

WORLD CONGRESS  
ON OSTEOPOROSIS,  
OSTEOARTHRITIS AND  
MUSCULOSKELETAL  
DISEASES

# VIRTUAL CONGRESS

August 26-28, 2021



2021 VIRTUAL



[VIRTUAL.WCO-IOF-ESCEO.org](https://VIRTUAL.WCO-IOF-ESCEO.org)

AbstractBook

The Essential  
Source

research  
essential  
results  
impact  
hypothesis  
relevant

**The Journal of Rheumatology** is your  
Essential Source with the latest research,  
authoritative and peer-reviewed papers.

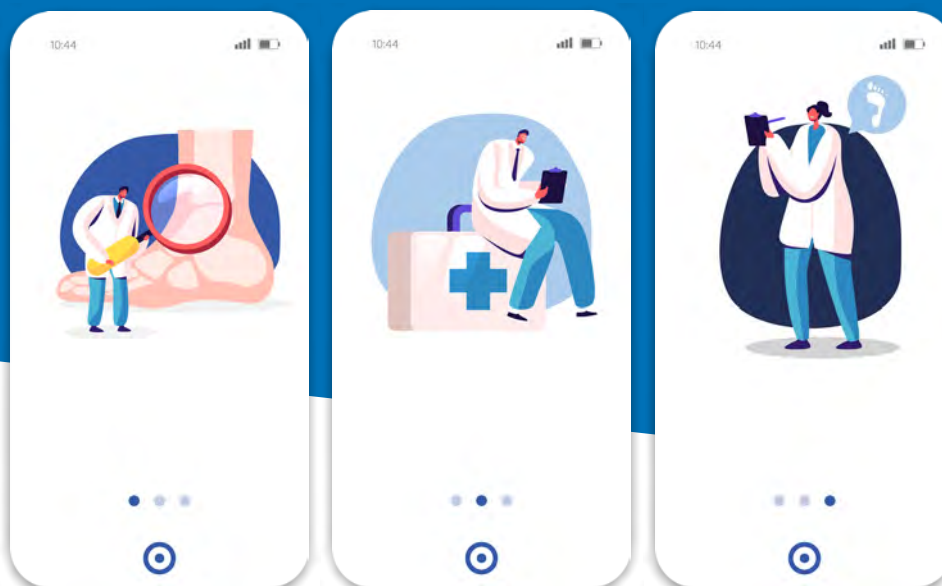


for more information visit us at [jrheum.org](http://jrheum.org)

About ESCEO and IOF . . . . .	5
Congress Organization . . . . .	7
Live Programme – Thursday August 26 . . . . .	11
Live Programme – Friday August 27 . . . . .	13
Live Programme – Saturday August 28 . . . . .	16
Recorded Sessions Programme . . . . .	22
Special Lectures Abstracts . . . . .	33
Educational Lectures Abstracts . . . . .	35
Plenary Lectures Abstracts . . . . .	39
Oral Communications Abstracts . . . . .	45
ESCEO Symposia Abstracts . . . . .	69
ESCEO-IOF Symposium Abstracts . . . . .	73
ESCEO-WHO CC Symposium Abstracts . . . . .	76
EUGMS-ESCEO-IOF Symposium Abstracts . . . . .	79
ESPRM-ESCEO-IOF Symposium Abstracts . . . . .	82
SICOT-ESCEO-IOF Symposium Abstracts . . . . .	86
ROS-IOF-ESCEO Symposium Abstracts . . . . .	89
ISGE-ESCEO Symposium Abstracts . . . . .	93
Meet-the-Experts Abstracts . . . . .	95
Committee of National Societies Abstracts . . . . .	102
Committee of Scientific Advisors Abstracts . . . . .	110
Non-Sponsored Symposia Abstracts . . . . .	113
Satellite Symposia Abstracts . . . . .	142
Posters Abstracts . . . . .	146
Author Index . . . . .	564

Pagination in this file will differ from the version of record  
(Osteoporosis International vol. 32 supplement 1) that will be found on [link.springer.com](http://link.springer.com)

This supplement will not be sponsored by outside commercial interests; it is entirely funded by the society's own resources



**Join the touchENDOCRINOLOGY  
online community for FREE access to**



**Practical  
articles**



**Expert  
interviews**



**News and  
insights**

**FREE to view, download and subscribe!**

**SIGN ME UP →**



## ABOUT ESCEO

**The European Society for Clinical and Economic Aspects of Osteoporosis, Osteoarthritis and Musculoskeletal Diseases (ESCEO)** is a not-for-profit organization, dedicated to a close interaction between clinical scientists dealing with bone, joint and muscle disorder, pharmaceutical industry developing new compounds in this field, regulators responsible for the registration of such drugs and health policy makers, to integrate the management of Osteoporosis and Osteoarthritis within the comprehensive perspective of health resources utilization.

**The objective of ESCEO** is to provide practitioners with the latest clinical and economic information, allowing them to organize their daily practice, in an evidence-based medicine perspective, with a cost-conscious perception.

[www.esceo.org](http://www.esceo.org)



## ABOUT IOF

The International Osteoporosis Foundation (IOF) is a non-profit, non-governmental organization dedicated to the worldwide fight against osteoporosis, the disease known as “the silent epidemic”. IOF's members – committees of scientific researchers, patient, medical and research societies and industry representatives from around the world – share a common vision of a world without osteoporotic fractures. IOF now represents 268 societies in 102 locations around the world.

[www.osteoporosis.foundation](http://www.osteoporosis.foundation)

### Mission

- | Increase awareness and understanding of osteoporosis.
- | Motivate people to take action to prevent, diagnose and treat osteoporosis.
- | Support national osteoporosis societies in order to maximize their effectiveness



DEAR COLLEAGUES,

**It is with great pleasure that we welcome you to the 2021 IOF-ESCEO World Congress on Osteoporosis, Osteoarthritis and Musculoskeletal Diseases.**

The Congress' scientific programme has been developed by a team comprising members of the Committee of Scientific Advisors of the International Osteoporosis Foundation (IOF) and the Scientific Advisory Board of the European Society for Clinical and Economic Aspects of Osteoporosis and Osteoarthritis (ESCEO). We would like to thank the respective Scientific Chairs, Professors Nicholas Harvey and René Rizzoli, for taking the lead in setting up an exciting and comprehensive programme that brings together the world's best in the field of musculoskeletal health and disease and takes advantage of the synergies and combined expertise of our two organisations.

We are all meeting with a common aim - to gather new knowledge, skills and tools in the prevention and treatment of osteoporosis and osteoarthritis, the two most disabling conditions in elderly people. An important addition is a focus on sarcopenia because of its intimate relation to bone and joint disease. It is our hope that this Congress will move the field one step forward on all fronts; from new understanding of bone metabolism and pathology, to new strategies and options in prevention, diagnosis and treatment.

The core scientific programme consists of **10** plenary lectures by renowned speakers and **35** oral communications selected from the very best of hundreds of submitted abstracts, and **29** oral presentations of selected posters. In addition, participants can choose among **14** different Meet-The-Expert sessions and **13** special

sessions and symposia on issues of clinical importance. We also encourage you to visit many of the scheduled poster sessions and industry sponsored satellite symposia and to visit the large commercial exhibition presented by the leading companies in the bone field.

The past 18 months has been a difficult time for face-to-face scientific communication. This meeting had originally been planned to take place in London but alas will now take place virtually. We are especially thankful for your support and participation during these unprecedented times. We will do our best to ensure that this meeting is a memorable, enriching experience for all. As the situation eases, **we look forward to meeting in person, perhaps next year in Berlin.**



**John A. Kanis**

**Jean-Yves Reginster**

A handwritten signature in black ink, appearing to read 'John A. Kanis'.

A handwritten signature in blue ink, appearing to read 'Jean-Yves Reginster'.

## EVENT

WCO-IOF-ESCEO  
August 26-28, 2021

WORLD CONGRESS ON OSTEOPOROSIS, OSTEOARTHRITIS AND MUSCULOSKELETAL DISEASES

## CONGRESS CHAIRMEN

**Jean-Yves REGINSTER**  
ESCEO President**John A. KANIS**  
IOF Honorary President

## PROGRAMME COMMITTEE

**Cyrus COOPER**  
Chair, IOF President**René RIZZOLI**  
Chair, ESCEO Scientific Advisory Board  
(SAB)**John A. KANIS**  
IOF Honorary President**Jean-Yves REGINSTER**  
ESCEO PresidentHONORARY LOCAL  
ORGANIZING COMMITTEEE. MCCLOSKEY  
N. FUGGLE  
E. DENNISON  
D. PRIETO-ALHAMBRA  
P. CONAGHAN  
R. OREFFO  
T. HILLARD  
K. JAVAID  
E. CURTIS  
N. ARDEN  
I. GIVENS  
P. COLLINS  
J. STEVENSON  
K. WARD  
N. HARVEYSCIENTIFIC ADVISORY BOARD  
AND ABSTRACTS REVIEWERS

N. ARDEN	A. KURTH
J. BAUER	F. LANDI
I. BAUTMANS	A. LASLOP
C. BEAUDART	S. MAGGI
E. BIVER	J. MARTEL-PELLETIER
A. BORG	R. MATIJEVIC
M. L. BRANDI	P. MIOSSEC
O. BRUYÈRE	A. MOBASHERI
F. BUCKINX	J. PACCOU
E. CAVALIER	J.-P. PELLETIER
M. CESARI	D. PINTO
R. CHAPURLAT	D. PRIETO-ALHAMBRA
A. CHERUBINI	F. RANNOU
T. CHEVALLEY	J.-Y. REGINSTER
C. COOPER	R. RIZZOLI
B. CORTET	Y. ROLLAND
A. CRUZ-JENTOFT	C. SIEBER
B. DAWSON-HUGHES	P. SZULC
E. DENNISON	T. THOMAS
J.-P. DEVOGELAER	F. THOMASIUŠ
A. DIEZ-PEREZ	A. TROMBETTI
H. P. DIMAI	Ş. TÜZÜN
F. DINCER	D. UEBELHART
R. FIELDING	B. VELLAS
N. FUGGLE	N. VERONESE
A. GASPARIK	M. VLASKOVSKA
E. GIELEN	
N. HARVEY	
M. HILIGSMANN	
J. A. KANIS	
J.-M. KAUFMAN	
J.-F. KAUX	

## CONGRESS ORGANIZER

**Sinklar Conference Management B.V.**

Pietersbergweg, 283  
1105 BM Amsterdam, The Netherlands  
secretariat@sinklarcm.org

## CONGRESS SECRETARIAT

**Humacom**

Rue Renier, 9  
4800 Verviers, Belgium  
Tel: +32 87 852 652  
info@humacom.com  
www.humacom.com

SPONSORSHIP OPPORTUNITIES /  
EXHIBITION**Humacom**

leisten@humacom.com  
Rue Renier, 9  
4800 Verviers, Belgium  
Phone: +32 87 852 652

## CONGRESS WEBSITE

[www.wco-iof-esceo.org](http://www.wco-iof-esceo.org)

**WCO**  
IOF-ESCEO

2021 VIRTUAL



WORLD CONGRESS  
ON OSTEOPOROSIS,  
OSTEOARTHRITIS AND  
MUSCULOSKELETAL  
DISEASES



## OUR SUPPORTER



Thanks to Amgen for their unrestricted contribution to the Scientific and Educational Activities conducted by ESCEO

## SPONSORS AND EXHIBITORS LIST OF THE WCO-IOF-ESCEO CONGRESS

SILVER SPONSOR



VIATRIS™

GENERAL SPONSORS



Pierre Fabre



The logo features the letters 'WCO' in a large, white, sans-serif font, with a stylized globe icon integrated into the letter 'O'. Below 'WCO' is the text 'IOF-ESCEO' in a smaller, white, sans-serif font. The entire logo is set against an orange rounded rectangular background.

WCO  
IOF-ESCEO

2022 BERLIN

WORLD CONGRESS ON  
OSTEOPOROSIS, OSTEOARTHRITIS  
AND MUSCULOSKELETAL DISEASES

March 24-27, 2022

Berlin | Germany  
Hub27 Messe Berlin

WORLD'S LEADING CLINICAL CONFERENCE  
ON BONE, JOINT AND MUSCLE HEALTH

Congress Organizer Sinklar Congress Management B.V.  
Congress Secretariat [www.humacom.com](http://www.humacom.com)

[www.WCO-IOF-ESCEO.org](http://www.WCO-IOF-ESCEO.org)



CEST (Central European summer time)

14.00 - 17.50

Channel 1

## SCIENTIFIC SESSION I

Chairpersons: Cyrus Cooper, Nicholas Harvey

14.00 - 15.30

Channel 1

### ROS-IOF-ESCEO Symposium

• *Royal Osteoporosis Society's Osteoporosis and Bone Research Academy – Our journey towards a cure*

Chairpersons: Cyrus Cooper, Neil Gittoes

• *Royal Osteoporosis Society Research Roadmap: the patient perspective*

• *An introduction to the Royal Osteoporosis Society's Osteoporosis and Bone Research Academy*

Juliet Compston

• *The Research Road Map: Our journey towards a cure* Nicholas Harvey

• *Exploring the research priorities : Causes and mechanisms* Stuart Ralston

• *Exploring the research priorities : Optimising effectiveness of assessments and treatment* Eugene McCloskey

• *Exploring the research priorities : Novel technologies for skeletal assessment* Emma Clark

• Q&A session

15.30

Channel 1

### Opening of the Congress

• Cyrus Cooper

15.40

Channel 1

### Plenary Lecture 1

• *Management of musculoskeletal disease from cradle to grave* Cyrus Cooper

16.10

Channel 1

### Guest lecture

• *Feast or Famine: How Nutrient Intake Regulates Bone Remodeling* Cliff Rosen

16.40

Channel 1

### Presentation of prizes and awards

• *Presentation of the IOF Olof Johnell Science Award, the IOF President's Award and the ESCEO-IOF*

*Herbert Fleisch Medal* Cyrus Cooper

• *Presentation of the IOF Medal of Achievement* Nicholas Harvey

16.50

Channel 1

### Honorary Lecture supported by an unrestricted grant from UCB

• *Where are the cracks? Understanding the needs in fragility fracture management*

• Kassim Javaid

17.50 - 19.30

Channel 1

## SCIENTIFIC SESSION II

Chairpersons: John A. Kanis, René Rizzoli

17.50

Channel 1

### Plenary Lecture 2

• *Building bone strength with anabolic agents* Michael R. McClung

18.20

Channel 1

### Best clinical papers published in 2020

• René Rizzoli

19.00

Channel 1

### Meet-The-Expert Session

• *Transgender medicine, bone and muscle* Jean-Marc Kaufman

19.30

Channel 1

### Adjournment

CEST (Central European summer time)

08.00 - 09.00

Channel 1

### INDUSTRY BREAKFAST SYMPOSIUM

\*See details on the [Sponsored Satellite Symposia page](#)

08.00 - 09.00

Channel 2

### INDUSTRY BREAKFAST SYMPOSIUM

\*See details on the [Sponsored Satellite Symposia page](#)

09.00 - 11.50

Channel 1

### SCIENTIFIC SESSION III

Chairpersons: Jean-Yves Reginster, Manju Chandran

09.00

Channel 1

#### Plenary Lecture 3

• *Management of bone disease in cancer* Robert E. Coleman

09.30

Channel 1

#### Plenary Lecture 4

• *Thyroid, bone and cartilage* Graham Williams

10.00

Channel 1

#### Meet-The-Expert Session

• *Impact of glucocorticoids on bone and muscle* Evelien Gielen

10.30

Channel 1

#### Oral communication selected from abstracts

• *OC1 - RECENT SENTINEL FRACTURES AND SUBSEQUENT FRACTURE PROBABILITIES OVER TWO, FIVE AND 10-YEAR TIMEFRAMES*

Presenting author: • H. Johansson

Authors: E. V. McCloskey, N. C. Harvey, V. Gudnason, G. Sigurdsson, K. Siggeirsdottir, M. Lorentzon, E. Liu, L. Vandenput, W. D. Leslie, J. A. Kanis

10.40

Channel 1

#### Meet-The-Expert Session

• *HIV and bone* Emmanuel Biver

11.10

Channel 1

#### Oral communication selected from abstracts

• *OC2 - ASSOCIATIONS BETWEEN BONE AND VASCULAR HEALTH IN THE UK BIOBANK*

Presenting author: • Z. Raisi-Estabragh

Authors: L. Biasioli, J. Cooper, N. Aung, K. Fung, J. Paiva, M. Sanghvi, R. Thomson, E. M. Curtis, J. Paccou, J. Rayner, K. Werys, H. Puchta, K. Thomas, A. M. Lee, S. Piechnik, S. Neubauer, P. B. Munroe, C. Cooper, S. E. Petersen, N. C. Harvey

11.20

Channel 1

#### Plenary Lecture 5

• *Bone and cartilage talk together* Ali Mobasheri

11.50 - 12.00

Channel 1

### BREAK 10'

12.00 - 13.30

Channel 1

**INDUSTRY SATELLITE LUNCH SYMPOSIUM**

\*See details on the Sponsored Satellite Symposia page

12.00 - 13.30

Channel 2

**INDUSTRY SATELLITE LUNCH SYMPOSIUM**

\*See details on the Sponsored Satellite Symposia page

13.30 - 15.20

Channel 1

**SCIENTIFIC SESSION IV**

Chairpersons: Evellen Gielen, Radmila Matijevic

13.30

Channel 1

**Plenary Lecture 6**• *Are there treatments for sarcopenia?* Marjolein Visser

14.00

Channel 1

**Meet-The-Expert Session**• *Is screening for osteoporosis useful?* E. M. Curtis

14.30

Channel 1

**Oral communication selected from abstracts**• *OC3 - A MULTICENTER, OBSERVATIONAL, EXTENSION STUDY EVALUATING THE SAFETY, TOLERABILITY, AND EFFICACY OF A SINGLE LORECIVIVINT INJECTION IN KNEE OA SUBJECTS*

Presenting author: • J. Tambiah

Authors: I. Simsek, C. Swearingen, H. Ghandehari, S. Kennedy, N. Skrepnik, Y. Yazici

14.40

Channel 1

**Meet-The-Expert Session**• *Calcium-vitamin D, still a role in osteoporosis management?* Elaine M. Dennison

15.10

Channel 1

**Oral communication selected from abstracts**• *OC4 - FRACTURE RISK IN PARKINSON'S DISEASE: DRIVEN BY LOW BONE STRENGTH, MUSCLE WEAKNESS OR FALLS?*

Presenting author: • E. V. McCloskey

Authors: P. Bhattia, H. Shreef, H. Johansson, M. Lorentzon, N. C. Harvey, J. A. Kanis

14.00 - 15.00

Channel 2

**Educational Lecture supported by an unrestricted grant from IBSA**• *Meet the evidence of pharma-grade chondroitin sulfate* Nicola Veronese

15.20 - 15.30

Channel 1

**BREAK 10'**



15.30 - 16.55

Channel 1

**SCIENTIFIC SESSION V**

Chairpersons: Claudia Campusano, Maria Luisa Brandi

15.30

Channel 1

**Plenary Lecture 7**

- *Gut microbiome, bone and joint* Georg Schett

16.00

Channel 1

**Meet-The-Expert Session**

- *Rehabilitation after fragility fracture* Olivier Bruyère

16.30

Channel 1

**Oral communication selected from abstracts**

- *OC5 - PREVALENCE AND AGREEMENT BETWEEN RECENT SARCOPENIA DEFINITIONS: FINDINGS FROM FOUR POPULATION-BASED COHORTS*

Presenting author: • L. D. Westbury

Authors: H. E. Syddall, J. A. Cauley, P. M. Cawthon, E. M. Curtis, K. Ensrud, R. A. Fielding, H. Johansson, J. A. Kanis, M. K. Karlsson, T. Kwok, N. Lane, M. Lorentzon, D. Mellström, A. B. Newman, C. Ohlsson, E. Orwoll, E. Ribom, B. E. Rosengren, J. T. Schousboe, E. J. Shiroma, N. C. Harvey, E. M. Dennison, C. Cooper

16.40

Channel 1

**Presentation of prizes and awards**

- *Presentation of the 2020 ESCEO Medal of Excellence, the IOF CNS Medal, the ESCEO-IOF Pierre Meunier Young Scientist Award and the ESCEO-IOF Young Investigator Awards* Jean-Yves Reginster
- *Presentation of the ESCEO-AgNovos Healthcare Young Investigator Awards* Jean-Yves Reginster, James Howe

16.55 - 17.00

Channel 1

**BREAK 05'**

17.00 - 18.30

Channel 1

**INDUSTRY SATELLITE SYMPOSIUM**\*[See details on the Sponsored Satellite Symposia page](#)

18.30

Channel 1

**Adjournment**

CEST (Central European summer time)

08.30 - 09.30

Channel 1

## INDUSTRY BREAKFAST SYMPOSIUM

*\*See details on the Sponsored Satellite Symposia page*

09.30 - 11.20

Channel 1

## SCIENTIFIC SESSION VI

Chairpersons: Charlotte Beaudart, Stefania Maggi

09.30

Channel 1

### Plenary Lecture 8

• *Is genetics helping to improve osteoporosis management ?* Emma Duncan

10.00

Channel 1

### Meet-The-Expert Session

• *Fracture during childhood and adolescence* Kate Ward

10.30

Channel 1

### Oral communication selected from abstracts

• *OC9 - MAINTENANCE OF EFFECT OF BUROSUMAB TREATMENT AND THE IMPACT OF TREATMENT INTERRUPTION ACROSS A 96-WEEK PHASE 3 STUDY AND 48 WEEKS OF A PHASE 3B STUDY IN ADULTS WITH X-LINKED HYPOPHOSPHATEMIA (XLH)*

Presenting author: • P. Kamenicky

Authors: K. Briot, M. L. Brandi, M. Cohen-Solal, R. Crowley, R. Keen, S. Kolta, R. Lachmann, S. Ralston, J. Walsh, A. Rylands, A. Williams, W. Sun, A. Nixon, M. Nixon, K. Javard

10.40

Channel 1

### Meet-The-Expert Session

• *Discussion of complex bone disorder clinical cases* Nicholas R. Fuggle and Roland Chapurlat

11.10

Channel 1

### Oral communication selected from abstracts

• *OC14 - PARATHYROIDECTOMY IS ASSOCIATED WITH REDUCED RISK OF FRACTURE AND CARDIOVASCULAR EVENTS IN PATIENTS DIAGNOSED WITH PRIMARY HYPERPARATHYROIDISM - A NATIONAL, RETROSPECTIVE COHORT STUDY*

Presenting author: • M. Lorentzon

Authors: K. F. Axelsson, M. Wallander, H. Johansson, N. C. Harvey, L. Vandenput, E. V. McCloskey, L. Enwu, J. A. Kanis, H. Litsne



09.30 - 11.20

Channel 2

**SCIENTIFIC SESSION VII**

Chairpersons: Friederike Thomasius, Etienne Cavalier

09.30

Channel 2

**Oral communication selected from abstracts**

• OC6 - GLUCOSAMINE SULPHATE: AN UMBRELLA REVIEW OF HEALTH OUTCOMES

Presenting author: • N. Veronese

Authors: J. Demurtas, L. Smith, J.-Y. Reginster, O. Bruyère, G. Honvo, S. Maggi

09.40

Channel 2

**Oral communication selected from abstracts**

• OC7 - THE ASSOCIATIONS BETWEEN DISEASE MODIFYING ANTIRHEUMATIC DRUGS AND INCIDENT AS WELL A PROGRESSION OF RADIOGRAPHIC HAND OSTEOARTHRITIS IN RHEUMATOID ARTHRITIS PATIENTS

Presenting author: • T. Burkard

Authors: C. Lechtenboehmer, S. Reichenback, U. A. Walker, A. M. BURDEN, T. Hügler

09.50

Channel 2

**Oral communication selected from abstracts**

• OC8 - MEANINGFUL IMPROVEMENTS IN WOMAC PAIN AND PHYSICAL FUNCTION IN THREE PHASE 3 TRIALS OF TANEZUMAB IN PATIENTS WITH MODERATE-TO-SEVERE OSTEOARTHRITIS: A RESPONDER ANALYSIS

Presenting author: • P. Conaghan

Authors: R. H. Dworkin, T. J. Schnitzer, F. Berenbaum, R. Yang, A. G. Bushmakina, J. C. Cappelleri, M. T. Brown, L. Viktrup, L. Abraham

10.00

Channel 2

**Meet-The-Expert Session**

• Lyosis Software - A new way to manage FLS centers more efficiently and cost optimized Werner Fehn

10.30

Channel 2

**Oral communication selected from abstracts**

• OC10 - ROMOSOZUMAB EFFICACY AND SAFETY IN EUROPEAN PATIENTS: A SUBANALYSIS OF THE PHASE 3, RANDOMISED FRAME STUDY

Presenting author: • B. Langdahl

Authors: L. C. Hofbauer, S. Ferrari, Z. Wang, A. Fahrleitner-Pammer, E. Gielen, P. Lakatos, E. Czerwinski, E. Jodar-Gimeno, J. Timoshanko, M. Oates, C. Libanati

10.40

Channel 2

**Oral communication selected from abstracts**

• OC11 - MULTIDIMENSIONAL PROGNOSTIC INDEX AND THE RISK OF FRACTURES: AN 8-YEAR LONGITUDINAL COHORT STUDY IN THE OSTEOARTHRITIS INITIATIVE

Presenting author: • N. Veronese

Authors: L. Smith, E. Ziguora, M. Barbagallo, L. Dominguez, C. Cooper, R. Rizzoli, J.-Y. Reginster, S. Maggi, A. Pilotto

10.50

Channel 2

**Oral communication selected from abstracts**

• OC12 - THE PREVALENCE OF COMMUNITY-DWELLING OLDER ADULTS AT HIGH FRACTURE RISK WHO ARE NOT TAKING OSTEOPOROSIS MEDICATIONS: RESULTS FROM THE CANADIAN LONGITUDINAL STUDY ON AGING (CLSA)

Presenting author: • C. McArthur

Authors: A. Lee, H. Abu Alrob, J. D. Adachi, L. Giangregorio, L. Griffith, S. N. Morin, L. Thabane, G. Ioannidis, J. Lee, W. D. Leslie, A. Papaioannou

11.00

Channel 2

**Oral communication selected from abstracts**

• OC13 - PATIENT'S PREFERENCES FOR LIFESTYLE CHANGES IN OSTEOPOROTIC FRACTURE PREVENTION: A CROSS-EUROPEAN DISCRETE-CHOICE EXPERIMENT

Presenting author: • C. Beaudart

Authors: A. Boonen, N. Li, S. Bours, S. Goemaere, J.-Y. Reginster, C. Roux, B. MCGOWAN, A. Diez-Perez, R. Rizzoli, C. Cooper, M. Hiligsmann

11.10

Channel 2

**Oral communication selected from abstracts**

• OC15 - FRAILITY IS ASSOCIATED WITH INFLAMMATION AND REDUCED BONE MINERAL DENSITY INDEPENDENT OF FAT MASS: FINDINGS FROM UK BIOBANK

Presenting author: • E. M. Curtis

Authors: S. D'angelo, S. Woolford, R. Durdin, Z. Raisi-Estabragh, K. A. Ward, C. Cooper, N. C. Harvey

11.20 - 13.20

Channel 1

**SCIENTIFIC SESSION VIII**

Chairpersons: Gemma Adib, Mickaël Hiligsmann

11.20

Channel 1

**Meet-The-Expert Session**

• Can we influence fracture repair? Julio Fernandes

11.50

Channel 1

**Oral communication selected from abstracts**

• OC18 - LOCAL OSTEO-ENHANCEMENT PROCEDURE SIGNIFICANTLY INCREASES BONE MINERAL DENSITY IN THE PROXIMAL FEMUR OF POSTMENOPAUSAL WOMEN WITH OSTEOPOROSIS AT HIGH RISK FOR HIP FRACTURE

Presenting author: • De Schepper

Authors: J. Howe, J. Shaul, J. Coteur, B. Huber

12.00

Channel 1

**Meet-The-Expert Session**

• FLS and fracture risk reduction Kassim Javaid

12.30

Channel 1

**Oral communication selected from abstracts**

• OC23 - QUALITY OF LIFE, RESOURCE USE AND COSTS RELATED TO FRAGILITY FRACTURES: DEVELOPMENT AND EVALUATION OF MULTIDISCIPLINARY POST-FRACTURE CARE PATHWAYS

Presenting author: • J. Talevski

Authors: K. Sanders, J. Watts, L. Busija, A. Beauchamp, G. Duque, F. Borgström, J. A. Kanis, A. Svedbom, A. Stuart, S. Brennan-Olsen

12.40

Channel 1

**Meet-The-Expert Session**

• How to warrant reliable data for calciotropic hormones and bone turnover markers assays Etienne Cavalier

13.10

Channel 1

**Oral communication selected from abstracts**

• OC29 - CORTICAL PORE SIZE DISTRIBUTION AND VISCOELASTIC HUMAN TIBIA PROPERTIES DISCRIMINATE FRAGILITY FRACTURES INDEPENDENT OF BONE MINERAL DENSITY

Presenting author: • K. Raum

Authors: G. Armbrecht, H. Minh Nguyen, J. Massmann

13.20

**BREAK 40'**



11.20 - 14.30

Channel 2

**SCIENTIFIC SESSION IX**

Chairpersons: Helena Johansson, Emmanuel Biver

11.20

Channel 2

**Oral communication selected from abstracts**

• OC16 - EPIGENETIC AGE ACCELERATION ASSOCIATIONS WITH SKELETAL OUTCOMES: DIFFERENTIAL IMPACTS IN MEN AND WOMEN

Presenting author: • N. R. Fuggle

Authors: M. A. Clynes, M. O'breasail, C. Parsons, J. W. Holloway, A. Kitaba, K. A. Ward, C. Cooper, E. M. Dennison

11.30

Channel 2

**Oral communication selected from abstracts**

• OC17 - COMPARISON OF FRACTURE RATES AND ECONOMIC OUTCOMES BETWEEN WOMEN WITH OSTEOPOROSIS RECEIVING RISEDRONATE GASTRO-RESISTANT (GR) AND ALENDRONATE

Presenting author: • F. Thomasius

Authors: S. Palacios, A. Alam, M. Boolell, F. Vekeman, G. Gauthier

11.40

Channel 2

**Oral communication selected from abstracts**

• OC19 - A PROSPECTIVE OPEN-LABEL OBSERVATIONAL STUDY OF A BUFFERED SOLUBLE 70 MG ALENDRONATE EFFERVESCENT TABLET ON UPPER GASTROINTESTINAL SAFETY AND MEDICATION ERRORS: THE GASTROPASS STUDY

Presenting author: • S. Minisola

Authors: A. Ponce Vargas, G. Letizia Mauro, F. Bonet Madurga, G. Adami, D. M. Black, N. Qizilbash, J. Blanch Rubió

11.50

Channel 2

**Oral communication selected from abstracts**

• OC20 - OSTEOPOROSIS, MUSCLE FUNCTION AND 15-YEAR FALLS-RELATED HOSPITALISATIONS IN OLDER WOMEN: THE PERTH LONGITUDINAL STUDY OF AGEING WOMEN

Presenting author: • C. Smith

Authors: J. R. Lewis, M. Sim, W. H. Lim, E. M. Lim, L. C. Blekkenhorst, T. Brennan-Speranza, L. Adams, E. Byrnes, G. Duque, I. Levinger, R. Prince

12.00

Channel 2

**Oral communication selected from abstracts**

• OC21 - RELATIONSHIPS BETWEEN MALNUTRITION, SARCOPENIA, AND FRAILTY AND THE INCIDENCE OF COVID-19 IN OLDER ADULTS: DATA FROM THE SARCOPHAGE COHORT

Presenting author: • L. Lengelé

Authors: M. Locquet, M. Moutschen, C. Beaudart, J.-F. Kaux, S. Gillain, C. Shadrouh, J.-Y. Reginster, O. Bruyère

12.10

Channel 2

**Oral communication selected from abstracts**

• OC22 - FUNCTIONAL BRAIN PROCESSES IN SARCOPENIA - EVIDENCE FOR DIFFERENTIAL CENTRAL NEURAL MECHANISMS IN DYNAPENIC OLDER ADULTS

Presenting author: • W. Trost

Authors: A. Trombetti, M. Hars, N. Fernandez, F. Herrmann, T. Chevalley, S. Ferrari, G. Gold, R. Rizzoli, P. Vuilleumier

12.20

Channel 2

**Oral communication selected from abstracts**

• OC24 - UC-II® COLLAGEN HELPS SUPPORT KNEE JOINT MOBILITY IN HEALTHY SUBJECTS: A RANDOMIZED, DOUBLE BLIND, PLACEBO-CONTROLLED STUDY

Presenting author: • V. Juturu

Authors: K. Knaub, W. Alt, C. Schön, S. Durkee, Z. Saiyed

12.30

Channel 2

**Oral communication selected from abstracts**

• OC25 - 10-YEAR TRENDS IN PREVALENCE OF RADIOGRAPHIC HIP OSTEOARTHRITIS IN JAPANESE MEN AND WOMEN: COMPARISON OF BASELINE AND 4TH RESEARCH ON OSTEOARTHRITIS/OSTEOPOROSIS AGAINST DISABILITY STUDY SURVEYS

Presenting author: • T. Iidaka

Authors: S. Muraki, H. Oka, C. Horii, K. Nakamura, T. Akune, S. Tanaka, N. Yoshimura

12.40

Channel 2

**Oral communication selected from abstracts**

• OC26 - SAFETY, TOLERABILITY, AND PHARMACOKINETICS OF AN INTRA-ARTICULAR CORTICOSTEROID INJECTION ADMINISTERED 7 DAYS BEFORE OR AFTER INTRA-ARTICULAR LORECEVIVINT INJECTION INTO THE SAME KNEE OF HEALTHY VOLUNTEERS: AN OPEN-LABEL, PARALLEL-ARM STUDY

Presenting author: • Y. Yazici

Authors: A. Halseth, S. Kennedy, C. Swearingen, I. Simsek, M. Fineman, N. E. Lane

12.50

Channel 2

**Oral communication selected from abstracts**

• OC27 - EFFECT OF 2 FORMS OF VITAMIN D ON SKELETAL MUSCLE FIBER SIZE AND VITAMIN D RECEPTOR (VDR) CONCENTRATION IN YOUNGER POSTMENOPAUSAL WOMEN

Presenting author: • L. Ceglia

Authors: D. Rivas, M. Schlögl, H. A. Bischoff-Ferrari, B. Dawson-Hughes

13.00

Channel 2

**Oral communication selected from abstracts**

• OC28 - NEUROFILAMENT-LIGHT CHAINS (NF-L), A BIOMARKER OF NEURONAL DAMAGE, IS INCREASED IN SARCOPENIC PATIENTS: RESULTS OF THE SARCOPHAGE STUDY

Presenting author: • A. Ladang

Authors: S. Kovacs, L. Lengelé, M. Locquet, J.-Y. Reginster, O. Bruyère, E. Cavalier

13.10

Channel 2

**Educational Lecture Sponsored by ESCEO through an unrestricted educational grant from Amgen**

• *Integrated Care Pathways for Bone Health: improving care around the world* Mary Bussell

14.00 - 17.00

Channel 1

**SCIENTIFIC SESSION X**

Chairpersons: Elaine M. Dennison, Bess Dawson-Hughes

14.00

Channel 1

**Meet-The-Expert Session**

• *Management of men with osteoporosis* Alberto Ferlin

14.30

Channel 1

**Oral communication selected from abstracts**

• OC30 - IN HEALTHY MEN, EARLY DECLINE IN TRABECULAR BONE MINERAL DENSITY IS, IN PART, RELATED TO DECREASES IN SEX STEROIDS

Presenting author: • T. Banica

Authors: C. Verroken, H. Zmierzak, S. Goemaere, J.-M. Kaufman, B. Lapauw

14.40

Channel 1

**Plenary Lecture 9**

• *Rehabilitation of menopausal hormone therapy in osteoporosis management* Irene Lambrinoudaki



15.10

Channel 1

**Oral communication selected from abstracts**

• OC31 - MULTICENTER PROSPECTIVE STUDY TO ASSESS EFFICACY AND SAFETY GLYCOSAMINOGLYCAN PEPTIDE COMPLEX IN PATIENTS WITH KNEE OSTEOARTHRITIS AND COMORBIDITY

Presenting author: • E. Taskina

Authors: N. Kashevarova, E. Sharapova, S. Anikin, E. Strebkova, K. Telyshev, L. Alekseeva, A. Lila, T. Raskina, E. Otteva, E. Zonova, N. Chichasova, V. Lila, I. Vinogradova, O. Ivanova, S. Yakupova, E. Shmidt

15.20

Channel 1

**Oral communication selected from abstracts**

• OC32 - IDENTIFICATION OF PATIENTS AT LOW, HIGH AND VERY HIGH RISK OF OSTEOPOROTIC FRACTURES IN THE UK USING FRAX

Presenting author: • E. V. McCloskey

Authors: N. C. Harvey, H. Johansson, M. Lorentzon, E. Liu, L. Vandenput, J. A. Kanis

15.30

Channel 1

**Oral communication selected from abstracts**

• OC33 - CIRCULATING MICRORNA AS BIOMARKERS OF OSTEOPOROSIS AND FRACTURE RISK

Presenting author: • S. Donati

Authors: S. Ciuffi, F. Marini, A. Botta, G. Isaia, P. D'Amelio, C. Marcocci, S. Migliaccio, S. Minisola, J. Pepe, R. Nuti, U. Tarantino, M. L. Brandi

15.40

Channel 1

**Oral communication selected from abstracts**

• OC34 - PALOVAROTENE FOR THE TREATMENT OF FIBRODYSPLASIA OSSIFICANS PROGRESSIVA IN FEMALES AGED  $\geq 8$  YEARS AND MALES AGED  $\geq 10$  YEARS: DATA FROM THE PHASE III MOVE TRIAL

Presenting author: • G. Baujat

Authors: R. J. Pignolo, M. Al Mukaddam, M. A. Brown, A. M. Cheung, C. L. De Cunto, P. Delai, E. C. Hsiao, P. Kannu, R. Keen, E. E. Mancilla, S. K. Berglund, R. Marino, A. Strahs, F. S. Kaplan

15.50

Channel 1

**Plenary Lecture 10**

• New approaches of rare skeletal diseases management Maria Luisa Brandi

17.20

Channel 1

**Oral communication selected from abstracts**

• OC35 - MIGHT NSAID USE INTERACT WITH BISPHOSPHONATE EFFICACY? EXPLORATORY ANALYSIS FROM THE CLODRONATE HIP STUDY

Presenting author: • E. V. McCloskey

Authors: Z. Zheng, H. Johansson, N. C. Harvey, M. Lorentzon, J. A. Kanis

16.20 - 17.20

Channel 1

**SPONSORED MEET-THE-EXPERT SESSION - BUILDING BONE, IMPROVING OUTCOMES**

\*-See details on the Sponsored Satellite Symposia page

17.00

**Adjournement**

# Non-Sponsored Symposium (NSS)

## NSS1

### Joint IOF and CABS Symposium - Cancer and Bone

Chairpersons: *P. Hadji, R. Coleman*

- ▶ *Cancer treatment induced osteoporosis - really important?* – *P. Hadji*
- ▶ *Influence of adj. bisphosphonates and denosumab on breast cancer outcome.*
- *R. Coleman*
- ▶ *Surgical treatment of bone metastasis – Update 2021* – *A.A. Kurth*

## NSS2

### The Asia Pacific Consortium on Osteoporosis (APCO) NSS Paving the Way Forward for Harmonization of Osteoporosis Guidelines - the Pan Asia and Oceania FRAMEWORK of the Asia Pacific Consortium on Osteoporosis (APCO)

Chairpersons: *Cyrus Cooper, Philippe Halbout*

- ▶ *The Asia Pacific Consortium on Osteoporosis – A brief introduction* – *Manju Chandran*
- ▶ *5IQ: A novel analysis of extant guidelines*
- *Paul Mitchell*
- ▶ *The Delphi Process: Developing consensus amongst experts from 19 countries and regions* – *Manju Chandran*
- ▶ *Embedding the Framework in the Asia Pacific* – *Greg Lyubomirsky and Ms Thalia Georgiou*
- ▶ *Conclusion*

## NSS3

### Breast Cancer and Osteoporosis

Chairperson: *Yannis Dionyssiotis*

- ▶ *Breast cancer and osteoporosis*
- *Lambros Athanassiou*
- ▶ *Estrogen receptor antagonists and osteoporosis* – *Yannis Dionyssiotis*
- ▶ *Pathophysiology of osteoporosis in the context of estrogen receptor antagonist treatment*
- *Panagiotis Athanassiou*
- ▶ *Management of osteoporosis in breast cancer patients* – *Ifigenia Kostoglou-Athanassiou*

## NSS4

### Exosomes to diagnose and treat musculoskeletal diseases: An update

Chairperson: *Gustavo Duque*

- ▶ *Extracellular vesicles in musculoskeletal diseases* – *Mark W. Hamrick*
- ▶ *The role of extracellular vesicles in the pathophysiology and treatment of osteosarcoma* – *Gustavo Duque*
- ▶ *Therapeutic applications of MSC derived extracellular vesicles in osteoarthritis*
- *Susanne Grässel*

## NSS5

### SARC-F for sarcopenia: high potential for new applications

Chairperson: *John Morley*

- ▶ *The comparison of SARC-F with other screening tools for sarcopenia.* – *Karolina Piotrowicz*
- ▶ *SARC-F Questionnaire Detects Frailty in Older Adults* – *Serdar Ozkok*
- ▶ *Ability of SARC-F to Find Probable Sarcopenia Cases in Older Adults: application of alternative cut-offs* – *Gülistan Bahat*

## NSS6

### Crystals at the crossroad between inflammation and degeneration

Chairperson: *Razvan Adrian Ionescu*

- ▶ *Check your past, know your future* – *Claudiu Avram*
- ▶ *Getting well or getting hell* – *Razvan Ionescu*
- ▶ *The chicken or the egg: the causality dilemma* – *Mihai Bojinca*
- ▶ *Look into the crystal bowl* – *Florentin Ananu Vreju*

## NSS7

### Occupational musculoskeletal hazards among health professionals

Chairperson: *Yesim Gökçe-Kutsal*

- ▶ *Are health professionals vulnerable to work-related musculoskeletal disorders?* – *Yesim Gökçe-Kutsal*
- ▶ *Neck and upper extremity disorders among health professionals* – *Yesim Kirazli*
- ▶ *Occupational back and lower extremity problems in health personnel* – *Ayşe A. Küçükdeveci*



### NSS8

#### Osteoporosis in 2020+: Flattening The Curve of Fragility Fractures

Chairperson: *Bruno Muzzi Camargos*

- ▶ *Introduction* – *Bruno Muzzi Camargos*
- ▶ *Do You Believe in Tests ?* – *John Carey*
- ▶ *To Mask or Not To Mask ?* – *Jorge Morales-Torres*
- ▶ *How Awareness Could Change a Common Fate* – *Bruno Muzzi Camargos*
- ▶ *Wrap-up/Discussion*

### NSS10

#### Fracture Liaison Services (FLS) in Latin America: From Where and Where To

Chairperson: *Bruno Muzzi Camargos*

- ▶ *Introduction - Overview of FLS in Latin America*  
– *Bruno Muzzi Camargos*
- ▶ *Situation of the FLS in Mexico: barriers and strengths* – *Andrea Olascoaga Gómez de León*
- ▶ *How fracture liaison services (FLS) impacted post-fracture outcomes in Colombia?*  
– *Adriana Medina Orjuela*
- ▶ *FLS in public and private systems in Brazil: two worlds and a single outcome.* – *Bernardo Stolnick*
- ▶ *Conclusion* – *Bruno Muzzi Camargos*.

### NSS11

#### Osteoporosis in the context of autoimmune rheumatic diseases

Chairperson: *Panagiotis Athanassiou*

- ▶ *Autoimmune rheumatic diseases and osteoporosis* – *Panagiotis Athanassiou*
- ▶ *Autoimmunity and osteoporosis*  
– *Ifigenia Kostoglou-Athanassiou*
- ▶ *Biologic agents in autoimmune rheumatic diseases and bone health* – *Lambros Athanassiou*
- ▶ *Management of osteoporosis in the context of autoimmune rheumatic diseases*  
– *Yannis Dionyssiou*

### NSS12

#### Presentation of the book “Osteoporosis: mitos y realidades” (“Osteoporosis: myths and realities”)

Chairperson: *David Vasquez-Awad*

- ▶ *Opening* – *David Vasquez-Awad*
- ▶ *"Osteoporosis: myths and realities" – the book* – *Jorge Felipe Ramirez*
- ▶ *Osteoporosis: an economic perspective*  
– *Diego Rosselli*
- ▶ *Osteoporosis, epidemic of the 21st century* – *David Vasquez-Awad*
- ▶ *Conclusions and closure* – *Jorge Felipe Ramirez, Diego Rosselli, David Vasquez-Awad*

### NSS13

#### The State of the Art in Hypophosphatasia (HPP) Diagnosis in Adults and Children

Chairperson: *Serge Ferrari*

- ▶ *Current State in Diagnosis of HPP* – *Aliya Khan*
- ▶ *Diagnostic Criteria for Children and Adolescents with* – *Eric Rush*
- ▶ *Diagnostic Criteria for Adults with HPP* – *Maria Luisa Brandi*

### NSS14

#### Improving the Communication of Fracture risk

Chairperson: *Mickael Hiligsmann*

- ▶ *Welcome and introduction* – *Stuart Silverman*
- ▶ *What can we learn from the literature?* – *Charlotte Beaudart*
- ▶ *Insights from interviews with patients at risk for fractures (the RICO study)* – *Mickael Hiligsmann*
- ▶ *- Key points, next steps & conclusion* – *Stuart Silverman*

### NSS15

#### Exercise to prevent deconditioning of older people during the covid-19 pandemic: from clinic to community setting

Chairperson: *Mylène Aubertin-Leheudre*

- ▶ *Feasibility of implementing physical activity programs in hospitalized positive covid-19 older adults* – Yves Rolland
- ▶ *Remote Physical Activity using Web Technology to Prevent Isolation-Related Mobility Loss in Independent older adults: a solution during the COVID-19 pandemic?* – Mylène Aubertin-Leheudre
- ▶ *Impacts of COVID-19 restrictions on functional status and mobility among community-dwelling pre-disabled seniors: Virtual Physical Exercises at Home, a solution?* – Fanny Buckinx

### NSS16

#### Osteosarcopenia in disabled persons

Chairperson: *Christina-Anastasia Rapti*

- ▶ *Osteosarcopenia and neurodisability* – Yannis Dionyssiots
- ▶ *Physical activity in osteoporosis and sarcopenia management and rehabilitation* – Mark A. Lissens
- ▶ *Conclusion - Discussion* – All

### NSS17

#### Rapid risk assessment and cost-effective methods for Osteoporosis in low resource settings – implication for practice

Chairperson: *Fatjona Kamberi*

- ▶ *Rapid risk assessment of osteoporosis using cost-effective methods – evidence from a cross sectional study in a South Eastern European country* – Fatjona Kamberi
- ▶ *Health beliefs, knowledge and barriers of women in local population regarding Osteoporosis – A cross-sectional study* – Enkeleda Sinaj
- ▶ *Awareness for early detection of Osteoporosis what the research in low resource settings suggests – evidence from a review study* – Vjollca Ndreu
- ▶ *The role of vitamin D in patients with osteoporosis-review* – Jerina Jaho

### NSS18

#### Depression, antidepressive treatment and osteoporosis

- ▶ *Depression and osteoporosis* – Ifigenia Kostoglou-Athanassiou
- ▶ *Stress and osteoporosis* – Panagiotis Athanassiou
- ▶ *Antidepressive agents and osteoporosis* – Lambros Athanassiou
- ▶ *Management of osteoporosis in the context of depression* – Yannis Dionyssiots

### NSS19

#### Interdisciplinary approach to chronic musculoskeletal pain

Chairperson: *Olga Kurushina*

- ▶ *Interdisciplinary approach to biomechanics in chronic musculoskeletal pain* – Alexander Barulin
- ▶ *Psychosomatics and cognitive-behavioral therapy in the treatment of chronic musculoskeletal pain* – Olga Kurushina
- ▶ *Kinesiotaping in the correction of myofascial pain* – Bogdan Kalinchenko
- ▶ *Non-pharmacological treatment in chronic musculoskeletal pain* – Anna Drushlyakova

### NSS20

#### The importance of Mediterranean diet in musculoskeletal diseases

Chairperson: *Stefania Maggi*

- ▶ *Mediterranean diet and sarcopenia* – Elaine Dennison
- ▶ *Mediterranean diet, osteoporosis and fracture* – René Rizzoli
- ▶ *Mediterranean diet in osteoarthritis and other inflammatory rheumatological diseases* – Nicola Veronese

**NSS21****The effects of vitamin K on bone; beyond coagulation**Chairperson: *Bo Abrahamsen*

- ▶ *The biology of the active forms of vitamin K.*
- *Dominic Harrington*
- ▶ *The effects of vitamin K on bone health*
- *Geeta Hampson*

**NSS22****Management of glucocorticoid induced osteoporosis**Chairpersons: *Osvaldo Daniel Messina, Luis F Vidal Neira*

- ▶ *Epidemiology and Pathogenesis* – *OD Messina*
- ▶ *Clinical features and diagnosis* – *OD Messina*
- ▶ *Therapeutic options: Candidates for receiving therapy* – *H Ratermann*
- ▶ *Modern treatment* – *W Lems*

**NSS23****Osteoclast activity defining bone strength in health and disease**Chairpersons: *Marise Lazaretti Castro, Francisco José de Paula*

- ▶ *Switching the osteoclast behavior determines the bone remodeling* – *Sandra Yasuyo Fukada*
- ▶ *Osteoclasts on: bone fragility in the primary hyperparathyroidism* – *Francisco Bandeira*
- ▶ *Osteoclasts off: quality of bone and fracture risk in the hypoparathyroidism* – *João Lindolfo Cunha Borges*
- ▶ *Closing: last considerations*

**NSS24****Assessing quality of life in sarcopenia: new insights from the SarQoL® questionnaire”**Chairperson: *Olivier Bruyère*

- ▶ *Welcome, introduction and presentation of the SarQoL® questionnaire* – *Jean-Yves Reginster*
- ▶ *Lecture 1. Clinimetric properties of Patient Reported Outcome Measures (PROMS) – Which methods for which purpose?:* – *Anton Geerinck*
- ▶ *Lecture 2. The SarQoL® questionnaire – Clinimetric properties and novel applications* – *Charlotte Beaudart*
- ▶ *Lecture 3. The Short-Form SarQoL® questionnaire - Development and validation of a Short Form Measure* – *Anton Geerinck*
- ▶ *Key points & Discussion* – *Olivier Bruyère*

## CSA Special Session

**CSA Showcase: State of the art in fracture risk mechanism and assessment**Chairperson: *Nicholas Harvey, Serge Ferrari*

- ▶ *Biomarkers of bone fragility in patients with diabetes* – *Christian Meier*
- ▶ *Vascular calcification and bone loss: Linked disorders of ageing?* – *Jorge Cannata-Andia*
- ▶ *Screening for high fracture risk in primary care* – *Eugene McCloskey*

## Educational Lectures (EL)

### EL1

**Dietary patterns and fracture risk**

*Stefania Maggi*

**EL2 (supported by an unrestricted grant from IBSA)**

**Meet the evidence of pharma-grade chondroitin sulfate**

*Nicola Veronese*

### EL3

**Peak bone mass and primary fracture prevention**

*Peter R. Ebeling*

**EL4 (sponsored by ESCEO through an unrestricted educational grant from AMGEN)**

**Integrated Care Pathways for Bone Health: improving care around the world**

*Mary Bussell*

### EL5

**Skeletal Rare Diseases: Case discussions with members of the IOF SRD Academy**

Chairperson: *Professor Nicholas Harvey, IOF CSA Chair and SRD Academy Co-chair; and Professor Maria Luisa Brandi, SRD Academy Convener and Co-chair*

► *Case history 1: McCune Albright Syndrome with phosphate wasting - Professor Roland Chapurlat*

► *Overview of McCune Albright Syndrome*

*- Professor Roland Chapurlat*

► *Case history 2: Tumour induced osteomalacia*

*- Dr Nicholas Fuggle*

► *Overview of tumour induced osteomalacia*

*- Dr Manju Chandran*

► *Panel discussion - chaired by Professor Maria Luisa Brandi, SRD Academy Convener and Co-chair*

*Participants: Dr Kassim Javaid, Dr Manju Chandran, Professor Serge Ferrari, Professor Roland Chapurlat, Dr Nicholas Fuggle, Professor Nicholas Harvey*

**Presentation of the IOF Skeletal Rare Disease Academy Awards Ceremony 2021 (Financially supported by Kyowa Kirin, which had no input into the Committee, abstract selection or awards)**

*Professor Nicholas Harvey, IOF CSA Chair, SRD Academy Co-Chair*

## ESCEO-WHO Collaborating Center Symposium

ESCEO Working Group organized under the auspices of the World Health Organization Collaborating Center for Public Health Aspects of Musculoskeletal Health and Aging.

**Interdisciplinary management of X-Linked Hypophosphatemia: from medical care to patient partnership**

Chairpersons: *René Rizzoli, Manju Chandran*

► *Clinical manifestations of XLH throughout the lifecourse - Kassim Javaid*

► *Therapeutic approaches of XLH throughout the lifecourse - Agnès Linglart*

► *Closing remarks - Maria Luisa Brandi*

## ESPRM-ESCEO-IOF Symposium

### ESPRM-ESCEO-IOF Symposium

**Update in the management of low back pain: the role of the PRM specialist**

Chairperson: *Fitnat Dincer*

► *The approach of physiatrists to Low Back Pain across Europe. The results of the research conducted by ESPRM Musculoskeletal Disorders Committee - Fitnat Dincer*

► *Update in the Pharmacological and Non pharmacological Management of Low Back Pain - Ülkü Akarimak*

► *Interventional pain treatment in Low Back Pain - M. A. Taskaynatan*

## ESCEO Symposia

Determinants of the differences between the ESCEO and OARSI 2019 guidelines for the management of knee osteoarthritis

Chairpersons: *Ali Mobasheri, Jean Yves Reginster*

- ▶ *Similarities and differences between the OARSI and ESCEO guidelines for the management of knee osteoarthritis* – *Ravi Bannuru*
- ▶ *How can we explain the differences between the OARSI and ESCEO guidelines for the management of knee osteoarthritis?* – *Nigel K. Arden*
- ▶ *Closing remarks* – *Olivier Bruyère*

Update of the ESCEO recommendations for the conduct of clinical trials for drugs aiming at the treatment of sarcopenia

Chairpersons: *Charlotte Beaudart, Roger A. Fielding*

- ▶ *Introduction* – *Alfonso Cruz Jentoft*
- ▶ *Patients to be included in clinical trials assessing the safety and efficacy of new chemical entities aiming at the treatment of sarcopenia* – *Mario Miguel Rosa*
- ▶ *Primary and secondary endpoints for clinical trials assessing the safety and efficacy of new chemical entities aiming at the treatment of sarcopenia* – *Andrea Laslop*
- ▶ *Closing remarks* – *Jürgen Bauer and Andrea Trombetti*

## EUGMS-ESCEO-IOF Symposium

### EUGMS-ESCEO-IOF Joint Symposium

Muscle matters for experts in osteoporosis

Chairperson: *Finbarr Martin*

- ▶ *Osteosarcopenia: prevalence and consequences* – *Barbara Rubek Nielsen*
- ▶ *Standardizing ultrasounds to assess muscle mass: the SARCUS project* – *Stany Perikias*

## ESCEO-IOF-SICOT Symposium

ESCEO-IOF-SICOT joint Symposium : Fracture Liaison Services (FLS) in Orthopaedic Surgery

Chairpersons: *Josée Delisle, Philippe Halbout*

- ▶ *Opening message* – *Philippe Halbout, Josée Delisle*
- ▶ *Success story of collaboration between orthopaedics and rest of the world in FLS! How can I work with my orthopaedic surgeon?* – *Julio Fernandes*
- ▶ *Getting FLSs sustainable- key steps* – *Kassim Javaid*
- ▶ *Teams and empowerment! How to create synergy between the Nurse, Doctor, Family and the Patient?* – *Josée Delisle*
- ▶ *Crossfire and Q&A*
- ▶ *Closing message* – *Josée Delisle*

## ISGE-ESCEO Symposium

### Contraception and Menopause Hormone Therapy: major issues for bone health

Chairperson: *Andrea Genazzani*

- ▶ *Hormonal contraception versus hormone replacement therapy: Major issues for bone health* – *Martin Birkhaeuser*
- ▶ *HRT and fracture prevention: more than just bone* – *John Stevenson*

## ESCEO-IOF Symposium

### ESCEO-IOF Working Group

### Role of orthopaedic surgeons to ensure optimal Vitamin D levels in patients operated for an osteoporotic fracture

Chairpersons: *Didier Hannouche, Gerrit Maier*

- ▶ *Introduction and scope of the problem*  
– *René Rizzoli*
- ▶ *Prevalence of Vitamin D sufficiency/  
deficiency in patients admitted to the orthopaedic  
ward* – *Nicholas Harvey*
- ▶ *Benefits of Vitamin D in patients with fragility  
fracture* – *Kyriakos Papavasiliou*
- ▶ *Supplementation with Vitamin D during  
rehabilitation* – *Giovanni Iolascon*
- ▶ *Closing remarks* – *Maria Luisa Brandi*

## Oral Presentations (OP)

### OP1 - P164

#### EQUITY OF HEALTHCARE EXPENDITURE IN HIP FRACTURE PATIENTS ACROSS SOCIOECONOMIC GROUPS: A BENEFIT INCIDENCE ANALYSIS USING AUSICUROS DATA

*A. Lal, S. Overell, K. Sanders, J. Talevski, J. A. Kanis,  
F. Borgstrom, A. Svedbom, S. Brennan-Olsen*

### OP2 - P278

#### GREATER PQCT CALF MUSCLE DENSITY IS ASSOCIATED WITH LOWER HIP FRACTURE RISK, INDEPENDENT OF FRAX, FALLS AND BMD: A META-ANALYSIS IN THE OSTEOPOROTIC FRACTURES IN MEN (MROS) STUDY

*N. C. Harvey, E. Orwoll, J. A. Cauley, T. Kwok, M. K.  
Karlsson, B. E. Rosengren, E. Ribom, P. M. Cawthon,  
K. Ensrud, E. Liu, K. A. Ward, C. Cooper, J. A.  
Kanis, M. Lorentzon, C. Ohlsson, D. Mellström, H.  
Johansson, E. V. McCloskey*

### OP3 - P288

#### TREATMENT GAP AMONG PATIENTS WITH PRIMARY OSTEOPOROSIS: A SYSTEMATIC LITERATURE REVIEW AND META-ANALYSIS

*S. Leroy, P. Saunders-Hastings, P. Eusebi, V. Taieb,  
B. Abrahamsen, E. V. McCloskey, S. Fujiwara, C.  
Libanati, A. Moayyeri*

### OP4 - P397

#### LEONIE STUDY: POOR COMPLIANCE WITH PATIENT INSTRUCTIONS FOR TAKING ORAL BISPHOSPHONATES (ORAL BPS)

*K. Briot, B. Cortet, P. Fardellone, T. Thomas, F.  
Tremollières*

### OP5 - P155

#### RELATIVE EFFICACY AND SAFETY OF BIOLOGIC TREATMENTS FOR OSTEOARTHRITIS: A CONVENTIONAL AND NETWORK META-ANALYSIS

*L. Yang, M. Yiyang, C. Peihua, W. Xing, F. Tianxiang,  
W. Jiaoshuai, R. Guangfeng, T. Su'An, Z. Weiya, D.  
Changhai, Z. Zhaohua*



# OP6 - P275

**EXAMINING THE RELATIONSHIPS BETWEEN TREATMENT AND PAIN AND PHYSICAL FUNCTION OUTCOMES IN PATIENTS WITH OSTEOARTHRITIS: A MEDIATION MODELING APPROACH**

*L. Abraham, R. H. Dworkin, D. C. Turk, J. D. Markman, D. A. Williams, A. G. Bushmakina, J. A. Hall, D. C. Semel, J. C. Cappelleri, R. Y. Yang*

# OP7 - P279

**THE BEST PREDICTIVE FACTORS AMONG CLINICAL AND STRUCTURAL CHANGES ASSOCIATED WITH KNEE REPLACEMENT: A NESTED CASE-CONTROL STUDY**

*J.-P. Pelletier, M. Dorais, P. Paiement, J.-P. Raynaud, J. Martel-Pelletier*

# OP8 - P613

**ANTI-INFLAMMATORY AND CHONDROPROTECTIVE EFFECTS OF CELECOXIB AND GLUCOSAMINE SULFATE ON HUMAN OSTEOARTHRITIC CHONDROCYTES EXPOSED TO IL-1B**

*S. Cheleschi, S. Tenti, A. Fioravanti*

# OP9 - P148

**SARCOPENIA AND FALL-RELATED INJURY AMONG OLDER ADULTS IN FIVE LOW- AND MIDDLE-INCOME COUNTRIES**

*N. Veronese, L. Smith, M. Barbagallo, A. Koyanagi*

# OP10 - P201

**LOW BIOAVAILABLE IGF-1 IS ASSOCIATED WITH SARCOPENIA IN POST-MENOPAUSAL WOMEN WITH RHEUMATOID ARTHRITIS**

*M. Krikelis, D. Moschou, K. Makris, S. Tournis, C. P. Mavragani, E. Mole, E. Chronopoulos, I. Donta, S. Gazi*

# OP11 - P257

**AGE-RELATED MUSCLE STRENGTH DECLINE IN EAST AND WEST: OBSERVATIONS FROM TWO HARMONISED COMMUNITY DWELLING COHORTS IN UK AND JAPAN**

*F. Laskou, J. Zhang, E. M. Dennison, K. A. Jameson, G. Bevilacqua, C. Cooper, T. Iidaka, C. Horii, S. Tanaka, N. Yoshimura*

# OP12 - P394

**AN ASSESSMENT OF THE TOULOUSE SAINT LOUIS UNIVERSITY MINI FALLS ASSESSMENT TOOL TO PREDICT INCIDENT FALLS AMONG OLDER ADULTS RESIDING IN NURSING HOMES: A 6-MONTH PROSPECTIVE STUDY**

*M. Locquet, F. Bonnard, C. Beaudart, C. Coendo, S. Gillain, J.-Y. Reginster, O. Bruyère*

# OP13 - P545

**RISK OF FRACTURE IN GLUCOCORTICOID REQUIRING DISEASES: AN ANALYSIS ON A NATION-WIDE DATABASE**

*G. Adami, A. Fassio, E. Bertoldo, O. Viapiana, D. Gatti, M. Rossini*

# OP14 - P622

**ASSOCIATIONS OF MARKERS OF ADIPOSITY AND INFLAMMATION WITH BONE PHENOTYPE: RESULTS FROM THE MRC NATIONAL SURVEY OF HEALTH AND DEVELOPMENT**

*R. Durdin, C. Parsons, D. Kuh, E. M. Dennison, R. Cooper, C. Cooper, K. A. Ward*

# OP15 - P634

**TREATMENT PATTERNS FOR OSTEOPOROSIS MEDICATIONS IN FIVE EUROPEAN COUNTRIES: A MULTINATIONAL REAL WORLD COHORT ANALYSIS**

*D. E. Robinson, E. H. Tan, A. Jödicke, M. Mosseveld, K. Bødkergaard, C. Reyes, A. Voss, E. Marconi, F. Lapi, J. Reinold, K. Verhamme, L. Pedersen, M. De Wilde, M. Far, M. Aragón, P. Bosco-Levy, R. Lassalle, D. Prieto-Alhambra*

# OP16 - P688

**DXA-BASED BONE STRAIN INDEX IN NORMOCALCEMIC PRIMARY HYPERPARATHYROIDISM**

*G. Tabacco, C. Messina, L. Rinaudo, S. Falcone, R. Cesareo, S. Manfrini, N. Napoli, F. M. Ulivieri, A. Palermo, A. Naciu*

### OP17 - P280

#### AN AUTOMATED PATIENT- AND GENDER-SPECIFIC MODEL FOR EARLY KNEE OSTEOARTHRITIS STRUCTURAL PROGRESSOR SCREENING

*J.-P. Pelletier, H. Bonakdari, A. Jamshidi, F. Abram, G. Tardif, J. Martel-Pelletier*

### OP18 - P444

#### EFFECT OF DALCROZE EURHYTHMICS EXERCISE ON PHYSICAL FUNCTION AND MUSCLE IN SARCOPENIC OLDER ADULTS: THE SARCARE RANDOMIZED CONTROLLED TRIAL

*M. Hars, F. Herrmann, T. Chevalley, S. L. Ferrari, G. Gold, R. Rizzoli, P. Vuilleumier, A. Trombetti*

### OP19 - P449

#### MEASUREMENT PROPERTIES OF THE SHORT FORM SARCOPENIA QUALITY OF LIFE (SF-SARQOL®) QUESTIONNAIRE IN AN INTERNATIONAL DATASET

*A. Geerinck, C. Beaudart, J.-Y. Reginster, Z. B. Wojszel, F. De Souza Orlandi, G. Bahat, T. Erdoğan, B. Montero-Erasquin, V. Alekna, O. Bruyère*

### OP20 - P606

#### THE IMPACT OF PHARMACOLOGICAL INTERVENTIONS FOR OLDER ADULTS WITH SARCOPENIA: A SYSTEMATIC REVIEW OF RANDOMIZED CONTROLLED TRIALS

*A. L. Lee, C. McArthur, H. A. A. Alrob, G. I. Ioannidis, J. D. A. Adachi, L. T. Thabane, J. L. Lee, A. P. Papaioannou*

### OP21 - P803

#### POTENTIAL ROLE OF RADIOFREQUENCY ECHOGRAPHIC MULTISPECTROMETRY TO ASSESS BONE STATUS IN WOMEN WITH LUMBAR SPINE OSTEOARTHRITIS

*F. A. Lombardi, C. Caffarelli, M. D. Tomai Pitinca, A. Al Refaie, M. De Vita, S. Catapano, F. Tramonte, S. Gonnelli*

### OP22 - P708

#### MEDITERRANEAN DIET ADHERENCE AND ITS ASSOCIATIONS WITH BONE QUALITY, CHRONIC INFLAMMATION, AND PHYSICAL FUNCTION IN SARCOPENIC OBESE OLDER ADULTS

*M. M. Cervo, T. McCaffrey, B. De Courten, C.-A. Ng, A. Gandham, P. Ebeling, D. Scott*

### OP23 - P726

#### POST-FRACTURE CARE PROGRAMMES START OFFSETTING INITIAL INVESTMENT TWO YEARS AFTER THEIR IMPLEMENTATION: PRELIMINARY FINDINGS FROM A MICROSIMULATION MODEL OF BENEFIT AND BUDGET IMPACT

*R. Pinedo-Villanueva, E. Burn, C. Cooper, M. K. Javaid, C. T. F. Partnership Stuy Group*

### OP24 - P737

#### VARIABILITY OF SARCOPENIA CUTOFF VALUES AMONG WOMEN: A SYSTEMATIC REVIEW

*N. Rathnayake, S. Lekamwasam, T. Abeygunasekara, G. Liyanage, S. Subasinghe*

### OP25 - P767

#### NUTRITION STATUS AND INFLAMMATORY POTENTIAL OF THE DIET AND RISK OF OSTEOSARCOPENIA: THE BUSHEHR ELDERLY HEALTH (BEH) PROGRAM

*G. Shafiee, M. Nasiri, R. Heshmat, M. Ebrahimi, A. Ostovar, N. Fahimfar, I. Nabipour, B. Larijani*

### OP26 - P758

#### IMPROVING COMMUNICATION OF FRACTURE RISK GLOBALLY: INSIGHTS FROM INTERVIEWS WITH PATIENTS. THE RISKCOMMUNICATION STUDY OR RICO STUDY

*C. Beaudart, S. Silverman, Z. Paskins, A. Boonen, J.-F. Kaux, S. Fujiwara, M. Hilgsmann*

### OP27 - P777

#### RECOVERY OF QUALITY OF LIFE IS ASSOCIATED WITH LOWER MORTALITY 5-YEARS POST-FRACTURE: THE AUSTRALIAN ARM OF THE INTERNATIONAL COSTS AND UTILITIES RELATED TO OSTEOPOROTIC FRACTURES STUDY (AUSICUROS)

*J. Talevski, K. Sanders, S. Vogrin, G. Duque, A. Beauchamp, E. Seeman, S. Iuliano, A. Svedbom, F. Borgström, J. A. Kanis, A. Stuart, S. Brennan-Olsen*

# OP28 - P781

## THIRTY YEARS OF HIP FRACTURE IN AUSTRIA; IS THE WORST OVER?

*H. P. Dimaj, B. Reichardt, E. Zitt, H. Concin, O. Malle, A. Fahrleitner-Pammer, A. Svedbom, W. Brozek*

# OP29 - P793

## PATIENTS' CHARACTERISTICS RELATED TO BONE MINERAL DENSITY EVOLUTION AT DENOSUMAB DISCONTINUATION: THE REOLAUS BONE PROJECT

*G. Liebich, E. Gonzalez Rodriguez, O. Lamy*

# Committee of National Societies Plenary Session (OCs): Osteoporotic fractures and loss of independence, what are the solutions (Prevention, treatment, care, nutrition, lifestyle rehabilitation)

Chairpersons: Famida Jiwa, Jean-Yves Reginster

# OCs1

## PREVALENCE AND AGREEMENT BETWEEN RECENT SARCOPENIA DEFINITIONS: FINDINGS FROM FOUR POPULATION-BASED COHORTS

*L. D. Westbury, H. E. Syddall, J. A. Cauley, P. M. Cawthon, E. M. Curtis, K. E. Ensrud, R. A. Fielding, H. Johansson, J. A. Kanis, M. K. Karlsson, T. Kwok, N. Lane, M. Lorentzon, D. Mellström, A. B. Newman, C. Ohlsson, E. Orwoll, E. Ribom, B. E. Rosengren, J. T. Schousboe, E. J. Shiroma, N. C. Harvey, E. M. Dennison, C. Cooper*

# OCs2

## DETERMINANTS OF MUSCLE DENSITY IN LATE ADULthood: FINDINGS FROM THE HERTFORDSHIRE COHORT STUDY

*F. Laskou, L. D. Westbury, N. Nicholas, N. C. Harvey, H. P. Patel, C. Cooper, K. Ward, E. M. Dennison*

# OCs3

## FRAX BASED OSTEOPOROSIS MANAGEMENT PATHWAY FOR UKRAINIAN MEN

*V. Povoroznyuk, H. Johansson, N. Grygorieva, M. Lorentzon, A. Musienko, N. C. Harvey, E. V. McCloskey, E. Liu, J. A. Kanis*

# OCs4

## SEX DIFFERENCES IN THE ASSOCIATIONS BETWEEN CARDIOVASCULAR RISK FACTORS AND PHYSICAL FUNCTION: THE GAMBIA BONE AND MUSCLE AGEING STUDY (GAMBAS)

*A. Zengin, M. Ó Breasail, C. P. Parsons, L. M. Jarjou, R. E. Janha, M. Jobe, A. Prentice, C. Cooper, P. R. Ebeling, K. A. Ward*

# OCs5

## VITAMIN D STATUS AND ASSOCIATED VDR GENE POLYMORPHISM IN BELARUSIAN POSTMENOPAUSAL WOMEN

*P. Marozik, E. Rudenka, K. Kobets, A. Rudenka, V. Samokhovec*

# OCs6

## SOFT BONE IS WEAK: PROSPECTIVE, BLINDED INTRAOPERATIVE ASSESSMENT OF BONE CORRELATES WITH T-SCORE

*B. Nickel, D. Krueger, G. Borchardt, L. Andersen, R. Illgen, D. Hennessy, N. Binkley, P. Anerson*

# OCs7

## THE EFFECT OF CALCIUM AND VITAMIN D3 ON CALCIUM HOMEOSTASIS AND FALLS INCIDENCE IN PATIENTS WITH HIGH FRACTURE RISK UNDERGOING MEDICAL REHABILITATION

*L. Marchenkova, V. Vasileva*

## OCs8

**IMPROVING COMMUNICATION OF FRACTURE  
RISK GLOBALLY: INSIGHTS FROM INTERVIEWS  
WITH PATIENTS. THE RISKCOMMUNICATION  
STUDY OR RICO STUDY**

*C. Beaudart, S. Silverman, Z. Paskins, A. Boonen, J.-  
F. Kaux, S. Fujiwara, M. Hiligsmann*

## OCs9

**OSTEOPOROSIS IN MIDDLE-AGED WOMEN:  
WHAT IS THE IMPACT OF MULTIMORBIDITY  
AND MEDICATION USE? A CROSS-SECTIONAL  
POPULATION-BASED STUDY**

*A. V. Gueldini de Moraes, L. H. Costa-Paiva, A. O.  
Pedro*

## OCs10

**INFLUENCE OF BARIATRIC SURGERY ON 25-OH-  
VITAMIN D AND PARATHYROID HORMONE IN  
OBESE PATIENTS**

*S. H. Scharla, U. G. Lempert*

## OCs11

**PATIENT'S PREFERENCES FOR LIFESTYLE  
CHANGES IN OSTEOPOROTIC FRACTURE  
PREVENTION: A CROSS-EUROPEAN DISCRETE-  
CHOICE EXPERIMENT**

*C. Beaudart, A. Boonen, N. Li, S. Bours, S. Goemaere,  
J.-Y. Reginster, C. Roux, B. McGowan, A. Diez-Perez,  
R. Rizzoli, C. Cooper, M. Hiligsmann*



WORLD CONGRESS  
ON OSTEOPOROSIS,  
OSTEOARTHRITIS AND  
MUSCULOSKELETAL  
DISEASES



2021 VIRTUAL



Abstract Book

## **Special Lectures Abstracts**

## SL1

**UCB-SPONSORED HONORARY LECTURE - WHERE ARE THE CRACKS? UNDERSTANDING THE NEEDS IN FRAGILITY FRACTURE MANAGEMENT**UCB<sup>1</sup><sup>1</sup>UCB, Brussels, Belgium

In 2010, 3.5 million fragility fractures were recorded in Europe, and this is expected to rise to 4.5 million in 2025.<sup>1</sup> Fragility fractures lead to loss of mobility and independence, and increase the risk of mortality and subsequent, secondary fractures.<sup>2,3</sup> They are also associated with substantial economic costs<sup>2</sup> and yet are seldom recognised by policy makers.<sup>4</sup>

Despite the prevalence and burden of fragility fractures, up to 80% of patients who experience a fragility fracture are neither assessed, nor treated by their healthcare system.<sup>3</sup> This disparity has resulted in a call to action to raise patient and practitioner awareness of secondary fracture prevention and to make osteoporosis and fragility fractures a policy priority.<sup>5</sup>

Why is there a mismatch between evidence, guidelines and patient care? Associate Professor Kassim Javaid (University of Oxford, United Kingdom), will provide his insight into the unmet needs that remain within post-fracture care – from the perspectives of policy makers, healthcare professionals, Fracture Liaison Service units and patients – and discuss potential positive steps that can and should be taken to improve secondary fracture prevention for your hospital, region and country.

Hernlund E, *et al. Arch Osteoporos.* 2013;8:136.

Bentler SE, *et al. Am J Epidemiol.* 2009;170:1290–9.

Nguyen TV, *et al. Med J Aust.* 2004;180:S18–22.

Briggs AM, *et al. BMJ Global Health.* 2019;4:e001806.

Osteoporosis and Fragility Fracture Policy Network. Available at: [www.osteopolicynetwork.org](http://www.osteopolicynetwork.org) (Accessed June 2021).

## SL2

**FEAST OR FAMINE: HOW NUTRIENT INTAKE REGULATE BONE REMODELING**C. J. Rosen<sup>1</sup><sup>1</sup>Maine Medical Center Research Institute, Scarborough, Maine, United States

Weight loss from calorie restriction is associated with bone loss. In the more extreme clinical scenario, Anorexia Nervosa, there is even more rapid bone loss, high blood cortisol levels and fractures. Despite the absence of peripheral fat in these patients, the bone marrow is laden with marrow adipocytes and bone remodeling is uncoupled with rapid bone loss. Paradoxically, obese individuals also have an abundance of marrow adipocytes, in the presence of large amounts of visceral fat but bone turnover is actually suppressed in many cases. Animal models in our laboratory have shown that 30% calorie restriction can also induce marrow adipogenesis, whereas a high fat diet induces an increase in marrow adipocytes. Similar to humans, in mice bone remodeling is uncoupled during calorie restriction and suppressed with a high fat diet.

To address this paradox we studied 26 healthy human volunteers at the Clinical Research Center at Mass General Hospital. Subjects were fed a high calorie diet (HCD) for 10 days, then went home for 10 days, then were fasted for 10 days. Marrow adiposity was measured by MRI and bone marrow aspirates were done pre- and post dietary induction. Both fasting and HCD induced marrow adipocytes, but only fasting stimulated bone resorption and suppressed bone formation. The induction of marrow fat was more consistent and stronger with fasting but readily reversible within two weeks. To our surprise, RNAseq and proteomics revealed that fasting was associated with an inflammatory component that included the complement system; other pathways included paradoxical lipid storage, growth factor binding proteins and adiponectin, an adipokine made only by fat cells. The enzyme that controls cortisol production, 11beta hydroxydehydrogenase (11BHSD) was one of the highest up regulated gene with fasting in the marrow. A high calorie diet showed genes associated with increased lipid storage and two cytokines- TNF and semaphorin 3E. Our data suggests that calorie restriction and/or fasting can have detrimental effects on the skeleton via a complement activated innate immune response, induction of local glucocorticoids, and high rates of bone resorption possibly induced by adiponectin. These findings have important implications for popular weight loss programs that follow an intermittent fasting regimen, and provide new insights into the pathophysiology of marrow adiposity and skeletal remodeling.

WORLD CONGRESS  
ON OSTEOPOROSIS,  
OSTEOARTHRITIS AND  
MUSCULOSKELETAL  
DISEASES



2021 VIRTUAL



Abstract Book

## **Educational Lectures Abstracts**

## EL1 DIETARY PATTERNS AND FRACTURE RISK

S. Maggi<sup>1</sup>

<sup>1</sup>CNR Aging Branch-IN, Padua, Italy

**Objective:** to review the role of selected dietary patterns in the pathogenesis of fragility fractures.

**Material and methods:** a narrative review of concepts and controversies in the most recent scientific literature.

**Results:** osteoporosis and sarcopenia are two important determinants of falls and fragility fractures, that recognize several common risk factors, including malnutrition. In particular, malnutrition is associated to a higher risk of osteoporosis and sarcopenia in a life-course perspective, leading to an increased risk of fragility fracture at older ages. Diet is therefore one of the modifiable lifestyle factors that could represent an effective preventive strategy. Besides calcium and vitamin D, proteins, magnesium and potassium, zinc, possibly vitamin A, C and K play a role. Good dietary intakes of calcium (1,000 mg/day before age 50, 1,200 mg/day beyond 50) and vitamin D (600 IU/day before the age of 70, and 800 IU/day thereafter) are crucial to prevent fragility fractures. Moreover, scientific evidence supports the protective role of n-3 fatty acids, flavonoids and antioxidants, and a negative role of saturated fatty acids and sugar. However, we consume selected foods within a dietary pattern, and recent epidemiological studies have focused on the assessment of selected dietary patterns and risk of fractures, more than of single components. This approach is very important, for two main reasons: first, dietary pattern that prevent not only musculoskeletal diseases, but also cardiovascular diseases, diabetes, and Inflammatory Bowel Diseases might lessen the risk of fractures, therefore we might consider several pathways, besides those typical of musculoskeletal health, explaining the association of diet and fractures. Specifically, bone loss might occur as a result of impaired calcium homeostasis, if the supply of calcium with the diet is inadequate, but also as a consequence of increased inflammatory cytokines and oxidative stress. Second, the analysis of dietary pattern, more than of single components, makes easier to translate the research findings into dietary recommendations for the general population.

One of the most studied dietary pattern is the Mediterranean diet, assessed usually through the Mediterranean Diet scores. Although in general there is a strong evidence supporting a protective effect of the Med diet on fracture risk, the comparison between studies is difficult, due to the different scoring systems used and the differences in the definition of the Med diet (traditional versus alternative). Evidence of the negative association between "Healthy diets" (such as the Med diet) and the positive association between the dietary Inflammatory Index (DII) and fractures has been reported recently in large, longitudinal studies in US, Europe and China. Therefore, diets rich on fruits and vegetables, and low on saturated fats and sugars, are consistently re-

ported as protective, but some concerns, and the need for further studies, are expressed for strict vegetarian, and vegan diets, that seems to have deleterious effects on bone.

**Conclusions.** According to this literature review, the adherence to a dietary pattern according to the Mediterranean Diet principles, supporting large intake of vegetables, fruits, and cereals, daily intake of one/two services of dairy, moderate to low intake of meat and wine, seems to offer the best life-course approach to the prevention of fragility fractures. However, several methodological problems, related to the design, sampling and instruments assessing the dietary pattern must be acknowledge and more studies are needed to fully elucidate the pathophysiological association with fragility fractures.

## EL2 MEET THE EVIDENCE OF PHARMA-GRADE CHONDROITIN SULFATE

N. Veronese<sup>1</sup>

<sup>1</sup>Geriatric Unit, Department of Internal Medicine and Geriatrics, University of Palermo, Palermo, Italy

### Objectives

Osteoarthritis (OA) represents the major cause of chronic pain and disability among the musculoskeletal diseases with a considerable impact on the public health burden. According to ESCEO algorithm, the initial therapy for the treatment of knee OA is the use of SYSADOAs, in line also with other international recommendations.

In particular, the ESCEO affords a strong recommendation for the use of prescription, pharma-grade chondroitin sulfate (CS) as long-term background therapy.

### Material and Methods

The MEDLINE and PubMed databases were searched for randomized controlled trials (RCTs), meta-analyses and review articles on pharma-grade CS to evaluate its benefit-risk profile in OA.

### Results

The available data shows that CS 800mg/day is effective and safe in the treatment of knee and hand OA, with increasing evidences available for hip OA. The evidence so far suggested an efficacy comparable between CS and some NSAIDs (i.e. celecoxib). The chronic use (2 years) of CS for knee OA is associated not only with a positive effect on symptoms, but also on articular cartilage. The pharma-grade CS is thus endowed of both SYSADOA and SMOAD effects. Even at higher dosages (1200 mg/day), CS of pharma-grade shows a favourable benefit risk profile together with an improved compliance thanks to a new oral gel pharmaceutical formulation. CS high tolerability is also supported by



its long marketing experience in different countries worldwide. Several products containing CS are available on the market, but the scientific evidences and considerations here analysed cannot be extrapolated to support other forms of CS (e.g. Food Supplements), but only attributed to CS of pharma grade.

### Conclusions

In line with the recent ESCEO algorithm and thanks to a robust scientific background, pharma-grade CS confirms its role as reference drug in the management of OA acting positively on signs, symptoms and structural changes of the disease.

### References.

J.Y. Reginster and N. Veronese. *Aging Clin Exp Res* 2021; 33 (1): 37-47.

Chevalier X. and Conrozier T. *Medicine Access@Point of Care* 2017; 1 (1): e134-e144.

### Disclosures

Dr. Veronese reports personal fees from Mylan, Viatrix, IBSA, Fidia,

## EL3

### PEAK BONE MASS AND PRIMARY FRACTURE PREVENTION

P. R. Ebeling<sup>1</sup>

<sup>1</sup>Bone and Muscle Health Research Group, Department of Medicine, School of Clinical Sciences at Monash Health, Faculty of Medicine, Nursing and Health Sciences, Monash University, Clayton, Victoria, Australia

Osteoporosis is a skeletal disorder characterized by reduced bone strength predisposing to an increased risk of fracture. Bone strength comprises both bone density and bone quality. Bone density in any given individual is determined by the interaction between peak bone mass (PBM) and the amount of subsequent bone loss. Much of the focus in osteoporosis has been on bone loss following menopause and with ageing. However, PBM is at least as important, with some studies suggesting it explains up to 60% of osteoporosis risk. Thus, an individual not attaining optimal PBM during childhood and adolescence may develop osteoporosis without having accelerated bone loss.

Many factors may diminish accrual of PBM. In young women and adolescents, late menarche, oligomenorrhea or amenorrhea are not uncommon. These menstrual disturbances may occur in the context of strenuous athletic training, emotional stress, and low body weight. Anorexia nervosa is an extreme example in which profound undernutrition and nutritional factors combine with a hypogonadal state to result in failure to achieve PBM, accelerated bone loss and increased fracture rates. The lack of correction of nutritional factors by oestrogen replacement explains its failure to correct bone loss in anorexia nervosa. Chronic disease in child-

hood and adolescence may also diminish PBM. Cystic fibrosis, coeliac disease, and inflammatory bowel disease are examples of conditions associated with malabsorption and resultant osteopenia in some young individuals. The osteoporosis of cystic fibrosis is also related to the frequent need for glucocorticoids as well as to other factors, including genetic factors. Glucocorticoids used to treat other inflammatory conditions, such as asthma and arthritis, in children can also inhibit growth and attainment of PBM. In Turner syndrome, both oestrogen deficiency and karyotype (SHOX haploinsufficiency) contribute to small bone size and skeletal fragility. Testosterone production (and its conversion to oestradiol) in adolescent boys and young men is similarly important in achieving PBM. Pathologic delay in the onset of puberty is a risk factor for suboptimal PBM in men.

Genetic factors exert the predominant effect on PBM, but environmental and modifiable lifestyle factors are also important. Among these are adequate nutrition and body weight, and physical activity. Thus, maximizing PBM creates a critical opportunity to reduce the impact of subsequent age-related bone loss. The prepubertal years and puberty are also critical times for the development of healthy lifestyle habits. Cigarette smoking, which usually starts in adolescence, should be avoided. A balanced diet, adequate calories, and appropriate calcium and vitamin D nutrition are required to achieve PBM. Excessive pursuit of thinness should be discouraged. The Institute of Medicine recommends children aged 1-3 years need 500 mg of calcium daily, and those aged ≥4 years need 800 mg daily. To support bone growth, adolescents need approximately 1,300 mg daily, however only a minority meet these recommendations. Factors contributing to low calcium intakes are restriction of dairy products, a generally low level of fruit and vegetable consumption, and a high intake of low calcium beverages such as soft drinks. A recommended vitamin D intake of 400 to 600 IU/day has been established for young adults. Supplementation of calcium and vitamin D may be necessary in those unable to meet dietary requirements. High dietary protein, caffeine, phosphorus, and sodium can adversely affect calcium balance, but their effects are mitigated in individuals with adequate calcium intakes.

There is strong evidence that physical activity early in life contributes to higher PBM with resistance and high impact exercise likely being the most beneficial. It is estimated that a one standard deviation increase in PBM can result in a 50% decrease in osteoporosis fracture risk. The timing of exercise creates a window of opportunity to increase PBM with the strongest evidence for prepubertal exercise conferring a long-term benefit. Prepubertal boys with a higher protein intake and higher weight-bearing physical activity levels achieved 10% higher PBM, which was maintained over the next 15 years into young adulthood. Optimising both nutrition and physical activity in the prepubertal years is therefore critical to increasing PBM and to reducing the risk of osteoporosis and fractures later in life.

EL4

## INTEGRATED CARE PATHWAYS FOR BONE HEALTH: IMPROVING CARE AROUND THE WORLD

M. E. Bussell<sup>1</sup>

<sup>1</sup>RN, BSN, MPH, MPhil, PhD The Economist Intelligence Unit, London, United Kingdom

### *Research sponsored by Amgen*

As people age maintaining mobility and memory become increasingly imperative, therefore, addressing bone health is the most important way to preserve mobility. Fractures cause reduced quality of life due to the loss of mobility, social isolation, depression and pain. Poor bone health encompasses a broad spectrum of diseases, but it is most often quantified as the cumulative burden of osteoporosis and osteoporotic fractures, also known as fragility fractures. Rates of these fractures have been increasing and are expected to continue rising globally, attributed to the anticipated rise in the worldwide population over age 60. From a population perspective, there is a lack of understanding and misconceptions need to be demystified: poor bone health is not an inevitable part of ageing. Among health professionals, bone health does not garner the same level of attention as other long-term conditions leading to a fragmentation in the care pathway in bone health, missed opportunities in the delivery of care and a lack of health system preparedness.

No single strategy will be sufficient to address this global public health issue. Coordination across all stakeholder groups is vital to decrease the health and socioeconomic burden of poor bone health. For health professionals, building multidisciplinary care teams to ensure the right approach – health promotion, disease awareness, prevention, diagnosis and treatment – is delivered to the right patient at the right time. Among payors, we need to incentivise and reimburse care for bone health. Among policy-makers, we need to ensure that there is a better understanding of the socioeconomic and health consequences of poor bone health to promote better policies to address needs. Building a more resilient health system approach to bone health based on the evidence and sound policy-making will not only improve population health but will provide cost savings to health systems by preventing poor bone health in the first place. Health systems around the world must prepare for this surge by prioritising bone health to preserve mobility and wellbeing. Working across the life-span, we can all benefit from improved bone health throughout the ages.... and stages....of our lives.

WORLD CONGRESS  
ON OSTEOPOROSIS,  
OSTEOARTHRITIS AND  
MUSCULOSKELETAL  
DISEASES



2021 VIRTUAL



Abstract Book

## Plenary Lectures Abstracts

## PL1

**MANAGEMENT OF MUSCULOSKELETAL DISEASE FROM CRADLE TO GRAVE**C. Cooper<sup>1</sup>

<sup>1</sup>OBE, DL, FMedSci Professor of Rheumatology and Director, MRC Lifecourse Epidemiology Unit, University of Southampton, Southampton, United Kingdom

Osteoporosis (reduced bone density) constitutes a major public health problem through its association with age-related fractures. These fractures typically occur at the hip, spine and wrist. Our research into osteoporosis at the MRC Lifecourse Epidemiology Unit over three decades has characterised the epidemiology of these fractures, and contributed to the generation of preventive strategies against them throughout the lifecourse. Around 1 in 2 women and 1 in 5 men in the UK will sustain an osteoporotic fracture from age 50 years onwards. Incidence rates rise with age, and rates in women are around double those in men above age 50 years (in large part due to the accelerated bone loss after the menopause among women). Rates are generally higher in Caucasian than in Asian and Afro-Caribbean populations. Life expectancy is increasing around the globe and the number of elderly individuals is rising in every geographic region. Assuming constant age-specific incidence rates for fracture, the number of hip fractures occurring worldwide among people aged 65 years and over will rise from 1.7 million in 1990 to 6.3 million in 2050. In addition to this demographic trend, studies between 1930 and the late 1980s consistently reported increases in the age-adjusted incidence of hip fractures among men and women; these now appear to have levelled off in Europe and North America, due to both period and birth cohort effects. Risk factors for osteoporosis in later life include low body mass index, cigarette smoking, alcohol consumption, physical inactivity and poor dietary calcium and vitamin D status; developmental factors include genetic constitution, diet and exercise. Examples of preventive strategies against fracture resulting from our work range from maternal vitamin D supplementation during pregnancy (which enhances childhood bone mineral accrual) as well as primary and secondary preventive strategies involving risk assessment and treatment during later adult life. Together, these well-validated strategies will assist in reducing the burden of this major contributor to musculoskeletal ageing.

## PL2

**BUILDING BONE STRENGTH WITH ANABOLIC AGENTS**M. R. McClung<sup>1</sup>

<sup>1</sup>Oregon Osteoporosis Center, Portland, United States

Osteoporosis is a condition characterized by both low bone mass and deteriorated skeletal architecture. The ideal therapy, then, would be one that increases bone mass and improves skeletal structure. Anti-remodeling agents strengthen the skeleton by decreasing the number and depth of bone remodeling units. However, because they inhibit bone formation as well as resorption, they do not restore bone structure. In contrast, osteoanabolic agents, by activating bone formation by osteoblasts, improve both trabecular and cortical bone structure.

Three anabolic agents are now available. The PTH receptor agonists, teriparatide and abaloparatide, activate remodeling-based bone formation but also, to a lesser extent, increase bone resorption. Romosozumab, a sclerostin inhibitor, activates remodeling- and especially modeling-based bone formation while decreasing bone resorption. This dual effect results in a very positive bone balance during the first few months of therapy. Each of these agents has been shown to improve skeletal architecture and to increase bone strength in preclinical studies.

Recent clinical studies have documented that osteoanabolic agents induce larger, faster gains in bone mineral density (BMD) than do anti-remodeling agents. In head-to-head trials in patients at very high risk of fracture, teriparatide and romosozumab reduce fracture risk more effectively than do oral bisphosphonates. Transition to an anti-remodeling drug after a course of anabolic therapy is necessary to prevent the rapid loss of BMD upon discontinuation of an anabolic drug. Importantly, the fracture risk reduction achieved with 12-18 months of anabolic therapy persists for at least 2 years after patients are transitioned to an anti-remodeling drug. Bone density responses to teriparatide and romosozumab are less when administered to patients who have received a bisphosphonate or denosumab than when given to treatment-naïve patients. Based on these results, coupled with the knowledge that on-treatment BMD correlates with current fracture risk, the IOF and several national societies now recommend that anabolic agents be the initial therapy in patients at very high risk of fracture. Issues of safety, evaluating the benefit:risk profiles of individual patients and matters of cost and reimbursement need to be considered in selecting patients for anabolic therapy.



## PL3 MANAGEMENT OF BONE DISEASE IN CANCER

R. Coleman<sup>1</sup>

<sup>1</sup>Emeritus Professor of Medical Oncology, University of Sheffield, Sheffield, United Kingdom

The introduction of bone-targeted treatments has transformed the clinical care of patients with bone metastases from solid tumors or myeloma bone disease. Both bisphosphonates and denosumab have a major beneficial impact on skeletal morbidity, leading to improved quality of life and physical functioning and reduced demands on expensive interventions and hospital care. International guidelines recommend the use of a bone-targeted agent for all patients with metastatic bone disease (and multiple myeloma) throughout the course of the disease alongside sequential systemic anticancer treatments. Denosumab has been shown in large, well-controlled clinical trials to have the greatest activity and has some tolerability and convenience advantages over the bisphosphonates. Treatment should be initiated at diagnosis of bone metastases and, due to the ongoing risk of skeletal morbidity, usually continued indefinitely.

Bone targeted treatments can also modify the process of metastasis and in breast cancer have important effects on disease outcomes as well as on bone health. The effects of adjuvant bisphosphonates in early breast cancer were demonstrated in a meta-analysis of individual patient data from all available randomized trials. In postmenopausal women, bisphosphonates (zoledronate or daily oral clodronate/ ibandronate) prevented about 1 in 4 bone recurrences and 1 in 6 breast cancer deaths; no effects on disease outcomes could be identified in premenopausal women. Somewhat surprisingly, these effects could not be reproduced with denosumab. The biologic basis of the discordance in results between bisphosphonates and denosumab and biomarkers that can predict treatment efficacy will be discussed.

## PL4 THYROID, BONE AND CARTILAGE

G. R. Williams<sup>1</sup>

<sup>1</sup>Molecular Endocrinology Laboratory, Department of Metabolism, Digestion & Reproduction, Imperial College London, London, United Kingdom

Thyroid hormones are essential for skeletal development and are important regulators of bone maintenance in adults. I will discuss the skeletal consequences of thyroid dysfunction and disease, resistance to thyroid hormone (RTH) resulting from dominant-negative mutations of the thyroid hormone receptors, and variations in normal thyroid status.

Childhood hypothyroidism results in delayed skeletal development, retarded linear growth and impaired bone mineral accrual. Epiphyseal dysgenesis is evidenced by classic features of stippled epiphyses on x-ray. In severe cases, post-natal growth arrest may result in a complex skeletal dysplasia. Thyroid hormone replacement results in catch-up growth and enhanced bone maturation, but recovery may be incomplete dependent on the duration and severity of hypothyroidism prior to treatment. Childhood thyrotoxicosis is rare and accelerates linear growth. Advanced bone age and premature closure of the growth plates result in short stature, and craniosynostosis may occur in severe cases.

A severe skeletal phenotype characteristic of congenital hypothyroidism occurs in children with RTH due to mutations affecting thyroid hormone receptor TR $\alpha$ . Mutations of TR $\beta$ , however, disrupt the hypothalamic-pituitary-thyroid axis and increase thyroid hormone levels causing a variable skeletal phenotype.

In adults, hypothyroidism inhibits bone turnover but identification of the effects on bone mass requires long-term follow-up of untreated patients. Thyrotoxicosis is well known to cause severe osteoporosis and fracture, but cases are rare because of prompt diagnosis and treatment. Nevertheless, recent data indicate that subclinical hyperthyroidism, in which the serum TSH concentration is suppressed but circulating thyroid hormones are normal, is associated with low bone mineral density and an increased risk of incident fracture. Similar studies have shown that variation in thyroid status within the reference range in post-menopausal women is associated with bone loss and an increased risk of fracture.

In summary, euthyroid status is required for normal post-natal growth and bone mineral accrual and is fundamental for maintenance of the adult skeleton.

## PL5

## BONE AND CARTILAGE TALK TOGETHER

A. Mobasher<sup>1,2,3,4</sup>

<sup>1</sup>Research Unit of Medical Imaging, Physics and Technology, Faculty of Medicine, University of Oulu, Oulu, Finland, <sup>2</sup>Department of Regenerative Medicine, State Research Institute Centre for Innovative Medicine, Vilnius, Lithuania, <sup>3</sup>Departments of Orthopedics, Rheumatology and Clinical Immunology, University Medical Center Utrecht, Utrecht, The Netherlands, <sup>4</sup>Department of Joint Surgery, First Affiliated Hospital of Sun Yat-sen University, Guangzhou, China

The bone-cartilage interface is an important synergistic unit consisting of the area between the deep layers of articular cartilage and the underlying subchondral bone. Cross-talk between bone and cartilage occurs during embryonic development and skeletal growth. During embryonic development the processes of osteogenesis and chondrogenesis are closely linked and do not occur independently. Paracrine mechanisms are important for the biological actions of trophic factors involved in the development of cartilage and bone and the maintenance and structural integrity of the interface between them. The close physical association between bone and cartilage allows biological interaction and suggests that biochemical and molecular cross-talk may contribute to the development of musculoskeletal diseases such as osteoarthritis (OA), osteoporosis (OP) and osteochondritis dissecans (OCD). This presentation will focus on the role of cartilage and bone cross-talk and the key biological mediators that are involved in the pathogenesis and progression of arthritic diseases, focusing on OA and OP. OA is a slow growing and progressing condition that accumulates pathology and symptoms over time, with features that are much closer to OP than rheumatoid arthritis (RA). Of course the crosstalk between bone and cartilage is implicated in all these diseases but there are likely to be important mechanistic similarities between OA and OP. Although cartilage degradation and loss is one of the key hallmarks of OA, it is now recognized that the whole joint is involved in the progression of OA and cross-talk between cartilage and subchondral bone is thought to be a central feature of this process. In OA cross-talk is elevated at the bone-cartilage interface due to osteochondral angiogenesis and bone remodelling. Vascular invasion from bone into cartilage and development of microcracks and fissures provide additional pathways for diffusion of biological molecules and cells, and thus increased communication between the tissues. Alterations in either bone or cartilage can modulate signalling pathways including HIF-2 $\alpha$ , OPG/RANK/RANKL, TGF- $\beta$  and Wnt/ $\beta$ -catenin. These pathways in turn may alter the physiological homeostasis of neighbouring tissues and affect the structural integrity and biomechanical function of the joint unit as a whole. The role of the cross-talk in the progression of bone and joint diseases requires further investigation using high-throughput omics technology platforms including genomics, epigenetics, proteomics and metabolomics approaches and integration of the data obtained

into a unified framework that emphasises spatio-temporal relationships between the key mediators and the cells and tissues involved. The Human Cell Atlas initiative has been established to create comprehensive reference maps of all human cells as a basis for understanding human health and diagnosing, monitoring, and treating disease. These efforts will contribute to a deeper mechanistic understanding of the cellular taxonomy in the cross-talk between bone and cartilage, and may reveal novel therapeutic targets or highlight opportunities for drug repurposing.

## PL6

## ARE THERE TREATMENTS FOR SARCOPENIA?

M. Visser<sup>1</sup>

<sup>1</sup>Professor of Healthy Aging, Department of Health Sciences, Faculty of Science, Vrije Universiteit Amsterdam, Amsterdam, The Netherlands

Sarcopenia, or muscle failure, often occurs in later life. One of its key characteristics is low muscle strength. As low muscle strength is associated with many relevant clinical outcomes, including falls, fractures and disability, effective prevention and treatment of sarcopenia in older adults is of utmost importance. Several randomized controlled clinical trials have been performed to test the effect of exercise and nutritional interventions, or their combination, in older adults with sarcopenia or those at high risk. These trials often used different definitions for sarcopenia, or also included those with frailty (an aging concept different from sarcopenia), which hampers the interpretation of the results. In the current lecture several relevant studies will be discussed focussing on the evidence of exercise and dietary protein in the prevention and treatment of sarcopenia.

## PL7

## GUT MICROBIOME, BONE AND JOINT

G. Schett<sup>1</sup><sup>1</sup>Deutsches Zentrum Immuntherapie, Medizin 3, Erlangen, Germany

While it is known that microbial dysbiosis is associated with the onset of arthritis and bone disease, mechanistic insights how it facilitates the development of arthritis and bone loss remained largely elusive. We speculated that a breakdown of intestinal barrier function caused by microbial dysbiosis and changed microbial metabolites allows immune cells to shuttle from the gut to the joints and trigger arthritis as well as bone loss. We have previously shown that short chain fatty acids (acetate, propionate, butyrate), which are built by the fermentation of dietary fibres through intestinal microbiota are not only powerful anti-inflammatory mediators but also protect bone by inhibiting the formation of bone-resorbing osteoclasts. To test the role of gut microbiome changes in arthritis and arthritis-related bone loss we tested whether intestinal barrier function is impaired before the onset of human RA and experimental arthritis. Of note, zonulin, a potent inhibitor of intestinal tight junctions, thereby increasing gut leakiness was elevated in autoimmune mice and men even before the onset of arthritis and predicted the onset of human RA. Intestinal barrier function and expression of epithelial tight junctions were decreased before the onset of experimental arthritis and at onset of human RA. Photoconvertible mice induced for arthritis showed that barrier dysfunction is associated with the shuttling of immune cells from the gut to the joints during this process. Furthermore, intestinal dysbiosis preceded gut leakiness and arthritis. Restoration of the intestinal barrier in the pre-phase of arthritis using the short chain acid butyrate or zonulin antagonist larazotide inhibited the development of arthritis and bone loss. In summary, these data show that microbial dysbiosis and intestinal barrier dysfunction precede the onset of arthritis and allows the trafficking of immune cells from the gut to the joints, which results in inflammation and bone destruction. Modification of intestinal dysbiosis and improving intestinal barrier function may therefore be important for preventing arthritis and bone loss associated with arthritis.

## PL8

## IS GENETICS HELPING TO IMPROVE OSTEOPOROSIS MANAGEMENT?

E. Duncan<sup>1</sup><sup>1</sup>Professor of Clinical Endocrinology King's College London, London, United Kingdom

The genetics revolution has led to a profound effect on our understanding of pathophysiology of both common and rare diseases, including osteoporosis and skeletal dysplasias. The challenge now is translating this knowledge into clinical benefit. Genetics and genomics could improve management for osteoporosis in multiple ways:

Disease prediction, through development and application of polygenic risk scores for osteoporosis and fracture – knowing who is or is not at high risk, allowing targeting of resources and screening towards high risk individuals and avoiding unnecessary tests and interventions in low risk individuals.

Pharmacogenomics: predicting who might be at risk of adverse drug reactions; and/or who might benefit from personalised dosing regimens.

Screening for rare genetic disorders of bone fragility – identifying individuals with forme fruste of osteogenesis imperfecta, hypophosphasia, or other skeletal dysplasias in whom alternative therapeutic approaches should be considered.

Informing therapeutics: drugs that target genes identified through human genetic studies are more likely to pass through development pipelines; moreover, genetic data can help predict potential toxicities.

These are not just theoretical prospects or hopeful aims: all these components have already been demonstrated in the literature; and it is likely that more is to come. Certainly functional genomics in bone is at early stage; and we have a wealth of genetic data to explore for novel therapeutics, particularly novel anabolic agents.

## PL9

**REHABILITATION OF MENOPAUSAL HORMONE THERAPY IN OSTEOPOROSIS MANAGEMENT**I. Lambrinoudaki<sup>1</sup><sup>1</sup>Professor of Endocrinology, National and Kapodistrian University of Athens, School of Medicine, Athens, Greece

Menopausal Hormone Therapy (MHT) is the treatment of choice for the management of bothersome menopausal symptoms and symptoms of vulvovaginal atrophy. MHT increases bone mineral density and reduces the risk of both vertebral and non-vertebral fractures up to 40% in both high and low risk postmenopausal populations. The initial publication of the two WHI trials have cast doubts as to the safety of MHT with regard to the breast and the cardiovascular system. Subsequent data indicate that the efficacy and safety of MHT depend on the age of initiation, the dose and the type of hormones, as well as the route of administration. In perimenopausal and postmenopausal women within the 1<sup>st</sup> decade after their last menstrual period, MHT has a favorable benefit/risk ratio and prevents the menopause – associated bone loss with additional benefits on quality of life and on cardiometabolic parameters. Women who stop MHT and are still at risk for fracture should be switched to another anti-resorptive medication.

## PL10

**NEW APPROACHES OF RARE SKELETAL DISEASES (SRD) MANAGEMENT**M. L. Brandi<sup>1</sup><sup>1</sup>Fondazione Italiana di Ricerca sulle Malattie dell'Osso (F.I.R.M.O.), Florence, Italy

There are approximately 500 rare skeletal diseases, over 100 of these are metabolic in nature, and pharmacological interventions is being applied to treat some of them.

The experience clearly indicated the need for a broad care team of specialists to care about SRD patients within a collaborative organizational model.

The importance that the Bone Doctor becomes aware about the off-label use of drugs for bone fragility, the novel therapies and the organizational models is paramount.

For this reason the IOF SRD Academy is implementing programs of education and of information about new discoveries in the field of targeted pharmacology in SRD.

Examples of new drugs for the cure of SRD and of the developmental pipeline of the future pharmacological intervention will be presented and discussed.



WORLD CONGRESS  
ON OSTEOPOROSIS,  
OSTEOARTHRITIS AND  
MUSCULOSKELETAL  
DISEASES



2021 VIRTUAL



Abstract Book

## Oral Communications Abstracts

## OC1

### RECENT SENTINEL FRACTURES AND SUBSEQUENT FRACTURE PROBABILITIES OVER TWO, FIVE AND 10-YEAR TIMEFRAMES

M. Lorentzon<sup>1</sup>, E. V. McCloskey<sup>2</sup>, H. Johansson<sup>3</sup>, N. C. Harvey<sup>4</sup>, V. Gudnason<sup>5</sup>, G. Sigurdsson<sup>5</sup>, K. Siggeirsdottir<sup>5</sup>, E. Liu<sup>3</sup>, L. Vandenput<sup>3</sup>, W. Leslie<sup>6</sup>, J. A. Kanis<sup>3</sup>

<sup>1</sup>University of Gothenburg, Gothenburg, Sweden, <sup>2</sup>Mellanby Centre for Musculoskeletal Research, University of Sheffield, Sheffield, United Kingdom, <sup>3</sup>Mary McKillop Institute for Health Research, Australian Catholic University, Melbourne, Australia, <sup>4</sup>MRC LEU, University of Sheffield, Southampton, United Kingdom, <sup>5</sup>Icelandic Heart Association Research Institute, Kopavogur, Iceland, <sup>6</sup>Department of Medicine, University of Manitoba, Winnipeg, Canada

#### Objective

Increasing evidence that the recency of prior fractures affects subsequent fracture risk has led to calls for fracture risk to be expressed over short timeframes. This analysis quantified the effect of a recent sentinel fracture, by skeletal site, on the 2-, 5-, and 10-year probability of fracture.

#### Methods

The study used data from the Reykjavik Study fracture register. Fracture probabilities were determined after a sentinel fracture (humeral, clinical vertebral, forearm and hip fracture) occurring within the previous 2 years, and probabilities for a prior osteoporotic fracture irrespective of recency. The probability ratios (recent/any prior) were used to adjust fracture probabilities over 2-, 5-, and 10-year time horizons.

#### Results

As expected, probabilities decreased with shorter time horizons. Probability ratios varied according to age and the site of sentinel fracture. The ratios were higher for shorter the time horizons, but the absolute increases in fracture probabilities were much reduced reflecting lower absolute probability with shorter time horizons. The relationship between time horizon and fracture risk was not linear; for example, at the age of 50 years, the 10-year probability in the presence of a recent clinical vertebral fracture was 3.6 times the 2-year probability, whereas at the age of 90, the ratio was only 1.7. The lower ratios at older ages reflect the incorporation of death risk into probability calculations, so that the 10-year probability approaches the 2-year and 5-year probabilities.

#### Conclusion

Probability ratios provide adjustments for fracture recency which can readily inform clinical decision-making. At advanced ages, FRAX 10-year probability calculates a 'remaining life-time' risk of fracture with values approaching those over shorter time frames. The 10-year probability of fractures is an appropriate metric to capture the impact of the recency of sentinel fractures.

## OC2

### ASSOCIATIONS BETWEEN BONE AND VASCULAR HEALTH IN THE UK BIOBANK

Z. Raisi-Estabragh<sup>1</sup>, L. Biasioli<sup>2</sup>, J. Cooper<sup>1</sup>, N. Aung<sup>1</sup>, K. Fung<sup>1</sup>, J. Paiva<sup>1</sup>, M. Sanghvi<sup>1</sup>, R. Thomson<sup>1</sup>, E. M. Curtis<sup>3</sup>, J. Paccou<sup>4</sup>, J. Rayner<sup>2</sup>, K. Werys<sup>2</sup>, H. Puchta<sup>2</sup>, K. Thomas<sup>2</sup>, A. M. Lee<sup>1</sup>, S. Piechnik<sup>2</sup>, S. Neubauer<sup>2</sup>, P. B. Munroe<sup>1</sup>, C. Cooper<sup>3</sup>, S. E. Petersen<sup>1</sup>, N. C. Harvey<sup>1</sup>

<sup>1</sup>William Harvey Research Institute, London, United Kingdom, <sup>2</sup>NIHR Oxford Biomedical Research Centre, Oxford, United Kingdom, <sup>3</sup>MRC Lifecourse Epidemiology Unit, Southampton, United Kingdom, <sup>4</sup>Lille University Hospital, Lille, France

**Background:** Osteoporosis and ischaemic heart disease (IHD) are important public health problems, particularly in aging populations. Multiple studies suggest associations between the two conditions beyond shared risk factors. However, existing work is limited by small sample sizes and limited assessment of possible biological mechanisms. Furthermore, although differential disease patterns by sex and menopause status have been reported for both IHD and osteoporosis, the modifying effect of such factors on the relationship between the two conditions has not been adequately studied.

**Objective:** We used the UK Biobank resource to investigate associations between bone health as assessed by speed of sound (SOS) from quantitative heel ultrasound and 1) arterial compliance measures: arterial stiffness index (ASI) from finger plethysmography and aortic distensibility (AoD) from cardiovascular magnetic resonance and 2) Incident IHD outcomes: IHD mortality and incident myocardial infarction (MI)

**Methods:** We estimated associations between SOS and ASI (n=159,542) and AoD (n=18,229) in multivariable linear regression models adjusting for age, exercise, smoking, deprivation, alcohol intake, hypercholesterolaemia, diabetes, and hypertension. We considered differential relationships by sex or menopause and tested mediating effect of a wide range of blood biomarkers and cardiometabolic morbidities. We considered associations of SOS with IHD mortality and incident MI (n=477,683) using competing risk regression models, adjusting for covariates as before.

**Results:** In fully adjusted models, better bone health (higher SOS) was associated with better vascular health (lower ASI, higher AoD). These relationships were consistent for men and women and with menopause status. The mediating variables considered provided only partial explanation of observed associations, with different directions of effect in men and women across several mediators. Better bone health (higher SOS) was associated with significantly lower risk of IHD mortality in men and women, although less robustly in the latter.

**Conclusions:** In this large, standardised cohort, we demonstrate association of better bone health with better vascular health for both men and women. Underlying mechanisms are complex and there is evidence of variation by sex.

## OC3

### A MULTICENTER, OBSERVATIONAL, EXTENSION STUDY EVALUATING THE SAFETY, TOLERABILITY, AND EFFICACY OF A SINGLE LORECIVIVINT INJECTION IN KNEE OA SUBJECTS

I. Simsek<sup>1</sup>, C. J. Swearingen<sup>1</sup>, H. Ghandehari<sup>1</sup>, S. Kennedy<sup>1</sup>, J. Tambiah<sup>1</sup>, Y. Yazici<sup>1</sup>, N. Skrepnik<sup>2</sup>

<sup>1</sup>Biosplice Therapeutics, Inc., San Diego, CA, United States, <sup>2</sup>Tucson Orthopaedic Institute, Tucson, AZ, United States

**Objective:** Lorecivivint [LOR] is a novel intra-articular [IA] CLK/DYRK inhibitor in development to treat knee osteoarthritis [OA]. This study evaluated safety and exploratory efficacy of a single IA LOR injection in subjects from two consecutive Phase 2 trials with moderate to severe knee OA.

**Methods:** This was a 5-year, Phase 3, multicenter, observational extension study (NCT02951026) of completer subjects from consecutive 12- and 6-month Phase 2 LOR trials (NCT02536833, NCT03122860). Subjects received one LOR or placebo [PBO] injection at their parent trial baseline visit (Month 0). Pooled data from clinic visits at 6, 12, 24, and 36 months were used to analyze serious adverse events [SAEs], knee-related AEs, and AEs of newly diagnosed conditions needing treatment for all LOR doses. Post hoc baseline-adjusted ANCOVA of time points to 18 months (across current/parent trials) was used to compare changes from baseline in a subject subgroup (unilateral symptoms, no widespread pain, 18-month post-injection radiograph at study termination) in WOMAC Pain and Function scores and medial joint space width (mJSW) between the pivotal 0.07 mg LOR dose and PBO groups.

**Results:** 119/703 (17%) subjects discontinued prior to study termination; no remaining subjects (n=495 LOR-treated; 208 PBO) withdrew due to treatment-related AEs. Baseline subject characteristics and incidences of AEs were similar between LOR and PBO groups. Four AEs in 3 (0.6%) subjects across all LOR doses were considered study-drug related; 68 serious AEs in 38 (5.4%) subjects were reported (none considered treatment-related). One death (control group) occurred. The 0.07 mg LOR group (n=59) showed greater mean improvements from baseline vs. the control group (n=70) in WOMAC Pain and Function at 6 (Pain: -8.16, 95% CI [-15.60, -0.71],  $P=0.032$ ; Function: -9.47 [-17.09, -1.84],  $P=0.015$ ) and 12 (Pain: -8.51 [-15.17, -1.85],  $P=0.013$ ; Function: -9.62 [-16.83, -2.42],  $P=0.009$ ) months. No mJSW progression was observed in any group.

**Conclusions:** LOR appeared safe and well tolerated. Post hoc efficacy analyses demonstrated durable symptom improvements in WOMAC Pain and Function for up to 12 months vs. controls.

**Table 1.** Key safety results (adverse events [AEs]) for all injected doses of lorecivivint and all controls (extension study reports only)

AEs Reported ≥1%	0.03 mg n=131	0.07 mg n=135	0.15 mg n=65	0.23 mg n=135	Other n=29	Control n=208	All N=703
Total AEs/Unique subjects (%)	50/24 (18.3)	28/21 (15.6)	25/11 (16.9)	64/33 (24.4)	10/4 (13.8)	60/44 (21.2)	237/137 (19.5)
Osteoarthritis	13/9 (6.9)	6/6 (4.4)	1/1 (1.5)	6/5 (3.7)	1/1 (3.4)	6/6 (2.9)	33/28 (4.0)
Arthralgia	6/5 (3.8)	5/5 (3.7)	1/1 (1.5)	6/6 (4.4)	1/1 (3.4)	8/7 (3.4)	27/25 (3.6)
Meniscus injury	3/3 (2.3)	2/2 (1.5)	1/1 (1.5)	1/1 (0.7)	0/0 (0.0)	2/2 (1.0)	9/9 (1.3)
Hypertension	2/2 (1.5)	0/0 (0.0)	2/2 (3.1)	2/2 (1.5)	0/0 (0.0)	6/6 (2.9)	12/12 (1.7)
Target Knee AEs (Total)	22/15 (11.5)	8/7 (5.2)	6/3 (4.6)	11/9 (6.7)	4/1 (3.4)	12/11 (5.3)	63/46 (8.5)
Osteoarthritis	8/8 (6.1)	2/2 (1.5)	1/1 (1.5)	2/2 (1.5)	1/1 (3.4)	4/4 (1.9)	18/18 (2.6)
Arthralgia	4/4 (3.1)	2/2 (1.5)	1/1 (1.5)	4/4 (3.0)	1/1 (3.4)	4/4 (1.9)	16/16 (2.3)
Meniscus injury	2/2 (1.5)	2/2 (1.5)	1/1 (1.5)	1/1 (0.7)	0/0 (0.0)	1/1 (0.5)	7/7 (1.0)
Serious AEs							
Subjects Reporting SAEs	14/8 (6.1)	8/6 (4.4)	8/4 (6.2)	32/14 (10.4)	1/1 (3.4)	5/5 (2.4)	68/38 (5.4)

Other: All subjects treated with anything other than the protocol-specified dose of LOR.  
\*Coronavirus (SARS-CoV-2) and 2 PBO subjects with dose of PBO not specified by protocol.

## OC4

### FRACTURE RISK IN PARKINSON'S DISEASE: DRIVEN BY LOW BONE STRENGTH, MUSCLE WEAKNESS OR FALLS?

P. Bhattia<sup>1</sup>, H. Shreef<sup>1</sup>, H. Johansson<sup>2</sup>, M. Lorentzon<sup>2</sup>, N. C. Harvey<sup>3</sup>, J. A. Kanis<sup>4</sup>, E. V. McCloskey<sup>1</sup>

<sup>1</sup>University of Sheffield, Sheffield, United Kingdom, <sup>2</sup>University of Gothenburg, Gothenburg, Sweden, <sup>3</sup>University of Southampton, Southampton, United Kingdom, <sup>4</sup>Australian Catholic University, Melbourne, Australia

#### Objective

The relative contributions of factors such as muscle strength, falls risk and low BMD to fracture risk in Parkinson's Disease (PD) remains unclear. We addressed this issue in an analysis of community-dwelling women age 75 years or more recruited to a prospective, single centre study.

#### Material and Methods

5212 women were recruited to an MRC-funded prospective, randomised, double-blind, placebo-controlled study of the oral bisphosphonate, clodronate. The women were unselected for osteoporosis or fracture risk. Participants completed a self-reported questionnaire capturing medical history, previous fractures, family history of fractures, recent falls, and current medications. A diagnosis of PD was made if it was self-reported and appropriate medication recorded. Each participant had measurements of hip and forearm BMD, and muscle strength (hand grip strength and maximum isometric quadriceps strength). Incident radiographic or surgically verified fractures, and deaths, were recorded over an average follow-up of 3.8 years.

#### Results

47 of the women (0.9%) had a diagnosis of PD at study entry. They were of similar age to those without PD, but reported higher disability scores, lower quality of life, and a higher prevalence of falls within the month prior to entry (17% vs 5.1%,  $p=0.003$ ). While BMD at the forearm and hip regions was lower in PD, this

only reached statistical significance at the femoral neck ( $0.61 \pm 0.12$  vs  $0.65 \pm 0.12$  g/cm<sup>2</sup>,  $p=0.037$ ). Right hand grip strength was lower, but not statistically significant, in PD but right quadriceps strength was much reduced ( $96.9 \pm 49.3$  vs  $126.3 \pm 59.3$  N,  $p=0.003$ ). During follow-up, 620 women (11.9%) sustained one or more osteoporotic fractures. PD was associated with 2.2-fold increase in the risk of osteoporotic fracture (Table). Adjustment for falls or quadriceps strength markedly reduced the hazard ratio, while femoral neck BMD adjustment had only a small impact.

#### Conclusion

These data suggest that knowledge of prior falls and/or quadriceps strength are likely to capture the impact of PD in future iterations of fracture risk models such as FRAX.

Model (adj. for age, BMI and treatment)	HR	95%CI	P-value
Parkinson's Disease	2.22	1.22-4.04	0.009
+ FN-BMD	2.03	1.12-3.70	0.02
+ Maximum R Quads Strength	1.62	0.77-3.42	0.21
+ Falls	1.71	0.94-3.12	.079
+ All 3 of above	1.38	0.65-2.92	.399

## OC5

### PREVALENCE AND AGREEMENT BETWEEN RECENT SARCOPENIA DEFINITIONS: FINDINGS FROM FOUR POPULATION-BASED COHORTS

L. D. Westbury<sup>1</sup>, H. E. Syddall<sup>1</sup>, J. A. Cauley<sup>2</sup>, P. M. Cawthon<sup>3</sup>, E. M. Curtis<sup>1</sup>, K. E. Ensrud<sup>4</sup>, R. A. Fielding<sup>5</sup>, H. Johansson<sup>6</sup>, J. A. Kanis<sup>6</sup>, M. K. Karlsson<sup>7</sup>, T. Kwok<sup>8</sup>, N. Lane<sup>9</sup>, M. Lorentzon<sup>6</sup>, D. Mellström<sup>10</sup>, A. B. Newman<sup>2</sup>, C. Ohlsson<sup>10</sup>, E. Orwoll<sup>11</sup>, E. Ribom<sup>12</sup>, B. E. Rosengren<sup>7</sup>, J. T. Schousboe<sup>13</sup>, E. J. Shiroma<sup>14</sup>, N. C. Harvey<sup>1</sup>, E. M. Dennison<sup>1</sup>, C. Cooper<sup>1</sup>

<sup>1</sup>MRC Lifecourse Epidemiology Unit, University of Southampton, Southampton, United Kingdom, <sup>2</sup>Department of Epidemiology, Graduate School of Public Health, University of Pittsburgh, Pittsburgh, United States, <sup>3</sup>Research Institute, California Pacific Medical Center, San Francisco, California, United States, <sup>4</sup>Medicine and Epidemiology & Community Health, University of Minnesota, Minnesota, United States, <sup>5</sup>Nutrition, Exercise Physiology, and Sarcopenia Laboratory, Jean Mayer USDA Human Nutrition Research Center on Aging, Tufts University, Boston, United States, <sup>6</sup>Mary MacKillop Institute for Health Research, Australian Catholic University, Melbourne, Australia, <sup>7</sup>Clinical and Molecular Osteoporosis Research Unit, Department of Clinical Sciences Malmö, Lund University and Department of Orthopedics, Skane University Hospital, Malmö, Sweden, <sup>8</sup>Department of Medicine & Therapeutics and School of Public Health, The Chinese University of Hong Kong, Hong Kong, China, <sup>9</sup>Division of Rheumatology, Department of Internal Medicine, UC Davis Health, 4625 Second Avenue, Sacramento, CA 95917, United States, <sup>10</sup>Centre for Bone and Arthritis Research (CBAR), Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden, <sup>11</sup>Oregon Health & Science University, Portland, Oregon, United States, <sup>12</sup>Department of Surgical Sciences, University of Uppsala, Uppsala, Sweden, <sup>13</sup>Park Nicollet Clinic and HealthPartners Institute, Bloomington, Minnesota, United States, <sup>14</sup>Laboratory of Epidemiology and Population Sciences, Intramural Research Program, National Institute on Aging, Baltimore, United States

ramento, CA 95917, United States, <sup>10</sup>Centre for Bone and Arthritis Research (CBAR), Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden, <sup>11</sup>Oregon Health & Science University, Portland, Oregon, United States, <sup>12</sup>Department of Surgical Sciences, University of Uppsala, Uppsala, Sweden, <sup>13</sup>Park Nicollet Clinic and HealthPartners Institute, Bloomington, Minnesota, United States, <sup>14</sup>Laboratory of Epidemiology and Population Sciences, Intramural Research Program, National Institute on Aging, Baltimore, United States

#### Objectives

The study aim was to assess, within each of four different population-based cohorts, prevalence of, and agreement between, two recent sarcopenia definitions, among older white men and women.

#### Material and Methods

Participants in the Health, Aging and Body Composition Study (Health ABC) (n=1734, 52% men), Hertfordshire Cohort Study (HCS) (n=304, 52% men), Osteoporotic Fractures in Men Sweden Study (MrOS Sweden) (n=2852, 100% men) and the Osteoporotic Fractures in Men US Study (MrOS US) (n=5189, 100% men) were analysed. Appendicular lean mass was ascertained using DXA; muscle strength by grip dynamometry; and usual gait speed was measured as a marker of mobility.

The sarcopenia definitions of interest were proposed by the Sarcopenia Definitions and Outcomes Consortium (SDOC) and the 2018 European Working Group on Sarcopenia in Older People (EWGSOP2). SDOC defines sarcopenia as having weak grip strength (<35.5kg [men], <20kg [women]) and slow gait speed (<0.8m/s). EWGSOP2 defines sarcopenia as having weak grip strength (<27kg [men], <16kg [women]) and low appendicular lean mass index (<7.0kg/m<sup>2</sup> [men], <5.5kg/m<sup>2</sup> [women]). Cohen's kappa (κ) statistic was used to assess agreement between the definitions.

#### Results

Mean (SD) ages of participants were: Health ABC [74.3 (2.8) years]; HCS [75.4 (2.5)]; MrOS Sweden [74.9 (3.1)]; and MrOS US [73.8 (5.9)]. Prevalence of sarcopenia according to SDOC vs EWGSOP2 was as follows: Health ABC (men: 0.3% vs 1.5%, women: 1.0% vs 2.1%); HCS (men: 15.3% vs 0.0%, women: 19.0% vs 0.7%); MrOS Sweden (men: 1.0% vs 0.5%); and MrOS US (men: 1.5% vs 1.3%). Agreement was low between SDOC and EWGSOP2 (κ<0.2 within each cohort).

#### Conclusions

Sarcopenia prevalence varied and agreement was low between SDOC and EWGSOP2. SDOC sarcopenia was more common in HCS than in Health ABC, perhaps due to the latter cohort's requirement for participants to have no mobility disability at enrolment. A consensus definition for sarcopenia is required.



## OC6

## GLUCOSAMINE SULPHATE: AN UMBRELLA REVIEW OF HEALTH OUTCOMES

N. Veronese<sup>1</sup>, J. Demurtas<sup>2</sup>, L. Smith<sup>3</sup>, J.-Y. Reginster<sup>4</sup>, O. Bruyère<sup>4</sup>, G. Honvo<sup>4</sup>, S. Maggi<sup>5</sup>

<sup>1</sup>University of Palermo, Palermo, Italy, <sup>2</sup>University of Modena and Reggio Emilia, Modena, Italy, <sup>3</sup>Anglia Ruskin University, Cambridge, United Kingdom, <sup>4</sup>University of Liège, Liège, Belgium, <sup>5</sup>Consiglio Nazionale delle Ricerche, Padova, Italy

**Objectives:** Glucosamine sulphate (GS) can be used as background therapy in people affected by knee osteoarthritis (OA). Knowledge regarding the efficacy and safety of GS is of importance since its use worldwide is increasing. Therefore, the present study aimed to map and grade the diverse health outcomes associated with GS using an umbrella review approach.

**Methods:** Medline, Cinahl and Embase databases were searched until 1 April 2020. An umbrella review of systematic reviews and meta-analyses of randomized controlled trials (RCTs) was carried out. The evidence from the RCTs was graded using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) tool.

**Results:** From 140 articles returned, 11 systematic reviews, for a total of 21 outcomes (37 RCTs; 3949 participants; almost all using 1500 mg/day), were included. No systematic reviews/meta-analyses of observational studies were included. Regarding the findings of the meta-analyses, 9/17 outcomes were statistically significant, indicating that GS is more effective than placebo. A high certainty of evidence, as assessed by GRADE, supported the use of GS (*versus* placebo) in improving the Lequesne Index, joint space width change, joint space width change after 3 years of follow up, joint space narrowing and OA progression. No difference in terms of adverse effects was found between GS and placebo. In systematic reviews, GS was associated with a better glucose profile and a better physical function performance than placebo.

**Conclusion:** GS, when used as a prescription drug (i.e. crystalline glucosamine sulphate) at 1500 mg daily dosage, can positively affect the cartilage structure, reduce pain, improve function and glucose metabolism in people with knee OA, without having a greater incidence of adverse effects than placebo.

## OC7

## THE ASSOCIATIONS BETWEEN DISEASE MODIFYING ANTIRHEUMATIC DRUGS AND INCIDENT AS WELL A PROGRESSION OF RADIOGRAPHIC HAND OSTEOARTHRITIS IN RHEUMATOID ARTHRITIS PATIENTS

T. Burkard<sup>1</sup>, C. Lechtenboehmer<sup>2</sup>, S. Reichenbach<sup>3</sup>, U. A. Walker<sup>2</sup>, A. M. Burden<sup>1</sup>, T. Hügler<sup>4</sup>

<sup>1</sup>ETH Zurich, Zurich, Switzerland, <sup>2</sup>University Hospital Basel, Basel, Switzerland, <sup>3</sup>University of Bern, Bern, Switzerland, <sup>4</sup>Lausanne University Hospital, Lausanne, Switzerland

**Objectives:** To assess the associations between disease modifying antirheumatic drugs (DMARDs) and incident as well as progression of radiographic distal interphalangeal (DIP) osteoarthritis (OA) in rheumatoid arthritis (RA) patients.

**Methods:** We performed two observational cohort studies in the Swiss Clinical Quality Management registry (SCQM) [1997-2014]. RA patients who had  $\geq 2$  eligible hand radiographs were included at their first eligible radiograph (i.e. if all 8 DIP joints could be scored). Modified Kellgren-Lawrence scores (KLS) were used to define incident/existing DIP OA (i.e. KLS  $\geq 2$  in  $\geq 1$  DIP joint), and progression of existing DIP OA (i.e. increase of  $\geq 1$  in KLS in  $\geq 1$  DIP joint). We divided the study population into two cohorts based on whether DIP OA was present or absent at cohort entry (cohorts 1 and 2, respectively). Cox time-varying regression were performed to estimate hazard ratios (HR) with 95% confidence intervals (CI) of DIP OA progression (cohort 1) or incidence (cohort 2) in the mutually exclusive exposure groups biologic (b) DMARD monotherapy, bDMARD/ conventional synthetic (cs) DMARD combination therapy, past DMARD use, or no DMARD use, when compared to csDMARD use.

**Results:** Among 2234 RA patients with 5928 eligible radiographs followed for an average of 3 years, 1340 patients had radiographic DIP OA at cohort entry (cohort 1). bDMARD monotherapy had an increased risk of radiographic DIP OA progression compared to csDMARD monotherapy (adjusted HR 1.36, 95% CI 1.08–1.71). The risk was not significant in csDMARD/bDMARD combination users (HR 1.13, 95% CI 0.97–1.32), absent in past DMARD users (HR 0.99, 95% CI 0.68–1.43), and significantly lower among nonDMARD users (HR 0.56, 95% CI 0.34–0.93). In 894 patients without initial DIP OA (cohort 2), the risk of incident OA did not differ between treatment groups.

**Conclusions:** Our results suggest that monotherapy with bDMARDs is not associated with incident DIP OA but may increase the risk of radiographic progression of existing DIP OA when compared to csDMARDs.

**Acknowledgements:** Pharmaceutical industries and donors support SCQM financially ([www.scqm.ch/sponsors](http://www.scqm.ch/sponsors)). Rheumatology offices and hospitals contribute data to SCQM ([www.scqm.ch/institutions](http://www.scqm.ch/institutions)).

## OC8

# MEANINGFUL IMPROVEMENTS IN WOMAC PAIN AND PHYSICAL FUNCTION IN THREE PHASE 3 TRIALS OF TANEZUMAB IN PATIENTS WITH MODERATE-TO-SEVERE OSTEOARTHRITIS: A RESPONDER ANALYSIS

P. G. Conaghan<sup>1</sup>, R. H. Dworkin<sup>2</sup>, T. J. Schnitzer<sup>3</sup>, F. Berenbaum<sup>4</sup>, R. Yang<sup>5</sup>, A. G. Bushmakina<sup>6</sup>, J. C. Cappelleri<sup>6</sup>, M. T. Brown<sup>6</sup>, L. Viktrup<sup>7</sup>, L. Abraham<sup>8</sup>

<sup>1</sup>University of Leeds, Leeds, United Kingdom, <sup>2</sup>University of Rochester, Rochester, United States, <sup>3</sup>Northwestern University, Evanston, United States, <sup>4</sup>Sorbonne Université, Paris, France, <sup>5</sup>Pfizer Inc, New York, United States, <sup>6</sup>Pfizer Inc, Groton, United States, <sup>7</sup>Eli Lilly and Company, Indianapolis, United States, <sup>8</sup>Pfizer Ltd, Tadworth, United Kingdom

## Objective

To evaluate differences between treatment groups in the proportion of patients (pts) with osteoarthritis (OA) meeting meaningful within patient change thresholds for improvements in Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC)\* Pain and Physical Function in three phase 3 trials of subcutaneous (SC) tanezumab (tnz), an antibody against nerve growth factor. While 30% improvement is widely accepted as moderately clinically meaningful, improvements of 1 point or 15% have recently been suggested as minimally clinically meaningful<sup>1</sup>.

\*© 1996 Nicholas Bellamy. WOMAC® is a registered trademark of Nicholas Bellamy (CDN, EU, USA).

## Methods

All 3 studies enrolled pts with radiographically confirmed OA of the hip or knee who had inadequate response or could not tolerate standard of care analgesics. Pts in study 1 (NCT02697773) and study 2 (NCT02709486) received SC placebo, tnz 2.5mg, 2.5mg then 5mg (2.5/5mg) or 5mg. Pts in study 3 (NCT02528188) received oral nonsteroidal anti-inflammatory drugs (NSAIDs), SC tnz 2.5mg or 5mg. Responder analyses based on at least 1 point and 15% improvement from baseline were performed at wks 16, 24 and 16 in studies 1, 2 and 3, respectively.

## Results

	Study 1			Study 2			Study 3		
Pts, %	Tnz 2.5mg (n=231)	Tnz 2.5/5mg (n=233)	Placebo (n=232)	Tnz 2.5mg (n=283)	Tnz 5mg (n=284)	Placebo (n=282)	Tnz 2.5mg (n=1002)	Tnz 5mg (n=998)	NSAID (n=996)
WOMAC Pain									
≥1-point improvement	81.0	83.7	75.0	79.4	79.9	68.3	83.2	81.3	80.4
p-value <sup>a</sup>	0.1523	0.0326		0.0020	0.0010		0.1224	0.6684	
≥15% improvement	80.5	81.1	70.7	79.8	79.9	68.7	81.4	80.4	78.8
p-value <sup>a</sup>	0.0244	0.0141		0.0019	0.0014		0.1534	0.3908	
WOMAC Physical Function									
≥1-point improvement	77.1	80.3	72.0	79.1	80.3	66.9	82.2	81.1	77.6
p-value <sup>a</sup>	0.2638	0.0469		0.0010	0.0004		0.0139	0.0661	
≥15% improvement	76.6	80.7	69.8	80.1	81.7	67.6	80.8	80.8	77.2
p-value <sup>a</sup>	0.1569	0.0090		0.0005	0.0001		0.0516	0.0511	

<sup>a</sup>Chi-square test. Studies 1 and 2 vs placebo; study 3 vs NSAID.

## Conclusions

A significantly greater proportion of pts had ≥1-point or ≥15% improvement in WOMAC Pain and Physical Function in the 2.5/5mg group in study 1 and both tnz groups in study 2 vs placebo. Across the 3 studies, approximately 80% of pts in tnz groups experienced meaningful improvements in WOMAC Pain and Function.

## References

<sup>1</sup>Conaghan PG *et al.*, ACR/ARHP 2020 Annual Scientific Meeting

## Disclosures

The study was sponsored by Pfizer and Eli Lilly and Company. Medical writing support was provided by Steven Moore, PhD, of Engage Scientific Solutions and funded by Pfizer and Eli Lilly and Company. PGC: consultant for AbbVie, Bristol-Myers Squibb, Eli Lilly and Company, EMD Serono, Flexion Therapeutics, Galapagos, Gilead, GlaxoSmithKline, Janssen, Novartis, Pfizer, Regeneron, and Samumed. RHD: research grants and contracts from the US Food and Drug Administration and the US National Institutes of Health, and advisory boards or consulting from Abide, Acadia, Adynxx, Analgesic Solutions, Aptinyx, Aquinox, Asahi Kasei, Astellas, AstraZeneca, Biogen, Biohaven, Boston Scientific, Braeburn, Cardialen, Celgene, Centrexion, Chromocell, Clexio, Collegium, Concert, Confo, Decibel, Dong-A, Editas, Eli Lilly, Ethismos, Eupraxia, Glenmark, Gloriana, Grace, Hope, Immune, Lotus, Mains-tay, Merck, Neumentum, Neurana, NeuroBo, Novaremed, Novartis, Olatec, Pfizer, Phosphagenics, Quark, Reckitt Benckiser, Regeneron, Relmada, Sanifit, Scilex, Semnur, SIMR Bio, SK Life Sciences, Sollis, SPRIM, Teva, TheraNexus, Trevena, Vertex, and Vizuri. TJS: consultant for AstraZeneca, Eli Lilly and Company, Pfizer, and Regeneron. FB: consultant for Eli Lilly and Company and Pfizer. RY, AGB, JCC, MTB and LA: employees of and stockholders in Pfizer. LV: employee of and stockholder in Eli Lilly and Company.

## OC9

### MAINTENANCE OF EFFECT OF BUROSUMAB TREATMENT AND THE IMPACT OF TREATMENT INTERRUPTION ACROSS A 96-WEEK PHASE 3 STUDY AND 48 WEEKS OF A PHASE 3B STUDY IN ADULTS WITH X-LINKED HYPOPHOSPHATEMIA (XLH)

P. Kamenický<sup>1</sup>, K. Briot<sup>2</sup>, M. L. Brandi<sup>3</sup>, M. Cohen-Solal<sup>4</sup>, R. Crowley<sup>5</sup>, R. Keen<sup>6</sup>, S. Kolta<sup>7</sup>, R. Lachmann<sup>8</sup>, S. Ralston<sup>9</sup>, J. Walsh<sup>10</sup>, A. Rylands<sup>11</sup>, A. Williams<sup>11</sup>, W. Sun<sup>12</sup>, A. Nixon<sup>13</sup>, M. Nixon<sup>13</sup>, M. Javaid<sup>14</sup>

<sup>1</sup>CHU de Bicêtre, Le Kremlin Bicetre, France, <sup>2</sup>Cochin Hospital, Assistance Publique- Hôpitaux de Paris, Paris, France, <sup>3</sup>Azienda ospedaliera universitaria Careggi, Florence, Italy, <sup>4</sup>Hôpital Lariboisière, Paris, France, <sup>5</sup>St. Vincent's University Hospital, Elm Park, Dublin, Ireland, <sup>6</sup>Royal National Orthopaedic Hospital, Stanmore, United Kingdom, <sup>7</sup>Assistance Publique, Hôpitaux de Paris, Paris, France, <sup>8</sup>University College of London Hospital, London, United Kingdom, <sup>9</sup>University of Edinburgh, Edinburgh, United Kingdom, <sup>10</sup>Clinical Trials Unit, Northern General Hospital, Sheffield, United Kingdom, <sup>11</sup>Kyowa Kirin International, Marlow, United Kingdom, <sup>12</sup>Kyowa Kirin Pharmaceutical Development, Princeton, NJ, United States, <sup>13</sup>Chilli Consultancy, Salisbury, United Kingdom, <sup>14</sup>University of Oxford, Oxford, United Kingdom

**Objective:** To evaluate the effects of continued burosumab treatment and treatment interruption on patient-reported outcomes (PROs; Western Ontario McMaster Universities Osteoarthritis® Index [WOMAC], Brief Pain Inventory Short Form [BPI-SF], Brief Fatigue Inventory), functional tests (6-Minute Walk Test [6MWT], Timed Up and Go test) and maintenance of serum phosphate in adults with XLH.

**Methods:** European subjects (n=47) who received up to 96 weeks' burosumab treatment in the phase 3 studies (UX023-CL303/304; NCT02526160/NCT02537431) were invited to enrol in the phase 3b BUR02 study (NCT03920072); 35 enrolled into BUR02 of whom 31 had previously been enrolled in CL303 and had received up to 48 weeks' further burosumab treatment at the data cut (January 2021). Between the studies (6–26 months), 23 subjects received interim burosumab (continuous or partial); 8 received none.

**Results:** Mean age at CL303 baseline was 42.9 years (18.5–59.9), 67.7% were female; 30 had documented *PHEX* mutations. Mean (SE) BPI-SF average Worst Pain was 6.74 (0.21), least squares mean change from baseline for all subjects was significant (p<0.05) at all timepoints from CL303 week 12 to BUR02 week 48, except for CL303 week 24. For all subjects, BPI-SF Worst Pain meaningful change from CL303 baseline ( $\geq 1.72$  point decrease) was seen at CL303 week 96 and BUR02 weeks 36 and 48. Improvements in BPI-SF Worst Pain scores were maintained through BUR02 in subjects who received interim burosumab. In those who did not receive interim burosumab, scores at BUR02 baseline had returned to CL303 pre-treatment levels, and did not recover to

CL303 week 96 levels by BUR02 week 48. Similar profiles were seen for all PROs, functional tests, and trough serum phosphate: benefits were maintained at the start of BUR02 in those who received interim burosumab whereas deterioration towards CL303 baseline levels was seen in those who did not (e.g. 6MWT mean (SE) change from CL303 baseline +49.18 (10.83) vs -8.13 (47.40) m). Benefits were seen with the restart of burosumab treatment but recovery often took 36 weeks or longer.

**Conclusion:** Continued, uninterrupted treatment with burosumab is warranted to sustain the clinical and biological benefits of treatment.

## OC10

### ROMOSUZUMAB EFFICACY AND SAFETY IN EUROPEAN PATIENTS: A SUBANALYSIS OF THE PHASE 3, RANDOMISED FRAME STUDY

B. Langdahl<sup>1</sup>, L. C. Hofbauer<sup>2</sup>, S. L. Ferrari<sup>3</sup>, Z. Wang<sup>4</sup>, A. Fahrleitner-Pammer<sup>5</sup>, E. Gielen<sup>6</sup>, P. Lakatos<sup>7</sup>, E. Czerwinski<sup>8</sup>, E. Jódar Gimeno<sup>9</sup>, J. Timoshanko<sup>10</sup>, M. Oates<sup>4</sup>, C. Libanati<sup>11</sup>

<sup>1</sup>Aarhus University Hospital, Aarhus, Denmark, <sup>2</sup>Technische Universität Dresden, Dresden, Germany, <sup>3</sup>Geneva University Hospital, Geneva, Switzerland, <sup>4</sup>Amgen Inc, Thousand Oaks, United States, <sup>5</sup>Medical University of Graz, Graz, Austria, <sup>6</sup>University Hospital Leuven, Leuven, Belgium, <sup>7</sup>Semmelweis University, Budapest, Hungary, <sup>8</sup>Jagiellonian University, Krakow, Poland, <sup>9</sup>University Hospitals Quirón Salud, Madrid, Spain, <sup>10</sup>UCB Pharma, Slough, United Kingdom, <sup>11</sup>UCB Pharma, Brussels, Belgium

**Objective(s):** Results from the FRAME and extension study (NCT01575834) of romosuzumab (Romo) for the treatment of postmenopausal (PM) osteoporosis (OP) showed significant reductions in vertebral (V) and clinical fracture (fx).<sup>1</sup> This post hoc analysis assessed efficacy and safety of Romo vs placebo (PBO) in women enrolled in Europe (EU).

**Materials and Methods:** PM women with OP at the hip were randomised 1:1 to Romo 210 mg or PBO monthly to Month (M) 12, followed by denosumab (Dmab) 60 mg every 6 months to M36 in both groups. We assessed least squares mean % change from baseline (CfB) in bone mineral density (BMD) at lumbar spine (LS), total hip (TH) and femoral neck (FN); fx outcomes and adverse events (AEs). Vfxs were assessed by baseline and yearly X-rays and analysed by logistic regression; other fx types were captured at time of event and analysed by Cox proportional hazards model.

**Results:** 3013/7180 patients (pts) (42%) were enrolled in EU (1494 Romo; 1519 PBO). Incidence of all fx types was lower for Romo vs PBO at M12 and Romo→Dmab vs PBO→Dmab at M36 (Table). Similar reductions were observed at M24. BMD CfB were greater for Romo vs PBO pts at M12 and Romo→Dmab vs PBO→Dmab at M36 for LS (M12/M36 differences: 12.3%/10.1%),

TH (5.2%/4.6%) and FN (5.0%/4.5%) (all  $p < 0.001$ ). Incidence of AEs and serious cardiovascular events were balanced between groups throughout.

**Conclusion(s):** In EU pts, Romo treatment resulted in early and sustained risk reduction for all major fx types.

**Table: Fracture outcomes**

	PBO→Dmab (N=1519) n (%)	Romo→Dmab (N=1494) n (%)	Odds ratio / Hazard ratio <sup>a</sup> (95% CI)
New vertebral fx			
M12	29/1368 (2.1)	6/1338 (0.4)	0.21 (0.09–0.52)
M36	44/1371 (3.2)	13/1341 (1.0)	0.30 (0.16–0.57)
Clinical fx			
M12	54 (3.6)	21 (1.4)	0.39 (0.24–0.65)
M36	107 (7.0)	64 (4.3)	0.61 (0.45–0.83)
Nonvertebral fx			
M12	45 (3.0)	21 (1.4)	0.47 (0.28–0.79)
M36	97 (6.4)	63 (4.2)	0.66 (0.48–0.91)
Hip fx			
M12	9 (0.6)	3 (0.2)	0.34 (0.09–1.27)
M36	18 (1.2)	8 (0.5)	0.47 (0.20–1.07)
MOF			
M12	42 (2.8)	14 (0.9)	0.34 (0.19–0.62)
M36	85 (5.6)	46 (3.1)	0.55 (0.39–0.79)

<sup>a</sup>Incidence of Vfx presented as odds ratios; all other fx types presented as hazard ratios. CI: confidence interval; fx: fracture; MOF: major OP fx; Vfx: vertebral fracture.

**References:** 1. Cosman F. NEJM 2016;375:1532–43

**Acknowledgements:** Funded by UCB Pharma and Amgen Inc. Medical writing by Costello Medical.

**Disclosures:** AFP: Research grants (to institution) Amgen, Roche; Consultancy/Lecture/advisory board fees: Amgen, Alexion, Amgen, Eli Lilly, Fresenius, Gedeon-Richter, Genericon, Ipsen, Ratio-pharm, Roche, Sandoz, Sanofi-Aventis, Shire-Takeda, Stada and UCB Pharma; BL: Research grants (to institution): Amgen and Novo Nordisk; Advisory boards and lectures: Amgen, Eli Lilly, Gedeon-Richter, Gilead and UCB Pharma; CL: Employee of UCB Pharma; EC: Grants from Amgen; EG: Consultancy fees, lecture fees and/or travel fees from Alexion, Amgen, Sandoz, Takeda and UCB Pharma; EJJ: Consultancy and/or speaker and/or Investigator for Amgen, Asofarma, Astellas, AstraZeneca, Boehringer, BMS, FAES, Helios-Fresenius, Italfarmaco, Janssen, Lilly, MSD, Mundipharma, Novo Nordisk, Sanofi, Shire, Technopharma, UCB Pharma and Viatrix; JT: Employee of UCB Pharma; MO: Employee of Amgen; PL: Grants and/or advisor from Amgen, UCB Pharma, Richter and Teva; ZW: Employee of Amgen and owns stock in Amgen.

## OC11

### MULTIDIMENSIONAL PROGNOSTIC INDEX AND THE RISK OF FRACTURES: AN 8-YEAR LONGITUDINAL COHORT STUDY IN THE OSTEOARTHRITIS INITIATIVE

N. Veronese<sup>1</sup>, L. Smith<sup>2</sup>, E. Zigoura<sup>3</sup>, M. Barbagallo<sup>1</sup>, L. Dominguez<sup>1</sup>, C. Cooper<sup>4</sup>, R. Rizzoli<sup>5</sup>, J.-Y. Reginster<sup>6</sup>, S. Maggi<sup>7</sup>, A. Pilotto<sup>3</sup>

<sup>1</sup>University of Palermo, Palermo, Italy, <sup>2</sup>Anglia Ruskin University, Cambridge, United Kingdom, <sup>3</sup>Galliera Ente Ospedaliero, Genova, Italy, <sup>4</sup>University of Southampton, Southampton, United Kingdom, <sup>5</sup>University of Geneva, Geneva, Switzerland, <sup>6</sup>University of Liège, Liège, Belgium, <sup>7</sup>Consiglio Nazionale delle Ricerche, Padova, Italy

**Background:** Fractures increase risk for disability and poor quality of life in older people. Frailty may be associated with higher fracture risk, but limited research has been carried out using a multidimensional approach to frailty assessment and diagnosis. The present research aimed to investigate whether the multidimensional prognostic index (MPI), based on comprehensive geriatric assessment (CGA), is associated with the risk of fractures in the Osteoarthritis Initiative (OAI) study.

**Methods:** Community-dwellers affected by knee OA or at high risk for this condition were followed-up for 8 years. A standardized CGA including information on functional, nutritional, mood, comorbidities, medications, quality of life and co-habitation status was used to calculate the MPI. Fractures were diagnosed using self-reported information. Cox's regression analysis was carried out and results are reported as hazard ratios (HRs), with their 95% confidence intervals (CIs), adjusted for potential confounders.

**Results:** The sample consisted of 4,024 individuals (mean age 61.0 years, females=59.0%). People with incident fractures had a significant higher MPI baseline value than those without ( $0.42 \pm 0.18$  vs.  $0.40 \pm 0.17$ ). After adjusting for eight potential confounders, people with an MPI over 0.66 (HR=1.71; 95%CI: 1.29–2.28) experienced a higher risk of fractures. An increase in 0.10 point in MPI score corresponded to an increase in fracture risk of 6% (HR=1.06; 95%CI: 1.01–1.11). Higher MPI values were also associated with a higher risk of non-vertebral clinical fractures.

**Conclusion:** Higher MPI values at baseline were associated with an increased risk of fractures, reinforcing the importance of CGA in predicting fractures in older people



## OC12

### THE PREVALENCE OF COMMUNITY-DWELLING OLDER ADULTS AT HIGH FRACTURE RISK WHO ARE NOT TAKING OSTEOPOROSIS MEDICATIONS: RESULTS FROM THE CANADIAN LONGITUDINAL STUDY ON AGING (CLSA)

C. McArthur<sup>1</sup>, A. Lee<sup>2</sup>, H. Abu Alrob<sup>2</sup>, J. D. A. Adachi<sup>2</sup>, L. Giangregorio<sup>3</sup>, L. Griffith<sup>2</sup>, S. Morin<sup>4</sup>, L. Thabane<sup>2</sup>, G. Ioannidis<sup>2</sup>, J. Lee<sup>2</sup>, W. Leslie<sup>5</sup>, A. Papaioannou<sup>2</sup>

<sup>1</sup>Dalhousie University, Halifax, Canada, <sup>2</sup>McMaster University, Hamilton, Canada, <sup>3</sup>University of Waterloo, Waterloo, Canada, <sup>4</sup>McGill University, Montreal, Canada, <sup>5</sup>University of Manitoba, Winnipeg, Canada

**Objective:** There is an established osteoporosis care gap, where individuals who have had a fracture do not receive subsequent treatment. Care gap studies have focused on the post-fracture context, and we know very little about whether individuals with other fracture risk factors are receiving treatment. The purpose of our study was to estimate the prevalence of community dwelling older adults at high fracture risk who are not taking osteoporosis medication using the Canadian Longitudinal Study on Aging (CLSA).<sup>1</sup>

**Material and methods:** We included CLSA participants who completed the baseline (2015) comprehensive interview and had dual-energy X-ray absorptiometry (DXA) (N=28,781). We describe the age- and sex- stratified proportion and prevalence of people at high fracture risk (FRAX<sup>®</sup> major osteoporotic fracture probability > 20%) and not taking an osteoporosis medication. Osteoporosis medications were defined using the Public Health Agency of Canada standards for osteoporosis surveillance and identified via drug identification numbers.<sup>2</sup> Sampling weights, as defined by the CLSA, were applied.<sup>1</sup>

**Results:** The mean age of participants was 70.0 (SD 10.3). Overall, 6.2% were at high fracture risk. Of people who were at high risk, 96.6% of men and 79.8% of women were not taking an osteoporosis medication. This proportion decreased with age, for both men (45-54 years: 100%; 55-64 years: 98.9%; 65-74 years: 96.7%; 75+ years: 91.2%) and women (45-54 years: 96.4%; 55-64 years: 86.2%; 65-74 years: 82.7%; 75+ years: 74.0%) but was higher for men at all ages. The prevalence of people at high fracture risk and not taking an osteoporosis medication per 1000 persons increased with age for both men (45-54 years: 10.1; 55-64 years: 19.8; 65-74 years: 20.8; 75+ years: 17.8) and women (45-54 years: 13.2; 55-64 years: 34.9; 65-74 years: 64.7; 75+ years: 153.2) and was highest for women aged 75 years or older.

**Conclusions:** Our study demonstrates that most community-dwelling older adults at high fracture risk are not receiving osteoporosis medication, particularly men. This presents an opportunity for improved primary fracture prevention in the community.

## References

1. Raina PS, Wolfson C, Kirkland SA, et al. The Canadian longitudinal study on aging (CLSA). *Canadian journal on aging = La revue canadienne du vieillissement*. 2009;28(3):221-229. doi:10.1017/S0714980809990055
2. O'Donnell S. Screening, prevention and management of osteoporosis among Canadian adults. *Health promotion and chronic disease prevention in Canada: research, policy and practice*. 2018;38(12):445-454. doi:10.24095/hpc-dp.38.12.02

## Acknowledgements

None.

## Disclosures

AP received funding from Amgen.

## OC13

### PATIENT'S PREFERENCES FOR LIFESTYLE CHANGES IN OSTEOPOROTIC FRACTURE PREVENTION: A CROSS-EUROPEAN DISCRETE-CHOICE EXPERIMENT

C. Beaudart<sup>1</sup>, A. Boonen<sup>2</sup>, N. Li<sup>1</sup>, S. Bours<sup>1</sup>, S. Goemaere<sup>3</sup>, J.-Y. Reginster<sup>4</sup>, C. Roux<sup>5</sup>, B. McGowan<sup>6</sup>, A. Diez-Perez<sup>7</sup>, R. Rizzoli<sup>8</sup>, C. Cooper<sup>9</sup>, M. Hilgsmann<sup>1</sup>

<sup>1</sup>Department of Health Services Research, CAPHRI Care and Public Health Research Institute, Maastricht University, Maastricht, The Netherlands, <sup>2</sup>Department of Internal Medicine, Division of Rheumatology and CAPHRI Care and Public Health Research Institute, Maastricht University Medical Center, Maastricht, The Netherlands, <sup>3</sup>Department of Rheumatology and Endocrinology, Ghent University Hospital, Ghent, Belgium, <sup>4</sup>WHO Collaborating Center for Public Health aspects of musculo-skeletal health and ageing, Division of Public Health, Epidemiology and Health Economics, University of Liège, Liège, Belgium, <sup>5</sup>Department of Rheumatology, Paris Descartes University, Paris, France, <sup>6</sup>The North Western Rheumatology Unit, Our Lady's Hospital, Manorhamilton, Manorhamilton, Ireland, <sup>7</sup>Musculoskeletal Research Unit (IMIM) and CIBERFES, Universitat Autònoma de Barcelona, Barcelona, Spain, <sup>8</sup>Division of Bone Diseases, Geneva University Hospitals, Geneva, Switzerland, <sup>9</sup>MRC Lifecourse Epidemiology Unit, University of Southampton, Southampton General Hospital, Southampton, United Kingdom

**Objective:** Healthy lifestyle habits are recommended for preventing osteoporotic fracture, alongside drug therapy. In this study, we aimed to assess patients' preference to adopt lifestyle changes to prevent osteoporotic fractures.

**Methods:** A discrete-choice experiment was conducted in seven European countries: Belgium, France, Ireland, Spain, Switzerland, the Netherlands and United Kingdom. Patients were repetitively asked if they would closely follow different regimens of lifestyle recommendations that varied with respect to 6 attributes and different levels (options): physical activity (levels: not included, moderate or high), calcium and vitamin D status (levels: not included, taking supplements or improve nutrition and assure a minimal daily sunlight exposure), smoking (levels: not included or quit smoking), alcohol (levels: not included or moderate consumption), weight reduction (levels: not included or ensure a healthy body weight) and fall prevention (levels: not included, receive general advice or following a one-day prevention program). A conditional logit model was used to estimate patient's preferences for all participants (global model) and per country.

**Results:** In total, 1042 patients completed the questionnaire, with samples varying between 91 and 244 per country. Overall, patients were favourable to lifestyle changes for preventing osteoporotic fractures (positive and significant coefficients in the global model as well as in all countries separately). However, among the lifestyle factors proposed, consensually across all countries, patients were not prone to engage in high physical activity (i.e. walking for 30-40 minutes, 3-4 times per week or equivalent). In Ireland, Belgium, the Netherlands and Switzerland, patients were not favourable neither to follow a one-day falls prevention program. Belgian, Swiss and Dutch patients were not prone neither to modify their nutrition (i.e. diet rich in calcium and consumption of fish at least twice a week) and ensure a 10-15 minutes daily sunlight exposure. In the global model as well as for Belgian and Dutch patients separately, we observed favourable intention from patients to reduce their alcohol consumption, engage in moderate physical activity, taking calcium and vitamin D supplements and ensure a normal body weight for preventing fractures.

**Conclusions:** Patient's healthy lifestyle behaviours are essential for an optimal osteoporosis management. This is the first study that explicit patients' preferences for lifestyle factors in preventing osteoporotic fracture. In an ideal patient-centred approach, fracture prevention should take these considerations and preferences into account.

## OC14

### PARATHYROIDECTOMY IS ASSOCIATED WITH REDUCED RISK OF FRACTURE AND CARDIOVASCULAR EVENTS IN PATIENTS DIAGNOSED WITH PRIMARY HYPERPARATHYROIDISM – A NATIONAL, RETROSPECTIVE COHORT STUDY

K. F. Axelsson<sup>1</sup>, M. Wallander<sup>1</sup>, H. Johansson<sup>1</sup>, N. C. Harvey<sup>2</sup>, L. Vandenput<sup>3</sup>, E. V. McCloskey<sup>4</sup>, L. Enwu<sup>3</sup>, J. A. Kanis<sup>3</sup>, H. Litsne<sup>5</sup>, M. Lorentzon<sup>5</sup>

<sup>1</sup>University of Gothenburg, Sahlgrenska Osteoporosis Centre, Institute of Medicine, Gothenburg, Sweden, <sup>2</sup>MRC Lifecourse Epidemiology Unit, University of Southampton and NIHR Southampton Biomedical Research Centre, University of Southampton and University Hospital Southampton NHS Foundation Trust, Southampton, United Kingdom, <sup>3</sup>Mary MacKillop Institute for Health Research, Australian Catholic University, Melbourne, Australia, <sup>4</sup>Centre for Metabolic Bone Diseases, University of Sheffield Medical School and MRC and Arthritis Research UK Centre for Integrated Research in Musculoskeletal Ageing, Mellanby Centre for Musculoskeletal Research, University of Sheffield, Sheffield, United Kingdom, <sup>5</sup>Sahlgrenska Osteoporosis Centre, Department of Internal Medicine and Clinical Nutrition, Institute of Medicine, University of Gothenburg, Gothenburg, Sweden

**Background:** Previous studies have shown that patients with primary hyperparathyroidism (PHPT) have an increased risk of fractures and other comorbidities such as cardiovascular events, but the effect of parathyroidectomy (PTX) on these outcomes, has been insufficiently studied. Most previous studies have been limited in size and results have not been consistent.

**Method:** In this retrospective cohort study of all patients diagnosed with PHPT (ICD-10 E210) at hospitals in Sweden between July 1<sup>st</sup> 2006 and Dec 31<sup>st</sup> 2017, we investigated the association between PHPT diagnosis, parathyroidectomy, and outcomes. In total, we identified 16 652 patients with PHPT who were assigned 166 520 age and sex-matched controls from the general population. The primary aim of this study was to investigate whether the diagnosis of PHPT was associated with an increased risk of fractures and cardiovascular events (CVE). The secondary aim was to determine if PTX in patients with PHPT diagnosis was associated with a reduced risk of these outcomes.

**Results:** The majority of the patients were female (78.2 %), the mean (standard deviation) age 67.4 (12.8) years, and the follow-up time for the entire patient group was 35 423 patient-years. In a Cox proportional hazards model, adjusted for age, sex, and calendar year, patients with PHPT had a higher risk of any fracture (adjusted HR 95% CI: 1.30 (1.22-1.38)), hip fracture (1.25 (1.11-1.40)), and major osteoporotic fracture (1.28 (1.19-1.38)) compared to controls. Furthermore, patients with PHPT had a higher risk of cardiovascular events (1.46 (1.35-1.57)) and death (1.44 (1.37-1.52)). In a Poisson regression model with PTX as a time-dependent variable, PTX was associated with reduced risk of hip fracture (HR 0.77 (0.61-0.97)), any fracture (HR 0.83 (0.74, 0.92)) and CVE (HR 0.77 (0.68-0.88)) in patients with PHPT.

**Conclusions:** Patients with primary hyperparathyroidism have an increased risk for fractures, cardiovascular events, and death. Parathyroidectomy was associated with a reduced risk of fractures and cardiovascular events, indicating that surgery could have beneficial effects in patients with PHPT.

## OC15

### **FRAILITY IS ASSOCIATED WITH INFLAMMATION AND REDUCED BONE MINERAL DENSITY INDEPENDENT OF FAT MASS: FINDINGS FROM UK BIOBANK**

E. M. Curtis<sup>1</sup>, S. D'Angelo<sup>1</sup>, S. Woolford<sup>1</sup>, R. Durdin<sup>1</sup>, Z. Raisi-Estabragh<sup>2</sup>, K. A. Ward<sup>1</sup>, C. Cooper<sup>1</sup>, N. C. Harvey<sup>1</sup>

<sup>1</sup>MRC Lifecourse Epidemiology Unit, University of Southampton, Southampton, United Kingdom, <sup>2</sup>William Harvey Research Institute, NIHR Barts Biomedical Research Centre, Queen Mary University of London, London, United Kingdom

#### Objective

Frailty represents a huge public health burden. Fundamental aging processes (e.g. chronic inflammation) are associated with frailty, but the independence of these relationships from age, sex, lifestyle and adiposity is unclear. Using UK Biobank, we investigated associations between frailty, blood biomarkers and bone health, independent of these characteristics.

#### Material and Methods

502,640 participants aged 40-69 years were recruited to UK Biobank 2006-10. Venous blood samples were obtained. From 2014 onwards, a subset attended an imaging follow-up, including whole-body DXA (GE Lunar iDXA), grip strength (Jamar dynamometer), and a questionnaire. Frailty was defined using a modification of Fried's classification (at least 3 of weight loss, mental exhaustion, low physical activity, slow gait speed and low grip strength). The presence of 1-2 criteria designated pre-frailty. Linear regression was used to discern associations between frailty status, biochemical markers (CRP, 25(OH)-vitamin D, HbA1c) and bone outcomes, adjusting for age, sex, smoking, alcohol, educational level and total fat mass assessed by DXA. Non-frail was the reference category and blood biomarkers were standardised ( $\beta$ : mean difference in SD).

#### Results

22,332 participants (11,484 women, 10,848 men) with frailty assessment and DXA bone measures or blood biochemistry were included in the analysis; 547(2.4%) were frail and 9359(41.9%) pre-frail. Frail participants were more likely to be female [59.6% vs. 50.9%], older [mean(SD) 63.2(7.9) vs. 62.6(7.3)years], of higher BMI [mean(SD) 30.7(6.4) vs. 25.9(4.0)kg/m<sup>2</sup>]. After full adjustment, frail participants had higher CRP [+0.34 SD(95% CI 0.18, 0.51)], lower 25(OH)-vitamin D [-0.36 SD(-0.54,-0.19)] and higher HbA1c [+0.27 SD(0.10, 0.43)], all  $p < 0.001$ . Frail participants had lower femoral neck [-0.03 g/cm<sup>2</sup>(-0.05, -0.01),  $p = 0.02$ ] and lumbar spine bone mineral density (BMD) [-0.03 g/cm<sup>2</sup>(-0.05, -0.002),  $p = 0.002$ ]. BMD associations were only apparent after fat adjustment. Similar associations were observed for pre-frail vs. non-frail participants.

#### Conclusion

In UK Biobank, frailty is associated with high levels of systemic inflammation, low 25(OH)-vitamin D, poorer glucose handling and lower BMD, independent of age, sex, lifestyle and fat mass. These findings suggest that frailty associations with age-associated inflammation (inflammaging) are only partly mediated via adiposity and warrant further mechanistic investigation.

## OC16

### **EPIGENETIC AGE ACCELERATION ASSOCIATIONS WITH SKELETAL OUTCOMES: DIFFERENTIAL IMPACTS IN MEN AND WOMEN**

N. Fuggle<sup>1</sup>, M. A. Clynes<sup>1</sup>, M. Ó Breasail<sup>2</sup>, C. Parsons<sup>1</sup>, J. Holloway<sup>1</sup>, N. Kitaba<sup>1</sup>, A. Ward<sup>1</sup>, C. Cooper<sup>1</sup>, E. M. Dennison<sup>1</sup>

<sup>1</sup>University of Southampton, Southampton, United Kingdom,

<sup>2</sup>University of Bristol, Bristol, United Kingdom

#### Objectives

Epigenetic clocks are composed of a selection of CpG sites which have the potential to capture 'biological age' and provide a measure of age acceleration (calculated as the difference between biological and chronological age). Here we investigate the associations between age acceleration (according to three different clocks: Horvath pan-tissue, GrimAge and PhenoAge) and hip DXA parameters.

#### Materials and methods

Participants were recruited across three generations of the Hertfordshire Intergenerational Study; original cohort members, their children, and grandchildren. Hip DXA was performed (Lunar iDXA, GE Healthcare) and whole blood DNA methylation was analysed using the Illumina 850k array (Infinium MethylationEPIC BeadChip) following which GrimAge, PhenoAge and Horvath pan-tissue age acceleration were calculated. Associations with DXA hip measures (including Bone Mineral Density (BMD), Bone Mineral Content (BMC) and bone area) were analysed using linear regression in sex-stratified unadjusted models and those adjusted for age and BMI. Results are presented as  $\beta$  coefficients with 95% confidence intervals.

#### Results

A total of 114 participants (39 males and 75 females) were recruited, mean age of 56 years (range 18 to 88). Relationships varied in different clocks; Horvath pan-tissue age acceleration was not associated with DXA measures in any models. However, greater GrimAge acceleration was associated with significantly lower hip BMC ( $\beta = -0.94$  (-1.50, -0.38),  $p < 0.01$ ) and lower bone area ( $\beta = -0.28$  (-0.55, -0.01),  $p < 0.05$ ) in males in fully-adjusted models, and with lower hip BMD in males in unadjusted models ( $\beta = -0.02$  (-0.04, -0.01),  $p < 0.05$ ). Greater PhenoAge acceleration was associated with lower hip BMC in males in models adjusted for age

and BMI ( $\beta = -0.34$  (-0.65,-0.03),  $p < 0.05$ ) and lower hip BMD in males in unadjusted models only ( $\beta = -0.01$  (-0.02,-0.00),  $p < 0.05$ ). No significant associations were observed in females.

## Conclusions

Our results demonstrate that the newer iterations of epigenetic clocks (GrimAge and PhenoAge) which were designed to measure age-related phenotypic changes are associated with bone measures at the hip, whereas the first-generation clocks (Horvath pan-tissue) were not. These sex-specific associations require further investigation.

## OC17

### COMPARISON OF FRACTURE RATES AND ECONOMIC OUTCOMES BETWEEN WOMEN WITH OSTEOPOROSIS RECEIVING RISEDRONATE GASTRO-RESISTANT (GR) AND ALENDRONATE

F. Thomasius<sup>1</sup>, S. Palacios<sup>2</sup>, A. Alam<sup>3</sup>, M. Boolell<sup>3</sup>, F. Vekeman<sup>4</sup>, G. Gauthier<sup>4</sup>

<sup>1</sup>Frankfurter Hormon und Osteoporosezentrum, Frankfurt, Germany, <sup>2</sup>Palacios' Institute of Women's Health, Madrid, Spain, <sup>3</sup>Theramex, London, United Kingdom, <sup>4</sup>STATLOG, Montreal, Canada

**Objective:** This study aimed at comparing the risk of fractures and economic outcomes between women with osteoporosis receiving risedronate GR vs alendronate immediate-release. Risedronate GR offers a more convenient dosing option by eliminating the need for fasting and has a higher oral bioavailability<sup>†</sup> than alendronate.

**Material and Methods:** Women with osteoporosis from a US claims database (2009-2019) were analyzed. They were observed for  $\geq 2$  years following the date of their first observed dispensing for an oral bisphosphonate and classified into the GR or alendronate cohort based on the treatment initiated on that date (index date). Women from the two cohorts were then matched 1:1 based on demographic and clinical characteristics evaluated during a six-month period prior to the index date. Incidence rates (IRs) of fractures and healthcare resource utilization per 1,000 patient-years were compared between the two cohorts using IR ratios (IRRs).

**Results:** 1,807 patients were selected in each cohort (median age: 60.0 years; average observation period [years]: GR: 4.3, alendronate: 4.6). The IR of fractures was statistically significantly lower in the GR vs the alendronate cohort for any fracture sites (IRR: 0.81,  $p < 0.05$ ) and spine fractures (IRR: 0.69,  $p < 0.05$ ) (table). Numerical trends of lower incidence of fractures among women in the GR cohort were observed for the other examined skeletal sites (table). Compared to the alendronate cohort, the GR cohort incurred fewer hospitalizations (IR, GR: 112.03; alendronate: 134.69;

IRR: 0.85,  $p < 0.05$ ) translating into numerically lower hospitalization costs (average per-patient-per-year; GR: \$3,605; alendronate: \$4,572,  $p = 0.0681$ ).

**Conclusion:** This study indicates that women treated with risedronate GR have a lower incidence of fractures compared to those treated with alendronate, consistent with the hypothesis that the gastro-resistant formulation of risedronate improves medication absorption, thus enabling a greater effectiveness.

	IR GR (N=1,807)	IR Alendronate (N=1,807)	IRR (95% CI)
Any site	33.97	42.53	0.81 (0.66 - 0.98) *
Hip	9.21	9.61	0.99 (0.65 - 1.51)
Pelvis	2.07	3.12	0.68 (0.35 - 1.33)
Spine	10.76	15.86	0.69 (0.49 - 0.97) *
Wrist/arm	14.52	15.86	0.91 (0.70 - 1.20)

<sup>†</sup>Risedronate GR SmPC

\*Significant at the 5% level

**Disclosure:** This study was funded by Theramex

**Conflicts of interest:** F. Thomasius has received fees for lectures and consultancy or investigator fees from Amgen, Gedeon Richter, Lilly, Hexal, Kyowa Kirin, Hologic, Novartis, Stada, Synexus, Theramex, and UCB. S. Palacios is a consultant for Pfizer, Amgen, MSD, Procare, Health, Bayer, Besins, Séréllys Shinogi, Exeltis, Gedeon Richter, Theramex, and UCB. A. Alam and M. Boolell are employees of Theramex. F. Vekeman and G. Gauthier are employees of STATLOG, Inc., which has received research funding from Theramex for this study.



OC18

# **LOCAL OSTEO-ENHANCEMENT PROCEDURE SIGNIFICANTLY INCREASES BONE MINERAL DENSITY IN THE PROXIMAL FEMUR OF POSTMENOPAUSAL WOMEN WITH OSTEOPOROSIS AT HIGH RISK FOR HIP FRACTURE**

J. De Schepper<sup>1</sup>, J. Howe<sup>2</sup>, J. Shaul<sup>2</sup>, J. Coteur<sup>2</sup>, B. Huber<sup>2</sup>

<sup>1</sup>AZ Nikolaas / Orthopaedic Department, Sint-Niklaas, Belgium,

<sup>2</sup>AgNovos Healthcare, Rockville, United States

**Objective:** Assess the improvement of proximal femur bone mineral density (BMD) in two prospective clinical studies two years after treatment with a AGN1 hip Local Osteo-enhancement Procedure (LOEP).

**Materials and Methods:** LOEP was evaluated in prospective, single-armed, cohort clinical studies in USA (Copley) and Europe (Confirm). Studies received ethics committee and IRB approvals; all subjects provided written consent. Criteria for both studies included post-menopausal women at high risk of hip fracture with femoral neck T-score  $\leq -2.5$ . LOEP was performed by injecting the femoral neck and intertrochanteric areas of the proximal femur with a triphasic, resorbable calcium-based implant (AGN1). 72 osteoporotic subjects/85 hips were treated with LOEP as unilateral or bilateral cases. To date, a sub-set of 26 operated hips in 25 subjects was evaluated with baseline and 2-year BMD data (Copley, 12; Confirm, 14). Copley evaluated the AGN1 implant resorption and replacement with bone utilizing sequential radiographs and computerized tomography (CT) scans at 12 wks, 24 wks and 5-7 years. The Confirm study is ongoing and will collect follow-up data to 5 years.

**Results:** Subjects were aged  $70 \pm 10$  with a baseline mean femoral neck T-Score of  $-3.0 \pm 0.5$  (N=26). The mean pre-operative FRAX score for 10-year probability of hip fracture was  $11 \pm 10\%$  (N=26). Skin-to-skin surgical time was  $16 \pm 4$  minutes (N=14). The mean volume of injection was  $17.6 \pm 2.6$  cc (N=26). CT and radiographs demonstrated complete AGN1 resorption and replacement with bone (N=26). Baseline femoral neck BMD was not statistically different between studies ( $p=0.085$ ). After  $2.1 \pm 0.4$  years, the mean percent difference in BMD increased by  $61\% \pm 37\%$  ( $p<0.001$ ) from baseline (N=26). All patients were weight bearing as tolerated after surgery and returned to activities of daily living in less than one week.

**Conclusion:** This data supports the use of AGN1 LOEP for high-risk patients with osteoporosis-related bone loss and demonstrates that the treatment significantly improves BMD from baseline which is expected to reduce hip fracture risk. The overall impact of LOEP on hip fracture reduction is currently being evaluated in an ongoing multi-national randomized, controlled, prospective, single-blinded clinical study.

**Disclosures:** J.D.-consultant, research support; J.H.-stock, employee and board AgNovos Healthcare; J.S.-stock, employee AgNovos Healthcare; J.C.-consultant; B.H.-stock, employee AgNovos Healthcare

OC19

# **A PROSPECTIVE OPEN-LABEL OBSERVATIONAL STUDY OF A BUFFERED SOLUBLE 70 MG ALENDRONATE EFFERVESCENT TABLET ON UPPER GASTROINTESTINAL SAFETY AND MEDICATION ERRORS: THE GASTROPASS STUDY**

S. Minisola<sup>1</sup>, A. Ponce Vargas<sup>2</sup>, G. Letizia Mauro<sup>3</sup>, F. Bonet Madurga<sup>4</sup>, G. Adami<sup>5</sup>, D. M. Black<sup>6</sup>, N. Qizilbash<sup>7</sup>, J. Blanch-Rubió<sup>8</sup>

<sup>1</sup>Sapienza University of Rome, Rome, Italy, <sup>2</sup>SEPAR S.L., Malaga, Spain, <sup>3</sup>University of Palermo, Palermo, Italy, <sup>4</sup>MDS 360 Chamartin, Madrid, Spain, <sup>5</sup>University and Azienda Ospedaliera Universitaria Integrata of Verona, Verona, Italy, <sup>6</sup>University of California San Francisco, San Francisco, United States, <sup>7</sup>Oxon Epidemiology, Madrid, Spain, <sup>8</sup>Hospital del Mar, Barcelona, Spain

**Objectives:** To investigate the incidence of upper Gastrointestinal (GI) AEs (oesophageal toxicity, gastritis, gastric ulcers and duodenitis) and medication errors (MEs) associated with a buffered soluble alendronate 70 mg effervescent (ALN-EFF) tablet.

**Material and Methods:** In this multicenter prospective observational post-authorisation safety study conducted in Italy and Spain, post-menopausal women (PMW) with osteoporosis (naïve to bisphosphonates (BP)) were treated weekly with ALN-EFF and followed for  $12 \pm 3$  months. Information was collected on AEs, MEs (error in following administration instructions), persistence and compliance.

**Results:** Patients (N=1,028) aged  $67 \pm 9$  years (mean  $\pm$  SD) received ALN-EFF weekly. The cumulative incidence of upper GI AEs related to ALN-EFF (primary endpoint) was 9.6%, vast majority being of mild intensity. The most frequently occurring upper GI AEs related to ALN-EFF were dyspepsia (2.7%), gastroesophageal reflux disease (2.4%), and nausea (2.2%). None of the relevant upper GI AEs listed in the primary endpoint and no serious AEs were reported. At least one ME occurred in 29.9% of patients. However, the majority of MEs were associated with administration instructions applicable to any oral BP and only 7 MEs were associated with ALN-EFF. ALN-EFF was discontinued in 209/1,028 (20.3%) patients. Compliance with ALN-EFF was high with a mean Morisky-Green score of  $92.8 \pm 18.6$ .

**Conclusions:** PMW with osteoporosis treated with ALN-EFF in a real-world setting, experienced few upper GI AEs. They also had a low discontinuation and high compliance compared to other formulations, suggesting that ALN-EFF may increase patient satisfaction and therefore long-term adherence and efficacy.

Disclosures: Adami personal fees Amgen, Theramex. Black personal fees Merck, Amgen, Asahi-Kasei, Eli Lilly, EffRx, University of Pittsburgh. Blanch-Rubio grants/consulting fees Amgen, Laboratorio Stada, Gedeon-Richter Ibérica, Lilly España, Pfizer, Gebro Pharma, UCB Pharma. Minisola speaker Abiogen, Amgen, Bruno Farmaceutici, Diasorin, Eli Lilly, Shire, Sandoz, Takeda. Advisory boards Abiogen, Kyowa Kirin, Pfizer, UCB. Ponce Vargas research fees Laboratories Lacer. Qizilbash owner OXON Epidemiology. Study sponsored by EffRx Pharmaceuticals

## OC20

### OSTEOCALCIN, MUSCLE FUNCTION AND 15-YEAR FALLS-RELATED HOSPITALISATIONS IN OLDER WOMEN: THE PERTH LONGITUDINAL STUDY OF AGEING WOMEN

C. Smith<sup>1</sup>, J. R. Lewis<sup>2</sup>, M. Sim<sup>2</sup>, W. H. Lim<sup>3</sup>, E. M. Lim<sup>4</sup>, L. C. Blekkenhorst<sup>2</sup>, T. C. Brennan-Speranza<sup>5</sup>, L. Adams<sup>3</sup>, E. Byrnes<sup>4</sup>, G. Duque<sup>6</sup>, I. Levinger<sup>1</sup>, R. Prince<sup>3</sup>

<sup>1</sup>Victoria University, Melbourne, Australia, <sup>2</sup>Edith Cowan University, Perth, Australia, <sup>3</sup>University of Western Australia, Perth, Australia, <sup>4</sup>Queen Elizabeth II Medical Centre, Perth, Australia, <sup>5</sup>University of Sydney, Sydney, Australia, <sup>6</sup>University of Melbourne, Melbourne, Australia

**Objective:** We tested the hypothesis that undercarboxylated osteocalcin (ucOC) and the ucOC to total (t)OC ratio are associated with muscle function and 15-year falls-related hospitalisations in older women.

**Material and Methods:** Serum OC and ucOC was assessed in 1261 older women (mean age 75.2 ± 2.7 years) at year-1 of the Calcium Intake Fracture Outcome Study trial, forming the Perth Longitudinal Study of Ageing Women (PLSAW, 1998 to 2013). Timed-up-and-go (TUG) and grip strength was assessed at baseline (1998) and at 5 years. Falls-related hospitalisations over a 14.5-year follow-up was captured by the Hospital Morbidity Data Collection, via the Western Australian Data Linkage System.

**Results:** At baseline, women with higher ucOC/tOC ratio (quartile 4) had slower TUG performance compared to quartile 1 by 0.68 secs (~0.68 secs, p<0.01); grip strength and 5-year change in TUG and grip was not significantly different (p>0.05). Higher ucOC/tOC ratio was significantly associated with poorer TUG performance at baseline and 5-year change in performance (all p<0.05). Those with the highest ucOC/tOC had greater falls-related hospitalisations (unadjusted log rank p=0.004) that remained significant after adjusting for key variables (HR 1.31, 95% CI 1.09-1.57, p=0.004).

**Conclusions:** We identified many older women with high ucOC/tOC ratio that also have poorer physical function, including a long-term decline and increased risk of falls-related hospitalisation. This data supports the concept that quantifying ucOC/tOC ratio

could be used as a predictor of these adverse outcomes, possibly enabling early intervention and minimising future fall risk. This should be explored in future.

## OC21

### RELATIONSHIPS BETWEEN MALNUTRITION, SARCOPENIA, AND FRAILTY AND THE INCIDENCE OF COVID-19 IN OLDER ADULTS: DATA FROM THE SARCOPHAGE COHORT

L. Lengelé<sup>1</sup>, M. Locquet<sup>1</sup>, M. Moutschen<sup>2</sup>, C. Beaudart<sup>3</sup>, J.-F. Kaux<sup>4</sup>, S. Gillain<sup>5</sup>, C. Shadoun<sup>1</sup>, J.-Y. Reginster<sup>1</sup>, O. Bruyère<sup>1</sup>

<sup>1</sup>WHO Collaborating Centre for Public Health Aspects of Musculoskeletal Health and Aging, Division of Public Health, Epidemiology and Health Economics, University of Liège, Liège, Belgium, <sup>2</sup>Department of Infectious Diseases and General Internal Medicine, CHU Sart-Tilman, University of Liège, Liège, Belgium, <sup>3</sup>WHO Collaborating Centre for Public Health Aspects of Musculoskeletal Health and Aging, Division of Public Health, Epidemiology and Health Economics, University of Liège, Liège, Belgium, <sup>4</sup>Department of Physical Medicine and Rehabilitation, Liege University Hospital Center, University of Liège, Liège, Belgium, <sup>5</sup>Geriatrics Department, University Hospital of Liège, Liège, Belgium

**Objectives** The identification of risk factors for COVID-19 is requested to implement targeted prevention strategies. Therefore, this study aimed to evaluate the associations between the incidence of COVID-19 and malnutrition, sarcopenia, and frailty, identified as potential risk factors in previous cross-sectional studies.

**Materials and methods** Community-dwelling older adults aged over 65 years from the Sarcopenia and Physical Impairments with Advancing Age (SarcoPhAge) cohort were included in the present study. Malnutrition, sarcopenia, and frailty were assessed at the last available follow-up from the SarcoPhAge cohort (i.e., the fifth year that ended in June 2019) according to the Mini-Nutritional Assessment short-form, the European Working Group on Sarcopenia in Older People (EWGSOP2), and the Fried criteria, respectively. Information regarding the COVID-19 was gathered by phone calls interviews to measure its self-declared incidence between March 2020 and April 2021. Cox-regressions adjusted for age, sex, body mass index, number of drugs and comorbidities per participants, Mini-Mental State Evaluation score, and physical activity level in analyses on malnutrition and sarcopenia, and Kaplan-Meier curves were performed.

**Results** The total study sample comprises 241 participants (median age 75.6 (73.0 – 80.6) years, 63.1% women) who were assessed for the three diseases and for which we have obtained information regarding the COVID-19. Among them, 27 participants (11.2%) developed the non-fatal Covid-19. No significant increased risks of Covid-19 were observed in patients with malnu-

trition (adjusted HR: 1.14 [0.26 – 5.07]) and sarcopenia (adjusted HR: 1.25 [0.35 – 4.42]). Nevertheless, the incidence of COVID-19 was significantly higher in frail (32.0 %) than in robust participants (8.8 %) (adjusted HR: 3.97 [1.56 – 10.10]), which was confirmed by the Kaplan-Meier curves ( $p < 0.001$ ). Among the frailty syndrome components, a low physical activity level was the only one significantly associated with an increased risk of COVID-19 (adjusted HR: 5.18 [1.37 – 19.54]).

**Conclusion** A 4-fold increased risk to develop COVID-19 was observed in the presence of the frailty syndrome. As we are the first to evaluate prospectively these associations, further investigations are needed to elaborate on our findings.

## OC22

### FUNCTIONAL BRAIN PROCESSES IN SARCOPIENIA – EVIDENCE FOR DIFFERENTIAL CENTRAL NEURAL MECHANISMS IN DYNAPENIC OLDER ADULTS

W. Trost<sup>1</sup>, M. Hars<sup>2</sup>, N. Fernandez<sup>3</sup>, F. Herrmann<sup>4</sup>, T. Chevalley<sup>5</sup>, S. L. Ferrari<sup>5</sup>, G. Gold<sup>4</sup>, R. Rizzoli<sup>5</sup>, P. Vuilleumier<sup>6</sup>, A. Trombetti<sup>2</sup>

<sup>1</sup>Division of Bone Diseases, Department of Medicine, Geneva University Hospitals and Faculty of Medicine & Laboratory for Behavioural Neurology and Imaging of Cognition, Campus Biotech, University of Geneva, Geneva, Switzerland, <sup>2</sup>Division of Bone Diseases, Department of Medicine & Division of Geriatrics, Department of Readaptation and Geriatrics, Geneva University Hospitals and Faculty of Medicine, Geneva, Switzerland, <sup>3</sup>Cognitive and Affective Neuroscience, Department of Psychology, University of Zurich, Zurich, Switzerland, <sup>4</sup>Division of Geriatrics, Department of Readaptation and Geriatrics, Geneva University Hospitals and Faculty of Medicine, Geneva, Switzerland, <sup>5</sup>Division of Bone Diseases, Department of Medicine, Geneva University Hospitals and Faculty of Medicine, Geneva, Switzerland, <sup>6</sup>Laboratory for Behavioural Neurology and Imaging of Cognition, Campus Biotech, University of Geneva, Geneva, Switzerland

#### Objectives

Recently, the European Working Group on Sarcopenia in Older People revised its definition and diagnostic criteria for sarcopenia (EWGSOP2), placing muscle strength at the forefront instead of muscle mass. The etiology and pathogenesis of dynapenia (or low muscle strength) is still not fully understood, but there is emerging evidence that central neural factors constitute critical determinants. Some studies have highlighted the relationships between muscle health and structural changes in brain, while the relationships with functional changes in brain has never been fully explored. In this study, we aimed thus to investigate functional brain processes in dynapenia.

#### Methods

This single-centre, cross-sectional study included 62 community-dwelling older adults (mean age 73.1 years; 59 females) in Geneva (Switzerland). Participants underwent i) detailed skeletal muscle assessments as well as ii) functional magnetic resonance imaging (fMRI) acquired on a 3 Tesla MRI scanner (Siemens® Trio, Germany) during the performance of a dual-task paradigm, consisting of a visual baseline, two single-tasks (motor joystick and arithmetic task) and a dual-task (motor and arithmetic task combined). Low muscle strength was defined according to handgrip strength (JAMAR® dynamometer) and/or chair rise time measurements using the EWGSOP2 cut-off points.

#### Results

47% (29/62) of participants were classified as dynapenic according to EWGSOP2. No differences were found between dynapenic and non dynapenic groups in regard to cognitive (MMSE) and frontal executive functioning (FAB), and gait speed.

fMRI results reveal a differential recruitment of motor circuits in the brain during the dual-task condition in dynapenic as compared with non dynapenic participants. In particular, while the brain activity during the single-tasks did not differ between the two groups, only during the dual-task condition non dynapenic participants showed significant increased activation in the premotor cortex as compared to dynapenic participants. This could be interpreted such that in dynapenia there is an insufficient recruitment of activity in the brain's motor areas, when a task gets more complex.

#### Conclusions

Our results point to a dysfunctional involvement of brain activity in dynapenia in a multi-tasking paradigm. A better knowledge of the link between dynapenia and brain functions could provide new impulses in the diagnosis and development of effective early-targeted interventions for sarcopenia.

#### Acknowledgments

This study is funded by the Swiss National Science Foundation (grant #32003B\_166690) and FROMO Foundation.

OC23

# QUALITY OF LIFE, RESOURCE USE AND COSTS RELATED TO FRAGILITY FRACTURES: DEVELOPMENT AND EVALUATION OF MULTIDISCIPLINARY POST-FRACTURE CARE PATHWAYS

J. Talevski<sup>1</sup>, K. Sanders<sup>1</sup>, J. Watts<sup>2</sup>, L. Busija<sup>3</sup>, A. Beauchamp<sup>3</sup>, G. Duque<sup>1</sup>, F. Borgström<sup>4</sup>, J. A. Kanis<sup>5</sup>, A. Svedbom<sup>6</sup>, A. Stuart<sup>2</sup>, S. Brennan-Olsen<sup>2</sup>

<sup>1</sup>The University of Melbourne, Melbourne, Australia, <sup>2</sup>Deakin University, Geelong, Australia, <sup>3</sup>Monash University, Melbourne, Australia, <sup>4</sup>Quantify Research, Stockholm, Sweden, <sup>5</sup>University of Sheffield, Sheffield, United Kingdom, <sup>6</sup>ICON Plc, Stockholm, Sweden

**Objectives:** To identify multidisciplinary care pathways for individual fracture sites (hip, vertebrae, wrist, humerus); and to determine the costs and impact of these care pathways on health-related quality of life (HRQoL) recovery.

**Methods and Materials:** The study included 4126 adults aged ≥50 years with a fragility fracture (1657 hip, 681 vertebrae, 1354 wrist, 434 humerus) from the International Cost & Utility Related to Osteoporotic Fractures Study (ICUROS) – an observational study in Austria, Australia, Estonia, France, Italy, Lithuania, Mexico, Russia, Spain & the UK. There were three main study components: 1) latent class analyses (LCA) to identify distinct care pathways (“classes”) that were statistically and clinically meaningful, representing common patterns of health service use in patients over 12-months; 2) multivariable logistic regression to analyze associations between each class and HRQoL recovery; and 3) a micro-costing analysis to determine direct health care costs per participant in each class (2020 Australian Dollars) and post-hoc Bonferroni tests to determine significant differences.

**Results:** The LCA determined 20 classes across the four fracture sites. Different classes were associated with HRQoL recovery at 12-months, although these classes generally included the combination of primary care; allied healthcare; osteoporosis medication use; vitamin D/calcium supplementation; and non-opioid analgesic use. The total direct cost of fractures was estimated at \$89564, \$38926, \$18333, and \$39461 per patient for hip, vertebral, wrist and humeral participants, respectively. The cost analysis identified that classes associated with HRQoL recovery were also less costly.

**Conclusions:** By using LCA on health service use, we were able to identify several multidisciplinary care pathways for individual fracture sites and determine the cost and impact of each care pathway on HRQoL recovery. These care pathways may assist health care providers worldwide in allocating resources for fractures in more cost-effective ways.

OC24

# UC-II® COLLAGEN HELPS SUPPORT KNEE JOINT MOBILITY IN HEALTHY SUBJECTS: A RANDOMIZED, DOUBLE BLIND, PLACEBO-CONTROLLED STUDY

V. Juturu<sup>1</sup>, K. Knaub<sup>2</sup>, W. Alt<sup>3</sup>, C. Schön<sup>4</sup>, S. Durkee<sup>1</sup>, Z. Saiyed<sup>1</sup>

<sup>1</sup>Lonza CHI Inc., Morristown, United States, <sup>2</sup>BioTeSys GmbH, Schelztorstraße 54-56, Esslingen, Baden-Württemberg, Germany, <sup>3</sup>Institute of Sports Science and Kinesiology, University of Stuttgart, Esslingen, Baden-Württemberg, Germany, <sup>4</sup>BioTeSys GmbH, Esslingen, Baden-Württemberg, Germany

**Objective:** Joint discomfort is a common issue seen in athletes and in normal active people. UC-II® undenatured type II collagen is a dietary ingredient derived from chicken sternum and has been shown in clinical studies to support knee joint comfort and flexibility. Herein, we report results from a 24 week randomized, placebo-controlled, double-blind study evaluating the efficacy and tolerability of UC-II® collagen in managing knee joint discomfort and mobility in healthy subjects who experience activity-related joint pain.

**Material and Methods :** Healthy subjects, (n = 96), who reported knee joint pain of 5 on an 11-point Likert scale while performing a single-leg-step-down (SLSD) test were randomized to receive placebo (PLA, n = 48), or 40 mg/day of UC-II® providing ≥ 3% undenatured type II collagen (n = 48) for 24 weeks. Joint mobility was measured from the daily number of steps using a step counter (without sporting activity). While joint discomfort was evaluated using subjective questionnaire including the Knee Injury and Outcome Score (KOOS).

**Results:** At the end of the study, subjects in collagen group reported taking higher number of daily steps than baseline value. A sub group-analysis based on gender showed significantly higher number of daily steps in males from the collagen group versus the PLA group (+669 steps vs. -526 steps, p=0.0374). Similarly, a sub-group analysis based on age showed that collagen supplemented subjects between 20 and 35 years old took higher numbers of steps on SLSD test before reporting the pain score of 5 on the Likert scale, and this change was significant versus the pre-supplementation value (p = 0.0409). In terms of joint discomfort measures, collagen group reported a significant decrease in the duration of knee pain during regular sporting activities versus the PLA group (p<0.05). Furthermore, the analysis of KOOS subscale data demonstrated a significant reduction in joint discomfort during sports or recreational activities in collagen group versus the baseline value (p=0.0009) and no significance observed between the treatments. Collagen supplemented group also showed improved quality of life over the study period (p<0.05). No significant change was observed in the PLA group. As for the KOOS individual questions, collagen group experienced significant reduction in knee pain versus the PLA group during knee twisting/



pivoting ( $p=0.0346$ ), while walking descending stairs ( $p=0.0215$ ) and walking on a flat surface ( $p=0.0241$ ) after 24 weeks of supplementation.

**Conclusion:** In conclusion, these results suggest that UC-II® undenatured type II collagen supplementation supports joint mobility and may reduce joint discomfort during the activities of daily living.

**Acknowledgments :** We are grateful to participants for their participation in the study. Lonza CHI Inc., Morristown to support the study.

**Disclosures :** Vijaya Juturu , Shane Durkee and Zainulabedin Saiyed are Lonza CHI Inc. Employers.

## OC25

### 10-YEAR TRENDS IN PREVALENCE OF RADIOGRAPHIC HIP OSTEOARTHRITIS IN JAPANESE MEN AND WOMEN: COMPARISON OF BASELINE AND 4TH RESEARCH ON OSTEOARTHRITIS/OSTEOPOROSIS AGAINST DISABILITY STUDY SURVEYS

T. Iidaka<sup>1</sup>, S. Muraki<sup>1</sup>, H. Oka<sup>2</sup>, C. Horii<sup>3</sup>, K. Nakamura<sup>4</sup>, T. Akune<sup>5</sup>, S. Tanaka<sup>3</sup>, N. Yoshimura<sup>1</sup>

<sup>1</sup>Department of Preventive Medicine for Locomotive Organ Disorders, 22nd Century Medical & Research Center, Faculty of Medicine, University of Tokyo, Tokyo, Japan, <sup>2</sup>Department of Medical Research and Management for Musculoskeletal Pain, 22nd Century Medical & Research Center, Faculty of Medicine, University of Tokyo, Tokyo, Japan, <sup>3</sup>Department of Orthopaedic Surgery, Faculty of Medicine, University of Tokyo, Tokyo, Japan, <sup>4</sup>Towa Hospital, Tokyo, Japan, <sup>5</sup>National Rehabilitation Center for Persons with Disabilities, Saitama, Japan

**Objective:** We investigated 10-year trends in the prevalence of radiographic hip osteoarthritis (OA) in Japanese men and women based on data obtained from a large-scale nationwide cohort study (The Research on Osteoarthritis/osteoporosis Against Disability study).

**Methods:** We analyzed the data of 2,924 participants (1,026 men, 1,898 women) aged 40–89 years (mean 70.7 years) residing in urban, mountainous, and coastal communities, using information from a baseline survey performed in 2005–2007. We also analyzed the data of 2,347 participants (726 men, 1,621 women) aged 40–89 years (mean 69.2 years) obtained from the 4<sup>th</sup> survey in 2015–2016. Radiographs were scored using the Kellgren/Lawrence (KL) grading system; radiographic hip OA was defined as a KL score  $\geq 2$ .

**Results:** The prevalence of radiographic hip OA was 18.4% and 14.4% in men and women, respectively in the baseline survey and 16.0% and 10.7%, respectively in the 4<sup>th</sup> survey. The prevalence of radiographic hip OA in men and women aged 40–60 years was significantly lower in the 4<sup>th</sup> survey than in the baseline survey and was significantly lower only in men in their 70s in the baseline than in the 4<sup>th</sup> survey. Logistic regression analysis performed after adjustment for age, sex, body mass index, and communities showed that the prevalence of radiographic hip OA in the 4<sup>th</sup> survey was significantly lower than that in the baseline survey (odds ratio 0.55, 95% confidence interval 0.46–0.65).

**Conclusion:** In the population-based survey with a 10-year interval, the prevalence of radiographic hip OA tended to decrease. This preferable change in radiographic hip OA circumstances could contribute to the decrease in the occurrence of osteoporotic fracture in the future.

## OC26

### SAFETY, TOLERABILITY, AND PHARMACOKINETICS OF AN INTRA-ARTICULAR CORTICOSTEROID INJECTION ADMINISTERED 7 DAYS BEFORE OR AFTER INTRA-ARTICULAR LORECIVIVINT INJECTION INTO THE SAME KNEE OF HEALTHY VOLUNTEERS: AN OPEN-LABEL, PARALLEL-ARM STUDY

A. Halseth<sup>1</sup>, N. E. Lane<sup>2</sup>, S. Kennedy<sup>1</sup>, C. J. Swearingen<sup>1</sup>, I. Simsek<sup>1</sup>, M. Fineman<sup>1</sup>, Y. Yazici<sup>1</sup>, V. A. Lopez<sup>1</sup>

<sup>1</sup>Biosplice Therapeutics, Inc., San Diego, CA, United States,

<sup>2</sup>University of California Davis, Davis, CA, United States

**Background:** Knee osteoarthritis (OA) is a painful condition frequently treated by intra-articular (IA) corticosteroid injections. Lorecivint (LOR), a novel IA CLK/DYRK inhibitor that modulates Wnt and inflammatory pathways, is in development as a potential knee OA treatment. While LOR is proposed for stand-alone use, in clinical practice, providers might administer LOR in close time proximity to IA corticosteroid. This open-label, parallel-arm, healthy volunteer study was conducted to assess safety, tolerability, and pharmacokinetic interactions between LOR and triamcinolone acetonide (TCA) when the two medications were administered 7 days apart.

**Methods:** Healthy volunteers were randomized 1:1 to Treatment Arm 1 (IA 40 mg TCA on Day 1 followed by IA 0.07 mg LOR on Day 8) or Treatment Arm 2 (IA 0.07 mg LOR on Day 1 followed by IA 40 mg TCA on Day 8). All injections were performed on the right knee. For each treatment arm, treatment-emergent adverse events (TEAEs) were categorized by “epoch”, with Epoch 1 spanning from first until second injection, and Epoch 2 spanning from second injection until end of study. In Treatment Arm 1, plasma TCA levels were assessed on Days 1 (before TCA dosing and up to 12 h after), 2 (24 h after), 3, 5, 8 (before LOR dosing and up to 8

h after), 11, and 15. Plasma LOR concentrations were assessed on Day 8 (before LOR dosing and up to 8 h after). In Treatment Arm 2, plasma LOR levels were assessed on Days 1 (before LOR dosing and up to 8 h after), 8 (up to 8 h after TCA dosing), 9 (24 h after), 10, and 12. Plasma TCA levels were assessed on Days 8 (before TCA dosing and up to 12 h after), 9 (24 h after), 10, 12, 15, 18, and 22.

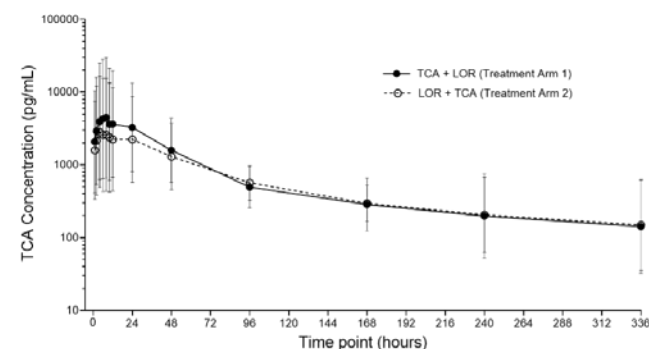
**Results:** Forty subjects (age  $41.3 \pm 7.2$  years; BMI  $27.8 \pm 2.98$  kg/m<sup>2</sup>; female 40.0%) were evaluated. A total of 18 TEAEs were reported by 11 (27.5%) subjects (Table 1). LOR injection-related TEAEs were similar between arms and there were no serious adverse events. In all subjects and at all time points, plasma LOR concentrations were below the limit of quantification (0.1 ng/ml). Geometric mean concentrations and PK parameters for TCA were similar between treatment arms (Figure 1).

**Conclusion:** There were no quantifiable plasma concentrations of LOR in either treatment arm, and the PK of TCA was not changed when administered after LOR injection compared to when administered alone. No safety signals were observed. These results suggested administering LOR and TCA within a 7-day period of each other should not pose a safety concern.

Table 1. TEAEs by Preferred Term (SAS)

Preferred Term	Treatment Arm 1		Treatment Arm 2	
	TA (Epoch 1) (N=20)	TA + LOR (Epoch 2) (N=20)	LOR (Epoch 1) (N=20)	LOR + TA (Epoch 2) (N=20)
	n (%)	Total Number of Events	n (%)	Total Number of Events
TEAEs	4 (20.0)	5	3 (15.0)	3
Injection site bruising	4 (20.0)	4	0	0
Injection site pain	0	0	1 (5.0)	1
Back pain	1 (5.0)	1	0	0
Flank pain	0	0	1 (5.0)	1
Musculoskeletal discomfort	0	0	1 (5.0)	1
Pain in extremity	0	0	1 (5.0)	1
Headache	0	0	1 (5.0)	1
Hypersensitivity	0	0	0	0
Skin abrasion	0	0	1 (5.0)	1
Adverse event pain	0	0	1 (5.0)	1

All subjects received both study injections. TA and LOR, in a randomized manner in either Treatment Arm 1 (TA then LOR) or Treatment Arm 2 (LOR then TA). Epoch 1 spans the duration from the first injection until just prior to the second injection. Epoch 2 spans the duration from the second injection until the end of study phone visit or early termination. TEAEs were coded using MedDRA v20.1 and are presented in descending order of frequency. TA = triamcinolone acetate; LOR = lorecivint.



**Figure 1.** Plasma concentration of triamcinolone acetate (TCA) following intra-articular (IA) knee injection (40 mg) 7 days before (Treatment Arm 1) and after (Treatment Arm 2) IA lorecivint (LOR) (0.07 mg). Values shown are geometric means (geometric SD) for all post-injection time points; those reported below the lower limit of quantification (LLOQ, <20.0 pg/ml) were set to  $\frac{1}{2} \times$  LLOQ.

## OC27

### EFFECT OF 2 FORMS OF VITAMIN D ON SKELETAL MUSCLE FIBER SIZE AND VITAMIN D RECEPTOR (VDR) CONCENTRATION IN YOUNGER POSTMENOPAUSAL WOMEN

L. Ceglia<sup>1</sup>, D. Rivas<sup>2</sup>, M. Schlögl<sup>3</sup>, H. Bischoff-Ferrari<sup>3</sup>, B. Dawson-Hughes<sup>4</sup>

<sup>1</sup>Division of Endocrinology, Tufts Medical Center and Bone Metabolism Lab, Jean Mayer USDA HNRCA at Tufts University, Boston, United States, <sup>2</sup>Nutrition, Exercise Physiology, and Sarcopenia Laboratory, Jean Mayer USDA HNRCA at Tufts University, Boston, United States, <sup>3</sup>Dept. of Aging Medicine and Aging Research, University of Zurich, Zurich, Switzerland, <sup>4</sup>Bone Metabolism Laboratory, Jean Mayer USDA HNRCA at Tufts University, Boston, United States

**Objective:** To examine the effect of 25(OH)D<sub>3</sub> (HyD), vitamin D<sub>3</sub> (VD<sub>3</sub>) or placebo on intramyonuclear VDR expression, muscle fiber cross-sectional area (FCSA), and muscle satellite cell activation.

**Methods:** The study was conducted in a subset of the HyD ( $n=11$ ), VD<sub>3</sub> ( $n=12$ ), and placebo ( $n=13$ ) groups of the HyD Osteopenia Study, a randomized controlled trial in postmenopausal women aged 50-70 years with osteopenia. Women were randomized to HyD 20 mcg/d, VD<sub>3</sub> 3200 IU/d, or matching placebo for 6 months. Baseline and 6-month FCSA and intramyonuclear VDR concentration were measured from vastus lateralis muscle cross-sections probed for fiber type I, VDR, and PAX-7 (satellite cell marker) using immunofluorescence.

**Results:** Baseline mean (SD) age was  $61 \pm 4$  years and 25OHD was  $21.6 \pm 9.5$  ng/mL. Baseline characteristics were similar except body mass index (BMI) which was slightly lower in the VD<sub>3</sub> group compared to the HyD and placebo groups. At 6 months, serum 25(OH)D levels were  $82.7 \pm 27.5$  ng/mL (HyD),  $55.4 \pm 8.5$  ng/mL (VD<sub>3</sub>),  $33.1 \pm 14.4$  ng/mL (placebo), ANOVA  $P < 0.001$ . After adjustments for baseline 25OHD and BMI, the mean (SE) percent change in total (type I/II) FCSA was  $-4.3 \pm 9.2\%$  (HyD),  $25.1 \pm 9.1\%$  (VD<sub>3</sub>),  $4.7 \pm 8.4\%$  (placebo), with  $P=0.033$  between HyD and VD<sub>3</sub>. More pronounced differences between HyD and VD<sub>3</sub> were noted in type I compared to the type II fibers. Percent changes in VDR and PAX-7 concentrations did not differ significantly by group (all  $P > 0.223$ ).

**Conclusion:** Although HyD vs. VD<sub>3</sub> resulted in higher final 25OHD levels, muscle fiber size significantly increased with VD<sub>3</sub> and did not change with HyD in 6 months in younger postmenopausal women. This result supports concerns that higher 25OHD levels may not benefit skeletal muscle outcomes.

*This study was supported by DSM Nutritional Products, Inc.*

## OC28

### NEUROFILAMENT-LIGHT CHAINS (NF-L), A BIOMARKER OF NEURONAL DAMAGE, IS INCREASED IN SARCOPENIC PATIENTS: RESULTS OF THE SARCOPHAGE STUDY

A. Ladang<sup>1</sup>, S. Kovacs<sup>1</sup>, L. Lengelé<sup>2</sup>, M. Locquet<sup>2</sup>, J.-Y. Reginster<sup>2</sup>, O. Bruyère<sup>2</sup>, E. Cavalier<sup>3</sup>

<sup>1</sup>Clinical Chemistry department, CHU de Liège, Liège, Belgium, <sup>2</sup>WHO Collaborating Centre for Public Health Aspects of Musculoskeletal Health and Aging, Division of Public Health, Epidemiology and Health Economics, University of Liège, Liège, Belgium, <sup>3</sup>Clinical Chemistry department, CHU Liège, Liège, Belgium

#### Backgrounds

Recently, several papers have made the hypothesis that sarcopenia might partially due to a nervous system failure. Indeed, part of the diagnosis is based on volitional tasks that require the integrity of the nervous system to be properly realized. In the recent years, neurofilament light chains (NF-L) have emerged as a new highly specific blood-biomarker of neuronal damage. Its expression has been reported to be modified in both central and peripheral neuropathies as well as traumatic brain injuries.

#### Objectives

In this study, we measured NF-L in a large cohort of older individuals to define its expression in presence of sarcopenia.

#### Methods

The SarcoPhAge cohort is a Belgian cohort of community-dwelling older adults. A diagnosis of sarcopenia was established according to the European Working Group on Sarcopenia in older People 2 (EWGSOP2) criteria. Muscle strength was evaluated with a hydraulic hand-dynamometer, appendicular lean mass by Dual-Energy X-Ray Absorptiometry and physical performance by the Short Physical Performance Battery test (SPPB). NF-L, was measured on all the available sera collected at time of inclusion (n=409) using the SiMoA technology (Quanterix°).

#### Results

NF-L was increased in sarcopenic patients (median NF-L: 43.0 pg/mL) compared to controls (median NF-L: 21.1 pg/mL) (p-value: < 0.0001). We also observed a significant difference between subjects with high SPPB score (score: 10 – 12) (median NF-L: 19.5 pg/mL), intermediate SPPB score (score: 7 – 9) (median NF-L: 24.5 pg/mL) and low SPPB score (score: 0 – 6) (median NF-L: 27.7 pg/mL) (p-value: <0.0001). The rank correlation gave a Spearman's rho of -0.267 (p-value <0.0001). A significant correlation was also observed between appendicular lean mass/height<sup>2</sup> (ALM/h<sup>2</sup>) and NF-L (rho: -0.200; p-value <0.0001) but also between handgrip strength and NF-L (rho: -0.196; p-value =0.0001). In a multiple regression after adjustment for potential confounding variables, NF-L was independently associated with SPPB score (p-value: <0.0001) but not with ALM/h<sup>2</sup> or handgrip strength.

#### Conclusions

In this study, we showed that NF-L is increased in sarcopenic patients and is more particularly associated with SPPB score. Our results suggest that sarcopenia may share common features with neurodegeneration.

## OC29

### CORTICAL PORE SIZE DISTRIBUTION AND VISCOELASTIC HUMAN TIBIA PROPERTIES DISCRIMINATE FRAGILITY FRACTURES INDEPENDENT OF BONE MINERAL DENSITY

G. Armbrrecht<sup>1</sup>, H. Minh Nguyen<sup>1</sup>, J. Massmann<sup>1</sup>, K. Raum<sup>1</sup>

<sup>1</sup>Charité-Universitätsmedizin Berlin, Berlin, Germany

**Objectives:** Osteoporosis is a disorder of bone remodeling leading to reduced bone mass, structural deterioration, and increased bone fragility. The established diagnosis is based on the measurement of areal bone mineral density by dual energy x-ray absorptiometry (DXA), which poorly captures individual bone loss and structural decay. Enlarged cortical pores in the tibia have been proposed to indicate structural deterioration and reduced bone strength in the hip.

**Material and Methods:** In this cross-sectional study, we have assessed for the first time the cortical pore diameter distribution Ct.Po.Dm.D together with viscoelastic bone properties (i.e. slope and intercept of the frequency-dependent attenuation Ct.q<sub>f</sub> and Ct.q<sub>0</sub>) at the anteromedial tibia midshaft by means of a novel ultrasonic cortical backscatter (CortBS) technology. We hypothesized that the CortBS biomarkers are associated with the occurrence of fragility fractures in postmenopausal women (N = 55). The discrimination performance was assessed by means of multivariate PLS discrimination analyses with Leave-One-Out Cross-Validation (PLS-LOOCV) and benchmarked with models obtained from DXA and site-matched second-generation high-resolution peripheral computed tomography (HR-pQCT).

**Results:** The short-term precision of the individual CortBS parameter estimations was in the range between 1.7 and 13.9 %. Ct.Po.Dm values were in the range between 20 and 62.8 µm. CortBS parameters were associated with subject's age (R<sup>2</sup> = 0.45), height (R<sup>2</sup> = 0.36), and marginally with weight (R<sup>2</sup> = 0.25) and BMI (R<sup>2</sup> = 0.22). We found a superior discrimination performance of CortBS (area under the receiver operating characteristic curve: 0.69 ≤ AUC ≤ 0.75) compared to DXA (0.53 ≤ AUC ≤ 0.55) and a similar performance compared to HR-pQCT (0.68 ≤ AUC ≤ 0.73).

**Conclusions:** CortBS is the first quantitative bone imaging modality that can quantify viscoelastic and microstructural tissue deteriorations in cortical bone, which occur during normal aging and the development of osteoporosis. A widespread application of the method is anticipated to enable an early identification of

people at increased risk, a timely initiation of preventive therapies, and subsequently to a reduction of the prevalence of fragility fractures in people with metabolic bone diseases.

**Acknowledgments:** This work was supported by BMBF KMUI grant 13GW0234, BMWi grant 03THW08H01, and DFG grant INST 335/555-1. We gratefully thank Gampt GmbH and exceeding solutions GmbH for their contributions to develop the CortBS data acquisition software.

**Disclosures:** JM is employee of poroUS GmbH, a startup developing the CortBS technology. KR is inventor on the patent applications (EP3641657A1, US 2020/0129140, CN110769754A and JP 2019-570514) describing the CortBS technology.

## OC30

### IN HEALTHY MEN, EARLY DECLINE IN TRABECULAR BONE MINERAL DENSITY IS, IN PART, RELATED TO DECREASES IN SEX STEROIDS

T. Banica<sup>1</sup>, C. Verroken<sup>1</sup>, H.-G. Zmierzak<sup>1</sup>, S. Goemaere<sup>1</sup>, J.-M. Kaufman<sup>1</sup>, B. Lapauw<sup>1</sup>

<sup>1</sup>Unit for Osteoporosis and Metabolic Bone Diseases, Department of Endocrinology, Ghent University Hospital, Ghent, Belgium

**Introduction :** Bone mass is known to decline in aging men and this decline is in part affected by sex steroid exposure. However, it is unclear how early after achieving peak bone mass bone loss begins and whether this decline is associated with sex steroid levels in young adulthood.

**Objective :** Investigating longitudinal changes in trabecular and cortical vBMD in relation to sex steroid levels, body composition and lifestyle factors in young adult men.

**Methods :** Longitudinal observational study. 999 healthy men aged 24-46 years of whom 691 were re-evaluated after a mean period of 12 years. Serum sex hormone binding globulin (SHBG) levels were measured using immuno-assay. Testosterone (T), estradiol (E2), were measured using LC-MS/MS, free T calculated (cFT). Volumetric BMD was determined at the non-dominant arm (radius, at 4% and 66% of bone length from distal) using pQCT (Stratec XCT-2000, Stratec Medizintechnik, Germany, version 6.0). Linear mixed models were used for statistical analyses. All models comprised lifestyle factors and were adjusted for age and body mass index (BMI).

**Results :** Baseline age was 34±6 years. Mean BMI increased by 1.19kg/m<sup>2</sup>. Trabecular vBMD decreased by 1.7% (228.9mg/mm<sup>3</sup> vs 225.0 mg/mm<sup>3</sup>), no changes over time in cortical vBMD were observed. Mean T levels decreased by 14.2% (20.8nmol/l vs. 17.8nmol/l), cFT by 19.1% (392pmol/l vs. 317pmol/l). Mean E2 levels did not change over time. SHBG increased by 3.0% (39.8nmol/l vs. 41.0nmol/l). Larger decreases in T, cFT and E2 (all p<0.03) but not SHBG (p>0.05) were associated with more pronounced decreases of trabecular vBMD over time.

**Conclusion :** Shortly after achieving peak bone mass, a modest trabecular decline was appreciated. This decline was in part associated with declining sex steroid levels. Moreover this decline persisted after correction for changes in body composition and lifestyle factors.

## OC31

### MULTICENTER PROSPECTIVE STUDY TO ASSESS EFFICACY AND SAFETY GLYCOSAMINOGLYCAN PEPTIDE COMPLEX IN PATIENTS WITH KNEE OSTEOARTHRITIS AND COMORBIDITY

E. Taskina<sup>1</sup>, N. Kashevarova<sup>1</sup>, E. Sharapova<sup>1</sup>, S. Anikin<sup>1</sup>, E. Strebkova<sup>2</sup>, K. Telyshev<sup>2</sup>, L. Alekseeva<sup>1</sup>, A. Lila<sup>1</sup>, T. Raskina<sup>3</sup>, E. Otteva<sup>4</sup>, E. Zonova<sup>5</sup>, N. Chichasova<sup>2</sup>, V. Lila<sup>6</sup>, I. Vinogradova<sup>7</sup>, O. Ivanova<sup>8</sup>, S. Yakupova<sup>9</sup>, E. Shmidt<sup>10</sup>

<sup>1</sup>V.A. Nasonova Research Institute of Rheumatology, Moscow, Russian Federation, Moscow, Russia, <sup>2</sup>V.A. Nasonova Research Institute of Rheumatology, Moscow, Russian Federation, Moscow, Russia, <sup>3</sup>KemSMU, Kemerovo, Russian Federation, Kemerovo, Russia, <sup>4</sup>IATHP, Khabarovsk, Russian Federation, Khabarovsk, Russia, <sup>5</sup>NSMU, Novosibirsk, Russian Federation, Novosibirsk, Russia, <sup>6</sup>NWSMU, Saint Petersburg, Russian Federation, Saint Petersburg, Russia, <sup>7</sup>URCH, Ulyanovsk, Russian Federation, Ulyanovsk, Russia, <sup>8</sup>Voronezh Regional Clinical Hospital No. 1, Voronezh, Russia, <sup>9</sup>Kazan State Medical University, Ministry of Health of Russia, Kazan, Russia, <sup>10</sup>N.I. Pirogov City Clinical Hospital, Moscow, Russia

#### Objective/Introduction:

we have conducted an open prospective observational multicenter study «Osteoarthritis: evaluation of progression in real clinical practice», aiming to assess the efficacy and safety of glycosaminoglycan peptide complex therapy in pts with knee (KOA) and comorbidity.

#### Materials and Methods.

179 outpatients (predominantly females – 86,6%) from 10 Russian constituent territories were enrolled in the study after signing the informed consent. The inclusion criteria were primary tibiofemoral Kellgren-Lawrence score grade II or III knee OA and comorbidity (type 2 diabetes mellitus and/or arterial hypertension), ≤40 mm pain intensity during walking on visual analogue scale (VAS), requiring NSAID intake (for at least 30 days during 3 months prior to enrollment). Mean age was 62,1 ± 7,4 years, mean BMI – 31 ± 5,3 kg/m<sup>2</sup>, disease duration – 8 (5 - 12) years. Grade II OA was documented in 70,9% of patients, Grade III - in 29,1%. Speaking of comorbidity, 92,2% of pts had hypertension, 14,5% had CAD, 19,6% had well controlled type 2 diabetes mellitus and 50,8% had obesity. Patients received two 8-week courses of trial medication, each consisting of intramuscular injections of 3 x 2 ml ampoules per week. The study duration was 10 months. Efficacy and safety evaluations were made based on VAS pain assessment, Western



Ontario and McMaster Universities Osteoarthritis Index (WOMAC) - (WOMAC pain (0-500), WOMAC function (0-1700), WOMAC stiffness (0-200)), VAS patients' health status, EQ-5D-based assessment of patients' quality of life, global physician's and patient's efficacy assessment, and daily NSAIDs requirements. Lab parameters of uric acid, fasting glucose and CRP were assessed on each visit. Statistica10.0 was used for statistical analysis.

### Results.

Statistically significant pain mitigation (VAS) while walking was documented in two months after start of treatment (60 (50-69) vs 40 (27-54) mm,  $p < 0,0001$ ), with subsequent further improvement during all 8 months (fig. 1). This picture corresponds with synovitis decline throughout the trial (55,6% pts initially vs 39,2% after 8 mo of treatment, OR=1,94, 95%CI 1,13-3,34,  $p=0,02$ ). There was no aggravation of pain after discontinuation of the drug (during 2-4mo FUP), indicating strong aftereffect of glycosaminoglycan peptide complex. Similar trends were observed with total WOMAC score (1130 (829-1436) – at baseline, and 596 (364-948) mm – by the end of the study,  $p < 0,0001$ ), and all WOMAC subscores (229 (159-308) – baseline WOMAC pain, 114 (65-184) mm – by the end of the study  $p < 0,0001$ ; stiffness–98 (60-124) and 50 (25-81) mm,  $p < 0,0001$ ; function–801 (541-1035) and 480 (289-687) mm,  $p < 0,0001$ , respectively). Statistically significant improvement of patients' quality of life by EQ-5D and general health status was observed during the follow up period (respectively, 0,52 (-0,02-0,59) and 0,69 (0,59-0,80),  $p < 0,0001$ ; 50 (40-60) and 60 (44-70) mm,  $p < 0,0001$ ). By the end of treatment 82,7% were categorized as responders by OMERACT-OARSI criteria, 60,3% pts did not take any NSAIDs. Glycosaminoglycan peptide complex therapy did not have any effect on comorbid disease course, did not impair protein or glucose metabolism (uric acid:  $316,5 \pm 74,9$  vs  $306,3 \pm 67,5$   $\mu\text{mol/l}$ ,  $p > 0,05$  and glucose  $5,7 \pm 1,2$  vs  $5,7 \pm 1,2$  mmol/l,  $p > 0,05$ ). Minor adverse reactions were documented in 5 pts (2,8%).

### Conclusion.

Obtained results show glycosaminoglycan peptide complex as rather safe disease modifying therapy in OA pts with comorbidity. Glycosaminoglycan peptide complex therapy reduces pain, stiffness, and use of NSAIDs, improves quality of life and joint function, and does not have any effect on protein and glucose metabolism. The drug demonstrated a favorable safety profile and sustainable aftereffect, lasting for at least 4 mo post-treatment.

## OC32

### IDENTIFICATION OF PATIENTS AT LOW, HIGH AND VERY HIGH RISK OF OSTEOPOROTIC FRACTURES IN THE UK USING FRAX

E. V. McCloskey<sup>1</sup>, N. C. Harvey<sup>2</sup>, H. Johansson<sup>3</sup>, M. Lorentzon<sup>4</sup>, E. Liu<sup>3</sup>, L. Vandenput<sup>3</sup>, J. A. Kanis<sup>3</sup>

<sup>1</sup>Mellanby Centre for Musculoskeletal Research, University of Sheffield, Sheffield, United Kingdom, <sup>2</sup>MRC LEU, University of Sheffield, Southampton, United Kingdom, <sup>3</sup>Mary McKillop Institute for Health Research, Australian Catholic University, Melbourne, Australia, <sup>4</sup>University of Gothenburg, Gothenburg, Sweden

A major use of FRAX has been its incorporation into treatment and assessment guidelines. The setting of intervention thresholds (the fracture probability above which to recommend treatment) has varied in different countries. Guidelines variously use an age-dependent fracture probability, or a fixed probability threshold applied to all relevant ages. In the UK, the National Osteoporosis Guideline Group (NOGG) have adopted a hybrid threshold. For men and women, the intervention threshold up to age 70 years is set at a risk equivalent to that associated with a prior fracture and therefore rises with age. At age 70 years and above, fixed thresholds are applied. The proportion of women potentially eligible for treatment rises from approximately 30% to 50% with age, largely driven by the prevalence of prior fracture.

The development of new anabolic interventions for osteoporosis has widened the strategies for its management, in particular, the need to identify patients at very high risk. Such patients might be preferentially targeted with an anabolic agent in the first instance, followed by an inhibitor of bone resorption to maintain a long-term response. NOGG has developed thresholds that characterise men and women with high and very high fracture risk; very high risk is classified as a fracture probability that exceeds the original (and current) intervention threshold by 60%. The proportion of women at very high risk rises from approximately 7% to 36% with age. Clinical scenarios that determine very high risk commonly arise through a combination of clinical risk factors. Additionally, a recent fracture within the past two years has been shown to increase the risk of refracture over and above that calculated by FRAX. Adjustments to FRAX probabilities have been made available to account for the recency of fracture. Such adjustments identify very high risk patients, particularly those with a recent vertebral fracture.

## OC33

### CIRCULATING MICRORNA AS BIOMARKERS OF OSTEOPOROSIS AND FRACTURE RISK

S. Ciuffi<sup>1</sup>, F. Marini<sup>1</sup>, A. Botta<sup>2</sup>, G. Isaia<sup>3</sup>, P. D'Amelio<sup>3</sup>, C. Maroccio<sup>4</sup>, S. Migliaccio<sup>5</sup>, S. Minisola<sup>6</sup>, J. Pepe<sup>6</sup>, R. Nuti<sup>7</sup>, U. Tarantino<sup>8</sup>, M. L. Brandi<sup>9</sup>

<sup>1</sup>University of Study of Florence, Department of Experimental and Clinical Biomedical Sciences, Florence, Italy, <sup>2</sup>University of Rome "Tor Vergata", Department of Biomedicine and Prevention, Medical Genetics Section, Rome, Italy, <sup>3</sup>University of Turin, Department of Medical Science, Gerontology Section, Turin, Italy, <sup>4</sup>University of Pisa and University Hospital of Pisa, Department of Clinical and Experimental Medicine, Endocrinology Unit II, Pisa, Italy, <sup>5</sup>University of "Foro Italico" of Rome, Department of Movement, Human and Health Sciences, Rome, Italy, <sup>6</sup>"Sapienza" University of Rome, Department of Radiotherapy, Policlinico Umberto I, Rome, Italy, <sup>7</sup>University of Siena, Department of Medicine, Surgery and Neuroscience, Siena, Italy, <sup>8</sup>University of Rome "Tor Vergata", Department of Clinical Sciences and Translational Medicine, Rome, Italy, <sup>9</sup>F.I.R.M.O. Italian Foundation for the Research on Bone Diseases, Florence, Italy

**Objectives:** MicroRNAs (miRNAs) demonstrated to be key regulators of bone modelling and remodelling, through epigenetic post-transcriptional control of gene expression in bone cells. De-regulation of expression and/or activity of specific miRNAs may concur to osteoporosis development and fragility fracture risk. Serum dosage of specific circulating microRNAs (c-miRNA) has recently become subject of investigation by the scientific community as possible early-stage and non-invasive diagnostic biomarkers for osteoporosis and/or prognostic marker for the individual risk of osteoporosis-associated fragility fractures.

**Material and methods:** The expression of human miRNAs was measured, by next generation sequencing (NGS), in serum samples of 50 osteoporotic patients (18 without fracture, 18 with lumbar spine fracture and 14 with femoral neck fracture) vs 30 individuals with normal bone mass (T-score at lumbar spine, femoral neck and total femur  $\geq 1$ ), who have not received any anti-fracture medical therapy at the time of serum collection. c-miRNAs, identified as significantly differentially expressed between the two groups, were validated by Droplet-Digital-PCR (ddPCR) technology in a larger number of serum samples, from untreated patients, presenting different bone phenotypes [105 with osteoporosis (54 without fracture, 32 with lumbar spine fracture, 16 with femoral neck fracture and 3 with both spine and femur fracture), 62 with osteopenia and 46 with healthy BMD].

**Results:** NGS identified 5 miRNAs (miR-8085, miR-320a-3p, miR-23a-3p, miR-4497, miR-145-5p) as differentially expressed between non-fractured osteoporosis cases and normal bone samples. ddPCR confirmed miR-23a-3p as less expressed in osteoporosis, with or without fracture, than osteopenia and normal bone, miR-320a-3p as more expressed in osteoporosis with fracture and less expressed in osteoporosis without fracture,

both with respect to the other two groups of bone phenotypes, and identified miR21-5p as more expressed in osteoporosis, with or without fracture, than osteopenia and normal bone.

**Conclusions:** Our data suggested these three c-miRNAs as possible serum diagnostic biomarkers of osteoporosis. Circulating miR-320a-3p appeared to be a promising prognostic indicator of fracture risk in osteoporotic patients. Further studies, in larger and different populations, are needed to confirm these data, to translate the use of c-miRNAs as diagnostic and prognostic biomarkers of osteoporosis and fracture into the clinical practice.

## OC34

### PALOVAROTENE FOR THE TREATMENT OF FIBRODYSPLASIA OSSIFICANS PROGRESSIVA IN FEMALES AGED $\geq 8$ YEARS AND MALES AGED $\geq 10$ YEARS: DATA FROM THE PHASE III MOVE TRIAL

R. J. Pignolo<sup>1</sup>, M. Al Mukaddam<sup>2</sup>, G. Baujat<sup>3</sup>, M. A. Brown<sup>4</sup>, A. M. Cheung<sup>5</sup>, C. L. De Cunto<sup>6</sup>, P. Delai<sup>7</sup>, E. C. Hsiao<sup>8</sup>, P. Kannu<sup>9</sup>, R. Keen<sup>10</sup>, E. E. Mancilla<sup>11</sup>, S. K. Berglund<sup>12</sup>, R. Marino<sup>13</sup>, A. Strahs<sup>13</sup>, F. S. Kaplan<sup>2</sup>

<sup>1</sup>Department of Medicine, Mayo Clinic, Rochester, Minnesota, United States, <sup>2</sup>Departments of Orthopaedic Surgery & Medicine, The Center for Research in FOP and Related Disorders, Perelman School of Medicine, University of Pennsylvania, Philadelphia, Pennsylvania, United States, <sup>3</sup>Département de Génétique, Institut IMAGINE and Hôpital Universitaire Necker-Enfants Malades, Paris, France, <sup>4</sup>Guy's and St Thomas' NHS Foundation Trust and King's College London NIHR Biomedical Research Centre, London, United Kingdom, <sup>5</sup>Department of Medicine and Joint Department of Medical Imaging, University Health Network, University of Toronto, Toronto, Ontario, Canada, <sup>6</sup>Pediatric Rheumatology Section, Department of Pediatrics, Hospital Italiano de Buenos Aires, Buenos Aires, Argentina, <sup>7</sup>Centro de Pesquisa Clínica, Hospital Israelita Albert Einstein, São Paulo, Brazil, <sup>8</sup>Division of Endocrinology and Metabolism, UCSF Metabolic Bone Clinic, Institute of Human Genetics, and UCSF Program in Craniofacial Biology, Department of Medicine, University of California-San Francisco, San Francisco, California, United States, <sup>9</sup>Hospital for Sick Children, Toronto, Ontario, Canada, <sup>10</sup>Centre for Metabolic Bone Disease, Royal National Orthopaedic Hospital, Stanmore, United Kingdom, <sup>11</sup>Children's Hospital of Philadelphia, Perelman School of Medicine, University of Pennsylvania, Philadelphia, Pennsylvania, United States, <sup>12</sup>Department of Clinical Sciences, Pediatrics, Umeå University, Umeå, Sweden, <sup>13</sup>Ipsen, Newton, Massachusetts, United States

**Objective(s):** Assess the safety and efficacy of palovarotene (PVO), a selective retinoic acid receptor- $\gamma$ , in preventing new heterotopic ossification (HO) in young patients with fibrodysplasia ossificans progressiva (FOP).

**Material and Methods:** The phase III MOVE trial (NCT03312634) compared efficacy data from PVO-treated patients with FOP aged  $\geq 4$  years with untreated participants aged  $\leq 65$  years from an FOP natural history study (NHS; NCT02322255). Annualized change in new HO volume was assessed by low-dose whole-body computed tomography. Adverse events (AEs) were assessed; given the known class effect of retinoids on the skeleton, bone safety assessments were included. Month 18 interim safety and post hoc efficacy data from MOVE are reported, focusing on females/males aged  $\geq 8/10$  years at enrollment (ages at which healthy controls reach  $\sim 80\%$  of adult height).<sup>1</sup>

**Results:** Efficacy analyses included individuals aged  $\geq 8/10$  years with  $\geq 1$  post-Baseline HO volume measurement (MOVE: N=77; NHS: N=76). Mean [SE] new HO was 57.0% lower with PVO ( $10.65 [3.64] \times 10^3 \text{ mm}^3$ ) versus no treatment ( $24.78 [6.19] \times 10^3 \text{ mm}^3$ ) as analyzed without square-root transformation of HO volume. Safety data included 86 patients from MOVE aged  $\geq 8/10$  years. The most common treatment-emergent AEs were mucocutaneous: dry skin (67.4%), lip dryness (44.2%), alopecia (34.9%). Premature physal closure (PPC) serious AEs occurred in 11/21 (52.4%) patients aged  $< 8/10$  years and 9/36 (25.0%)  $\geq 8/10$ – $< 14$  years at enrollment.

**Conclusion(s):** PVO may be an important therapeutic option in FOP. As HO is cumulative and functional disability begins in childhood, most benefit would accrue to young individuals, although the risk of PPC must be considered in growing children.

**References:** 1. Greulich W. Radiographic Atlas of Skeletal Development of the Hand and Wrist: Stanford Univ. Press, 1959.

**Acknowledgements:** This study was sponsored by Ipsen.

**Disclosures:** RJP: Research investigator: Clementia/Ipsen, Regeneron; Advisory board: President of the International Clinical Council on FOP; MAM: Research support: Clementia/Ipsen, Regeneron; Non-paid consultant: Biocryst, Blueprint, Daiichi Sankyo, Incyte, Keros; Advisory board (all voluntary): IFOPA Registry Medical Advisory Board, International Clinical Council on FOP; GB: Advisory board: Clementia/Ipsen, FOP European Consortium, International Clinical Council on FOP; Speaker: Clementia/Ipsen; MAB: Advisory board: AbbVie, Janssen, Pfizer, UCB Pharma, Novartis; Grant support: AbbVie; Research investigator: AbbVie, Clementia/Ipsen, Janssen, Novartis, Pathios, Regeneron; Speaker: AbbVie, Janssen, Novartis, Pfizer, Regeneron, UCB Pharma; AMC: Research investigator: Clementia/Ipsen, Regeneron; Consultant: Ipsen; CDC: Research investigator: Clementia/Ipsen; Speaker: Biogen; PD: Research investigator: Clementia/Ipsen. Member of the International Clinical Council on FOP; ECH: Principal investigator at UCSF for all palovarotene clinical trials in FOP; sub-investigator for clinical trials of palovarotene in MO, and for a clinical trial sponsored by Neurocrine Biosciences, Inc.; member of the International Clinical Council on FOP, Fibrous Dysplasia Foundation, and IFOPA Registry advisory board (all voluntary); PK: Research investigator: Clementia/Ipsen; RK: Research investigator: Clementia/Ipsen, Kyowa Kirin, Regeneron; Advisory board: IFOPA FOP Registry Medical Advisory Board, International Clinical Council on FOP; EEM: Research investigator: Clementia/Ipsen; SKB: Research investigator: Clementia/Ipsen; Speaker: Nestlé Nutri-

tion, Nutricia; Funding: Mead Johnson Nutrition; RM: Employee of Ipsen; AS: Employee of Ipsen; FSK: Research investigator: Clementia/Ipsen, Regeneron; Advisory Board: IFOPA Medical Advisory Board; Founder and Immediate Past-President of the International Clinical Council (ICC) on FOP; Chair of the Publications Committee of the ICC.

## OC35

### MIGHT NSAID USE INTERACT WITH BISPHOSPHONATE EFFICACY? EXPLORATORY ANALYSIS FROM THE CLODRONATE HIP STUDY

Z. Zheng<sup>1</sup>, H. Johansson<sup>2</sup>, N. C. Harvey<sup>3</sup>, M. Lorentzon<sup>2</sup>, J. A. Kanis<sup>4</sup>, E. V. McCloskey<sup>5</sup>

<sup>1</sup>Mellanby Centre for Musculoskeletal Research, University of Sheffield, Sheffield, United Kingdom, <sup>2</sup>University of Gothenburg, Gothenburg, Sweden, <sup>3</sup>University of Southampton, Southampton, United Kingdom, <sup>4</sup>Australian Catholic University, Melbourne, Australia, <sup>5</sup>University of Sheffield, Sheffield, United Kingdom

#### Objectives

NSAIDs are commonly used in the setting of musculoskeletal disorders. It has been hypothesized that NSAIDs might have weak but beneficial effects on bone health, including fracture risk, but most studies have been unable to adjust for potential confounders. We explored the relationship between NSAIDs and fracture risk within the setting of a well-documented, randomised, placebo-controlled study of the bisphosphonate, clodronate.

#### Material and Methods

5212 community-dwelling, women age 75 years and older, unselected for osteoporosis were included in this single centre trial. Clodronate 1600mg daily was compared to placebo over a 3 year treatment period, and reduced osteoporotic fracture risk by 23%. Concurrent medication use at baseline was used to identify those prescribed oral NSAIDs. Only verified, incident fractures were included in the analysis. Using Cox regression, the impact of NSAIDs on fracture risk was examined as well as the anti-fracture efficacy of clodronate in those using or not using NSAIDs.

#### Results

1082 (20.8%) women reported use of NSAIDs at baseline. They were slightly, but significantly, younger (mean 79 vs 80 years,  $p=0.004$ ) and heavier (mean 66.7 vs 64.7 kg,  $p<0.001$ ) than non-users, with slightly higher femoral neck BMD (FN-BMD, 0.66 vs 0.64 g/cm<sup>2</sup>,  $p<0.001$ ). When adjusted for age, FN-BMD and weight, NSAID use was associated with a significant increase in osteoporotic fracture risk (HR 1.29, 95%CI 1.03-1.62,  $p=0.025$ ). However, this increase in risk was not statistically significant in the placebo group (HR 1.14, 0.84-1.55). In women receiving clodronate, the effect of the bisphosphonate to reduce osteoporotic

tic fracture risk was not observed in those receiving NSAIDs (HR 0.95, 0.65-1.41,  $p=0.81$ ) in contrast to those not using NSAIDs (HR 0.71, 95%CI 0.58-0.89,  $p=0.002$ ).

#### Conclusion

The analysis suggests that the efficacy of the bisphosphonate, clodronate, to reduce fracture risk was negated in those receiving NSAIDs. The mechanism, if real, is unclear, but this observation may be of significant clinical importance. Further exploration in other studies with commonly used oral bisphosphonates is required.



WORLD CONGRESS  
ON OSTEOPOROSIS,  
OSTEOARTHRITIS AND  
MUSCULOSKELETAL  
DISEASES



2021 VIRTUAL



Abstract Book

## **ESCEO Symposia Abstracts**

## ESCEO1

## SIMILARITIES AND DIFFERENCES BETWEEN THE OARSI AND ESCEO GUIDELINES FOR THE MANAGEMENT OF KNEE OSTEOARTHRITIS

T. E. McAlindon<sup>1</sup>, R. R. Bannuru<sup>1</sup>

<sup>1</sup>Center for Treatment Comparison and Integrative Analysis, Division of Rheumatology, Tufts Medical Center, Boston, United States on behalf of OARSI and ESCEO joint working group

**Objectives:** Knee osteoarthritis (OA) is a highly heterogeneous disease known to have significant impacts on quality of life. With newly published data and the identification of new OA phenotypes, the management of knee OA has become increasingly challenging. Two international organisations updated their treatment algorithms in 2019 for the non-surgical management of knee OA; i) the Osteoarthritis Research Society International (OARSI) and ii) the European Society for Clinical and Economic Aspects of Osteoporosis and Osteoarthritis (ESCEO). Our aims were to examine the similarities and differences between these two guidelines and provide a narrative to help guide health-care providers through the complexities of non-surgical management of knee OA.

**Methods:** A joint working group comprising selected authors of the 2019 OARSI and ESCEO guidelines as well as independent members convened for a 1-day meeting and jointly reviewed these guidelines (November 13<sup>th</sup> 2019). A comprehensive discussion was held among all members of the working group to discuss the treatment algorithms and the methodological approaches used to formulate recommendations in the OARSI and ESCEO guidelines. The working group was convened and funded by ESCEO.

**Results:** OARSI and ESCEO both recommend education, structured exercise and weight loss as core treatments, topical NSAIDs as first-line treatments and oral NSAIDs and intra-articular injections for persistent pain. Low-dose, short-term acetaminophen, pharmaceutical grade glucosamine and chondroitin sulfate are recommended by ESCEO. OARSI strongly recommends against the use of all glucosamine and chondroitin formulations and conditionally recommend against acetaminophen use. If symptoms persist, ESCEO recommended the short-term use of weak opioids (e.g. tramadol) whilst OARSI make no such recommendation due to a poor safety profile and lack of treatment efficacy.

**Conclusions:** The guidelines agreed in the majority of their recommendations providing a framework of local guideline production. There were some differences that were thought to be predominantly the result of differences in guideline methodology. These algorithms provide a useful guide for patients and healthcare providers for the non-surgical management of knee OA.

**Funding:** The joint working group was funded by ESCEO

## ESCEO2

## HOW CAN WE EXPLAIN THE DIFFERENCES BETWEEN THE OARSI AND ESCEO GUIDELINES FOR THE MANAGEMENT OF KNEE OSTEOARTHRITIS?

N. K. Arden<sup>1,2,3</sup>, T. A. Perry<sup>1</sup>, R. R. Bannuru<sup>4</sup>, O. Bruyère<sup>3,5</sup>, C. Cooper<sup>2,3</sup>, I. K. Haugen<sup>6</sup>, M. C. Hochberg<sup>7</sup>, T. E. McAlindon<sup>4</sup>, A. Mobasheri<sup>8,9,10</sup>, J.-Y. Reginster<sup>3,11</sup>

<sup>1</sup>Versus Arthritis Centre for Sport, Exercise and Osteoarthritis, University of Oxford, Oxford, United Kingdom, <sup>2</sup>MRC Lifecourse Epidemiology Unit, University of Southampton, Southampton General Hospital, Southampton, United Kingdom, <sup>3</sup>WHO Collaborating Centre for Public Health Aspects of Musculoskeletal Health and Aging, Liège, Belgium, <sup>4</sup>Center for Treatment Comparison and Integrative Analysis, Division of Rheumatology, Tufts Medical Center, Boston, United States, <sup>5</sup>Division of Public Health, Epidemiology and Health Economics, University of Liège, CHU Sart Tilman, Liège, Belgium, <sup>6</sup>Department of Rheumatology, Diakonhjemmet Hospital, Oslo, Norway, <sup>7</sup>Departments of Medicine and Epidemiology and Public Health, University of Maryland School of Medicine, Baltimore, United States, <sup>8</sup>Research Unit of Medical Imaging, Physics and Technology, University of Oulu, Oulu, Finland, <sup>9</sup>Department of Regenerative Medicine, State Research Institute Centre for Innovative Medicine, Vilnius, Lithuania, <sup>10</sup>UMC Utrecht, Departments of Orthopedics, Rheumatology and Clinical Immunology, Utrecht, The Netherlands, <sup>11</sup>Chair for Biomarkers of Chronic Diseases, Biochemistry Department, College of Science, King Saud University, Riyadh, Saudi Arabia

**Purpose:**

Knee osteoarthritis (OA) is a highly heterogeneous disease known to have significant impacts on quality of life. With newly published data and the identification of new OA phenotypes, the management of knee OA has become increasingly challenging. Two international organisations updated their treatment algorithms in 2019 for the non-surgical management of knee OA; i) the Osteoarthritis Research Society International (OARSI) and ii) the European Society for Clinical and Economic Aspects of Osteoporosis and Osteoarthritis (ESCEO). Our aims were to examine the similarities and differences between these treatment algorithms for the non-surgical management of knee OA.

**Methods:**

A joint working group comprising selected authors of the 2019 OARSI and ESCEO guidelines as well as independent members convened for a 1-day meeting and jointly reviewed these guidelines (November 13<sup>th</sup> 2019). The working group was selected for its experience across rheumatology and orthopaedics, knowledge of recommendations/guidelines for the management of OA, and were thought to be representative of the wider, international OA-field. A comprehensive discussion was held among all members of the working group to discuss the treatment algorithms.

**Results:**

Both the 2019 OARSI and ESCEO guidelines were constructed to provide a practical algorithm to help guide clinicians in their decision-making for the treatment management of knee OA. Both guidelines aimed to deliver patient-centred recommendations with both presenting personalised recommendations based upon a patient's gastrointestinal and cardiovascular risk profile. OARSI further considered frailty and widespread pain/depression comorbidities whilst ESCEO also tailored treatments to participants aged over 75 years (this age group was not considered separately by OARSI). Both organizations used well-characterised procedures for the reporting of the treatment guidelines however, some key differences were observed; these are summarised in Table 1. Specifically, there were differences in the constitution of the panel(s), literature search strategies used, voting procedures and scaling of the treatment recommendations.

In a stepwise manner, both OARSI and ESCEO recommended education, the provision of arthritis-related information, structured exercise and weight loss (if overweight) as core treatments; see Table 2. Both recommended topical non-steroidal anti-inflammatories (NSAIDs) as first-line treatments with non-selective NSAIDs and intra-articular injections recommended in those with persistent pain. OARSI, however, recommended topical NSAIDs as the first pharmacological treatment whilst ESCEO did not. Low-dose, short-term acetaminophen, pharmaceutical-grade glucosamine and chondroitin sulphate were recommended by ESCEO whilst OARSI strongly recommended against their use (all formulations). If symptoms persist, ESCEO recommended the short-term use of weak opioids (e.g. tramadol) whilst OARSI make no such recommendation due to a poor safety profile and lack of treatment efficacy. OARSI do, however, recommend the use of duloxetine only for patients who have knee OA and widespread pain and/or depression.

**Conclusion:**

The guidelines agreed in the majority of their recommendations providing a framework of local guideline production. There were some differences that were thought to be predominantly the result of differences in guideline methodology. These algorithms provide a useful guide for patients and healthcare providers for the non-surgical management of knee OA.

**ESCEO3**
**PATIENTS TO BE INCLUDED IN CLINICAL TRIALS  
ASSESSING THE SAFETY AND EFFICACY OF NEW  
CHEMICAL ENTITIES AIMING AT THE TREATMENT  
OF SARCOPENIA**

M. M. Rosa<sup>1,2</sup>

<sup>1</sup>Laboratório de Farmacologia Clínica e Terapêutica, Faculdade de Medicina da Universidade de Lisboa, Lisbon, Portugal, <sup>2</sup>Neurology Dept., CHULN, Lisbon, Portugal

**Objective:** Choosing the population to be enrolled in trials on sarcopenia

**Material and methods:** Clinical development of agents aiming the treatment of sarcopenia has been facing several issues hampering the identification of valuable drugs to fight the disorder, thus delaying the requirements for marketing authorisation. Selection of the adequate population to study is challenging. The characteristics of the population vary depending on a) the phase of the development plan (early proof of concept/dose finding or later confirmatory studies), b) the expected mode of action/ specific clinical setting, and c) study duration. Patients with a "sarcopenic risk profile" are the starting requirement (choice of diagnostic criteria and diagnostic tools), followed by the disease stage where the intended intervention is likely to be effective (ambulant patients), and amenable for detection of efficacy (selection of efficacy tools and study duration). For the confirmatory phase 3 trials, characteristics that mimic the general sarcopenic population (including some frequent co-morbidities) should also be present: the required external validity of these studies pays off the increased heterogeneity and resulting higher sample size.

**Results:** Diagnostic criteria are based on muscle strength and physical performance, rather than muscle mass; tools for each criterion (such as handheld dynamometer or gait speed) have been selected and their cut-offs proposed. Other characteristics include both genders, being above 70 years of age, ambulant, not recovering from acute disorders, with no mobility impairment due to other reasons than sarcopenia (e.g., osteoarthritis, Parkinson's disease), fair nutritional status and without near terminal disorders; these rely on the population risks that the drug is expected to mitigate, the impact that some disorders may have on the tools assessing efficacy and the fact that patients should be sufficiently fit so that they will reach the end of the study period.

The inclusion/exclusion criteria should convey robust samples with low dropouts, enhancing the effect of the intervention. In phase 3 trials the population must also be sufficiently broad to allow extrapolation to the intended sarcopenic population.

**References:** Reginster JY, et al. doi: 10.1007/s40520-020-01663-4.

**Disclosures:** Mário Miguel Rosa is a member of the Scientific Advice Working Party at the European Medicines Agency

## ESCEO4

**PRIMARY AND SECONDARY ENDPOINTS FOR  
CLINICAL TRIALS ASSESSING THE SAFETY AND  
EFFICACY OF NEW CHEMICAL ENTITIES AIMING  
AT THE TREATMENT OF SARCOPENIA**

A. Laslop<sup>1</sup>

<sup>1</sup>Scientific Office, Federal Office for Safety in Health Care, Vienna, Austria

**Objectives:** A working group under the auspices of the European Society for Clinical and Economic Aspects of Osteoporosis and Osteoarthritis (ESCEO) was convened to provide up-dated recommendations on the conduct of clinical trials investigating new treatments for sarcopenia.

**Methods:** Based on a comprehensive literature search of pharmacological interventions aimed at sarcopenia treatment the working group discussed and agreed the most appropriate study design.

**Results:** Phase II trials provide proof of concept and identify the optimal dose for further investigation in phase III. A number of endpoints may be chosen to evaluate preliminary efficacy data, usually surrogate outcomes related to the drug's mode of action. Examples include measures of improvement of physical performance, muscle strength, mass or quality, and biomarkers of muscle metabolism and muscle-bone interaction.

The objective of phase III trials is to confirm evidence of efficacy and safety. Primary endpoints document clinically relevant outcomes tested for statistical significance in appropriately sized patient groups. We advise to use co-primary endpoints assessing both an objective amelioration of physical performance, which is a surrogate for hard clinical endpoints such as mortality, falls and fractures, as well as a subjective Patient Reported Outcome Measure (PROM). Physical performance may be captured by the 400-m walk test or by the Short Physical Performance Battery. For PROMs we suggest two different sarcopenia-specific instruments, i.e. the Age-Related Muscle Loss questionnaire and the SarQoL questionnaire. Secondary endpoints can be based on efficacy variables employed in phase II.

**Conclusions:** Randomised double-blind placebo-controlled trials are expected to robustly establish efficacy as determined by co-primary endpoints of physical function and PROMs. Various secondary endpoints may deliver additional clinically relevant supportive information.

**References:** Update on the ESCEO recommendation for the conduct of clinical trials for drugs aiming at the treatment of sarcopenia in older adults. Reginster et al. Aging Clinical and Experimental Research, <https://doi.org/10.1007/s40520-020-01663-4>

**Acknowledgements:** The contribution of all members of the working group is appreciated.



WORLD CONGRESS  
ON OSTEOPOROSIS,  
OSTEOARTHRITIS AND  
MUSCULOSKELETAL  
DISEASES



2021 VIRTUAL



Abstract Book

## **ESCEO-IOF Symposium Abstracts**

## ESCEO-IOF1 PREVALENCE OF VITAMIN D SUFFICIENCY/ DEFICIENCY IN PATIENTS ADMITTED TO THE ORTHOPAEDIC WARD

N. C. Harvey<sup>1</sup>

<sup>1</sup>MRC Lifecourse Epidemiology Unit, University of Southampton, Southampton, United Kingdom

This presentation will address the determinants of 25-hydroxyvitamin D levels in patients admitted to the orthopaedic ward and the evidence pertaining to such measures as assessed on admission. Thus a range of factors, such as ethnicity, latitude/season and obesity all influence 25-hydroxyvitamin D levels. It is also recognised that there are substantial differences between laboratory assays used to measure 25-hydroxyvitamin D concentrations, making comparison of study findings problematic. Most recently, evidence has emerged that 25-hydroxyvitamin D may be a negative acute phase reactant with levels decreasing after acute infection in animal experiments and after arthroplasty in humans. Several studies have examined 25-hydroxyvitamin D concentrations in patients admitted for fracture repair. The heterogeneity in populations, geographical location and assays used mean that detailed comparison is difficult, but overall they suggest that a substantial proportion of such patients have low levels of 25-hydroxyvitamin D, with potential adverse consequences for rehabilitation and future bone health.

## ESCEO-IOF2 BENEFITS OF VITAMIN D IN PATIENTS WITH FRAGILITY FRACTURE

K. Papavasiliou<sup>1</sup>

<sup>1</sup>Papageorgiou General Hospital of Thessaloniki, Thessaloniki, Greece

**Objective(s).** Vitamin D supplementation has been widely recommended for the prevention of osteoporosis and subsequent fractures, its actual role however, on patients with fragility fractures, is under investigation.

**Material and Methods.** An expert working group was convened in September 2020 under the auspices of the European Society for Clinical and Economic Aspects of Osteoporosis, Osteoarthritis and Musculoskeletal Diseases (ESCEO), reviewed the literature, and presented the current state of the art on the topic of vitamin D administration in patients with fragility fracture, with regard to fracture healing and material osseointegration.

**Results.** The effects of vitamin D supplementation on fracture healing remain controversial. Vitamin D deficiency can adversely affect fracture healing and conceivably contribute to the development of nonunion. As mechanism for non-union, impaired IL-4 and IL-13 production under vitamin D deficiency has been proposed. A high-dose bolus of vitamin D3 during the acute recovery period does not impact rate of union of vitamin D deficient patients with a long bone fracture.

There seems to exist a lower bone to implant contact and impaired functional osseointegration in vitamin deficient animals. A clear association between hypovitaminosis D and impaired osseointegration, with a higher probability of early implant failure, is reported in both clinical and animal studies. Both in the frail elderly and younger patients, in the presence of traumatic fractures, hypovitaminosis D is associated with worse bone stock and delay in the formation of callus and healing. Vitamin D promotes mineralization and bone repair processes. Low vitamin D levels are also associated with increased exposure to infections, longer length of hospital stay and higher frequency of post-operative complications. Retrospective clinical studies suggest some trend to early dental implant failure in patients with low circulating 25OHD.

**Conclusion(s).** The effects of vitamin D deficiency and/or supplementation on fracture healing in clinical studies are rare. The overall impression is that vitamin D has a positive influence on this process but the mechanism and the magnitude of the effect remain to be determined. The role of vitamin D in material osseointegration requires further investigation.

Disclosures. No conflict of interest.

## ESCEO-IOF3 SUPPLEMENTATION WITH VITAMIN D DURING REHABILITATION

G. Iolascon<sup>1</sup>, A. Moretti<sup>1</sup>, S. Liguori<sup>1</sup>, M. Paoletta<sup>1</sup>

<sup>1</sup>Department of Medical and Surgical Specialties and Dentistry,  
University of Campania "Luigi Vanvitelli", Naples, Italy

Vitamin D has a critical role for the functional recovery in patients with fragility fractures and its supplementation is recommended by international guidelines in this population. Patients treated with anti-osteoporotic drugs and calcium/vitamin D supplementation have significant reduction of risk for subsequent fracture and mortality compared to those treated with anti-osteoporotic drugs alone[1]. Nevertheless, only 10% commonly receive vitamin D supplementation at admission in acute care[2] and less than 20% have a prescription of supplementation after hospitalization for hip fracture[3]. In addition, vitamin D has significant benefits for muscle health with consequent improvement of physical performance and, in combination with exercise significantly improves muscle strength in older patients[4]. Considering the criticism of ensuring adequate vitamin d supplementation in orthopedic/trauma care units, rehabilitation setting could be a key moment for the prescription and administration of vitamin D in order to normalize serum 25(OH) D and enhance functional recovery of patients with hip fractures.

[1] Degli Esposti L, Girardi A, Saragoni S, Sella S, Andretta M, Rossini M, Giannini S; on the behalf of the Study group. Use of antios-teoporotic drugs and calcium/vitamin D in patients with fragility fractures: impact on re-fracture and mortality risk. *Endocrine*. 2019 May;64(2):367-377. doi: 10.1007/s12020-018-1824-9. Epub 2018 Dec 4. PMID: 30515678.

[2] Bischoff-Ferrari HA, Can U, Staehelin HB, Platz A, Henschkowski J, Michel BA, Dawson-Hughes B, Theiler R. Severe vitamin D deficiency in Swiss hip fracture patients. *Bone*. 2008 Mar;42(3):597-602. doi: 10.1016/j.bone.2007.10.026. Epub 2007 Nov 28. PMID: 18180211.

[3] Gonnelli S, Caffarelli C, Iolascon G, Bertoldo F, Letizia Mauro G, Patti A, Nuti R. Prescription of anti-osteoporosis medications after hospitalization for hip fracture: a multicentre Italian survey. *Aging Clin Exp Res*. 2017 Oct;29(5):1031-1037. doi: 10.1007/s40520-016-0681-8. Epub 2016 Dec 9. PMID: 27943127.

[4] Antoniak AE, Greig CA. The effect of combined resistance exercise training and vitamin D3 supplementation on musculoskeletal health and function in older adults: a systematic review and meta-analysis. *BMJ Open*. 2017 Jul 20;7(7):e014619. doi: 10.1136/bmjopen-2016-014619. PMID: 28729308; PMCID: PMC5541589.

WORLD CONGRESS  
ON OSTEOPOROSIS,  
OSTEOARTHRITIS AND  
MUSCULOSKELETAL  
DISEASES



2021 VIRTUAL



Abstract Book

## **ESCEO-WHO CC Symposium Abstracts**



## ESCEO-WHOCC1 CLINICAL MANIFESTATIONS OF XLH THROUGHOUT THE LIFECOURSE

K. Javaid<sup>1</sup>

<sup>1</sup>NIHR Musculoskeletal Biomedical Research Unit, University of Oxford, Oxford, United Kingdom

X-linked hypophosphataemic rickets is a rare genetic cause for osteomalacia in adults. It is due to inactivating mutations in the *PHEX* gene leading to excess FGF23 concentrations in the blood. The increase in FGF23 down-regulates the sodium phosphate transporter in the kidney leading to reduced renal phosphate reabsorption and excessive urinary phosphate loss. There is also downregulation in 1 $\alpha$ OHase, leading to inappropriately low levels of 1, 25 hydroxyvitamin D. Chronic hypophosphatemia is associated with skeletal and non-skeletal features.

The skeletal complications include the effects of long limb deformity that developed during childhood growth. This includes varus or valgus deformity, which reduces mobility, gait efficiency leading to increased fatigue, joint degeneration and pseudofractures. Pseudofractures can present with referred pain and should be excluded by imaging the bones below and above the region of pain. Another common but unexplained manifestation of XLH is a mineralising enthesopathy that affects the hip, spine and ankles and presents with limited joint movements. Joint movements can also be limited by joint capsule thickening and muscle stiffness. In the spine, the ossification of the ligamentum flavum and facet joint hypertrophy can lead to critical spinal cord compression with loss of sensation weakness and interference in bladder and bowel function. Joint pain can also be due to premature osteoarthritis or degenerative change, which causes weight-bearing pain, night pain, limited mobility and fatigue. This is exaggerated by limb malalignment deformity of the lower limbs. Further, osteomalacia can cause a deep bone ache that can be difficult to manage and often leaves patients labelled as having widespread chronic pain.

Neurological symptoms include spinal stenosis and an Arnold Chiari malformation. The symptoms of an Arnold Chiari malformation depend on the severity of the herniation of the cerebellum and brain stem into the cervical canal. A common symptom is suboccipital headaches and neck pain which is worse with the Valsalva manoeuvre. There can be visual and vestibular disturbance leading to dizziness, vertigo. The gait can become ataxic. There may be other cerebellar and lower cranial nerve signs causing tinnitus, vocal cord paralysis and sensitive or reduced hearing. More non-specific features include generalised fatigue, pain in the extremities or distal peripheral neuropathy. Patients can present to the respiratory team with evidence of sleep apnoea which can be obstructive from pharyngeal muscle weakness or central from brain stem respiratory centre compression. The dys-

phagia can lead to recurrent aspiration pneumonia and bronchiectasis as well as hoarseness. Other symptoms include involuntary naps, nocturia and morning headaches.

The common non-skeletal manifestation is recurrent dental abscesses which can lead to premature tooth loss. It is important that dental practitioners with expertise and experience in XLH are involved to ensure treatments are proportionate and effective. Dental radiographs may be needed to exclude osteomyelitis of the jaw in patients with severe infections. Manifestations of XLH may be due to complications from phosphate and activated vitamin D therapy, including secondary and tertiary hyperthyroidism, renal stones and nephrocalcinosis. Finally, the chronic pain and reduced mobility can often lead to significant issues with mental health with increased risk of depression and anxiety.

Understanding the range of clinical features is critical to ensuring patients receive optimal management, including early recognition of potentially life-changing and life-shortening complications.

## ESCEO-WHOCC2 THERAPEUTIC APPROACHES OF XLH THROUGHOUT THE LIFE COURSE

A. Linglart<sup>1</sup>

<sup>1</sup>APHP, Endocrinologie and diabète de l'enfant, 64 boulevard Gabriel Péri, Hôpital Bicêtre Paris Saclay, Le Kremlin Bicêtre, France

X-linked hypophosphatemia (XLH), due to *PHEX* mutations, is the most frequent form of hypophosphatemic rickets/osteomalacia. XLH is a dominant disorder with a prevalence of approximately 1.7/100,000 children to 4.8/100,000 persons. XLH represents approx. 80% of all cases of XLH up to 87% of familial cases and 72% of sporadic cases.

XLH is X-linked dominantly inherited, hence there are twice more affected girls than boys. *PHEX*, the gene responsible for XLH was identified on chromosome Xp22. It codes for a cell surface-bound protein-cleaving enzyme expressed predominantly in bone and teeth. The altered function of this bone-derived endopeptidase causes both the mineralization defect and the renal phenotypic abnormalities of XLH.

The molecular defect in *PHEX* leads to an increase production of circulating FGF23. FGF23 is critical in controlling serum phosphate level through the reabsorption of phosphate in the renal proximal tubule. In situations where FGF23 is produced in excess, phosphate leaks through the kidney in the urine, hence serum phosphate is below the normal range. In addition, FGF23 has a strong inhibitory effect on 1,25(OH)<sub>2</sub>D synthesis, hence reduces calcium absorption through the gut. Therefore, patients with *PHEX* mutation usually present with low serum phosphate, mildly decreased serum calcium, phosphate wasting and reduced 1,25(OH)<sub>2</sub>D levels. The abnormal phosphate level, the defect

in 1,25(OH)<sub>2</sub>D synthesis, and the accumulation of ASARM peptides lead to an impaired mineralization of the skeleton and ultimately, rickets, osteomalacia and insufficient growth.

Clinical manifestations of XLH occur most often around the age of walking, despite an adequate vitamin D supplementation. In children the primary clinical symptoms are skeletal pain and deformity, abnormal gait, decreased growth velocity, dental abscesses and craniosynostosis. In the absence of diagnosis and/or treatment, short stature worsens progressively until the age of 5 years and becomes disproportionate. This may lead to extreme short stature with an adult height below -2 SD. Tooth eruption is often delayed, but, when present, teeth display a normal enamel. The impaired mineralization of dentin is the cause of dental abscesses and early decay of lacteal and permanent teeth. Young adults present with increased frequency of periodontitis and altered perialveolar bone. In adults, osteomalacia, bone pain, stiffness and enthesopathy (calcification of tendons, ligaments, and joint capsules) are typical findings. Hypertension, left ventricular hypertrophy and cardiac insufficiency have been sporadically described in children and young adults. Dizziness and deafness due to abnormalities of the inner ear may develop towards adulthood. Many patients may have partial synostosis of the sagittal sutures leading to a dolichocephalic shape of the head. This may be accompanied by intracranial hypertension. Type 1 Chiari malformation is a complication of XLH in about 25% of the patients, triggering the search for headaches and neck pain.

XLH is characterized by elevated ALP, low serum phosphate, phosphate wasting and elevated levels of circulating FGF23.

The diagnosis of XLH is based on clinical, radiological, and biochemical findings. The x-linked inheritance strongly argues for the diagnosis. FGF23 is not available everywhere and is not fully mandatory for the diagnosis. In a subset of patients without familial history, i.e. one third of the patients, mutational analysis of *PHEX* is recommended. In case of atypical features and/or lack of *PHEX* mutation, further work-up is recommended.

In children, the conventional treatment of XLH associates vitamin D analogues and repeated doses of phosphate supplements. Active vitamin D analogues are given to counter calcitriol deficiency, prevent secondary hyperparathyroidism, and increase phosphate absorption from the gut without normalizing phosphate levels. The objectives of treatment are to heal rickets, improve growth, and near normalize ALP. The continuation of conventional treatment in adults is debated, yet may help to prevent the dental disease. The human anti-FGF23 monoclonal antibody, burosumab, is now an alternative to the conventional therapy as it was approved by The Food Drug Administration (FDA) for adults and children above one year of age and by the European Medicines Agency (EMA) in children and is now available in some countries. Administered subcutaneously to XLH children twice a month, burosumab demonstrated favorable clinical and biochemical effects, i.e. radiographic improvement of rickets, improved distance during the 6-minute walk test, increase in serum phosphate, increase in TmP/GFR, and increase in 1,25(OH)<sub>2</sub>D. Patients with severe rickets show greater rickets, growth, and biochemical improvement under burosumab than upon conventional therapy. Most

side effects are reactions at the site of injection. Burosumab is therefore an alternative in children refractory or do not respond adequately to the conventional therapy or in patients with severe rickets. In adults, burosumab treatment induces an improvement in serum phosphate and biochemical markers such as TmP/GFR and 1,25(OH)<sub>2</sub>D, and more importantly in quality of life scales, e.g., WOMAC, and SF36, and in skeletal outcomes such as fracture healing and pain.

Adjuvant therapies are sometimes required. The administration of growth hormone (rhGH) improves growth in prepubertal children with XLH but no clear indication exist to support systematic treatment of patients with XLH. Surgery is indicated for severe bowing or tibial torsion unlikely to improve with medical management alone. Except in extremely deformed limbs, corrective osteotomies (a surgical procedure in which a bone is cut to straighten it) are usually not performed in children before puberty, as medical therapy improves bow deformities until this age. Eight plates guided growth surgery have been used in young children, yet seems to give better results in *valgus* deformities and have not been evaluated until the end of growth. Finally, the multidisciplinary management of these patients is mandatory; adolescence, pregnancy and menopause are critical for patients and may imbalance the disease.

WORLD CONGRESS  
ON OSTEOPOROSIS,  
OSTEOARTHRITIS AND  
MUSCULOSKELETAL  
DISEASES



2021 VIRTUAL



Abstract Book

## **EUGMS-ESCEO-IOF Symposium Abstracts**

## EUGMS-ESCEO-IOF1 OSTEOSARCOPENIA: PREVALENCE AND CONSEQUENCES

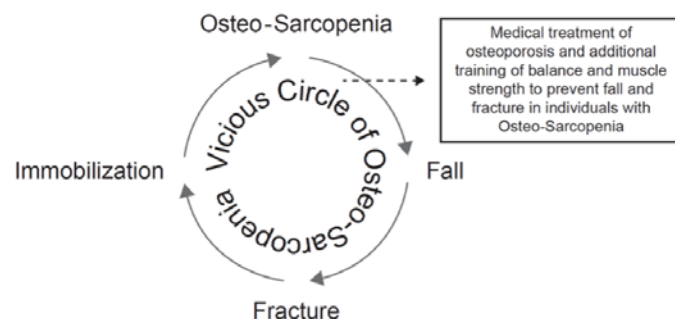
B. Rubek Nielsen<sup>1,2</sup>

<sup>1</sup>Department of Internal Medicine M, Geriatric Section, Amager and Hvidovre Hospital, Glostrup, Denmark, <sup>2</sup>Department of Internal Medicine, Lung Section, Amager and Hvidovre Hospital, Glostrup, Denmark

Older age has a negative effect on the musculoskeletal system and, due to the increase life expectancy, a heightened risk of osteoporosis and sarcopenia is expected. Hence, the prevalence of the combined geriatric syndrome "OsteoSarcopenia" is expected to increase as well.

Osteoporosis, defined by WHO in 1994, is characterized by changes of the microarchitecture of the bone causing a fragile state leading to induced risk of low-energy fracture (1). No consensus regarding the definition of sarcopenia is present. However, a combination of impaired muscle strength and mass as well as physical function is considered essential (2).

In older home dwelling populations, the prevalence of osteosarcopenia is relatively high but inconsistent due to varying definitions of sarcopenia (1.5 to 32.2%) (3-7). In a more fragile population of geriatric inpatients a prevalence of 14.2% is reported (8). Higher prevalence is reported in patients from osteoporosis outpatient clinics (20% to 65%) (9-11) and patients who have incurred an osteoporosis related fracture (46% estimated from pooled data in a meta-analysis) (12).



(3)

Both osteoporosis and sarcopenia independently increase the risk of fall, fracture, loss of mobility and mortality (13-15). As illustrated, patients with osteosarcopenia is expected to enter a vicious circle that may lead to a higher risk of those outcome, though conflicting data exists (16, 17).

This oral lecture on osteosarcopenia aims to share the newest data on the prevalence of osteosarcopenia. Furthermore, data pro and con the hypothesis of an increased risk of negative outcome in patients suffering from osteosarcopenia versus either osteoporosis or sarcopenia alone will be presented.

### Reference

1. WHO. Assessment of fracture risk and its application to screening for postmenopausal osteoporosis. World Health Organ Tech Rep Ser 843:1-129; 1994.
2. Cruz-Jentoft AJ, Bahat G, Bauer J, Boirie Y, Bruyère O, Cederholm T, et al. Sarcopenia: revised European consensus on definition and diagnosis. Age and ageing. 2019;48(1):16-31.
3. Nielsen BR, Andersen HE, Haddock B, Hovind P, Schwarz P, Suetta C. Prevalence of muscle dysfunction concomitant with osteoporosis in a home-dwelling Danish population aged 65-93 years - The Copenhagen Sarcopenia Study. Experimental gerontology. 2020;138:110974.
4. Drey M, Sieber CC, Bertsch T, Bauer JM, Schmidmaier R. Osteosarcopenia is more than sarcopenia and osteopenia alone. Aging clinical and experimental research. 2016;28(5):895-9.
5. Gentil P, Lima RM, Jaco de Oliveira R, Pereira RW, Reis VM. Association between femoral neck bone mineral density and lower limb fat-free mass in postmenopausal women. Journal of clinical densitometry : the official journal of the International Society for Clinical Densitometry. 2007;10(2):174-8.
6. Locquet M, Beaudart C, Bruyère O, Kanis JA, Delandsheere L, Reginster JY. Bone health assessment in older people with or without muscle health impairment. Osteoporosis international : a journal established as result of cooperation between the European Foundation for Osteoporosis and the National Osteoporosis Foundation of the USA. 2018;29(5):1057-67.
7. Buehring B, Krueger D, Binkley N. Effect of including historical height and radius BMD measurement on sarcoosteoporosis prevalence. Journal of cachexia, sarcopenia and muscle. 2013;4(1):47-54.
8. Reiss J, Iglseider B, Alzner R, Mayr-Pirker B, Pirich C, Kässmann H, et al. Sarcopenia and osteoporosis are interrelated in geriatric inpatients. Zeitschrift für Gerontologie und Geriatrie. 2019;52(7):688-93.
9. Genaro PS, Pereira GA, Pinheiro MM, Szejnfeld VL, Martini LA. Influence of body composition on bone mass in postmenopausal osteoporotic women. Archives of gerontology and geriatrics. 2010;51(3):295-8.
10. Hamad B, Basaran S, Coskun Benlidayi I. Osteosarcopenia among postmenopausal women and handgrip strength as a practical method for predicting the risk. Aging clinical and experimental research. 2020;32(10):1923-30.
11. Huo YR, Suriyaarachchi P, Gomez F, Curcio CL, Boersma D, Muir SW, et al. Phenotype of osteosarcopenia in older individuals with a history of falling. Journal of the American Medical Directors Association. 2015;16(4):290-5.



12. Nielsen BR, Abdulla J, Andersen HE, Schwarz P, Suetta C. Sarcopenia and osteoporosis in older people: a systematic review and meta-analysis. *European Geriatric Medicine*. 2018(9):419-34.
13. Baumgartner RN, Koehler KM, Gallagher D, Romero L, Heymsfield SB, Ross RR, et al. Epidemiology of sarcopenia among the elderly in New Mexico. *American journal of epidemiology*. 1998;147(8):755-63.
14. Frisoli A, Jr., Chaves PH, Ingham SJ, Fried LP. Severe osteopenia and osteoporosis, sarcopenia, and frailty status in community-dwelling older women: results from the Women's Health and Aging Study (WHAS) II. *Bone*. 2011;48(4):952-7.
15. Marks R. Hip fracture epidemiological trends, outcomes, and risk factors, 1970-2009. *International journal of general medicine*. 2010;3:1-17.
16. Paintin J, Cooper C, Dennison E. Osteosarcopenia. *British journal of hospital medicine (London, England : 2005)*. 2018;79(5):253-8.
17. Scott D, Johansson J, McMillan LB, Ebeling PR, Nordstrom P, Nordstrom A. Associations of Sarcopenia and Its Components with Bone Structure and Incident Falls in Swedish Older Adults. *Calcified tissue international*. 2019;105(1):26-36.

able to measure them, will improve the timing of - preventive - treatment options that exist for osteoporosis, eventually leading to better outcomes.

In this presentation, two main points will be addressed. First, an overview will be given on this muscle-bone interaction, with special emphasis on osteoporosis being a consequence to be avoided, rather than a disease to be treated. Some provocative viewing points will be introduced, for instance why osteoporosis should not pose any problem for either patients or health care systems. Second, an insight into the most recent recommendations for muscle mass assessment will be given, including the new guidelines for ultrasonographic measurements. The exact place of ultrasound in the assessment of muscle will be highlighted, as also the potential it has on future osteoporosis screening.

**References:** Not applicable

**Acknowledgments:** Not applicable

**Disclosures:** I have no conflict of interest to disclose.

## EUGMS-ESCEO-IOF2 MUSCLE MATTERS FOR EXPERTS IN OSTEOPOROSIS

S. Perkisas<sup>1</sup>

<sup>1</sup>University Center of Geriatrics, Univeristy of Antwerp, Antwerp, Belgium

**Objectives:** This presentation is intended to convince the audience to shift the focus of their osteoporosis management away from the bone and towards the muscle.

**Material and Methods:** Not applicable

**Results :** Not applicable

**Conclusion:** The pathophysiology of osteoporosis is quite complicated, as it is not only an interplay between changes intrinsic to the bone itself, but also to external factors. Of the latter, activity of the muscles seems to be the most important. The exact mechanism of muscle-bone crosstalk, with myokines and osteokines as primary actors, is still not quite understood. However, instead of waiting for the mysteries of this crosstalk to be unraveled and translated into a use for clinical practice, perhaps it is advisable to use a simpler and more functional viewing point on the matter. Understanding the changes that occur in the muscle and to be

WORLD CONGRESS  
ON OSTEOPOROSIS,  
OSTEOARTHRITIS AND  
MUSCULOSKELETAL  
DISEASES



2021 VIRTUAL



Abstract Book

## **ESPRM-ESCEO-IOF Symposium Abstracts**

## ESPRM-ESCEO-IOF1

## THE APPROACH OF PHYSIATRISTS TO LOW BACK PAIN ACROSS EUROPE

F. Dincer<sup>1,2,3,4</sup>

<sup>1</sup>Dept of Physical and Rehabilitation Medicine, Hacettepe University, Faculty of Medicine, Ankara, Turkey, <sup>2</sup>President, Turkish Society of Rehabilitation Medicine, Ankara, Turkey, <sup>3</sup>Chair ESPRM, Musculoskeletal Disorders Committee, Ankara, Turkey, <sup>4</sup>ESCEO Scientific Advisory Board Member, UEMS/European Board of PRM-Expert, Ankara, Turkey

**Background:** Low back pain (LBP) is the most common type of musculoskeletal disorders. The physicians who are primarily responsible for the nonsurgical management of LBP are physiatrists. Thus it is one of the most commonly encountered conditions in Physical and Rehabilitation Medicine.

**Objective:** The present study aimed to investigate the approaches of physiatrists to low back pain across Europe. Preferences, tendencies, and priorities in the diagnosis, management, and treatment of LBP, as well as the epidemiological data pertaining to LBP in PRM practice were evaluated in this Europe-wide study.

**Methods:** The study was conducted under the control of the European Society of Physical and Rehabilitation Medicine (ESPRM) Musculoskeletal Disorders Research Committee. 576 physiatrists from most of the European countries took part in this survey.

**Results:** The results show that physiatrists frequently deal with patients with LBP in their daily practice. Most patients are not referred to other departments and are treated with various conservative methods. Less than one-fifth of patients are primarily referred for surgery. The physiatrists believe that a clear diagnosis to account for cases of low back pain is rarely established. The most common diagnosis is discopathy. History and physical examination remain the most valuable clinical evaluation tools for low back pain according to physiatrists. Less than half the patients require a magnetic resonance imaging. Non-steroidal anti-inflammatory drugs are the most commonly prescribed drugs for low back pain. Exercise, back care information, and physical therapy are the preferred conservative treatments. More than half of the physiatrists offer interventional treatments to patients with low back pain.

**Conclusion:** The present study is a preliminary report that presents the attitudes of European physiatrists in the management of low back pain. Further researches are warranted to standardize the conservative management of LBP.

**Keywords:** Low back pain; conservative management; physiatrist; rehabilitation.

## ESPRM-ESCEO-IOF2

## UPDATE IN THE PHARMACOLOGICAL AND NON-PHARMACOLOGICAL MANAGEMENT OF LOW BACK PAIN

U. Akarımak<sup>1</sup>

<sup>1</sup>Istanbul University – Cerrahpaşa, Cerrahpaşa Medical School, Physical Medicine and Rehabilitation Department, Istanbul, Turkey

Management of low back pain (LBP) consists of non-pharmacological interventions followed by pharmacologic treatment if pain continues.

Self-management is advised as initial approach, for one to two weeks for LBP.

**Nonpharmacologic treatment:** Recent Guidelines strongly support: reassurance; advice and education for physical activity, exercises and work; manual therapy combined with active treatment; exercise interventions; group exercise programmes including back schools; psychological therapies also cognitive behavioural interventions or combination with exercise; work-based rehabilitation programmes.

Psychological therapies are recommended for subgroups with psychosocial risks, mood problems, or chronic back pain.

All updated clinical Guidelines recommend strongly against more than a couple of days bedrest. Second step options for acute low back pain include physical therapies like massage and heat-wrap therapy. Exercise programmes tailored specific for each patient are recommended. Exercises for subacute and chronic LBP, improve pain and function and include: Walking, aerobic exercises, stretching, yoga, core exercise/spinal stabilization, graded activities or a combination.

**Pharmacological management:** Pharmacological management of LBP is the next step, following nonpharmacologic management. For acute LBP or acute exacerbation of chronic LBP, oral NSAIDs are the first choice for treatment. Close following for gastrointestinal, liver and cardio-renal adverse events, and personal risk factors, including age and comedication are of critical importance. Gastroprotective treatment should be used if indicated. There is strong recommendation for oral NSAIDs to be prescribed at the lowest effective dose, for the shortest possible period of time, according to all clinical LBP guidelines. A short-term (two to four weeks) treatment with a NSAID is adequate for most patients. If pain continues, addition of a nonbenzodiazepine muscle relaxant is recommended. Combining NSAIDs and [acetaminophen](#) is another option.

Weak opioids (with or without paracetamol) can be used if NSAIDs are contraindicated, not tolerated or ineffective and only for short duration. Paracetamol, alone is not effective and not indicated for management of LBP.

Opioids are not indicated for managing chronic LBP.

Antidepressants (SSRIs, SNRIs or TCAs), are not indicated for treatment of acute LBP.

Gabapentinoids or antiepileptics are not indicated for treatment of acute LBP.

Systemic glucocorticoids are not indicated for treatment of acute LBP.

LBP patients who do not improve after four weeks of pharmacotherapy should be carefully reassessed. Some patients with acute LBP will develop chronic LBP. Chronic LBP presents a far more complicated problem in most patients and warrants a multidisciplinary approach.

**Conclusion:** Self-management followed by nonpharmacologic management is the first and sustainable step for approach and management in all stages of LBP. Updated guidelines strongly recommend starting nonpharmacologic before pharmacologic treatment. Evidence based guidelines of high quality have to be followed for management of LBP. Care of LBP without medication is preferred. If pain medication is needed, begin with a NSAID drug at the lowest effective dose for the shortest time (recommended by all guidelines).

#### References

1. NICE guideline. Low back pain and sciatica in over 16s: assessment and management. 2016, updated in 2020.
2. Nadia Corp. Evidence-based treatment recommendations for neck and low back pain across Europe: A systematic review of guidelines. *Eur J Pain*. 2021;25:275–295.
3. Adrian C Traeger. Care for low back pain: can health systems deliver? *Bull World Health Organ* 2019; 97:423–433
4. Low Back Pain clinical practice guide. American College of Physicians. *Ann Intern Med* 2017

Foster NE, Lancet Low Back Pain Series Working Group: Prevention and treatment of low back pain: evidence, challenges, and promising directions. *The Lancet* 2018; 391, 2368-2383

## ESPRM-ESCEO-IOF3

### INTERVENTIONAL TREATMENT IN LOW BACK PAIN

M. A. Taskaynatan<sup>1</sup>

<sup>1</sup>Dept. Physical Medicine and Rehabilitation and Algology, Istanbul, Turkey

Low back pain (LBP) and neck pain still continue to be a serious problem because of their quite high frequencies and significant financial burdens. Although a large proportion of spinal pain improve within one month, 10-15% of them become chronic. Approximately 75% of whole effort and money are spent for these chronic patients<sup>1</sup>. Current knowledge shows that the analgesic effects of many treatments for non-specific LBP are small and surgery does not provide better improvement in long term in spinal pain<sup>2</sup>.

In classical approach, interventions are applied in subacute or chronic period in contrary to the evidence that their effects seem to be less in prolonged clinical pictures. There is sufficient evidence supporting that repetitive somatic stimuli may cause central plasticity<sup>3</sup>. Therefore, perhaps we should revise the intervention timing.

Some authors believe that the pain generator cannot be determined in chronic LBP. Conversely some other physicians suggest that the pain generator can be located in most of the cases with mechanical pain characteristics by using interventional technique<sup>4</sup>. It is likely that we should keep investigating pain source(s) even if in cases whom central changes and related clinical signs have started.

An interventional treatment method must be kept simple and safe (KISS (keep it simple and safe) principle). Because this is a target specific treatment, we must have a specific diagnosis before the procedure. Scientific evidence should be cared in every step.

Interventional treatment is not a standalone option; it is rather a component of functional rehabilitation program. Patients should be informed about the other treatment options and written informed consent must be obtained before each procedure.

#### Diagnostic blocks

In spinal pain, magnetic resonance imaging (MRI) can provide very good detail of soft tissue structures and about the spinal column, however, 24–80% of asymptomatic adults exhibit abnormalities of lumbar discs. If not correlated with the clinical signs, MRI is an important reason for overdiagnosis<sup>5</sup>. Selective diagnostic blocks may be helpful when clinical signs and symptoms cannot be explained by abnormality of only one anatomic structure or when an imaging study indicates that pain may be originating from more than one source. Selective diagnostic injections may provide the pain generator(s) in 80-85% of the patients with mechanical spinal pain<sup>5</sup>.

#### Epidural steroid injections (ESIs)

This treatment method is most widely used in pain centers all over the world. In many centers, corticosteroid and local anesthetic medications are delivered together. The exact mechanism of action of these drugs is unknown. The proposed mechanisms for local anesthetics are conduction block (sensory, motor, sympathetic) and wind-down theory. It is shown that corticosteroids act on various processes like inflammation, neural membrane stabilization, nociceptive ectopic discharge, conduction block due to compression, edema and scar formation<sup>6</sup>. Its final action may be the summation of these.

There are mainly three routes of ESIs: Caudal, interlaminar and transforaminal.

**Other treatment methods frequently used in spinal pain can be listed as follows:**

Zygapophyseal joint (Z-joint) injection

Medial branch blocks

Sacroiliac joint (SIJ) injection

Intradiscal injections



Chemonucleolysis

Ozone injection

Intradiscal electrothermal treatment (IDET)

Radiofrequency (RF)

Spinal cord stimulation (SCS)

#### References

1. Chou R, Loeser JD, Owens DK, Rosenquist RW, Atlas SJ, Baisden J, et al. Interventional therapies, surgery, and interdisciplinary rehabilitation for low back pain: An evidence-based clinical practice guideline from the american pain society. *Spine (Phila Pa 1976)* 2009;34:1066-1077
2. Gianola S, Barger S, Del Castillo G, Corbetta D, Turolla A et al. Effectiveness of treatments for acute and subacute mechanical non-specific low back pain: a systematic review with network meta-analysis. *Br J Sports Med.* 2021, ahead of print
3. Chanda ML, Alvin MD, Schnitzer TJ, Apkarian AV. Pain characteristic differences between subacute and chronic back pain. *J Pain* 2011;12:792-800
4. Peckham ME, Hutchins TA, Shah LM. Conventional Image-Guided Procedures for Painful Spine. *Neuroimaging Clin N Am.* 2019, 539-551.
5. Manchikanti L, Boswell MV, Singh V, Derby R, Fellows B, Falco FJ, et al. Comprehensive review of neurophysiologic basis and diagnostic interventions in managing chronic spinal pain. *Pain Physician* 2009;12:E71-120
6. Benoist M, Boulu P, Hayem G. Epidural steroid injections in the management of low-back pain with radiculopathy: An update of their efficacy and safety. *Eur Spine J* 2012;21:204-213

WORLD CONGRESS  
ON OSTEOPOROSIS,  
OSTEOARTHRITIS AND  
MUSCULOSKELETAL  
DISEASES



2021 VIRTUAL



Abstract Book

## **SICOT-ESCEO-IOF Symposium Abstracts**

## SICOT-ESCEO-IOF1

## SUCCESS STORY OF COLLABORATION BETWEEN ORTHOPAEDICS AND REST OF THE WORLD IN FLS! HOW CAN I WORK WITH MY ORTHOPAEDIC SURGEON?

J. Fernandes<sup>1</sup><sup>1</sup>Orthopedic Research Laboratory, Hopital du Sacré Coeur, Université de Montréal, Montréal, Canada

**Introduction:** We implemented an FLS called *Lucky Bone*<sup>™</sup> (FLS 4i) for fragility fractures (FF) managed by nursing staff in a community hospital. This included an order set for Identification (1st "i"), Investigation (2nd "i"), Initiation of treatment for osteoporosis (3rd "i") and Integration to follow up (4th "i"). The 1st "i" is the most important step for a FLS to be successful. The goal of our program is to monitor the referral rate and barriers of FF patients from the emergency room (ER), the orthopaedic surgery wards (OS) and out-patient clinic (OPC) nurses to our FLS.

**Methods:** We identified 1011 patients with a fracture from the orthopaedic referrals. 249 patients (24.6%) were not identified because of non-referral by surgeons or staff. Of the remaining 762, we excluded 288. A second study then retrieved the administrative list of patients 40 years and older seen at the hospital with a primary code typical of FF from May 2018 to September 2018 and the referrals to our FLS. Out of 474 fragility fracture patients, 295 patients (62.2%) joined the FLS (178 refusals (37.6%)). FLS managers only accessed 46.9% (474/1011) of eligible patients.

**Results:** Out of the first study which identified 474 fragility fracture patients, 295 patients (62.2%) joined the FLS (178 refusals - 37.6%). On our second study, we identified 227 patients with a primary code typical of FF. One hundred forty-five patients (64%) were referred to the FLS. Forty (17.6%) had sustained high energy fractures, 67 hip fractures (46.2%) and 38 non-hip non-vertebral fractures (26.2%). FLS managers only accessed 46.9% (474/1011) of eligible patients.

**Conclusion:** We successfully trained and empowered nurses, administrative personnel and surgeons to manage FF in a real-world scenario in a community hospital. The success rate of the program was 62%, with a potential to attain 90%, since only 46.9% (474/1011) of eligible patients were referred to FLS managers. Major barriers were non-referral from orthopaedic surgeons and staff and patient's refusal. Challenges to success reside in implementing an institutional policy for optimal screening, standardized algorithms of care and order sets.

## SICOT-ESCEO-IOF2

## GETTING FLS SUSTAINABLE- KEY STEPS

K. Javaid<sup>1</sup><sup>1</sup>NIHR Musculoskeletal Biomedical Research Unit, University of Oxford, Oxford, United Kingdom

Fracture liaison services (FLSs) are healthcare systems that identify, investigate, recommend treatment and monitor adults age 50 and over presenting with a recent fragility fracture diagnosis. To be sustainable, an FLS needs to demonstrate that it is effective, efficient and delivering a good patient experience. Through effective and efficient delivery of each step of the patient pathway, the FLS can reach their optimal performance and provide their expected benefit to patient's healthcare systems and wider society. The patient pathway is complex. Patients often cross multiple clinical departments within the hospital, such as the emergency room orthopaedics and trauma geriatrics internal medicine and rehabilitation, as well as cross between secondary, primary and community care. The challenge is therefore implementing the FLS model within the local healthcare setting. The first step is adequate resourcing in terms of staff, information technology infrastructure and access to laboratory tests, imaging and a range of anti-osteoporosis treatments, so an FLS has the potential to deliver its expected benefits.

The next step is to ensure the FLS is performing. Patient-level key performance indicators have been developed to track the patient journey from diagnosis to adherence at 12 months. These indicators measure the current performance of an FLS, inform prioritisation for quality improvement and measure the impact of any service change. A reasonable target for an FLS is to identify 80% of its expected caseload, recommend treatment in approximately 50% of identified patients, and ensure 80% of patients are started within 16 weeks of fracture and continue to adhere for at least a year. Advances in digital technologies to improve case finding, including opportunistic vertebral fractures, and a range of anti-osteoporosis treatments if patients are at very high imminent risk of fracture or fail standard oral therapy, make these targets achievable.

Quality Improvement presents a systematic approach for FLS is to become more effective. At its heart is the PDSA cycle, where we Plan the change to be tested, Do the change, Study its impact on outcomes and then Act to plan the next change. The first step is to identify the quality improvement team. The team should be multi-professional and include at least two patients and senior members of the healthcare system that can empower the team to change practice. The next step is to check the current FLS delivery for patients with hip fractures, other inpatients, outpatients and patients with spine fractures across identification investigation, treatment recommendation, early and late monitoring. This then leads to a list of gaps in the pathway that need to be improved. The next step is to prioritise which gaps to address first by comparing the expected benefit for the FLS with the expected effort needed to improve performance. Once the area of improvement has been

identified, the next step is to develop a SMART aim. A SMART aim is specific, measurable achievable/ assignable, relevant and timely. This includes setting the boundaries for any change. The next step is to list the process, outcome and balancing measures to evaluate any service change. To develop the intervention, one first needs to understand why the current care gap exists. This can be done using a fishbone diagram that defines the critical process is leading to the care gap. Themes include equipment, process, people, material, environment and management. Once potential causes have been identified, a driver diagram is used to understand the primary and secondary drivers and the possible change ideas. The change ideas then go through another round of prioritisation comparing expected effort versus reward. The proposed service change is then refined to a scalable unit for early testing and evaluation before scaling up across the service. There is a period of evaluation using the process, outcome and balancing measures to inform the next improvement cycle.

Improving the capability and capacity of FLSs to deliver quality improvement requires integrating data, resources and expertise from peer and mentors in platforms either remotely, face-to-face or using hybrid models within a community of practice.

A total of 532 subjects were recruited (mean age 63.4 years, 85.7% female). Bone mineral density results were collected for 472 subjects (88.7%) and a prescription for anti-osteoporosis medication was handed to 86.6% of patients. Over two years, 83.6% of patients attended at least one visit. The subsequent fracture incidence rate was 2.6 per 100 person-years (n=23).

**Conclusion:** Our FLS improved care for osteoporotic FF with rates of investigation and treatment initiation above 80%, and persistence above 55% after two years of follow-up. The rate of subsequent fractures was low compared with the 12% incidence rate in non-FLS population. This demonstrate that multidisciplinary nurse-led FLS was able to deliver an effective patient-centered service. Our next phase will introduce patient empowerment and shared decision-making strategies that could close the care gaps in areas where FLS could be not optimal.

## SICOT-ESCEO-IOF3

### TEAMS AND EMPOWERMENT! HOW TO CREATE SYNERGY BETWEEN THE NURSE, DOCTOR, FAMILY AND THE PATIENT?

J. Delisle<sup>1</sup>

<sup>1</sup>CIUSSS Nord de L'Île de Montreal, Montreal, Canada

#### Objective

Fracture Liaison Service (FLS) is an efficient way to follow patients and improve management of fragility fracture (FF) patients from multiple medical disciplines. We demonstrated that nurses had the clinical skills to independently manage a FLS. We empowered the nursing staff of a community-dwelling hospital to undertake this role to create synergy between the nurses, doctors, family and patients in the management of FF. This discussion is based on the assessment of the performance of the *Lucky Bone™* FLS. New directions are leaning towards patient empowerment in his care management and in shared decision making.

#### Method

In 2010, a FLS managed by clinical nurses was implemented in two outpatient orthopedic clinics in Montreal, Canada. Patients were followed over 2 years. Medical services, hospitalizations and pharmacy claims data were retrieved for the cohort from administrative databases. Key indicators of effectiveness were measured as proportions of patients with BMD testing, treatment initiation, follow up attendance and subsequent FF rate.

#### Results



WORLD CONGRESS  
ON OSTEOPOROSIS,  
OSTEOARTHRITIS AND  
MUSCULOSKELETAL  
DISEASES



2021 VIRTUAL



Abstract Book

## **ROS-IOF-ESCEO Symposium Abstracts**

## ROS-IOF-ESCEO1

**AN INTRODUCTION TO THE OSTEOPOROSIS AND BONE RESEARCH ACADEMY OF THE ROYAL OSTEOPOROSIS SOCIETY:**J. E. Compston<sup>1</sup><sup>1</sup>Cambridge Biomedical Campus, Dept of Medicine, Cambridge, United Kingdom

Presented by Juliet Compston on behalf of the Royal Osteoporosis Society and the Academy of Osteoporosis and Bone Research

The Osteoporosis and Bone Research Academy was launched in London in February 2019 as part of the celebration to mark the protected royal title granted to the National Osteoporosis Society by Her Majesty Queen Elizabeth. The Academy is the first of its kind in bone health, collaborating with leading researchers, clinicians and people living with osteoporosis, in the search for a cure for the disease. This aim is closely aligned with the Royal Osteoporosis Society's Strategic Direction published in January 2018, with its focus on prevention, care, support and cure.

The concept of a cure for osteoporosis is novel and involves a number of possible approaches throughout the normal lifecourse. These include optimising bone health during growth, preventing bone loss later in life, and restoring skeletal strength in those who already have the condition. The Academy addresses three broad areas of research: the causes of osteoporosis, technology to improve the management of osteoporosis, and strategies to improve real world effectiveness of fracture risk assessment and the diagnosis and treatment of osteoporosis. Three working groups have been set up to develop these themes. The Causes Working Group is chaired by Professor Stuart Ralston (University of Edinburgh), the Effectiveness Working Group by Professor Eugene McCloskey (University of Sheffield) and the Technology Working Group by Dr Ken Poole (University of Cambridge).

Public and patient involvement is a vital part of the Academy structure and there is strong patient representation in all three working groups to ensure that patient views are represented and used to inform research priorities. The Academy also has a key national role in the education, mentorship and development of high quality early and mid-career clinicians and researchers. With its community of leading healthcare professionals, scientists and patient advocates the Academy's aspiration is to ensure the best bone health throughout the lifecourse and to transform the hope of a cure for osteoporosis into a reality.

## ROS-IOF-ESCEO2

**THE ROYAL OSTEOPOROSIS SOCIETY RESEARCH ROADMAP: OUR JOURNEY TOWARDS A CURE**N. C. Harvey<sup>1,2</sup>

<sup>1</sup>MRC Lifecourse Epidemiology Unit, University of Southampton, Southampton, United Kingdom, <sup>2</sup>on behalf of the Royal Osteoporosis Society (ROS) and the ROS Osteoporosis and Bone Research Academy, Southampton, United Kingdom

As documented in the Royal Osteoporosis Society (ROS) Research Roadmap, the ROS Osteoporosis and Bone Research Academy has undertaken evidence reviews to identify gaps in osteoporosis research and patient care, and has generated a comprehensive programme of projects to address the resulting key priorities. The Academy's mission is to achieve a cure for osteoporosis through the development of novel strategies to optimise bone health across the whole lifecourse, and to implement new practices to ensure that every person at increased risk of fracture is identified, assessed and treated appropriately. Through this comprehensive programme of work involving internationally leading clinicians and scientists, linked with ongoing support for the development of younger investigators, and with patient advocacy a key component at every stage, the Academy has identified these key gaps in research and clinical care across three phases of the lifecourse: early growth through development in the womb and during childhood until peak bone mass is achieved in young adulthood; maintenance of bone mass through adulthood; and minimisation of bone loss and fracture risk in older age. The three Academy working groups (Causes, Effectiveness and Technology) have thus generated an integrated workplan across these phases addressing three synergistic and closely interlinked research areas: Causes and mechanisms; Novel technology for skeletal assessment; Optimising effectiveness of assessment and treatment. The resulting projects will have the potential to achieve a step change in osteoporosis prevention and management through optimising population bone health and ensuring that all at high fracture risk are appropriately identified, assessed and treated. (Text adapted from Royal Osteoporosis Society Research Roadmap 2021).

## ROS-IOF-ESCEO3

**THE CAUSES AND MECHANISMS WORKING GROUP OF THE ROYAL OSTEOPOROSIS SOCIETY OSTEOPOROSIS AND BONE RESEARCH ACADEMY**S. H. Ralston<sup>1</sup><sup>1</sup>Professor of Rheumatology, University of Edinburgh, Edinburgh, Scotland

The remit of the Causes and Mechanisms Working Group of the Royal Osteoporosis Society Osteoporosis and Bone Research Academy is to identify and promote avenues of research which will lead to a greater understanding of the mechanisms of osteoporosis and loss of bone strength that lead to fragility fractures. The outputs of this working group will be combined with those of the Technology and Effectiveness Working Groups to work towards the aim of preventing and curing osteoporosis. Since a large number of risk factors for osteoporosis have already been identified and researched, the Causes group considered that it would be most appropriate to focus efforts on identifying new and emerging areas of research where evidence was incomplete, as opposed to concentrating on areas of established knowledge. The group also considered the most appropriate areas to focus upon would be on the factors which regulated bone density, bone structure and bone quality as opposed to factors that influence the risk of falls which the group felt would be more appropriately addressed by other research efforts. The group identified four areas where further research was likely to be fruitful in creating new knowledge that might underpin a cure of osteoporosis; studies of the genetic and epigenetic basis of osteoporosis, pregnancy osteoporosis and early onset osteoporosis; interactions between diet, the microbiome and susceptibility to osteoporosis; and exploring the role of senescence and osteoporosis with a view to identifying new therapeutic targets. The Causes group have hosted two workshops, each of which was attended by a panel of international experts to explore research opportunities. The recommendations from a workshop on functional genomics of osteoporosis hosted by Prof Jon Tobias in October 2020 have now been published [1] and the recommendations from a workshop on the microbiome and osteoporosis hosted by Prof Sue Lanham-New and Dr Owen Cronin have been submitted for publication. The causes group has also initiated a UK-wide research study on the presentation, clinical features and treatment of pregnancy associated osteoporosis led by Professor Stuart H Ralston with initial results expected by the end of 2021. The vision of all of these activities is to generate a new roadmap for research which will advance understanding of key drivers of osteoporosis and to collaborate with the Technology and Effectiveness groups to work towards cure.

1. Tobias JH, Duncan EL, Kague E, Hammond CL, Gregson CL, Bassett D, Williams GR, Min JL, Gaunt TR, Karasik D, Ohlsson C, Rivadeneira F, Edwards JR, Hannan FM, Kemp JP, Gilbert SJ, Alonso N, Hassan N, Compston JE, Ralston SH (2020) Opportunities and Challenges in Functional Genomics Re-

search in Osteoporosis: Report From a Workshop Held by the Causes Working Group of the Osteoporosis and Bone Research Academy of the Royal Osteoporosis Society on October 5th 2020. Front Endocrinol (Lausanne) 11:630875

## ROS-IOF-ESCEO4

**THE EFFECTIVENESS WORKING GROUP OF THE ROYAL OSTEOPOROSIS SOCIETY OSTEOPOROSIS AND BONE RESEARCH ACADEMY**E. V. McCloskey<sup>1</sup><sup>1</sup>Department of Oncology & Metabolism, Centre for Integrated research in Musculoskeletal Ageing, University of Sheffield, Sheffield, United Kingdom

on behalf of the Effectiveness Working Group of the Royal Osteoporosis Society Osteoporosis and Bone Research Academy

With the goal of seeking a cure for osteoporosis, the Royal Osteoporosis Society Osteoporosis and Bone Research Academy has initially decided to focus on three key areas of research, namely the causes of osteoporosis, technology to improve the management of osteoporosis, and strategies to improve real world effectiveness of osteoporosis management. The latter is the remit of the Effectiveness Working Group, with effectiveness being defined as the ability of an intervention to have a meaningful effect on patients in normal clinical conditions. The goal of the Effectiveness Working Group is to bring best practice, that is all of the knowledge, technologies and therapies, to the widest range of individuals at risk of fracture as possible, thereby closing a wide and persisting treatment gap in the management of those most vulnerable to osteoporosis.

The Effectiveness Group is now working within three key areas; a) to increase access to fracture risk assessment and management in primary care, b) to improve treatment adherence and management follow-up in primary care, and c) to improve secondary fracture prevention. The first area, explored by a sub-group led by Eugene McCloskey, directly assesses the treatment gap by working with patient representatives, primary care staff, primary care researchers, digital health IT experts and NHS foundation IT providers (e.g. GP electronic patient record systems) to identify barriers and opportunities to embedding fracture risk assessment in routine care. The solution seeks to minimise the impact on primary care workloads but to also address the needs of individual patients. Targeting and initiation of treatment is just an early step in the process as successful management, for the patient and society, requires long term adherence and monitoring to ensure the best outcome. Under the leadership of Dr Zoe Paskins, a sub-group is initially undertaking a realist evidence synthesis to define what works for who, when and why and how practically to implement interventions. Such rapid realist reviews are helpful for informing policy and the work is supplemented by the on-going

NIHR-funded Improving uptake of Fracture Prevention Treatments (iFRAP) study. The third sub-group, led by Kassim Javaid, seeks to improve the function and effectiveness of Fracture Liaison Services (FLS) by undertaking a series of interlinked analyses to better understand the determinants of an effective and efficient secondary fracture prevention service model in real-world healthcare settings. Given the remit of the Effectiveness Working Group, there is an understandable and productive overlap with the other ROS Research Academy, particularly the Technologies Working Group. The vision, driven by the recently announced roadmap for research, is to advance our current and future management of osteoporosis and work towards cure.

## ROS-IOF-ESCEO5

### EXPLORING THE RESEARCH PRIORITIES : NOVEL TECHNOLOGIES FOR SKELETAL ASSESSMENT

E. Clark<sup>1</sup>

<sup>1</sup>Musculoskeletal Research Unit Translational Health Sciences Bristol Medical School University of Bristol, Bristol, United Kingdom

The remit of the Technology Working Group of the Royal Osteoporosis Society Osteoporosis and Bone Research Academy is to explore and develop new and innovative technologies in the field of osteoporosis. By 'technology' we mean any method used to promote bone health, prevent and treat osteoporosis and fragility fracture or improve osteoporosis care. It includes interventions used in treatment, prevention or diagnosis of disease, procedures, drugs, devices, diagnostic tests, software and screening programmes. The outputs of this working group will be combined with those of the Causes and Mechanisms, and Effectiveness Working Groups to work towards the aim of preventing and curing osteoporosis. Our first priority was to identify three broad themes and two potential 'game changers' within each theme. Our first theme is 'Developing Systems and Processes' within which we consider opportunistic analysis technologies and novel software technologies applying automated best-practice osteoporosis care as key technologies. Our second theme is 'Assessment of Bone Health' to include novel technologies to define healthy bone at different points in the lifecourse, and novel software technologies to automatically stratify/personalise fracture risk estimates at the point of care. Our final theme is 'Exploiting Data' covering use of mega-cohorts such as UK Biobank in novel approaches to assess genotype-phenotype relationships relevant to bone health, and novel technologies to understand the contribution of multiple organ systems to bone health, osteoporosis and multimorbidity. Our initial focus has been to understand the existing technologies available for skeletal assessment that utilise routinely collected imaging for diagnosis and monitoring of various conditions, such as computed tomography (CT) scans. We have commissioned and published[1] a rapid evidence review to define the key unanswered questions where further research is needed

to enable the adoption of technologies already available for maximal patient benefit. A series of workshops are planned around our key themes, to work up new research proposals to answer the identified gaps including targets for screening, integration of opportunistic identification of fractures into current care pathways, technical considerations including characterisations of optimum calibration techniques, and head to head comparisons of existing and novel technologies. As with the other working groups, our vision is to generate a new research roadmap to advance our understanding of the key drivers of osteoporosis and work towards a cure.

1. V Aggarwal, C Maslen, RL Abel, P Bhattacharya, PA Bromiley, EM Clark, JE Compston, N Crabtree, JS Gregory, EP Kariki, NC Harvey, KA Ward, KES Poole (2021) Opportunistic Diagnosis of Osteoporosis, Fragile bone health and Vertebral Fractures from Routine CT scans; a Review of Approved Technology Systems and Pathways to Implementation. Therapeutic Advances in Musculoskeletal Disease TAB-20-11-061.R1



WORLD CONGRESS  
ON OSTEOPOROSIS,  
OSTEOARTHRITIS AND  
MUSCULOSKELETAL  
DISEASES



2021 VIRTUAL



Abstract Book

## **ISGE-ESCEO Symposium Abstracts**

## ISGE-ESCEO1

**HORMONAL CONTRACEPTION VERSUS HORMONE REPLACEMENT THERAPY: MAJOR ISSUES FOR BONE HEALTH**M. Birkhaeuser<sup>1</sup><sup>1</sup>Professor emeritus for Gynaecological Endocrinology and Reproductive Medicine, University of Berne, Bern, Switzerland

Most MD's believe that hormonal contraception (HC) is unconditionally safe for bone health. However, this is not the case for some subgroups of HC user. Strong evidence shows that:

- In post-adolescent women >30 years of age and in perimenopausal women, preparations containing 15–20 and 30–35µg EE/day are both capable of maintaining BMD and to guarantee bone protection. Combined oral contraception (COC) may prevent the physiological bone loss that occurs in women >40 years of age and possibly increase BMD in the perimenopause.
- In contrast, in adolescents (≤ 18–20 years), the strongly anti-gonadotropic progestins in COCs containing 15–20µg EE suppress the hypothalamic-pituitary-ovarian axis and reduce endogenous E2 production. 15–20µg EE do not guarantee the necessary oestrogen activity for the acquirement of a normal peak bone mass (PMB) as do 30µg EE COCs.
- in adolescents, depot-medroxyprogesterone acetate (DMPA) administration may reduce PBM for the same reason, particularly when given early after menarche.
- there is strong evidence from longitudinal data that DMPA affects significantly BMD in adult current users. The BMD decrease appears to be at least partially reversible in adult and in adolescent women.

This evidence allows to formulate the following recommendations:

In adolescents, 30–35µg EE COCs are safe for the acquisition of a PMB. 15–20µg EE COCs should not be used in young women until stable ovulatory cycles are reached.

DMPA should be avoided in adolescents before PMB is acquired. Initiation of DMPA within the first 3 years after menarche is of particular concern. DMPA should remain a reserve medication where no alternative is possible.

For all other HC methods, good evidence is missing and it is not known if their use in adolescent girls is safe.

In contrast to HC, correctly administered hormone replacement therapy (HRT) is safe for bone health in women of all ages. In adolescents, HRT guarantees the acquisition on a normal PBM.

## ISGE-ESCEO2

**HRT AND FRACTURE PREVENTION: MORE THAN JUST BONE**J. C. Stevenson<sup>1</sup><sup>1</sup>National Heart & Lung Institute, Royal Brompton Hospital, London, United Kingdom

Ageing leads to loss of bone and also loss of muscle mass and muscle function. In women, menopause has an additional deleterious effect on these. This will increase the risk of sustaining osteoporotic fractures. Loss of ovarian function at the menopause leads to bone loss. This loss is greatest in the early years following the menopause but can persist into old age. Whilst numerically the greatest number of fractures is seen in women with osteopenia, the greatest risk of fracture is seen in those with the lowest bone density, namely those with osteoporosis. Thus prevention of bone loss and any restoration of bone mass will reduce the risk of fractures. But menopause is also associated with loss of muscle mass, strength and power which will increase the risk of falls and fractures. Loss of ovarian function is also associated with loss of collagen, not only in skin but also in intervertebral disks. The intervertebral disks act as shock absorbers for the spine, and loss of disk height is associated with an increase in vertebral fractures. Hormone replacement therapy (HRT) has been shown to prevent or reduce bone loss in postmenopausal women at all the sites of classical osteoporotic fracture. It has been shown to reduce fractures both in normal and in osteoporotic women. Physical exercise has small beneficial effects on bone density but these are quickly lost on cessation of the exercise. There is only weak evidence that exercise alone will reduce fracture risk, but the improvements in muscle strength and power seen with HRT will contribute to overall musculoskeletal benefit. HRT has also been shown to increase intervertebral disk height in a dose-dependent manner which will help to reduce vertebral fracture risk. These non-osseous benefits of HRT are not seen with alternative bone treatments. For postmenopausal women, HRT is a most effective and safe treatment for the prevention of osteoporosis and its attendant fractures.

WORLD CONGRESS  
ON OSTEOPOROSIS,  
OSTEOARTHRITIS AND  
MUSCULOSKELETAL  
DISEASES



2021 VIRTUAL



Abstract Book

## **Meet-the-Experts Abstracts**

## MTE1

**TRANSGENER MEDICINE: BONE AND MUSCLE**J.-M. Kaufman<sup>1</sup><sup>1</sup>Department of Endocrinology, Ghent University Hospital, Ghent, Belgium

Worldwide, the number of transgender persons receiving gender-affirming hormonal treatment has been steadily increasing. Hormonal treatment (HT) in transgender women (male-to-female transgender people) usually consists of the combination of an estrogen and an androgen-lowering drug, whereas in transgender men (female-to-male transgender people) HT consists of testosterone. Taken that sex steroids are major players both in acquisition and maintenance of bone mass and skeletal musculature, it is relevant for the care of transgender people to understand what the effects are of the profound hormonal changes they undergo for their bone and muscle health. Moreover, the study of these effects may allow to gain some further insights in the role of sex steroids in bone and muscle physiology. As to bone health, transgender women tend to have a lower bone mineral density (BMD) than cisgender men, possibly because of lower level of physical activity. Transfeminine HT results in a decrease of bone turnover, a modest short- and longer-term increase of lumbar spine BMD and no change to limited increase of hip BMD. HT decreases lean mass and muscle strength while increasing fat mass. In transgender men BMD before initiation of HT is not different from cisgender women. Testosterone treatment results in increased bone turnover, except in transgender women older than 50y (i.e. postmenopausal) in whom testosterone reduces bone turnover. Testosterone treatment appears able to preserve BMD both in the shorter- and longer term. Furthermore, cortical bone size and cortical thickness are increased in transgender men compared to cisgender women. Reliable data on fracture risk are not available. Testosterone treatment reduces fat mass and induces a substantial increase of skeletal muscle mass and associated muscle strength. As will be discussed, the whole of these findings reflects the predominant role of estrogens in the regulation of bone homeostasis in both the female and male skeleton and the role of androgens on muscle mass and strength and, directly or indirectly, on cortical bone apposition.

## MTE2

**IMPACT OF GLUCOCORTICOIDS ON BONE AND MUSCLE**E. Gielen<sup>1,2</sup><sup>1</sup>Geriatric Medicine & Centre for Metabolic Bone Diseases, UZ Leuven, Leuven, Belgium, <sup>2</sup>Gerontology and Geriatrics, Department of Public Health and Primary Care, KU Leuven, Leuven, Belgium

Glucocorticoids are effective immunomodulatory drugs used for many inflammatory disorders as well as transplantation. However, glucocorticoids are associated with several side effects including an increased risk of osteoporosis and fractures. Glucocorticoid-induced osteoporosis (GIOP) is a common cause of secondary osteoporosis in adults. The pathophysiology of GIOP is multifactorial, with both direct effects on bone cells (decreased osteoblastogenesis, decreased lifespan of osteoblasts and osteocytes, and an increased number of osteoclasts) and indirect effects through suppression of the somatotrophic and gonadotrophic axes as well as altered intestinal and renal calcium handling, resulting in a negative calcium balance. In addition, glucocorticoids induce loss of muscle mass and strength (glucocorticoid-induced myopathy) leading to an increased risk of falls. The combined effect on bone and muscle accounts for the higher fracture risk in patients on glucocorticoids.

In patients starting glucocorticoids, there is a rapid phase of bone loss, followed by a slower decline. This bone loss is most pronounced in regions of the skeleton with abundant trabecular bone, such as the lumbar spine. Although vertebral fractures are particularly characteristic of GIOP, the risk of non-vertebral and hip fractures is also increased. Fracture risk increases within three to six months after the start of glucocorticoid therapy and fractures occur at higher BMD than in postmenopausal osteoporosis. Despite availability of clear evidence and international guidelines for the prevention of GIOP, a large treatment gap remains. Non-pharmacological measures include physical exercise, smoking cessation and avoidance of alcohol abuse, in addition to sufficient calcium intake and avoidance of vitamin D deficiency. Randomized controlled trials have demonstrated the efficacy of alendronate, risedronate, zoledronate, denosumab and teriparatide in GIOP. Zoledronate and denosumab have shown superior effects on BMD than risedronate. In head to head trials, patients on teriparatide had fewer new vertebral fractures as compared with alendronate. In 2021, the Belgian Bone Club conducted an umbrella systematic review to update its 2006 consensus recommendations for the prevention and treatment of GIOP in adults.

Patients with glucocorticoid-induced myopathy present with gradual onset of proximal muscle weakness, with lower extremity weakness usually occurring before upper extremity weakness and being more severe. The glucocorticoid dose that induces glucocorticoid-induced myopathy as well as the time to onset of symptoms varies widely among patients. Treatment consists of reduction and, if possible, discontinuation of glucocorticoids. Fluorinated glucocorticoids can be replaced with non-fluorinated glucocorticoids. In addition, physical therapy should be considered for the prevention and treatment of glucocorticoid-induced myopathy.



## MTE3

## HIV AND BONE

E. Biver<sup>1</sup>

<sup>1</sup>Division of Bone Diseases, Geneva University Hospitals and Faculty of Medicine, University of Geneva, Geneva, Switzerland

Life expectancy of people living with HIV (PLWH) is reaching similar length as in the general population. Accordingly, age-related comorbidities, including osteoporosis, are increasing in PLWH. Fracture risk is higher and increases approximately 10 years earlier as compared to the HIV-negative population. Classical risk factors of bone fragility are highly prevalent in PLWH but HIV infection itself and the type of antiretroviral therapy (ART) regimen (especially tenofovir and protease inhibitors) also contribute to bone loss. The majority of bone loss occurs during virus replication and at initiation of ART (immune reconstitution), and is associated with an increase of bone resorption (upregulation RANKL). Periodic assessment of fracture risk is indicated in PLWH, but FRAX underestimates fracture probability in these patients. Measurement of bone mineral density is recommended in patients at increased fracture risk, and in all postmenopausal women and men above 50 years of age. General preventive measures (promotion of physical activity, discontinuation of toxic habits, nutritional counseling and supplementation) should be implemented. Calcium and vitamin D supplements provided as ART initiation lower BMD loss. Bisphosphonates have been shown to increase bone density in PLWH but fracture outcomes are not available. In case of osteoporosis or high fracture risk, review of ART regimen in favor of more bone-friendly options should be discussed. The reduction of tenofovir plasma concentrations with tenofovir alafenamide attenuates BMD loss but it remains unknown whether it contributes to fracture risk reduction.

## MTE4

## IS SCREENING FOR OSTEOPOROSIS USEFUL?

E. M. Curtis<sup>1</sup>

<sup>1</sup>Clinical Lecturer in Rheumatology and Honorary Consultant Rheumatologist MRC Lifecourse Epidemiology Unit, University of Southampton, Southampton, United Kingdom

Osteoporotic fractures present a major public health problem, for individuals, healthcare systems and society. Current estimates suggest that, in developed countries, around one in three women and one in five men aged 50 years or older will have a fragility fracture during their remaining lifetime.

Whilst, in the last four decades, remarkable progress has been made in terms of our understanding of osteoporosis (we have a definition, diagnostic test (DXA), comprehensive risk assessment tools and affordable, effective treatments), but many individuals

with osteoporosis are not recognised or treated – there is a huge treatment gap. Would screening for osteoporosis in the general population help to reduce fracture rates?

In this session, we will discuss the current evidence for and against population based screening for high fracture risk. A large UK randomised trial of fracture risk screening using FRAX in primary care (SCOOP) demonstrated a reduction in hip fracture risk consequent to the screening intervention, and meta-analysis with two other screening trials from Denmark and The Netherlands has confirmed this effect. We will consider the evidence provided by these studies and how they may inform the practical implementation of osteoporosis screening.

With a screening programme comes a variety of challenges. Its cost-effectiveness must be proven and it must be acceptable to patients, doctors and politicians alike - implementing change in overburdened healthcare systems with aging populations and in the wake of the COVID-19 pandemic is difficult. We will discuss how screening can be made economically viable, and present approaches to automated case-finding which will require minimal input from clinicians in primary care. We all want the best for our patients – we know that many are suffering fractures which could have been prevented through appropriate risk assessment and treatment – but is screening the most useful approach?

## MTE5

## CALCIUM-VITAMIN D: STILL A ROLE IN OSTEOPOROSIS MANAGEMENT?

E. M. Dennison<sup>1</sup>

<sup>1</sup>MRC Lifecourse Epidemiology Unit, Southampton, United Kingdom

Supplementary calcium and vitamin D are often prescribed alongside anti-osteoporosis medication, and may play an important role in the management of older institutionalized adults. In the first randomised controlled trial to consider the efficacy of these agents, a daily dose of calcium (1200 mg) and vitamin D3 (800 IU) in community dwelling elderly women normalized serum parathyroid hormone and 25(OH)D levels and apparently led to a reduced bone loss and decreased risk of hip fracture but in a subsequent study which used a 400 IU daily vitamin D dose, a non-significant reduction in hip fractures was observed, possibly as a consequence of the lower doses used.

In recent years, calcium supplementation has been controversial, with some but not all studies suggesting that there may be an increased risk of cardiovascular disease among women prescribed therapy. However recent studies show no association between risk of cardiovascular diseases and calcium supplementation in physiological doses, which can be considered safe. The most recent systematic review of the effectiveness of calcium and vitamin D combined supplementation observed a reduction in hip and total fracture which appeared more marked in the elderly, patients

with low body weight and increased fracture risk and concluded that the minimum effective dose of calcium is 1200 mg while vitamin D should not be below 800 IU. Previous studies, including previous systematic reviews, have yielded conflicting results; methodological factors may be the explanation for these differing results, highlighting the need to look at the details of each study. In general, the combination of calcium with vitamin D is well tolerated, although increased frequency of urinary and renal tract stones has been reported and many patients report mild gastrointestinal irritation with calcium supplementation.

This workshop will discuss the available literature, and consider how we can incorporate current knowledge into clinical practice.

#### Conflict of interest

ED has received honoraria from UCB, Lilly and Pfizer

## MTE6

### REHABILITATION AFTER FRAGILITY FRACTURE

O. Bruyère<sup>1</sup>

<sup>1</sup>Department of Public Health, Epidemiology and Health Economics, WHO Collaborating Centre for Public Health Aspects of Musculo-Skeletal Health and Ageing, University of Liège, 4000, Liège, Belgium

Fragility fractures are associated with pain, loss of bone mineral density and muscle mass, disability, reduced quality of life, increased risk of subsequent fracture, and death. Guidance for the prevention, management, and treatment of osteoporosis has been developed by multiple national and regional organizations, and international campaigns exist to reduce the morbidity and mortality associated with osteoporosis. The treatment of individuals post fracture is multifactorial. Moreover, other risk factors exist for future fractures, such as sarcopenia, frailty, low supply of dietary protein, poor muscle strength and power, inadequate dynamic balance, and environmental risks such as safe walking environments. The management of most of these risk factors falls broadly within the scope of rehabilitation. Multi-modal exercise post fragility fracture to the spine and hip is strongly recommended to reduce pain, improve physical function, and improve quality of life. Outpatient physiotherapy post hip fracture has a stronger evidence base than outpatient physiotherapy post-vertebral fracture. Appropriate nutritional care after fragility fracture provides a large range of improvement in morbidity and mortality. Education increases understanding of osteoporosis which in turn increases utilization of other rehabilitation services. Education may improve other health outcomes such as pain and increase a patient's ability for self-advocacy. Rehabilitation interventions are inter-reliant and research investigating these relationships may increase the relevance of rehabilitation research to clinical care.

## MTE7

### FRACTURES DURING CHILDHOOD AND ADOLESCENCE

K. Ward<sup>1</sup>

<sup>1</sup>MRC Lifecourse Epidemiology Unit, Southampton, United Kingdom

Growth during early life, through childhood and adolescence is an important determinant of peak bone strength, and thus risk of later-life osteoporosis. During adolescence, individuals gain 20% of their adult height, 50% adult weight and 40% of their peak bone mass. During childhood, fractures peak during infancy and in early adolescence. In contrast to later life, males tend to fracture more than females during infancy and adolescence. Data from longitudinal studies show there is an offset in peak growth rates, where height and lean mass occur first, followed by bone area and finally a period of consolidation where bone mineral continues to be accrued. The peak period of fractures occurs after peak height growth and whilst bone mineral consolidation occurs. The timing of puberty, and rate of both height and weight growth impact peak bone mass and later life fracture risk.

Genetics account for ~60-85% of variation in peak bone mass, with environment contributing the remainder. Modifiable environment, such as nutrition status and physical activity, play an important part in determining healthy growth with maternal and paternal environment also playing important roles. Further to this, there is impact of epidemiological transition on pubertal timing, body composition; how this might impact childhood and later fracture risk in transitioning populations is also an important area of focus. The aetiology and impact of acute and chronic childhood diseases on current and future fracture risk is also an extremely important area for clinical and research fields, with a growing body of evidence and guidelines for assessment, treatment and monitoring.

Key evidence will be reviewed from across the globe, drawing from randomised controlled trials, longitudinal cohort data and meta-analyses. The session will also include considerations for the assessment of the skeleton using bone densitometry during the growing years.

## MTE8

## DISCUSSION OF COMPLEX BONE DISORDER CASES

N. Fuggle<sup>1,2</sup>

<sup>1</sup>Dunhill Clinical Research Fellow, Rheumatology Registrar and Fellow of the Alan Turing Institute, London, United Kingdom,  
<sup>2</sup>MRC Lifecourse Epidemiology Unit, University of Southampton, Southampton, United Kingdom

**Skeletal Rare Diseases: Case discussions with members of the IOF SRD Academy**

International Osteoporosis Foundation Skeletal Rare Diseases Academy

Although individually rare, the health burden consequent to Skeletal Rare Diseases as a whole is substantial and there are critical nuances to diagnosis, management and therapy which are often missed or neglected at presentation. In order to raise awareness and provide education in this important area of clinical practice, the International Osteoporosis Foundation has established the IOF Skeletal Rare Diseases (SRD) Academy.

This session will showcase key aspects of the SRD Academy, focusing on case presentations that demonstrate important clinical aspects of skeletal rare diseases including McCune Albright Syndrome and Tumour-Induced Osteomalacia. The aspiration is to provide a valuable learning opportunity for clinicians working in osteoporosis and metabolic bone disease, but who may not be experts in skeletal rare diseases.

## MTE9

## CAN WE INFLUENCE FRACTURE REPAIR?

J. Fernandes<sup>1</sup>

<sup>1</sup>Orthopedic Research Laboratory, Hopital du Sacré Coeur, Université de Montréal, Montréal, Canada

**Introduction:** Fracture repair involves bringing damaged tissue back to a cellular and structure normality to restore its biomechanical function. Only a fraction of these fractures will not heal properly. We will discuss immune and inflammatory factors of the injury response to bone and surrounding tissues. We'll discuss current research and clinical strategies for fracture repair. We will focus on specific local and systemic therapies which enhance fracture repair.

**General Overview:** We will present the potential role of the immune system in fracture healing, including T-cells, inflammatory cytokines, and impact of unresolved inflammation on fracture repair. The role of mesenchymal stem cells in callus formation will be presented.

**Fracture Repair enhancement therapy: Focal Therapy:** Biophysical intervention such as local pulsed electromagnetic fields (PEMF) and low-intensity pulsed ultrasonography (LIPUS) are currently available for clinical use. Biological enhancement such as autologous platelet-rich plasma (PRP) and bone marrow-derived cell therapies, extracellular signaling molecules (platelet-derived growth factors – PDGF- and Fibroblast growth factor - FGF-2), TGF- $\beta$  superfamily (bone morphogenetic protein BMP-2 and -7) and Wnt signaling proteins. **Systemic Therapy:** Current and future systemic biological fracture repair enhancements include anti-inflammatory cytokines such as IL4, IL10, and IL13, recombinant Parathormone (rPTH), and anti-sclerostin, anti-IL-20 and anti-DKK1 monoclonal antibodies. Future gene therapy applications will also be discussed.

**Conclusion:** No specific, enhanced fracture repair therapy presents a significant clinical impact as of today. Nevertheless, future therapeutics for enhanced fracture repair are being developed to improve tissue composition and structure, along with clinically significant shorter fracture repair time. Genome editing and gene therapy strategies will also become available in the not-so-distant future.

## MTE10

## FLS AND FRACTURE RISK REDUCTION

K. Javaid<sup>1</sup>

<sup>1</sup>NIHR Musculoskeletal Biomedical Research Unit, University of Oxford, Oxford, United Kingdom

Even though it is established that adults suffering a fracture after a fall from standing height or less are at increased risk of another fracture, few patients receive effective management. This is despite the availability of validated fracture risk assessment tools and a range of anti-osteoporosis treatments that can rapidly reduce a patient's fracture risk. Closing the secondary fracture prevention gap has been highlighted as a priority for policymakers globally. The key steps for the key components for the patient pathway include identification, investigation, treatment recommendation, and monitoring to ensure early initiation of treatment and longer-term adherence. A number of reviews have now demonstrated positive effects on treatment recommendation and fracture reduction from studies using different designs.

A major challenge faced by clinicians is policy prioritisation so a local FLS can be sufficiently funded to benefit patients. An FLS benefit and budget impact model has been developed to describe the expected number of fractures avoided, impact on healthcare use and costs, as well as describe the costs of fracture prevention programme for staffing, investigations and medications. The inputs are adapted for each country from the published literature, government data and expert opinion. The results of this model can be applied at the national, regional or local hospital level to inform policy decision-making and plan services.

## MTE11

**HOW TO WARRANT RELIABLE DATA FOR CALCITROPIC HORMONES AND BONE TURNOVER MARKERS ASSAYS?**E. Cavalier<sup>1</sup><sup>1</sup>Department of Clinical Chemistry, University of Liège, CHU – Sart Tilman, Liège, Belgium

Determination of biomarkers is of paramount importance in clinical practice and millions of tests are daily performed worldwide. Yet, even if automated, biomarker determination remains a challenge. Indeed, as in any other analytical process, different variations in the process can lead to an unexpected wrong result, potentially leading to erroneous medical decisions. Traditionally, three types of errors can occur can happen during the whole process of biomarker determination, namely, the pre-analytical, the analytical and the post-analytical error.

Biomarkers of bone turnover (BTM) and calcitropic hormones are not free from these potential errors. Preanalytical errors are the most frequently observed in daily practice. They encompass errors like the use of wrong sampling tube, the fasting status, the time of sampling, the presence of fractures or the stability of the analytes. These conditions can differently affect BTM, parathyroid hormone (PTH), FGF23 and vitamin D (VTD) metabolites – even if these latter are less influenced by preanalytical conditions.

One of the major issues of the analytical phase is probably linked to standardization – or rather to the lack of standardization of analytical methods, which really complicates the follow-up of patients. Indeed, some assays can provide very discrepant results, sometimes by several magnitudes, because of this lack of standardization. Standardization – or harmonization – of biochemical assays necessitate the identification of the analyte of interest (the measurand), a commutable standard recognized by the scientific community, the presence of reference method procedures (RMPs) and that all manufacturers use these tools to calibrate the assays accordingly. Standardization efforts are however undertaken by the Vitamin D Standardization Program (VDSP) and the International Federation of Clinical Chemistry (IFCC). Yet, to date, 25(OH)D is the only analyte for which the prerequisites are present and the efforts have lead to improved situation. PINP assays are not standardized but, in patients who do not suffer from chronic kidney diseases (CKD) the results are quite homogeneous. True bone markers (bone alkaline phosphatase and Tartrate resistant acid phosphatase, type 5b) also show more coherent results. Improvement is still needed for  $\beta$ -CTX, FGF23 and other VTD metabolites.

Finally, regarding the post-analytical phase, the need of good reference ranges is mandatory.

In conclusion, reliable data can be obtained for BTM and calcitropic hormones, but important efforts, especially on standardization of the assays and on the implementation of good standard operating procedures (SOPs) for blood sampling and transportation are needed.

## MTE12

**MANAGEMENT OF MEN WITH OSTEOPOROSIS**A. Ferlin<sup>1</sup><sup>1</sup>University of Brescia, Department of Clinical and Experimental Sciences, Unit of Endocrinology and Metabolism, Brescia, Italy

Male osteoporosis is clearly under-estimated, under-diagnosed and under-treated. The diagnosis is often made late or even after a fracture event, also because guidelines on screening politics do not agree whether and when men should be considered. Furthermore, not only fewer men receive a correct and timely diagnosis, but also fewer men receive adequate treatment. Clinical trials are far less performed in men with respect to women, and we tend simply extrapolating from the female counterpart our clinical management. Since male osteoporosis is frequently secondary to other conditions and often associated with comorbidities, the identification of specific causes of male osteoporosis is essential to drive a correct and personalized treatment and should follows careful diagnostic approach. Very few studies assessed the effect of antiosteoporotic treatments in men and most of them considered only bone mineral density (BMD) as primary endpoint. However, BMD alone is not sufficient to clearly define osteoporosis in men and should not be considered the only target of treatments. A more integrated approach should be assessed, including for example vertebral morphometry, evaluation of sarcopenia and measures of bone and skeletal muscle strength.

Adequate management of male osteoporosis requires life style interventions and treatment of underlying conditions as first step, and decision on which specific anti-osteoporotic drug to use as second step. According to guidelines, pharmacological therapy is recommended for men with hip and/or vertebral fragility fracture, men with a T-score (spine, hip) lower than  $-2.5$  S.D., and men with T-score between  $-1$  and  $-2.5$  (spine, hip) and fracture risk over 20% or hip fracture risk in 10 years  $\geq 3\%$  according to FRAX. However, national guidelines and rules might differ in the different countries. Men receiving chronic therapy with high dosage glucocorticoids and men receiving androgen deprivation therapy for prostatic cancer are also candidates to antiosteoporotic drugs. Supplement with calcium and vitamin D should always be considered, and replacement therapy with testosterone is fundamental in men diagnosed with hypogonadism.

The antiresorptive and anabolic drugs approved for osteoporosis in men are represented by bisphosphonates, denosumab, and teriparatide, but the data are incredibly few compared to osteoporosis in the female. Furthermore, no study, except one with zoledronic acid, had fracture risk as primary end point. Only few,



preliminary data are available for romosozumab. There is also need for clinical trials assessing the efficacy of multistep therapeutic approach, that is, for example, antiresorptive drugs plus testosterone in hypogonadal men, and combination therapy (e.g. antiresorptive plus anabolic drugs).

Finally, it is fundamental to note that male osteoporosis is not simply a disease related to ageing. Many conditions acting before and during puberty might compromise the bone health for the rest of the life. Nevertheless, the early identification of these conditions (such as, for example, the Klinefelter syndrome, malabsorption diseases, vitamin D deficiency) might allow for better management of fracture risk.

## MTE13

### UCB SPONSORED MEET-THE-EXPERT SESSION - BUILDING BONE, IMPROVING OUTCOMES: MEET THE EXPERTS

UCB<sup>1</sup>

<sup>1</sup>UCB, Brussels, Belgium

This highly interactive session will showcase real-life clinical cases from Dr Andrea Singer (MedStar Georgetown University Hospital, USA) and Dr Ralf Oheim (University Medical Center Hamburg UKE, Germany) to initiate discussion on the optimal therapeutic management of postmenopausal women with severe osteoporosis at very high fracture risk.

The experts will provide a background to their patient cases, before opening the floor to the audience to share their opinions on the optimal treatment strategy for each case. The actual course of action taken by each expert, along with the resultant clinical outcomes, will then be discussed, with audience invited to ask questions and, again, share their opinions.

WORLD CONGRESS  
ON OSTEOPOROSIS,  
OSTEOARTHRITIS AND  
MUSCULOSKELETAL  
DISEASES



2021 VIRTUAL



Abstract Book

## **Committee of National Societies Abstracts**

## OCs1

**PREVALENCE AND AGREEMENT BETWEEN RECENT SARCOPENIA DEFINITIONS: FINDINGS FROM FOUR POPULATION-BASED COHORTS**

L. D. Westbury<sup>1</sup>, H. E. Syddall<sup>1</sup>, J. A. Cauley<sup>2</sup>, P. M. Cawthon<sup>3</sup>, E. M. Curtis<sup>1</sup>, K. E. Ensrud<sup>4</sup>, R. A. Fielding<sup>5</sup>, H. Johansson<sup>6</sup>, J. A. Kanis<sup>6</sup>, M. K. Karlsson<sup>7</sup>, T. Kwok<sup>8</sup>, N. Lane<sup>9</sup>, M. Lorentzon<sup>6</sup>, D. Mellström<sup>10</sup>, A. B. Newman<sup>2</sup>, C. Ohlsson<sup>10</sup>, E. Orwoll<sup>11</sup>, E. Ribom<sup>12</sup>, B. E. Rosengren<sup>7</sup>, J. T. Schousboe<sup>13</sup>, E. J. Shiroma<sup>14</sup>, N. C. Harvey<sup>1</sup>, E. M. Dennison<sup>1</sup>, C. Cooper<sup>1</sup>

<sup>1</sup>MRC Lifecourse Epidemiology Unit, University of Southampton, Southampton, United Kingdom, <sup>2</sup>Department of Epidemiology, Graduate School of Public Health, University of Pittsburgh, Pittsburgh, United States, <sup>3</sup>Research Institute, California Pacific Medical Center, San Francisco, California, United States, <sup>4</sup>Medicine and Epidemiology & Community Health, University of Minnesota, Minnesota, United States, <sup>5</sup>Nutrition, Exercise Physiology, and Sarcopenia Laboratory, Jean Mayer USDA Human Nutrition Research Center on Aging, Tufts University, Boston, United States, <sup>6</sup>Mary MacKillop Institute for Health Research, Australian Catholic University, Melbourne, Australia, <sup>7</sup>Clinical and Molecular Osteoporosis Research Unit, Department of Clinical Sciences Malmö, Lund University and Department of Orthopedics, Skane University Hospital, Malmö, Sweden, <sup>8</sup>Department of Medicine & Therapeutics and School of Public Health, The Chinese University of Hong Kong, Hong Kong, China, <sup>9</sup>Division of Rheumatology, Department of Internal Medicine, UC Davis Health, 4625 Second Avenue, Sacramento, CA 95917, United States, <sup>10</sup>Centre for Bone and Arthritis Research (CBAR), Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden, <sup>11</sup>Oregon Health & Science University, Portland, Oregon, United States, <sup>12</sup>Department of Surgical Sciences, University of Uppsala, Uppsala, Sweden, <sup>13</sup>Park Nicollet Clinic and HealthPartners Institute, Bloomington, Minnesota, United States, <sup>14</sup>Laboratory of Epidemiology and Population Sciences, Intramural Research Program, National Institute on Aging, Baltimore, United States

**Objectives**

The study aim was to assess, within each of four different population-based cohorts, prevalence of, and agreement between, two recent sarcopenia definitions, among older white men and women.

**Material and Methods**

Participants in the Health, Aging and Body Composition Study (Health ABC) (n=1734, 52% men), Hertfordshire Cohort Study (HCS) (n=304, 52% men), Osteoporotic Fractures in Men Sweden Study (MrOS Sweden) (n=2852, 100% men) and the Osteoporotic Fractures in Men US Study (MrOS US) (n=5189, 100% men) were analysed. Appendicular lean mass was ascertained using DXA; muscle strength by grip dynamometry; and usual gait speed was measured as a marker of mobility.

The sarcopenia definitions of interest were proposed by the Sarcopenia Definitions and Outcomes Consortium (SDOC) and the 2018 European Working Group on Sarcopenia in Older People (EWGSOP2). SDOC defines sarcopenia as having weak grip strength (<35.5kg [men], <20kg [women]) and slow gait speed (<0.8m/s). EWGSOP2 defines sarcopenia as having weak grip strength (<27kg [men], <16kg [women]) and low appendicular lean mass index (<7.0kg/m<sup>2</sup> [men], <5.5kg/m<sup>2</sup> [women]). Cohen's kappa (κ) statistic was used to assess agreement between the definitions.

**Results**

Mean (SD) ages of participants were: Health ABC [74.3 (2.8) years]; HCS [75.4 (2.5)]; MrOS Sweden [74.9 (3.1)]; and MrOS US [73.8 (5.9)]. Prevalence of sarcopenia according to SDOC vs EWGSOP2 was as follows: Health ABC (men: 0.3% vs 1.5%, women: 1.0% vs 2.1%); HCS (men: 15.3% vs 0.0%, women: 19.0% vs 0.7%); MrOS Sweden (men: 1.0% vs 0.5%); and MrOS US (men: 1.5% vs 1.3%). Agreement was low between SDOC and EWGSOP2 (κ<0.2 within each cohort).

**Conclusions**

Sarcopenia prevalence varied and agreement was low between SDOC and EWGSOP2. SDOC sarcopenia was more common in HCS than in Health ABC, perhaps due to the latter cohort's requirement for participants to have no mobility disability at enrolment. A consensus definition for sarcopenia is required.

## OCs2

**DETERMINANTS OF MUSCLE DENSITY IN LATE ADULthood: FINDINGS FROM THE HERTFORDSHIRE COHORT STUDY**

F. Laskou<sup>1</sup>, L. D. Westbury<sup>1</sup>, N. Nicholas<sup>1</sup>, N. C. Harvey<sup>1</sup>, H. P. Patel<sup>1</sup>, C. Cooper<sup>1</sup>, K. Ward<sup>1</sup>, E. M. Dennison<sup>1</sup>

<sup>1</sup>MRC Lifecourse Epidemiology unit Southampton, Southampton, UK

**Objective:** In a recent meta-analysis, lower calf muscle density (indicating greater muscle adiposity and lower muscle quality) as assessed by pQCT was associated with greater hip fracture risk, independent of FRAX, falls and bone mineral density. To date, muscle density has been little studied, and its determinants are unknown. In this study, we used a well characterised cohort of older adults (Hertfordshire Cohort Study) to identify lifestyle and anthropometric determinants of muscle density some 11 y later.

**Methods:** At baseline, 197 men and 178 women, aged 59-70 y, were recruited to a longitudinal study of musculoskeletal health. A lifestyle questionnaire was administered to collect information on physical activity, smoking, alcohol consumption and dietary patterns; height and weight were measured. pQCT of the radius and tibia was performed a median of 11.5 (IQR 10.9, 12.3) y later, and muscle density was measured at the 66% site using standard methodology. Baseline characteristics in relation to muscle den-

sity at follow-up were examined separately using linear regression with sex, baseline age and follow-up time included as covariates in all models.

**Results:** Mean (SD) age at baseline was 64.7 (2.7) y; mean (SD) muscle density values (mg/cm<sup>3</sup>) were as follows: forearm [men 79.9 (3.1), women 77.2 (3.2)], calf [men 80.7 (2.6), women 78.5 (2.6)]. Baseline correlates ( $p < 0.05$ ) of both lower forearm and calf muscle density included female sex, lower weight, and lower BMI; SD difference in calf muscle density for women compared to men, and per SD lower weight and BMI were -0.84 [95%CI: -1.13, -0.54], -0.37 [-0.46, -0.27] and -0.31 [-0.40, -0.23] respectively. Additional correlates of lower calf muscle density included older age and shorter stature. Relationships between muscle density and age were stronger at the calf ( $p < 0.001$ ) than the forearm ( $p = 0.08$ ). Lifestyle measures were not associated with muscle density.

**Conclusion:** Female sex, older age, and lower adiposity, rather than lifestyle, were associated with lower muscle density in older community-dwelling adults. Age was more strongly associated with calf than forearm muscle density. Further studies in larger cohorts are required.

## OCs3

### FRAX BASED OSTEOPOROSIS MANAGEMENT PATHWAY FOR UKRAINIAN MEN

V. Povoroznyuk<sup>1</sup>, H. Johansson<sup>2</sup>, N. Grygorieva<sup>1</sup>, M. Lorentzon<sup>3</sup>, A. Musienko<sup>1</sup>, N. C. Harvey<sup>4</sup>, E. V. McCloskey<sup>5</sup>, E. Liu<sup>2</sup>, J. A. Kanis<sup>5</sup>

<sup>1</sup>D. F. Chebotarev Institute of Gerontology NAMS of Ukraine, Kyiv, Ukraine, <sup>2</sup>Sahlgrenska Osteoporosis Centre, Institute of Medicine, University of Gothenburg, Gothenburg, Sweden, <sup>3</sup>Mary McKillop Institute for Health Research, Australian Catholic University, Melbourne, Australia, <sup>4</sup>MRC Lifecourse Epidemiology Unit, University of Southampton, Southampton, UK, <sup>5</sup>Centre for Metabolic Bone Diseases, University of Sheffield Medical School, Sheffield, UK

**Objective:** Ukrainian FRAX model for Ukraine was launched in 2016 and intervention thresholds for women were published in 2019. The impact of intervention thresholds for Ukrainian men was not explored. The aim of this research was to assess the impact of the use of these thresholds in Ukrainian men.

**Methods:** 653 men (age 60.5±11.8, range 40-88 y) referred as outpatients to the Dmitry F. Chebotarev Institute of Gerontology of the National Academy of Medical Sciences of Ukraine for the evaluation of skeletal status were studied. The 10-y probabilities of hip fracture and a major osteoporotic fracture were calculated using the Ukrainian FRAX model (version 4.2) with and without femoral neck BMD.

**Results:** 174 of 653 men (26.6%) had a prior fragility fracture and would be eligible for treatment on this basis. From the 479 males without a prior fracture, 447 were at low risk (68.5%) and were

not be eligible for further assessment of fracture probability. The intermediate category of risk comprised 32 men (4.9%) in whom FRAX was recalculated with the inclusion of femoral neck BMD. Of these 23 were categorized at low risk (3.5%) and 9 at high risk (1.4%). Fracture probability calculated with BMD was higher than that without BMD. The disposition of the cohort in men was markedly different from that for women. 28% of men and 57% of women were eligible for antiosteoporotic treatment. The eligibility for treatment by FRAX alone was higher in women than in men (6.1 vs. 1.4% had a prior fragility fracture and were eligible for treatment). The requirement for BMD testing was also higher in women than in men (18.3 vs. 4.9%, respectively).

**Conclusion:** We have examined the assessment of fracture risk in Ukrainian men and compared their disposition with that of a referral population of women. 27% of men referred for skeletal assessment had a prior fracture that categorized eligibility for treatment, and this characteristic was less frequent than in Ukrainian women (51% of referrals).

## OCs4

### SEX DIFFERENCES IN THE ASSOCIATIONS BETWEEN CARDIOVASCULAR RISK FACTORS AND PHYSICAL FUNCTION: THE GAMBIA BONE AND MUSCLE AGEING STUDY (GAMBAS)

A. Zengin<sup>1</sup>, M. Ó Breasail<sup>2</sup>, C. P. Parsons<sup>3</sup>, L. M. Jarjou<sup>4</sup>, R. E. Janha<sup>4</sup>, M. Jobe<sup>4</sup>, A. Prentice<sup>2</sup>, C. Cooper<sup>3</sup>, P. R. Ebeling<sup>1</sup>, K. A. Ward<sup>3</sup>

<sup>1</sup>Dept. of Medicine, School of Clinical Sciences, Faculty of Medicine, Nursing and Health Sciences, Monash University, Clayton, Victoria, Melbourne, Australia, <sup>2</sup>MRC Nutrition and Bone Health Group, Cambridge, UK, <sup>3</sup>MRC Lifecourse Epidemiology Unit, University of Southampton, Southampton, UK, <sup>4</sup>MRC Unit The Gambia at the London School of Hygiene and Tropical Medicine, Keneba, Gambia

**Objective:** In sub-Saharan Africa, the prevalence of obesity, cardiovascular disease (CVD) and impaired physical function are increasing due to rapid urbanisation. We investigated the associations between cardiac-workload, arterial stiffness, peripheral vascular calcification (PVC) and physical function in Gambian adults.

**Methods:** We recruited 249 women and 239 men aged 40-75+ y. Supine blood pressure and heart rate were measured and used to calculate rate pressure product (RPP) and pulse pressure (PP). Presence of PVC was determined from tibia pQCT scans. Physical function was assessed by a force platform to measure muscle force (kN) and power (kW) during a chair rise test (CRT) and single 2-leg-jump (s2LJ); hand dynamometer measured hand grip strength (HGS). Body composition was assessed with DXA; body size corrections were made by dividing by height squared (kg/m<sup>2</sup>) giving fat mass index (FMI) and appendicular lean mass index



(ALMI). Sex-interactions were tested (denoted as p-int) after adjustment for age and height. Data are expressed as 10% percent difference in RPP or PP, per one-unit difference in physical functions measures. Values are  $\beta$ -coefficients with 95% confidence intervals. Mediation analyses were performed with the mediator as ALMI/FMI.

**Results:** Mean age was similar in women ( $61 \pm 13$  y) and men ( $61 \pm 12$  y). BMI was higher in women vs. men ( $21.9 \pm 3.7$  vs.  $20.9 \pm 3.1$ ,  $p=0.0009$ ). There was a greater negative association between RPP and s2LJ power after adjustments in men ( $-0.02$  kW:  $-0.05, 0.03$ ) vs. women ( $0.04$  kW:  $0.004, 0.08$ ),  $p\text{-int}=0.017$ ; with no other significant interactions. In men, there were greater negative associations between PP and CRT power ( $-0.008$  kW), s2LJ power ( $-0.03$  kW) and HGS ( $-0.48$  kg) vs. women (all  $p\text{-int}<0.01$ ). In men, presence of PVC was associated with lower s2LJ power ( $-0.2$  kW:  $-0.4, 0.02$ ,  $p\text{-int}=0.037$ ) and HGS ( $-2.3$  kg:  $-4.2, -0.4$ ,  $p\text{-int}=0.016$ ). In men, FMI mediated the association between RPP and CRT power ( $p=0.002$ ), s2LJ force ( $p<0.001$ ) and s2LJ power ( $p=0.001$ ). There was no significant mediation by ALMI; there were no mediation by ALMI or FMI in women.

**Conclusion:** Multiple markers of CVD were associated with poorer physical function in men, and these were mediated by FMI. There is a need to identify preventative strategies to slow/prevent the rising burden of CVD and poor physical function in sub-Saharan Africa.

## OCs5

### VITAMIN D STATUS AND ASSOCIATED VDR GENE POLYMORPHISM IN BELARUSIAN POSTMENOPAUSAL WOMEN

P. Marozik<sup>1</sup>, E. Rudenka<sup>2</sup>, K. Kobets<sup>1</sup>, A. Rudenka<sup>3</sup>, V. Samokhovec<sup>3</sup>

<sup>1</sup>Institute of Genetics and Cytology of the National Academy of Sciences of Belarus, <sup>2</sup>Belarusian State Medical University, <sup>3</sup>Belarusian Medical Academy of Post-Graduate Education, Minsk, Belarus

**Objective:** Vitamin D plays an important role bone diseases prevention, including osteoporosis (OP). The biological action of vitamin is realized through its receptor, coded by *VDR* gene. Therefore, *VDR* gene polymorphism can influence vitamin D supplementation effectiveness. The objective of this work was to reveal the effects of *VDR* gene Apal rs7975232, BsmI rs1544410, TaqI rs731236, FokI rs2228570 and Cdx2 rs11568820 variants on 25(OH)D level in Belarusian women with OP.

**Methods:** Patients were recruited at 1st Minsk city clinic (Minsk, Belarus). In total, 602 women met inclusion criteria, of them 355 patients with OP and 247 subjects from control group. BMD was evaluated by DXA (GE Lunar, USA), serum vitamin D was deter-

mined by electrochemiluminescence immunoassay (Cobas e411, Roche, Switzerland). *VDR* gene variants markers were determined using the quantitative PCR.

**Results:** We revealed significant association of rs1544410, and rs731236 gene variants with 25(OH)D level, which is gene/dose dependent: the lowest vitamin level was typical for reference genotype, intermediate – for heterozygotes and the highest – for the bearers of minor homozygous genotypes ( $P<0.01$ ). The opposite gene/dose relationship was revealed for rs11568820 variant. We also assessed the distribution of each *VDR* variant genotypes in different groups of study participants according to vitamin D level (defined as sufficient, insufficient, deficient). Using  $\chi^2$ -test, a significant difference in genotype distribution between groups was revealed only for rs731236 variant ( $\chi^2=12.8$ ,  $P=0.012$ , Figure). The G/G genotype was over-represented in group of participants with "sufficient" state, while A/A genotype was associated with vitamin D deficiency.

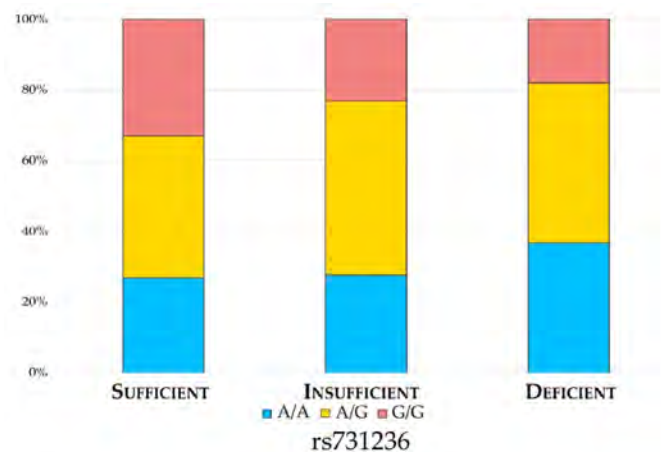


Figure. The association of serum 25(OH)D levels with *VDR* rs731236 genotype distribution in groups based on vitamin D status.

**Conclusion:** The data shows that the increased level of circulating 25(OH)D is observed in bearers of unfavorable *VDR* genotypes, associated with decreased receptor expression, possibly due to altered metabolic feedback loops or effectiveness of vitamin metabolism. *VDR* gene variants should be considered for personalized vitamin D supplementation.

## OCs6

## SOFT BONE IS WEAK: PROSPECTIVE, BLINDED INTRAOPERATIVE ASSESSMENT OF BONE CORRELATES WITH T-SCORE

B. Nickel<sup>1</sup>, D. Krueger<sup>1</sup>, G. Borchardt<sup>1</sup>, L. Andersen<sup>1</sup>, R. Illgen<sup>1</sup>, D. Hennessy<sup>1</sup>, N. Binkley<sup>1</sup>, P. Anerson<sup>1</sup>

<sup>1</sup>University of Wisconsin, Madison, USA

**Objective:** Intuitively, intraoperative physician assessment (IPA) of bone would be an excellent measure of quality as surgeons gain insight into bone strength through haptic feedback while bone preparation is performed. However, no studies evaluate a surgeon's ability to do so. Our purpose was to investigate IPA of bone quality in patients undergoing total knee arthroplasty (TKA) with a) lowest T-score BMD b) custom regions of interest (ROI) in distal femur BMD.

**Methods:** Prospectively, 70 patients identified as primary TKA candidates by 3 surgeons received pre-operative DXA (spine, hip, wrist, VFA and TBS). Intraoperatively, the surgeon assessed bone quality on a 5 point scale based on tactile feedback to resistance with preparation: 1=excellent, 2=above average, 3=normal, 4=below average and 5=poor. This IPA was recorded in the operative note. Demographic data, DXA results and IPA scale between surgeons was compared by factorial ANOVA. Lowest T-score (L-spine, femoral neck/total hip and 3 radius) and custom regions were correlated to IPA using Spearman's correlation.

**Results:** Mean IPA was  $2.74 \pm 1.2$  with no statistical difference ( $p=0.284$ ) between surgeons. Demographic data, BMD, and lowest T-score of patients (38 surgeon A, 25 surgeon B and 7 surgeon C) not differ between surgeons. Mean age was  $65.8 \pm 7.6$  y and BMI  $31.4 \pm 5.1$  kg/m<sup>2</sup>. IPA directly correlated with lowest T-score ( $R=0.482$ ) and ROI ( $R=0.587-0.645$ ). Based on lowest T-score, no patients with osteoporosis were classified as above average bone quality and none with normal BMD were classified as having poor bone

**Conclusion:** Novel IPA provides valuable information that can identify patients with below average/poor bone quality and expedite treatment ideally decreasing periprosthetic fracture risk. Reproducibility between three surgeons highlights potential for universal implementation and future studies may validate IPA in hip replacement aiding implant fixation selection.

## OCs7

## THE EFFECT OF CALCIUM AND VITAMIN D3 ON CALCIUM HOMEOSTASIS AND FALLS INCIDENCE IN PATIENTS WITH HIGH FRACTURE RISK UNDERGOING MEDICAL REHABILITATION

L. Marchenkova<sup>1</sup>, V. Vasileva<sup>1</sup>

<sup>1</sup>National Medical Research Center of Rehabilitation and Balneology" of Ministry of Health of Russian Federation, Dept. of Somatic Rehabilitation, Moscow, Russia

**Objective:** Vitamin D and calcium deficiencies is of particular importance in older patients undergoing medical rehabilitation and having a high risk of fractures. Preventing falls and fractures, including during the course of rehabilitation, is an important challenge that can be addressed in these patients, in particular through improved nutrition and vitamin D and calcium supplementation. This study aimed to evaluate the effect of long-term calcium and vitamin D3 intake on calcium homeostasis and fall's rate in patients with high fracture risk starting rehabilitation course.

**Methods:** The study enrolled 119 men and women aged 50-80 y.o. with high absolute fracture probability by FRAX who started medical rehabilitation. 41 patients have been receiving antiresorptive therapy already comprised group 1, other patients were randomized into groups 2 (n=39) and 3 (control, n=39). In groups 1 and 2, a food supplement containing calcium citrate 1000 mg and vitamin D3 600 IU was prescribed for 12 months. All patients undergo laboratory examination, food calcium intake and fall assessment at baseline, in 6 and 12 months

**Results:** Daily calcium intake in the study sample (n=119) was  $782.9 \pm 243.4$  mg. Vitamin D deficiency was detected in 38.4% of the examined. An increase in 25(OH)D level was noted in groups 1 and 2 after 6 and 12 months ( $p<0.01$ ). Patients in group 1 showed an increase in serum osteocalcin and calcium levels after 6 and 12 months ( $p<0.05$ ). In group 3, there was an increase of immunoreactive PTH levels after 6 ( $p<0.05$ ) and 12 months ( $p<0.01$ ), C-terminal telopeptide of type I collagen level and alkaline phosphatase activity after 12 months ( $p<0.05$ ). In group 1, there was also a decrease in proportion of patients who fell after 6 months ( $\chi^2=4.97$ ,  $p=0.026$ ) and a decrease in the total number of falls after 12 months ( $\chi^2=4.89$ ,  $p=0.027$ ). Group 2 showed a decrease in the number of patients who fell after 6 and 12 months ( $\chi^2=48.58$ ,  $p=0.0034$  at both stages of the study) and the number of falls in general after 6 months ( $\chi^2=6.02$ ,  $p=0.0142$ ).

**Conclusion:** The obtained data allow us to recommend prescription of dietary supplements containing calcium and vitamin D3 as a part of complex rehabilitation of patients with high fracture risk.

## OCs8

**IMPROVING COMMUNICATION OF FRACTURE RISK GLOBALLY: INSIGHTS FROM INTERVIEWS WITH PATIENTS. THE RISKCOMMUNICATION STUDY OR RICO STUDY**

C. Beaudart<sup>1</sup>, S. Silverman<sup>2</sup>, Z. Paskins<sup>3</sup>, A. Boonen<sup>4</sup>, J.-F. Kaux<sup>5</sup>, S. Fujiwara<sup>6</sup>, M. Hilgsmann<sup>1</sup>

<sup>1</sup>Dept. of Health Services Research, CAPHRI Care and Public Health Research Institute, Maastricht University, Maastricht, The Netherlands, <sup>2</sup>Cedars-Sinai Medical Center, Los Angeles, USA, <sup>3</sup>School of Medicine, Keele University, Staffordshire, UK, <sup>4</sup>Dept. of Internal Medicine, Division of Rheumatology and CAPHRI Care and Public Health Research Institute, Maastricht University Medical Center, Maastricht, The Netherlands, <sup>5</sup>Physical Medicine, Rehabilitation and Sports Traumatology, University and University Hospital of Liège, Liège, Belgium, <sup>6</sup>Dept. of Pharmacy, Yasuda Women's University, Hiroshima, Japan

**Objective:** Lack of or low quality communication between patient and healthcare provider may partially explain poor initiation and adherence to anti-osteoporosis treatment. In this study, we aimed to gain insights into patients' understanding and preferences for various approaches for communication of fracture risk, derived from a risk algorithm, with the goal of improving osteoporosis treatment and management.

**Methods:** Individual physical or online interviews with patients at risk for fractures were organized in 4 different countries (Belgium, The Netherlands, United States and Japan). A semi-structured workbook developed following a scoping literature review and experts insight was used to conduct interviews. Using an example of a personal risk of 21% for any fracture in the next 10 y, four main fracture risk presentations were used to guide these interviews: verbal/written presentation of the percentage fracture risk, various types of coloured graphs, icon arrays, and icon arrays with or without treatment effect on fracture risk. Patients were asked to critically reflect on the different framing presentations for fracture risk, to suggest alternatives for improvement and to rank their preference.

**Results:** A total of 26 women (mean age of 70.5 y) at risk for fractures participated in the study. Thirteen (50%) had an history of fracture, 18 (69.2%) were on antiosteoporosis medication and 4 (15.4%), 11 (42.3%), 5 (19.2%) considered themselves at low, moderate and high risk of fracture respectively. Most patients (76.9%) preferred coloured graphs over other presentations. Icon arrays of baseline fracture risk were never a preferred method of risk communication. Most patients also reported that presenting the risk of fracture with and without treatment would be more convincing to initiate a treatment. Participants also suggested that fracture risk communication should be supported with additional data, such as the consequences of fractures. Most patients would value the development of a visual tool to better understand fracture risk.

**Conclusion:** Insights from these interviews suggest the importance of a patient-centered approach to fracture risk communication. A larger global survey is currently being developed to provide additional insights into patients' understanding and preferences for fracture risk communication and assess potential cultural and geographical differences in the optimal way to communicate fracture risk.

**Acknowledgement:** Amgen, Inc. funded this investigator initiated study. \*The RICO project is endorsed by the Epi/QOL working group.

## OCs9

**OSTEOPOROSIS IN MIDDLE-AGED WOMEN: WHAT IS THE IMPACT OF MULTIMORBIDITY AND MEDICATION USE? A CROSS-SECTIONAL POPULATION-BASED STUDY**

A. V. Gueldini de Moraes<sup>1</sup>, L. H. Costa-Paiva<sup>1</sup>, A. O. Pedro<sup>1</sup>

<sup>1</sup>UNICAMP, Campinas, Brazil

**Objective:** Osteoporosis is a multifactorial disease influenced by many clinical factors. Some of these factors are nonmodifiable, while others can be avoided, ameliorated and prevented. From the perspective of the middle-aged women and their physician, this is of importance since longevity and aging process is associated to chronic conditions, medication use and multimorbidity that may affect bone health. Many of these chronic diseases may affect women during the menopause transition. Therefore, it is important to know which medications are most used by middle-aged women and which ones can potentially have adverse skeletal effects. This study aimed to evaluate the association between self-reported osteoporosis and multimorbidity and medication use, in Brazilian middle-aged women.

**Methods:** A secondary analysis of household survey data from a previous cross-sectional, population-based study conducted with a sample of 749 women of a population of 257,434 female urban residents in the age bracket of interest (45-60 y). Associations between self-reported osteoporosis and chronic diseases, multimorbidity, and medication use were evaluated. Simple and multiple Poisson regression analyses (with a forward stepwise selection of variables) were performed to evaluate the significance of the factors associated with self-reported osteoporosis (95%CI for the prevalence ratio). The level of statistical significance was set at 5%.

**Results:** Mean age of participants was 52.5±4.4 y. Mean age at menopause was 46.5±5.8 y. About 79% of women reported having some kind of chronic disease. The most prevalent morbidities were hypertension (36%), depression (34%), anxiety (27%), osteoarticular diseases (27%), dyslipidemia (22%), asthma (10.5%), and diabetes mellitus (10.4%). Only 21.6% denied having morbidities. The prevalence of self-reported osteoporosis was 7.3%. Among those women with osteoporosis, 67.3% reported using

specific drugs to treat bone loss. The specific intake of drugs for osteoporosis treatment correspond to 7.6% of the overall prevalence of medication use. Only 6% of the entire studied population reported using calcium and vitamin D supplementation. The overall prevalence of medication use was 68.8%, with the drugs predominantly consisting of those used for cardiovascular diseases (34.6%), oral lipid-lowering agents (13%), anxiolytics (12%), treatment of osteoarticular diseases (12%), and treatment of diabetes (9.6%). Only 19.5% of the participants reported previous or current use of hormone replacement therapy. The overall frequency of polypharmacy was 23%. After multiple regression analysis, the main factors associated with self-reported osteoporosis were having osteoarthritis/osteoarthritis (PR=2.86; 95%CI: 1.58-5.17;  $p \leq 0.001$ ), multimorbidity (PR=2.61; 95%CI: 1.43-4.75;  $p=0.002$ ), and treatment for ischemic heart disease (PR=3.28; 95%CI: 1.02-10.56;  $p=0.046$ ). Strength & limitations: This observational study provides an epidemiological contribution. The meticulous methodology and the representativeness of the population sample permit these conclusions to be extrapolated to the entire population of middle-aged women residing in the metropolitan region of Campinas, Brazil. Some limitations of this study must be considered, particularly bearing in mind that much of the data was self-reported, which may lead to biases.

**Conclusion:** The prevalence of morbidities and medication use among middle-aged women was high in a relatively young population. Osteoporosis was reported by approximately 8% of women, highlighting the importance of menopause transition. However, only 2/3 of the osteoporotic women reported using specific drugs for its treatment. Furthermore, it was observed a low prevalence of calcium and vitamin D supplementation. Women with self-reported osteoporosis were more likely to use medicine for ischemic heart disease, to have osteoarticular disease, besides having multimorbidity. Our findings reinforce the need to address women earlier, preferably in the period before the menopausal transition, to promote health through lifestyle modifications, thus preventing the onset of chronic degenerative diseases at earlier ages. Furthermore, clinicians should be aware to select drugs for the treatment of chronic conditions in this specific group of women, considering the potential side effects on bone health.

**Acknowledgement:** São Paulo Research Foundation - FAPESP 2016/08089-9.

## OCs10

### INFLUENCE OF BARIATRIC SURGERY ON 25-OH-VITAMIN D AND PTH IN OBESE PATIENTS

S. H. Scharla<sup>1</sup>, U. G. Lempert<sup>1</sup>

<sup>1</sup>Practice Endocrinology & Diabetes, Bad Reichenhall, Germany

**Objective:** Obesity is associated with vitamin D deficiency and potential calcium malabsorption. Bariatric surgery is performed for the treatment of obesity with increasing frequency, but may aggravate malabsorption and increase the risk of osteoporosis and fractures. Therefore, supplementation of vitamin D (alongside with minerals and other vitamins) is part of the follow-up program after bariatric surgery. We present data on the vitamin D status and PTH before and after bariatric surgery.

**Methods:** We studied 23 obese patients before bariatric surgery and 25 patients after bariatric surgery. 25-OH-Vitamin D was used as an estimate for vitamin status. 25-OH-vitamin D and PTH were measured by the automated methods of Roche Diagnostics (Mannheim) using a COBAS 411 platform. Clinical Chemistry (calcium, phosphate, alk. phosphatase, creatinine) were measured by routine standard methods. Group differences were evaluated with t-test and Pearson correlation analyses were done.

**Results:** The BMI in the group before surgery was  $49.9 \pm 8.4 \text{ kg/m}^2$ , and after surgery  $34.6 \pm 7.8 \text{ kg/m}^2$  (mean  $\pm$  SD),  $p < 0.001$ . The age of the patients was  $40.9 \pm 10.7 \text{ y}$ . 25-OH-vitamin D serum concentrations were  $49.9 \pm 21.8 \text{ nmol/l}$  and  $72.7 \pm 37.3 \text{ nmol/l}$  after surgery ( $p < 0.05$ ). The physiological range for 25-OH-vitamin D is 50-125 nmol/l. PTH was  $23.2 \pm 17 \text{ ng/l}$  before surgery and  $36.7 \pm 19.2 \text{ ng/l}$  after surgery ( $p < 0.05$ ), the normal range for PTH being 10-65 ng/l. There was a significant negative correlation between BMI and 25-OH-vitamin D in patients before surgery ( $r = -0.46$ ,  $p = 0.03$ ). After surgery, this relationship was not significant anymore ( $r = 0.17$ ,  $p = 0.41$ ). There was no significant correlation between BMI and PTH. 25-OH-vitamin D and PTH were negatively correlated. This correlation was not significant before surgery ( $r = -0.36$ ,  $p = 0.09$ ), but after surgery ( $r = -0.39$ ,  $p = 0.05$ ).

**Conclusion:** Obese patients displayed vitamin D insufficiency, as has been described in former studies. The vitamin D status was significantly improved after bariatric surgery, which resulted also in a substantial weight loss. Since 25-OH-vitamin D is negatively correlated with BMI, the reduction in BMI may explain the increase in 25-OH-vitamin D. However, the widely used vitamin supplementation after surgery may also contribute to the better vitamin D status.



OCs11

# **PATIENT'S PREFERENCES FOR LIFESTYLE CHANGES IN OSTEOPOROTIC FRACTURE PREVENTION: A CROSS-EUROPEAN DISCRETE-CHOICE EXPERIMENT**

C. Beaudart<sup>1</sup>, A. Boonen<sup>2</sup>, N. Li<sup>1</sup>, S. Bours<sup>1</sup>, S. Goemaere<sup>3</sup>, J.-Y. Reginster<sup>4</sup>, C. Roux<sup>5</sup>, B. McGowan<sup>6</sup>, A. Diez-Perez<sup>7</sup>, R. Rizzoli<sup>8</sup>, C. Cooper<sup>9</sup>, M. Hilgsmann<sup>1</sup>

<sup>1</sup>Department of Health Services Research, CAPHRI Care and Public Health Research Institute, Maastricht University, Maastricht, The Netherlands, <sup>2</sup>Department of Internal Medicine, Division of Rheumatology and CAPHRI Care and Public Health Research Institute, Maastricht University Medical Center, Maastricht, The Netherlands, <sup>3</sup>Department of Rheumatology and Endocrinology, Ghent University Hospital, Gent, Belgium, <sup>4</sup>WHO Collaborating Center for Public Health aspects of musculo-skeletal health and ageing, Division of Public Health, Epidemiology and Health Economics, University of Liège, Liège, Belgium, <sup>5</sup>Department of Rheumatology, Paris Descartes University, Paris, France, <sup>6</sup>The North Western Rheumatology Unit, Our Lady's Hospital, Manorhamilton, Manorhamilton, Ireland, <sup>7</sup>Musculoskeletal Research Unit (IMIM) and CIBERFES, Universitat Autònoma de Barcelona, Barcelona, Spain, <sup>8</sup>Division of Bone Diseases, Geneva University Hospitals, Geneva, Switzerland, <sup>9</sup>MRC Lifecourse Epidemiology Unit, University of Southampton, Southampton General Hospital, Southampton, United Kingdom

**Objective:** Healthy lifestyle habits are recommended for preventing osteoporotic fracture, alongside drug therapy. In this study, we aimed to assess patients' preference to adopt lifestyle changes to prevent osteoporotic fractures.

**Methods:** A discrete-choice experiment was conducted in seven European countries: Belgium, France, Ireland, Spain, Switzerland, the Netherlands and United Kingdom. Patients were repetitively asked if they would closely follow different regimens of lifestyle recommendations that varied with respect to 6 attributes and different levels (options): physical activity (levels: not included, moderate or high), calcium and vitamin D status (levels: not included, taking supplements or improve nutrition and assure a minimal daily sunlight exposure), smoking (levels: not included or quit smoking), alcohol (levels: not included or moderate consumption), weight reduction (levels: not included or ensure a healthy body weight) and fall prevention (levels: not included, receive general advice or following a one-day prevention program). A conditional logit model was used to estimate patient's preferences for all participants (global model) and per country.

**Results:** In total, 1042 patients completed the questionnaire, with samples varying between 91 and 244 per country. Overall, patients were favourable to lifestyle changes for preventing osteoporotic fractures (positive and significant coefficients in the global model as well as in all countries separately). However, among the lifestyle factors proposed, consensually across all countries,

patients were not prone to engage in high physical activity (i.e. walking for 30-40 minutes, 3-4 times per week or equivalent). In Ireland, Belgium, the Netherlands and Switzerland, patients were not favourable neither to follow a one-day falls prevention program. Belgian, Swiss and Dutch patients were not prone neither to modify their nutrition (i.e. diet rich in calcium and consumption of fish at least twice a week) and ensure a 10-15 minutes daily sunlight exposure. In the global model as well as for Belgian and Dutch patients separately, we observed favourable intention from patients to reduce their alcohol consumption, engage in moderate physical activity, taking calcium and vitamin D supplements and ensure a normal body weight for preventing fractures.

**Conclusions:** Patient's healthy lifestyle behaviours are essential for an optimal osteoporosis management. This is the first study that explicit patients' preferences for lifestyle factors in preventing osteoporotic fracture. In an ideal patient-centred approach, fracture prevention should take these considerations and preferences into account.

WORLD CONGRESS  
ON OSTEOPOROSIS,  
OSTEOARTHRITIS AND  
MUSCULOSKELETAL  
DISEASES



2021 VIRTUAL



Abstract Book

## **Committee of Scientific Advisors Abstracts**

## CSA-OC1

**BIOMARKERS OF BONE FRAGILITY IN PATIENTS WITH DIABETES**C. Meier<sup>1</sup><sup>1</sup>Division of Endocrinology, Diabetes and Metabolism, University Hospital Basel, Basel, Switzerland

In recent years fragility fractures have been recognized as an important complication of patients with type 1 and type 2 diabetes. The exact mechanisms accounting for bone fragility in diabetes are poorly understood. Determinants of reduced bone strength include micro- and macroarchitectural changes, cellular and molecular mechanisms, poor glycaemic control and presence of diabetes-related complications.

Cellular and molecular changes in diabetic bone disease include a state of low bone turnover, altered calcium and PTH metabolism with relative hypoparathyroidism, a decrease in enzymatic crosslinking and hyperglycaemia-induced accumulation of AGEs, alterations in osteocyte function with changes in protein levels (sclerostin, periostin), increase in pro-inflammatory cytokines (TNF, IL-6, IL-1) and markers of inflammation (CRP), dysregulation of adipokines (adiponectin, leptin) and altered hormone levels (amylin, insulin, IGF-1, gonadal hormones).

Some of these biochemical markers are commercially available to be measured in serum or urine. They may be used to reflect diabetes-specific structural and/or material changes in bone properties and may be used for fracture risk assessment in patients with type 1 and type 2 diabetes.

This lecture will characterize cellular and molecular markers reflecting diabetic bone disease, review the interaction of these molecular markers in the pathogenesis of diabetic bone disease, discuss their potential use in clinical practice with specific focus on their analytical performance and evaluate whether these markers may be used as clinical tools to predict bone loss and fracture risk in patients with diabetes.

## CSA-OC2

**PATHOPHYSIOLOGY OF VASCULAR CALCIFICATION AND BONE LOSS: LINKED DISORDERS OF AGEING?**J. B. Cannata-Andía<sup>1</sup><sup>1</sup>Bone and Mineral Research Unit, Hospital Universitario Central de Asturias, Instituto de Investigación Sanitaria del Principado de Asturias (ISPA), Retic REDinREN-ISCIII, Oviedo, Spain

Vascular calcification, bone loss and increased fracture risk are current age-associated disorders frequently considered as “physiological” ageing. Clinical and experimental data suggest that vascular calcification and bone loss, beyond ageing, could be influenced by multiple factors that can promote, at the same time, vascular calcification and bone loss.

Vascular calcification is an active process of calcium and phosphate precipitation that involves the transition of the vascular smooth muscle cells (VSMCs) to osteoblast-like cells. If mineralization takes place, the clinical consequence in the large and medium-caliber arteries is an increased stiffness with negative impact on cardiovascular outcomes. The molecules involved in the change of the VSMC phenotype have been extensively studied, the evidence suggests there are driving factors that promote and/or inhibit vascular calcification.

Parathyroid hormone (PTH) plays a key role in bone metabolism and vascular calcification acting through several mechanisms which includes the regulation of the RANK/RANKL/OPG system, the Wnt/ $\beta$ -catenin pathway and the modulation of several factors, such as calcium, phosphorus, and vitamin D. The micro RNAs have been also implicated as they are regulators not only of skeletal related genes, but also of genes involved in cardiovascular complications, such as vascular calcification, left ventricle hypertrophy and myocardial fibrosis.

Important progress has been made in this field, however, the complete understanding of interactions between ageing, vascular calcification and bone loss still remains incomplete.

## CSA-OC3

## SCREENING FOR HIGH FRACTURE RISK IN PRIMARY CARE

E. V. McCloskey<sup>1</sup>

<sup>1</sup>Department of Oncology & Metabolism, Centre for Integrated research in Musculoskeletal Ageing, University of Sheffield, Sheffield, United Kingdom

The burden of long-term osteoporosis management falls on primary care in most healthcare systems. However, past and recent studies demonstrate a wide and stable treatment gap, most of which appears to be secondary to a lack of awareness of fracture risk. In most countries, screening is regarded as a public health measure for the purpose of identifying individuals who are likely to benefit from further investigations and/or treatment to reduce the risk of a disease or its complications. Well-established criteria for the development of a screening program have existed for over 50 years[1] and osteoporosis and its ensuing fractures fulfill many of these. For example, the condition should be a significant health burden, with a sufficiently large, identifiable target population to enable safe, clinically and cost-effective screening. Likewise, there is an obvious need for an established testing procedure and effective interventions to prevent the outcome of interest.

The effectiveness of screening programmes incorporating the FRAX fracture risk assessment tool has recently been evaluated in three large randomised, controlled studies[2-4]. Despite important differences in study design and approaches to intervention thresholds, two of the studies showed significant reductions in hip fractures[2, 3]. While the third study failed to show such an effect, a meta-analysis of all three studies showed a 20% reduction in hip fractures with smaller but significant reductions in major osteoporotic fractures and all osteoporotic fractures [4, 5]. The approaches, particularly that utilized in the SCOOP study in the UK is highly cost-effective or cost-saving[6, 7]. These studies support the proposal that screening for high fracture risk in primary care should strongly be considered for incorporation into many health care systems to reduce the burden of fractures, particularly hip fractures. The key remaining hurdles to overcome are engagement with primary care healthcare professionals, and the implementation of systems that facilitate and maintain the screening program.

## References

1. Wilson JMG, Jungner G (1968) Principles and practice of screening for disease. World Health Organization <https://apps.who.int/iris/handle/10665/37650>.
2. Shepstone L, Lenaghan E, Cooper C, et al. (2018) Screening in the community to reduce fractures in older women (SCOOP): a randomised controlled trial. *Lancet* 391:741-747
3. Rubin KH, Rothmann MJ, Holmberg T, et al. (2018) Effectiveness of a two-step population-based osteoporosis screening program using FRAX: the randomized Risk-stratified Osteoporosis Strategy Evaluation (ROSE) study. *Osteoporos Int* 29:567-578
4. Merlijn T, Swart KM, van Schoor NM, et al. (2019) The Effect of a Screening and Treatment Program for the Prevention of Fractures in Older Women: A Randomized Pragmatic Trial. *J Bone Miner Res* 34:1993-2000
5. Merlijn T, Swart KMA, van der Horst HE, Netelenbos JC, Elders PJM (2020) Fracture prevention by screening for high fracture risk: a systematic review and meta-analysis. *Osteoporos Int* 31:251-257
6. Soreskog E, Borgstrom F, Shepstone L, et al. (2020) Long-term cost-effectiveness of screening for fracture risk in a UK primary care setting: the SCOOP study. *Osteoporos Int* 31:1499-1506
7. Turner DA, Khioe RFS, Shepstone L, et al. (2018) The Cost-Effectiveness of Screening in the Community to Reduce Osteoporotic Fractures in Older Women in the UK: Economic Evaluation of the SCOOP Study. *J Bone Miner Res* 33:845-851



WORLD CONGRESS  
ON OSTEOPOROSIS,  
OSTEOARTHRITIS AND  
MUSCULOSKELETAL  
DISEASES



2021 VIRTUAL



Abstract Book

## **Non-Sponsored Symposia Abstracts**

## NSS1

**CANCER TREATMENT INDUCED OSTEOPOROSIS - REALLY IMPORTANT?**P. Hadji<sup>1</sup><sup>1</sup>Head of the Frankfurt Bone Health Center, Frankfurt, Germany

Osteoporosis is one of the most frequent diseases in postmenopausal women leading to an increased fracture risk due to the physiologic loss of the bone protective effects of estrogen. Hereby, several risk factors for fracture such as prevalent fracture, low BMD, age, family history, use of glucocorticoid use etc. have been identified. Additionally, the further reduction of endogenous estrogens with chemotherapy (CHT), GnRH-analoga or aromatase inhibitors (AI) continuously increases fracture risk. Breast cancer (BC) on the other hand is the most frequent cancer type in women. Recent reports indicated a continuous increased incidence while mortality, due to early diagnosis and treatment improvements is decreasing. Dependent on specific tumor characteristics, radiation, chemotherapy (CHT), antibody treatment as well as endocrine treatment has been introduced into the adjuvant clinical treatment setting.

Some but not all of this cancer specific treatments interfere with bone turnover leading to an accelerate bone loss referred to as cancer treatment induced bone loss (CTIBL). Whereas CHT leads to an unspecific increased of bone resorption, Aromatase inhibitor (AI) reduces residual serum endogenous estrogen level and is associated with a decrease of bone mineral density (BMD) and increased fracture risk. Independent of the type of AI administered, bone loss is 2-3 fold increased compared to healthy, age matched postmenopausal controls. Therefore several guidelines have emerged to help managing CTIBL in women with BC including strategies to identify and treat those at highest risk for fractures.

The lecture will summarize the current knowledge on CTIBL and fracturing risk and indicates current treatment guidelines and intervention options.

## NSS2

**INFLUENCE OF ADJUVANT BISPHOSPHONATES AND DENOSUMAB ON BREAST CANCER OUTCOMES**R. Coleman<sup>1</sup><sup>1</sup>Emeritus Professor of Medical Oncology, University of Sheffield, Sheffield, United Kingdom

The introduction of bone targeted treatments has transformed the clinical care of patients with bone metastases from solid tumours or myeloma bone disease. Additionally, bone targeted treatments can also modify the process of metastasis and in breast cancer have important effects on disease outcomes as well as on bone

health. The effects of adjuvant bisphosphonates in early breast cancer were demonstrated in a meta-analysis of individual patient data from all available randomized trials. In postmenopausal women, bisphosphonates (zoledronate or daily oral clodronate/ibandronate) prevented about 1 in 4 bone recurrences and 1 in 6 breast cancer deaths; no effects on disease outcomes could be identified in premenopausal women. Somewhat surprisingly, these effects could not be reproduced with denosumab. Current clinical guidelines in Europe and North America recommend adjuvant bisphosphonates for postmenopausal women with early breast cancer at intermediate to high risk of recurrence, while denosumab is reserved for fracture prevention in women at high risk for fracture but with a low likelihood of developing recurrent breast cancer.

Treatment benefit with adjuvant bisphosphonates depends on more than just the levels of reproductive hormones and rates of bone turnover. Biological characteristics of the underlying malignancy are also important. Biomarkers that can predict treatment efficacy more precisely are needed. One such biomarker MAF, a transcription factor involved in cell adhesion, migration and PTHrP signalling, appears to predict treatment benefit in the 80% of women with normal levels of MAF expression in primary breast tumours, irrespective of menopausal status. On the other hand, in the 20% with amplified levels of MAF, bisphosphonates appear to be harmful, increasing the dissemination of tumour cells to other organs and an excess rate of visceral metastases and breast cancer deaths.

## NSS3

**CONCEPTS IN THE SURGICAL TREATMENT OF SKELETAL METASTASES**A. Kurth<sup>1</sup><sup>1</sup>Department of Orthopedics and Trauma Surgery, Campus Kemperhof Community Clinics Middle Rhine, Koblenz, Major Teaching Hospital of the University of Mainz, Mainz, Germany

A large number malignancies metastasize primarily into the skeleton (lung, renal cell, thyroid cancer, prostate and breast cancer).

In recent years, the life expectancy of patients with neoplasia has improved significantly due to advances in the treatment. Metastasis to the skeleton typically involves multiple bones and causes pronounced pain and an increasing risk of pathologic fractures. The goal of the treatment of bone metastases is to prevent the progression of the osseous destruction and to achieve an improvement of the clinical symptoms.

If conservative treatment approaches for bone metastases fail, especially in case of increasing pain intensity and/or neurologic deficits, imminent instability due to fractures or demonstration of new fractures, surgical intervention is indicated, taking into account the issues of tumor biology, severe comorbidities, age and life expectancy. To date, surgical treatment of bone metastases

has followed the palliative approach and must aim at adequate pain control, prevention and healing of pathologic fractures and restoration of the patient's functional integrity. Curative treatment success cannot be expected except in very rare cases.

The presence of a pathological fracture and severe pain are key indications for surgery. In patients with impending fracture, management is more controversial. Among the aspects to be considered include the primary tumor and its biological behavior in bone, an assessment of the likely efficacy of available treatments and the comorbidities. Nowadays, there is a wide range of implants and procedures for stabilization and reconstruction of bone defects. "Safe, fast and simple" should be the chosen surgical procedure. For spinal metastases a number of proven surgical procedures with modern, sparing and minimally invasive techniques are available. The minimally invasive procedures in particular correlate with short hospital stays and subsequent follow-up treatment (e.g. radiotherapy) and with fewer postoperative complaints

**Impending pathological fracture:** It is never possible to accurately predict which metastatic lesions will eventually lead to fractures and require surgical treatment. Prophylactic stabilization of imminent pathological fractures is generally preferred, as the results of surgery prior to fracture are associated with fewer surgical complications, shorter hospital stay, and better functional recovery than with than post-fracture surgery.

**Keywords:** Pathologic fractures, surgical treatment, impending fractures, spinal metastases

## NSS4

### THE ASIA PACIFIC CONSORTIUM ON OSTEOPOROSIS – A BRIEF INTRODUCTION

M. Chandran<sup>1</sup>

<sup>1</sup>Director, Osteoporosis and Bone Metabolism Unit, Singapore General Hospital, Singapore, Singapore

The Asia Pacific Consortium on Osteoporosis (APCO) is comprised of 39 osteoporosis experts drawn from a diverse range of clinical settings, from low-, middle- and high-income countries and regions in the Asia-Pacific (AP). APCO aims to develop regionally relevant, pragmatic, and effective strategies for improving osteoporosis management and reducing rates of fragility fractures. APCO's mission is to engage with relevant stakeholders including health care providers, policy makers, and the public to help develop and implement country and region-specific programs for research, the prevention and treatment of osteoporosis and its complication of fragility fractures in the Asia Pacific. This multi-pronged approach will help to achieve APCO's vision which is to reduce the burden of osteoporosis and fragility fractures in the AP region. APCO was launched in May 2019 and its first project was to develop a Framework of clear and concise standards for

the screening, diagnosis, and management of osteoporosis that are pan AP in their reach. This symposium will introduce APCO to the audience. We will then describe the structured, comparative analysis that was undertaken of the extant 18 clinical practice guidelines for osteoporosis in the AP region and the Delphi method of consensus development that was used to develop the 16 Clinical Standards of Care in the APCO Framework. We will end with a description of how APCO plans to embed the Framework in the Asia Pacific through both a bottoms-up approach by engaging health care providers, and a top-down approach by engaging policymakers, payors, and governments.

## NSS5

### 5IQ: A NOVEL ANALYSIS OF EXTANT GUIDELINES

P. Mitchell<sup>1</sup>

<sup>1</sup>University of Notre Dame, Fremantle, Australia

A structured comparative analysis was undertaken of 18 osteoporosis clinical practice guidelines from Asia Pacific countries and regions with populations ranging from 4.8 million to 1.4 billion people, living in a broad spectrum of socio-economic circumstances. One-hundred data elements were extracted from each guideline relating to the following:

**Identification:** Statements regarding which individuals should be identified.

**Investigation:** Description of the types of investigations that should be undertaken.

**Information:** Description of the types of information that should be provided to the patient.

**Initiation:** Description of pharmacological interventions and falls prevention.

**Integration:** Statements on the need for integration between primary and secondary care.

**Quality:** Description of professional development, audit, and peer-review activities.

The 5IQ analysis confirmed previous anecdotal reports that existing guidelines were markedly heterogeneous in terms of their scope and recommendations. This heterogeneity was evident for guidance on risk factors, the use of biochemical markers, self-care information for patients, indications for osteoporosis treatment, use of fracture risk assessment tools, and protocols for monitoring treatment.

While all guidelines noted fragility fracture as a risk factor for subsequent fracture, only three guidelines referred to the importance of fracture liaison services. There was also minimal guidance on the need for development of long-term management plans.

A report on the 5IQ analysis was provided to APCO members to inform their participation in a Delphi process of consensus building and so laid the foundations for development of the APCO Framework clinical standards of care.

## NSS6

### THE DELPHI PROCESS: DEVELOPING CONSENSUS AMONGST EXPERTS FROM 19 COUNTRIES AND REGIONS

M. Chandran<sup>1</sup>

<sup>1</sup>Director, Osteoporosis and Bone Metabolism Unit, Singapore General Hospital, Singapore, Singapore

APCO's first successful project was the development of a Framework of Standards of Care for Osteoporosis in the Asia Pacific region. A four-round Delphi process- a structured approach which ensures that the opinions of participants are equally considered, was adopted to develop the Framework. 29 APCO members participated in one or more of the four rounds.

Round 1: Comprised of 32 questions, round 1 determined which aspects of osteoporosis care required clinical standards to be developed. Consensus was defined as a ranking of 'extremely important' or 'very important' by at least 75% of respondents.

Round 2: Members were asked to express their agreement (or not) with the wording of 16 draft standards. Consensus was defined as a ranking of 'strongly agree' or 'agree' by at least 75% of respondents. 3 of the 16 standards proved amenable to the further development of levels of attainment. These three standards were on a) identification of fragility fractures, b) investigation of vertebral fractures, and c) quality metrics to assess clinical adherence to guidelines.

Round 3: The wording of standards and levels of attainment was amended, based on the results of round 2. APCO members were invited to approve or not approve amendments. Consensus was defined as a 'yes' response to a proposed rewording by at least 75% of respondents.

Round 4: A fourth round was conducted to reword some of the standards for clarity and precision without changing their intent. 16 finely-tuned standards of care were developed at the end of the Delphi process.

## NSS7

### EMBEDDING THE FRAMEWORK IN THE ASIA PACIFIC. "BOTTOM UP" APPROACHES: ENGAGING HEALTH CARE PROVIDERS TO PROVIDE OPTIMAL OSTEOPOROSIS CARE THROUGH PEER-TO-PEER EDUCATION AND PATHFINDER AUDITS

G. Lyubomirsky<sup>1</sup>

<sup>1</sup>Healthy Bones Australia, APCO Executive Committee Member, Ultimo, Australia

To address the current variations in standard of care, APCO has created a Pan-Asia Pacific Framework (The Framework) of minimal clinical standards for the screening, diagnosis, and management of osteoporosis.

Successful implementation of the Framework is contingent on all APCO members being fully informed, ready, and able to engage their peers, hospitals, and other key stakeholders in their respective practice environments.

To improve clinical gaps with different stakeholders, educational modules with slides have been developed to align with the Clinical Standards of the Framework.

The modules and slides have been designed to be used by APCO members across multidisciplinary teams to improve the care of people with osteoporosis.

Additionally, APCO members will be invited to undertake selective "Pathfinder audits" in their hospitals to establish baseline levels of adherence to selected Clinical Standards. A Pilot Phase Audit Tool Kit will be developed under the guidance of an APCO steering committee by August /September 2021, with selected APCO Members starting implementation of the Pathfinder Audit soon after.

The Tool Kit will include:

- the key priority Clinical Standards to be assessed.
- local factors that affect national practices within a stakeholder group.
- A questionnaire to assess current practices with respect to the nominated Framework Clinical Standards.
- Project plan and a process guide.

Follow up audits will be conducted 12 months later to measure the impact of implementing the standards.



## NSS8

**BREAST CANCER AND OSTEOPOROSIS**L. Athanassiou<sup>1</sup><sup>1</sup>Department of Rheumatology, Asclepeion Hospital, Voula, Athens, Greece

Breast cancer may be accompanied by osteoporosis. Osteoporosis in the context of breast cancer may be associated with treatment, as breast cancer may be managed by aggressive chemotherapy and radiotherapy which can adversely affect bone metabolism or induce premature menopause. In postmenopausal women breast cancer and osteoporosis are common incidents which affect quality of life. Breast cancer and osteoporosis are both dependent on estrogens. Estrogens reduce fracture risk but they increase the risk of breast cancer. Estrogen treatment is therefore contraindicated in patients with a history of breast cancer. Selective estrogen receptor modifiers (SERMs) hold a great potential in the treatment of both breast cancer and osteoporosis, as they appear to decrease both fracture risk as they have an estrogen agonist effect on bone and breast cancer risk as they have an estrogen antagonist effect on breast tissue. Estrogen receptor antagonists are also used in breast cancer treatment and they appear to adversely affect bone metabolism and cause osteoporosis. As the prognosis of breast cancer improves over the years the relationship between breast cancer and breast cancer treatment and osteoporosis attains increasing interest for both the medical community and the patients themselves.

## NSS9

**PATHOPHYSIOLOGY OF OSTEOPOROSIS IN THE CONTEXT OF AROMATASE INHIBITOR TREATMENT**P. Athanassiou<sup>1</sup><sup>1</sup>Department of Rheumatology, St. Paul's Hospital, Thessaloniki, Greece

The use of aromatase inhibitors improves survival in breast cancer patients but adversely affects bone health. Aromatase inhibitors block estrogen production in peripheral tissues and the third generation aromatase inhibitors reduce circulating estrogen levels thus leading to accelerated bone loss and an increased fracture risk. Aromatase inhibitors act as aromatase inhibitors within the whole organism and they potently and effectively reduce endogenous estrogen levels in postmenopausal women. Most fractures appear to occur in women already osteopenic, in which aromatase inhibitor treatment was initiated. Current evidence on the beneficial effect of aromatase inhibitor use in breast cancer has increased their use and requires selection of patients for antiresorptive treatment and careful bone health management to reduce bone loss and prevent fragility fractures.

## NSS10

**MANAGEMENT OF OSTEOPOROSIS IN BREAST CANCER PATIENTS**Y. Dionyssiotis<sup>1</sup><sup>1</sup>1st Physical Medicine & Rehabilitation Department, National Rehabilitation Center EKA, Athens, Greece

Breast cancer continues to be the most commonly diagnosed cancer in women from the ancient years till today. Despite improvement in survival, it is still a major cause of cancer related death. Adjuvant treatment of breast cancer is generally advocated and increases survival. Aromatase inhibitor treatment increases disease free survival and reduces recurrence. Patients should be actively screened for bone health on treatment initiation with aromatase inhibitors. Calcium and vitamin D should be used in all patients. Additionally, oral bisphosphonates, denosumab or zoledronic acid should be used concurrently with aromatase inhibitors to improve bone health and reduce fractures for the whole length of aromatase inhibitor treatment in women with osteoporosis or at increased risk for the development of the disease. Zoledronic acid 4 mg iv every 6 months may be used and is a well-tolerated option for the prevention of osteoporosis and bone health improvement in female patients on treatment with aromatase inhibitors.

## NSS11

**AROMATASE INHIBITOR TREATMENT AND OSTEOPOROSIS**I. Kostoglou-Athanassiou<sup>1</sup><sup>1</sup>Department of Endocrinology, Asclepeion Hospital, Voula, Athens, Greece

Aromatase inhibitors are effective as adjuvant therapy for breast cancer. They are used as adjuvant treatment for postmenopausal women with estrogen-receptor-positive early breast cancer. Aromatase inhibitors induce osteoporosis and arthralgias. An increased risk of bone fractures has been reported in patient with breast cancer on treatment with aromatase inhibitors. Patients on treatment with aromatase inhibitors who develop osteoporosis are at increased risk for musculoskeletal symptoms and bone fractures. The use of calcium supplementation and bisphosphonates reduces the risk of osteoporosis and musculoskeletal symptoms. Patients who received tamoxifen before the initiation of aromatase inhibitor treatment may be less likely to develop aromatase inhibitor related musculoskeletal symptoms. Monitoring and management of bone loss associated with the use of aromatase inhibitor treatment in breast cancer is essential and may improve quality of life in breast cancer patients.

## NSS12

**EXTRACELLULAR VESICLES IN MUSCULOSKELETAL DISEASES**M. Hamrick<sup>1</sup>

<sup>1</sup>George G. Weiss Research Professor, Regents' Professor Senior Associate Dean for Research, Institute of Molecular Medicine & Genetics Augusta University (USA), Augusta, United States

Cell-cell communication plays an important role in the development and progression of numerous musculoskeletal disorders, including sarcopenia, osteoporosis, and osteoarthritis. Extracellular vesicles, including exosomes and microvesicles, are now recognized as key mediators of cell and tissue crosstalk via their cargo that includes various proteins, cytokines, and small non-coding RNAs. Exosome cargo loading, secretion, and uptake appear to be tightly regulated in normal and pathological settings. Aging, in particular, is associated with changes in exosome cargo, and exosome secretion is associated with senescence. The DNA damage and mitochondrial dysfunction that occur with aging lead to the release of exosomes that remove debris and other damaging factors. Therefore, these exosomes secreted from aged cells represent a component of the senescence-associated secretory phenotype (SASP) and are likely to have a "bystander effect" on other tissues and organs. In the case of muscle, bone and cartilage, the accumulation of extracellular vesicles from senescent cells and tissues can contribute to muscle atrophy, bone loss, and articular cartilage degeneration. Therapeutic strategies targeting cell senescence and mitochondrial dysfunction with aging may therefore promote and preserve musculoskeletal function by reducing the secretion of SASP-related extracellular vesicles.

## NSS13

**THE ROLE OF EXTRACELLULAR VESICLES IN THE PATHOPHYSIOLOGY AND TREATMENT OF OSTEOSARCOPENIA**G. Duque<sup>1</sup>

<sup>1</sup>Australian Institute for Musculoskeletal Science (AIMSS). The University of Melbourne and Western Health, Melbourne, Australia

Osteoporosis and sarcopenia are two of the most prevalent chronic diseases in older people, with both conditions sharing overlapping risk factors and pathogenesis. When occurring together, these diseases form a geriatric syndrome termed "osteosarcopenia," which increases the risk of adverse outcomes. Historically, the coupling between muscle and bone has been viewed in light of mechanotransduction, which dictates that the mechanical forces applied to muscle are transmitted to the skeleton to initiate bone formation. However, these organs also communicate through a complex bidirectional communication, orchestrated by

a family of cytokines, namely myokines (derived from myocytes) and osteokines (derived from bone cells) and other important molecules such as microRNAs. Some of these molecules are transported via microvesicles and exosomes. Alterations in this transportation system play an important role in the pathogenesis of osteosarcopenia. In addition, targeting these extracellular vesicles (ECVs) could provide novel therapeutic approaches with dual effect on muscle and bone. In this session, current evidence on the role of the SCVs in the pathophysiology of osteosarcopenia will be reviewed, and their future therapeutic potential will be discussed.

## NSS14

**THERAPEUTIC APPLICATIONS OF MSC DERIVED EXTRACELLULAR VESICLES IN OSTEOARTHRITIS**S. Graessel<sup>1</sup>

<sup>1</sup>Department of Orthopaedic Surgery, Experimental Orthopaedics, Centre for Medical Biotechnology (ZMB/Biopark 1), University of Regensburg, Regensburg, Germany

Osteoarthritis (OA) is a leading cause of disability and a source of societal cost in older adults. It is a whole-joint disease in which all components of the joint are affected, involving structural alterations in the articular cartilage with additional abnormalities in subchondral bone, ligaments, and synovium. OA finally leads to the dysfunction of the whole joint. Despite centuries of research, there is still no general disease-modifying or regenerative treatment available, halting or reversing joint tissue dysfunction and destruction. Mesenchymal stromal cell (MSC) derived small extracellular vesicles (EVs), i.e., exosomes, could qualify as novel cell-free therapeutic tools to combat OA pathogenesis. It has been shown, that MSC-EVs could attenuate OA by stimulation of chondrocyte migration and proliferation. In addition, MSC-EVs could protect cartilage and bone from degradation during OA pathogenesis by increasing the expression of anabolic chondrocyte markers, reducing catabolic enzymes, and decreasing inflammatory markers, protecting chondrocytes from apoptosis, and blocking macrophage activation. Overall, EVs applied intra-articularly to treat cartilage pathology in knee OA had pleiotropic and mostly positive effects. Pre-clinical in vivo studies in rat, mouse and rabbit OA models resulted in positive effects on the joints and supported the effectiveness of EV intra-articular injections as a minimally invasive therapy.

## NSS15

## CAPACITY OF SARC-F TO FIND PROBABLE SARCOPENIA CASES

G. Bahat<sup>1</sup>

<sup>1</sup>Istanbul University, Istanbul Medical School, Department of Internal Medicine, Capa, 34390, Istanbul, Turkey

**Objective(s):** In 2018 EWGSOP2 has suggested low muscle strength as the primary parameter of sarcopenia. The consensus has recommended SARC-F questionnaire as a screening test to find cases with low muscle strength, which has been designated as probable sarcopenia. We aimed to study the ability of SARC-F to find probable sarcopenia cases in older patients.

**Material and Methods:** Retrospective, cross-sectional. Setting: University hospital, outpatient geriatrics clinic. Participants: A total of 456 older adults (71.1% female, mean age: 74.6±6.6 years)

Measurements: We diagnosed probable sarcopenia by EWGSOP 2 criteria, i.e., presence of low handgrip strength (HGS). SARC-F questionnaire was performed by all participants. We used a receiver operating characteristics curve to obtain SARC-F cut-off values to detect probable sarcopenia and calculated the area under the curve and 95% confidence interval (CI).

**Results:** We included 456 participants (71.1% female; mean age: 74.6 ± 6.6 years). Probable sarcopenia was present in 58 (12.7%). SARC-F cut-off ≥ 2 presented the best balance between sensitivity and specificity (sensitivity: 64.9% vs specificity: 67.9%) to detect probable sarcopenia [the area under the receiver operating characteristics curve (AUC) = 0.710; 95% CI: 0.66–0.752, p< 0.001]. SARC-F with a cut-off point ≥ 1 had sensitivity 84.2% and specificity 40.5%, and SARC-F ≥ 4 had high specificity 88.2% with 40.3% sensitivity.

**Conclusion(s):** SARC-F is a good screening tool for probable sarcopenia in practice. Our findings suggest SARC-F ≥ 1 cut-off point to be used as the probable sarcopenia screening tool regarding its high sensitivity. Consequently, SARC-F ≥ 4 cut-off is better to be used if one prefers to exclude probable sarcopenia.

## NSS16

## DETECTING FRAILTY BY SARC-F QUESTIONNAIRE

S. Ozkok<sup>1</sup>

<sup>1</sup>Istanbul University, Istanbul Medical School, Department of Internal Medicine, Capa, 34390, Istanbul, Turkey

**Objective(s):** The physical phenotype of frailty, described by Fried et al., shows significant

overlap with sarcopenia. EWGSOP2 recommends the SARC-F questionnaire to screen for sarcopenia. Considering common features between both conditions, we aimed to investigate whether the SARC-F questionnaire could also be a valid and reliable tool to screen or evaluate frailty.

**Material and Methods:** Design: Retrospective, cross-sectional. Setting: Istanbul University Istanbul Faculty of Medicine. Participants: A total of 447 older adults (70.7% female, mean age: 74.5±6.6 years). Measurements: Frailty was assessed by the modified Fried scale. SARC-F questionnaire was performed by all participants. We used a receiver operating characteristics curve to obtain SARC-F cut-off values to detect frailty, and calculated the area under the curve and 95% confidence interval.

**Results:** There were 93 (20.8%) older adults with frailty according to the modified Fried scale. SARC-F cut-off ≥1 had 91.4% sensitivity and 44.9% specificity. SARC-F cut-off ≥2 presented the best balance between sensitivity and specificity (sensitivity: 74.1% vs. specificity: 73.7%) to identify frailty (area under curve: 0.807; 95% confidence interval: 0.76-0.84, p<0.001). SARC-F ≥4 had high specificity of 92.6% with a sensitivity of 46.2%. **Conclusion(s):** We suggest that SARC-F ≥1 point can be used to screen for frailty with high sensitivity, and SARC-F ≥4 can be used to diagnose frailty with high specificity. SARC-F may be used to evaluate frailty in usual geriatric practice.

## NSS17

## THE COMPARISON OF SARC-F WITH OTHER SCREENING TOOLS FOR SARCOPENIA

K. Piotrowicz<sup>1</sup>, J. Gąsowski<sup>1</sup>

<sup>1</sup>Department of Internal Medicine and Gerontology, Faculty of Medicine, Jagiellonian University Medical College, Krakow, Poland

**Objective(s):** SARC-F<sup>1</sup> is recommended by the European Working Group on Sarcopenia in Older People (EWGSOP2) for sarcopenia case finding<sup>2</sup>. A number of other screening tools have been devised. We aim to present i) SARC-F in the context of other screening measures for sarcopenia, ii) their comparison to SARC-F in terms of the psychometric properties but also feasibility in different clinical scenarios.

**Material and Methods:** PubMed, EMBASE, Web of Science and Cochrane Library were searched for the SARC-F original papers and conference abstracts, and for the other screening measures for sarcopenia. The SARC-F national validation paper by Piotrowicz et al.<sup>3</sup> will serve as an anchor for the discussion of the topic.

**Results:** Eleven screening methods for sarcopenia case finding have been identified. We present their applicability in the various settings and different clinical conditions. This includes the COVID-19 pandemic and an emerging concept of acute sarcopenia due to SARS-CoV-2 infection.

**Conclusion(s):** As compared with other sarcopenia screening tools, SARC-F is more versatile, as it can be self-administered, assessed during a telephone interview, or used in subjects of varying body-build, or body-build affected by pathologies such as heart failure, liver failure, hypoalbuminemia.

**References (if applicable):**

1. Malmstrom TK, Morley JE. SARC-F: a simple questionnaire to rapidly diagnose sarcopenia. *J Am Med Dir Assoc.* 2013 Aug;14(8):531-2. doi: 10.1016/j.jamda.2013.05.018.
2. Cruz-Jentoft AJ, Bahat G, Bauer J, Boirie Y, Bruyère O, Cederholm T, Cooper C, Landi F, Rolland Y, Sayer AA, Schneider SM, Sieber CC, Topinkova E, Vandewoude M, Visser M, Zamboni M; Writing Group for the European Working Group on Sarcopenia in Older People 2 (EWGSOP2), and the Extended Group for EWGSOP2. Sarcopenia: revised European consensus on definition and diagnosis. *Age Ageing.* 2019 Jan 1;48(1):16-31. doi: 10.1093/ageing/afy169.
3. Piotrowicz K, Gluszczyńska A, Czesak J, Fedyk-Lukasik M, Klimek E, Sánchez-Rodríguez D, Skalska A, Gryglewska B, Grodzicki T, Gąsowski J. SARC-F as a case-finding tool for sarcopenia according to the EWGSOP2. National validation and comparison with other diagnostic standards. *Aging Clin Exp Res.* 2021 Jan 28. doi: 10.1007/s40520-020-01782-

## NSS18

### CHECK YOUR PAST, KNOW YOUR FUTURE

C. Avram<sup>1</sup>

<sup>1</sup>West University of Timisoara, Timisoara, Romania

Intra-articular crystals deposition (monosodium urate, calcium pyrophosphate dihydrate, calcium hydroxyapatite, and calcium oxalate) can cause acute and chronic inflammation and joint damage. Shedding of these crystals into the joint activate phagocytic cells that release proinflammatory cytokines, and cause leukocyte and mononuclear cell migration.

The most recognized crystalline arthritis is gout, caused by monosodium urate crystals. Genome-wide association studies have permitted the identification of several new and common genetic factors that contribute to hyperuricemia and gout. A study of more than 140000 European individuals, found significant associations of 28 separate genetic loci with serum urate levels. Most of these are involved with the renal urate transport system, generally considered the most influential regulator of serum urate homeostasis.

Calcium pyrophosphate crystals are related to a variety of articular manifestations known as calcium pyrophosphate deposition (CPPD) arthritis. Familial cases of CPPD arthritis appeared to be inherited in an autosomal dominant manner. The mechanisms responsible for the deposition of the CPPD crystals are not fully understood, although some studies have reported that structural changes in the extracellular matrix of the articular cartilage might

promote this process. In addition to extracellular matrix proteins as potential candidates for familial CPPD disease, other studies of a chondrocyte nucleoside triphosphate pyrophosphohydrolase have suggested that the biochemical pathway responsible for the generation of inorganic pyrophosphate may play a role in the crystal deposition. An important aspect of CPPD arthritis is its association with metabolic and endocrine disorders like hemochromatosis, hyperparathyroidism, and hypomagnesemia but the pathogenic mechanisms are not fully elucidated.

There are few reports of the deposition of hydroxyapatite and other basic calcium phosphate crystals as a heritable disorder in the medical literature, such as calcific periarthritis in multiple joints of identical twins and in relatives presenting with intervertebral disc calcification.

At present, there is reason to believe that population-based studies of susceptibility genes for the crystal arthropathies will contribute to our understanding of the complexity of inheritance of these disorders.

## NSS19

### GETTING WELL OR GETTING HELL

R. Ionescu<sup>1</sup>

<sup>1</sup>"Carol Davila" University of Medicine and Pharmacy, Bucharest, Romania

The main mineral constituents of bone are calcium and phosphorus, alongside magnesium, chloride, fluoride, citrate. The interaction between all these and the bone cells and matrix, results in the normal composition, physical and chemical properties, strength and complexity of bones. The somehow inevitable bone disease affecting humans is osteoporosis, a complex disease not completely and fully understood yet.

Uric acid, a normal constituent of blood plasma, (interestingly, its presence in blood is due to the suppression of an existing gene) has many roles in the human body. It can be, from a physiological point of view, a rather potent antioxidant, while when in excess, it can deposit as microcrystals in the synovium of joints producing an acute form of arthritis.

But, through its antioxidant properties, is uric acid, or any other crystal, for that matter, capable of influencing osteoporosis? The answer seems to be yes and my talk will try to raise your interest regarding this rather unexpected relation between crystals and bone modelling. Maybe, studying this connection as well, we will be able in the future to treat even better some of the factors that we do not take into account today in the management of a common rheumatological disease.



NSS20

**THE CHICKEN OR THE EGG: THE CAUSALITY DILEMMA**M. Bojinca<sup>1</sup><sup>1</sup>"Carol Davila" University of Medicine and Pharmacy, Bucharest, Romania

Osteoarthritis is the most common articular disorder and an important cause of disability. Osteoarthritis is classified as primary (idiopathic) and secondary to a large variety of diseases including crystal related arthropathies. The relation between osteoarthritis and crystal arthropathies is very complex: the osteoarthritic lesions are involved in the local formation and deposition of crystals and many patients (mainly elderly) considered to be affected by idiopathic osteoarthritis are exhibiting also crystal deposition features that are leading to reclassification as secondary osteoarthritis. A large amount of published data shows that crystals are very frequent in osteoarthritic synovial fluid and sometimes the presence of the crystals is associated to a more severe evolution. It is possible that in this moment we are seeing only the tip of the iceberg; maybe primary osteoarthritis is not as frequent as is considered nowadays and future research could reclassify an important part of primary osteoarthritis as crystal deposition arthropathies with secondary osteoarthritis features. Studying the connections between osteoarthritis and crystal related arthropathies is important for a better understanding of pathogenic mechanisms, early diagnosis and more effective treatments for both types of diseases.

NSS21

**LOOK INTO THE CRYSTAL BOWL**F. A. Vreju<sup>1</sup><sup>1</sup>UMF Craiova, Dep. of Rheumatology, Craiova, Romania

Crystal related arthropathies are nowadays a common problem in daily medical practice and not just incidental issues. Among the most frequent type of joint involvement, microcrystalline arthritis can sometimes be difficult to differentiate from other conditions, but also within the group itself. Periarticular crystal deposition is frequent, but clinical expression is usually poor and non-specific for one of the types of deposits. Thus, imaging methods and especially ultrasonography, have found their place in the diagnosis and monitoring of deposits in the joints and periarticular tissues. ACR/EULAR classification criteria for gout included ultrasound as an imaging method with impact to the final score and recently it gained an important role in calcium pyrophosphate dihydrate (CPPD), as the OMERACT published US definitions and demonstrated their reliability in an extended set of joints. At the same

time, US demonstrated to be an accurate tool for discriminating CPPD at the level of the knee, as compared to the biopsy as a golden standard.

NSS22

**ARE HEALTH PROFESSIONALS VULNERABLE TO WORK-RELATED MUSCULOSKELETAL DISORDERS**Y. Gokce Kutsal<sup>1</sup><sup>1</sup>Hacettepe University Faculty of Medicine Dept of PMR, Ankara, Turkey

**Introduction-**Work-related musculoskeletal disorders (MSDs) are a group of disorders confined basically to muscles, tendons, ligaments, nerves, joints, and bones and occur in relation to occupational activities. These disorders are reported to be common in health professionals and affect their quality of life. Carpal tunnel syndrome, tendinitis, degenerative spine disease, thoracic outlet syndrome, and strained neck syndrome are common in health workers. These problems often arise due to non-neutral postures, unsuitable instruments, non-ergonomic working conditions. In addition, repetitive challenging activities are common risk factors.

**Medical students-** MSDs can begin in medical students at even educational stage, especially during laboratory studies. Researches showed that the most common sites of problems are; lower back, neck and upper back. Lower back, neck and upper back prevented daily activities in the majority of cases. Strategies are suggested to address ergonomic and postural training, as part of university curriculums, including the identification of problems for early intervention to facilitate sustainable workforces.

**Health professionals-**Work-related MSDs were found to be relatively highly prevalent among health care and hospital workers in general and nurses in particular. Both disorders were reported to be largely work-related and stress-related. Moreover, they were found to be a result of both psychological stress and physical strain from work.

**Surgeons-**Compared with disease estimates in the general population, surgeons have a higher prevalence of MSDs. Surgeons, hospital administrations, surgical material designers, and health insurance schemes have a role to play in taking action to protect surgeons from this potential burden and occupational health hazard.

**Dentistry-**Professional practice and dental training have many risk factors, and the dental team should be able to recognize these factors to protect themselves. The most common sites for MSDs are neck, lower back and shoulders. Women show a higher frequency of intense pain involving the cervical, lumbar, dorsal and wrist areas placing them at a higher risk of injury.

**Nurses-**Because of the specificity of their work tasks and the long duration of tasks in health institutions, nurses are quite vulnerable to various occupational risk factors. In addition to the physical risk factors connected to the work tasks, there are also

individual risk factors, related to each individual's susceptibility and organizational/psychosocial risk factors (although these occupational risk factors are often addressed separately), whose control is critical.

**During the pandemic-**Physicians and nurses can be considered to have MSDs because of: 1-the difficulties they experience, especially while using Personal Protective Equipment for Covid-19 in Intensive Care Unit/Settings. 2-the difficulties they experience by having to spend a long time at the computer to provide telemedicine services to the patients they monitor. Long and intensive studies leading up to these periods may have also caused MSDs.

**Conclusion-**Areas of action can be ergonomic equipment, training, and consulting for workplaces at home and ergonomic risk assessments. In cases where protection is not provided and early treatment is not performed, they can cause temporary or permanent work disability.

## NSS23

### NECK AND UPPER EXTREMITY DISORDERS AMONG HEALTH PROFESSIONALS

Y. Kirazlı<sup>1</sup>

<sup>1</sup>University of Ege, İzmir, Turkey

Occupational musculoskeletal disorders(MSD) pose a major risk to the physical and mental well-being of health professionals worldwide. The neck and upper extremity disorders account for more than 50% among them with the most common being degenerative cervical spine disease, rotator cuff pathology and carpal tunnel syndrome. The most researched occupational musculoskeletal disorders among health professionals are related to dentists, nurses, surgeons especially the neurosurgeons and otolaryngologists. "Inadequate" and extreme postures sustained for prolonged periods and their repetitiveness will contribute to this occurrence. This shows the need to develop occupational prevention. The negative influence of MSDs on health professionals' health and quality of life will directly influence their performance, but also indirectly influence the quality of care provided to patients.

Occupational health-related problems are still prevalent in current dentistry practice, despite changes in equipment and surgery design. The most common sites for MSDs are neck, lower back, and shoulders. Women showed a higher frequency of intense pain involving the cervical, lumbar, dorsal, and wrist areas. Female dentists are at higher risk of tendonitis.

Evidence shows that the key to reducing the risk of musculoskeletal problems in surgeons is in encouraging frequent intraoperative movements as well as better ergonomic postures. As for the ENT surgeons, the highest prevalence of neck and back pain were amongst otologists due to the frequent microscopic work requiring static postures, prolonged sitting and awkward bending. Such risks were also found in surgeons using microscopes for laryngeal work.

"Inadequate" and extreme postures causing a deviation of postural alignment, that are maintained and repeated daily for prolonged periods, such as bending/rotating the trunk and standing work increases the risk of MSDs in nurses.

#### Conclusion:

The introduction of the principles of ergonomics in practice is suggested by many researchers although this is not consistent with some studies, where more than half of the participants were aware of correct ergonomic posture, yet most of them reported MSDs of the back and neck being the most painful.

Job posture analysis and workplace analysis should be carried out.

Although most preventive strategies at the workplace are focused on ergonomic risk factors, improving the psychosocial work environment might have an impact on reducing MSDs as work-related psychosocial factors seem to be associated with MSD.

## NSS24

### OCCUPATIONAL BACK AND LOWER EXTREMITY PROBLEMS IN HEALTH PERSONNEL

A. A. Kucukdeveci<sup>1</sup>

<sup>1</sup>Ankara University, Medical Faculty, Department of Physical Medicine and Rehabilitation, Ankara, Turkey

One of the most common region, affected by work-related musculoskeletal hazards among health professionals is the lower back. Low back pain is prevalent among nurses, nursing aides, physiotherapists, surgeons, interventional physicians, dentists, ultrasound practitioners, occupational therapists and other allied health professionals. Risk factors are predominately physical in nature and includes working in awkward positions, working in the same position, bending or twisting, handling and transferring patients, lifting, performing tasks monotonously, performing repetitive tasks, working with a high number of patients, and a lack of rest breaks. Low back pain can be due to muscular and/or ligamentous strain/sprain, lumbar disc lesion with or without radiculopathy, myofascial pain, or facet joint dysfunction. Management includes the routine diagnostic procedures and therapeutic interventions for low back pain, including rest, orthosis, medication, local injection, physical therapy and exercises depending on the stage of the condition (acute vs chronic) as well as surgery if indicated. Preventive measures should focus on both the individual and the organization and include worksite evaluation, ergonomic risk assessment, ergonomic training and support, and work conditioning.

Lower extremity musculoskeletal problems, mainly affecting foot/ankle and knee, are fairly common within the nursing workforce. Personal factors such as older age (>40) and high BMI, as well as environmental factors such as psychological and physical job demands and physical isometric load (exposure to prolonged sitting and static posture, too much walking) are associated with

lower extremity problems. Multifaceted ergonomic training and intervention program can improve symptoms and functional outcomes.

#### References:

Epstein S, et al. Prevalence of Work-Related Musculoskeletal Disorders Among Surgeons and Interventionalists: A Systematic Review and Meta-analysis. *JAMA Surg.* 2018;153:e174947.

Anderson SP &, Oakman J. Allied Health Professionals and Work-Related Musculoskeletal Disorders: A Systematic Review. *Saf Health Work.* 2016;7:259-267.

Schröder C, et al. Intervertebral Disc Disease of the Lumbar Spine in Health Personnel with Occupational Exposure to Patient Handling-A Systematic Literature Review and Meta-Analysis. *Int J Environ Res Public Health.* 2020;17:4832.

Bernal D, et al. Work-related psychosocial risk factors and musculoskeletal disorders in hospital nurses and nursing aides: a systematic review and meta-analysis. *Int J Nurs Stud.* 2015;52:635-48.

Stolt M, et al. Lower extremity musculoskeletal disorders in nurses: A narrative literature review. *Scand J Public Health.* 2016;44:106-15

## NSS25

### IDENTIFICATION, RISK AND DIAGNOSIS: DO YOU BELIEVE IN TESTS ?

J. J. Carey<sup>1</sup>

<sup>1</sup>Consultant Physician in Medicine and Rheumatology, Clinical Lead in DXA, Fracture Liaison Services and Osteoporosis, Galway University Hospitals. Professor in Medicine, National University of Ireland Galway, Galway, Ireland

We are in the midst of an osteoporotic pandemic for decades, and global fragility fracture numbers continue to rise exponentially. Causal factors include the ageing of the world's population, while many people live with multiple competing or contributing co-morbidities, often in countries where skeletal health and the resources to manage it are not a priority. Fragility fracture associated morbidity, mortality and economic toll remain stubbornly high. Although the illness burden for major fractures are similar to stroke, MI or cancer, governments, health professionals and the public do not attach the same importance. Many tools can identify those at risk for fracture, or with osteoporosis today, perhaps too many. Sadly studies continue to show most people are neither diagnosed or managed for their underlying osteoporosis before or after they fracture, and effective assessment and management in practice remains poor. Novel strategies are required to address this pandemic, and 'flatten the curve' of fragility fractures. Many lessons have been learned from the COVID-19 pandemic over the past year which could help.

Historically fracture risk and prevention has been thought of and taught to be a multi-factorial process linked to individual patient risk factors such as low BMD, ageing and others. A more prudent approach for this pandemic considers these in aggregate, broken down into categories like innate patient factors such as age, gender and genetics, medical disorders and their treatments such as rheumatoid arthritis and corticosteroids, and societal issues such as government policy, priorities and resources including staffing, equipment and treatment. A strategic rearrangement such as this may have a more emphatic 'flattening of the curve' by communicating and implementing effective processes targeted at a patient level, a healthcare level and a government or regional level to prevent the disease for those without it, and a more sustainable way of living for those with it.

#### References:

Borgström F. Fragility fractures in Europe. *Arch Osteoporos* 2020; 15:59.

Chandran M. Development of the Asia Pacific Consortium on Osteoporosis Framework. *Osteoporos Int* 2021. PMID: 33502559.

Clark P. FRAX-based intervention and assessment thresholds in seven Latin American countries. *Osteoporos Int* 2018; 29(3): 707-15.

Maeda SS. Challenges and opportunities for quality densitometry in Latin America. *Arch Osteoporos* 2021; 16(1): 23.

Lewiecki EM. Osteoporotic fracture trends in a population of US managed care enrollees from 2007 to 2017. *Osteoporosis Int* 2020; 31:1299-1304.

Lewiecki EM. Core Principles of Fracture Prevention. *Osteoporosis Int* 2020; 31:2073-6.

Singer A. Burden of illness for osteoporotic fractures compared with other serious diseases. *Mayo Clin Proc* 2015; 90(1): 53-62.

Alanezi F. A comparative study on the strategies adopted by the United Kingdom, India, China, Italy and Saudi Arabia to contain the spread of the COVID-19 pandemic. *J Healthc Leadersh* 2020; 12:117-131.

Kaslow NJ. Flattening the emotional distress curve. *Am Psychol* 2020; 75(7):875-886.

NSS26

**TO MASK OR NOT TO MASK : PREVENTION OF OSTEOPOROTIC FRACTURES: LESSONS FROM THE COVID-19 PANDEMIC**J. L. A. Morales-Torres<sup>1</sup>

<sup>1</sup>Professor of Medicine, Universidad de Guanajuato at Leon (Ret.). Head of Osteoporosis Unit, Hospital Aranda de la Parra. Director at Morales Vargas Centro de Investigacion, Leon, Mexico

While it is increasingly evident that preventing secondary fractures can be a feasible and cost-effective task through active steps taken on those identified at higher risk, after suffering a fragility fracture; the burden in morbidity, mortality and resources needed for acute and chronic care, still will be significant. Patients with fragility fractures requiring attention in a hospital, may not be overwhelming in terms of space and resources needed – as the COVID-19 pandemic – but, as the population ages and the prevalence of osteoporosis grows, the tendency is clearly upwards. Are there realistic interventions to decrease the number or first fragility fracture (FFF) at the population level?

Since the early days of the COVID-19 pandemic, proposals to control its burden included ideas on accelerating preparedness on testing, personal protection and tools to help in medical decisions; on mitigation of the burden of social distancing; on the use of digital technologies, like Tele-Health and artificial intelligence to notify those at risk; on adaptations of legal, regulatory and support framework; on the need to invest and support innovators and on the need to improve communications on these topics<sup>1</sup>.

In the case of osteoporosis, some of these thoughts may help. We can improve preparedness by broadening the involvement of primary care physicians on detection with simple tools and, if possible, access to DXA. Well informed health professionals may increase awareness among general population on the disease and how to help it. Involvement of the community in identifying those at higher risk, through a broader use of digital technologies and artificial intelligence seems feasible, now that the community sees as normal, a number of intrusive activities. If the world wide web allows a number of entities to identify potential customers, it can certainly provide clues on identification of candidates to be tested. This will require reviews of the legal basis for some of the required actions. There is a need to create sources of funding to support innovators on the design of new approaches – beyond pharmacological developments - for the prevention of osteoporotic fractures and their burden. All of these ideas require a massive distribution through strong communication efforts.

The "SCOOP" study demonstrated that a systematic, community-based screening program of fracture risk in older women brought a significant improvement in terms of prevention of fractures<sup>2</sup>. A number of lifestyle changes may also have a positive impact in the community, with low cost<sup>3</sup>. These are only 2 of the many concepts that may find a way in our communication developments to decrease the burden of fragility fractures.

**References:**

Lesser R. Six steps to sustainably flatten the coronavirus curve. <https://fortune.com/2020/03/19/coronavirus-covid-19-flatten-curve-solution/>. Accessed on May 20, 2021.

Turner DA, Khioe RFS, Shepstone L, Lenaghan E, Cooper C, Gittos N, Harvey NC, Holland R, Howe A, McCloskey E, O'Neill TW, Torgerson D, Fordham R; SCOOP Study Team. The Cost-Effectiveness of Screening in the Community to Reduce Osteoporotic Fractures in Older Women in the UK: Economic Evaluation of the SCOOP Study. *J Bone Miner Res*. 2018; 33: 845-851. doi: 10.1002/jbmr.3381.

Coronado-Zarco R, Olascoaga-Gómez de León A, García-Lara A, Quinzanos-Fresnedo J, Nava-Bringas TI, Macías-Hernández SI. Nonpharmacological interventions for osteoporosis treatment: Systematic review of clinical practice guidelines. *Osteoporos Sarcopenia*. 2019; 5: 69-77. doi: 10.1016/j.afos.2019.09.005.

NSS27

**HOW AWARENESS COULD CHANGE A COMMON FATE?**B. Muzzi Camargos<sup>1</sup>

<sup>1</sup>CSA-IOF Member. Densitometry Unit Coordinator at Hospital Materdei. Vice President for Densitometry at Sociedade Mineira de Radiologia, Belo Horizonte, Brazil

When a patient accomplishes adherence of a certain treatment, it is expected that he or she will have a similar dose-response profile and a range of side effects too. It is a personal engagement taking risks to obtain benefits. When an institution establishes its goals, it engages into a plan. Like the Fracture Liaison Services (FLS) initiatives. It is so cost-effective and clever that it spreaded rapidly around the world, establishing treatment goals for post-fractured patients and medical teams. These services reduced the gap between clinical diagnostic and effective treatment use. They do a lot for post-fractured individuals. But not so much for pre-fractured patients. Should we also target densitometric osteoporosis? When the public administration defines their policies, they are engaging on their public strategy plan. But how do we improve engagement between diagnostic and treatment? Private and public sectors? Doctors and patients? The COVID pandemic brought changes into people's houses, changing their habits. And also changed societies initiatives. As virtual interaction became more needed; on-line initiatives reached a wider public. Live sessions peaked audience rates and gave visibility to many Societies. There were a world change from presential into virtual contact. Podcasts and other media resources ease content transmission and keep the audience close. Maybe apps and platforms will be the answer to keep contact with patients too. Smartphones could be used as reminders of daily intakes, exercises and nutrition. Technology could turn awareness into care, provided under the guidance of scientific societies. It could be the missing link between doctors and patients, diagnostic and treatment. Although it doesn't have a vaccine for osteoporosis,



the disease does not spread so fast. So, with logistic and technology we can achieve a proactive attitude against fragility fractures and flatten the osteoporosis curve.

#### References:

Barton DW, Piple AS, Smith CT, Moskal SA, Carmouche JJ. The Clinical Impact of Fracture Liaison Services: A Systematic Review - Geriatric Orthopaedic Surgery & Rehabilitation 12: 1-9.

Javaid, MK, Kyer, C, Mitchell, PJ, et al. Effective secondary fracture prevention: implementation of a global benchmarking of clinical quality using the IOF capture the fracture(r) best practice framework tool. Osteoporos Int. 2015;26(11):2573–2578.

Ruggiero, C, Zampi, E, Rinonapoli, G, et al. Fracture prevention service to bridge the osteoporosis care gap. Clin Interv Aging. 2015 June 25;10:1035–1042. doi:10.2147/CIA.S76695.

Solomon, DH, Patrick, AR, Schousboe, J, Losina, E. The potential economic benefits of improved postfracture care: a cost-effectiveness analysis of a fracture liaison service in the US Health-Care system. J Bone Miner Res. 2014;29(7):1667–1674.

#### NSS28

### OSTEOPOROSIS IN 2020+: FLATTENING THE CURVE OF FRAGILITY FRACTURES

B. Muzzi Camargos<sup>1</sup>

<sup>1</sup>CSA-IOF Member. Densitometry Unit Coordinator at Hospital Materdei. Vice President for Densitometry at Sociedade Mineira de Radiologia, Belo Horizonte, Brazil

SARS/COVID19 pandemic have literally spreaded several concepts that were already familiar on osteoporosis area since a long time. The concept of “bending the curve” has been traditionally applied to osteoporotic fractures. The fracture trending is upwards, boosted by behavioral changes brought during the pandemic. These same curves used to be downwards. When testing was more performed. The coronavirus PCR and SPINE/FEMUR DXA are tests that share similar variables like: timing, sampling and analysis. Even with the best technique in the world, we have to assume that none of the methods is perfect. But both are widely used and frequently misused as well. The interventions for COVID and Osteoporosis look alike too. Interventions are behavioral, pharmacological or both. If diagnosis comes from DXA or clinical fracture, treatment will address just a few patients. A small part of fractured adults accomplishes 1-year of post-fracture treatment. And when treatment is initiated, discontinuation is problem on real-life patients. Once we know where the gaps are, how could we improve healthcare after diagnosis? Should more effort be driven to pre-fractured prevention, post-fractured treatment or both? How could we shorten the gap between diagnosis and treatment?

#### NSS29

### INTRODUCTION - OVERVIEW OF FLS IN LATIN AMERICA

B. Muzzi Camargos<sup>1</sup>

<sup>1</sup>CSA-IOF Member. Densitometry Unit Coordinator at Hospital Materdei. Vice President for Densitometry at Sociedade Mineira de Radiologia, Belo Horizonte, Brazil

Although there are many different cultures, with some exceptions, public and private sectors do not act synergistically around Latin America. Maybe due this gap, FLS numbers are growing rapidly in the region. Good for patients but also good for those who are most financially impacted by the costs of fracture care: health-care reimbursement system. With a huge difference between public and private sector, osteoporosis care is improving in Latin America and the most fruitful initiative within the region in undoubtedly the FLS.

#### NSS30

### SITUATION OF THE FLS IN MEXICO: BARRIERS AND STRENGTHS

A. Olascoaga-Gómez de León<sup>1</sup>

<sup>1</sup>Jefe de Servicio de Rehabilitación de Columna y Clínica de Osteoporosis Instituto Nacional de Rehabilitación Luis Guillermo Ibarra Ibarra. IOF Capture the Fracture® FLS Menthor, Mexico, Mexico

The epidemiological transition process is inverting the population pyramid, with substantial growth in individuals over 65 years of age, and consequently osteoporosis is becoming more frequent every day. It is estimated that one in 12 Mexican women and one in 20 Mexican men over the age of 50 will suffer a hip fracture.

In Mexico, at the end of May 2021, 17 health institutions have either enrolled an FLS through the Capture The Fracture program or are at different stage of development and implementation of this care model, while other 17 are assessing its adoption, which consist of a precedent to avoid secondary fractures in this country.

In Mexico, the health care system is extremely complex, with different types of social security and with a very significant variability between hospitals, as well as the volume of patients it receives. Among the areas of opportunities in the implementation of an FLS are: the assessment of new fractures' risk, fall prevention programs, nutritional and educational recommendations in healthy aging, all of them focused on patients' recovery of functional capability and independence to regain their daily life activities. One of this main areas of opportunity consists in increa-

sing the identification of patients at risk and to offer effective treatment and follow-up. The key component is building quality improvement into FLS implementation so services can improve.

### NSS31

#### FLS IN PUBLIC AND PRIVATE SYSTEMS IN BRAZIL: TWO WORLDS AND A SINGLE OUTCOME

B. Stolnick<sup>1</sup>

<sup>1</sup>Chief of Bone Metabolic Diseases Department at Hospital Federal de Ipanema. Coordinator of Prevrefrat (Re-Fracture Prevention Program) at Hospital Federal de Ipanema, Rio de Janeiro, Brazil. IOF Capture the Fracture® FLS Menthor, Rio de Janeiro, Brazil

Although osteoporosis represents a major healthcare cost for public and private sectors, the secondary fracture prevention or Fracture Liaison Services (FLS) are not initiatives supported by the Ministry of Health nor the healthcare providers and operators in Brazil. Insurers and other private healthcare providers show increasing interest on FLS implementation as part of the portfolio of services. 42 FLS are registered on the Good Practice FLS Map, 28 from private institutions and 14 in public hospitals (03 are military hospitals). Brazil has 6 FLS Gold (2 public and 4 private), 8 Silver (5 public and 3 private) and 7 Bronze (1 public and 6 private). While the implementation and operation of two FLS in public hospitals depends mostly on its coordinator's entrepreneurship and effort, due to the restrictions of the public health sector. At the private sector, incentives and investments have been documented from private players, interested on FLS system.

These investments end up having a positive impact, mainly in the identification and recruitment of patients assignment of available therapeutic approach. The effectiveness of FLS motivates stakeholders to increase and save the resources provided to FLS.

Some private institutions have requested from their contracting parties, to incorporate primary prevention FLS management for higher-risk patients.

### NSS32

#### HOW FRACTURE LIAISON SERVICES (FLS) IMPACTED POST-FRACTURE OUTCOMES IN COLOMBIA?

A. Medina Orjuela<sup>1</sup>

<sup>1</sup>Internist-Endocrinologist at Hospital San José. Associate Professor at Fundación Universitaria de Ciencias de la Salud, Bogotá. Mentora Capture the Fracture IOF, Bogota, Colombia

To date, there are 18 FLS in Colombia, 4 of them are categorized as silver, 5 as bronze, 5 are prospects, and 4 are not registered in the IOF Capture the Fracture Good Practices Map, however, they are advanced in the process.

The Asociación Colombiana de Osteoporosis y Metabolismo Mineral (ACOMM) with the support of the IOF, has joined the initiative of "Capture the Fracture" (CTF) to build a national database and institutionalize FLS.

In Colombia, where 10 FLS carried out a registry of 1699 patients with osteoporotic fracture, older than 50 years, it was found that 39,1% had previous fragility fractures and 35,7% had a previous diagnosis of osteoporosis; of these, only 7% received anti-osteoporosis medication (anti-resorptives or anabolic therapy) and, after one year of establishing the FLS, 43 % received it post-fracture. The time to surgery was shorted (76% in the first five days from the admission to the emergency room) and the mortality in hip fracture patients was lower (8%) than reported in the literature (15% to 30%) in the first year after the fracture occurred. The prevalence for vertebral fracture of 19% was found higher than 14% reported in 2009 by the LAVOS study (Latin American Vertebral Osteoporosis Study), which included five countries: Argentina, Brazil, Colombia, Mexico and Puerto Rico.

The main barriers in our FLS are lack of recognition of osteoporosis as a preventable public health disease, lack of registration of fragility fractures, and lack of support from health institutions and the government policies.

The strengths of the FLS traduce into the implementation of the CTF strategies for FLS, in the case of Colombia, requires the support from a national entity as ACOMM and the participation of local leaders to provide viability to these projects with a multi-disciplinary group. These results from this first national register, show an increment in antiosteoporosis treatment with reductions in post-fracture mortality, which will impact on the costs of care and the quality of life of the patients. Additionally, it is expected to reduce the incidence of refractures in the long term.

Conclusion: Fracture prevention programs/FLS allow detect patients with fragility fractures, clinical characteristics of these, in addition to strengthen the conditions of a centralized national registry, based on the parameters of the IOF - CTF program through strategies with multidisciplinary staff to improve identification, evaluation, treatment and follow-up of patients who suffered an osteoporosis fracture.

NSS33

**CLOSING REMARKS - CONCLUSION**B. Muzzi Camargos<sup>1</sup>

<sup>1</sup>CSA-IOF Member. Densitometry Unit Coordinator at Hospital Materdei. Vice President for Densitometry at Sociedade Mineira de Radiologia, Belo Horizonte, Brazil

FLS is more than a program. It is an attitude that fulfills the health-care gap between a fracture and the patient's pharmacological management. Although it starts after a fracture, the range of its initiative goes a long way beyond lowering the risk of fracture with a drug. It represents an enhancement to cost-effectiveness on a scenario traditionally dragged by longer life-expectancy.

NSS34

**AUTOIMMUNE RHEUMATIC DISEASES AND OSTEOPOROSIS**P. Athanassiou<sup>1</sup>

<sup>1</sup>Department of Rheumatology, St. Paul's Hospital, Thessaloniki, Greece

Autoimmune rheumatic diseases may be accompanied by osteoporosis. In particular, rheumatoid arthritis is known to be accompanied by periarticular osteoporosis as well as systemic osteoporosis. Ankylosing spondylitis is known to be accompanied by osteoporosis. In particular, although in ankylosing spondylitis a bone forming process takes place, simultaneously bone resorption occurs. Bone resorption is so severe that it may cause osteoporotic fractures, which may affect the stability and function of the skeleton and cause disability. Systemic lupus erythematosus may also be accompanied by osteoporosis. Inflammatory bowel disease is also accompanied by osteoporosis as the disease is characterized by vitamin D deficiency, malabsorption of vitamins and minerals as well as severe systemic inflammation. The pathogenesis of osteoporosis in the context of autoimmune rheumatic diseases is due to the inflammatory nature of the disorders and the systemic circulation and effect of inflammatory cytokines as well as their periarticular effect. In addition, autoimmune rheumatic diseases are treated with various agents, including corticosteroids. Corticosteroids are known to induce osteoporosis. Thus, it appears that autoimmune rheumatic diseases may be accompanied by osteoporosis. Osteoporosis in this context is due both to the inflammatory milieu related to the circulation and local action of proinflammatory cytokines as well as to the treatment used for autoimmune rheumatic diseases such as corticosteroids.

NSS35

**AUTOIMMUNITY AND OSTEOPOROSIS**I. Kostoglou-Athanassiou<sup>1</sup>

<sup>1</sup>Department of Endocrinology, Asclepeion Hospital, Voula, Athens, Greece

Autoimmunity is a process in which the body forms antibodies against its own tissues and initiates mechanisms which affect and destroy its own organs. Autoimmune processes may be accompanied by systemic inflammation. During this process inflammatory cytokines are formed and circulate within the body. In addition, inflammatory cytokines are formed and affect periarticular tissues including bone tissue. Many of these inflammatory cytokines induce the formation of osteoclasts. The formation of osteoclasts may induce osteoporosis accelerating the process of bone resorption. In particular, tumor necrosis factor alpha (TNFα) induces osteoclastogenesis and facilitates the survival of mature osteoclasts. The osteoclastogenic effect of TNFα is expressed both with and without collaboration with RANKL. Thus, it appears that autoimmunity as a systemic process may be accompanied by effects on the bone such as osteopenia and osteoporosis.

NSS36

**BIOLOGIC AGENTS IN AUTOIMMUNE RHEUMATIC DISEASES AND BONE HEALTH**L. Athanassiou<sup>1</sup>

<sup>1</sup>Department of Rheumatology, Asclepeion Hospital, Voula, Athens, Greece

During the last years biologic agents have entered in the field of treatment of autoimmune rheumatic diseases. These diseases have a long course and are characterized in other cases of a rather benign course with flares and remissions, whereas in other cases by flares which lead to organ destruction and disability. Biologic agents have revolutionized the field of treatment of autoimmune rheumatic diseases. They may induce sustained remission thus averting and preventing long-term organ destruction. Thus, treatment of autoimmune rheumatic diseases with biologic agents may prevent the bone damaging effects of systemic inflammation and may prevent severe osteoporosis. However, patients with autoimmune rheumatic diseases should be evaluated for osteoporosis on initial examination and should be followed thereafter as far as their bone health is concerned.

NSS37

**MANAGEMENT OF OSTEOPOROSIS IN THE CONTEXT OF AUTOIMMUNE RHEUMATIC DISEASES**Y. Dionyssiotis<sup>1</sup><sup>1</sup>1st Physical Medicine & Rehabilitation Department, National Rehabilitation Center EKA, Athens, Greece

Autoimmune rheumatic diseases are characterized by a long course with flares and remissions. These diseases affect bone health. They may induce periarticular as well as systemic osteoporosis. Patients may also present with vitamin D deficiency, especially when they have a flare of their disease. Patients with autoimmune rheumatic diseases should be evaluated for osteoporosis upon initial presentation. They should also be followed up for osteoporosis in the course of their disease. All antiosteoporotic agents may be used for the treatment of osteoporosis in patients with autoimmune rheumatic diseases. However, the use of two biologic agents simultaneously should be carefully assessed and may be necessary to be avoided. In all patients vitamin D status should be evaluated and treated accordingly. In patients treated with corticosteroids, especially during first evaluation and treatment initiation, antiosteoporotic treatment should be administered, as corticosteroids have a rapid detrimental effect on the bone.

NSS38

**OSTEOPOROSIS: MYTHS AND REALITIES**J. F. Ramirez<sup>1</sup><sup>1</sup>Professor and Chairman Board of Directors Sanitas University Member National Academy of Medicine, Bogota D.C., Colombia

"Osteoporosis: myths and realities" aims to analyze in a scientific and serious way the phenomenon of bone loss, its result, osteoporosis and its serious consequence, fractures. For this, the editors called the most important Colombian scientists (and from Latin America and Spain) on the subject, and all generously supported the idea, contributed their work and bibliographic searches, with their experience and with their valuable concepts.

This work is not intended to be a teaching text. This is the authorship of many scientists in our country who dedicated much of their time to make this work a reality. To all of them our deep gratitude. Our appreciation for understanding that if we do not write we do not exist, we do not transcend. This book has the scientific endorsement of the National Academy of Medicine of Colombia and of all the scientific societies that in our country and in Latin America have to do with osteoporosis, 9 in total. The points that were considered key in separating the myth from reality in osteoporosis have been touched. From the history of the disease, its epidemiology, its pathophysiology and clinical presentation and in laboratory tests and images, to delving into the aspects of me-

dical and surgical treatment, without neglecting aspects as novel as bone mass in transgender patients, mental health in these patients and drug-economics issues that are crucial when making decisions in public health. Two chapters on the surgical management of the most frequent fragility fractures are included, given their impressive results in terms of recovery and rehabilitation.

NSS39

**OSTEOPOROSIS: AN ECONOMIC PERSPECTIVE**D. Rosseli<sup>1</sup><sup>1</sup>Doctor, Neurologist, Master degree in Farmacoeconomics Professor Pontifical Javeriana University Member National Academy of Medicine, Bogota, Colombia

In complex medical conditions like osteoporosis, the role of health economists goes far beyond estimating the costs of medications or the direct financial impact of its complications on the health system. As a social science, health economics deals with social values, one of them, of course, is money. But when confronted with pain or disability other perhaps more important value frameworks become a priority. In this chapter, through a scoping literature review we go through the different research designs that have been used to address these issues. The first few paragraphs point at why osteoporosis holds a high priority in health economics due to its growing prevalence, associated both with an ageing population and an increasing life expectancy of patients with chronic conditions, like diabetes or cancer, which are closely associated with bone metabolism. The complexity of health-related quality of life is discussed, and the issues that arise with the different scales used to quantify an inherently qualitative variable. Costs and cost analysis studies are abundant in the literature, and are surprisingly variable due to differences in the population considered, in the methods used to determine costs as well as in the type of costs considered. In whichever case, cost of illness studies in every country show the magnitude of the financial resources needed to prevent, treat or rehabilitate osteoporosis. Finally, cost-effectiveness studies have shown the importance of this approach in the clinical context, either in the design of clinical practice guidelines or the individual patient level decision-making.

NSS40

**OSTEOPOROSIS, EPIDEMIC OF THE 21ST CENTURY**D. Vasquez Awad<sup>1</sup><sup>1</sup>Doctor, Gynecologist, Epidemiologist Professor Pontifical Javeriana University Member National Academy of Medicine, Bogota, Colombia



"Osteoporosis: Myths and Realities" is the result of a long academic and clinical exercise carried out by the editors throughout more than 40 years of professional practice, treating patients with osteoporosis in the medical and surgical aspects. The title was born as a result of the amount of information that is released daily for consumption not only by professionals but also by the general public. This information is often of excellent quality, the product of serious, well-designed studies and in compliance with the methodological regulations that science has defined. But, you have to accept it, as many times the information is the product of poorly designed, poorly prepared and poorly focused studies. And, worst of all, that behaviors are taken or changed based on these studies without first having gone through a thorough analysis and a severe process of verification and analysis. We must also mention the series of beliefs within the population that are simply spread from voice to voice or through social networks without any control or verification.

This book was designed, written and comes to light in the midst of a serious health crisis such as the SARS Cov 2 virus pandemic. If we have learned anything in this difficult year, it is precisely that science, and science in particular medical, are riddled with myths. Of myths that are generated without an adequate scientific method, without the dikes and the conditions that a process as delicate as that of Medicine and the medical disposition must have, and then one falls into the "magical thinking" that does so much damage and more in these times of social networks, the immediacy of the messages and that lead to confusion of thought.

## NSS41

### THE STATE OF THE ART IN HYPOPHOSPHATASIA (HPP) DIAGNOSIS IN ADULTS AND CHILDREN

A. Khan<sup>1</sup>, E. Rush<sup>2</sup>, M. L. Brandi<sup>3</sup>

<sup>1</sup>Divisions of Endocrinology and Metabolism and Geriatrics, McMaster University, Hamilton, Canada, <sup>2</sup>Division of Clinical Genetics, Children's Mercy Kansas City; Department of Pediatrics, University of Missouri – Kansas City School of Medicine, Kansas City, United States, <sup>3</sup>Division of Endocrinology, University of Florence Medical School, Florence, Italy

#### Objectives

- 1) Review the current state in diagnosis of patients with HPP
- 2) Explore proposed diagnostic criteria for HPP in children and adults

Materials and Methods – meta-analysis was conducted for articles published since 2005 that discuss the diagnosis of HPP. Literature search noted 1311 studies reviewed as title and abstract, 655 reviewed in full text, and 221 studies further reviewed

as articles that discuss diagnostic criteria. Patient series of fewer than 10 patients were excluded. This resulted in a total of 22 series in adults and 25 series children and adolescents.

Results – For children with HPP, presence of pathogenic/likely pathogenic ALPL variant, elevation of natural substrates, decreased BMD/osteoporosis, and early non-traumatic loss of teeth were seen with frequency greater than 50%. Short stature, motor delay, impaired mobility, history of first-degree relative with HPP, genu valgum/varum, low muscle tone, chronic MSK pain, presence of rickets, vitamin B6-responsive seizures, craniosynostosis, and nephrocalcinosis were seen at a frequency less than 50%.

For adults with HPP, presence of pathogenic/likely pathogenic ALPL variant, elevation of natural substrates, decreased BMD/osteoporosis, chronic MSK pain, poorly healing fractures, history of a first-degree relative with HPP, and premature loss of secondary teeth were seen with a frequency at or greater than 50%. Recurrent metatarsal fractures, short stature, atypical femur fractures, history of premature loss of primary teeth, impaired mobility, osteomalacia, chondrocalcinosis/CPPD, genu valgum/varum, pseudofractures, and nephrocalcinosis were seen at a frequency less than 50%.

Conclusions – The presence or absence of specific findings related to HPP in children and adults in the literature allowed for identification of major and minor findings which we can integrate into diagnostic scoring system for more objective identification of patients with HPP.

Acknowledgments – an unrestricted educational grant from Alexion was forwarded to the IOF to support methodology and administrative costs for this international task force. The authors would like to acknowledge the support of the study methodologist Gordon Guyatt and his team Romina Brignardello Petersen, Linan Zeng, Liam Yao, Maryam Gahdimi, Ying Wang, and the members of the HPP International Working Group

#### Disclosures:

AK - has received research funding from Alexion Pharmaceuticals  
ETR has received research funding, consulting fees, and honoraria from Alexion Pharmaceuticals

MLB - has received consulting fees and honoraria from Alexion Pharmaceuticals

NSS42

### IMPROVING THE COMMUNICATION OF FRACTURE RISK - WHAT CAN WE LEARN FROM THE LITERATURE?

C. Beaudart<sup>1</sup>

<sup>1</sup>WHO Collaborating Center for Public Health aspects of musculoskeletal health and ageing, Division of Public Health, Epidemiology and Health Economics, University of Liège, Liège, Belgium

Effective communication of fracture risk between healthcare professionals and patients with osteoporosis is an important aspect of patient-centered care and shared decision-making. Appropriate communication of both health-related risks and benefits are essential to help patients make the best-informed health-related decisions regarding their treatment. The quality of fracture risk communication between patient and healthcare provider involves different factors such as the way the information is presented by clinicians or the capacity of the clinicians to modify language to the patient's needs. Equally important is the patient perspective which includes the relationship between clinicians and patients, how the information is understood by patients and the patients' perspective of their own health, their health literacy, their numeracy, their own emotions and experiences.

Through a scoping review conducted in August 2020 and including 68 papers, we identified general recommendations and guidelines for health risk communication which will be presented during this lecture. Healthcare professionals will be encouraged to apply these recommendations to their clinical practice. An ideal patient-centered approach to fracture risk communication should include individualization of the communication format based on the individual patient specific needs, confirmation by the patient that he/she understand their fracture risk and that he/she feel free to ask questions and express concerns. The development of visual aids to present fracture risk algorithms may also be useful to facilitate risk communication and understanding.

NSS43

### IMPROVING THE COMMUNICATION OF FRACTURE RISK - INSIGHTS FROM INTERVIEWS WITH PATIENTS AT RISK FOR FRACTURES (THE RICO STUDY)

M. Hilgsmann<sup>1</sup>

<sup>1</sup>Department of Health Services Research, Maastricht University, Maastricht, The Netherlands

We studied the use of visual aids to improve patient understanding of fracture risk, with the ultimate goal of to improve therapy initiation and adherence to therapy. To assess patients' preferences for framing fracture risk, we conducted qualitative interviews in

5 different centres across 4 countries worldwide (Belgium, the Netherlands, USA, and Japan). Four main fracture risk presentations were used to guide these interviews: verbal/written presentation of the risk percentage, coloured graphs, icon arrays, and comparison of risk with/without treatment. A total of 26 patients (mean age of 70.5 years) at risk for fractures participated in on-line individual interviews and were asked to critically reflect on these 4 fracture framing presentations and suggest alternatives for improvement and to rank their preferences. Through these interviews, patients underlined the importance of visual aids in support to oral communication between patients and healthcare professionals. Most patients (76.9%) preferred coloured graphs over other presentations. Most patients also reported that presenting both the risk of fracture with and without treatment would be more convincing to initiate a treatment. Participants also suggested that fracture risk framing should also be supported with additional data, such as the consequences of fractures, to reinforce their willingness to initiate treatment. Insights from these interviews will be used for the development of a larger survey which will assess preferences and wishes for framing fracture risk, as part of the RICO (Risk Communication on Osteoporosis) study which has been endorsed by the IOF EpiQOL working group.

NSS44

### FEASIBILITY OF IMPLEMENTING PHYSICAL ACTIVITY PROGRAMS IN HOSPITALIZED POSITIVE COVID-19 OLDER ADULTS

Y. Rolland<sup>1</sup>

<sup>1</sup>Gerontopole of Toulouse, University Hospital of Toulouse (CHU-Toulouse), Toulouse, France; UMR INSERM 1027, University of Toulouse III, Toulouse, France

**Background:** Nineteen percent of COVID-19 patients have been hospitalized and most of them were older adults. During covid-19, specific measures such as decreasing usual care (physical rehabilitation activities or social interactions in patient's room) have been implemented during hospitalization to protect the patient. However, these measures could accelerated risk factors of functional decline during hospitalization.

**Objective:** Evaluate the feasibility to implement an unsupervised validated physical activity (PA) program (MATCH) in a short-stay Covid-19 geriatric unit.

**Methods:** Our pilot study was realized during the covid-19 European 1st wave (March to April 2020). Hospitalized Anxiety and Depression (HAD) scale, Activities of Daily Living (ADL) score and functional capacities were assessed at hospital admission and discharge. Before discharge, self-satisfaction of the program was also recorded. A decisional tree including 3 validated tests (30 second chair test, balance with joint-feet and semi-tandem stance and, 4 meters comfortable walking test) was performed during the first days in order to prescribe one of the five unsupervised, specific and adapted MATCH program. This program, carried out

by the patients themselves and done every day, have been chosen as it seemed to limit healthcare professionals work overload and respect covid-19 public health restrictions.

**Results:** Forty-eight COVID-19 patients were hospitalized. Among this number, 11 patients (7 women;  $86.6 \pm 6.3$  yrs) were included in the MATCH intervention. MATCH intervention was feasible and implementable as: 1) it took only 15-20 minutes to complete the decisional tree; 2) staff found it easy to learn and to teach and 3) did not require specific materials. The intervention length was 9.3 days on average. We observed that MATCH was done 53% of the time (adherence: 26 to 80%) even if 36% of the participants presented some medical limitations. Moreover, 82% of patient were satisfied. ADL improved clinically (mean change: +0.4 points;  $p=0.05$ )

**Conclusion:** Implementing MATCH seems feasible in geriatric covid-19 unit, acceptable for professional team and patients and should be beneficial to improve or preserve ADL. Further research with larger sample size and control group are needed to confirm these results.

## NSS45

### REMOTE PHYSICAL ACTIVITY USING WEB TECHNOLOGY TO PREVENT ISOLATION-RELATED MOBILITY LOSS IN INDEPENDENT OLDER ADULTS: A SOLUTION DURING THE COVID-19 PANDEMIC? M. Aubertin-Leheudre<sup>1</sup>

<sup>1</sup>Centre de recherche, Institut universitaire de gériatrie de Montréal (IUGM), CIUSSS du Centre-Sud-de-l'Île-de-Montréal, Montreal, Canada; Département des Sciences de l'activité physique, Faculté des sciences, Université du Québec à Montréal, Montréal, Canada

**Background:** Physical inactivity lead to physical and functional declines. This state is exacerbated by COVID-19 lockdown. Gerontechnology could help older adults to become / remain active by allowing them to move at distance. Previous studies showed that gerontechnology intervention are effective and feasible in person. As more than 50% of seniors have connected technologies and used Internet daily, implementing remote physical activity could be a solution to maintain their health.

**Objective:** To assess the effects of remote physical activity interventions on physical performance among community-dwelling older adults.

**Methods:** Fifty-five older adults aged 60 years and over, living at home and previously sedentary completed a 12-weeks intervention (3 times/weeks) during the covid-19 1st wave. Participants were randomized into 2 groups: interactive (IG;  $n = 29$ ) or video (VG;  $n = 26$ ). The IG was trained in group by a kinesiologist, via Zoom© whereas the VG did the same sessions but individually with pre-recorded videos through a dedicated website. A decisional tree was used to determine the physical activity capacity to ensure safety and adequacy. Anthropometric characteristics,

functional capacities (balances, normal 3-meter TUG & normal 4-meter walking tests), muscle power (10-rep chair test), muscle endurance (30s chair test), quality of life and perceived health (EQ-5D), and level of physical activity (RAPA) were assessed pre- and post-intervention via Zoom or lime-survey software.

**Results:** The drop-out rate was higher in VG compared to IG (40% vs 10% respectively). The adherence to the intervention was similar in both group (session completed: >80%). Quality of life, functional capacities, muscle power and endurance improved in both groups ( $p < 0.05$ ). Physical activity level and perceived health improved only in IG group. The changes in muscle power and endurance were significantly greater for the IG group than the VG group.

**Conclusion:** Remote physical activity interventions appear to be effective to counteract physical decline among older adults. Nevertheless, the interactive modality seems to be more effective in increasing muscle parameters and generates greater retention. Before to address specific exercise recommendation, further studies examining the virtual/interactive sessions ratio are needed to evaluate the most effective.

## NSS46

### IMPACTS OF COVID-19 RESTRICTIONS ON FUNCTIONAL STATUS AND MOBILITY AMONG COMMUNITY-DWELLING PRE-DISABLED SENIORS: VIRTUAL PHYSICAL EXERCISES AT HOME, A SOLUTION? F. Buckinx<sup>1</sup>

<sup>1</sup>Centre de recherche, Institut universitaire de gériatrie de Montréal (IUGM), CIUSSS du Centre-Sud-de-l'Île-de-Montréal, Montreal, Canada; Département des Sciences de l'activité physique, Faculté des sciences, Université du Québec à Montréal, Montréal, Canada

<sup>1</sup>Centre de recherche, Institut universitaire de gériatrie de Montréal (IUGM), CIUSSS du Centre-Sud-de-l'Île-de-Montréal, Montreal, Canada; Département des Sciences de l'activité physique, Faculté des sciences, Université du Québec à Montréal, Montréal, Canada

**Background:** The COVID-19-related lockdowns have imposed sedentariness and limited seniors' mobility and engagement in physical activity. Unfortunately, this could precipitate or accelerate frailty or loss of functional capacities.

**Objective:** To assess if distance-training in physical exercises helps counteract the lockdown deleterious effects (sedentary and inactivity) in pre-disabled seniors.

**Methods:** This is a 12-month intervention study, which started in May 2020 among 84 pre-disabled seniors, previous participants of the Canadian "CEDECOMS" trial. **Intervention:** 12-week Physical Exercises (PE) program (1 hour/3-times/week) in kinesiologist-guided groups using Zoom (Web-Ex group,  $n=11$ ) or phone-supervised individual booklet-based home-program (CEDECOMS group,  $n=33$ ) vs Control (CONTR,  $n=40$ ). **Measures:** Adherence, self-reported satisfaction and acceptability of interventions;

Functional status in ADL (OARS Functional scale); Level of aerobic/strength/flexibility activities (RAPA); Basic Mobility (SPPB: balance, lower limbs strength, walking speed), Frailty (SOF index); Quality of Life (SF-12); and COVID-19 symptoms were assessed every 3 months.

**Results:** There were respectively 68%, 67% and 79% women in Web-Ex, CEDECOMS and CONTR groups, with mean ages being  $77 \pm 7$ ,  $80 \pm 6$  and  $70 \pm 7$  years. Preliminary pre- (T0) and post-(T3) intervention results are presented. **Adherence/satisfaction:** during the 12-week intervention, 7 participants dropped out: CEDECOMS: n=5(16%, including 1 COVID-19 positive); WEB-Ex: n=2 (18%). At week 12 of intervention, 56% (CEDECOMS) and 60 % (WEB-Ex) of participants were very satisfied with intervention. **Mobility:** between T0 and T3, RAPA scores increased by 2.7, 1.3 and 0.4 in Web-Ex, CEDECOMS, and CONTR, respectively. All groups improved their SPPB scores, Web-Ex: +1.7/12; CEDECOMS: +0.53/12; CONTR: +0.93/12. The 3-meter walking speed also improved, Web-Ex: -1.7 sec.; CEDECOMS: -0.5 sec.; CONTR: -0.9 sec. Based on SOF-scores, the percentage of robust seniors in Web-Ex doubled to 80%; increased from 34% to 57% in CEDECOMS, while remaining stable around 50% in CONTR. Baseline **functional ADL scores** were similar across groups, averaging  $13.8 \pm 0.6/14$  and remained stable over time. The SF-12 physical-function scores changes were + 13.1/100; -5.7/100 and + 6.0/100 in the Web-Ex, CEDECOMS and CONTR groups, respectively.

**Conclusion:** Distance training and monitoring of PE programs at Home during the lockdown seemed feasible and acceptable among pre-disabled seniors and seemed to improve their mobility and function, while allowing to maintain some social interactions.

## NSS47

### OSTEOSARCOPENIA AND NEURODISABILITY

Y. Dionyssiotis<sup>1</sup>

<sup>1</sup>MD, MSc, PhD, 1ST Physical Medicine and Rehabilitation Department, National Rehabilitation Center EKA, Athens, Greece

Sarcopenia and osteoporosis are very prevalent in disabled adults; however, the degree of disability due to osteosarcopenia syndrome is not yet known. Osteosarcopenia is a syndrome where bone mineral density loss is synchronic with decreased muscle mass, strength, and function, and may be preventable. It frequently occurs in patients after a central nervous system injury due to a combination of various factors, such as the injury, structural adaptations, limited physical activity and malnutrition. Some suggestions have been made concerning general treatment and management of osteosarcopenia, mainly in elderly able-bodied people, associated with exercise, diet and the use of medical preparations, lacking though disease-specific guidelines for management, treatment and possibly prevention of neurodisability-related osteosarcopenia. People with neurodisabilities need

a better and holistic management, to reduce morbidity and disability due to osteosarcopenia that both are sequelae that reduce quality of life.

## NSS48

### PHYSICAL ACTIVITY IN OSTEOPOROSIS AND SARCOPENIA MANAGEMENT AND REHABILITATION

M. Lissens<sup>1</sup>

<sup>1</sup>M.D., Ph.D., Thomas More University College, Geel, University Association K.U., Leuven, Belgium

Physical activity is an important factor influencing peak bone mass and muscle volume. A lack of physical activity is a major risk factor to develop osteoporosis and sarcopenia. Several studies showed significant associations between physical activity level, bone mass and muscle mass measures. This has its implications in rehabilitation medicine. In primary rehabilitation the aim is prevention of osteoporosis and sarcopenia, whereas in secondary rehabilitation treatment is the main goal. In tertiary rehabilitation emphasis is put on treatment of fractures and complications. The goal of an osteoporosis and sarcopenia rehabilitation program is to help the patient to return to the highest level of function and independence possible, while improving the overall quality of life, physically, emotionally, and socially. The focus of rehabilitation is to decrease pain, help prevent fractures, and minimize further bone and muscle loss. Therefore, rehabilitation programs may include the following: exercise programs and conditioning to increase weight bearing and physical fitness, pain management techniques, nutritional counselling, use of assistive devices to improve safety at home, patient, and family education, especially prevention of falls (90% of hip and wrist fractures are the result of a fall). Many skilled professionals are part of the multidisciplinary rehabilitation team, including the specialist in physical medicine and rehabilitation or physiatrist as coordinator. Physical activity can help osteoporosis and sarcopenia patients gain improvement in muscle strength and cardiovascular endurance, can prevent falls, and can reduce functional decline. Benefits from regular exercise include improved bone health, both psychological and cognitive benefits, and enhanced quality of life.



NSS49

**RAPID RISK ASSESSMENT OF OSTEOPOROSIS USING COST-EFFECTIVE METHODS – EVIDENCE FROM A CROSS SECTIONAL STUDY IN A SOUTH EASTERN EUROPEAN COUNTRY**K. Fatjona<sup>1</sup><sup>1</sup>Research Centre of Public Health Faculty of Health University of Vlore "Ismail Qemali", Vlore, Albania

Osteoporosis is defined as a "disease characterized by low bone mass and disrupted microarchitecture, leading to increased bone fragility and consequently increased risk of fracture." 1 in 3 women and 1 in 5 men over the age of 50 worldwide will experience a fracture due to osteoporosis. The purpose of this study was to assess the risk for osteoporosis using the International Osteoporosis Foundation (IOF) One-Minute Osteoporosis Risk Test. The study included people from the primary health service who went for basic health control in the city of Vlora, Albania. The results showed that attention to osteoporosis should be focused on men as it has always been thought that women are more prone to osteoporosis and osteoporotic fractures. Men were regular consumers of alcohol and tobacco,  $p=0.001$ . Also, the men in the study report that their parents had "dowager's" hump and report to be underweight,  $p=0.004$ . The IOF One-Minute Osteoporosis Risk Test resulted in an effective and easy method to use for the risk assessment of osteoporosis in low resource settings.

NSS50

**HEALTH BELIEFS, KNOWLEDGE AND BARRIERS OF WOMEN IN LOCAL POPULATION REGARDING OSTEOPOROSIS – A CROSS-SECTIONAL STUDY**S. Enkeleda<sup>1</sup><sup>1</sup>Department of Physiotherapy Faculty of Technical Medical Sciences University of Medicine, Tirana, Albania

The aim of the study was to assess women's knowledge and health beliefs about osteoporosis using the Osteoporosis Health Belief Scale in a local population. The cross-sectional study was carried out 1 month and included healthy women randomly selected. Mean age was  $44.5 \pm 14.93$  years. No statistical association was found between socio-demographic data and the items of osteoporosis scale. About 40% of women have a low perceived risk of developing osteoporosis, while as many say that the cost of calcium-rich foods is high. About 30% of women in the study are unaware that regular physical activity reduces the chances of fractures. A low level of self-efficacy was noted. Low health literacy was evident in relation to osteoporosis prevention. Designing a prevention model for osteoporosis based on the Health Belief Model is recommended.

NSS51

**AWARENESS FOR EARLY DETECTION OF OSTEOPOROSIS WHAT THE RESEARCH IN LOW RESOURCE SETTINGS SUGGESTS – EVIDENCE FROM A REVIEW STUDY**N. Vjollca<sup>1</sup><sup>1</sup>Department of Physiotherapy Faculty of Technical Medical Sciences University of Medicine, Tirana, Albania

Osteoporosis is a silent disease which lead to disability and lose of autonomy with health and social cost impact. The aim of this study was to review research studies performed in Albania in regard to risk factors, awareness, screening and prevention of osteoporosis. A systematic online search including databases available in English with no time limit was conducted for two months. The categorization was done based on the type of publication, full article or conference presentation, first author name, year of publication, method and results as well as the instrument used for the data collection. The results were very heterogenic. Full articles were focused in treatments, incidence and prevention. The majority of findings belong to conference presentations. The results highlighted that the published research for osteoporosis in Albania is very limited. More osteoporosis prevention and management research is needed. The address of this issue by researchers and healthcare professionals is recommended.

NSS52

**THE ROLE OF VITAMIN D IN PATIENTS WITH OSTEOPOROSIS-REVIEW**J. Jerina<sup>1</sup><sup>1</sup>Research Centre of Public Health Faculty of Health University of Vlore "Ismail Qemali", Vlore, Albania

Osteoporosis is a disease that weakens the bone by reducing the density of bone tissue over time. A variety of factors have been identified that are considered the potential for causing osteoporosis. It is very important to identify them as early as possible, to prevent or detect them at the stage of osteopenia. The goal of osteoporosis therapy is to reduce bone resorption and improve bone formation. Dietary supplements and vitamin D have provided a reduction in the risk of fracture and have their impact on preventing osteoporosis. The purpose of this literature review was to identify the role that vitamin D has, both in the prevention and treatment of osteoporosis. This study was conducted based on systematic research of the literature. The online search included full-text articles on sites of scientific publications such as Pub Med, Cochrane, and Google Scholar, and guidelines for systematic literature review were considered. After literature research, based on keywords and inclusive criteria, six articles were selected. Studies have identified the relationships among vitamin

D, bone mineral status, and risk of osteoporosis. Some of the studies showed that there are still some gaps regarding the unification of the recommended daily doses of vitamin D. On the other hand, there is still a need for increased information and awareness among health care workers and the community about the effects of vitamin D on osteoporosis. Inadequate serum vitamin D levels pose a serious risk factor for osteoporosis. Setting these levels in the normal, significantly improves the health of people with osteoporosis. Fortification of vitamin D of basic foods such as dairy products and flour increase serial concentrations of 25 (OH) D, reducing the risk of osteoporosis.

### NSS53

#### DEPRESSION AND OSTEOPOROSIS

I. Kostoglou-Athanassiou<sup>1</sup>

<sup>1</sup>Department of Endocrinology, Asclepeion Hospital, Voula, Athens, Greece

Depression is a form of severe and chronic stress. During chronic stress cortisol levels increase and 24-hour urinary cortisol levels increase. Cortisol levels adversely affect bone metabolism and may cause osteoporosis. Depression may also be accompanied by increasing levels of proinflammatory cytokines. Proinflammatory cytokines are known to affect osteoclastogenesis, thus increasing bone resorption and may cause a decrease in bone mineral density. Depression has been shown to be accompanied by an increased risk for low bone mineral density and fractures. The effect of depression on bone metabolism may be via the hypothalamic pituitary adrenal axis and via the sympathetic adrenal axis.

### NSS54

#### STRESS AND OSTEOPOROSIS

P. Athanassiou<sup>1</sup>

<sup>1</sup>Department of Rheumatology, St. Paul's Hospital, Thessaloniki, Greece

Chronic stress may cause an increase in cortisol levels. Cortisol levels when increased affect bone metabolism and may cause osteoporosis. In addition, stress is accompanied by increased levels of proinflammatory cytokines, including IL-6. Proinflammatory cytokines are known to affect bone metabolism as they increase osteoclastogenesis and may increase the survival of osteoclasts. In addition, there are other additional ways in which stress may affect bone metabolism. Stress induces alterations in eating, drinking, exercise and sleep habits which may lead to osteoporosis. Stress may bring about amenorrhea in the context of anorexia nervosa, which is also reported to adversely affect bone metabolism. Thus, it appears that chronic stress may be accompanied by a detrimental effect on bone metabolism.

### NSS55

#### ANTIDEPRESSIVE AGENTS AND OSTEOPOROSIS

L. Athanassiou<sup>1</sup>

<sup>1</sup>Department of Rheumatology, Asclepeion Hospital, Voula, Athens, Greece

Various studies have suggested an association between depression and osteoporosis. In an animal model, depression was shown to induce bone loss mediated by brain-to-bone sympathetic signaling. Depression may also increase the activity of the hypothalamic-pituitary-adrenal axis and increase cortisol levels thus adversely affecting bone metabolism. Selective serotonin reuptake inhibitors, the first line antidepressants have been shown to have adverse effects on bone metabolism. The skeletal serotonergic system consists of 5-HT receptors and the 5-HT transporter in osteoblasts and osteocytes. The 5-HT transporter is a transmembrane protein targeted by selective serotonin reuptake inhibitors. 5-HT restrains osteoblastic activity, thus leading to bone loss. Apparently, the negative skeletal effects of the peripheral selective serotonin reuptake inhibitors induced increase in 5-HT outweighs the skeletal benefits resulting from the enhanced central 5-HT antidepressant and antisympathetic activity. Overall, major depression appears as an important risk factor for osteoporosis. Antidepressants, mainly selective serotonin reuptake inhibitors, should be evaluated for their adverse skeletal effects.

### NSS56

#### MANAGEMENT OF OSTEOPOROSIS IN THE CONTEXT OF DEPRESSION

Y. Dionysiotis<sup>1</sup>

<sup>1</sup>1st Physical Medicine & Rehabilitation Department, National Rehabilitation Center EKA, Athens, Greece

Osteoporosis may be an effect of depression as well as the use of antidepressive agents, such as selective serotonin reuptake inhibitors used as first line treatment for this disorder. Depression may also be accompanied by low vitamin D levels, as low vitamin D levels increase the risk for the development of depression and depression may be accompanied by low vitamin D levels. All agents used for the treatment of osteoporosis may be used in the management of osteoporosis in the context of depression. Bisphosphonates, denosumab and bone forming agents may be applied in the treatment of osteoporosis in the context of depression. In addition, vitamin D supplementation should be used in such patients. In conclusion, patients with depressive disorders should undergo skeletal evaluation and receive prompt antiosteoporotic treatment, especially if on treatment with antidepressants.

NSS57

**INTERDISCIPLINARY APPROACH TO  
BIOMECHANICS IN CHRONIC MUSCULOSKELETAL  
PAIN**A. Barulin<sup>1</sup><sup>1</sup>Volgograd State Medical University, Volgograd, Russia

Chronic musculoskeletal pain definitely is a common problem in adult life. However, despite its high prevalence the nature chronic musculoskeletal pain is not yet well understanding. Its mechanism remains complex included biological, psychological and social factors. Some anatomical structures and their biomechanical characters are all suspects of forming the causes of the non-specific chronic pain. Researches are constantly attempting to search new approaches for understanding mechanism of chronic pain. Obviously, we need to exam the human biomechanical status deeply for create modern methods of treatment. This is especially important for patients with high risks (heavy physical work, static work postures and another).

NSS58

**PSYCHOSOMATICS AND COGNITIVE-  
BEHAVIORAL THERAPY IN THE TREATMENT OF  
CHRONIC MUSCULOSKELETAL PAIN**O. Kurushina<sup>1</sup><sup>1</sup>Volgograd State Medical University, Volgograd, Russia

Chronic musculoskeletal pain is a complex experience that cannot be unambiguously perceived by the patient and easily diagnosed by the doctor. It is one of the most striking examples of the role of psycho-emotional disorders in the formation of chronic pathological syndromes. The report will present the main pathogenetic mechanisms of chronic pain syndromes, the role of social status and models of doctor-patient interaction. Approaches to the treatment and prevention of chronic back pain will be demonstrated using cognitive-behavioral psychotherapy.

The proposed diagnostic and therapeutic algorithms may be useful to doctors of various specialties in the management of patients with chronic musculoskeletal diseases.

NSS59

**KINESIOTAPING IN THE CORRECTION OF  
MYOFASCIAL PAIN**B. Kalinchenko<sup>1</sup><sup>1</sup>Volgograd State Medical University, Volgograd, Russia

Pain, associated with damage to musculoskeletal structures is a common and urgent problem in modern medicine. The purpose of the report is to present the modern methods for diagnosing disorders of the biomechanics of the musculoskeletal system in patients with myofascial pain. The effectiveness and possibility of using the developed methods of visual diagnostics in neurological patients with myofascial pain syndrome will be presented. The report will present the possibilities of using the kinesio taping technique for myofascial pain. The report will consider the possibilities of non-pharmacological treatment including exercises, massage, manual therapy and others as the primary treatment for myofascial pain.

NSS60

**NON-PHARMACOLOGICAL TREATMENT IN  
CHRONIC MUSCULOSKELETAL PAIN**A. Drushlyakova<sup>1</sup><sup>1</sup>Volgograd State Medical University, Volgograd, Russia

Acceleration of the pace of life, urbanization, information overload, reduced physical activity, monotony, the need to perform work in extreme situations, social conflicts and other factors of scientific and technological progress contribute to the development and progression of changes in the locomotor sphere. Violation of the biomechanics of the body leads to the development of pathological myofascial relationships and the formation of musculoskeletal pain.

One of the methods of non-pharmacological correction of such manifestations is neuromotor retraining of the patient with the help of biofeedback.

NSS61

**MEDITERRANEAN DIET AND SARCOPENIA**E. M. Dennison<sup>1</sup><sup>1</sup>MRC Lifecourse Epidemiology Unit, Southampton, United Kingdom

Sarcopenia (the decline in muscle strength, mass and function with age) is associated with adverse health outcomes. The Mediterranean diet is characterized by high intake of whole grains, vegetables, fruits, fish, and nuts, moderate intake of alcohol and olive oil and low intake of red meat. Several of the constituents of such a diet may be protective against sarcopenia and frailty, in addition to preserving muscle mass and physical ability. Recent systematic reviews have investigated the relationship between adherence to a Mediterranean diet and musculoskeletal and functional outcomes including frailty in older adults, with researchers concluding that there does appear to be benefit for muscle outcomes when adopting this dietary pattern, from the data available. These observations have been underpinned by suggestions that modulation of inflammatory markers or telomere length may be important mediators of this association. When considering individual constituents of the Mediterranean diet, a higher intake of fruit and vegetables has been shown to be beneficial in observational studies, with higher intake of dairy solids also associated with better muscle health. Hence there is a growing consensus that there are indeed benefits of greater adherence to a Mediterranean diet, although researchers have concluded that further research is needed as much of the available data are observational in nature.

NSS62

**MEDITERRANEAN DIET, OSTEOPOROSIS AND FRACTURE**R. Rizzoli<sup>1</sup><sup>1</sup>Service of Bone Diseases Geneva University Hospitals and Faculty of Medicine, Geneva, Switzerland

A Mediterranean diet is high in fruits, vegetables, legumes, whole grains, fish and poultry, olive oil and dairy foods, in particular fermented dairy products. This diet provides fiber, fermented dairies and thereby bioactive food compounds such as polyphenols, prebiotics and probiotics. Changes in gut microbiota have been reported in subjects adherent to a Mediterranean diet. Each of these nutrients have been shown to have some beneficial effects on BMD and/or fracture risk, in addition to the well-recognized favourable influence on cardiovascular system. In a one-year randomized controlled trial, a Mediterranean diet increased BMD in the subjects with osteoporosis at baseline. In at least 4 cohort studies, adherence to Mediterranean diet was associated with a lower hip fracture risk. In a meta-analysis of these data, the re-

duction of fracture risk amounted to 21 % with adherence to a Mediterranean diet. For one unit increase in the Mediterranean diet score, on a scale of 0 to 7, a 5% reduction in the risk of hip fracture (RR 0.95, 95% CI 0.92-0.98) was found. Among diet patterns with some influence on bone health, the Mediterranean diet appears to exert the greatest positive impact on bone outcomes.

NSS63

**MEDITERRANEAN DIET IN OSTEOARTHRITIS AND OTHER INFLAMMATORY RHEUMATOLOGICAL DISEASES**N. Veronese<sup>1</sup><sup>1</sup>Geriatric Unit, Department of Internal Medicine and Geriatrics, University of Palermo, Palermo, Italy

Osteoarthritis and other inflammatory rheumatological diseases, such as rheumatoid arthritis, are very common in older people. It is recognized that nutrition may play a beneficial role in chronic diseases, supported by inflammation. For example, eating a diet high in trans and saturated fats can increase the onset of common risk factors for chronic comorbidities, including osteoarthritis, as well as exacerbate osteoarthritic symptoms and, finally, worse symptomatology in rheumatoid arthritis. The Mediterranean diet, characterized by a high intake in vegetables, fruits, beans, whole grains, olive oil and fish seem to be associated with reduction in inflammatory parameters in patients with rheumatoid arthritis and better outcomes in osteoarthritis. Some epidemiological studies, moreover, reported that higher adherence to Mediterranean diet is associated with a lower presence of osteoarthritis, probably for the anti-inflammatory of this healthy dietary pattern and a better architecture for knee cartilages.

NSS64

**THE BIOLOGY OF THE ACTIVE FORMS OF VITAMIN K**D. J. Harrington<sup>1,2</sup><sup>1</sup>Nutristasis Unit, Guy's and St. Thomas' NHS Foundation Trust, London, United Kingdom, <sup>2</sup>Faculty of Life Sciences and Medicine, King's College London, London, United Kingdom

Vitamin K is the name given to a class of fat-soluble homologues that confer biological activity on seventeen vitamin K-dependent proteins (VKDPs). Vitamin K achieves this by acting as an essential cofactor for the post-translational modification of specific glutamate residues (Glu) to  $\gamma$ -carboxyglutamate residues (Gla) distributed over a peptide sequence called the Gla domain.



VKDPs are divided into two groups—based on their tissue of origin. Seven VKDPs are predominately synthesised by the liver and possess 9-12 Gla residues. The hepatic proteins function as pro-coagulants (Factors II, VII, IX and X) and as natural anticoagulants (proteins C, S and Z). Osteocalcin (OC) and matrix Gla protein (MGP) are two examples of VKDPs synthesised by extra-hepatic tissue. They are important for bone and cardiovascular health. The functions of the other extra-hepatic VKDPs remain to be elucidated.

The daily dietary reference value for vitamin K is 1 µg/kg body weight, an intake regarded as adequate for coagulation but does not consider the biological roles of extra-hepatic VKDPs. In subjects with fully γ-carboxylated clotting factors, high circulating concentrations of undercarboxylated OC and MGP may be seen. The suggestion is that hepatic VKDPs may be preferentially γ-carboxylated compared with extrahepatic VKDPs, particularly in situations where vitamin K is scarce (the triage theory).

The most abundant form of dietary vitamin K is phylloquinone (K<sub>1</sub>) which is made almost exclusively by plants. The other dietary forms are members of the menaquinone series (K<sub>2</sub>) which, with the exception of menaquinone-4, are made by bacteria. These contribute to our daily dietary intake of vitamin K through dairy and meat products. The extent to which menaquinones produced by our gut microbiome contribute to vitamin K status is unquantified. Modifying the microbiome such that K<sub>2</sub> synthesis is increased may be a potential new arena to maintain the health benefits of vitamin K beyond coagulation.

## NSS65

### THE EFFECTS OF VITAMIN K ON BONE HEALTH

G. Hampson<sup>1</sup>

<sup>1</sup>Department of Clinical Chemistry and Metabolic Medicine Guy's and St Thomas' NHS foundation Trust, London, United Kingdom, London, United Kingdom

This talk will review the evidence linking vitamin K intake and status with fracture risk and parameters of bone health. Vitamin K may play a role in skeletal metabolism through the carboxylation of several vitamin K dependent proteins present in bone such as osteocalcin and matrix-gla protein.

Low dietary intake of vitamin K is associated with increased fracture risk, particularly in post-menopausal women and in the elderly. An inverse relationship between dietary vitamin K intake and fracture risk (highest vs. the lowest intake, RR=0.78, 95% CI: 0.56–0.99) has been reported in a meta-analysis of 80,000 participants. Higher serum vitamin K<sub>1</sub> concentration, used as a marker of vitamin K<sub>1</sub> intake, is associated with reduced fracture risk in post menopausal osteoporosis with adjusted odds ratio (95% CI) per µg/L increase in vitamin K<sub>1</sub> of 0.550 (0.310-0.978). The optimum intake of vitamin K needed to maximise its skeletal benefits however remains unclear. Data suggest that higher concentrations than for its coagulation effect may be needed.

Disappointingly, the effects of vitamin K on bone mineral density (BMD) have been inconsistent, although vitamin K may improve bone strength independently of BMD. Our recent study shows that serum vitamin K<sub>1</sub> is associated with parameters of hip geometry and mechanical strength and not with BMD. Intervention trials of vitamin K have yielded mixed results in part due to variability in study design, treatment duration, heterogeneity of the study population and treatment regimes. Nevertheless, when data from the trials were pooled in a meta-analysis, a 28% reduction in clinical fractures was seen. Whether these findings can be extrapolated to clinical practice remains uncertain.

As further evidence shows that vitamin K plays an important role in health aspects beyond coagulation, further well-designed studies are needed to better understand the impact of vitamin K either through dietary manipulation and/or supplements on bone health.

## NSS66

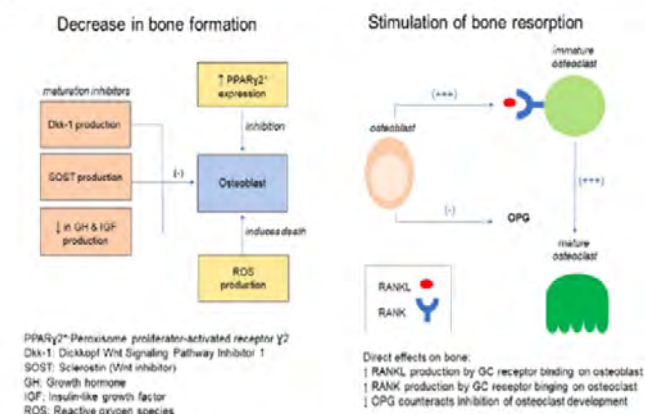
### EPIDEMIOLOGY AND PATHOGENESIS OF GIOP: NOVEL INSIGHTS

I. E. M. Bultink<sup>1</sup>

<sup>1</sup>Department of Rheumatology and Clinical Immunology, Amsterdam, The Netherlands

Glucocorticoids (GCs) are frequently used for the treatment of a variety of inflammatory and autoimmune diseases. A meta-analysis showed that 3% of the population aged 50 years or more have ever been treated with GCs, and this percentage increases to 5.2% among those aged 80 years and older. GC therapy induces bone loss and is associated with an increased risk for vertebral and nonvertebral fractures. Besides the adverse effect of GCs on bone mass, the underlying disease for which GCs are prescribed may also contribute to bone loss and fracture risk. The increased fracture risk during GC therapy is dose-dependent and is increased even with low doses of prednisolone (2.5–7.5 mg daily). Fracture risk increases within 30 days of initiation of GC therapy, which underlines the importance of prompt initiation of anti-osteoporotic therapy when prescribing GCs. In addition, fracture risk in glucocorticoid-induced osteoporosis (GIOP) also depends on cumulative GC dose: a cumulative GC dosage of ≥ 1000 mg is more strongly associated with fractures than smaller cumulative dosages. After discontinuation of GC therapy, fracture risk gradually decreases towards baseline. However, a residual increased risk remains, which might be related to the underlying disease for which GC therapy was initiated.

In recent years, more insight has been gained into the mechanisms involved in the development of GIOP (Figure 1). The direct effects of GCs on osteoblasts, osteoclasts and osteocytes and the central role of the Wnt signaling pathway and the Notch pathway in the pathogenesis of GIOP will be discussed. Furthermore, the indirect effects of GCs on muscle mass and muscle strength, calcium metabolism and bone mass will be illustrated.



## NSS67

## OPTIONS OF PHARMACOLOGICAL TREATMENT IN GLUCOCORTICOID INDUCED OSTEOPOROSIS

H. Raterman<sup>1</sup>

<sup>1</sup>MD, PhD, Rheumatologist Noordwest Ziekenhuisgroep, Department of Rheumatology, Alkmaar, The Netherlands

Glucocorticoids (GCs) are often indicated in patients with autoimmune and chronic inflammatory diseases. However, in long-term GC-users bone loss and fractures are among the most devastating side effects and chronic GC use increases fracture risk, particularly in patients with a severe underlying disease. Nowadays, GC induced osteoporosis (GIOP) is the most frequent cause of secondary osteoporosis. Moreover, most of the GIOP patients have an augmented background fracture risk as these patients also suffer from a high presence of traditional risk factors for osteoporosis.

In high-risk patients fracture riskmanagement should involve next to the general measures and calcium D intake, also initiation of bone acting drugs to preserve BMD and reduce the burden of GC use. In general, oral bisphosphonates (BPs) are the first choice, because of their efficacy and safety combined with the low cost of the drugs. In some patients alternatives ("second-line therapies") are needed: intravenously zoledronic acid, denosumab and teriparatide.

In this presentation first line and second line bone acting therapies for GIOP patients will be discussed.

## NSS68

## MODERN THERAPEUTIC APPROACH GIOP

W. F. Lems<sup>1</sup>

<sup>1</sup>Department of Rheumatology and Clinical Immunology, Amsterdam, The Netherlands

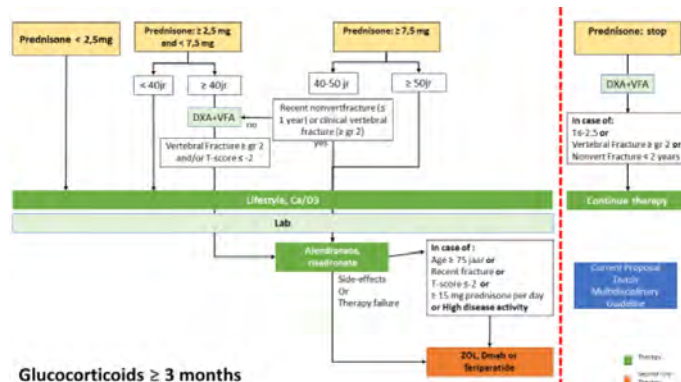
Long term glucocorticoid therapy is frequently indicated to treat autoimmune and chronic inflammatory diseases in daily clinical practice. Two of the most devastating untoward effects are bone loss and fractures. Doses of 7,5 mg of prednisone for more than 3 months can substantially impair bone integrity, and even longterm use of two dosages may induce bone loss. Population at risk is defined based on the dose and duration of GC therapy, and should be stratified according to FRAX, including age, major osteoporotic fractures, prior fractures and bone mineral density values. General measures include to prescribe the lowest GC dose to control the underlying disease for the shortest possible time, maintain adequate levels of vitamin D and calcium intake, maintain mobility and physical activity and prescribe a bone acting agent in patients at risk of fracture. These agents include oral and IV bisphosphonates, denosumab and teriparatide.

A new proposal for treatment will be discussed (see figure), based on:

-The fact that patients with glucocorticoids are undertreated with bisphosphonates. Therefore we advocate to start directly with bisphosphonates in patients starting with at least 7,5 mg with prednisone or more for at least three months, without doing a DXA/VFA (the DXA/VFA can be done later, for a baseline value)

- Another point is that second line drugs (Zol, Dmab and Teriparatide) have been superior to oral bisphosphonates. Therefore, we propose to start directly with second line drugs in high risk patients.

Finally the aim or learning tool of this non sponsored symposium is to update clinicians how to diagnose and treat GC induced osteoporosis, being the most frequent cause of secondary osteoporosis.



NSS69

**SWITCHING THE OSTEOCLAST BEHAVIOR DETERMINES THE BONE REMODELING**S. Y. Fukada<sup>1</sup>

<sup>1</sup>Professor of Pharmacology at the School of Pharmaceutical Sciences of Ribeirao Preto - Universidade de Sao Paulo, Sao Paulo, Brazil

Bone homeostasis relies on the tightly coordinated action of osteoblasts and osteoclasts, which perform the bone formation and resorption, respectively. After disruption of this regulated function, the bone resorption may become deleterious in pathological situations. The hyperactivity of osteoclasts leads to a reduction of bone mass and an increase in bone fragility. The osteoclastogenesis follows linked events that include hematopoietic progenitor cell proliferation, migration, and fusion. Mature multinucleated osteoclasts contain an abundant number of mitochondria and the resorption is a high energy demand process. The resorption behavior of osteoclast is liable to alternate between pits and trench resorption mode. The pit is characterized by round short-time excavation events separated by migration periods, whereas trench resorption mode is characterized by continuous resorption and movement. The trench mode appears to have clinical relevance as osteoporotic patients show a high prevalence of trenches. Although the mechanism whereby the osteoclast engages in this process is not fully clear, some pharmacological agents and age are able to alter the osteoclast resorption mode. Our recent data show that metabolic reprogramming of cells can also tune the osteoclast behavior dictating the bone resorption outcome. The knowledge of the mechanism underlying the switch of osteoclast behavior to more aggressive and higher resorption performances uncovers novel avenues for targeting excessive osteoclast activity in pathological bone destruction.

NSS70

**OSTEOCLAST ON: BONE FRAGILITY IN PRIMARY HYPERPARATHYROIDISM**F. Bandeira<sup>1</sup>

<sup>1</sup>Professor of Medicine and Chairman, Division of Endocrinology, University of Pernambuco Medical School. Recife, Brazil., Recife, Brazil

In asymptomatic primary hyperparathyroidism (PHPT), bone mineral density (BMD) reductions are seen mainly at the distal one-third radius, a site composed primarily of cortical bone, and this finding is confirmed by Micro-CT and histomorphometry analyses of bone biopsy specimens. Although BMD at trabecular sites is relatively preserved, other technologies such as trabecular bone score (TBS) and High Resolution peripheral Quantitative Computed Tomography (HRpQCT), show trabecular bone dete-

rioration. Lower TBS has also been associated with increased vertebral fracture risk in PHPT. In asymptomatic patients, while over half the subjects present with normal lumbar spine BMD, only 27 % of subjects has normal TBS values. In HRpQCT analysis, there are substantial decreases in volumetric density in both the cortical and trabecular compartments, thinner cortices, and more widely spaced and heterogeneously distributed trabeculae. Trabecular segmentation analysis of the HRpQCT images, in which the trabecular network is divided into individual plates and rods, shows that postmenopausal women with PHPT exhibit a trabecular network consisting of relatively fewer plate-like than rod-like trabeculae, less connectivity, and a less axially oriented trabecular network. Epidemiological data have demonstrated an increased fracture risk at both vertebral and non-vertebral sites in patients with PHPT. Normocalcemic primary hyperparathyroidism (NPHPT), characterized by persistently elevated serum PTH levels, normal serum calcium concentrations, and the absence of identifiable causes of secondary HPT, has been increasingly diagnosed. The high rate of fragility fractures reported in NPHPT may depend on the bias in selection as patients are typically referred for osteoporosis workup. Recent data on body composition, sarcopenia, and physical function (which may also contribute to bone fragility in PHPT) have found some impairment in both asymptomatic and normocalcemic patients. Improvements in bone turnover markers, BMD, and quality of life are observed after surgical cure of PHPT. The newer recommendations from the 2021 International Task Force on Diagnosis and Management of PHPT will be discussed.

SS71

**OSTEOCLASTS OFF: QUALITY OF BONE AND FRACTURE RISK IN THE HYPOPARATHYROIDISM**J. Borges<sup>1</sup>

<sup>1</sup>President of the Brazilian Society of Endocrinology and Metabolism chapter DF, Brasilia, Brazil

Hypoparathyroidism is an uncommon condition marked by hypocalcemia and low or nonexistent parathyroid hormone levels. The consequences of chronic hypoparathyroidism involve classic target organs of parathyroid hormone, namely the skeleton and the kidneys. In this presentation, I will focus on the abnormalities in bone quality that are associated with hypoparathyroidism. As assessed by several modalities, bone quality is compromised. The evidence for abnormal bone quality includes bone histomorphometry, bone material properties, and high-resolution peripheral computed tomography. These abnormalities include low bone turnover, altered skeletal microarchitecture, and bone material properties. How these abnormalities relate to fracture risk are under investigation. In patients with chronic hypoparathyroidism, bone mineral density is frequently normal or

higher than normal.

The use of peripheral quantitative computed tomography has provided more insight into the architectural foundation of the increase in bone mass seen in hypoparathyroidism (pQCT)). The volumetric bone mineral density (vBMD) and geometry of the distal and mid-radius were compared in postmenopausal women with postoperative or idiopathic hypoparathyroidism, primary hyperparathyroidism, and healthy controls.. The results showed that at the 4% distal radius site, which is enriched in cancellous bone, trabecular vBMD was higher in the patients with hypoparathyroidism, lower in controls, and lowest in patients with primary hyperparathyroidism.

The mechanism behind PTH activation of bone remodeling is intimately dependent on exposure of bone cells to parathyroid hormone levels. Sustained high PTH levels trigger catabolism, while transitory elevations induce anabolism.

Taken together, these findings imply that treating hypoparathyroidism patients with PTH lowers BMD and improves bone microarchitecture, resulting in increased bone strength.. These changes should also lead to reduced fracture risk, but prospective randomized controlled trials have not yet been conducted to demonstrate this.

## NSS72

### CLINIMETRIC PROPERTIES OF PATIENT-REPORTED OUTCOME MEASURES (PROM): WHICH METHODS FOR WHICH PURPOSE?

A. Geerinck<sup>1</sup>

<sup>1</sup>WHO Collaborating Centre for Public Health aspects of musculoskeletal health and ageing, Division of Public Health, Epidemiology and Health Economics, University of Liège, Liège, Belgium

Researchers that wish to investigate the clinimetric properties of a PROM to evaluate whether an instrument possesses adequate measurement properties in a specific context may find it challenging to determine how to design their validation study and how to measure the different measurement properties.

In this lecture, the Consensus-based Standards for the selection of health Measurement Instruments (COSMIN) taxonomy, methods and recommendations are presented within the practical context of the validation of a quality-of-life questionnaire.

This lecture will provide an overview of the evaluation of several essential clinimetric properties of a PROM. First, the validity of a PROM (*"Does it measure what it claims to measure?"*), detailing content, criterion, and construct validity. Secondly, the reliability of a PROM (*"How much uncertainty is there around the measured score?"*) going over test-retest reliability as well as inter- and intra-rater reliability, internal consistency, and measurement error. Lastly, the responsiveness of the PROM in question (*"can it detect change over time?"*) will be described.

This lecture will also provide an overview of the statistical test used to assess the clinimetric properties previously mentioned, including correlation analysis, the Cronbach's alpha value, factor analysis, the intraclass correlation coefficient, Cohen's kappa statistic, standard error of measurement and effect size.

Researchers and clinicians that care about the quality of their measurements and the strength of their conclusions should pay particular attention to the clinimetric properties of the instruments they use and validate them if required. This lecture should be of use to researchers and clinicians that wish to use an instrument in a population or language for which its measurement properties have not yet been evaluated, or that wish to understand how the reported measurement properties of an instrument were obtained.

## NSS73

### THE SARQOL® QUESTIONNAIRE – CLINIMETRIC PROPERTIES AND NOVEL APPLICATIONS

C. Beaudart<sup>1</sup>

<sup>1</sup>Department of Health Services Research University of Maastricht, Maastricht, The Netherlands

Quality of life is one of the rare indicators that translates the lived experience of a patient into a quantitative value that can be used in statistical analysis. Because of this important role in clinical trials and general research, it is important that a valid, reliable, and precise instrument is available, and that its content is pertinent to the target population.

The Sarcopenia quality of life (SarQoL) questionnaire was launched in 2015 and was designed to measure sarcopenia-related quality of life (QoL) in older, community-dwelling people with reduced muscle strength and function. It does so through 55 items covering 7 domains of QoL, namely physical and mental health, locomotion body composition, functionality, activities of daily living, leisure activities and fears.

Since its publication, 16 articles, representing more than 2800 participants, have reported on the measurement properties of the SarQoL questionnaire in 13 languages. In this lecture, an overview of the evidence for the questionnaire's known-groups validity, construct validity, internal consistency, test-retest reliability, standard error of measurement, smallest detectable change, and responsiveness to change will be presented.

Aside from its function as a patient-reported outcome measure for sarcopenia-related quality of life, some novel applications for the SarQoL questionnaire have been proposed recently. This lecture will feature the measurement properties and applicability of the SarQoL questionnaire as a QoL instrument in populations characterized by physical frailty as defined by the Fried criteria, as well as the performance of the SarQoL questionnaire as a screening instrument to detect sarcopenic subjects as diagnosed with the EWGSOP2 criteria.



The SarQoL questionnaire is currently the only PROM specifically designed to measure QoL in sarcopenia. There is growing evidence on its different measurement properties and its usefulness can extend beyond its main objective of measuring QoL in sarcopenia.

In this lecture, we describe a practical example of the methodology used to develop a short form instrument and the measurement properties of the newly developed SF-SarQoL. Because of its shorter length and reduced response burden, it is easier to administer and integrate into studies.

NSS74

### THE SHORT-FORM SARQOL® QUESTIONNAIRE – DEVELOPMENT AND VALIDATION OF A SHORT FORM MEASURE

A. Geerinck<sup>1</sup>

<sup>1</sup>WHO Collaborating Centre for Public Health aspects of musculoskeletal health and ageing, Division of Public Health, Epidemiology and Health Economics, University of Liège, Liège, Belgium

Quality of life is a complex, multi-faceted concept, and therefore instruments to measure it often use a significant number of items so as to adequately capture a person's subjective assessment of their own well-being. While a larger number of items can improve the measurement properties of an instrument, it also increases the response burden for the respondent and carries an opportunity cost for researchers.

This burden has created a strong demand for shorter instruments, but methods to reduce the number of items in a questionnaire while safeguarding its content and measurement properties are not well documented, and there is no consensus on a single methodology. Several guideline documents have aimed to improve this situation throughout the last 2 decades. In this lecture, a practical application of the recommendations put forward by these guidelines is presented.

In the development of the Short-Form SarQoL questionnaire, a 2-phase process was used. In the first phase, information on the impact of individual items was collected from older people, a Delphi method with experts was organized, and the available evidence on the measurement properties of the SarQoL questionnaire was summarized. In the second phase, an expert group decided on the inclusion and exclusion of items based on the information collected in phase 1. The newly developed SF-SarQoL is composed of 14 items from 6 out of the 7 domains of the original SarQoL questionnaire. Its measurement properties were subsequently investigated in 214 older, community-dwelling people. This study showed that the scores measured by the short and long form were highly related ( $ICC=0.835$ ) and that the SF-SarQoL can discriminate between sarcopenic and non-sarcopenic participants (diagnosed with EWGSOP2 criteria), is internally consistent ( $\alpha=0.915$ ) and reliable ( $ICC=0.912$ ). The structural validity was investigated through confirmatory factor analysis, with both a unidimensional and a 2-factor model fitted and evaluated.

WORLD CONGRESS  
ON OSTEOPOROSIS,  
OSTEOARTHRITIS AND  
MUSCULOSKELETAL  
DISEASES



2021 VIRTUAL



Abstract Book

## **Satellite Symposia Abstracts**

SY1

## RECOGNISING HYPOPHOSPHATASIA (HPP) IN ADULTS: A CASE-BASED DISCUSSION FROM DIAGNOSIS TO MANAGEMENT

R. Eastell<sup>1</sup>, M. L. Brandi<sup>2</sup>, R. Keen<sup>3</sup>

<sup>1</sup>University of Sheffield, Sheffield, United Kingdom, <sup>2</sup>University of Florence and Fondazione Italiana Ricerca sulle Malattie dell'Osso (FIRMO), Florence, Italy, <sup>3</sup>Royal National Orthopaedic Hospital, Stanmore, United Kingdom

Hypophosphatasia (HPP) is a rare, inherited metabolic disease caused by tissue nonspecific alkaline phosphatase deficiency. HPP is clinically heterogeneous with manifestations that can occur at any age and, for adults, commonly include pain, recurrent and poorly healing fractures, and muscle weakness leading to a high disease burden.<sup>1</sup> Symptom overlap with other, more common disorders contributes to the frequently experienced delay in diagnosis. A median ~10-year delay in diagnosis for adults was reported from the Global HPP Registry.<sup>1</sup> Delays lead to increased healthcare utilisation; results from a self-reported UK-based study showed that patients with HPP require multiple different outpatient contacts and diagnostic tests before diagnosis<sup>2</sup> (NCT02751801).<sup>3</sup>

Therefore, it is important to recognise key biochemical and clinical characteristics that differentiate patients with HPP from those with other disorders. In a prospective study in a UK metabolic bone clinic, thresholds of biochemical assessments such as alkaline phosphatase  $\leq 43$  IU/L and pyridoxal 5'-phosphate  $\geq 120$  nmol/L, along with key clinical features such as younger age and presence of metatarsal or femoral shaft fractures, were found to sufficiently differentiate patients with HPP from patients with low bone mineral density.<sup>4</sup>

After diagnosis, care is centred around managing symptoms and often requires a multidisciplinary approach.<sup>5</sup> The enzyme replacement therapy asfotase alfa is licensed in the EU for patients with paediatric-onset HPP to treat the bone manifestations of the disease. This presentation is a case-based discussion of the diagnosis and management of these adults with HPP.

### References:

1. Högl W et al. BMC Musculoskelet Disord 2019;20:80
2. Jenkins-Jones S et al. J Bone Miner Res 2018;33(S1):oral 1107
3. NIH. US National Library of Medicine. Available from <https://clinicaltrials.gov/ct2/show/NCT02751801>. Accessed: May 2021
4. Desborough R et al. Bone 2021;144:115795
5. Bianchi ML et al. Osteoporos Int 2020;31:1445-1460

### Acknowledgements:

This symposium is sponsored, organised and funded by Alexion Pharmaceuticals, Inc.

### Disclosures:

RE receives consultancy funding from AbbVie, Eli Lilly, FNIH, GSK Nutrition, Haoma Medica, IDS, Mereo, Nittobo, Roche Diagnostics, Samsung, Sandoz; grant funding from Alexion, Amgen, IDS, Nittobo, Roche. MLB has received honoraria from Amgen, Bruno Farmaceutici, Calcilytix, Kyowa Kirin, UCB; grants and/or speaker fees from Abiogen, Alexion, Amgen, Bruno Farmaceutici, Echolight, Eli Lilly, Kyowa Kirin, SPA, Theramex, UCB; consultancy funding from Alexion, Amolyt, Bruno Farmaceutici, Calcilytix, Kyowa Kirin, UCB. RK has nothing to disclose.

SY2

## CLINICAL GUIDELINES FOR THE MANAGEMENT OF OSTEOARTHRITIS: MULTIMODAL APPROACH

C. Cooper<sup>1</sup>

<sup>1</sup>MRC Lifecourse Epidemiology Unit, University of Southampton, Southampton General Hospital, Southampton, United Kingdom

Professor Cooper will provide an overview of the epidemiology of Osteoarthritis, highlighting its increasing importance in a global society where populations are generally ageing, and are often simultaneously challenged by an elevated Body Mass Index. The different approaches to disease management, as suggested in international disease area guidelines for Osteoarthritis will be briefly outlined, focusing on the need to utilise different non pharmacological and pharmacological options, sometimes concurrently, to achieve optimal outcomes for patients. The final part of the presentation will focus on a summary of the key synergistic strategies outlined in the 2019 update to the ESCEO treatment algorithm for the management of knee Osteoarthritis with a focus on the treatment options that the ESCEO working group identified as being particularly beneficial to manage osteoarthritis patients.

SY3

## REHABILITATION FOR MANAGING OA: AN OPPORTUNITY FOR BEHAVIOR CHANGE

D. Pinto<sup>1</sup>

<sup>1</sup>PT, D.P.T., Ph.D., OCS, FAAOMPT. Physical Therapy, Marquette University, Milwaukee, United States

Dr Pinto is an expert in Physical Therapy and will provide guidance on the various rehabilitative practices that can be adopted to encourage better management of the heterogeneous overlapping group of disorders collectively known as Osteoarthritis. An important concept in these practices is the principle of behaviour change, the techniques that can be employed in its facilitation, and the broader system level considerations that must be evaluated in order for behaviour change techniques successful integration into osteoarthritis management.

SY4

## A PATIENT CENTRIC APPROACH TO OA MANAGEMENT: PROMOTING KNOWLEDGE TRANSFER AMONG PATIENTS

M. De Wit<sup>1</sup>

<sup>1</sup>Patient Research Partner, VU Medical Center, Amsterdam, The Netherlands

Dr De Wit is a strong and active member of the EULAR community of People with Arthritis/Rheumatism in Europe (PARE). In presenting a view of osteoarthritis from a patients perspective, he will highlight that the condition is treatable, requiring patient centric multidisciplinary care, that also fully utilizes the patient in the mobilization of research evidence in order to turn it into common clinical practice. Dr De Wit will also focus on the importance of trust, social support and patient education as critical levers in promoting long term adherence to the different strategies that may be employed in the management of Osteoarthritis.

SY5

## UCB SPONSORED SYMPOSIUM - THE BLUEPRINT: A PLAN FOR IMPROVED CLINICAL OUTCOMES IN POSTMENOPAUSAL WOMEN WITH SEVERE OSTEOPOROSIS

UCB<sup>1</sup>

<sup>1</sup>UCB, Brussels, Belgium

We invite you to join this interactive symposium, chaired by Professor Bente Langdahl (Aarhus University Hospital, Denmark), to discover how to identify and optimise care for postmenopausal women at high risk of fracture.

### How do we identify those patients appropriate for earlier bone-forming therapy?

Professor Eugene McCloskey (University of Sheffield, United Kingdom)

Postmenopausal women have an inherent risk of fragility fractures due to the marked decrease in oestrogen at menopause, which can lead to bone loss.<sup>1</sup>

In addition to the female sex and older age, many other interacting non-modifiable and lifestyle factors can place postmenopausal women at high or very high fracture risk.<sup>1-3</sup> Of these risk factors, one of the most important to consider is a recent fragility

fracture, which increases the risk level of a subsequent fracture to 'imminent' and necessitates early and effective therapeutic intervention.<sup>3-5</sup>

To begin the symposium, Professor McCloskey will explore the factors that contribute to fragility fracture risk in postmenopausal women, focusing on how to identify patients who may derive the greatest clinical benefit from earlier bone-forming therapy – supported by the presentation of one of Professor McCloskey's clinical cases.

### Optimising clinical outcomes with bone-forming therapy: Why the sequence of treatment matters

Professor Serge Ferrari (Geneva University Hospitals, Switzerland)

To achieve optimal and sustained BMD gains in patients with osteoporosis, it has been suggested that bone-forming therapy should be used as first-line treatment followed by antiresorptive therapy, rather than *vice versa*.<sup>6</sup> Professor Ferrari will discuss the data supporting this recommendation and how the sequence of treatment, and initial choice of bone-forming agent, can be highly influential in determining patient outcomes.

### Evaluating the benefits and risks of a dual-effect bone-forming therapy: Latest real-world clinical insights

Professor David Reid (University of Aberdeen, United Kingdom)

Finally, Professor David Reid will share his early experience of using romosozumab in clinical practice. He will provide his real-world insights on how this dual-effect, bone-forming therapy fits into the current treatment algorithm, including the patient profile, observed outcomes of therapy and assessment of cardiovascular risk. Professor Reid will also discuss the adverse events observed in his clinical practice and how these are currently being monitored more widely to inform the benefit-risk profile.

This symposium is sponsored by UCB.

1. Gallagher JC, and Tella SH. *J Steroid Biochem Mol Biol.* 2014;142:155–70.
2. Kanis JA, et al. *Osteoporos Int.* 2019;30:3–44.
3. Kanis JA, et al. *Osteoporos Int.* 2020;31:1–12.
4. Siris ES, et al. *Osteoporos Int.* 2014;25:1439–43.
5. Balasubramanian A, et al. *Osteoporos Int.* 2019;30:79–92.
6. Cosman F, et al. *J Bone Miner Res.* 2017;32:198–202.



SY6

## BONE HEALTH AND FRACTURE PREVENTION IN THE DECADE OF HEALTHY AGEING

C. Cooper<sup>1</sup>
<sup>1</sup>MRC Lifecourse Epidemiology Unit, University of Southampton, Southampton General Hospital, Southampton, United Kingdom

Professor Cyrus Cooper's presentation will focus on ways to reduce the health and societal burden of poor bone health, which results in poor quality of life (QOL) and high rates of hospitalisation. Given that old age is a significant risk factor for osteoporosis, Professor Cooper will also introduce the 'decade of healthy ageing' initiative developed by the United Nations, which aims to align health systems to the needs of older people and lay the foundations for long-term care in every country.

Professor Cooper will also discuss the importance of integrated care pathways for increasing awareness of poor bone health and preventing the occurrence of fractures in patients with osteoporosis. Such pathways are designed to integrate stakeholder action with optimal primary and secondary care, which can help to increase understanding and preparedness among healthcare providers, resulting in improved QOL and reduced healthcare costs.

During his presentation, Professor Cooper will also discuss the Capture the fracture<sup>®</sup> initiative, which is a stepwise approach to policy building with the ultimate goal of improving patient outcomes, reducing healthcare costs and saving patients' lives.

SY7

## LONG-TERM TREATMENT STRATEGIES FOR OSTEOPOROSIS

A. Diez-Perez<sup>1</sup>
<sup>1</sup>Hospital del Mar, Barcelona, Spain

In the final presentation, Professor Adolfo Diez-Perez will address the challenges in the sequential treatment of osteoporosis and explore options for treat-to-target, and goal-directed therapy. He will focus on the latest developments in international osteoporosis guidelines and discuss the recommended treatments for patients as defined by their individual level of risk e.g., initial treatment with an anabolic agent followed by an antiresorptive in patients at very high risk of fracture. During his presentation, Professor Diez-Perez will offer his perspectives on published studies of sequential treatment in osteoporosis and provide practical advice on optimal treatment strategies depending on individual patient profiles.

Professor Diez-Perez will also discuss the importance of continuity of care during the COVID19 pandemic.

SY8

## THE ROLE FOR PROCEDURAL TREATMENTS TO ADDRESS BONE LOSS IN PATIENTS AT HIGH RISK OF HIP FRACTURE

S. Ferrari<sup>1</sup>, M. L. Brandi<sup>2</sup>, J. De Schepper<sup>3</sup>, A. Kurth<sup>4</sup>
<sup>1</sup>University of Geneva, Geneva, Switzerland, <sup>2</sup>University of Florence, Florence, Italy, <sup>3</sup>A.Z. Nikolaas, Sint-Niklaas, Belgium, <sup>4</sup>Middle Rhein Community Hospital, Koblenz, Germany

This symposium is guided by a multi-disciplinary group of expert clinician researchers who are interested in the question of how procedural treatments can enhance bone strength to help prevent fragility fractures in high-risk patients.

While the available portfolio of proven pharmacological therapies to address osteoporosis-related bone loss and fragility fracture risk has grown over the past decades, unmet needs clearly remain. Unmet needs are especially prominent for patients at imminent and very high risk of hip fragility fracture<sup>1</sup>. The stubbornness of this problem has led to the development, study and introduction of procedural treatments<sup>2</sup> as a novel means to address the loss of bone mass, quality and strength that characterize osteoporosis and are a precursor for fragility fractures. Current treatment guidance suggests consideration of one type of procedural treatment for patients at very high risk of fracture<sup>3</sup>. To help clinicians understand how this procedural treatment may help clinicians to improve care, the panel of experts will lecture on both the structural determinants of bone fragility, focusing on novel imaging techniques that allow to better evaluate the longitudinal changes in bone volume and strength in the aging skeleton, as well as on the overall approach of procedural treatments and pre-clinical evidence and clinical experience with one treatment (i.e., LOEP), including:

- How bone volume and microarchitecture informs our understanding of bone fragility
- Avoidance of bone loss versus expansion of bone volume as a treatment goal
- Multi-model, pre-clinical evidence of bone formation
- The clinical experience with a local osteo-enhancement procedure (LOEP)
- The present and future for procedural treatments

This symposium is sponsored by AgNovos Healthcare.

1. Ferrari et al., Archives of Osteoporosis 2016 11:37; 2. Howe et al. Osteoporos Int 31, 921–929 (2020); 3. Kanis et al., Osteoporos Int 31, 209 (2020).

WORLD CONGRESS  
ON OSTEOPOROSIS,  
OSTEOARTHRITIS AND  
MUSCULOSKELETAL  
DISEASES



2021 VIRTUAL



Abstract Book

**Posters Abstracts**

P101

### OSTEOPOROTIC VERTEBRAL COMPRESSION FRACTURE: USE OF SUBLAMINAR MERSILENE TAPE AUGMENTED PEDICLE SCREWS

G. Kakadiya<sup>1</sup>, K. Chaudhary<sup>2</sup>

<sup>1</sup>Topiwala National Medical College & BYL Nair Hospital, <sup>2</sup>PD Hinduja Hospital & Research Centre, Mumbai, India

**Objective:** To assess safety and efficacy of sublaminar mersilene tape augmented pedicle screws fixation as a novel and low cost modality of spinal instrumentation for osteoporotic vertebral compression fractures treatment.

**Methods:** A retrospective study of 40 consecutive patients of the osteoporotic vertebral compression fractures. All patients were operated with open surgery with decompression, pedicle screw fixation, and sublaminar mersilene tape augmentation. Clinical, functional, and radiological outcomes were compared to describe the utility of sublaminar mersilene tape augmented pedicle screws for the treatment of osteoporotic vertebral compression fractures.

**Results:** Complete neurological improvement was noted in 38 patients (Frankel Grade-D to Grade-E), two patients remain with Frankel Grade D neurology. Significant improvement was noted in VAS (preoperative  $7.90 \pm 0.60$  to final follow-up  $2.90 \pm 0.54$ ) and ODI (preoperative  $77.10 \pm 6.96$  to  $21.30 \pm 6.70$  at final follow-up). Significant improvement was noted in local kyphosis angle (preoperative  $22.14 \pm 2.60$  to  $10.40 \pm 1.40$  at postoperative) with a 10% loss of correction ( $2.5 \pm 0.90$ ) at final follow-up. There were no pseudoarthrosis and implant failure noted. No iatrogenic dural or nerve injury. Superficial wound infection was noted in two patients that was managed with debridement and antibiotics.

**Conclusion:** There is a high chance of implant failure in the osteoporotic spine due to poor bone quality. Sublaminar mersilene tape augmented pedicle screws fixation is a novel and low-cost modality for osteoporotic vertebral compression fracture. It provides significant improvement in clinical, radiological, and functional outcomes. It is an alternative option for osteoporotic vertebral compression fractures fixation to avoid long construct or cement related complications. A mersilene tape is radiolucent material and does not affect postoperative MRI.

P102

### EFFECT OF TERIPARATIDE VS. CALCITONIN ON SPINAL FUSION IN OSTEOPOROSIS PATIENTS

G. Kakadiya<sup>1</sup>

<sup>1</sup>Topiwala National Medical College & BYL Nair Hospital, Mumbai, India

**Objective:** Osteoporosis is a progressive metabolic bone disease that is characterized by a decrease in bone mass and density. TLIF is biomechanically a better technique for the treatment of degenerative lumbar disease. Teriparatide (rPTH) is the only anabolic agent that has been approved for the treatment of osteoporosis. The study aim was to evaluate the efficacy of teriparatide for TLIF in osteoporotic women.

**Methods:** 94 osteoporotic patients underwent TLIF surgery for degenerative lumbar spine disease. Patients were divided into two groups. The calcitonin group (n=48) was administered nasal calcitonin (200 IU) for 2 months. The teriparatide group (n=46) was injected subcutaneously with teriparatide (20 ug/d) for 3-month cycles. Serial plain x-rays, computed tomography, and BMD evaluations were performed. Fusion rate, bony fusion duration, and T-score changes were evaluated. VAS and ODI were evaluated.

**Results:** The teriparatide group showed earlier fusion than the calcitonin group. The mean bone fusion period was  $5.8 \pm 4.7$  months in the teriparatide group but  $9.4 \pm 5.2$  months in the calcitonin group. The bone fusion rate in the teriparatide group was higher than that in the calcitonin group at 5 months; however, there was no difference after 12 and 24 months surgery. Pain scores and ODI were not significantly different between groups. BMD scores in the teriparatide group were significantly improved compared with the calcitonin group 2 y after surgery.

**Conclusion:** There was no significant improvement in overall fusion rate and clinical outcome in our patients after injection of teriparatide, but the teriparatide group showed early bony union and highly improved BMD scores.

P103

**OSTEOPOROTIC BURST FRACTURE: OUTCOMES OF THREE-COLUMN RECONSTRUCTION SURGERY**G. Kakadiya<sup>1</sup><sup>1</sup>Topiwala National Medical College & BYL Nair Hospital, Mumbai, India

**Objective:** To evaluate a novel effective procedure utilizing three-column reconstruction via a posterior approach with a technique that utilizes an arthroscope to visualize the anterior surface of the dura during decompression.

**Methods:** A prospective study. 80 Osteoporotic vertebral burst fracture patients with similar demographic data, clinical parameters (visual analog scale: VAS; Oswestry Disability Index: ODI; Frankel grade) and radiological parameters (BMD, kyphosis) managed by three-column reconstruction through single posterior approach surgery: pedicle screw fixation, corpectomy, arthroscope assisted transpedicular decompression and fusion (mesh cage + bone grafting). Preoperative data, postoperative data, surgical variables and complications were recorded analysed.

**Results:** No significant differences in demographic data. Significant improvement was noted in VAS (pre-operative,  $7.90 \pm 0.60$ ; final follow-up  $2.90 \pm 0.54$ ) and ODI (preoperative,  $77.10 \pm 6.96$ ; final follow-up  $21.30 \pm 6.70$ ). Neurological improvement was noted in 74 patients (Frankel grade E) while six patients remained nonambulatory (Frankel grade C). Significant improvement was noted in local kyphosis angle (preoperative,  $22.14 \pm 2.60$ ; postoperative,  $10.40 \pm 1.40$ ) with a 10% loss of correction ( $2.5 \pm 0.90$ ) at final follow-up. Implant failure in two patients and proximal junctional failure in two patients managed with revision surgery. No iatrogenic dural or nerve injury.

**Conclusion:** Osteoporotic burst fracture can be managed with single posterior surgery, three-column reconstruction with mesh cage. It provides a significant improvement in clinical, radiological and functional outcomes. The arthroscope can improve a surgeon's operative field and magnification thereby ensuring complete decompression without injuring the dura or spinal cord.

P104

**THE OBESITY PARADOX AND BONE LOSS**Y. Makhoul<sup>1</sup>, M. Sellami<sup>1</sup>, S. Miladi<sup>1</sup>, A. Fazaa<sup>1</sup>, L. Souebni<sup>1</sup>, K. Ouenniche<sup>1</sup>, S. Kassab<sup>1</sup>, S. Chekili<sup>1</sup>, L. Zakraoui<sup>1</sup>, K. Ben Abdelghani<sup>1</sup>, A. Laatar<sup>1</sup><sup>1</sup>Mongi Slim Hospital, Tunis, Tunisia

**Objective:** Most of the available evidence supports a lower risk of vertebral fracture in obese adults. This belief was partially suggested by the positive correlation between BMD and BMI. This study aimed to assess the association of BMI with BMD and to explore their relation with age and gender.

**Methods:** This is a cross-sectional study including Tunisian patients referred for an assessment of BMD through DXA. BMD was measured using standard methods over the lumbar spine L1-L4, the total proximal femur. The results were expressed as T-scores according to the WHO definition. Patients were subgrouped according to age ( $\leq 50$  and  $> 50$  y). Association between BMD and age as well as BMI was also assessed (G1: obese patients and G2: nonobese patients). The level of significance was fixed for  $p < 0.05$ .

**Results:** The study included 100 patients with a female predominance (sex ratio=10.1). The mean age for women was  $61.9 \pm 13$  y [18-83] and the mean age for men was  $59.7 \pm 7.5$  y [47-72]. The mean BMI was  $29.1 \pm 5$  kg/m<sup>2</sup> [15-45] for women and  $27.6 \pm 3.6$  kg/m<sup>2</sup> [22.8-32.9] for men. 40% of all patients were obese with a mean BMI of  $32.9 \pm 4.3$  kg/m<sup>2</sup>. Osteopenia was diagnosed in half of the men (55.5%) and most of the women (70%). 29% of patients suffered from osteoporosis. BMD of the spine was similar between men and women ( $p=0.53$ ). Men had higher BMD of the hip than women ( $p=0.038$ ). The mainstream of the subjects  $> 50$  y had more vertebral fractures, suffered more from osteoporosis and had a higher BMI than those  $< 50$  y (95 vs. 5%;  $p=0.04$ ), (92.3 vs. 77%;  $p=0.03$ ) and (82.5 vs. 17.5%;  $p=0.05$ ), respectively. There was no correlation between BMD of the spine and higher BMI (0.94 in G1 vs. 0.98 in G2,  $p=0.3$ ). Similarly, there was no correlation between BMD of the hip and higher BMI (0.9 in G1 vs. 0.84 in G2,  $p=0.2$ ). Moreover, Obese patients had less a vertebral fracture but with no statistically significant correlation (21% in G1 vs. 25% in G2;  $p=0.2$ ).

**Conclusion:** Our study showed that obesity was frequent among Tunisian patients but was not associated with a higher BMD. Older age was directly associated with a lower BMD and higher risk for vertebral fracture.



P105

### DENSITOMETRIC VERTEBRAL FRACTURE ASSESSMENT: FACTORS LIMITING GOOD VISIBILITY OF THE VERTEBRA

Y. Makhoul<sup>1</sup>, M. Sellami<sup>1</sup>, S. Miladi<sup>1</sup>, A. Fazaa<sup>1</sup>, L. Souebni<sup>1</sup>, K. Ouenniche<sup>1</sup>, S. Kassab<sup>1</sup>, S. Chekili<sup>1</sup>, L. Zakraoui<sup>1</sup>, K. Ben Abdelghani<sup>1</sup>, A. Laatar<sup>1</sup>

<sup>1</sup>Mongi Slim Hospital, Tunis, Tunisia

**Objective:** The radiograph of the spine is the gold standard for identifying vertebral fractures (VF). Vertebral fracture assessment (VFA) is a new feature available on modern densitometers that could assess VF. This technique offers the advantage of low irradiation over standard radiography but at the cost of lower image quality. The aim of this study was to assess factors associated with good vertebra visibility when using VFA.

**Methods:** This is a cross-sectional study including patients referred by their physicians for BMD measurement. Anthropometric data were recorded. BMD was measured using standard methods over the lumbar spine L1-L4, the total proximal femur. Results were expressed as T-scores using DXA. The screening for VF was performed by VFA. A professional operator analyses VFA scans and assessed the good visibility of the vertebra.

**Results:** The study included 100 patients. The mean age was  $61.7 \pm 12.6$  y [18-83]. The average BMI was  $28.9 \pm 24.2$  kg/m<sup>2</sup> [14.2-45.3]. The mean T-score at the vertebral site was -1.5 SD [-4.9-1.5] with a mean mass of 0.95 g/cm<sup>2</sup> [0.58-1.371]. Osteoporosis was found in 27.7% of patients. A vertebral fracture was diagnosed in 25% of cases. The visualization of the vertebra was impaired in the upper thoracic region in 60% of cases. Poor visibility was observed in 19% of cases in the mid-thoracic spine and only in 2% of cases in the lumbar spine. No statistically significant correlation was found between good vertebral visibility and age ( $p=0.2$ ), weight ( $p=0.5$ ), or BMI ( $p=0.7$ ). However, good visibility of the vertebra was associated with a lower height (1.7 vs. 1.5 m,  $p=0.03$ ). A better vertebrae visualization was correlated neither to the BMD of the right hip (0.84 vs. 0.87,  $p=0.4$ ) nor to the left hip (0.85 vs. 0.89,  $p=0.3$ ). Similarly, the absence of vertebral osteoporosis was not correlated with a better vertebral visualization ( $p=0.6$ ).

**Conclusion:** Visibility of the vertebra on VFA does not appear to be altered by the BMD and vertebral osteoporosis, suggesting safe use in the elderly. However, precautions may be taken when interpreting VFA in patients with high heights.

P106

### RELIABILITY OF VERTEBRAL FRACTURE ASSESSMENT

Y. Makhoul<sup>1</sup>, M. Sellami<sup>1</sup>, S. Miladi<sup>1</sup>, A. Fazaa<sup>1</sup>, L. Souebni<sup>1</sup>, K. Ouenniche<sup>1</sup>, S. Kassab<sup>1</sup>, S. Chekili<sup>1</sup>, L. Zakraoui<sup>1</sup>, K. Ben Abdelghani<sup>1</sup>, A. Laatar<sup>1</sup>

<sup>1</sup>Mongi Slim Hospital, Tunis, Tunisia

**Objective:** Vertebral fracture assessment (VFA) is a new feature available on modern densitometers. Yet, the assessment of vertebral fracture (VF) status has not become standard practice. Our study aimed to evaluate the reliability of VFA as assessed by a rheumatologist and a radiology technician

**Methods:** We conducted a cross-sectional study assessing the performance of low radiation single energy x-ray absorptiometry VFA for the detection of VF. We selected patients who were assessed for osteoporosis according to screening protocols. BMD was measured using standard methods over the lumbar spine L1-L4, the total proximal femur, and results were expressed as T-scores. All VFAs were independently evaluated by 2 experienced readers: a rheumatologist and a radiology technician for the identification of VF (T4-L4). VF was classified according to the Genant grading system: grade 1 for an anterior, mid or posterior reduction of 20-25% in vertebral height; grade 2 for a reduction of 25-40%; and grade 3 for a reduction of >40% in vertebral height. A score for the interrater reliability between the readers was expressed using the kappa statistic.

**Results:** 100 patients were included with a mean age of  $66.9 \pm 9.5$  y [46.7-83]. There was a female predominance (91%). Nearly half of patients had osteopenia (48.9%), 27.7% had osteoporosis and 23.4% had a normal BMD. On VFA scans, the nonvisible vertebra was mostly located in the upper thoracic spine (60%). The mean number of VF was 1.2 [0-3] for both readers. According to the doctor's evaluation, 25% of patients had at least one VF, of which 75.9% had a Genant grade 1, 17.2% had grade 2, and 6.9% had grade 3. According to the technician evaluation, at least one VF was found in 36% of patients. A grade 1 was assessed in 91.7% of cases, a grade 2 in 8.3% of patients, but no VF grade 3 was assessed. A kappa score for the interrater reliability between the readers for VFA was 0.545 ( $p=0.000$ ). The overall agreement by grade between the readers was 0.785 ( $p=0.000$ ). The exclusion of nonvisible vertebra resulted in a better agreement ( $k=0.853$ ). Further analysis excluding vertebra T4 to D10, revealed a very good agreement ( $k=0.9$ ).

**Conclusion:** Our study showed a low agreement between the readers on VFA and a better agreement when nonvisible vertebrae were excluded. Thus, caution should be advocated when relying exclusively on this device.

P107

### OUR EXPERIENCE WITH QUS OF PHALANX IN SECONDARY OSTEOPOROSIS IN IRAN

Z. Hamidi<sup>1</sup>, Minoo Najafi<sup>1</sup>, Maryam Najafi<sup>1</sup>, M. Mahdavi-Mazdeh<sup>2</sup>, S. Maziar<sup>3</sup>, A. A. Keshtkar<sup>4</sup>, M. Sedaghat<sup>5</sup>, F. Zare-Bidaki<sup>6</sup>, B. Larijani<sup>6</sup>

<sup>1</sup>Endocrinology & Metabolism Research Center, Endocrinology & Metabolism Clinical Sciences Institute, <sup>2</sup>Iranian Tissue Bank & Research Center, <sup>3</sup>Dept. of Nephrology, Amir-Alam Hospital, <sup>4</sup>Dept. of Health Sciences Education Development, School of Public Health, <sup>5</sup>Dept. of Community Medicine, Faculty of Medicine, <sup>6</sup>Osteoporosis Research Center, Endocrinology & Metabolism Clinical Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran

**Objective:** DXA is gold standard of bone densitometry, but it is expensive, nonportable and uses radiation. Quantitative ultrasound (QUS) of bone has fewer burdens and is portable. QUS of phalanx, due to physical and structural characteristics of phalanx is one the most practical BMD machine. So we tried to assess its usefulness in osteoporosis diagnosis.

**Methods:** We entered 200 adult secondary osteoporosis patients (rheumatoid arthritis, hemodialysis, renal transplantation and levothyroxine users) to this study and compared their phalanx QUS results with normal age and sex matched controls. Also the results of QUS, compared with DXA results to find the correlation between these two methods in diagnosis of osteoporosis.

**Results:** Results was not significantly different between normal and patients except in hemodialysis patients (P value=0.00). Also the results of QUS compared with DXA results showed no significant correlation in diagnosis of osteoporosis except in hemodialysis in spine and femoral region (P value=0.023 and P value=0.21, respectively) and levothyroxine group in spinal region (P value=0.005).

**Conclusion:** Our results suggest that QUS of phalanx may be useful in screening secondary osteoporosis; but for establishment of diagnosis by QUA, DXA measurement is needed.

P108

### PREDICTING RESPONSE TO VITAMIN D TREATMENT ON OSTEOARTHRITIS: A RADIOMICS NOMOGRAM BASED ON MRI

T. Lin<sup>1</sup>, S. Fu<sup>2</sup>, D. Zeng<sup>3</sup>, S. Lu<sup>1</sup>, M. Zhou<sup>1</sup>, J. Li<sup>4</sup>, T. Chen<sup>4</sup>, T. Fan<sup>4</sup>, C. Lang<sup>4</sup>, J. Ma<sup>2</sup>, X. Quan<sup>1</sup>, F. Cicuttini<sup>5</sup>, C. Ding<sup>4</sup>, Z. Zhu<sup>4</sup>

<sup>1</sup>Dept. of Radiology, Zhujiang Hospital, Southern Medical University, Guangzhou, China, <sup>2</sup>School of Biomedical Engineering, Southern Medical University, Guangzhou, China, <sup>3</sup>College of Automation Science & Engineering, South China University of Technology, Guangzhou, China, <sup>4</sup>Clinical Research Centre, Zhujiang Hospital, Southern Medical University, Guangzhou, China, <sup>5</sup>Dept. of Epidemiology & Preventive Medicine, Monash University, Melbourne, Australia

**Objective:** To develop and validate a radiomics nomogram by combining the optimized radiomics features extracted from MRI images and clinical characteristics for predicting the treatment response of vitamin D supplementation defining as 20% improvement of knee pain on patients with osteoarthritis (OA).

**Methods:** Participants were selected from the Vitamin D Effects on Osteoarthritis (VIDEO) study, which is a randomized, placebo controlled, and double blinded clinical trial. 216 patients in Hobart center underwent MR scans of the target knees using a 1.5 T MRI scanner were analyzed. We segmented and depicted tibial subchondral bone region of interests that beneath articular cartilage and above epiphyseal line. Radiomics-based predicting models incorporating the radiomics features and independent clinical risk factors were constructed using Relief (RELIF) based feature selection method and logistic regression based classification method, and expressed as a nomogram in the training cohort (n=172). The performance of radiomics nomogram was assessed by discrimination, calibration and clinical constructive validity. The results were then validated in an independent validation cohort (n=44).

**Results:** A total of 974 radiomics features were extracted from T1 and T2 images for each patient in the training cohort. The radiomics nomogram incorporating six selected radiomics features, sex, baseline total knee pain score, radiographic OA (ROA) score, bone marrow lesions (BML) achieved a better discrimination performance than clinical model (sex, total knee pain score, ROA and BML) in both training (AUC: 0.77 vs. 0.70) and validating cohort (AUC: 0.80 vs. 0.71). The calibration curve showed satisfactory concordance between the observed and estimated frequencies in both cohorts. Additionally, radiomics nomogram outperformed the clinical model with favorable net reclassification index [0.20 (95%CI: 0.06-0.34) in training cohort and 0.24 (95%CI: 0.02-0.48) in validating cohort]. Decision curve analysis confirmed the clinical usefulness of radiomics nomogram for predicting treatment response of vitamin D supplementation on OA patients.

**Conclusion:** The MRI based radiomics nomogram achieves a favorable predictive efficacy in differentiating responders from non-responders among OA patients treated with vitamin D. This proof-of-concept study provides a promising way to predict clinical outcomes of certain OA treatments.

P109

### DO FRAILTY SCORES PREDICT OUTCOME AFTER PROXIMAL FEMORAL REPLACEMENT FOR MUSCULOSKELETAL TUMOURS?

M. T. Buldu<sup>1</sup>, C. Wigley<sup>1</sup>, P. Bassett<sup>2</sup>, S. Kapoor<sup>1</sup>, C. Gerrand<sup>1</sup>

<sup>1</sup>Royal National Orthopaedic Hospital, Stanmore, <sup>2</sup>Statsconsultancy Ltd., Amersham, UK

**Objective:** Frailty is a concept where an individual has exceptionally low physiological compensation, resilience and adaptive capacity to external stressors with unfavourable consequences. Frailty has a negative independent relationship with morbidity and mortality. The aim of this study was to investigate frailty in patients undergoing surgery for musculoskeletal tumours, by applying frailty scoring systems and exploring correlations with survival and secondary outcome measures.

**Methods:** This was a retrospective study of patients over 60 y of age undergoing proximal femoral replacement for musculoskeletal tumours. Patients were classified as fit, vulnerable or frail using the modified frailty index, Rockwood and ASA grading systems. Correlation was performed with outcomes including survival and length of hospital stay (LOS).

**Results:** 85 patients were identified of mean age 72.6 y. Median follow-up was 18.9 months (range 0.1-56.4). The overall median survival in frail groups was 19.8 months regardless of the scoring system used. Frail patients classified by the Rockwood score had a greater LOS and a trend to reduced survival.

**Conclusion:** There is a high prevalence of frailty in this cohort of patients. The Rockwood score is related to overall survival and LOS. Therefore, frailty scores should be considered when planning surgery as part of appropriate holistic care. Moreover, a median survival greater than 18 months in frail patients supports the decision to offer surgery which may positively impact quality of life in the short term. Further research to identify the relationship between frailty and outcomes in musculoskeletal tumour patients is needed.

P110

### WHAT IS THE ROLE OF RNA N6-METHYLADENOSINE IN OSTEOPOROSIS? A SYSTEMATIC REVIEW

G. Li<sup>1</sup>, X. Chen<sup>1</sup>, J. D. A. Adachi<sup>2</sup>

<sup>1</sup>Guangdong Second Provincial General Hospital, Guangzhou, China, <sup>2</sup>McMaster University, Hamilton, Canada

**Background:** RNA N6-methyladenosine (m6A) modification has been widely reported to play a significant role in oncology. Some recent studies suggested m6A was also involved in bone development and metabolism. Nevertheless there was no summarized evidence to reveal the impact of m6A on osteoporosis.

**Methods:** We conducted a systematic review to include studies assessing the role of m6A in osteoporosis by searching PubMed and EMBASE (up to July 2019). Studies that evaluated the association between m6A and bone metabolism and osteoporosis, and provided sufficient data for extraction, were eligible for inclusion.

**Results:** There were nine studies included for analyses, among which six were experimental research, two candidate gene association studies, and one genomewide association study. M6A methyltransferase METTL3 and demethyltransferase FTO were found to be involved in the delicate process between adipogenesis differentiation and osteogenic differentiation. Conditional knock-down of the METTL3 in bone marrow stem cells could suppress PI3K-Akt signaling, limit the expression of bone formation-related genes, restrain the expression of vascular endothelial growth factor and downregulate the decreased translation efficiency of PTH receptor-1 mRNA. Similarly, FTO prompted the shift of BMSC lineage commitment to adipocyte and inhibited bone formation during osteoporosis.

**Conclusion:** RNA m6A performs important functions in osteoporosis, which may be helpful in prevention, treatment, and management of osteoporosis.

P111

### THE INFLUENCE OF ANTI-TNF DRUGS ON OSTEOPOROSIS IN PATIENTS WITH RHEUMATOID ARTHRITIS

D. Ruci<sup>1</sup>, V. Ruci<sup>2</sup>, M. Jordhani<sup>3</sup>

<sup>1</sup>UHC Mother Teresa, Tirana, <sup>2</sup>Trauma University Hospital Tirana, Tirana, <sup>3</sup>Korça Regional Hospital, Korçe, Albania

**Objective:** In rheumatoid arthritis (RA), because of inflammation and steroid therapy, there is an elevated risk for the patients to develop osteoporosis. In fact, the more inflammation, the more severe the osteoporosis. Anti-TNF drugs, because of the inhibition of TNF, could improve the bone turnover and eventually the bone densitometry in patients with RA. This study aimed to evaluate the impact of anti-TNF drugs on osteoporosis in patients with RA.

**Methods:** This is a case-control study including 123 patients with RA. The first group consisted of 63 patients with RA, receiving methotrexate as disease-modifying antirheumatic drug (DMARD), besides steroids, NSAIDs, and calcium supplements. The second group consisted of 60 patients receiving the anti-TNF drug as well as the medication the first group received. All patients were evaluated before and 1 y after the therapy initiation about their DXA. All data were gathered and analyzed using statistical methods.

**Results:** After gathering and evaluating all data, it resulted that for the first group, there was a slight worsening of DXA results after 1 y of conservative therapy (T-score L1-L4 average, from -2.4 to -2.6); while for the second group, the T-score L1-L4 changed from -2.3 to -1.8.

**Conclusion:** It was found that the use of anti-TNF drugs in patients with RA may contribute to improving DXA results and eventually in reducing the risk for osteoporosis.

P112

### COST OF OSTEOPOROSIS-RELATED HIP FRACTURES IN A PRIVATE TERTIARY HOSPITAL

A. J. Ho<sup>1</sup><sup>1</sup>Chong Hua Hospital, Cebu, Philippines

**Objective:** Osteoporotic fractures, especially of the hip, lead to great burden both for the patient and economy. Due to the paucity of burden of illness studies of osteoporosis in the Asian region, particularly the Philippines, it is difficult to allocate healthcare resources appropriately for fracture prevention. The availability of information on the financial burden of osteoporosis-related fractures, particularly in the local region, will create awareness of the size of the problem as well as assist healthcare authorities to initiate appropriate programs and strategies. This study aimed to determine the cost of osteoporosis-related hip fractures in a private tertiary hospital.

**Methods:** Data from the medical records of patients diagnosed with osteoporosis-related hip fractures who were hospitalized from January 1, 2017 to December 31, 2019 were analyzed. The researcher recorded the patient's demographic data, type of hip fracture, type of treatment, duration of hospitalization, and medical costs. Descriptive statistics, t-test, chi-squared test, ANOVA with Tukey HSD test and regression analysis were employed to treat and analyze the different sets of data.

**Results:** Among the 150 patients, 44.6% were within the ≥80 years old age group and majority (76%) were females. The most common type of osteoporotic hip fracture involved the femoral neck (52.7%) and most of the patients underwent partial hip replacement (66%). Patients ≥80 age group, those sustaining an intertrochanteric fracture and those who were treated with internal fixation had a longer length of stay in the hospital. There was note of a parallel increase in the direct medical cost as the patients age group got older. It was found that femoral neck fracture had significantly higher implant costs while the other costs (hospitalization, surgery, laboratories, and medications) were observed to be comparable between the two types of fracture.

**Conclusion:** The overall mean cost of osteoporotic hip fracture was 5227.78 USD. The implant used on average accounted for approximately 27% of the total direct medical costs. It was noted that 26% and 23% of the total cost was attributed to the cost of

surgery and hospitalization, respectively. Medication costs accounted for 11%, while laboratory costs comprised 13% of total costs.

P113

### REARRANGING THE PLAYLIST - OPTIMIZING SEQUENTIAL AND COMBINED ANABOLIC & ANTIRESORPTIVE THERAPY FOR OSTEOPOROSIS MANAGEMENT: A CONSENSUS REPORT BY THE EGYPTIAN ACADEMY OF BONE HEALTH

Y. El Miedany<sup>1</sup>, M. Abu Zaid<sup>2</sup>, M. El Gaafary<sup>3</sup>, M. Hasab El Naby<sup>4</sup>, N. Fathi<sup>5</sup>, H. Saber<sup>6</sup>, W. Hassan<sup>7</sup>, M. Eissa<sup>8</sup>, N. Mohannad<sup>9</sup>, H. Khaled<sup>10</sup>, M. Mortada<sup>11</sup>, S. Galal<sup>10</sup>, R. Ghaleb<sup>12</sup>, S. Tabra<sup>2</sup>, S. Mohamed<sup>8</sup>, B. Medhat<sup>8</sup>, R. Ali<sup>10</sup>, H. Aly<sup>13</sup>, G. Elolemy<sup>7</sup>, N. Fouad<sup>14</sup>, S. Ganab<sup>7</sup>, Y. Adel<sup>15</sup>, M. Ibrahim<sup>16</sup>, O. Farouk<sup>17</sup>, A. El-Shanawany<sup>18</sup>, N. Gadallah<sup>10</sup>

<sup>1</sup>Canterbury Christ Church University, Kent, UK, <sup>2</sup>Rheumatology & Rehabilitation Tanta University, Tanta, <sup>3</sup>Community & Public Health Ain Shams University, Cairo, <sup>4</sup>Rheumatology & Rehabilitation Ain Shams University, Cairo, <sup>5</sup>Rheumatology & Rehabilitation Assiut University, Assiut, <sup>6</sup>Geriatrics & Gerontology, Ain Shams University, Cairo, <sup>7</sup>Rheumatology & Rehabilitation, Benha University, Benha, <sup>8</sup>Rheumatology & Rehabilitation, Cairo University, Cairo, <sup>9</sup>Internal Medicine & Rheumatology, Alexandria University Hospitals, Alexandria, <sup>10</sup>Rheumatology, Physical Medicine & Rehabilitation, Ain Shams University, Cairo, <sup>11</sup>Rheumatology & Rehabilitation, Zagazig University, Zagazig, <sup>12</sup>Rheumatology & Rehabilitation Dept., Minia University, Minia, <sup>13</sup>Rheumatology & Rehabilitation, Al-Azhar University, Cairo, <sup>14</sup>Rheumatology & Rehabilitation, Fayoum University, Fayoum, <sup>15</sup>Rheumatology & Rehabilitation, Mansoura University, Mansoura, <sup>16</sup>Rheumatology & Immunology, Health insurance, Ministry of Health, Cairo, <sup>17</sup>Dept. of Orthopaedic & Trauma Surgery, Assiut University, Assiut, <sup>18</sup>Rheumatology & Rehabilitation, Menoufia University, Menoufia, Egypt

**Objective:** With the expansion of osteoporosis therapy options, clinical guidelines started to adopt new concepts such as short treatment courses and drug holidays. The introduction of the new concept of very high fracture risk has had its impact on the choices that treating doctors make when commencing, selecting to continue, or switching therapies. Therefore, one of the vital decisions which should be carefully considered is whether, when, and in what sequence anabolic/antiresorptive therapies should be employed. Aims: 1. to review and update the available therapeutic interventions approaches of osteoporosis patients at very high fracture risk, based on the best possible evidence; 2. to determine the manner in which these therapies can be implemented to standardize clinical practice for the prevention of osteoporotic fragility fracture.

**Methods:** Delphi approach was convened to establish consensus among bone health experts on best practice management approach for patients at very high risk of osteoporotic fragility



fractures adopting a treat-to-target strategy. The level of evidence and the grade of recommendation were classified according to the model of the Center for Evidence Based Medicine in Oxford, and the grade of agreement was extracted using the Delphi technique. A Delphi questionnaire was developed and each statement was rated between 1-9 with 1 being 'complete disagreement' and 9 being 'complete agreement'.

**Results:** The expert panel composed of 24 experts employed a two-round Delphi consensus process. Seven statements were included entailing the sequential and combination therapy for management of osteoporosis in patients at very high fracture risk. Very high fracture risk was defined as BMD T-score  $\leq -2.5$  in addition to multiple vertebral fractures or FRAX probability  $>30\%$  MOF,  $>4.5\%$  hip fracture. Level of evidence was 2a for sequential therapy and 2b for combined therapy (PTH and denosumab). Agreement with the recommendations (rank 7-9) ranged from 83.3-95.8%. After making some amendments, consensus was reached (i.e.,  $\geq 75\%$  of respondents strongly agreed or agreed) on the wording of all 7 recommendations. The mean rate of agreement ranged between  $8.38 \pm 1.06$  and  $8.71 \pm 0.69$ . An updated treatment algorithm was produced including recommended therapeutic options, duration of treatment and post-treatment management protocols.

**Conclusion:** Based on the available evidence and expert clinical experience, this work was able to stimulate a cohesive approach to the management of osteoporosis in patients at very high fracture risk to replace current variations in therapeutic options. It can serve as a useful tool that will contribute to the standardization of clinical practice for this pathology. Optimizing therapeutic approaches with sequential anabolic/antiresorptive as well as combined antiresorptive/anabolic therapies appear to provide the most substantial and clinically relevant skeletal benefits to this osteoporotic patients cohort.

P114

### INFLUENCE OF PHARMACOLOGICAL OSTEOPOROSIS TREATMENT ON REFRACTURES FOLLOWING KYPHOPLASTY

I. Alam<sup>1</sup>, Z. Alam<sup>2</sup>, M. Rumi<sup>3</sup>

<sup>1</sup>New College of Florida, Bradenton, <sup>2</sup>LECOM, Bradenton, <sup>3</sup>Orthopedic Associates of Central Texas, Austin, USA

**Objective:** To examine the relationship between pharmacological osteoporosis treatment on the refracture rate in patients who have had a thoracic or lumbar level kyphoplasty. A kyphoplasty was a noninvasive vertebral augmentation surgery used to treat compression fractures. It was a known fact that a kyphoplasty could cause future compression fractures at the levels above and below the initial procedure. In addition, spinal compression fractures were considered to be osteoporotic fractures.

**Methods:** A single center observational cohort study with 192 patients who had kyphoplasty from 2015-2019 was conducted. The cohort was divided into two groups with a 1:1 ratio. The two groups were labeled Group I (pharmacological osteoporosis treatment) and Group II (no pharmacological osteoporosis treatment). Refracture was defined as having at least one future osteoporotic compression fracture requiring a kyphoplasty after the initial. Patients that had a subsequent fracture following the initial kyphoplasty procedure were placed into the "post kyphoplasty refracture" category, whereas those that did not have a fracture subsequent to the initial kyphoplasty were categorized as "no post kyphoplasty refracture". 44 patients self-reported the intent to start osteoporosis treatment with their primary care provider and were placed in an intended to treat group (ITT).

**Results:** A chi-square independence test was used to analyze the data. There was a significant reduction in the refracture rate ( $\chi^2=4.4045$ ,  $p=0.036$ ). In Group I, the ITT group were the only patients who were lost to follow up. 0 were lost to follow up in Group II.

**Conclusion:** The chi-square independence test suggested a strong dependent relationship between pharmacological osteoporosis treatment and the refracture rate following kyphoplasty and determined significance in data. This study gave physicians a treatment method to reduce the chance of patients developing future compression fractures. Thus, leading to far less future kyphoplasty procedures.

P115

### POTENTIAL INTEREST OF VITAMIN D SUPPLEMENTATION TO PATIENTS WITH RESPIRATORY TRACT INFECTIONS (RTI)

R. Amir<sup>1</sup>

<sup>1</sup>Centre de Santé des Fagnes Chimay, Chimay, Belgium

**Objective:** Assessment of the overall effect of vitamin D supplementation using relevant procedure to improve the prognosis of RTI either in cases of frequent infections or to prevent or minimise effects of acute RTI.

**Methods:** After review and analysis of multiple publications and several studies, this retrospective meta-analysis of data help to demonstrate that vitamin D supplementation is safe and can protect against acute RTI whatever the age of the patients. This communication reviews the roles of vitamin D in reducing the risk of RTI, knowledge about the evidence that vitamin D could reduce, particularly, risk of influenza infections by several mechanisms including cathelicidins and defensins that can lower viral replication rates and reducing concentrations of pro-inflammatory cytokines that contribute to produce the inflammation that injures the lining of the lungs, leading to pneumonia as well as increasing concentrations of anti-inflammatory cytokines.

**Results:** Vitamin D is considered to be important for a healthy immune system by inducing expression of antimicrobial peptides in immune cells and at epithelial surfaces <sup>(1)</sup>. Moreover vitamin D has anti-inflammatory effects on the adaptive immune system and can downregulate pro-inflammatory cytokines and increase immune regulatory T-cells <sup>(2,3)</sup>. Both innate and adaptive immune responses can vary according to different polymorphisms found in many steps of the vitamin D pathway.

**Conclusion:** The vitamin D supplementation increases the probability to stay free of RTI. In many studies, the findings support the notion that vitamin D status should be monitored in adult patients with RTI and suggest that an adapted supplementation of vitamin D deficiency could be a safe and cheap way to reduce RTI and improve health in this vulnerable patient population. To reduce the risk of infection, it is recommended that people at risk of RTI consider taking for adult patient about 2000 UI/d of vitamin D<sub>3</sub> to raise 25(OH)D concentration above 40-50 ng/ml.

#### References:

1. Wang TT, et al. J Immunol 2004;173:2909.
2. Daniel C, et al. J Pharmacol Exp Ther 2008;324:23.
3. Lemire JM, et al. J Nutr 1995;125(suppl 6):17045.

P116

### POTENTIAL CONTRIBUTION OF VITAMIN D IN SARS-COV-2 VIRUS/COVID-19 DISEASE (SCVD)

R. Amir<sup>1</sup>

<sup>1</sup>Centre de Santé des Fagnes Chimay, Chimay, Belgium

**Objective:** To provide a balanced scientific view on vitamin D and SCVD. It reports many information resulting from several and recent studies, providing from different sources.

**Methods:** It has been reported in many recent studies that vitamin D deficiencies have a higher risk of mortality from SCVD and it has been suggested that vitamin D supplementation can be effective in lowering the rate of SCVD intensive care unit admissions. In view of current interest in vitamin D as a potential factor in the COVID-19 pandemic, we have analysed, by retrospective review, the ways in which vitamin D reduces the risk of viral infections <sup>(1,2)</sup>, and the potential contribution in COVID-19 disease. Vitamin D has many mechanisms by which it reduces the risk of microbial infection and death. The most commonly processes known are: physical barrier, cellular natural immunity and adaptive immunity <sup>(3)</sup>. Vitamin D helps maintain right, gap, and adherences junctions <sup>(4)</sup>.

**Results:** Vitamin D enhances cellular innate immunity partly through the induction of antimicrobial peptides, including human cathelicidin <sup>(5,6)</sup> and defensins <sup>(7)</sup>. Vitamin D also enhances cellular immunity, in part by reducing the cytokine storm induced by the innate immune. This system generates pro-inflammatory and anti-inflammatory cytokines in response to viral and bacte-

rial infections as observed in COVID-19 patients <sup>(8)</sup>. It is relevant to suppose that an adapted supplementation to patients, taking in account the turnover of vitamin D in the body, by reference to 25(OH)D serum concentration could be imagined as reference, taking everything into consideration.

**Conclusion:** We can confirm observational evidence of a link of vitamin D with mortality and morbidity of SCVD. Based on the concept of balance benefit risk, we propose to people at risk of SCVD and diagnosed patients, a supplementation of vitamin D for adult patient, close to 2000 UI/d of vitamin D<sub>3</sub> to raise 25(OH)D concentration about 50-60 ng/ml.

#### References:

1. Beard JA, et al. Clin Virol 2011;50:194.
2. Holick MF. N Engl J Med 2007;357:266.
3. Rondanelli M, et al. Alternat Med 2018;5813095 (cross ref).
4. Schwalfenberg GK. Nutr Food Res 2011;55:96.
5. Liu PT, et al. Science 2006;311:1770.
6. Adams JS, et al. Immunol 2009;182:4289.
7. Laaksi I. Proc Nutr Soc 2012;71:90.
8. Huang C, et al. Lancet 2020;395:497.

P117

### METFORMIN USE AND RISK OF TOTAL JOINT REPLACEMENT IN PATIENTS WITH DIABETES A POPULATION-BASED COHORT STUDY

Z. Zhu<sup>1</sup>, J. Huang<sup>2</sup>, G. Ruan<sup>3</sup>, C. Chen<sup>3</sup>, C. Cao<sup>3</sup>, Z. Zhang<sup>3</sup>, H. Hunter<sup>4</sup>, C. Wei<sup>5</sup>, D. Ding<sup>3</sup>

<sup>1</sup>Clinical Research Centre, Zhujiang Hospital of Southern Medical University, Guangzhou, China, <sup>2</sup>Dept. of Medical Research, Chung Shan Medical University Hospital, Taichung, Taichung, Taiwan, <sup>3</sup>Clinical Research Centre, Zhujiang Hospital, Southern Medical University, Guangzhou, China, <sup>4</sup>Dept. of Rheumatology, Royal North Shore Hospital and Institute of Bone & Joint Research, Kolling Institute, University of Sydney, Sydney, Australia, <sup>5</sup>Institute of Medicine, Chung Shan Medical University, Taichung, Taiwan

**Objective:** To examine the association of metformin prescription with risks of total knee and/or hip joint replacement among patients with type 2 diabetes.

**Methods:** A population-based cohort study used 2000-2013 Taiwan's national health insurance research database. We selected patients over 45 years old when they newly diagnosed with type 2 diabetes mellitus (DM). DM patients were classified into metformin and nonmetformin users based on if metformin was ever used after diagnosis. Prescription time-distribution matching (PTDM) was performed to select the age, sex, and year of DM diagnosis paired exposure and nonexposure candidates. Then, propensity score matching (PSM) was used to balance the age, sex, urbanization, insurance type, adapted diabetes complication

index, medications for pain management, hyaluronic acid and physical rehabilitation between two groups. The risk of knee and/or hip joint replacement after metformin use were assessed using Cox proportional hazard regression. Dosage of metformin (0,  $\leq 1.0$  mg/d;  $> 1$  mg/d) at baseline and the landmark (12/24 months after first prescription) were performed to evaluate potential dose-response relationship. Sensitivity analysis was performed by using inverse probability of treatment weighting (IPTW) and completing risk models.

**Results:** A total of 40,694 participants (20,347 nonmetformin vs. 20,347 metformin) were included (mean [SD] age, 63 [11] y; 49.8% were women) after PTDM. Comparing with the nonmetformin users, patients who used metformin had a lower risk of total knee or hip joint replacement (adjusted HR (aHR) = 0.67, 95%CI=0.58-0.76 for any joint replacement; aHR=0.67, 95%CI=0.59-0.79 for total knee replacement; aHR=0.59, 95%CI=0.41-0.85 for total hip replacement) after adjustment for covariates. PSM analyses in participants (10,163 nonmetformin vs. 10,163 metformin) and sensitivity analyses using IPDW and completing risk models showed similar results. Significant dose-response relationships (all p for trend  $< 0.05$ ) were observed between metformin use at baseline or 12/24 landmark points and total knee/hip replacement.

**Conclusion:** Use of metformin in patients with type 2 diabetes was associated with a significantly reduced risk of total joint replacement due to osteoarthritis, suggesting a potentially therapeutic effect of metformin on osteoarthritis. Further randomized controlled clinical trials are warranted to confirm the findings.

## P118

### ATYPICAL FEMORAL FRACTURE, OSTEOPOROSIS AND BIPHOSPHONATES: WHAT IS THE RELATIONSHIP?

I. Puyuelo Jarne<sup>1</sup>, A. C. Laga Cuen<sup>1</sup>, A. Aguirre Extebarria<sup>1</sup>, P. Sevilla Ortega<sup>1</sup>, P. Isla Sarasa<sup>1</sup>, N. Pardina Lanuza<sup>1</sup>

<sup>1</sup>Servicio Riojano de Salud, Traumatología, Hospital San Pedro, Logroño, Spain

**Objective:** To know the personal history importance of each patient when evaluating long bone fractures and posterior management.

**Methods:** We present the case about a 55 years old women who suffers accidental trauma at home that causes several pain and functional impotence so she decides to go to the hospital where she is diagnosed with a subtrochanteric femoral fracture.

**Results:** Analyzing the radiological characteristics of the fracture, we are surprised by the fact that it meets the criteria for an atypical fracture so when asking about personal history and previous treatments, the patient tells us that she has been taking bisphos-

phonates for three years due to osteoporosis and the last month she refers a pain in his left hip that prevents her from walking normally.

**Conclusion:** Bisphosphonates are medications used for the osteoporosis treatment in order to reduce the risk of fracture in these patients, but should not be administered indefinitely because their effectiveness decreases beyond 5 years and the increased risk of serious adverse events, such as atypical femoral fractures.

## P119

### HIP DYSPLASIA, OSTEOPOROSIS AND CUT-THROUGH NAIL: NOW WHAT?

I. Puyuelo Jarne<sup>1</sup>, A. C. Laga Cuen<sup>1</sup>, A. Aguirre Extebarria<sup>1</sup>, P. Sevilla Ortega<sup>1</sup>, P. Isla Sarasa<sup>1</sup>, N. Pardina Lanuza<sup>1</sup>

<sup>1</sup>Servicio Riojano de Salud, Traumatología, Hospital San Pedro, Logroño, Spain

**Objective:** Know the possible complications that can exist in elderly patients who suffer trochanteric fractures.

**Methods:** We present the case about a 88 years old patient who suffers 3 months ago a trochanteric femoral fracture after falling at home. The x-ray shows a typical pertrochanteric fracture, but really impresses us is the several same hip dysplasia that the patient suffers.

**Results:** As the objective of treatment in this patient was to nail the fracture, we proceed to do, using a standard gamma nail, with good postoperative results and in subsequent consultations. The patient was walking a month after the surgery with some independence at daily life. Three months later the patient comes to the consultation with hip pain and inability to walk, at the x-rays we can see one type of complication that does not occur frequently in this type of age patients, a cut-through nail, with a small difference, this patient had a several dysplasia at same hip that increased the difficulty in managing this complication.

**Conclusion:** In the cut-through exists a central position perforation at the hip joint without cephalic screw loosening. These type of complications can be explained by a biomechanical change in the fracture site when the patient begins loading and walking on the member intervened. Collapse of the femoral neck and shear forces in a comminuted area, around the lag screw can produce a collapse in the area of the fracture. Having osteoporosis is also an added risk factor in these patients to suffer this type of complication.

P120

**DOUBLE OSTEOPOROTIC FRACTURE IN UPPER EXTREMITY, ARE WE DOING IT RIGHT?**

N. Pardina Lanuza<sup>1</sup>, I. Puyuelo Jarne<sup>1</sup>, A. C. Laga Cuen<sup>1</sup>, A. Aguirre Etxebarria<sup>1</sup>, P. Sevilla Ortega<sup>1</sup>, P. Isla Sarasa<sup>1</sup>

<sup>1</sup>Hospital San Pedro, Logroño, Spain

Osteoporosis is a systemic disease whose incidence is increasing in recent years. Therefore it, the incidence of osteoporotic fractures also increases.

We present the case of a 63-year-old female patient, who suffered a subcapital fracture of the right humerus in 2019, treated conservatively with immobilization. After her recovery, a bone densitometry was performed, with which the patient was diagnosed with osteoporosis in the lumbar spine and grade II osteopenia in the femoral neck. For this reason, we decided to start, in October 2019, treatment with alendronic acid, calcium and vitamin D.

A year and a half later, the patient went to the emergency room due to a low energy fall on the public highway. She reported functional impotence in the right upper limb. X-rays are taken and the existence of a double fracture in the limb is observed: supra-intercondylar humerus fracture and distal radius fracture.



The patient needed surgery for both fractures, we performed osteosynthesis with 90° double plate in the elbow using a posterior approach with osteotomy of the olecranon and osteosynthesis with a preformed distal radius plate using a volar approach.



Osteoporosis is present in our daily work. This case shows us how a patient with correct treatment for osteoporosis suffers again a double osteoporotic fracture after a low-energy trauma. This makes us ask ourselves... are we really doing it right?

P121

### SELF-DIRECTED AGEISM AND PHYSICAL PERFORMANCE AMONG OLDER ADULTS

A. I. Gasparik<sup>1</sup>, B. Mester-Nagy<sup>1</sup>, M. Cevei<sup>2</sup>, S. Mihalcea<sup>3</sup>, D. Stoicanescu<sup>4</sup>, M. Farcas<sup>2</sup>, Z. S. Csata<sup>5</sup>

<sup>1</sup>University of Medicine, Pharmacy, Science & Technology of Targu Mures, Tirgu Mures, <sup>2</sup>Universitatea din Oradea, Oradea, <sup>3</sup>Rehab. Hospital, Baile Felix, <sup>4</sup>UMF Victor Babes, Timisoara, <sup>5</sup>University Babes-Bolyai, Cluj Napoca, Romania

**Objective:** Age-related impairments in muscle performance have been proved to be influenced by various, including psychological, factors. Evidence shows that ageism negatively impacts the health of older adults: those with negative attitudes about ageing may live 7.5 years less than those with positive. This study aimed to explore possible links between physical performance and the prejudicial attitudes among older persons towards their own age group.

**Methods:** The survey consisting of 29 variables assessed socio-demographic parameters, physical fitness and attitudes toward ageing. Correlation, OLS regression and factor analysis were used.

**Results:** Based on the responses of 227 persons (age 60+/ ~73): education and rural environment reduce the tendency to think stereotypically. The negative elderly (self) picture increases with age. However, age-related perceptions were not correlated with BMI, the chair-test was the strongest predictor of the age-related attitudes ( $t=3.123$ ,  $p=0.002$ ). In a next step, we performed factor analysis on the 24-item scale about ageing perceptions. Four factors explained 50% of the total variance, including the feeling of loneliness and exclusion, which proved to have a significant effect on muscle performance along with higher education, rural residence and age.

**Conclusion:** Seniors with negative stereotypes of ageing are characterized by significantly lower muscle performance. Investigation of the causal relationship between physical health and mental disposition is needed in order to verify if changing society's view of aging can delay age-related declines in muscle function.

P122

### RISK FACTORS OF THE DEVELOPMENT OF OSTEOPOROSIS IN FEMALE WITH RHEUMATOID ARTHRITIS, NONTREATMENT BY GLUCOCORTICIDS

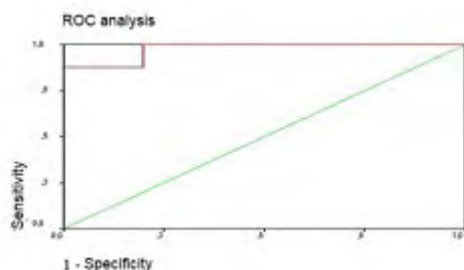
E. Taskina<sup>1</sup>, L. Alekseeva<sup>1</sup>, N. Kashevarova<sup>1</sup>, D. Kusevich<sup>1</sup>, I. Dydykina<sup>1</sup>, A. Smirnov<sup>1</sup>

<sup>1</sup>V.A. Nasonova Research Institute of Rheumatology, Moscow, Russia

**Objective:** Tradition basic risk factors of osteoporosis (OP) is middle-age and glucocorticoids (GC), negative affect in quality of bone tissue and decrease BMD. Aim was to define role of rheumatoid arthritis (RA) in the development of OP in female with RA up to 60 years old, nontreatment with GC.

**Methods:** The study included 52 RA females (according to ACR 1987 criteria), nontreatment of GC, in age between 20-60 years old (mean  $50.2 \pm 7.4$ ). An patient's file contained social and demographic data, anthropometric parameters, medical history, clinical and lab examination, traditional OP risk factors, joint status and comorbidities. Hand and distal feet X-ray was taken in each case. Van der Heijde modified Sharp method was used to score the erosions and joint space narrowing in hands and feet. Axial BMD was measured using DXA scan. DXA T-score was used in postmenopausal women and Z-score in menstruating women. After examination patient were divided in two groups with and without osteoporosis: 14 (26.9%) and 38 (73.1%), respectively. Both groups are similar by mean age and anthropometric characteristics, debut age and disease duration, stage of clinical lab activity and HAQ.

**Results:** In first group vs. second, number of patients with 4 flares of RA during the last year were over (42.9% vs. 15.8%,  $p=0.04$ ), difference was significant. Statistically significant intergroups differences was identified by quantitative assessment of X-ray by Sharp method (Sharp-Van der Heijde): the assessment of erosions in group 1 was 51(28.5-77), in group 2 was 6 (1.5-18),  $p<0.001$ , scoring of joint space narrowing 115.5(83-126) vs. 69(50-98),  $p<0.04$  and the total Sharpe index 165(119.5-196.5) vs. 80(51-117),  $p<0.008$ , respectively. When assessing traditional risk factors, it was shown that in the postmenopausal period were 13 patients from group 1 (92.9%) and 21 (55.3%) patients from group 2 (OR=1.68, 95%CI 1.22-2.32,  $p=0.01$ ). Periods of immobilization (more than two months) and low-energy fractures in the history were also more often detected in OP (respectively, 28.6 and 2.6%, OR=10.9, 95%CI 1.32-89.0,  $p=0.02$ ; 50 and 18.4%, OR=2.71, 95%CI 1.13-6.52,  $p=0.03$ ). Multifactorial analysis identified the following major OP risk factors: Sharp erosion score, fracture incident in medical history, menopause, smoking; the contribution of these variables in OP development was assessed (discriminant function coefficients: 0.0946; 3.6973; 3.5363; 2.6253, respectively). In according to revealed risk factors and their coefficients was created a ROC curve (AUC) model allows to predict the axial OP with high accuracy, equal to 92.9% (with the area under the ROC curve equal to 0.969, Fig.1).



**Conclusion:** Development of OP in female with RA up to 60 years old, nontreatment of GC was conditioned to erosive X-ray changes in hand and distal feet (assessment by Sharp method), smoking, menopause and fact history of fracture.

P123

### RAPAMYCIN IMPROVES BONE MASS IN HIGH TURNOVER OSTEOPOROSIS WITH IRON ACCUMULATION THROUGH POSITIVE EFFECTS ON OSTEOGENESIS AND ANGIOGENESIS

W. Aifei<sup>1</sup>, W. Jiadong<sup>1</sup>, X. Youjia<sup>1</sup>

<sup>1</sup>Dept. of Orthopaedics, The Second Affiliated Hospital of Soochow University, Suzhou, China

**Objective:** Iron accumulation is an independent risk factors of type I osteoporosis, and mTOR plays an important role on the crosstalk between osteogenesis and angiogenesis. This study aimed to identify the role of mTOR in the high-turnover osteoporosis with iron accumulation, the underlying molecular mechanism, and whether rapamycin can target at mTOR treating type I osteoporosis with iron accumulation effectively.

**Methods:** We establish mouse models of iron accumulation and transgenic mouse models (Hepc<sup>-/-</sup>) of high turnover type osteoporosis with iron accumulation to observe the variety of mTOR in these mice, and treat osteoblasts with FAC to watch mTOR in vitro. Then we injected rapamycin to mouse models of high turnover osteoporosis with iron accumulation, transfected the FAC treated osteoblasts with mTOR relative siRNA and cultured HU-VECs with corresponding medium extracted from osteoblasts, to detect indexes of bone, osteogenesis and angiogenesis in bone and in vitro. Finally, relative biomarkers of cell signaling pathways were measured.

**Results:** We found the osteoblastic mTOR was activated both in mouse models of iron accumulation and high turnover osteoporosis with iron accumulation, and the deteriorative bone, osteogenesis and angiogenesis induced by iron accumulation were improved by suppressing mTOR with rapamycin in mice and siRNA transfection in vitro. The mTOR/STAT1/Cxcl9 pathway signals were stimulated by iron accumulation in osteoblasts.

**Conclusion:** Our study shows that iron accumulation impairs the bone regeneration of osteoporosis via osteoblastic mTOR/STAT1/Cxcl9 pathway, and rapamycin can target at mTOR improving osteogenesis and angiogenesis in bone of high turnover type osteoporosis with iron accumulation to increase bone mass.

P124

### RESEARCH ON KEY MOLECULES OF OSTEOPOROSIS BASED ON PROTEOMICS OF BONE TISSUE IN POSTMENOPAUSAL WOMEN

W. Aifei<sup>1</sup>, Z. Hui<sup>1</sup>, C. Bin<sup>1</sup>, X. Youjia<sup>1</sup>

<sup>1</sup>Dept. of Orthopaedics, The Second Affiliated Hospital of Soochow University, Suzhou, China

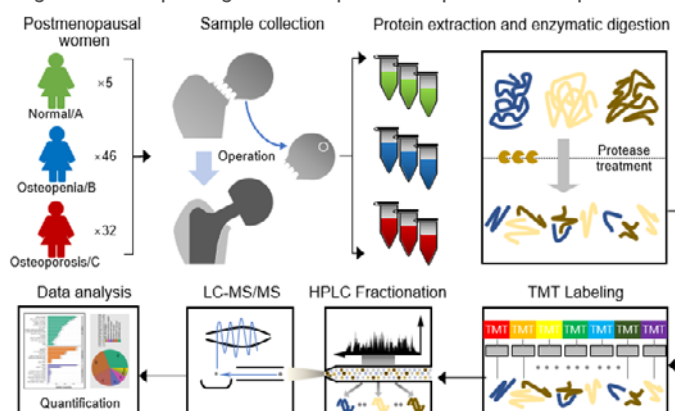
**Objective:** Using bone tissue proteomics analysis to find new mechanisms and new targets for the pathogenesis of postmenopausal osteoporosis, and to provide new strategies for the diagnosis and prevention of postmenopausal osteoporosis.

**Methods:** In this study, patients were screened according to the inclusion and exclusion criteria, and the femoral skull tissue samples were collected. A total of 96 femoral skull tissue samples were collected. A total of 83 samples were qualified for protein examination. The bone tissue samples were performed according to the BMD T value of the patient's hip. Grouping: normal group ( $T > -1.0$ , group A), osteopenia group ( $-2.5 < T < -1.0$ , group B), osteoporosis group ( $T < -2.5$ , group C), all samples were protein Extracted, digested with trypsin, and labeled with TMT. After HPLC fractionation, liquid chromatography mass spectrometry was used to analyze the expression levels of different proteins in each bone tissue specimen; analysis of proteins with significant differential expression between each group of bone tissues (change fold  $\geq 1.2$ , P value  $\leq 0.05$ ), perform bioinformatics analysis, and further screen the three groups of osteoporosis group, osteopenia group and normal group that show continuous upregulation or downregulation as possible key molecules of osteoporosis.

**Results:** This postmenopausal female bone tissue proteomics study identified 3743 proteins in human bone tissues, of which 3280 proteins contained quantitative information. Using 1.2 times as the differential expression change threshold and statistical test t-test p-value  $< 0.05$  as the significance threshold, then among the quantified proteins, the expression of 353 proteins in the B/A comparison group was upregulated, and 387 proteins The expression was downregulated; the expression of 343 proteins in the C/A comparison group was upregulated, and the expression of 288 proteins was downregulated; the expression of 224 proteins in the C/B comparison group was upregulated, and the expression of 310 proteins was downregulated; and for all differentially expressed proteins functional classification, functional enrichment and cluster analysis based on functional enrichment were carried out; through further screening of the proteins that showed continuous changes in the three groups, 18 downregulated proteins and 13 upregulated proteins were found, a total of 31 differences in

the same direction and significant. The proteins include COL1A1, COL1A2 and DMP1, which are known to play an important role in bone metabolism. Among the 31 differential proteins, 26 proteins have not been reported in bone metabolism related research.

**Conclusion:** This proteomics has identified a large number of proteins in the bone tissues of postmenopausal women, and found that there are significant differences in the proteins in bone tissues among people with normal, osteopenia and osteoporosis. Through screening, we have obtained 31 significantly different proteins. These proteins include not only the currently known protein molecules related to bone metabolism, but also many proteins with unknown functions and roles in the process of bone metabolism. These may be clues for new mechanisms and new targets for the pathogenesis of postmenopausal osteoporosis.



P125

## MODERN POSSIBILITIES OF COMBINED THERAPY OF HYPERURICEMIA AND EXACERBATIONS OF ARTICULAR SYNDROME IN PATIENTS WITH GOUT

M. Gromova<sup>1</sup>

<sup>1</sup>Pirogov Russian National Research Medical University, Moscow, Russia

**Objective:** Throughout the year 69% of patients with gout experienced repeated exacerbations during therapy aimed at reducing urate levels. Therefore, proper prevention of articular syndrome exacerbations in acute and chronic gout is very important. Prevention of arthritis exacerbations with low dose NSAIDs should be done in the first 3-6 months of urate-reducing therapy. This study aimed to assess the frequency of exacerbations and quality of life in patients with gout after a 12 weeks course of urate-reducing therapy with allopurinol in combination with the anti-inflammatory drug meloxicam for the prevention of gout exacerbations.

**Methods:** 143 patients with an established diagnosis of gout were examined at an outpatient appointment. Physical examination was performed in all patients with the calculation of anthropometric data indicators (height, body weight, BMI), blood pressure (BP) levels during visits. Clinical blood and urine tests, biochemical blood tests with determination of the level of uric acid, cre-

atinine, C-reactive protein (CRP), instrumental diagnostics (electrocardiography). Information about concomitant diseases was entered, drug therapy was recorded on moment of the program. Allopurinol was administered orally, once a day. Every 3 weeks under the control of serum uric acid levels (sUA), the allopurinol dosage was increased by 50 mg, up to 300 mg/d. The total daily dose of meloxicam administered in different dosage forms was 7.5-15 mg. After 3, 6, 9 and 12 weeks, the clinical efficiency of treatment was assessed using the EuroQol-5D-5L questionnaire, physical examination, joint pain dynamics at rest, during movement and palpation, as well as the Likert scale and visual analog scale (VAS) in mm. Factors such as the presence of anxiety or depression, selfcare ability, normal daily activities of daily living were taken into account, as well as their rating of their level of satisfaction with the treatment on a scale of 1 to 5, where 1 is not an improvement but a deterioration and 5 is a very good result. Both the period of remission and the time before the onset of a recurrence of gouty arthritis were taken into account, as well as adverse events (AEs) were recorded.

**Results:** Against the background of treatment with meloxicam 7.5 mg/d, more than two-thirds of the patients did not experience a worsening of the joint syndrome with an increase in the dose of allopurinol to 300 mg/d. By the 12th week of follow-up, it was found that the characteristic features of gouty arthritis significantly began to differ in improving mobility, selfcare, habitual daily activities, reducing soreness, reducing anxiety and depression ( $p < 0.05$ ). Moreover, the initial ESR and sUA levels were significantly different from the follow-up endpoint ( $p < 0.05$ ), indicating a positive effect on the inflammatory process. A 3-month course of combination therapy did not cause a significant increase in BP or change in serum creatinine clearance in the patients. From the gastrointestinal tract there were no adverse events. 90.9% of patients assessed the treatment efficiency as very good. AEs in the form of an allergic skin rash were observed in one patient. But there was no need to interrupt the treatment, as the rash completely disappeared without consequences after completing the course of treatment with allopurinol and meloxicam.

**Conclusion:** A 12-week combination therapy with allopurinol, a urate-reducing drug, and meloxicam, an anti-inflammatory drug, prevents exacerbation of joint syndrome and improves quality of life in patients with gout.

P126

## EXAMINATION OF LEAN MASS CONTENT IN TYPE 2 DIABETES MELLITUS PATIENTS USING DIFFERENT HYPOGLYCEMIC DRUGS

L. Labashova<sup>1</sup>, P. Shepelkevich<sup>2</sup>, V. Dydyshka<sup>2</sup>

<sup>1</sup>Republic Centre of Medical Rehabilitation & Balneotherapy,

<sup>2</sup>Belarusian State Medical University, Minsk, Belarus

**Objective:** Diabetes mellitus can be one of the reasons for the loss of muscle mass. Since absolute muscle mass is strongly correlated with height or weight, relative muscle mass -appendicular

muscle mass (AMM) indexes are used for sarcopenia diagnosis by DXA. The aim was to examine lean body mass in postmenopausal women with type 2 diabetes depending on prescribed hypoglycemic drugs.

**Methods:** A sample of 75 postmenopausal women with type 2 diabetes mellitus (53 women injected insulin and 22 women received oral antidiabetic drugs (metformin+sulfonylurea) were recruited to the research. Patients were matched for age (U=582.0; p=0.986), height (U=545.0; p=0.662), weight (U=453.5; p=0.133), and BMI (U=444.5; p=0.108). The age of the participants was 62.6 (59.6-66.4) y, BMI 32.7(29.3- 35.6) kg/m<sup>2</sup>. Lean mass was measured using DXA. AMM, AMM in kg divided by height and BMI were calculated.

**Results:** We did not reveal the differences in the total amount of lean mass in grams (U=524.0; p=0.496), regional distribution of lean mass: trunk (U=538.0; p=0.604), android region (U=501.0; p=0.342), gynoid region (U=576.5; p=0.944) in patients with different types of hypoglycemic drugs. There were no significant differences in the AMM (U=504.5; p=0.364) and calculated indices of the quantitative state of the muscle component: AMM/height (U=479.0; p=0.228), AMM/BMI (U=484.0; p=0.251).

**Conclusion:** Our study did not find any significant differences in lean mass component in patients with type 2 diabetes mellitus received different hypoglycemic therapy.

## P127

### IMPACT OF CROSS HORMONAL THERAPY IN PATIENTS WITH GENDER DYSPHORIA: FINAL RESULTS

D. C. Concha<sup>1</sup>, A. S. Sierra<sup>1</sup>, J. V. Vargas<sup>1</sup>, A. M. Medina<sup>1</sup>

<sup>1</sup>Hospital de San Jose - Fundación Ciencias de La Salud, Bogota, Colombia

**Objective:** Hormone therapy is the main medical strategy for patients facing gender transition. Cross hormone therapy, acts by suppressing gonadal hormones and secondary sex characteristics of the biological sex. The impact of long-term cross sex hormone therapy in the transgender population is still unknown. We present an analysis in the impact of hormone replacement therapy on BMD in patients with gender incongruity who attend a program with a multidisciplinary approach in Bogotá, Colombia. This study aimed to evaluate the impact of hormone affirmation therapy on BMD in transgender patients in a center with a multidisciplinary approach in Bogotá, Colombia.

**Methods:** A series of cases of patients with gender dysphoria of MTF (transgender woman) and FTM (transgender man) is reported. Before the start of hormone therapy, a bone densitometry was performed evaluating the lumbar spine (LS), total hip (TH) and femoral neck (FN) BMD. A year after the start of treatment a new BMD evaluation was carried out using bone densitometry. The impact of the hormone therapy on BMD was analyzed within the

period of one year after its initiation by means of the difference in BMD in g/cm<sup>2</sup> and the change in the percentage in the MTF and FTM group.

**Results:** In the FTM group there was an increase in BMD of 2.2% in the lumbar spine and of 0.9% in the femoral neck. In the MTF group there was a gain of 17% in the femoral neck. All the patients had normal T- and Z-scores.

**Conclusion:** Cross hormone therapy in patients with gender dysphoria has a positive impact in BMD.

## P128

### SCREENING CALCANEAL BONE MINERAL DENSITY AMONG JORDANIAN WOMEN

R. Al-Ahmar<sup>1</sup>, A. Asma<sup>1</sup>, K. Abu Rouse<sup>1</sup>

<sup>1</sup>Jordanian Osteoporosis Prevention Society (JOPS), Amman, Jordan

**Objective:** Osteoporosis is the most common systemic skeleton illness that is characterized by a reduction in bone density and increased risk of fracture. The diagnostic sensitivity of ultrasound measurement of the calcaneus in the prediction of hip fracture has been shown by recent large prospective studies to be similar to hip BMD measured with DXA and superior to spine BMD. For each standard deviation decrease in the measurement, the risk of fracture increases approximately two-fold. The aim of this study was to screen osteoporosis, osteopenia, and normal BMD between different age groups of Jordanian women in different parts of Jordan using a Hologic Sahara bone densitometer machine.

**Methods:** BMD of the calcaneal Jordanian Women screen had been executed by the National Woman's Health Care Centre in collaboration with the Jordanian Osteoporosis Society (JOPS) through woman's health awareness campaign from 2014-2016 using an easy and painless procedure; an osteoporosis screening measures the calcaneal T-score by placing the (Lt) foot in a Hologic Sahara bone densitometer machine for all ladies attended the campaign and were elder than 20 years.

**Results:** 776 women have been screened from different parts of Jordan, their age was (20-87) years. Using estimated BMD by heel ultrasound, few patients have T-scores below -2.5, whereas most women fall above this level especially postmenopausal women.

**Conclusion:** The discrepancies in the prevalence of osteoporosis are the result of several factors including differences in age-related bone loss, some medication, and secondary to other diseases.



P129

**REHABILITATION PROGRAM IN OSTEOARTHRITIS PATIENTS DURING THE COVID-19 LOCKDOWN**O. Fugaru<sup>1</sup>, D. Kamal<sup>2</sup>, C. Kamal<sup>1</sup>, O. Rogoveanu<sup>1</sup>, R. Traistaru<sup>1</sup><sup>1</sup>University of Medicine & Pharmacy, <sup>2</sup>MedLife Clinic, Craiova, Romania

**Objective:** In 2020, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which causes coronavirus disease 2019 (COVID-19), changed the entire providing rehabilitation medical services for osteoarthritis patients. To minimize the rate of new infections and to preserve medical resources, most rehabilitation programs in Romania hospitals were postponed. The aim of this prospective randomized controlled trial is to compare the outcomes of telerehabilitation program and conventional treatment in patients with lower limb osteoarthritis (hip and knee) during the COVID-19 lockdown.

**Methods:** Our study included 53 patients (aged 54-72 y, 25 females, 28 males), with known hip or knee osteoarthritis, who had been postponed for inpatient rehabilitation program because of COVID-19. Between April and June 2020, patients were randomly divided into experimental group (26 patients underwent telerehabilitation program: conventional treatment, educational measures, home web-based exercise program for entire body, including respiratory and aerobic exercises) and control group (27 patients) received only conventional treatment (usual analgesic and nonsteroidal anti-inflammatory drugs and chondroprotector agents). We chose easy scales to assess the outcomes – WOMAC index for functional status and visual analogue scale for pain. All patients were evaluated by telephone interviews during baseline, in the fourth and eighth week.

**Results:** The pain in EG decreased compared with that in CG both at the fourth week ( $p < 0.003$ ) and at the eighth week ( $p < 0.05$ ). The self-reported WOMAC score in EG was significantly lower than that in the CG at the fourth week ( $p < 0.001$ ), but not at the final ( $p > 0.05$ ). Patients over 65 years of age mentioned that the person which helps them to access the web material was no longer available.

**Conclusion:** A decrease of physical activity in pandemic period is associated with an increase in pain and loss of lower limb joint function. Our results were in accordance with the demonstrated importance of home exercise programs to decrease symptoms and improve daily functioning during prolonged rest period. The best results were obtained in subjects under 65 years old, so age is a real obstacle for telerehabilitation in our patients.

P130

**WEB-BASED EXERCISE PROGRAM IN THE OSTEOPOROTIC FIBROMYALGIA FEMALES DURING COVID-19 PANDEMIC**R. Traistaru<sup>1</sup>, C. Kamal<sup>1</sup>, D. Kamal<sup>2</sup>, A. M. Bumbea<sup>1</sup>, O. Rogoveanu<sup>1</sup><sup>1</sup>University of Medicine & Pharmacy, <sup>2</sup>MedLife Clinic, Craiova, Romania

**Objective:** The positive effects of an aerobic exercise in the management of fibromyalgia (FM) patients with osteoporosis was recognized. At present, the coronavirus disease 2019 (COVID-19) pandemic has significantly affected public health. As entire world, in our country hospital facilities, are less accessible than usual. To minimize the rate of new infections and to preserve medical resources, most rehabilitation services in our country were postponed.

**Methods:** A single blind randomized controlled trial was conducted to evaluate home-training program efficacy in the treatment of females that associated FM and postmenopausal osteoporosis. 42 licensed females (average age 52.3 y). diagnosed with FM by ACR criteria and postmenopausal osteoporosis (lumbar spine BMD T-score  $< -2.5$  SD) were recruited from our rehabilitation clinic database. Patients were randomized into two groups: group 1 – 22 females (G1) underwent telerehabilitation program: conventional treatment, educational measures, home web-based exercise program for entire body, including respiratory, resistive, weight bearing and aerobic exercises; group 2 – 20 females control (G2), receiving only conventional treatment for osteoporosis and analgetic drugs. We chose relative easy scales to assess the outcomes – visual analogue scale (VAS) for pain, Spitzer scale for quality of life and fibromyalgia impact questionnaire (FIQ). All patients were evaluated by telephone interviews during baseline and after 6 weeks.

**Results:** Obtained data presented statistical differences between the groups. The improvements were found after 6 weeks for FIQ (47.5% in G1 and 29.5% in G 2, respectively) ( $p < 0.05$ ) and improvement in G1 was significantly higher than G2 ( $p < 0.01$ ). VAS scores for pain reduced in all females; this reduction was significantly higher in G1. The Spitzer scale also showed significant improvements in G1 group.

**Conclusion:** Home-training program, based on aerobic exercises, can lead to long-term success in the management of females with FM and osteoporosis, especially for quality of life and clinical status. Early detection and implementation an aerobic training – resistive and weight-bearing exercises, may be indicated in all postmenopausal females with FM in special situation like present pandemic. Age is not a barrier to the adoption of telerehabilitation in our licensed patients.

P131

**NEUROPATHIC PAIN IN PRIMARY KNEE OSTEOARTHRITIS: COMPLETE MANAGEMENT**R. Traistaru<sup>1</sup>, D. Kamal<sup>2</sup>, A. M. Bumbea<sup>1</sup>, O. Fugaru<sup>1</sup>, C. Kamal<sup>1</sup><sup>1</sup>University of Medicine & Pharmacy, <sup>2</sup>MedLife Clinic, Craiova, Romania

**Objective:** Primary knee osteoarthritis (PKOA), a complex joint disease causing pain and decreased function, is one of the leading causes of year lost to disability worldwide. The recent documented presence of a neuropathic component of pain in these patients has an important negative impact on quality of life. In our study we investigated if complete management (SpineDinamic daily, 1 tablet, 8 weeks and rehabilitation program – educational measures, aerobic and proprioceptive exercises, and magnetotherapy, three times a week) influence neuropathic pain and functional status and improve quality of life in PKOA.

**Methods:** We performed a prospective randomized controlled trial in outpatient medicine clinic. 54 PKOA patients (aged 51-72 y, 35 females, 19 males, diagnosed as grade II and III KOA in accordance with the Kellgren-Lawrence classification) were completely evaluated before rehabilitation program, to exclude the potential confounding comorbidities for neuropathic pain subphenotype, in accordance with the updated ESCO stepwise algorithm, and were randomly divided into the experimental group (EG - underwent complete management) and control group (CG) received only rehabilitation program, without SpineDinamic therapy. Improvements in pain (painDETECT questionnaire), knee function (WOMAC questionnaire) and quality of life (Short Form-36 survey) were compared. These outcomes were measured at baseline and postrehabilitation. We used SPSS Statistics 22.0 for the data analysis.

**Results:** Parameters in both groups had an improving trend. The painDETECT and WOMAC pain scores decreased significantly in the EG compared to the CG ( $p < 0.001$  and  $p = 0.003$ , respectively). The WOMAC physical function and SF-36 scores were significantly improved in EG. Between-group differences were statistically significant postrehabilitation ( $p < 0.05$ ).

**Conclusion:** Our results sustained the well known benefit of magnetotherapy and exercise program for clinical manifestations and functional status in PKOA. Combining SpineDinamic therapy with rehabilitation program might enhance both the altered pain perception and quality of life in PKOA patients. Pain level and quality of life in PKOA patients are deeply interconditioned and require both careful assessment and complete management.

P132

**IDENTIFICATION OF COMMON DIFFERENTIAL GENES AND SEVERAL PROGNOSIS BIOMARKERS IN EWING SARCOMA USING BIOINFORMATIC ANALYSIS**B. Liu<sup>1</sup>, Y. Xu<sup>1</sup><sup>1</sup>Dept. of Orthopedics, Clinical Center for Osteoporosis, the Second Affiliated Hospital of Soochow University, Suzhou, China

**Objective:** Ewing sarcoma (ES) is a highly aggressive tumor occurring mainly in adolescents and young adults. The purpose of our study was to identify candidate biomarkers of ES and uncover their potential molecular mechanisms. Genetically, some genes play an important role in the development of ES, however, the specific molecular mechanism and pathogenesis are still unclear. Our study aims to identify candidate biomarkers of ES using bioinformatic analysis.

**Methods:** The gene expression profiles of GSE45544 and GSE17674 were downloaded from Gene Expression Omnibus (GEO) database. Gene Ontology (GO) and Kyoto Encyclopedia of Genes and Genomes pathway (KEGG) were used to analyze the functions and pathway enrichment of the common differential genes based on Metascape online tool. Subsequently, protein-protein interaction (PPI) network was constructed, and hub genes of the differentially expressed genes (DEGs) were identified by Cytoscape software. Finally, the prognostic significance of each hub gene was performed by GEPIA.

**Results:** A total of 591 common DEGs were identified in ES, including 47 upregulated genes and 42 downregulated genes. GO analysis showed that these DEGs were mainly enriched in cell division, chromatin binding and response to antibiotic, while KEGG analysis revealed that all these DEGs were mainly enriched in the pathways associated with cancer, such as aldosterone-regulated sodium reabsorption and p53 signaling pathway. In addition, PPI network was visualized by the Cytoscape software, and 6 of hub genes include TOP2A, BUB1B, NUSAP1, NCAPG, CDK1 and ASPM showed worse disease-free survival in sarcoma patients.

**Conclusion:** TOP2A, BUB1B, NUSAP1, NCAPG, CDK1 and ASPM may be potential biomarkers for the prognosis of ES, and provide therapeutic targets for the development of drugs.

P133

**BIOINFORMATIC ANALYSIS OF DIFFERENTIALLY EXPRESSED GENES IN PRIMARY OSTEOPOROSIS**B. Liu<sup>1</sup>, Y. Xu<sup>1</sup><sup>1</sup>Dept. of Orthopedics, Clinical Center for Osteoporosis, the Second Affiliated Hospital of Soochow University, Suzhou, China**Objective:** To investigate the differentially expressed genes (DEGs) related to the occurrence and development of osteoporosis (OP) as well as screen out potential drug targets.**Methods:** The microarray data concern osteoporosis were obtained from GEO database and DEGs were identified by R statistical software. GO and KEGG enrichment analysis, protein-protein interaction (PPI) network analysis, and selection of hub genes were conducted.**Results:** A total of 569 DEGs were screened out, 7 upregulated and 562 downregulated. At the same time, GO analysis of DEGs was mainly enriched in processes such as pre-mRNA intronic binding, nuclear body, histone modification, and mRNA 3'-end processing, while KEGG analysis mainly involved the ubiquitin mediated proteolysis signal pathway (hsa04120). By the calculation of the STRING database, we obtained the PPI network, which consists of 517 nodes and 363 edges, and the top 10 hub genes (TCEB1, CUL2, KBTBD6, KBTBD7, ASB8, KLHL42, ASB5, FBXO11, ANAPC10, CDC23) of this study were acquired by Cytoscape software.**Conclusion:** The top 10 hub genes might help us understand the pathophysiology of OP, even provide therapeutic targets for the development of drugs. Meanwhile, it might provide some new ideas for funding creative scientific hypotheses of OP.

P134

**THE EFFECT OF IRON ACCUMULATION ON OSTEOBLAST ACTIVITY AND MINERALIZATION THROUGH SLC7A11**J. J. Li<sup>1</sup>, Y. J. Xu<sup>1</sup><sup>1</sup>Soochow University, Suzhou, China**Objective:** Iron accumulation affects the activity of osteoblasts, which may be related to the production of ROS, but the detailed mechanism remains to be further elucidated. The cystine/glutamate antiporter system is embedded on the surface of the cell membrane and can transport cystine into the cell and glutamate to the outside of the cell to play an antioxidant role. SLC7A11 is an important subunit of this system. This study explored the effect of iron accumulation through SLC7A11 on the activity and mineralization of osteoblasts.**Methods:** The osteoblast cell lines Saos-2 and MC3T3-E1 were used as the research objects and were divided into two groups, one group was the control group (Ctrl), and the other was the iron intervention group (FAC). The control group did not do any treatment, and the FAC group was cultured with osteoblast culture medium containing 200  $\mu$ M ferric ammonium citrate (FAC). After the intervention, mRNA expression levels of osteoblast-specific genes (such as RUNX2, ALP, OCN, SP7, OSX) and SLC7A11 were detected by quantitative reverse transcription PCR (qRT-PCR), protein expression levels of osteoblast-specific genes (such as Runx2, ALP, OCN, SP7, OSX) and SLC7A11 were detected by western blotting, while using alkaline phosphatase (ALP) staining to detect osteoblast differentiation and alizarin red staining to detect the mineralization ability of osteoblasts.**Results:** Compared with the control group, the osteogenic specific genes Runx2, ALP, OCN, SP7, OSX mRNA and protein expression in the FAC group were significantly decreased, and the RNA and protein expression of SLC7A11 were significantly decreased as well. The area of positive areas stained with ALP and alizarin red was significantly reduced compared with the control group.**Conclusion:** Iron accumulation can significantly affect the activity and mineralization of osteoblasts, which may affect the function of osteoblasts by inhibiting the expression of SLC7A11.

P135

**MECHANISM OF PILOSE ANTLE IN TREATMENT OF OSTEOPOROSIS BASED ON NETWORK PHARMACOLOGY**B. Liu<sup>1</sup>, Y. Xu<sup>1</sup><sup>1</sup>Dept. of Orthopedics, Clinical Center for Osteoporosis, the Second Affiliated Hospital of Soochow University, Suzhou, China**Objective:** To demonstrate the pharmacodynamic material basis and molecular mechanism of pilose antler (PA) in the prevention and treatment of osteoporosis (OP) by the method of network pharmacology.**Methods:** First, the active components of PA were screened by BATMAN-TCM database, and the components targets were obtained from the SwissTargetPrediction online tool. Moreover, the relevant target genes of OP were obtained by searching the DisGeNET database. Second, a Venn diagram was drawn to obtain the PA-OP common targets, as well as the protein-protein interaction (PPI) network and drug-components-targets (D-C-T) network were constructed by Cytoscape software. Last, the GO functional annotation and KEGG pathway enrichment analysis of common targets were performed using the Metascape online tool.**Results:** A total of 14 candidate components of PA and 320 targets were identified, as well as 1098 targets associated with OP were predicted. Subsequently, 82 common targets were identified by generating a Venn diagram. The PPI network of 82 common targets indicated that the top 5 nodal targets, including PIK3CA,

MAPK1, ESR1, AKT1 and SRC were strongly associated with other proteins. The D-C-T network suggested that the active components with high degree of connectivity include prostaglandin E1, 17- $\beta$ -estradiol,  $\alpha$ -estradiol and oestrone. Furthermore, the GO enrichment analysis revealed that the biological process categories were dominated by response to peptide, cellular response to lipid, regulation of MAPK cascade, and so on. Additionally, the KEGG pathway analysis indicated the estrogen signaling pathway, osteoclast differentiation, and HIF-1 signaling pathway might have critical effects on the development of OP.

**Conclusion:** The results provide certain scientific basis for the research on the mechanism of OP prevention and treatment by PA.

P136

### IMPACT OF ARNTL KNOCKDOWN ON OSTEOBLAST ACTIVITY AND ITS MECHANISM

J. J. Li<sup>1</sup>, Y. J. Xu<sup>1</sup>

<sup>1</sup>Soochow University, Suzhou, China

**Objective:** The circadian rhythm is an endogenous oscillating mechanism that regulates a variety of cellular processes, including iron metabolism, oxidative stress, and cell death. ARNTL is the core component of mammalian biological clock which regulates the expression of other biological clock controlling genes. This study preliminarily explores the effect of ARNTL gene on osteoblast activity and possible mechanism.

**Methods:** Human osteoblast cell line Saos-2 was divided randomly into three groups: control (Ctrl), negative control (NC) and ARNTL knockdown (ARNTL<sup>-/-</sup>). No treatment was done in the Ctrl group, the NC group was transfected with siRNA-NC, and the ARNTL<sup>-/-</sup> group was transfected with siRNA-ARNTL. After 24 h of transfection, knockdown efficiency of ARNTL was detected by quantitative reverse transcription PCR (qRT-PCR). Proliferation ability of osteoblasts was detected by Cell Counting Kit 8 (CCK8). Malondialdehyde (MDA) content was detected by lipid oxidation detection kit. The mRNA expression level of osteoblast-specific genes (such as Runx2, ALP, OCN, SP7, OSX) and ferroptosis related genes (PTGS2, GPX4) was detected by qRT-PCR, and the protein expression levels of osteoblast specific genes (such as Runx2, ALP, OCN, SP7, OSX) and ferroptosis related genes (PTGS2, GPX4) were detected by western blotting.

**Results:** Compared with the control group, there was no significant difference in the expression of ARNTL mRNA in the NC group. The expression of ARNTL mRNA in the ARNTL<sup>-/-</sup> group was significantly decreased. The CCK8 test results indicated that the proliferation ability of osteoblast in ARNTL<sup>-/-</sup> group was significantly weakened. The MDA level was significantly increased. The ferroptosis related PTGS2 mRNA and protein expression was increased, GPX4 and osteoblast specific genes (such as Runx2, ALP, OCN, SP7, OSX) mRNA and protein expression were decreased.

**Conclusion:** After the ARNTL gene of osteoblasts was successfully knocked down, the activity of osteoblasts was significantly reduced, and the ferroptosis markers changed significantly. The ARNTL gene may affect the function and activity of osteoblasts through the ferroptosis mechanism.

P137

### EFFECTS OF ADHERENCE TO TREATMENT ON MINERAL BONE DENSITY GROWTH (3-YEAR RESEARCH STUDY)

A. Trushyna<sup>1</sup>, V. Spesivtseva<sup>2</sup>, N. Bashlakova<sup>3</sup>

<sup>1</sup>Belarusian State Medical University, <sup>2</sup>City Clinical Hospital #10, <sup>3</sup>Belarusian Medical Academy of Postgraduate Education, Minsk, Belarus

**Objective:** To determine the dependence of the increase of BMD on patients' adherence to treatment during long-term therapy.

**Methods:** The viewed group: 102 women with postmenopausal osteoporosis (PMO) age 59 $\pm$ 4.6 years old took alendronate for 2 or more years with no medication change. The viewed group therapy regimen: alendronate 70 mg/week taken with calcium 1000 mg/d and vitamin D 800 IU/d. Research methods: DXA (once a year), test for patient compliance evaluation (once every 3 months for 3 y).

**Results:** After 1 year of treatment an increase in lumbar spine BMD by +0.048 (+0.028; +0.074) was detected at +5.99 (+3.46; +9.11)% ( $p<0.001$ ). With high adherence to treatment (MPR >80%), the increase was significant and reliable during the 1st, 2nd, and 3rd years of alendronate treatment ( $p<0.001$ ), and with low adherence to treatment, the increase was significant, but not reliable during both the 1st ( $p=0.128$ ) and the 2nd years of treatment ( $p=0.023$ ). After 1 y of treatment the increase in BMD of the femoral neck with high adherence to treatment was not reliable +0.023 (+0.002; +0.046). Only provided that high adherence (MPR >80%) was maintained over 2 y of alendronate treatment, the increase in BMD of the femoral neck was both significant and reliable +0.032 (+0.012; +0.050) g/cm<sup>2</sup>, which amounted to +4.34 (+1.47; +6.67)% ( $p<0.001$ ).

**Conclusion:** Alendronate intake for 1 y with high adherence to treatment (MPR >80%) causes a significant increase in lumbar spine BMD. The increase in BMD of the femoral neck after 1 y of alendronate intake with high adherence is not reliable. With high adherence to treatment, the increase in BMD of the lumbar spine was significant and reliable during the 1st, 2nd, and 3rd years of treatment with alendronate intake. Only provided that high adherence to treatment is maintained for 2 y, the increase in BMD of the femoral neck while alendronate intake becomes significant and reliable.



P138

### HOW LONG TO TAKE ALENDRONATE IN POSTMENOPAUSAL OSTEOPOROSIS? (5-YEAR RESEARCH STUDY)

A. Trushyna<sup>1</sup>, V. Spesivtseva<sup>2</sup>, N. Bashlakova<sup>3</sup>

<sup>1</sup>Belarusian State Medical University, <sup>2</sup>City Clinical Hospital #10, <sup>3</sup>Belarusian Medical Academy of Postgraduate Education, Minsk, Belarus

**Objective:** To determine the necessary duration of alendronate intake to achieve a sustained increase in BMD in postmenopausal osteoporosis (PMO).

**Methods:** The viewed group: 102 women with PMO age 59±4.6 years old took alendronate for 2 or more years with no medication change. Exclusion criterion: other diseases causing osteoporosis (OP). The control group: 32 women without OP, comparable in age with the main group. The viewed group therapy regimen: alendronate 70 mg/week taken with calcium 1000 mg/d and vitamin D 800 IU/d. The control group patients (pt) took as much Ca and vitamin D as the main group. Research methods: DXA (once a year), test for pt compliance evaluation (once every 3 months for 5 y).

**Results:** After 1 y of treatment an increase in lumbar spine BMD by +0.048 (+0.028;+0.074) was detected at +5.99 (+3.46; +9.11)% ( $p<0.001$ ). The increase in BMD of the femoral neck is not reliable. After 3 y an increase in lumbar spine BMD by +0.072 g/cm<sup>2</sup> (+8.51%),  $p<0.001$  was detected, the BMD increase in the 2nd and 3rd years together was lower than its increase in 1st year alone. 3 years of treatment caused an increase in femur BMD ( $p<0.01$ ) for pt with PMO, the BMD increase in the 2nd and 3rd years together was lower than its increase in 1st year alone. The increase in BMD of the femoral neck in the 1st, 3rd and 5th years is uncertain because it does not exceed the densitometer error level ( $\pm 0.012$  g/cm<sup>2</sup>). 5 y of treatment with no medication change cause an increase in lumbar spine BMD ( $p<0.001$ ), the BMD increase in the 4th and 5th years together is not reliable.

**Conclusion:** 3-y alendronate treatment is proved to increase lumbar spine BMD and femoral BMD. There was no increase in BMD of the femoral neck while taking alendronate over 5 y. Further treatment (5 y with no medication change) does not lead to a further increase in the density of BMD in all studied regions but to a decrease in the number of spinal and distal fractures.

P139

### CAN THE LIMITING OF KNEE ARTHROPLASTY TO IMPROVE THE PROGNOSIS IN PATIENTS WITH OSTEOARTHRITIS?

A. Tkachenko<sup>1</sup>, I. Urazovskaya<sup>1</sup>, Y. Dorofeev<sup>2</sup>, V. Khaydarov<sup>1</sup>, D. Mansurov<sup>1</sup>, A. Spichko<sup>3</sup>

<sup>1</sup>North-Western State Medical University I.I. Mechnikov, Saint-Petersburg, <sup>2</sup>Scandinavia Ava-Peter Clinic Attentive Medicine, Saint-Petersburg, <sup>3</sup>Clinic of Traumatology & Orthopedics Republican Hospital V.A. Baranova, Petrozavodsk, Russia

**Objective:** The number of total knee arthroplasty (TKA) increase annually. In fact, the number of patients who are not satisfied with the results of arthroplasty also increase. The aim of this study was to analyze the functional outcomes and quality of life in patients with osteoarthritis (OA) who underwent TKA from 2008-2017.

**Methods:** We identified primary TKAs performed for noninflammatory arthritis in 1698 patients between 2008-2017. The outcomes of TKA assessed according to Oxford Knee Score (OKS) and the WHO Quality of life (WHOQOL). We received 1451 (85.4%) fully completed questionnaires.

**Results:** Among 1451 patients with OA only 1291(89.0%) patients had the excellent and good OKS results in 1 y after TKA. The same results after 2 y had 1240 (85.5%) of patients and only 1207 (83.2%) in 3 y after TKA and 78.3% patients in 4 y after TKA. Overall, 74.3% of patients have good and excellent results and were satisfied with their ability to perform normal daily living activities in 5 y after TKA. Conversely, the number of patients dissatisfied with the results of TKA according to OKS increases from 11% to 25.7% within 5 y. The results of WHOQOL were comparable to the results of OKS.

**Conclusion:** In the future we can have the situation, when the quantity of patients with excellent and good results according to OKS (0-39 points) will be comparable with patients with satisfied and dissatisfied results of TKA (40-60 points). The 71 (28.1% between 253) patients with satisfied and dissatisfied results had preoperative pain of low intensity and OA (Kellgren-Lawrence radiologic stage II-III) before TKA had no conservative treatment. Based on the receiving data we cannot exclude the fact that operation was early performed. More research is needed to explain this issue.

P140

# **VIEWS, BARRIERS, AND FACILITATORS OF PHARMACISTS REGARDING THE NEED FOR A FRACTURE LIAISON SERVICE IN A TERTIARY TEACHING HOSPITAL IN MALAYSIA**

M. H. Cheah<sup>1</sup>, P. S. M. Lai<sup>1</sup>, T. Ong<sup>1</sup>

<sup>1</sup>University of Malaya, Kuala Lumpur, Malaysia

**Objective:** To explore the views, barriers, and facilitators of pharmacists regarding the need for a Fracture Liaison Service (FLS) in the University Malaya Medical Centre (UMMC).

**Methods:** This qualitative study was conducted from February to April 2021 in the UMMC. Pharmacists working in the outpatient, inpatient and drug information centre were recruited via purposive sampling to ensure maximum variation. Provisional registered pharmacists were excluded. Semistructured in-depth interviews were conducted using a topic guide until thematic saturation was achieved. Data were transcribed verbatim and analysed using thematic analysis.

**Results:** Eight pharmacists with 2-16 y of working experience were recruited. Three themes emerged from our data: views regarding 1) secondary fracture prevention; 2) the implementation of FLS; and 3) role of the FLS coordinator. Pharmacists recognised the importance of secondary fracture prevention as fracture begets fracture. All pharmacists agreed that FLS should be implemented in the UMMC to improve secondary fracture prevention management to reduce refracture rates. However, most pharmacists have never heard of the term "FLS". They perceived that the functions of FLS were to ensure that patients received the care required for secondary fracture prevention by coordinating the care provided between departments and to ensure continuity of care. Patient education should be provided as part of the FLS. In order for FLS to be successful and sustainable, a dedicated coordinator should be appointed, and support from the relevant stakeholders including doctors, nurses, pharmacists, rehabilitation team, and policymakers is needed. Development of local guidelines can help to improve FLS awareness among stakeholders. Ideally, any healthcare professional can become a FLS coordinator; however, pharmacists have the advantage as a FLS coordinator in terms of knowledge in medications, but the shortage of manpower might be a barrier.

**Conclusion:** Most pharmacists have never heard of a FLS, but agreed that there was a need for FLS in the UMMC to improve the delivery of secondary fracture prevention. They believed that they were sufficiently qualified to be the FLS coordinator, but were concerned regarding the lack of manpower.

P141

# **THE RELATIONSHIP BETWEEN VITAMIN D DEFICIENCY AND OUTCOME OF COVID-19 PATIENTS**

C. Zidrou<sup>1</sup>, M. Tsalidou<sup>1</sup>, A. Vasiliadis<sup>1</sup>, S. Vogiatzis<sup>2</sup>, A. Beletsiotis<sup>1</sup>

<sup>1</sup>2nd Orthopaedic Dept., <sup>2</sup>Pneumonological Dept. of G. Papagergiou General Hospital, Thessaloniki, Greece

**Objective:** Infection with the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) poses an enormous challenge to health care systems throughout the world. Without causal treatment, identification of modifiable prognostic factors may help to improve outcomes. The purpose of our study is to explore possible associations of vitamin D (VitD) status with disease severity and survival.

**Methods:** We studied 165 patients diagnosed with coronavirus disease 2019 (COVID-19) and treated at our center. VitD status at first presentation was assessed retrospectively using accredited laboratory methods. VitD deficiency was defined as serum total 25-hydroxyvitamin D level <12 ng/mL (<30 nM). Primary endpoint was severe course of disease (i.e., need for invasive mechanical ventilation and/or death, IMV/D).

**Results:** Within a median observation period of 66 d (range 2-92), 21 patients required IMV. A total of 28 patients had IMV/D, including 16 deaths. 84 (50.9%) patients required hospitalization (inpatient subgroup). A total of 45 (27.2%) patients were VitD deficient. When adjusted for age, gender, and comorbidities, VitD deficiency was associated with higher risk of IMV/D and death (HR 6.11, 95%CI 2.78-13.43, p<0.001 and HR 14.69, 95%CI 4.17-51.89, p<0.001, respectively). Similar correlations were observed in the inpatient subgroup.

**Conclusion:** Our study demonstrates an association between VitD deficiency and severity/mortality of COVID-19, highlighting the need for interventional studies on VitD supplementation in SARS-CoV-2 infected individuals.

P142

### THE RELATIONSHIP BETWEEN POLYPHARMACY AND FALLS IN ELDERLY PATIENTS WITH HIP FRACTURE

C. Zidrou<sup>1</sup>, A. Vasiliadis<sup>1</sup>, M. Tsatlidou<sup>1</sup>, A. Beletsiotis<sup>1</sup><sup>1</sup>2nd Orthopaedic Dept., G. Papageorgiou General Hospital, Thessaloniki, Greece,

**Objective:** Polypharmacy and fall-risk increasing drugs (FRIDS) have been associated with injurious falls. FRIDS are classified into two groups: those which are associated with a high risk of falling (antipsychotics, anxiolytics, hypnotics and sedatives, antidepressants, and dopaminergic agents) and those considered as associated with a low and moderate risk of falling (opioids, vasodilators used in cardiac diseases, antihypertensives, diuretics, beta blocking agents, calcium channel blockers, agents acting on the renin-angiotensin system,  $\alpha$ -adrenoreceptor antagonists). The purpose of this study is to measure the prevalence of polypharmacy and use of FRIDS (by pharmacological group and by total number) at discharge in patients older than 65 y hospitalized due to a hip fracture in an Orthopaedic Dept. In addition, we aim to explore what patient's characteristics may be associated with polypharmacy and FRIDS prevalence.

**Methods:** This study describes the baseline findings of a 5-y retrospective cohort study (from January 2016 to December 2020). We included 478 patients older than 65 y discharged from an Orthopaedic Unit who were able to walk before surgery. Patient's baseline variables, total number of drugs, and FRIDS at hospital discharge were collected.

**Results:** The mean number of drugs and FRIDS prescribed at discharge was  $11.2 \pm 3.0$  and  $2.8 \pm 1.5$ , respectively. Polypharmacy was prevalent in all patients except in four: 22.9% (5-9 drugs) and 75.3% ( $\geq 10$  drugs). Only 13 patients had no FRIDS and 35.7% were on  $>3$  FRIDS. The most prevalent FRIDS were agents acting on the renin angiotensin system (42.9%) and anxiolytics (38.7%). The number of FRIDS was higher in patients with extreme polypharmacy ( $3.3 \pm 1.4$ ) than in those on 5-9 drugs ( $1.6 \pm 1.0$ ,  $p < 0.05$ ). Independent people in performing instrumental activities had lower risk of extreme polypharmacy ( $\geq 10$  drugs) or  $>3$  FRIDS: OR 0.39 (95%CI 0.18-0.83) and OR 0.41 (95%CI 0.20-0.84), respectively. People living in a nursing home had higher risk of  $>3$  FRIDS: OR 4.02 (95%CI 1.12-14.53).

**Conclusion:** Polypharmacy and FRIDS are prevalent in patients discharged from orthopaedic care after surgery for a hip fracture. Interventions on drug use at hospital discharge could have a potential impact on falls in this high risk population.

P143

### EFFECT OF SURGERY ON CARDIAC STRUCTURE AND FUNCTION IN MILD PRIMARY HYPERPARATHYROIDISM

C. Zidrou<sup>1</sup>, A. Beletsiotis<sup>1</sup><sup>1</sup>2nd Orthopaedic Dept., G. Papageorgiou General Hospital, Thessaloniki, Greece,

**Objective:** The cardiovascular (CV) risk profile is worsened in primary hyperparathyroidism (PHPT), and CV mortality is related to serum calcium levels. It is unknown whether CV mortality is increased in the most common form of PHPT and whether the increased CV risk is reversible after surgery. The purpose of this study is to investigate the morbidity of parathyroidectomy compared with observation without operation in patients with mild primary hyperparathyroidism. Furthermore, the study researches for recording simultaneously reversibility of echocardiographic changes in mild primary hyperparathyroidism after surgery treatment.

**Methods:** From January 2012 to December 2019, 30 patients were involved, of which 15 were randomized to observation (1<sup>st</sup> subgroup) and 15 for parathyroidectomy (2<sup>nd</sup> subgroup).

The inclusion criteria were mild PHPT without the appearance of symptoms, corrected calcium levels for albumin between 2.60-2.85 mmol/l, age between 50-80 y, without taking other drugs that affect calcium metabolism. At baseline and after 2 y, a biochemist and echocardiographic control was conducted.

**Results:** In the 2-y follow-up, the corrected calcium levels and those of PTH were significantly lower in the 2<sup>nd</sup> subgroup. Instead, there seemed no significant differences in blood pressure, heart rate, BMI, inflammatory markers, cholesterol and other cardiovascular risk markers. The echocardiography did not show significant differences between subgroups in heart function and dimensions, except a marginal reduction in left ventricular mass and the mass ratio of the left ventricle in the 2<sup>nd</sup> subgroup, suggesting reversibility of left ventricular hypertrophy even in mild PHPT. Simultaneously, to the 2<sup>nd</sup> subgroup, a decrease of septum size was found. Unlike other studies, no correlation was observed between vitamin D and echocardiographic variables.

**Conclusion:** It is safe to observe without surgery patients with mild PHPT for a few years and suggest that longer follow-up may yield larger and clinically important differences.

P144

# DEVELOPMENT, VALIDITY AND RELIABILITY OF A REFERRAL FORM FOR SARCOPENIA ASSESSMENT IN STANDARD CLINICAL PRACTICE

Y. El Miedany<sup>1</sup>, M. Toth<sup>2</sup>, M. El Gaafary<sup>3</sup>, M. Hassan<sup>4</sup>, A. Elshanawany<sup>5</sup>, N. Fathi<sup>6</sup>, H. Abozaid<sup>7</sup>, M. Eissa<sup>8</sup>, N. Ahmed<sup>9</sup>, N. Gadallah<sup>10</sup>, S. Galal<sup>10</sup>, W. Hassan<sup>11</sup>

<sup>1</sup>King's College, London, UK, <sup>2</sup>Darent Valley Hospital, Dartford, UK, <sup>3</sup>Community & Public Health Ain Shams University, Cairo, Egypt, <sup>4</sup>Rheumatology & Rehabilitation Tanta University, Tanta, Egypt, <sup>5</sup>Rheumatology & Rehabilitation, Menofeya University, Menofeya, Egypt, <sup>6</sup>Rheumatology & Rehabilitation Assiut University, Assiut, Egypt, <sup>7</sup>Rheumatology & Rehabilitation, Sohag University, Sohag, Egypt, <sup>8</sup>Rheumatology & Rehabilitation, Cairo University, Cairo, Egypt, <sup>9</sup>Rheumatology & Rehabilitation, Fayoum University, Fayoum, Egypt, <sup>10</sup>Rheumatology, Physical Medicine & Rehabilitation, Ain Shams University, Cairo, Egypt, <sup>11</sup>Rheumatology & Rehabilitation, Benha University. On behalf of the Egyptian Academy Bone Health and Metabolic Bone Diseases, Benha, Egypt.

**Objective:** Diagnosis of sarcopenia requires quantitative and qualitative measurement of muscle mass as well as assessment for underlying aetiology. Early detection of sarcopenia can prevent downstream adverse health outcomes. Since sarcopenia is asymptomatic, particularly in its early stage, the development of an effective screening tool is vital to identify those patients at risk and in the meantime can be used to refer this cohort, suspected to have sarcopenia, for body composition valuation. Currently, the gold standard in measurement is highly debatable. It is unlikely that a single test which examines only 1 parameter will be adopted as the standard tool to assess for sarcopenia. Furthermore, the tool should be cheap, easy to use and has high predictive value. Aims: 1. To develop a screening tool that can be used to identify older adults who are at risk of developing sarcopenia; 2. To assess its validity, reproducibility as well as comprehensibility as a referral form for body composition assessment using DXA scanning.

**Methods:** The screening form was based on the EWGSOP recommended definition for sarcopenia which is based on: low muscle strength, low muscle quantity or quality and low physical performance. The developed tool included a combination of SARC-F questionnaire, scores of grip strength and chair stand test as a measure of muscle strength, as well as 4-m walk gait speed test as a measure of physical performance. In addition, the screening tool included the mini-nutrition assessment short form (MNA-SF) for malnourishment and falls risk assessment (FRAS). As DXA is used as a measure of muscle quality, the validity of the model was assessed by comparing the results of the scale to the results of the appendicular lean mass adjusted for BMI (ALM/BMI). 67 patients with suspected sarcopenia (52.2% females, 47.8% males) were assessed. 68 healthy subjects of matched sex and age were included as a control group. The comprehensibility and reproducibility of the model were also assessed.

**Results:** The developed model was a combination of questionnaires, anthropometric measures, and physical function tests. Using the ALM/BMI as standard reference, the combined model scores suggestive of sarcopenia, showed enhanced sensitivity (86.7%) with a resultant increase in screening performance compared to individual tools, such as SARC-F, with AUROC, 0.892; 95%CI, 0.86-0.92; P=0.018. The specificity and negative predictive value were, respectively, 98.9% and 97.6% in men and 95.8% and 96.8% in women. Reproducibility of the overall questionnaire and individual domains was excellent (Spearman-Brown index, 0.94-0.98). All the patients rated the form as quite comprehensible or extremely comprehensible. Comprehensibility percentage was 96.8%.

**Conclusion:** Results revealed clearly that while each tool may reliably exclude subjects without sarcopenia, they may not be effective in screening for the condition, particularly in asymptomatic older adults. The consistent association between the diagnosis of sarcopenia and clinically significant outcomes such as decline in physical performance, nutrition status and increased falls risk, endorses their combined efficacy as screening tools. The developed model was effective, reliable and well validated referral instrument with improved diagnostic accuracy. The advent of pharmacological treatment and evidence-based management such as exercise and nutrient supplementation have helped sarcopenia screening gain prominence.

P145

# OSTEOPOROSIS TREATMENT FOLLOWING OSTEOPOROTIC FRACTURES: DATA FROM A SINGLE MEDICAL CENTER

O. Tell-Lebanon<sup>1</sup>, R. H. Rosenblum<sup>2</sup>, E. Yaccobi<sup>3</sup>, N. Ohana<sup>4</sup>, O. Twito<sup>5</sup>, P. Rotman-Pikielny<sup>5</sup>

<sup>1</sup>Metabolic Bone Diseases Service, Endocrine Institute, Meir Medical Center, Kfar Saba <sup>2</sup>Metabolic Bone Diseases Service, Endocrine Institute, Meir Medical Center, Kfar Saba, <sup>3</sup>Orthopedic Dept., Meir Medical Center affiliated with Sackler Faculty of Medicine, Tel Aviv University, Tel Aviv, <sup>4</sup>Orthopedic Dept., Meir Medical Center affiliated with Sackler Faculty of Medicine, Tel Aviv University, Tel Aviv, <sup>5</sup>Metabolic Bone Diseases Service, Endocrine Institute, Meir Medical Center affiliated with Sackler Faculty of Medicine, Tel Aviv University, Tel Aviv, Israel

**Objective:** Most postosteoporotic fracture patients do not receive osteoporosis treatment, although it reduces risks for additional fractures. This retrospective, observational study reviewed osteoporosis evaluation and treatment following typical osteoporotic fractures.

**Methods:** We identified patients with hip, vertebral, humerus or radius fractures, examined in Meir Medical Center, January-December 2017. Exclusion criteria were: not a Clalit Health Services member, high energy or pathologic fracture, or 30-d postoperative



mortality. Primary endpoint was osteoporosis drugs issued within 12 months of fracture. Secondary endpoints were bone density testing and mortality.

**Results:** Of 928 patients diagnosed, 346 (37%) were excluded. 582 (78.6±11.1 y of age, 75.8% women) were included: 321 (55.5%) hip, 84 (14.1%) humerus, 33 (5.6%) vertebra, 144 (24.7%) radius. Hip fracture patients were older, with more previous fractures. Osteoporosis drugs were issued to 26.5%; humerus fracture received the least (21.4%) and vertebral fracture, the most (30.3%),  $p=0.51$ . Treatment related to age, gender or previous fracture, was similar. Bone density testing was done in 23.2% of patients, with vertebra (39.4%) and radius (34%) the most. One-year mortality after hip fracture was 12.1%, with humerus (3.6%), vertebral (3%) and radius (1.4%) ( $p=0.0$ ). Logistic regression demonstrated that previous treatment (OR=7.4, 95%CI 3.6-15.2), bone density testing (OR=4.4, 95%CI 2.6-7.4) and endocrinology visit (OR=2.6, 95%CI=1.4-4.6) were the most significant discriminating factors associated with osteoporosis treatment.

**Conclusion:** Fewer than one-third of patients received pharmacotherapy within a year postfracture. Since pharmacotherapy reduces future fractures and mortality, we encourage medical staff, including orthopedic surgeons, rehabilitation team and general practitioners to increase awareness of their importance.

P146

## URBAN-RURAL DIFFERENCES IN PATIENTS WITH OSTEOARTHRITIS

K. S. Skrame<sup>1</sup>, E. Z. Zaimi<sup>2</sup>, E. P. Petrela<sup>3</sup>

<sup>1</sup>Kamel Farma, <sup>2</sup>UHC Mother Teresa, Emergency Dept., <sup>3</sup>UHC Mother Teresa, Dept. of Statistics, Tirana, Albania

**Objective:** Osteoarthritis, the most common form of arthritis, is a disabling chronic disease with significant clinical and economic implications <sup>(1-6)</sup>. The most important risk factors for osteoarthritis include age, sex, obesity, and trauma <sup>(6-10)</sup>. With aging and obesity trends, the incidence and prevalence of osteoarthritis is expected to rise in the world, increasing the demand for health resources. The pain caused by this pathology is the main complaint of most patients, prompting them to seek medical attention <sup>(11)</sup>. Although osteoarthritis is considered a non-inflammatory arthritis, where mechanical causes play a major role, inflammatory mechanisms may be present. Our goal is to analyze rural-urban differences, in patients with osteoarthritis.

**Methods:** The study included all consecutive patients diagnosed with osteoarthritis, hospitalized in the Rheumatology Service at QSUT Mother Teresa, in the period of January 2010 to December 2015, using diagnostic codes.

**Results:** We analyzed 589 cases, where 79% ( $n=464$ ) were female and 20% ( $n=118$ ) lived in rural areas. The average age of patients in rural areas is significantly younger than the average age of patients in urban areas (respectively 53.41±10.53 and 56.01±10.13

$y, p=0.013$ ). The most commonly affected joint in the rural population is the knee (52.3 vs. 39.4% in urban areas,  $p=0.044$ ), followed by the hip (19.8 vs. 18.6%,  $p=0.238$ ) and the least affected is the hand joint (18.7% vs. 33.3%,  $p=0.052$ ). Overweight was found more in the rural population (41.7% urban vs. 31% rural,  $p=0.011$ ).

**Conclusion:** Lifestyle is an important factor, which contributes to osteoarthritis. Putting in the movements of the joints of the hands significantly reduces the presence of pain.

### References:

1. Marshall DA, et al. Arthritis Care Res 2015;67:1379.
2. Finlayson G, et al. The additional cost of chronic disease in Manitoba. Winnipeg (Canada): Manitoba Centre for Health Policy; 2010.
3. Kopec JA, et al. J Rheumatol 2007;34:386.
4. Kopec JA, et al. Arthritis Rheum 2008;59:929.
5. Kopec JA, et al. Osteoarthritis Cartilage 2010;18:303.
6. Srikanth V, et al. Osteoarthritis Cartilage 2005;13:769.
7. Anderson SA, Loeser RF. Best Pract Res Clin Rheumatol 2010;24:15.
8. Woolf A, Pfleger B. Bull World Health Organ 2003;81:646.
9. Felson DT, et al. Ann Int Med 2000;133:635.
10. Zhang Y, Jordan JM. Clin Geriatr Med 2010;26:355.
11. Hunter DJ, et al. Clin Exp Rheumatol 2002;20:93.

P147

## SONOGRAPHIC PECULIARITIES OF HIP JOINT DEVELOPMENT OF CHILDREN OF THE FIRST YEAR OF LIFE

V. Zinchenko<sup>1</sup>, M. Kabatsy<sup>1</sup>, O. Gayko<sup>2</sup>

<sup>1</sup>State Institution "Institute of Traumatology and Orthopedics National Academy of Medical Science of Ukraine", Dept. of Joint Diseases in Children & Adolescents, <sup>2</sup>State Institution "Institute of Traumatology and Orthopedics National Academy of Medical Science of Ukraine", Diagnostics Dept., Kyiv, Ukraine

**Objective:** To evaluate the hip morphology of children using the ultrasound according to Graf's technique. To investigate the development of the femoral head ossification centre and the hip joint acetabulum of children of the first year of life.

**Methods:** The study included 1549 children (600 boys and 949 girls) ranging from 5 days to 12 months of age and also 812 children (413 boys and 399 girls) aged from 10-15 days old. The children were scanned according to Graf's technique.

**Results:** We have received the following distribution on the types according to Graf: Ia, Ib 40.48%; IIa+ 8.39%; IIa- 9.49%; IIb 34.7%; IIc 2.55%; D 2.87%; IIIa, IIIb 1.42%; IV 0.1%. In our research we were taking the alpha angle for the analysis. The alpha angle allows

conclusions to be drawn about the potential for the ossification in the acetabular roof. The acetabular roof of hip joint in our investigation shows an enormous potential in the first 2 months of life, which is still present to 6 months period but reduces after 6 months and approaches a level by 10 months with very little movement thereafter. The significant difference of the alpha angle average values of the infant hip among newborn children born in different seasons was revealed. The alpha angle average value was distinctly bigger among the infants who were born in spring and summer months than among those who were born in winter and autumn. The statistical confidence of differences of the alpha angle average values between the newborn boys and girls who were born in the same season ( $p < 0.05$ ) was revealed. The femoral head ossification center in girls appears earlier than in boys ( $p < 0.05$ ).

**Conclusion:** The data received as the result of the statistical analysis indicate the statistical confidence of differences of the femoral head ossification centre and the hip joint acetabulum development between the boys and girls ( $p < 0.05$ ). The unusual observation that there is a seasonal element in the development of the hip joint was received.

P148

### SARCOPENIA AND FALL-RELATED INJURY AMONG OLDER ADULTS IN FIVE LOW AND MIDDLE INCOME COUNTRIES

N. Veronese<sup>1</sup>, L. Smith<sup>2</sup>, M. Barbagallo<sup>1</sup>, A. Koyanagi<sup>3</sup>

<sup>1</sup>University of Palermo, Palermo, Italy, <sup>2</sup>Anglia Ruskin University, Cambridge, UK, <sup>3</sup>Universitat de Barcelona, Barcelona, Spain

**Objective:** Sarcopenia is a common condition in older people and increasing evidence suggests that it can be considered as a potential risk factor for falls and fractures. However, no studies on this topic from low and middle income countries (LMICs) are available. Thus, we assessed this association among older adults from five LMICs (China, India, Ghana, Mexico, and Russia).

**Methods:** Community-based, nationally representative, cross-sectional data of the Study on Global Aging and Adult Health were analyzed. Sarcopenia was defined as the presence of low skeletal muscle mass based on indirect population formula, and either slow gait or low hand grip strength. The presence of fall-related injury was ascertained through self-reported information. Multi-variable logistic regression analysis and meta-analysis were conducted.

**Results:** The sample consisted of 13,101 individuals aged  $\geq 65$  y (mean (SD) age 72.6 (11.3) y; 45% males). The prevalence of fall-related injury was higher among those with sarcopenia than in those without this condition (e.g., Mexico 9.8% vs. 2.7%). Adjusted analyses showed that sarcopenia was associated with a 1.85 (95%CI=1.24-2.77) times higher odds for fall-related injury, with a low level of between-country heterogeneity.

**Conclusion:** Sarcopenia is associated with a significant higher odds of fall-related injury in LMICs. Future studies of longitudinal design may shed light on whether sarcopenia in LMICs may be considered as a risk factor for falls.

P149

### OSTEOPOROSIS: PREVALENCE, AWARENESS AND PERTINENT RISK FACTORS IN A COHORT OF ELDERLY ASIAN POPULATION PRESENTING WITH LOW-ENERGY DISTAL RADIUS FRACTURES

M. Muzzammi<sup>1</sup>

<sup>1</sup>Sindh Gov Services Hospital Karachi, Karachi, Pakistan

**Objective:** To evaluate the awareness of osteoporosis and related risk factors in elderly Asian patients who present with distal radius fractures. The distal radius fracture is one of the most frequent fractures in the elderly cohort, owing to osteoporosis, and may be a harbinger for further fractures, however, data is scarce regarding awareness of this condition among these patients.

**Methods:** This cross-sectional study was conducted on patients aged  $\geq 45$  that presented in the emergency department with low-energy distal radial fractures in Karachi from January-December 2018. Data were collected via a self-designed questionnaire, assessing the demographic information, knowledge about osteoporosis and its risk factors. The data were analyzed using SPSS 20 for statistical significance.

**Results:** From a total of 550 patients with a mean age of  $70.5 \pm 32.82$  y, there were 442(80.36%) females and 108(19.63%) males. On educational consideration, 243(44.18%) patients could not read or write and only 110(20%) of the patients received secondary school education. Only 123(22.36%) were well informed about osteoporosis, the predominant source of information being their physician. There were 427(77.63%) patients who were unaware of osteoporosis, 16% of which were smokers, 26% indicated they exercised at least 30 min daily, and 2% reported drinking alcohol occasionally. On dietary supplements, 24.27% of patients reported calcium and 17.81% reported vitamin D supplement consumption on regular basis.

**Conclusion:** We found a positive correlation between a patient's education status and osteoporosis awareness. We believe that the role of the physician could be crucial in preventing further fractures in such patients via physician lead educational campaigns to target modifiable risk factors.

P150

## 25-HYDROXYVITAMIN D CONCENTRATION, PTH, AND PREVALENT VERTEBRAL FRACTURE IN JAPANESE HIP FRACTURE PATIENTS

A. Kanno<sup>1</sup>, T. Aizawa<sup>2</sup>

<sup>1</sup>Dept. of Orthopaedic Surgery, Japan Community Health Care Organization Sendai South Hospital, Sendai, <sup>2</sup>Dept. of Orthopaedic Surgery, Iwaki City Medical Center, Iwaki, Japan

**Objective:** To evaluate the level of 25-hydroxyvitamin D (25(OH)D) in Japanese hip fracture patients and to evaluate the relationships between concentration of 25(OH)D and PTH, the number of moderate or severe prevalent vertebral fractures.

**Methods:** The study subjects were 310 patients (62 men, 248 women) who sustained hip fracture due to a fall from a standing position, or due to events of lower energy trauma, between April 2017 and May 2020. The average age at the time of injury was 84.8 y (67-98 years). 25(OH)D and intact PTH (iPTH) concentrations in serum were evaluated. A 25(OH)D concentration of  $\geq 30$  ng/mL, 20-30 ng/mL, and  $< 20$  ng/mL were considered sufficiency, insufficiency, and deficiency, respectively. Prevalent vertebral fractures were determined using plain radiographs of the thoracic or lumbar spine. The number of vertebral fractures of semiquantitative grade (SQ grade) 2,3 were counted. The relationships between 25(OH)D concentration and the number of vertebral fractures, iPTH were examined using Spearman's rank correlation coefficient.

**Results:** The mean 25(OH)D concentration was 11.3 ng/mL (4-26.1 ng/mL). None of the subjects had adequate vitamin D levels. The mean iPTH value in subjects was 48.9 pg/mL (9-429 pg/mL). The mean number of prevalent vertebral fractures was 1.5 (0-11). There was a weak significant correlation between 25(OH)D concentration and number of prevalent vertebral fractures of SQ grade 2,3 ( $p=0.003$ ,  $r=-0.168$ ). There was a weak significant correlation between 25(OH)D and iPTH concentrations ( $p<0.001$ ,  $r=-0.236$ ).

**Conclusion:** Vitamin D deficiency was much severe in hip fracture patients. Moderate or severe grade of prevalent vertebral fracture might be related to vitamin D deficiency. Despite of vitamin D deficiency, iPTH was within normal range in many subjects. This might be due to low active daily living level prior to fracture.

P151

## INFLAMMATORY MARKERS ARE ASSOCIATED WITH QUALITY OF LIFE, PHYSICAL ACTIVITY & GAIT SPEED BUT NOT SARCOPENIA IN AGED MEN (40-79 Y)

J. Dupont<sup>1</sup>, L. Antonio<sup>2</sup>, L. Dedeyne<sup>1</sup>, T. W. O'Neill<sup>3</sup>, D. Vanderschueren<sup>2</sup>, J. Tournoy<sup>1</sup>, K. Koppo<sup>4</sup>, E. Gielen<sup>1</sup>

<sup>1</sup>Geriatrics & Gerontology, Dept. of Public Health and Primary Care, KU Leuven, Leuven, Belgium, <sup>2</sup>Clinical & Experimental Endocrinology, Dept. of Chronic Diseases & Metabolism, KU Leuven, Leuven, Belgium, <sup>3</sup>Arthritis Research UK Centre for Epidemiology & NIHR Manchester Musculoskeletal Biomedical Research Unit, Manchester, UK, <sup>4</sup>Exercise Physiology Research Group, Dept. of Movement Sciences, KU Leuven, Leuven, Belgium

**Objective:** One of the presumed driving mechanisms behind sarcopenia is the age-related chronic low-grade inflammation (inflammaging). However, findings regarding inflammaging in sarcopenic older adults are often conflicting. This study aimed to determine associations between inflammatory markers, prevalent as well as incident sarcopenia, sarcopenia-defining parameters, quality of life (QoL) and physical activity in middle-aged and older European men.

**Methods:** Men aged 40-79 y (mean  $59.66 \pm 11.00$ ) were recruited from population registers in eight European centres for participation in the European Male Aging study (EMAS). Subjects were assessed at baseline (2003-2005) and again after a median follow-up of 4.29 y. In 2577 participants, associations between baseline inflammatory markers (hs-CRP, white blood cell count (WBC), albumin) and baseline physical activity PASE) and QoL (SF-36) were analysed. In the Leuven and Manchester cohort ( $n=447$ ), data were available on muscle mass (whole body DXA) and strength at baseline. In this subgroup, cross-sectional associations between baseline inflammatory markers and sarcopenia-defining parameters (hand grip strength, chair stand test, appendicular lean mass, gait speed) and prevalent sarcopenia were examined. In a further subgroup ( $n=277$ ), associations with knee extensor strength were explored. Predictive value of baseline inflammation on functional decline, physical activity, QoL and incident sarcopenia was also examined. Linear and logistic regression were used, adjusted for age, BMI, centre and smoking.

**Results:** At baseline, hs-CRP and WBC were negatively associated with PASE score (hs-CRP:  $\beta=-7.920$ ,  $p<0.001$ ; WBC:  $\beta=-4.552$ ,  $p<0.001$ ) and the physical component score of SF-36 (hs-CRP:  $\beta=-1.025$ ,  $p<0.001$ ; WBC:  $\beta=-0.364$ ,  $p<0.001$ ). Baseline WBC levels were negatively associated with gait speed ( $\beta=-0.013$ ,  $p=0.025$ ), quadriceps isometric 90° ( $\beta=-5.983$ ;  $p=0.035$ ) and isokinetic 60°/s peak torque/body weight ( $\beta=-5.532$ ,  $p=0.027$ ). Prevalence of sarcopenia at baseline was 18.1% ( $n=81$ ). Of those without sarcopenia at baseline, 64 (18.6%) satisfied criteria for sarcopenia at follow-up. There were no significant associations between baseline inflammatory markers and either prevalent or incident sarcopenia, or change in sarcopenia-defining parameters.

**Conclusion:** In middle aged and older men, inflammatory markers (hs-CRP and WBC) were associated with measures of QoL, physical activity and gait speed, but not with other sarcopenia-defining parameters. None of the inflammatory markers in this study could predict functional decline, decline in physical activity, decline in QoL or incident sarcopenia.

P152

### PROGNOSTIC MARKERS OF SURGICAL SITE INFECTION FOR PATIENTS BEFORE TOTAL HIP ARTHROPLASTY

A. Tkachenko<sup>1</sup>, B. Gaykovaya<sup>1</sup>, I. Urazovskaya<sup>1</sup>, Y. Dorofeev<sup>2</sup>

<sup>1</sup>North-Western State Medical University I.I. Mechnikov,  
<sup>2</sup>Scandinavia Ava-Peter Clinic Attentive Medicine, Saint-Petersburg, Russia

**Objective:** Surgical site infection (SSI) is one of the most serious complications after arthroplasty. The aim of this study was to develop blood laboratory markers for early postoperative complications prognosis.

**Methods:** This prospective study comprised 42 patients who underwent primary total hip arthroplasty (THA) and 28 donors were in control group. Mean age in group with THA was 59.8±21 y (range 34-76), 50% were female, in control group 54.3±22 y (range 31-72 y), 50% were female. Blood samples were collected before THA. Patients after THA were divided into 2 groups depending on postoperative complications: 31 patients without SSI (group 1) and 11 patients with SSI (group 2). Blood samples were analyzed, using an automatic blood cell counter (DxH800; Beckman Coulter, USA) and flow cytometry (FC 500; Beckman Coulter) by using CytoDiff reagent and analysis software (Beckman Coulter).

**Results:** Patients in the group 2 had significantly lower baseline level of B lymphocytes compared with patients without infectious complications (group 1).

Table 1. Subpopulation composition of leukocytes in the blood of patients before surgery, depending on the development of infectious complications

Subpopulations of leukocytes Me (C <sub>25</sub> -C <sub>75</sub> ), ×10 <sup>9</sup> /L	Group 1 (n=31)	Group 2 (n=11)
Total white blood cell count	6.4 [5.4 - 7.6]	6.7 [4.8 - 7.7]
B lymphocytes (CD3-CD19+)	0.22 [0.16 - 0.31]	0.16* [0.10 - 0.22]

CD16 negative T lymphocytes & NK cells	1.51 [1.20 - 1.82]	1.60 [1.38 - 2.05]
CD16 positive T lymphocytes & NK cells	0.27 [0.21 - 0.35]	0.24 [0.14 - 0.44]
Total T lymphocyte & NK cell count	1.85 [1.51 - 2.27]	1.73 [1.53 - 2.48]
Total lymphocyte count	2.07 [1.75 - 2.48]	1.96 [1.62 - 2.65]
CD16- negative monocytes	0.47 [0.33 - 0.60]	0.49 [0.41 - 0.59]
CD16- positive monocytes (pro-inflammatory)	0.04 [0.02 - 0.05]	0.03 [0.01 - 0.06]
Total monocytes count	0.52 [0.36 - 0.66]	0.52 [0.43 - 0.67]
CD16 negative immature granulocytes (neutrophils)	0.01 [0.00 - 0.03]	0.02 [0.00 - 0.03]
Total eosinophil count	0.17 [0.10 - 0.28]	0.13 [0.08 - 0.24]
CD16 positive mature granulocytes (neutrophils)	3.51 [2.36 - 4.30]	3.45 [2.58 - 4.34]
Total granulocyte (neutrophil) count	3.52 [2.47 - 4.31]	3.47 [2.61 - 4.40]
Total basophil count	0.06 [0.04 - 0.09]	0.06 [0.06 - 0.08]

Note: \* - significant differences, p<0.05

In the group of patients without infectious complications was significant direct relationship ( $r_s=0.45$ ;  $p=0.02$ ) between the number of B lymphocytes and standard deviation of monocyte volume (SD-V-Mo). This result indicates, that a large number of functionally active monocytes perform the processes of phagocytosis and antigen presentation. In the group of patients with the devel-



opment of infectious complications was an inverse relationship. ( $r_s = -0.68$ ;  $p = 0.02$ ). We have detected that the SD-V-Mo index in patients of the 2nd group was significantly ( $p < 0.05$ ) lower (19.08) compared with the 1st group (19.71).

**Conclusion:** The blood level of B lymphocytes (CD3-CD19+) and the SD-V-Mo can be prognostic markers of an SSI for patients before THA.

## P153

### COMPARING PRIMITIVE (I) AND SECONDARY (II) MALE OSTEOPOROSIS (MOP)

N. Bouhedja<sup>1</sup>, L. Poulain<sup>1</sup>, X. Grapton<sup>2</sup>, P. Lemesle<sup>3</sup>

<sup>1</sup>Private Practice, La Garenne Colombes, <sup>2</sup>Hopital Swiss, Issy Les Moulineaux, <sup>3</sup>Private Practice, Bois Colombes, France

**Objective:** Clinical, BMD and biological criteria in MOP I/II

**Methods:** 95 men, 50% MOP I/II, average 64 yo. Size, weight, BMD and biology measurements.

**Results:** 9/10 of MOP II with single etiology: 33% iatrogenic (1/2 corticoids) 26% endocrine, 9% hypogonadism, 30% other. Discovery: vertebrae compression (VC) I>II (57/45%),

medical history: VC 71/59%, other fractures 20% I=II, BMD 10%, size loss, rare back pain. Risk factors: alcohol, tobacco, coffee, MOP I=II. Sedentary lifestyle predominates in MOP II (43/31). 100% MOP I had BMD/80% MOP II. Results before/after treatment (average time 6 y): MOP I in vertebral -2.8/-2.1 (significant), at femoral neck -2/-1.7, MOP II vertebral -2.6/-1.9 (significant), at femoral neck -2.1/-1.8. FRAX: I 5.9%/ II 7.9%. Size loss differs significantly - 5.6 cm (I), -3 cm (II). Weight: MOP I=MOP II. Biologically: vitamin D is subnormal (I=II), average serum CTX is 0.48. Daily calcium intake is around 500 mg. Treatment: MOP I and II: Ca and vitamin D (88/76%), oral bisphosphonates (68%), teriparatide (25%), denosumab 0% (not prescribed in MOP in France). Secondary etiologies are treated for 41%, surgically: 20%. The risk of falls: 27/39% (I/II), 50% >70 yo. Fall causes: neurological and locomotor (20% each), unipodal balance is good 2/3. Rheumatologist (Rh) has hygiene-dietary approach, sensitive to the risks of falls but does not prevent them enough, in this case he recommends the cane (1/2). He is attentive to the management, compliance, visual correction. He must improve the monitoring: appointments and biological controls are prescribed only once /2, BMD once /3. However, MOP II is better followed up even though the Rh does not refer much to the endocrinologist (37%). Tolerance to treatments is excellent (96%) with rare side effects (7%) for MOP I and II. The clinical and biological results of treatment are very good in the framework of the guidelines.

**Conclusion:** This study of the MOP, rich in information about Rh practices, highlights several differences between MOP I and II but 2 significant items: loss of size, lumbar density before/after treatment.

## P154

### FRAGILITY OF RESULTS IN OSTEOPOROSIS RANDOMIZED CONTROLLED TRIALS SUPPORTING THE TREATMENT GUIDELINES

X. Huang<sup>1</sup>, J. D. A. Adachi<sup>2</sup>, G. Li<sup>1</sup>

<sup>1</sup>Center for Clinical Epidemiology & Methodology (CCEM), Guangdong Second Provincial General Hospital, Guangzhou, China, <sup>2</sup>Dept. of Medicine, McMaster University, Hamilton, Canada

**Objective:** Evidence-based guideline recommendations that are mainly based on results of clinical trials are important to clinical decision-making. The 'fragility index' (FI) has been proposed as a novel measure of the robustness of trial findings. The purpose of our study was to analyze the fragility of the randomized controlled trial (RCT) referenced in the guidelines for the treatment of osteoporosis.

**Methods:** We included the clinical trials if they investigated primary osteoporosis, used a parallel two-group design with a 1:1 randomization, and reported fracture outcome as the primary endpoint. The FI for each outcome was calculated. The FI was defined as the minimum number of events in the experimental group that need to change from a nonevent to an event in order to render a significant result non-significant (or vice versa), which was calculated in a two-by-two contingency table based on the data that the trial authors used in original analyses.

**Results:** Of the 372 RCTs identified from the guidelines, 42 were eligible for analyses. The median FI was 10 (25th-75th percentile [Q1-Q3]: 4-18). Of the 23 neutral trials, the median FI was 6 (Q1-Q3: 4-16), while the remaining significant trials had a median FI of 11 (Q1-Q3: 4-40). There were 17 (40.5%) trials where the number of patients lost to follow-up was greater than the FI. The FI was significantly associated with sample size ( $r = 0.459$ ,  $p = 0.002$ ), journal impact factor ( $r = 0.426$ ,  $p = 0.0056$ ), and the percent of patients lost to follow-up ( $r = 0.433$ ,  $p = 0.015$ ).

**Conclusion:** We found that the robustness of results from include trials varied, and results from some RCTs depend on a small number of events. The FI may provide additional, intuitive metrics to help interpret the robustness of trial results.

## P155

# RELATIVE EFFICACY AND SAFETY OF BIOLOGIC TREATMENTS FOR OSTEOARTHRITIS: A CONVENTIONAL AND NETWORK META-ANALYSIS

Yang Li<sup>1</sup>, Yiyang Mai<sup>1</sup>, Peihua Cao<sup>1</sup>, Xin Wen<sup>1</sup>, Tianxiang Fan<sup>1</sup>, Xiaoshuai Wang<sup>1</sup>, Guangfeng Ruan<sup>1</sup>, Su'an Tang<sup>1</sup>, Weiya Zhang<sup>2</sup>, Changhai Ding<sup>1</sup>, Zhaohua Zhu<sup>1</sup>

<sup>1</sup>Clinical Research Centre, Zhujiang Hospital, Southern Medical University, Guangzhou, China, <sup>2</sup>Faculty of Medicine & Health Science, University of Nottingham, Nottingham, UK

**Objective:** To examine the efficacy and safety of novel biologic interventions, including TNF $\alpha$  inhibitors, IL-1/IL-6/IL-17 inhibitors and others, for the treatment of osteoarthritis (OA).

**Methods:** Five databases were searched up to Feb 20, 2021. Randomized controlled trials (RCTs) and prospective studies comparing biologics with placebo or each other in patients with OA were included. The primary outcomes were the mean changes from baseline in pain and physical function score. Secondary outcomes were adverse events (AEs) and mean change in stiffness score. Bayesian network and conventional meta-analyses were performed.

**Results:** 15 studies were analyzed, including 13 RCTs and 2 pilot studies. In the network meta-analysis, infliximab achieved a greater pain relief compared with hyaluronic acid (HA) [standardized mean differences(SMD) -22.95; -34.21 to -10.43], adalimumab (SMD -21.71; -32.65 to -11.00), anakinra (SMD -24.63; -38.79 to -10.05), canakinumab (SMD -32.83; -44.45 to -20.68), etanercept (SMD -18.40; -29.97 to -5.73), lutikizumab (SMD -25.11; -36.47 to -14.78), naproxen (SMD -30.16; -41.78 to -17.38), tocilizumab (SMD -24.02; -35.63 to -11.86) and placebo (SMD -25.88; -34.87 to -16.60). Probability ranking indicated that infliximab had the highest (98%) probability to be the best drug for pain reduction, while canakinumab (79%) was the worst one. In the conventional meta-analysis compared to placebo, tocilizumab was superior in pain (SMD -0.60; -1.05 to -0.15) and function (SMD -1.48; -2.00 to -0.97), while infliximab (SMD -2.04; -2.56 to -1.52) and etanercept (SMD -0.47; -0.89 to -0.05) were more effective only in pain outcome. No more significant differences were observed between biologics and placebo.

**Conclusion:** Infliximab was the most effective biologic for pain relief in patients with OA and did not cause more AEs compared with placebo. The efficacy and safety of other novel biologics was uncertain and more RCTs are warranted.

HA	-1.29 (-7.19, 8.82)	1.53 (-11.33, 15.78)	9.86 (-0.88, 21.70)	-4.34 (-12.06, 3.83)	-22.95 (-34.21, -10.43)	2.10 (-6.40, 13.15)	7.07 (-3.31, 18.83)	2.82 (-4.28, 11.63)	0.94 (-9.31, 12.68)
adalimumab	1.29 (-6.82, 7.19)	2.61 (-10.00, 15.01)	11.11 (1.26, 20.16)	-3.30 (-12.21, 4.56)	-21.71 (-32.65, -11.00)	3.36 (-4.59, 11.75)	8.32 (-2.04, 17.30)	4.05 (-1.85, 9.87)	2.13 (-7.16, 11.53)
anakinra	-1.53 (-15.78, 11.33)	-2.61 (-15.01, 10.00)	8.42 (-5.25, 21.59)	-6.23 (-20.18, 7.22)	-24.63 (-38.79, -10.05)	0.57 (-12.07, 13.78)	5.61 (-7.82, 19.79)	1.37 (-10.19, 12.55)	-0.55 (-13.71, 12.67)
canakinumab	-9.86 (-21.70, 0.88)	-11.11 (-20.16, -1.26)	-8.42 (-21.59, 5.25)	-14.40 (-26.10, -3.24)	-32.83 (-44.45, -20.68)	-7.88 (-16.56, 2.73)	-2.76 (-10.55, 4.47)	-7.04 (-14.91, 0.88)	-8.92 (-19.54, 2.60)
etanercept	4.34 (-3.83, 12.06)	3.30 (-4.56, 12.21)	6.23 (-7.22, 20.18)	14.40 (3.24, 26.10)	-18.40 (-29.97, -5.73)	6.78 (-2.66, 17.44)	11.71 (0.52, 23.06)	7.49 (-0.57, 15.03)	5.59 (-4.45, 17.28)
infliximab	22.95 (10.43, 34.21)	21.71 (11.00, 32.65)	24.63 (10.05, 39.79)	32.83 (20.68, 44.45)	18.40 (5.73, 29.97)	25.11 (14.78, 36.47)	39.16 (17.38, 41.78)	25.88 (16.60, 34.87)	24.02 (11.86, 35.63)
lutikizumab	-2.10 (-13.15, 6.40)	-3.36 (-11.75, 4.59)	-0.57 (-13.76, 12.07)	7.88 (-2.73, 16.56)	-25.11 (-36.47, -14.78)	5.13 (-6.00, 13.83)	0.79 (-5.86, 6.12)	-1.05 (-11.31, 6.10)	-1.05 (-11.31, 6.10)
naproxen	-7.07 (-18.93, 3.31)	-8.32 (-17.30, 2.94)	-5.61 (-18.79, 7.82)	2.76 (-4.47, 10.55)	-11.71 (-23.06, -0.52)	-30.16 (-41.78, -17.38)	-5.13 (-13.83, 6.00)	-4.34 (-11.64, 3.87)	-6.17 (-16.78, 5.46)
placebo	-2.82 (-11.63, 4.28)	-4.05 (-9.87, 1.85)	-1.37 (-12.35, 10.19)	7.04 (-0.88, 14.91)	-7.49 (-15.93, 0.57)	-25.88 (-34.87, -16.60)	-6.79 (-12.55, 5.86)	4.34 (-3.87, 11.64)	-1.86 (-9.55, 5.93)
tocilizumab	-0.94 (-12.69, 9.31)	-2.13 (-11.53, 7.16)	0.55 (-12.67, 13.71)	8.92 (-2.60, 19.54)	-5.59 (-17.28, 5.45)	-24.02 (-35.63, -11.86)	1.05 (-8.10, 11.31)	5.17 (-5.46, 16.78)	1.86 (-5.93, 9.55)

Result of network meta-analysis for pain. The light grey grid represents statistical significant.

## P156

# RETROSPECTIVE ANALYSIS OF THE EFFECTS OF NONCOMPLIANCE WITH DENOSUMAB ON CHANGES IN BONE MINERAL DENSITY DURING THE COVID-19 PANDEMIC

C.-F. Huang<sup>1</sup>, M.-S. Shiao<sup>2</sup>, T.-Y. Mao<sup>3</sup>

<sup>1</sup>National Yang Ming Chiao Tung University Hospital, Yilan City, <sup>2</sup>Chang Gung University, Taoyuan, <sup>3</sup>Chaoyang University of Technology, Taichung, Taiwan

**Objective:** Although denosumab is a safe and effective treatment for osteoporosis in various clinical trials, few studies have investigated its efficacy in specific clinical situations. The effect of noncompliance with the standard six-month dosing regimen for denosumab on BMD was assessed in a retrospective study of patients prescribed denosumab during the COVID-19 pandemic.

**Methods:** Between February 2019 and September 2020, 638 patient records were reviewed, with 236 patients meeting the eligibility criteria. Patients were divided into three groups: those who received denosumab injections between 5-7 months after their initial subcutaneous injection, those who received denosumab injections between 7-9 months after their initial subcutaneous injection, and those who received denosumab injections >9 months after their initial subcutaneous injection. A multivariate regression study was conducted to compare the BMD shift (at least one year apart) before and after two denosumab injections between the three prespecified groups in both the lumbar spine (LS) and the femoral neck (FN).

**Results:** The difference between LS BMD indicates that there is a statistical difference between subjects who received denosumab injections between 5-7 months (near-standard dosing interval) and >9 months ( $p < 0.05$ ), but not in FN BMD, and no clinically significant association was identified.

**Conclusion:** The results of this study show that in special clinical situations, such as the COVID-19 pandemic, clinicians may have some flexibility to prescribe denosumab, but the interval between injections should not exceed 9 months.

P157

**A LOOK AT LOW T3 SYNDROME IN RHEUMATOID ARTHRITIS**O. V. Paramonova<sup>1</sup>, L. N. Shilova<sup>1</sup>, E. G. Korenskaya<sup>1</sup><sup>1</sup>Volgograd State Medical University, Volgograd, Russia

Syndrome of low T3 level (low T3), arises as a general response of the body as a compensatory reaction in severe disease, and reflects adaptive metabolic reactions and energy savings in a painful situation. Euthyroidism with a low level of T3 indicates an energy deficiency in the tissues. Apparently, under conditions of euthyroidism with a low level of T3, oxygen assimilation by tissues almost does not occur, energy is wasted, and therefore, the body in this situation is in a state of constant energy hunger. The analysis of biochemical tests shows that under these conditions there are colossal losses of structural material - proteins, to a much lesser extent - carbohydrates and fats, but the assimilation of oxygen by "starving" tissues and organs does not occur. At the same time, the result of prolonged hypoxia and energy deficiency is increased body weight loss, amyotrophic syndrome, the development of amyloidosis, myocardial dystrophy, fibrosing alveolitis, vasculitis, etc. The mechanisms of development of the established changes in the function of the thyroid gland are not clear. Despite a decrease in T3 and an increase in T4, the clinical picture of diseases in the examined persons with rheumatoid arthritis (RA) did not always correspond to the classical picture of hypo- or hyperthyroidism, although there were complaints characteristic of these states. It is possible that in RA there is a secondary thyroid disorder associated with the function of the pituitary gland and hypothalamus. In addition, the shift in the ratio of free T3 and free T4 levels in RA may be associated with the development of changes in the metabolism of thyroid hormones in peripheral tissues, a decrease in the sensitivity of receptors to them in cells and target tissues, as well as a decrease in the activity of T4 deiodases. Possibly, at the first stage of RA development, an increase in the level of T3 in the blood occurs due to the adaptive-compensatory response of the whole organism and the thyroid gland to the increased need for thyroglobulin to support metabolic processes in tissues under conditions of illness. This is provided by an increase in the conversion of T4 to T3, as well as an increase in the synthesis of T3 in the thyroid gland. In unfavorable conditions, more triiodothyronine is required to maintain constancy in the intracellular and pericellular environment, which directly controls energy metabolism in tissues. Prolonged increased consumption of T3 leads to its functional insufficiency and indirectly contributes to the formation of combined pathology of RA and ATP. As a result, patients with RA and ATP often have "ineffective" goiter transformation, accompanied by a hypothyroid state relative to triiodothyronine, and a hyperthyroid state relative to thyroxine against the background of normal TSH synthesis. Excessive concentration of thyroid hormones contributes to an increase in inflammatory reactions. It has been proven that the

more vividly the infection manifests, leading to the development of RA, the more often the thyroid function increases. Infection, even in an inactive state, enhances thyroid activity in 50% of patients. It is assumed that the infection causes irritation of the thyroid parenchyma, pituitary gland, hypothalamic region. On the other hand, a violation of the normal activity of the thyroid gland affects the course of the infectious process. This is manifested in various metabolic disorders, changes in calorogenesis and oxygen consumption by tissues, the activity of the central nervous system and other organs, as well as in the inhibition of lymphopoiesis, a decrease in the reactivity of the body and an increase in the adverse effect of infection on the course of the rheumatoid process.

With the involvement of the thyroid gland during RA, the pathological process intensifies, its course worsens, and the tactics of treating these patients also change. An excess of thyroid hormones leads to a disruption in the formation of a general adaptation syndrome, patients become torpid to any therapy. The condition improves with a gradual decrease in the functional activity of the thyroid gland against the background of the appointment of treatment. On the other hand, this can be explained by the fact that, in addition to autoimmune mechanisms in thyroid damage, an important role is played by the direct influence of "pro-inflammatory" cytokines: interleukin-1, 6, tumor necrosis factor, which can enhance immune responses, interact with thyrotropin receptors and additionally stimulate the production of thyroid hormones. The thyroid gland expresses interleukins when exposed to circulating immune complexes (which are formed in excess in RA), and cytokines, in turn, stimulate fibroblast proliferation, excessive production of collagen and glycosaminoglycans, leading to a narrowing of the joint space, the formation of bone outgrowths and a decrease in functional activity joint. It is known that the production of cytokines, in particular IL-6, is increased in RA. An increase in the level of cytokines such as  $\alpha$ -interferon,  $\gamma$ -interferon, IL-1, IL-2, TNF and granulocyte colony-stimulating factor may be accompanied by the development of hypothyroidism or thyrotoxicosis. These changes are often of a transient nature and disappear several months after the normalization of their number. The process of formation of reverse T3 is considered as a way of removing an excess amount of thyroxine from metabolism. The reverse T3 content rises sharply in conditions when it is necessary to conserve energy, to protect the body from overheating during fasting, an increase in body temperature, systemic or severe diseases, as well as in old and senile age.

P158

**PANDEMIC, LOCKDOWN AND RHEUMATOLOGIC PRACTICE**X. Grapton<sup>1</sup>, L. Poulain<sup>2</sup>, P. Lemesle<sup>3</sup>, N. Bouhedja<sup>2</sup><sup>1</sup>Hopital Swiss, Issy Les Moulineaux, <sup>2</sup>Private Practice, La Garenne Colombes, <sup>3</sup>Private Practice, Bois Colombes, France

**Objective:** During this exceptional and particular period of confinement, we have observed and analyzed the rheumatologists' (Rh) feelings, reactions, and attitudes that may have emerged.

**Methods:** During the first lockdown in France, during spring 2020, 13 questions, 9 appendices, ranking of the most frequently cited reactions were asked to 38 private practice Rh from the Ile-de-France region, average age 63 yo, 58% male (M).

**Results:** Fear of being contaminated and of transmitting M 91/F 69%, concern about an unknown pandemic M 86/F 69%, anger M 71/F 84% were the main feelings expressed. Anger at the indifference to the exposure of doctors in the city 84%, the unpreparedness of the authorities M 95/F 62%, the mortality in EHPAD (nursing homes) 81%, the media cacophony 79%, the hidden reality 71%. On a personal level, according to 61%, the Rh is not anxious about the world after, has no psychological repercussions (sleep, melancholy, family relations, frustration) 58% and his degree of commitment was guilt-free 55%. Professionally: perplexity in the face of the contradictions of experts and scientific journals 79%, wide acceptance of constraints in the practice (10 h/d mask wearing, 92%, spaced reception of patients 95%, education of barrier gestures and social distancing 97%), adaptation of the medical practice (teleconsultation, telephone consultation) 78%, fear of abandoning treatment or diagnostic delay M 82/F 62%, financial arrangements necessary M 86/F 53%. For M: worries about the pandemic, anger and uncertainty about what will happen next predominate in this order. For F, anger (untruths and lack of means) is the main feeling. Anger, fear and uncertainty are the most frequently cited feelings for both male and female.

**Conclusion:** The Rh at the end of the period of confinement during spring of 2020, is worried M>F and anger especially in front of the sanitary unpreparedness M>F. On a personal level the private life has been little affected F>M and he has been able to adapt professionally. Nevertheless, the deconfinement has not been a banal return to normal 63% M=F.

P159

**BENEFITS OF PHYSICAL ACTIVITY IN CHRONIC RHEUMATOID DISEASE (CRD)**P. Lemesle<sup>1</sup>, L. Poulain<sup>2</sup>, X. Grapton<sup>3</sup>, N. Bouhedja<sup>1</sup><sup>1</sup>Private Practice Creer Group, Bois Colombes, <sup>2</sup>Private Practice Creer Group, La Garenne Colombes, <sup>3</sup>Hopital Swiss Creer Group, Issy Les Moulineaux, France

**Objective:** CREER group of rheumatologists (Rh) has studied a CRD population practicing a physical activity (motivations, expectations, nature and rhythm) excluding household ones despite their quantifiable energy value (MET). This study aimed to determine the place of physical activity in the management of CRD.

**Methods:** 207 patients, 53 yo average, 56% (50-70 yo), 60% women (W), rheumatoid arthritis (RA): 57% or ankylosing spondylitis (AS): 40%, low or moderate activity (66%). Years of evolution: 10 RA/11.5 AS, corticosteroids 34/5%, NSAIDs 15/52%, conventional DMARDs 84/30%, biotherapies 21/43%. Comorbidities: 55 RA/ 44% AS, high blood pressure 20%, overweight 21%, tobacco 13.5%, other 19%.

**Results:** 7/10 patients are encouraged to engage in physical activity, regardless of gender, age, RA or AS. Are suggested: walking 53%, swimming/aquagym 40%, gym 19%. The practice is regular for 60% W>M, RA=AS, more for 70% if <40 yo and >60 yo. Really practiced activity: walking 46%, aquatic activities 37%, cycling 29%, home sports 19%. Once/week minimum is followed for cycling and swimming, insufficiently for walking, largely for sport at home. 50% have been practicing for 3 y. 60% adapt the rhythm to the CRD activity. Motivations: maintain one's health, de-stress. Sport recommendations: Rh 80%/ general physician 45%. 50% patients ignore if this will improve or worsen the CRD. Hence the need for information by the Rh of the benefits of physical activity. If 60% of patients modify their activity because of CRD, many do not participate in sport because no time, no need, no desire RA=AS.

**Conclusion:** The main activity practiced and advocated is walking. The patients go beyond, by mobilizing for cycling, swimming and gym. But the reluctance persists and we must, through therapeutic education, convince of the benefits of the activity on CRD and its comorbidities, unknown to 50% of patients. To map lesions, judge the ability and desires are necessary to set goals for duration and frequency of activity. Using connected tools improves compliance. Finally, walking which does not require neither schedule nor equipment (otherwise a cane) should become a firstline prescription.



P160

# ANALYSIS OF TREATMENT RESULTS FOR LATERAL CLAVICLE FRACTURES AND FRACTURE DISLOCATIONS

M. Kodirov<sup>1</sup>, O. Shodiyev<sup>1</sup>, U. Mirobidov<sup>1</sup>

<sup>1</sup>Samarkand Branch of Republican Specialised Scientific Practical Medical Center of Traumatology & Orthopedics, Samarkand, Uzbekistan

**Objective:** Description of a new method of surgical treatment of fracture dislocations and fractures of the acromial end of the clavicle using a clavicle hook plate in the department of concomitant injuries of adults of the Samarkand branch of RSPMCTO in period from 2015-2020.

**Methods:** When analyzing 150 cases of medical histories for a clavicle fracture, 45 fracture dislocations and fractures of the acromial end of the clavicle were identified; there were 42 injured men, 3 women. According to the types of injury, the largest number falls on household - 12%, road traffic accidents - 11%, sports - 3%, street - 2%, others - 3%. Under general anesthesia, the acromion and the fracture site of the acromial end of the clavicle are exposed in layers for 5-6 cm. The hook is placed under the acromion, the plate is reinforced with three or four screws on the acromial end of the clavicle. The wound is sutured in layers. Immobilization with a "scarf bandage" until removing the stitches for 7-10 d. Development of the hand, wrist joint from the first days in the elbow joint from 3-5 d.

**Results:** According to the described method, 45 operations were performed. Development of the hand, wrist joint from the first days; in the elbow joint from 3-5 d. Movement in the shoulder joint after 2 weeks from the day of surgery. According to the described method, 45 operations were performed. Early functional development of the joints, shortening the treatment time in the postoperative period, and shortening the time of inpatient and outpatient treatment made it possible to reduce the period of temporary disability.

**Conclusion:** The proposed method of surgery with the use of a clavicular hook plate is currently the most optimal in comparison with other methods of surgery. The technique of performing operation is not complicated, it is carried out with minimal traumatization of soft tissues and does not require special external immobilization of the limb.

P161

# MALE SECONDARY OSTEOPOROSIS: MULTILEVEL ASPECTS

I. A. Voinea<sup>1</sup>, A. Ghemigian<sup>2</sup>, E. Petrova<sup>2</sup>, E. D. Becheru<sup>1</sup>, A. Dumitrascu<sup>1</sup>, G. Voicu<sup>1</sup>

<sup>1</sup>C.I. Parhon National Institute of Endocrinology, <sup>2</sup>C.I. Parhon National Institute of Endocrinology & C. Davila University of Medicine & Pharmacy, Bucharest, Romania

**Objective:** Multiple causes of male osteoporosis are described like glucocorticoid exposure, hypogonadism, uncontrolled long term hyperthyroidism, primary hyperparathyroidism, severe hypovitaminosis D, different active endocrine tumours of pituitary and adrenal glands, etc. (1-5). After the administration of glucocorticoids, rapid bone loss occurs, and fracture risk increases within a few months in a dose-dependent manner. We aim to introduce a male with prior ankylosing spondylitis can be associated with bone loss and increased risk of fractures.

**Case report:** A 63-year old, nonsmoking male is admitted for evaluation of osteoporosis. His medical history includes: HLA-B27-positive ankylosing spondylitis (AS). He is also known with left thyroidectomy and isthmectomy for toxic adenoma that was performed 38 y prior to current admission, without consecutive levothyroxine treatment and an additional right thyroid node, which was detected 14 y ago. At the age of 22 y, the patient was offered glucocorticoid treatment for 2 y. The medical background also includes: aortic and mitral regurgitation, extrasystolic supra-ventricular arrhythmia, grade III arterial hypertension, currently controlled with specific oral medication. Furthermore, he is suffering from kidney microlithiasis and vitamin D deficiency which was treated with vitamin D supplements. On admission, he accused persistent back pain without evidence of a radiological thoracic-lumbar fracture. The panel of evaluation revealed: total calcium=9.83 mg/dL (8.4-10.3), phosphorus=2.33 mg/dL (2.5-4.5), alkaline phosphatase=100 U/L(38-129), CrossLaps=0.130 ng/mL (0.104-0.504), osteocalcin=17.82 ng/mL (14-46), P1NP=21.07 ng/mL (normal: 15-58), PTH=55.87 pg/mL (15-65), 25-hydroxyvitaminD=42.3 ng/mL (30-100), TSH=0.59 µIU/mL (normal: 0.34-5.6), freeT4=0.87 ng/dL (normal: 0.61-1.12), calcitonin=3.53 pg/mL(normal: 1-11.8), without hypogonadism. L2-4 lumbar BMD-DXA=0.667 g/cm<sup>2</sup>, T-score=-3 SD, Z-score=-1.7 SD. 1 y after weekly alendronic acid 5600 UI and vitaminD3 supplements, DXA showed BMD=0.681 g/cm<sup>2</sup>, T-score=-3 SD, Z-score=-1.7 SD.

**Conclusion:** Prior glucocorticoid exposure in addition to AS are contributor to male bone loss. However, stationary BMD after oral bisphosphonates is suggestive for a good response to therapy.

## References:

1. Radu L, et al. Revista de Chimie 2018;69:2754.
2. Paduraru DN, et al. Chirurgia (Bucur) 2019;14:564.
3. Albulescu DM, et al. Revista de Chimie 2018;69:3683.
4. Poiana C, et al. 2009;104:753.
5. Albulescu DM, et al. Revista de Chimie 2018;69:3683.

P162

### MIR-671 ABUNDANT IN SMALL EXTRACELLULAR VESICLES DERIVED FROM RHIZOMA DRYNARIAE- PRECONDITIONED BONE MESENCHYMAL STEM CELLS REGULATING OSTEOGENESIS BY TARGETING TAK1 MEDIATING WNT SIGNALING

X. Li<sup>1</sup>, L. Yang<sup>2</sup>, X. Zhu<sup>1</sup>, R. Zhang<sup>2</sup><sup>1</sup>College of Traditional Chinese Medicine, Jinan University,<sup>2</sup>College of Pharmacy, Jinan University, Guangzhou, China

The antiosteoporosis and bone protection effects of Rhizoma drynariae (RD) are well known. Small extracellular vesicles (sEVs) derived from mesenchymal stem cells have been demonstrated to possess potent regeneration. Whether the antiosteoporosis and bone protection effects of RD are correlated to the exosomes secretion and delivery is still not fully understood. In this study, we evaluated the osteogenesis effects of sEVs derived from RD-preconditioned bone mesenchymal stem cells (RD-sEV) on osteoblasts. The underlying mechanism of RD-sEV-induced osteogenesis was explored by RNA sequencing and verified by transfection with the corresponding mimic and inhibitor. RD-sEV stimulates proliferation and osteogenic differentiation of osteoblasts. Sequencing identified a unique enrichment of a set of miRNAs in RD-sEV. Overexpression or inhibition in vitro demonstrated that the osteogenesis-inducing potential was primarily attributed to miR-671, one of the most dramatically downregulated miRNAs in the RD-sEV fraction. Dual-luciferase reporter assays showed that miR-671 attenuated osteogenesis through direct suppression of TAK1 by targeting its 3' untranslated region. Rescue experiments indicated that miR-671 mimic could reverse the decrease of beta-catenin which aroused by Dkk-1, a classic Wnt signaling inhibitor. These data report the potential of RD-sEV to stimulate osteogenic differentiation achieved by delivering sEV-miR-671 to target TAK1 for further regulating the Wnt signaling.

P163

### MONITORING OF LUMBAR SPINE KINEMATICS AFTER MICRODISCECTOMY WITH THE USE OF WEARABLE SENSORS: A PATH TO RECOGNIZE POSSIBLE RECURRENCE KINEMATIC FACTORS

G. Papagiannis<sup>1</sup>, A. Triantafyllou<sup>1</sup>, P. Papagelopoulos<sup>1</sup>, E. Papadopoulos<sup>2</sup>, P. Koulouvaris<sup>1</sup>

<sup>1</sup>National and Kapodistrian University of Athens, 1st Dept. of Orthopaedic Surgery, Medical School, Attikon General University Hospital, <sup>2</sup>National and Kapodistrian University of Athens, 2nd Dept. of Orthopaedic Surgery, Medical School, Agia Olga General Hospital, Athens, Greece

**Objective:** The literature reports 5-15% recurrence rate of lumbar spine microdiscectomies (LSMs). Lumbar spine flexion (LSF) is mentioned as the most harmful load to the intervertebral disc that could lead to recurrence during the 6 postoperative weeks. Patients with sagittal plane ROMs more than 10° during that period had a recurrence rate of 26.5%, whereas those with <10° had a rate of 4.1%. The purpose of this study is to quantify LSFs, following LSM, by quantifying (monitoring during daily activities) the frequency of more than 10° LSF ROM, at the period of 6 weeks postoperatively.

**Methods:** ROMs were recorded during 33 subjects' daily activities for 24 h twice per week. MetaMotionR+, Inertial Measurement Unit (IMU), was used for the measurement of lumbar spine kinematics.

**Results:** The mean number of >10° of LSFs per hour were: 40.1/h during the 1st postoperative week (P.W.) (29% normal subjects-N.S.), 2nd P.W. 61.2/h (44% N.S.), 3rd P.W. 72.9/h (52.7% N.S.), 4th P.W. 61.1/h (61.1% N.S.), 5th P.W. (69.7% N.S.) and 6th P.W. 106.25 (76.9% N.S.).

**Conclusion:** LSFs constitute important risk factors for rLDH. This is the first time, to our knowledge, recording lumbar spine kinematics during daily activities for 24 h/d following microdiscectomy. Although patients' data report less sagittal plane movements than normal, further in vitro studies should be done by using our results of the patients' kinematic, to identify if such a kinematic pattern could cause reherniation of microdiscectomized lumbar discs. Furthermore IMUs could be additionally used as a precaution measure, to alert patients by vibration, whenever they exceed acceptable rates of LSFs.

P164

### EQUITY OF HEALTHCARE EXPENDITURE IN HIP FRACTURE PATIENTS ACROSS SOCIOECONOMIC GROUPS: A BENEFIT INCIDENCE ANALYSIS USING AUSCUIROS DATA

A. Lal<sup>1</sup>, S. Overell<sup>1</sup>, K. Sanders<sup>2</sup>, J. Talevski<sup>2</sup>, J. A. Kanis<sup>3</sup>, F. Borgstrom<sup>4</sup>, A. Svedbom<sup>5</sup>, S. Brennan-Olsen<sup>6</sup>

<sup>1</sup>Deakin University, School of Health & Social Development, Burwood, Australia, <sup>2</sup>University of Melbourne, Dept. of Medicine, Melbourne, Australia, <sup>3</sup>University of Sheffield, Centre for Metabolic Bone Diseases, Sheffield, UK, <sup>4</sup>Karolinska Institute, Dept. of Learning, Informatics, Management and Ethics, Medical Management Centre, Stockholm, Sweden, <sup>5</sup>ICON Plc, Stockholm, Sweden, <sup>6</sup>Deakin University, School of Health and Social Development, Geelong, Australia

**Objective:** Data suggest a higher incidence of hip fracture among those of lower socioeconomic position (SEP) compared to those of higher SEP. With a universal healthcare system in Australia, we examined health service expenditure for hip fracture patients across income and education groups using healthcare utilisation

data collected by the Australian arm of the International Costs and Utilities Related to Osteoporotic fractures Study (AusICUROS) study.

**Methods:** Healthcare utilisation data 4 months post-fracture were extracted for participants aged  $\geq 50$  y with hip fracture ( $n=174$ , 76% women). Self-reported income and highest level of education were categorised as low, medium, or high. Using Benefits Incidence Analysis, total healthcare expenditure (public and private) was calculated from 2020 Medicare Benefits Schedule, and mean hip fracture related admissions were ascertained from the 2018 National Hospital Cost Data Collection. Concentration Indexes (CI) were developed to indicate the degree of socioeconomic inequality in healthcare expenditure. Their magnitude indicates the strength of the relationship and degree of variability. We also compared distributions of expenditure across SEP groups with expected need inferred from hip fracture incidence.

**Results:** The CI suggested health expenditure across socioeconomic groups was equitable, although we observed a nonsignificant trend toward greater healthcare expenditure in the lowest income and education groups (CI=-0.0455,  $p=0.20$ , and -0.0506,  $p=0.09$ , respectively).

**Conclusion:** Overall healthcare expenditure for individuals with incident hip fracture was found to be equitable across socioeconomic groups, slightly favouring the most disadvantaged groups. The results appear as a positive reflection of Australia's universal health system.

curves (AUC). A mobile application to predict 1-y mortality after hip fracture was then developed using the best performing algorithm (Figure 1).

**Results:** The ANN model was the best performing algorithm with the highest accuracy of 96.80% and 95.95% in the training and testing datasets, respectively. The AUC of the ANN model for both datasets were 0.993 [95%CI: 0.986, 0.998] and 0.949 [95%CI: 0.892, 0.993], higher than the 0.986 [95%CI: 0.976, 0.994] and 0.939 [95%CI: 0.881, 0.985] of the logistic regression model. The best algorithm was subsequently incorporated into a mobile application: (Figure 2)



**Conclusion:** Our machine learning approach provided excellent capability for predicting 1-y mortality after hip fracture and had developed into a mobile application for any users. External validation of this tool is needed to ensure the clinical utility in hip fracture care among different centers.

P165

## DEVELOPMENT AND INTERNAL VALIDATION OF MACHINE LEARNING APPROACH FOR PREDICTING 1-YEAR MORTALITY AFTER FRAGILITY HIP FRACTURE

N. Kitcharanant<sup>1</sup>, P. Chotiyarnwong<sup>2</sup>

<sup>1</sup>Chiang Mai University, Chiang Mai, <sup>2</sup>Mahidol University, Bangkok, Thailand

**Objective:** This study aimed to (1) develop and internally validate the mortality prediction models for 1-y mortality after hip fracture using the machine learning approach; and (2) incorporate the algorithm with the best prediction performance into a freely accessible mobile application.

**Methods:** This retrospective study was conducted using database from our fracture liaison service registry. 492 patients diagnosed with fragility hip fracture were included. The database was randomly split into two sets: 344 cases (70%) for training and 148 (30%) for testing. A machine learning technique was utilized to develop the Artificial Neural Network (ANN) and logistic regression (LR) models, and internally validated by evaluating their accuracies and the area under the receiver operating characteristic

P166

# THE RESULTS OF MEDICATION CORRECTION OF CLINICAL AND ORTHOPEDIC MANIFESTATIONS IN PATIENTS WITH VARIOUS FORMS OF FIBROUS DYSPLASIA

M. D. Guk<sup>1</sup>, M. D. Zyma<sup>1</sup>, M. D. Kincha-Polishchuk<sup>1</sup>, M. D. Cheverda<sup>1</sup>, M. D. Skuratov<sup>1</sup>, M. D. Vyderko<sup>1</sup>

<sup>1</sup>SI "The Institute of Traumatology and Orthopedics" by NAMS of Ukraine, Kyiv, Ukraine

**Objective:** To improve medication correction of disorders of the structural state and metabolism of bone tissue in patients with fibrous dysplasia (FD).

**Methods:** There were 16 patients with FD who were receiving medication treatment. Age of patients was from 6-28 y. All patients underwent basic antiosteoporotic therapy, of which 10 were treated with pamidronic acid. Serum Ca and Vit D3 levels were screened before and during treatment. The structural state of bone tissue was studied according to the Z- and T-criteria, bone metabolism - the study of bone markers: total P1NP,  $\beta$ -CTx, osteocalcin.

**Results:** Based on paraclinical studies in patients with FD, depending on the clinical manifestations, form of the disease, age, indications for medication treatment with the use of pamidronic acid have been developed. Basic treatment and basic treatment in combination with pamidronic acid were used. Pamidronic acid medications were used at a dose of 0.5-1.0 mg/kg/d for one - three infusions, the interval between cycles was 3-4 months. Schemes, doses, combinations of pamidronic acid with other antiosteoporotic drugs depending on changes in the condition and metabolism of bone tissue in FD were determined. Indications for basic therapy were:  $\beta$ -CTx up to 0.500 ng/ml and Z-test up to -1.0 SD. Basic therapy included: preparations of Ca "Osteogenon" 1-2 capsules 2 times a day and vitamin D3 in a dose of up to 2000 IU. Indications for basic therapy in combination with the use of pamidronic acid at a dose of 0.5-1.0 mg/kg/d were severe pain, a significant area of long bone lesions, changes in  $\beta$ -CTx from 1.5 ng/ml and above, Z-test from -1.5 SD and below. The effectiveness of therapy was assessed by changes in the level of  $\beta$ -CTx in the serum and the Z-test of the lumbar vertebrae. The effectiveness of the used treatment did not depend on the dose of pamidronic acid and the form of FD. The relation between changes in the marker of osteoresorption and its reduction depending on the initial values (Wilcoxon's test  $p=0.0045$ ).

**Conclusion:** The results of medication treatment in patients with FD indicate its significant effectiveness (Wilcoxon test  $p=0.0045$ ): reduction and elimination of pain, improvement of the structural condition and metabolism of bone tissue.

P167

# HYPOVITAMINOSIS D ON AN ADULT FEMALE: FROM AUTOIMMUNE CONDITIONS TO PANDEMIC DAYS

I. A. Voinea<sup>1</sup>, E. Petrova<sup>2</sup>, A. Draghici<sup>1</sup>, A. Dumitrascu<sup>1</sup>, G. Voicu<sup>1</sup>, A. Ghemigian<sup>2</sup>

<sup>1</sup>C.I. Parhon National Institute of Endocrinology, <sup>2</sup>C.I.Parhon National Institute of Endocrinology & C. Davila University of Medicine & Pharmacy, Bucharest, Romania

**Objective:** COVID-19 pandemic was associated with increased risk of hypovitaminosis D due to lockdown regulations and limited outdoor activities, while young adult patients with autoimmune conditions may associated decreased values of 25-hydroxyvitamin D due to copresence of celiac disease, glucocorticoid exposure, malabsorption, overtreatment of autoimmune hypothyroidism, etc. (1-5). We aim to introduce a female case known with autoimmune conditions who was admitted for vitamin D deficiency related symptoms during pandemic.

**Case report:** A 41-year-old, nonsmoker female is admitted for nonspecific muscle cramps, and joints pain, asthenia which is persistent for the last several months in addition to chronic low back pain (which required chronic use of nonsteroid anti-inflammatory medication). Her personal medical background reveals a diagnosis of HLA-B27-positive ankylosing spondylitis that was established seven years before current admission. She is also known with autoimmune thyroiditis with negative antibodies, a diagnosis that was based on suggestive ultrasound features with highly hypoechoic pattern of relative small thyroid gland (and normal thyroid function). She is also confirmed with thrombophilia. She has a negative personal history of confirmed COVID-19 infection and she followed the lockdown restrictions for several weeks. The family medical history is irrelevant. On admission, clinical examination of the thyroid is within normal limits on a menstruated normal weighted female. Biochemistry data points out normal total calcium of 9.45 mg/dL (normal: 8.4-10.3 mg/dL). Endocrine panel shows TSH=1.28  $\mu$ UI/mL (normal: 0.5-4.5  $\mu$ UI/mL), free levothyroxine=11.65 pmol/L (normal: 9-19 pmol/L), anti-thyroperoxidase antibodies=10.88 UI/mL (normal: 0-35), anti-thyroglobulin antibodies=10 UI/mL (normal: 0-115 UI/mL). 25-hydroxyvitamin D=10 ng/mL (normal >30 ng/mL) with increased PTH levels and negative antibodies for celiac disease. Supplementation with daily 2000 UI of vitamin D for 12 weeks followed by daily 1000 UI was recommended.

**Conclusion:** The association thrombophilia-hypovitaminosis D has been reported in some patients, but it is rather incidental. Chronic use of anti-inflammatory medication may cause malabsorption, and also the potential of a second autoimmune disease at intestinal level may cause this deficiency, but the current pandemic reality has become a new cause of it.

## References:

1. Albulescu DM, et al. Revista de Chimie 2018;69:3683.



2. Paduraru DN, et al. Chirurgia (Bucur) 2019;114:564.
3. Poiana C, et al. Rom J Morphol Embryol 2011;52:187.
4. Radu L, et al. Revista de Chimie 2018;69:2754.
5. Albulescu DM, et al. Revista de Chimie 2018;69:2438.

## P168

### BONE INVOLVEMENT ON A YOUNG MALE WITH MEDULLARY THYROID CARCINOMA

I. C. Raducu<sup>1</sup>, I. A. Voinea<sup>1</sup>, A. Draghici<sup>1</sup>, N. Dumitru<sup>2</sup>, E. Petrova<sup>2</sup>, A. Dumitrascu<sup>1</sup>, G. Voicu<sup>1</sup>, A. Ghemigian<sup>2</sup>

<sup>1</sup>C.I. Parhon National Institute of Endocrinology, <sup>2</sup>C.I. Parhon National Institute of Endocrinology & C. Davila University of Medicine & Pharmacy, Bucharest, Romania

**Objective:** Medullary thyroid cancer (MTC), neuroendocrine tumor with bone spreading potential, may be already metastasized at the time of diagnosis (for instance, affecting liver, lung, brain and) (1-5). Most common skeleton sites are the spine and pelvis, followed by the ribs, then the extremities, and skull (1-5). Also, MTC may associate primary hyperparathyroidism (MEN2A syndrome) and common vitamin D deficiency (1-5). We aim to introduce a male with MTC and severe outcome, in addition to bone involvement.

**Case report:** A 31-year-old, nonsmoking male is admitted as an emergency for a large right mediastinal mass of 11.4/8.3/14.3 cm, causing severe haemoptysis. Biopsy showed MTC, so he was referred for endocrine assays. Paraclinical investigations: serum calcitonin=6245 pg/mL (normal: 8.3-14.3 pg/mL), chromogranin A=189.5 ng/mL (normal: 20-125 ng/mL); neuron specific enolase=12.93 ng/mL (normal: 0-12 ng/mL), total serum calcium=9.1 mg/dL (normal: 8.4-10.2 mg/dL), PTH=44.12 pg/mL (normal: 15-65 pg/mL), 25-hydroxyvitaminD=25.98 ng/mL (normal: 30-100 ng/mL), normal metanephrines/normetanephrines. Cervical ultrasound: no specific nodule at thyroid, but multiple supraclavicular and lateral cervical lymph nodes (blocklike), of maximum 5.78/2.13 cm. Computed tomography (CT) showed: thyroid nodule of 0.9/0.6 cm, lung metastases with secondary incomplete atelectasis, hepatosplenomegaly, numerous supraclavicular, intercostal and phrenic lymph nodes, in association with mediastinal mass. A severe cholestasis initially contraindicated chemotherapy thus external radiotherapy for the lung and mediastinal masses was started followed by chemotherapy (doxorubicin-cyclophosphamide-vincristine). 8 months calcitonin increased to 11791 pg/mL while total serum calcium decreased to 8.6 mg. Lumbar BMD-DXA=1.342 g/cm<sup>2</sup>, Z-score=1.1 SD, CT revealed more metastases (including at liver of 2.8/2.7 cm) and an osteolytic lesion on left iliac bone of 6.2/4.5 cm, confirmed at Tc<sup>99m</sup> bone scintigraphy as high uptake, also at right humerus, scapula, 1/3 distal left femur. Zolendronic acid (4 mg/28 d) was added.

**Conclusion:** Bone metastases might be expected even in young patients with uncontrolled MTC.

#### References:

1. Albulescu DM, et al. Revista de Chimie 2018;69:2438.
2. Paduraru DN, et al. Chirurgia (Bucur) 2019;114:564.
3. Albulescu DM, et al. Revista de Chimie 2018;69:3683.
4. Popescu M, et al. Revista de Chimie 2018;69:2089.
5. Bechir ES, et al. Revista de Chimie 2019;70:3515.

## P169

### POLYMORPHISM OF ANDROGEN RECEPTOR GENE AND SKELETON FORMATION IN TRANSGENDER INDIVIDUALS

V. Makarova<sup>1</sup>, V. Solov'Eva<sup>2</sup>, A. Kremenitskaya<sup>2</sup>

<sup>1</sup>National Research Institute of Public Health N.A. Semashko, <sup>2</sup>Scientific Center of Personalized Medicine, Moscow, Russia

**Objective:** The androgen receptor (AR) gene MIGHR is known to be associated with transsexualism. Bone tissue is one of the target organs for androgens. Trochanteric index (TI) (ratio of height to the leg length) may indicate the organism androgenization level during puberty. It is interesting to identify the peculiarities of this process in the transperson population. Our aim was to identify the connection between androgen receptor (AR) gene CAG polymorphism and skeletal formation type in transgender persons.

**Methods:** The study involved 262 patients above 18 y with the diagnosis of transsexualism (121 MtF, 141 FtM). Mental and sexual status; TI; and genetic analysis (AR gene polymorphism) was estimated.

**Results:** The average TI in the MtF group accounts for 1.93±0.03, which represents hypoevolutive type of skeletal development. For FtM group TI was 2.01±0.04, that matches frontier between normal evolutive and hyperevolutionary types. Differences in TI values in the MtF and FtM were significant (p=0.000). The MtF and FtM groups showed significant differences in the number of CAG repeats (p=0.000). A strong negative correlation was found between the TI value and number of CAG repeats in both groups (R=-0.24; p=0.000).

**Conclusion:** TI is associated with polymorphism of AR. FtM population is characterized by a less number of CAG repeats in the AR gene compared to MtF, a higher TI, and a tendency toward a hyperevolutionary type of the formation of the skeleton. The MtF population otherwise is characterized by a hypoevolutive type of the formation of the skeleton.

P170

# EFFECT OF VITAMIN D SUPPLEMENTATION ON RISK OF BREAST CANCER: A SYSTEMATIC REVIEW AND META-ANALYSIS OF RANDOMIZED CONTROLLED TRIALS

Z. Li<sup>1</sup>, G. Li<sup>1</sup>, L. Thabane<sup>2</sup>

<sup>1</sup>Guangdong Second Provincial General Hospital, Guangzhou, China, <sup>2</sup>McMaster University, Hamilton, Canada

**Objective:** Vitamin D supplementations are widely used to prevent osteoporosis, especially in menopausal women. However, the association between vitamin D and the risk of breast cancer should be taken into consideration. Laboratory findings indicated that vitamin D might have potent protective effect on breast cancer, but epidemiology studies reported conflicting results. The aim of the study was to conduct a systematic review and meta-analysis to clarify the efficacy and safety of vitamin D supplementation on risk of breast cancer.

**Methods:** MEDLINE, EMBASE, The Cochrane Central Register of Controlled Trials, ClinicalTrials.gov and abstracts of three major conferences were searched (up to December 8, 2020). Parallel randomized controlled trials (RCTs) examining the efficacy of vitamin D supplementation on risk of breast cancer or change of mammography compared with placebo in females were included. Data were meta-analyzed using a random-effects model. Bayesian meta-analysis was conducted to synthesize the results using data from observational studies as priors.

**Results:** Seven RCTs were identified for effect of vitamin D on risk of breast cancer, with 19,137 females included for meta-analysis. No statistically significant effect of vitamin D on risk of breast cancer was found in classical random-effect meta-analysis (risk ratio=1.04, 95% CI: 0.84 to 1.28, p=0.71). When Bayesian meta-analyses were conducted, results remained nonsignificant. There was no statistically significant effect of vitamin D on mammography density observed: mean difference=0.46, 95% CI: -2.06 to 2.98, p=0.72.

**Conclusion:** There is insufficient evidence to support the harmness or efficacy of vitamin D supplementation in breast cancer risk. The efficacy of using vitamin D on risk of breast cancer from previous observational studies may be overestimated.

**Acknowledgement:** Registration: PROSPERO (identifier: CRD42019138718).

P171

# MUSCULOSKELETAL DISORDERS AND PERCEIVED WORK DEMANDS AMONG FEMALE NURSES AT A TERTIARY CARE HOSPITAL IN INDIA

S. Siddique<sup>1</sup>

<sup>1</sup>Kuhs, Malappuram, India

**Objective:** Musculoskeletal disorders (MSD) are common among nurses and can affect patient outcomes. Our aim was to measure prevalence of MSD and their association with perceived work demands and sociodemographic variables among female nurses at a tertiary care hospital in South India.

**Methods:** A cross-sectional study was conducted starting June 2018 to May 2019 through interviewer administered questionnaires which comprised three parts: sociodemographic data, modified Nordic questionnaire, and perceived physical and psychological work demands. **Results:** 296 nurses with a mean age of 30.4 y participated. Prevalence of any MSD in the last seven days was 60.5% with low back pain being the most common and elbow pain the least common. Occurrence of any MSD was associated with age, number of children, working hours at home, BMI, and total work experience. High perceived physical demands score was associated with lower back (OR: 3.06) and knee pain (OR: 7.73).

**Conclusion:** Prevalence of MSD was high and occurrence of lower back and knee MSD was associated with perceived physical demands. This information should be used as a benchmark and guiding tool for designing work place interventions to improve working conditions and health of nurses.

P172

# A RISK ASSESSMENT STUDY ON WORK-RELATED MUSCULOSKELETAL DISORDERS AMONG DENTISTS IN MANGALORE, INDIA

S. Siddique<sup>1</sup>

<sup>1</sup>Kuhs, Malappuram, India

**Objective:** Work-related musculoskeletal disorders (WMSDs) are responsible for morbidity in many working populations, which are of multifactorial in origin and of global concern due to industrialization. Dentists as one of the healthcare professionals who are prone to develop these WMSDs. The study aims to determine the prevalence of WMSDs among dentists in Mangalore region and explores the various risk factors for the development of MSDs and WMSDs.

**Methods:** This proposed study is a cross-sectional study conducted among dentists of two randomly selected dental colleges of Mangalore, India. A structured questionnaire was used to collect the demographic information, occupational his-

tory, risk factors, and ergonomic awareness with job task details. Prevalidated standardized tools such as quick exposure check list, rapid entire body assessment score sheet, and Nordic Musculoskeletal Questionnaire were also used. Data were entered in MS-Excel and analyzed through SPSS version 22.

**Results:** More than 92% of the participants reported pain and discomfort in at least one part of their body. The major affected body part is neck, followed by the lower back and wrist. More than half of the orthodontists and oral surgeons reported that their MSDs are work-related origin. Pearson's correlation test indicated that there is a positive correlation between the current exposure and risk ( $r=0.613$ ). Multivariate regression analysis found that younger participants, male ( $OR=4.1$ ), involved physical activity ( $OR=1.04$ ), dentists not taught about ergonomics in their dental school ( $OR=1.69$ ) or never attended any workshops ( $OR=1.38$ ), who reported task involving sustained muscle contraction ( $OR=1.12$ ) or task with repetitive movements ( $OR=1.11$ ) are the major risk factors for the development of MSDs among the dentists.

**Conclusion:** This risk assessment study found that there is a high prevalence of MSDs and WMSDs among dentists. Ergonomic awareness and health promotion need to be integrated with the professional practice for dentists.

### P173

#### LOW-ENERGY FRACTURE PREDICTION IN PATIENTS PRESCRIBED ANTIEPILEPTIC DRUGS: A SWEDISH CASE-CONTROL STUDY ASSESSING THE VALUE OF BMD AND TBS

O. Nordqvist<sup>1</sup>, A. Petersson<sup>2</sup>, O. Björnelid<sup>3</sup>, L. Brudin<sup>2</sup>, P. Wanby<sup>1</sup>, R. Nobin<sup>4</sup>, M. Carlsson<sup>1</sup>

<sup>1</sup>Dept. of Medicine & Optometry, Linnaeus University, Kalmar, <sup>2</sup>Dept. of Medical & Health Sciences, University of Linköping, Linköping, <sup>3</sup>Dept. of Computer Science & Media Technology, Linnaeus University, Kalmar, <sup>4</sup>Dept. of Clinical Sciences, Lund University, Malmö, Sweden

**Objective:** Antiepileptic drugs (AED) are known to increase the risk of low energy fractures by causing secondary osteoporosis. In this study, we determined the value of BMD and trabecular bone score (TBS) as predictors for low energy fractures in patients prescribed AED.

**Methods:** This case-control study included 517 low energy fractures, i.e., a combination of ICD-10 codes according to the Swedish National Board of Health and Welfare's definition of osteoporosis-related fractures and ICD-10 codes for low energy trauma, in 1385 subjects who had all participated in a TBS convertible DXA examination between July 2011 and November 2018 in Kalmar county, southeast Sweden. The AED users were stratified according to cytochrome P-450 enzyme inducing ability and compared to controls. The dataset was a combination of previously collected

data from the electronic health register (EHR) and new BMD and TBS data from a DXA database. Univariate and multivariate logistic regressions were applied.

**Results:** In this study BMD-spine did not predict low energy fractures; however, both BMD-hip ( $aOR: 0.35$ , 95%CI: 0.24-0.50) and TBS ( $aOR: 0.65$ , 95%CI: 0.46-0.92) were inversely related to fractures. Patients prescribed enzyme inducing AED had an increased fracture odds ( $aOR: 2.15$ , 95%CI: 1.24-3.72). There was no difference for fracture outcome between subjects with noninducing drugs and controls ( $p$ -value 0.476). In this study 67.5% of the TBS convertible DXAs were performed within a year of the low-energy fracture. Of the included patients, 82% were women.

**Conclusion:** While BMD-spine was not associated with low energy fractures, both BMD-hip and TBS predicted low energy fractures independently in patients prescribed AED. This is the first study demonstrating the value of TBS in patients prescribed AED. In clinical practice, BMD-hip and TBS could be combined to improve the assessment of bone health in this growing patient group. The value of the combination of the two measures should be assessed in a future prospective randomized study.

### P174

#### ASSESSMENT OF CARDIOVASCULAR RISK IN PATIENTS WITH CALCIUM PYROPHOSPHATE CRYSTAL DEPOSITION DISEASE AND OSTEOARTHRITIS

M. Eliseev<sup>1</sup>, O. Zhelyabina<sup>1</sup>, A. Novikova<sup>1</sup>, M. Chikina<sup>1</sup>

<sup>1</sup>V.A.Nasonova Research Institute of Rheumatology, Moscow, Russia

**Objective:** Factors affecting cardiovascular risk (CVR) in patients with calcium pyrophosphate crystal deposition disease (CPPD) have not been studied. Our aim was to do a comparison of CVR on the SCORE scale and the incidence of individual risk factors for cardiovascular diseases (CVD) in patients with CPPD and osteoarthritis (OA).

**Methods:** A single-stage, single-center study. The compared groups - patients with CPPD ( $n=246$ ) and OA of the knee joints ( $n=53$ ), from 18-80 years old. The frequency of individual CVR factors was compared with the results of stratification on the SCORE scale.

**Results:** The frequency of individual risk factors of CVD in CPPD and OA did not differ significantly, with the exception of arterial hypertension, which was detected in 123 (50%) patients with CPPD, and in 9 (17%) patients with OA,  $p=0.01$ . However, the presence of  $\geq 3$  of the listed risk factors (smoking, BMI  $>30$  kg/m<sup>2</sup>, hypertension, ischemic heart disease, type 2 diabetes mellitus, chronic heart failure, myocardial infarction, serum cholesterol  $>5.0$  mmol/L, uric acid  $>360$   $\mu$ mol/L, C-reactive protein (CRP)  $>5$  mg/L, glomerular filtration rate  $<60$  ml/min) was determined in 123 (50%) patients with CPPD, and in 11 (21%) patients with OA

( $p=0.0002$ ). The CVR on the SCORE scale was stratified as high or very high in 63% of patients with CPPD and in 38% of patients with OA ( $p=0.006$ ). The median SCORE index in CPPD (10 [1.7; 10]) was significantly higher than in OA (3.5 [1.3; 8.6]),  $p=0.004$ . The median serum CRP level was also significantly higher in CPPD ( $p<0.001$ ), as well as the number of patients with CRP  $\geq 5$  mg/l ( $p<0.001$ ).

**Conclusion:** With a comparable frequency of detection of individual RFs in patients with CPPD and OA, patients with CPPD have a higher CVR, when stratified on the SCORE scale, as well as a higher CRP level.

## P175

### RELIABILITY OF RADIOLOGICAL INDICES IN COMPARISON WITH DXA IN DIAGNOSIS OF OSTEOPOROSIS

G. Kakadiya<sup>1</sup>, D. Joshi<sup>2</sup>

<sup>1</sup>Fortis Hospital Mohali, Mohali, <sup>2</sup>1, Mohali, India

**Objective:** Osteoporosis projects a dominant issue related to health in the community in developing country like ours, India and is often unrecognised or undiagnosed. Early diagnosis and treatment of osteoporosis is of utmost importance. This study evaluates the accuracy of Radiological Indices in comparison to gold standard DXA scan for diagnosis of osteoporosis, so that diagnosis of osteoporosis can be done using simple radiographs which would be cost effective and less exposure to radiation.

**Methods:** The study is a one year hospital based comparative study which included a total of 80 patients who presented to OPD / IPD of Dept. of Orthopaedics and met the inclusion criteria were enrolled in the study. Patients were subjected to DXA scan and a plain radiograph of either of the hip joint with full length femur in AP and lateral views. Subsequently, the Singh's Index, cortical thickness index (CTI) AP and lateral, calcar to canal ratio (CCR) were measured and compared with the standard DXA scan. Spearman's rank coefficient was used to find correlation between radiological indices and DXA scan, kappa statistics for level of agreement, sensitivity and specificity for radiological indices was calculated.

**Results:** The data analysed showed significant correlation (Spearman coefficient) between radiological indices and DXA scan. CTI antero-posterior view and lateral view with cutoff 0.43 ( $r=0.8172$ ,  $p<0.0001$  and  $r=0.8243$ ,  $p<0.0001$  respectively), CCR with cutoff 0.50 ( $r=0.8188$ ,  $p<0.0001$ ). Similarly for Singh's index ( $r=0.6002$ ,  $p<0.0001$ ).

**Conclusion:** Radiological indices are reliable in the diagnosis of osteoporosis and have a good correlation with T-scores deduced by DXA scan.

## P176

### PROFILE OF PATIENTS ENROLLED IN A FRACTURE LIAISON SERVICE IN A PRIVATE TERTIARY HOSPITAL IN CEBU

A. J. Ho<sup>1</sup>, J. Arbatin<sup>1</sup>, J. Akol<sup>1</sup>

<sup>1</sup>Chong Hua Hospital, Cebu, Philippines

**Objective:** It is estimated that the number of osteoporotic hip fractures among Filipinos will reach 65,000 by 2020 and 175,000 by 2050. In an attempt to improve the identification, diagnosis and treatment of osteoporosis in the province of Cebu, the Fracture Liaison Service (FLS) was started. This study aims to evaluate the implementation of this program for targeting these high-risk groups and improving secondary fracture prevention. Our aim was to describe the profile and outcome of patients enrolled in the FLS program in a private, tertiary hospital in Cebu City.

**Methods:** All patients enrolled in the FLS of Chong Hua Hospital from September 2018 to May 2019 were included in this study. A total of 103 patients, above 50 y of age were interviewed and followed up. Utilizing the Fracture Liaison Assessment Form, the following data were collected: demographics, comorbidities, presence of fragility fracture or osteopenia, compliance to DXA scan, treatment compliance, refracture rate and incidence of falls. Descriptive statistics using frequency count and percentages were used.

**Results:** Majority of patients were within the 70-79 years old age group (33%) and majority were females (73%). Among the 103 enrollees, 32% had osteopenia while 68% had a fragility fracture involving the hip in 27.18%. While under the FLS care, 90.9% of patients were compliant with prescribed medications (calcium, antiosteoporotic drugs) and 98.86% were adherent to fall prevention exercises. No incidence of secondary fractures or falls after discharge.

**Conclusion:** The FLS care has enhanced the identification, assessment and initiation of treatment in patients at high risk for osteoporotic fracture. This approach has improved the pharmacologic compliance of patients and has helped prevent secondary fractures and falls in all patients enrolled in the program.



P177

### ASSOCIATION BETWEEN TYPE 2 DIABETES AND RISK OF OSTEOPOROSIS: A NATIONWIDE COHORT STUDY

H.-H. Lin<sup>1</sup>, H.-Y. Hsu<sup>2</sup>, M.-C. Tsai<sup>1</sup>, L.-Y. Hsu<sup>3</sup>, K.-L. Chien<sup>3</sup>, T.-L. Yeh<sup>4</sup>

<sup>1</sup>Dept. of Family Medicine, Mackay Memorial Hospital, Tamsui Branch, New Taipei City, <sup>2</sup>Dept. of Family Medicine, Mackay Memorial Hospital, Taipei City, <sup>3</sup>Institute of Epidemiology & Preventive Medicine, National Taiwan University, Taipei City, <sup>4</sup>Dept. of Family Medicine, Hsinchu Mackay Memorial Hospital, Hsinchu City, Taiwan

**Objective:** Though previous studies have investigated the relationship between fracture risk and type 2 diabetes (T2D), cohort studies estimating composite osteoporosis risk have been lacking. The retrospective, nationwide, cohort study sought to determine the risk of osteoporosis in a Taiwanese cohort of patients with T2D.

**Methods:** This included patients diagnosed with T2D between 2002-2015 identified through the 2002 Taiwan survey of hypertension, hyperglycemia, and hyperlipidemia. A total of 1690 men and 1641 women aged 40 years old and older linked to the National Health Insurance Research Database (NHIRD) were followed up until the end of 2015 to determine incidences of osteoporosis through ICD9-CM codes for osteoporosis or osteoporotic fractures or use of antiosteoporotic agents according to anatomical therapeutic chemical codes retrieved from the NHIRD. The person-year approach and Kaplan-Meier analysis were then used to estimate incidences and cumulative event rates, while Cox proportional hazard models were used to calculate adjusted hazard ratios (HR) for osteoporosis events.

**Results:** A total of 792 new osteoporosis events were documented over a median follow-up of 13.6 y. Compared to participants without T2D, those with T2D had higher osteoporosis risk [adjusted HR: 1.37, 95%CI: 1.11-1.69]. Subgroup analyses revealed that age had a marginally significant effect, indicating that T2D had more pronounced effect on osteoporosis risk in younger populations (<65 years old). No difference was found between patients stratified by gender.

**Conclusion:** T2D was significantly associated with increased risk for osteoporosis, especially in younger participants.

P178

### REFERENCE VALUES FOR VITAMIN D FROM DOCTOR'S PERSPECTIVE

N. N. Katamadze<sup>1</sup>, A. S. Shutova<sup>1</sup>, H. R. Fargieva<sup>1</sup>, V. S. Glazieva<sup>2</sup>, A. A. Povaliaeva<sup>1</sup>, E. A. Pigarova<sup>1</sup>, L. K. Dzeranova<sup>1</sup>, I. M. Belovalova<sup>1</sup>, I. I. Dedov<sup>1</sup>

<sup>1</sup>Endocrinology Research Centre, <sup>2</sup>Lomonosov Moscow State University, Moscow, Russia

**Objective:** The connection between vitamin D deficiency and osteoporosis is well established. Vitamin D hypovitaminosis also might predispose to inflammatory states and autoimmune diseases. On the opposite, vitamin D toxicity can cause symptoms such as nausea, vomiting, constipation, pancreatitis, acute kidney injury, weight loss, dehydration, altered mental status and lead to the development of life-threatening conditions. Subsequently the precision of a vitamin D reference range is of paramount importance in patient's health outcomes. Total 25-hydroxyvitamin D is considered as the most representative metabolite of vitamin D status. However, the reference values of 25-hydroxyvitamin D has not yet been fully elucidated and much debated during the past decades. The aim of our survey was to assess the level of awareness on upper and lower limits of the reference range for 25-hydroxyvitamin D among practicing doctors.

**Methods:** We conducted the national survey on reference values for vitamin D status among physicians specialized in various fields. Endocrinologists accounted for 80% of them.

**Results:** In our survey, we found that out of 704 physicians 77 (10.9%) and 45 (6.4%) considered 25 nmol/L and 50 nmol/L as the lower limits of the reference interval, respectively. On the other hand, 111 (15.8%), 115 (16.3%) and 36 (5.1%) physicians considered 375 nmol/L, 150 nmol/L and 75 nmol/L as the upper limits of the reference interval, respectively.

**Conclusion:** Currently, the question of the optimal concentrations of 25(OH)D in the blood serum stays open. Raising awareness among health care providers in this area, as well as on the characteristics of calcium-phosphorus metabolism, will help maintain adequate vitamin D levels and avoid excessive supplementation. At the present, clinicians prescribing vitamin D, in order to avoid undesirable consequences for the patient's health, should exercise caution.

P179

**CURRENT THERAPIES IN OSTEOPOROSIS: NEW PERSPECTIVES OR IS IT ENOUGH?**C. Ciofu<sup>1</sup>, B. Gavrilă<sup>1</sup>, I. Ancuța<sup>1</sup><sup>1</sup>University of Medicine & Pharmacy Carol Davila, Bucharest, Romania

**Objective:** the discovery of biological therapies was a big step forward in the management of patients with osteoporosis and rheumatic diseases. Although the therapeutic offer seems sufficient, in the clinic, we continue to meet patients in whom apparently we still need new progresses.

**Methods:** We present the case of a 68-year-old man known with surgically treated mixed pulmonary adenocarcinoma, ankylosing spondylitis and osteoporosis of complex etiology, who presented to the Internal Medicine and Rheumatology Clinic Dr. I. Cantacuzino in December 2020 for intense pain in the lumbar spine, with insidious onset and aggravated in the last few days. From the patient's history we notice the left lower lobectomy for pulmonary adenocarcinoma (April 2013), recently diagnosed with ankylosing spondylitis (March 2019 when it was first seen in our clinic), osteoporosis-DXA examination (March 2019, score T -3.1. FRAX score 22% for major osteoporotic fracture, 15% for hip fracture), type 2 diabetes and high blood pressure. He received treatment with multiple NSAIDs (currently diclofenac 150 mg, and given the risks associated with osteoporosis, he received treatment with alendronate 70 mg/week, calcium 1 g, and vitamin D 2000 IU). At the objective examination we find typical changes of ankylosing spondylitis axial form with kyphotic thorax, significant pain in the percussion of the thoracic spinous processes, in a fixed point, T10-T12 area, with marked limitation of joint mobility. Biological investigations and composite scores for measuring ankylosing spondylitis activity reveal a disease with intense activity (BASDAI score 8.7, ASDAS-CRP 3.9). Current DXA exam T-score -3.3. Imaging, multiple thoracic vertebral fractures are identified (T9-T12).

**Results:** At this time, the patient needs to escalate the therapy for the autoimmune rheumatic disease and rethink the therapeutic regimen for the treatment of osteoporosis.

**Conclusion:** In such a patient, given the history of malignancy, the severe course of ankylosing spondylitis requiring biological treatment and complications on a rigid spine, with complex, progressive osteoporosis, despite oral bisphosphonate treatment, is there an ideal solution? Do we need to change the route of administration (intravenous bisphosphonates) or associate biological treatment (anti-TNF and anti-RANKL) under strict supervision?

P180

**IMPACT OF HOMOCYSTEINE LEVELS ON BONE MINERAL DENSITY IN POSTMENOPAUSAL WOMEN WITH ANKYLOSING SPONDYLITIS WITH ANTI-TNF $\alpha$  THERAPY**D. Anghel<sup>1</sup>, L. Otloca<sup>2</sup>, O. Petrache<sup>3</sup>, C. Mijea<sup>3</sup>, M. M. Negru<sup>4</sup><sup>1</sup>Carol Davila Central Military University Hospital, <sup>2</sup>Sfanta Maria Clinic, <sup>3</sup>Dr. Carol Davila Central Military University Hospital, <sup>4</sup>Sfanta Maria Clinical Hospital, Bucharest, Romania

**Objective:** Osteoporosis is common complication in women with ankylosing spondylitis (AS), after menopause, even in early stages of the disease. Homocysteine (HCY) levels interferes with collagen crosslinking in bones and may affect BMD. The aim of our study was to follow the influence of HCY levels and 25-OH-vitamin D levels on BMD, in AS patients treated with anti-TNF $\alpha$  agents and antiosteoporotic treatment.

**Methods:** We recruited 55 postmenopausal women with AS between the age group of 47-75 y. All patients were in treatment with anti-TNF $\alpha$  agents (adalimumab, infliximab, etanercept). We measured BMD at baseline and then at 12 months. BMD was determined by DXA scan. Based on the WHO criteria, patients were included into 2 groups as follows: patients with osteopenia and patients with osteoporosis. We followed activity disease by BASDAI score and laboratory parameters: HCY, 25-OH-D3, C-reactive protein (CRP), erythrocyte sedimentation rate (ESR), BASDAI score and serum calcium. The patients received specific antiosteoporotic treatment (bisphosphonates, vitamin D supplementation and calcium supplementation).

**Results:** Among 57 postmenopausal women at baseline 61.40% (35) had osteoporosis (mean age 56.2 $\pm$ 6.9 y) and 38.59% (22) had osteopenia (mean age 54.56 $\pm$ 6.5 y). We found high levels of HCY in 68.4% (39) of the patients while the rest of them had normal levels. After 12 months of antiosteoporotic treatment in the group of patients with osteoporosis and high HCY level, BMD increased less compared to patients with osteoporosis and normal HCY level. Regarding patients with osteopenia, there was no significant difference in BMD between patients with elevated, respectively normal levels of HCY. Hyperhomocysteinemia was positively correlated with low levels of 25-OH-vitamin D ( $p=0.001$ ), serum calcium ( $p<0.005$ ) but also with increased disease activity (increased ESR, CRP and BASDAI score). There were no differences between HCY levels and BMD depending on the type of anti-TNF $\alpha$  agent.

**Conclusion:** Hyperhomocysteinemia and low levels of vitamin D were correlated with low BMD. Patients with AS in postmenopausal with elevated HCY levels had a poorer response to antiosteoporotic treatment.

P181

# CLINICAL REMISSION IN RHEUMATOID ARTHRITIS PATIENTS TREATED WITH TOFACITINIB IS ASSOCIATED WITH LOW BASELINE EXPRESSION OF PYRUVATE KINASE AND SUCCINATE DEHYDROGENASE GENES IN THE PERIPHERAL BLOOD

E. Tchetina<sup>1</sup>, A. Satybaldyev<sup>1</sup>, G. Markova<sup>1</sup><sup>1</sup>Nasonova Research Institute of Rheumatology, Moscow, Russia

**Objective:** To investigate the importance of baseline expression of genes involved in energy generation in RA patients, which could serve prognostic biomarkers for treatment response to tofacitinib (TFCN).

**Methods:** Peripheral blood of 28 RA patients aged 52.2±15.6 years old, average disease duration 3.5 y (range 0.6-19) treated with TFCN (5-10 mg twice a day) during three months and 26 healthy age-matched control subjects were examined. Clinical response was assessed by disease activity score (DAS28-ESR), serum levels of ACPA antibodies, rheumatoid factor

(RF), C-reactive protein (CRP), and erythrocyte sedimentation rate (ESR). Clinical remission

was assessed according to ACR criteria and DAS28 (DAS28 <2.6). Protein concentrations

were measured using ELISA. Total RNA was isolated from whole blood and used in gene expression studies performed with quantitative real-time RT-PCR.

**Results:** All of the patients were Steinbrocker's radiographic stage II-III at baseline. The majority of patients demonstrated erosive arthritis (23 out of 28), they were ACPA- (25 out of 28) and RF- (24 out of 28) positive. TFCN treatment significantly decreased the disease activity according to DAS28. At the end of the study majority of patients demonstrated moderate disease activity (3.2 < DAS28 < 5.1), four patients retained high disease activity while 7 attained remission (DAS28 <2.6). This was accompanied by significant decrease in CRP and the number of swollen and tender joints. Gene and protein expression analyses revealed that RA patients, which attained clinical remission following TFCN treatment demonstrated significantly lower baseline expression of genes associated with glycolysis (pyruvate kinase) and oxidative phosphorylation (succinate dehydrogenase) compared to other examined RA patients. Moreover, these gene expressions increased in the course of follow-up in RA patients who attained clinical remission.

**Conclusion:** Clinical remission attainment in RA patients treated with tofacitinib was associated with lower baseline expression of genes involved in energy generation pathways (pyruvate kinase and succinate dehydrogenase) compared to other examined subjects.

P182

# ASSESSMENT OF MUSCULOSKELETAL DISORDERS IN PROFESSIONAL SONOGRAPHERS

K. Nassar<sup>1</sup>, S. Janani<sup>1</sup><sup>1</sup>Ibn Rochd University Hospital, Rheumatology Dept., Hassan II University of Medicine & Pharmacy, Casablanca, Morocco

**Objective:** The musculoskeletal disorders, ultrasound origin, are defined as the clinical manifestations that are either caused by or aggravated by ultrasound exams at the workplace in professional sonographers. They are an occupational health problem for physicians and have a reported incidence of 90%. These conditions have a health and an emotional impact on the worker. Due to the multiplicity of disciplines that currently carry out ultrasound examinations, the purpose of this study is to assess the different musculoskeletal disorders in relation with ultrasound, their impact and monitoring, through the experience of ultrasonographers.

**Methods:** This is a survey comprising questions to single or multiple choices, addressed to different categories of physicians performing ultrasound. The first part is about the practitioner's information and experiences. The second one regarding the number of ultrasounds performed per week, the ergonomics at workplace, the different musculoskeletal manifestations attributed to the ultrasound examination, their impact on professional and family life and finally their management and monitoring.

**Results:** For two weeks, 151 physicians accepted to answer to the questionnaires. The mean age was 44 years old. The sex-ratio F/H is 2,3. These are 60 rheumatologists, 52 radiologists, 19 general practitioners, 12 gastroenterologist and 8 other specialties (gynecology, nephrology, cardiology, internal medicine). The exercise duration was >10 y in 43.7%. 42.3% of physicians do the ultrasound for >5 y and 67.3% more than three times a week. Every week, 40% do between 20-50 ultrasound exams. 28% of participants do physical activities with charging port. Concerning the general posture, the majority do the sonographers are while sitting and standing and 18.5% are constantly seated. 45.2% monitor their posture from time to time, 38% have a repetitive load at work. 54,3% do not have a touch screen ultrasound and 44.4% have a seat of work without backrest. 90.7% of partitioners have already suffered of musculoskeletal disorders after performing ultrasound and not explained by another cause. The most frequent localizations are shoulders, cervical spine, wrists, elbows and hands. The table summarizes the different musculoskeletal manifestations, their impact and their management.

**Conclusion:** 80-90% of sonographers will experience pain whilst scanning at some stage during their career (1,2). Musculoskeletal disorders are a significant concern for sonographers with detrimental effects on the individual, patients and the employer. The causes for these injuries are multifactorial; especially individual; gender, state of health postures, biomechanics, organizational, material and psychosocial. This is correlated with the exponential solicitation of sonographers but also with the high number of patients. Our study joined the results of the literature about the

high frequency of musculoskeletal disorders in partitioner's sonographers and about the risk factors of these disorders. There is a variety of solutions for mitigating injury risk. Sonographer work postures, work schedules, task rotation, administrative support, and ergonomic workplace equipment all enter into the formula for reducing the incidence of these disorders.

#### References:

1. Jakes C. J Diagnostic Med Sonography 2001;17:74.
2. Mason B, et al. Sound Effects News 2014;3:26.

Table: Summary of the different musculoskeletal manifestations, their impact and their management by the participants.

	Number (%)
Clinical disorders (pain, stiffness, numbness, uncomforted), after ultrasound not explain by another causes:	93 (61.6)
- From time to time	40 (26.2)
- Often	14 (2.3)
- Never	4 (2.6)
- Just after the ultrasound exam	
Localizations of the musculoskeletal disorders:	
- Shoulders	104 (75.9)
- Cervical spine	55 (40.1)
- Wrist	50 (36.5)
- Elbows	23(16.8)
- Hands	22(16.1)
- Others	13 (9.5)
Partitioners who attribute the disorders to the nature of the ultrasound requested: the time of the examination, the position it demands.	34 (60.7)
- Those who answered that the problems occur whatever the type of ultrasound requested	19 (33.9)
-Other answers	3 (5.4)

MS disorders affect the family life:	
- Low level	109 (72.2)
- Moderate	35 (23.2)
- High	7(4.6)
MS disorders affect the quality or performance of your work	
- Low level	116 (76.8)
- Moderate	31 (20.5)
- High	4 (2.6)
Use of medication or consultations in the past 12 months because of the MS disorders:	
- Automedication	69 (45.7)
- Specialist consult	47 (47.5)
- Never	56 (37.1)
Use of symptomatic treatments in the last 12 months	98 64.9)
-Physiotherapy plus medical treatment	35 (32.7)
-Immobilization of the member affected	20 (18.7)
Evolution	
- Good	63 (53.4)
- Partial, with MS manifestations after ultrasound	42 (35.6)
- MS signs still persist	13 (11%)

MS: musculoskeletal.

#### P183

#### OSTEOPOROSIS RISK FACTORS IN PATIENTS WITH INFLAMMATORY BOWEL DISEASE

K. Nassar<sup>1</sup>, S. Janani<sup>1</sup>

<sup>1</sup>Ibn Rochd University Hospital, Rheumatology Dept., Hassan II University of Medicine & Pharmacy, Casablanca, Morocco

**Objective:** Osteoporosis is one of the major complications of inflammatory bowel disease (IBD). It is essential to identify risk factors for osteoporosis whether general or specific to the intestinal disease. The objective of this study is to determine the prevalence and the risk factors of osteoporosis in patients with IBD.



**Methods:** One-year retrospective study conducted in patients followed in gastroenterology departments and admitted in rheumatology for bone status assessment. Inclusion criteria are patients aged over 20 y followed for IBD. Exclusion criteria are patients with musculoskeletal or other general disease that could have an impact on bone density. We have compared the demographic characteristics of both groups: osteoporotic (group 1) and not osteoporotic (Group 2). We then assessed the risk factors of bone loss.

**Results:** 46 patients have been included. It was about 27 men and 19 women. The average age was 38 y (20-67). The type of IBD was Crohn's disease in 71% cases and 29% followed for ulcerative colitis (UC). The median disease duration was 7 y. 13 patients have osteoporosis in at least 1 site among the lumbar spine, femoral neck and total hip (Group 1) and 33 patients were not osteoporotic. The osteoporosis risk factors were menopause in 37%, corticosteroid in 60%, smoking in 19.5%, the insufficient intake calcium was noted in 69.5% and insufficient physical activity in 8.7%. The table below determines the characteristic demographic of both groups and the risk factors of bone loss. The two significant risk factors were age and Crohn's disease.

**Conclusion:** Osteoporosis commonly affects patients with IBD and many risk factors have been identified in literature. Based on the guidelines, patients at risk should have an assessment of BMD, in order to prevent or treat osteoporosis in early stage. In our study, factors significantly associated with osteoporosis were age and the type of IBD with a greater frequency of osteoporosis in Crohn's disease. Unlike gender, low BMI, and malabsorption that do not seem to matter as in literature in our study, probably because of the limited number of patients. Routine screening for osteoporosis and its risk factors should be systematic in patients with IBD.

**Reference:** Ostlander AE, et al. Gastroenterology 2011;140:116

Table: Characteristic demographic of the population and assessment of bone loss risk factors.

	Group I (osteoporotic) n=13	Group II (without osteoporosis) n=33t	p
Average age	45.76±12.88	35.36±9.94	0.01
Sex			
F	7	12	0.27
M	6	21	
Disease duration	8.84±6.29	5.51±5.79	0.11

Surgery			
Yes	8	13	0.17
No	5	20	
BMI	22.9±3.64	21.54±4.78	0.30
History of corticosteroid therapy			
Yes	9	19	0.46
No	4	14	
Disease type			
Crohn's	12	21	0.051
RCH	1	12	
Vitamin D value			
<30	13	29	
≥30	0	3	
Calcium value (average)	93.95±6.70	116.82±130.91	0.33
Past smoking			
Yes	2	6	0.82
No	11	27	
Adequate physical activity			
Yes	11	32	0.12
No	2	1	
Calcium intake			
Yes	5	10	0.59
No	8	23	

P184

# HEALTHCARE RESOURCE UTILISATION AND COSTS AMONG PATIENTS WITH MODERATE TO SEVERE OSTEOARTHRITIS PAIN: A NONINTERVENTIONAL RETROSPECTIVE COHORT STUDY IN SALFORD, UK

L. Abraham<sup>1</sup>, K. Halsby<sup>1</sup>, B. Emir<sup>2</sup>, H. Stevenson<sup>1</sup><sup>1</sup>Pfizer Ltd., Surrey, UK, <sup>2</sup>Pfizer, New York, USA

**Objective:** Compare healthcare resource utilisation (HCRU) and costs between patients with moderate to severe osteoarthritis (OA) pain and those without OA using the Salford Integrated Record (2010-2017).

**Methods:** For each patient, HCRU (GP, inpatient, outpatient, and A&E visits) and total direct costs (HCRU and prescribed analgesic drugs per UK standardised tariffs) were calculated and compared with propensity matched controls for the year post-index (cost by 2-part model; HCRU by t-test).

**Results:** 3123 patients with moderate to severe OA pain (1922 severe) were indexed alongside 3123 controls without OA (60.2/60.9% female; mean age 63.8/63.4 y, median CCI: 3/3, respectively). Total direct costs (£2519 vs. £1379) and all categories of HCRU, except GP home visits, were significantly higher in the year post-index among patients with moderate to severe OA pain than in controls (Table). Highest mean costs in both cohorts were for inpatient admissions (£1517 vs. £770) and outpatient visits (£674 vs. £407). Total mean analgesia costs were ~3-fold higher (£110 vs. £39) and covered a broader range of drug classes in patients with moderate to severe OA pain than in controls. Paracetamol (40% had ≥1 prescription) and strong opioids (34%) were the most prescribed analgesics to patients with moderate to severe OA pain.

**Conclusion:** Patients with moderate to severe OA pain have considerably higher HCRU and incur almost double the annual direct costs of patients without OA.

**Disclosure:** Funded by Pfizer & Eli Lilly. Norman Stein and Bozydar Wrona of NorthWest EHealth contributed to the study design and data analysis. LA, KH, BE and HS are employees of Pfizer and hold stock/stock options.

Table. Annual healthcare resource use and costs

	Mod/sev OA pain	Matched controls
n	3123	3123
Total annual direct cost	£2519 (3511)	£1379 (3787)
comprising		
GP	£149 (214)	£107 (201)
Inpatient	£1517 (2809)	£770 (2717)

Outpatient	£674 (1213)	£407 (1726)
A&E	£70 (167)	£55 (149)
Analgesic drugs <sup>a</sup>	£110 (260)	£39 (190)
Annual healthcare resource utilisation		
GP		
visit	3.61 (4.13)	2.04 (2.85)
phone call	1.52 (3.04)	1.08 (2.22)
home visit	0.20 (1.24)	0.29 (1.40)
Inpatient	0.74 (1.30)	0.57 (4.40)
Outpatient	11.19 (14.17)	5.85 (18.68)
A&E	0.48 (1.10)	0.35 (0.90)
Mean and costs±SD per patient in the year post-index.		
All p<0.05 between cohorts.		
<sup>a</sup> Opioid, nonopioid and adjuvant analgesics.		
mod/sev, moderate to severe.		

P185

# CAPTURE THE FRACTURE: EXPERIENCE OF OUR FLS IN ARGENTINA

H. C. Habib<sup>1</sup>, E. C. Firpo<sup>1</sup>, G. F. Geraci<sup>1</sup><sup>1</sup>Sanatorio Las Lomas, Buenos Aires, Argentina

We present the data and achievements of our pioneer Fracture Liaison Service (FLS) in Argentina, after 4 y of the Capture the Fracture program, within the Sanatorio Las Lomas private hospital. The aim is to evaluate our FLS consolidation after its implementation, taking in account the obstacles we faced and the experiences we obtained.

Our secondary prevention program was launched during 2017, developed and attended by the Endocrinology and Metabolism Dept.'s medical staff. Immediately the Orthopedic Dept. joined us. We identified and gathered fractured patients in emergency, ambulatory and hospitalized rooms. During the first visit we included physical exam, personal and familiar medical history, BMD evaluation by DXA scan with TBS and FRAX algorithm and mineral metabolism laboratory testing. From 521 included patients, the fracture index was: 30.4% radius, 17.1% femoral, 16% vertebral, 11.6% tibial, 4% humerus and 11% other sites. Comparing April 2021 vs. April 2020, despite SARS-Cov-2 pandemic, we achieved an increase in patients recruitment (46.64%), doubling the number. We attribute this to our increased efforts by contacting fractured patients by telephone, offering medical assistance. The refracture index was 20%, with 25% of these patients suffering a third fracture. The centinel fracture and the most predictive of a second episode was the radius fracture.

In the next chart we present the numbers achieved in our private hospital FLS.

Included FLS patients	Number (n=521)	Percentage (%)
Women	327	93.16
Age, media (DE)	72.6	
Primary fracture site	351	
Radius	107	30.4
Hip	60	17.1
Vertebra	56	16
Tibia	41	11.6
Humeral	13	4
others	40	11
Risk fracture factors		
Previous fragility fracture	69	20
Family history of hip fracture	12	17.4
Active smoking habit	13	18.8
Corticosteroids >32	26	37
Diabetes	20	28
FRAX, media (DE)		
Mayor	116	13.7
Hip	116	5.2

P186

## WHICH IS THE BEST ANTIRESORPTIVE TREATMENT AFTER FINISHING TERIPARATIDE? BEST POST-TERIPARATIDE TREATMENT

S. M. Sarli<sup>1</sup>, H. C. Habib<sup>2</sup>, Z. B. Zanchetta<sup>1</sup>

<sup>1</sup>Instituto de Investigaciones Metabólicas, <sup>2</sup>Maestría en Osteología, Universidad del Salvador, Buenos Aires, Argentina

Anabolic drugs are the treatment of choice for osteoporotic patients with very high risk of fractures. Postanabolic treatment an antiresorptive drug maintains the BMD gained. The recommendations regarding the ideal antiresorptive drug are not precise. The aim of this paper is to compare the usefulness of zoledronate and denosumab in a group of 28 women with very high risk of fractures. All of them completed at least one year of treatment with teriparatide and latter 14 received zoledronate and 14 denosumab for another year. We retrospectively review their biochemical and densitometric changes. Both treatment groups experienced a reduction in bone turnover markers of the same magnitude at the end of the second year. In Lumbar Spine BMD increase of  $3.96 \pm 8.56\%$  median (Me) 2.54 p 0.21 in zoledronate group and  $3.55 \pm 5.36\%$  (Me 5.14) p 0.07 in denosumab group. Femoral neck BMD changed  $-0.09 \pm 6.50\%$  (Me 0.29) p 0.85 in zoledronate group, and  $-3.41 \pm 5.08\%$  (Me 5.35) p 0.59 in denosumab group, with no difference between both groups. In total hip BMD an increase of  $0.55 \pm 4.20\%$  (Me 0.43) p 0.70 in zoledronate group, and  $4.53 \pm 5.13\%$  (Me 0.64) P 0.04 with denosumab. We conclude that both antiresorptive treatments have a similar effect in biochemical markers after one year of treatment. BMD increase significantly in total hip and changed with a trend in lumbar spine with denosumab, but without differences between both groups of treatment.

Table. Baseline characteristics and densitometric results of the subgroups. The results are expressed as media $\pm$ SD; when the standard deviation is very large, they are also expressed as median (Me). Baseline BMD is BMD prior to teriparatide therapy and post- antiresorptive. BMD is BMD after teriparatide and one year with zoledronate or denosumab. \* Median of changes between BMD post-teriparatide and post- antiresorptive

Table.

	Zoledronate	Denosumab	P
N	14	14	NS
Age (y)	66.7 $\pm$ 13	64.7 $\pm$ 8.3	0.64
BMI (kg/m <sup>2</sup> )	23 $\pm$ 3.1	25 $\pm$ 4.3	0.21
Calcium intake (mg/d)	893.5 $\pm$ 448	725 $\pm$ 419	0.33
Previous bisphosphonates	8/14 (57%)	9/14 (64%)	0.64
Months of previous bisphosphonates	58.67 $\pm$ 70.62	71.77 $\pm$ 55	0.66
Teriparatide (months)	20.28 $\pm$ 4.76	18 $\pm$ 5	0.22
Baseline BMD LS (g/cm <sup>2</sup> )	0.831 $\pm$ 0.07	0.875 $\pm$ 0.08	0.01
Baseline BMD FN (g/cm <sup>2</sup> )	0.706 $\pm$ 0.04	0.702 $\pm$ 0.14	0.94
Baseline BMD TH (g/cm <sup>2</sup> )	0.644 $\pm$ 0.09	0.637 $\pm$ 0.04	0.89
Postantiresorptive BMD LS	0.952 $\pm$ 0.125 p 0.21 * 2.54% *	0.838 $\pm$ 0.05 p 0.07* 5.14%*	p 0.88
Postantiresorptive BMD FN	0.724 $\pm$ 0.06 p 0.85* 0.29% *	0.712 $\pm$ 0.11 p 0.59* 5.35% *	0.37
Postantiresorptive TH	0.678 $\pm$ 0.07 p 0.70* 0.43%*	0.700 $\pm$ 0.05 p 0.04* 4.64% *	0.11
Vertebral fractures	9/14	7/14	0.70
Hip fractures	4/14	1/14	0.32
Other fractures	6/14	4/14	0.69
CTX (ug/ml)	424 $\pm$ 234	511 $\pm$ 158	0.20
Osteocalcin (ng/ml)	26.42 $\pm$ 17	27.26 $\pm$ 11	0.60

Vit D (ng/ml)	30.81±9.9	33.51±20	0.70
PTH (pg/ml)	45.02±13.6	47.45±19.8	0.18

P187

# ONE-YEAR LEVEL OF SUSTAINED LOW ACTIVITY OF RHEUMATOID ARTHRITIS AND OVERWEIGHT/OBESITY: DATA FROM REAL CLINICAL PRACTICE

T. Shivacheva<sup>1</sup><sup>1</sup>Medical University, Prof. Dr. P. Stoianov-Varna, Varna, Bulgaria

**Objective:** To determine the level of one-year low activity as a result of treatment with biological drugs and the impact of overweight/obesity.

**Methods:** A retrospective study of an administrative data of RA patients (according to the ACR 1987). The analysis period covers one year of long-term biological therapy. The patients went through a rheumatology office, St. Marina University Hospital, Varna, Bulgaria in the period June 2017 to September 2018. Sociodemographic indicators, BMI (kg/m<sup>2</sup>), RA activity (according to SDAI) were analysed. A sustained low activity (LDA) was accepted at SDAI values below 11 for each of the three consecutive visits (at 6 months). Statistical processing was performed with descriptive statistics, chi-square, independent t-test, logistic regression. Significance level of p<0.05 is used.

**Results:** 190 patients were included, mostly women (85.8%) with a mean age of 58.7 (±11.3) with long-standing RA (12.1 y ±9.2) during treatment with biologics (3.7 y ±2.1). The mean BMI was 26.8 kg/m<sup>2</sup> (±5.2). No gender difference was found in BMI. 55.3% of patients were overweight (p>0.05), 23.2% were obese (p<0.001). Patients received TNFi or IL6i (55.4% and 44.6%, p>0.05). One-year LDA was found in 32.6% of patients (p<0.001). Regardless of the type of biologic therapy, patients with a BMI <30 kg/m<sup>2</sup> were two and a half times more likely to be in a sustained LDA than in obese patients (OR 2.64, 95%CI 1.14-6.09). In TNFi treatment, a BMI <30 kg/m<sup>2</sup> was associated with an almost 4-fold higher chance of the patient being in the LDA than in obese patients (OR 3.9 95%CI 1.24-12.52). In IL6i treatment, obesity is not defined as a factor that is associated with a lower chance of the patient being in a 1-y LDA.

**Conclusion:** One year of low RA activity is rarely achieved in real clinical conditions. Being overweight/obese makes this goal even more difficult. In these patients, treatment with IL6i appears to be the better choice.

P188

# PERSISTENCE WITH OSTEOPOROSIS TREATMENT IN PATIENTS FROM THE LILLE UNIVERSITY HOSPITAL FRACTURE LIAISON SERVICE

A. Delbar<sup>1</sup>, J. Paccou<sup>1</sup>, A. Pflimlin<sup>1</sup>, I. Delabrière<sup>2</sup>, C. Ternynck<sup>3</sup>, C. Chantelot<sup>4</sup>, F. Puisieux<sup>2</sup>, B. Cortet<sup>1</sup>

<sup>1</sup>Lille University Hospital - Dept. of Rheumatology, <sup>2</sup>Lille University Hospital - Dept. of Gerontology, <sup>3</sup>Lille University Hospital - METRICS - Évaluation des technologies de la santé et des pratiques médicales, <sup>4</sup>Lille University Hospital - Dept. of Traumatology, Lille, France

**Objective:** A Fracture Liaison Service (FLS) was set up at Lille University Hospital in 2016. The purpose of this study was to assess persistence with osteoporosis treatment in patients from the FLS over a period of 1 year, and to determine predictors of discontinuation.

**Methods:** The study population comprised adults of both genders, aged 50 or over, admitted to Lille University Hospital between January 2016 and January 2019 for a low-trauma fracture and managed in our FLS. Outcomes included (1) persistence rate at 1 year after treatment initiation, (2) persistence rate at 2 years after treatment initiation, (3) persistence rate at 1 and 2 years after treatment initiation according to type of treatment, (4) predictors of non-persistence, and (5) reasons for discontinuing treatment over 1 year after initiation. Persistence was determined using the Kaplan-Meier method.

**Results:** In all, 1224 patients (≥50 years old) with a recent history of low-trauma fracture (≤12 months) were identified. Of these, 380 patients – 79.2% female; mean (SD) age 76 (11) years – were seen at the FLS. In those 380 patients, 410 fractures were found and 360 of them (87.8%) were major fractures, breaking down as follows: vertebra (44%), hip (19%), proximal humerus (10%), and pelvis (8%). Osteoporosis treatment was prescribed for 367 (96.6%) patients and 275 of them began the prescribed treatment. The following anti-osteoporosis drugs were prescribed: zoledronic acid (n=150, 54.5%), teriparatide (n=63, 22.9%), and denosumab (n=39, 14.2%). Oral bisphosphonates were prescribed for a few patients (n=23, 8.4%). Persistence with osteoporosis medication (any class) was estimated at 84.1% (95%CI: 79.1% to 88.1%) at 12-month follow-up, and dropped to 70.3% (95%CI: 63.7% to 75.9%) at 24 months. When drug-specific analyses were performed using the Kaplan-Meier method, persistence rates at 12 and 24 months were found to be higher with denosumab than with any other treatment. Independent predictors of nonpersistence at 12 months were 'follow-up performed by a general practitioner (GP)' – odds ratio (OR) for GP vs. FLS=3.68; 95%CI, 1.52 to 8.90, p=0.004 – and 'treatment with zoledronic acid' – OR for zoledronic acid vs. denosumab=3.39; 95%CI, 1.21 to 9.50, p=0.019; OR for zoledronic acid vs. teriparatide=8.86; 95%CI, 1.15 to 68.10, p=0.035.

**Conclusion:** This study provides evidence of the success of our FLS in terms of long-term persistence with osteoporosis treatments. However, osteoporosis treatment initiation still needs to be improved.



P189

### AN APPROPRIATE INTERVENTION THRESHOLD BY FRAX® TOOL FOR PHARMACOLOGICAL TREATMENT OF OSTEOPOROSIS IN THAILAND

T. Amphansap<sup>1</sup>, C. Phan-Udom<sup>1</sup>, P. Chotiarnwong<sup>2</sup>, A. Therdyothin<sup>1</sup>, N. Stitkitti<sup>1</sup>

<sup>1</sup>Police General Hospital, <sup>2</sup>Siriraj Hospital, Bangkok, Thailand

**Objective:** Osteoporosis is a common medical condition amongst the elderly population. The consequences of osteoporotic fractures are associated with high morbidity and mortality rates, as well as an economic burden. Presently, Fracture Risk Assessment Tool (FRAX) has been recommended and incorporated into over 100 osteoporotic guidelines worldwide. However, the appropriate intervention threshold for osteoporosis treatment in Thailand is still unknown. The aim of this study was to identify an appropriate cut point of Thai 10-y probability of major osteoporotic fracture (MOF) intervention thresholds in Thai population.

**Methods:** In this cross-sectional study, we analyzed data collected by filling questionnaires for online FRAX tool evaluation of 1311 Thai population aged 50-90 years old seen at Police General Hospital and Siriraj Hospital, from January 2018 to January 2020. The determined results from the FRAX tool were analyzed through receiver operating characteristic (ROC) curve to identify the cut-point of the new intervention threshold.

**Results:** Based on the ROC curve, the appropriate intervention threshold for FRAX 10-y probability of major osteoporotic fracture with maximum area under the curve of 0.54 at 95%CI was 10% with the sensitivity and the specificity of 55% and 54.5%, respectively.

**Conclusion:** This study interpreted an appropriate cut point of Thai MOF intervention thresholds for osteoporosis treatment, and the value of 10% was found to be similar to other Asian countries (Hong Kong, Japan, and Sri Lanka) and can guide a therapeutic decision in Thailand.

P190

### SUPPLEMENTAL VIDEO PODCASTS IN OSTEOPOROSIS FOR ORTHOPAEDIC RESIDENT PHYSICIANS DURING COVID-19 PANDEMIC IN THAILAND

T. Amphansap<sup>1</sup>, A. Therdyothin<sup>1</sup>

<sup>1</sup>Police General Hospital, Bangkok, Thailand

**Objective:** COVID-19 pandemic has posed challenges to medical education. Video podcasts are offered to students to compensate loss of lecture hours. Efficacy of video podcasts, however, are still controversial.

**Methods:** We developed 22 video podcasts covering major topics in osteoporosis and metabolic bone diseases. Of 37 orthopaedic residents at Police General Hospital recruited, 18 watched the videos. Participants completed pre-exposure 60 multiple choice questions and a self-assessment questionnaire. They were given one month to study, after which the postexposure test, self-assessment form and preference survey were completed.

**Results:** With numerically lower pretest scores (47.59±9.77% in video group, 53.95±9.77% in traditional group, p=0.056), students in the video group significantly outperformed the traditional group in the post-test (89.81±3.83% in video group, 76.93±10.92% in traditional group, p<0.001). Juniors watching videos also scored higher than seniors. Gain of confidence and perceived ability was greater with the videos. However, students still preferred live lectures over an entire course of videos.

**Conclusion:** This study showed better improvement in performance and confidence using supplemental video podcasts. Juniors tended to improve more watching videos. We suggest providing video podcasts during early years as a supplement during the pandemic and as a new normal residency training.

P191

### COMPARISON OF BONE MINERAL DENSITY IN POSTMENOPAUSAL WOMEN BETWEEN FRACTURE DISTAL END RADIUS CASES AND WITHOUT FRACTURES: PROSPECTIVE STUDY IN POLICE GENERAL HOSPITAL

T. Amphansap<sup>1</sup>, C. Rattanaphonglekha<sup>1</sup>, J. Vechasilp<sup>1</sup>, A. Therdyothin<sup>1</sup>, N. Stitkitti<sup>1</sup>, K. Apiromyanont<sup>2</sup>

<sup>1</sup>Dept. of Orthopaedic Surgery, <sup>2</sup>Dept. of Radiology, Police General Hospital, Bangkok, Thailand

**Objective:** Distal radius fracture is universally accepted as one of major osteoporotic fractures. Few patients suffering of this type of fracture, however, has undergone proper assessment for future fracture risk, leading to underdiagnosis of osteoporosis and undertreatment after this type of fragility fracture. This study aimed to compare age- and site-related BMD in Thai menopausal women with distal end radius fracture with those without fracture, and to investigate the role of vertebral fracture assessment (VFA) in diagnosing osteoporosis after distal radius fracture.

**Methods:** We performed a prospective study, in 50 postmenopausal women with distal radius fracture, and 111 controls. BMD of the femoral neck (FN BMD), total hip (TH BMD), lumbar spine (LS BMD), and VFA were obtained from DXA scans performed within 2 weeks of injury. The site-specific BMDs were compared between the two groups using independent T-test.

**Results:** The mean BMD was significantly lower at all sites in the fracture group (FN BMD 0.5899±0.075 vs. 0.6714±0.090, p-value=0.0074; TH BMD 0.7415±0.103 vs. 0.8276±0.116, p-value=0.0093; LS BMD 0.7988±0.107 vs. 0.8899±0.111, p-value=0.0093).

ue=0.0094 in fracture vs. non-fracture group, respectively). According to the WHO criteria, 23(46%) of the fracture group were defined as having osteoporosis, 25(50%) having osteopenia, 2(4%) having normal BMD, whereas 18(16%) of the nonfracture group had osteoporosis, 60(54%) had osteopenia, and 33(30%) had normal BMD. VFA increased the yield for diagnosis of osteoporosis with a number needed to treat of 10.

**Conclusion:** Postmenopausal women with distal radius fracture had lower BMD at all sites compared to those without fracture. These results suggest that every postmenopausal woman aged 50 and over with distal radius fracture from a low energy trauma should be investigated for osteoporosis. VFA aided in diagnosing osteoporosis, as it detected unknown vertebral fractures in approximately one-tenth of patients. Hence, BMD plus VFA may become a new standard of diagnosing osteoporosis.

P192

### SECONDARY HYPERPARATHYROIDISM WITH SEVERE OSTEOPOROSIS AFTER BILIO-PANCREATIC DIVERSION: CLINICAL CASE REPORT

E. Kim<sup>1</sup>, E. Ershova<sup>1</sup>, E. Troshina<sup>1</sup>

<sup>1</sup>Endocrinology Research Centre, Moscow, Russia

**Objectives:** Obesity is an important public health scourge worldwide, which lately reached epidemic proportion. Bariatric surgery is the most effective way to cut and maintain weight among patients with morbid obesity. One of the methods is biliopancreatic diversion (BPD) which has the most frequent complications associated with macro- and micronutrient malabsorption.

**Methods:** We present a case of a 50-year-old female patient with secondary osteoporosis developed into severe osteoporosis after a BPD treatment performed 6 years previously. In the postoperative period, the necessary replacement therapy with calcium, vitamin D and other micro- and macronutrients had been taken irregularly; no long-term laboratory monitoring was provided due to the lack of appropriate recommendations. On admission, she was not able to move because of severe pain and edematous syndromes, her height decreased by 10-12 cm. The DXA confirmed severe osteoporosis (T-score of radius total -5.6 SD, L1-L4 -3.4 SD and total hip -4.2 SD). The X-ray demonstrated multiple consolidated fractures of ribs. The laboratory data indicated severe hypoproteinemia (total protein 38 g/L), hypocalcemia (ionized calcium 0.99 mmol/l), 25(OH) vitamin D deficiency (5.6 nmol/l) and an increased rate of PTH (562.6 pg/ml). Ultrasound revealed signs of hyperplasia of the right upper parathyroid gland (1.0x0.8x0.4 cm).

**Results:** Our treatment started with enhanced infusion therapy of albumin and diuretics with the response of positive diuresis and a loss of excess fluid. Next, the therapy aimed to replenish the deficiency of calcium (calcium carbonate 2 g), vitamins A, D (cholecalciferol 800 IU and alfacalcidol 2 µg), E, B, iron, folic acid, digestive enzymes and protein. Long-term bisphosphonate therapy

is prescribed after normalization of calcium-phosphorus metabolism. Upon reexamination after the relief of the malabsorptive syndrome and an improvement of general somatic state. During 2 years of follow-up, the patient moved independently, did not present new fractures; an increase of BMD was observed (T-score of radius total -5.1 SD, L1-L4 -2.3 SD and total hip -2.4 SD), the laboratory test showed normalization of biochemical parameters.

**Conclusion:** The lack of compulsory lifelong replacement therapy and a follow-up management leads to side effects, including severe osteoporosis due to malabsorption related vitamin D deficiency. Keeping all risk factors for osteoporotic fractures under control is necessary to prevent a decrease of life quality in the extreme case of patient's disability.

P193

### SARCOPENIA AND LONG-TERM OUTCOMES IN YOUNG ADULTS WITH JUVENILE IDIOPATHIC ARTHRITIS

M. S. Kulyk<sup>1</sup>, O. I. Ivashkevskyi<sup>2</sup>, M. B. Dzhus<sup>1</sup>

<sup>1</sup>O.O. Bohomolets National Medical University, Kyiv, Ukraine,

<sup>2</sup>Communal non-commercial institution "Oleksandrivska Clinical Hospital", Kyiv, Ukraine

**Objective:** Association of sarcopenia and long-term outcomes in young adults with juvenile idiopathic arthritis (JIA) are not well studied. The study indicates the association between articular (JADI-A) and extraarticular (JADI-E) damages and the low lean mass in young adults with JIA.

**Methods:** We studied 26 young adults with JIA, diagnosed according to the ILAR classification, with a disease duration of >3 y, a mean age of 22.3±8.15 y. The mean age at the disease onset was 9.04±4.9 y. We diagnosed sarcopenia as a decrease muscle mass on DXA. We distributed patients into two groups according to the skeletal muscle index (SMI) calculation - the sum of muscle masses of the arms and legs/height<sup>2</sup>; the cutoff points considered by SMI <7 kg/m<sup>2</sup> for males, <6 kg/m<sup>2</sup> for females. We used the integral index of articular (JADI-A) and extraarticular (JADI-E) damages to assess the long-term outcomes of JIA [1].

**Results:** All patients were divided into 2 groups according to lean mass. The I group included 16 patients with sarcopenia (SMI=5.22±0.72 kg/m<sup>2</sup>), II group - 10 patients without sarcopenia (SMI=8.05±0.94 kg/m<sup>2</sup>). Although patients of both groups did not differ by age, duration and age of disease onset, in I group were detected lower height and weight than in the II group (height 1.6±0.07 m vs. 1.7±0.09 m; p=0.01; weight 55.06±8.3 kg, 70.0±10.8 kg; p=0.001, respectively). The JADI-A was higher in the I group: 6.06±7.9 vs. 0.3±0.5; p=0.04; JADI-E was higher in group I, either: 1.62±1.6 vs. 0.22±0.4; p=0.02. The JADI-A score correlated with SMI (Spearman's r [rS=-0.61]); the JADI-E score correlated with SMI [rS=-0.49], either (p<0.05).

**Conclusion:** Sarcopenia was detected in young adults with JIA. The presence of articular and extraarticular outcomes in young adults with JIA is associated with sarcopenia.

**Reference:** 1. Viola S, et al. Arthritis Rheum 2005;52:2092

P194

### CHARACTERIZATION OF PATIENTS WITH FRAGILITY FRACTURE IN A CENTER OF SOUTHERN COLOMBIA

A. Pinzon Tovar<sup>1</sup>, S. Jimenez Salazar<sup>1</sup>, K. M. Tinjaca Montañó<sup>1</sup>

<sup>1</sup>Hospital Universitario de Neiva, Colombia, Neiva, Colombia

**Objective:** Fragility fractures associated with osteoporosis are a frequent clinical condition, with a predilection for postmenopausal women, however it can affect people of all ages. Its early detection and treatment is associated with an improvement in the quality of life, as a result of a reduction in the incidence of new fractures and prevention of the disability.

**Methods:** Prospective, cross-sectional, analytical, observational, quantitative study in adult hospitalized patients with a diagnosis of fragility fracture referred to the endocrinology service at the Hernando Moncaleano Perdomo University Hospital, who underwent FRAX score classification and biochemical profile to identify secondary causes of osteoporosis.

**Results:** Of the 31 patients included in the study, the median age of the population was 74±13.5 years, of which only 16.3% had a previous diagnosis of osteoporosis even though 29% had a fracture event due to previous fragility. A 12.9% in hospital mortality was documented and an average hospital stay of 17 days with 12.17 million Colombian pesos cost. Hip fracture was the most frequent location with 62% of the cases. Nonoptimal levels of vitamin D were found in 80.6%; hypoalbuminemia, anemia, and increased BMI were associated with higher mortality during hospital stay with a statistically significant  $p < 0.05$ . Thus creating the first database of fragility fractures in Huila and the first approach to Fracture Liaison Service.

**Conclusion:** In patients with fragility fractures, it is vital to perform a complete biochemical profile in search of secondaryism; as well as the beginning of active therapy in order to avoid new major fracture events that condition a negative impact on the quality of life of the patient and their family. Comprehensive assessment by a Fracture Liaison Service makes it easier to approach and manage these patients.

P195

### LABORATORY METHOD FOR DETERMINING THE MALPOSITION OF THE RODS OF TRANSPEDICULAR APPARATUS OF THE SPINE IN THE INTRAOPERATIVE PERIOD

O. V. Berdyugina<sup>1</sup>, K. A. Berdyugin<sup>1</sup>

<sup>1</sup>Ural Institute of Traumatology & Orthopaedics of V.D. Chaklin, Ekaterinburg, Russia

**Objective:** The use of transpedicular fixation in the treatment of spinal injuries greatly contributes to the patient's recovery. Despite significant advances in the use of instrumental correction, up to 15% of patients face manifestations of neurological symptoms as a result of surgical treatment, and up to 14% of patients have malposition of threaded transpedicular rods and screws. The aim of the study was to determine laboratory criteria for assessing the incorrect position of the rods in the intraoperative period during transpedicular fixation of spine.

**Methods:** The studies were carried out in a group of 110 patients with fractures of the lumbar spine (localization: level L1). The indications for surgical treatment were: wedge-shaped deformity of the vertebra more than 1/3, local kyphotic deformity of the spine, the presence of vertebro-medullary conflict of the 2nd degree. Malposition of threaded rods was found in 10% of cases. In ½ cases (that is, in 5%), the complication was detected no later than 10 days after the operation. The complication was accompanied by the standing of the structural elements into the lumen of the spinal canal. All patients underwent clinical and X-ray examination, computed tomography. A small volume of cerebrospinal fluid (CSF) was taken from all patients in the intraoperative period, after installing the rods, to determine general clinical parameters (cytosis, leukogram, etc.), biochemical parameters (total protein, chlorides, etc.), immunological parameters (acute phase proteins, interleukins).

**Results:** It was found that among all the studied laboratory parameters, the concentration of the acute phase protein, haptoglobin, was the most important. At a level of haptoglobin in the cerebrospinal fluid of 0.1 g/l and higher, the malposition of the rods was detected, at a concentration of less than 0.1 g/l, there was no malposition. The method allows obtaining reliable information about the presence of complications of surgical treatment at the stage when it is possible to correct the position of metal structures, that is, it aims to prevent the formation of a possible complication.

**Conclusion:** The resulting research laboratory test is accurate; it allows you to properly differentiate between not less than 82% of cases.

P196

# LABORATORY CRITERION FOR DETERMINING THE MALPOSITION OF RODS IN PATIENTS WITH TRANSPEDICULAR FIXATION OF THE SPINE IN OSTEOPOROSIS

O. V. Berdyugina<sup>1</sup>, K. A. Berdyugin<sup>1</sup><sup>1</sup>Ural Institute of Traumatology & Orthopaedics of V.D. Chaklin, Ekaterinburg, Russia

**Objective:** It is known that the presence of vertebral osteoporosis complicates the treatment of patients with spinal injuries, in particular, when using the method of transpedicular fixation. Changes in the structure of bone tissue often lead to malposition of threaded transpedicular rods, which can appear both in the early postoperative period and in the long term after the start of treatment. The aim of this work was to develop a laboratory criterion for assessing the risk of incorrect position of the rods in patients with transpedicular fixation of the spine in osteoporosis.

**Methods:** Studies were carried out in a group of 110 patients with a fracture of the lumbar spine. Malposition of threaded rods was detected in 5% of cases. In patients with suspected malposition, 0.5 ml of cerebrospinal fluid (CSF) was taken to determine the concentration of ceruloplasmin. The study was performed on a Ciba Corning Express Plus biochemical analyzer (Diagnostics, Germany).

**Results:** It was found that the concentration of ceruloplasmin determined in the cerebrospinal fluid obtained at the time of the operation, as well as in the postoperative period, may reflect the risk of malposition of threaded transpedicular rods in osteoporosis of the vertebrae. Obtaining CSF in a patient with undiagnosed vertebral osteoporosis with suspected malposition transpedicular rod at any stage of postoperative follow-up, as well as in a patient with a known diagnosis of "vertebral osteoporosis" at any stage of postoperative follow-up or at least 2-3 months after applying an external fixation device during a control examination with the determination of ceruloplasmin concentration in the CSF, allows us to conclude that there is a high risk of having a malposition at a protein level of <0.2 g/l, and at a concentration of 0.2 g/l and above – about the absence of a malposition. The duration of ceruloplasmin determination on an automatic biochemical analyzer is 10 min, thus, the determination method is simple to perform and allows you to quickly obtain the necessary information about the complication.

**Conclusion:** The developed method for determining the risk of developing an incorrect position of the rods in patients with transpedicular fixation of the spine in osteoporosis makes it possible to determine with high accuracy the presence of a complication of surgical treatment.

P197

# EXAMINATION OF THE HEMOSINOVIAL FLUID TO DETERMINE HOW LONG AGO THE INJURY THAT CAUSED POST-TRAUMATIC HEMARTHROSIS WAS RECEIVED

O. V. Berdyugina<sup>1</sup>, K. A. Berdyugin<sup>1</sup><sup>1</sup>Ural Institute of Traumatology & Orthopaedics of V.D. Chaklin, Ekaterinburg, Russia

**Objective:** The nature of the course of post-traumatic hemarthrosis, the risk of complications and the outcome of treatment depend on how long ago the injury that caused the pathological process occurred. Obviously, you can find out about when the injury occurred from the patient. There are situations in which it is not possible to find out the information (the patient does not remember or was not conscious). Meanwhile, information about how long ago the injury occurred is important, it is taken into account when making a diagnosis and influences the choice of an adequate method of treatment. This study aimed to develop a laboratory criterion to determine how long ago the injury that caused the hemarthrosis occurred.

**Methods:** We examined 25 patients with a diagnosis of post-traumatic hemarthrosis of the knee joint. The diagnosis was made on the basis of a combination of clinical, instrumental and laboratory research methods. All patients underwent knee puncture to reduce fluid pressure and relieve pain. The resulting biological fluid was examined by general clinical, biochemical, and immunological methods. The research results were processed statistically using the Statistica v.10.0.228.2 software (Stat Soft, USA).

**Results:** Despite the ambiguous changes associated with the response to inflammation, the most specific marker of erythrocyte hemolysis is the haptoglobin protein. It serves to bind free hemoglobin formed during the destruction of red blood cells in the bloodstream. In patients with post-traumatic hemarthrosis caused by trauma 1-3 days before going to the doctor ("fresh" hemarthrosis), the concentration of haptoglobin in the aspirate was 1.66 g/l or more, if the patient had post-traumatic hemarthrosis as a result of trauma, received 4 or more days before going to the clinic ("stale" hemarthrosis), the concentration of haptoglobin in the aspirate was <1.66 g/l.

**Conclusion:** Determination of the time from the moment of injury that caused post-traumatic hemarthrosis can be carried out using a laboratory indicator, assessed in the hemosynovial fluid from the damaged joint.



P198

### ASSOCIATION BETWEEN EXPOSURE TO FINE PARTICULATE MATTER AND OSTEOPOROSIS: A POPULATION-BASED COHORT STUDY

G. Adami<sup>1</sup>, G. Cattani<sup>2</sup>, A. Fassio<sup>1</sup>, O. Viapiana<sup>1</sup>, P. Olivi<sup>3</sup>, G. Orsolini<sup>1</sup>, E. Bertoldo<sup>1</sup>, E. Fracassi<sup>1</sup>, D. Gatti<sup>1</sup>, M. Rossini<sup>1</sup>

<sup>1</sup>Rheumatology Unit, University of Verona, Verona, <sup>2</sup>Italian Institute for Environmental Protection & Research, Rome, <sup>3</sup>Orthopedic Unit, University of Verona, Verona, Italy

**Objective:** Environmental air pollution has been associated with disruption of bone health at a molecular level. Particulate matter (PM) exposure can simultaneously stimulate bone resorption and halt bone formation. The primary aim of the present study is to describe the association between long-term exposure to PM and osteoporosis in a large cohort of women at high risk of fracture.

**Methods:** Clinical, demographic and densitometric data were extracted from the DeFRACalc79 dataset, which gathers data on women at risk for osteoporosis. Data on the monitoring of PM10 and PM2.5 concentrations were retrieved from the Italian institute of environment protection and research (Istituto Superiore per la Protezione e la Ricerca Ambientale, ISPRA). Generalized linear models with robust estimators were employed to determine the relationship between BMD and PM long-term exposure.

**Results:** 59,950 women from 110 Italian provinces were included in the study. PM 2.5 exposure was negatively associated with T-score levels at the femoral neck ( $\beta$  -0.005, 95%CI 0.007 to -0.003) and lumbar spine ( $\beta$  -0.003, 95%CI -0.006 to -0.001). Chronic exposure to PM2.5 above 25  $\mu\text{g}/\text{m}^3$  was associated with a 16% higher risk of having osteoporotic T-score at any site (aOR 1.161, 95%CI 1.105 to 1.220), exposure to PM10 above 30  $\mu\text{g}/\text{m}^3$  was associated with a 15% higher risk of having osteoporotic T-score at any site (aOR 1.148, 95%CI 1.098 to 1.200) (Figure).

**Conclusion:** Long-term exposure to air pollution was associated with a higher risk of osteoporosis. Femoral neck site seemed to be more susceptible to the detrimental effect of PM exposure than lumbar spine site.

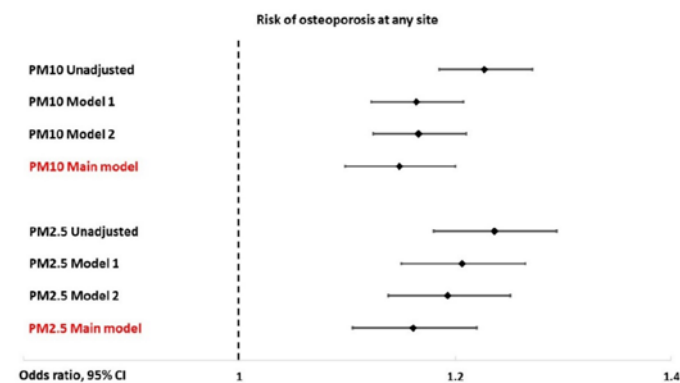


Figure. Risk of osteoporosis at any site in patients chronically exposed to particulate matter (PM) 10 >30  $\mu\text{g}/\text{m}^3$  and PM2.5 >25  $\mu\text{g}/\text{m}^3$ . Model 3 (main model) adjusted for age, BMI, presence of prevalent fragility fractures, family history of osteoporosis, menopause, glucocorticoid treatment, comorbidities and macro-area of residency (categorized as: northern Italy, central Italy and southern Italy).

P199

### THE USE OF ORAL AMINO-BISPHOSPHONATES AND THE RISK OF COVID-19

G. Adami<sup>1</sup>, M. Rossini<sup>1</sup>, V. Perrone<sup>2</sup>, D. Sangiorgi<sup>2</sup>, M. Andretta<sup>3</sup>, F. Bartolini<sup>4</sup>, A. Cavaliere<sup>5</sup>, A. Ciaccia<sup>6</sup>, S. Dell'Orco<sup>7</sup>, S. Grego<sup>8</sup>, S. Salzano<sup>9</sup>, L. Ubertazzo<sup>9</sup>, A. Vercellone<sup>10</sup>, D. Gatti<sup>1</sup>, A. Fassio<sup>1</sup>, O. Viapiana<sup>1</sup>, L. Degli Esposti<sup>2</sup>

<sup>1</sup>Rheumatology Unit, University of Verona, Verona, <sup>2</sup>CliCon S.r.l. Health, Economics & Outcomes Research, Bologna, <sup>3</sup>UOC Assistenza Farmaceutica Territoriale Azienda ULSS 8 Berica, Vicenza, <sup>4</sup>Dipartimento Farmaceutico, USL Umbria 2, Perugia, <sup>5</sup>UOC Farmacia Aziendale, ASL Viterbo, Viterbo, <sup>6</sup>Dipartimento Farmaceutico, ASL Foggia, Foggia, <sup>7</sup>UOC Farmaceutica Territoriale, ASL Roma 6, Roma, <sup>8</sup>Dipartimento Tecnico-Amministrativo, ASL 3 Genovese, Genova, <sup>9</sup>UOC Farmacia Territoriale, ASL Roma 4, Roma, <sup>10</sup>Dipartimento Farmaceutico, ASL Napoli 3 Sud, Napoli, Italy

**Objective:** The determinants of the susceptibility to SARS-CoV-2 infection and severe coronavirus disease 19 (COVID-19) manifestations are yet not fully understood. Amino-bisphosphonates (N-BPs) have anti-inflammatory properties and have been shown to reduce the incidence of lower respiratory infections, cardiovascular events and cancer. We conducted a population-based retrospective observational case-control study with the primary objective of determining if oral N-BPs treatment can play a role in the susceptibility to the development of severe COVID-19.

**Methods:** Administrative ICD-9-CM and ATC data, representative of Italian population (9% sample of the overall population), were analyzed. Oral N-BPs (mainly alendronate and risedronate) were included in the analysis. Patients treated with bisphosphonates (cases) were randomly matched (1:1 ratio) for age, sex and for other clinically relevant variables (presence of treatments other than bisphosphonates and hospitalizations) with all the health assisted population without this treatment (controls).

**Results:** Incidence of COVID-19 hospitalization was 12.32 [95%CI 9.61-15.04] and 11.55 [95%CI 8.91-14.20], of ICU utilization due to COVID-19 was 1.25 [95%CI 0.38-2.11] and 1.42 [95%CI 0.49-2.36] and of all-cause death was 4.06 [95%CI 2.50-5.61] and 3.96 [95%CI 2.41-5.51] for oral N-BPs users and non-users, respectively (Figure 1). Sensitivity analyses that excluded patients with prevalent vertebral or hip fragility fractures and without concomitant glucocorticoid treatment yielded similar results (Figures 2, 3).

**Conclusion:** We found that the incidence of COVID-19 hospitalization, intensive care unit (ICU) utilization and COVID-19 potentially related mortality were similar in N-BPs treated and nontreated subjects. Similar results were found in N-BPs vs. other antiosteoporotic drugs. We provided real-life data on the safety of oral N-BPs in terms of severe COVID-19 risk on a population-based cohort. Our results strongly support national and international guidelines that advocate against the discontinuation of oral bisphosphonates only for the fear of COVID-19.

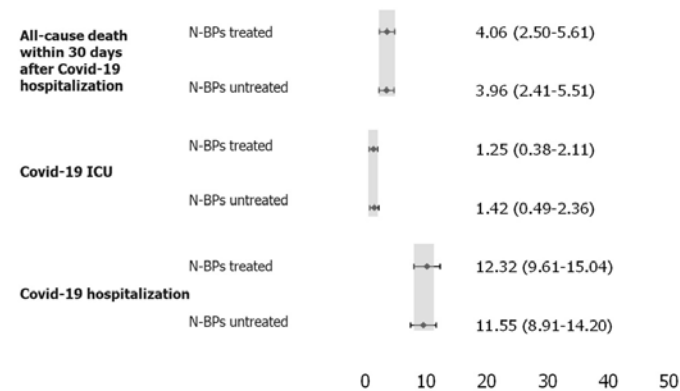


Figure 1. Incidence and 95%CI of COVID-19 related events in N-BPs treated and untreated subjects.

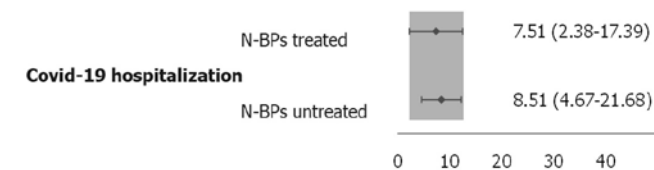


Figure 2. Incidence and 95%CI of COVID-19 related events in N-BPs treated and untreated subjects with antiosteoporotic drugs and without corticosteroids.

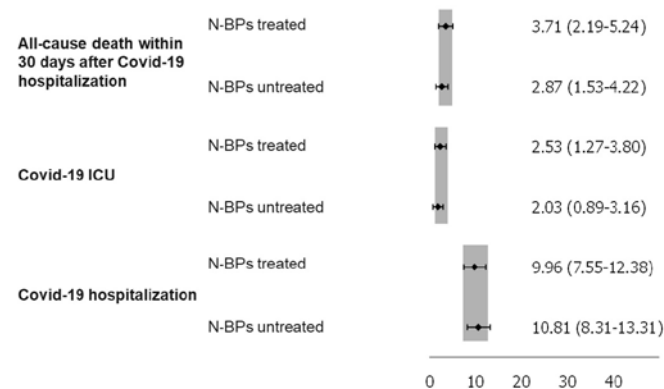


Figure 3. Incidence and 95%CI of COVID-19 related events in N-BPs treated and untreated without previous vertebral or hip fragility fractures.

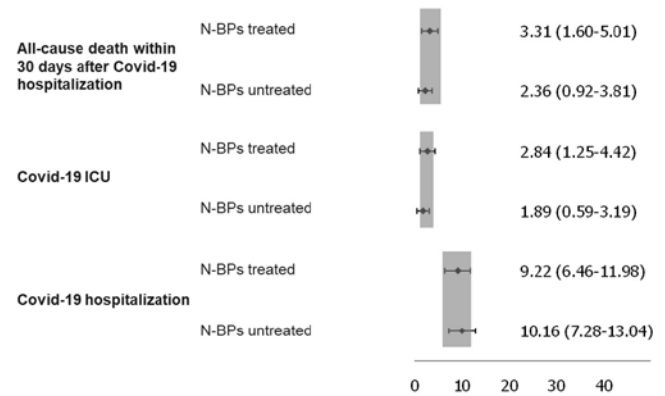


Figure 4. Incidence of COVID-19 related events in bisphosphonates treated and untreated patients without previous vertebral or hip fracture without corticosteroid prescriptions.

## P200

### PROBLEMS OF CLINICAL DIAGNOSIS OF DEVELOPMENTAL DYSPLASIA OF THE HIP IN INFANTS

V. Zinchenko<sup>1</sup>, M. Kabatsy<sup>1</sup>, I. Hertsen<sup>1</sup>

<sup>1</sup>State Institution "Institute of Traumatology & Orthopedics National Academy of Medical Science of Ukraine", Dept. of Joint Diseases in Children & Adolescents, Kyiv, Ukraine

**Objective:** To determine the reliability and feasibility of using the system of selective ultrasound screening of children in groups at risk of DDH.

**Methods:** The hip joints were examined in 1549 children (600 boys and 949 girls) ranging from 5 days to 12 months of age. All children were divided into two groups, identified by clinical signs and risk factors DDH. The children underwent ultrasound examination of the hip joints according to R. Graf. Based on this final diagnosis, sensitivity, specificity, positive and negative predictive values of risk factors and physical examination findings were calculated.

**Results:** The sensitivity, specificity, positive predictive value and negative predictive values of having a risk factor for DDH in history were 63%, 76%, 48%, 86%, and having abnormal hip examination findings were 37%, 91%, 58% and 81%, respectively.

**Conclusion:** The expediency of the system of general ultrasound screening of the infants hip has been substantiated, given that when using the system of selective screening of risk groups, 12% (every eighth child) of DDH in children remains undiagnosed.

P201

### LOW BIOAVAILABLE IGF-1 IS ASSOCIATED WITH SARCOPENIA IN POSTMENOPAUSAL WOMEN WITH RHEUMATOID ARTHRITIS

M. Krikelis<sup>1</sup>, D. Moschou<sup>1</sup>, K. Makris<sup>2</sup>, S. Tournis<sup>3</sup>, C. P. Mavragani<sup>4</sup>, E. Mole<sup>1</sup>, E. Chronopoulos<sup>5</sup>, I. Donta<sup>3</sup>, S. Gazi<sup>1</sup>

<sup>1</sup>KAT General Hospital, Rheumatology Dept., <sup>2</sup>KAT General Hospital, Clinical Biochemistry Dept., <sup>3</sup>National and Kapodistrian University of Athens, School of Medicine, KAT General Hospital, Laboratory for Research of the Musculoskeletal System "Theodoros Garofalidis", <sup>4</sup>National and Kapodistrian University of Athens, School of Medicine, Dept. of Physiology, <sup>5</sup>National and Kapodistrian University of Athens, School of Medicine, Konstantopoulou General Hospital, Second Dept. of Orthopaedics, Attica, Greece

**Objective:** To measure serum levels of bioavailable IGF-1 in postmenopausal women with rheumatoid arthritis (RA) and to examine their association with sarcopenia.

**Methods:** The study group consisted of 69 postmenopausal women with RA and 28 postmenopausal women as controls. Serum levels of bioavailable IGF-1 was determined using an electrochemiluminescent assay. Sarcopenia was defined according to EWG-SOP recommendations as low muscle mass (expressed as appendicular skeletal muscle mass index [ASMI] calculated by DXA) and low muscle strength (hand grip) or low physical performance (short physical performance battery [SPPB]).

**Results:** Mean IGF-1 levels were significantly lower in the RA group as compared with controls ( $102.3 \pm 42.2$  µg/L vs.  $121.3 \pm 34.9$  µg/L,  $p=0.038$ ). In addition, the prevalence of sarcopenia was significantly higher in patients with RA (42% vs. 0%,  $p=0.001$ ). Moreover, RA patients with sarcopenia had lower IGF-1 levels compared to those without sarcopenia ( $90.15 \pm 37.2$  µg/L vs.  $111.08 \pm 43.8$  µg/L,  $p=0.036$ ).

**Conclusion:** Postmenopausal women with RA have lower levels of bioavailable serum IGF-1 and higher prevalence of sarcopenia as compared with controls. Lower levels of IGF-1 are associated with the presence of sarcopenia in postmenopausal women with RA. Thus, low levels of bioavailable serum IGF-1 may serve as a predictive factor of developing sarcopenia in postmenopausal women with RA.

**Acknowledgements:** Supported by grants from the Greek Rheumatology Society and Professional Association of Rheumatologists.

P202

### HIGH BONE TURNOVER IS ASSOCIATED WITH DISEASE ACTIVITY IN POSTMENOPAUSAL WOMEN WITH RHEUMATOID ARTHRITIS AND IS NOT ASSOCIATED WITH DISEASE CHRONICITY OR SARCOPENIA

D. Moschou<sup>1</sup>, M. Krikelis<sup>1</sup>, K. Makris<sup>2</sup>, E. Mole<sup>1</sup>, G. Baili<sup>1</sup>, E. Chronopoulos<sup>3</sup>, S. Tournis<sup>4</sup>, C. P. Mavragani<sup>5</sup>, I. Donta<sup>4</sup>, S. Gazi<sup>1</sup>

<sup>1</sup>KAT General Hospital, Rheumatology Dept., <sup>2</sup>KAT General Hospital, Clinical Biochemistry Dept., <sup>3</sup>National and Kapodistrian University of Athens, School of Medicine, Kotsantopoulou General Hospital, Second Dept. of Orthopaedics, <sup>4</sup>National and Kapodistrian University of Athens, School of Medicine, Laboratory for Research of the Musculoskeletal System "Theodoros Garofalidis", KAT General Hospital, <sup>5</sup>National and Kapodistrian University of Athens, School of Medicine, Dept. of Physiology, Attica, Greece

**Objective:** To measure serum levels of bone turnover markers in postmenopausal women with rheumatoid arthritis (RA) and to examine their association with disease activity, disease chronicity and sarcopenia.

**Methods:** The study group consisted of 69 postmenopausal women with RA and 28 postmenopausal women as controls. Serum levels of bone alkaline phosphatase (BALP), serum crosslinked C-telopeptide of type I collagen (CTX), osteocalcin (OCN), PTH, and 25-hydroxycalciferol (25-OH-D3) were determined. The ratio CTX/OCN was calculated as indicative of bone turnover levels. RA disease activity was calculated using the DAS28 (ESR) score and RA chronicity was calculated using the HAQ score. Sarcopenia was defined according to the EWG-SOP recommendations.

**Results:** The mean values for bone formation markers OCN and BALP were significantly lower in the RA group (OCN:  $16.6 \pm 9.3$  ng/ml vs.  $20.3 \pm 6.7$  ng/ml,  $p=0.05$  and BALP:  $11.9 \pm 4.8$  IU/dl vs.  $19.5 \pm 6.18$  IU/dl,  $p=0.001$ ). The mean values for bone resorption markers CTX and PTH were increased in the RA group (CTX:  $0.273 \pm 0.176$  ng/ml vs.  $0.243 \pm 0.114$  ng/ml,  $p=0.402$  and PTH:  $53.29 \pm 22.4$  pg/ml vs.  $38.8 \pm 15.8$  pg/ml,  $p=0.004$ ). The mean value of 25 OH cholecalciferol did not differ between the two groups ( $29.6 \pm 10.1$  vs.  $25.3 \pm 11.4$ ,  $p=0.071$ ). The ratio CTX/OCN, indicative of high bone turnover levels, was significantly increased in RA patients ( $0.182 \pm 0.009$  vs.  $0.013 \pm 0.007$ ,  $p=0.007$ ). The high bone turnover in the RA group was independent of disease chronicity ( $p=0.173$ ) or sarcopenia ( $p=0.645$ ) and was positively associated with disease activity ( $p=0.05$ ). Higher disease activity was associated with increased bone turnover (Spearman value: 0.233).

**Conclusion:** Increased bone resorption accompanied with decreased bone formation is associated with high bone turnover in post-menopausal women with RA. Increased disease activity results to high bone turnover and the latter is not associated with disease chronicity or sarcopenia.

P203

### CHARACTERISATION OF GROWTH PLATE DYNAMICS IN SURGICAL AND NONINVASIVE LOADED MURINE MODELS OF OSTEOARTHRITIS

H. J. Samvelyan<sup>1</sup>, K. Madi<sup>2</sup>, A. E. Törnqvist<sup>3</sup>, B. Javaheri<sup>4</sup>, K. A. Staines<sup>1</sup>

<sup>1</sup>University of Brighton, Brighton, UK, <sup>2</sup>3Dmagination Ltd, Didcot, UK, <sup>3</sup>University of Gothenburg, Gothenburg, Sweden, <sup>4</sup>City University of London, London, UK

**Objective:** Our recent work in the MRC National Survey of Health and Development (NSHD) found that increased height in childhood was associated, albeit modestly, with lower odds of knee OA at age 53 years. We build upon this work to examine growth plate dynamics in surgical and noninvasive loaded mouse models of osteoarthritis (OA).

**Methods:** Eight 8-week-old C57BL/6 male mice underwent destabilisation of medial meniscus (DMM) surgery to induce OA-like changes in right knee joints. Contralateral left knee joints had no intervention (controls). In 16-week-old C57BL/6 male mice (n=6), OA was induced using non-invasive mechanical loading of right knee joints with peak force of 11 N. Nonloaded left knee joints were internal controls. Chondrocyte transiency in articular cartilage (AC) and growth plate (GP) of tibiae was examined by histology and immunohistochemistry. Tibial subchondral bone (SCB) parameters were measured using  $\mu$ CT and correlated to 3D GP bridging analysis.

**Results:** Higher expression of chondrocyte hypertrophy markers; Col10a1 and MMP13 were observed in tibial AC chondrocytes of DMM and loaded knees. In tibial GP, Col10a1 and MMP13 expressions were widely dispersed in significantly enlarged zones of proliferative and hypertrophic chondrocytes in DMM ( $p=0.002$  and  $p<0.0001$ , respectively) and loaded (both  $p<0.0001$ ) tibiae of mice compared to their controls. 3D quantification revealed enriched GP bridging and higher bridge densities in medial compared to lateral tibiae of DMM and loaded knee joints of the mice. GP dynamics were associated with higher SCB volume fraction in medial compared to lateral tibiae of DMM and loaded knee joints (DMM SCB BV/TV:  $36.7\pm4.5\%$  vs.  $29.4\pm3.1\%$ ,  $p=0.03$ ; loaded:  $47.1\pm1.6\%$  vs.  $40.1\pm1.7\%$ ,  $p=0.02$  respectively) and epiphyseal trabecular BV/TV in medial tibiae of loaded knee joints ( $73.4\pm2.8\%$  vs.  $60.7\pm1.8\%$ ,  $p=0.005$ ).

**Conclusion:** The results confirm associations between aberrant chondrocyte hypertrophy marker expression and OA pathology in surgical and loaded murine models of OA. Herein, we reveal for the first time spatial variation of growth plate bridging in surgical and loaded osteoarthritis models and how these may contribute to anatomical variation in vulnerability of osteoarthritis development.

**Disclosure:** The research leading to these results has received technical support from 3Dmagination Ltd, Didcot, UK.

P204

### OSTEOPOROSIS CLINICAL RISK FACTORS THAT JUSTIFIED THE PRESCRIPTION OF BONE DENSITOMETRY (DXA): ABOUT 444 PATIENTS

K. Nassar<sup>1</sup>, S. Janani<sup>1</sup>

<sup>1</sup>Ibn Rochd University Hospital, Rheumatology Dept., Hassan II University of Medicine & Pharmacy, Casablanca, Morocco

**Objective:** Osteoporosis is a disease that affects BMD and bone microarchitecture at the origin of an increased risk of fracture. The reduction in bone density assessed DXA and fall history represent the first two risk factors of nonvertebral fracture after menopause. There is a several risk factors of densitometric osteoporosis. The study aim was evaluation of clinical risk factors that justified the realization of BMD by DXA about 444 cases.

**Methods:** Transversal and descriptive monocentric cohort study conducted for 24 months in 444 patients referred by physicians regularly use prescription of BMD by DXA. The realization of this exploration by the same DXA-Hologic in the rheumatology department at the University Hospital Ibn Rochd was the criterion for entry into the study. All patients were interviewed on the same day on the risk factors for osteoporosis and fractures justifying the prescription of a BMD.

**Results:** Data included 410 women and 34 men. Most women were postmenopausal (90.2%). The average age was 59.3 y ( $\sigma=12.6$ ), 34% were  $\geq 65$  y. The mean BMI was at 27.6. 18.3% of patients had at least a history of falls in the previous 12 months and 22.5% a history of fracture after a low-energy trauma. 42.6% were osteoporotic and 36.7% had osteopenia in at least one of these sites: lumbar spine, femoral neck, total hip. Early menopause, taking corticosteroids in the long term, rheumatoid arthritis and diabetes were the main risk factors that justified the prescription of DXA for the evaluation of bone densitometry (Table). Prescribers of this exploration were mainly rheumatologists (N=256, 57.1%), 41 endocrinologists (9.2%).

**Conclusion:** Our results confirm those of the literature regarding the risk factors that justified the prescription of BMD by DXA. These factors occurs diagnosis of osteoporosis in our study in 42.6% of patients.

Table. Patients characteristics and risk factors justified DXA

Patients characteristics and osteoporosis risk factors	Patients number=444 n (%)
Women	410 (92.3')
Menopausal women	370 (90.2)
Mean age ( $\sigma$ )	59.3 (12.6)
< 65 y	293 (66.0)
$\geq 65$ y	151 (34.0)



BMI (kg/m <sup>2</sup> )	
mean ( $\sigma$ )	27.6 (5.1)
skinny (<19)	9 (2.0)
normal (19-25)	135 (30.4)
overweight ( $\geq 25$ )	300 (67.6)
Osteoporosis risk factors	
Early menopause	77 (18.8)
Rheumatoid arthritis	54 (12.2)
Diabetes	62 (14.0)
Hyperthyroidism	46 (10.4)
Long term corticosteroid	76 (17.1)
Past history of smoking	12 (2.7)
Alcohol intake	11 (2.5)

## P205

**BONE STATUS AND TRANSVERSE MYELITIS**

I. A. Voinea<sup>1</sup>, I. C. Raducu<sup>1</sup>, A. Draghici<sup>1</sup>, E. Petrova<sup>2</sup>, A. Dumitrascu<sup>1</sup>, G. Voicu<sup>1</sup>, N. Dumitru<sup>2</sup>, A. Ghemigian<sup>2</sup>

<sup>1</sup>C.I. Parhon National Institute of Endocrinology, <sup>2</sup>C.I. Parhon National Institute of Endocrinology & C. Davila University of Medicine & Pharmacy, Bucharest, Romania

**Objective:** Bone loss might be expected in patients with spinal cord dysfunction including those patients associating transverse myelitis (TM) (1-5). Skeletal fragility may be related to immobilization, vitamin D deficiency, etc. (1-5). We aim to introduce a female with anomalies of bone status associating TM.

**Case report:** A 54-year old, nonsmoking female is admitted for 5-y history of thoracic TM with motor deficit of paralytic intensity on both lower limbs. She is also known with untreated postmenopausal osteoporosis. The medical history also includes neurogenic bladder, ponytail syndrome, micronodular endemic goiter with euthyroidism and vitamin D deficiency with persistent supplementation. On admission, total serum calcium=9.5 mg/dL (normal: 8.4-10.2 mg/dL), bone turnover markers: alkaline phosphatase=75 U/L (normal: 40-150U/L), CrossLaps=0.379 ng/mL (normal: 0.33-0.782 ng/mL), osteocalcin=20.30 ng/mL (normal: 15-46 ng/mL), P1NP=67.6 ng/mL (normal: 15-46 ng/mL), normal PTH=31.55 pg/mL (normal: 15-65pg/mL), low 25OHD=15.8 ng/mL (normal >30 ng/mL). The central DXA showed lumbar BMD=0.905 g/cm<sup>2</sup>, T-score=-2.3 SD, Z-score=-1.1 SD, hip BMD=0.483 g/cm<sup>2</sup>, T-score=-4.2 SD, Z-score=-3.1 SD. Profile screening X-Ray of thoracic-lumbar spine showed no vertebral fractures. Treatment with zoledronic acid 5 mg/y plus vitamin D 2000 UI/d was initiated. One year later, 25OHD increased to 24.3 ng/mL, while DXA as-

says showed an improvement of parameters as following: lumbar BMD=0.925 g/cm<sup>2</sup>, T-score=-2.1 SD, Z-score=-0.9 SD, hip BMD=0.546 g/cm<sup>2</sup>, T-score=-3.7 SD, Z-score=-2.7 SD.

**Conclusion:** In patients with TM, bone status may be damaged due to multiple mechanisms and antiosteoporotic drugs in addition to vitamin D supplements might help the prevention of fracture and sarcopenia in order to pay attention to quality of life.

**References:**

1. Bechir ES, et al. Revista de Chimie 2019;70:3515.
2. Albulescu DM, et al. Revista de Chimie 2018;69:2438.
3. Paduraru DN, et al. Chirurgia (Bucur) 2019;114:564.
4. Albulescu DM, et al. Revista de Chimie 2018;69:36837.
5. Popescu M, et al. Revista de Chimie 2018;69:2089.

## P206

**SECONDARY DETERMINATIONS AT BONE LEVEL AS FIRST MANIFESTATION OF BREAST CANCER**

E. D. Becheru<sup>1</sup>, A. Draghici<sup>1</sup>, C. M. Alexandru<sup>1</sup>, A. Dumitrascu<sup>1</sup>, G. Voicu<sup>1</sup>, A. Goldstein<sup>1</sup>, N. Dumitru<sup>2</sup>, E. Petrova<sup>2</sup>, A. Ghemigian<sup>2</sup>

<sup>1</sup>C.I. Parhon National Institute of Endocrinology, <sup>2</sup>C.I. Parhon National Institute of Endocrinology & C. Davila University of Medicine & Pharmacy, Bucharest, Romania

**Objective:** Breast cancer is the most frequent diagnosed carcinoma in women (1-5). Skeleton is among the most common sites of secondary spreading, as well as lung, liver, brain, and lymph nodes (1-5). Prompt recognition of metastases involves a prompt therapy with prolonged survival time and increase quality of life (1-5). We aim to introduce a female case associating bone metastasis as first manifestation of mammary carcinoma.

**Case report:** A 44-year-old female known with total hysterectomy and bilateral adnexectomy for a benign uterine tumour at age of 40 y is admitted for generalized bone pain, especially at lower left limb, left shoulder and generalized muscular pain, fatigue. Biochemistry panel of phosphor-calcium metabolism was normal, as well as BMD at DXA. Technetium <sup>99m</sup> whole body bone scintigraphy showed abnormal uptake at skull (frontal and parietal bones), vertebral spine, femur, humerus. Tumoral markers CA<sub>125</sub> and CA<sub>153</sub> were mildly elevated, as well as bone turnover markers. Computed tomography scan showed a large lump at the level of left breast and multiple other smaller lesions in both mammary regions, characteristic for a multicentric and multifocal carcinoma, with mediastinal lymph nodes enlargement in addition to secondary bone spreading at the level of cervical and thoracic vertebrae, femur, lumbar region and both clavicles. Zoledronic acid was initiated in association with multilevel oncologic therapy.

**Conclusion:** Bone metastases on females without a history of a carcinoma might represent the first sign of the disease and adequate recognition may improve the outcome.

#### References:

1. Bechir ES, et al. Revista de Chimie 2019;70:3515.
2. Albulescu DM, et al. Revista de Chimie 2018;69:2438.
3. Paduraru DN, et al. Chirurgia (Bucur) 2019;114:564.
4. Albulescu DM, et al. Revista de Chimie 2018;69:3683.
5. Popescu M, et al. Revista de Chimie 2018;69:2089.

## P207

### SKELTON METASTASES AS FIRST SIGN OF AGGRESSIVE PAPILLARY THYROID CARCINOMA

E. D. Becheru<sup>1</sup>, I. A. Voinea<sup>1</sup>, C. M. Alexandru<sup>1</sup>, A. Dumitrascu<sup>1</sup>, A. Goldstein<sup>1</sup>, N. Dumitru<sup>2</sup>, A. Ghemigian<sup>2</sup>, E. Petrova<sup>2</sup>, M. Ghemigian<sup>1</sup>

<sup>1</sup>C.I. Parhon National Institute of Endocrinology, <sup>2</sup>C.I. Parhon National Institute of Endocrinology & C. Davila University of Medicine & Pharmacy, Bucharest, Romania

**Objective:** Papillary thyroid carcinoma (PTC), a common endocrine neoplasia has a slow evolution, mostly associating a favourable prognosis (1-5). Thyroidectomy is the first line therapy; postoperative hypocalcemia requires calcium and vitamin D (1-5). PTC first invades cervical lymph nodes (1-5). Distant spreading (lung, bones) in the absence of obvious thyroid disease is very uncommon (occult evolution).

**Case report:** This is a 55-year-old male admitted for lumbar pain emerging to lower limbs, poorly responsive to analgesics. Clinical evaluation was irrelevant. MRI revealed a tumour at S1 sacral vertebra of 46/36/27 mm, with compression of the spinal nerve and local oedema. S1-L5 laminectomy was performed; postoperative pathologic and immunochemistry exam pointed PTC metastases. Further, computed tomography was done and a few thyroid nodules were identified, the largest of 16 mm with microcalcifications, and cervical lymph nodes of maximum 19/18 mm. Total thyroidectomy with central lymphadenectomy was done with post-operative PTC confirmation. Within less than a year, while under monthly zoledronic acid, the patient also received radioiodine therapy (450 mCi), with progressive evolution of the disease, reaching a peak of blood thyroglobulin level of 12586 ng/mL. Whole body iodine 131 scintigraphy showed spreading to both lungs, left shoulder, sacrum, and vertebral spine. He further started a therapy with tyrosine kinase inhibitor.

**Conclusion:** It is very unlikely that PTC's first sign to be bone metastasis. It is important to identify the condition, for a proper diagnosis and therapy to improve the outcome. This case was an exceptional form of aggressive PTC poorly responsive to traditional treatment.

#### References:

1. Poiana C, et al. Rom J Morphol Embryol 2011;52:187.
2. Bechir ES, et al. Revista de Chimie 2019;70:3515.
3. Paduraru DN, et al. Chirurgia (Bucur) 2019;114:564.
4. Albulescu DM, et al. Revista de Chimie 2018;69:3683.
5. Popescu M, et al. Revista de Chimie 2018;69:2089.

## P208

### HYPERCALCEMIA AS FIRST MANIFESTATION OF LUNG CANCER

A. Draghici<sup>1</sup>, E. D. Becheru<sup>1</sup>, I. C. Raducu<sup>1</sup>, A. Dumitrascu<sup>1</sup>, A. Goldstein<sup>1</sup>, N. Dumitru<sup>2</sup>, A. Ghemigian<sup>2</sup>, E. Petrova<sup>2</sup>

<sup>1</sup>C.I. Parhon National Institute of Endocrinology, <sup>2</sup>C.I. Parhon National Institute of Endocrinology & C. Davila University of Medicine & Pharmacy, Bucharest, Romania

**Objective:** Hypercalcemia associating lung and mediastinal carcinomas represents a marker of poor prognostic marker (1-5). Low PTH is suggestive for paraneoplastic syndrome (1-5).

**Case report:** This is a 54-year-old, nonsmoking male, known with arterial hypertension, type 2 diabetes mellitus, and high levels of total serum calcium (TSC)=13.4 mg/dL (normal: 8.5-10.2 mg/dL) without any investigations and therapy. He was admitted for constipation, nausea and abdominal pain in relationship to high TSC. Thyroid function was normal, TSC was persistently high=13.2 mg/dL (normal: 8.5-10.2 mg/dL), suppressed PTH=6.7 pg/mL (normal: 15-64 pg/mL), 25OHD=22.7 ng/mL (normal >30 ng/mL), increased CrossLaps=1.35 ng/mL (normal: 0.104-0.504 ng/mL) and osteocalcin=82 ng/mL (normal: 14-46 ng/mL). Lumbar BMD-DXA=0.892 g/cm<sup>2</sup>, T-score=-2.7 SD, Z-score=-1.9 SD. Computed tomography: inhomogeneous mediastinal and lung tumor enclosing the left primitive bronchus, left inferior pulmonary vein of 42/65/55 mm, left pulmonary atelectasis and cloned fluid accumulation in the right pleural cavity; mediastinal lymphadenopathy of 7/12 mm. High tumor markers: CA125=47.8 U/mL (normal <35), CA15-3=25.4 U/mL (normal <25 U/mL). Whole body bone scintigraphy (99mTc-HDP) revealed increased tracer uptake at bilateral hip, mostly at femoral head and humeral proximal epiphyses. The patient was offered pamidronate 15 mg/mL by intravenous infusion, and after 2 weeks biochemistry showed normal values of TSC=9.9 mg/dL (normal: 8.4-10.2 mg/dL) and PTH=7.3 pg/mL (normal: 15-65 pg/mL). However, muscle weakness, fatigue, nausea persistent, and after initial biochemical control of hypercalcemia, high TSC relapsed. In the meantime, the patient was referred for further oncological investigations and therapy which he delayed. He died within a few months.

**Conclusion:** Malignancy related hypercalcemia represents an independent factor of poor prognostic. Some cases present the high TSC levels in the absence of specific diagnostic of originating neoplasia. Specialists from different areas of medicine

should pay attention to high levels of calcium unrelated to drugs or dehydration. Low PTH levels in addition to high calcium are very suggestive for cancer associated hypercalcemia.

#### References:

1. Poiana C, et al. Rom J Morphol Embryol 2011;52:187.
2. Bechir ES, et al. Revista de Chimie 2019;70:3515.
3. Paduraru DN, et al. Chirurgia (Bucur) 2019;114:564.
4. Albulescu DM, et al. Revista de Chimie 2018;69:3683.
5. Popescu M, et al. Revista de Chimie 2018;69:2089.

## P209

### VERY LOW BONE MASS AND ANKYLOSING SPONDYLITIS

I. A. Voinea<sup>1</sup>, E. D. Becheru<sup>1</sup>, A. Draghici<sup>1</sup>, G. Voicu<sup>1</sup>, R. Capota<sup>1</sup>, N. Dumitru<sup>2</sup>, A. Ghemigian<sup>2</sup>, E. Petrova<sup>2</sup>

<sup>1</sup>C.I. Parhon National Institute of Endocrinology, <sup>2</sup>C.I. Parhon National Institute of Endocrinology & C. Davila University of Medicine & Pharmacy, Bucharest, Romania

**Objective:** Several rheumatic diseases, for instance ankylosing spondylitis (AS), are characterized by extremely low bone mass, including in males or young adults (1-5). In patients with very low T-score, high risk of vertebral fractures, lack of response to antiresorptive therapy, or gastric morbidities, anabolic drugs like teriparatide are an option in countries with available protocol (1-5).

**Case report:** A 66-year-old, smoking male is admitted for bone assessment. His personal history includes: 2 years ago he suffered a left hip fracture and, despite the diagnosis of severe osteoporosis, he was not compliant to specific therapy. He is known for HLA-B27-positive AS since the age of 35 y. The medical history includes: congenital dysphonia, polyneuropathy, atrial fibrillation, chronic heart failure, right fascicular block; also, chronic gastro-duodenitis, megacolon, gallstones, microlithiasis. On admission, biochemistry profile showed: total serum calcium=9.8 mg/dL (normal: 8.5-10.2 mg/dL), phosphorus=3.2 mg/dL (normal: 2.5-4.5 mg/dL), bone turnover markers: alkaline phosphatase=85 U/L (normal: 38-129 U/L), high CrossLaps=0.892 ng/mL (normal: 0.104-0.504 ng/mL), osteocalcin=20.60 ng/mL (normal: 14-46 ng/mL), and increased P1NP=88.25 ng/mL (normal: 15-46 pg/mL), and bone hormones as following: PTH=31.96 pg/mL (normal: 15-65 pg/mL), 25OHD=20.4 ng/mL (normal >30 ng/mL). Central DXA showed lumbar L2-4 BMD=0.905 g/cm<sup>2</sup>, T-score=-6.6 SD, Z-score=-5.5 SD, hip BMD=0.581 g/cm<sup>2</sup>, T-score=-3.6 SD, Z-score=-2.7 SD, 1/3 distal radius BMD=0.580 g/cm<sup>2</sup>, T-score=-2.8 SD, Z-score=-2.2 SD. Screening spine X-ray revealed kyphosis-maximum point: T8 vertebra, mild (T5,T10,T11), moderate (T6) and severe (T7,T8,T9,T12) vertebral fractures. Treatment with zoledronic acid 5 mg/y plus vitamin D 2000 IU/d was initiated. One year later, 25OHD was 23.50 ng/mL; improvement of DXA profile: L2-4 BMD=0.554 g/cm<sup>2</sup>, T-score=-5.6 SD, Z-score=-4.9

SD, hip BMD=0.624 g/cm<sup>2</sup>, T-score=-3.4SD, Z-score=-2.2 SD, 1/3 radius BMD=0.592 g/cm<sup>2</sup>, T-score=-2.7 SD, Z-score=-2 SD. Further therapy with zoledronic acid and vitamin D supplements were recommended.

**Conclusion:** AS-related qualitative and quantitative impact on bone requires lifelong follow-up, as well as therapy.

#### References:

1. Popescu M, et al. Revista de Chimie 2018;69:2089.
2. Albulescu DM, et al. Revista de Chimie 2018;69:3683.
3. Paduraru DN, et al. Chirurgia (Bucur) 2019;114:564.
4. Bechir ES, et al. Revista de Chimie 2018;70:3176.
5. Radu L, et al. Revista de Chimie 2018;69:3483.

## P210

### FROM HYPERCALCEMIA TO... OVARIAN CANCER

A. Draghici<sup>1</sup>, E. Petrova<sup>2</sup>, I. A. Voinea<sup>1</sup>, I. C. Raducu<sup>1</sup>, G. Voicu<sup>1</sup>, R. Capota<sup>1</sup>, N. Dumitru<sup>2</sup>, A. Dumitrascu<sup>1</sup>, A. Ghemigian<sup>2</sup>

<sup>1</sup>C.I. Parhon National Institute of Endocrinology, <sup>2</sup>C.I. Parhon National Institute of Endocrinology & C. Davila University of Medicine & Pharmacy, Bucharest, Romania

**Objective:** Ovarian tumors represent a vast, challenging, multidisciplinary field, with a particular poor outcome for ovarian cancer (OC) (1-5). Malignancy-related hypercalcemia is a marker of severe prognostic (1-5). We aim to introduce a case detected with OC starting from hypercalcemia-related syndrome.

**Case report:** A 75-year-old female, known with arterial hypertension, type 2 diabetes mellitus, is admitted for fatigue, nausea, lower abdominal distension, 9-kg weight loss/last year. Clinical exam: pelvic mass and ascites. Blood assays: total serum calcium=11.1 mg/dL (normal:8.5-10 mg/dL) (she denies vitamin D/A/calcium supplements); normal TSH; PTH=84.9 pg/mL (normal: 15-65 pg/mL); 25OHD=10 ng/mL (normal >30 ng/mL); normal bone turnover markers. Osteoporosis confirmed by: L<sub>2-4</sub>BMD-DXA=0.839 g/cm<sup>2</sup>, T-score=-3 SD, Z-score=-1.1 SD. Computer tomography: left ovarian tumor(14/10.5 cm), peritoneal carcinomatosis, hepatic and pulmonary metastases, subchondral cysts in left acetabulum(1.7/1.3 cm), and areas of osteocondensation of L2 (0.4 cm), left iliac bone (0.5 cm), right iliac bone (0.55 cm). CA125=5439 U/mL(normal: 0.1-35). Immunohistochemistry (IHC) based on cell block ascitic fluid: positive WT1, ER=40%, PGR negative, Ki67=45% (high grade serous adenocarcinoma). Vitamin D was added to adjuvant dose-dense carboplatin and paclitaxel chemotherapy (6 cycles) followed by debulking surgery (hysterectomy+salpingo-oophorectomy+omentectomy+local lymphadenectomy), then another 6 cycles. Postoperative histological and IHC profile confirmed the block cell profiling. BRCA1+2 tests were negative so she became candidate to olaparib, a poly(ADP-ribose) polymerase inhibitor. After another month of therapy,

<sup>18</sup>F-FDG positron emission tomography/computed tomography (PET/CT) showed no metabolic active lesions in pelvic area, neither thyroid gland, mammary gland, pulmonary, in liver, adrenals or bones. Also, the value of CA125 normalized (=10 U/mL), so was total serum calcium (=9.8 mg/dL). **Conclusion:** Nowadays, prompt recognition of a malignancy might embrace a clear beneficial of the outcome even in severe cases like OC. Hypercalcemia may be related to bone metastases or paraneoplastic PTHrP production.

#### References:

1. Gheorghisan-Galateanu AA, et al. Acta Endocrinologica-Bucharest 2017;3:356.
2. Popescu M, et al. Revista de Chimie 2018;69:2089.
3. Albulescu DM, et al. Revista de Chimie 2018;69:3683.
4. Poiana C, et al. Gynecol Endocrinol 2010;26:617.
5. Bechir ES, et al. Revista de Chimie 2019;70:3515.

## P211

### PITUITARY TUMOR AND BLOOD CALCIUM LEVELS

E. Petrova<sup>1</sup>, E. D. Becheru<sup>2</sup>, A. I. Trandafir<sup>2</sup>, A. Draghici<sup>2</sup>, N. Dumitru<sup>1</sup>, A. Dumitrascu<sup>2</sup>, A. Ghemigian<sup>1</sup>

<sup>1</sup>C.I. Parhon National Institute of Endocrinology & C. Davila University of Medicine & Pharmacy, <sup>2</sup>C.I. Parhon National Institute of Endocrinology, Bucharest, Romania

**Objective:** Patients with pituitary adenomas may associate primary hyperparathyroidism (PHP) – related hypercalcemia in cases with MEN1 (multiple endocrine neoplasia) syndrome, but, on daily practice, the levels of blood calcium may vary with the degree of dehydration or with calcium daily intake (1-5). We aim to introduce an adult female with a pituitary macroadenoma and calcium profile anomalies

**Case report:** This is a 56-year-old, nonsmoking female, with menopause at the age of 48 y, who was admitted a decade ago for persistent headache which lead to the detection of a pituitary tumour of 1.2x0.7 cm in contact with cavernous sinus. A mild elevation of prolactin level (48 ng/mL, normal <29 ng/mL) required dopamine agonists therapy (weekly cabergoline 1.5 mg) while neurosurgery was postponed. During follow-up, IGF-1 values remain within normal limits, so was DXA evaluation, while total serum calcium levels were detected several times mildly elevated (10.5 mg/dL, with normal range 8.5-10.2 mg/dL) in association with a mild elevation of PTH which was not confirmed at reassessment thus the diagnosis of PHP was not confirmed. However, the patient associated two gallstones of 2.2 cm, respective 1.8 cm which required surgical removal of gall bladder. The mild increase of PTH was associated with low levels of 25-hydroxyvitamin D=9 ng/mL (normal >30 ng/mL) which required cholecalciferol supplements.

After 10 years since first diagnosed, the pituitary macroadenoma increased to 1.6x1.2 cm and selective hypophysectomy was necessary. No MEN1 syndrome criteria were confirmed.

**Conclusion:** In this case, the presence of mild elevation of calcium levels was probably related to oral diet intake, not with MEN1 syndrome.

#### References:

1. Popescu M, et al. Revista de Chimie 2018;69:2089.
2. Albulescu DM, et al. Revista de Chimie 2018;69:3683.
3. Bechir ES, et al. Revista de Chimie 2019;70:3515.
4. Albulescu DM, et al. Revista de Chimie 2018;69:2438.
5. Poiana C, et al. Maturitas 2009;62:98.

## P212

### ZOLENDRONIC ACID AFTER TERIPARATIDE: PANDEMIC OBSERVATIONS

E. Petrova<sup>1</sup>, C. M. Alexandru<sup>2</sup>, A. I. Trandafir<sup>2</sup>, G. Voicu<sup>2</sup>, A. Ghemigian<sup>1</sup>

<sup>1</sup>C.I. Parhon National Institute of Endocrinology & C. Davila University of Medicine & Pharmacy, <sup>2</sup>C.I. Parhon National Institute of Endocrinology, Bucharest, Romania

**Objective:** Teriparatide for severe osteoporosis is followed by antiresorptive drugs, and one option in patients with gastric intolerance is zoledronic acid or denosumab (1-5). During pandemic lockdown, the access to bone assessment was limited (1-5). Type 1 diabetic patients are particularly at risk for bone loss, but also for COVID-19 infection, thus the importance of respecting the pandemic rules (1-5). We aim to introduce a female case diagnosed with severe menopausal osteoporosis that was followed during post-teriparatide sequence of medication, including during pandemic days.

**Case report:** This is a type 1 diabetic female of 77 y who was first diagnosed with menopausal osteoporosis 8 y ago (lumbar T-score of -3.1 SD) and started medication with weekly alendronate in addition to vitamin D supplements. After 3 y, she suffered a single spontaneous vertebral fracture thus teriparatide was initiated for 2 y (with good tolerance): lumbar T-score went from -3.1 to -1.9 SD. In the meantime, due to bilateral coxarthrosis she needed bilateral hip replacement. Further on, she continued with biannually denosumab for 8 injections, reaching a lumbar BMD-DXA 0.942 g/cm<sup>2</sup>, T-score of -2 SD, Z-score of -0.8 SD so an intravenous perfusion with zoledronic acid 5 mg was administered plus vitamin D supplements. While she had no additional fracture and glycosylated haemoglobin A1c remained around 6.2-6.4%, one year later, the pandemic started, so only bone turnover markers (BTM) were assessed, not DXA: suppressed CrossLaps=0.22 ng/mL (normal: 0.33-0.782 ng/mL), osteocalcin=11 ng/mL (normal: 15-46 ng/mL), P1NP=27 pg/mL (normal: 15-45 pg/mL). She continued with



vitamin D, and 20 months after injection CrossLaps remained low (=22 ng/mL) with normal osteocalcin (=15 ng/mL), P1NP (=28 pg/mL) and stationary BMD.

**Conclusion:** Zolendronic acid effect in osteoporotic patients is easy to access by blood assays if DXA is not available, while lack of BTM increase is suggestive for a good outcome.

#### References:

1. Poiana C, et al. Bone Res 2013;1:275.
2. Popescu M, et al. Revista de Chimie 2018;69:2089.
3. Bechir ES, et al. Revista de Chimie 2019;70:3515.
4. Bechir ES, et al. Revista de Chimie 2018;70:3176.
5. Radu L, et al. Revista de Chimie 2018;69:3483.

## P213

### OSTEOPOROSIS-RELATED TO LONG-TERM HYPERTHYROIDISM ON A PATIENT WITH ESOPHAGIAN LEIOMYOMA

E. Petrova<sup>1</sup>, A. Draghici<sup>2</sup>, I. C. Raducu<sup>2</sup>, C. M. Alexandru<sup>2</sup>, E. D. Becheru<sup>2</sup>, I. A. Voinea<sup>2</sup>, A. Ghemigian<sup>1</sup>

<sup>1</sup>C.I. Parhon National Institute of Endocrinology & C. Davila University of Medicine & Pharmacy, <sup>2</sup>C.I. Parhon National Institute of Endocrinology, Bucharest, Romania

**Objective:** Approach of patients with menopausal osteoporosis and associated hormonal and/or metabolic risk factors requires a particular attention, especially in patients with multiple morbidities (1-5). We aim to present a case of a menopausal woman diagnosed with osteoporosis after a long time of uncontrolled hyperthyroidism, also displaying several morbidities that influenced her decision to follow the therapy.

**Case report:** This is a 58-year-old, nonsmoking female, initially admitted for neck compressive symptoms. She is known with suppressed TSH for several years and she refused therapy. A large multinodular goiter is confirmed (2 nodules with calcifications of maximum 2.5 cm at identified at ultrasound). She associates essential thrombocytosis, NYHA class III cardiac failure, a history of pulmonary thromboembolism and a recent diagnosis of oesophageal leiomyoma. Due to cardiovascular risk, after achieving control of thyroid function using thiamazole, I<sup>131</sup> radioiodine therapy induced iatrogenic hypothyroidism and she continued with levothyroxine substitution. Bone evaluation revealed osteoporosis: lumbar L1-4 BMD of 0.83 g/cm<sup>2</sup>, T-score of -2.9 SD, Z-score of -2.5 SD. Also, a thoracic T9 vertebral fracture was identified. Due to oesophageal tumour and associated risk of reflux, oral antire-sorptive drugs are not indicated. Injectable bisphosphonates and denosumab as well as teriparatide represented a potential therapy which the patient refused due to multiple concomitant drugs for mentioned morbidities. Vitamin D supplements were started.

**Conclusion:** Despite multiple levels of drugs against osteoporosis, real life medicine has shown us that the compliance/adherence to therapy decided by the patient is markedly influenced by concomitant medications and severe non-bone related diseases which might make the picture of osteoporosis and osteoporotic fractures not an essential target to treat.

#### References:

1. Sandru F, et al. Rom J Military Med 2020;123:166.
2. Popescu M, et al. Revista de Chimie 2018;69:2089.
3. Bechir ES, et al. Revista de Chimie 2018;70:3176.
4. Radu L, et al. Revista de Chimie 2018;69:3483.
5. Poiana C, et al. Rom J Morphol Embryol 2011;52:187.

## P214

### POST COVID SEQUELAE ORTHOPAEDIC ASSOCIATED SYMPTOMS OF 60 PATIENTS: A CASE SERIES WITH 8 MONTHS OF FOLLOW UP

D. R. Jain Mch<sup>1</sup>

<sup>1</sup>Karun Jain, Delhi, India

**Introduction:** Post Covid-19, pulmonary complications are well understood but there are no studies that specifically investigate the frequency, characteristics and presentation patterns of orthopaedic associated symptoms in COVID-19 recovered patients. **Objective:** to evaluate the variety of orthopaedic symptoms and their frequency, localization, and severity in covid recovered patients to understand better, impact of Covid-19 on musculoskeletal system. **Methods:** Diagnosed & recovered 60 cases of Covid-19, who were admitted between June & July 2020 & visited orthopaedic OPDs for regular monthly follow-up were prospectively analysed for 8 months. Clinical examination and questionnaire about orthopaedic symptoms and their frequency, localization, severity and their use of analgesics & overall quality of life. **Results:** 60 post covid recovered patient, who were available for 8 months of follow up were included. Complaints of the patients were 81.6% (49) fatigue, 73.3% (44) muscle cramps, 66.7 % (40) large joint arthralgia, 51.6% (31) Small joint arthralgia, 48.3 (29) headache, 36.7% (22) back pain, 23.3% (14) chest pain and 15% (9) non-specific pain. An average of 3 analgesic medicines per week were consumed by study patients. 28 patients were working office population and had taken average of 24 days off in 8 months follow-up. **Conclusion:** Our 8 months follow-up data revealed that fatigue, muscle cramps, large & small joint arthralgia and back pain can be seen in patients at varying rates for a longer duration after covid recovery, which in turn affects their day-to-day life and PQLI. Long term analgesic intake is another area of concern. **Keywords:** Post covid sequelae, Orthopedic symptoms, arthralgia, COVID-19, Cramp, Pain

P215

### BONE MARROW FAT AS IMAGING MARKER OF SKELETAL FRAGILITY IN WOMEN WITH POSTSURGICAL HYPOPARATHYROIDISM

D. Diacinti<sup>1</sup>, C. Cipriani<sup>2</sup>, A. Iannacone<sup>3</sup>, E. Kripa<sup>3</sup>, M. Orlandi<sup>3</sup>, J. Pepe<sup>2</sup>, L. Colangelo<sup>2</sup>, D. Diacinti<sup>4</sup>, S. Minisola<sup>2</sup>

<sup>1</sup>Dept. of Oral & Maxillofacial Sciences, Umberto I Hospital, University Sapienza, Dept. of Diagnostic & Molecular Imaging, Radiology & Radiotherapy, University Tor Vergata, <sup>2</sup>Dept. of Clinical, Internal, Anesthesiological & Cardiovascular Sciences, Sapienza Rome University, <sup>3</sup>Dept. of Radiological Sciences, Oncology & Anatomic-Pathology, University Sapienza, <sup>4</sup>Dept. of Radiological Sciences, Oncology & Anatomic-Pathology, University Sapienza, Rome, Italy

**Objective:** To assess lumbar spine bone marrow fat (BMF) content in postmenopausal women with chronic postsurgical HypoPT using magnetic resonance spectroscopy and evaluate how it could be related to vertebral fragility.

**Methods:** We studied 28 postmenopausal women with postsurgical HypoPT (mean age 66±6.8 SD years) and 28 healthy age-matched women. In all subjects we assessed: lumbar spine (L1-L4), femoral neck (FN) and total hip (TH) BMD by DXA (Hologic QDR 4500A, USA); trabecular bone score (TBS) on the L1-L4 images by the TBS-iNsight software; vertebral fracture assessment (VFA) by iDXA (Lunar, GE, USA). BMF was measured by 3 Tesla L1-L5 MRI with application of the PRESS spectroscopy sequences on L3 vertebral body.

**Results:** HypoPT subjects had significantly higher mean BMD values than controls (1.044 vs. 0.956 g/cm<sup>2</sup>; p<0.01), and lower TBS values (1.218 vs. 1.273; p<0.01). Vertebral fractures by VFA were observed in 6/28 (21%) of HypoPT vs. 3/28 (11%) of healthy subjects. Mean BMF values were significantly higher in HypoPT compared to healthy subjects: 79% vs. 60% (p<0.05). The percentage of unsaturated, residual and saturated BMF in the HypoPT group were 5%, 6% and 68%; in healthy subjects 9%, 3%, 48%, respectively. We observed statistically significant negative correlations between BMF values and both BMD (R=0.517; p<0.03) and TBS (R=0.767; p<0.03) in the HypoPT group. When only patients with vertebral fractures were compared, BMF was higher in HypoPT than in healthy subjects (62% vs. 78%; p<0.05).

**Conclusion:** Our results demonstrate that BMF assessed by magnetic resonance spectroscopy at the lumbar spine is increased in postmenopausal women with chronic postsurgical HypoPT and is associated with increased prevalence of fragility fractures at this level. Hence, adipogenesis may be stimulated in the trabecular bone in the absence of PTH and associated with skeletal fragility.

P216

### FGF23 IS ASSOCIATED WITH TRABECULAR BONE SCORE BUT NOT BONE MINERAL DENSITY IN EARLY STAGES OF CKD: RESULTS OF THE CROSS-SECTIONAL STUDY

Z. Kužmová<sup>1</sup>, M. Kužma<sup>1</sup>, A. Gažová<sup>1</sup>, Z. Killinger<sup>1</sup>, P. Jackuliak<sup>1</sup>, J. Kyselovič<sup>1</sup>, J. Payer<sup>1</sup>

<sup>1</sup>Comenius University Faculty of Medicine, Bratislava, Slovakia

**Objective:** Newer markers of kidney damage and mineral and bone changes in chronic kidney disease (CKD) are needed. This study aimed to evaluate BMD and trabecular bone score (TBS) in relationship with new laboratory markers of CKD, such as FGF23 and klotho.

**Methods:** A cross-sectional study during July 2018-July 2019 was conducted. Plasma levels of soluble klotho and FGF23 were determined by ELISA. All patients undergone BMD and TBS measurement. Patients were divided into 2 groups as follows: A - patients in stages G1-G3; B - patients in stages G4-G5 according to KDIGO.

**Results:** A total of 74 CKD patients (42 males, 32 females; mean age 68.8 y) were included in the study. Greater FGF23 levels in group B (N=15) in comparison to group A (N=59) (p=0.001) were observed. FGF23 was associated with glomerular filtration (GF) (R=-0.43; p=0.003), with greater levels of FGF23 at GF <0.8 ml/s. Significant difference in TBS within first 3 CKD stages (mean TBS in G1=1.374 vs. G2=1.304 vs. G3a=1.24; p=0.03) and negative correlation of FGF23 and TBS (R=-0.33; p=0.05) and a positive correlation between klotho and TBS (R=0.419; p=0.04) was observed.

**Conclusion:** This study confirmed that FGF23 is associated with TBS. However, TBS reflects kidney function decline only in first 3 stages of CKD. Thus, FGF23 together with TBS are promising markers of early trabecular bone impairment in CKD.

P217

### VITAMIN D INSUFFICIENCY IS ASSOCIATED WITH LOWER TRABECULAR BONE SCORE BUT NOT BONE MINERAL DENSITY IN POSTMENOPAUSAL WOMEN

M. Kužma<sup>1</sup>, Z. Kužmová<sup>1</sup>, P. Jackuliak<sup>1</sup>, Z. Killinger<sup>1</sup>, J. Payer<sup>1</sup>

<sup>1</sup>Comenius University Faculty of Medicine, Bratislava, Slovakia

**Objective:** The contribution of vitamin D to fracture risk reduction can be attributed, at least in part, to a beneficial effect on BMD. However, less evidence to explain the effect of vitamin D on bone microarchitecture exists. This study aimed to assess the relationship between 25(OH)D3 levels and BMD and trabecular bone score (TBS) in postmenopausal women.

**Methods:** A cross-sectional study in postmenopausal women (mean age=64 y) from endocrinology outpatient clinic undergoing DXA examination during 10/2015 to 03/2017 was conducted. In all subjects, measurement of BMD and TBS was performed. 25(OH)D3 levels were determined by chromatography using an HPLC system with UV detection (Chromsystem®) (interassay variability CV: 0.8-3%). From total number of 347 subjects; 129 fulfilled inclusion criteria. Study group was then divided in two groups according to serum concentration of vitamin D. A level of 30 ng/ml was considered as the cutoff value.

**Results:** The prevalence of vitamin D insufficiency in the study group was 49.6%. Patients with vitamin D >30 ng/ml (N=67) in comparison to patients with vitamin D <30 ng/ml (N=64) had greater proportion of patients treated with vitamin D supplement (55 vs. 35; p=0.05) and higher TBS values (1,276 vs. 1,241; p=0.05). No difference in L-spine, total hip or neck BMD was observed.

**Conclusion:** This study shows that sufficient vitamin D levels in postmenopausal women are associated with better bone microstructure, as assessed by TBS, but not BMD. A prospective follow-up to better understand relationship between levels of vitamin D and bone structure is needed.

## P218

### FRACTURE RISK ASSESSMENT AFTER KIDNEY TRANSPLANTATION

S. Mazurenko<sup>1</sup>, Y. Nakatis<sup>1</sup>, O. Mazurenko<sup>2</sup>, E. Semenova<sup>3</sup>

<sup>1</sup>Saint Petersburg State University, <sup>2</sup>North-Western District Scientific & Clinical Center L. G. Sokolov, Federal Medical and Biological Agency, <sup>3</sup>North-Western State Medical University I.I. Mechnikov, Saint Petersburg, Russia

**Objective:** Epigenetic clocks are composed of a selection of CpG sites which have the potential to capture 'biological age' and provide a measure of age acceleration (calculated as the difference between biological and chronological age). Here we investigate the associations between age acceleration (according to three different clocks: Horvath pan-tissue, GrimAge and PhenoAge) and hip DXA parameters.

**Methods:** Participants were recruited across three generations of the Hertfordshire Intergenerational Study; original cohort members, their children, and grandchildren. Hip DXA was performed (Lunar iDXA, GE Healthcare) and whole blood DNA methylation was analysed using the Illumina 850k array (Infinium MethylationEPIC BeadChip) following which GrimAge, PhenoAge and Horvath pan-tissue age acceleration were calculated. Associations with DXA hip measures (including BMD, bone mineral content (BMC) and bone area) were analysed using linear regression in sex-stratified unadjusted models and those adjusted for age and BMI. Results are presented as  $\beta$  coefficients with 95% CIs.

**Results:** A total of 114 participants (39 males, 75 females) were recruited, mean age of 56 y (range 18-88). Relationships varied in different clocks; Horvath pan-tissue age acceleration was not associated with DXA measures in any models. However, greater GrimAge acceleration was associated with significantly lower hip BMC ( $\beta=-0.94$  (-1.50,-0.38), p<0.01 and lower bone area ( $\beta=-0.28$  (-0.55,-0.01), p<0.05) in males in fully adjusted models, and with lower hip BMD in males in unadjusted models ( $\beta=-0.02$  (-0.04,-0.01), p<0.05). Greater PhenoAge acceleration was associated with lower hip BMC in males in models adjusted for age and BMI ( $\beta=-0.34$  (-0.65,-0.03), p<0.05) and lower hip BMD in males in unadjusted models only ( $\beta=-0.01$  (-0.02,-0.00), p<0.05). No significant associations were observed in females.

**Conclusion:** Our results demonstrate that the newer iterations of epigenetic clocks (GrimAge and PhenoAge) which were designed to measure age-related phenotypic changes are associated with bone measures at the hip, whereas the first generation clocks (Horvath pan-tissue) were not. These sex-specific associations require further investigation.

## P219

### ASSESSMENT OF THE ASSOCIATION BETWEEN RHEUMATOID ARTHRITIS ACTIVITY AND BODY COMPOSITION

K. Nassar<sup>1</sup>, A. Ajerouassi<sup>2</sup>, S. Janani<sup>1</sup>

<sup>1</sup>Ibn Rochd University Hospital, Rheumatology Dept., Hassan II University of Medicine & Pharmacy, <sup>2</sup>Department of Rheumatology, Ibn Rochd University Hospital Center, Hassan II University, Faculty of Medicine & Pharmacy, Casablanca, Morocco

**Objective:** Rheumatoid arthritis (RA) is associated with altered body composition, which can result in rheumatoid cachexia caused by the inflammatory factors. RA patients often present with low muscle mass and decreased strength with high fat mass. The muscle changes may occur in the early stages of RA and persist throughout the disease duration like the excess of fat mass. The purpose of the study is to assess the link between the activity of the RA and the change of the fat and lean body mass.

**Methods:** Transversal and descriptive monocentric study conducted in 26 RA patients followed in the rheumatology department at the University Hospital Ibn Rochd. The study include 13 patients with active RA and 13 control group with remission disease. Demographic characteristics were noted in all patients as well as disease activity and treatment characteristics. All patients underwent a DXA with evaluation of the body mass precisely the lean and the fat mass. Finally the data of the 2 groups were compared to assess the relationship between disease activity and disturbances in body mass.

**Results:** 26 patients were included. The mean age was 52±10.3, predominantly female (92.3%). The mean BMI was 26.2±6.4. 7.6% are diabetic, 3.8% are smoking 53.8% are postmenopausal. Mean

duration of RA  $12 \pm 7.4$  y. Mean sedimentation rate was at  $57.4 \pm 31$  mm/1e h and CRP at  $26.6 \pm 24.1$  mg/l. The DAS 28 m CRP was at  $3.59 \pm 1.35$ . The DXA found T-score m at the lumbar spine at  $(-2.1 \pm 1.39)$ , femoral neck at  $(-1.33 \pm 1.32)$  and the total hip at  $(-1.13 \pm 1.30)$ . Concerning the evaluation of body mass, we found the following results: Total leg average fat mass (g) at  $3731 \pm 2390$ , total leg mean lean mass (g) at  $9267 \pm 2619$ , total leg BMC (g) at  $446 \pm 159$ . The whole body average fat (g) at  $17715 \pm 13322$ , the average lean whole body (g) at  $46883 \pm 5802$  and the BMC whole body (g) at  $2201 \pm 346$  (Table).

**Conclusion:** The assessment of fat and lean mass is important in patients followed for chronic inflammatory rheumatism such as RA. Inflammation induces an increase in fat mass and a decrease in lean mass with the risk of osteoporosis and fall, especially in patients with active rheumatism and obesity. Our study showed an increase in fat content in patients with active RA but without statistically significant difference with the control group. Regarding the lean mass, the expected results were not found in our study. This can be explained by the low number of patients and the few associated comorbidities. The changes in body composition during RA are linked to a cascade of metabolic abnormalities with inflammatory factors. There are multiple, complex interactions which remain largely unknown.

Table. Population characteristics and the assessment of the link between active RA and body mass

	Remission RA	Active RA PR	p-value
	Number = 13	Number 13	
Demographic characteristics			
Mean age	$58 \pm 7.5$	$45.9 \pm 9.2$	
Women	100% (13)	84.6% (11)	
Men	0	76.9% (2)	
Mean body index	$24.1 \pm 6.1$	$28.3 \pm 6$	
Menopause	77% (10)	15.3% (4)	

Treatments			
AINS	38.4% (5)	76.9% (2)	
Corticosteroids	42.3% (11)	77% (10)	
Mean dose	13.3	16.6	
Mean duration	9.5	4.7	
MTX	38.4% (5)	61.5% (8)	
SLZ	23% (3)	76.9% (2)	
Leflunomid	23% (3)	3.8% (1)	
Synthetic antimalarial	15.3% (4)	3.8% (1)	
Disease characteristics			
Mean duration	$12.19 \pm 8.2$	$11.9 \pm 6.6$	0.37
Mean age	$45 \pm 12$	$34.4 \pm 10.5$	0.04
Mean sedimentation rate	$59.4 \pm 36.8$	$62.1 \pm 22.4$	0.08
Mean C-reactive protein	$21.4 \pm 19.9$	$31.4 \pm 26.5$	0.008
Mean DAS 28 CRP	$2.48 \pm 0.48$	$4.7 \pm 0.9$	



Mean BMD (T-score)			
Lumbar spine			
Femoral neck	0.887 ±0.174 (-2.1±1.27)	0.915 ±0.185 (-2.06±1.44)	0.08
Total hip			0.16
Whole Body	0.729 ±0.126 (-1.68±0.90)	0.835±0.185 (-1±1.55)	0.04
Mean total leg fat mass (g)	0.753±0.133 (-1.65±1.03)	0.923±0.153 (-0.6±1.33)	
Mean total leg lean mass (g)	3286± 2107	4177±2567	0.21
Total leg BMC (g)	9074±3387	9461±1474	0.28
Mean whole body fat (g)	410±195	482±100	0.11
Mean whole body lean mass (g)	15022±12819	20408±13271	0.2
Whole body BMC (g)	43871±4700	49895±5205	0.001
	2059±333	2342±298	0.02
-			

P220

### VITAMIN D DEFICIENCY AND RISK OF OSTEOPOROTIC THORACOLUMBAR VERTEBRAL FRACTURES: IS THERE ANY CORRELATION?

G. Kakadiya<sup>1</sup><sup>1</sup>Fortis Hospital, Mohali, India

**Objective:** To determine whether serum 25-hydroxyvitamin D (25(OH)D) level is associated with osteoporotic thoracolumbar junction vertebral fracture (VFX) in elderly patients.

**Methods:** From June 2016 to Dec 2018, this retrospective case-control study included 267 patients with primary osteoporotic thoracolumbar junction VFX (T10-L2) and 285 elderly orthopaedic patients with back pain (without osteoporotic VFX) as controls. Serum 25(OH)D levels were measured and the association with osteoporotic VFX was analysed. Other clinical data, including BMI, comorbidities, and BMD, were also collected and compared between these two groups.

**Results:** It was shown that 25(OH)D levels were significantly lower in patients with T10-L2 VFX than in control patients. Among 267 VFX patients, 78.1% patients showed grade 2-3 fractures.

Serum 25(OH)D levels were significantly related to affected vertebral numbers and VFX severities. The VFX risk was 28% lower (OR=0.72, 95%CI 0.62-0.83) per increased SD in serum 25(OH)D. Compared with the 1st quartile (mean 25(OH)D: 29.67±6.18 nmol/L), the VFX risk was significantly lower in the 3rd (mean 25(OH)D: 60.91±5.12 nmol/L) and 4th quartiles (mean 25(OH)D: 103.3±44.21 nmol/L), but not in the 2nd quartile (mean 25(OH)D: 45.40±3.95 nmol/L). In contrast, the VFX risk was significantly increased in the 1st quartile (OR=1.87, 95%CI 1.42-2.45) compared with the 2<sup>nd</sup>-4th quartiles.

**Conclusion:** Vitamin D deficiency/insufficiency was associated with the risk of osteoporotic thoracolumbar junction vertebral fractures in elderly patients.

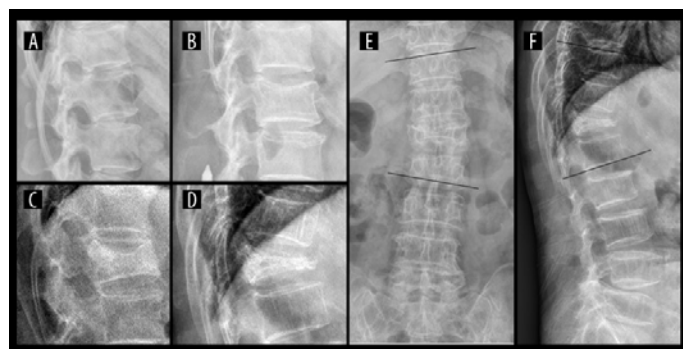


Figure. Diagnosis of osteoporotic vertebral fractures and spinal deformities in thoracolumbar junction region. (A) Grade 0, normal vertebral shape; (B) Grade 1 (mild), a reduction in vertebral height of 20-25%; (C) Grade 2 (moderate), a reduction of 26-40%; (D) Grade 3 (severe), a reduction of over 40%. (E, F) Thoracolumbar scoliosis (>10°) and kyphosis (>15°) measured at T10-L2 region on coronal and sagittal plane using the Cobb method.

P221

### TIME TO REVISIT 'ABSOLUTE' AND 'RELATIVE' CONTRAINDICATIONS OF VERTEBROPLASTY: CASE SERIES OF 16 PATIENTS WITH NEUROLOGICAL DEFICITS WITH VERTEBRA PLANA AND POSTERIOR/ANTERIOR WALL DEFECTS TREATED WITH VERTEBROPLASTY AND CEMENT AUGMENTED SCREW FIXATION

G. Kakadiya<sup>1</sup>, D. Joshi<sup>1</sup><sup>1</sup>Fortis Hospital, Mohali, India

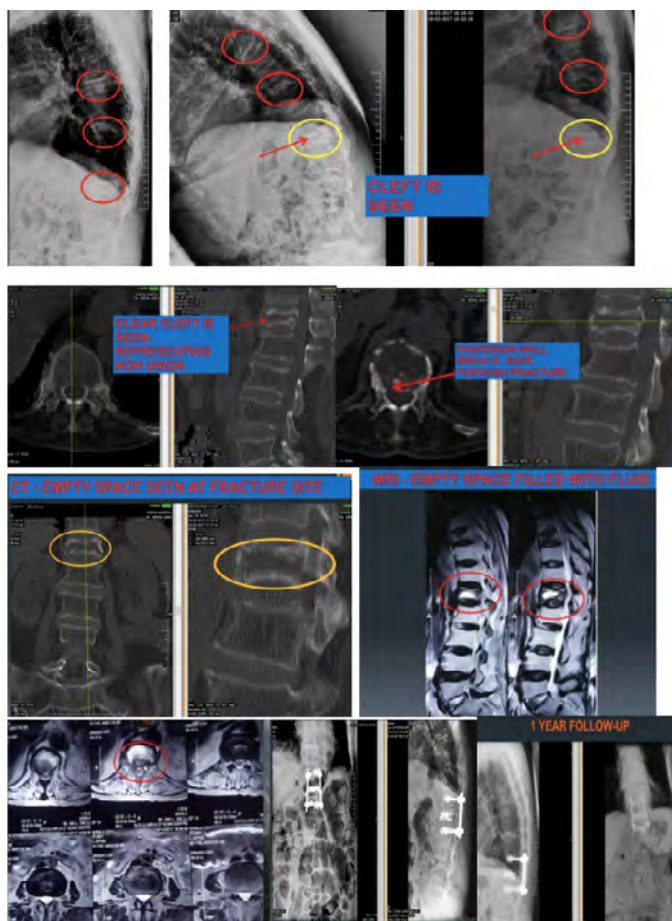
**Objective:** To evaluate the efficacy and safety of vertebroplasty with cement augmented pedicle screws for osteoporotic vertebra plana and posterior/anterior wall defects fracture in neurological deficits patients.

**Methods:** It was a case series of thoracolumbar 16-osteoporotic fracture (vertebra plana and posterior/anterior wall defects) patients, were treated by percutaneous vertebroplasty and PMMA

cement augmented pedicle screws fixation. Preoperative and postoperative clinical and radiological parameters (kyphotic angle, compression ratio, the visual analog scale (VAS) for back pain, and the Oswestry Disability Index (ODI) were analyzed.

**Results:** The average age of the patient was 68.88. Mean blood loss was 312.5 ml and mean surgical duration was 170.6 min. A significant improvement was noted in VAS (preoperative,  $7.90 \pm 0.60$ ; final follow-up  $2.90 \pm 0.54$ ) and ODI (preoperative  $77.10 \pm 6.96$ , postoperative  $21.30 \pm 6.70$ ). Neurological improvement was noted in all patients (Frankel D). Vertebral height and kyphotic angle of the compressed vertebral bodies were significantly corrected, preoperative  $22.14 \pm 2.60$  to postoperative  $10.40 \pm 1.40$  with 10% ( $2.5 \pm 0.90$ ) loss of correction at final follow-up. No cement leakage was found. No implant related complication was seen. No iatrogenic dural or nerve injury.

**Conclusion:** Treatment with vertebroplasty with cement augmented screw fixation and direct decompression is a great option in treating such a complex situation in fragile age with fragile bones because It provides anterior support with cementing that avoids corpectomy. Short segment pedicle screws fixation avoids stress risers at the junctional area.



P222

### LONGITUDINAL CHANGE IN BONE MINERAL DENSITY AMONG ADULTS AGED 55 YEARS AND OLDER USING THE HEALTHY AGING LONGITUDINAL STUDY IN TAIWAN (HALST)

T.-J. H. Hsieh<sup>1</sup>, W.-J. Chen<sup>2</sup>, J. Ku<sup>2</sup>, C. A. Hsiung<sup>1</sup>, C.-C. Hsu<sup>1</sup>

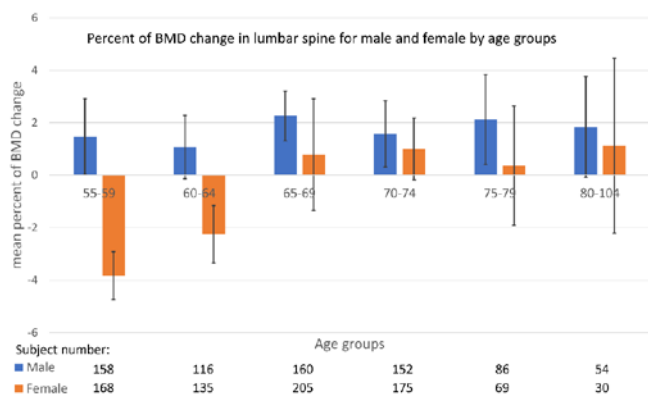
<sup>1</sup>Institute of Population Health Sciences, National Health Research Institutes, Zhunan, <sup>2</sup>Amgen Taiwan Ltd., Taipei, Taiwan

**Objective:** To describe the change in BMD over 6 y among adults aged 55 y and older by sex and osteoporosis status.

**Methods:** Participants included the cohort of healthy adults from HALST having BMD measurements at baseline and at follow-up (follow-up duration (mean $\pm$ SD):  $6.1 \pm 0.5$  y). BMD of lumbar spine (L1-L4) was measured using DXA by operators following standardized procedures at 4 sites in HALST. Osteoporosis status at baseline was defined by a BMD T-score as osteoporosis (T-score  $\leq -2.5$ ), osteopenia ( $-2.5 < \text{T-score} < -1$ ), or normal status (T-score  $\geq -1$ ). Longitudinal BMD change was calculated as the percent change between the baseline BMD and the follow-up BMD. A 3% BMD change has been considered as the least significant change (LSC) at the lumbar spine to be of potential clinical significance beyond measurement imprecision.

**Results:** Among the 1508 participants with BMD measurements at baseline and follow-up; at baseline, 52% (n=782) were women, 62% (n=932) aged 65 y and older, 14% (n=215) had osteoporosis, 33% (n=500) had osteopenia, and 3% (n=47) had a recent history of an antiosteoporotic medication. At 6 y of follow-up, the largest BMD reduction had occurred among women aged between 55-65 y ( $-3.1\%$ , 95%CI:  $-3.8\%$ ,  $-2.4\%$ ) (Figure). For all other healthy aging adults, there were no changes in BMD beyond the LSC of 3%.

**Conclusion:** Among healthy adults in Taiwan aged 55 y and older, women aged 55-65, soon after menopause, experienced the most significant BMD loss in lumbar spine in a 6-y observation period. These women may benefit most from potential interventions to reduce bone loss and risk of developing osteoporosis. For the other healthy adults, men aged 55 y and older and women aged 65 y and older, who have relatively stable measurements of BMD over 6 y, a one-time DXA screening appears adequate to identify those at high risk for an osteoporotic fracture.



P223

### DISTAL SODIUM CHANNEL BLOCKERS (DSCB) INJECTION FOR UPPER LIMB NEUROPATHIC PAIN: AN OUTPATIENT CASE SERIES OF 50 PATIENTS AND REVIEW OF LITERATURE

D. R. Jain Mch<sup>1</sup><sup>1</sup>Karun Jain, Delhi, India

**Objective:** Evidence points toward voltage-gated sodium channels blockers as a key target for novel analgesics. Sodium channel blockers are the class of drugs that act by inhibition of sodium influx through cell membranes. Blockade of sodium channels slows the rate and amplitude of initial rapid depolarization, reduces cell excitabilities and reduces conduction velocities. DSCB injection is infiltration of local anaesthetic drugs around nerve sheaths at the most terminal branch along its course, which leads to the sodium channel blocking effect upwards towards the dorsal root ganglia and nerve roots, which produce pain due to excitation after the disease complex. This study aimed to assess the usefulness of DSCB injection in upper limb pain complex diseases of various origins

**Methods:** 50 patients of neuropathic upper limb pain with various severity were followed up for a minimum of 6 months. 20 patients of cervical disc lesion with nerve root compression (group 1), 20 patients of adhesive capsulitis (group 3) and 10 patients with overlapping of both diseases (group 3) were included in the study. A mixture of 2 ml 1% lignocaine, 30 µg clonidine, 40 mg 1ml of methylprednisolone acetate injected in first web space of affected limbs two times, one month apart. Assessment is done by visual analogue scale (VAS) pain score and clinical examination. Significant improvement is considered, if VAS score reduces by 5 or more. 30° or more, pain-free improvement of range of motion (ROM) is considered significant. Number of analgesics taken per week also enquired.

**Results:** Patients in Group 1, 2 and 3 had 50%, 60% & 50%, improvement in VAS score & ROM after first injection and 65%, 75% & 60%, after second injection respectively. 60%, 65% & 50% pa-

tients in the respective groups, maintained the improvement at the end of 6-month examination for both VAS score & ROM. An average of 3 analgesic medicines per week were consumed by study patients.

**Conclusion:** DSCB injection is simpler, safer, cheaper and effective outpatient procedure to treat upper limb pain complex of disease of various origins. However, prospective long term multicentric studies with larger sample size, are required to understand how these distal nerve blocks really work. Long term analgesic intake is another area of concern.

P224

### ADULT UNTREATED HYPOPHYSECTOMY AND BONE

E. Petrova<sup>1</sup>, E. D. Becheru<sup>2</sup>, I. C. Raducu<sup>2</sup>, I. A. Voinea<sup>2</sup>, M. Popescu<sup>3</sup>, A. Ghemigian<sup>1</sup>

<sup>1</sup>C.I. Parhon National Institute of Endocrinology & C. Davila University of Medicine & Pharmacy, Bucharest, <sup>2</sup>C.I. Parhon National Institute of Endocrinology, Bucharest, <sup>3</sup>University of Medicine & Pharmacy Craiova, Craiova, Romania

**Objective:** Hypopituitarism associated or ovarian related amenorrhea negatively impacts bone status in teenagers and young adults if left untreated, first by impairing the achievement of peak bone mass, then by anomalies of bone turnovers and estrogen-connected bone loss (1-5). We aim to introduce an adult female case who was noncompliant to hypopituitarism therapy with negative bone effects.

**Case report:** This is a 36-year-old, nonsmoking female who is admitted for nonspecific bone and joints. The family medical history is negative. The personal medical history includes the diagnosis of empty sella-related hypopituitarism (no genetic testing was done) which lead to therapy with growth hormone (GH) from the age of 12-15 y due to GH deficiency; therapy with daily levothyroxine 25 µg from the age of 12 y to 30 y for central hypothyroidism (CH) and delayed puberty which required priming with estrogens followed by estrogen-progestative therapy for hypogonadotropic hypogonadism (HH); despite a good tolerance, the subject decided to stop it and remained in amenorrhea for the last 7 y. On current admission, adequate levels of vitamin D are detected in addition to low BMD for age (a Z-score at lumbar DXA of -2.5 SD). Endocrine panel confirmed HH by FSH/LH ratio =0.166/0.1 mIU/mL, and CH by TSH of 0.6 µIU/mL (normal: 0.5-4.5 µIU/mL), and FT4 of 6.6 pmol/L (normal: 9-19 pmol/L).

**Conclusion:** Adult GH deficiency may also have an impact on bone/muscle status but in some countries, as ours, GH for adults is not applicable. Routine DXA is useful in young adult patients with untreated hypopituitarism in terms of HH.

#### References:

1. Poiana C, et al. Gynecol Endocrinol 2010;26:617.
2. Popescu M, et al. Revista de Chimie 2018;69:2089.



3. Bechir ES, et al. Revista de Chimie 2018;70:3176.
4. Sandru F, et al. Rom J Military Med 2020;123:166.
5. Albulescu DM, et al. Revista de Chimie 2018;69:2438.

## P225

## TYPE 2 DIABETES MELLITUS AND LOW TBS: ANY THERAPY?

E. Petrova<sup>1</sup>, G. Voicu<sup>2</sup>, A. Goldstein<sup>2</sup>, A. Ghemigian<sup>1</sup>

<sup>1</sup>C.I. Parhon National Institute of Endocrinology & C. Davila University of Medicine & Pharmacy, <sup>2</sup>C.I. Parhon National Institute of Endocrinology, Bucharest, Romania

**Objective:** Type 2 diabetes mellitus (2DM) associates not only a large panel of cardiometabolic complications, but also muscle-skeletal damage (1-5). Low trabecular bone score (TBS), blunt bone turnover markers potentially associated with vitamin D deficit represent the hallmark of 2DM (1-5). We aim to introduce a diabetic male case in relationship to the therapy decision based on low TBS values, but not BMD at central DXA assay.

**Case report:** This is a 68-year-old, nonsmoking male, known with 2DM, chronic high blood pressure, overweight, and persistent hypomagnesemia, is admitted for chronic, nonspecific bone pain. On admission, blood glucose was 187 mg/dL with uncontrolled 2DM (glycated haemoglobin A1c of 7.3% with normal levels <6.5%, under daily metformin 2000 mg/d). 25OHD was of 19 ng/mL, with normal calcium (total serum of 9.3 mg/dL, normal values between 8.5-10.2 mg/dL) and PTH. Serum magnesium of 1.4 mg/dL (normal: 1.6-2.6 mg/dL) with normal thyroid and kidney function, and low alkaline phosphatase=35 U/L (normal: 40-150 U/L) were identified. The bone evaluation revealed normal BMD for age (a T-score of 1.9 SD) with decreased TBS of 1,169. Screening profile spine X-Ray did not identified a fracture. A better control of 2DM and vitamin D supplements were recommended for the moment.

**Conclusion:** If persistent low magnesium might deteriorate the bone quality is debatable. The nonspecific leg pain might be related to low magnesium, diabetic neuropathy and hypovitaminosis D. This case addresses a current challenge of daily practitioners, namely the decision of introducing antiresorptive drugs in type 2 diabetic persons who display normal or high-normal BMD.

## References:

1. Sandru F, et al. Rom J Military Med 2020;123:166.
2. Iorga AM, et al. Exp Ther Med 2020;20:2396.
3. Paduraru DN, et al. Chirurgia (Bucur) 2019;114:564.
4. Bechir ES, et al. Revista de Chimie 2019;70:3515.
5. Poiana C. et al. Bone Res 2013;1:275.

## P226

## ROLE OF THE ENDOVANILLOID/ ENDOCANNABINOID SYSTEM IN THE MODULATION OF OSTEOCLAST ACTIVITY IN INDIVIDUALS WITH PAGET'S DISEASE OF BONE

M. P. Paoletta<sup>1</sup>, S. L. Liguori<sup>1</sup>, A. M. Moretti<sup>1</sup>, G. I. Iolascon<sup>1</sup>

<sup>1</sup>Dept. of Medical & Surgical Specialties and Dentistry, University of Campania Luigi Vanvitelli, Naples, Italy

**Objective:** To compare osteoclast (OC) expression of endocannabinoid/endovanilloid (EC/EV) system in patients with Paget's disease of the bone (PDB) and healthy people and to investigate the modulation effect of specific agents targeting EC/EV system on OC activity in this metabolic bone disorder.

**Methods:** In vitro OCs were differentiated from peripheral blood mononuclear cells of patient with PDB and healthy donors. Characterization by real-time PCR and western blot were performed for evaluating the expression of CB2 and TRPV1 receptors. TRAP assay and bone resorption assay were performed to evaluate OCs activity before and after 48 h exposure to CB2 (JWH-133 and AM630) and TRPV1 (resiniferatoxin (RTX), iodoresiniferatoxin (I-RTX) selective drugs.

**Results:** Four women with PDB (3 with polyostotic form) and 4 age-matched controls were enrolled. Real-time PCR evidenced a significant higher expression of CB2 gene in OCs patients with PDB compared to healthy controls, while no between-group difference for TRPV1 gene expression were found. Western blot analysis evidenced a significant increase of CB2 protein expression in patients with PDB compared to healthy controls. TRAP Assay showed a significant reduction of multinucleated TRAP+ OCs (n≥3) after treatment with JWH-133, and no significant changes after treatment with AM630. A significant increase of the number of active OCs was found after treatment with RTX, while treatment with I-RTX induced a significant reduction in the number of OCs in patients with PDB compared to healthy controls. Bone resorption assay showed a significant reduction of resorption areas in in vitro samples treated with JWH-133 while a significant increase of the number and size of bone resorption areas after treatment with AM630 were found. Treatment with I-RTX did not show a significant reduction bone resorption area compared to untreated controls.

**Conclusion:** Our study demonstrate the expression of EC/EV system by OCs in patient affected by PDB suggesting a role of these receptors in this condition. Moreover, the significant impact on bone resorption in using specific agents addressing CB2 and TRPV1 receptors on OCs opens new therapeutic scenarios in patients with PDB in addition to current therapeutic options.



P227

**SCREENING IN THE DIAGNOSIS OF EARLY DISORDERS OF CARBOHYDRATE METABOLISM**O. V. Paramonova<sup>1</sup>, L. N. Shilova<sup>1</sup>, E. G. Korenskaya<sup>1</sup><sup>1</sup>Volgograd State Medical University, Volgograd, Russia

**Objective:** To assess the significance of screening in identifying early disorders of carbohydrate metabolism in residents of Volgograd.

**Methods:** On the basis of the City Clinical Hospital 25 in 2020, screening of early disorders of carbohydrate metabolism was conducted. The screening involved persons over 40 y of age with risk factors (obesity, hypertension, a history of elevated glycemic levels above 5.5 mmol/l, a family history of type 2 diabetes). The study group consisted of approximately equal numbers of men and women. All subjects were tested for fasting glucose, an oral glucose-tolerance test, and the level of glycated hemoglobin (HbA1c) was determined.

**Results:** The screening involved 100 people who had no history of type 2 diabetes and no complaints of carbohydrate metabolism disorders at the time of the examination. The subjects were treated in hospital for other therapeutic and surgical diseases. The average age of the subjects was 55±7.4 y. Of these, 56 (56%) people were found to have a risk of developing carbohydrate metabolism disorders. During the oral glucose-tolerance test, 20 (20%) of the examined patients were found to have impaired carbohydrate metabolism, which was confirmed by the definition of HbA1c. The average level of glycemia according to the screening data was 5.9±1.24 mmol/l, HbA1c 6.3±0.17%. In 6 of the examined individuals (6%), reliable type 2 diabetes mellitus was detected. The differences in the gender ratio by sex were not significant.

**Conclusion:** Screening in individuals with risk factors is an urgent task, since it allows us to identify patients with early manifestations of carbohydrate metabolism disorders, which contributes to the prevention of possible vascular complications.

P228

**THE ROLE OF ANTIBODIES TO ELASTIN IN VARIOUS CLINICAL VARIANTS OF THE COURSE OF SYSTEMIC SCLERODERMA**E. G. Korenskaya<sup>1</sup>, O. V. Paramonova<sup>1</sup>, L. N. Shilova<sup>1</sup>, O. D. Korolik<sup>1</sup><sup>1</sup>Volgograd State Medical University, Volgograd, Russia

**Objective:** The relevance of studying elastin as an antigen is determined by its high prevalence in organs and tissues that undergo significant deformations under the influence of loads (ligaments, skin, lungs, blood vessels). Elastin, being a high molecular protein, contains a large number of antigenic determinants. The aim of the study was to identify differences in the number of antibodies to elastin in different clinical variants of the course of systemic scleroderma.

**Methods:** We examined 42 patients with SDS, including 11 men (26.2%) and 31 women (73.8%) aged 22-72 y. The average age of the patients was 44.1±15.4 y. The average age of patients at the time of examination was 44.1 y. The average duration of the disease is 9.2 y. Diffuse form of systemic scleroderma was diagnosed in 18 patients (42.9%), limited in 24 (57.1%). Minimal activity of the disease was detected in 16 patients (38.1%), moderate in 22 (52.4%), high in 4 (9.5%) patients. The median duration of the disease in the observed group was 9.2±7.4 y (range 2-27 y). The relationship between the detection of antibodies to elastin and the presence of a certain clinical and immunological variant of systemic scleroderma was studied, characterizing the latter in accordance with the prevalence of the skin process, the rate of formation of the main symptom complex and the spectrum of organ damage. To determine the content of antibodies to elastin, an indirect version of the enzyme immunoassay was used.

**Results:** Most clinical manifestations occurred in approximately equal proportions in patients with the presence of antibodies to elastin and negative for this trait. Statistically significant differences between the clinical groups were found only for joint damage (arthritis/tenosynovitis) and lung damage (bilateral basal pneumosclerosis) ( $p < 0.001$ ). The results obtained should be considered in the light of the possible involvement of antibodies to elastin in the pathogenesis of these clinical manifestations, since it is the ligamentous apparatus and the lungs that are the main place of concentration of elastin fibers. The revealed patterns are not accidental: elastic fibers are found in large quantities in the ligaments and lung tissue, so the autoimmune process affecting elastin is manifested by the corresponding symptoms.

**Conclusion:** Analyzing the results obtained in our study, we can assume the participation of antibodies to elastin in the processes of remodeling of the pulmonary parenchyma leading to a decrease in the elasticity of the pulmonary framework and an aggravation of the processes of fibrosis. Thus, in systemic scleroderma, the presence of antibodies to elastin is associated with damage to the joints and pulmonary parenchyma.

P229

# PANNICULITIS IN RHEUMATOLOGY PRACTICE: SPECIFIC FEATURES OF CLINICAL COURSE AND OUTCOMES

O. Egorova<sup>1</sup>, B. Belov<sup>1</sup>

<sup>1</sup>V. A. Nasonova Research Institute of Rheumatology, Moscow, Russia

**Objective:** Panniculitis (Pn) is a heterogenic group of inflammatory diseases with predominant involvement of subcutaneous adipose tissue and may occasionally be seen in clinical practice by many specialists. Although, fever, skin symptoms and joints involvement alongside with pronounced rise of acute phase inflammation reactants are the reasons for referral to a rheumatologist. At the same time absence of clear diagnostic algorithm would result in delayed diagnosis and, consequently, inadequate treatment. This study aimed to assess clinical course and clinical outcomes of Pn in current rheumatology practice.

**Methods:** The study included 209 pts on the record at VA Nasonova Research Institute of Rheumatology during 2009-2016, (185 females, 24 males, aged 17-80 y) with referral diagnosis of "erythema nodosum nondifferentiated panniculitis" and disease duration from 1 week to 25 y. Patients' assessment included general clinical examination, serological and immunological tests, histological and immunohistochemical analyses, chest CT scan, Doppler ultrasonography of the lower extremity veins, and tuberculin skin test. Outcomes were evaluated in 1-6 y.

**Results:** Secondary to underlying nonrheumatic condition Pn was identified in 23 pts. The most prevalent Pn types in remaining 186 cases were erythema nodosum (EN) (121pts), lipodermatosclerosis (LDS) (38) and Weber-Christian disease (WCD) (18). Symmetrical distribution of nodules over upper and lower extremities (ULE) was characteristic for 93% of all EN cases. In LDS populations 68% cases had increased mean BMI, 79% chronic venous insufficiency (CVI), 60% asymmetric distribution of lesions, mostly over medial leg (92%). In WCD patients the nodules were covering all ULE surfaces, and in 14 nodules were found on the trunk. The three Pn types had certain differences in the clinical course: high clinical and lab activity was documented in Löfgren syndrome and WCD pts. Asymmetric distribution of nodules on the legs was characteristic for LDS, nodules on the trunk were specific for WCD. The highest recurrence rate was documented in WCD pts (39.7 per 100 patient-years), the lowest in Löfgren syndrome pts (15.3 per 100 patient-years). The probability of EN recurrence in Löfgren syndrome pts was significantly higher in subjects older than 40 y (OR 3.81; p=0.03), in subjects with late ( $\geq 3$  months from EN onset) initiation of treatment (OR 8.94; p=0.0008) and in subjects with indurations  $> 5$  cm in size (OR 3.65; p=0.03). The probability of LDS recurrence was significantly higher in pts with confluent nodules, forming conglomerate masses (OR 4.33; p=0.037), and pts taking hydroxychloroquine at  $\leq 200$  mg/d during  $\geq 6$  months (OR 5.25; p=0.019).

**Conclusion:** Comprehensive examination is needed to identify the clinical type of Pn. Symmetrical involvement of all extremities is characteristic for EN in young subjects. Asymmetric nodular rash over lower extremities in subjects with abnormal BMI and CVI is specific for LDS. CWD usually presents with nodular rash on the trunk. Identified risk factor for EN and LDS recurrence should be taken into consideration while writing a treatment plan.

P230

# RISK FACTORS FOR GASTROINTESTINAL AND RENAL EVENTS BY TYPE OF LONG-TERM NSAID INITIATED: A REAL-WORLD STUDY OF COMMERCIALY-INSURED PATIENTS WITH OSTEOARTHRITIS

S. Silverman<sup>1</sup>, P. Schepman<sup>2</sup>, J. B. Rice<sup>3</sup>, C. G. Beck<sup>2</sup>, A. White<sup>3</sup>, S. Thakkar<sup>2</sup>, C. Fernan<sup>3</sup>, R. L. Robinson<sup>4</sup>, B. Emir<sup>2</sup>

<sup>1</sup>Cedars-Sinai Medical Center; David Geffen School of Medicine of University of California Los Angeles, Beverly Hills, <sup>2</sup>Pfizer Inc., New York, <sup>3</sup>Analysis Group, Boston, <sup>4</sup>Eli Lilly Inc., Indianapolis, USA

**Objectives:** The goal of this research was to evaluate the risk factors associated with gastrointestinal (GI) events and acute renal failure (ARF) among patients receiving long-term topical nonsteroidal anti-inflammatory drugs (NSAIDs), oral traditional NSAIDs (tNSAIDs), and cyclooxygenase-2 inhibitors (COX-2s) for management of hip/knee osteoarthritis (OA).

**Methods:** The Optum Healthcare Solutions, Inc. claims database (1/2012-3/2017) was used to identify adult patients  $\geq 18$  with  $\geq 2$  diagnoses of hip and/or knee OA. The index date was defined as the first prescription after the first OA diagnosis. Patients were assigned to cohorts based on the type of NSAID prescribed on index date. Patients were required to be continuously-enrolled 6 months before (baseline) and 36 months after (follow-up) the index date. Patients were also required to have  $\geq 90$  d supply of their cohort type of NSAID during year 1 of follow up. Demographic and clinical characteristics were summarized during baseline. Logistic regressions were conducted to assess the risk factors for GI and ARF, respectively.

**Results:** Data for 23,796 patients were analyzed (18,100 tNSAIDs, 4825 COX-2s, and 871 topical NSAIDs). GI and ARF events during follow-up ranged from 7.3-8.1% and 8.0-11.0% of cohorts, respectively. For both GI and ARF, age and baseline healthcare costs were predictive of incurring these clinical events. In the follow-up period, patients in the tNSAIDs or COX-2s cohorts had an increased trend of a GI event relative to topical NSAIDs (OR=1.15, p=0.33 and OR=1.24, p=0.11, respectively). Other risk factors included a GI event in baseline, such as, iron-deficient anemia of GI origin (OR=11.08, p<0.01). Prominent risk factors associated

with ARF in year 1 of follow-up were being in the tNSAIDs or COX-2s cohort relative to topical NSAIDs cohort (OR=2.04, p=0.04 and OR=1.92, p=0.07, respectively).

**Conclusion:** These findings suggest that important safety considerations associated with long-term NSAID use vary by NSAID type initiated following OA diagnosis. This research stresses the importance of mitigating risk for safe use of NSAIDs.

**Disclosure:** The study was sponsored by Pfizer and Eli Lilly and Company.

## P231

### EFFICACY OF ANTIRESORPTIVE TREATMENT IN OSTEOPOROTIC OLDER ADULTS: A NESTED CASE-CONTROL STUDY

B. A. Cedeno-Veloz<sup>1</sup>, J. Erviti Lopez<sup>2</sup>, M. Gutiérrez-Valencia<sup>2</sup>, L. Leache Alegria<sup>2</sup>, L. C. Saiz Fernandez<sup>2</sup>, A. M. Rodriguez-Garcia<sup>1</sup>, M. Sanchez Latorre<sup>1</sup>, R. Ramirez Velez<sup>3</sup>, M. Izquierdo<sup>3</sup>, N. Martinez-Velilla<sup>1</sup>

<sup>1</sup>Geriatric Dept., Complejo Hospitalario de Navarra (CHN), <sup>2</sup>Unit of Innovation & Organization, Navarre Health Service, <sup>3</sup>Dept. of Health Sciences, Public University of Navarra, Pamplona, Spain

**Objective:** A nested case-control study will be carried out to evaluate the real life efficacy of antiresorptive treatment regarding the prevention of osteoporotic hip fractures in older adults with osteoporosis.

**Methods:** A case-control study nested in a cohort in Spain using the information from BIFAP (Base de Datos para la Investigación Farmacoepidemiológica en Atención Primaria, Database for Pharmacoepidemiologic Research in Primary Care). Cases were defined as women aged 75 y or older with a first diagnosis of osteoporotic hip fracture, using the International Classification of Primary Care (ICPC)-1 codes, recorded between 1 January 2016 and 31 December 2019, and using one of the following drugs: alendronate, etidronate, ibandronate, risedronate, clodronate, minodronate, pamidronate, tiludronate, zoledronic acid or denosumab. 3 years of follow-up in BIFAP before the event date. The date of hospitalization served as the index date. All hip fracture cases were double-checked and validated by both BIFAP and the research team. We excluded women with any history of cancer, Paget disease, prevalent hip fracture and fractures resulting from high intense trauma. For each case, X controls same characteristics but with any of the drugs involve the study by the time of the index date of their corresponding case were selected, matched by the same age and calendar year of enrolment in BIFAP.

**Results:** Antiresorptive drugs are usually the first-line treatment in older adults [1]. These drugs have been shown to increase BMD and reduce fragility fractures in osteoporotic patients [2]. Besides this pharmacological prevention has proven to be cost-saving in clinical practice [3]. However, there is no clear evidence in older adults [4]. A study based on screening for osteoporosis in older

women did not reduce the incidence of osteoporosis-related fractures [5]. However, the analysis of other national databases has not related the use of bisphosphonates with fracture reduction [6].

**Conclusion:** The purpose of our update study will be to determine the real life evidence of antiresorptive treatment in this specific population.

#### References:

1. Alejandro P, Constantinescu F. Clin Geriatr Med 2017;33:27.
2. Crandall CJ, et al. Ann Intern Med 2014;161:711.
3. Svedbom A, et al. Osteoporos Int 2019;30:1745.
4. Ervit J, et al. Front Pharmacol 2017;8:265.
5. Shepstone L, et al. Lancet 2018;391:741.
6. Nordström P, et al. J Am Med Dir Assoc 2017;18:515.

## P232

### PROTEOMIC CHARACTERIZATION OF BONE, MUSCLE AND CEREBROSPINAL FLUID IN THE ELDERLY PATIENT WITH HIP FRACTURE: A CROSS-SECTIONAL STUDY

B. A. Cedeno-Veloz<sup>1</sup>, A. M. Rodriguez-Garcia<sup>1</sup>, F. Zambom Ferrasi<sup>2</sup>, A. M. Hidalgo Ovejero<sup>3</sup>, R. Ramirez Velez<sup>2</sup>, M. Izquierdo<sup>2</sup>, N. Martinez-Velilla<sup>1</sup>

<sup>1</sup>Geriatric Dept., Complejo Hospitalario de Navarra, <sup>2</sup>Department of Health Sciences, Public University of Navarra, <sup>3</sup>Traumatology and Orthopedics Service, Pamplona, Spain

**Objective:** To describe the proteomic characterization of bone, muscle and cerebrospinal fluid in the elderly patient with hip fracture compared to nonfractured controls.

**Methods:** This study aims to know the characteristics of the proteomics of the bones (femoral head), muscle (gluteus maximus) and cerebrospinal fluid, obtaining a sample of them during the process of osteosynthesis of hip fracture (in case of fracture hip). In the case of nonfractured controls, the sample will be obtained during the hip replacement surgery process (placement of a femoral prosthesis for hip osteoarthritis). Patients who meet the inclusion criteria and sign the informed consent will become research subjects. The blood collection will be carried out in the same admission analysis. The samples of bone, muscle and cerebrospinal fluid will be made in the surgical act of hip osteosynthesis

**Results:** Proteomic analysis has become a tool to assess the biological function of proteins [1]. These tests are useful for discovering potential therapeutic targets. As bone and muscle [3] deterioration (osteoporosis and sarcopenia), together with alterations at the brain level, are very important factors related to hip fracture, knowing its proteomic characteristics in this context becomes a vitally important objective. The proteomic oxidation mechanisms

have been studied in young or older populations without incident fracture. Therefore, it is important to study the mechanisms of affection of these and their affection in the muscular and bone function. The identification of these modified proteomic compounds (oxy-proteome) [4] can help us understand the mechanisms of protein damage accumulated in bone and muscle and its potential effect accumulates in older people with hip fracture. There is a study of the Osteoporotic Fractures in Men (MrOS) cohort that relates the analysis of 5 proteins with the incidence of hip fracture (CD14, CHL1, C07, FCGBP, PZP) [5]. The proteomic relationship with hip fracture is related to the proinflammatory state that the accelerated decrease in BMD would have with it [6]. All these studies also indicate that there is a relationship between brain and bone (with a greater number of fractures) without the presence of cognitive impairment being necessary [7]. However, when studying markers in cerebrospinal fluid, it is more common to find studies in mice in the literature, with humans being a less studied subject [8].

**Conclusion:** The purpose of our update study will be to determine the real life evidence of antiresorptive treatment in this specific population.

#### References:

1. Megger DA, et al. *Biochim Biophys Acta* 1834;2013:1581.
2. Zhang H, et al. *Expert Rev Proteomics* 2010;7:103.
3. Gonzalez-Freire M, et al. *J Cachexia Sarcopenia Muscle* 2017;8:5.
4. Baraibar MA, et al. *Oxid Med Cell Longev* 2012;2012:1.
5. Nielson CM, et al. *J Bone Miner Res* 2017;32:1559.
6. Hardy R, Cooper MS. *J Endocrinol* 2009;201:309.
7. Oh ES, et al. *PLoS One* 2018;13:e0204695.
8. Li F-X-Z, et al. *Front Endocrinol* 2020;11:77.

## P233

### THE ASSOCIATION BETWEEN OSTEOPOROSIS AND SARCOPENIA IN ALCOHOLIC LIVER CIRRHOSIS

I. Rogoveanu<sup>1</sup>, C. Ionele<sup>1</sup>, D. N. Florescu<sup>1</sup>, O. C. Rogoveanu<sup>1</sup>, B. Ungureanu<sup>1</sup>

<sup>1</sup>University of Medicine & Pharmacy of Craiova, Craiova, Romania

**Objective:** Osteoporosis and sarcopenia are important complications of alcoholic liver cirrhosis (ALC). The aim of this study was to evaluate the relationship between osteoporosis and sarcopenia in patients with ALC.

**Methods:** We retrospectively evaluated the correlation between osteoporosis and sarcopenia in 112 patients with liver cirrhosis of various etiologies (57 men, 55 women), by measuring the appendicular skeletal muscle mass index (ASMI) using bio-imped-

ance analysis. BMD was measured by DXA osteodensitometry. Of these, 40 patients were diagnosed with alcoholic liver cirrhosis (36%) while 72 patients had liver cirrhosis of viral etiology.

**Result:** The rate of sarcopenia was 13% (14/112), while the rate of osteoporosis and osteopenia was 17% (19/112) and 65% (73/112), respectively. The rate of osteoporosis was significant and increased in patients with sarcopenia and ALC. In the linear regression analysis, sarcopenia was significantly associated with BMD of the lumbar spine (coefficient=-0.149, P=0.014) and femoral neck (coefficient=-0.110, P=0.003). ALC was also significantly associated with low BMD of the lumbar spine (coefficient -0.160, P<0.001) and femoral neck (coefficient=-0.066, P=0.015). In the logistic analysis, sarcopenia (odds ratio=6.16, P=0.039) and cirrhosis (odds ratio=15.8, P=0.002) were independent risk factors for osteoporosis. The IMSA limit values for osteoporosis were 7.33 kg/m<sup>2</sup> in men and 5.71 kg/m<sup>2</sup> in women.

**Conclusion:** Sarcopenia has been closely associated with osteoporosis and it has been observed that low ASMI could be a potential predictor of osteoporosis in patients with chronic liver disease. Examination of BMD may be needed to detect osteoporosis in patients with cirrhosis.

## P234

### EFFICIENCY OF INTRA-ARTICULAR TREATMENT ON PAIN IN KNEE OSTEOARTHRITIS

O. C. Rogoveanu<sup>1</sup>, G. O. Cioroianu<sup>1</sup>, C. Gofita<sup>1</sup>, A. Musetescu<sup>1</sup>, R. Traistaru<sup>1</sup>

<sup>1</sup>University of Medicine & Pharmacy of Craiova, Craiova, Romania

**Objective:** Knee Osteoarthritis is a degenerative disease that occurs in most of the population with age. It represents one of the main causes that lead to disability worldwide.

**Methods:** We analyzed intra-articular treatment methods on a group of 46 patients aged between 60-80 y, diagnosed with knee osteoarthritis. 16 patients were treated with local analgesics and nonsteroidal anti-inflammatory drugs intra-articularly, 16 patients were treated with intra-articular glucocorticoids and 14 patients were treated with intra-articular hyaluronic acid.

**Results:** In patients treated with local analgesics and nonsteroidal anti-inflammatory drugs there was a decrease in pain for about 1 day, in those treated with glucocorticoids the decrease in pain lasted about one month while in patients treated with hyaluronic acid there was no immediate decrease in pain for any of the patients, but the effect later obtained was maintained for an average of 90 days.

**Conclusion:** Intra-articular treatment of knee osteoarthritis may reduce local pain temporary or in the short-term, but it cannot stop the progression of the intraarticular inflammatory process. The use of analgesics or corticosteroids with local anti-inflamma-



tory effect is preferable in hyperalgesic forms but sustainable results are obtained by injecting substances with protective effect on the articular cartilage.

P235

### VITAMIN D LEVELS, BONE METABOLISM AND BONE MASS IN PATIENTS WITH HEPATIC CIRRHOSIS OF ALCOHOLIC ETIOLOGY

I. Rogoveanu<sup>1</sup>, C. Ionele<sup>1</sup>, A. E. Musetescu<sup>1</sup>, M. Sacerdotianu<sup>1</sup>, O. C. Rogoveanu<sup>1</sup>

<sup>1</sup>University of Medicine & Pharmacy of Craiova, Craiova, Romania

**Objective:** Osteoporosis is observed in approximately 12-50% of the patients with liver cirrhosis. The negative effects of alcohol are exerted directly on bone cells and indirectly on hormones. Vitamin D is involved in the differentiation of osteoblasts, bone matrix synthesis and bone mineralization, as well as in its decomposition. Vitamin D deficiency has been reported in approximately 2/3 of the patients with liver cirrhosis. Our aim was the determination of vitamin D level, bone metabolic activity and bone mass in patients with hepatic cirrhosis of alcoholic etiology.

**Methods:** 30 male patients with liver cirrhosis of alcoholic etiology were investigated between October 2019 and March 2020. Total vitamin D, PTH and osteocalcin were determined by the ECLIA method (electrochemiluminescence immunoassay) using the Elecsys 2010 analyzer. BMD was measured by osteodensitometry (DXA) using Hologic Horizon A. The analysis of the results was performed using descriptive statistics and hypothesis testing, as well as the nonparametric analysis of the unidirectional variance and the Pearson correlation coefficient.

**Results:** Vitamin D deficiency (<50 nmol/l) was observed in 66.66% of patients, with a higher prevalence in Child-Pugh class C patients. Osteocalcin levels were below the normal limit in 86.7% of patients. CrossLaps was increased in only 20% of patients, but a significant increase was observed in Child-Pugh Class C patients.

**Conclusion:** Vitamin D deficiency is present in most patients with liver cirrhosis of alcoholic etiology. Osteoporosis is a common complication in patients with chronic liver disease. The pathogenesis of osteoporosis is mainly explained by low bone formation, although increased bone resorption has also been reported, especially in women with advanced cholestatic liver disease, due to vitamin D absorption deficiency.

P236

### OSTEOPOROSIS IN CIRRHOTIC PATIENTS BEFORE AND AFTER LIVER TRANSPLANTATION: THE RELATIONSHIP BETWEEN MALNUTRITION AND INFLAMMATORY SYNDROME

I. Rogoveanu<sup>1</sup>, C. Ionele<sup>1</sup>, T. Sas<sup>1</sup>, A. Florescu<sup>1</sup>, O. C. Rogoveanu<sup>1</sup>

<sup>1</sup>University of Medicine & Pharmacy of Craiova, Craiova, Romania

**Objective:** Liver cirrhosis is associated with osteoporosis and liver transplantation (LT) with increased bone demineralization. This study aimed to investigate the relationship between BMD and bone matrix demineralization in transplant candidates with malnutrition, inflammatory syndrome and altered levels of stress hormones.

**Methods:** We included 100 patients diagnosed with cirrhosis who underwent LT between May 2019 and April 2020. BMD was assessed by osteodensitometry (DXA). Malnutrition has been defined through anthropometry and the assessment of recent weight loss. The hormone TSH, free triiodothyronine (T3), free thyroxine (T4) and growth hormone (GH), cortisol, free testosterone, estradiol, IL-6 and TNF were evaluated in 75/100 patients. Overall, 57/100 patients received LT and 47/100 were followed-up for one year after transplantation. At follow-up, nutritional status and BMD were assessed in all the patients (n=47), while 34/47 had blood samples available for analysis.

**Results:** Forty (40%) transplant candidates had osteopenia or osteoporosis and 38 (38%) were malnourished. Malnutrition was associated with osteopenia/osteoporosis (probability: 3.5, 95%CI 1.4, 9.9). The Z-score of the hip decreased by -0.25 (95%CI -0.41, -0.09) from the initial time of assessment to one year after transplantation. Initially high TNFα values correlated with a more pronounced decrease in BMD (partial correlation (r)=-0.47, p<0.05) as well as high levels of initial cortisol (r=-0.49, p<0.05).

**Conclusion:** Malnutrition in liver cirrhosis appears to be associated with osteopenia/osteoporosis, systemic inflammation (elevated TNF) and systemic stress (elevated plasma cortisol levels). LT improves the quality of life of these patients but can increase the bone demineralization process in the medium term by increasing the release of stress hormones.

P237

# OSTEOPOROSIS IN PATIENTS WITH HIP OSTEOARTHRITIS WHO WILL UNDERGO TOTAL HIP ARTHROPLASTY

O. C. Rogoveanu<sup>1</sup>, R. Traistaru<sup>1</sup>, G. O. Cioroianu<sup>1</sup>, T. Sas<sup>1</sup>, D. Niculescu<sup>1</sup>

<sup>1</sup>University of Medicine & Pharmacy of Craiova, Craiova, Romania

**Objective:** Both osteoarthritis and osteoporosis are relatively common diseases in women and their incidence increases with age. Total hip arthroplasty is a surgical procedure whose number is expected to double in the coming years.

**Methods:** In our study we included 43 patients, aged between 59-85 y, who were waiting to undergo total hip arthroplasty. None of the women were known to have been previously investigated for osteoporosis. We evaluated the patients by DXA of the lumbar spine and of the proximal femur bilateral.

**Results:** We found that 33% of patients had osteopenia, while 24% had osteoporosis. These composed the study group. We also found that BMD of the unaffected hip was lower than that of the hip awaiting surgery in 68% of cases. The other patients (43%), in which no changes of osteoporosis or osteopenia were revealed by osteodensitometry composed the control group. The analysis of the postoperative evolution showed an increase in the duration of hospitalization and recovery time for the patients from the study group compared to the control group.

**Conclusion:** Osteoporosis and osteoarthritis may be present at the same time and may have a disabling effect on gait. Assessing the degree of osteoporosis on the joint awaiting total hip arthroplasty is essential for the postoperative evolution and early recovery of patients.

P238

# PREVALENCE AND CHARACTERISTICS OF BONE DAMAGE IN CIRRHOTIC PATIENTS BEING EVALUATED FOR LIVER TRANSPLANTATION

I. Rogoveanu<sup>1</sup>, C. Ionele<sup>1</sup>, O. C. Rogoveanu<sup>1</sup>, B. Ungureanu<sup>1</sup>, D. A. Horga<sup>2</sup>

<sup>1</sup>University of Medicine & Pharmacy of Craiova, Craiova, Romania,  
<sup>2</sup>CHU Saint Eloi, Montpellier, France

**Objective:** We conducted a retrospective study to examine the prevalence of bone disease among patients with cirrhosis who were evaluated for liver transplantation.

**Methods:** We used dual energy bone osteodensitometry in the hip/femoral neck and lumbar spine. The associations of bone diseases with demographic and clinical data, disease etiology and liver function were studied by logistic regression analyzes. Osteopenia and osteoporosis were defined by the criteria of the WHO.

**Results:** We included in the study 66 patients (79% men, mean age of 53 y, range 21-69) of which 62.6% smokers and 23.7% diabetic subjects. The mean BM was 28 kg/m<sup>2</sup>. Liver disease was classified as Child-Pugh class A (22%), B (51%) or C (27%); the mean score for endstage liver disease (MELD) was 14.6. The etiology of the liver disease was alcohol (49%), hepatitis C virus (32%), hepatitis B virus (10%), primary biliary cirrhosis (PBC) (2.3%), secondary biliary cirrhosis (2%) or of other causes (4.7%). In total, 50 patients (72%) had bone diseases in the hip/femoral neck and/or in the lumbar spine: overall hip damage, 26% (osteopenia, 22%; osteoporosis, 4%); femoral neck, 48% (osteopenia, 43%; osteoporosis, 5%) and lumbar spine, 63% (osteopenia, 40%; osteoporosis, 23%). By adjusting the values of bone mineral density with age (Z-score) in relation to that defined by the T-score, we observed a decrease in the prevalence of bone diseases both in the femoral neck (20% compared to 48%) and in the lumbar spine (44% vs. 63%).

**Conclusion:** Bone damage, especially in the lumbar spine, is common in patients with cirrhosis who are being evaluated for liver transplantation. Cirrhosis is a major risk factor for bone disease that remains even when bone density values are adjusted by age. Female gender, lower BMI and tobacco use are major risk factors for bone disease in patients with cirrhosis. Bone osteodensitometry should be included in the assessment of liver transplantation in all patients.

P239

# COMPARATIVE STUDY OF THE EFFECTS OF CORTICOSTEROID THERAPY VS. BIOLOGICAL AGENTS ON BONE METABOLISM IN PATIENTS WITH RHEUMATOID ARTHRITIS

O. C. Rogoveanu<sup>1</sup>, G. O. Cioroianu<sup>1</sup>, C. Geormaneanu<sup>1</sup>, A. Florescu<sup>1</sup>, A. E. Musetescu<sup>1</sup>

<sup>1</sup>University of Medicine & Pharmacy of Craiova, Craiova, Romania

**Objective:** The use of glucocorticoids in the long-term treatment of rheumatoid arthritis may cause possible side effects, including among others, the loss of BMD.

**Methods:** We studied the effects of the treatments used in rheumatoid arthritis on 32 patients, all women aged between 57-68 y, in the postmenopausal period. Half of the patients were treated with high-dose glucocorticoids (40 mg/gc), while the other 16 patients were given a combination of 10-15 mg/Kgc glucocorticoids and biological agents for the next 6 months.

**Results:** Following the 6 months of treatment, the patients were evaluated by DXA of the lumbar spine. The mean T-score for the patients treated with glucocorticoids alone was -2.3, with a maximum value of -2.8 and a minimum value of -2; while the mean T-score for patients treated with both glucocorticoids and biological agents was -2 with a maximum value of -2.4 and a minimum value of -1.4.

**Conclusion:** A lower dose of glucocorticoids in combination with biologic therapy correlates with a lower risk of osteoporosis and its complications.

P240

### NUTRITIONAL SUPPORT AND PHYSICAL ACTIVITY IN POSTMENOPAUSAL WOMEN WITH OSTEOPENIA OR OSTEOPOROSIS

O. C. Rogoveanu<sup>1</sup>, G. O. Cioroianu<sup>1</sup>, C. Geormaneanu<sup>1</sup>, T. Sas<sup>1</sup>, C. Gofita<sup>1</sup>

<sup>1</sup>University of Medicine & Pharmacy of Craiova, Craiova, Romania

**Objective:** In women aged between 40-79, the prevention of osteoporosis and its complications represents a goal of the highest importance. Lifestyle and diet can have a positive or negative effect on the disease.

**Methods:** 23 postmenopausal women with ages between 53-71 y were included in the study. Each patient was assessed by DXA of the lumbar spine. The results showed the lowest T-score of -2.9 and the highest T-score of -1.4 with a mean T-score of -2.1. After the evaluation, the patients were prescribed vitamin D supplements, and their diet was changed so that it contained an increased amount of calcium. The patients were also inducted in a 3 times/week physical exercise class. In addition, the patients were advised to maintain an ideal body weight, to quit smoking and, if necessary, to reduce alcohol intake. A control group was also composed, consisting of 23 patients age- and sex-matched with the study group in which osteoporosis was treated only with medication and dietary supplements, without physical treatment.

**Results:** After 3 months, the patients were reevaluated by DXA of the spine. It was found that the lowest T-score was now -2.8, while the highest T-score was now -1.2 with a mean T-score of -2 in the study group, compared to the control group in which the mean T-score found was -2.2.

**Conclusion:** Dietary control and lifestyle in postmenopausal women can reduce the risk of fractures, help treat osteoporosis, or may even help in preventing its onset. The association of physical exercise improves the T score and helps increase the quality of life of these patients.

P241

### HYPOPHOSPHATEMIA – MORE OFTEN THAN BELIEVED: A SINGLE LABORATORY DATABASE 15 YEARS RESULTS FROM LATVIA

D. Pokšāne<sup>1</sup>, I. Rasa<sup>2</sup>

<sup>1</sup>Rīga Stradiņš University; Latvian Osteoporosis & Bone Metabolic Diseases Association, <sup>2</sup>Rīga Stradiņš University; Riga East Clinical University Hospital; Latvian Osteoporosis & Bone Metabolic Diseases Association, Riga, Latvia

**Objective:** A database analysis was conducted to assess phosphorus serum level status among adults in Latvia from E. Gulbja lab electronic database over the past 15 y. Hypophosphatemia may be the reason for different hypophosphatemic syndr.

**Methods:** Pts with hypophosphatemia in the E. Gulbja lab database retrospectively from January 2004 to December 2020 were identified. All hypophosphatemia levels (the reference range 0.80-1.60 mmol/L) was divided into 3 groups (Felsenfeld A et al., 2012) depending on serum phosphorus level – mild hypophosphatemia (0.81-0.65 mmol/L), moderate (0.65-0.32 mmol/L) and severe (<0.32 mmol/L). Also, serum calcium (Ca) (the reference range 2.1-2.6 mmol/L), vitamin D (30-100 ng/mL) and iPTH (12-72 pg/mL) were analyzed.

**Results:** A total of 3173 serum phosphorus samples were analyzed – 1760 females and 1413 males. Pts were, on average, 60.2±14.9SD yrs old. The average age of females – 60.4±15.0 SD yrs and males – 60.0±14.8 SD. The number of blood samples with reduced (<0.80 mmol/L) serum phosphorus level was 1803 (56.8%), were mild hypophosphatemia was 1414 (78.4%) were 767 females (54.2%), and 647 males (45.8%) with an average age was 60.0±14.7 SD yrs. Moderate hypophosphatemia were 381 (21.1%) were 206 females (54.1%), and 175 males (45.9%) with an average age was 56.6±15.7 SD yrs. Severe hypophosphatemia was 8 pts (0.5%) – 5 females, 3 males with the average age 56.1±16.4 SD yrs. A total of 1719 (95.3%) serum Ca levels were analyzed, where decreased were 84 (4.9%) and increased were 490 (28.5%). A total of 972 (53.9%) serum iPTH levels were analyzed for pts with hypophosphatemia, where decreases were 4 (0.4%) and increased were 610 (62.8%). A total of 456 (25.3%) serum vitamin D levels were analyzed in pts with hypophosphatemia, where decreased (<30 ng/mL) were 104 (22.8%) and increased (>100 ng/mL) were 21 (4.6%).

**Conclusion:** Hypophosphatemia is more often than commonly believed. It needs to be examined for various reasons, e.g., hyperparathyroidism, vitamin D deficiency, hypophosphatemic syndr.: vitamin D-dependent rickets type 1-3, X-linked hypophosphatemia, gastrointestinal disorders. These data may facilitate research within all areas of genetic disorders of hypophosphatemia.

P242

# MINERAL BONE DENSITY, TRABECULAR BONE SCORE AND FRAX® IN PEOPLE WITH DIABETES MELLITUS

E. Mazurenko<sup>1</sup>, O. Rymar<sup>1</sup>, L. Shcherbakova<sup>1</sup>, M. Bobak<sup>2</sup>, S. Malyutina<sup>1</sup>

<sup>1</sup>Research Institute of Internal & Preventive Medicine – Branch of the Institute of Cytology & Genetics, Siberian Branch of Russian Academy of Sciences, Novosibirsk, Russia, <sup>2</sup>University College London, London, UK

**Objective:** To study indicators of BMD and trabecular bone score (TBS) and to reveal the 10-y fracture risk (FRAX) taking into account the data obtained in persons with type 2 diabetes (DM2).

**Methods:** A clinical study of the type of case-control. The study included 122 people (19 men, 103 women) aged 45-69 y with and without DM2 (among women, only postmenopausal women were included). In the subgroup of people with DM2 were 64 (32 indicated a history of osteoporotic fracture (OF), 32 without a fracture), without diabetes were 58 (29 with OF, 29 without OF). All persons had questionnaire assessment of fracture factors on the FRAX score, anthropometry, DXA, determination of TBS and fracture risk on the FRAX. Statistical data processing using the SPSS program (v.13.0).

**Results:** Persons with DM2 who underwent a fracture had lower T-score values in the femoral neck on the right and left ( $p=0.047$ ), unlike those with DM2, but without fracture.

However, persons with DM2 had a fracture at high values of T-score in vertebrae and hips in comparison with persons without DM. Using the TBS, we did not get a significant difference in any of the examined groups. The values of FRAX by T-score in the group of persons with DM with fractures were significantly lower ( $p=0.029$  for major fractures,  $p=0.024$  for hip fractures) than in persons without DM with fractures. Among women with DM2 and OF, the FRAX adjusted for TBS was significantly lower for major fractures ( $p=0.010$ ) than FRAX calculated without DXA. We also found no differences in the risk of recurrent fractures among women with and without DM2 using FRAX without densitometry ( $p=0.094$  for major fractures,  $p=0.058$  for the hip) and FRAX adjusted for TBS.

**Conclusion:** The structure of the bone in diabetes remains unknown. There are conflicting data on the risk of fractures in people with DM2. Peoples with DM2 and fractures have higher BMD values, lower fracture risk according to FRAX corrected for the T-score, have no TBS value, which determines the complexity of diagnosis, search for additional methods for early diagnosis of an increased risk of fractures in patients with DM2.

**Acknowledgement:** The study was supported by RSF №20-15-00371; State target № AAAA-A17-117112850280-2

P243

# THE RISK OF OSTEOPOROTIC FOREARM FRACTURES IN SUBJECTS WITH DIABETES AND WITHOUT DIABETES IN THE SIBERIAN POPULATION

E. Mazurenko<sup>1</sup>, S. Malyutina<sup>1</sup>, L. Shcherbakova<sup>1</sup>, O. Rymar<sup>1</sup>

<sup>1</sup>Research Institute of Internal & Preventive Medicine – Branch of the Institute of Cytology & Genetics, Siberian Branch of Russian Academy of Sciences, Novosibirsk, Russia

**Objective:** An unexpected finding in the general structure of fractures in the Russian Federation was a higher frequency of the forearm fractures compared with other countries. The attention to the forearm fractures, as to osteoporotic fractures (OF), is important for ensuring early detection of individuals at increased risk of future fractures and taking preventive measures. This study aimed to study the frequency of the history of forearm fractures (FF) and their risk factors in patients with type 2 diabetes mellitus (DM2) and without diabetes aged over 50 y.

**Methods:** The cross-sectional study was based on a population cohort (the HAPIEE Project, Novosibirsk) examined at baseline in 2015-2017, in Novosibirsk,  $n=3878$  men and women aged 58-84 y. The study included people who signed the informed consent to conduct the study, excluded individuals who wrote a waiver of taking blood to determine biochemical parameters. In total, the analysis included  $n=3393$  people, 718 of them with DM2 (21.2%). The information was collected on OF over the past 3 y, the registration of sociodemographic data; and risk factors for OF, a study of biochemical blood parameters. The analysis of the association of DM2 and a complex of risk factors with a chance of a FF was performed. DM was defined by fasting blood glucose  $\geq 7.0$  mmol/l (WHO, 1999) and/or history of treated DM. Statistical analysis was carried out by SPSS package (v.13.0).

**Results:** Among 3393 subjects there were 1388 men and 2005 women. The prevalence of FF in the last 3 y did not differ in patients with DM2 compared with those examined without diabetes and was 2.4% and 2.8%, respectively ( $p=0.557$ ). Men with OF had higher cholesterol and HDL values, women had lower BMI compared with people without fractures. According to the results of a multivariate analysis in women, the chance of a FF is directly associated with smoking in the past, a total cholesterol level of more than 200 mg/dl and inversely associated with a BMI. In men, associations were found of the chance of a FF with an increase in the level of cholesterol. There was no evidence of DM2 with FF.

**Conclusion:** The associations were found between risk factors, such as smoking, hypercholesterolemia and BMI with the FF. The obtained data on the incidence of fractures and their association with risk factors indicate the need for preventive measures for OF, both in people with and without DM2.

**Acknowledgement:** The study was supported by WT081081AIA, State target № AAAA-A17-117112850280-2.



P244

**BODY COMPOSITION OF LONG-LIVING PATIENTS WITH CORONARY ARTERY DISEASE**S. V. Topolyanskaya<sup>1</sup>, T. A. Eliseeva<sup>2</sup>, N. A. Balyasnikova<sup>2</sup>, O. N. Vakulenko<sup>2</sup>, L. I. Dvoretzki<sup>1</sup><sup>1</sup>First Moscow State Medical University, <sup>2</sup>War Veterans Hospital N3, Moscow, Russia

**Objective:** Very limited data are available on body composition of long-living patients with coronary artery disease (CAD), therefore, we evaluated body composition of long-living patients with CAD.

**Methods:** 200 hospitalized patients with CAD (females 69.3%, males 30.7%) aged 90-106 y were enrolled in this cross-sectional study. Body composition was assessed by DXA.

**Results:** 70.3% of patients were overweight or obese. Obesity was observed in 30.2% of patients; in 93.5% of them it was 1st degree obesity, 2nd degree was only in 6.5%, and 3rd degree was never met. The body weight deficit was found in only one patient (0.49%). Mean BMI was 27.6 (18.2-38.8) kg/m<sup>2</sup>. Women had more fat mass than men: total fat 39.8% vs. 30.0% ( $p<0.0001$ ), lower extremities fat 42.4% vs. 27.4% ( $p<0.0001$ ). Mean total mass of lean tissue in women was 38.4 kg, and in men 48.8 kg ( $p<0.000001$ ). The musculoskeletal index remained within the normal range in 77.2% and was below normal in 22.8% of patients. A decrease in the musculoskeletal index was observed in 22.9% of men and 19.1% of women ( $p=0.5$ ). The mean total T-score was -1.75 SD. Decrease of total BMD (T-score)  $\leq -2.5$  SD was detected in 40%, and normal total T-score in 30.7% of patients. The greatest BMD was recorded in lumbar spine ( $1005.6 \pm 190.6$  mg/cm<sup>3</sup>), the lowest BMD in ribs ( $626.2 \pm 83.9$  mg/cm<sup>3</sup>). As expected, female patients had lower BMD in all parts of the body ( $p<0.0001$ ). A significant positive correlation was found between BMD and the fat mass in all parts of the body ( $r=0.6$ ;  $p<0.000001$ ). A positive correlation was found between the lean mass and BMD ( $r=0.64$ ;  $p<0.000001$ ). A negative correlation was found between the fat and lean mass, in particular, in lower extremities ( $r=-0.47$ ;  $p<0.000001$ ). Muscle strength (according to dynamometry data) positively correlated with lean tissue content ( $r=0.55$ ;  $p<0.000001$ ). The content of lean tissue was positively correlated with the distance covered in the 6-min walk test ( $p=0.007$ ).

**Conclusion:** Study results demonstrated some features of body composition in patients with CAD aged 90 years or older. The proportion of overweight patients with normal indices of BMD and lean mass was relatively high. Significant relationships between the bone, adipose and lean tissues were demonstrated.

P245

**BONE MINERAL DENSITY AND METABOLISM IN VERY ELDERLY PATIENTS WITH CONGESTIVE HEART FAILURE**S. V. Topolyanskaya<sup>1</sup>, L. S. Lifanova<sup>1</sup>, T. A. Eliseeva<sup>2</sup>, O. N. Vakulenko<sup>2</sup>, L. I. Dvoretzki<sup>1</sup><sup>1</sup>First Moscow State Medical University, <sup>2</sup>War Veterans Hospital N3, Moscow, Russia

**Objective:** There are few data available on the relationship of heart failure and osteoporosis among very elderly patients, therefore we investigated BMD and metabolism in very elderly patients with heart failure.

**Methods:** The study enrolled 125 patients (38 men, 87 women, aged 75-98 y) hospitalized with coronary artery disease (CAD). Study group comprised 61 patients with clinically significant CHF (NYHA FC III-IV), control group 64 CAD patients without CHF symptoms. Main exclusion criteria were any other diseases that could cause osteoporosis and administration of medications reducing BMD. Lumbar spine and proximal femur BMD was measured by DXA. Fracture risk was measured under FRAX model, and osteoporosis standard risk factors were analyzed. Osteocalcin concentration in the blood serum was measured by immunochemiluminiscent method, and  $\beta$ -CrossLaps level (degradation products of collagen type I) by electrochemiluminescence.

**Results:** BMD in the CHF patients was lower (both in absolute values and by the T-score) vs. the control group (age-matched patients with similar main disease of CAD). Largest differences were recorded in proximal femur: BMD in the CHF patients was  $719.8 \pm 188.2$  mg/cm<sup>3</sup> vs.  $797.7 \pm 161.7$  mg/cm<sup>3</sup> ( $p=0.02$ ) in the control group. Greater differences in BMD were detected in female patients ( $p=0.007$ ). Femoral neck BMD in the CHF patients was  $649.4 \pm 137.1$  mg/cm<sup>3</sup> vs.  $696.2 \pm 121.8$  mg/cm<sup>3</sup> ( $p=0.03$ ) in the control group. There were no significant differences found in lumbar vertebrae BMD between the groups ( $p=0.4$ ). Proximal femur BMD had normal values only in 5% of the CHF patients, whilst normal BMD values in the control group were in 31% of cases ( $p=0.003$ ). A similar trend was found for lumbar spine BMD, but these group differences did not achieve statistical significance ( $p=0.11$ ). CHF impact on BMD was also confirmed during multiple regression analysis. It found that ultimate significant factors determining proximal femur BMD were CHF ( $\beta=-0.375$ ,  $p=0.005$ ) and female sex ( $\beta=0.698$ ,  $p<0.0001$ ). Reduced osteoblast function was observed in CHF patients: the mean osteocalcin level in the CHF patients was  $1.2 \pm 1.7$  ng/ml vs.  $4.2 \pm 4.1$  ng/ml ( $p=0.03$ ) in the control group. In 60.6% of the CHF patients, osteocalcin concentration was below the lower limit of normal ( $p=0.02$  vs. control). Also, mean  $\beta$ -CrossLaps level in the CHF patients reached  $0.73 \pm 0.4$  ng/ml vs.  $0.4 \pm 0.1$  ng/ml ( $p=0.003$ ) in the control group.  $\beta$ -CrossLaps level was increased in 21.7% of the CHF patients, but no one had high  $\beta$ -CrossLaps values in the control group ( $p=0.03$ ). There was negative correlation between  $\beta$ -CrossLaps concentration and BMD, especially in the proximal femur ( $r=-0.4$ ,  $p=0.03$ ).

Negative correlation was found between TNF $\alpha$  level with its serum concentration higher in the CHF patients ( $p=0.04$ ) and BMD, especially in the proximal femur ( $r=-0.9$ ,  $p=0.03$ ). In patients with decreased leptin concentration (found only in the CHF patients), BMD values were lower than in those with normal or increased serum leptin concentration ( $p=0.006$  for the proximal femur).

**Conclusion:** These study findings suggest that BMD in very elderly CHF patients is noticeably lower vs. the patient group similar in age and main diseases. This study has demonstrated significantly reduced osteoblast function in CHF patients and slight increase in bone resorption. Further studies of bone tissue condition in CHF patients with large patient sample and research into mechanisms of relationship between osteoporosis and heart failure are reasonable.

## P246

### INCREASING THE DETECTION OF VERTEBRAL FRACTURES (VFS) USING AI ON CT PERFORMED FOR ALL CLINICAL INDICATIONS

R. Gordon<sup>1</sup>, B. Gordon<sup>2</sup>, K. White<sup>2</sup>, H. Lebel<sup>1</sup>, E. Spitz<sup>1</sup>, E. Blumenfeld<sup>1</sup>

<sup>1</sup>Zebra Medical Vision, Shefayim, Israel, <sup>2</sup>Intermountain Healthcare, Utah, USA

**Objective:** Despite their prognostic value, reporting of vertebral fractures (VFs) on routine imaging is commonly low. We report on the diagnostic accuracy and potential for clinical impact of software which detects VFs.

**Methods:** A convolutional neural network based VF detection tool was generated utilizing a training set of 1832 Computed tomography (CT) scans including compression fractures indexed according to the Genant classification as mild, moderate, and severe. Ground truth was established by three expert radiologists. Validation was performed on a novel dataset of 611 CT scans of the chest and abdomen/pelvis. To assess the potential for clinical impact, the software was applied to 76,069 anonymized CTs acquired from a USA based integrated health delivery system comprising 24 hospitals and 7 clinics. The threshold for a positive result was set at the presence of at least one moderate VF. Each corresponding CT report was evaluated by a combination of human and natural language processing for the reporting of vertebral compression fracture. 290 studies were randomly selected and reviewed by two expert radiologists to verify consistent algorithmic accuracy in this data set.

**Results:** On the validation dataset of 611 examinations, the software achieved an overall AUC of 0.95 with sensitivity 90.6% and specificity of 86.6% for the detection of VFs. VFs were noted in 4996 (6.6%) of 76,069 radiology reports; of these, 3167 were also detected algorithmically. VFs were detected by the software in a total of 11,890 (15.6%) CT examinations. Of the 290 CTs analyzed for consistent accuracy, results achieved a negative predic-

tive value of 90.7% and positive predictive value of 58.2%. Of the 94 false positive cases, 72 (76.6%) comprised studies with mild compression fractures.

**Conclusion:** An automatic VF detection tool with high diagnostic accuracy demonstrates potential to substantially improve the current reporting gap for vertebral compression fractures, increasing the detected moderate-severe VFs by 138%.

**Clinical relevance/application:** Vertebral fractures are commonly underreported. A tool to increase reporting of vertebral fractures can potentially increase preventative interventions for subsequent major osteoporotic fractures.

## P247

### VITAMIN D STATUS IN BREAST CANCER PATIENTS UNDER HORMONE THERAPY

K. Nassar<sup>1</sup>, R. Assadi<sup>2</sup>, S. Janani<sup>1</sup>

<sup>1</sup>Ibn Rochd University Hospital, Rheumatology Dept., Hassan II University of Medicine & Pharmacy., <sup>2</sup>Dept. of Rheumatology, Ibn Rochd University Hospital Center, Hassan II University, Faculty of Medicine & Pharmacy, Casablanca, Morocco

**Objective:** Hormone therapy, particularly aromatase inhibitors, are the cause of a decrease of estrogens and their use is correlated with an increased risk of bone loss and fractures when they are used between 2-5 y. 25 (OH) vitamin D around 30 ng/ml is needed to prevent reactive hyperparathyroidism, bone loss and the resulting osteoporotic fractures. Some studies also seem to show a protective effect of vitamin D against breast and colorectal cancer. The purpose of this study is to assess the vitamin D status in patients followed for breast cancer and receiving hormone therapy, especially those under aromatase inhibitors.

**Methods:** Transversal and descriptive monocentric study conducted in the rheumatology department at Ibn Rochd University Hospital, in bone diseases unit. The patients included are those who are followed in oncology for breast cancer under hormone therapy and referred to rheumatology for an evaluation of the bone loss. Those who were under other anti-cancer treatments were excluded. All patients underwent a complete phosphocalcic and vitamin D explorations. Those with low vitamin D have received supplementation prior to performing a DXA. We included demographic data, those related to neoplastic disease, then the results of blood and urinary explorations. Vitamin D deficiency was defined by a 25 (OH) D level <10 ng/ml and an insufficiency when it was between 10-30 ng/ml.

**Results:** 188 patients under hormone therapy were recruited, 160 of whom were using aromatase inhibitors and only 28 on tamoxifen. The average age was 54.3 years old. The majority were postmenopausal (98%). The long-term use of corticosteroids was the only other risk factor for bone loss, noted in 13% of cases. 87% of patients had low vitamin D at the time of the consultation; 70% were in deficient. The mean value of vitamin D was at 19.35 ng/

ml. The mean serum calcium was at 90.82 mg/l, mean calciuria was at 100.5 mg/24 h, mean serum phosphate was at 42.57 mg/l and PTH at 70.6 pg/ml (Table). The lack of vitamin D had been corrected. Treatment with bisphosphonates was associated with it for those with osteoporosis (T-Score <-2 SD).

**Conclusion:** A very large percentage of patients starting adjuvant aromatase inhibitors therapy have severe vitamin D insufficiency compared to women of the same age. Our results join those of the literature. This vitamin D insufficiency or deficiency are reversible, and studies are underway to analyze the effect of such substitution on bone loss and fracture risk in these patients under aromatase inhibitors. Several recent studies tend to show the potential role of low vitamin D levels in terms of increased risk of recurrence and death from breast cancer. For all these reasons, the evaluation of vitamin D and its supplementation are necessary and important in women with breast cancer treated with antiestrogens.

Table. Characteristics of the population and the results of vitamin D and phospho-calcic explorations

Patients under hormone therapy (HTT)	188 (94%)
Types of hormone therapy	
Aromatase inhibitors	160 (85%)
Tamoxifen	28 (15%)
Patients mean age	54.3 y
Average age of breast cancer diagnosis	56.12 y
Menopausal patients	184 (98%)
Secondary menopause linked to HTT	38%
Others risk factors of bone loss justifying specialized monitoring	
Long term use of corticosteroids	13%
Metastatic cancer	15.18%

Patients with low vitamin D :	164 (87%) 115 (70%)
*vitamin D deficiency (<10 ng/ml )	
*vitamin D insufficiency (10-30 ng/ml)	49 (30%)
Mean value of 25(OH)vitamin D	19.35 ng/ml
Mean calcemia	90.82 mg/l
Mean calciuria	100.5 mg/24-h
Mean serum phosphate	42.57 mg/l
Mean PTH	70.6 pg/ml

## P248

### DIAGNOSIS AND TREATMENT OF MYOTONIC AND MYOFASCIAL SYNDROMES OF NECK PAIN

A. Filipovich<sup>1</sup>

<sup>1</sup>National Science and Practice Centre of Medical Assessment & Rehabilitation, Yukhnovka, Belarus

**Objective:** The dynamic monitoring of 195 patients with myotonic and myofascial syndromes of neck pain was done against the control group of 45 people.

**Methods:** MRI of cervical and vertebrocranial areas of spinal column, electromyography of 7-9 relevant muscles, finding of the "key" muscle and the overall computer aided assessment of osteomuscular, cardiorespiratory and oxygen transport system disorders.

**Results:** Clinical and electromyographic criteria for diagnosis of myotonic and myofascial syndromes of neck pain were identified based on the occurrence rates. The role of major system disorders in pathogenesis of neurological manifests of neck pain was studied. New therapeutic approaches to stopping pain and myotonic syndromes were developed; the effectiveness of early rehabilitation measures was demonstrated. The prevailing myotonic syndromes were identified which were the musculus obliquus capitis inferior syndrome (in 68, or 39.4% patients); suprascapular area syndrome (33% of patients); musculus scalenus anterior and musculus scalenus medius syndromes (18.9%); musculus pectoralis minor syndrome (9.7%). Hypodynamia caused system disorders were noted in 78.3% patients including excessive body mass and fat content; reduced blood circulation rate and heart-beat volume and the pronounced decrease of PWC<sub>170</sub>. The most informative spondylographic findings were reduced thickness of posterior areas of intervertebral disks from C1 to CVII (52.3 to 77.9% of patients), cervical lordosis impression (76.4%) and uncovertebral arthroses (58.2%).

**Conclusion:** The most seriously affected ("key") muscles in neck pain patients were found. Diagnosis and treatment strategies for neck pain patients were developed.

P249

### SOME TECHNICAL MEANS OF REHABILITATION FOR PATIENTS WITH LOW BACK PAIN

A. Filipovich<sup>1</sup>

<sup>1</sup>National Science and Practice Centre of Medical Assessment & Rehabilitation, Yuhnovka, Belarus

**Objective:** 78 patients with myotonic (MT) syndrome.

**Methods:** Patients went through the clinical estimation of neurologic status, manual testing of muscles, CT and MRI of back bone lumbar department, interferential and needle electromyography of the most damaged muscular groups, dosed loading veloergometry, revasography of feet, and shins.

**Results:** Medical rehabilitation complex on damaged extremity was approbated in 27 patients with MT syndrome. The complex included oral reception of katadolon (100 mg 3 times a day for 10 days), tractions on Fintrac-471 table (with force from 3-55 kg, a course of 8-10 sessions) and also acupuncture with use acupuncture points of general action with vascular autonomic nervous system orientation (G14, MJ6, E36, RP6, TR5, V40) and locally segmented points on the most damaged muscular groups (AT60, VB30 with deep introduction to piriform muscle; VB 34, VB41, F3).

**Conclusion:** After treatment damaged extremity pain has completely disappeared in 19 patients, pain essentially decreased and increased tolerance of physical activity in 6 patients. It is established that katadolon shows not only analgesic and neuroprotective, but also myorelaxing action on muscles of pelvic girdle and feet in patients with acute and chronic pain syndrome.

P250

### CLINICAL AND IMMUNOLOGICAL DISORDERS IN MULTIPLE SCLEROSIS PATIENTS WITH THE PRESENCE OF FOOD ALLERGY

A. Filipovich<sup>1</sup>

<sup>1</sup>National Science and Practice Centre of Medical Assessment & Rehabilitation, Yuhnovka, Belarus

**Objective:** 102 multiple sclerosis patients 19-33 years old were examined against the control group of 20 healthy people.

**Methods:** MRI and immunological studies.

**Results:** All patients on the level of IgE in blood serum of 20 basic food products are divided into four groups: the first (13 pers, 12.7%) with the absence of IgE in serum, second (29 pers, 28.5%

) with the presence of IgE (threshold 0.35-0.69 IU/ml); third (45 pers, 44.1%) with a moderate increase in IgE (0.70-3.49 IU/ml); fourth (15 pers, 14.7%) with a significant increase in IgE (3.50-17.49 IU/ml) in serum. Patients first group without clinical signs of apparent exacerbation of MS were observed in blood eosinophilia, and the brain MRI revealed hyperintense foci in a single T-2W mode, indicating the absence of active demyelinating process. Patients with the second group with a slow chronic course of MS were determined by individual eosinophils (18.1%), indicating that they have a weak allergic reaction. Identification of individual hypo- and hyperintense lesions on brain MRI evidence of chronic course of demyelinating process in the presence of rare clinical exacerbations was seen by us as secondary progressive MS. In the third group investigated the apparent worsening of the process of clinical signs detected a moderate increase in serum IgE (45 pers, 44.1%) in the presence of explicit eosinophilia (11.8%).

**Conclusion:** Markers of exacerbation of MS is the simultaneous moderate increase in serum IgE eosinophilia, and the appearance of new lesions on MRI gipointensivnyh brain.

P251

### THE LONG TERM RESULTS OF TREATMENT AND REHABILITATION OF MULTIPLE SCLEROSIS PATIENTS

A. Filipovich<sup>1</sup>

<sup>1</sup>National Science and Practice Centre of Medical Assessment & Rehabilitation, Yuhnovka, Belarus

**Objective:** Long term results of treatment of multiple sclerosis were studied.

**Methods:** The dynamic monitoring of 110 patients over the period of 1-1.5 y following the successful in-hospital treatment of MS was carried out. Clinical methods, CT and MRI of cerebrum and spinal cord, and a patented radioimmunobiological assay of the myelinotoxic activity (MTA) of blood serum were used.

**Results:** Four groups of patients were distinguished: group 1 (36 patients; 32.7%) had patients with low MTA level ( $4.56 \pm 0.7$  units) after successful hormone therapy. No rehabilitation was required out afterwards. Group 2 included 41 patients (37.3%) with low MTA level ( $3.76 \pm 0.81$ ) after hormone and corrector therapy; a rehabilitation course was carried out at a later stage. Group 3 consisted of 22 patients (20.0%) that required long term immunomodulating therapy due to a higher rate of demyelination ( $MTA = 19.2 \pm 0.43$ ). The remaining 11 patients (group 4, 10.0%) with moderate rate of demyelination ( $16.4 \pm 0.52$ ) were prescribed general health improvement therapy and rehabilitation based on intensive motional activity and physical exercise.



**Conclusion:** Hormone therapy helps to reduce the demyelination rate to acceptable level within 2-4 months. The subsequent rehabilitation helps to achieve the extended remission period. However, long time after treatment of acute MS the hormone therapy is not justified.

P252

### USE OF MRI AND MTA ASSAY OF BLOOD SERUM FOR DIAGNOSIS OF INITIAL PHASE OF MULTIPLE SCLEROSIS

A. Filipovich<sup>1</sup>

<sup>1</sup>National Science and Practice Centre of Medical Assessment & Rehabilitation, Yukhnovka, Belarus

**Methods:** MRI of cerebrum and spinal cord and a patented method for measuring the myelinotoxic activity (MTA) of blood serum and spinal fluid were used. 75 initial MS patients 16-35 years old were examined.

**Results:** Monosymptomatic start of MS was found in 46 (61.3%) patients, and polysymptomatic MS in 29 (38.7%) patients. MRI of cerebrum and spinal cord revealed focal points of decreasing T-1W / increasing T-2W signal in 50 (70.7%) of examined patients. Therefore, the diagnostic importance of MRI of cerebrum and spinal fluid at the initial phase of MS is not very high. Two groups of patients were distinguished on the basis of MTA measurements. Group 1 included 46 monosymptomatic patients with slightly increased MTA of blood serum ( $9.8 \pm 1.3$  units compared to  $3.9 \pm 0.82$  in control group) and spinal fluid ( $11.2 \pm 1.2$  units compared to  $5.9 \pm 1.4$  in control group). Group 2 consisted of patients with polysymptomatic course of MS. Clear increase in MTA level ( $18.9 \pm 0.92$  for blood serum and  $23.4 \pm 0.7$  for spinal fluid) compared to both control group and group 1 was noted.

**Conclusion:** The diagnostic importance of MRI of cerebrum is not high at the initial stage of MS. However, MRI in combination with MTA assay of blood serum greatly helps to reveal the initial MS in vast majority of cases.

P253

### CANDIDA PERIPROSTHETIC JOINT INFECTION: SIGNIFICANT DIFFERENCES BETWEEN ALBICANS AND NON-ALBICANS GROUP

D. Karczewski<sup>1</sup>, D. Akguen<sup>1</sup>, O. Andronic<sup>2</sup>, C. Perka<sup>1</sup>, M. Müller<sup>1</sup>, A. Kienzle<sup>1</sup>

<sup>1</sup>Charité University Hospital Berlin, Berlin, Germany, <sup>2</sup>Balgrist University Hospital, University of Zurich, Zurich, Switzerland

**Objectives:** Approximately 1% of all periprosthetic joint infections (PJI) are caused by fungal microorganisms. Previous systematic analyses have focused on the impact of treatment rather than the role of the causative fungal agent itself, and there is lack of knowledge on Candida strain-dependent patient characteristics and clinical outcome. For that reason, it was the goal of the present study to compare Candida albicans and non-albicans PJI concerning patient characteristics, diagnosis, treatment and outcome.

**Methods:** Inclusion criteria were: (1) Candida PJI, (2) of a THA or TKA, (3) treated in our department between the years 2010-2018. All patients were regularly invited to our specialized outpatient clinic for follow-up examinations after treatment (6-12 weeks postoperatively and thereafter half-annually). In addition, all included patients were prospectively followed up at the end of the present study. A PJI was defined according to IDSA, a reinfection according to the modified Delphi Consensus criteria. Statistical analysis was performed using t-test, chi-square test with Yates correction, and log rank test for reinfection rate.

**Results:** Besides age and the affected joint, no significant differences were found between albicans and non-albicans strains. However, the reinfection rate was significantly higher in patients with Candida albicans PJI compared to non-albicans Candida PJI (Table).

**Conclusion:** To the authors best knowledge, this is the first study to compare albicans to non-albicans Candida PJI. While age and affected joint might play a confounding role, we speculate the causative Candida sub strain to play a decisive role in disease progression.

Table. PJI characteristics

	Candia albicans PJI	non-albicans Candida PJI	p
Count [n]	17	12	-
Gender distribution [n]	5 males; 12 females	8 males; 4 females	0.108
Age [y]	75.83±7.29	64.11±15.71	0.012
Follow-up time [months]	26.70±33.48	42.01±30.95	0.223
Affected joint [n]	hip: 12; knee: 5	hip: 2; knee: 10	0.013
CCI	5.88±2.00	4.67±2.10	0.126
CRP [mg/L]	66.85±72.53	30.33±28.88	0.111
Additional bacterial infection [%] (n)	76.47% (13)	75.00% (9)	-
Reinfection [%] (n)	52.9% (9)	16.6% (2)	0.044

P254

# INTRAVENOUS ZOLEDRONATE FOR POSTMENOPAUSAL OSTEOPOROSIS: SYSTEMATIC REVIEW AND META-ANALYSIS

F. Gazoni<sup>1</sup>, V. Civile<sup>1</sup>, F. Santos<sup>1</sup>, B. Albergaria<sup>2</sup>, B. Andriolo<sup>1</sup>, A. Atallah<sup>1</sup>, V. Trevisani<sup>1</sup>

<sup>1</sup>Sao Paulo Federal University, Sao Paulo, <sup>2</sup>Espirito Santo Federal University, Vitoria, Brazil

**Objective:** Osteoporosis compromises bone strength and increases fracture risk. Fractures are responsible for high morbidity leading to low quality of life and high mortality. Zoledronate inhibits the activity of osteoclasts, preventing loss of bone mass and reducing risk of fractures. This study aimed to determine the efficacy and safety of zoledronate therapy for preventing and treating postmenopausal osteoporosis.

**Methods:** We searched CENTRAL, MEDLINE, Embase, LILACS, four trial registers, two conference abstract books and the bibliographies of included studies until May 2020. Selection criteria: We included all randomised controlled trials (at least one year long) comparing zoledronate with placebo or other bisphosphonates in postmenopausal women. Data collection and analysis: We used standard methodological procedures expected by Cochrane reviews. Two review authors independently assessed risk of bias and extracted data about efficacy and safety.

**Results:** We included in this review 13 trials with 12,871 participants. Nine trials accounted for 10,068 osteoporotic women (5 studies compared zoledronate with placebo; one investigated different doses and frequencies of zoledronate vs. placebo; 2 compared zoledronate with alendronate; and one assessed zoledronate vs. ibandronate). Four trials accounted for 2803 osteopenic women (2 studies compared different doses and frequencies of zoledronate with placebo; and other 2 assessed different frequencies of zoledronate vs. placebo, with a long follow-up period). Trials size varied from 50-7765 participants. Participants mean age ranged from 54-73 y. We rated seven studies at unclear or high risk of bias for at least 2 domains, and 4 at low risk of bias for all domains. The most common sources of bias were no description of random sequence generation and allocation concealment, and lack of blinding of participants and personnel. Based on one study comparing zoledronate 5 mg yearly with placebo for osteoporotic women during a 3-y period: the rate of morphometric vertebral fracture is 33 women per 1000 in the zoledronate group (range 26-41) and 109/1000 in the control group (absolute difference of 7.6% fewer events (8.3% fewer to 6.8% fewer) (high certainty evidence)); the rate of nonvertebral fracture is 79 women per 1000 in the zoledronate group (range 68-94) compared with 106/1000 in the control group (absolute difference of 2.6% fewer events (3.8% fewer to 1.2% fewer) (moderate certainty evidence; downgraded for imprecision)); the rate of hip fracture is 14 women per 1000 in the zoledronate group (range 10-20) and 23/1000 in the control group (absolute difference of 0.9% fewer events (1.3% fewer to 0.3% fewer) (moderate certainty evidence; downgraded for imprecision)); the rate of cardiovascular event is 57 women per 1000 in the zoledronate group (range 47-68) and 53/1000 in the control group (absolute difference of 0.3% more events (0.6% fewer to 1.5% more) (moderate certainty evidence; downgraded for imprecision)); the mean percentage difference in CTX is 63.16% lower (51.44% lower to 74.88% lower) with zoledronate and 13.99% higher with placebo (moderate certainty evidence; downgraded for imprecision); the mean percentage difference in BMD is at lumbar spine, 6.67% higher (5.34% higher to 8% higher) with zoledronate and 0.27% lower with placebo; and at total hip, 6.07% higher (5.91% higher to 6.23% higher) with zoledronate and 1.88% lower with placebo (high certainty evidence). Based on one study comparing zoledronate 5 mg each 18 months with placebo for osteopenic women during a 6-y period: the rate of morphometric vertebral fracture is 25 women per 1000 in the zoledronate group (range 16-39) and 64/1000 in the control group (absolute difference of 3.9% fewer events (4.8% fewer to 2.5% fewer) (moderate certainty evidence; downgraded for imprecision)); the rate of nonvertebral fragility fracture is 108 women per 1000 in the zoledronate group (range 87-135) and 178/1000 in the control group (absolute difference of 6.9% fewer events (9.1% fewer to 4.3% fewer) (moderate certainty evidence; downgraded for imprecision)); the rate of hip fracture is 8 women per 1000 in the zoledronate group (range 3-19) and 12/1000 in the control group (absolute difference of 0.4% fewer events (0.9% fewer to 0.7% more) (moderate certainty evidence; downgraded for imprecision)); the rate of cardiovascular event is 118 women per 1000 in the zoledronate group (range 93-150) and 128/1000 in the control group (absolute difference of 1% fewer events (3.5% fewer to 2.2% more) (moderate certainty evidence; downgraded for imprecision)); the mean percentage difference in CTX is 58.3% lower (56.96% to 59.64% lower) with zoledronate and 10.2% higher with placebo (high certainty evidence); the mean percentage difference in BMD is: at lumbar spine, 8.46% higher (8.43% higher to 8.49% higher) with zoledronate and 1.14% lower with placebo; and at total hip, 7.44% higher (7.42% higher to 7.46% higher) with zoledronate and 3.97% lower with placebo (high certainty evidence).

**Conclusion:** Moderate to high certainty evidence indicates zoledronate is efficacious and safe during a 3-y period (5 mg yearly) for osteoporotic women and a 6-y period (5 mg each 18 months) for osteopenic women. Evidence supports the action of zoledronate lasts for more than 12 months, increasing bone mass and reducing bone markers. This might justify carrying out studies for osteoporotic women with longer intervals and large number of participants to evaluate reduction in number of fractures. The toxicity profile of zoledronate appears acceptable, with frequent nonserious transient adverse effects.

P255

### DXA UNITS SPECIFIC CHARACTERISTICS ANALYSIS: RESULTS FROM LAST 5 YEARS IN LATVIA

D. Pokšāne<sup>1</sup>, I. Rasa<sup>2</sup>

<sup>1</sup>Rīga Stradiņš University; Latvian Osteoporosis and Bone Metabolic Diseases Association, <sup>2</sup>Latvian Osteoporosis and Bone Metabolic Diseases Association, Riga East Clinical University Hospital, Rīga Stradiņš University, Riga, Latvia

**Objective:** Osteoporosis (OP) is a bone disease that occurs when the body loses too much bone, makes too little bone, or both. As a result, bones become weak and may cause low energy trauma fractures, leading to severe disability and death. In 2019, there were 6762 unique pts with femoral prosthesis and osteosynthesis surgery registered in Latvia. In 2019, 21,615 pts received reimbursement drugs for the treatment of osteoporosis. DXA has an essential role in evaluating individuals at risk of OP and helping clinicians advise pts about the appropriate antifracture treatment. The main aim of this study was to analyse the specific characteristics of each DXA units/cabinet during the 5 y and the availability of diagnostic units for OP and osteopenia diagnosis in different parts of Latvia.

**Methods:** In 2009 Latvian Osteoporosis and Bone Metabolic Disease Association made a united register for all Latvia's DXA and QCT units. The annual characteristics of the DXA units are analysed each year at the particular Association and medical staff Conference, which was based on the EU OP Consultation Panel Questionnaire (2008) 6 questions (modified). For the last 5 y starting from 2016, data have been collected and analysed in this cross-sectional study.

**Results:** As of 2020 and 2021, there is a total of 24 DXA units in Latvia. 12 DXA units are located in the capital city Riga, and 12 are located in different regional cities. IOF has recommended a DXA unit count of 10.6 per 1 million citizens, which Latvia fulfils with 24 DXA units per 1.93 million citizens. Despite a steady increase of DXA units from the 1st DXA unit in 1989, 17 units in 2009 to 24 DXA units in 2020/2021, the amount of DXA scans carried out decreased from 27,864 scans in 2016 to 26,884 scans in 2020. The number of pts diagnosed with OP had dropped from 11,376 pts in 2016 to 10,288 pts in 2020. The waiting time has increased from 17.6 days in 2016 to 17.5 days in 2020.

**Conclusion:** We conclude that for the last 5 yrs, DXA scans have decreased, and the number of pts diagnosed OP has reduced. Further data collection is needed. It is necessary to reduce the increasing waiting time for DXA. There is also a need to educate patients and GP, medical staff about OP.

P256

### SEVERE OSTEOPOROSIS: PANDEMIC PICK UPS

A. Ghemigian<sup>1</sup>, N. Dumitru<sup>1</sup>, C. Tupea<sup>2</sup>, G. Voicu<sup>2</sup>, E. Petrova<sup>1</sup>

<sup>1</sup>C.I. Parhon National Institute of Endocrinology & C. Davila University of Medicine & Pharmacy, <sup>2</sup>C.I. Parhon National Institute of Endocrinology, Bucharest, Romania

**Objective:** During COVID-19 pandemic, the access to skeleton investigations for osteoporosis was in many cases postponed, thus consequences on fracture risk (FR) might be expected in terms of not continuing the antiosteoporotic medication or not initiating it if needed. Reduced physical activity might reduce the risk of fall, on one hand, but associated sarcopenia and inhibition of bone formation due to lack of physical exercise increase the FR, on the other hand (1-5). This is a case report of a female with severe osteoporosis who delayed the presentation for diagnostic during first 15 months of pandemic.

**Case report:** This is a 73-year-old female, known with a history of osteoporosis since 2005. She also associates FR: chronic therapy with different SSRIs for depression, multinodular goiter-related hyperthyroidism (which was treated with radioiodine therapy). She has chronic therapy for arteria hypertension, hyperlipemia and hiatal hernia. At diagnostic, after initial lumbar T-score=-3.5 SD, she refused therapy until 2015 (when T-score decreased to -4 SD), thus she began therapy with intravenous ibandronate until 2017 when she experienced a vertebral fracture and daily 20 µg of teriparatide was initiated, starting from a DXA-BMD of 0.783 g/cm<sup>2</sup>, T-score of 3.1 SD. After 8 months, the treatment was stopped because of her lack of compliance, so she continued with annual zolendronic acid 5 mg until of T-score of -2.6 SD, BMD=0.856 g/cm<sup>2</sup>. In March 2020, when lockdown pandemic were initiated, she had to come to reassessment, but delayed it, and refused medication based on telemedicine recommendations, except for daily 1000 UI vitamin D. 14 months later, central DXA showed lumbar L1-3 BMD of 0.824 g/cm<sup>2</sup>, T-score of -2.9 SD, Z-score of -0.7 SD, hip BMD of 0.682 g/cm<sup>2</sup>, T-score of -2.6 SD, Z-score of -0.4 SD; 25-hydroxyvitamin D of 29 ng/mL, PTH of 55 pg/mL, suppressed CrossLaps of 0.287 ng/mL (normal: 0.33-0.782 ng/mL), osteocalcin of 17 ng/mL (normal: 15-46 ng/mL), P1NP of 27 pg/mL (normal: 15-45 pg/mL); an additional T4 thoracic fracture. Zolendronic acid was further recommended.

**Conclusion:** During pandemic lockdown, the usual serial assays and decision of therapy were less adequate based on telemedicine.

#### References:

1. Poiana C, et al. Maturitas 2009;62:98.
2. Bechir ES, et al. Revista de Chimie 2018;70:3176.
3. Radu L, et al. Revista de Chimie 2018;69:3483.
4. Poiana C, et al. Rom J Morphol Embryol 2011;52:187.
5. Sandru F, et al. Exp Ther Med 2020;20:3389.

P257

# AGE-RELATED MUSCLE STRENGTH DECLINE IN EAST AND WEST: OBSERVATIONS FROM TWO HARMONISED COMMUNITY DWELLING COHORTS IN UK AND JAPAN

F. Laskou<sup>1</sup>, J. Zhang<sup>1</sup>, E. M. Dennison<sup>1</sup>, K. A. Jameson<sup>1</sup>, G. Bevilacqua<sup>1</sup>, C. Cooper<sup>1</sup>, T. Iidaka<sup>2</sup>, C. Horii<sup>3</sup>, S. Tanaka<sup>3</sup>, N. Yoshimura<sup>2</sup>

<sup>1</sup>MRC Lifecourse Epidemiology Unit Southampton, Southampton, UK, <sup>2</sup>Dept. of Preventive Medicine for Locomotive Organ Disorders, 22nd Medical and Research Center, University of Tokyo, Tokyo, Japan, <sup>3</sup>Department of Orthopaedic Surgery, University of Tokyo, Tokyo, Japan

**Objective:** Age-related decline in muscle strength is associated with clinical outcomes including disability and increased mortality. However, no previous study has compared its prevalence, demographic and lifestyle associates, in comparable populations in different geographic regions. Here we (1) consider the prevalence of this condition in harmonised UK and Japan population based cohorts of older community dwelling adults, and (2) report lifestyle associations with the condition.

**Methods:** UK study participants (1572 men; 1415 women) were recruited from the Hertfordshire Cohort Study, a cohort study of community-dwelling adults. Japanese participants (520 men; 1028 women) were recruited from the ROAD study, a study of community dwelling Japanese adults. Lifestyle questionnaire data from the two cohorts were harmonised. Age-related muscle strength decline was measured in both studies using a dynamometer, with low values classified as grip strength of <30 kg in men and <20 kg in women.

**Results:** The median age of UK participants was 65.8 (IQR 63.5-67.8) years in men and 66.5 (IQR 64.5-68.7) years in women, while in Japan this was 68 (IQR 58-76) years in men and 67 (57-74) years in women. The prevalence of age-related muscle strength decline in the UK was 3.0% in men and 10.3% in women, higher than Japan (11.5% men and 16.1% women). In both cohorts, women were at greater risk of muscle strength decline (UK: OR 3.73, 95%CI 2.66-5.23,  $p < 0.001$ ; Japan: OR 1.47, 95%CI 1.07-2.01,  $p = 0.02$ ), while greater height was protective ( $p < 0.001$ ). Smoking was not associated with muscle strength decline in either cohort, though drinking alcohol was protective in Japanese women (OR 0.60, 95%CI 0.38-0.95,  $p = 0.03$ ). Age at leaving education was a predictor of age-related muscle strength decline in both cohorts, particularly in Japan, where more time spent in education was protective in both genders ( $p < 0.001$ ); in the UK, this was significant in women only ( $p = 0.01$ ).

**Conclusion:** Despite a different prevalence of age-related muscle strength decline in comparable cohorts based in UK and Japan, the anthropometric and lifestyle determinants of the condition were very similar. These findings suggest that a global approach to prevention may be appropriate.

P258

# LIFESTYLE AND PHYSICAL WORKLOAD AS RISK FACTORS FOR KNEE OSTEOARTHRITIS: CLINIC-BASED CASE-CONTROL STUDY

K. Ibragimov<sup>1</sup>, L. Tashinova<sup>1</sup>, N. Ishankulova<sup>1</sup>, N. Hamraeva<sup>1</sup>, I. Axmedov<sup>1</sup>, F. Olimjonova<sup>1</sup>, S. Ziyadullayev<sup>1</sup>, I. Sultonov<sup>1</sup>, F. Xasanov<sup>1</sup>

<sup>1</sup>Samarkand State Medical Institute, Samarkand, Uzbekistan

**Objective:** To examine possible relationships between age, "lifestyle-modifiable factors" (BMI, tobacco smoking, sports), and symptomatic knee osteoarthritis in a clinic-based case-control study. Additionally, the study aims to investigate the mode of interaction between BMI and physical workload with respect to the risk of symptomatic knee osteoarthritis.

**Methods:** In five orthopedic clinics and five practices, 87 male patients aged 25-70 with radiographically confirmed knee osteoarthritis associated with chronic complaints were recruited. The control group comprised 261 male control subjects. In a structured personal interview, body weight at different ages, body height, cumulative amount of smoking, and cumulative duration of different sports activities until the date of first diagnosis of knee osteoarthritis were elicited. Adjusted odds ratios (ORs) and 95%CIs were calculated using unconditional logistic regression analysis. Analyses were performed using R studio version 3.6.1.

**Results:** Age and overweight were strongly associated with the diagnosis of knee osteoarthritis. Compared with people less than 35 years old, those who were at least 65 years old had an OR of 16.3 (95%CI 6.1-58.7) for knee osteoarthritis. Patients with BMI  $\geq 28.41$  kg/m<sup>2</sup> had a strongly elevated risk of knee osteoarthritis (OR 9.6; 95%CI 4.5-24.2) compared to those with a BMI <22.86 kg/m<sup>2</sup>. Alternatively, heavy tobacco smoking ( $\geq 10$  pack/week) was associated with a decreased knee osteoarthritis risk in comparison with never-smoking (OR 0.2; 95%CI 0.1-0.5). Ball games (handball, volleyball, etc.) and cycling were associated with symptomatic knee osteoarthritis (OR 3.1; 95%CI 1.2-7.3 and OR 3.7; 95%CI 1.6-8.6 in the highest category of cumulative duration, respectively); to a weaker degree jogging, swimming, and soccer also were positively related to symptomatic knee osteoarthritis. Combining the two parameters, BMI and kneeling/squatting into one variable led to a multiplicative interaction mode for symptomatic knee osteoarthritis. For persons with elevated BMI in combination with moderate to high exposure to occupational kneeling/squatting, the attributable risk was 5.1%.

**Conclusion:** In accordance with the literature, we find a strong association between BMI and knee osteoarthritis risk. Considering the relatively high prevalence of occupational manual materials handling, prevention of knee osteoarthritis should not only focus on body weight reduction, but should also take into account work organizational measures particularly aiming to reduce occupational lifting and carrying of loads.



P259

**EFFICACY OF THE THROMBOCYTE DERIVED PRODUCT IN KNEE PTOA TREATMENT**L. Khimion<sup>1</sup>, O. Burianov<sup>2</sup>, H. Havryliuk<sup>1</sup>, T. Omelchenko<sup>2</sup>, S. Danyliuk<sup>1</sup><sup>1</sup>Shupyk National Healthcare University of Ukraine, <sup>2</sup>Bogomolets National Medical University, Kyiv, Ukraine

**Objective:** At the absence of confirmed evidence based efficacy of the OA pharmacologic treatment and rather high prevalence of post-traumatic OA (PTOA), particularly of the knee, the development of new approaches for the PTOA treatment is needed. This study aimed to study efficacy and safety of the platelet autologous plasma (PAP) comparing to standard treatment in young patients with symptomatic knee PTOA.

**Methods:** Study included 62 patients (mean age 38.29±3.51 y) with established symptomatic knee PTOA (mean time from trauma: 46.87±2.09 months), I-II stages (X-ray). Patients with prominent known primary OA risk factors (obesity, metabolic diseases), after knee surgery, with other arthritis or any other uncontrolled diseases and disorders were not included in the study. All patients consented to participate in the study and were divided into 2 groups: Gr.1 received standard treatment (NSAIDs, exercises, multimodal physiotherapy), Gr.2 received the course of 3 intra-articular injections of PAP in addition to the standard treatment.

**Results:** During early observation period (first 2 weeks) all patients with PTOA demonstrated significant improvement in pain and functional activity, comparing to baseline values but patients from Gr.2 demonstrated better daily living activities and better points in KOOS sport and recreation subscales. In 4 weeks the difference between groups were more prominent, with better results of treatment in group treated with PAP. Later, during the late observation period, second group still demonstrated better outcomes (both comparing to the baseline and to the first group), while Gr.1 patients partly returned to the baseline levels; after 3-6 months one-third of Gr.1 patients experienced 1-2 OA exacerbations, accompanied by repeated NSAIDs use; in Gr.2 only 6.45% of patients has had 1 OA exacerbation ( $p<0.05$ ). During next 12 months of supervision the majority of Gr.2 patients still had better knee functional capacity and less pain comparing to the baseline, while Gr.1 patients showed no significant difference with baseline in all KOOS parameters. No significant complications were observed during PAP use, except of temporary local pain at the injection site.

**Conclusion:** Use of the PAP intraarticular injections in addition to the standard PTOA treatment improves both early and late results of treatment, decreases the number of OA exacerbations and need in NSAIDs use during 12 months after treatment.

P260

**OSTEOSARCOPENIA AND TYPE 2 DIABETES MELLITUS: A CASE-CONTROL STUDY**A. Moretti<sup>1</sup>, M. Paoletta<sup>1</sup>, S. Liguori<sup>1</sup>, F. Gimigliano<sup>1</sup>, G. Iolascon<sup>1</sup><sup>1</sup>University of Campania Luigi Vanvitelli, Naples, Italy

**Objective:** Osteosarcopenia has been defined as the coexistence of low bone density (osteopenia/osteoporosis) and sarcopenia. Osteoporosis is characterized by alterations in bone microarchitecture and decreased BMD resulting in an increased risk of fractures, whereas sarcopenia is the progressive decrease of both muscle mass and function that increases the risk of falls. Type 2 diabetes mellitus (T2DM) is associated with poor bone strength and muscle wasting, although the risk of osteosarcopenia in patients with T2DM is not known so far. The aim of this study is to investigate the association between osteosarcopenia and T2DM in postmenopausal women (PMW).

**Methods:** PMW referring to our outpatient service of Physical & Rehabilitation Medicine for the management of metabolic bone disorders were enrolled. For all patients, DXA scans to measure bone density and body composition parameters were performed. DXA-derived outcome measures were femoral neck and lumbar spine BMD T-scores, and appendicular lean mass. We also measured hand grip strength and the Short Physical Performance Battery (SPPB) score to assess muscle strength and physical performance, respectively. Levels of physical activity were assessed according to the International Physical Activity Questionnaire. Data were analyzed to calculate between-group differences for the outcomes investigated.

**Results:** 36 PMW (12 T2DM, cases, and 24 non-T2DM, age-matched controls) were enrolled. Patients with T2DM showed a higher risk of osteosarcopenia compared to controls (OR 5.0, 95%CI 1.05-23.79,  $p=0.043$ ). Moreover, hand grip strength was significantly lower in T2DM group (10.09±4.02 kg vs. 18.40±6.83 kg;  $p=0.001$ ). However, T2DM patients did not show a significantly higher risk of severe osteosarcopenia (osteosarcopenia combined with poor physical performance, SPPB <8; OR 5.0, 95%CI 0.94-26.49) compared to the control group.

**Conclusion:** PMW affected by T2DM are at higher risk of osteosarcopenia vs. nondiabetic patients. Further research on a large cohort is required to improve knowledge about the association between osteosarcopenia and diabetes.

P261

### TRABECULAR BONE SCORE IDENTIFIES EARLY BONE INVOLVEMENT IN PATIENTS WITH MULTIPLE SCLEROSIS: A CASE-CONTROL STUDY

S. Liguori<sup>1</sup>, M. Paoletta<sup>1</sup>, A. Moretti<sup>1</sup>, G. Iolascon<sup>1</sup><sup>1</sup>University of Campania Luigi Vanvitelli, Naples, Italy

**Objective:** To investigate bone involvement in patients with multiple sclerosis (MS), particularly looking for instrumental parameters of early bone damage.

**Methods:** We enrolled MS patients with mild disability (EDSS  $\leq 3.5$ ) and as control group patients referred to our outpatient service of Physical and & Medicine for the management of metabolic bone diseases. We assessed BMD at total body-less head (TBLH), femoral neck (FN) and lumbar spine (L1-L4) using DXA (GE Lunar) and trabecular bone score (TBS) and evaluated muscle performance using the Short Physical Performance Battery (SPPB). Based on SPPB scores, we identified two groups among MS patients: group A, "poor performance" (SPPB score  $\leq 8$ ) and group B, "high performance" (SPPB score  $> 8$ ). Finally, we performed a statistical analysis to investigate the differences in qualitative and quantitative bone parameters across each group.

**Results:** We included 13 MS patients, mean aged  $57.35 \pm 7.96$  y and 13 age-matched controls, mean aged  $57.62 \pm 7.51$  y. In the MS group, DXA examination showed the following results: TBLH BMD =  $1.114 \pm 0.20$  g/cm<sup>2</sup>, T-score =  $-0.30 \pm 1.25$  SD, Z-score =  $-0.13 \pm 0.99$  SD; L1-L4 BMD =  $1.126 \pm 0.14$  g/cm<sup>2</sup>, T-score =  $-0.56 \pm 1.19$  SD, Z-score =  $-0.06 \pm 1.27$  SD; FN BMD =  $0.865 \pm 0.134$  g/cm<sup>2</sup>, T-score =  $-1.19 \pm 0.95$  SD, Z-score =  $-0.39 \pm 0.93$  SD. In the control group DXA examination revealed: TBLH BMD =  $1.206 \pm 0.34$  g/cm<sup>2</sup>, T-score =  $0.369 \pm 1.32$  SD, Z-score =  $0.90 \pm 1.11$  SD; L1-L4 BMD =  $1.18 \pm 0.28$  g/cm<sup>2</sup>, T-score =  $-0.09 \pm 2.17$  SD, Z-score =  $0.65 \pm 1.98$  SD; FN BMD =  $0.96 \pm 0.20$  g/cm<sup>2</sup>, T-score =  $-0.40 \pm 1.43$  SD, Z-score =  $0.39 \pm 1.21$  SD. The mean TBS was  $1.222 \pm 0.83$  in MS group, with degraded (TBS  $< 1.2$ ) or partially degraded ( $1.2 < \text{TBS} < 1.350$ ) microarchitecture in 11 patients while mean TBS was  $1.350 \pm 0.09$  in the control group (6 patients with  $1.2 < \text{TBS} < 1.350$ ). We found statistically significant between-group differences for TBS and SPPB ( $p < 0.001$ ). In the MS group, not statistically significant difference was reported for TBS between patients with poor physical performance and those with high physical performance.

**Conclusion:** In MS patients with mild disability, TBS could be useful for early identification of bone involvement. Altered bone microarchitecture might be influenced by inflammatory milieu of MS itself rather than impaired physical performance in affected patients.

P262

### DIGITAL OSTEOARTHRITIS AND PREDICTING SEVERITY FACTORS

S. Abdellaoui<sup>1</sup>, A. Boukabous<sup>1</sup>, B. Bengana<sup>1</sup>, S. Lefkir-Tafiani<sup>1</sup><sup>1</sup>Issad Hassani Beni messous Hospital, Algiers, Algeria

**Objective:** Hand osteoarthritis (OA) is one of the most common localizations of OA affecting mainly women. The etiology appears to be multifactorial and the disease heterogeneous, comprising several clinical, radiological and ultrasound subsets. Erosive digital OA is most often painful, has inflammatory signs, causes functional impairment and has a more unfavorable course than that of nonerosive osteoarthritis of the hand. The objective of our study is to determine the clinical profile of patients with digital OA (DOA) as well as the predictive factors associated with the severity of this pathology.

**Methods:** We performed a trans-sectional descriptive study of 38 patients with DOA meeting the criteria for ACR. SPSS.20 Software was performed to data analysis.

**Results:** There were 38 patients: 84% women and 16% men, mean age 61 y. The BMI was 24 kg/m<sup>2</sup>, 47.36% had had a manual profession, 50% had  $\geq 1$  comorbidity, 21.05% hypercholesterolemia, 39.47% osteoporosis, and 29% associated thyroiditis. 28.12% of the women were in perimenopause and 9.37% had a history of hysterectomy. Pain visual analog scale (VAS) was 3.47/10, Dreiser's score was 7.87, CRP was 5 mg/L. Regarding the evaluation of quality of life, the SF-36 was 61.47/100, the AIMS score was respectively 1.84 for social activity, 2.34 for pain, 1.34 for depression, and 3.63 for physical activity. Knee and/or hip OA was associated in 92.10% and 44.43% of cases. 66% had reported the presence of finger nodules in the mother in family history. The injury was more severe on the side of the dominant hand in 39.47% of cases. 60.52% of patients presented Heberden's nodules, 34.21% of Bouchard's nodules, 63.15% an adductus inch and 13.15% an inch in "M" deformation. Metacarpophalangeal, proximal interphalangeal, distal interphalangeal and trapeziometacarpal were found respectively: clinically in 24%, 58%, 87% and 76% of cases, in 10.5%, 37%, 68% and 82% after X-ray analysis and in 8%, 37%, 74% and 92% after ultrasound examination. Regarding the "erosive" DOA, 79% of patients presented at least one clinical and/or imaging criterion suggesting an erosive form. 7.89% of patients had stiffness, 13.15% erythema, 34.21% swelling and 60.52% paresthesias. On the hands X-ray: 7.89% had a "gull-wing" appearance, 78.94% presented with pinching and 2.63% with ankylosis of the joint space. 28.94% had appearance of erosion/reconstruction on ultrasound. Regarding therapy, 66% had taken analgesics, 21% of NSAIDs, 68% used topical balms, 37% an OA drugs and 18% a hand orthosis. Age  $\geq 60$  y, BMI  $\geq 24$ , presence knee and/or hip OA (overweight/osteophyte correlation was 36.84%), the presence of nodules, comorbidities, thyroiditis, osteoporosis, history of hysterectomy and Dreiser score were correlated with DOA

severity. Whereas, perimenopause, manual occupation, VAS pain, CRP and quality of life score outcomes were not significant for seriousness of this impairment.

**Conclusion:** DOA is a very heterogeneous degenerative disease. The main difficulty lies in identifying the predictive factors of an evolution towards a severe erosive form leading to a significant degree of disability and altering the quality of life. To date, the treatments remain unsatisfactory, the place of DMARDs remains to be defined in this pathology.

P263

### MYOGENIC AND STRESS FACTORS ARE DIFFERENTIALLY EXPRESSED IN SKELETAL MUSCLE OF OLDER ADULTS WITH LOW MUSCLE STRENGTH

S. Dalle<sup>1</sup>, J. Dupont<sup>2</sup>, L. Dedeyne<sup>2</sup>, E. Gielen<sup>2</sup>, K. Koppo<sup>1</sup>

<sup>1</sup>Exercise Physiology Research Group, Dept. of Movement Sciences, KU Leuven, <sup>2</sup>Geriatrics & Gerontology, Department of Public Health and Primary Care, KU Leuven, Leuven, Belgium

**Objective:** Sarcopenia is a growing concern in the ageing population. This study aimed to compare protein expression profiles relevant in the context of muscle ageing, such as myogenic, catabolic and stress-related pathways between older adults with low compared to preserved muscle strength.

**Methods:** Through biopsies of the m. vastus lateralis, muscle protein expression profiles from 11 older adults that exhibited low muscle strength (6♀ and 5♂) were compared with the profiles of 13 older adults with preserved muscle strength (8♀ and 5♂), using western blotting technique. Low muscle strength was defined according to EWGSOP2 sarcopenia diagnostic criteria, e.g., chair stand test >15 s or grip strength <27 kg (male) or <16 kg (females).

**Results:** The low strength group was older (mean±SD; 78.0±5.0 vs. 71.5 ±2.6 y; p<0.001), but weight (75.6±4.6 vs. 72.8±2.9 kg; p=0.617) and BMI (26.7±2.5 vs. 27.2±6.0 kg/m<sup>2</sup>; p=0.782) were not different from the preserved strength group. Performance significantly differed between the low vs. preserved strength group for the chair stand test (17.5±4.9 vs. 9.1±1.5 s; p<0.01), gait speed (1.0±0.2 vs. 1.4±0.1 m/s; p<0.001) and SPPB test (median 9 [5-12] vs. 12 [10-12]; p<0.01) but hand grip strength was not different (26.7±3.4 vs. 29.7±2.7 kg; p=0.559). Catabolic pathways, i.e., ubiquitin-proteasome system (i.e., FOXO1/3a, MuRF1) and autophagy (i.e., LC3b, Atg5) were not differentially expressed between both groups, whereas myogenic factors (i.e., Pax7, MyoD) were systemically upregulated (~2-fold), in the low strength group. Stress markers CHOP and p-ERK1/2 were higher expressed (~1.5-fold) in the muscle of the low strength group. Surprisingly, expression of the inflammatory markers p-65NF-κB was higher (~7-fold) in muscle of normal strength older adults.

**Conclusion:** Older adults with low muscle strength differ in muscle expression profile, characterized by a higher expression of myogenic and stress factors. Whereas stress factors might reflect the age-related deterioration of tissue homeostasis, e.g., due to misfolded proteins (CHOP), chronic upregulation of myogenic markers might be an attempt to compensate for the gradual loss in muscle quantity and quality. These data might provide valuable insights in the processes that underlie the final stages of sarcopenia (at higher age), which can be different from gradual muscle wasting (e.g., characterized by upregulated catabolic processes).

P264

### PREDICTIVE VALUE OF ULTRASOUND IN DIGITAL OSTEOARTHRITIS

S. Abdellaoui<sup>1</sup>, A. Boukabous<sup>1</sup>, B. Bengana<sup>1</sup>, S. Lefkir-Tafiani<sup>1</sup>

<sup>1</sup>Issad Hassani Beni Messous Hospital, Algiers, Algeria

**Objective:** Digital osteoarthritis (DOA) is a complex degenerative pathology with sometimes noisy joint manifestations that can mimic inflammatory rheumatism. The osteoarticular ultrasound, is a valuable addition to the clinical examination, remains little used for diagnosis and monitoring DOA. The objective of our study is to analyze the ultrasound characteristics of arthritic hands OA in order to know the lesions and to better correlate the clinical data with the sonographic results.

**Methods:** We performed an ultrasound study of 38 patients (76 OA hands) suffering from DOA meeting the ACR criteria. SPSS.20 Software was performed to data analysis.

**Results:** There were 38 patients: 84% women, 16% men, mean age 61 y. 47.36% had a manual profession, 39.47% had associated osteoporosis, 66% had reported the presence of finger nodules in the mother in family history. 60.52% of patients presented with Heberden's nodules, 34.21% with Bouchard nodules, 63.15% an adductus inch and 13.15% an inch in "M" deformation. Impairment of metacarpophalangeal, proximal interphalangeal (PIP), distal interphalangeal (DIP) and trapeziometacarpal were found respectively: clinically in 24%, 58%, 87% and 76% of cases, and in 8%, 37%, 74% and 92% after ultrasound examination. The impairment was more severe from side of the dominant hand in 39.47% of cases clinically vs 52.63% after an ultrasound analysis. Regarding "erosive" DOA, 36.84% of patients presented at least one clinical and/or sonographic criterion suggesting an erosive form. 7.89% of patients had rigidity, 13.15% erythema, 34.21% swelling and 60.52% paresthesia. According to ultrasound, 28.94% showed an erosion/reconstruction aspect. 26.31% of the patients had presented an effusion of the PIP, 47.36% an effusion of the DIP, grade 1 Doppler signal was found in 15.78% with a strong clinical correlation and positive ultrasound signs in 65.78% of cases, no synovitis was reported.

**Conclusion:** DOA is a very heterogeneous disease, the added value of ultrasound appears to be of interest in the diagnosis and monitoring patients with this pathology.

P265

### EVALUATION AND TREATMENT OF AROMATASE INHIBITOR-INDUCED BONE LOSS

K. Nassar<sup>1</sup>, R. Assadi<sup>1</sup>, S. Janani<sup>1</sup>

<sup>1</sup>Ibn Rochd University Hospital, Rheumatology Dept., Hassan II University of Medicine & Pharmacy,

**Objective:** Hormone therapy, especially anti-aromatases (AI) used as adjunctive treatment of breast cancer have revolutionized cancer management, but they induce bone loss and increase the risk of fracture. Purpose of the study was to assess bone statuses in patients under AI for breast cancer, and the management of those with osteoporosis.

**Methods:** This is a descriptive, analytical study, carried out in the rheumatology department, in bone disease unit. Inclusion criteria were patients followed for breast cancer in the oncology department, treated by AI and referred to the rheumatology department for bone evaluation and management. All patients with vitamin D loss have been supplemented before performing the DXA. Exclusion criteria were patients having received another type of hormone therapy and presenting other risk factors of osteoporosis. Demographic data were identified, and all these patients received a measurement of BMD.

**Results:** Among 200 patients followed for breast cancer, 92 (46%) under AI were include. The mean age was 58.22 y (41-75 y). 97% of the study group were postmenopausal and 38% of them had postmenopause secondary to treatment. 85 patients (92.4%) had osteoporosis and 7 (7.6%) patients had osteopenia. The average time between the start of anti-aromatase therapy and the discovery of bone loss was 20.3 months. On bone densitometry, the lumbar spine was the most affected site (87%) with an average T-score at -2.84 and an average BMD at 0.843, followed by the femoral neck (16.5%) and the total hip (13.7%). All osteoporotic patients were treated with bisphosphonates: alendronate (60%), risedronate (17%) and zoledronate(12%).

**Conclusion:** The anti-estrogenic effect of AIs interferes with bone metabolism during treatment for breast cancer, which increases the risk of bone loss of risk of fracture. The frequency of bone loss in our series is estimated at 46%. Assessment of bone status and the long-term follow-up should be systematic in all patients followed for breast cancer on AI. The hygiene and dietary measures and the supplementation of phospho-calcium deficits must be corrected in patients in addition osteoporosis treatment according to specific recommendations.

	Results
Total patient	92
Mean age	58.22 y
Average age of cancer diagnosis	46.75 y
Time from medication by AI bone loss diagnosis	20.3 months
Menauposal patients	97%
Menopause secondary to AIs	38%
Osteoporotic patients	85 (92.4%)
Patients with osteopenia	7 (7.6%)
Osteoporotic sites	
Lumbar spine	88%
Femoral neck	17%
Total hip	14%
Metastatic cancer	15.18%
Bone	75%
Other	25%
Phosphocalcic statues (average value)	
Calcemia	92.83 mg/l
Calciuria	131.8 mg/24-h
Phosphatemia	48.09 mg/l
25 OH vitaminD	19.78 ng/ml
PTH	79 pg/ml
Bisphosphonate therapies	
Alendronate	60%
Risedronate	17%
Zoledronate	12%

Table. Patients characteristics, bone status under AI and the management of osteoporosis



P266

# ULTRASONOGRAPHIC AND ELASTOGRAPHIC CHANGES IN THE ACHILLES TENDON AND RETROCALCANEAL BURSA IN HEALTHY POPULATION REGARDING HABITUAL PHYSICAL ACTIVITY

C. A. Guillén-Astete<sup>1</sup>, C. Pijoán-Moratalla<sup>1</sup>, A. Barreal-Gómez<sup>2</sup>, I. Matellán-Fernández<sup>2</sup>

<sup>1</sup>Ramón y Cajal University Hospital, <sup>2</sup>CEU San Pablo, Madrid, Spain

**Objective:** Ultrasound examination, including elastography, has been a subject of interest in the evaluation of patients with suspected or diagnosed spondyloarthritis. It has been demonstrated that physical activity, in the general population, leads to adaptive morphological changes in the muscles and, it is expected, also at the tendon level. The characterization of these changes should be considered when applying the parameters of normality to the morphological characteristics of such well-studied structures as the Achilles tendon. The purpose of this study is to determine whether certain patterns of sporting activity (high, low or sedentary) are associated with morphological changes of the Achilles tendon and retrocalcaneal bursa.

**Methods:** 180 consecutive healthy volunteers, medical students or their relatives, frequent users of 3 sports centers, and a group of volunteer female employees of a large warehouse in the northern area of Madrid, were recruited between December 2019 and January 2020. To avoid the possible effect of degenerative changes, only adult subjects under 35 y of age were included. The percentage of lean mass was obtained by impedanciometry of four extremities. Ultrasound measurements performed (Figure 1): tendon thickness at the calcaneal border (TH) and at 1 cm proximal to this (TH-1), tendon diameter at the calcaneal border (TD) and at 1 cm proximal to this (TD-1), cross-sectional area at the calcaneal border (TA) and at 1 cm proximal to this (TA-1), bursa height (BH) and enthesis length (TEL). Elastography was measured in m/s.

**Results:** Characteristics of the study population: 112 women, mean age 23.8 SD 2.7 y, 35% sedentary, 77.8% right-handed. All ultrasound measurements except BH presented statistically significant differences according to sex (Table 1). Differences in tendon morphological characteristics were only identified between high-impact sports participants and the rest of the volunteers, regardless of sex (Table 1). A significant correlation was detected between lean mass percentage and TH (Pearson 0.22,  $P<0.002$ ), TH-1 (Pearson 0.364,  $P<0.001$ ), and TEL (Pearson 0.293,  $P<0.001$ ). Wave conduction velocity (elastography) in the tendon of males was 6.02 SD 1.6 and in females 5.4 SD 1.73 m/s ( $P=0.038$ ). Overall high-impact athletes had a velocity of 5.03 SD 1.68 and sedentary athletes 6.91 SD 0.93 m/s ( $P<0.001$ ).

**Conclusion:** Physical activity leads to structural changes in the Achilles tendon. High-impact physical activity should be taken into account in patients in whom ultrasound examinations or elastographic studies are performed, since normal parameters may require revision.

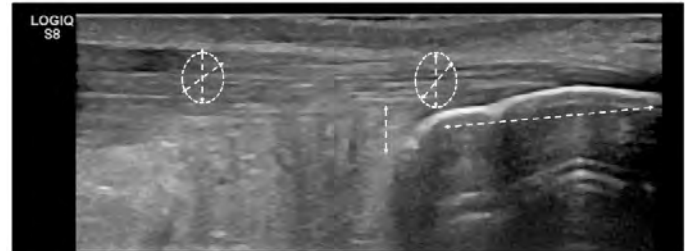
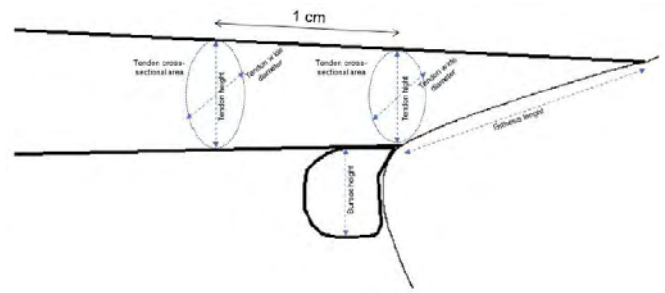


Figure 1. Representative scheme of the measurements taken during the ultrasound examination of the Achilles tendon.

Table 1. Results of the ultrasound examination of the entire cohort studied according to sex (female:female; male:male) and degree of physical activity (sedentary:sedentary; low impact:low impact; high impact:high impact). P-value: P-value.

	Sedentarios				Bajo impacto				Alto impacto				P-valor
	Mujer		Hombre		Mujer		Hombre		Mujer		Hombre		
	Media	SD	Media	SD	Media	SD	Media	SD	Media	SD	Media	SD	
TH mm	3.49	.60	3.77	.41	3.94	.46	4.26	.42	3.91	.53	4.44	.97	<0.001
TH-1 mm	3.52	.66	3.85	.49	3.51	.89	4.18	.59	3.95	.65	4.65	.75	<0.001
TD mm	18.59	2.01	19.50	2.50	18.29	2.43	20.72	1.73	18.80	2.52	19.88	1.66	0.003
TD-1 mm	18.87	1.98	19.62	2.22	18.39	2.36	20.92	1.72	18.59	2.64	19.75	1.77	0.009
TA mm <sup>2</sup>	0.60	0.15	0.70	0.17	0.59	0.09	0.74	0.10	0.62	0.11	0.77	0.13	<0.001
TA-1 mm <sup>2</sup>	0.59	0.11	0.70	0.09	0.63	0.10	0.77	0.10	0.66	0.12	0.80	0.11	<0.001
BH mm	1.62	.73	2.13	.61	1.66	.75	2.28	.71	2.62	1.16	2.45	1.12	0.504
TEL mm	18.97	2.49	18.49	1.92	18.56	2.46	20.02	2.93	17.82	2.51	20.73	2.50	<0.001

Table 2. Results of the elastographic study. All measurements were made in m/s. The results were grouped by sex, degree of activity, and leg dominance.

		Dominant leg				P-value
		Right		Left		
		Media	SD	Media	SD	
<b>Right tendon</b>	Sedentarian	7,11	,92	6,65	1,42	0.372
	Low impact	6,74	1,10	5,38	.	-
	High impact	5,13	1,79	4,02	2,06	0.009
<b>Left tendon</b>	Sedentarian	7,01	,93	5,39	1,47	0.001
	Low impact	6,62	1,12	4,91	.	-
	Hig impact	5,47	1,59	4,52	1,24	0.003

P267

# EFFECTS OF FREQUENT WEARING OF HIGH HEELS ON ACHILLES TENDON ULTRASTRUCTURE AND ELASTOGRAPHY IN HEALTHY YOUNG WOMEN

C. A. Guillén-Astete<sup>1</sup>, C. Pijoán-Moratalla<sup>1</sup>, A. Barreal-Gómez<sup>2</sup>, I. Matellán-Fernández<sup>2</sup>

<sup>1</sup>Ramón y Cajal University Hospital, <sup>2</sup>CEU San Pablo, Madrid, Spain

**Objective:** Both for aesthetic and occupational reasons, high-heeled shoes have become widespread among the western female population, although it is becoming less frequent with advancing age. Like certain physical activities performed regularly, the use of heeled shoes leads to postural changes in plantar support that in turn could lead to the development of adaptive processes of the Achilles tendon. The effect that the use of heels would have on the echostructure and elasticity of the Achilles tendon is not well known, however, given the relative extension of their use among women, it would be convenient to know them at the time of echography evaluation of a patient with suspected spondyloarthritis. In the same way, patients with spondyloarthritis who wear heels may undergo morphologic changes attributable to the footwear rather than to the disease itself, and this will be of great interest during clinical follow-up. The purpose of the present study was to compare the ultrasonographic and elastographic findings of women who wear heels for work purposes with healthy, athletic, or sedentary volunteers who do not wear this type of footwear regularly.

**Methods:** 112 female volunteers were recruited, 58 frequent heel wearers (>4 cm, >15 h/wk, >1 y). An ultrasound examination of the Achilles tendon and the retrocalcaneal bursa was performed as well as an elastographic study of three foci of the longitudinal plane of the tendon. Direct comparisons were made of the measurements obtained according to the use or non-use of heels.

**Results:** Heel wearers reported a mean of 35.2 SD 10 h/wk of heel use. The enthesis length of heel wearers and non-heel wearers was 18.7 SD 2.4 mm and 17.7 SD 2.5 mm, respectively ( $P=0.0043$ ; Mann-Whitney  $U=1218.0$ ). No other significant morphological differences were detected. Elastography among heel wearers had a conduction speed of 6.95 SD 0.93 m/s and among non-wearers, 5.02 SD 1.58 m/s ( $P<0.001$ ). Among heel wearers, a positive correlation (Figures 1 and 2) was observed between the number of h/week of use with thickness in the longitudinal plane, transverse diameter, and cross-sectional area of the tendon (Pearson coef. 0.420, 0.530, and 0.633, respectively;  $P<0.001$  in all cases).

**Conclusion:** Regular heel wear in women leads to the greater length of the Achilles enthesis and greater stiffness of the fibrillar structure. In addition, the morphological changes of the tendon correlate directly with the time of exposure to the use of this type of footwear. Our findings suggest that when performing an ultrasound evaluation of the Achilles tendon, we should take into account the history of frequent use of high heels.

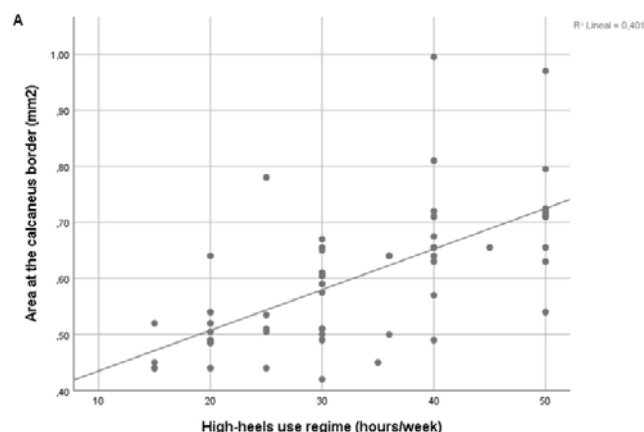


Figure 1. Dot plot showing the correlation between time of exposure to wearing high-heeled shoes and the cross-sectional area of the Achilles tendon at the edge of the calcaneus (talocalcaneal emergence point).

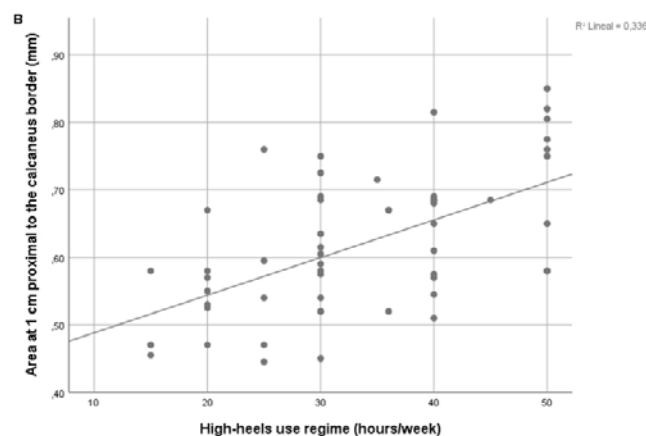


Figure 2. Dot plot showing the correlation between time of exposure to wearing high-heeled shoes and the cross-sectional area of the Achilles tendon at 1 cm proximal to the edge of the calcaneus (talocalcaneal emergence point).

P268

## CLINICAL SERVICES RECOVERY MATRIX (CSR-MATRIX): THE EXAMPLE OF PATIENT STRATIFICATION FOR THE RESTORATION OF BONE HEALTH ASSESSMENT SERVICES DURING THE ONGOING HEALTHCARE CRISIS

E. P. Kariki<sup>1</sup>, I. Ntanos<sup>2</sup>

<sup>1</sup>Manchester University NHS Foundation Trust/Department of Clinical Radiology/Manchester Royal Infirmary - The University of Manchester/School of Health Sciences/Division of Informatics, Imaging & Data Sciences, <sup>2</sup>Manchester University NHS Foundation Trust/Breast Surgery Unit/North Manchester General Hospital - The University of Manchester/Alliance Business School and School of Social Sciences, Manchester, UK

**Objective:** Facilitate the safe recovery of health services after the initial COVID19 healthcare lockdown, ensuring equal reliable care.

**Methods:** After the initial reaction to Covid19, with increasing pressures on elective patient care, we designed CSR-MATRIX, a dynamic Clinical-Service-Recovery tool. Based on the national risk alert level information<sup>1</sup>, the population COVID-19 risk assessment<sup>2</sup>, the Royal College of Radiologists guidelines<sup>3</sup> and Royal Osteoporosis Society guidance<sup>4</sup>, we developed CSR-MATRIX and stratified bone health assessment patient referrals for our bone mineral densitometry and vertebral fracture assessment services at our Trust according to low, medium, high COVID-19 clinical risk and examination priority. The matrix is adaptable to different national risk alert levels, various clinical services, their patients' needs and providers' preferences. We implemented the CSR-MATRIX in 2 DXA units, trained 3 radiographers with a 4-h session and a follow-up discussion.

**Results:** In June 2021 we had 3957 referrals for BMD (<5% CT-BMD); 87% of these were from mid-January 2020 onwards. User1: Reviewed 87 referrals in 5 d, User2: 462 referrals in 7 d, User3: 257 referrals in 8 d (a day is a 7-h shift, other nonscanning tasks were also performed). In 8 d, 20.4% of the referrals had been reviewed and stratified, in 3 d 153 patients had been identified for immediate scanning, which corresponded to up to 8 working days for the 3 DXA scanners under COVID-19 public safety measures (1 patient at a time, disinfection in between patients, patients waiting outside hospital).

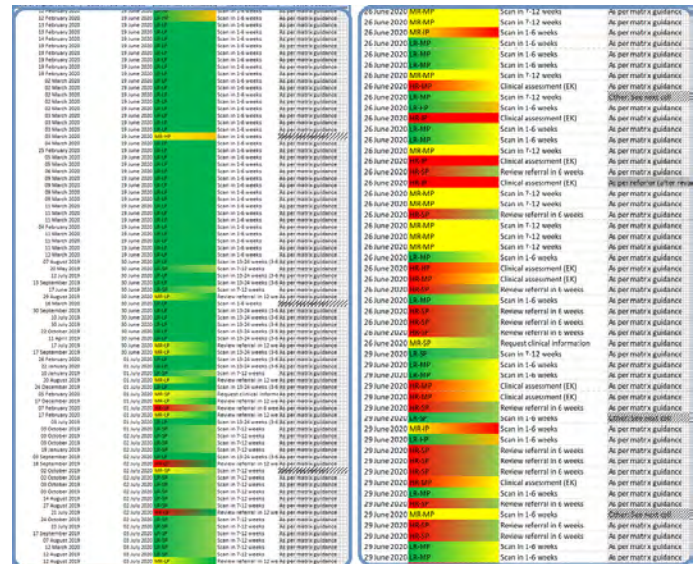
**Conclusion:** Healthcare services are the first to bear the burden in emergency events, even more so in pandemics. Shutting down elective care created an immense load to the already strained health services. The CSR-MATRIX is a pragmatic, flexible tool that can be used to stratify healthcare users fairly and safely in a responsible standardised manner.

### References:

- 1.GOV.UK. Our plan to rebuild: The UK Government' COVID-19 recovery strategy, 11/May/2020
- 2.NHSDigital. COVID-19 Population Risk Assessment, 2020

3.RCR. COVID-19 interim guidance on restarting elective work, 7/ May/2020

4.ROS. Toolkit: DXA restoration of service, 2020.



Part of the completed matrix from two users

P269

## BIOELECTRICAL IMPEDANCE ANALYSIS FOR PREDICTION OF BONE MINERAL DENSITY IN HEMODIALYSIS PATIENTS

M. Mazurenko<sup>1</sup>, A. Enkin<sup>2</sup>, S. Mazurenko<sup>1</sup>, U. Gomon<sup>3</sup>

<sup>1</sup>Saint Petersburg State University, <sup>2</sup>Leningrad Regional Hospital, <sup>3</sup>First Saint Petersburg State Medical University I. P. Pavlov, Saint Petersburg, Russia

**Objective:** The risk of fractures in CKD patients is significantly increased. Assessment of BMD by DXA is proved to be effective for prediction of fractures in dialysis patients. However X-ray densitometers are not always available in dialysis centers, and there are not criterion, except fractures and FRAX, to select patients who need BMD analysis. Bioelectrical impedance analysis (BIA) is not expensive and can be available at any center. The aim of the study was to assess the coherence between body composition estimates analyzed by BIA and bone mineral density measured by DXA in patients with CKD stage 5D.

**Methods:** Body composition, was analyzed by Tanita BC-401 and BMD was measured by DXA (Hologic QDR Discovery W). Study included 64 patients with CKD Stage 5 (30 men, 34 women) on hemodialysis. The average age of patients was 44.5±9.0 y, the duration of RRT patients from 12-201 months. Methods of descriptive statistics included the estimation of the mean with SD and the median with quartiles (25-75%). Intergroup differences were eval-



uated by parametric (student's t-test) and nonparametric analysis methods (Mann-Whitney U test). Spearman correlation was performed to analyze relationship between variables. In each of these methods the level of significance was set at P-values <0.05.

**Results:** Comparative analysis of body composition showed women had more fat in the body (both% and kg) and men had more lean mass in kg. Results of BIA of dialysis patients:

Table.

Variables	male	female	p
Body fat (%)	20.8±8.8	30.9±5.1	<0.001
Body lean ass (%)	20.5±4.1	19.6±2.5	>0.05
Body fat mass (kg)	16.6±7.9	20.7±4.8	<0.05
Body lean mass (kg)	15.1±2.2	13.1±2.1	<0.05

In whole group of dialysis patients BMD g/cm<sup>2</sup> of the distal arm correlated with height ( $r=+0.8$ ;  $p<0.001$ ), weight ( $r=+0.5$ ;  $p<0.01$ ), lean body mass (kg) ( $r=+0.5$ ;  $p<0.01$ ) and fat (%) ( $r=-0.41$ ;  $p<0.05$ ). T-score of the distal arm correlated with weight ( $r=+0.41$ ;  $p<0.01$ ), BMI ( $r=+0.51$ ;  $p<0.05$ ), lean body mass ( $r=+0.36$ ;  $p<0.05$ ). Z-score of the distal arm correlated with weight ( $r=+0.5$ ;  $p<0.01$ ), BMI ( $r=+0.51$ ;  $p<0.01$ ), and fat (kg) ( $r=+0.38$ ;  $p<0.05$ ). BMD g/cm<sup>2</sup> of the lumbar spine (L1-L4) correlated with height ( $r=+0.35$ ;  $p<0.05$ ) and lean body mass (kg) ( $r=+0.5$ ;  $p<0.01$ ). T-score of the lumbar spine correlated with lean body mass (kg) ( $r=+0.36$ ;  $p<0.05$ ). Z-score does not real any significant correlation with the other variables. BMD g/cm<sup>2</sup> of the total hip correlated with height ( $r=+0.39$ ;  $p<0.05$ ) weight ( $r=+0.54$ ;  $p<0.01$ ), lean body mass (kg) ( $r=+0.42$ ;  $p<0.05$ ). T-score of the total hip correlated with weight ( $r=+0.44$ ;  $p<0.01$ ), lean body mass ( $r=+0.34$ ;  $p<0.05$ ), fat (kg) ( $r=+0.35$ ;  $p<0.05$ ). Z-score of the total hip correlated with weight ( $r=+0.39$ ;  $p<0.05$ ), lean body mass ( $r=+0.34$ ;  $p<0.05$ ), fat (kg) ( $r=+0.38$ ;  $p<0.05$ ). When we analyzed men and women separately revealed that in men body fat (kg) showed more influence on BMD ( $r=+0.57$ ;  $p<0.01$ ), T-score ( $r=+0.57$ ;  $p<0.01$ ), and Z-score ( $r=+0.65$ ;  $p<0.001$ ) of the distal arm than in women.

**Conclusion:** BIA is not the best method for prediction of BMD in dialysis patients and does not reveal great advantage before constitutional characteristics of the patients. Maybe more sophisticated equipment than we used in the study will show better results. We will try to study this in the future.

## P270

### ULTRASOUND CHARACTERIZATION OF THE PLANTAR FASCIA: A COMPARATIVE STUDY BETWEEN PATIENTS WITH SPONDYLOARTHRITIS AND HEALTHY VOLUNTEERS, HIGH-IMPACT ATHLETES AND HIGH-HEEL USERS

C. A. Guillén-Astete<sup>1</sup>, C. Pijoán-Moratalla<sup>1</sup>, L. Seghers-Aguilar<sup>2</sup>, S. Espejo-Polidura<sup>2</sup>

<sup>1</sup>Ramón y Cajal University Hospital, <sup>2</sup>CEU San Pablo, Madrid, Spain

**Objective:** The plantar fascia is one of the most frequently affected enthesis territories in patients with spondyloarthritis. Plantar fasciitis, not related to these diseases, is also a frequent pathology linked to alterations in the biomechanics of plantar support. The plantar fascia, moreover, is one of the most relevant structures in plantar flexion of the foot and is therefore subject to bodyweight loading in high-impact sports. Although plantar fasciitis is defined clinically, it is noted by demonstrating an increase in its thickness. The purpose of the present study is to determine whether there are differences between the plantar fasciae of healthy subjects, high-impact athletes, high-heel users, and patients with spondyloarthritis (with plantar fascia involvement).

**Methods:** between December 2019 and January 2020, sedentary healthy volunteers (medical students and relatives), basketball and volleyball players, female workers of a department store heel wearers (>4 cm, >15 h/wk, >1 y), and patients with a known diagnosis of spondyloarthritis and plantar fascia involvement were recruited. An ultrasound examination of the plantar fascia of the dominant foot was performed in the longitudinal plane, at the level of the calcaneal border and 10mm distal to it. To exclude changes attributable to age, volunteers under 35 y of age were included. The ultrastructure of the fascia was dichotomously assessed as normal or altered. All scans were performed by an expert sonographer unrelated to the type of volunteer being scanned.

**Results:** 46 sedentary volunteers (<2 h weekly exercise), 42 federated basketball and volleyball players, 58 female heel wearers, and 26 patients diagnosed with spondyloarthritis and plantar fasciitis were included. Table 1 summarizes the demographic and anthropometric characteristics of the included subjects. The thicknesses of the plantar fascia heights in the longitudinal plane at the height of the calcaneal border are shown in Table 2. No statistically significant differences were identified between the thickness of the patients and the high-impact athletes. Statistically significant differences were identified in the comparisons between the remaining three height means, depicted in Figure 1. The proportion detecting altered echostructure occurred in 76.9% of patients, 38% of high-impact athletes, and 10.3% of heel wearers, and 8.6% of sedentary people. Statistical comparison of these proportions is shown in Figure 1.

**Conclusion:** The ultrasound changes observed in the plantar fascia in patients with spondyloarthritis and plantar fasciitis are similar to those presented by high-impact athletes both at the level of ultrastructure and fascia thickness. According to these results,



it is advisable to know the history of sports activities of patients with suspected spondyloarthritis or under follow-up for this diagnosis when evaluating the plantar fascia ultrasonographically.

Table 1. Demographic and anthropometric characteristics of the population studied.

	Asymptomatic volunteers			SpA patients N=26
	Sedentarian N=46	High impact athletes N=42	High-heels users N=58	
Age (years)	23.8 DE 3.1	25.5 DE 3.9	26.8 DE 2.3	36.9 DE 3.9
Female sex, %	29, 63%	33, 78.5%	58, 100%	8, 30.7%
BMI g/cm <sup>2</sup>	25.7 DE 2.6	23.4 DE 2.8	23.8 DE 3.8	25.6 DE 3.4
% lean mass				
Men	36.3 DE 5.4%	47.3 DE 4.3%	-	34.9 DE 5.2%
Women	32.7 DE 6.2%	43.7 DE 3.9%	33.7 DE 5.3%	31.3 DE 5.9%

Table 2. Results of the ultrasound assessment of the plantar fascia.

	Asymptomatic volunteers			SpA patients N=26
	Sedentarian N=46	High impact athletes N=42	High-heel users N=58	
Fascia height at the talocalcaneal border (mm)	2.93 DE 0.58	4.45 DE 0.37	3.33 DE 0.44	4.51 DE 0.32
Height of the fascia 10 mm distal to the talocalcaneal edge	2.77 DE 0.53	4.19 DE 0.32	3.19 DE 0.37	4.43 DE 0.39
Presence of calcaneal enthesophyte	5 (10.8%)	34 (80.9%)	6 (10.3%)	19 (73%)
Echostructure alteration	4 (8.6%)	16 (38%)	6 (8.6%)	20 (76.9%)

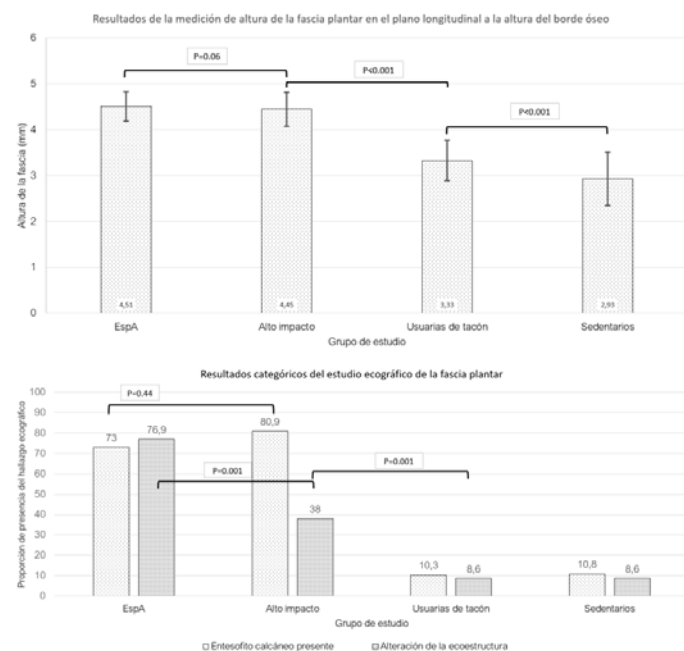


Figure 1. Comparisons of quantitative (superior) and categorical (inferior) ultrasound findings among groups studied.

P271

## AMINO ACID METABOLITE PROFILE OF LOW BMD IN IRANIAN ELDERLY: BUSHEHR ELDERLY HEALTH PROGRAM

N. Panahi<sup>1</sup>, N. Fahimfar<sup>1</sup>, S. Roshani<sup>2</sup>, S. Gharibzadeh<sup>3</sup>, B. Arjmand<sup>4</sup>, E. Migliavacca<sup>5</sup>, D. Breuille<sup>5</sup>, J. N. Feige<sup>5</sup>, Y. Grzywinski<sup>5</sup>, J. Corthesy<sup>5</sup>, R. Heshmat<sup>6</sup>, I. Nabipour<sup>7</sup>, A. Soltani<sup>8</sup>, F. Farzadfar<sup>2</sup>, B. Larijani<sup>9</sup>, A. Ostovar<sup>1</sup>

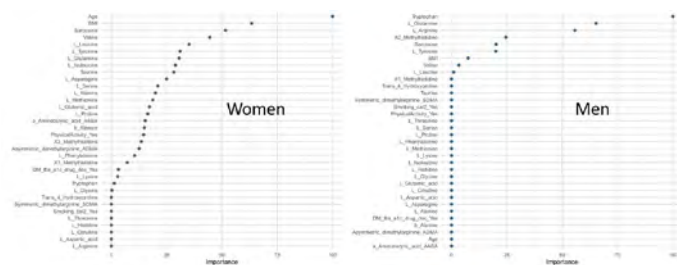
<sup>1</sup>Osteoporosis Research Center, Endocrinology & Metabolism Clinical Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran, <sup>2</sup>Non-Communicable Diseases Research Center, Endocrinology and Metabolism Population Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran, <sup>3</sup>Department of Epidemiology and Biostatistics, Pasteur Institute of Iran, Tehran, Iran, <sup>4</sup>Metabolomics & Genomics Research Center, Endocrinology & Metabolism Molecular-Cellular Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran, <sup>5</sup>Nestlé Research, EPFL Innovation Park, Lausanne, Switzerland, <sup>6</sup>Chronic Diseases Research Center, Endocrinology & Metabolism Population Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran, <sup>7</sup>The Persian Gulf Marine Biotechnology Research Center, The Persian Gulf Biomedical Sciences Research Institute, Bushehr University of Medical Sciences, Bushehr, Iran, <sup>8</sup>Evidence Based Medicine Research Center, Endocrinology & Metabolism Clinical Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran, <sup>9</sup>Endocrinology & Metabolism Research Center, Endocrinology & Metabolism Clinical Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran

**Objective:** Amino acids play an important role in bone health and have been the most frequently reported metabolites associated with low BMD in metabolomics studies. We hypothesized that amino acid metabolic profile may be an early indicator of bone deterioration in the elderly population reflected in BMD.

**Methods:** We randomly selected 400 individuals from 2384 elderly men and women participating in the second stage of the Bushehr Elderly Health (BEH) program, a population-based prospective cohort study that is being conducted in Bushehr, a southern province of Iran. Frozen plasma samples were used to measure 34 amino acid and derivatives metabolites using the UPLC-MS/MS-based targeted metabolomics platform. We conducted the least absolute shrinkage and selection operator regression analysis to examine the ability of measured metabolites to predict low BMD.

**Results:** When adjusted for possible confounders (age, BMI, diabetes, smoking, physical activity, and sex), 5 metabolites were associated with femoral neck BMD, 17 metabolites with total hip BMD, and 8 metabolites with lumbar spine BMD (17 metabolites in total). Four metabolites (L-glutamine, L-tryptophan, 3-methylhistidine, and L-leucine) were associated with all 3 sites BMDs. We also observed that lower leucine, valine, tryptophan, and 3-methylhistidine, and higher glutamine could differentiate osteoporosis from non-osteoporosis in both women and men (Figure).

**Conclusion:** We found several amino acid metabolites associated with bone status in elderly individuals. Further studies are required to evaluate the bone health effect of these metabolites and their usefulness as clinical biomarkers for osteoporosis prediction.



tion means and conditions) for the realization of the rehabilitation potential in full taking into account the full recovery of the everyday activity and the ability to work. ability to work. The rehabilitation prognosis was defined as doubtful, with probable possibility of partial realization of the rehabilitation potential in cases of insufficient effectiveness of measures to implementation of IPR, with the prognosis of partial restoration of the impaired categories of vital functions with a decrease in the degree of their limitations. An unfavorable rehabilitation prognosis occurred when the impossibility of partial restoration of the impaired categories of vital activity and reduction of the degree of their limitations, the impossibility of realizing the rehabilitation potential. These cases occurred with progression of musculoskeletal pathology, pathogenically unrelated to the traumatic factor.

P272

## ASSESSMENT OF REHABILITATION PROGNOSIS IN PATIENTS WITH NEUROPATHIES

A. Filipovich<sup>1</sup>

<sup>1</sup>National Science and Practice Centre of Medical Assessment & Rehabilitation, Yuhknovka, Belarus

The evaluation of the rehabilitation potential and the rehabilitation prognosis in 30 patients with neuropathies, mainly of traumatic genesis was carried out. of traumatic genesis during the rehabilitation period was carried out. Taking into account rehabilitation potential and rehabilitation prognosis determination, a list of indications for specific rehabilitation measures (type, frequency, duration, number of procedures in the course), an individual rehabilitation program (IRP) was formed. Rehabilitation prognosis was determined in relation to specific categories of disabilities (movement, selfcare) in the early and late recovery periods, based on nosology, the severity of syndromic and functional disorders, the nature of the recovery process, taking into account age, comorbidity, intoxicating factors (alcohol use, smoking), the assumed influence of environmental factors. Rehabilitation prognosis was assessed taking into account the probability of realization of the goals of rehabilitation in relation to separate components of the rehabilitation potential, mainly according to the degree of severity of the statodynamic disturbances. For patients with high severity of disabilities (mostly with traumatic sciatic nerve injury) with functional class (FC) 3 of the ability to move or selfcare, prognosis was made taking into account anticipated recovery in the six-month period after rehabilitation of active daily activities. In patients with disability categories within FK2 (mostly with upper extremity nerve damage), prognosis was based on the expected recovery of the ability to perform activities of daily living in the 6-month period after rehabilitation. was based on the expected recovery of the ability to work and accordingly realization of the labor prognosis. Favorable rehabilitation prognosis was determined when a high probability of full restoration of the impaired activity categories (self-care, movement) with of objective possibilities (rehabilita-

P273

## REHABILITATION AND EXPERT DIAGNOSIS OF DISORDERS, DISABILITIES IN PATIENTS WITH NEUROPATHIES ON THE BASIS OF ICF

A. Filipovich<sup>1</sup>

<sup>1</sup>National Science and Practice Centre of Medical Assessment & Rehabilitation, Yuhknovka, Belarus

In the course of the research, the algorithm of the rehabilitation evaluation of neurological disorders, restrictions of vital functions in patients with statodynamic disturbances caused by traumatic and compression-ischemic neuropathies was developed on the basis of the International Classification of Functioning, Disability and Health (ICF). The algorithm provides for certain stages, interrelations 117 in the assessment of body function and structures, activity, and participation both in conducting rehabilitation measures, as well as medical and social expertise, and is carried out with the aim of standardizing the medical services rendered. Within the framework of the presented general model of ICF use a three-level diagnostic algorithm for expert evaluation of impairments and disabilities has been developed, which optimized for the already existing technology of examining patients by specialists of medical and rehabilitation expert commissions, which use a system of quantitative assessment of impairments, limitations of vital activity in the category of "functional class".

In the course of the study, a list of methods for objectification of the presence and severity of statodynamic impairments was developed. The detailed list of methods intended for practical use, includes a number of separate diagnostic tables. The diagnostic list contains such categories as the assessed diagnostic expert attribute or indicator, assessment technique (expert-rehabilitation diagnostics), registered and analyzed indicators, peculiarities of carrying out methods, nature of changes in pathology. It is suggested to perform the assessment (as markers of "function" state in the ICF system): statodynamic status (muscle strength and muscle tone, deep reflexes, skin reflexes, pathological reflexes); simple sensorimotor reactions and complex sensorimotor

reactions with Schilder, Stewart-Holmes tests; static coordination of upper and lower extremities; dynamic coupled coordination of trunk, upper and lower extremities; biomechanical assessment of walking function, active and passive movements in joints and spine; simple and complex types of sensitivity. Assessment (as markers of "structures" condition): results of ultrasound diagnostics of nerve structures and vascular segment with evaluation of presence and expression of morphological changes in nerve structures, results of electroneuromyography diagnostics - conduction velocity, rhythm, symmetry of electrical velocity, rhythm, symmetry of electrical activity, character of response to functional tests; peripheral emodynamic indexes, Peripheral hemodynamic indices in the segments of the affected limb using rheovasography and raseospirometry. using rheovasography and calculation of rheographic index, index of venous outflow obstruction.

P274

### THE CURRENT PROBLEMS OF DIAGNOSIS AND THERAPY OF OSTEOPOROSIS IN THE MODERN MEGAPOLIS

T. Semenova<sup>1</sup>, S. Mazurenko<sup>1</sup>, K. Egorov<sup>2</sup>, L. Ermolaeva<sup>1</sup>, M. Shabalina<sup>1</sup>

<sup>1</sup>Saint Petersburg State University, <sup>2</sup>Saint George City Hospital, Saint Petersburg, Russia

**Objective:** Saint Petersburg is a second biggest city in Russia with very well developed high quality health care system. It has many centers with modern diagnostic equipment for diagnosis and therapy of osteoporosis. There are no significant problems with the availability of osteoporotic drugs. At the same time the problem of early diagnosis and therapy of osteoporosis is still exists. The aim of this study was to investigate the level of the diagnosis and treatment of osteoporosis in patients admitted with low-trauma fractures to trauma and orthopaedics department of a big municipal hospital.

**Methods:** We analyzed cases of 101 patients (77 women, 24 men) with low-trauma fractures. The average age was 65.4±16.3 y. 15 women were premenopausal and 62 postmenopausal. The average BMI was 26.4±6.3. All patients were interviewed for the presence of osteoporosis risk factors, its diagnosis and treatment before the fracture, the presence of comorbidities, and physical activity before the fracture. The results were processed using the standard software for applied statistical analysis.

**Results:** 47 patients had fractures of the femur (32 femoral neck fractures, 8 diaphyseal fractures, 7 femoral pertrochanteric). 28 patients had tib-fib fractures, 12 had fractures of shoulder bones and distal forearm. 32 patients had a previous history of a low-energy fractures. 23 patients noted the presence of low-energy fractures in close relatives. 31 patients underwent hip arthroplasty, 35 patients underwent metal osteosynthesis. The average age of patients at the time of the first low-energy fracture was 62.7±13.0 y. 49 people smoked before the first fracture. 20 patients con-

tinued to smoke afterwards. The average duration of smoking is 20.6±17.7 y. 11 patients consumed alcohol more often than once a week, 1 patient 3-4 times a week and 1 everyday. One patient reported drinking binges. 8 patients received long-term glucocorticosteroid therapy. 25 patients had spontaneous falls during the year preceding the fracture. The average number of falls was 3.0±2.2 per year. 31 patients were diagnosed with coronary heart disease, 54 hypertension, 18 chronic heart failure, 18 chronic cerebrovascular accident, 7 chronic kidney disease stages 2-3, 4 type 2 diabetes mellitus. Densitometry (DXA) was performed in 11 patients before admission to hospital. Osteoporosis was diagnosed in 7 patients, osteopenia in 3 patients. Only eight patients received osteoporosis treatment: 4 patients consumed vitamin D and calcium supplements irregularly, 3 patients received short-term treatment with bisphosphonates, 1 patient had single denosumab injection. Most patients reported a lack of available information about the possibility of diagnosing and treating osteoporosis before the fracture and after the first fracture.

**Conclusion:** We revealed the common risk factors for fractures in the studied group: female gender, postmenopausal age, smoking, alcohol abuse, glucocorticosteroid intake, falls, and previous low-energy fractures. The most common comorbidities were diseases of the cardiovascular system, which increase the risk of falls. At the same time we revealed problems with primary and secondary prevention of fragility fractures. The lack of information about osteoporosis, simple ways to prevent and diagnose the disease is the main problem. Health care professionals should provide patients with more accessible information about osteoporosis. Awareness among clinicians and health care professionals on osteoporosis should be increased to overcome the burden of the disease.

P275

### EXAMINING THE RELATIONSHIPS BETWEEN TREATMENT AND PAIN AND PHYSICAL FUNCTION OUTCOMES IN PATIENTS WITH OSTEOARTHRITIS: A MEDIATION MODELING APPROACH

L. Abraham<sup>1</sup>, R. H. Dworkin<sup>2</sup>, D. C. Turk<sup>3</sup>, J. D. Markman<sup>2</sup>, D. A. Williams<sup>4</sup>, A. G. Bushmakina<sup>5</sup>, J. A. Hall<sup>6</sup>, D. C. Semel<sup>7</sup>, J. C. Cappelleri<sup>5</sup>, R. Y. Yang<sup>7</sup>

<sup>1</sup>Pfizer Ltd., Tadworth, UK, <sup>2</sup>University of Rochester, Rochester, USA, <sup>3</sup>University of Washington, Seattle, USA, <sup>4</sup>University of Michigan, Ann Arbor, USA, <sup>5</sup>Pfizer, Groton, USA, <sup>6</sup>Eli Lilly and Company, Indianapolis, USA, <sup>7</sup>Pfizer, New York, USA

**Objective:** To better understand the complex relationships between treatment and pain and physical function (PF) outcomes, we investigated a set of mediation models of osteoarthritis patients' responses to tanezumab.

**Methods:** Data came from 2 randomized trials of tanezumab (Study 1: NCT02697773<sup>1</sup>, Study 2: NCT02709486<sup>2</sup>). A set of mediation models was used to explore the interrelationships among



treatment, PF as measured by the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC\*) PF scores, and pain (WOMAC Pain scores) as a mediator of the effect of treatment on PF: (a) cross-sectional mediation models, (b) longitudinal mediation models, and (c) pseudo steady-state longitudinal mediation models. Variables in the cross-sectional mediation models were: treatment (tanezumab vs. placebo), pain and PF scores (models were assessed separately at weeks 2, 4, 8, 12, 16, or 24). The longitudinal mediation models estimate relationships using data from all weeks simultaneously. The longitudinal steady-state mediation model also uses all available data at weeks 2, 4, 8, 12, 16, and 24 with the assumption that relationships among variables in the model are the same at all time points.

\*©1996 Nicholas Bellamy. WOMAC® is a registered trademark of Nicholas Bellamy (CDN, EU, USA).

**Results:** The cross-sectional and longitudinal mediation models showed that the indirect effect of treatment through pain on PF was stable across time (cross-sectional: 78.8-95.1%, all  $P < 0.0001$ ; longitudinal: 70.5-86.6%, all  $P < 0.0001$ ), indicating that a pseudo steady-state model is appropriate. The longitudinal steady-state mediation models showed that the indirect effect of the treatment on PF was 77.8% in Study 1 and 74.1% in Study 2 ( $P < 0.0001$ , respectively), while the direct effect of the treatment on PF was 22.2% for Study 1 ( $P = 0.0003$ ) and 25.9% for Study 2 ( $P = 0.0019$ ).

**Conclusion:** At least 75% of the treatment effect of tanezumab on physical functioning can be explained by the improvements in pain. However, tanezumab has an additional effect on physical functioning (approximately 25%), which is independent of improvements in pain. Research is needed to explain this effect and evaluate additional mediators (e.g., sleep, fatigue, method variance) that may contribute to the observed direct effect.

#### References:

1. Schnitzer TJ, et al. JAMA 2019;322:37.
2. Berenbaum F, et al. Ann Rheum Dis 2020;79:800.

**Acknowledgments:** This study was funded by Pfizer and Eli Lilly and Company. Medical writing support was provided by Shuang Li, PhD, of Engage Scientific Solutions, and funded by Pfizer and Eli Lilly and Company.

**Disclosures:** Robert H. Dworkin, PhD, has received in the past 5 years research grants and contracts from the US Food and Drug Administration and the US National Institutes of Health, and compensation for serving on advisory boards or consulting on clinical trial methods from Abide, Acadia, Adynxx, Analgesic Solutions, Aptinyx, Aquinox, Asahi Kasei, Astellas, AstraZeneca, Biogen, Biohaven, Boston Scientific, Braeburn, Cardialen, Celgene, Centrexion, Chromocell, Clexio, Collegium, Concert, Confo, Decibel, Dong-A, Editas, Eli Lilly, Ethismos (equity), Eupraxia, Glenmark, Gloriana, Grace, Hope, Immune, Lotus, Mainstay, Merck, Neumentum, Neurana, NeuroBo, Novaremed, Novartis, Olatec, Pfizer, Phosphagenics, Quark, Reckitt Benckiser, Regenacy (also equity), Relmada, Sanifit, Scilex, Semnur, SIMR Bio, SK Life Sciences, Sollis, PRIM, Teva, Theranexus, Trevena, Vertex, and Vizuri. Dennis C. Turk has received research grants and contracts from the

US Food and Drug Administration and US National Institutes of Health and has received compensation for consulting on clinical trial and patient preferences from AccelRx, Eli Lilly and Company, Flexion, GlaxoSmithKline, and Pfizer. David A. Williams has received research grants from the National Institutes of Health and has received compensation for consulting on clinical trials and behaviourally based interventions with Swing Therapeutics, Inc. and Community Health Focus Inc. John D. Markman has the following to disclose: Ad board: Clexio Biosciences, Flexion Therapeutics, Quark Pharmaceuticals, Quartet Medicine, Collegium Pharmaceutical, Purdue Pharma, Biogen, Novartis, Aptinyx, Nektar, Allergan, Grünenthal, Eli Lilly and Company, Depomed, Janssen, Teva Pharmaceutical Industries, KemPharm, Abbott Laboratories, Plasma Surgical, Chromocell, Convergence Pharmaceuticals, Inspiron, Pfizer, Sanofi, Daiichi Sankyo, and Trevena. Consultant: Trigemina, Editas Medicine, and Plasma Surgical. Data safety monitoring board: Novartis and Allergan. Jerry A. Hall is an employee of Eli Lilly and Company with stock and/or stock options. Andrew G. Bushmakina, Lucy Abraham, David C. Semel, Joseph C. Cappelleri, and Ruoyong Yang are employees of Pfizer with stock and/or stock options.

## P276

### THE CASE OF X-LINKED HYPOPHOSPHATAEMIA (XLH)

V. Vasylets<sup>1</sup>, N. Tikhonchuk<sup>1</sup>

<sup>1</sup>Multifield Medical Center of Odessa National Medical University, Odessa, Ukraine

**Objective:** To improve diagnostics of XLH as a rare lifelong disease in adult rheumatological practice.

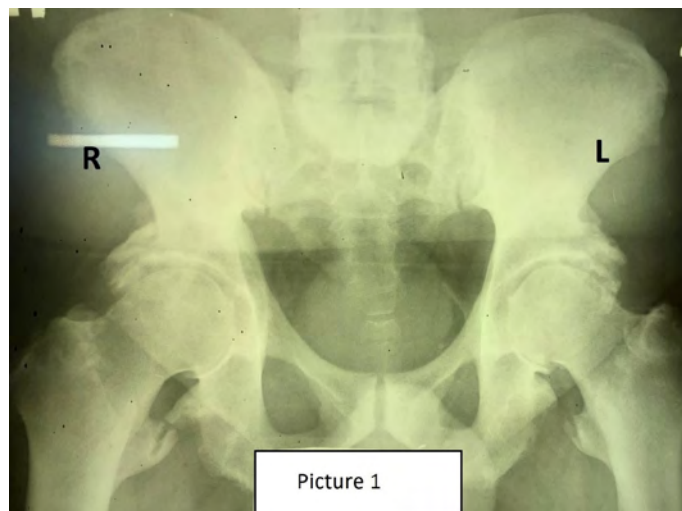
**Methods:** Based on clinical observation of 51 y.o. male with an erroneous diagnosis of ankylosing spondylitis (AS).

**Results:** Patient R. presented chronic diffuse musculoskeletal pain during 15 y, both of inflammatory and mechanical character, morning stiffness up to 90 min. There was no synovitis. Patient was of short stature – 1.70 m. Patient assessed pain VAS as 7.5/10. Chronic use of NSAIDs with a weak effect. CRP – 5 mg/dl, ESR – 12 mm/h, HLA-B27 – negative. No MRI signs of inflammatory bone edema in sacrum and iliosacral joints were identified. There was calcification of anterior and posterior longitudinal ligaments at levels C5-T7. Sacroiliac joints were poorly differentiated. Massive marginal bony outgrowths in both acetabular cavities, greater and lesser trochanters. X-ray slits were not narrowed. Bony growths in the area of the ischial bones (hyperostosis) and enthesites are very characteristic, present at the attached X-Ray (Picture 1). Further examination showed: serum phosphorus was decreased to 0.6 mmol/l (normal range 0.81-1.45), serum PTH was normal – 29.4 pg/ml (15.0-65.0). Phosphorus in 24-h urine was elevated to 71.8 mmol/24-h (12.9-42.0). XLH diagnosis should be confirmed by molecular genetic analysis or determination of FGF23 levels before treatment, if possible. Traditional



treatment includes alphacalcidol, phosphates. Burosumab – fully human IgG1 monoclonal antibody against FGF23 was approved by FDA, 2018.

**Conclusion:** Serum phosphorus level decrease is a mandatory, although not specific, sign of hypophosphatemia. Clinical diagnosis of XLH should be based on symptoms of rickets and osteomalacia in combination with a hypophosphataemia and kidney loss of phosphorus. Calcium and vitamin D deficiency are absent. Rheumatologists should be aware of signs and symptoms of XLH and assess the serum phosphorus level in patients with existing or suspected AS.



P277

### IMPACT OF NON-HIP FRACTURES IN ELDERLY WOMEN: A NARRATIVE REVIEW

A. Charles<sup>1</sup>, A. Mugisha<sup>2</sup>, L. Iconaru<sup>1</sup>, F. Baleanu<sup>1</sup>, F. Benoit<sup>2</sup>, M. Surquin<sup>2</sup>, P. Bergmann<sup>3,4</sup>, J.-J. Body<sup>1,2,4</sup>

<sup>1</sup>Dept. of Endocrinology, CHU Brugmann, <sup>2</sup>Dept. of Internal Medicine, CHU Brugmann, <sup>3</sup>Dept. of Nuclear Medicine, CHU Brugmann, <sup>4</sup>Laboratory of Translational Medicine, CHU Brugmann, Brussels, Belgium

**Objective:** The association of hip fractures with adverse outcomes is well established but, for non-hip fractures, this association still needs to be further investigated. The objective of this narrative review is to describe the state of the art with regards to the health impact of clinically relevant non-hip fracture locations in postmenopausal women.

**Methods:** PubMed and Scopus databases were searched from January 2010 until December 2020. Studies were included when the crude rates and/or relative risk of one-year subsequent fractures and/or mortality were reported as well as the precise fracture site.

**Results:** Twenty-three studies met the inclusion criteria. Regarding mortality rates, there was a high variability between studies,

with higher rates for vertebral, proximal humerus and pelvic fractures. There was a small or no impact of wrist, ankle or tibia fractures. The mortality rate increased with age after vertebral, proximal humerus and wrist fractures. Moreover, proximal humerus and vertebral fractures were associated with a higher mortality risk. Although it is claimed that fracture risk is increased after any fragility fracture, few studies have actually investigated fracture risk according to the site of an index fracture. Our review indicates that the one-year risk of subsequent fracture is significantly increased after an initial proximal humerus, vertebral or pelvis fracture.

**Conclusion:** This narrative review indicates that, besides hip, fractures of vertebrae, proximal humerus or pelvis deserve more attention when trying to prevent adverse outcomes of osteoporosis. More studies on the topic of non-hip fractures are urgently needed.

P278

### GREATER PQCT CALF MUSCLE DENSITY IS ASSOCIATED WITH LOWER HIP FRACTURE RISK, INDEPENDENT OF FRAX, FALLS AND BMD: A META-ANALYSIS IN THE OSTEOPOROTIC FRACTURES IN MEN (MROS) STUDY

N. C. Harvey<sup>1</sup>, E. Orwoll<sup>2</sup>, J. A. Cauley<sup>3</sup>, T. Kwok<sup>4</sup>, M. K. Karlsson<sup>5</sup>, B. E. Rosengren<sup>5</sup>, E. Ribom<sup>6</sup>, P. M. Cawthon<sup>7</sup>, K. Ensrud<sup>8</sup>, E. Liu<sup>9</sup>, K. A. Ward<sup>1</sup>, C. Cooper<sup>1</sup>, J. A. Kanis<sup>10</sup>, M. Lorentzon<sup>11</sup>, C. Ohlsson<sup>12</sup>, D. Mellström<sup>12</sup>, H. Johansson<sup>9</sup>, E. V. McCloskey<sup>13</sup>

<sup>1</sup>MRC Lifecourse Epidemiology Unit, University of Southampton, Southampton, UK, <sup>2</sup>Oregon Health & Science University, Portland, USA, <sup>3</sup>Dept. of Epidemiology, Graduate School of Public Health, University of Pittsburgh, Pittsburgh, USA, <sup>4</sup>Dept. of Medicine & Therapeutics and School of Public Health, The Chinese University of Hong Kong, Hong Kong, China, <sup>5</sup>Clinical & Molecular Osteoporosis Research Unit, Dept. of Clinical Sciences Malmö, Lund University and Dept. of Orthopedics, Skane University Hospital, Malmö, Sweden, <sup>6</sup>Dept. of Surgical Sciences, University of Uppsala, Uppsala, Sweden, <sup>7</sup>Dept. of Epidemiology & Biostatistics, University of California, San Francisco, USA, <sup>8</sup>Medicine and Epidemiology & Community Health, University of Minnesota, Minneapolis, USA, <sup>9</sup>Mary MacKillop Institute for Health Research, Australian Catholic University, Melbourne, Australia, <sup>10</sup>Centre for Metabolic Bone Diseases, University of Sheffield, Sheffield, UK, <sup>11</sup>Institute of Medicine, Sahlgrenska Academy, Sahlgrenska University Hospital, Mölndal, Sweden, <sup>12</sup>Centre for Bone & Arthritis Research, Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden, <sup>13</sup>Centre for Integrated research in Musculoskeletal Ageing, Mellanby Centre for Musculoskeletal Research, University of Sheffield, Sheffield, UK

**Objective:** To investigate the predictive performance of pQCT measures of both calf muscle density (an established surrogate for muscle adiposity) and size (cross-sectional area, CSA) for hip fracture (HF).

**Methods:** pQCT (Stratec XCT2000/3000) measurements at the tibia were undertaken in the MrOS US, Hong Kong (HK) and Swedish Gothenburg (SW) cohorts. Analyses were by cohort and synthesised by meta-analysis. The predictive value for incident HF, using an extension of Poisson regression adjusted for age and follow-up time, was expressed as gradient of risk (GR=hazard ratio per SD increase in the exposure). Further analyses adjusted for femoral neck(fn) BMD T-score, FRAX 10-y fracture probability (major osteoporotic fracture) and prior falls (y/n, in the preceding 12 months).

**Results:** We studied 1008 (US), 1662 (HK), 581 (SW) men, mean (SD) age 77.0 (5.1), 73.9 (4.9), 80 (3.4) y, followed for a mean (SD) 7.9 (2.2), 8.1 (2.3), 4.4 (1.6) y, with 31, 47, and 34 incident HF respectively. Both greater muscle cross-sectional area (CSA) and greater muscle density (suggesting lower muscle adiposity and higher muscle quality) were associated with a lower risk of incident HF [GR: 0.79 (95%CI:0.65,0.96) and 0.83 (95%CI:0.69,0.99) respectively]. The pattern of associations was not materially changed by adjustment for prior falls or FRAX probability. In contrast, after inclusion of fnBMD T-score, the association for muscle CSA was attenuated [GR: 0.97 (95%CI:0.80,1.19)], whereas that for muscle density was not materially changed [GR: 0.74 (95%CI:0.62,0.89)].

**Conclusion:** pQCT measures of greater calf muscle density and cross-sectional area were both associated with lower incidence of hip fractures in older men, but only muscle density remained an independent risk factor for fracture after accounting for femoral neck BMD T-score. These findings demonstrate a complex interplay between measures of bone, and muscle size and quality, in determining fracture risk.

**Acknowledgements:** We thank the participants of MrOs US, Sweden, and Hong Kong. The Osteoporotic Fractures in Men (MrOS) Study is supported by National Institutes of Health funding. The following institutes provide support: the National Institute on Aging (NIA), the National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS), the National Center for Advancing Translational Sciences (NCATS), and NIH Roadmap for Medical Research under the following grant numbers: U01 AG027810, U01 AG042124, U01 AG042139, U01 AG042140, U01 AG042143, U01 AG042145, U01 AG042168, U01 AR066160, and UL1 TR000128. MrOS Sweden is supported by the Swedish Research Council, ALF/LUA research grants in Gothenburg, and the King Gustav V and Queen Victoria Frimurarestiftelse Research Foundation.

P279

## THE BEST PREDICTIVE FACTORS AMONG CLINICAL AND STRUCTURAL CHANGES ASSOCIATED WITH KNEE REPLACEMENT: A NESTED CASE-CONTROL STUDY

J.-P. Pelletier<sup>1</sup>, M. Dorais<sup>2</sup>, P. Paiement<sup>3</sup>, J.-P. Raynauld<sup>1</sup>, J. Martel-Pelletier<sup>1</sup>

<sup>1</sup>Osteoarthritis Research Unit, University of Montreal Hospital Research Centre (CRCHUM), Montreal, <sup>2</sup>StatSciences Inc., Notre-Dame-de-l'Île-Perrot, <sup>3</sup>ArthroLab Inc., Montreal, Canada

**Objective:** In the search in osteoarthritis (OA) patients for knee replacement (KR) predictors, very little information is available on the role of the concomitant symptoms, malalignment, and structural changes on a study population over an extended period of time. With the use of a nested case-control study allowing to measure the effect of various clinical and structural joint features in different time frames before KR, we investigated which changes in OA risk factors were most associated with the occurrence of KR.

**Methods:** Participants were from the Osteoarthritis Initiative: 195 KR cases were matched with 468 controls. They had a KR after cohort entry (cases), and controls matched for age, gender, income, WOMAC pain, Kellgren-Lawrence grade, and duration of follow-up. Changes were calculated as differences between the values at KR and baseline discriminating women and men. Conditional logistic regression analyses were performed.

**Results:** Worsening of WOMAC scores (crude odd ratios 1.02-1.20,  $p \leq 0.012$ ), KOOS (1.02-1.04,  $p \leq 0.014$ ), and knee injuries sustained 30-40 years before KR (women 2.70,  $p = 0.034$ ) were associated with the occurrence of KR. Also associated with KR were cartilage volume loss in the lateral compartment ( $>0\%$ , overall 1.76,  $p = 0.025$ ; women 1.93,  $p = 0.047$ ) and medial compartment ( $\geq 10\%$ , overall 1.54,  $p = 0.027$ ; men 2.34,  $p = 0.008$ ) and an increase in bone marrow lesions (BMLs) for women (1.09,  $p = 0.048$ ). The association of risk factors with KR was reinforced when patients presented both an increase in WOMAC pain and cartilage volume loss (1.85,  $p = 0.001$ ). Pain medication usage, mainly narcotics and intra-articular steroid injections (IASI), was also associated with KR. IASI in the follow-up period did not demonstrate a detrimental effect on cartilage loss, in cases and controls, indicate that structural changes were not causal of KR.

**Conclusion:** This study provides further evidence that worsening of OA symptoms, cartilage volume loss, BMLs, and, to a lesser extent, older injuries are important risk factors for KR occurrence, particularly in women. Previous use of pain medication and IASI were associated, but not causal, with the imminent occurrence of KR, a finding of clinical importance.

**Disclosure:** JPP and JMP are shareholders, JPR and MD are consultants, and PP an employee in ArthroLab Inc.

P280

# AN AUTOMATED PATIENT- AND GENDER-SPECIFIC MODEL FOR EARLY KNEE OSTEOARTHRITIS STRUCTURAL PROGRESSOR SCREENING

J.-P. Pelletier<sup>1</sup>, H. Bonakdari<sup>1</sup>, A. Jamshidi<sup>1</sup>, F. Abram<sup>2</sup>, G. Tardif<sup>1</sup>, J. Martel-Pelletier<sup>1</sup>

<sup>1</sup>Osteoarthritis Research Unit, University of Montreal Hospital Research Centre (CRCHUM), Montreal, <sup>2</sup>Medical Imaging Research & Development, ArthroLab Inc., Montreal, Canada

**Objective:** There is a need for an automated screening system for the early detection of knee structural progressors in osteoarthritis (OA). Our aim was to build a patient- and gender-based machine learning (ML) model that bridges major OA risk factors and serum levels of adipokines/related inflammatory factors at baseline for early prediction of at-risk knee OA patient structural progressors over time.

**Methods:** The serums (n=677) were from the Osteoarthritis Initiative (OAI) cohort. The model development used baseline serum levels of six adipokines, three related inflammatory factors, and their ratios (36), as well as two major OA risk factors (age and bone mass density [BMI]) (n=47 variables). Subjects were classified for their probability of being structural progressors using our published prediction model<sup>1</sup>, including baseline, two X-rays, and three magnetic resonance imaging variables. Five ML classification methodologies were evaluated; the support vector machine demonstrated the best accuracy and was further used for the identification of the most important variables in relation to being structural progressors and the model development. A reproducibility analysis was performed with an external cohort from a clinical trial.

**Results:** Data revealed that the combination of age, BMI, and the ratios CRP/MCP-1 and leptin/C-reactive protein (CRP) are the most important variables in predicting OA structural progressors in both genders. Classification accuracies for both genders in the testing stage (OAI) were >80%, with the highest sensitivity of CRP/chemoattractant protein-1 (MCP-1). Reproducibility analysis demonstrated an accuracy ≥92%; the ratio CRP/MCP-1 showed the highest sensitivity in women and leptin/CRP in men.

**Conclusion:** This study offers a new automated patient- and gender-specific model, using only three baseline serum biomarkers and two demographic factors for identifying, at an early stage, individuals at-risk of being knee OA structural progressors. This model is a new step toward precision medicine, as it will significantly improve early clinical prognosis of knee OA patients with real time patient monitoring.

**Reference:** 1. Jamshidi A, et al. Ther Adv Musculoskelet Dis 2020;13;12.

**Disclosures:** JPP and JMP are shareholders and FA an employee of ArthroLab Inc.

P281

# MULTIMORBIDITY AND FRAGILITY FRACTURES: A NATIONWIDE STUDY

A. B. Barcelos<sup>1</sup>, D. L. Lopes<sup>2</sup>, H. C. Canhão<sup>2</sup>, J. C. B. Cunha Branco<sup>2</sup>, A. M. R. Rodrigues<sup>2</sup>

<sup>1</sup>NOVA National School of Public Health, Public Health Research Centre, Universidade NOVA de Lisboa, <sup>2</sup>EpiDoC Unit, CEDOC, NOVA Medical School, Universidade Nova de Lisboa, Lisbon, Portugal

**Objective:** Multimorbidity is very common in elderly patients and there is insufficient knowledge in Portugal about the burden of multimorbidity in patients with prevalent fragility fractures (FF). The aim of this cross-sectional study is evaluate the association between multimorbidity with a prevalent FF in women with 50 years old and more.

**Methods:** Women aged 50 y and older from the EpiReumaPt study (2011-2013), a nationwide, population-based study, were evaluated. Selfreported data regarding sociodemographic, health-related quality of life, physical functions, FF and multimorbidity was collected through a semistructured questionnaire. Women with prevalent FF were compared with women without prevalent FF.

**Results:** The estimated prevalence of FF in women older than 50 y of age was 17.5%. Wrist fractures were the most prevalent fracture site (18.6%) and 57.1% of women reported one prevalent FF in the last twelve months. We verified that 43.7% of women with FF reported having had at least one fall in the previous year. A higher prevalence of multimorbidity (74.6%) has been found in the group of women with FF, after adjusted for age group, marital status, NUTSII and educational level. A statistically significant difference between Azores and Lisbon regions was found. For women with multimorbidity the probability of having a FF is 40% higher relatively to women with just one or no selfreported noncommunicable chronic diseases. In the group of women with FF, rheumatic disease and hypertension (62.7% and 58.6%, respectively) were the two most selfreported noncommunicable chronic diseases. Having FF combined with multimorbidity brings increased risk to a lower quality of life and a higher degree of disability.

**Conclusion:** Women after 50 years old in Portugal with multimorbidity had a significant higher FF incidence compared with women at the same age with just one or no selfreported noncommunicable chronic diseases. FF combined with multimorbidity brings increased risk to a lower quality of life and a higher degree of disability. This study should emphasize the need to redesigned health services to care for patients in order to prevent noncommunicable chronic diseases and FF, especially in patients older than 50 years old.

P282

### MUTATION DETECTION IN POSTMENOPAUSAL PATIENTS WITH OSTEOPOROTIC HIP FRACTURE USING TARGETED NEXT GENERATION SEQUENCING

M. P. Zumaraga<sup>1</sup>, C. Tanchoco<sup>2</sup>, P. J. Medina<sup>3</sup>, C. Palmes-Saloma<sup>4</sup>

<sup>1</sup>Dept. of Science & Technology - Food & Nutrition Research Institute, Taguig, <sup>2</sup>International Life Sciences Institute – SEA Region, Manila, <sup>3</sup>Mindanao State University – Iligan Institute of Technology, Iligan, <sup>4</sup>Philippine Genome Center, University of the Philippines Diliman, Quezon, Philippines

**Objective:** To identify disease-causing mutation in the vitamin D receptor (VDR) gene in a group of postmenopausal women with osteoporotic hip fracture using targeted next generation sequencing (NGS).

**Methods:** A total of 26 unrelated women with osteoporotic hip fracture admitted at the Philippine Orthopedic Center were included. Custom AmpliSeq™ VDR gene panel was designed to specifically target the VDR gene using Ion Torrent Personal Genome Machine.

**Results:** A total of 1322 unique variants in the whole 101 kb VDR gene in this group of patients with osteoporotic hip fracture was determined. Noteworthy is the identification of two novel heterozygous frameshift mutations. Of the two mutations, particularly interesting is the p.K111fs that is found in the nuclear receptor's hinge region between VDR's ligand binding domain and DNA binding domain.

**Conclusion:** Targeted NGS was successful in surveying the VDR gene for polymorphisms correlated with osteoporotic hip fracture. Through NGS technologies, we were able to sequence thousands of variants in postmenopausal patients with fragility fractures. Two of these genetic variants were found to potentially cause osteoporotic hip fracture in women volunteers. Such can provide valuable insight in VDR control as well as elucidate mechanism of disease pathogenesis.

P283

### DISCOVERY OF GENETIC MARKERS CORRELATED WITH VITAMIN D: A STRATEGY TO OPTIMIZE DIETARY VITAMIN D RECOMMENDATION FOR MULTIPLE HEALTH OUTCOMES IN THE PHILIPPINES

M. P. Zumaraga<sup>1</sup>, M. A. Concepcion<sup>1</sup>, C. Duante<sup>1</sup>, M. Rodriguez<sup>1</sup>

<sup>1</sup>Dept. of Science & Technology - Food & Nutrition Research Institute, Taguig, Philippines

**Objective:** In the Philippines, based on the 2013 National Nutrition Survey, vitamin D deficiency was highest in Benguet at 60.3% and lowest in Cagayan, but still very high, at 19.5%. With vitamin D implicated in a wide range of multiple health outcomes, a fuller understanding of the determinants of vitamin D status is needed and must include consideration of inherited characteristics. The study determined the relationship of serum vitamin D levels and genetic variations in 502 lifestyle related genes among adult respondents, age 21 years old and above, from the 2013 Philippine National Nutrition Survey (NNS).

**Methods:** The study followed a cross-sectional research design. A total of 1160 adult respondents of the 2013 NNS and living in metro Manila, Philippines were included in the study. Anthropometric, biochemical, clinical and dietary data were generated through validated questionnaires, physical examination and laboratory analyses. Total serum 25-hydroxyvitamin D (25OHD3) was determined using electrochemiluminescence binding assay method. Genomic DNA was used for massively parallel sequencing of 502 lifestyle related genes.

**Results:** Of the study participants, 56% were classified as having low serum 25OHD3 concentration (<75 nmol/mL). Low 25(OH)D was associated in the following gene/genotypes: KNG1 rs11924390 T/T; ANKH rs2454873 G/G; NPFFR2 rs4129733 T/G; SH2B1 rs4788102 G/A; RAP1A rs494453 T/T and CRHBP rs7728378 T/C. These genes were previously associated to the risk of osteoporosis, obesity, type 2 diabetes mellitus, and stress response.

**Conclusion:** Large-scale analysis of genes associated with lifestyle disease and other determinants of overall health have shown great utility in the discovery of genes and polymorphisms that play a role in vitamin D nutrition. It is envisioned that understanding how genetic variations interact with environmental factors, especially nutrition may hold the key to better prevention and management of nutrition-related diseases and may be basis for future innovative genome-based functional food product development enriched with vitamin D.



P284

# COST-EFFECTIVENESS ANALYSIS OF FRACTURE LIAISON SERVICE IN SECONDARY PREVENTION OF FRAGILITY FRACTURES IN SPAIN

A. Naranjo<sup>1</sup>, D. Prieto-Alhambra<sup>2</sup>, J. Sánchez-Martín<sup>3</sup>, A. Pérez-Mitru<sup>3</sup>, M. Brosa<sup>3</sup>

<sup>1</sup>Dept. of Rheumatology, Hospital Universitario de Gran Canaria Dr. Negrín, Universidad de Las Palmas de Gran Canaria, Las Palmas de Gran Canaria, Spain, <sup>2</sup>NIHR Musculoskeletal Biomedical Research Unit, University of Oxford, Oxford, UK, <sup>3</sup>Oblikue Consulting, Barcelona, Spain

**Objective:** To assess the cost-effectiveness of a Fracture Liaison Service [FLS] model compared to standard care for secondary prevention of fragility fractures in Spain.

**Methods:** Disease progression was simulated with a Markov model through 7 health states (with and without anti-osteoporotic [OP] treatment, subsequent hip, vertebral, forearm and humerus fracture, and death) within a cohort of OP patients after initial fragility fracture who were candidates to initiate anti-OP treatment with a mean age of 65 years old and a mean proportion of females of 90.7%. A time horizon of 10 y and a 6-month duration per cycle was set. Clinical, economic, and quality of life parameters were drawn from the literature and local clinical practice. Use of resources and treatment patterns were validated by a panel of experts. The Spanish National Health System [NHS] perspective was adopted, taking into account direct healthcare costs expressed in 2020 Euros. A time preference discount rate of 3% was applied to costs and healthcare outcomes. Uncertainty of the parameters was assessed through an extensive range of deterministic, scenario and probabilistic sensitivity analyses.

**Results:** Implementing FLS for the secondary prevention of fragility fractures in Spain would provide a greater anti-OP treatment initiation and persistence. This would reduce subsequent fragility fractures, which would result in a reduction of disutilities and deaths. The results of this analysis showed a greater clinical benefit (0.01 and 0.08 life-years and quality-adjusted life years [QALYs] gained per patient, respectively) compared to standard of care. This would imply a higher cost (€563.69/patient) leading to an incremental cost-utility ratio of €6,855.23 per QALY gained. The multiple sensitivity analyses showed limited dispersion of the base case results, corroborating their robustness and conservative approach.

**Conclusion:** From the NHS perspective and considering the locally established willingness-to-pay thresholds, the implementation of FLS would be cost-effective in the Spanish setting in comparison with standard care for secondary prevention of fragility fractures.

**Acknowledgment:** This study was funded by Amgen (Europe) GmbH.

P285

# EFFECT OF AROMATASE INHIBITORS ON BONE MINERAL DENSITY AND TRABECULAR BONE MICROARCHITECTURE IN PATIENTS WITH BREAST CANCER

M. Tsagareli<sup>1</sup>, E. Giorgadze<sup>1</sup>, T. Sulikashvili<sup>1</sup>, N. Jeiranashvili<sup>1</sup>

<sup>1</sup>National Institute of Endocrinology, Tbilisi, Georgia

**Objective:** Aromatase inhibitors (AIs) are important components of adjuvant endocrine therapy in postmenopausal women with estrogen receptor positive breast cancer. The aim of our study was to assess the effect of Aromatase inhibitors (AIs) on BMD and trabecular bone microarchitecture in patients with breast cancer.

**Methods:** We studied 52 postmenopausal women (between 45-70 y) receiving adjuvant therapy (anastrozole or letrozole) after breast cancer. We measured lumbar spine (LS) and proximal femur (PF) BMD using DXA; trabecular bone score (TBS) was calculated using TBS iNsight software. DXA baseline assessment was obtained within 3 months of commencing therapy and after 2 y of treatment. Patients were divided in two groups: in group 1 were enrolled 27 patients with normal BMD and partially degraded bone microarchitecture (mean TBS - 1,312); in group 2 - 25 patients with T-score <-2 and partially degraded bone microarchitecture (mean TBS - 1,245). Patients in group 1 received Ca and Vit D, patients in group 2 started oral bisphosphonate (OB). DXA BMD and TBS values were assessed after 24 months of therapy.

**Results:** After 2 y interval in women from group 1 bone loss estimated to 6.1%, TBS decreased by 5.8%. In patients treated with OB DXA BMD value decreased by 2.7%, TBS decreased by 6.4%.

**Conclusion:** An AI treatment is associated with significant BMD loss and degraded bone microarchitecture. Bisphosphonates did not show positive effect on bone microarchitecture.

P287

# EPIDEMIOLOGY AND SECULAR TRENDS OF PELVIC FRACTURES: A RETROSPECTIVE, POPULATION-BASED, NATIONWIDE OBSERVATIONAL STUDY

M. Herteleer<sup>1</sup>, M. Dejaeger<sup>2</sup>, S. Nijs<sup>1</sup>, H. Hoekstra<sup>1</sup>, M. R. Laurent<sup>3</sup>

<sup>1</sup>Traumatology Dept., University Hospitals Leuven, Leuven, <sup>2</sup>Geriatrics Dept., University Hospitals Leuven, Leuven, <sup>3</sup>Geriatrics Department, Imelda Hospital, Bonheiden, Belgium

**Objective:** Fractures of the pelvis and acetabulum are associated with osteoporosis, reduced mobility and imminent risk of further fractures. Still, the epidemiology of these central fractures has received little attention. This study aimed to describe the annual incidence of pelvic and acetabular fractures in Belgium.

**Methods:** We conducted a retrospective, nationwide, population-based study using the National Institute for Health and Disability Insurance database. Multiple codes for the reimbursement of the diagnosis and treatment of pelvic and acetabular fractures were collated and (since 2006) linked to the patients' age group, sex and region.

**Results:** From 1988-2018, 91317 pelvic and acetabular fractures were diagnosed. The overall incidence increased from 15.8/100000 persons/y in 1988 to 29.7/100000 persons/year in 2006 and to 37.6/100.000 persons/y in 2018. These fractures showed a bimodal incidence, with a small peak in children (particularly boys), and an exponential increase in older adults, being twice as high in women vs. men. By linear regression, there was a significant decline in fracture incidence between 2006-2018 in the 20-29 y age group (9.8 to 8.7/100000 person-years,  $p=0.0015$ ), and an increase in age groups 30-39 y (6.3 to 8.2/100000 person-years,  $p=0.0176$ ), 50-59 y (14.8 to 22.0/100000 person-years,  $p=0.0002$ ), 60-69 y (30.6 to 42.1/100000 person-years) and 70-79 y (81.5 to 96.0/100000 person-years,  $p=0.0136$ ). Between 2006-2018, 5957 patients (12.36%) underwent pelvic or acetabular fracture surgery. Surgical repair was performed in 2088 patients with acetabular fractures and 3869 patients with pelvic fractures. There were 3622 (60.8%) surgeries in patients younger than 60 y and 2335 (39.1%) in patients 60 y and older. For acetabular fractures, the proportion of surgical treatment was higher in Brussels (7.6%) compared to other regions (Flanders 3.8%, Wallonia 5.2%, both  $p<0.0001$ ).

**Conclusion:** There is an increasing incidence of pelvic and acetabular fractures in Belgium, due to both a rising age-adjusted incidence and aging of the population. Most fractures are managed non-surgically, albeit with significant regional differences. Younger adults have the highest proportion of surgical treatment, but given the much higher incidence in older adults, there is a considerable amount of operations in older adults too. Our findings inform regional policy making for fragility fractures of the pelvis.

**Disclosures:** Aspen Pharma (M.H.); Mathys Orthopaedics Belux, Zimmer Biomet, Johnson & Johnson, MSD (S.N.); Alexion, Amgen, Kyowa Kirin, Menarini, UCB, Takeda and Will Pharma (M.R.L.); all unrelated to this work.

P288

# TREATMENT GAP AMONG PATIENTS WITH PRIMARY OSTEOPOROSIS: A SYSTEMATIC LITERATURE REVIEW AND META-ANALYSIS

S. Leroy<sup>1</sup>, P. Saunders-Hastings<sup>2</sup>, P. Eusebi<sup>1</sup>, V. Taieb<sup>1</sup>, B. Abrahamsen<sup>3</sup>, E. V. McCloskey<sup>4</sup>, S. Fujiwara<sup>5</sup>, C. Libanati<sup>1</sup>, A. Moayyeri<sup>1</sup>

<sup>1</sup>UCB Pharma, Brussels, Belgium, <sup>2</sup>Epi Excellence LCC, Ottawa, Canada, <sup>3</sup>Dept. of Medicine, Holbæk Hospital, Holbæk, Denmark; Open Patient Data Explorative Network, Institute of Clinical Research, University of Southern Denmark, Odense, Denmark, <sup>4</sup>Centre for Metabolic Bone Diseases, University of Sheffield, Sheffield, UK; Mellanby Centre for Musculoskeletal Research, University of Sheffield, Sheffield, UK, <sup>5</sup>Yasuda Women's University, Hiroshima, Japan

**Objective:** Despite clinical guidelines, patients (pts) diagnosed with osteoporosis (OP) or a recent fragility fracture (fx) are often not treated; we explored treatment gap characteristics and magnitude.

**Methods:** To investigate treatment rate, we conducted a PRISMA-compliant systematic literature review (SLR) and random-effect meta-analysis (MA) on MedLine publications to June 2020. Observational studies including pts with diagnosed OP or incident fx reporting quantitative treatment rate estimates were included. Each SLR step involved 2 independent reviewers and several subgroup MAs were run.

**Results:** 139 articles were included in the SLR (N=3,911,151 pts) and 131 in the MA (N=2,092,369 pts). The overall pooled treatment rate was 29.7% (95%CI 25.2-34.7), notably lower in high-quality studies (Table). Pooled treatment rates were similar across different geographies. Pts with history of fx prior to index date had higher treatment rates compared with pts without history of fx (42.2% vs. 21.1%). Vertebral fx pts were more likely to receive OP treatment (Table).

**Conclusion:** This study confirms the concerning level of under-treatment of primary OP pts as a worldwide challenge. High-quality real-world studies show that only one in four pts with OP or fx are treated. Pts with multiple fx are more likely to receive OP treatment but still at a far from optimal rate (42.2%).

Table: Overall treatment rates – pooled estimates

	Number of studies (n)	Number of pts (n)	Pooled treatment rate % (95% CI)
Region			
North America	58	880,708	29.8 (23.5–37.1)
Europe	36	603,158	28.5 (19.8–39.2)
Asia/Pacific	33	607,697	30.3 (21.9–40.3)
Middle East	4	806	34.0 (30.0–38.2)
History of fracture			
Yes <sup>a</sup>	9	34,151	42.2 (26.5–59.8)
No <sup>b</sup>	10	180,474	21.1 (10.8–37.0)
Mixed <sup>c</sup>	29	218,548	29.6 (18.6–43.6)
Not available	94	1,742,362	28.9 (24.0–34.3)
Index <sup>d</sup> fracture site			
Hip/femur	49	468,226	26.1 (19.6–33.7)
Vertebral	16	390,089	35.0 (27.8–42.9)
Wrist/humerus	17	118,404	15.1 (10.6–21.1)
Study quality <sup>e</sup>			
High	26	867,269	26.6 (20.0–34.6)
Intermediate	69	641,238	27.7 (21.5–35.0)
Low	36	583,862	37.0 (26.9–48.4)

<sup>a</sup>100% pts; <sup>b</sup>0% pts; <sup>c</sup>0–100%, not inclusive; <sup>d</sup>event expected to trigger treatment; <sup>e</sup>Assessed by NIH score. CI: confidence interval.

**Acknowledgements:** Study funded by UCB Pharma and Amgen Inc.; Medical writing services: Costello Medical.

**Disclosures:** SL, PE, PSH, VT: Contractor: UCB Pharma; BA: Consulting: Kyowa-Kirin and UCB Pharma. Speakers fees: MSD, Pharmacosmos and UCB Pharma. Institutional research grants: Kyowa-Kirin, Novartis, Pharmacosmos and UCB Pharma; EVM: Advisor/consultant and speaker fees: UCB Pharma; SF: Consulting: Teijin Pharma; AM, CL: Employee: UCB Pharma; Stock: UCB Pharma.

## P289

### FACTORS ASSOCIATED WITH BONE METABOLISM PARAMETERS IN PRIMARY HYPERPARATHYROIDISM BEFORE AND AFTER SURGERY

S. Akcay<sup>1</sup>, D. Gogas Yavuz<sup>1</sup>

<sup>1</sup>Marmara University School of Medicine, Dept. of Endocrinology & Metabolism, Istanbul, Turkey

**Objective:** Although primary hyperparathyroidism (PHPT) is usually asymptomatic and diagnosed incidentally, unwanted effects of excessive PTH can be observed during diagnosis of PHPT. The aim of this study is to identify the factors affecting BMD values and changes in bone metabolism parameters before and after surgical intervention for PHPT.

**Methods:** A total of 214 patients (59.6±12.2 y, F/M: 187/27) diagnosed PHPT were included in the study. 145 patients underwent to the surgery (59.1±11.8 y, F/M: 123/22) and 69 patients were followed under medical treatment. Preoperative and postoperative first year available data such as demographic parameters,

clinical characteristics, laboratory data, adenoma diameter and location with neck USG and sestamibi imaging, BMD measurements.

**Results:** DXA measurements revealed osteopenia in 88 (41.1%) and osteoporosis in 55 (25.6%) of all patients at the time of diagnosis. Hypercalcemia and hypercalciuria were observed in 205 (95.8%) and 75 (35.0%) of the patients. Serum Ca (p<0.01), PTH (p<0.05) and ALP (p<0.05) levels were significantly higher in hypercalciuric patients compared to normocalciuric patients. Post-operative in the first year, serum Ca (p<0.0001), PTH (p<0.0001), ALP (p<0.0001), 24-hour urinary Ca levels (p<0.0001) decreased compared to preoperative values, and serum P (p<0.0001) level increased significantly. L1-L4 lumbar spine BMD increased compared to preoperative period (p<0.05) while both femoral neck and L1-L4 lumbar spine BMD values at the time of diagnosis in patients under medical treatment were similar in the first year. At the diagnosis, PTH levels correlated with L1-L4 lumbar spine (p<0.01, r=-0.22), femoral BMD (p<0.001, r=-0.26), ALP (p<0.0001, r=0.36), serum Ca (p<0.0001, r=0.53), 24-h urinary Ca (p<0.05, r=0.15) and the maximum diameter (p<0.0001, r=0.52) while negatively correlated with levels of serum P (p<0.0001, r=-0.49) and 25-OH vitamin D (p<0.0001, r=-0.26) in whole group.

**Conclusion:** Osteoporosis and osteopenia observed more frequent in PHPT than estimated population frequency. One year after surgery, while normocalcemia and normal PTH levels achieved improvement in BMD observed at lumbar spine.

## P290

### THERAPEUTIC ADHERENCE IN PATIENTS WITH PREVIOUS OSTEOPOROTIC VERTEBRAL FRACTURE

M.-J. Montesa<sup>1</sup>, N. Montesino<sup>1</sup>, C. Córdoba<sup>1</sup>, B. González<sup>1</sup>

<sup>1</sup>Hospital Universitario Nuestra Señora de Candelaria, Santa Cruz de Tenerife, Spain

**Objective:** To evaluate the adherence to osteoporosis therapies in a sample of patients with previous osteoporotic vertebral fracture.

**Methods:** This study was a longitudinal observational analysis characterizing osteoporosis medications adherence in those patients who started treatment between January and December 2018. Data were obtained from patients attended in our Fracture Liaison Service (FLS) with at least one osteoporotic vertebral fracture. We measure the percentage of patients who retained the treatment verified by electronic prescription after 24 months. In addition, descriptive data was collected including age, sex and osteoporosis treatment.

**Results:** The total number of patients evaluated was 83. After exclusion of patients with a fewer than 6 months of follow-up, the final study population was 64, mean age 69.8 y, 90.6% women. 10 (15.6%) received alendronate, 1 (1.6%) risedronate, 10 (15.6%) zoledronate and 43 (67.2%) denosumab. 5 patients who received

denosumab (11.6% of them) showed no adherence, only 1 patient who received alendronate and 1 patient with zoledronate (10% of each) showed no adherence.

**Conclusion:** Patients with vertebral fractures who continue follow-up for more than 6 months in our FLS showed optimal therapeutic adherence to osteoporosis medications.

## P291

### CORRELATIONS BETWEEN CLINICAL PARAMETERS AND SERUM CYTOKINE LEVELS IN OSTEOARTHRITIS PATIENTS WITH OBESITY

E. P. Trifonova<sup>1</sup>, E. V. Zonova<sup>1</sup>, O. V. Sazonova<sup>1</sup>

<sup>1</sup>Novosibirsk State Medical University, Novosibirsk, Russia

**Objective:** Obesity is a most frequent factor which can influence on development and progression of osteoarthritis (OA) and has similar mechanisms of immunopathogenesis. This study aimed to explore the symptoms and the proinflammatory serum cytokine levels in OA (hand, knee, hip) patients with obesity and to estimate relationships between clinical and immunological features.

**Methods:** Patients who participated in this study (n=250) were divided in two groups: patients with bilateral hand, knee and hip OA (n=169) and obesity and control group (n=81) which had only hand, knee and hip OA without such comorbidity. All patients were comparable in age, sex and duration of OA. We assessed serum cytokine levels (IL-1b, IL-6, IL-10, IL-18), NO including adipokines such as adiponectin and leptin, C-reactive protein (CRP), erythrocyte sedimentation rate (ESR). Various symptoms of OA and mental health were measured using visual analog scale (VAS), Functional Index for Hand Osteoarthritis (FIHOA), WOMAC Knee/Hip, Knee injury and Osteoarthritis Outcome Score (KOOS), Hip injury and Osteoarthritis Outcome Score (HOOS) and with short-form 36 (SF-36), Psychological Health Questionnaire (PHQ9), Coping Strategy Questionnaire (CSQ). We used U-Mann-Whitney test to detect differences between groups. Correlation was assessed using Spearman correlation coefficient ( $r_s$ ).

**Results:** Patients with OA and obesity are characterized by the prevalence of KOOS symptoms (median (Me) 61.1; interquartile range (IQR) 55.5-69.4;  $p<0.001$ ) and low values of mental health (SF-MH) (Me 52; IQR 44-64;  $p<0.001$ ). Statistically significant differences in serum cytokine levels were not found but correlation analysis identified the relationships between clinical parameters and such cytokines as IL-1b, IL-6, IL-10, IL-18 in OA patients with obesity. Some data are presented (Table). Patients with OA and obesity had high leptin level (Me 54.7; IQR 32.5-64.1;  $p<0.001$ ). Correlation analysis showed the relationships between adiponectin level and physician's global assessment (VAS) ( $r=0.9$ ,  $p=0.01$ ), CRP and KOOS symptoms ( $r=0.8$ ,  $p=0.04$ ) in group OA patients with obesity also.

Table. Correlations between clinical parameters and serum cytokine levels in studied groups.

Cytokines	OA patients with obesity n=169					
	Pain	Total score	Sport activity	Physical Functioning	Body pain	Physical health
	(WOMAC Knee)	(WOMAC)	(KOOS)	(SF36-PF)	(SF36-BP)	(SF36-PH)
IL-1b (pg/ml)	0.002*	0.01*	0.05	0.03*	0.41	0.10
IL-6 (pg/ml)	0.17	0.13	0.24	0.13	0.01*	0.01*
IL-10 (pg/ml)	0.24	0.35	0.01*	0.13	0.49	0.29
IL-18 (pg/ml)	0.24	0.35	0.29	0.05	0.17	0.01*

Table legend: \*  $r - p<0.005$ .

**Conclusion:** Such comorbidity as OA and obesity has clinical and laboratory features of progression of OA. Such immunological factors as serum cytokines concentrations, adipokines, CRP are linked with the severity of obesity-associated OA. A different variation of correlations may suppose role of this proinflammatory factors in the pathogenesis of this OA phenotype. These data should be verified by larger studies.

## P292

### ULTRASOUND ASSESSMENT OF GOUT LESIONS IN AN ALGERIAN POPULATION WITH ASYMPTOMATIC HYPERURICEMIA

B. Bengana<sup>1</sup>, A. Ladjouze-Rezig<sup>2</sup>, N. Beramtane Raaf<sup>3</sup>, C. Aimeur<sup>4</sup>, S. Ayoub<sup>5</sup>, A. Boukabous<sup>1</sup>, S. Lefkir - Tafiani<sup>1</sup>

<sup>1</sup>Rheumatology Dept - University Hospital of Benimessous, <sup>2</sup>Rheumatology Dept - Specialized Hospital Establishment of Benaknoute, <sup>3</sup>Biochemistry Dept - Hospital of Bitraria, <sup>4</sup>Radiology Dept - University hospital of Mustapha Bacha, <sup>5</sup>Internal Medicine Dept - University Hospital of Benimessous, Algiers, Algeria

**Objective:** Hyperuricemia is a common biological abnormality, often clinically asymptomatic. However, it can announce a gout and be linked to many diseases such as metabolic syndrome, high blood pressure or kidney disease. In fact, the majority of learned societies do not recommend any urate lowering therapy (ULT) as long as the hyperuricemia remains asymptomatic. But it turns out that part of the population with asymptomatic hyperuricemia (AH) develops a gout after a few years particularly with genetic predisposition, but also on certain risk factors that need to be confirmed. By this way, musculoskeletal ultrasound (MUS) can detect "asymptomatic gout" by visualizing signs of urate deposits (UD) in subjects with AH. Our main objective is already to estimate the prevalence of specific signs of gout in Algerian population with AH and assess the factors exposing to UD.

**Methods:** This is a descriptive cross-sectional study from January 2017 to February 2019, with the recruitment of subjects with AH and serum urate level  $> 60$  mg/L, who do not take any ULT and have not associated any chronic inflammatory rheumatism, where



we performed a MUS of the knees, metatarsophalangeal joints MTP1, MTP2 and metacarpophalangeal joint MCP2 and MCP3 with the Achilles, patellar and quadriceps tendons.

**Results:** We retained 258 subjects with AH, 132 women and 126 men (sex ratio=0.95), the mean age was 59 y, the mean BMI was 28.4 kg/m<sup>2</sup>, 42 patients were under diuretics, 37 patients reported being on low-dose of aspirin 100 mg daily. The mean rate of serum urate levels was 78±10 mg/L, the prevalence of UD found at the MUS was 22% (n=58), among them 36% (21/58) had a sign of the double contour DC on the MTP1 and 29% (17/58) on the knee, 7% (4/58) had tophi on the MTP1 and 3% (2/58) had urate aggregates. The factors reported to be linked to UD in the sample were: the male gender (p=0.0016); the high uric acid level (p= 0.0355); BMI (p=0.0427); taking diuretics for women (p=0.0002).

**Conclusion:** Through this work, it is clear that elementary ultrasound lesions related to gout disease are common in a population with AH and concerned one fifth of subjects in our study with a higher risk in men and subjects with obesity and high uric acid level, but also in women taking diuretics. These results need to be enhanced with a randomized controlled study in order to better determine the predisposing factors for gout in any subject with AH.

## P293

### PREVALENCE OF SARCOPENIA IN ELDERLY PATIENTS ADMITTED TO HOSPITAL WITH ACUTE CEREBROVASCULAR DISEASE

A. Gruzmanov<sup>1</sup>, S. Mazurenko<sup>1</sup>, O. Ilyina<sup>2</sup>

<sup>1</sup>Saint Petersburg State University, Saint George Hospital, <sup>2</sup>Saint George Hospital, Saint Petersburg, Russia

**Objective:** To define the muscle mass, muscle strength and prevalence of pre- and sarcopenia in patients admitted to the hospital due to a new ischemic stroke and a transitory ischemic attack (TIA).

**Methods:** 60 patients (35 women, 25 men, average age 72.9±11.6 y, 10 patients had TIA, 50 - ischemic stroke) were analyzed with bioelectrical impedance analysis (BIA). Skeletal muscle mass index (SMMI) was calculated as skeletal muscle mass (kg)/height (m)<sup>2</sup>. Muscle strength was measured in all patients using a Jamar hand dynamometer.

**Results:** The cutoff values for SMMI were in conformity with the consensus of EWGSOP1 (<10.76 kg/m<sup>2</sup> in men, <6.76 kg/m<sup>2</sup> in women). Cutoff values for grip strength were according to EWGSOP2 (< 27 kg in men, < 16 kg in women). In our study, the mean SMMI was 10.9±1.4 kg/m<sup>2</sup> (11.6±0.9 kg/m<sup>2</sup> in males, 10.5±1.0 kg/m<sup>2</sup> in females). All women had muscle mass value higher than EWGSOP1 cutoff values. On the contrary, 6 out of 25 males (24%) had decreased muscle mass. The mean hand grip strength was 25.2±12.7 kg (36.8±10.2 kg in men, 16.9±4.4 kg in women). According to the EWGSOP2 criteria 19 out of 35 women (54%) and

6 men (24%) performed decreased muscle strength. In our study, only 2 patients (both males) fulfilled criteria for sarcopenia diagnosis, however 23 patients (predominantly females) were diagnosed with presarcopenia due to reduced muscle strength and preserved muscle mass.

**Conclusion:** The elderly patients with a new ischemic stroke or TIA assessed with BMI and hand grip strength demonstrated low prevalence of sarcopenia in our study (3.3%). Nevertheless 39.6% of patients (54% of females) had decreased hand grip strength and can be considered as presarcopenia patients.

## P294

### BONE MINERAL DENSITY STATUS AND PATHOLOGICAL FRACTURES IN CHUVASH PATIENTS WITH NEWLY DIAGNOSED PAGET'S DISEASE

I. B. Bashkova<sup>1</sup>, N. V. Bezlyudnaya<sup>2</sup>, N. S. Nikolaev<sup>1</sup>, V. U. Emelianov<sup>1</sup>

<sup>1</sup>Center of Traumatology, Orthopedics and Arthroplasty, Chuvash State University I.N. Ulyanov, <sup>2</sup>Center of Traumatology, Orthopedics & Arthroplasty, Cheboksary, Russia

**Objective:** This study was to evaluate BMD of the central parts of the skeleton according to DXA and to conduct a retrospective assessment of pathological fractures in patients with a newly diagnosed diagnosis of Paget's disease (PD) the ethnic Chuvashia region of Russia where this pathology is rare.

**Methods:** In the blood were studied the total calcium, phosphorus, creatinine, alkaline phosphatase (ALP). The assessment of the BMD of the lumbar spine (L1-LIV) and the proximal parts of both femurs was performed by the DXA method.

**Results:** The new diagnosis of PD was established in Regional Medical Center from October 2011 to November 2020 in 21 patients (11 men, 10 women) with a mean aged 59.0±10.9 y. The diagnosis of PD was established on average 7.6±5.3 y after the clinical manifestation. In 18 cases (85.7%) was diagnosed a polyostotic type of PD, and only 3 cases monostotic type of the disease. PD was detected at the intermediate stage in 15 people (71.4%) or at the late stage in 6 people (28.6%). The activity of alkaline phosphatase increase by 1.5-9.5 times with normal content of total calcium (2.3±0.2 mmol/L), phosphorus (1.1±0.2 mmol/L) and creatinine (88.3±21.9 mmol/L). According to the DXA, the average T-test values in the lumbar spine were -3.16±1.93 CO, and in the proximal femur -2.18±1.20 CO. Osteoporosis was detected in 78.6%, osteopenia in 14.3% of cases. More frequently PD affected pelvic bones (33.3%), femoral (38.1%) and tibial (14.3%) bones, lower thoracic and lumbar spine (19.0%). 52.4% of patients with PD had a history of pathological fractures. Compression fractures of the vertebral bodies were found in 6 people, fractures of the proximal femur in 5 people, pelvic bones in 1 person, surgical neck of the humerus in 1 person. 6 out of 11 patients had a history

of low-energy multiple fractures history. Secondary coxarthrosis and/or gonarthrosis of the third radiological stage was detected in 17 patients (81%).

**Conclusion:** All rear cases of PD in Chuvash were detected at the advanced stages when complications of this disease have already developed.

P295

### POTENTIAL CLINICAL USEFULNESS OF BIOMARKERS IN CURRENT MEDICAL APPLICATIONS

R. Amir<sup>1</sup>

<sup>1</sup>Centre de Santé des Fagnes Chimay, Chimay, Belgium

**Objective:** Biomarkers are potentially useful in the contexts of primary, secondary and tertiary prevention. The main characteristics of an ideal biomarker include that they are safe and easy to measure with a scientific evidence to suggest that biomarker is any substance, structure or process that can be measured in the body or its products and influence or predict the incidence of outcome or disease<sup>(1,2)</sup>. Additionally, variation in biomarker levels with gender and ethnicity should be elucidated, and the biomarker should have good performance characteristics. Risk prediction scores can combine information from several different biomarkers in order to estimate an individual's risk of developing an outcome, such as disease or death.

**Methods:** As reported in several publications, biomarkers are potentially useful along several points of a disease continuum. They can be useful in the context of primary prevention, for preventing disease itself. Moreover, they can facilitate secondary prevention by the early detection of disease via screening, detection of sub-clinical disease, and by helping the monitoring of disease progression. Biomarkers are also useful for the purpose of tertiary prevention, allowing guide treatment to avoid morbidity owing to established disease<sup>(3)</sup>.

**Results:** The most important aim of identifying biomarkers that can accurately predict disease is to prevent disease in those at greatest risk and to personalize treatment according to maximal potential patient benefit. With the completion of the human genome project and the rapid expansion of the "omics field (i.e., genomics, proteomics, metabolomics, lipomics, ribomics and pharmacogenomics).

**Conclusion:** There is a growing interest in the field of biomarkers in most subspecialties of medicine. Discrimination, calibration and risk reclassification are the usual classical methods which allow to assess the clinical utility of biomarkers, and each method has strengths and weaknesses that should be considered when employed to assess a biomarker.

#### References:

1. Lasserre MN. Stat Methods Med Res 2008;17:303.

2. World Health Organization. Biomarkers in risk assessment: Validity and validation. WHO 2001.
3. Vasan RS. Circulation 2006;113:2335.

P296

### SARCOPENIC OBESITY AND FUNCTIONAL PROGNOSIS IN WOMEN WITH SUBACUTE HIP FRACTURE: A SHORT-TERM PROSPECTIVE STUDY

M. Di Monaco<sup>1</sup>, C. Castiglioni<sup>1</sup>, F. Bardesono<sup>2</sup>, E. Milano<sup>1</sup>, G. Massazza<sup>2</sup>

<sup>1</sup>Osteoporosis Research Center, Division of Physical & Rehabilitation Medicine, Presidio Sanitario San Camillo, Fondazione Opera San Camillo, <sup>2</sup>Division of Physical & Rehabilitation Medicine, Dept. of Surgical Sciences, University, Torino, Italy

**Objective:** To evaluate the effect of sarcopenic obesity on ability to function in women with subacute hip fracture.

**Methods:** We prospectively studied one sample of women with subacute hip fracture. At admission to our rehabilitation hospital, we assessed grip strength by a Jamar dynamometer and body composition by DXA. Sarcopenia was defined according to the criteria released by EWGSOP2 in 2019, with both grip strength <16 kg and appendicular lean mass (aLM)/(height)<sup>2</sup> <5.5 kg/m<sup>2</sup>. Alternatively, aLM <15 kg was substituted for aLM/(height)<sup>2</sup> <5.5 kg/m<sup>2</sup> to define sarcopenia. Obesity was diagnosed with fat mass exceeding 40% of total body mass. Ability to function in activities of daily living was assessed by the Barthel index.

**Results:** We evaluated 183 of 200 women. Sarcopenic women had lower Barthel index scores assessed at the end of subacute inpatient rehabilitation (U=367.0; z=-3.8; P<0.001) and lower Barthel index effectiveness (U=374.5; z=-3.68; P<0.001) than non-sarcopenic women. Conversely, we found no significant differences in function between obese and non-obese women. The concurrent presence of sarcopenia and obesity did not worsen the functional prognosis vs. the presence of isolated sarcopenia. After adjustment for Barthel index scores before rehabilitation, age, hip-fracture type and cognitive impairment, sarcopenia was significantly associated with Barthel index scores (P=0.008) and Barthel index effectiveness (P=0.004), whereas obesity was not. The results did not materially change when aLM <15 kg was substituted for aLM/(height)<sup>2</sup> <5.5 kg/m<sup>2</sup> to confirm sarcopenia in the women whose hand grip strength was <16 kg.

**Conclusion:** The concurrent presence of obesity did not worsen the negative prognostic role of sarcopenia in the short-term recovery of ability to function in women with subacute hip fracture.

P297

### ASSOCIATION BETWEEN SARCOPENIA AND OSTEOPOROSIS IN SUBACUTE HIP FRACTURE: A CROSS-SECTIONAL STUDY OF 262 WOMEN

M. Di Monaco<sup>1</sup>, C. Castiglioni<sup>1</sup>, F. Bardesono<sup>2</sup>, M. Freiburger<sup>2</sup>, E. Milano<sup>1</sup>, G. Massazza<sup>2</sup>

<sup>1</sup>Osteoporosis Research Center, Division of Physical & Rehabilitation Medicine, Presidio Sanitario San Camillo, Fondazione Opera San Camillo, <sup>2</sup>Division of Physical & Rehabilitation Medicine, Dept. of Surgical Sciences, University, Torino, Italy

**Objective:** To assess the association between sarcopenia and osteoporosis in women with a fragility fracture of the hip.

**Methods:** We studied 262 of 290 women with subacute hip fracture. A scan by DXA was performed to assess body composition. A Jamar dynamometer was used to measure hand grip strength. Sarcopenia was diagnosed with both hand grip strength <16 kg and appendicular lean mass (aLM) <15 kg, according to the EWG-SOP2 criteria released in 2019. Osteoporosis was identified with low femoral BMD (threshold fixed at 2.5 SD below the mean of the young reference population).

**Results:** Osteoporosis was found in 189 of the 262 women (72%; 95%CI from 67% to 78%) whereas sarcopenia in 147 of the 262 (56%; 95%CI from 50% to 62%). The unadjusted odds ratio to have osteoporosis for a sarcopenic woman was 2.93 (95%CI from 1.69 to 5.19,  $P < 0.001$ ). After adjustment for age, time interval between fracture and DXA scan and body fat percentage the odds ratio was 2.30 (95%CI from 1.27 to 4.14;  $P = 0.006$ ). Data did not materially change after substituting BMI for body fat percentage among the independent variables in the regression model: the adjusted odds ratio to have osteoporosis for a sarcopenic woman became 1.94 (95%CI from 1.05 to 3.56;  $P = 0.033$ ).

**Conclusion:** We show a positive association between sarcopenia and osteoporosis in 262 women with a fragility fracture of the hip. We contribute to the concept of tight links between bones and muscles in the poorly investigated population of older women with a fragility fracture of the hip. It is noteworthy that the EWG-SOP2 sarcopenia definition can successfully capture the women with concomitant osteoporosis.

P298

### INCREASED PSYCHOLOGICAL STRAIN AMONG ORTHOPAEDIC HEALTHCARE WORKERS IS ASSOCIATED WITH LONGER WORKING HOURS AND HAS POTENTIAL IMPACTS ON FAMILY RELATED ADJUSTMENTS

K. C. Wong<sup>1</sup>, K. X. K. Tay<sup>1</sup>, P. D/O Vas Dev Bajaj<sup>1</sup>, M. A. Png<sup>2</sup>, N. N. Lo<sup>1</sup>, A. K. Mitra<sup>1</sup>, J. S. B. Koh<sup>1</sup>, T. S. Howe<sup>1</sup>

<sup>1</sup>Dept. of Orthopaedic Surgery, Singapore General Hospital, <sup>2</sup>Dept. of Diagnostic Radiology, Singapore General Hospital, Singapore, Singapore

**Objective:** To investigate the psychological strain experienced by orthopaedic healthcare workers and attributing factors during the COVID-19 pandemic.

**Methods:** We surveyed healthcare workers in an outpatient musculoskeletal clinic with a questionnaire based on the validated Caregiver Strain Index<sup>1</sup>. We have previously shown the prevalence of psychological strain during the pre-peak phase of the pandemic.<sup>2</sup> The same group was followed up 6 months later (post-peak phase) to evaluate the downstream psychological strain.

**Results:** Of the 57 participants who were followed up, 30 (52.6%) experienced a greater level of strain (Group A), similar to the prevalence in our previous study (51.6%). Significantly, participants in Group A work longer hours per day compared to Group B ( $8.8 \pm 1.6$  vs.  $8.0 \pm 1.5$ ; mean difference, 0.8; 95%CI, 0.0 to 1.6;  $p = 0.043$ ). "Family adjustments" (84.2%) garnered the most positive responses.

**Conclusion:** Longer working hours contributes to psychological strain and measures should be designed to mitigate this. Potential impact on family life of healthcare workers is an unrecognised toll which should receive more attention. Health ministries should ensure measures to safeguard the mental health of healthcare workers to avoid reactive strategies during a pandemic.

#### References:

1. Sullivan M. J Gerontol Nurs 2002;28:4.
2. Wong K, et al. J Orthop Surg Res 2020;15:322.

Table 1: Population Demographics

		Pre-Peak Phase			Post-Peak Phase		
		Group 1 (n = 32)	Group 2 (n = 30)	p-value	Group A (n = 36)	Group B (n = 27)	p-value
Age (years)		40.4 ± 13.4	39.4 ± 11.9	0.756	39.6 ± 13.0	44.2 ± 15.3	0.223
Gender (F/M)		24/8	21/9	0.659	20/16	20/7	0.576
Race	Chinese	14	7	0.172	11	8	0.304
	Malay	11	9		11	11	
	Indian	5	7		7	3	
	Others	2	7		1	5	
	Single	11	9		9	7	
Marital status	Married	20	10	0.762	20	18	0.753
	Widowed	0	1		0	1	
	Divorced	1	1		1	1	
	Alone	0	0		1	0	
Living status	With family	32	28	0.138	28	26	0.632
	With partner	0	2		1	1	
	PSA	19	9		13	10	
Vocation	HCA	2	2	0.095	1	2	0.233
	Nurse	8	10		7	8	
	OT	2	1		0	1	
	Doctor	6	8		9	4	
	Working hours (hour/day)	8.4 ± 1.8	8.6 ± 1.3	0.733	8.8 ± 1.6	8.0 ± 1.5	0.043
Work experience (year)		10.0 ± 9.5	11.4 ± 11.5	0.625	11.2 ± 11.7	14.8 ± 13.3	0.281

PSA = Patient Service Associate; HCA = Healthcare Assistant; OT = Orthopedic Technician

## P299

## MANAGING A FLS IN A BRAZILIAN HEALTHCARE PROVIDER DURING COVID'S PANDEMIC

B. Stolnicki<sup>1</sup>, L. Silva<sup>2</sup><sup>1</sup>PREVREFRAT, <sup>2</sup>Fiosaúde, Rio de Janeiro, Brazil

**Objective:** Fiosaúde is a healthcare provider that has approximately 15,000 beneficiaries. 27% of them are over 60 y of age. In January of 2015 we started an FLS (PREVREFRAT) in the Fiosaúde Clinic. Men and women over 50 y of age with a history of fragility fractures were referred. From 2016, patients with a high risk of fractures (BMD <2.5 SD in the lumbar spine or neck or total femur) were referred without previous fractures. The objective of this presentation is to demonstrate the cost-effectiveness of FLS in this environment comparing the years 2019 and 2020 (pandemic).

**Methods:** 119 patients participating in the FLS were evaluated in the years 2019 and 2020. 109 women and 10 men, aged between 53-96 y (mean 74 y). 44 patients were treated with zoledronic acid 5 mg, 54 with denosumab 60 mg, 1 with ibandronate and 20 with calcium and vitamin D (12 zoledronic acid drug holiday). Subsequent fracture outcome and costs were compared during the years 2019 and 2020. Usually, patients using zoledronic acid were infused at home and patients received denosumab during regular visits. With the advent of the pandemic, denosumab patients also started to receive it at home. There was great concern about the rebound effect due to the suspension or delay in the application of denosumab. No patient was delayed for more than 30 days. In patients using zoledronic acid, due to the characteristics of the drug, greater tolerance was allowed. Communication tools such as telemedicine, e-mail and phone calls were widely used in the monitoring and scheduling of patients.

**Results:** In 2019 there were 3 subsequent fractures and 1 subsequent fracture in 2020. In this environment the cost of a fragility fracture is \$10500. The annual cost (including medical fees, medication and laboratory and imaging tests) in 2019 was US \$42056 and US \$47726 in 2020 (US \$5670 difference). The isolated cost

of home application of denosumab was US \$1481.20. 53.8 fractures were avoided in 2019 and 54.74 in 2020, generating savings of US \$56510 in 2019 and US \$57470 in 2020 (difference of US \$9660).

**Conclusion:** Adequate planning and concentrated efforts, especially by the Nursing team, allowed the FLS to function following their effectiveness and safety protocols, respecting their deadlines in such an atypical and risky moment. Despite rising costs to face the challenges posed by the pandemic, the FLS in the healthcare provider environment has proved to be highly cost-effective.

## P300

## INDICATIONS OF CYCLIC ANTI-PEPTIDE CITRULIN ANTIBODIES: EXPERIENCE OF THE RHEUMATOLOGY DEPARTMENT

A. A. Ibovi Mouondayi<sup>1</sup>, N. Kawtar<sup>1</sup>, S. Janani<sup>1</sup><sup>1</sup>CHU Ibn Rochd, Casablanca, Morocco

**Objective:** Anti-cyclic citrullinated peptide antibody (anti CCP) is known to be a useful marker for the diagnosis of rheumatoid arthritis (RA). Its specificity for rheumatoid arthritis is reported to be 89-98%, is of particular interest as it is higher than all other serological markers reported previously. Recently, the additional usefulness of anti CCP as a predictor of joint destruction has attracted attention. In contrast to its specificity in RA, the positivity of anti CCP can be seen in other diseases.

**Methods:** A retrospective, descriptive study of records of patients with a positive anti CCP in rheumatology department over a period of 32 months from January 2018 to August 2020. Inclusion criteria: all patients who were requested and found to be anti CCP positive, they were all tested in the same laboratory. Exclusion criteria: all patients with negative anti CCP.

**Results:** There were 67 patients, 59 women and 8 men, with a sex ratio M/F of 0.13. The average age of the patients was 52 y, with extremes ranging from 33-81 y. Diabetes and hypertension were the most common comorbidities in 25% of the patients. Joint signs included inflammatory articular pain and arthritis. Biological inflammatory syndrome was present in >62%. RA was retained in 49 patients, 9 psoriatic arthritis, 6 Sjögren's syndrome and 3 for other connective tissue diseases.

**Conclusion:** Our data illustrate that anti CCP antibodies can be linked to joint damage not only in RA but also in other rheumatic diseases. Recently, some studies have reported the relationship between the presence of anti CCP antibodies and joint damage in non-RA diseases. Gottenberg and colleagues in a work on Sjögren's syndrome, reported that 7.5% of patients with anti CCP(+). These findings in the literature, are fully consistent with our results. Indeed, RA was the predominant diagnosis in our series followed by rheumatic psoriasis. However, our results, as well as others reported in the literature, suggest that anti CCP may be useful as a marker of joint inflammation not only in RA but also in others.



From this work it appears that the positivity of anti CCP is not pathognomonic to RA, other pathologies mentioned above may be associated. Therefore, it would be wise that further studies concerning anti CCP in non-RA diseases should clarify this issue.

## P301

### RETROSPECTIVE COMPARISON OF THE EFFECT OF IL-17 BLOCKER THERAPY AND ANTI-TNF AGENT THERAPY ON BONE MINERAL DENSITY IN AXIAL SPONDYLOARTROPATHY PATIENTS

N. Ferhatlar<sup>1</sup>, E. Demirhan<sup>1</sup>, S. Kanyılmaz<sup>1</sup>, S. Atar<sup>1</sup>, O. Kuru<sup>1</sup>

<sup>1</sup>University of Health Sciences, Prof. Dr. Cemil Tascioglu City Hospital, Dept. of Physical Medicine & Rehabilitation, Istanbul, Turkey

**Objective:** Axial spondyloarthropathy (AxSpA) is a chronic inflammatory disease of the axial skeleton characterized by inflammatory low back pain. Osteopenia and osteoporosis may accompany since the early stages of the disease. TNF $\alpha$ , which plays a key role in inflammation, is also an osteoclast activator. Anti-TNF $\alpha$  agents and IL-17 blockers used in AxSpA treatment, which have been used in recent years, have positive effects on BMD in patients with AxSpA by reducing inflammation. This study was conducted to compare the BMD measured by DXA in patients with AxSpA under anti-TNF $\alpha$  and IL-17 blockers treatment.

**Methods:** 66 patients who have been diagnosed with AxSpA according to the 2009 Assessment in SpondyloArthritis International Society (ASAS) criteria were involved in our study. 27 of 66 patients were treated with anti-TNF $\alpha$  and 39 patients were treated with IL-17 blocker (secukinumab). All patients' sociodemographic data, medications, anteroposterior lumbar, femur neck and femur total DXA values (BMD, T-score and Z-score) taken at the beginning of the study and 1-y later were evaluated. Erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) and 25(OH) vitD levels results were evaluated. Bath Ankylosing Spondylitis Disease Activity Index (BASDAI) and Bath Ankylosing Spondylitis Functional Index (BASFI) values, which are disease activity and function indicators, were evaluated at the beginning and after 1 y. Outcome values were compared between those receiving IL-17 blocker therapy and anti-TNF $\alpha$  agent therapy.

**Results:** In this study, 66 patients were included for evaluation. (37.8% of them were women (n:25) and 62.1% of them were men (n:41)). Average duration of disease was 5.3 $\pm$ 2.7 y (range: 1-12 y). Patients' clinical data were similar in patients treated with both anti-TNF and IL-17 blocker. Statistically significant negative correlation was detected between patients' age and femur total BMD values (r: -0.298 p:0.015). The mean lumbar region (L2-L4) BMD value of the patients was 1.07 $\pm$ 0.29 and femoral neck BMD value was 0.93 $\pm$ 0.27. In patients using both anti-TNF and IL17 blockers, a statistically significant increase was found in the lumbar region (L1-L4, L2-L4), femoral neck and femur total BMD after 1

y of observation (p<0.05). In patients using anti-TNF, an increase of 9.5% in lumbar (L2-L4) BMD and a 1.6% increase in femoral neck BMD was found. In patients using IL-17 blocker, there was a 5.1% increase in lumbar (L2-L4) BMD and a 1.1% increase in femoral neck BMD. Compared to patients using anti-TNF, the rate of increase in femur total BMD was higher in patients using IL-17 blocker (p=0.013). Patients who were previously treated with another biological drug (anti-TNF agent) had a higher rate of increase in BMD at the end of 1 y than naïve patients (p<0.01).

**Conclusion:** BMD decreases in time in AxSpA patients due to inflammation. Pharmacological treatments that suppress inflammation, such as anti-TNF $\alpha$  and IL-17 blockers, have been found to increase bone mineral density values as well as ceasing the loss of in bone mineral density. The positive effect of IL-17 blockers on femur total bone mineral density was determined more than anti-TNF $\alpha$  agents.

## P302

### RENAL SAFETY OF ZOLEDRONIC ACID IN PATIENTS WITH BORDERLINE KIDNEY FUNCTION AT A METABOLIC BONE CENTRE IN THE U

M. Schini<sup>1</sup>, N. Peel<sup>2</sup>, L. Toronjo-Urquiza<sup>3</sup>, E. Thomas<sup>4</sup>, S. Salam<sup>5</sup>, A. Khwaja<sup>5</sup>, R. Eastell<sup>1</sup>, J. Walsh<sup>1</sup>

<sup>1</sup>Oncology and Metabolism, University of Sheffield, <sup>2</sup>Sheffield Teaching Hospitals, <sup>3</sup>Chemical Engineering Dept., University of Sheffield, <sup>4</sup>Pharmacy, Sheffield Teaching Hospitals, <sup>5</sup>Sheffield Kidney Institute, Sheffield Teaching Hospitals, Sheffield, UK

**Objective:** Zoledronic acid is a bisphosphonate widely used for the treatment of osteoporosis that leads to improvements in bone mineral density and reductions in fractures. A potential side effect is nephrotoxicity and acute kidney injury (AKI). Advice from the UK Medicines and Healthcare products Regulatory Agency (MHRA) in 2019 stated that creatinine clearance (CrCl) and not estimated glomerular rate (eGFR) should be used to guide and make decisions about treatment and that patients should not receive zoledronic acid if their CrCl is below 35 ml/min. The objective of this study was to review the safety of our previous practice using eGFR and the clinical impact of implementing the MHRA recommendations.

**Methods:** The study was performed at the Metabolic Bone Centre (MBC) in Sheffield Teaching Hospitals, UK. Data on all the patients who had zoledronic acid infusions from 1/09/2015 to 1/10/2020 at the center were retrieved and evaluated.

**Results:** Data on 4405 patients were retrieved. Serum creatinine in the 14 days post-infusion was available for a total of 969 infusions and amongst them, 160 (16%) infusions were given with baseline CrCl <35 ml/min. AKI was observed within 14 days following 45 infusions (4.5%). Only 9 infusions resulted in AKI with a pre-treatment of CrCl <35 ml/min. If the MHRA rules had been followed (calculating CrCl for patients aged  $\geq$ 75 y and/or extreme BMI <18 or >40 kg/m<sup>2</sup>), 996 infusions with baseline CrCl <35 ml/

min would not have been given. Logistic regression showed that both CrCl and eGFR were significant factors in predicting AKI within 14 days, but that the currently recommended cutoff of CrCl 35 ml/min had poor sensitivity. The areas under the curve for each marker were 0.608 and 0.627, respectively, suggesting that neither are sensitive in predicting AKI.

**Conclusion:** This study suggested that zoledronic acid could be contributing to the development of AKI in some patients. Estimated GFR is better validated than CrCl and so is preferable to use. Since low eGFR is at least as good a predictor of AKI as CrCl, it should be used in everyday clinical practice.

P303

### A NEW WEARABLE TRANSCUTANEOUS ELECTRICAL NERVE STIMULATION DEVICE IS MORE EFFICIENT AND BETTER TOLERATED THAN WEAK OPIOIDS IN THE TREATMENT OF KNEE OSTEOARTHRITIS PAIN

E. Maheu<sup>1</sup>, S. Soriot-Thomas<sup>2</sup>, E. Noël<sup>3</sup>, H. Ganry<sup>4</sup>, E. Lespessailles<sup>5</sup>, B. Cortet<sup>6</sup>

<sup>1</sup>Saint Antoine Hospital, Paris, <sup>2</sup>CHU Amiens Picardie, Amiens, <sup>3</sup>Santy Orthopaedic Center, Lyon, <sup>4</sup>Herganconsulting4U, Amiens, <sup>5</sup>Orleans Hospital, Orleans, <sup>6</sup>CHU Lille, Lille, France

**Objective:** To compare the analgesic efficacy and safety of a new wearable transcutaneous electrical nerve stimulation (W-TENS) to weak opioids (WO) in the treatment of moderate to severe, nociceptive, chronic pain in knee osteoarthritis (KOA) patients.

**Methods:** ArthroTENS study is a noninferiority, multicentric, prospective, randomized, single-blinded for primary efficacy outcome, controlled, 2-parallel groups, clinical study comparing W-TENS to WO over a 3-month controlled period with an additional optional noncontrolled 3-month follow-up in W-TENS group. Patients had KOA (ACR criteria) with baseline pain intensity (PI)  $\geq 4$  on a numerical rating scale (NRS), after failure to level 1 analgesics/NSAIDs, a Kellgren-Lawrence grade  $\geq 2$  and were assessed at baseline, month 1 and month 3. The co-primary outcomes were KOA PI at 3-month and the number of adverse events (AEs) over 3 months. Secondary outcomes included WOMAC function, EuroQol, responder rates defined by PI reduction  $\geq 30$  and  $\geq 50\%$  and OMERACT-OARSI response criteria. The noninferiority margin was defined as 0.825 on PI reduction.

**Results:** The noninferiority of W-TENS was demonstrated in both the per protocol (PP) and intent-to treat (ITT) populations. At M3, PI in PP population was 3.87 (2.12) compared to 4.66 (2.37) (delta: -0.79 (0.44); 95%CI (-1.65; 0.08)) in W-TENS and WO groups, respectively. A planned superiority analysis performed, demonstrated that W-TENS was significantly superior to WO at M3 ( $p=0.0124$ ). At M3, PI reduction in W-TENS group reached the absolute minimal clinically important difference: -2.1 (2.3) on the NRS (equivalent to -20 mm on a 0-100 visual analog scale), which

means being "much better". In the WO group, only a 1.1 (2.1) PI reduction was observed at M3, which means being "slightly better". OMERACT-OARSI responders were 54.5% in W-TENS group compared to 32.7% in WO group ( $p=0.021$ ). The number of AEs was significantly lower ( $p<0.001$ ) in W-TENS group ( $n=7$ ) than in WO ( $n=36$ ) group.

**Conclusion:** W-TENS was more effective and better tolerated than WO in the treatment of nociceptive KOA chronic pain and could represent an interesting non-pharmacological alternative to WO or NSAIDs.

**Acknowledgement:** This study was supported by SUBLIMED France, actiTENS<sup>®</sup> manufacturer (W-TENS used in this study).

P304

### BILATERAL FATIGUE ILIAC FRACTURE IN A MILITARY CADET: A UNIQUE CASE

C. Koutserimpas<sup>1</sup>, S. Naoum<sup>1</sup>, I. Chamakioti<sup>1</sup>, K. Raptis<sup>1</sup>, K. Alpentaki<sup>2</sup>, T. Koureta<sup>1</sup>

<sup>1</sup>Dept. of Orthopaedics & Traumatology, "251" Hellenic Air Force General Hospital of Athens, <sup>2</sup>Dept. of Orthopaedics & Traumatology, "Venizeleion" General Hospital of Heraklion, Crete, Greece

**Objective:** To describe a unique case of a bilateral iliac fatigue fracture in a young male air force cadet during the routine military training program.

**Methods:** The clinical, radiologic and laboratory findings, as well as the clinical course of the patient are presented.

**Results:** A 18-year-old male Greek air force cadet presented to the Emergency Dept. of "251" Hellenic Air Force General Hospital due to persistent pain in both hip joints, 3 weeks after he started basic combat training in the academy. His medical history was unremarkable. Plain X-ray views revealed a radiolucent line at the right iliac bone, while MRI showed bilateral bone marrow edema. The biochemical markers and bone densitometry scan in lumbar spine and left hip were normal. Based on the radiological and biochemical findings the diagnosis of fatigue bilateral iliac fractures was established. The patient followed conservative treatment with partial weight bearing using crutches and the symptoms disappeared after a 3-month period.

**Conclusion:** Stress fractures are common in military population. Diagnosis is challenging, since the majority of them is asymptomatic and presenting with normal radiographic images (X-ray, CT). MRI is the method of choice for early diagnosis and precise assessment of regional osseous morphology and surrounding soft tissues. The appropriate treatment is based upon the distinction of a fatigue from an insufficiency fracture through the assessment of bone metabolism and patient's medical history. Furthermore, to the best of our knowledge, the present case is unique, since no other bilateral fatigue iliac fracture has been reported in

the literature so far. It is of paramount importance to report such cases, in order to raise the awareness of physicians and to better understand this clinical entity.

### P305

#### FATIGUE SACRAL FRACTURES: A CASE SERIES

A. Tsatsaragkou<sup>1</sup>, K. Vlasos<sup>1</sup>, S. Naoum<sup>2</sup>, I. Chamakioti<sup>2</sup>, K. Raptis<sup>2</sup>, A. Mari<sup>3</sup>, K. Alpentaki<sup>4</sup>, C. Koutserimpas<sup>2</sup>

<sup>1</sup>Department of Anatomy, Faculty of Medicine, National and Kapodistrian University of Athens, Athens, <sup>2</sup>Dept. of Orthopaedics & Traumatology, "251" Hellenic Air Force General Hospital of Athens, Athens, <sup>3</sup>Dept. of Internal Medicine, "251" Hellenic Air Force General Hospital of Athens, Athens, <sup>4</sup>Dept. of Orthopaedics & Traumatology, "Venizeleion" General Hospital of Heraklion, Crete, Heraklion, Greece

**Objective:** Fatigue sacral fractures (FSFs) are rare, since only a few reports have been described so far, and often misdiagnosed due to clinical entities with similar symptomatology. This study presents a case series of FSFs, regarding imaging and management, aiming to increase the awareness of physicians for these injuries in cases of low-back and/or pelvic pain in young active patients.

**Methods:** The present is an 9-y retrospective observational study of a prospectively maintained database. Patients' demographics, fracture site and type, type of sports activity, duration of symptomatology prior to diagnosis, imaging, management, duration of symptomatology after diagnosis, history of fatigue fractures and follow-up were evaluated from the medical records.

**Results:** Six cases (4 females), suffering from 8 fractures (since 2 patients suffered bilateral sacral fractures) with mean age=29.8 y were studied. Two patients had suffered another fatigue fracture in the past. Mean symptoms' duration prior diagnosis was 7.5 weeks (SD=3.5), while mean symptoms' duration after diagnosis was 10.3 weeks (SD=10.2). In most cases (5), MRI revealed the fracture. According to the Kaeding-Miller classification; five fractures were type III, two IV and one II. All patients were treated conservatively, with rest and analgesics, while three received vitamin D and calcium.

**Conclusion:** FSFs are often misdiagnosed; therefore, detailed medical history, as well as clinical examination are of utmost importance and FSFs should be included in the differential diagnosis for chronic low back-or-hip pain in young patients engaging in sports, especially female runners. History of other fatigue injuries seems to be a predisposing factor. It is of paramount importance to obtain advanced imaging, including MRI, early in the workup for identifying a sacral fatigue fracture and preventing worsening of the injury.

### P306

#### FUNGAL PROSTHETIC JOINT INFECTION IN REVISED ARTHROPLASTY

C. Koutserimpas<sup>1</sup>, I. Chamakioti<sup>1</sup>, S. Naoum<sup>1</sup>, K. Alpentaki<sup>2</sup>, K. Dretakis<sup>3</sup>, K. Raptis<sup>1</sup>

<sup>1</sup>Dept. of Orthopaedics & Traumatology, "251" Hellenic Air Force General Hospital of Athens, Athens, <sup>2</sup>Dept. of Orthopaedics & Traumatology, "Venizeleion" General Hospital of Heraklion, Crete, Heraklion, <sup>3</sup>2nd Dept. of Orthopaedics, "Hygeia" General Hospital of Athens, Athens, Greece

**Objective:** To describe a case of a fungal prosthetic joint infection (PJI) in revised knee arthroplasty in 70-year-old female, two years following initial reconstruction surgery.

**Methods:** The clinical and laboratory findings, as well as the clinical course of the patient are presented.

**Results:** A 70-year-old female, with medical history remarkable for hypertension, diabetes mellitus and obesity, underwent 2-stage exchange knee arthroplasty due to PJI. The cultures from the first stage surgery yielded a methicillin resistant *S. aureus* (MRSA). Five days following the second stage of the reconstruction surgery the wound was purulent. The patient underwent surgical debridement, while new intraoperative cultures were obtained. Cultures revealed *Candida albicans* and MRSA, while blood cultures yielded the same *C. albicans*. The patient was commenced on iv fluconazole and vancomycin for 3 weeks. She refused further surgical treatment and continued life-long per os suppression with fluconazole. At follow-up 3 years after discharge, she has no symptoms or signs of an infection.

**Conclusion:** Fungal prosthetic joint infections are rare. They represent a challenging to treat clinical entity, requiring multidisciplinary approach. The combination of two-stage revision arthroplasty and prolonged period of antifungal treatment seems to be the optimal management. This report raises the question whether life-long fungal suppression is a feasible option in cases that further surgery may lead to failure, either due to technical difficulties (extensive bone loss, challenging reconstructive options) or to high patient's comorbidities. It is understood that definitive infection's eradication has not been achieved, however, the patient is mobile without signs of infection.

P307

**PREGNANCY-ASSOCIATED OSTEOPOROTIC VERTEBRAL FRACTURES: A REPORT OF TWO CASES**C. Koutserimpas<sup>1</sup>, K. Chaniotakis<sup>2</sup>, I. Chamakioti<sup>1</sup>, K. Raptis<sup>1</sup>, A. Mari<sup>3</sup>, S. Naoum<sup>1</sup>, K. Dretakis<sup>4</sup>, K. Alpantaki<sup>2</sup>

<sup>1</sup>Dept. of Orthopaedics & Traumatology, "251" Hellenic Air Force General Hospital of Athens, Athens, <sup>2</sup>Dept. of Orthopaedics & Traumatology, "Venizeleion" General Hospital of Heraklion, Crete, Heraklion, <sup>3</sup>Dept. of Internal Medicine, "251" Hellenic Air Force General Hospital of Athens, Athens, <sup>4</sup>2nd Dept. of Orthopaedics, "Hygeia" General Hospital of Athens, Athens, Greece

**Objective:** To describe two rare cases of pregnancy-associated osteoporosis (PAO) related vertebral compression fractures.

**Methods:** The clinical, radiologic and laboratory findings, as well as the clinical course and the treatment of the patients are presented.

**Results:** Two young females, in the early postpartum period, presented to the outpatient orthopaedic clinic due to acute back pain. Their medical history was unremarkable. MRI revealed vertebral compression fractures, in both cases. The fractures were localized in the thoracolumbar spine. According to the clinical symptoms, laboratory examinations and imaging characteristics, the diagnosis of pathologic fractures secondary to PAO was established. Both presented cases had vitamin D deficiency. Treatment included a spine- orthosis, cessation of breastfeeding, per os supplementation of vitamin D and calcium, while one case also received teriparatide. During the follow-up, both patients were free of symptoms and returned to their previous activities.

**Conclusion:** PAO is a rare disorder affecting women during the last trimester of pregnancy or during the early postpartum period. Pregnancy related osteoporotic vertebral compression fractures (OVCF) occur due to a combination of metabolic and mechanical factors. OVCF should be considered in the differential diagnosis in women at the last trimester of pregnancy or early postpartum period with acute back pain. The conservative treatment is considered successful for the cases presented in this report.

P308

**BONE HEALTH TELECHO MOSCOW: RESULTS OF TWO-YEAR ECHO PROJECT IMPLEMENTATION IN THE RUSSIAN FEDERATION**Z. Belaya<sup>1</sup>, G. Melnichenko<sup>1</sup>, O. Golounina<sup>2</sup>, T. Tsoriev<sup>1</sup>, L. Rozhinskaya<sup>1</sup>, T. Dubovitskaya<sup>1</sup>, I. Belovalova<sup>1</sup>, E. Gorochov<sup>1</sup>, M. Shestakova<sup>1</sup>, I. Dedov<sup>1</sup>, M. Lewiecki<sup>3</sup>

<sup>1</sup>The National Medical Research Centre for Endocrinology, Moscow, Russia, <sup>2</sup>I.M. Sechenov First Moscow State Medical University of the Ministry of Health of the Russian Federation (Sechenov University), Moscow, Russia, <sup>3</sup>Bone Health TeleECHO, UNM Health Sciences Center, Albuquerque, USA

**Objective:** Bone Health TeleECHO Moscow was launched on November 27, 2018. It is the first Russian speaking ECHO project that replicates the original Bone Health TeleECHO, with participation by healthcare professionals from across Russia and other Russian-speaking countries. This study aimed to evaluate the impact of 2-y Bone Health TeleECHO Moscow on physicians' knowledge in management of bone disease.

**Methods:** In order to assess Bone Health TeleECHO Moscow outcomes, we used a blinded self-efficacy questionnaire focusing on competence and skills in 20 domains of osteoporosis care before and after each year of participation in the Bone Health TeleECHO Moscow project with a scale of 1 to 7 (1 – no skills; 7 – expert level). Demographic data such as age, gender, specialization, degree and main employment were collected through the questionnaire. The questionnaire was sent at the end of 2019 and 2020 with a request to complete if at least three ECHO programmes were attended. The data are summarized for 2 y.

**Results:** Over the 2 y, 244 participants completed the questionnaire. Average attendance for each session increased from 64 in 2019 to 80 in 2020. Participation was from all regions of Russia and Russian-speaking countries such as Kazakhstan, Belarus, Moldova and Armenia. The mean age of our respondents was 43 y with the youngest being 23 and eldest 74. Participants' primary specialties were endocrinology (n=214, 87.7%), gynecology (n=19, 7.8%), nephrology (n=2, 0.8%), orthopedics (n=2, 0.8%) and other (n=7, 2.9%). All of our participants were MD, in addition to this there were 56 MD, PhD. Most of the physicians were employed in state-owned outpatient clinics, however 57 participants were employed in private outpatient clinics and 23 participants worked in the National Medical Centers. According to the results of the questionnaire, statistically significant improvement was observed in all evaluated fields with an effect size of 0.82.

**Conclusion:** Bone Health TeleECHO replication in Russia has proven to be effective at improving clinicians' skills in the management of osteoporosis and other bone diseases.



P309

### DENOSUMAB FOR THE TREATMENT OF OSTEOPOROSIS IN PATIENTS WITH RENAL INSUFFICIENCY WITH AND WITHOUT PRIMARY HYPERPARATHYROIDISM

S. Gronskaya<sup>1</sup>, L. Rozhinskaya<sup>1</sup>, E. Mamedova<sup>1</sup>, M. Vorotsova<sup>1</sup>, G. Melnichenko<sup>1</sup>, Z. Belaya<sup>1</sup>

<sup>1</sup>The National Medical Research Centre for Endocrinology, Moscow, Russia

**Objective:** To determine the safety and efficacy of denosumab in individuals with mild-to-moderate chronic kidney disease (CKD) (glomerular filtration rate (GFR) <60 ml/min/1.73 m<sup>2</sup>) in patients with primary hyperparathyroidism (PHPT)-related osteoporosis and primary postmenopausal osteoporosis (PMO).

**Methods:** We enrolled patients over 50 y of age with mild to moderate kidney failure (GFR 30-60 ml/min/1.73 m<sup>2</sup>) with and without PHPT and a control group with GFR >60 ml/min/1.73 m<sup>2</sup> with and without PHPT. All patients had verified osteoporosis (based on BMD T-score ≤ -2.5 SD and/or low-trauma fracture) and had at least 3 injections of denosumab. BMD, markers of bone turnover serum levels of calcium and adverse events (AEs) were evaluated from baseline to the final outcome.

**Results:** 145 patients, 69±9 years old were included in the study. Among them were patients with PHPT-related osteoporosis and CKD [(n=22); calcium - 2.63 (2.51-2.72) mmol/l; GFR - 43.7 (32.8-54.3) ml/min/1.73 m<sup>2</sup>]; patients with PHPT-related osteoporosis without CKD [(n=38); calcium - 2.60 (2.5-2.75) mmol/l; GFR 77.5 (71.5-84.9) ml/min/1.73 m<sup>2</sup>]; postmenopausal women with osteoporosis (PMO) and CKD [(n=17); calcium - 2.36 (2.26-2.47) mmol/l; GFR - 50.4 (44.3-53.4) ml/min/1.73 m<sup>2</sup>] and patients with PMO without CKD [(n= 64) calcium - 2.42 (2.3-2.47) mmol/l; GFR - 79.7 (71.8-86.3) ml/min/1.73 m<sup>2</sup>]. Among all patients denosumab treatment significantly increased BMD and decreased serum levels of calcium and bone turnover markers compared to baseline evaluation. In patients with PHPT-related osteoporosis and CKD: the median increase in BMD according to the T-score was L1-L4 0.65 (p<0.001), femoral neck 0.3 (p=0.012); radius 33% 0.2 (p<0.05), serum calcium levels decreased -0.24 (p<0.001). PHPT-related osteoporosis without CKD: the median increase in BMD according to the T-score was L1-L4 0.65 (p<0.001), femoral neck 0.2 (p<0.001); radius 33% 0.3 (p=0.013), serum calcium levels declined -0.08 (p<0.001). In patients with PMO and CKD, denosumab increased BMD in the lumbar spine L1-L4 0.5 (p<0.001), femoral neck 0.02 (p=0.8); serum calcium decreased -0.04 (p=0.4). In subjects with PMO without CKD: the median increase in BMD according to the T-score was L1-L4 0.6 (p<0.001), femoral neck 0.2 (p<0.001), serum calcium decreased -0.04 (p=0.02). A marked decline in levels of serum calcium was noted among patients with PHPT and GFR less than 60 ml/min/1.73 m<sup>2</sup> (median Δ Ca serum= 0.24 p<0.001), compared to patients with PHPT without CKD (median Δ Ca serum=0.08, p<0.001) and all others subjects. Most participants with baseline CKD remained within

the same CKD subgroup at study completion; less than 5% progressed to CKD stage 4. The percentage of participants reporting AEs was similar among participants without CKD.

**Conclusion:** Denosumab treatment is similarly effective at increasing BMD and decreasing bone turnover markers in patients with PMO and PHPT among postmenopausal women. Calcium lowering effects of denosumab are most significant in patients with PHPT and CKD. The safety of denosumab did not differ among participants with and without CKD.

P310

### PRELIMINARY RESULTS OF A COMPLEX PROGRAM: CARE FOR METABOLIC STATE OF MUSCULOSKELETAL SYSTEM – A KEY TO LONG-LIFE INDEPENDENCE IN PATIENTS WITH OSTEOPOROSIS AND OSTEOPENIA

P. Novosad<sup>1</sup>, P. Hrdý<sup>1</sup>, P. Fojtík<sup>2</sup>

<sup>1</sup>Mediekos Ambulance s.r.o., Osteology Centre Zlín, Osteology Academy Zlín o.p.s.; Zlín, <sup>2</sup>Centre for Digestive System Care, AGEL Hospital Ostrava-Vítkovice, Ostrava-Vítkovice, Czech Republic

**Objective:** Ever since the times of ancient physicians and surgeons like Sushruta (600 BC) or Hippocrates (400 BC), it is clear that physical development of individuals with sedentary lifestyle is different from the one of the physically active individuals. Only after the year 2000, with the first discovery of causality of IL-6 and muscular movement, an intensive study of this problematics has begun. Currently, there are about 600 known operations (myokines) that are interrelated with muscle functions. Muscular tissue interrelates with others mechanistically, but it also forms humoral harmony in which the muscular tissue has a dominant and determining role. This phenomenon is relevant for pathophysiology of chronic low-grade inflammation, muscle loss, origin and development of noncommunicable diseases. These cause approx. 75% of deaths in population. Solution of this problem has been considerably affecting cost-effectivity in the health care system today and thus the state economy as well. Therapeutic recommendations together with the whole health care strategy need to be adjusted according to the above mentioned findings, including the patients with osteoporosis and osteopenia. There are, so far, no known suitable medicaments which would be used for solving problematics of muscular loss. This is a reason why more attention needs to be paid to the recommended physical regime (150 min/week, according to WHO) and dietary regime (basic diet + proteins). We have built a complex diagnostic and therapeutic program for our patients. Definition of pathological values follows EWGSOP and WHO.

**Methods:** Patient cohorts: Osteoporosis 60-70 y, 70-80 y, osteopenia 60-70 y and 70-80 y. Control group for osteopenia 60-80 y. We followed information about the control group during the COVID-19 time period, particularly their physical activity regime.

1) Instructions for patients used to be delivered in a form of lectures for different age groups. Now, during the COVID-19 time period, instructions are provided individually.

2) SarQol (Sarcopenia and Quality of Life) questionnaire (Beaudart 2015). Czech version used with agreement from sarqol.org. Assessment is now done individually only.

3) Measuring hand-grip is standardised according to Southampton protocol with a dynamometer Jamar. Values of 20 kg are found pathological (female values).

4) Determination of BMI, according to WHO, the border figure is 25 or 30 kg/m<sup>2</sup>.

5) DXA method determination of selective muscle index as a measure for muscle mass. ALM/Ht<sup>2</sup> for age above 60 y, border value for sarcopenia is  $\leq 5.45$  kg/m<sup>2</sup>.

6) From laboratory examinations we aimed at IL-6 and CRP(hs) - these are not a subject of this report.

#### Results:

Osteoporosis	n	Age	BMI	ALT/Ht <sup>2</sup>	Hand grip	T-score
60-70	16	68.6	22	5.56	23.4	-2.5
70-80	22	73.7	22.6	5.79	17.0	-2.9
Osteopenia	n	Age	BMI	ALT/Ht <sup>2</sup>	Hand grip	T-score
60-70	28	67.4	25.2	6.06	21.2*	-1.1
70-80	36	73.8	27.3*	6.2	21.5*	-1.6
Control group	17	71.9	25.4	6.55*	24.6**	-1.2

Statistically relevant findings: 0.05\* 0.001\*\* DXA: LSC-1.5%

**Conclusion:** We have been running a physical activity and dietary program for our patients for more than 2 y. Physical activity is aimed at 150 min/week (WHO) and basic diet aims at the Mediterranean type + protein saturation, considerable stress is given to whey proteins enriched with Leucin. Patients have been instructed. Due to adherence to this regime we are able to report on statistically relevant changes in muscle power and also in complex muscle mass, even during the current pandemic situation.

#### P311

### OSTEOPOROSIS AND UNDIAGNOSED VERTEBRAL FRACTURES IN PERI- AND POSTMENOPAUSAL WOMEN WITH SYSTEMIC LUPUS ERYTHEMATOSUS

S. Shkireeva<sup>1</sup>, O. Lesnyak<sup>2</sup>

<sup>1</sup>Scientific and Research Institution of Rheumatology V.A. Nasonova, Moscow, <sup>2</sup>North-Western State Medical University I.I. Mechnikov, Saint-Petersburg, Russia

**Objective:** Systemic lupus erythematosus (SLE) is a chronic autoimmune disease with unknown etiology and polymorphic clinical picture occurring mainly in women. Treat to target strategy has been proposed in order to control disease activity, improve health-related quality of life, and reduce morbidity and mortality. While autoimmune inflammation being continuously reduced, comorbidities and medicine toxicity become the focus of attention. By the 5<sup>th</sup> year the most common musculoskeletal complications in patients with SLE are osteoporosis (OP) and osteoporotic fractures. Our study aimed to investigate the prevalence of osteoporosis and vertebral fractures in pre- and postmenopausal women with SLE.

**Methods:** Cross-sectional study was performed among 197 consecutive pre- and postmenopausal women with SLE. The only exclusion criteria was chronic renal failure. The median [25%;75%] of age was 48 [44;56] years and the median [25%;75%] of SLE duration was 7 [4;12] years. 43.7% of all women included in our study were postmenopausal. BMD measurements of the hip and spine were performed using DXA. Vertebral fracture assessment (VFA) was done for vertebral fractures detection using a method described by Genant. Fracture risk was assessed using the Fracture Risk Assessment Tool (FRAX®).

**Results:** All 197 patients had different fracture risks. The most prevalent fracture risk was long therapy with glucocorticoids. By the moment of the study 93.4% (n=184) of all women with SLE were taking glucocorticoids and 53 (26.9%) women had osteoporotic fractures. The BMD (T-score) at the femoral neck were lower than at total hip (p=0.000001) or spine (p=0.000001). The median [25%; 75%] of 10-y probability of fracture (FRAX) for major osteoporotic fractures before and after DXA were 11% [8.4%; 20%] and 12% [8.4%; 20%], respectively. According to FRAX-based intervention threshold 96 (48.7%) women with SLE antiosteoporotic treatment had been considered. OP could be diagnosed at 108 (54.8%) patients according to National Osteoporosis Foundation guidelines. VFA have shown 87 vertebral fractures in 55 (27.9%) women with SLE. In 31 (56.4%) cases vertebral fracture was asymptomatic and had been diagnosed only at the study. After VFA the incidence of vertebral fractures has risen to 15.7% (from 12.2% to 27.9%). 10 (18.2%) patients with vertebral fractures had normal BMD (T-score) at spine and femur neck (BMD>-0.9 SD). Multivariate regression analysis had shown that vertebral fractures were associated with longer glucocorticoids intake (p=0.000001), the

number of previous fractures ( $p=0.000001$ ), lower BMD of the hip ( $p<0.05$ ). Following VFA the number of patients with OP increased up to 61.4%.

**Conclusion:** Vertebral fractures are the most prevalent OP complication in SLE. Undiagnosed vertebral fractures in pre- and postmenopausal women with SLE are a challenging issue, underestimated by rheumatologists. Those fractures may be subclinical or asymptomatic thus providing diagnostic intricacies. The current method using DXA to predict the presence of vertebral fracture has limited value and there is a need for assessment of bone quality. VFA in pre- and postmenopausal women with SLE could be recommended as screening method for identification vertebral fractures.

P312

### TEN CASES OF OSTEOGENESIS IMPERFECTA: CLINICAL FEATURES, OUTCOMES AND TREATMENT RESPONSE

S. Dashdamirova<sup>1</sup>, D. Gogas Yavuz<sup>1</sup>

<sup>1</sup>Marmara University School of Medicine, Dept. of Endocrinology & Metabolism, Istanbul, Turkey

**Objective:** Osteogenesis imperfecta (OI) is a collagen related disorder with an autosomal inheritance that characterized by low bone density leading to recurrent fractures and deformities. We herein describe the clinical features and outcomes in 10 cases of OI via to examine bone turnover markers, bone mineral density measurements, and treatment responses in long term.

**Methods:** Ten cases were diagnosed OI that followed up in a tertiary endocrinology clinic were evaluated retrospectively. The data containing the following information as history of fracture and antiresorptive treatment, presence of deformities and blue sclera, BMD measurements, serum osteocalcin, c-telopeptide, intact PTH, calcium levels, height, body weight, and BMI during follow up recorded from patients files. Results of genetic analyses also recorded. Patients phenotypes were classified based on clinical and radiological criteria (Sillence classification).

**Results:** Median age of the cases was 34.5 (min: 23, max: 55) and the male:female ratio in the cases was 7:3. Eight patients had a family history of OI. According to Sillence classification; five patients were classified as type 1, three of them were type 4 and two of them were type 3. All patients experienced fractures, four of them had a history of ten or more fractures. Common fracture areas were radius, femur, and tibia. Life limiting deformities were observed in two patients. Hearing impairment was detected in four patients, and blue sclera finding was seen in six patients. Three patients did not receive any treatment for OI, these three patients were classified as type 1, two of these patients had radius fractures and one of them had phalanx fractures. Seven patients received treatment with oral and intravenous bisphosphonates, denosumab, and teriparatide, Three patients developed fractures after treatment, two of them were type 3, and one of

them type 4 OI. After teriparatide treatment vertebra BMD increased, but femur neck BMD decreased and new fracture did not develop. After 3 doses of denosumab new fracture developed.

**Conclusion:** Clinical presentation and treatment responses were heterogeneous. Patients had a history of osteoblastic and osteoclastic treatments given consecutively.

P313

### AN ESTIMATE OF THE INCIDENCE OF FRAGILITY FRACTURES IN THE REPUBLIC OF IRELAND

D. O'Sullivan<sup>1</sup>, J. Carey<sup>2</sup>, C. Armstrong<sup>2</sup>, F. Heaney<sup>2</sup>, J. McCabe<sup>1</sup>

<sup>1</sup>Dept. of Trauma & Orthopaedics, Galway University Hospitals,

<sup>2</sup>Dept. of Rheumatology, Galway University Hospitals, Galway, Ireland

**Objective:** There is a paucity of fragility fracture research on the Irish population, especially identifying vertebral fractures. Previous reports estimated that the annual incidence of fragility fractures in Ireland was 18,000. Our aim was to undertake the first national study estimating the fracture incidence using national data on hospitalised and non-hospitalised patients and estimating the incidence of subclinical fractures.

**Methods:** International clinical trials and observational studies were analysed that calculated fragility fracture incidence and the variability in fracture site. Previously published Irish literature on hospitalised fragility fractures using the Hospital in-patient enquiry system (HIPE) was analysed and compared to international figures. Cross sectional audits were carried out on orthopaedic outpatient clinics to determine frequency of fragility fracture presentation and the proportion of patients hospitalised. The incidence of subclinical fractures in Ireland was estimated by applying results from international epidemiological studies.

**Results:** Applying EU6 estimates to the Irish population, the fragility fracture incidence ranges from 24,000-51,000. Hip fracture incidence ranges from 6.2-28% and vertebral fractures ranged from 15-30% in observational studies. We estimate that the annual fracture incidence is 30,000-35,000 or 20 per 1000 over fifty in the Republic of Ireland. There are 15,000-20,000 patients hospitalised, 4000-8000 seen in out-patient clinics and a further 7000-21,000 subclinical fractures not formally diagnosed.

**Conclusion:** The estimated incidence of fragility fractures in Ireland is much higher than previously reported. Fragility fractures in Ireland are underreported and undertreated. Further studies are required to identify and treat all patients presenting with fragility fractures to decrease the incidence of secondary fractures.

P314

# MEASURED RESECTION VS. COMPUTER-ASSISTED GAP BALANCING TECHNIQUE FOR COMPONENT ALIGNMENT AND FEMORO-TIBIAL ROTATIONAL MISMATCH IN POSTERIOR-STABILIZED TOTAL KNEE ARTHROPLASTY: A PROSPECTIVE STUDY

A. Patamarat<sup>1</sup>, N. Kitcharanant<sup>2</sup>

<sup>1</sup>Phra Nakorn Si Ayutthaya Hospital, Ayutthaya, <sup>2</sup>Chiang Mai University, Chiang Mai, Thailand

**Objective:** To evaluate a difference in the femoral and tibial component rotational angle, femoro-tibial rotational mismatch, and the frequency of outlier relative with the surgical transepicondylar axis (sTEA) of the femur between measured resection technique and the computer-assisted gap balancing technique when combined with self-aligned technique for tibial component placement in posterior-stabilized total knee arthroplasty.

**Methods:** 100 patients with endstage osteoarthritis of the knee underwent primary total knee arthroplasty using the measured resection technique (n=50) or the computer-assisted gap balancing technique (n=50). The femoral and tibial component rotational angle, femoro-tibial rotational mismatch, and the frequency of outlier relative with the sTEA of the femur were evaluated 30 d after surgery using computed tomography.

**Results:** There were significant difference between the measured resection technique group and the computer-assisted gap balancing technique group in terms of the femoral component rotational angle ( $0.28 \pm 1.16^\circ$  vs.  $1.52 \pm 1.31^\circ$ ,  $p < 0.001$ ), but the tibial component rotational angle between both groups were without significant difference ( $1.28 \pm 3.17^\circ$  vs.  $1.86 \pm 2.81^\circ$ ,  $p = 0.22$ ). The mean femoro-tibial rotational mismatch in the measured resection technique group and the computer-assisted gap balancing technique group were  $1.00 \pm 3.28^\circ$  and  $0.34 \pm 2.71^\circ$ , respectively, without significant difference ( $p = 0.306$ ). No patients had femoro-tibial mismatch over  $10^\circ$ . The outliers were least frequent in the measured resection group than the computer-assisted gap balancing technique group.

**Conclusion:** Both techniques contributed to significant difference in femoral component rotation with a tendency to become more externally rotated in the computer-assisted gap balancing group after posterior-stabilized total knee arthroplasty. When combined with selfaligned technique for tibial component placement, there were no significant difference in tibial component rotation or femoro-tibial rotational mismatch between both groups. All cases had  $< 10^\circ$  femoro-tibial rotational mismatch.

P315

# DYNAMICS OF SERUM $\beta$ -CROSS LAPS LEVELS IN EARLY MONITORING OF OSTEOPOROSIS TREATMENT WITH DENOSUMAB

T. Simeonova<sup>1</sup>, K. Stefanova<sup>2</sup>, I. Himcheva<sup>1</sup>, P. Yordanova-Laleva<sup>3</sup>, A. Dimitrova<sup>1</sup>, B. Ruseva<sup>1</sup>

<sup>1</sup>Dept. of Physiology & Pathophysiology, Medical University-Pleven, <sup>2</sup>Diagnostic Consulting Center II - Pleven, <sup>3</sup>Faculty of Pharmacy, Medical University-Pleven, Pleven, Bulgaria

**Objective:** Recent antiresorptive long-term treatment for osteoporosis increases BMD and reduces fracture risk. Due to the long duration, poor adherence to medications is a big challenge. Bone mineral density measurements are recommended in guidelines for monitoring of the treatment, but changes in bone density may take up to 2-3 y to detect and does not predict the reduction of fractures. Recent data suggest that biochemical markers of bone turnover may be useful for monitoring since they change rapidly in response to treatment. The variability of their measurement reduces their value in clinical practice and more data are needed. Our study aimed to assess whether the dynamics of marker for bone resorption  $\beta$ -CrossLaps have a real practical benefit in the early monitoring of the treatment of patients with postmenopausal osteoporosis.

**Methods:** 21 Bulgarian women in menopause with newly diagnosed by DXA osteoporosis were studied. All participants had not been under treatment for osteoporosis. Serum  $\beta$ -CrossLaps levels were measured before and 6 months after treatment with denosumab injection subcutaneously 60 mg once every 6 months.

**Results:** Serum concentrations before and 6 months after starting treatment are respectively  $0.589 \pm 0.266$  ng/ml /0.06 - 1.2/ and  $0.166 \pm 0.139$  ng/ml /0.05 - 0.59/. The  $\beta$ -CrossLaps serum levels of a pretreatment study are within the reference range for the commercial kit. After 6 months of treatment, there was a significant decrease in serum concentrations of about 72% from baseline. In Bulgaria, successful treatment is considered to a decrease in  $\beta$ -CrossLaps values  $> 56\%$ .

**Conclusion:** In our study although pretreatment levels were within the reference range, a significant decrease in concentrations was observed in all patients. Our results show that the dynamics of  $\beta$ -CrossLaps may be useful in the early monitoring of the therapeutic effect of treatment with denosumab.

**Acknowledgment:** This research was funded by Medical University - Pleven, Project № 10/2018.



P316

# EVALUATION OF DISEASE BURDEN, UNMET TREATMENT AND MANAGEMENT NEEDS OF PATIENTS WITH HIP AND KNEE OSTEOARTHRITIS: CONSENSUS STATEMENTS FROM A DELPHI-METHOD PANEL IN TURKEY

H. F. Çay<sup>1</sup>, T. Tuncer<sup>2</sup>, A. Akıncı<sup>3</sup>, L. Altan<sup>4</sup>, S. Ataman<sup>5</sup>, S. Aydoğdu<sup>6</sup>, D. Dıraçoğlu<sup>7</sup>, H. Genç<sup>8</sup>, S. Hepgüler<sup>9</sup>, A. Ketenci<sup>10</sup>, K. Öneş<sup>11</sup>, M. Uyar<sup>12</sup>, A. Ölmez<sup>13</sup>, S. Gumru<sup>13</sup>

<sup>1</sup>Dept. of Rheumatology, Sağlık Bilimleri University, Antalya Education and Research Hospital, Antalya, <sup>2</sup>Dept. of Physical Medicine & Rehabilitation, Akdeniz University, School of Medicine, Antalya, <sup>3</sup>Dept. of Physical Medicine & Rehabilitation, Hacettepe University Medical School, Ankara, <sup>4</sup>Dept. of Physical Medicine & Rehabilitation, Uludağ University Medical School, Bursa, <sup>5</sup>Dept. of Rheumatology, Ankara University Medical School, Ankara, <sup>6</sup>Dept. of Orthopaedic Surgery, School of Medicine, Ege University, İzmir, <sup>7</sup>Dept. of Physical Medicine & Rehabilitation, Istanbul Faculty of Medicine, Istanbul University, Istanbul, <sup>8</sup>Dept. of Physical Medicine & Rehabilitation, University of Health Sciences, Ankara Training & Research Hospital, Ankara, <sup>9</sup>Dept. of Physical Medicine & Rehabilitation, School of Medicine, Ege University, İzmir, <sup>10</sup>Dept. of Physical Medicine & Rehabilitation, Division of Pain Medicine, Istanbul Faculty of Medicine, Istanbul University, Istanbul, <sup>11</sup>Dept. of Physical Medicine & Rehabilitation, Istanbul Physical Medicine & Rehabilitation Training & Research Hospital, University of Health Sciences, Istanbul, <sup>12</sup>Dept. of Anesthesiology & Reanimation, Pain Clinic, Ege University, İzmir, <sup>13</sup>Pfizer, Istanbul, Turkey

**Objective:** To get information-driven insights from expert physicians regarding multiple aspects of the patient journey in knee and hip OA and establish a consensus in order to set a stage for future studies and decision tree models in Turkey.

**Methods:** 157 questions were asked in total during this three-round modified Delphi-method panel to 10 physical medicine and rehabilitation specialists (2 have rheumatology and 3 have algology subspecialty), one orthopaedic surgeon and one algology specialist from anaesthesia specialty background. A consensus was achieved when 80% of the panel members agreed with an item. Contradictions between different disciplines were accepted as a nonconsensus factor.

**Results:** Panelists agreed that American College of Rheumatology classification criteria is mostly sufficient to provide an OA diagnosis in clinical practice (100%). WOMAC pain subscale score of at least 5 in the index hip or knee with Kellgren-Lawrence x-ray Grade of at least 2 was accepted as a moderate to severe OA definition (81%). A 30% of improvement from baseline in WOMAC pain or function subscales or in PGA score were accepted as moderate treatment response where 50% improvement from baseline in those scores as substantial responses with full consensus (100%). Panelists reached a consensus that arthroplasty procedures need to be delayed as long as possible, but this delay should not jeopardize a beneficial and successful operation

(90%). They underlined that OA is an impairing and disabling disease (100%) which results in a dramatic impact on quality of life (100%) and leading to early retirement from active working life (81%). Panelists agreed that there is a significant unmet treatment need for patients with moderate-to-severe OA who are unable to take, tolerate or adequately respond to currently available therapies.

**Conclusion:** These findings show that there is a significant disease burden, unmet treatment needs for patients with moderate-to-severe OA in Turkey from experts' perspective. Therefore, an updated systematic approach and decision tree models are needed to be implemented.

**Disclosures:** This research was sponsored by Pfizer. The panel members received honoraria from Pfizer for their consultancy on answering the questionnaires. Medical writing and editorial support were provided by Remedium Consulting Group and was funded by Pfizer. H. Fatih Çay has received speaker honorarium from Pfizer. Tiraje Tuncer has acted in advisory board of Pfizer. Aysen Akıncı has acted in advisory board of Novartis, Pfizer and has received speaker honorarium from Abbvie, Novartis, Lilly and Pfizer. Lale Altan has acted in advisory board of Novartis, Pfizer, Abbvie, Roche, Eli Lilly and MSD, and has received speaker honorarium from Novartis, Pfizer, Abbvie, Gensenta, İbrahim Ethem, Sanovel, Roche, Exeltis, Santa Farma, Eli Lilly and MSD. Sebnem Ataman has acted in the advisory board or received a speaker honorarium at pharmaceutical companies, including Novartis, Pfizer, Abbvie, Amgen, and Lilly. Semih Aydoğdu has acted in advisory board of Pfizer. Demirhan Dıraçoğlu has received speaker honorarium from Expanscience, Pfizer and Sandoz. Hakan Genç has acted in advisory board of İE Menarini and Pfizer and has received speaker honorarium from Pfizer and İE Menarini. Simin Hepgüler has acted in advisory board of Pfizer and has received speaker honorarium from Novartis. Ayşegül Ketenci has acted in advisory board of Abdi İbrahim, İbrahim Ethem Menarini, MEDA, Pfizer, and has received speaker honorarium from of Abdi İbrahim, Adilna Sanovel, İbrahim Ethem Menarini, MEDA, Santa Farma, Pfizer, Viatrix. Kadriye Öneş has acted in advisory board of Novartis, Pfizer, and Bristol Myers Squibb and has received speaker honorarium from Pfizer. Meltem Uyar has acted in advisory board of Pfizer.

P317

# INDICATIONS FOR SURGICAL TREATMENT OF THORACOLUMBAR KYPHOSIS IN PATIENTS WITH MUCOPOLYSACCHARIDOSIS

V. S. Pereverzev<sup>1</sup>, A. I. Kazmin<sup>1</sup>, A. A. Panteleev<sup>1</sup>, M. L. Sazhnev<sup>1</sup>

<sup>1</sup>N.N. Priorov Central Scientific Research Institute of Traumatology & Orthopedics, Moscow, Russia

**Objective:** This retrospective multicenter study compares the long-term results of circumferential and posterior-only surgical treatment of thoracolumbar kyphosis in patients with MPS. Con-

sidering multiple concomitant organ disorders in MPS patients, anterior stabilization increases risks of complications. A posterior-only approach can provide stable fixation with lowered complication risks in MPS patients. Circumferential fusion of kyphosis in patients with MPS is currently accepted as the most effective surgical approach. However, long-term results remain debatable. This study assesses the effectiveness of posterior-only compared to circumferential fusion.

**Methods:** A retrospective multicenter study. Eleven patients (7 male, 4 female) with MPS and thoracolumbar kyphosis underwent surgical treatment. Hurler syndrome (type I) was diagnosed in 5 patients, Morquio syndrome (type IV) in 2, and Maroteaux-Lamy (type VI) in 4 patients. Indications for surgical treatment included more than 40° kyphosis, sagittal spinal imbalance, progressive neurological symptoms and severe pain. In 3 cases, patients underwent circumferential arthrodesis combining anterior and posterior approaches. In 8 cases, instrumentation included hooks and/or pedicular screws, placed two levels above and two levels below the deformity apex. The follow-up period ranged from 2-5 y.

**Results:** In 8 cases solid spinal fusion was achieved. Complications after surgical treatment were observed in 4 patients (36%). PJK developed in one case 2 y after surgery, pseudarthrosis was observed in one case, wound suppuration was observed in one case, and a broken metal rod in one case.

**Conclusion:** Surgical treatment of MPS patients with thoracolumbar kyphosis is accompanied by a high risk of complications when circumferential stabilization is performed. Most authors and our data show that the most optimal method of surgical treatment of thoracolumbar deformation is dorsal correction and fixation in combination with a wide laminectomy at the level of stenosis. The second stage includes the anterior decompression and interbody fusion. However, if the patient's lung function is dramatically compromised, and a high risk of respiratory complications exists, surgery may be limited to only posterior correction and fixation in conjunction with a wide laminectomy, which allows to achieve a comparable level of fixation with a lower risk of complications.

P318

### RISK FACTORS AND SURGICAL TREATMENT OF CRANIOVERTEBRAL STENOSIS IN PATIENTS WITH MAROTEAUX-LAMY SYNDROME (MUCOPOLYSACCHARIDOSIS TYPE VI)

V. S. Pereverzev<sup>1</sup>, A. I. Kazmin<sup>1</sup>, A. A. Panteleev<sup>1</sup>, M. L. Sazhnev<sup>1</sup>

<sup>1</sup>N.N. Priorov Central Scientific Research Institute of Traumatology and Orthopedics, Moscow, Russia

**Objective:** The most common lesion of the spine with mucopolysaccharidosis type VI (Maroteaux-Lamy syndrome) is spinal stenosis at the atlantoaxial junction, which leads to neurological complications of varying degree, including tetraparesis or tetra-

plegia due to spinal cord compression at this level. This retrospective multicenter study presents the long-term results of surgical treatment of patients with the Maroteaux-Lamy syndrome. Early decompression of the spinal canal with leads to atlantoaxial stabilization and regression of neurological symptoms in patients with Maroteaux-Lamy syndrome. Atlantoaxial instability with the outcome of myelopathy and spastic tetraparesis are commonly described in patients with MPS VI type. The accumulation of glycosaminoglycans behind the odontoid process leads to a gradual development of the spinal canal stenosis and compression of the spinal cord in the cervical spine. These lesions lead to neurological disorders and loss of quality of life.

**Methods:** A retrospective, multicenter study. Nine patients with MPS type VI. Of them 3 males and 6 females aged 14-35 y (mean age 20.8 y). All patients presented with craniovertebral stenosis of some degree and underwent posterior spinal canal decompression with cervical fusion. Neurological symptoms were observed in 7 of all cases preoperatively. Functional assessment and evaluation of neurological status was conducted in all cases. CT and MRI evaluation was performed at the atlantoaxial level before surgery and at follow-up.

**Results:** The average follow-up period was 2.9 y. Seven of the nine patients demonstrated regression of neurological symptoms. In two patients the neurological status was unchanged. Solid fusion was achieved in 6 cases. Complications from surgery we observed in 3 patients. One patient died one year after surgery due to unrelated causes, there was one case of pseudarthrosis one case of implant instability and one case of early postoperative wound suppuration.

**Conclusion:** The majority of patients with type VI MPS present with some degree of spinal stenosis at the atlantoaxial level. Based on our experience, these patients require close neurological and radiographic monitoring as early as possible. In our view, surgical treatment of patients with type VI MPS should be considered before the onset and progression of neurological symptoms.

P319

### THE IMPACT OF MUSCULOSKELETAL CONDITIONS AND FRAILTY ON THE ABILITY TO SELF-CARE OR BE IN RECEIPT OF CARE: A STUDY OF COMMUNITY-DWELLING OLDER ADULTS FROM THE HERTFORDSHIRE COHORT STUDY

G. Bevilacqua<sup>1</sup>, F. Laskou<sup>1</sup>, H. P. Patel<sup>1</sup>, K. Jameson<sup>1</sup>, N. Fuggle<sup>1</sup>, C. Cooper<sup>1</sup>, E. M. Dennison<sup>1</sup>

<sup>1</sup>MRC Lifecourse Epidemiology Unit, Southampton, UK

**Objective:** Musculoskeletal conditions and frailty lead to a significant burden of disease in later life. However, living independently remains the aim of older adults. The ability to self-care and reliance on external, or access to care at home may hamper this. Musculoskeletal conditions (MSC) as well as frailty lead to sig-

nificant morbidity in later life and may influence care needs. In this study, we consider whether MSC (osteoporosis, sarcopenia, osteoarthritis) and frailty are associated with ability to self-care, and influence access to formal/informal care among community-dwelling older adults.

**Methods:** Participants were recruited from the Hertfordshire Cohort Study, an established cohort study of community-dwelling adults in the UK. Osteoporosis was assessed using DXA. Sarcopenia was assessed using EWGOP2 criteria. Osteoarthritis of the hand, hip or knee was defined by clinical examination. Frailty was assessed using Fried criteria. Ability to self-care and access to formal/informal care were self-reported.

**Results:** 443 men and women (median age 75.5 [IQR 73.5-77.9] y) participated. Osteoporosis affected (n=74) 21.4% of participants, (n=115) 26.8% had osteoarthritis, (n=30) 8.6% had sarcopenia, and (n=33) 7.6% were identified as frail. Most participants (n=402 [90.7%]) reported no problems with self-care. Identical proportions of participants received informal (n=53 [12%]) and formal (n=53 [12%]) care at home in the previous year. Reporting difficulties with self-care was associated with clinical osteoarthritis (OR 3.48, 95%CI 1.63-7.43, p=0.001) and frailty (5.29, 2.12-13.2, p<0.001), but not with osteoporosis or sarcopenia. Receiving informal care at home in the past year was associated with osteoarthritis (2.56, 1.28-5.14, p=0.008), the coexistence of two or more MSC (6.50, 1.66-25.39, p=0.007), and frailty (6.25, 2.59-15.08, p<0.001), but not with osteoporosis or sarcopenia alone. None of the conditions were associated with receiving formal care.

**Conclusion:** MSC are associated with informal receipt of care. Presence of two or more MSC convey similar informal care requirements to those living with frailty. Early assessment and management of MSC and frailty in clinical practice may reduce need for care and preserve independence.

## P320

### PROSPECTIVE OBSERVATIONAL STUDY IN REAL LIFE TREATMENT IN LATINAMERICAN PATIENTS WITH DENOSUMB QUERY DATABASE (ROSELA DATABASE): PRELIMINARY REPORT IN 2285 PATIENTS

F. Cons-Molina<sup>1</sup>, J. L. Balcazar<sup>2</sup>, E. Romero<sup>3</sup>, J. F. Molina<sup>4</sup>, J. A. Montañó<sup>5</sup>, L. J. Elizondo-Alanis<sup>6</sup>, F. Irazoque<sup>7</sup>, A. J. Zarain<sup>8</sup>, J. A. Veloz<sup>9</sup>, J. Morales-Torres<sup>10</sup>, F. Olán<sup>11</sup>, C. R. Salinas<sup>12</sup>, M. A. Perez-Romero<sup>13</sup>, D. A. Bernal<sup>14</sup>, C. R. Rios<sup>15</sup>, C. Aguiar-Moreira<sup>16</sup>, B. Muzzi Camargos<sup>17</sup>, L. Guimarães-Oliveira<sup>18</sup>, S. Duran<sup>19</sup>, N. Casas<sup>20</sup>, A. Roman-Gonzalez<sup>21</sup>, L. Brance<sup>22</sup>, M. S. Larroude<sup>23</sup>, E. Teixeira<sup>24</sup>, A. J. Chuquihuara<sup>25</sup>, J. F. Betancur<sup>26</sup>, D. O. Messina<sup>27</sup>, D. Wiluzanski<sup>28</sup>, M. E. Algan<sup>29</sup>, M. Candela<sup>30</sup>, M. B. Zancheta<sup>30</sup>, E. A. Zamora<sup>31</sup>, R. G. Sanchez<sup>32</sup>, R. M. Martinez<sup>33</sup>, M. A. Polanco<sup>34</sup>, H. Avila<sup>35</sup>, A. Escobar<sup>36</sup>

<sup>1</sup>Centro Investigacion en Artritis y Osteoporosis, Mexicali, Mexico, <sup>2</sup>Hospital Regional ISSSTE Culiacan, Culiacan, Mexico, <sup>3</sup>Osteology Medical Office, Tacuarembó, Uruguay, <sup>4</sup>Centro Reumalab, Medellín, Colombia, <sup>5</sup>Diagnóstico Integral Para la Mujer GineDX, Mexico City, Mexico, <sup>6</sup>Centro de Investigación Clínica de Cd. Obregon, Obregon city, Mexico, <sup>7</sup>Centro de Investigación y Tratamiento Reumatológico, Mexico City, Mexico, <sup>8</sup>Centro de Climaterio Menopausia y Osteoporosis, Puebla, Mexico, <sup>9</sup>Hospital Regional ISSSTE Leon, Leon, Mexico, <sup>10</sup>Hospital Aranda de la Parra, Leon, Mexico, <sup>11</sup>Hospital Regional de Alta Especialidad, Villahermosa, Mexico, <sup>12</sup>Hospital Angeles de Puebla, Puebla, Mexico, <sup>13</sup>Centro Integral para la Atención de la Osteoporosis, Guadalajara, Mexico, <sup>14</sup>Unidad de Endocrinología y Densitometria, Mexicali, Mexico, <sup>15</sup>Centro de Reumatología y Rehabilitación, Guayaquil, Ecuador, <sup>16</sup>SEMPR- Hospital de Clinicas- UFPR, Curitiba, Brazil, <sup>17</sup>Clinica y Pesquisa de Osteoporosis, Bello Horizonte, Brazil, <sup>18</sup>Clinica de Ortopedia e Fraturas, Goiânia, Brazil, <sup>19</sup>Clinica de Investigación en Reumatología y Obesidad, Guadalajara, Mexico, <sup>20</sup>Rheumatology Medical office, Bogota, Colombia, <sup>21</sup>Hospital Universitario San Vicente Fundación, Medellín, Colombia, <sup>22</sup>Centro de Reumatologia, Rosario, Argentina, <sup>23</sup>Rheumatology Medical office, Buenos Aires, Argentina, <sup>24</sup>Complejo Hospitalario San Pablo, Lima, Peru, <sup>25</sup>Hospital Nacional Dos de Mayo, Lima, Peru, <sup>26</sup>Clinica Medellin, Medellin, Colombia, <sup>27</sup>Investigaciones Reumatologicas y Osteologicas, Buenos Aires, Argentina, <sup>28</sup>CENTROSEO, Montevideo, Uruguay, <sup>29</sup>Hospital Provincial SAMCO Rufino., Rufino, Argentina, <sup>30</sup>Instituto Investigaciones Metabolicas IDIM, Buenos Aires, Argentina, <sup>31</sup>Medical Care & Research SA de CV, Merida, Mexico, <sup>32</sup>Centro Medico Puerta de Hierro Sur, Zapopan, Mexico, <sup>33</sup>Endocrinology Medical office, Guadalajara, Mexico, <sup>34</sup>Endocrinology Medical Office, Guadalajara, Mexico, <sup>35</sup>Centro Integral en Reumatologia, S.A. de C.V., Guadalajara, Mexico, <sup>36</sup>Consultorio Ginecología y Obstetricia, Tijuana, Mexico

**Objective:** Preliminary report of a real-life experience in treatment of postmenopausal osteoporosis (PMOP) with denosumab (Dmab).

**Methods:** A multicenter prospective, descriptive cohort study, conducted in 8 countries (Mexico, Argentina, Peru, Colombia, Ecuador, Uruguay, Chile, Brazil) with up to 8 y of clinical records of patients treated with Dmab. A online DB was used to collect data in 41 centers.

**Results:** 2285 patients age at baseline (BL) 66 ± 9.8 y, 75.1% with >60 y. The main reason for using Dmab: hip Op (36.8%) in DXA; lack of BMD gain (31.9%). Dmab was used as the first anti-Op drug in 971 (42.5%) patients and 57.5% had used prior anti-Op medication. The average BMD increase from BL up to 8th year was in LS 16.1%, in FN 7.3% and TF 7.9%. The comparison between diabetics and nondiabetics shows a decrease in BMD gain in TF from the 1st year and in LS from the 4th year ahead. The 10 y FRAX level was 9.1 ± 6.3 for major OP fracture (Fx) at BL and for hip Fx 3.3 ± 4.2. A total of 563 (24.6%) prevalent Fx were detected at BL; 201 patients (36.7%) with >1 Fx. Only 107 patients (4.6%) developed Fx during treatment with Dmab. Vertebral (VFX) and nonvertebral Fx (NVFX) increase during 2nd and 3rd years of treatment, related to a decrease in persistence. Adverse events (AE) were reported in 61 patients (2.6%) and SAE in 71 (3.1%), including 2 eczema, 1 ONM and 2 AFF cases. Ad-



herence to Dmab treatment is not optimal, mainly in years 2-4. Only 45% completed 2 y of treatment and only 11% used for at least 4 y with a patient loss of follow-up (50.2%). Most patients received no treatment after discontinuing DMAB, 10 cases of post-Dmab vertebral Fx, 3 with >1 fracture was reported. **Conclusion:** Dmab improves BMD and reduces rate of VFX and NVFX in most patients with PMOP in a real-life environment in 8 LatAm countries. Patient follow-up loss is very high in LatAm countries. Dmab proved to be as safe as observed in clinical registry studies with a very low rate of AE and SAE.

P321

### ASSESSMENT OF TREATMENT PRACTICES OF GLUCOCORTICOID-INDUCED OSTEOPOROSIS AND THEIR ADEQUACY

M. Nunes<sup>1</sup>, J. F. Ferreira<sup>2</sup>, A. S. Pinto<sup>2</sup>, F. C. Santos<sup>2</sup>, C. Vaz<sup>2</sup>

<sup>1</sup>Faculdade de Ciências da Saúde da Universidade da Beira Interior, Covilhã, <sup>2</sup>Unidade de Saúde Local da Guarda, Guarda, Portugal

**Objective:** To assess the current treatment practices of glucocorticoid-induced osteoporosis (GIOP) in patients followed in Rheumatology outpatient clinic in a Portuguese secondary hospital.

**Methods:** A retrospective cohort study was conducted in patients followed in Rheumatology outpatient clinic in a Portuguese secondary hospital between 1 June 2019 and 31 December 2019. Patients with inflammatory rheumatic disease, under glucocorticoid (GC) treatment for  $\geq 3$  months, with a daily dosage of  $\geq 2.5$  mg were included in the study. Sociodemographic, clinical and GIOP management data were obtained from clinical records. Using the 2017 American College of Rheumatology (ACR) guidelines for the prevention and treatment of GIOP as reference, treatment adequacy was assessed and treatment prescription predictors were identified. Patients were grouped by age (<40 and  $\geq 40$ ) and analyzed separately. Descriptive and inferential analysis were conducted using 5 and 7.5 mg of daily GC as cutoffs. Mann-Whitney and chi-squared or exact Fisher tests were used, as well as a multivariable classification tree analysis.

**Results:** Of 676 patients followed in this Rheumatology outpatient clinic in that period, 103 were included in the study. Patients' mean age was 60.9 ( $\pm 13.3$ ) and 68% were female. Seven patients were <40 years old, one of which was considered undertreated according to ACR guidelines. Of the 96 patients  $\geq 40$  years old, 20.8% were adequately treated and 40.6% were undertreated. No patients were considered overtreated. Factors associated with GIOP treatment prescription were older age, higher major bone fracture or hip bone fracture risk obtained through Fracture Risk Assessment Tool (FRAX) and previous bone fragility fracture. A FRAX score for hip fracture  $\geq 3\%$  and a vertebral BMD T-score <-2.1 were identified as prescription determinants of pharmacological treatment.

**Conclusion:** Following the 2017 ACR guidelines, a large proportion of patients with inflammatory rheumatic disease chronically treated with GC were undertreated for GIOP. There are, however, limitations in these guidelines application to the Portuguese population which emphasize the need to develop national clinical recommendations for the prevention and treatment of GIOP.

P322

### CLINICAL OUTCOME AND HEALTH-RELATED QUALITY OF LIFE OF FRAGILITY HIP FRACTURE PATIENTS: A FOLLOW UP STUDY IN TERTIARY CARE FACILITY IN SRI LANKA

T. Abeygunasekara<sup>1</sup>, S. Lekamwasam<sup>2</sup>

<sup>1</sup>Faculty of Allied Health Sciences, University of Ruhuna, <sup>2</sup>Faculty of Medicine, University of Ruhuna, Galle, Sri Lanka

**Objective:** To assess the clinical outcome and health-related quality of life (HRQOL) of hip fracture patients admitted to a tertiary care facility in southern Sri Lanka for 12 months.

**Methods:** Hip fracture patients (n=180) admitted to Teaching Hospital, Karapitiya and age and sex matched controls from their neighborhood (n=348) were included in the case control study. The 180 fragility hip fracture patients were followed up for one year to assess morbidity, mortality and the HRQOL at regular intervals after the fracture. The HRQOL was assessed using the validated Sinhala versions of the SF 36, BI and MMSE scale. Results were presented as numbers (percentages), mean (SD) or median (IQR), appropriately. Chi-square test and independent t-test were used to compare groups. ROC analyses were done for selected variables considering the death/survival as the dependent variable.

**Results:** Of 180 patients (149 women), 107 had surgery while the rest were managed conservatively. Mean (SD) age of study subjects was 76.5 (9.2 y). Patients who underwent surgery had less complications compared to those managed conservatively (15% vs. 51% with one complication or more) ( $p < 0.001$ ). Thirty three patients who died within the first 12 months were older, had higher comorbidity and physical impairment before fracture and at discharge from the hospital, when compared with those survived. An initial sharp decline and a partial recovery was seen in the total SF 36 score and physical and psychological domains among patients with hip fractures. Furthermore, patients who had surgical treatment had significantly higher physical independence at 12 months compared to those managed nonsurgically (mean BI 81 vs. 10.5). In the ROC analysis, AUC for age, Charlson index, age-adjusted Charlson index, BI before fracture and BI at discharge were 0.77 (0.04), 0.79 (0.04), 0.70 (0.05), 0.67 (0.05) and 0.76 (0.04) ( $p < 0.01$  for all). The two groups were similar in mental status but control group had better HRQOL and ADL than hip fracture patients ( $p < 0.01$ ).



**Conclusion:** Hip fracture leads to higher mortality, physical dependence and poor QOL especially among those managed non-surgically. This study found gaps in the current management of hip fracture patients.

P323

### DOES ORTHOPEDISTS LEARN TO MANAGE OSTEOPOROTIC FRACTURES DURING ORTHOPAEDIC RESIDENCY PROGRAM?

G. Ocampos<sup>1</sup>, M. Arouca<sup>1</sup>, M. Peres<sup>1</sup>, M. Rezende<sup>1</sup>, O. Camargo<sup>1</sup>

<sup>1</sup>Institute of Orthopedics & Traumatology, Hospital das Clínicas, Faculty of Medicine, University of São Paulo, São Paulo, Brazil

**Objective:** To evaluate whether residents (r1, r2 or r3, according to the year of formation) of orthopedics in a tertiary service investigate, treat and/or refer the patient with an osteoporotic fracture to treat osteoporosis (OP) and whether this management improved during residency program.

**Methods:** All residents answered diagnostic and therapeutic questions related to a clinical case of osteoporotic fracture (hip transtrochanteric fracture) in 4 scenarios: initial care in the emergency room, at the time of hospital discharge, during outpatient follow up at 3 and 6 months. Answers were compared between years of residence.

**Results:** Twenty r1, 21 r2 and 19 r3 answered the questions. One resident adequately treated osteoporosis in r1, two in r2 and four in r3. 75% of r1, 90.5% of r2 and 68% of r3 referred patients for OP treatment. There is an improvement in the prescription of laboratory tests for osteoporosis investigation over the years ( $p=0.028$ ), with 52.6% of 3rd year residents prescribing adequate laboratory tests. In the same period 100% of r3 correctly prescribed prophylaxis for deep vein thrombosis ( $p=0.001$ ).

**Conclusion:** Despite being below the ideal, residents treat and/or refer patients with osteoporotic fractures for secondary prevention. The orthopaedic residency program improves resident performance in osteoporotic fracture management, in spite of comparison with deep venous thrombosis management shows that there is a lot of room for improvement.

P324

### A RETROSPECTIVE OBSERVATIONAL STUDY OF OSTEOPOROSIS MANAGEMENT AFTER A FRAGILITY FRACTURE IN PRIMARY CARE

A. Bell<sup>1</sup>, D. L. Kendler<sup>2</sup>, A. A. Khan<sup>3</sup>, M. Shapiro<sup>1</sup>, A. Morisset<sup>4</sup>, J.-P. Leung<sup>5</sup>, M. Reiner<sup>6</sup>, S. M. Colgan<sup>6</sup>, M. Packalen<sup>7</sup>, L. Slatkovska<sup>7</sup>

<sup>1</sup>Dept. of Family & Community Medicine, University of Toronto, Toronto, Canada, <sup>2</sup>Dept. of Medicine, Division of Endocrinology, University of British Columbia, Vancouver, Canada, <sup>3</sup>Dept. of Medicine, Divisions of Endocrinology & Metabolism and Geriatrics, McMaster University, Hamilton, Canada, <sup>4</sup>CIUSSS de l'Estrie – CHUS, Centre Haute-Yamaska, Granby, Canada, <sup>5</sup>Dept. of Family Medicine, University of Calgary, Calgary, Canada, <sup>6</sup>Amgen Inc., California, USA, <sup>7</sup>Amgen Canada Inc., Mississauga, Canada

**Objective:** A fragility fracture is a clinical manifestation of osteoporosis and a major risk factor for subsequent fracture in adults aged 50+, yet adherence to secondary prevention strategies is lacking internationally. This retrospective observational study aimed to characterize post-fracture management, in the Canadian primary care setting.

**Methods:** Patients with an index fragility fracture occurring between January 1, 2014 and December 1, 2016 were identified, from medical records reviewed at 76 primary care centers in Canada, with follow-up until January 2018. Fragility fracture was defined as a fracture occurring without major trauma at any skeletal site other than the skull, face, cervical spine, hand, metatarsus, phalanges or patella. Patients with a history of fragility fracture in the five years prior to their index fracture were excluded.

**Results:** Of all 778 patients identified (80.5% female, median age [IQR] 73 [64-80]), 215 were on osteoporosis treatment and 269 had osteoporosis diagnosis recorded prior to their index fracture. The median follow-up after index fracture was 363 (IQR 91-808) days. Of patients not on osteoporosis treatment at their index fracture, 60.2% ( $n=339/563$ ) remained untreated after their index fracture and 62.2% ( $n=23/37$ ) continued untreated after their subsequent fracture. After their index fracture, fracture risk assessment (FRAX or CAROC) was not performed in 83.2% ( $n=647/778$ ) of patients, and 59.9% ( $n=466/778$ ) of patients did not receive BMD testing. Of patients who did not have osteoporosis diagnosis recorded prior to their index date, 58.9% ( $n=300/509$ ) remained undiagnosed over the interval from index fracture to the end of follow-up. At least one subsequent fracture occurred in 11.1% ( $n=86/778$ ) of patients after their index fracture until the end of study follow-up.

**Conclusion:** In the primary care setting, fragility fracture infrequently resulted in osteoporosis treatment or fracture risk assessment. Even after experiencing multiple fragility fractures over a relatively short follow-up, the majority of patients remained untreated. These results suggest a fragility fracture is not recognized as a major risk factor for subsequent fracture and its occurrence does not prompt primary care physicians to intervene. These data should direct initiatives to overcome obstacles to primary care physicians' effective management of patients after initial fragility fractures.

P325

### PHOTOBIMODULATION: A NEW TOOL FOR POSTOPERATIVE PAIN IN TOTAL KNEE ARTHROPLASTY? A CASE SERIES

G. Ocampos<sup>1</sup>, M. Arouca<sup>1</sup>, M. Rezende<sup>1</sup>, B. Varone<sup>1</sup>, D. Martuscelli<sup>1</sup>, G. Freire<sup>1</sup>, N. Pinto<sup>2</sup>, M. Souza<sup>2</sup>, O. Camargo<sup>1</sup>

<sup>1</sup>Institute of Orthopedics & Traumatology, Hospital das Clínicas, Faculty of Medicine, University of São Paulo, <sup>2</sup>Bright Photomedicine, São Paulo, Brazil

**Objective:** To evaluate the effect of photobiomodulation (PBM, low level laser therapy) in postoperative pain control after total knee arthroplasty.

**Methods:** Nine patients with knee osteoarthritis were submitted to primary total knee arthroplasty under spinal anesthesia and sedation. Among postoperative analgesia, all patients received obturator and femoral blockage guided by ultrasound, dipyrone 30 mg/kg, intravenous, every 6 h, ketorolac 30g, intramuscular, every 12 h, for 3 d. If still with pain patients could receive morphine, 2 mg, intravenous, by a patient control analgesia device. PBM was applied with a light aid equipment from Bright Photomedicine, with LEDs of 850 nm. Patients received sessions of PBM in the operating room after wound closure and after 24 h in the topography of femoral nerve, for 4 min, and parallel to the surgical incision for 2 min. The total consumption of morphine from the immediate postoperative period until hospital discharge was recorded. Pain, at rest and at movement, was assessed using the visual analog scale from the immediate postoperative period until the second postoperative day.

**Results:** Patients received  $16.7 \pm 15$  mg of morphine until the third postoperative day. Pain at rest and at movement average  $4.8 \pm 3.2$  and  $5.6 \pm 3.5$  in the immediate postoperative period. In the first postoperative day, pain at rest and at movement were  $3 \pm 3.1$  and  $4.2 \pm 2.9$  at 6:00;  $2.3 \pm 2.3$  and  $3.7 \pm 2.1$  at 12:00;  $1.6 \pm 1.2$  and  $2.4 \pm 1.6$  at 18:00. On day two postoperative pain at rest and at movement average  $1.2 \pm 1.6$  and  $3.5 \pm 1.8$  at 6:00;  $1.2 \pm 1.4$  and  $3.5 \pm 2.9$  at 12:00;  $0.4 \pm 1$  and  $2.2 \pm 1.8$  at 18:00.

**Conclusion:** PBM may be a tool to assist in the control of postoperative pain in patients submitted to total knee arthroplasty.

P326

### VITAMIN D DEFICIENCY IN RUSSIAN FEDERATION

L. A. Suplotova<sup>1</sup>, V. A. Avdeeva<sup>1</sup>, E. A. Pigarova<sup>2</sup>, L. Y. Rozhinskaya<sup>2</sup>, E. A. Troshina<sup>2</sup>

<sup>1</sup>Tyumen State Medical University, Tyumen, <sup>2</sup>Endocrinology Research Centre, Moscow, Russia

**Objective:** Most of the territory of Russian Federation, due to its geographical location, climatic and weather conditions, has all the prerequisites for the development of vitamin D deficiency and insufficiency in the population. This study aimed to estimate the incidence of vitamin D deficiency and insufficiency in the representative population sample from Russian Federation.

**Methods:** Russian multicenter noninterventional, cross-sectional study was conducted in two time periods: March-May (spring) and October-November (autumn) of 2020. Study population included 996 conditionally healthy volunteers from 10 regions of the Russian Federation (latitudes from 45° to 70°). The level of 25(OH) D was considered as adequate at a value of  $\geq 30$  ng/ml, insufficiency -  $\geq 20$  and  $< 30$  ng/ml, deficiency -  $< 20$  ng/ml. All patients were evaluated for 25(OH) serum by chemiluminescence immunoassay. The study was carried out with the financial support of the company JSC "AKRIKHIN", protocol # AQ-01/20, version 2.0 from February 25, 2020.

**Results:** Study results showed that deficient levels of 25(OH)D were registered in 39.36% of cases, insufficient in 32.83%. In total, 72.19% of the examined individuals had deficiency or insufficiency of vitamin D, and optimal level of the vitamin were showed in only 27.81%. The prevalence of vitamin D deficiency/insufficiency depended on the time period with statistically significant difference ( $p < 0.00001$ ) - 84.27% in the spring vs. 62.43% in the autumn. The study also examined basic demographic characteristics such as gender and age. The data obtained indicate that the highest incidence of vitamin D deficiency and insufficiency in males vs. women ( $p = 0.013$ , 79.05% and 70.36%, respectively), as well as the most pronounced vitamin D deficiency was observed in young people in the age subgroup of 18-25 years old ( $p < 0.001$ ) and constitute 79.15%.

**Conclusion:** The results of the study indicate a widespread significant prevalence of vitamin D deficiency and insufficiency in the Russian Federation, regardless of the region of residence and season. The main risk group for suboptimal levels of 25(OH)D in serum was young men.

P327

### PREVALENCE OF CLINICAL RISK FACTORS OF OSTEOPOROTIC FRACTURES AMONG URBAN AND RURAL POPULATIONS OF THE RUSSIAN FEDERATION

I. Skripnikova<sup>1</sup>, M. Miagkova<sup>1</sup>, S. Shalnova<sup>1</sup>, V. Vygodin<sup>1</sup>

<sup>1</sup>Federal State Institution "National Medical Research Center for Therapy and Preventive Medicine" of the Ministry of Healthcare of the Russian Federation, Moscow, Russia

**Objective:** To study the prevalence of clinical risk factors (RFs) of fractures, which are components of the FRAX calculator, among urban and rural populations of the Russian Federation.

**Methods:** Representative samples of urban from 12 regions and rural populations from 4 regions of the Russian Federation were analyzed. In total 13,116 Russian residents aged 40-69 y participated in the study (8489 women, 4627 men). Groups of urban (n=11962) and rural (n=1154) populations were comparable by age. Participants were interviewed using a single standard modular questionnaire containing questions about clinical RFs of fractures included in FRAX.

**Results:** Among the studied RFs of fractures, the most common were the following: previous fractures (16.3%), causes of secondary osteoporosis (20.8%) and current smoking (17.9%). In men were more often registered previous fractures (20.3%), smoking (34.3%) and alcohol abuse (5.5%), while in women – causes of secondary osteoporosis (28.1%), rheumatoid arthritis (3.7%) and taking glucocorticoids (3.6%), regardless of the place of residence. With age, the frequency of all RFs in women and men increased, with the exception of smoking and alcohol abuse. In rural men, the frequency of previous fractures and alcohol abuse was higher than in urban ones (24.3% vs. 19.9%,  $p<0.05$  and 7.6% vs. 5.3%,  $p<0.05$ ). At the same time, women living in the city, compared to rural women, had more frequent RFs of fractures such as smoking (10.7% vs. 8.3%,  $p<0.05$ ) and taking glucocorticoids (3.9% vs. 1.4%,  $p<0.001$ ).

**Conclusion:** The prevalence of RFs of fractures varied in different regions of the Russian Federation depending on age and gender and the type of settlement. Previous fractures and alcohol abuse predominated in rural men compared to men living in the city. Smoking and taking glucocorticoids were more common in urban women compared to rural ones.

P328

### ASSOCIATION BETWEEN THE OSTEOPOROTIC FRACTURES RISK AND THE TOTAL CARDIOVASCULAR RISK IN URBAN AND RURAL POPULATIONS

M. Miagkova<sup>1</sup>, I. Skripnikova<sup>1</sup>, S. Shalnova<sup>1</sup>, V. Vygodin<sup>1</sup>

<sup>1</sup>Federal State Institution "National Medical Research Center for Therapy and Preventive Medicine" of the Ministry of Healthcare of the Russian Federation, Moscow, Russia

**Objective:** To analyze the relationship between the absolute risk (AR) of osteoporotic fractures (OPF) and the total cardiovascular risk (CVR) among the urban and rural population of the Russian Federation.

**Methods:** A representative samples of urban (n=11,962) and rural (n=1154) population of men and women aged 40-69 y from 12 regions of the Russian Federation were analyzed. Over the next 10 y AR of OPF was calculated on the basis of the Russian FRAX model without taking into account BMD. Total CVR was evaluated in individuals <65 y on the basis of the Euro Heart SCORE scale for high-risk countries.

**Results:** Among all study participants, the frequency of high AR of major fractures was 7.0%. High and very high CVR was detected in 13.0% of 40-64 years old population with no history of atherosclerotic cardiovascular diseases and diabetes mellitus. Among the urban residents, moderate and strong positive correlations between AR of OPF and CVR were found: for AR of major fractures and CVR in women  $r=0.48$ ,  $p<0.0001$  and in men  $r=0.17$ ,  $p<0.0001$ ; for AR of hip fractures and CVR in women  $r=0.54$ ,  $p<0.0001$  and in men  $r=0.56$ ,  $p<0.0001$ . Similar correlations were observed in rural residents: for AR of major fractures and CVR in women  $r=0.49$ ,  $p<0.0001$  and in men  $r=0.13$ ,  $p<0.01$ ; for AR of hip fractures and CVR in women  $r=0.53$ ,  $p<0.0001$  and in men  $r=0.47$ ,  $p<0.0001$ . In the presence of high and very high CVR ( $\geq 5\%$ ), these relationships were confirmed by the logistic regression analysis: AR of hip fractures  $\geq 1\%$  was increased by 1.9 times (95%CI=1.5-2.4,  $p<0.001$ ), AR of major fractures  $\geq 10\%$  – 1.5 times (95%CI=1.3-2.0,  $p<0.05$ ), high AR of major fractures, according to the threshold of therapeutic intervention was increased by 1.3 times (95%CI=1.2-1.6,  $p<0.05$ ).

**Conclusion:** In both urban and rural residents, a positive association was found between AR of OPF and CVR, regardless of gender. It is likely that a comprehensive approach aimed at early detection of comorbid pathology of osteoporosis and atherosclerosis may have equal value for the urban and rural populations.

P329

**PREGNANCY-RELATED OSTEOPOROSIS: SINGLE-CENTER EXPERIENCE (SERIES OF CASES)**A. Povaliaeva<sup>1</sup>, E. Pigarova<sup>1</sup>, L. Dzeranova<sup>1</sup>, L. Rozhinskaya<sup>1</sup><sup>1</sup>Endocrinology Research Centre, Moscow, Russia

**Objective:** Pregnancy-related osteoporosis is an extremely rare condition which leads to the development of severe complications and disability in young women. Deciding on a management strategy is particularly difficult due to the lack of evidence and clinical guidelines.

**Methods:** We present 17 cases of pregnancy-related osteoporosis in women aged between 25-43 y, who were referred to a tertiary osteoporosis care center during the period from 2009-2021. Nine patients were diagnosed between 1 month and 3 y postpartum, and eight patients were diagnosed in the 3<sup>rd</sup> trimester of pregnancy.

**Results:** Risk factors for osteoporosis in the anamnesis were identified only in 5 patients (29%) and included heparin treatment, chemotherapy, underweight, thyrotoxicosis and gestational diabetes mellitus. All patients had normocalcemia and normophosphatemia; three patients had mild secondary hyperparathyroidism due to vitamin D deficiency. One patient presented with hypercalciuria. 4/10 (40%) had low serum osteocalcin and 2/6 (33%) had elevated  $\beta$ -CrossLaps. Thirteen patients had multiple vertebral compression fractures at X-ray or MRI with a prominent decrease in BMD (median spinal Z-score -3.0 SD, range from -2.1 to -4.4 SD) and one patient had bilateral hip fracture. Treatment approaches included calcium (1000–2000 mg/d) and vitamin D (alfacalcidol 0.5–3  $\mu$ g/d or cholecalciferol 10000–20000 IU/week) in all patients; 12 patients (71%) received specific treatment: 5 – bisphosphonates, 4 – teriparatide, 3 – denosumab, 3 – calcitonin spray, 2 – strontium ranelate. Three women underwent vertebroplasty and one woman had bilateral hip replacement. Follow-up DXA data were available in 10 patients with a median of 24 months, 8/10 (80%) had an improvement in lumbar spine BMD. Both patients with continuing loss of BMD and 5/8 (63%) of patients with improved BMD received no specific treatment.

**Conclusion:** Our data confirm the severity of pregnancy-related osteoporosis and the difficulty of its diagnosing and managing. There is still insufficient data to determine the optimal management of these patients.

P330

**CHOLECALCIFEROL BOLUS TREATMENT IN MILD PRIMARY HYPERPARATHYROIDISM: EFFECTS ON VITAMIN D METABOLISM AND CALCIUM-PHOSPHORUS PARAMETERS**I. Maganeva<sup>1</sup>, A. Povaliaeva<sup>1</sup>, V. Bogdanov<sup>1</sup>, A. Zhukov<sup>1</sup>, E. Pigarova<sup>1</sup>, L. Dzeranova<sup>1</sup>, L. Rozhinskaya<sup>1</sup>, N. Mokrysheva<sup>1</sup><sup>1</sup>Endocrinology Research Centre, Moscow, Russia

**Objective:** To evaluate vitamin D metabolism in patients with primary hyperparathyroidism in the setting of cholecalciferol bolus dose treatment.

**Methods:** The study included 18 patients with mild primary hyperparathyroidism (defined as serum calcium <3.0 mmol/L), 3 males and 15 females, median age 55.6 [44.8; 59] years. All participants did not take any vitamin D containing supplements or drugs that interfere with vitamin D metabolism within 3 months prior to the participation in the study and were tested for serum vitamin D metabolites (25(OH)D<sub>3</sub>, 25(OH)D<sub>2</sub>, 1,25(OH)<sub>2</sub>D<sub>3</sub>, 3-epi-25(OH)D<sub>3</sub>, 24,25(OH)<sub>2</sub>D<sub>3</sub> and D<sub>3</sub>) by UPLC-MS/MS, PTH by electrochemiluminescence immunoassay, routine serum biochemical parameters (calcium, phosphorus, creatinine, albumin, magnesium) and calcium- and phosphorus-creatinine ratio in single void urine before oral administration of 150,000 IU of an aqueous solution of cholecalciferol and 7 d after administration.

**Results:** Median level of 25(OH)D<sub>3</sub> at the baseline evaluation was 18.0 [10.2; 27.8] ng/mL, 10 patients (56%) had vitamin D deficiency (25(OH)D <20 ng/mL) and 6 patients (33%) had vitamin D insufficiency (25(OH)D 20-29 ng/mL). 25(OH)D<sub>3</sub> levels increased significantly on the 7<sup>th</sup> day after cholecalciferol intake (35.4 [26.4; 41] vs. 18.0 [10.2; 27.8] ng/mL, p<0.05), median  $\Delta$ 25(OH)D<sub>3</sub> was 15.6 [12.7; 18.8] ng/mL and all patients reached 25(OH)D<sub>3</sub> levels >20 ng/mL. We also observed concordant increase in 3-epi-25(OH)D<sub>3</sub> (2.9 [2.4; 3.4] vs. 0.8 [0.5; 1.1] ng/mL, p<0.05) and 24,25(OH)<sub>2</sub>D<sub>3</sub> (2.4 [1.4; 3.0] vs. 0.9 [0.4; 1.8] ng/mL, p<0.05), while baseline high normal or modestly elevated 1,25(OH)<sub>2</sub>D<sub>3</sub> levels had an upward trend not reaching a statistic significance (62 [52; 79] vs. 56 [48; 71] pg/mL, p=0.05). Albumin-adjusted calcium levels showed clinically insignificant elevation (2.69 [2.59; 2.78] vs. 2.65 [2.57; 2.76] mmol/L, p<0.05), however, total serum calcium remained stable (p>0.05) and PTH levels decreased (105 [79; 154] vs. 121 [102; 179] pg/mL, p<0.05). Magnesium levels slightly decreased (0.82 [0.78; 0.86] vs. 0.84 [0.81; 0.89] mmol/L, p<0.05), and phosphorus, creatinine and albumin serum levels as well as urine calcium- and phosphorus-creatinine ratio did not change over the follow-up period (p>0.05).

**Conclusion:** In patients with primary hyperparathyroidism in the absence of severe hypercalcemia, cholecalciferol bolus dose has a prompt favorable effect on vitamin D and PTH levels along with a proper safety profile of calcium-phosphorus parameters.

**Acknowledgement:** This work was supported by the Russian Science Foundation (grant № 19-15-00243).



P331

**IS KNEE MRI SCAN OVERUSED IN PRIMARY CARE SETTING?**S. Goh<sup>1</sup><sup>1</sup>Logan Hospital, Brisbane, Australia

**Objective:** In Australia, the Medicare Benefits Scheme (MBS) from 2013 provides rebates for adult knee MRI organised by general practitioners (GPs) for suspected diagnosis of knee pain. This resulted in unexpected increase in knee MRI scan ordered prior to orthopaedic specialist referral. We investigate if access to MRI knee prior referral improves patient management and outcome of knee pain. This study aimed to determine investigations performed at primary care setting prior specialist referral for adult knee pain, outline initial treatment of adults with knee pain prior referral, explain why MRI may not contribute more than plain radiographs.

**Methods:** 99 consecutive adults (>40 y) referred for knee pain in 2016-7 to orthopaedic outpatient clinic at Redland Hospital (250 beds, in South Brisbane). Referral letters, clinical history, assessment (including imaging report) and management determined at outpatient clinic were recorded. We determined proportions of patients who had MRI knee scans; knee MRI with clinical history/findings that fulfil the 2013 MBS criteria; patients who underwent surgical intervention; knee MRI that affect patient management different from plain radiographs.

**Results:** 39% had knee MRI scan as sole imaging before orthopaedic referral; another 21% had both knee x-ray and MRI. Only 8% of patients with knee MRI scans fit 2013 MBS criteria, 25% did not provide enough information. 59% of knee pain were diagnosed as osteoarthritis (OA) by GP, orthopaedic specialists determined 82% OA as main diagnosis. 13% underwent surgical intervention, and only 17% knee MRI resulted in a change in treatment.

**Conclusion:** Our results were also reflected in other countries where access to MRI did not ultimately alter GP diagnoses or treatment and there is over-reliance on knee MRIs, underutilise x-rays. There is an urgent need to realign GP practice with prevailing guidelines in investigation modalities for adult knee pain.

P332

**PRIMARY CARE MANAGEMENT OF KNEE OSTEOARTHRITIS PRIOR REFERRAL TO ORTHOPAEDIC CLINIC AND ITS CONCORDANCE WITH PUBLISHED NATIONAL GUIDELINES AND RECOMMENDATIONS**S. Goh<sup>1</sup><sup>1</sup>Logan Hospital, Brisbane, Australia

**Objective:** Knee pain from osteoarthritis (OA) is a common musculoskeletal condition managed in primary care. Despite widely available national guidelines, there is significant variation in treatment prior to referral to orthopaedic clinic. This study aimed to determine prevalence of knee OA in adults referred to orthopaedic clinic for knee pain, define previous treatment prior referral and its concordance with national guidelines.

**Methods:** 99 consecutive adults (>40 y) referred for knee pain in 2016-7 to orthopaedic outpatient clinic at Redland Hospital (250 beds, in South Brisbane) were reviewed over a 12-month period. Referral letters, clinical history, assessment (including imaging report) and management determined at outpatient clinic were recorded. For those with referral diagnosis of OA, prereferral treatment was compared to then current NHMRC guideline (2009). We consider any management involving at least 80% of therapies listed by guideline as guideline compliant.

**Results:** 72% patients referred (51% female, mean 56.2 y) had OA diagnoses. Most common treatment recorded in referrals is oral analgesics (12%), 86% referral letters (RL) did not mention any treatment attempted prior referral. Previous treatment self-reported by patients (SR) revealed oral analgesic use in 91%, 49% attempted weight loss, 36% tried physiotherapy. Corroboration of history and treatment of knee OA between RL vs. SR shows only 24% concurrence. SR treatment is more likely to be compliant with NHMRC's recommendation as compared to those recorded by RL (39% vs. 6%) but neither achieve better than 39% in adherence to recommendation, hence none of prereferral management were guideline compliant.

**Conclusion:** Despite availability of NHMRC's guideline for knee OA management for a decade, few patients have adequate experience of recommended management before referral to specialist clinic. This suggests potential success of conservative measures if instituted by general practitioners and orthopaedic surgeons, if majority of knee pain is correctly diagnosed as from OA.

P334

## BONE HEALTH EVALUATION ONE YEAR AFTER AROMATASE INHIBITORS COMPLETION IN OSTEOPOROTIC PATIENTS

R. Assadi<sup>1</sup><sup>1</sup>University of Casablanca, Casablanca, Morocco

**Objective:** Anti aromatase inhibitors (AI) used for breast cancer increase bone loss during their treatment, few studies have assessed BMD after completing AI treatment. This study aimed to assess changes in BMD one year after AI completion therapy in postmenopausal patients followed for breast cancer and treated for secondary OP.

**Methods:** We conducted a cross-sectional, observational study, which studied the records of patients followed in the rheumatology department over 5 y (2016-2020). Inclusion criteria: postmenopausal patients treated with AI for breast cancer and followed in the rheumatology department at the specialist consultation for weakening osteopathies for OP and treated with bisphosphonates (BP). All disturbances in the phosphocalcic status were corrected before the ODM measurement. Exclusion criteria: premenopausal patients, or patients with another risk factor for OP, Patients treated with tamoxifen or other antiosteoporotic treatment. All of these patients had BMD measurement before starting BP and one year after AI therapy.

**Results:** 92 patients were included, the mean age was 54.3 y, all were postmenopausal and had received a 5-y course of AI for breast cancer. The mean time between the start of BP and the discovery of OP was 23.4 months and the mean duration of follow-up for OP was 38.9 months. One year after AI treatment completion, 67 patients had undergone bone status assessment. It was noted, in all participants, clear improvement in the mean values of BMD in all the sites: the lumbar spine L1-L4 (+2.85%), femoral neck (+2.77%) and at the level of the hip. total (+3.05%). The results of the study are summed up in the Table below.

**Conclusion:** BP markedly improve bone status in osteoporotic patients throughout AI treatment. The persistent effect of BP helps to overcome bone depletion after AI completion, which is a serious side effect of hormone therapy used for breast cancer (2).

Table. Characteristics of patients

	Results
1. General characteristics	
Total of patients	92
Mean age	54.3 y
Menopause	100%
Delay before OP diagnosis	23,4 months
Mean duration of follow up for OP	38.9 months

2. BMD characteristics (mean values)	
Before BP	T-score: -3.04 - DMO: 0.702
Lumbar spine L1-L4	T-score: -2.9 - DMO: 0.586
Femoral neck	T-score: -3.18 - DMO: 0.483
Total hip	
One year after AI completion	T-score: -2.01 - DMO: 0.722
Lumbar spine	T-score: -1.7 - DMO: 0.602
Femoral neck	T-score: -1.06 - DMO: 0.497
Total hip	

### References:

1. Handforth C, et al. Calcif Tissue Int 2018;102:251.
2. Yamada K, Kohno N. Clin Calcium 2008;18:507.

P335

## PRIMARY HYPERPARATHYROIDISM IN RUSSIA ACCORDING TO THE ONLINE REGISTRY

A. Eremkina<sup>1</sup>, E. Kovaleva<sup>1</sup>, A. Ajnetdinova<sup>1</sup>, E. Karaseva<sup>1</sup>, O. Vikulova<sup>1</sup>, N. Mokrysheva<sup>1</sup><sup>1</sup>Endocrinology Research Centre, Moscow, Russia

**Objective:** Primary hyperparathyroidism (PHPT) is a widespread endocrine disorder. The clinical presentation is heterogeneous, from mild asymptomatic hypercalcemia to the classical complications such as osteoporosis and low-trauma fractures, fractures, nephrolithiasis/nephrocalcinosis and hypercalciuria. Other clinical forms of PHPT, such as normocalcaemic PHPT, are less common. This study aimed to assess the main characteristics of PHPT patients and to conduct initial analysis of clinical presentations and management.

**Methods:** The present study explored retrospective data submitted to the Russian online PHPT registry (<http://pgpt.clin-reg.ru/>) between February 2017 and April 2021. The data in the text are presented by median (Me) and values of the 1st and 3rd quartiles [Q1; Q3], the significance levels in the range from critical to 0.05 were considered.

**Results:** The total number of patients in the registry is 4176 from 79 regions of Russian Federation. The average age at the time of diagnosis was 56.67±13 y. The active phase of the disease at the time of data submission was registered in 58.8% (2454/4176) and

the majority of patients were symptomatic 71.7% (1760/2454). Among them, renal manifestations (nephrolithiasis/nephrocalcinosis) were found in 21%, bone involvement (decreased BMD and fractures) in 36.5%, 37.5% had the both complications, 5% - no data is available. Patients with the symptomatic PHPT had significantly higher serum PTH and calcium levels compared to mild course of disease: 150 pg/ml [103; 243], 2.74 mmol/l [2.62; 2.9] vs. 117 pg/ml [90.48; 164], 2.67 mmol/l [2.57; 2.77] respectively ( $p < 0.05$  for all). 669 patients meet the clinical criteria of MEN-1 and MEN-2A syndromes, the average age  $43.62 \pm 15.9$  y. Genetic testing in 114 people (2.7%) showed the mutation *MEN1* in 1.7% of cases (71/4176) and in the *CDC73* gene in 0.14% of cases (6/4176), 7 patients presented with a combination of PHPT and medullary thyroid cancer. The incidence of parathyroid cancer was 1.9% (78/4176) based on postsurgical morphological examination. Summary surgery has been performed in 57.97% of patients (2421/4176). Remission was achieved in 92.3% of cases (2234/2421). Recurrence after the first surgery occurred in 7.7% more often among hereditary form.

**Conclusion:** According to the Russian registry, the symptomatic course with severe renal and bone manifestations is dominant. At this stage, it is necessary to introduce routine calcium screening to detect PHPT on early stages.

### P336

#### ASSESSMENT OF OSTEOPOROSIS RISK IN BREAST CANCER PATIENTS: ABOUT 200 CASES

R. Assadi<sup>1</sup>

<sup>1</sup>University of Casablanca, Casablanca, Morocco

**Objective:** Breast cancer is the most common cancer affecting women both before and after the menopause. The therapeutic used (chemotherapy, radiotherapy and hormone therapy) can be responsible for deleterious effects on the bone leading to secondary osteoporosis (1). This study aimed to assess the bone status and the frequency of osteoporosis (OP) in patients followed for breast cancer.

**Methods:** We conducted a retrospective study in the rheumatology department over 5 y (2016-2020). Inclusion criteria: Patients followed for breast cancer in the oncology department and referred to the rheumatology department for the weakening osteopathies consultation for bone evaluation. OP was considered when the T-score at the 3 sites (lumbar spine, femoral neck and total hip) is  $< -2$ . The phosphocalcic anomalies were corrected before the measurement of BMD. All these patients underwent BMD measurement and phosphocalcic assessment.

**Results:** 200 patients were included, the average age was 61.25 y (37-82 y) with an average age of discovery of the cancer was 58.12 y. 98% of patients were postmenopausal and 29% of them had menopause after treatment. The other risk factors for OP were: long-term corticosteroid therapy (13%) and dysthyroidism (9.6%). 98% of patients were treated by surgery, 84.6% by che-

motherapy, 70% by radiotherapy and 94% by hormone therapy, of which 85% were treated with anti-aromatase and 15% with tamoxifen. The mean time from starting adjuvant therapy and diagnosing OP was 23.4 months. 136 patients (68%) had OP, lumbar spine was affected in 86% of cases with a mean T-score of -2.98 and mean BMD at 0.854. Osteoporotic patients were treated with bisphosphonates, 50% of which received alendronate, 19% risedronate and 17% zoledronate in addition to dietary measures and correction of phosphocalcic anomalies. Results are summed up in the Table below.

**Conclusion:** Breast cancer patients under treatment are at risk of OP, because of the age of onset of cancer, menopause secondary to chemotherapy, corticosteroid therapy and estrogen depletion induced by hormone therapy (1). The frequency of OP in patients followed for breast cancer is 27.5% (2), the frequency in our series is estimated at 68% this can be explained by the profile of patients treated in a hospital environment with several risk factors.

Whatever the antineoplastic therapy used, the evaluation of bone status is systematic during the course of and at the end of treatment and especially in the presence of other OP risk factors.

#### References:

1. Bjarnasonn H, et al. Acta Oncol 2008;47:747.
2. Lipton A, et al. SM Cancer 2017;123:2444.

Table. Characteristics of patients

	Results
Total patients	200
Mean age	61.25 y
Mean age of breast cancer diagnosis	58.12 y
Postmenopausal patients	98%
Menopause secondary to treatment	29%
Treatment	
Surgery	98%
Chemotherapy	84.6%
Radiotherapy	70%
Hormonotherapy	94%
Mean delay before OP diagnosis	23.4 months
Osteoporotic patients	136 (68%)
Osteopenic patients	7 (7.6%)
Sites of OP	
Lumbar spine	88%
Femoral neck	17%
Total hip	14%

Bisphosphonate therapy	
Alendronate	60%
Risedronate	17%
Zoledronate	12%

P337

### BONE STATUS OF POSTMENOPAUSAL PATIENTS TREATED WITH HORMONETHERAPY FOR BREAST CANCER: ABOUT 200 CASES

R. Assadi<sup>1</sup>

<sup>1</sup>Dept. of Rheumatology, Ibn Rochd Hospital, University of Casablanca, Casablanca, Morocco

**Objective:** Hormone therapy used to treat a breast cancer worsens bone depletion during treatment, especially in postmenopausal women (1). This study aimed to assess the bone status and the frequency of osteoporosis (OP) in postmenopausal patients followed for breast cancer and treated with hormone therapy (HTT).

**Methods:** We conducted a retrospective study in the rheumatology department over 5 y (2016-2020). Inclusion criteria: postmenopausal patients treated with HTT for breast neoplasm in the oncology department and referred to the rheumatology department for the specialist consultation for weakening osteopathies for bone evaluation. Exclusion criteria: premenopausal patients with another risk factor of OP. OP was considered when the T-score at the 3 sites (lumbar spine, femoral neck and total hip) was <-2 and osteopenia was considered when the T-score is between -1 and -2 at the different sites. All of these patients underwent a measurement of BMD, and all phosphocalcic disturbances were corrected before the BMD measurement.

**Results:** 200 patients were included, The average age was 54.3 y (39-75 y) with an average age of the discovery of breast cancer at 56.12 y, the average time between the start of adjuvant treatment and the first specialist consultation of bone was 23.4 months. 196 patients (98%) were postmenopausal, of which 29% had menopause secondary to treatment. 175 (89.3%) cases received HTT treatment of which 85% were treated with anti-aromatase and 15% with tamoxifen. 126 patients (76%) had OP and 42 participants (24%) had osteopenia, 7 (4%) patients had normal BMD. The lumbar spine was affected in 74% of cases with a mean T-score of -2.87 and mean BMD of 0.889. The neoplasm was metastatic in 15% of patients, 85% of whom had bone metastases and 15% had visceral ones. Osteoporotic patients were treated with bisphosphonates of which 60% received alendronate, 16% risedronate and 12% zoledronate. the results are summed up in the Table below.

**Conclusion:** Patients followed for breast neoplasm under HTT are exposed to the risk of OP (2). The frequency of OP in our series is estimated at 76% and osteopenia is estimated at 42%.

Management of osteoporotic and even osteopenic patients treated with HTT for breast cancer requires the identification of other risk factors of OP, the correction of calcium and vitamin D deficiencies, hygienic dietary measures, the prescription of treatment with BP as recommended and a long-term monitoring of bone status during and after therapy completion.

#### References:

1. Ramchand SK, et al. J Endocrinol 2019;241:R111.
2. Lipton A, et al. SM Cancer 2017;123:2444.

Table. Characteristics of patients

	Results
1. General characteristics	
Total patients	200
Average age	54.3 y
Average age of breast cancer diagnosis	56.12 ys
Average time before bone loss diagnosis	23.4 months
Total postmenopausal patients	196 (98%)
Cancer metastase	15.18%
Bone	85%
Visceral	15%
Patients treated with HTT	175 (89.3%)
Aromatase inhibitors	148.75 (85%)
Tamoxifen	26.25 (15%)
2. BMD characteristics	
Osteoporosis	126 patients (76%)
Osteopenia	42 patients (24%)
Normal	7 patients (4%)
Sites of OP	
Lumbar spine	74%
Femoral neck	23%
Total hip	17%
3. Bisphosphonate therapy	
Alendronate	60%
Risedronate	16%
Zoledronate	12%



P338

# **PAGET'S DISEASE: REAL-LIFE EXPERIENCE FROM AN INSTITUTION SPECIALIZED IN BONE METABOLISM IN LATIN AMERICA**

M. Sarli<sup>1</sup>, M. D. Colacelli<sup>2</sup>, F. Jerkovich<sup>1</sup>, P. Rey<sup>1</sup>, R. Spivacow<sup>1</sup>, M. B. Zanchetta<sup>1</sup>

<sup>1</sup>IDIM, Universidad del Salvador, <sup>2</sup>Maestría en Osteología, Universidad del Salvador, Buenos Aires, Argentina

**Objective:** The epidemiology of Paget's disease of bone (PDB) has changed in the last years but there is no update data on its clinical presentation, diagnosis and management in Latin America. Our aim was to describe its clinical features, diagnostic evaluation and responses to treatment in a group of PDB patients treated in Argentina.

**Methods:** We assessed all patients attending our institution that specializes in bone diseases, from June 2012 to December 2019. We reviewed the clinical records and laboratory findings of all the patients diagnosed with PDB followed up for more than a year after diagnosis.

**Results:** The frequency of PDB was 1.68%. Median age was 67 y (range 39-97) and 59.5% were women. Most patients were asymptomatic (58.6%) and had monostotic disease (54.3%). Favorable biochemical responses were obtained in all patients who were treated with zoledronate (n=36), in 10 out of 14 treated with pamidronate (71.4%), in 9 out of 10 who received IV ibandronate (90%) and in 12 out of 13 who took oral bisphosphonates (92.3%). The response rates were not significantly different when we compared monostotic vs. polyostotic disease (Table 1). Among the biochemical parameters, mean values of bone specific and total ALP, and C-terminal crosslinked telopeptide of type I collagen decreased significantly after treatment with bisphosphonates. The following complications were reported: bone deformities, 2.6%; fractures, 3.4%; nerve root compression, 3.4%; arthrosis, 25.8%.

**Conclusion:** Our cohort of PDB patients was mostly asymptomatic, monostotic, with a discreet female predominance and low rate of orthopedic and neurologic complications. Our results reflect the change in PDB epidemiology towards a more indolent disease.

Table. Drug treatment and responses of treated patients.

Treatment	Mono-stotic n=48	Polyostotic n=25	Total n=73	p
% of patients under treatment				
Zoledronate	21 (43.7%)	15 (60%)	36 (49.3%)	0.223

Pamidronate	10 (20.8%)	4 (16%)	14 (19.2%)	0.759
IV ibandronate	7 (14.6%)	3 (12%)	10 (13.7%)	1.000
Oral bisphosphonates	10 (20.8%)	3 (12%)	13 (17.8%)	0.522
% of patients with favorable response				
Zoledronate	21 (100%)	15 (100%)	36 (100%)	1.000
Pamidronate	7 (70%)	3 (100%)	10 (71.4%)	1.000
IV ibandronate	6 (85%)	3 (100%)	9 (90%)	1.000
Oral bisphosphonates	10 (100%)	2 (66.7%)	12 (92.3%)	0.231

P339

# **ONSET OF PRIMARY HYPERPARATHYROIDISM 12 YEARS AFTER INITIAL DIAGNOSTIC OF GH-PRODUCING MESOADENOMA**

A. Ghemigian<sup>1</sup>, N. Dumitru<sup>1</sup>, C. Tupea<sup>2</sup>, M. Popescu<sup>3</sup>, E. Petrova<sup>1</sup>

<sup>1</sup>C.I. Parhon National Institute of Endocrinology & C. Davila University of Medicine & Pharmacy, Bucharest, <sup>2</sup>C.I. Parhon National Institute of Endocrinology, Bucharest, <sup>3</sup>University of Medicine & Pharmacy Craiova, Craiova, Romania

**Objective:** Syndromic primary hyperparathyroidism (PHP) includes, among other tumours, the association with growth hormone (GH) producing tumour causing acromegaly; this combination, namely multiple endocrine neoplasia (MEN1) syndrome underlines *MEN1* mutations that are not characterised by phenotype – genotype correlations, thus a particular constellation (in terms of type and timing) of pituitary and parathyroid adenomas in addition to pancreatic neuroendocrine neoplasia or other masses like breast tumours, etc. cannot be anticipated (1-5).

**Case report:** An adult female with a history of treated acromegaly that was confirmed with MEN1-related PHP after more than a decade from initial presentation. This is a 53-year-old who was admitted for acromegaly serial assessment. The personal medical family is irrelevant. Her medical background includes: in 2009 she was recognized as acromegalic based on facial features; the somatotropinoma of 1.1 cm was referred to selective hypophysectomy with postoperative uncontrolled disease which required additional radiotherapy which was added to first line somatostatin analogue octreotide LAR 40 mg/month and dopamine agonist cabergoline 3 mg/week, and since last 5 y GH receptor blocker pegvisomant 70 mg/week. The acromegaly was complicated with mild arterial hypertension, and hypercholesterolemia, and 5 y ago a mammary tumour of 3 cm was diagnosed; she refused its bi-

opsy/removal with stationary imaging aspect during follow-up. Recently, she had her annual evaluation done which showed controlled acromegaly in terms of mean GH profile of 1.2 ng/mL/24-h (normal <2.5 ng/mL); nadir GH during 75 g oral glucose tolerance test of 0.72 ng/mL (normal <1 ng/mL) and IGF-1=296 ng/mL (normal: 51-233), but, opposite to prior assays, PHP-related hypercalcemia was confirmed: total serum calcium of 10.4 mg/dL (normal: 8.5-10.2 mg/dL), PTH=88 pg/mL (normal: 15-65 pg/mL), 25OHD=25 ng/mL, normal bone turnover markers and BMD at DXA, no kidney stones. For the moment, hydration, daily 1000 UI cholecalciferol is added to acromegaly regime.

**Conclusion:** Acromegaly requires lifelong surveillance of MEN1 syndrome elements, especially in young adults.

#### References:

1. Poiana C, et al. *Maturitas* 2009;62:98.
2. Bechir ES, et al. *Revista de Chimie* 2019;70:3515.
3. Gheorghisan-Galateanu AA, et al. *J Pak Med Assoc* 2017;67:917.
4. Gheorghiu M, et al. *Acta Endocrinologica-Bucharest* 2009;5:371.
5. Poiana C, et al. *Bone Res* 2013;1:275.

## P340

### ETHICAL JUSTIFICATION OF APPLYING DXA ANALYSIS IN CHILDREN WITH MUSCULOSKELETAL DISORDERS

J. S. Nurković<sup>1</sup>, P. Petković<sup>2</sup>, V. Marković<sup>2</sup>, A. Habibović<sup>3</sup>, R. Vojinović<sup>4</sup>

<sup>1</sup>Center for Regeneration & Rehabilitation, Novi Pazar, <sup>2</sup>Radiology Dept., Clinical Center Kragujevac, Kragujevac, <sup>3</sup>General Hospital, Novi Pazar, <sup>4</sup>Radiology Dept., Faculty of Medical Sciences, Kragujevac, Serbia

**Objectives:** Performing DXA analysis is not a common part of the diagnostic process in children. However, it is known that reduced physical activity affects bone metabolism and antigravity muscles. This study aimed to evaluate BMD in children with musculoskeletal disorders (MD) and the ethical justification of applying DXA analysis in these children.

**Methods:** In this monocentric retrospective analysis, data were collected from children and adolescents with cerebral palsy, juvenile idiopathic arthritis, Legg-Calvé-Perthes disease, muscular dystrophy, spina bifida, and syringomyelia, who were treated for a primary illness for three years. A clinical examination, which included a DXA scan, recommended by the multidisciplinary team, was performed. After applying inclusion and exclusion criteria, 92 scans remained for statistical analysis. BMD and Z-scores for the lumbar spine (LS), and hip right and left femoral neck (RFN and LFN, respectively), and total hip (TH) were recorded.

**Results:** The average age of children with MD when DXA analysis was first performed was about 8 y. The BMD (mean±SD) at LS of all patients was 0.565±0.21, at RFN 0.602±0.26, at LFN 0.596±0.24, and at TH 0.578±0.22. The values of the Z-score (mean±SD) at LS of all patients were -2.4±0.3, at RFN -2.32±0.19, at LFN -2.25±0.3, and at TH -2.3±0.31. There was no statistical significance between gender; however, BMI, walking ability, fracture history, and regular physical treatment had a significant impact on BMD and Z-score values of these children.

**Conclusion:** The results of our study clearly indicate that children with MD have a higher risk of low BMD, osteoporosis, and bone fractures, which makes it ethically justifiable to perform the DXA analysis in these children.

## P341

### ADVANCED PRP PROCEDURE INCREASES KNEE CARTILAGE THICKNESS

J. S. Nurković<sup>1</sup>

<sup>1</sup>Center for Regeneration & Rehabilitation, Novi Pazar, Serbia

**Objective:** The successful assessment of osteoarthritis (OA) progression and the results of applied therapy can be determined by objective methods of damage monitoring, and one of them is an ultrasound measurement of cartilage thickness. The aim of the study was to determine whether and how the diameter cartilage of the knee changes after the advanced platelet-rich plasma (a-PRP) procedure.

**Methods:** The study included 150 patients who underwent the a-PRP procedure in 2018 and 2019 at the Center for Regeneration & Rehabilitation in Novi Pazar, Serbia. After explaining the procedure, adequate preparation, and consent, the a-PRP procedure was performed in patients with II and III degrees knee OA. The diameter cartilage of knees was measured with a linear probe of frequency 7-12 MHz in the position of flexion of the knee joints at 90°. Three values of cartilage thickness were recorded: on the medial condyle (MC), on the lateral condyle (LC), and the intercondylar part (ICP) before the a-PRP procedure and 3, 6, and 12 months after the a-PRP procedure.

**Results:** The cartilage thickness was significantly greater at all 3 measurement sites after 3, and 6 months from the a-PRP procedure in 76% of patients ( $p<0.05$ ), and after 12 months the diameter increased and was maintained in a total of 112 subjects. The largest increase occurred in LC ( $p<0.01$ ). No statistically significant increase in cartilage thickness was observed in 28 patients, and the diameter decreased in 10 patients. None of the patients had side effects.

**Conclusion:** The ultrasound measured cartilage knee diameter increases after 3, 6, and 12 months of the a-PRP procedure, making this procedure a therapeutic choice for the treatment of knee OA.

P342

**COVID-19 IMPACT ON BONE MINERAL DENSITY**J. S. Nurković<sup>1</sup><sup>1</sup>Center for Regeneration & Rehabilitation, Novi Pazar, Serbia

**Objective:** COVID-19 pandemic, infection, and lockdown led to the impact on physical activity, regular training, and fitness of people around the globe. This phenomenon has led to short-term as well as long-term bone and muscle health implications. We performed a case-control study to evaluate the effect of COVID-19 infection on BMD in Novi Pazar city people.

**Methods:** The cases were hospitalized patients with confirmed COVID-19 with treatment longer than 2 weeks. Each patient was matched with healthy individuals for age, gender, and BMI. All our patients were without secondary causes or medications that might affect bone density. After 3 months of cure, BMD and Z-scores for the lumbar spine (LS), and hip right and left femoral neck (RFN and LFN, respectively), and total hip (TH) were recorded.

**Results:** 30 COVID-19 recovered patients (15 male, 15 female) and 30 (15 male, 15 female) controls were studied. The mean age of the cases and the controls was 43.5 (SD 12.2) years and the mean BMI was 25.1 (SD 8). The results of crude odds ratios analyses indicated that COVID-19 infection was associated with a high risk of reduction of BMD: OR 2.31 (95%CI, 1.32–3.43). Lockdown had also a significant effect on increasing the osteoporosis risk (ORs: 1.92 (95%CI, 1.11–3.38) and 2.12 (95%CI, 1.23–3.11)). After multiple regression analysis, COVID-19 infection and being quarantined due to infection or fear of infection remained both independent factors that increased the osteoporosis risk (ORs: 1.95 (95%CI, 1.26–3.76) and 2.08 (95%CI, 1.11–4.13) respectively).

**Conclusion:** Our study suggested that in Novi Pazar city people COVID-19 infection increased the risk of osteoporosis. Further studies are required to evaluate the clinical impact of the above findings and to clarify the status of vitamin D among people in Novi Pazar.

P343

**ULTRASOUND-GUIDED INJECTION OF PLATELET-RICH PLASMA IN KNEE OSTEOARTHRITIS**J. S. Nurković<sup>1</sup><sup>1</sup>Center for Regeneration & Rehabilitation, Novi Pazar, Serbia

**Objective:** The efficacy of platelet-rich plasma (PRP) in the treatment and healing of knee osteoarthritis (KOA) through stimulation of cell proliferation and reducing inflammation has been demonstrated by both in vitro and in vivo studies. The aim of this

study is to evaluate the effectiveness of ultrasound (US)-guided autologous advanced PRP injections in KAO with Kellgren-Lawrence grades 2–3.

**Methods:** Autologous PRP was isolated from peripheral arterial blood, previously stimulated by a low-level laser (LLL) and electromagnetic field (EMF), and was injected under US-guidance into the knee, by an anteromedial approach, under conditions of sterility (185 knees) in 100 prospectively selected patients (42 males, 58 females, mean age 48±16 y, range 29–69 y), during the first half of 2019. Patients were examined for range of motion, improvements in VAS scale, WOMAC score, Lequesne index (LI), ambulation speed, and medical outcomes study 36 short-form (SF-36) health survey 7, 3 days, 3 and 6 months after intra-articular application of PRP.

**Results:** 30 days after PRP injection the patients presented first minor improvements in clinical symptoms. At the 6-month follow-up VAS, WOMAC, and LI score significantly decreased, and ambulation speed and SF-36 increased. US evaluation revealed an increase in cartilage thickness, associated with a reduction in synovial hyperplasia, and reduced hypervascularity at power Doppler. There were no PRP-a-related adverse events during and after the interventions.

**Conclusion:** PRP injection in KAO results in a significant improvement of clinical symptoms and functionality, thereby slowing down the degenerative process of joint decay. US guidance allows PRP injection into the knee with great accuracy.

P344

**CONGENITAL BILATERAL RADIOULNAR SYNOSTOSIS - CASE REPORT: GRANDFATHER, SON, AND GRANDSON**J. S. Nurković<sup>1</sup><sup>1</sup>Center for Regeneration & Rehabilitation, Novi Pazar, Serbia

**Objective:** Congenital bilateral radioulnar synostosis (CRUS) is a rare condition, characterized by an osseous or fibrous fusion of the radius and ulna present at birth, resulting in functional deficits of the elbow joints.

**Case report:** A 68-year-old retired salesman, his son, and grandson, all three of them with this rare condition, whose bilateral limited mobility of the elbow joints has been clinically proven, after which the radiographic and CT imaging was performed, confirming the presence of this bone condition. 3D reconstruction has

provided a detailed spatial visualization of the existing malformations and the reciprocal anatomical relationships between the bone structures. The treatment can be conservative or surgical, depending on the elbow joint's degree and range of motion. When deciding the course of treatment, diagnostic imaging results, especially those of MDCT with 3D and multiplanar reconstruction are extremely valuable.



**Conclusion:** CRUS is a rare malformation treated conservatively or surgically, depending on the elbow joint's degree and range of motion. When deciding the course of treatment, imaging diagnostics is invaluable.

### P345

#### FACTORS ASSOCIATED WITH SPONTANEOUS FALLING IN OLDER ADULTS: RESULTS OF THE BUSHEHR ELDERLY HEALTH PROGRAM

K. Khalagi<sup>1</sup>, N. Fahimfar<sup>1</sup>, M. Sanjari<sup>1</sup>, G. Shafiee<sup>2</sup>, S. Gharibzadeh<sup>3</sup>, N. Panahi<sup>1</sup>, M. J. Mansourzadeh<sup>1</sup>, R. Heshmat<sup>2</sup>, I. Nabipour<sup>4</sup>, B. Larijani<sup>5</sup>, A. Ostovar<sup>1</sup>

<sup>1</sup>Osteoporosis Research Center, Endocrinology & Metabolism Clinical Sciences Institute, Tehran University of Medical Sciences, Tehran, <sup>2</sup>Chronic Diseases Research Center, Endocrinology & Metabolism Population Sciences Institute, Tehran University of Medical Sciences, Tehran, <sup>3</sup>Dept. of Epidemiology & Biostatistics, Pasteur Institute of Iran, Tehran, <sup>4</sup>The Persian Gulf Marine Biotechnology Research Center, The Persian Gulf Biomedical Sciences Research Institute, Bushehr University of Medical Sciences, Bushehr, <sup>5</sup>Endocrinology Research Center, Endocrinology & Metabolism Clinical Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran

**Objective:** Spontaneous fall is one of the causes of fractures in people with osteoporosis. This study aimed to investigate the factors associated with spontaneous fall among people  $\geq 60$  y in southern Iran.

**Methods:** The baseline data of 2424 samples from the second stage of the first phase of a prospective cohort, the Bushehr Elderly Health (BEH) program [1, 2] was included in the analysis. A history of spontaneous fall in the year before the recruitment was measured by self-report using a standardized questionnaire. Demographic characteristics, as well as the history of osteoarthritis, rheumatoid arthritis, low back pain, Alzheimer's disease, epilepsy, depression, and cancer, were measured using standardized questionnaires. Tandem gait (heel-to-toe) exam, as well as laboratory tests, was performed under standard conditions. A logistic regression model was used in the analysis and the multiple model was fitted backwardly using Hosmer and Lemeshow strategy [3].

**Results:** Mean (standard deviation) of the participants' age was 69.34 (6.4) y (range: 60-96 y), and 48.06% of the participants were men. 260 subjects of the 2,424 participants reported a spontaneous fall in the year before the recruitment (10.7%, 95%CI (9.5-12.0)%). The result of the bivariate and multiple analysis of the association between potential risk factors and spontaneous fall were presented in Table.

**Conclusion:** Adjusted for potential confounders, having epilepsy, cancer, depression, low back pain, and osteoarthritis increase the risk of spontaneous fall in older adults. Ability to stand  $\geq 10$  s in the tandem gait exam, being men, and having physical activity and high serum triglyceride reduce the risk of fall.

#### References:

1. Ostovar A, et al. BMJ Open 2015;5:e009597.
2. Shafiee G, et al. BMJ Open 2017;7:e013606.
3. Jewell NP. Statistics for epidemiology: Chapman and Hall/CRC; 2003.
4. Aadahl M, Jørgensen T. Med Sci Sports Exerc 2003;35:1196.

Table. Factors associated with last year spontaneous falling in older adults; results from simple and multiple logistic regression analysis.

Risk factor	Crude OR <sup>a</sup> (95%CI)	P value	Adjusted OR <sup>a</sup> (95%CI)	P value
Age (y)				
60-64	1	-	1	-
65-69	0.69 (0.49-0.96)	0.03	0.62 (0.44-0.88)	0.01
70-74	0.70 (0.45-1.08)	0.10	0.59 (0.38-0.93)	0.02
75-79	1.28 (0.85-1.93)	0.24	1.00 (0.64-1.55)	0.99
80-84	1.09 (0.64-1.88)	0.75	0.84 (0.47-1.51)	0.56
>85	1.54 (0.79-3.00)	0.21	1.08 (0.53-2.23)	0.83
Sex (Male)	0.44 (0.33-0.58)	<0.001	0.60 (0.44-0.81)	0.001
Education				



No education	1	-	-	-
Primary school	0.97 (0.73-1.31)	0.86	-	-
Guidance school	0.53 (0.30-0.93)	0.03	-	-
High school	0.66 (0.42-1.02)	0.06	-	-
Academic	0.53 (0.29-0.97)	0.04	-	-
High cholesterol <sup>b</sup>	1.25 (0.96-1.63)	0.10	-	-
High LDL <sup>c</sup>	1.22 (0.95-1.58)	0.12	-	-
High triglyceride <sup>d</sup>	0.81 (0.61-1.07)	0.14	0.72 (0.53-0.97)	0.03
Osteoporosis <sup>e</sup>	1.57 (1.21-2.03)	0.001	-	-
Osteoarthritis	1.83 (1.31-2.55)	<0.001	1.49 (1.05-2.11)	0.02
Rheumatoid arthritis	2.86 (1.47-5.56)	0.002	-	-
Low back pain	2.17 (1.65-2.86)	<0.001	1.79 (1.33-2.40)	<0.001
Alzheimer's	2.10 (0.78-5.65)	0.14	-	-
Epilepsy	3.91 (1.47-10.37)	0.006	4.31 (1.54-12.07)	0.005
Depression	2.20 (1.34-3.62)	0.002	1.81 (1.08-3.06)	0.02
Cancer	3.12 (1.30-7.50)	0.01	2.73 (1.09-6.84)	0.03
Physical activity <sup>f</sup>	0.60 (0.42-0.85)	0.004	0.69 (0.48-0.99)	0.046
Tandem gait exam				
No standing	1	-	1	-
Standing <10 s	0.74 (0.47-1.15)	0.18	0.86 (0.54-1.37)	0.54
Standing ≥10 s	0.37 (.27 - 0.50)	<0.001	0.49 (0.35-0.69)	<0.001

a: Prevalence odds ratio

b: Total cholesterol ≥200 mg/d.

c: Low-density lipoprotein cholesterol ≥110 mg/dL

d: Serum triglyceride ≥150 mg/dL

e: Measured by BMD using the DXA method by a Hologic Discovery machine. It was defined as a T-score ≤ -2.5 (in any sex compared to the ideal BMD of a young healthy white person of the same sex) at any site (total hip, spine, or neck of femur).

f: Measured using Aadahl et al. physical activity questionnaire [4].

## P346

### IMPACT OF CYSTIC FIBROSIS ON THE EVOLUTION OF BONE MINERAL DENSITY

J. Terrier<sup>1</sup>, O. Le Rouzic<sup>1</sup>, J. Paccou<sup>1</sup>, A. Prevotat<sup>1</sup>, B. Cortet<sup>1</sup>, I. Legroux<sup>1</sup>

<sup>1</sup>University of Lille, Lille, France

**Objective:** Cystic fibrosis (CF) can induce osteoporosis, and increases the risk of fractures. The objective of this study was to determine the prevalence of osteoporosis in a cohort of patients followed at the Lille University Hospital, and its evolution over time. We also analyzed the risk factors influencing bone loss, as well as the impact of an antiosteoporosis therapy or a chloride channel modulator (lumacaftor/ivacaftor).

**Methods:** Single-center, descriptive study carried out on adult patients with CF, followed between 2010-2020. The evaluation comprised bone assessment including BMD measurement, biological assessment focused on calcium, phosphorus, vitamin D, PTH and pneumologic assessment. Also collection of clinical and laboratory parameters were evaluated at two different stages, spaced on average 7±3 y.

**Results:** 119 patients were included and among them 10% were treated with antiosteoporotic drugs, whereas 25.2% were treated with lumacaftor/ivacaftor. The prevalence of osteoporosis by DXA at baseline was 8.4%, and 12.6% at the end of the study period respectively. BMD significantly decreased over time at the femoral neck (-6%, p<0.001), and at the total hip (-2%, p<0.001) but not at the lumbar spine. BMD changes at the femoral neck were significantly associated with the decrease of forced vital capacity, and also the presence of diabetes at baseline (p<0.05 and p<0.01, respectively). BMD changes were not different for patients who were receiving antiosteoporotic drugs and those who were not. The figures were the same for lumacaftor/ivacaftor.

**Conclusion:** Our data demonstrate a decrease in BMD at the femoral neck and at the hip in CF related to the severity of respiratory involvement and the presence of diabetes. Other studies are required for explaining the absence of efficacy of antiosteoporotic drugs in this cohort of patients with CF.

P347

# **ULTRASOUND CHARACTERIZATION OF THE PLANTAR FASCIA: A COMPARATIVE STUDY BETWEEN PATIENTS WITH SPONDYLOARTHRITIS, HIGH-IMPACT ATHLETES AND HEELED SHOE WEARERS**

C. A. Guillén-Astete<sup>1</sup>, C. Pijoán-Moratalla<sup>1</sup>, L. Seghers-Aguilar<sup>2</sup>, N. García-Montes<sup>1</sup>, S. Espejo-Polidura<sup>2</sup>

<sup>1</sup>Ramón y Cajal University Hospital, <sup>2</sup>CEU San Pablo, Madrid, Spain

**Objective:** The plantar fascia is one of the most frequently affected enthesal territories in patients with spondyloarthritis. Plantar fasciitis, not related to these diseases, is also a frequent pathology linked to alterations in the biomechanics of plantar bearing. The plantar fascia, moreover, is one of the most relevant structures in the plantar flexion of the foot and, therefore, must support the load of body weight in high-impact sports. Although plantar fasciitis is defined clinically, it is noted by demonstrating an increase in its thickness. The purpose of the present study is to determine whether there are differences between the plantar fasciae of healthy subjects, high-impact athletes, heel wearers, and patients with spondyloarthritis (with plantar fascia involvement).

**Methods:** Between December 2019 and January 2020, sedentary healthy volunteers (medical students and relatives), basketball and volleyball players, female workers in a department store and heel wearers (> 4cm, >5 h/wk, >1 y) and patients with known diagnosis of spondyloarthritis and plantar fascia involvement were recruited. An ultrasound examination of the plantar fascia of the dominant foot was performed in the longitudinal axis at the edge of the calcaneus and 10mm distal to it. To exclude changes attributable to age, volunteers under 35 years of age were included. The ultrastructure of the fascia was dichotomously assessed as normal or altered. All scans were performed by an expert sonographer unrelated to the type of volunteer being scanned.

**Results:** 46 sedentary volunteers (<2 h of weekly exercise), 42 federated basketball and volleyball players, 58 female heel wearers and 26 patients diagnosed with spondyloarthritis and plantar fasciitis were included. Table 1 summarizes the demographic and anthropometric characteristics of the included subjects. Plantar fascia thicknesses in the longitudinal axis at the edge of the calcaneus are shown in Table 2. No statistically significant differences were identified between the tendon thickness of patients and high-impact athletes. Statistically significant differences were identified in the comparisons between the remaining three height means, depicted in Figure 1. The proportion detecting altered echostructure occurred in 76.9% of patients, 38% of high-impact athletes, and 10.3% of heel wearers and 8.6% of sedentary people. Statistical comparison of these proportions is shown in Figure 1.

**Conclusion:** The ultrasound changes observed in the plantar fascia in patients with spondyloarthritis and plantar fasciitis are similar to those presented by high-impact athletes both in terms of altered ultrastructure and fascial thickness. According to these results, it is advisable to know the sports history of patients with suspected spondyloarthritis or under follow-up for this diagnosis when evaluating the plantar fascia ultrasonographically.

Table 1.

	Asymptomatic volunteers			SpA patients N=26
	Sedentarian N=46	High impact athletes N=42	High-heels users N=58	
Age (years)	23.8 DE 3.1	25.5 DE 3.9	26.8 DE 2.3	36.9 DE 3.9
Female sex, %	29, 63%	33, 78.5%	58, 100%	8, 30.7%
BMI g/cm <sup>2</sup>	25.7 DE 2.6	23.4 DE 2.8	23.8 DE 3.8	25.6 DE 3.4
% lean mass				
Men	36.3 DE 5.4%	47.3 DE 4.3%	-	34.9 DE 5.2%
Women	32.7 DE 6.2%	43.7 DE 3.9%	33.7 DE 5.3%	31.3 DE 5.9%

Table 2.

	Asymptomatic volunteers			SpA patients N=26
	Sedentarian N=46	High impact athletes N=42	High-heel users N=58	
Fascia height at the talocalcaneal border (mm)	2.93 DE 0.58	4.45 DE 0.37	3.33 DE 0.44	4.51 DE 0.32
Height of the fascia 10 mm distal to the talocalcaneal edge	2.77 DE 0.53	4.19 DE 0.32	3.19 DE 0.37	4.43 DE 0.39
Presence of calcaneal enthesophyte	5 (10.8%)	34 (80.9%)	6 (10.3%)	19 (73%)
Echostructure alteration	4 (8.6%)	16 (38%)	6 (8.6%)	20 (76.9%)

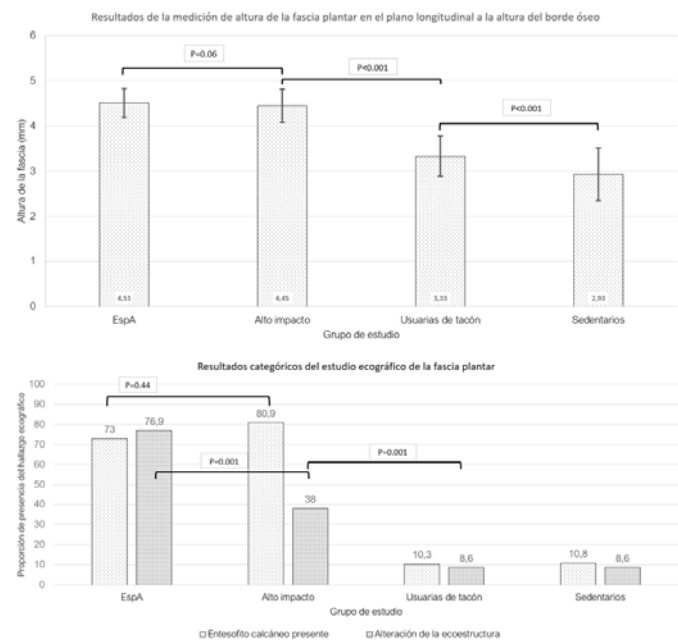


Figure 1.

P348

# STRUCTURAL CHANGES IN THE ACHILLES TENDON AND RETRO ACHILLES BURSA INDUCED BY EXERCISE IN HEALTHY SUBJECTS

C. A. Guillén-Astete<sup>1</sup>, M. Pozo-Notario<sup>2</sup>, P. A. Zurita-Prada<sup>3</sup>, C. Urrego-Laurín<sup>3</sup>, N. García-Montes<sup>1</sup>

<sup>1</sup>Ramón y Cajal University Hospital, <sup>2</sup>European University of Madrid, <sup>3</sup>HLA Moncloa University Hospital, Madrid, Spain

**Objective:** The Achilles tendon (AT) is the largest and most traction-resistant tendon in the body. These anatomical characteristics and its ease of exploration make this tendon a structure of interest in the study of patients with suspected spondyloarthritis. Like other load-bearing tendons, devoid of its own synovium, the Achilles tendon requires the cushioning of a bursa. The retro Achilles bursa (ARB) is a paratendinous structure lined with synovial tissue. Both the AT and the ARB are structures with the ability to adapt to biomechanical demand. Knowing the behavior of these structural modifications would allow us to understand to what extent changes in tendon architecture and bursa size can be considered physiological. The aim of the present study was to determine, in terms of ultrasonographically assessable structural changes, the physiological response of the AT and ARB to regular and controlled physical exertion.

**Methods:** An observational, longitudinal-retrospective study was performed using data obtained in a previous study. For this study, 116 young volunteers (20-30 years old) were enrolled throughout 2019 by means of posters placed in three sports centers in the northeastern area of Madrid (Alcobendas, San Sebastián de Los Reyes), who previously did not exercise more than 1 d/wk with the lower body. Subjects were excluded if they declared having a diagnosis of immune-mediated rheumatologic diseases or first-degree relatives with these diagnoses. Volunteers were instructed a training regimen (running) of 60'/d, 5d/wk. The research team encouraged the participants interweekly to perform the routine aiming to reach 140% of basal HR. At the beginning and end of the exercise period, an ultrasound examination of AT and ARB was performed. The outcome variables were the gradient of the longitudinal and transverse thickness of the AT and the height of the ARB. The independent variables were the gradients of the subjects' anthropometric measurements. The working hypothesis was that the greater the anthropometric change of the individual, the greater the structural changes that should be expected in the AT and the ARB.

**Results:** Of the 116 volunteers studied, 72 (62.1%) were male. Median age 24 RIC [4.50]. Basal BMI  $21.8 \pm 2.88$  g/m<sup>2</sup>. Basal muscle mass percentage (% lean mass) was  $33.06 \pm 6.48$ %. Table 1 summarizes the anthropometric characteristics of the volunteers and the results of the ultrasound examinations before and after the exercise routine. Table 2 presents the results of the bivariate correlation tests between the anthropometric changes: percentage muscle mass gain and increase in the circumference of the dominant calf, with the structural variations of AT and ARB. In all correlations, statistical-

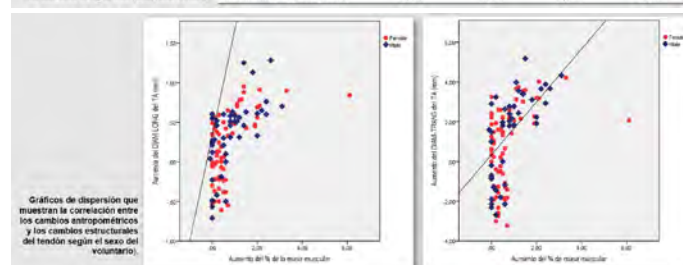
ly significant differences were demonstrated in both sexes. **Conclusion:** Regulated physical exercise produces detectable morphological changes in AT and ARB architecture. The anthropometric modifications induced by exercise in the individual correlate with the magnitude of these changes.

Variable	Antes	Después	P-valor
IMC (g/m <sup>2</sup> )	22.83 $\pm$ 3.15	21.80 $\pm$ 2.88	.03
Masa muscular (%)	33.06 $\pm$ 6.48	33.80 $\pm$ 6.47	<.01
Circunferencia pantorrilla (cm)	37.71 $\pm$ 2.89	38.83 $\pm$ 3.52	<.01
Diam-Long TA (mm)	4.10 $\pm$ 0.74	4.35 $\pm$ 0.94	<.01
Diam-Trans TA (mm)	20.00 $\pm$ 3.41	20.19 $\pm$ 3.47	<.01
Altura BRA (mm)	2.50 $\pm$ 1.12	2.63 $\pm$ 1.22	<.01

Table 1. Resumen de los resultados del estudio antropométrico y ecográfico antes y después de la rutina de ejercicios. El p-valor ha sido calculado mediante el estadístico T-Student para muestras relacionadas.

Variable	Ganancia de masa muscular		Incremento de la circunferencia de la pantorrilla	
	Coef. Pearson	P-valor	Coef. Pearson	P-valor
Incremento de altura de la BRA	0.499	<.001	0.446	<.001
Incremento de DIAM-LONG	0.569	<.001	0.447	<.001
Incremento de DIAM-TRANS	0.525	<.001	0.465	<.001

Table 2. Resultados de la prueba de correlación bivariable entre los cambios antropométricos experimentados por los voluntarios y los cambios observados en los estudios ecográficos (Después-Antes).



P349

# A NEW PROPOSAL TO REDUCE ATYPICAL FEMORAL FRACTURES

I. P. Papaioannou<sup>1</sup>, G. P. Pantazidou<sup>2</sup>, T. R. Repantis<sup>1</sup>, A. B. Baikousis<sup>1</sup>, P. K. Korovessis<sup>1</sup>

<sup>1</sup>Orthopedic Dept. of General Hospital of Patras, <sup>2</sup>University of Patras, Public Health Postgraduate Program, Patras, Greece

**Objective:** Atypical femur fracture (AFF), which is a rare type of fracture that has been associated with the long-term use of potent antiresorptive bone medications, is a potentially devastating consequence of osteoporosis treatment. AFF pathogenesis is associated with mechanical and biological mechanisms of cortical bone. This study highlights the patient group that is at high risk for development of this complication from the biomechanical point of view.

**Methods:** We retrospectively studied cases with atypical femoral fractures in the last 5 y. We retrieved 7 cases, 5 female and 2 male patients. 4/7 patients had diaphyseal AFF, while the rest had subtrochanteric AFF. All of them were treated with alendronate for osteoporosis. Mean age of these patients was 69.7 years old. We examined the radiographs and evaluated the diaphyseal lateral femoral bowing angle and femoral neck-shaft angle to clarify if increased femoral lateral bowing (>5.25°) or decreased femoral neck-shaft angle (<125°), are associated with increased risk for diaphyseal and subtrochanteric AFFs respectively.

**Results:** All patients with diaphyseal AFFs had increased lateral femoral bowing angle and subsequently all patients with subtrochanteric AFFs had decreased neck-shaft angle. Mean lateral femoral bowing was 12.9° (SD=5.5°), while mean neck-shaft angle was 120.3° (SD= 1.24°). It is worth-noting that in two cases with excessive lateral femoral bowing (>15°), surgical procedure was very challenging due to the design of the intramedullary nail.

**Conclusion:** Based on current evidence and our results about AFFs, we conclude that both femoral bowing angle and femoral neck-shaft angle should be evaluated before bisphosphonates (BPs) administration. In cases with excessive lateral femoral shaft bowing or decreased femoral neck-shaft angle, prescription of another antiosteoporotic treatment should be recommended. If, however, BPs cannot be avoided, clinicians should be aware of the fact that long-term administration may be implicated with AFFs occurrence. Short term BPs administration with timely drug holiday between three and five years may be reasonable. Roentgenographic evaluation of both femurs every six months and medical reference in case of any emerging thigh pain can prevent AFFs. Larger studies are urgently needed to confirm or contradict this statement.

### P350 IS DIABETES MELLITUS TYPE 2 A RISK FACTOR FOR FRAGILITY HIP FRACTURES?

I. P. Papaioannou<sup>1</sup>, G. P. Pantazidou<sup>2</sup>, Z. K. Kokkalis<sup>3</sup>, N. G. Georgopoulos<sup>4</sup>, E. J. Jelastopulu<sup>5</sup>, P. K. Korovessis<sup>1</sup>

<sup>1</sup>Orthopedic Dept. of General Hospital of Patras, <sup>2</sup>University of Patras, Public Health Postgraduate Program, <sup>3</sup>Orthopaedic Surgery, Medical School, University of Patras, <sup>4</sup>Endocrinology, University of Patras, <sup>5</sup>Dept. of Public Health, University of Patras, Patras, Greece

**Objective:** Current evidence supports that individuals with diabetes mellitus type 2 (T2DM) are more vulnerable to fragility fractures, although elderly patients with osteoporotic and especially hip fractures haven't receive the appropriate proportion of the publishing data.

**Methods:** We retrospectively studied elderly patients (>60 years old) with low energy hip fractures, which were treated in our department during the last year between January 2020 and January 2021 to determine if T2DM consists a worth noting risk factor for fragility hip fractures in this specific age group. Furthermore, we conducted a systematic review of the literature concerning elderly with fragility fractures (especially hip fractures) and the possible impact of T2DM. Finally, we identified 17 records which met our inclusion criteria (elderly patients over 60 years old accompanied with T2DM and fragility fractures) based on literature research in PubMed and google scholar.

**Results:** We retrieved 141 patients over 65 years old with fragility hip fractures treated in our department, 73 with extracapsular and 68 intra-capsular, while mean age was 73.66. Among them 41

patients had T2DM, so a total 29.07% of the elderly with fragility hip fracture were also diabetic. This finding confirms the fact that diabetic elderly individuals are at increased risk for hip fractures. The results from our systematic review concludes that there is almost consensus about the increased prevalence of all kinds of fragility fractures and especially low-energy hip fractures among elderly patients with T2DM compared with their counterparts without T2DM, while there is relative controversy concerning the nonvertebral fractures. Insulin usage can even double the risk for fragility fracture.

**Conclusion:** Bone fragility should be recognized as a new complication of T2DM, especially in elderly patients. The elderly patients are even more vulnerable to T2DM-induced bone fragility due to several additional aggravating factors, which include senile osteoporosis, severe vitamin D deficiency, presence of many comorbidities, increased possibility of insulin usage, presence of diabetes-related complications and especially diabetic neuropathy and retinopathy, predisposing to falls. Clinicians who treat these patients should be also aware of the special diagnostic and therapeutic approaches concerning these patients.

### P351 IMPLICATIONS OF DEFFICIENT VITAMIN D LEVELS IN DIABETIC ELDERLY

I. P. Papaioannou<sup>1</sup>, G. P. Pantazidou<sup>2</sup>, Z. K. Kokkalis<sup>3</sup>, N. G. Georgopoulos<sup>4</sup>, E. J. Jelastopulu<sup>5</sup>

<sup>1</sup>Orthopedic Dept. of General Hospital of Patras, <sup>2</sup>University of Patras, Public Health Postgraduate Program, <sup>3</sup>Orthopaedic Surgery, Medical School, University of Patras, <sup>4</sup>Endocrinology, University of Patras, <sup>5</sup>Dept. of Public Health, University of Patras, Patras, Greece

**Objective:** During the last two decades there has been expanding evidence describing the implications of vitamin D deficiency (VDD) in patients with type 2 diabetes mellitus (T2DM), although until now elderly have not received the required proportion of the published studies. The aim of this study is to fill this gap in current literature concerning this patient group.

**Methods:** Literature in PubMed and Google Scholar was searched for relevant articles published up to October 2020. The keywords used were: VDD, elderly and T2DM. Among 556 articles retrieved, 90 full texts were eligible and only 34 studies (12 retrospective studies, 2 prospective cohorts, 3 meta-analyses, 7 cross-sectional studies, 9 randomized control trials- RCTs, and one observational study) met the inclusion criteria for the review.

**Results:** According to this study there is adequate evidence to support the correlation between VDD and T2DM in elderly. Results from RCTs are more conflicting, so further studies are necessary to confirm the impact of VDD supplementation on metabolic, lipid profile, oxidative stress and complications of T2DM in elderly. VDD is clearly related with severe retinopathy, diabetic peripheral neuropathy and poor cognition performance, while there is con-



sensus about the beneficial effect of vitamin D (VD) on peripheral artery disease, foot ulceration prevention and wound healing. However, there is controversy about the effect of VD supplementation on cardiovascular adverse events, endothelial function and estimated glomerular filtration rate. Finally, the association of VDD with fragility fractures and depression in the elderly with T2DM is currently insufficiently studied and remains controversial.

**Conclusion:** Undoubtedly, there is definite correlation of VDD with T2DM in elderly. However, the effect of VD supplementation on metabolic and lipid profile, oxidative stress and complications of T2DM in older patients require larger randomized controlled trials. Definition of the exact threshold of VD levels and the regimen of VD supplementation is important, although very difficult to be determined. Based on the small number of studies of this patient group and the conflicting results in specific points of this topic, there is emerging need for new well designed studies for elderly with T2DM and VDD.

P352

### CAN VITAMIN D AND/OR PTH PREDICT A NEW LOW ENERGY HIP FRACTURE IN ELDERLY?

I. P. Papaioannou<sup>1</sup>, G. P. Pantazidou<sup>2</sup>, T. R. Repantis<sup>1</sup>, A. B. Baikousis<sup>1</sup>, P. K. Korovessis<sup>1</sup>

<sup>1</sup>Orthopedic Dept. of General Hospital of Patras, <sup>2</sup>University of Patras, Public Health Postgraduate Program, Patras, Greece

**Objective:** Vitamin D (VD) deficiency seems to be underestimated, especially in countries with significant duration of sunlight throughout the year. This study was conducted to highlight two easily measurable prognostic factors to identify low energy hip fractures in elderly. These factors are VD and PTH.

**Methods:** This study included 63 patients with mean age of 83 y who sustained hip fracture (Group A) within a year. 64 patients, with average age of 73 y, who suffered from degenerative hip/knee osteoarthritis or lumbar spondylosis, were subsequently selected as control group (Group B). PTH and VD blood levels were measured.

**Results:** Statistical analysis was performed using SPSS statistics. P-value <0.05 was set as level of statistically significant difference. 93.6% (59/63) of individuals with hip fracture and 76.5% (49/64) in controls were found with abnormal VD values (<30 ng/ml). Comparison of vitamin D values between the total samples of group A and B revealed statistically significant difference, while both male (p=0.0049) and female (p<0.0001) patients of group A showed statistically significant lower VD levels than their counterparts. In addition, increased levels of PTH were observed in women of group A (p=0.0016), while no statistical significance was found in males (p=0.7712). Age was an independent risk factor for VD deficiency in both groups (Group A p=0.04, Group

B p=0.043). Four patients only from group B (6.25%) and none from group A had undergone blood tests for VD and PTH before hospital admission.

**Conclusion:** Our study confirmed that elderly patients with hip fractures in Greece have less VD adequacy and increased PTH levels comparing with elderly people with osteoarthritis. Moreover, the study demonstrated that age constitutes an independent aggravating factor for hypovitaminosis D among elderly either with hip fracture or osteoarthritis and this finding should be taken also under consideration by physicians. As hypovitaminosis D concerns the majority of elderly living in this south-western Mediterranean region, authors suggest VD and PTH measurements, regardless of annual insolation, to identify and counsel elderly with increased risk of hip fracture and avoid perioperative complications in patients who undergo elective orthopedic surgeries.

P353

### CAN VITAMIN D AND/OR PTH LEVELS PREDICT HIP FRACTURE SEVERITY IN ELDERLY?

I. P. Papaioannou<sup>1</sup>, G. P. Pantazidou<sup>2</sup>, T. R. Repantis<sup>1</sup>, A. B. Baikousis<sup>1</sup>, P. K. Korovessis<sup>1</sup>

<sup>1</sup>Orthopedic Dept. of General Hospital of Patras, <sup>2</sup>University of Patras, Public Health Postgraduate Program, Patras, Greece

**Objective:** Many studies support that lower vitamin D (VD) and/or increased PTH levels are associated with hip fracture severity.

**Methods:** We retrospectively evaluated 137 elderly patients with low energy hip fractures, treated in our department from January 2020 to January 2021. PTH and 25-hydroxyVD blood levels were measured, recording type of fracture and fracture severity. We defined severe subcapital fractures those with grade 3 or 4 according to Garden classification, while severe intertrochanteric those with grade A2.2, A2.3 and all A3 fractures according to AO/OTA classification.

**Results:** 72.26% (99/137) were female, 27.74 (38/137) male. Majority of men had intertrochanteric fracture (25/38), while 32.32% of women subcapital (32/99). Mean VD levels were 10.15 (SD 6.63) ng/ml, mean PTH levels 64.36 (53.38) pg/ml, 30.65% had secondary hyperparathyroidism and 2 (1.45%) patients efficient VD levels (>30 ng/ml). Mean VD and PTH levels were 10.54±5.949 ng/ml and 47.68±41.203 pg/ml respectively for male. Values for female were 10.0±6.901 ng/ml and 70.77±56.252 pg/ml. 60.59% had severe VD deficiency (<10 ng/ml), 30.66% VD deficiency (10-20 ng/ml) and 7.30% VD inadequacy. So, intracapsular fractures are associated with more severe VD deficiency (9.17±4.962 ng/ml) compared to extracapsular (10.63±7.290 ng/ml). 70.8% (97/137) had severe or comminuted hip fractures, while stable fractures were 29.2% (40/137). In group with severe hip fracture (97 patients), mean VD was 9.76±6.717 ng/ml and PTH 65.18±56.631 pg/ml. Furthermore, in this group 63.91% (62/97) had severe VD deficiency, 27.83% (27/97) VD deficiency, 6.18% (6/97) VD inadequacy and 2.08% (2/97) adequate VD. Converse-

ly, in group with stable hip fractures (40 patients) mean VD was  $11.09 \pm 6.409$  ng/ml and PTH  $62.38 \pm 45.134$  pg/ml. In this group, 52.50% (21/40) had severe VD deficiency, 37.5% (15/40) VD deficiency, 10% (4/40) VD inadequacy and no patient with adequate VD levels. Correlation between PTH and VD with fracture severity did not reveal statistical significance.

**Conclusion:** Clinicians should have in mind that severe VD deficiency is associated with comminuted fracture pattern, intracapsular hip fracture and female gender.

### P354

#### PSYCHOTROPIC DRUGS, POLYPHARMACY AND HIP FRACTURES IN ELDERLY: A RETROSPECTIVE STUDY

I. P. Papaioannou<sup>1</sup>, G. P. Pantazidou<sup>2</sup>, T. R. Repantis<sup>1</sup>, A. B. Baikousis<sup>1</sup>, P. K. Korovessis<sup>1</sup>

<sup>1</sup>Orthopedic Dept. of General Hospital of Patras, <sup>2</sup>University of Patras, Public Health Postgraduate Program, Patras, Greece

**Objective:** Polypharmacy and use of psychotropic agents are established risk factors for falls and hip fractures. This retrospective study evaluates the impact of these factors to PTH, 25-hydroxyvitamin D (VD) blood levels and fracture severity.

**Methods:** We retrospectively evaluated 76 elderly with fragility hip fractures. PTH and VD blood levels were measured. Polypharmacy and intake of psychotropic drugs were recorded. Polypharmacy was defined the intake of 4 or more drugs, while we included typical and atypical antipsychotics, tricyclic antidepressants, selective serotonin reuptake inhibitors and benzodiazepines in the group with psychotropic drugs uptake. We defined severe subcapital fractures those with grade 3 or 4 according to Garden classification, while severe intertrochanteric those with grade A2.2, A2.3 and all A3 fractures according to AO/OTA classification.

**Results:** Mean age of 76 participants was  $83.08 \pm 7.203$ . 63.2% (48/76) sustained extracapsular fractures, while 36.8% (28/76) intracapsular. Based on our records, 39/76 patients (51.3%) received psychotropic drugs. Polypharmacy was identified in 77.6% of patients (59/76), 37 females and 22 males. 22.4% of patients (17/76) received 3 or less drugs per day. In 59 cases associated with polypharmacy, we found 46 (77.9%) with comminuted fractures and 13 (22.1%) with stable fracture pattern, while in 17 without polypharmacy the incidence of unstable fractures was 64.7% (11/17). Mean VD levels were 10.35 ng/ml with 4.78 SD and PTH levels 73.77 pg/ml with SD 64.59 in cases with psychotropic drugs intake, while values of their counterparts were  $11.75 \pm 6.27$  ng/ml and  $54.11 \pm 44.36$  pg/ml respectively. Finally, mean VD levels were 9.27 ng/ml with 4.77 SD and PTH levels 65.61 pg/ml with SD 55.22 in cases associated with polypharmacy, while the values of their counterparts were  $11.56 \pm 5.71$  ng/ml and  $59.29 \pm 60.83$  pg/ml respectively.

**Conclusion:** Clinicians should be aware that polypharmacy and psychotropic drugs intake are associated with more unstable hip fractures, severe VD deficiency and increased levels of PTH. Probably, VD deficiency and secondary hyperparathyroidism consist adverse effects of polypharmacy and psychotropic drugs intake. More studies are necessary to evaluate this thesis.

### P355

#### BONE LOSS AND OSTEOPOROSIS IN OLDER MEN AND WOMEN FROM THE GAMBIA, WEST AFRICA

C. M. Parsons<sup>1</sup>, M. Ó Breasail<sup>2</sup>, L. Jarjou<sup>3</sup>, A. Zengin<sup>4</sup>, A. Prentice<sup>3</sup>, P. Ebeling<sup>4</sup>, C. Cooper<sup>1</sup>, K. A. Ward<sup>1</sup>

<sup>1</sup>MRC Lifecourse Epidemiology Unit, Southampton, UK, <sup>2</sup>MRC Nutrition & Bone Health Group, Cambridge, UK, <sup>3</sup>MRC Unit The Gambia at the London School of Hygiene & Tropical Medicine, Banjul, Gambia, <sup>4</sup>Dept. of Medicine, School of Clinical Sciences, Faculty of Medicine, Nursing and Health Sciences, Monash University, Victoria, Australia

**Objective:** Due to an increase in longevity and rapid urbanization in sub-Saharan Africa (SSA), it is predicted that the incidence of hip fracture will increase 6-fold in Africa and Asia by 2050. The aims were to describe and characterize changes in bone mass of older adults and to determine prevalence of osteoporosis and osteopenia in a population accustomed to low habitual calcium intakes.

**Methods:** The Gambian Bone and Muscle Ageing Study (GamBAS; ISRCTN17900679) is a prospective observational study in women and men from rural Gambia. The primary outcome was change in total hip aBMD over a 1.5-2 y period (follow-up was randomized to account for seasonality). A GE-Lunar Prodigy scanner was used to obtain proximal femur scans for assessment of aBMD. Annualized percentage change in aBMD was calculated. Total hip BMD T-scores were calculated using NHANES data and Z-scores were calculated using manufacturer reference data as per ISCD recommendations. Results are presented as mean (standard deviation) change.

**Results:** A total of 383 (54.6% women) had repeat DXA scans (median follow-up 1.72 y); median age 59, range 40-92 y; BMI men  $20.9(3.0)$  kg/m<sup>2</sup>; women  $21.9(3.5)$  kg/m<sup>2</sup>. At baseline, the mean total hip Z-score was  $-0.23(0.98)$  in men and  $-0.55(1.06)$  in women. The mean total hip T-score in men was  $0.05(1.20)$  and  $-1.25(1.42)$  in women. Forty-two (20.6%) women, and 2 (1.2%) men have osteoporosis, and n=82 (40.2%) women and 32(18.6%) men osteopenia. Figure shows the mean annualized percentage change in total hip aBMD.

In men, total hip aBMD changed most after the age of 70 y;  $-1.10(1.20)$  70-74 y;  $-1.24(0.98)$  75+ years. In women, the change in total hip aBMD change was  $-0.17(1.19)$  in 40-44 y;  $-1.09(1.46)$  in 45-49 y;  $-1.22(1.23)$  50-54 y;  $-1.22(1.27)$  55-59 y;  $-0.73(1.31)$  60-64 y;  $-1.22(1.04)$  65-69 y;  $-1.00(1.36)$  70-74 y;  $-1.50(1.35)$  75+ years.

**Conclusion:** These are the first longitudinal musculoskeletal DXA data in an older adult population from SSA. The change at the hip was comparative to that in higher income countries where fracture risk is high. Over 40% of women were osteopenic and osteoporotic. These data provide important insights into musculoskeletal health in the Gambian population, previously thought to be at low risk of fracture.

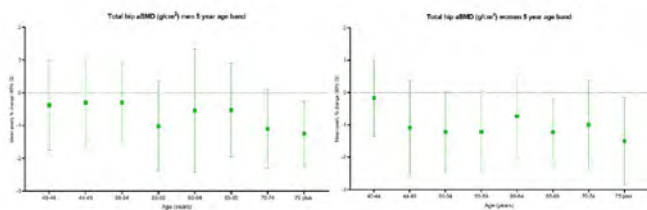


Figure. Mean annualized percentage change in total hip aBMD.

P356

### PRIMARY HYPERPARATHYROIDISM DUE TO ECTOPIC PARATHYROID ADENOMA

M. Popescu<sup>1</sup>, E. Petrova<sup>2</sup>, M. Ghemigian<sup>3</sup>, A. Ghemigian<sup>2</sup>

<sup>1</sup>University of Medicine & Pharmacy Craiova, Craiova, <sup>2</sup>C.I. Parhon National Institute of Endocrinology & C. Davila University of Medicine & Pharmacy, Bucharest, <sup>3</sup>C.I. Parhon National Institute of Endocrinology, Bucharest, Romania

**Objective:** Primary hyperparathyroidism (PHPT) results from intrinsic hyperfunction of parathyroid glands; either sporadic or familial. When due to an ectopic parathyroid tissue, localization and removal are challenging (1-5).

**Case report:** We present a 43-year-old female who was referred to the Endocrinology for symptomatic hypercalcemia. She was diagnosed 4 y ago with chronic kidney disease, chronic interstitial nephropathy, multiple episodes of urinary infection and recurrent lithotripsies. While investigating the etiology of recurrent nephrolithiasis, the diagnosis of PHPT emerged. The laboratory investigations showed: elevated corrected serum calcium (13.2 mg/dl) with an intact PTH serum of 620 pg/ml. The serum phosphate was decreased (2.1 mg/dl) and urinary calcium of 0.25 g/24-h. The assessment of renal function showed serum creatinine of 1.7 mg/dl (GFR=37 ml/min) and serum urea of 57 mg/dl. Bone markers (osteocalcin, CrossLaps, P1NP) were increased; low 25-hydroxyvitaminD-14 ng/ml. DXA revealed lumbar T-score of T-3.53SD, hip (T-3.13 SD), and distal radius (T-4.1 SD). <sup>99m</sup>Tc Sestamibi scintigraphy showed: focus of radioactivity in medias-tinum (thymic box), suggesting an ectopic hyperfunctioning parathyroid gland. Its excision was attempted, but the calcium values increased progressively and the PTH serum levels remained unchanged. Therefore, the patient was operated once again one

year later. The histological report confirmed parathyroid ectopic tissue. The patient's evolution was favorable (increase in BMD and no more nephrolithiasis).

**Conclusion:** We reported a case with persistent hyperparathyroidism after surgery due to an ectopic parathyroid adenoma. This study should warn on the delayed diagnosis and difficult treatment of an abnormal localization of the parathyroid adenoma in order to improve the management of the disorder and the outcome of the patient.

#### References:

1. Popescu M, et al. Revista de Chimie 2018;69:2089.
2. Bechir ES, et al. Revista de Chimie 2019;70:3515.
3. Ionovici N, et al. Rom J Morphol Embriol 2020;70:129.
4. Iorga AM, et al. Exp Ther Med 2020;20:2396.
5. Albulescu DM, et al. Revista de Chimie 2018;69:3683.

P357

### EXTRASPINAL OSTEOARTICULAR MANIFESTATIONS OF DIFFUSE IDIOPATHIC SKELETAL HYPEROSTOSIS: ABOUT 54 STUDY PATIENTS

A.-R. Halidou Idrissa<sup>1</sup>, N. Kawtar<sup>1</sup>, J. Saadia<sup>1</sup>

<sup>1</sup>Rheumatology Dept. of Ibn Rochd CHU, Casablanca Faculty of Medicine & Pharmacy, Hassan II University, Casablanca, Morocco

**Objective:** Diffuse idiopathic skeletal hyperostosis (DISH) or Jacques Forestier and Jaume Rotés-Quèrol disease, is a non-inflammatory ossification of entheses. The term hyperostosis is defined by an enlarged bone, or abnormally thick bones. It takes two (according to Forestier) or three (according to Resnick) contiguous intervertebral bridges to affirm hyperostosis, as well as correct discs and the absence of fusion of the sacroiliac or posterior joints. The diagnosis of DISH is radiological (frontal views). The peripheral locations, reported by Forestier himself, are frequent and have some peculiarities that distinguish them from osteophytes of osteoarthritis, they are observed around joints rarely affected by osteoarthritis: shoulder, elbow, metacarpophalangeal, enthesophytes. They are bulky, different from osteophytes. They are clearly implanted on the bone, away from the bone-cartilage junction, site of the osteophyte, these enthesophytes are seen at a distance from a joint, on other enthesic sites (heel spur, quadriceps tendon). We conducted a study to determine the frequency of extraspinal forms of DISH and their clinical presentations.

**Methods:** We conducted a prospective study in the Dept. of Rheumatology, University Hospital of Ibn Rochd, Casablanca, from February 2020 to February 2021 (12 months). The inclusion criteria were all patients in whom the diagnosis of DISH was made according to the definition criteria of Risnick. The exclusion criteria were the patients who did not meet the definition criteria according to Risnick.

**Results:** 54 patients corresponding to the definition of Risnick were included, with an average age of 67.21 y (54-87 y), a male predominance of 61.11%. The most frequent antecedents were diabetes mellitus (55.55%), followed by dyslipidemia (42.59%) and arterial hypertension (29.82%). In our series, 6 patients (11.11%) of the patient presented in addition to the spinal involvement an extraspinal osteoarticular expression of DISH. The localizations were: the elbows (annular ligaments and radial collateral), bilaterally, with irreducible painful limitations of the elbows; the left ankle (calcaneofubular ligament) in one patient; the forefoot in the 2 patients (talonavicular ligaments), presenting with mechanical pain when walking, with limitation of lateral movements. The inflammatory assessment was negative in the patients. These patients were put on analgesics and joint rehabilitation to reduce joint pain and prevent limitations in terms of mobility and function.

**Conclusion:** The extraspinal forms of DISH are relatively frequent and, depending on their location, lead to clinical manifestations that may affect the functional prognosis of the joints. Their management consists in treating pain while ensuring joint mobility.



Figure 1. Standard x-ray of the right elbow, frontal view: ossification of the annular and radial collateral ligaments with preservation of the joint spaces in the context of a DISH.



Figure 2. Standard x-ray of the left forefoot, frontal view showing an ossification of the calcaneofubular ligament in the setting of DISH.



Figure 3. Standard X-ray of the right forefoot, lateral view showing an ossification of the ligament with preservation of the joint space.

### P358

#### CAVITIES IN BONE TISSUE, DIAGNOSTICS, TREATMENT AND PROPHYLAXIS OF RECURRENT FRACTURES IN CHILDREN

I. Prokofev<sup>1</sup>

<sup>1</sup>Penza State University, Penza, Russia, <sup>1</sup>Prokofiev I.A., <sup>2</sup>Scherbakova J.G. <sup>3</sup>Strukov V.I. <sup>4</sup>Elistratov D.G., <sup>5</sup>Alekseeva N.U. <sup>1</sup>Penza Institute of Postgraduate Medical Training, <sup>2</sup>Dept. of Pediatrics, Penza State University, <sup>3</sup>MC "Healthy Children", Penza, Russia

**Objective:** To study the role of detection of bone cavities (BC) in trabecular bone with low BMD during diagnostics, treatment and prevention of recurrent fractures (RF) in bones of forearm.

**Methods:** 67 children and adolescents aged 9-17 with RF of the forearm bones and the presence of BC in them (boys 38, girls 29) were examined. Laboratory work included serum total Ca, phosphorus, alkaline phosphatase, 25(OH)D, PTH. BMD and BC in bone were assessed with DXA. Children were divided into 2 groups. Group I - 32 patients received vitamin complex containing D3 150 IU, vitamin B6 0.5 mg and drone homogenate (HDBA). HDBA contains entomological hormones of bees and organic vitamin D. Group II - 35 children received similar vitamin complex without HDBA. Both groups received 3-month courses, 3 times a year, with 1 month breaks.

**Results:** 43 children had BMD below - 2.0 SD, 24 had BMD between -2.0 to +1.0 SD. The number and size of cavities on the DXA correlated with the frequency of repeated fractures. Vitamin D deficiency was observed in 43 children (64±10%), the content of 25(OH)D <20 ng/ml. 24 children (36±8%) had insufficient level of 25(OH)D (from 21-29 ng/ml). The level of PTH was high in 78±9% of children. After 1 y of treatment we detected increase BMD in group I - 3.7% and 3.1% in group II. Closure and reduction of bone cavities were 68±5% in group 1 vs. 43±6% in group II (p<0.05);



increase of 25(OH)D to  $47 \pm 3.1$  in group 1 and up to  $30 \pm 2.9$  ng/ml ( $p < 0.05$ ) in group II. No side effects were observed. We believe that better results in group I were achieved due to HDBA.

**Conclusion:** 1. Detection of BC in trabecular bone is important for diagnosis, prognosis and treatment of RF. 2. Drone homogenate HDBA can be safely and effectively used in children with recurrent fractures of forearm bones.

P359

### A BUNDLED CARE PROTOCOL IMPROVES CLINICAL OUTCOMES AND ACCESS TO CARE FOR PATIENTS WITH SURGICALLY MANAGED HIP FRACTURES DESPITE POORER COMORBIDITIES

K. C. Wong<sup>1</sup>, G. J. W. Cheok<sup>1</sup>, K. X. K. Tay<sup>1</sup>, M. A. Png<sup>2</sup>, N. N. Lo<sup>1</sup>, A. K. Mitra<sup>1</sup>, T. S. Howe<sup>1</sup>, J. S. B. Koh<sup>1</sup>

<sup>1</sup>Dept. of Orthopaedic Surgery, <sup>2</sup>Dept. of Diagnostic Radiology, Singapore General Hospital, Singapore, Singapore

**Objective:** Current literature has displayed the economic and clinical benefits of standardised hip fracture programs.<sup>1</sup> Our institution implemented a hip fracture bundled care protocol in 2017, integrating multidisciplinary teams to manage hip fracture patients requiring surgery. Our study aims to analyze the impact of a bundled care protocol on performance indicators and short-term outcomes of these patients.

**Methods:** "Post-Bundle" group included surgically managed hip fracture patients admitted under a bundled care protocol. "Pre-Bundle" group included patients admitted 2 y before implementation of this protocol. Demographic data and key performance indicators such as time to admission, time to surgery, inpatient mortality rates, length of stay and discharge disposition were collected.

**Results:** There were 701 Pre-Bundle patients and 935 Post-Bundle patients. Post-Bundle patients were older ( $78.0 \pm 8.5$  vs.  $79.6 \pm 8.6$ ; mean difference, -1.6; 95%CI -2.4 to -0.7;  $p < 0.001$ ), with a greater proportion in American Society of Anesthesiologists (ASA) classification III and IV (III, 22.8 vs. 27.7%; IV, 0.7 vs. 1.0%;  $p = 0.026$ ). Post-Bundle patients had shorter time to surgery ( $86.2 \pm 94.1$  vs.  $63.3 \pm 59.9$ ; mean difference, 22.9; 95%CI 14.9-30.8;  $p < 0.001$ ), and a greater proportion (86.0 vs. 97.2%;  $p < 0.001$ ) were admitted within 4 h and operated within 48 h (36.8 vs. 56.4%;  $p < 0.001$ ). There was no difference in mortality rates. Post-Bundle patients had shorter length of stay ( $14.8 \pm 13.0$  vs.  $11.2 \pm 9.0$ ; mean difference, 3.6; 95%CI 2.5-4.7;  $p < 0.001$ ), with more discharged within 9 d (43.2 vs. 55.6%;  $p < 0.001$ ) and to a step-down care facility (47.8 vs. 68.0%;  $p < 0.001$ ).

**Conclusion:** Our study shows the clinical incentives following a bundled care protocol in surgically managed hip fractures. Inpatient mortality rates remain statistically similar in older hip fracture patients with higher ASA scores. We conclude that a multidisciplinary approach to orthogeriatric care leads to a more

streamlined admission process, ensuring optimal access to care for older and sicker patients, proper rehabilitation protocols and resultant shorter hospital stays.

**Reference:** 1. Arshi A, et al. J Orthop Trauma 2019;33:e223.

P360

### LOWER SOCIOECONOMIC STATUS IS ASSOCIATED WITH HIGHER CHARLSON COMORBIDITY INDEX AND INDEPENDENTLY PREDICTIVE OF POORER OUTCOMES FOLLOWING HIP FRACTURE SURGERY

K. C. Wong<sup>1</sup>, L. M. H. Liow<sup>1</sup>, E. S. E. Tan<sup>1</sup>, K. X. K. Tay<sup>1</sup>, M. A. Png<sup>2</sup>, N. N. Lo<sup>1</sup>, A. K. Mitra<sup>1</sup>, T. S. Howe<sup>1</sup>, J. S. B. Koh<sup>1</sup>

<sup>1</sup>Dept. of Orthopaedic Surgery, <sup>2</sup>Dept. of Diagnostic Radiology, Singapore General Hospital, Singapore, Singapore

**Objective:** Lower socioeconomic status (SES) has been associated with incidence of hip fractures<sup>1</sup> and postoperative mortality.<sup>2</sup> We aim to examine the relationship between SES and Charlson comorbidity index (CCI), length of hospitalization, time to surgery and 90-d readmission rates in hip fracture patients.

**Methods:** Patients who underwent hip fracture surgery between 2013-2016 were included. They were divided into Group PRIV (private) consisting of patients with higher SES, and group SUB (subsidised) consisting of patients with lower SES. We collected patient demographic data and also analysed time to surgery, length of hospitalization and 90-d readmission rates.

**Results:** There were 145 PRIV patients and 1146 SUB patients. SUB patients had higher mean CCI (5.3 vs. 4.8,  $p = 0.01$ ), longer length of hospitalization (19.2 vs. 14.9 d;  $p = 0.001$ ), increased delay in surgery (96.3 vs. 70.1 h;  $p = 0.005$ ) and higher 90-d readmission rates (19.5 vs. 11.0%;  $p = 0.013$ ). Lower SES (OR, 2.5; 95%CI 4.72-40.65;  $p = 0.01$ ), older age (OR, 3.20; 95%CI, 0.47-1.94;  $p = 0.01$ ), higher CCI (OR, 8.00; 95%CI 10.13-16.7;  $p < 0.01$ ) and higher American Society of Anaesthesiologists score (OR, 2.94; 95%CI 6.13-30.64;  $p = 0.03$ ) was predictive of time to surgery. Lower SES (OR, 3.88; 95%CI 1.43-6.32;  $p = 0.02$ ) and higher CCI (OR, 1.21; 95%CI 0.76-1.66;  $p < 0.001$ ) was predictive of length of hospitalization. Lower SES (OR, 1.79; 95%CI 1.03-3.10;  $p = 0.04$ ) and higher CCI (OR, 1.24; 95%CI 1.15-1.33;  $p < 0.001$ ) was predictive of 90-d readmission rates.

**Conclusion:** Despite current literature establishing the relationship between low SES and higher CCI, our study proves low SES to be an independent predictor of time to surgery, length of stay and readmission rate. Existing infrastructure should focus on home care delivery, health education, and chronic disease management in order to reduce disparity and healthcare burden, minimising the effect of socioeconomic factors on patient outcomes.

#### References:

1. Reyes C, et al. Bone 2015;73:127.
2. Petrelli A, et al. J Health Qual 2018;40:209.

P361

### EFFECTS OF PTH(1-84) ON cAMP LEVELS IN AN IN VITRO MODEL OF HUMAN SATELLITE CELLS FROM SKELETAL MUSCLE TISSUE

C. Romagnoli<sup>1</sup>, R. Zonefrati<sup>2</sup>, E. Lucattelli<sup>3</sup>, M. Innocenti<sup>3</sup>, T. Iantomasi<sup>1</sup>, M. L. Brandi<sup>2</sup>

<sup>1</sup>Dept. of Experimental & Clinical Biomedical Sciences, University of Florence, <sup>2</sup>FIRMO Italian Foundation for the Research on Bone Diseases, <sup>3</sup>Plastic & Reconstructive Microsurgery, Careggi University Hospital, Florence, Italy

**Objective:** PTH is a single-chain peptide hormone consisting of 84 amino acids, secreted by the parathyroids, 4 endocrine glands located on the back of the thyroid. Its main role is to maintain a constant concentration of calcium ( $\text{Ca}^{2+}$ ) in the bloodstream. Since PTH increases  $\text{Ca}^{2+}$  mobilization from bone, it is a key effector in bone metabolism, balancing the process of bone regeneration and remodeling. However, very few studies evaluate the effect of PTH on skeletal muscle, both clinically and experimentally. Therefore, the aim of our work was to investigate the in vitro effect of several PTH(1-84) concentrations in human satellite cells (hSCs) in order to elucidate, at a cellular and molecular levels, the mechanism of action of this hormone on skeletal muscle tissue.

**Methods:** hSCs were isolated by enzymatic digestion and mechanical dispersion of skeletal muscle tissue biopsies and a protocol for in vitro myogenesis was established, as previously reported [1]. Cells were exposed for 30' to different concentrations of PTH(1-84), from  $10^{-6}$  to  $10^{-12}$  M, and cAMP levels were assayed by ELISA, in order to evaluate the responsive concentrations of the hormone, in proliferating and differentiated hSCs. Statistical analysis was performed by ANOVA followed by Bonferroni's test.

**Results:** The ELISA assay has shown no significant variation in cAMP levels in hSCs in proliferation treated with several PTH(1-84) concentrations. On the other hand, treatment in differentiated myotubes with different PTH(1-84) concentrations has shown a significant increase (+107%) in cAMP levels in cells treated with  $10^{-7}$  M PTH(1-84) vs. control group (\* $p < 0.01$ ).

**Conclusion:** This work has shown preliminary data on the in vitro effects of PTH(1-84) on cAMP levels in proliferating and differentiated hSCs, identifying the PTH(1-84) concentration  $10^{-7}$  M as the responsive one in myotubes. Studies are in progress in order to evaluate the effects of PTH(1-84) on the hSCs proliferation and the myogenic processes.

**Acknowledgment:** This work was supported by FIRMO Foundation.

**Reference:** 1. Romagnoli C, et al. Calcif Tissue Int 2020;107:18.

P362

### RELATIONSHIP OF HAND GRIP STRENGTH, PHYSICAL ACTIVITY AND ANTHROPOMETRIC CHARACTERISTICS IN A SAMPLE OF GREEK PHYSIOTHERAPY STUDENTS

M. Tsekoura<sup>1</sup>, S. M. Bakirtzi<sup>1</sup>, S. L. Papadimitropoulou<sup>1</sup>, E. Billis<sup>1</sup>, K. Fousekis<sup>1</sup>, C. Matzaroglou<sup>1</sup>, S. Xergia<sup>1</sup>, S. Lampropoulou<sup>1</sup>, E. Tsepis<sup>1</sup>

<sup>1</sup>Dept. of Physiotherapy, School of Health Rehabilitation Sciences, University of Patras, Aigio, Greece

**Objective:** To investigate the association of hand grip strength (HGS), physical activity and anthropometric characteristics in physiotherapy students living in Greece.

**Methods:** This cross-sectional study was done at Dept. of Physiotherapy, University of Patras, Greece. A convenient sample of 276 physiotherapy students of both sexes participated in this study. Body composition was determined by bioelectrical impedance analysis (TANITA BC 601), calf, midarm and waist circumferences were measured in centimeters with non-elastic tape and HGS via a hand-held grip strength dynamometer (Saehan, Seoul, Korea). Physical activity was assessed with the modified Baecke Questionnaire for Habitual Physical Activity (mBQHPA). The association between variables was calculated using Pearson r-correlation coefficients. Effects of factors associated with HGS were evaluated using regressions analysis. The study protocol was approved by the ethics committee of Technological Education of Western Greece (17-1-2018). All participants provided a written informed consent approved by the ethics committee.

**Results:** 276 participants ( $21.5 \pm 4.11$  y) were included in this study. Out of 276 students, 154 (55.8%) were women, and 122 (44.2%) were men. The mean of HGS was  $37.15 \pm 11.2$  kg. Men had significantly ( $p < 0.001$ ) greater HGS than women ( $30.7 \pm 7.39$  vs.  $45.23 \pm 10.02$ ). Statistically significant strong correlation was detected between HGS and muscle mass ( $r = 0.73$ ;  $p \leq 0.001$ ), gender ( $r = 0.6$ ;  $p \leq 0.001$ ); midarm ( $r = 0.74$ ;  $p \leq 0.001$ ) and calf circumference ( $r = 0.69$ ;  $p \leq 0.001$ ). Results show that fat mass were risk factor associated with HGS using regression analyses in both genders. However physical activity was significant associated factors only for women participants (OR 0.77, CI 0.17-1.38;  $p \leq 0.05$ ).

**Conclusion:** This study identified that HGS is associated with muscle mass in young men and women. These findings suggest that muscle mass may be protective against lower HGS values for both genders. These results may have significant impact in both prevention and treatment techniques for people of different population and age groups. Future studies in different age groups should investigate more factors that could influence the strength of the grip.

P363

# IN VITRO EFFECTS OF THE MYOKINE IRISIN ON HUMAN ADIPOSE TISSUE-DERIVED MESENCHYMAL STEM CELLS DURING PROLIFERATION AND OSTEOGENIC DIFFERENTIATION

C. Romagnoli<sup>1</sup>, G. Palmiini<sup>1</sup>, S. Donati<sup>1</sup>, R. Zonefrati<sup>2</sup>, T. Iantomasi<sup>1</sup>, M. L. Brandi<sup>2</sup>

<sup>1</sup>Dept. of Experimental & Clinical Biomedical Sciences, University of Florence, <sup>2</sup>FIRMO Italian Foundation for the Research on Bone Diseases, Florence, Italy

**Objective:** Irisin is a protein cleaved from fibronectin type III domain containing protein 5 (FNDC5), first reported in 2012 by Bostrom et al. It is a hormone-like molecule secreted from skeletal muscle in response to exercise both in mice and humans and identified as an important effector in the crosstalk between muscle and bone. Although a number of studies reports that irisin increases osteoblast differentiation in vitro and cortical bone mass in vivo, the models used are exclusively from rodent. Due to the lack of reports on human models, the aim of our work was to investigate the in vitro effects of this myokine on the proliferation and the osteogenic differentiation processes in human adipose tissue-derived mesenchymal stem cells.

**Methods:** hADMSCs were obtained by enzymatic digestion and mechanical dispersion, and cultured in growth medium. Cells were exposed to 10 and 100 ng/ml irisin, for the entire experimental period and refreshed every 2 d. The proliferation process was performed in growth medium containing 2.5% FBS by cell counting at 24-48-72 h. Statistical analysis was made by linearity test and parallelism test of the linear regressions of the obtained growth curves. The differentiation process was assayed quantifying the ALP activity and Ca<sup>2+</sup> depositions by fluorometric assays up to 35 d of osteogenic induction. Statistical analysis was performed by ANOVA followed by Bonferroni's test.

**Results:** hADMSCs proliferation analysis has shown that 100 ng/ml irisin significantly increases proliferation process ( $p < 0.01$ ) vs. control, with a decrease of cell doubling time from 88 h to 63 h. Osteodifferentiation with 10 and 100 ng/ml Irisin showed, after 14 d, significant increases in ALP activity vs. control (+26%,  $p < 0.01$ ). Moreover, both tested concentrations of Irisin anticipate the deposition of mineralized matrix, resulting in significant increments in the production Ca<sup>2+</sup> nodules vs control after 35 d (+45%,  $p < 0.01$ ).

**Conclusion:** The work has shown the in vitro effects of irisin on a human model of ADMSCs. Preliminary results have highlighted this myokine as an important effector on cell proliferation and during osteodifferentiation of hADMSCs, supporting the hypothesis that Irisin could represent a new potent anabolic treatment to gain bone mass.

**Acknowledgment:** This work is supported by FIRMO Foundation.

P364

# THE EFFECT OF CHOLECALCIFEROL SUPPLEMENTATION ON ARTERIAL STIFFNESS IN PATIENTS WITH HYPOTHYROIDISM

I. Pankiv<sup>1</sup>

<sup>1</sup>Bukovinian State Medical University, Dept. of Clinical Immunology, Allergology & Endocrinology, Chernivtsi, Ukraine

**Objective:** Recent epidemiological studies revealed a striking inverse relationship between vitamin D levels, insulin resistance (IR), and cardiovascular disease. However, few interventional studies have evaluated the effect of vitamin D supplementation on cardiovascular risk, such as IR and arterial stiffness in hypothyroidism. The aim of the study is to investigate the role of vitamin D supplementation on cardiovascular risk in patients with hypothyroidism, including metabolic parameters, IR, and arterial stiffness.

**Methods:** We enrolled patients with hypothyroidism who were taking levothyroxine medications. We excluded patients who were taking vitamin D or calcium supplements. Participants were randomized into the vitamin D group (cholecalciferol 4000 IU/d, n=40) or the control group (only levothyroxine, n=35). We compared their IR (homeostasis model of assessment [HOMA]-IR) and arterial stiffness (brachial-ankle pulse wave velocity) before and after 26 weeks of intervention.

**Results:** The baseline characteristics of the two groups were similar. A total of 75 participants completed the study protocol. At the end of the study period, the 25-hydroxyvitamin D [25(OH)D] levels were significantly higher in the vitamin D group than in the control group ( $32.3 \pm 7.1$  ng/ml vs.  $17.2 \pm 6.4$  ng/ml,  $p < 0.05$ ). There were significant differences in HOMA-IR and changes in arterial stiffness between the groups.

**Conclusion:** Our data suggest that vitamin D supplementation might be effective in terms of elevating 25(OH)D levels. We identified beneficial effects on cardiovascular risk in hypothyroidism, including IR and arterial stiffness.

P365

**DRONE BROOD HOMOGENATE ABSORBED IN POSTMENOPAUSAL OSTEOPOROSIS TREATMENT**S. J. G. Shcherbakova<sup>1</sup>, P. I. A. Prokofiev<sup>2</sup>, S. V. I. Strukov<sup>3</sup>, E. D. G. Elistratov<sup>4</sup>, M. S. A. Musatova<sup>1</sup>

<sup>1</sup>Dept. of Pediatrics, Penza State University, <sup>2</sup>Institute of Advanced Medical Training, Branch of the Russian Medical Academy of Continuing Professional Education, <sup>3</sup>Institute of Advanced Medical Training, Branch of the Russian Medical Academy of Continuing Professional Education, <sup>4</sup>MC "Healthy Children", Penza, Russia

**Objective:** To study the effect of drone brood homogenate absorbed (HDBA) on postmenopausal osteoporosis (OP).

**Methods:** 79 women with postmenopausal osteoporosis (OP) at the age of 49-77 with androgen deficiency were examined. Diagnostics of OP was conducted by means of clinical, laboratory, biochemical, and X-ray methods. BMD was assessed by X-ray absorption. Hormonal status was checked by enzyme immunoassay. Severity of OP was assessed according to WHO classification. The study included only women with menopause and presence of cavities in trabecular bones. Patients were divided into 2 comparable groups. Group 1: 38 women received a composition containing in 1 tablet: Ca citrate 250 mg, HDBA 50 mg, vitamin D3 150 IU, vitamin B6 0.5 mg as follows: 2 tablets in the morning and 2 tablets at night, 3 months courses, 3 times a year, with a break of 1 month. Group 2: 41 women received a similar composition, but without HDBA. BMD and the size of cavities were assessed before the beginning of treatment and every 3 months during the treatment.

**Results:** Majority of patients demonstrated less complaints. More pronounced clinical effect was noted in group1. 75% of patients demonstrated a reduction of cavities size or closure of cavities. In group 2, cavity closure occurred 4 times rare. In group 1, concentration of total testosterone increased from  $1.1 \pm 0.4$  nmol/l to  $2.3 \pm 0.7$  nmol/l ( $p < 0.05$ ) in comparison with concentration before treatment. DHEA-S exceeded the upper limit of the reference age value. In group 2, there were no significant changes in the androgen level.

**Conclusion:** The combined usage of HDBA, Ca citrate, vitamins D3, B6 influences the OP therapy effectiveness. BMD increases, cavities decrease in size or are being closed, hormonal status is being normalized. The effect is due to unique entomological pro-hormones in HDBA and other substrates promoting synthesis of own hormones in the body.

P366

**APPLICATION OF AGE DEPENDENT INTERVENTION THRESHOLDS TO OPTIMIZE DXA USAGE IN A RESOURCE CONSTRAINED COUNTRY**S. Lekamwasam<sup>1</sup>, T. Abeygunasekara<sup>2</sup>, S. Subasinghe<sup>2</sup>, N. Rathnayake<sup>2</sup>, G. Liyanage<sup>1</sup>

<sup>1</sup>Faculty of Medicine, University of Ruhuna, <sup>2</sup>Faculty of Allied Health Sciences, University of Ruhuna, Galle, Sri Lanka

**Objective:** Age dependent intervention thresholds (ITs) are used for the judicious use of DXA facility in resource poor settings and this study evaluated such application in Sri Lanka.

**Methods:** Age dependent ITs were developed based on Sri Lankan FRAX model adhering to the National Osteoporosis Guideline Group (NOGG) guidelines published in the UK. Low ITs were calculated for a woman of 25 kg/m<sup>2</sup> BMI with no clinical risk factors for age range of 45-80 y (5-y intervals). ITs were calculated in the same manner considering that she had a previous fracture and high ITs were set at 1.2 times higher. These values were applied to a group of postmenopausal women referred to a DXA Unit in a tertiary care center in the southern province of Sri Lanka, for the estimation of BMD and fracture risk. Fracture risks (major osteoporotic fracture: MOF) and hip fracture (HF) of these women were calculated using Sri Lankan FRAX model considering clinical risk factors sans BMD input. Women were categorized to three groups: high risk requiring treatment, low risk not requiring treatment and intermediate risk where estimation of BMD is required for further evaluation.

**Results:** Low ITs of MOF and HF ranged from 0.9-11% and 0.1-4.6%, respectively. High ITs for MOF and HF ranged from 2.5-21.6% and 0.24-8.4%, respectively. Mean (SD) age of the study sample (n=384) was 64.7 (8.5) y and all had been referred to DXA unit for clinical indications. Based on above thresholds, 40% women were at high risk while 6% were at the low risk categories. The proportion of women in the intermediate category who require BMD for further assessment was 54%.

**Conclusion:** Application of age dependent ITs can potentially halve the number of referrals for DXA evaluation and this would help streamlining the DXA facility in the country.



P367

**FRACTURE PREVALENCE IN MEXICAN CHILDREN AND ADOLESCENTS: A 10-YEAR ANALYSIS DATA**P. Clark<sup>1</sup>, D. Montiel-Ojeda<sup>1</sup>, M. A. Guagnelli<sup>1</sup>, A. Rascón<sup>2</sup>, V. H. Borja<sup>3</sup>

<sup>1</sup>Clinical Epidemiology Research Unit, Children's Hospital of Mexico Federico Gomez-UNAM, <sup>2</sup>Coordination of Epidemiology & Informatics, Mexican Social Security Institute, <sup>3</sup>Directorate of Medical Benefits, Mexican Institute of Social Security, Mexico City, Mexico

**Objective:** Due to changes in recent years of lifestyle, and enforcement of laws that protect children within motor vehicles, fracture prevalence could be changing in children and adolescents. However, in Mexico, such variation has not been explored. Hence, we obtained information regarding fractures in children and adolescents from the population affiliated to the Mexican Institute of Social Security (IMSS) to answer this question. This study aimed to describe fracture rates in the children and adolescent population of Mexico in 10 y (2007-2017) and to detect whether the patterns of fractures have changed over time, between sexes, and among different anatomical sites.

**Methods:** The information on fractures from children and adolescents 0-19 years old was gathered from the Emergency Departments or hospital wards at IMSS. The ICD-10 codes harvested were: S02, S12, S22, S32, S42, S52, S62, S72, S82, S92, T02, T10, and T12. We harvest additional information regarding sex and age. Rates of fractures stratified by sex per 10,000 were presented. Finally, we compared our results with a standard population by direct method rate adjustment (1).

**Results:** In 10 y, 1,202,035 fractures were reported, 51.5% of fractures were notified in adolescents between 10-19 years old. The most common fracture site was the forearm (37%), followed by the shoulder (18%). Boys had the highest frequency of fractures in both age groups (68.4%). We observed a decrease in the prevalence rates of fractures in boys and girls aged 0-9 y of: -1.9% (AAPC -1.9, 95%CI -2.6 to -1.2) and -1.4% (AAPC -1.4, 95%CI -2.2 to -0.6), respectively. This same trend was observed in the group of boys aged 10-19 y (AAPC -1.6, 95%CI -3 to -0.2). In girls aged 10-19 y, no significant changes were observed in fracture trends. When our rates were compared with the ones reported in the population of Australian children, all groups of Australians, boys, and girls, reported higher rates of fractures than the Mexicans of the same age.

**Conclusion:** Rates of fractures in Mexican children/adolescents have not shown considerable variations over the years. However, we notice in all cases, except in the group of girls aged 10-19, a slight diminution of fracture rates. One hypothesis to explain this difference could be associated with lifestyle changes.

**Reference:** 1. Pasco JA, et al. *Calcif Tissue Int* 2015;97:568.

P368

**ASSOCIATION BETWEEN KNEE MRI MARKERS AND KNEE SYMPTOMS OVER 7 YEARS IN YOUNG ADULTS**A. Singh<sup>1</sup>, A. Venn<sup>1</sup>, L. Blizzard<sup>1</sup>, F. Cicuttini<sup>2</sup>, G. Jones<sup>1</sup>, C. Ding<sup>1</sup>, B. Antony<sup>1</sup>

<sup>1</sup>Menzies Institute for Medical Research, University of Tasmania, Hobart, <sup>2</sup>Dept. of Epidemiology & Preventive Medicine, Monash University, Melbourne, Australia

**Objective:** Knee MRI-based morphological markers (quantitative biomarkers) and structural abnormalities (semiquantitative biomarkers) are known to be associated with the progression of knee osteoarthritis (OA). However, there is conflicting evidence on the association between knee MRI-based morphological markers and knee symptoms (pain, stiffness, and dysfunction). Besides, there is a lack of evidence on the clinical significance of MRI markers in general population-based young adults. Hence, our aim was to investigate the associations between MRI biomarkers and knee symptoms in middle-aged adults followed over 7 y. We aim to describe the associations of cartilage volume, cartilage thickness, subchondral bone area, cartilage defects, and bone marrow lesions (BML) with knee symptoms in young adults followed up over 6-9 y.

**Methods:** Knee symptoms were assessed using the WOMAC scale during the Childhood Determinants of Adult Health (CDAH)-knee study at baseline (year: 2008-10, age: 30-40 y) and 6-9 y follow-up (CDAH-3; year: 2014-2019, age: 36-49 y). Knee MRI scans were obtained at baseline and were assessed quantitatively for morphological markers such as cartilage volume, cartilage thickness, subchondral bone area using semi-automated segmentation (Chondrometrics, Germany). Cartilage defects and BMLs were assessed using semi-quantitative scoring systems. Univariable and multivariable (adjusted for age, sex, BMI) zero-inflated Poisson (ZIP) regression models with random effects were used to describe the cross-sectional and longitudinal associations.

**Results:** The prevalence of knee pain at baseline (mean age (SD): 34 (2.7); female 49%) was 34%, and the prevalence increased to 50% over 6-9 years' follow-up (mean age (SD): 43 (3.2)). There were significant negative associations between medial femorotibial compartment (MFTC) and patellar cartilage volume with WOMAC symptoms at baseline and after seven years, and lateral femorotibial compartment (LFTC) and WOMAC symptoms at baseline in the multivariable model. Similarly, there was a significant negative association between MFTC cartilage thickness and WOMAC symptoms assessed after seven years. The bone area at patella was consistently negatively associated with WOMAC symptoms at baseline and over seven years; no association was observed for femorotibial bone area and WOMAC symptoms. Presence of any cartilage defect or BML was associated with higher WOMAC symptoms at baseline and after seven years.

**Conclusion:** In this middle-aged adult population, BML and cartilage defects were positively associated with knee symptoms, whereas cartilage volume and thickness at MFTC were negatively associated with knee symptoms. These results suggest that the quantitative and semiquantitative MR imaging biomarkers can be used as a marker of the clinical progression of OA in a young adult population.

### P369

#### VERTEBRAL FRACTURE ASSESSMENT USING DXA EQUIPMENT HAS MODERATE INTEROBSERVER AGREEMENT AND AFFECTS READER FATIGUE

J. M. Mostert<sup>1</sup>, P. Dibbets-Schneider<sup>1</sup>, S. R. Romeijn<sup>1</sup>, C. Götz<sup>2</sup>, M. Diffranco<sup>2</sup>, H. P. Dimai<sup>3</sup>, W. Grootjans<sup>1</sup>

<sup>1</sup>Leiden University Medical Center, Dept. of Radiology, Leiden, The Netherlands, <sup>2</sup>Imagebiopsy Lab, Vienna, Austria, <sup>3</sup>Medical University of Graz, Division of Endocrinology & Diabetology, Graz, Austria

**Objective:** To investigate the time and effort needed to perform vertebral morphometry, as well as interobserver agreement for identification of vertebral fractures on vertebral fracture assessment (VFA) images, and to evaluate the potential benefit for automated VFA.

**Methods:** 96 images were retrospectively selected and three radiographers independently performed semi-automatic 6-point morphometry in reading sessions of 6 images. Fractures were identified and graded using the Genant classification. Time needed to annotate each image was recorded and reader fatigue was assessed using a modified Simulator Sickness Questionnaire (SSQ). Interobserver agreement was assessed per-patient and per-vertebra for detecting fractures of all grades (grade 1-3) and for grade 2 and 3 fractures using the kappa statistic. Variability in measured vertebral height was evaluated using the intraclass correlation coefficient (ICC).

**Results:** Per-patient agreement was 0.59 for grade 1-3 fracture detection, and 0.65 for grade 2-3 only. Agreement for per-vertebra fracture classification was 0.92. Vertebral height measurements showed a mean absolute difference from the average across radiographers of 1.38 mm (95%CI: 1.36-1.41), with an ICC of 0.96. Time needed to annotate VFA images ranged between 91-540 s, with a mean annotation time of 259 s. Mean SSQ scores were significantly lower at the start of a reading session (1.29; 95%CI: 0.81-1.77) compared to the end of a session (3.25; 95%CI: 2.60-3.90;  $p < 0.001$ ).

**Conclusion:** Although excellent ICC for vertebral height measurement was achieved, agreement for detection of patients with vertebral fractures was only moderate. In addition, vertebral morphometry requires substantial time investment and significantly affects reader fatigue. There is a potential benefit for automation

tools for detection of vertebral fractures on VFA, both in improving interobserver agreement and in decreasing reading time and burden on readers.

### P370

#### THE LEVEL OF 25-HYDROXYVITAMIN D FOR OPTIMUM PTH SUPPRESSION

O. Alsaed<sup>1</sup>, N. Abdulla<sup>1</sup>, A. Lutfi<sup>1</sup>, F. Alam<sup>1</sup>, I. Abdelmomen<sup>1</sup>, S. Alemadi<sup>1</sup>

<sup>1</sup>Hamad Medical Corporation, Doha, Qatar

**Objective:** To determine 25-hydroxyvitamin D (Vit D) level at which optimum PTH suppression can be achieved.

**Methods:** Serum levels of Vit D, corrected calcium (C.Ca), creatinine, alkaline phosphatase (Alk-P), and PTH were extracted from Hamad Medical Corporation laboratory database from June 2017 to June 2020 and analyzed retrospectively. Only simultaneously processed tests from the same blood extraction were included. We excluded patients with chronic kidney disease, primary parathyroid diseases, metastatic bone malignancies, Vit D toxicity and pregnancy by identifying patients with creatinine  $>100$   $\mu\text{mol/L}$ , C.Ca  $>2.5$  and  $<2.15$   $\text{mmol/L}$ , Vit D  $>80$   $\text{ng/ml}$ , and Alk-P  $>105$   $\text{U/L}$ . Mean difference of PTH level at Vit D  $\geq 50$   $\text{ng/ml}$  and at different Vit D level intervals (showed in Table) will be calculated with corresponding p value and 95%CI.

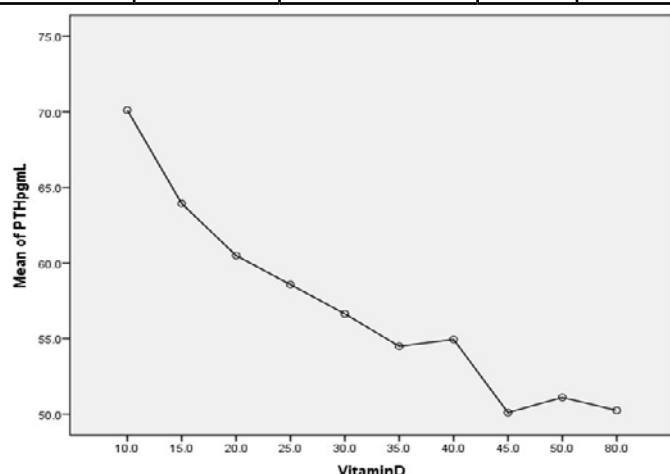
**Results:** A total of 54,828 sets of tests were extracted from laboratory data base. (29,428 sets) with serum creatinine  $>100$ , (52 sets) with Vit D  $>80$ , (3665 sets) with Alk-P  $>105$ , (2125 sets) with C.Ca  $>2.5$  and (421 sets) with C.Ca  $<2.15$  were subsequently excluded. The remaining 19,137 sets of tests were included in the analysis. Mean age was 45.0 y (Std 14.0), 56.1% were females. 80%, 17.9% and 2.9% were Arab, Asian, and other ethnicities, respectively. There was no significant difference in PTH suppression at Vit D intervals starting from (30-34.9), (35-39.9), (40-44.9) and (45-49.9).

**Conclusion:** The optimum PTH suppression is observed at Vit D of 30  $\text{ng/ml}$  and above. PTH level will not be suppressed significantly more beyond Vit D level of 30  $\text{ng/ml}$ .

Table. Mean difference of PTH level at Vit D  $\geq 50$   $\text{ng/ml}$  and at different Vit D level intervals (ANOVA analysis) with corresponding p value and 95%CI.

Vit D level intervals	Mean difference	P Value (Ref. Vit D $\geq 50$ )	95%CI	
$<10$	19.86	0.000	14.566	25.166
10 – 14.9	13.68	0.000	8.577	18.797
15 – 19.9	10.24	0.000	5.181	15.317

20 – 24.9	8.32	0.000	3.177	13.468
25 – 29.9	6.39	0.005	1.109	11.674
30 – 34.9	4.24	0.322	-1.335	9.817
35 – 39.9	4.69	0.263	-1.226	10.612
40 – 44.9	0.15	1.000	-6.732	6.429
45 – 49.9	0.85	1.000	-6.662	8.381



(shown here) per SD decrease in LS BMD or TBS as calculated for L1, L2, L3, L4, L1L2, L2L3, L1-L3, L2-L4, L3L4 and L1-L4. The area under the receiver-operating-characteristic curve (AUC) for each model.

**Results:** As shown in the Table, we see a tendency of the L4 TBS and BMD to be more poorly associated with the risk of fragility fracture than the other upper vertebrae. Further, one SD decrease in LS TBS and BMD calculated from the combinations of upper lumbar vertebrae (L1, L2) was more highly associated with the odds ratio for having a fracture than of lower vertebrae (L3, L4). In the models of the LS TBS calculated based on three or four vertebrae, the weakest association with fracture risk was found with TBS L2-L4 and the strongest with TBS L1-L3, moderate with TBS L1-L4.

**Conclusion:** The exclusion of L4 from LS TBS and BMD calculations would improve their performance in fracture risk prediction; the inclusion of L1 is strongly suggested. The latter applies particularly for the countries using L2-L4 for LS BMD or TBS calculation as a standard in clinical practice. L1-L3 is indicated as an optimal combination for the TBS or LS BMD calculation. However, relying on less than four vertebrae for the TBS and BMD calculations is uncertain given the vertebrae exclusion rules. These findings need to be replicated in larger studies to give assertive clinical recommendations.

Table.

	SD decrease in TBS		SD decrease in BMD	
	MOF		MOF	
	OR (95%CI)	AUC (95%CI)	OR (95%CI)	AUC (95%CI)
L1	1.46 (1.15-1.87)	0.76 (0.72-0.81)	1.30 (1.11-1.52)	0.75 (0.71-0.80)
L2	1.37 (1.07-1.75)	0.76 (0.71-0.80)	1.20 (1.05-1.37)	0.75 (0.70-0.80)
L3	1.17 (0.92-1.49)	0.75 (0.70-0.80)	1.18 (1.05-1.33)	0.75 (0.70-0.79)
L4	1.12 (0.88-1.41)	0.74 (0.69-0.79)	1.15 (1.03-1.28)	0.75 (0.70-0.79)
L1L2	1.61 (1.18-2.18)	0.78 (0.73-0.83)	1.33 (1.10-1.60)	0.76 (0.70-0.81)
L2L3	1.34 (0.98-1.82)	0.77 (0.71-0.82)	1.31 (1.09-1.57)	0.75 (0.69-0.81)
L1-L3	1.46 (1.11-1.93)	0.76 (0.71-0.81)	1.24 (1.07-1.44)	0.75 (0.70-0.80)
L2-L4	1.27 (0.97-1.67)	0.75 (0.70-0.80)	1.17 (1.02-1.34)	0.75 (0.70-0.80)
L3L4	1.17 (0.87-1.57)	0.740 (0.684-0.797)	1.17 (1.00-1.37)	0.74 (0.69-0.80)
L1-L4	1.38 (1.05-1.82)	0.75 (0.71-0.80)	1.23 (1.07-1.41)	0.75 (0.70-0.80)

## P371

### WHICH BEST COMBINATION OF THE LUMBAR SPINE VERTEBRAE FOR THE FRACTURE PREDICTIVE ABILITY OF LUMBAR SPINE BMD AND TBS: THE OSTEOLAUS STUDY

E. Shevroja<sup>1</sup>, F. Mo Costabella<sup>1</sup>, E. Gonzalez Rodriguez<sup>1</sup>, O. Lamy<sup>1</sup>, D. Hans<sup>1</sup>

<sup>1</sup>Lausanne University Hospital, Bone & Joint Dept., Center of Bone diseases, Lausanne, Switzerland

**Objective:** BMD and TBS are two bone parameters assessed in the same region (L1-L4) of lumbar spine DXA scans, which predict fracture risk independently. In this study, we compare the fracture predictive ability of BMD and TBS as calculated based on different adjacent vertebrae combinations within L1-L4. We hypothesized that the L4 vertebra would be more affected by the erroneous positioning (e.g., lordosis) and their exclusion from the TBS and BMD calculations would present a more optimal estimation of TBS and BMD. Further, we aimed to see if some combinations perform better at osteoporotic fractures prediction than the traditional L1-L4 combination.

**Methods:** 1362 postmenopausal women (64.4±7.5 y old) from the OsteoLaus cohort in Lausanne, Switzerland were included in this study. LS DXA scans were performed using Discovery A System (Hologic). Major osteoporotic fractures (MOF) occurring during the 5-y follow-up, were assessed using Genant's method (vertebral, VF) and questionnaires (nonvertebral). Binary logistic regressions were used to obtain the risk estimates for VFs or MOFs

SD standard deviation, MOF major osteoporotic fracture, VF vertebral fracture, OR odds ratio, AUC area under the curve, TBS models adjusted for age, LS BMD and VF level, BMD models adjusted for age and VF level. Results were similar for VF and non-VF MOF.

P372

### INCIDENCE RATE OF OSTEOPOROTIC HIP FRACTURE IN QATAR

O. Alsaed<sup>1</sup>, N. Abdulla<sup>1</sup>, A. Lutf<sup>1</sup>, F. Alam<sup>1</sup>, I. Abdelmomen<sup>1</sup>, S. Alemadi<sup>1</sup>

<sup>1</sup>Hamad Medical Corp., Doha, Qatar

**Objective:** To estimate the annual incidence rate of osteoporotic hip fracture in Qatar from January 2017 to December 2019.

**Methods:** Hamad Medical Corp. (HMC) is a governmental based tertiary medical institute that provides medical care for the whole Qatar population. International Classification of Diseases (ICD-10) is used in HMC for disease coding. Hip fractures were captured by identifying ICD-10 hip fracture codes (S72.0, S72.1 and S72.2) from first of January 2017 till end of December 2019. Records of these patients were reviewed retrospectively to identify patient demographic data, mechanism of fracture and pathological fractures. Patients who were nonresident in Qatar were excluded. The observed census of Qatar population in 2017 and the estimated census of 2018 and 2019 were obtained from the book (Qatar Population and Employment Projections 2017-2024 - a framework for national planning). These censuses were used to calculate the age-gender specific annual incidence rate of osteoporotic hip fracture for population aged  $\geq 40$  y. World population 2010 was used to calculate the age standardized incidence rate per 100,000 for population aged  $\geq 50$  to enable comparison with other country figure rates.

**Results:** During the study period, 458 hip fractures were identified. 75 (16.4%) hip fracture events were due to high energy trauma and 9 (2%) were pathological hip fractures. The total number of osteoporotic hip fractures was 374 (81.7%). Fractures were slightly more in males; 215 (57.5%). Mean age was 70.2 y ( $\text{std} \pm 12.6$ ). 141 (37.7%) osteoporotic hip fractures were in Qatari citizens. In 2017, 2018 and 2019, the annual standardized incidence rate of osteoporotic hip fracture for whole Qatar population was 141.7, 140.8 and 162.7, for Qataris 154.2, 105.2 and 176.6, for non-Qataris 134.8, 183.9 and 160.4, respectively.

**Conclusion:** The standardized incidence rate of osteoporotic hip fracture was quite close to the regional countries and lower than European and north America countries.

Table. The annual standardized incidence rate of osteoporotic hip fracture per 100,000 for population aged  $\geq 50$  y.

Year	2017			2018			2019		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
Qataris	143.7	157.0	154.2	67.0	139.5	105.2	145.6	220.0	176.6
Non-Qataris	87.2	213.8	134.8	169.8	191.0	183.9	256.8	195.4	160.4
Qatar population	112.7	183.0	141.7	126.3	155.1	140.8	129.3	207.9	162.7

P373

### VITAMIN D DEFICIENCY DURING PREGNANCY IS AN ADDITIONAL FACTOR IN THE DEVELOPMENT OF DIABETES

A. M. Borissova<sup>1</sup>, B. Trifonova<sup>1</sup>, L. Dakovaska<sup>1</sup>, E. Michaylova<sup>1</sup>, M. Vukov<sup>1</sup>

<sup>1</sup>Bulgarian League for the Prevention of Osteoporosis, Sofia, Bulgaria

**Objective:** During pregnancy, physiologically develops progressively increasing during this period of a woman's life insulin resistance and as a result hyperinsulinemia. In diabetics, a beneficial effect of vitamin D on glucose tolerance has been found. The aim of the present study was to examine pregnant women with different levels of vitamin D and to evaluate its effect on the characteristics of their  $\beta$ -cell function.

**Methods:** We investigated 547 pregnant Bulgarian women, mean age  $30 \pm 5$  y; with 79 hyperglycemia and 468 normoglycemia women. Two categories of vitamin D levels were adopted:  $<30$  ng/ml (deficiency), n-401 and  $>30$  ng/ml (sufficiency), n-146. The peripheral levels of 25(OH)D were investigated using a standard electrochemiluminescence immunoassay in a central laboratory on the day of sampling.

**Results:** The whole group of pregnant women studied (n-547) had a mean value of 25(OH)D  $25.86 \pm 9.46$  ng/ml, without significant difference between groups with hyperglycemia and normoglycemia ( $25.69 \pm 8.67$  vs.  $25.89 \pm 5.7$  ng/ml, NS). When comparing the two groups with 25(OH)D  $>30$  ng/ml (n-146) vs. 25(OH)D  $<30$  ng/ml (n-401) with respect to plasma glycemia during oGTT, a significant difference was found for 120 min -  $5.58 \pm 1.45$  vs.  $6.04 \pm 1.59$  mmol/l,  $P < 0.001$ , but insignificant for 0 min -  $4.72 \pm 0.45$  vs.  $4.85 \pm 0.50$  mmol/l, NS. These facts unequivocally emphasize the direct link between sufficient levels of vitamin D and the secretory capacity of  $\beta$ -cells. Correlation analysis showed a negative significant correlation between 25(OH)D with the level of fasting plasma glycemia -  $P < 0.004$  and on 120 min at oGTT -  $P < 0.003$ .

**Conclusion:** We believe that vitamin D normalizes beta-cell function by counteracting peripheral insulin resistance, thus overcoming basal hyperinsulinemia. It further improves the functional capacity of  $\beta$ -cells, judging by its effect on plasma glycemia at the 120<sup>th</sup> minute of the oGTT performed in pregnant women.



P374

### DETERMINANTS OF MUSCLE DENSITY IN LATE ADULTHOOD: FINDINGS FROM THE HERTFORDSHIRE COHORT STUDY

F. Laskou<sup>1</sup>, L. D. Westbury<sup>1</sup>, N. Nicholas<sup>1</sup>, N. C. Harvey<sup>1</sup>, H. P. Patel<sup>1</sup>, C. Cooper<sup>1</sup>, K. Ward<sup>1</sup>, E. M. Dennison<sup>1</sup>

<sup>1</sup>MRC Lifecourse Epidemiology unit Southampton, Southampton, UK

**Objective:** In a recent meta-analysis, lower calf muscle density (indicating greater muscle adiposity and lower muscle quality) as assessed by pQCT was associated with greater hip fracture risk, independent of FRAX, falls and bone mineral density. To date, muscle density has been little studied, and its determinants are unknown. In this study, we used a well characterised cohort of older adults (Hertfordshire Cohort Study) to identify lifestyle and anthropometric determinants of muscle density some 11 y later.

**Methods:** At baseline, 197 men and 178 women, aged 59-70 y, were recruited to a longitudinal study of musculoskeletal health. A lifestyle questionnaire was administered to collect information on physical activity, smoking, alcohol consumption and dietary patterns; height and weight were measured. pQCT of the radius and tibia was performed a median of 11.5 (IQR 10.9, 12.3) y later, and muscle density was measured at the 66% site using standard methodology. Baseline characteristics in relation to muscle density at follow-up were examined separately using linear regression with sex, baseline age and follow-up time included as covariates in all models.

**Results:** Mean (SD) age at baseline was 64.7 (2.7) y; mean (SD) muscle density values (mg/cm<sup>3</sup>) were as follows: forearm [men 79.9 (3.1), women 77.2 (3.2)], calf [men 80.7 (2.6), women 78.5 (2.6)]. Baseline correlates ( $p < 0.05$ ) of both lower forearm and calf muscle density included female sex, lower weight, and lower BMI; SD difference in calf muscle density for women compared to men, and per SD lower weight and BMI were -0.84 [95%CI: -1.13, -0.54], -0.37 [-0.46, -0.27] and -0.31 [-0.40, -0.23] respectively. Additional correlates of lower calf muscle density included older age and shorter stature. Relationships between muscle density and age were stronger at the calf ( $p < 0.001$ ) than the forearm ( $p = 0.08$ ). Lifestyle measures were not associated with muscle density.

**Conclusion:** Female sex, older age, and lower adiposity, rather than lifestyle, were associated with lower muscle density in older community-dwelling adults. Age was more strongly associated with calf than forearm muscle density. Further studies in larger cohorts are required.

P375

### A STUDY OF ANTI-MULLERIAN HORMONE AND 25-HYDROXYVITAMIN D LEVELS IN POSTMENOPAUSAL WOMEN WITH LOW BONE MINERAL DENSITY

S. Das<sup>1</sup>, S. Verma<sup>2</sup>

<sup>1</sup>Ram Manohar Lohia Hospital, Delhi, <sup>2</sup>SMSR, Noida, India

**Objective:** Osteoporosis is a bone disorder that increases a person's risk of fracture due to low BMD. Anti-Müllerian hormone (AMH) is an ovarian biomarker that plays an important role in folliculogenesis. AMH is widely used clinically in reproductive medicine and is known to decrease with age. Vitamin D is a steroid hormone that is mainly synthesized in the skin after exposure to ultraviolet sunlight. It is debated whether vitamin D has the capacity to influence the AMH level. This study evaluates the role of decreased AMH and vitamin D linked to increased risks of osteoporosis in postmenopausal women. This study aimed to evaluate the association of AMH and 25-hydroxyvitamin D serum levels with BMD test results in postmenopausal women.

**Method:** This study was conducted in a tertiary care hospital and included 100 postmenopausal females, with ages ranging from 45-75 y. These patients attended the Bone Clinic and were classified in the osteoporosis group and control group on the basis of BMD study. AMH and vitamin D were measured by chemiluminescence assay (CLIA), and BMD was measured by DXA for all the participants.

**Results:** Among the study participants, 56 % reported normal results of BMD measurement (control group), and the incidence of osteoporosis was 43% (osteoporosis group). AMH levels in the osteoporosis group were  $0.19 \pm 0.06$  ng/mL and the control group was  $0.44 \pm 0.05$  ng/mL. Vitamin D levels in the osteoporosis group was  $37.65 \pm 3.26$  ng/mL and the control group was  $9.84 \pm 2.48$  ng/mL. A significant positive correlation ( $r = 0.86$ ,  $p < 0.05$ ) was observed between lower serum levels of AMH and lower levels of vitamin D in the participants with decreased BMD results (osteoporosis patients).

**Conclusion:** Lower vitamin D and AMH levels correlate significantly with decreased BMD in postmenopausal females. These results suggest that AMH is a potential biomarker of osteoporosis in postmenopausal women.

P376

### THE VALUES OF BONE RESORPTION MARKER $\beta$ -CTX FOR EARLY DETECTION OF POSTMENOPAUSAL OSTEOPOROSIS

A. Kocevsk<sup>1</sup>, B. Kocevsk<sup>2</sup>, S. Shubeska Stratrova<sup>2</sup><sup>1</sup>Special Hospital for Gynecology & Obstetrics Mother Theresa,<sup>2</sup>University Clinic of Endocrinology, Diabetes & Metabolic Disorders, Medical Faculty, Ss. Cyril and Methodius University, Skopje, Macedonia

**Objective:** 30-40% of healthy women develop postmenopausal osteoporosis after the last menstruation due to a loss of estrogenic hormones. Until recently, the measure of bone density was the most commonly used method for osteoporosis detection. The disease was diagnosed very late, often after voluminous osteoresorption. For timely intervention it is necessary to detect the extent of the bone resorption what has been enabled by usage of biochemical markers for assessment of osteoresorption and osteoformation. This study aimed to determine the values of serum  $\beta$ -CTX in perimenopausal and postmenopausal women.

**Methods:** A total of 350 women were included in this study. 45 of them were in the control group of healthy women with regular menstrual cycles.

The other 305 women were divided in 6 subgroups:

PeriM: 51 women in perimenopausal period

M1: 52 women with duration of postmenopause <2 y

M2: 52 women with duration of postmenopause 2-6 y

M3: 50 women with duration of postmenopause 6-10 y

M4: 52 women with duration of postmenopause > 10 y

Mt: 48 women with postmenopausal osteoporosis, treated with antiresorptive therapy

$\beta$ -CTX was determined in serum, with ECLIA method and measured in ng/ml.

**Results:** In the control group all of the respondents had normal values of beta CTx. In perimenopausal group (PeriM), the values of  $\beta$ -CTX were above the upper limit (0.299 ng/ml) in 39.22% of women. In postmenopausal groups, the values of  $\beta$ -CTX were above the upper limit for postmenopausal women (0.556 ng/ml) in 39.22% of women in PeriM group; in 38.46% of women in M1 group; in 51.92% of women in M2 group, in 61.54% of women in M3 group and in 59.62% of women in M4 group. Patients treated with antiresorption therapy had normal values of serum  $\beta$ -CTX.

**Conclusion:**  $\beta$ -CtX derived from collagen type 1 is an important biochemical marker that reflects the intensity of bone resorption, determines the individual risk of bone loss and fractures, especially in postmenopausal women. The percentage of women with increased markers for bone resorption, and thus an increased risk of postmenopausal osteoporosis, increases with age and duration of postmenopause.

P377

### MOTOR CONTROL AND ERGONOMIC INTERVENTION HOME BASED PROGRAMME DURING COVID-19 PANDEMIC: PRELIMINARY RESULTS OF THE MCHEELP STUDY

M. Tsekoura<sup>1</sup>, S. Stasi<sup>2</sup>, J. Gliatis<sup>3</sup>, V. Sakellari<sup>4</sup>

<sup>1</sup>Dept. of Physiotherapy, School of Health Rehabilitation Sciences, University of Patras, Aigio, <sup>2</sup>Dept. of Physiotherapy, Faculty of Health and Care Sciences, University of West Attica, Athens, <sup>3</sup>Dept. of Medicine, School of Health Sciences, University of Patras, Patras, <sup>4</sup>Dept. of Physiotherapy, Faculty of Health and Care Sciences, University of West Attica, Athens, Greece

**Objective:** To investigate the effects of a 12 week "Motor Control Home Ergonomics Elderlies' Prevention of Falls" (McHeELP) on functionality and fear of falling among Greek older adults.

**Methods:** 52 older adults (aged  $\geq 65$  y) who had experienced at least one fall incident in the past 12 months were randomly assigned into two groups. The first group (n=26) received motor control exercises combined with ergonomic arrangements of the home environment and the second group served as control (n=26). The McHeELP programme includes motor control exercises, divided into six domains: "Warm up," "Serial skills," "Cognitive skills," "Balance," "Sensory strategy," and "Dynamic control." Regarding home modification, a booklet that contained basic advice and tips on the modification for their home environment was provided to all participants. Functional assessments included 4-m, timed-up and go (TUG) and chair stand (CS) tests. Fear of falling was assessed via the Falls Efficacy Scale (FES-I) questionnaire. All participants were assessed at baseline and immediately post intervention (week 12). The Ethics Committee of the University of Patras, Greece, approved the study protocol.

**Results:** A total of 52 participants (20 men; 32 women) with a mean age of  $76.26 \pm 6.33$  y participated in this study. Comparison between pre- and post-intervention changes in functional measures and fear of falling showed significant interaction between "intervention" and "time" in 4-m test ( $p=0.014$ ), TUG ( $p<0.005$ ), CS test ( $p=0.011$ ) and fear of falling ( $p=0.041$ ). Pairwise comparisons presented statistically significant difference between baseline and 3 months for all variables. No statistically significant differences between time measurements were found for the control group.

**Conclusion:** Results suggest that the McHeELP programme is feasible and beneficial for older adults. This novel home-based exercise programme is low cost and may help to increase functionality and decrease falls in older adults. Further research is needed to understand the effects of this targeted exercise program on older adults' motor control.

P378

### SUSTAINING SHORT TERM OUTCOMES OF HIP FRACTURE PATIENTS DURING THE COVID-19 GLOBAL PANDEMIC UNDER A BUNDLED CARE PROTOCOL

G. Cheok<sup>1</sup>, K. C. Wong<sup>1</sup>, K. Tay<sup>1</sup>, M. A. Png<sup>2</sup>, D. Chua<sup>3</sup>, J. Koh<sup>1</sup>, T. S. Howe<sup>1</sup>

<sup>1</sup>Singapore General Hospital, Dept. of Orthopaedic Surgery,

<sup>2</sup>Singapore General Hospital, Dept. of Diagnostic Radiology,

<sup>3</sup>Changi General Hospital, Dept. of Orthopaedic Surgery, Singapore, Singapore

**Objective:** To investigate how the COVID-19 pandemic affects early outcomes of an established hip fracture bundled care protocol within a tertiary institute operating within its capacity.

**Methods:** We reviewed patients admitted for fragility hip fractures that were surgically managed under a bundled care protocol between October 2019 to May 2020. "Pre-COVID" and "COVID" groups included patients admitted in a 4-month period before and after the nationwide lockdown measures were implemented on 7 February 2021 respectively. Demographic data, key performance indicators and outcome measures were collected. Statistical analysis was performed and significance was defined as  $p < 0.05$ .

**Results:** Of the 245 patients studied, none of whom were COVID-19 positive, 143 were included in Pre-COVID arm and 101 patients in the COVID arm. There was no significant difference in demographic data, fracture pattern, type of surgery, time to admission and operation, discharge disposition and mean postoperative length of stay. More patients were discharged within 9 d postoperatively in the COVID group, and fewer patients in the COVID group were reviewed by a physiotherapist on postoperation day one. There was no significant difference in inpatient mortality, 30-d readmission and revision surgery rates (Table 1).

**Conclusion:** No significant differences in key performance indicators despite the various disruptions to hospital workflow during the COVID-19 pandemic demonstrates that despite the effects of a pandemic on public healthcare system, a robust bundled care protocol allows the continuity of essential services whilst maintaining standards of care, sustaining short term postoperative outcomes for hip fracture patients.

Table 1. Key Performance Indicators & Short-Term Outcomes

	PRE-COVID (n=143)	COVID (n=101)	p-value
Mean Time to Admission (hours)	1.86 ± 1.09	1.95 ± 1.17	0.566
Admitted within 4 Hours (%)	94.4	89.1	0.282
Mean Time to Operation (hours)	63.9 ± 62.9	62.6 ± 50.3	0.867
Operation performed within 48 Hours (%)	51.7	48.5	0.833
Physiotherapy on POD1 (%)	95.1	85.1	0.007
Inpatient Mortality (%)	1.4	1.0	0.231
Mean Post-op LOS (Days)	11.4 ± 9.2	9.8 ± 13.0	0.289
Discharge within 9 days post-operatively (%)	53.8	71.3	0.008
30 Day Readmission (%)	10.5	6.9	0.339
Revision surgery (%)	0	3.0	0.059
Discharge Disposition (%)			0.087
Step down care facility	72.7	62.4	
Home	27.3	37.6	

P379

### ASSOCIATION BETWEEN TRYPTOPHAN METABOLITES AND PHYSICAL PERFORMANCE AND FRAILTY IN OLDER PERSONS

A. A. Al Saedi<sup>1</sup>, S. V. Vogrin<sup>2</sup>, G. G. Guillemin<sup>3</sup>, G. D. Duque<sup>1</sup>

<sup>1</sup>Australian Institute for Musculoskeletal Science, Geroscience & Osteosarcopenia Research Program, University of Melbourne and Western Health, St. Albans, Melbourne <sup>2</sup>Dept. of Medicine-Western Health, Melbourne Medical School, University of Melbourne, St. Albans, Melbourne, <sup>3</sup>Neuroinflammation Group, Faculty of Medicine and Health Sciences, Macquarie University, Sydney, Australia

Frailty is defined as a syndrome of physiological decline in late life, characterized by marked vulnerability to adverse health outcomes. A robust biomarker for frailty is still lacking. Tryptophan (TRP) metabolism through the kynurenine pathway (KP) plays essential roles in aging, the musculoskeletal system and physical performance. In this study, we quantified eight KP metabolites, including kynurenine (KYN), kynurenine acid (KYNA), quinolinic acid (QUIN), picolinic acid (PIC), 3-hydroxykynurenine (3-HK), 3-hydroxyanthranilic acid (3-HAA) and anthranilic acid (AA) using ultra-high-performance liquid chromatography and gas chromatography-mass spectrometry in the serum of 85 participants (median age 75; 65% female; 28 non-frail, 29 pre-frail, and 28 frail) at the Nepean Osteoporosis and Frailty (NOF) Study. We looked at the association between TRP metabolites and physical performance, disability, frailty and percentage of circulating osteogenic precursor (COP) cells, another potential biomarker of frailty. After adjusting for age and sex, we found that frailty was associated with lower KYNA (OR 0.93 (0.88, 0.98),  $p=0.009$ ) and higher QUIN (OR 1.11 (1.01, 1.21) for 500 nM increase in QUIN,  $p=0.029$ ). Similarly, when using the Rockwood index, there was a weak association with KYNA ( $r=-0.241$ ,  $p=0.028$ ) and TRP ( $r=-0.220$ ,  $p=0.045$ ). Lower KYNA was also associated with sarcopenia (OR 0.88 (0.78,

1.00),  $p=0.049$ ). In addition, serum IL-6 was positively associated with KYN ( $r=0.324$ ,  $p=0.003$ ), 3-HK ( $r=0.293$ ,  $p=0.008$ ) and QUIN ( $r=-0.293$ ,  $p=0.008$ ). Furthermore, COP cells were associated with higher levels of serum TRP ( $r=0.296$ ,  $p=0.008$ ). No association was found between TRP metabolites and grip strength or gait speed. In conclusion, different TRP metabolites have various associations with physical performance and frailty. Defining the underlying mechanisms may permit the development and validation of new biomarkers and therapeutics for frailty and musculoskeletal conditions targeting specific metabolites of the TRP catabolic pathway. As seen in this study, lower KYNA is associated with Fried, Rockwood and sarcopenia.

### P380

#### RURAL-URBAN DIFFERENCES IN FRACTURE LIAISON SERVICES

C.-B. Chang<sup>1</sup>, R.-S. Yang<sup>2</sup>, W.-J. Huang<sup>3</sup>, D.-C. Chan<sup>4</sup>

<sup>1</sup>Dept. of Internal Medicine, National Taiwan University Hospital Hsin-Chu Branch, Hsinchu City, <sup>2</sup>Dept. of Orthopaedics, National Taiwan University Hospital, Taipei, <sup>3</sup>Dept. of Geriatrics & Gerontology, National Taiwan University Hospital, Taipei, <sup>4</sup>Superintendent Office, National Taiwan University Hospital Hsin-Chu Branch, Hsinchu City, Taiwan

**Objective:** Geographic variations may exist for fracture liaison service (FLS) and medication management service (MMS) programs because of different health resources and patients' characteristics. We reported that the medication uses patterns, 1-y medication adherence, and outcome for FLS and MMS programs in the urban and rural areas.

**Methods:** The cohort included older adults with vertebral fractures under antiosteoporosis medications treatment in the outpatient clinic. (N=237 in Taipei City (urban) and N=141 in Chu-Tung Township (rural)). Care coordinators followed similar protocols adapted from the 13 best practice framework standards by the International Osteoporosis Foundation to provide baseline assessments, and telephone follow-up every 4 months for one year. The comparisons were made between rural and urban regions. Regression analyses were performed to identify baseline correlates of selected outcomes.

**Results:** The mean age of the overall cohort was  $76.1 \pm 9.6$  y and 76.7% of them were women. Patients in the rural region were less likely to adhere to their medications for osteoporosis at one year (78.0 vs. 92.1%,  $p<0.001$ ). Regression analysis revealed that older age (odds ratio [OR] 1.098,  $p<0.05$ ), lower serum albumin level (g/dL) (OR 0.091,  $p<0.05$ ), having heart disease (OR 5.667,  $p<0.05$ ) were the factors associated with mortality in one year in the urban region. Being older (OR 1.134,  $p<0.05$ ), higher serum Ca level (mmol/L) (OR 1.089,  $p<0.05$ ), lower serum albumin level (g/dL) (OR 0.296,  $p<0.05$ ), lower adherence to antiosteoporosis medications (OR 0.974,  $p<0.05$ ) were the factors associated with mortality in one year in the rural region.

**Conclusion:** Patients in the rural region had lower medication adherence rates during 1-y follow-up than those in the urban region. The older age and lower serum albumin level were the important factors associated with mortality in both regions.

### P381

#### EFFECT OF A SINGLE-SHOT INJECTION OF A HIGH-DENSITY HYALURONIC ACID GEL IN PATIENTS WITH SYMPTOMATIC PRIMARY KNEE OSTEOARTHRITIS: RESULTS OF NO-DOLOR STUDY

D. Khorsandi<sup>1</sup>, J. Monfort<sup>2</sup>, J. Combalia<sup>3</sup>, C. Emsellem<sup>3</sup>, Y. Gaslain<sup>3</sup>

<sup>1</sup>University of Barcelona, Procare Health, Barcelona, <sup>2</sup>Hospital del Mar de Barcelona, Barcelona, <sup>3</sup>Procare Health, Castelldefels, Spain

**Objective:** The main aim of NO-DOLOR study is to evaluate the evolution of pain in patients with primary knee osteoarthritis (OA), after a single injection of a high-density viscoelastic gel, which contains a high concentration of hyaluronic acid (HA) (Pronolis® HD mono 2.5%: 120 mg HA in 4.8 ml)

**Methods:** Patients with symptomatic primary knee OA (according to ACR criteria and with pain at inclusion equal or superior to 4 out of 10 measured by visual analog scale) were included in an observational, multicenter (70 specialized care centers), prospective one-cohort study. After a single dose of Pronolis HD mono 2.5%, patients were followed for 6 months. Final results of the primary endpoint (3-months pain evolution measured by domain "A" of the WOMAC scale) and secondary endpoints (6-months pain, stiffness, physical function, and pain on movement evolution, measured by WOMAC-A, WOMAC-B, WOMAC-C and 1st question of WOMAC-A respectively, safety and product tolerability throughout the study were reported). The study was approved by the Ethics Committee of the Hospital del Mar in Barcelona (CEIC-Parc de Salut Mar).

**Results:** 189 patients were recruited. Data from 166 patients at 3 months and 150 patients at 6 months were available for efficacy analyses. A statistically significant reduction ( $p<0.0001$ ) of the WOMAC-A score was observed at 3-month visit vs. baseline visit:  $4.25 \pm 3.36$  vs.  $9.03 \pm 3.49$ , with a relative reduction of 42.5% (Figure 1). At 6 months, the pain level continued to decrease significantly throughout the study (Figure 1). Pain on movement score was also significantly reduced at 6-month vs baseline: 0.80 vs. 1.69 (52.66% of improvement;  $p<0.0001$ ). The degree of joint stiffness and the functional capacity significantly improved at 6 months vs. baseline: 1.69 vs. 3.69 in WOMAC B (54.20% of improvement;  $p<0.0001$ ) and 15.05 vs. 31.01 in WOMAC-C (51.60% of improvement;  $p<0.0001$ ), respectively. A significant percentage of patients improved WOMAC indexes vs. baseline (Figure 2); 1.6% of patients reported local adverse events (joint swelling) of mild intensity.



**Conclusion:** After 3 and 6 months of a single intra-articular injection of Pronolis HD mono 2.5%, patients with symptomatic knee OA reported significant pain improvement. The results were similar for pain on movement, joint stiffness, and functional capacity. In addition, good tolerability was observed.

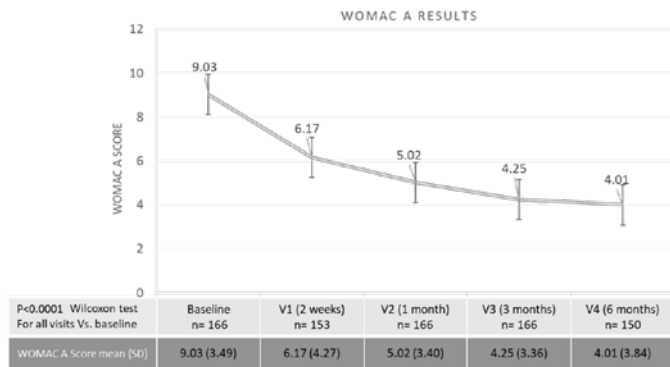


Figure 1. Pain reduction along with the study.

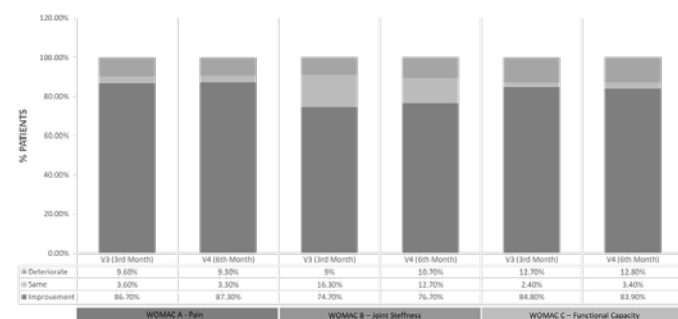


Figure 2. Percentage of patients with improvement, no change, and deterioration in WOMAC indexes at 3 and 6 months.

**Objective:** Despite vertebral fractures (VF) being the commonest osteoporotic fracture, causing pain, disability, increased mortality, and being a risk factor for future fracture, there are few to no data from resource-poor settings where healthcare is limited. The aim of this study was to determine fracture prevalence and incidence in a population from rural Gambia, West Africa, in a sub-cohort of the longitudinal Gambian Bone Ageing study (GamBAS).

**Methods:** GamBAS is a prospective observational study in women and men aged >40 y. Participants had baseline measurements in 2011-12 and were followed-up 6-8 y later. DXA scans of the lateral and AP spine, and proximal femur were obtained for VF assessment (LVA) and measurement of BMD. The Genant semiquantitative method was used to define VF. Prevalence and incidence were calculated; differences between fracture and nonfracture groups compared using t-tests.

**Results:** 98 individuals (60 women[W]) had usable scans at both visits. Median follow-up time was 7.2 y (range 6.6-8.6 y). Prevalence was 23.5% (n=23; 15W) at baseline with 46 total fractures (40 mild, 5 moderate; 1 severe). There were 11 incident (7W) VF fractures during the 7 y follow-up (715 person years); giving an incidence per 1000 person years of 15.4%. Spine and hip BMD, T- and Z-scores were lower in the prevalent fracture vs. no fracture group; lumbar spine T-score [mean(SD)] was -3.22(1.09) vs. -1.87(1.32); femoral neck -1.62(0.93) vs. -0.97(1.03). In those with incident fracture, spine and total hip baseline BMD, T- and Z-scores were lower (T-score lumbar spine -3.00(0.66) vs. -1.92(1.47); total hip -2.03(1.25); -1.12(1.26)).

**Conclusion:** These are the first data to present VF prevalence and incidence from West Africa. Population prevalence was similar to that from the EVOS and SOF studies. There are few data in which to compare incidence, though it is much lower than rest of the globe. As well as prevalent fractures, significant amounts of degenerative change were detected. Given the rising ageing population the burden of fracture in these populations requires further and extended study, determining risk factors and practical solutions within the limited resource healthcare settings.

## P382

### PREVALENCE AND INCIDENCE OF VERTEBRAL FRACTURES IN A RURAL GAMBIA, WEST AFRICA

N. Crabtree<sup>1</sup>, C. Parsons<sup>2</sup>, L. Jarjou<sup>3</sup>, R. Janha<sup>3</sup>, M. Ó Breasail<sup>4</sup>, A. Zengin<sup>5</sup>, A. Prentice<sup>4</sup>, P. Ebeling<sup>5</sup>, C. Cooper<sup>6</sup>, K. Ward<sup>6</sup>

<sup>1</sup>Birmingham Women's and Children's NHS Foundation Trust, Birmingham, UK, <sup>2</sup>MRC Lifecourse Epidemiology Unit, Southampton, UK, <sup>3</sup>MRC Unit The Gambia at the London School of Hygiene and Tropical Medicine, Banjul, Gambia, <sup>4</sup>MRC Nutrition and Bone Health Group, Cambridge, UK, <sup>5</sup>Department of Medicine, School of Clinical Sciences, Faculty of Medicine, Nursing and Health Sciences, Monash University, Clayton, Australia, <sup>6</sup>MRC Lifecourse Epidemiology Unit, Southampton, UK

P383

### BIFIDOBACTERIUM LONGUM ATTENUATES BONE LOSS AND MAINTAINS BONE HEALTH BY MODULATING BREGS-TREGS-TH17 CELL AXIS IN OVX MICE

L. Sapra<sup>1</sup>, A. Bhardwaj<sup>1</sup>, R. Srivastava<sup>1</sup><sup>1</sup>All India Institute of Medical Sciences, New Delhi, India

**Objective:** Probiotics are known to be involved in management of various inflammatory diseases including osteoporosis. Several studies along with ours reported that probiotics showed its health promoting effects by regulating Treg-Th17 immune cell balance in host. Furthermore, various studies demonstrated that Tregs-Th17 immune cell balance can be further regulated by regulatory B cells (Bregs) in host. But no study till date had delineated the Bregs-Tregs-Th17 cell axis in case of osteoporosis i.e., "immunoporosis". Moreover, no study investigated the immunomodulatory potential of *Bifidobacterium longum* (BL) in regulating bone health. This study aims to examine the effect of probiotic BL on bone health via modulation of host Bregs-Tregs-Th17 cell axis in Ovx mice.

**Methods:** 18 female C57BL/6 mice of 8-10 weeks were divided equally in three groups as sham/control group, Ovx group and Ovx+BL group (received 10<sup>9</sup> CFU/ml/d BL orally) for a period of 45 d. At the end of experiment mice were sacrificed and tissues analysed for various parameters to access the role of BL administration on bone-health by using several cutting edge technologies such as SEM, AFM, µCT, FACS and ELISA/CBA.

**Results:** We observed that administration of BL attenuated bone loss in Ovx mice. Both the cortical and trabecular bone content of Ovx+BL treated group was significantly higher than Ovx group. Remarkably, the percentage of osteoclastogenic Th17 (CD4<sup>+</sup>Roryt<sup>+</sup>) cells at distinct immunological sites such as BM and spleen were significantly reduced (p<0.01), whereas the percentage of anti-osteoclastogenic regulatory T cells (Tregs); CD4<sup>+</sup>Foxp3<sup>+</sup> and CD8<sup>+</sup>Foxp3<sup>+</sup> were significantly enhanced (p<0.01) in BL treated group, thus resulting in inhibition of bone loss. Interestingly, we for the first time observed that the population of Bregs (CD19<sup>+</sup>CD1d<sup>hi</sup>CD5<sup>hi</sup>IL-10<sup>hi</sup>) was significantly reduced in Ovx mice with respect to sham group. Moreover, BL administration significantly (p<0.01) enhanced population of these Bregs in Ovx+BL group. The immunomodulatory role of BL was further supported by serum cytokine data with a significant reduction in proinflammatory cytokines (IL-6, IL-17 and TNFα) along with enhancement of anti-inflammatory cytokines (IL-10, IFNγ) in BL treated group.

**Conclusion:** We propose for the first time that osteoprotective role of BL on bone health is mediated via its effects on the Bregs-Treg-Th17 cell axis which further regulates osteoclastogenesis. The present study thus highlights the potential of probiotic BL as a novel osteoprotective agent in the treatment and management of bone related diseases including osteoporosis.

**Acknowledgement:** This work was financially supported by projects: DST-SERB (EMR/2016/007158), Govt. of India sanctioned to RKS. LS thank UGC for research fellowship and AB thank DST SERB project for research fellowship.

P384

### DEPENDENCE OF THE ANTIDESTRUCTIVE EFFECT OF RITUXIMAB ON THE COMBINATION WITH VARIOUS DMARDS OR GLUCOCORTICOIDS IN PATIENTS WITH RHEUMATOID ARTHRITIS

A. Kudryavtseva<sup>1</sup>, G. Lukina<sup>2</sup>, E. Aronova<sup>1</sup>, G. Gridneva<sup>1</sup>, L. Dydykina<sup>1</sup>, S. Glukhova<sup>1</sup>, A. Smirnov<sup>3</sup>

<sup>1</sup>V.A. Nasonova Research Institute of Rheumatology, <sup>2</sup>GBUZ Moscow Clinical Scientific Center A.S. Loginova, <sup>3</sup>V.A. Nasonova Research Institute of Rheumatology, Moscow, Russia

**Objective:** To evaluate antidestructive effect of rituximab (RTM) in various combinations (RTM-mono, RTM+disease-modifying antirheumatic drugs (DMARDs) and RTM+glucocorticoids (GK) in patients with rheumatoid arthritis in real clinical practice.

**Methods:** Clinical and radiological evaluation on 0 and 48 weeks 110 patients with rheumatoid arthritis treated with rituximab: as monotherapy RTM - group 1, RTM in combination with methotrexate (MTX) - group 2, RTM in combination with leflunomide (LEF) - group 3, and RTM + other DMARDs - group 4. The same 110 patients were divided into 2 groups depending on the presence of concomitant GC therapy. Clinical effect was scored by EULAR criteria, radiographic progression was assessed using Sharp/van der Heijde (SvH) modified scoring method.

**Results:** When assessed after 48 weeks in the general group, remission and a low degree of disease activity were noted in 22.36% of patients and radiological progression was absent in 60.9% of patients. In the group of RTM monotherapy, inhibition of destruction was noted in 76.92%, in the RTM+MT group - in 54.29%, in the RTM+LEF group - 65.0%, and in the group of other DMARDs - in 50% of patients (p>0.05). When assessing the radiological progression it was shown that in the group of patients who did not receive concomitant GC therapy, inhibition of bone destruction according to the total Sharp score was noted in 54.55%, in the group receiving concomitant GC therapy in 61.54% of patients, also without statistically significant differences (p>0.05).

**Conclusion:** This work has demonstrated the good therapeutic and radiological effect of RTM in real clinical practice. There were no significant differences in the degree of progression depending on the concomitant therapy of DMARDs or GK. In the treatment of RTM, inhibition of articular destruction is possible against the background of clinical deterioration.

P385

### BMD AND BONE TURNOVER MARKERS ALTERATIONS IN WOMEN WITH ENDOMETRIOSIS DURING MENSTRUAL CESSATION DUE TO GNRH THERAPY AND AFTER MENSTRUAL RESTORATION

A. D. Anastasilakis<sup>1</sup>, S. Papachatzopoulos<sup>2</sup>, M. P. Yavropoulou<sup>3</sup>, A. Gkiomisi<sup>2</sup>, P. Nikolakopoulos<sup>2</sup>, S. A. Polyzos<sup>4</sup>, I. Ballaouri<sup>5</sup>, K. Aliazis<sup>6</sup>, T. Barbounis<sup>6</sup>, A. Papatheodorou<sup>6</sup>, S. Fermanoglou<sup>7</sup>, P. Makras<sup>8</sup>

<sup>1</sup>Dept. of Endocrinology, 424 General Military Hospital, Thessaloniki, <sup>2</sup>Dept. of Obstetrics & Gynecology, 424 General Military Hospital, Thessaloniki, <sup>3</sup>Endocrinology Unit, 1st Dept. of Propaedeutic & Internal Medicine, School of Medicine, National and Kapodistrian University of Athens; Department of Medical Research, 251 Hellenic Air Force & VA General Hospital, Athens, <sup>4</sup>First Laboratory of Pharmacology, School of Medicine, Aristotle University of Thessaloniki, Thessaloniki, <sup>5</sup>Analysis laboratories, Thessaloniki, <sup>6</sup>Dept. of Medical Research, 251 Hellenic Air Force & VA General Hospital, Athens, <sup>7</sup>Dept. of Bone Densitometry, AXEPA Hospital, Thessaloniki, <sup>8</sup>Dept. of Medical Research, 251 Hellenic Air Force & VA General Hospital; Dept. of Endocrinology & Diabetes, 251 Hellenic Air Force & VA General Hospital, Athens, Greece

**Objective:** In this prospective, controlled, open label study among women with endometriosis we aimed to investigate the acute skeletal effects of a short treatment period with a GnRH analog.

**Methods.** Premenopausal women (n=21, age 35.4±7.6 y) with surgically verified endometriosis received once monthly goserelin s.c. for 6 months. Following goserelin discontinuation patients were monitored for another 6 months after menstrual restoration. Age- and BMI-matched premenopausal, healthy, untreated women served as controls (n=19, age 37.1±3.6 y). BMD at the lumbar spine (LS) and the femoral neck (FN), and bone turnover markers (BTMs; P1NP and CTx) were measured before treatment (baseline), at 6 months of treatment (6mo), and 6 months after menstrual restoration (12mo).

**Results:** Baseline LS- and FN-BMD values did not differ between patients and controls (1.217±0.036 vs. 1.225±0.041, p=0.925 and 1.000±0.038 vs. 0.986±0.036, p=0.807, respectively). In controls, LS- and FN-BMD did not change during the study. Among patients both LS- and FN-BMD decreased from baseline to 6mo (1.217±0.036 vs. 1.145±0.035 g/cm<sup>2</sup>, p<0.001 and 1.000±0.038 vs. 0.975±0.039 g/cm<sup>2</sup>, p=0.001, respectively), while LS-BMD increased again from 6 to 12mo (1.145±0.035 vs. 1.193±0.038 g/cm<sup>2</sup>, p<0.001) but FN-BMD remained stable (0.975±0.039 vs. 0.966±0.035 g/cm<sup>2</sup>, p=0.69); both LS- and FN-BMD at 12mo remained below the baseline values (p=0.004 and p=0.006, respectively). CTx and P1NP increased from baseline to 6mo (349.4±47.3 vs. 629.1±65.5 pg/ml, p<0.001 and 40.4±4.4 vs. 81.2±7.7 ng/ml, p<0.001, respectively) and decreased from 6 to 12mo (629.1±65.5 vs. 324.6±46.7 pg/ml, p<0.001 and 81.2±7.7 vs. 60.6±9.7 ng/ml, p=0.004, respectively), returning to baseline levels.

**Conclusion:** In premenopausal women treated with goserelin menstrual cessation results in rapid increases of BTMs and decreases of BMD values. These changes are partially reversed 6 months after menstrual restoration.

P386

### LOW BACK PAIN IN MEN AND WOMEN WITHOUT SPONDYLOARTHRITIS

O. Iaremenko<sup>1</sup>, K. Mazanko<sup>1</sup>, D. Fedkov<sup>1</sup>, D. Dobrianskyi<sup>1</sup>, O. Smirnova<sup>1</sup>, V. Zhukova<sup>1</sup>

<sup>1</sup>Bogomolets National Medical University, Dept. of Internal Medicine #3, Kyiv, Ukraine

**Objective:** To determine the lower back pain (LBP) and inflammatory back pain (IBP) prevalence, characteristics, gender differences among patients (pts) without spondyloarthritis (SpA).

**Methods:** 1799 pts, including 736 men and 1063 women, with general therapeutic, urological, and neurological pathologies completed the questionnaire developed in the Internal Medicine Department #3 of Bogomolets National Medical University. The presence or history of LBP, its cause, localization, onset, signs of IBP determined by Calin criteria [1] were analyzed depending on sex.

**Results:** 1567 of 1799 pts (84.9% of men and 87.6% of women) with mean age 41.4±17.1 reported the presence or history of LBP. 95.4% (1717 pts, 696 men and 1021 women, mean age 41.4±17.1) were patients without SpA. In this group, 50.4% of men vs. 44.1% of women had decreased pain after exercise (p<0.05). Also, in men, LBP was preceded by trauma 1.5 times more often than women (p<0.05). The age distribution of the onset of LBP had no significant difference between gender groups. Gradual onset of pain characterized both sexes. 19.3% of men and 18.3% of women had morning stiffness for >30 min (p>0.05). Four of the five signs of IBP had 16.5% (17.8% of men and 15.7% of women). The most common combination (7.7%) of IBP signs was: the onset of back pain up to 40 y, the gradual onset of back pain, morning stiffness, relief of back pain during exercise.

**Conclusion:** The prevalence of LBP in patients without SpA is high for both sexes. In men, in comparison with women, LBP is more often related to previous trauma and decreases after physical activity. The prevalence of IBP is high among the patients without SpA, which indicates the need for additional procedures to exclude SpA in this pts group and may indicate the low specificity of the Calin criteria.

**Reference:** 1. Akgul O, Ozgocmen S. World J Orthop 2011;2:107.

P387

### SCORING PROPOSAL FOR THE UNDERLYING DIAGNOSIS OF SYSTEMIC MASTOCYTOSIS IN PATIENTS WITH UNEXPLAINED SEVERE OSTEOPOROSIS

G. Orsolini<sup>1</sup>, I. Tanasi<sup>2</sup>, L. Crosera<sup>2</sup>, A. Bernardelli<sup>2</sup>, M. Bonifacio<sup>2</sup>, P. Bonadonna<sup>3</sup>, R. Zanotti<sup>2</sup>, A. Fassio<sup>1</sup>, G. Adami<sup>1</sup>, M. Krampera<sup>2</sup>, M. Rossini<sup>1</sup>

<sup>1</sup>AQUI Verona - Rheumatology Unit, <sup>2</sup>AQUI Verona - Hematology Unit, <sup>3</sup>AQUI Verona - Allergology Unit, Verona, Italy

**Objective:** Fragility fracture and osteoporosis have a high prevalence and clinical burden in systemic mastocytosis (SM). As distinct from patients with other mediator-related symptoms, a predictive score to diagnose SM in these patients is lacking. moreover, normal serum basal tryptase (sbT) levels do not exclude SM diagnosis, whereas high sbT levels might be due to familial hypertryptasemia. The aims describing the clinical features of a large series of adult patients referred for unexplained osteoporosis and suspected SM. Also we wanted to identify criteria useful to predict SM diagnosis and strengthen the indication for bone marrow biopsy (BM).

**Methods:** We included 110 ten patients with unexplained osteoporosis who underwent BM evaluation. The design is retrospective. Diagnosis of SM was based on the 2016 WHO criteria. We excluded patients with osteoporosis explained otherwise.

**Results:** With BM, 48 patients (43.6%) received the diagnosis of SM, of whom 44 (91.7%) had bone marrow mastocytosis and 4 (8.3%) had indolent SM, with previously unrecognized skin lesions. Other mediator-related symptoms were reported in 31 patients (64.6%). 62 patients (56.4%) were negative for mastocytosis and used as a control group. SM patients were younger than controls (median age 55 vs. 63 y, respectively;  $p=0.005$ ), had higher median sbT level (31.7 vs. 15.8 ng/mL,  $p<0.001$ ) and presented more frequently fragility fractures (93.7 vs. 74%, respectively;  $p=0.009$ ). No significant differences according to gender and mediator-related symptoms were found between the two groups. Based on multivariate analysis, a model to predict the diagnosis of SM before BM study was built, including age  $<50$  y ( $p\leq 0.001$ ) or not  $>70$  y ( $p=0.010$ ), sbT level  $\geq 19.4$  ng/mL ( $p<0.001$ ) and the presence of fragility fractures ( $p=0.02$ ) as independent predictive factors. Patients with a score  $<2$  had a lower probability to have mastocytosis ( $p<0.001$ ).

**Conclusion:** The diagnosis of SM should be excluded in cases of unexplained osteoporosis. Since BM evaluation counts a large number of negative cases, this score could avoid useless BM studies. In cases with a score  $<2$ , searching for the D816V KIT mutation on peripheral blood and testing for familial hypertryptasemia could lower the risk of losing cases of mastocytosis.

P388

### INFLUENCE OF VITAMIN D AND IODINE DEFICIENCY ON THYROID FUNCTION AND AUTOIMMUNITY MARKERS IN HYPOTHYROIDISM

V. Pankiv<sup>1</sup>

<sup>1</sup>Ukrainian Research Centre of Endocrine Surgery, Kyiv, Ukraine

**Objective:** Data on the effects of vitamin D and iodine supplementation on thyroid function in hypothyroid patients are scarce. There are controversies in this regard. The aim of this double-blind randomized placebo-controlled clinical trial was to investigate the effect of vitamin D and iodine deficiency treatment on thyroid function and autoimmunity marker (thyroid peroxidase antibody [TPO-Ab]) in patients with hypothyroidism.

**Methods:** 76 patients with hypothyroidism, iodine and vitamin D deficiency (25-hydroxyvitamin D level  $\leq 20$  ng/ml) were randomly allocated into two groups to receive vitamin D (30000 IU/week, orally) or placebo for 12 weeks, as vitamin D-treated ( $n=50$ ) and control ( $n=26$ ) groups, respectively. Serum TPO-Ab, thyroid stimulating hormone (TSH), PTH, calcium, and urinary iodine concentrations were compared before and after trial between and within groups. The data were presented as mean (standard error [SE]) and analyzed by appropriate tests.

**Results:** Mean of vitamin D was increased in vitamin D-treated group (43.2 [1.9] vs. 12.9 [0.8] ng/ml,  $P=0.02$ ). Mean of TPO-Ab significantly changed in both groups (837 [104.89] vs. 411.35 [92.41] IU/ml,  $P=0.04$  in vitamin D-treated and did not significantly change 770.08 [106.3] vs. 827.14 [97.2] IU/ml in placebo-treated group,  $P=0.25$ ). Mean of TSH was not changed in both groups after trial,  $P=0.3$  and  $P=0.35$  for vitamin D-treated and control groups, respectively.

**Conclusion:** Vitamin D treatment in iodine and vitamin D deficient patients with hypothyroidism has significant effect on thyroid function and autoimmunity.



P389

# SELF-INJECTION OF DENOSUMAB IN CLINICAL PRACTICE IN THE FRENCH PILOTE STUDY

K. Briot<sup>1</sup>, P. Samama<sup>2</sup>, G. Desamericq<sup>2</sup>, J. O'Kelly<sup>3</sup>

<sup>1</sup>Dept. of Rheumatology, Hopital Cochin, Assistance Publique-Hopitaux de Paris, Paris, France, <sup>2</sup>Amgen SAS, Boulogne-Billancourt, France, <sup>3</sup>Amgen Ltd, Uxbridge, UK

**Objective:** Describe characteristics of patients who self-inject denosumab and patterns of self-injection in France.

**Methods:** PILOTE was a prospective observational study that evaluated persistence to denosumab over 24 months in France in postmenopausal women. Clinical information obtained through routine practice was recorded onto an eCRF, including the individual who injected subcutaneous denosumab (physician, nurse, patient, other). We conducted an ad hoc analysis of the patients in the study who self-injected denosumab.

**Results:** In total, 478 patients were enrolled between June 2105 and February 2016. 27 patients self-injected denosumab at least once, with these patients distributed across multiple sites. Those who self-injected appeared slightly younger with longer duration of osteoporosis, and a higher proportion had a prior fracture and previous glucocorticoid and teriparatide treatment than the overall population (Table). Self-injected patients were also more likely to be living at home with family, have a University education, and be seen by a rheumatologist than a GP. Twelve patients self-injected from the beginning of the study, 15 self-injected after receiving injection from an HCP and 8 switched back to HCP injections after self-injection. Eleven of the 12 patients who self-injected from the beginning were persistent at 24 months. Six ADRs occurred in three self-injecting patients: one vertebral fracture, bone pain, muscle fatigue, myalgia, asthenia, pyelonephritis.

**Conclusion:** Although numbers were small, self-administration of denosumab appeared feasible for women with postmenopausal osteoporosis and may be a valuable option, particularly in the context of the COVID-19 pandemic when office visits are restricted.

**Acknowledgement:** This study was funded by Amgen.

Table. Characteristics of patients who self-administered denosumab and overall.

	Patients who self-injected at least once N=27	All patients N=478
Age (Mean±SD), years	69.81±10.29	72.48±9.73
Number of comorbidities – n (%)		
<3	19 (70.4%)	349 (73.0%)
≥3	8 (29.6%)	129 (27.0%)

Prior treatment with osteoporosis therapies – n (%)	25 (92.6%)	434 (90.8%)
BP	22 (81.5%)	416 (87.0%)
Teriparatide	7 (25.9%)	44 (9.2%)
Glucocorticoids >3 months 5 mg or more – n (%)	4 (14.8%)	42 (8.8%)
History of osteoporosis related fracture – n (%)	20 (74.1%)	291 (60.9%)
Parent history of hip fracture – n (%)	2 (8.7%)	61 (15.5%)
Rheumatoid arthritis	1 (3.7%)	19 (4.0%)
Visual impairment	5 (18.5%)	100 (20.9%)
Year since PMO diagnosis (Mean±SD)	8.74±6.36	7.82±6.00
Diabetes type 1	0 (0.0%)	3 (0.6%)
Diabetes type 2	0 (0.0%)	23 (4.8%)
Patient's living situation		
At home with spouse/family	20 (74.1%)	267 (55.9%)
At home with care/support	0 (0.0%)	38 (7.9%)
At home alone	7 (25.9%)	164 (34.3%)
Nursing home	0 (0.0%)	4 (0.8%)
Unknown	0 (0.0%)	5 (1.0%)
Formal education of the patient		
No formal education	0 (0.0%)	9 (1.9%)
Elementary education	3 (11.1%)	186 (38.9%)
Secondary education	12 (44.4%)	185 (38.7%)
University	10 (37.0%)	64 (13.4%)
Unknown	2 (7.4%)	34 (7.1%)
Physician primary specialty		
Rheumatologist	24 (88.9%)	326 (68.2%)
General practitioner	3 (11.1%)	152 (31.8%)
Physician type of practice		
Private practice	9 (33.3%)	247 (51.7%)
Hospital practice	7 (25.9%)	118 (24.7%)
Mixed practice	11 (40.7%)	113 (23.6%)

P390

# EVALUATION OF TOPICAL THERAPY OF PATIENTS WITH OSTEOARTHRITIS OF SMALL JOINTS OF THE HANDS

V. Tsurko<sup>1</sup>, M. Gromova<sup>2</sup>

<sup>1</sup>Sechenov First Moscow State Medical University (Sechenov University), <sup>2</sup>Pirogov Russian National Research Medical University (Pirogov Medical University), Moscow, Russia

**Objective:** More and more attention is paid to the problem of osteoarthritis (OA) of small joints of the hands. To date, there is evidence of the efficacy of diclofenac diethylamine 2% in the treatment of OA of large joints, but there is no data on its effect on OA of small joints of the hands. This study aimed to evaluate the efficacy and safety of using the diclofenac diethylamine 2% for 14 d in patients with osteoarthritis of small joints of the hands.

**Methods:** 62 patients of both sexes with hands OA were included in the study, 31 of whom (main group) used diclofenac diethylamine 2% topically, and the remaining 31 (comparison group) – diclofenac diethylamine 2% + oral nonsteroidal anti-inflammatory drugs. The effectiveness of therapy was assessed by using a visual analogue scale in dynamics: joint pain and stiffness at rest, during movement and palpation, by functional indices AUSCAN, FIHOA, by assessment of the effect of therapy by the doctor and the patient on a weekly basis.

**Results:** Joint pain decreased after 2 weeks of therapy in all patients during treatment with diclofenac diethylamine 2% in both groups. Significant reduction in stiffness and improvement in hand joint function was achieved after 7 days and lasted until the end of treatment. By the end of treatment, 100% of patients assessed their condition as improvement.

**Conclusion:** Diclofenac diethylamine 2% demonstrates efficacy in patients with OA of the hand joints (reduced pain, stiffness and improved joint function) both in monotherapy and as part of complex therapy, while being well tolerated.

P391

# RISK OF REVISION AFTER TOTAL HIP ARTHROPLASTY: WHAT IS THE ROLE OF PHYSICALLY DEMANDING WORK?

E. Zaballa<sup>1</sup>, G. Ntani<sup>1</sup>, E. C. Harris<sup>1</sup>, A. Lübbecke-Wolff<sup>2</sup>, C. Cooper<sup>3</sup>, K. Walker-Bone<sup>1</sup>

<sup>1</sup>MRC Versus Arthritis Centre for Musculoskeletal Health and Work, University of Southampton, Southampton, UK, <sup>2</sup>Division of Orthopaedics and Trauma Surgery, Geneva University Hospitals, Geneva, Switzerland, <sup>3</sup>MRC Lifecourse Epidemiology Unit, University of Southampton, Southampton, UK

**Objective:** To investigate the role of occupational exposure post total hip arthroplasty (THA) in increasing the risk of future revision.

**Methods:** People in the Geneva Hip Arthroplasty registry aged 18-64 y who underwent an elective THA between March 1996-December 2012 were eligible for this study. A postal questionnaire was sent to collect postoperative: leisure time physical activities and physically demanding work exposures. Preoperative health status and relevant surgical factors were extracted from the GAR records. People were excluded if they had undergone revision surgery for postoperative complications or infection. Proportional Cox regression hazard models were fitted to calculate crude and adjusted hazard ratios (HR) for the risk of revision surgery and their 95% confidence intervals (CI).

**Results:** Amongst 557 respondents (57% response rate) who underwent THA at a median of 58 years (IQR: 51-61), 329 worked post-THA. Of these, 241 provided information on job title, physical occupational activities and duration of work. There were 17 revision THAs amongst those who worked post-THA. We found no increased risk of revision THA amongst people who reported: standing >4 h/d; walking >2 miles/d; carrying/lifting weights; climbing ladders; or climbing >30 flights of stairs/d. However, after adjusting for age at THA, sex, BMI and time to reach best function, people who knelt/squatted at work post-THA showed a HR of 2.79 (95%CI 1.00-7.81) for risk of revision compared with those who did not.

**Conclusion:** There were few revision procedures even despite the long period of follow-up, thus diminishing our statistical power. Although no occupational activity reached significance, the estimated risk of revision surgery after kneeling/squatting is doubled. This result requires replication but may be of importance in advising THA patients preoperatively.

P392

# ASSESSMENT OF THE RESPONSE PROFILE TO HYALURONIC ACID PLUS SORBITOL INJECTION IN PATIENTS WITH KNEE OSTEOARTHRITIS: POST HOC ANALYSIS OF A 6-MONTH RANDOMIZED CONTROLLED TRIAL

O. Bruyère<sup>1</sup>, G. Honvo<sup>1</sup>, E. Vidovic<sup>2</sup>, B. Cortet<sup>3</sup>

<sup>1</sup>Division of Public Health, Epidemiology and Health Economics, Liège, Belgium, <sup>2</sup>Aptissen SA, Medical Department, Plan-les-Ouates, Switzerland, <sup>3</sup>University Hospital of Lille, Department of Rheumatology and UR4490, Lille, France

**Objective:** Independent risk factors for osteoarthritis (OA) progression have been identified but little is known whether they might also alter the response to treatments. In a previous randomized trial, the noninferiority of two hyaluronic acid injections (Synolis VA vs. Synvisc-One) was assessed in patients with knee

OA, with an OMREACT-OARSI response rate of 79% for Synolis VA. The objective of the present study was to assess whether a responder profile could be established for this treatment modality.

**Methods:** Post hoc analysis using the Synolis VA arm of a 6-month prospective, multicentre, comparative, randomized, double-blind trial. At baseline and during the study, pain and function were assessed using the WOMAC questionnaire. Patient response to treatment at after 6 months was also assessed according to the OMERACT/OARSI criteria. Data were collected, at baseline, on variables that could potentially impact the response to treatment (e.g., age, sex, BMI, Kellgren-Lawrence grade, duration of OA since diagnosis, and baseline WOMAC scores).

**Results:** 91 subjects with complete data were included in the analyses. The probability of improving the WOMAC Pain with Synolis VA was independent of any baseline clinical data. However, the chance to improve the WOMAC Function was significantly associated with its baseline level, even after adjustment for potential confounding variables ( $p=0.046$ ). In addition, the WOMAC total score at baseline was independently associated with treatment response using the OMERACT/OARSI criteria (OR: 1.05; 95%CI: 1.02-1.09) in multivariate logistic regression analysis adjusted for age, sex, and baseline BMI. Only baseline WOMAC pain ( $p=0.005$ ) and WOMAC function ( $p=0.01$ ) specific subscales play a significant role as predictor of response to treatment according to the OMERACT/OARSI criteria, while baseline WOMAC stiffness had no significant effect ( $p=0.08$ ).

**Conclusion:** In addition to the high absolute response rate to Synolis VA, the probability of success is even increased if administered in patients with more intense pain and more limited physical function at baseline. Further research with other potential confounding clinical variables is warranted in order to better apply the concept of personalized medicine.

### P393

#### DISSECTING THE MOLECULAR MECHANISMS BEHIND THE BIOSYNTHESIS AND TRAFFICKING OF THE CALCIUM-SENSING RECEPTOR

L. Iamartino<sup>1</sup>, M. L. Brandi<sup>2</sup>

<sup>1</sup>Dept. of Experimental & Clinical Biomedical Sciences, University of Florence, <sup>2</sup>Dept. of Experimental & Clinical Biomedical Sciences, University of Florence; FIRMO Foundation, Florence, Italy

The calcium-sensing receptor (CaSR) is a GPCR receptor that controls calcium level in the blood by regulating the synthesis and the secretion of PTH. Defects on CaSR activity, due to its downregulation or to inherited mutations, lead to hyperparathyroidism disorders and to calcium/PTH imbalance. It appears, despite some contradictory reports, that pharmacological stimulation of the CaSR via its specific FDA-approved modulator cinacalcet increases CaSR expression and its membrane recruitment. However, the mechanisms behind CaSR biosynthesis and its anterograde trafficking are still unclear and require further proofs.

The aim of the present study is to dissect how CaSR activation triggers its own biosynthesis and whether this can be further enhanced by pharmacological stimulation.

Using either bovine parathyroid and human adenoma parathyroid cells, either HEK cells stably transfected with a CaSR-expressing vector (HEK\_CaSR), we are investigating the changes of CaSR expression and signaling via RT-qPCR, western blot, IP-one and intracellular calcium mobilization assays. We are further double transfecting the parathyroid cell line (PTH1C1), generated in our laboratory, with vectors expressing CFP-tag CaSR and DKK-tag PTH. With this model we will be able to i) monitor CaSR biosynthesis and membrane trafficking through live cell imaging; ii) CaSR activity by assessing PTH production and secretion; iii) assess the interaction of the CaSR with down-stream signaling factors via immunoprecipitation and further unveil novel interacting proteins through mass spectrometry and FRET assays.

Our preliminary data show that in HEK\_CaSR cells, 24 h stimulation with 1 $\mu$ M of cinacalcet increases CaSR mRNA and protein levels by 2-fold compared to untreated control, while inhibiting the CaSR with 1 $\mu$ M of NPS 2143 reduces CaSR expression.

Based on our early results, we suggest the existence of a positive feedback mechanism that promotes CaSR biosynthesis upon its stimulation. Commonly GPCRs internalize once activated causing desensitization, while the CaSR seems to guarantee a sustained signaling upon continuous stimulus. Exploiting this mechanism will allow us to improve current pharmacological treatments for hyperparathyroidism disorders.

### P394

#### AN ASSESSMENT OF THE TOULOUSE SAINT LOUIS UNIVERSITY MINI FALLS ASSESSMENT TOOL TO PREDICT INCIDENT FALLS AMONG OLDER ADULTS RESIDING IN NURSING HOMES: A 6-MONTH PROSPECTIVE STUDY

M. Locquet<sup>1</sup>, F. Bonnard<sup>1</sup>, C. Beaudart<sup>1</sup>, C. Coendo<sup>2</sup>, S. Gillain<sup>3</sup>, J.-Y. Reginster<sup>1</sup>, O. Bruyère<sup>1</sup>

<sup>1</sup>University of Liège, Division of Public Health, Epidemiology and Health Economics, <sup>2</sup>University Hospital of Liège, Physical Rehabilitation Medicine and Sports Traumatology, <sup>3</sup>University Hospital of Liège, Geriatrics Dept., Liège, Belgium

**Objectives:** Toulouse Saint Louis University Mini Falls Assessment (TSLUMFA) tool has been designed to predict falls. It was initially validated in a geriatric clinic in 2018. The primary objective was to evaluate the predictive capacity of the TSLUMFA for incident falls in older adults residing in nursing homes. The secondary objective was to determine the TSLUMFA optimal cut-off value identifying those older adults with a high-risk of falling.

**Methods:** Settings: A longitudinal study was carried out over a period of 6 months. Participants: 93 older adults residing in nursing homes were evaluated for the present study. Measurements:

The TSLUMFA (made up of 7 criteria) was administered at baseline, and incident falls were recorded based on a registry of falls. Comparisons of TSLUMFA scores between fallers and non-fallers were performed using the U Mann-Whitney test or  $\chi^2$ . Correlation between the total TSLUMFA score (/30 points) and incident fall(s) was explored using the Cox proportional hazard model. ROC analysis enabled an optimal cutoff value to be established to identify those adults at the highest risk of falling.

**Results:** In the study, 93 older adults (61.3% women) with a median age of 80 (69-87) y were included. The median total TSLUMFA score was 21 (19-24.5) points. During the 6-month study period, 38 subjects (40.9%) experienced at least one fall. The total TSLUMFA score in older adults with incident fall(s) was significantly lower than in those who did not fall (20 (15.75-22.25) points vs. 23 (20-25) points and a p-value of <0.001). For each 1-point higher score at the total TSLUMFA a 9% less chance of falling was observed during the study period (p-value=0.006). The AUC was 0.736 (95%CI: 0.617-0.822) and p-value<0.001, clearly demonstrating its interesting performance as a screening tool. A score of  $\leq 21$  points was identified as the optimal cutoff to identify those older adults at a higher risk of falling.

**Conclusion:** The TSLUMFA performed well and successfully identified older adults with a high risk of falling in a nursing home setting. Further comparisons with existing tools are warranted.

### P395

#### EMPLOYMENT RETENTION AMONGST HIP ARTHROPLASTY RECIPIENTS WHO RETURN TO WORK

E. Zaballa<sup>1</sup>, G. Ntani<sup>1</sup>, E. C. Harris<sup>1</sup>, A. Lübbecke-Wolff<sup>2</sup>, N. K. Arden<sup>3</sup>, C. Cooper<sup>4</sup>, K. Walker-Bone<sup>1</sup>

<sup>1</sup>MRC Versus Arthritis Centre for Musculoskeletal Health and Work, University of Southampton, Southampton, UK, <sup>2</sup>Division of Orthopaedics and Trauma Surgery, Geneva University Hospitals, Geneva, Switzerland, <sup>3</sup>Centre for Sport, Exercise and Osteoarthritis Research Versus Arthritis, University of Oxford, Oxford, UK, <sup>4</sup>MRC Lifecourse Epidemiology Unit, University of Southampton, Southampton, UK

**Objective:** To explore associations between exposure to physically demanding work performed after total hip arthroplasty (THA) and job loss due to the replaced hip.

**Methods:** A postal survey was mailed to THA recipients from the Geneva Hip Arthroplasty Registry and the Clinical Outcomes in Arthroplasty study. To be eligible, patients needed to have received their arthroplasty at least 5 y before and to have been aged 18-64 y at the time. Data collection included: demographics, time to reach best function and postoperative recreational activities. For each job held postoperatively, participants self-reported exposure to a range of physically demanding activities (standing, walking,

kneeling/squatting, climbing ladders, digging). Cox proportional hazard models were used to estimate the effect of occupational activities on the risk of job loss.

**Results:** Of the 817 respondents (57% response rate), 514 returned to work (RTW) postoperatively. The median follow-up post-THA was 7.5 y (IQR 6.2 -12.1). Occupational exposure information was available for 411 of the 514 who RTW (206 men, 205 women). Adjusted models (age at operation, sex, BMI, time to reach best postoperative function, cohort and follow-up) showed an increased risk of stopping work post-THA in workers who needed to stand >4 h/d (HR:3.81, 95%CI 1.62-8.96); kneel/squat (HR:95%CI 3.32, 1.46-7.55) and carry/lift >0 kg (HR:5.43, 95%CI 2.29-12.88) compared with those who did not. Mutually adjusted models showed that the effect of lifting/carrying weights in excess of 10 kg remained statistically significant (p<0.01).

**Conclusion:** Jobs that entail standing, kneeling/squatting or lifting heavy weights are more difficult to retain amongst THA recipients. These findings need to be confirmed in other cohorts, but clinicians may need to discuss pre-operatively potential limitations of arthroplasty on work outcomes and/or specialised rehabilitation may be required.

### P396

#### HIGH ADHERENCE TO SECONDARY PREVENTION TREATMENTS, LOW REHOSPITALIZATION AND MORTALITY RATES AMONG OLDER ADULTS WITH HIP FRACTURES ENTERED THE ORTHOGERIATRIC OUTPATIENT SERVICE

M. Baroni<sup>1</sup>, A. R. Bianco<sup>1</sup>, M. Ferracci<sup>1</sup>, G. R. Talesa<sup>2</sup>, A. Cirimilli<sup>2</sup>, V. Prenni<sup>1</sup>, V. Bubba<sup>1</sup>, V. Boccardi<sup>1</sup>, G. Rinonapoli<sup>2</sup>, A. Caraffa<sup>2</sup>, P. Mecocci<sup>1</sup>, C. Ruggiero<sup>1</sup>

<sup>1</sup>Geriatric & Orthogeriatric Unit, SM Misericordia Hospital, University of Perugia, <sup>2</sup>Orthopedic & Traumatologic Unit, SM Misericordia Hospital, University of Perugia, Perugia, Italy

**Objective:** To compare the outcomes of hip fracture patients who entered the interdisciplinary fracture liaison services (FLS) with those who followed the usual orthopedic care (UOC).

**Methods:** A prospective observational study including subjects aged  $\geq 65$  y hospitalized because of hip fracture. At the time of discharge, participants who underwent surgery were invited to enter FLS, received a schedule of lab and x-ray exams and outpatient orthogeriatric assessment within 30 d from surgery.

**Results:** Among 762 patients eligible within 1 y, 540 (71.0%) attended the 30-d outpatient visit: 268 (49.6%) opted for FLS while 272 (50.3%) for UOC. The patients who entered the FLS compared to those in the UOC had higher 1-y adherence to vitamin D supplementation, plus calcium if needed, as well as adherence to the specific antiosteoporosis drug (75.1 vs. 8.0%; p<0.0001), and complete antifracture treatments (defined as a combination of the specific antiosteoporosis drug plus vitamin D, and calcium if



needed) (72.3 vs. 5.7%;  $p < 0.0001$ ). The older adults who entered the FLS experienced a long time of hospitalization-free survival (176.4 vs. 88.7 d;  $p = 0.0152$ ) compared to those in UOC. Compared with participants in the UOC, a tendency to a lower annual mortality rate (19.7/100 vs. 25.5/100 person-years; HR=0.62; 95%CI 0.35; 1.09) was found in those who entered the FLS group independent of confounders.

**Conclusion:** The FLS may increase initiation and adherence to antifracture treatments over time. Compared with UOC, FLS may positively impact on health-related outcomes, such as time free from rehospitalization and mortality rates.

P397

### LEONIE STUDY: POOR COMPLIANCE WITH PATIENT INSTRUCTIONS FOR TAKING ORAL BISPHOSPHONATES (ORAL BPS)

K. Briot<sup>1</sup>, B. Cortet<sup>2</sup>, P. Fardellone<sup>3</sup>, T. Thomas<sup>4</sup>, F. Tremollières<sup>5</sup>

<sup>1</sup>Rheumatology, Hôpital Cochin, Paris, <sup>2</sup>Rheumatology, CHU de Lille, Lille, <sup>3</sup>Rheumatology, CHU Amiens, Amiens, <sup>4</sup>Rheumatology, Hôpital Nord Saint-Etienne, Saint-Etienne, <sup>5</sup>Menopause, CHU Purpan, Toulouse, France

**Objective:** To assess compliance with patient instructions with oral BPs in osteoporotic women, especially the 4 cardinal points for an appropriate intake (taken on an empty stomach, at least 30 min before the first food, with a glass of plain water, staying in an upright position).

**Methods:** A nationally representative sample of 152 pharmacies was constituted. A 37 questions questionnaire established by the scientific study committee was proposed to women aged 60 and over visiting the pharmacist for an oral BP drug delivery between January-June 2020. The computer assisted telephone interview methodology was used. 254 patients (mean age  $68.6 \pm 6.46$  y) were interviewed. Diagnosis of osteoporosis was defined either by BMD  $< -2.5$  SD or a fragility fracture event (respectively 57% and 43% of women). The treatment was prescribed by GPs (63%) or Rheumatologist (31%), with a mean duration of  $7.6 \pm 7.3$ . Alendronate accounted for 48% of prescriptions, risedronate 43% and gastroresistant risedronate 9%.

**Results:** A high rate of poor compliance was observed: of all 230 patients on non-gastroresistant oral BPs, 56% did not follow all the patient instructions. Of these, 19% ate food before taking the treatment and for those who did not, 14% did not meet the 30-min fasting time. In total, the fasting conditions were not followed by 30% of the patients. In addition, 28% of the patients took the treatment with mineral water (rich in calcium for more than 50%) and 32% of them took the treatment with or after other medications. 84% of the patients perceived their treatment positively, considering it as essential (57%) and easy to take (54%). The constraints

linked to drug intake were spontaneously mentioned by 26% of patients. In 41% of cases, the 4 cardinal points were mentioned on the prescription.

**Conclusion:** The results of the LEONIE study show a high rate of poor compliance with the patient instructions which are essential for a good absorption of oral BPs, with the risk of poor bioavailability of drugs and therefore reduced therapeutic efficacy. They strongly suggest that education of physicians, pharmacists and patients to this issue is mandatory. The use of gastro-resistant oral forms may also be of interest with the objective of circumvent poor compliance to appropriate drug intake conditions.

P398

### CAPILLAROSCOPIC PROFILE IN UNDIFFERENTIATED CONNECTIVE TISSUE DISEASES

F. Mechid<sup>1</sup>, N. Bahaz<sup>1</sup>, H. Hafirassou<sup>1</sup>, R. Benaziez<sup>1</sup>, C. Dahou-Makhloufi<sup>1</sup>

<sup>1</sup>University of Algiers Benyoucef Benkhedda, Mohamed Lamine Debaghine Hospital, Algiers, Algeria

**Objective:** To describe microvascular damage in patients with undifferentiated connective tissue disease (UCTD).

**Methods:** It is an observational and descriptive study. We enrolled 70 patients who have clinical and serological manifestations of systemic autoimmune disease without fulfilling any of the existing classification criteria, which defines UCTD. Nailfold capillaroscopy was performed to all the patients. We identified demographic data, Raynaud phenomenon (RP) and microvascular abnormalities.

**Results:** Among the 70 patients with UCTD, 54 (77%) were female and the average age was 44 years old (range:16-70 y). 43 (61.4%) patients had RP. A scleroderma pattern was found in 11.4% (8/70) of patients. Non-specific capillaroscopic findings were observed in 86.04% of patients who have RP vs. 48% without RP ( $P = 0.0006$ ). There was significantly higher major capillary abnormalities in subjects with RP (72%) than in those without this latter (18.51%), ( $P = 10^{-5}$ ). However, there was no association between RP and minor capillary abnormalities.

**Conclusion:** Our study showed that RP is very common in the UCTD. In addition, RP seems to be related to nonspecific capillary abnormalities.

P399

### OUR EXPERIENCE WITH TERIPARATIDE (FORSTEO) IN PATIENTS WITH SEVERE OSTEOPOROSIS

V. P. Popova<sup>1</sup>, M. P. Gebeva<sup>0</sup> Popova<sup>2</sup>, Z. V. Vazhev<sup>3</sup>, Y. R. Ronchev<sup>4</sup>, K. K. Kraev<sup>2</sup>, A. B. Batalov<sup>2</sup>

<sup>1</sup>Medical University of Plovdiv, Dept. of Rheumatology, Medical Faculty, <sup>2</sup>Medical University of Plovdiv, Dept. of Rheumatology, Medical Faculty, <sup>3</sup>Medical University of Plovdiv, Dept. of Cardiac Surgery, Medical Faculty, <sup>4</sup>Medical University of Plovdiv, Dept. of Inubiology, Medical Faculty, Plovdiv, Bulgaria

**Objective:** Teriparatide is a recombinant human PTH containing 1-34 amino acid sequences of the natural PTH molecule. It is a unique anabolic drug indicated for the treatment of severe postmenopausal osteoporosis in women - initially untreated, as well as with an insufficient response from the current treatment, as well as in men with idiopathic osteoporosis and androgen deficiency. It is also indicated for the treatment of glucocorticoid induced osteoporosis (GCS) induced osteoporosis for both sexes.

**Methods:** There were 12 female patients aged 65-82 y, of which 8 with 2-4 vertebral fractures, in which the treatment with teriparatide is primary and 4 patients with severe osteoporosis with insufficient response to the current treatment - worsened indicators, in whom treatment is after 2 previous preparations. Mean baseline BMD T-score in the group with vertebral fractures BMD T-score - 3.91 SD, and in the group without fractures - BMD T-score - 3.89 SD. Patient observation period 36 months, including 18 months of treatment with teriparatide and investigating period of 18 months.

**Results:** No deterioration was observed in any patient - BMD T-score - 2.16 SD in the group with vertebral fractures, and BMD T-score - 1.92 SD in the group without vertebral fractures, in addition, in the control DXA after another 18 months was there was a mean improvement in scores of 0.3 in the first group and 0.24 in the second group of patients, respectively. Pain assessment with the VAS index was significantly affected after the end of teriparatide treatment - baseline levels of 92 and 85 mm, respectively, in both groups, and 36 and 32 mm, respectively, at the end of treatment with permanent retention and thereafter.

**Conclusion:** Treatment with teriparatide is the tool of choice for severe osteoporosis in the absence of contraindications for it with a powerful anabolic effect that lasts permanently over time, ensuring a high quality of life for our patients and indirectly reducing mortality in them.

P400

### MANAGEMENT OF BISPHOSPHONATE (BP) RELATED ATYPICAL FEMORAL FRACTURE (AFF)

A. Michael<sup>1</sup>, N. Obiechina<sup>2</sup>, Q. Mujeeb<sup>1</sup>

<sup>1</sup>Russells Hall Hospital, Dudley, <sup>2</sup>Queen's Hospital, Burton, UK

Case report: A 72 years old female had a fall resulting in left neck of femur fracture. She had alendronic acid 70 mg once weekly for 6 y and was on a drug holiday for a year when she broke her left hip. The fracture had radiological features suggestive of BP related AFF (Fig 1), and It was repaired with intramedullary nail (IMN). DXA scan showed that the overall lumbar spine T-score was -2.8, and at L3, T-score was -4.2. Having fractured in a drug holiday, and with DXA evidence of osteoporosis she was restarted on alendronic acid after a total of 20 months of drug holiday. Four years later, while on alendronic acid, she sustained a twisting injury to her right leg and experienced right hip pain for 3 months. X-ray was suggestive of healing bisphosphonate related right femur AFF (Fig 2). The BP was stopped and she was treated conservatively.

Discussion: AFF is a rare side effect of BP. An AFF is often complicated by delayed or nonunion. Patients with unilateral AFF are likely to have a contralateral AFF within a year.

To prevent AFF, patients should be calcium and vit D replete and the therapy duration should be regularly reassessed. Patients should have drug holidays when indicated. If patients develop thigh or groin pain they should have an XR of the femur. And patients who sustain an AFF should have an XR of the other femur.

Treatment: Discontinuation of the BP is essential. For complete AFF, an orthopaedic intervention is needed. For incomplete AFF, conservative management is the first step. Prophylactic nailing can be considered for patients with pain or those who did not respond to 3 months of conservative management. Teriparatide can be considered for AFF which do not heal however more evidence is needed. There is no place for denosumab in management of osteoporosis after BP related AFF. Also there is no clear evidence to whether antiresorptive measures can be retried after a certain period. There is a need for research to develop evidence based recommendations for treatment of bisphosphonate related AFF.

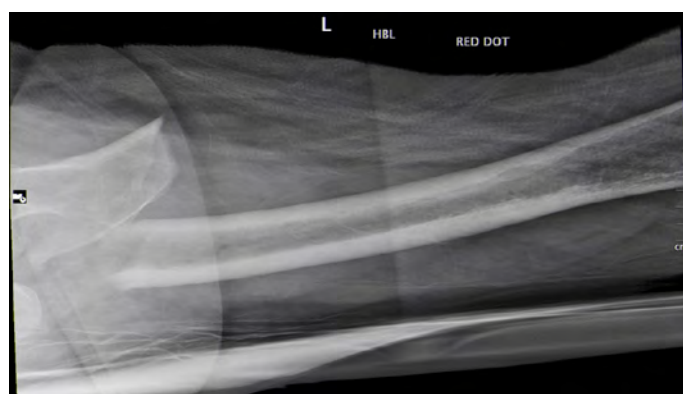


Figure 1.

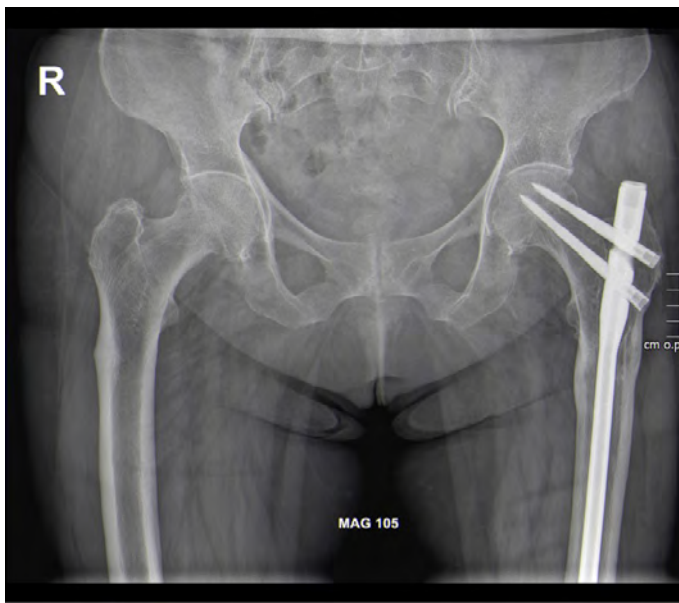


Figure 2.

P401

### EXPLORING SHARED PATHOGENESIS OF OSTEOARTHRITIS AND METABOLIC SYNDROME BY BIOINFORMATIC APPROACH

W. Dai<sup>1</sup>, Y. Cai<sup>2</sup>, X. Jiang<sup>3</sup>

<sup>1</sup>Decathlon International, Shanghai, China, <sup>2</sup>University of Heidelberg, Heidelberg, Germany, <sup>3</sup>Tongji University School of Medicine, Shanghai, China

**Objective:** Although increasing evidence has supported the close linkage between osteoarthritis (OA) and metabolic syndrome (MS), the interrelational mechanisms remain to be fully elucidated [1]. The aim of this study is to explore the shared pathological processes of OA and MS.

**Methods:** The gene expression profiles of OA and MS were retrieved from the Gene Expression Omnibus (GEO) database. The genes in the key module of MS were identified by weighted gene coexpression network analysis (WGCNA). The differentially expressed genes (DEGs) in MS were then intersected with genes in the key modules to obtain hub genes for MS. Next, the potential functions and pathways of hub genes were detected through the Gene Ontology (GO) and Kyoto Encyclopedia of Gene and Genome (KEGG) pathway enrichment analyses. Finally, single sample gene set enrichment analysis (ssGSEA) was operated to calculate the enrichment score of the harvested KEGG pathways in the control and OA patient samples.

**Results:** 51 modules were detected through the dynamic tree cutting method, among which the skyblue module ( $R=0.48$ ,  $P=0.007$ ) and indianred4 module ( $R=0.4$ ,  $P=0.03$ ) were positively correlated with clinical traits of MS. Besides, 372 DEGs were screened between the control and MS patient samples with 195 upregulated and 177 downregulated genes. The result of Venn analysis suggested that 61 hub genes related to MS were identified as hub genes by overlapping the 372 DEGs and 212 genes in the key module (Figure 2). The KEGG result highlighted that the hub genes were mainly concentrated on platelet activation, complement and coagulation cascades, and hematopoietic cell lineage. According to the selected enriched pathways analyzed by the KEGG algorithm, we uncovered that the pathways of arachidonic acid metabolism, fatty acid metabolism and platelet activation play a vital role in the pathogenesis of OA (Figure 3).

**Conclusion:** Our work identified potential common pathogenesis of OA and MS. These shared pathways might provide a novel idea for further mechanistic studies in comorbidity between OA and MS. Further studies will focus on identifying and validating hub genes as potential target for both diagnosis and treatment of OA and MS.

**Reference:** 1. Valdes, AM. Osteoarthritis Cartilage 2020;28:7.

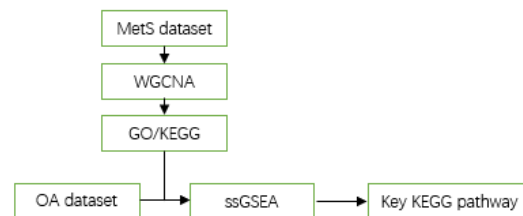


Figure 1. Workflow of this study.

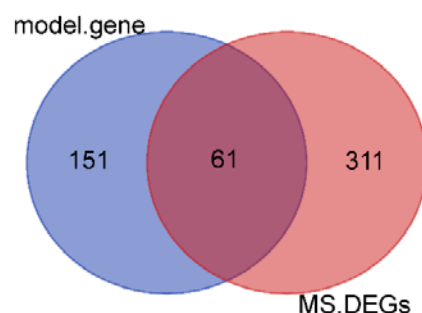


Figure 2. Venn diagram of the overlap between DEGs (right circle) and key module genes (left circle).

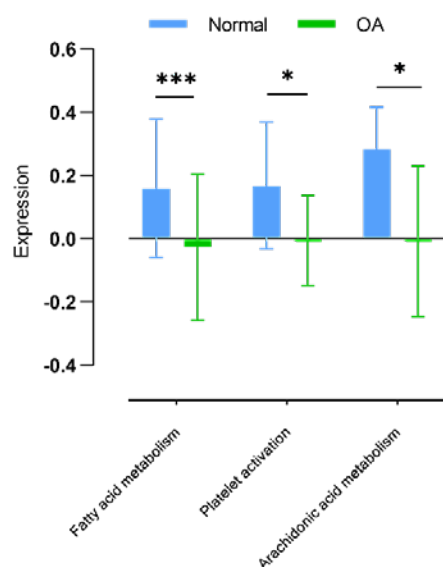


Figure 3. Differentiated expression of KEGG pathways in normal and OA samples.

P402

### MONTHLY CALCIFEDIOL 0.266 MG SOFT CAPSULES ARE MORE EFFICIENT AND PREDICTABLE THAN MONTHLY CHOLECALCIFEROL 25000 IU: RESULTS FROM A 12-MONTH RANDOMISED CLINICAL TRIAL

J. Del Pino-Montes<sup>1</sup>, J. L. Perez-Castrillón<sup>2</sup>, A. Dueñas-Laita<sup>3</sup>, G. Hernández<sup>4</sup>, S. P. Chinchilla<sup>4</sup>, A. García-Bea<sup>5</sup>

<sup>1</sup>Hospital Universitario de Salamanca and Universidad de Salamanca, Salamanca, <sup>2</sup>Hospital Universitario Río Ortega and Universidad de Valladolid, Valladolid, <sup>3</sup>Hospital Universitario Río Ortega and Universidad de Valladolid, Valladolid, <sup>4</sup>Faes Farma, R&D and Innovation Department, Leioa, <sup>5</sup>Faes Farma, Medical Affairs, Leioa, Spain

**Objective:** To assess the efficacy and safety of long-term treatment with monthly calcifediol 0.266 mg soft capsules compared to monthly cholecalciferol 25000 IU in vitamin D deficient postmenopausal women.

**Methods:** This was a phase III-IV, double blind, randomised, controlled, multicentre superiority clinical trial. Postmenopausal women (25(OH)D<20 ng/mL) were randomised to three arms: Group A1) monthly calcifediol 0.266 mg for 12 months; Group A2) monthly calcifediol 0.266 mg for 4 months followed by placebo for 8 months; and Group B) monthly cholecalciferol 25000 IU for 12 months.

**Results:** 170 postmenopausal women were included in the PP population, with mean basal 25(OH)D levels of 12.9±3.9 ng/mL. The primary endpoint (at month 4) was previously reported. At month 12, the increments of 25(OH)D levels per microgram of drug administered represented an approximately 3.2 higher potency of calcifediol over cholecalciferol (p<0.0001). When patients were divided into two groups according to basal levels, the potency of calcifediol was 2.3 and 3.5 times higher than cholecalciferol in subjects with basal 25(OH)D levels <10 ng/mL and between 10-20 ng/mL, respectively. This difference in potency was due to fairly stable increments in calcifediol group, regardless of baseline levels, but a different increment depending on basal 25(OH)D levels in cholecalciferol group. After 4 months, a steady state was observed in 25(OH)D levels in both calcifediol (Group A1) and cholecalciferol groups. 25(OH)D levels of Group A2 reverted to baseline by month 12.

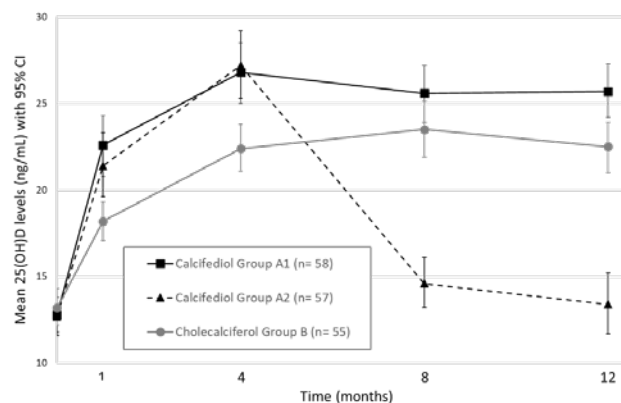


Figure 1. Mean 25(OH)D levels (ng/mL) per treatment group (PP population)

After 12 months, the maximum 25(OH)D levels reached in any of the study groups were far from the levels considered pathologic.

**Conclusion:** Monthly calcifediol is more potent and raises 25(OH)D levels faster and in a more predictable way than cholecalciferol. Maintained treatment with calcifediol has proven to be effective and safe, reaching a steady state. Its maintenance is necessary to avoid returning to basal levels.

**Acknowledgments:** Osteoferol Study Group principal investigators and their teams: F Cereto, ML Brandi, E Jodar, JM Quesada-Gómez, JM Olmos-Martínez, MA Colmenero-Camacho, R Alhambra, C Gómez-Alonso, B Galarraga

**Disclosures:** Javier del Pino Consultant of: Gedeon, Grant/research support from: Roche, Bristol, Faes Farma, José Luis Pérez-Castrillón Consultant of: Farmalider, Faes Farma, Gedeon-Richter, Grant/research support from: Farmalider, Pfizer, Speakers bureau: Amgen, Lilly, MSD, Faes Farma, Theramex, Gruentall, Antonio Dueñas-Laita Consultant of: Faes Farma, Farmalider, Grant/researchsupport from: Pfizer, Speakers bureau:



Merk-Serono, Gonzalo Hernandez Employee of: Faes Farma, Sandra Pamela Chinchilla Employee of: Faes Farma, Aintzane García-Bea Employee of: Faes Farma

P403

### RELATIONSHIP BETWEEN THE FUNCTIONALITY OF WOMEN'S KNEES WITH OSTEOARTHRITIS SUBMITTED TO A PHYSICAL EXERCISE PROGRAM AND THE VARIATION OF THE CTX-II BIOMARKER FOR DEGRADATION OF ARTICULAR CARTILAGE

P. R. Moraes<sup>1</sup>, H. H. Pohl<sup>1</sup>, A. R. M. Valim<sup>1</sup>

<sup>1</sup>Universidade de Santa Cruz do Sul, Santa Cruz do Sul, Brazil

**Objective:** To evaluate the serum levels of the CTX-II biomarker for cartilage degradation and joint function in women with knee OA undergoing a planned practice of resisted physical exercises to strengthen the knee muscles.

**Methods:** 29 women with knee OA, older than 50 y, were included in the study. They underwent an intervention in the form of a program of a planned exercise practice for strengthening the knee extensor and flexor muscles for a period of 8 weeks. Before and after the end of the program, the blood serum level of the CTX-II biomarker was analyzed, as well as the WOMAC questionnaire and a sociodemographic and health questionnaire.

**Results:** There was a reduction in pain, stiffness and pre-intervention physical function ( $p < 0.001$ ), with a mean magnitude of  $-5.52 \pm 2.59$  points (43%),  $-2.03 \pm 1.12$  points (41%) and  $-18.21 \pm 8.64$  points (43%), respectively. Regarding the CTX-II outcome, the mean magnitude of  $0.005 \pm 0.180$  ng/mL (2%) increase from pre-post-intervention was not sufficient to be considered statistically significant ( $p = 0.991$ ) maintenance of their concentrations. In order to verify the existence of associations between the WOMAC domains and the CTX-II concentrations, Spearman's correlation tests were performed, where no significant correlations were observed when compared to the pain score ( $p = 0.724$ ), stiffness ( $p = 0.107$ ) and the physical function ( $p = 0.296$ ) at the pre-intervention with the CTX-II concentration at the same time.

**Conclusion:** Although there was an improvement in pain, stiffness and functionality after the intervention to strengthen knee flexors and extensors, the same did not occur with CTX-II concentrations that remained unchanged. Thus, there is not always an increase in joint degradation in women with knee OA when submitted to resisted exercises for quadriceps and hamstrings.

P404

### THE SUPERIORITY OF DANCE IN IMPROVING JOINT FUNCTION IN LADIES WITH KNEE OSTEOARTHRITIS

P. R. Moraes<sup>1</sup>, H. H. Hildegard<sup>1</sup>, A. R. M. Valim<sup>1</sup>

<sup>1</sup>Universidade de Santa Cruz do Sul, Santa Cruz do Sul, Brazil

**Objective:** To compare joint function among women with knee OA who participate in a monitored physical activity program of stretches and resistance exercises for senior citizens and among participants of a recreational dance group.

**Methods:** The study included 47 women with knee OA, older than 50 y. One group, containing 25 participants, was from women participating in a recreational dance group for the elderly; the other, a total of 22 women performed a program of physical activity monitored stretching and resistance exercises for the elderly. All were interviewed and answered a sociodemographic and health questionnaire; in the same way, the joint function was evaluated by the WOMAC questionnaire.

**Results:** The participants had similar sample characteristics regarding sociodemographic and health characteristics. The participants in the physical activity group had a higher score in the WOMAC questionnaire in relation to the dimensions of pain ( $p < 0.001$ ), as well as in stiffness ( $p < 0.001$ ) and physical function ( $p < 0.001$ ), when compared to those in the dance group.

**Conclusion:** These results demonstrate that women with knee OA who participate in a recreational dance group, when compared with groups, practice monitored physical activity of stretching and resistance exercises for the elderly, have less pain, less rigidity and better physical function knee.

P405

### EFFECTS OF A 12-MONTH SUPERVISED EXERCISE INTERVENTION ON VERTEBRAL FRACTURE INCIDENCE IN PATIENTS WITH VERTEBRAL FRAGILITY FRACTURE AND PATIENTS WITH A HIGH RISK OF FRACTURE

A. C. Guzmán-Rico<sup>1</sup>, F. Torres-Naranjo<sup>1</sup>, D. F. Solórzano-Moreno<sup>1</sup>, R. G. González-Mendoza<sup>2</sup>, A. Gaytán-González<sup>2</sup>, J. R. López Y Taylor<sup>2</sup>

<sup>1</sup>Centro de Investigación Ósea y de la Composición Corporal, CIO,

<sup>2</sup>Instituto de Ciencias Aplicadas a la Actividad Física y al Deporte, Centro Universitario de Ciencias de la Salud, Universidad de Guadalajara, Guadalajara, Mexico

**Objective:** Vertebral fractures are a significant independent risk for vertebral and non-vertebral fragility fractures. Subjects with an incident vertebral fragility fracture remain at imminent risk for further fragility fractures within the next twelve months. Since

factors such as impaired mobility, previous falls, spinal curve deformity, and back extensor weakness contribute to this risk, therapeutic exercise is a non-pharmacological intervention that potentially reduces the risk of new onset fractures. This study aimed to assess the effects of 12-month supervised spinal exercises of proprioceptive extension and postural strengthening on vertebral fracture rates in patients at high risk and incident vertebral fragility fractures.

**Methods:** We evaluated women aged 50 y or older with osteoporosis, at least one incident vertebral fracture, and at high fracture risk. Clinical history, physical capabilities, BMD, and vertebral morphology were assessed at baseline, the 6th and 12th month. All participants conducted a 30-min supervised program of physical exercises twice a week for 3 weeks. After that, they were instructed to perform the exercises 5 d/week at home with periodic monthly supervision. The program consisted of static and dynamic movements to strengthen the spinal extensor muscles, increase mobility, and improve static and dynamic posture. Loads and volumes were calculated individually. Resistance bands and body weight were used. All patients received specific medical treatment for osteoporosis.

**Results:** 51 women 50-85 years old (mean 65.2, SD 6.6) with osteoporosis (T-score mean -2.9, SD 0.98) and at least one incident vertebral fracture or with a very high risk of fracture were evaluated, 48 participants completed the follow-up. At baseline, 62.7% of the patients presented some postural alteration, 47% a limited range of motion of joints (ROM), and 35% at least one fall in the last year. By the end of the follow-up, there were no new vertebral fractures nor worsening of existing ones. All patients showed improvements in posture, ROM, and fall frequency.

**Conclusion:** Our observations suggest that a twelve-month supervised exercise program is safe in populations at high risk for fracture when standard osteoporosis treatment is given. In addition to that, it can provide other benefits, such as better back mobility, and perhaps help reduce the risk of fractures. Controlled clinical trials designed to assess the contribution of an exercise-based intervention on fracture risk are foreseen.

P406

### FRACTURE LIAISON SERVICE (FLS) IN MANAGING OSTEOPOROTIC FRACTURE IN TERTIARY HOSPITAL CENTRE, MALAYSIA

J. F. Leong<sup>1</sup>, K. X. L. Law<sup>1</sup>, N. S. Z. Abidin<sup>1</sup>, L. K. Belani<sup>1</sup>, H. Mahadzir<sup>2</sup>, D. K. A. Singh<sup>3</sup>, N. A. Wahab<sup>4</sup>, M. K. Yin<sup>5</sup>, Z. A. Samad<sup>6</sup>, S. A. Mokhtar<sup>1</sup>

<sup>1</sup>Fracture Liaison Service, Orthopaedic & Traumatology Dept., Hospital Canselor Tuanku Muhriz, <sup>2</sup>Geriatric Unit, Dept. of Internal Medicine, Hospital Canselor Tuanku Muhriz, <sup>3</sup>Center of Health Aging and Wellness, Faculty of Health Sciences, Universiti Kebangsaan Malaysia, <sup>4</sup>Endocrine Unit, Dept. of Internal Medicine, Hospital Canselor Tuanku Muhriz, <sup>5</sup>Dept. of Pharmacy, Hospital Canselor Tuanku Muhriz, <sup>6</sup>Dept. of Rehabilitation, Hospital Canselor Tuanku Muhriz, Kuala Lumpur, Malaysia

**Objective:** Osteoporosis management following a fragility fracture has been poor across the globe. Leong JF et al (2018) demonstrated that only 19% of patients have been given antiosteoporotic medication following a fragility fracture at UKM Medical Centre (UKMMC). FLS is a multidisciplinary systemic approach to reduce subsequent fracture risk in patients with a recent fragility fracture which include appropriate medication treatments with monitoring of compliance and adherence. The aim of the study is to evaluate the effectiveness of FLS in improving management following fragility fracture in UKMMC.

**Methods:** It is a prospective study of patients with recent fragility fracture from January 2019 to December 2019. Data collected included demographic and drug prescriptions related to osteoporosis treatment. The data was then compared with previous study from January 2016 to December 2016 before implementation of FLS.

**Results:** 242 patients were identified with a mean age of 76 years old. Majority were females (78.9%) and highest incidence were the Chinese (63.2%) followed by Malays (25.6%) and Indians (11.2%). Fractures sustained were hip (38.2%), wrist (23.9%), spine (16.9%), other lower limbs (11.1%), other upper limbs (4.1%) and more than one fractures (5.4%). There was a significant increase in patients getting antiosteoporotic treatment from 19% to 72%. Supplement prescription have also improved from 54.6% to 91.3% for calcium and 43% to 90.1% for vitamin D. With FLS, the percentage of patients having BMD assessment have also improve from 18.6% to 54.5%. Patients adherence to antiosteoporotic medication was 83% for 6 months and 82.3% for 12 months.

**Conclusion:** FLS has proven to be effective in improving drug prescription and adherence among patients with recent fragility fractures. As a result, our hospital was the first hospital in Malaysia to be awarded the Silver Award by the International Osteoporosis Foundation for 'Capture the Fracture Best Practice'.

P407

# BONE MINERAL DENSITY AND ITS RELATIONSHIP TO MUSCLE STRENGTH IN POSTMENOPAUSAL WOMEN WITH KNEE OSTEOARTHRITIS

J. Averkieva<sup>1</sup>, T. Raskina<sup>1</sup>, M. Letaeva<sup>1</sup>, M. Koroleva<sup>1</sup>, O. Malysenko<sup>1</sup>

<sup>1</sup>Kemerovo State Medical University, Kemerovo, Russia

**Objective:** To evaluate the relationship between the state of BMD and muscle strength of the hand and in postmenopausal women with osteoarthritis (OA) of the knee joint.

**Methods:** The study included 50 female patients (mean age 64 (58.3; 66) y) with a diagnosis of knee joint OA established according to the ACR criteria (1991). The control group consisted of 50 women without clinical signs of OA (mean age 64 (60.3; 68) y).

**Results:** Osteopenic syndrome (OPS) in the study cohort was detected in 95 (95%) women. In the group of women with OA of the knee joint OPe in 24 (48%), OP in 23 (46%). In patients with OA of the knee joint, OPe was recorded significantly more often ( $p=0.029$ ) than in the control group. OP, on the contrary, was more common in women without OA of the knee joint ( $p=0.024$ ). The median index of carpal dynamometry in the group of patients with OA of the knee joint was 17.4 (16.8;18.4) kg, which was significantly lower than the same indicator in the control group-18.9 (17.6; 21.7) kg ( $p<0.001$ ). It was found that in women with OA of the knee joint, the absolute value of muscle strength decreased in direct proportion to the decrease in BMD ( $p<0.001$ ). Thus, in patients with normal BMD, this indicator was 20.0 (20.0; 20.1) kg, in women with OPe-18.2 (17.3;18.6) kg, in patients with OP-16.9 (16.4; 17.3) kg. According to the results of the correlation analysis, it was found that the indicators of carpal dynamometry significantly positively correlated with the T-criterion of the femoral neck and lumbar spine ( $r=0.450$ ,  $p=0.001$  and  $r=0.664$ ,  $p<0.001$ , respectively). A similar relationship of muscle strength was established with the BMD of the femoral neck and lumbar spine ( $r=0.484$ ,  $p<0.001$  and  $r=0.678$ ,  $p<0.001$ , respectively).

**Conclusion:** A decrease in BMD in women with OA was significantly associated with a significant decrease in muscle strength.

P408

# INCIDENCE OF SUBSEQUENT FRACTURE FOLLOWING OSTEOPOROTIC FRACTURE IN A FRACTURE LIAISON SERVICE HOSPITAL: A PROSPECTIVE STUDY

J. F. Leong<sup>1</sup>, S. T. Ooi<sup>1</sup>, D. G. R. Rao<sup>1</sup>, K. X. L. Law<sup>1</sup>, N. S. Z. Abidin<sup>1</sup>, L. K. Belani<sup>1</sup>, R. A. Rani<sup>1</sup>, A. F. Don<sup>1</sup>, S. A. Mokhtar<sup>1</sup>

<sup>1</sup>Fracture Liaison Service, Orthopaedic & Traumatology Dept., Hospital Canselor Tuanku Muhriz, Kuala Lumpur, Malaysia

**Objective:** Patients who sustained an osteoporotic fracture are at increased risk of sustaining another fracture hence efforts are directed towards secondary fracture prevention. The aim of this study was to determine the incidence of subsequent fractures in patients with fragility fracture and to look at their general health outcomes in a tertiary hospital center with the availability of Fracture Liaison Service (FLS).

**Methods:** We analyzed our FLS registry and a prospective observational cohort study was performed from August 2018 to February 2019. These patients with osteoporotic fractures were identified the first 6 months and a minimum follow-up of one year to determine the risk of secondary fracture. The demographic data, quality of life and physical activities, and prevalence of antiosteoporotic medication were also identified.

**Results:** A total of 124 patients (31 males, 93 females) were identified. Majority sustained hip fractures ( $n=72$ , 58.1%), followed by wrist fracture ( $n=16$ , 12.9%), spine ( $n=14$ , 11.3%), other lower limb fracture ( $n=13$ , 10.4%) and other upper limb fractures ( $n=9$ , 7.3%). The incidence of subsequent fracture was 3.2% ( $n=4$ ) within one year. The mortality rate was 18.2% ( $n=31$ ). During the study period, Patients were prescribed with calcium ( $n=114$ , 91.9%), vitamin D ( $n=115$ , 91.9%) and antiosteoporotic drugs ( $n=100$ , 80.6%). Katz ADL score showed that patients with conservative treatment were not be able to get full functional status after one year compared with those with surgical treatment ( $P<0.05$ ).

**Conclusion:** Incidence of subsequent fracture following fragility fracture within one-year in our study was 3.2% which is comparative with other studies in a hospital with FLS. The mortality rate in fragility fracture patients was 18.2% and majority were hip fracture patients.

P409

# BONE MINERAL DENSITY AND RISK FACTORS FOR OSTEOPOROSIS IN POSTMENOPAUSAL WOMEN WITH KNEE OSTEOARTHRITIS

J. Averkieva<sup>1</sup>, T. Raskina<sup>1</sup>, M. Koroleva<sup>1</sup>, M. Letaeva<sup>1</sup>, O. Malysenko<sup>1</sup>

<sup>1</sup>Kemerovo State Medical University, Kemerovo, Russia

**Objective:** To evaluate BMD and risk factors for osteoporosis (OP) in postmenopausal women with knee OA.

**Methods:** The study included 100 female patients aged 44-75 y, including 50 patients with OA of the knee joints and 50 comparable age women without OA. The survey established the presence of the following main risk factors for the development of OP: age 65 y and older, the presence of previous low-energy fractures, family history of OP, low weight (<57 kg) or low BMI (<20 kg/m<sup>2</sup>), smoking.

**Results:** The value of the BMD and T-test in the femoral neck in patients without OA was significantly lower both in comparison with the indicators of patients with stage I-II and stage III-IV OA. Thus, the BMD in the femoral neck in women without OA was 0.712 (0.632; 0.764) g/cm<sup>2</sup>, which corresponded to -2.40 (-2.70; -2.00) CO according to the T-criterion ( $p < 0.001$ ). The BMD of the indicated localization in patients with stage I-II OA was 0.889 (0.824; 0.943) g/cm<sup>2</sup> and corresponded to -1.75 (-2.27; -1.13) CO according to the T-criterion ( $p < 0.001$ ), in patients with stage III-IV - 0.913 (0.813; 1.02) g/cm<sup>2</sup> and -1.60 (-1.72; -1.3) CO according to the T-criterion ( $p = 0.001$ ). When comparing the BMD and T-test in the lumbar spine, no significant differences were found between the study groups ( $p > 0.050$ ). When analyzing the occurrence of a family history of osteoporosis, it was noted that this risk factor was registered with a higher frequency in women without OA and with OA of stage I-II (58.0 and 68.4%, respectively) compared to the same indicator in the group of patients with OA of stage III-IV (25.5%) ( $p = 0.049$  and  $p = 0.345$ , respectively). The remaining risk factors for OP were found with a comparable frequency in all three groups of patients.

**Conclusion:** The presence of OA in postmenopausal women is associated with higher rates of BMD in the femoral neck.

P410

# CERULOPLASMIN: A SURROGATE MARKER OF OSTEOPOROSIS

S. Das<sup>1</sup>, S. Verma<sup>2</sup>

<sup>1</sup>Ram Manohar Lohia Hospital, Delhi, <sup>2</sup>SMSR, Noida, India

**Objective:** Osteoporosis is a bone disorder and is currently a major global health issue. Ceruloplasmin (CP) is an acute phase reactant and antioxidant, characterized by ferroxidase activity and increases in inflammation. C-reactive protein (CRP), an acute phase protein belonging to pentraxin family of proteins. This study was designed to investigate the role of acute phase reactants CP and CRP in the screening of osteoporosis. This study aimed to evaluate the role of serum CP and CRP as biomarkers of osteoporosis.

**Method:** This study was conducted in the Bone Clinic and the biochemistry department of a tertiary care hospital. 120 participants were included in the study belonging to the age group of 50-80 y. Participants in the group were divided into two groups, group I comprising of patients with osteoporosis, and group II consisted of patients without osteoporosis (n=56) (control group) (n=64). Patients were classified into the two groups on the basis of BMD measurements using DXA scanning. CRP and serum CP levels were analyzed in blood samples by immunoturbidimetry.

**Results:** Serum CP levels were significantly higher in osteoporosis patients as compared to the control group. A significant positive correlation ( $r = 0.92$ ,  $p < 0.05$ ) was observed between higher serum levels of CP and higher levels of CRP in the osteoporosis patients. There was a significant difference in the CP levels of the osteoporosis group ( $68.4 \pm 7.2$  mg/dl) and the control group ( $37.3 \pm 4.9$  mg/dl) ( $p < 0.05$ ). CRP levels also differed significantly among the osteoporosis patients ( $2.23 \pm 0.68$  mg/dl) and the control participants ( $1.07 \pm 0.42$  mg/dl) ( $p < 0.05$ ).

**Conclusion:** Our study demonstrates that measurement of serum CP levels has potential as a surrogate marker for patients with osteoporosis



P411

**MORTALITY OUTCOME OF OSTEOPOROTIC HIP FRACTURE: OPERATIVE VS. NONOPERATIVE INTERVENTION**N. S. Z. Abidin<sup>1</sup>, J. F. Leong<sup>1</sup>, K. X. L. Law<sup>1</sup>, L. K. Belani<sup>1</sup>, R. A. Rani<sup>1</sup>, A. F. Don<sup>1</sup>, S. A. Mokhtar<sup>1</sup><sup>1</sup>Fracture Liaison Service, Orthopaedic & Traumatology Dept., Hospital Canselor Tuanku Muhriz, Kuala Lumpur, Malaysia

**Objective:** Hip fractures are common in the elderly and the mortality rate of these patients have been well documented with a rate of approximately 10% and 30% at one month and one year respectively. The aim of this study is to compare the outcomes following hip fracture between those treated operatively and non-operative management.

**Methods:** Demographic and clinical data of patients admitted to Hospital Canselor Tuanku Muhriz aged 60 and above with osteoporotic hip fractures from January-December 2019 were reviewed. The data on mortality and cause of death were collected retrospectively through the hospital electronic medical record and telephone interviews.

**Results:** A total of 112 patients were included in the study with a mean age of 76.9±8.9 (68.2% female, 31.8% male). The majority of patients were Chinese (68.2%) followed by Malays (21.8%) and Indians (9.2%). 50 patients were treated surgically and 62 were treated conservatively. The overall 1-y mortality rate following an osteoporotic hip fracture in 2019 was 17.0%. The 6-month and 1-y mortality were higher (15 and 25% respectively) in the nonoperative group. There were no deaths reported at month six while two patients (4%) died by the end of the first year in the operative group. The majority of patients treated conservatively were cited as unfit for surgery (66.2%). Other reasons for nonoperative treatment include personal choice (21.5%) and cost (10.8%). The most common causes of death recorded in the nonoperative group were sepsis (33.3%), old age (20.0%) and renal failure (13.3%).

**Conclusion:** The overall mortality outcomes of hip fractures were lower in the operative group. The 1-y mortality rate in conservatively treated patients were similar to published data. Therefore, osteoporotic hip fracture patients should be advised to undergo surgical management to prevent further complications and patient should be counselled the risk if treated conservatively.

P412

**OSTEOPOROSIS KNOWLEDGE AND AWARENESS AMONG MEDICAL STUDENTS IN MALAYSIA**K. X. L. Law<sup>1</sup>, J. F. Leong<sup>1</sup>, N. S. Z. Abidin<sup>1</sup>, S. T. Ooi<sup>1</sup>, D. G. R. Rao<sup>1</sup>, L. K. Belani<sup>1</sup>, S. A. Mokhtar<sup>1</sup><sup>1</sup>Fracture Liaison Service, Orthopaedic & Traumatology Dept., Hospital Canselor Tuanku Muhriz, Kuala Lumpur, Malaysia

**Objective:** Osteoporosis is a prevalent health problem in an ageing population like Malaysia. Increasing the knowledge and awareness of osteoporosis is essential in efforts to decrease the incidence of osteoporosis. Hence, emphasis on this topic in the undergraduate medical curriculum is essential as medical students are the future frontliners in our healthcare system. Our aim is to assess osteoporosis knowledge and awareness among medical students in our institution.

**Methods:** A cross-sectional study was conducted among Year 4 medical students undergoing Orthopaedic rotation at Faculty of Medicine, Universiti Kebangsaan Malaysia. The students were divided into two groups. One group was assessed at the beginning of the rotation and the second group was assessed at the end of the rotation where an osteoporosis module was delivered. Assessment of knowledge and awareness of osteoporosis was completed using validated Osteoporosis Questionnaire(OPQ).

**Results:** A total of 72 Year 4 medical students were enrolled in our study. The mean total OPQ score was (14.4±4.6). Students who attended osteoporosis module were found to have significantly higher ( $p \leq 0.001$ ) mean OPQ scores (16.7±3.4); as compared to the group of students at the start of rotation with mean score (10.7±3.9). Mean score was also analysed based on each component of OPQ. Students who completed the module performed better with mean score of general information (4.1±1.1), risk factors (6.2±1.1), consequences (3.3±1.2) and treatment of osteoporosis (3.2±1.2) compared to the other group with mean score of general information (3.2±1.2), risk factors (4.8±1.9), consequences (1.4±1.4) and treatment of osteoporosis (1.4±2.0). They were also able to provide more detailed description of osteoporosis, wider range of treatment options and more aware of disease complication than the other group.

**Conclusion:** The OPQ mean score of Year 4 medical students who had gone through the module was higher than those who had not. Osteoporosis modules can improve knowledge and awareness among medical students. The gap in osteoporosis knowledge was more pronounced in the domain of risk factors and consequences compared to general information and treatment of osteoporosis.

P413

# IS PLASMA PARATHYROID HORMONE RELATED PEPTIDE REALLY RELATED WITH BONE MINERAL DENSITY IN EUGONADAL PROLACTINOMA PATIENTS?

A. Okyar Baş<sup>1</sup>, M. Cinel<sup>2</sup>, ? Demir<sup>2</sup><sup>1</sup>Ankara University Faculty of Medicine, Dept. of Internal Medicine,<sup>2</sup>Ankara University Faculty of Medicine, Dept. of Internal Medicine, Endocrinology & Metabolic Diseases, Ankara, Turkey

**Objective:** There are various hypotheses for the aetiology of osteoporosis in patients with prolactinoma, and the increased level of the parathyroid hormone-related peptide (PTHrP) is one of them.<sup>1</sup> This study aims to investigate the presence of increased PTHrP and its possible effects on BMD in premenopausal women and men with normal gonadal function by excluding the negative effect of prolactin on the gonadal system.

**Methods:** We enrolled in 29 eugonadal prolactinoma patients and 31 healthy individuals. Serum prolactin, gonadal steroids, TSH, fT3, fT4, calcium, phosphorus, albumin, PTH, alkaline phosphatase, 25OHvitaminD, 24-h urine calcium, PTHrP and BMD (lumbar spine, femur, radius) were measured from participants.

**Results:** Between the prolactinoma patients and the control group, there was no statistically significant difference in PTHrP levels ( $p=0.288$ ). Both in the control group and the study group, the PTHrP levels were higher in men than in women ( $p<0.05$ ). The relationship between the serum levels of PTHrP and BMD in g/cm<sup>2</sup> was evaluated, and no statistically significant relationship was observed ( $p=0.330$  for the femur,  $p=0.389$  for the lumbar vertebrae, for the radius: 0.938).

**Conclusion:** Contrary to studies in which the elevated level of PTHrP has been reported as one of the factors that play a role in the development of osteoporosis in patients with prolactinoma, no significant relationship found in this study. As this study is the first study claiming physiological PTHrP level differences between genders, further large-sampled studies needed to confirm this finding.

**Reference:** 1. Stiegler C, et al. J Bone Miner Res 1995;10:751.

P414

# CLUSTER ANALYSIS OF PATIENT-REPORTED OUTCOME MEASURES OF ADULTS WITH X-LINKED HYPOPHOSPHATAEMIA

S. Cole<sup>1</sup>, M. T. Sanchez-Santos<sup>1</sup>, S. Kolovos<sup>1</sup>, M. K. Javaid<sup>1</sup>, R. Pinedo-Villanueva<sup>1</sup><sup>1</sup>University of Oxford, Oxford, UK

**Objective:** To identify distinct subgroups of adults with X-linked hypophosphataemia (XLH) based on their patient-reported outcomes.

**Methods:** We used data from adults with XLH registered in RUDY, a UK rare diseases cohort study. We applied cluster analysis using the K-means method to 7 patient-reported outcome measures (PROMs): EQ5D-5L and SF-36 physical and mental component scores (PCS and MCS) as measures of quality of life (QoL), FACIT-F of fatigue, PainDETECT and SF-MPQ-2 of pain, PSQI of sleep quality, and HADS of anxiety and depression. Instruments' scores were standardised so that all variables would be comparable. The average silhouette and elbow method were used to determine the optimal number of clusters.

**Results:** 17 participants (76.5% females, median age 41 y) completed all seven PROMs at their first submission. Optimal number of clusters was two. The "higher-score" cluster included 11 participants reporting higher (better) mean QoL scores compared to the "lower-score" group (EQ5D-5L=0.817, PCS=45.40 and MCS=51.31, compared to 0.288, 19.54, and 43.44, respectively). They also reported better sleep quality (PSQI=7.64 compared to 12.67), less fatigue (FACIT-F=125.32 vs. 78.00), less pain (SF-MPQ-2=1.03 compared to 3.58), and lower likelihood of being categorised with neuropathic pain (PainDETECT=5.64 vs. 14.17) and depression (HADS=3.18 vs. 8.17). Anxiety was found to be similar between clusters (HADS=6.73 vs. 6.50).

**Conclusion:** This analysis shows that adults diagnosed with XLH report broadly heterogeneous PROMs which, even with a limited sample size, allow them to be split into two very distinct subgroups, one with consistently better pain, sleep, fatigue, and depression than the other. Comparisons with other rare disease groups, other musculoskeletal conditions, and the general population would provide an important benchmark.

**Acknowledgments:** We would like to thank both the RUDY team and participants of the RUDY study who have enabled this work.

**Disclosure:** This research was partially funded through a grant from Kiowa Kirin International; they had no part in the conduct or shaping of the study.

P415

# RISK OF FRACTURES IN PATIENTS WITH OPPORTUNISTICALLY IDENTIFIED VERTEBRAL FRACTURES: AN OBSERVATIONAL COHORT STUDY

M. K. Skjødt<sup>1</sup>, C. Libanati<sup>2</sup>, J. Nicolaes<sup>2</sup>, A. Moayyeri<sup>2</sup>, K. R. Olsen<sup>3</sup>, C. Cooper<sup>4</sup>, B. Abrahamsen<sup>1</sup>

<sup>1</sup>Dept. of Medicine, Hospital of Holbæk, Holbæk, Denmark, <sup>2</sup>UCB Pharma, Brussels, Belgium, <sup>3</sup>DaCHE, Institute of Public Health, University of Southern Denmark, Odense, Denmark, <sup>4</sup>MRC Lifecourse Epidemiology Unit, University of Southampton, Southampton General Hospital, Southampton, UK

**Objective:** To assess the risk of subsequent fractures in subjects with opportunistically identified vertebral fractures (VF) vs. subjects with no VF on CT scans performed as part of daily clinical practice.

**Methods:** This is an observational cohort study in 2000 men and women  $\geq 50$  y, undergoing a CT scan of the chest and/or abdomen in 2010-2011 at Holbæk Hospital, Denmark. The CT scans were re-evaluated to identify prevalent VF in a process blinded to clinical information. Subjects were excluded if they had no or less than 1 year registry data available, if migrated before baseline (date of CT), or if treated with anti-osteoporosis medications in the year prior to baseline. Subjects with VF on the CT were matched on age and gender against those with no VF in a 1:2 ratio, to form the exposed (VF on CT) and comparator (no VF) cohorts. The cohorts were followed for up to 7 y in the Danish health registers. The primary outcome was the risk of any fracture (excluding face, skull and digits) from baseline until censored in the exposed vs the comparator cohort, evaluated by Cox proportional hazards regression analysis.

**Results:** Of the 2000 CT scans, 423 had at least one prevalent VF (21.2%), while 1577 had no visible VF. After exclusion and matching, 325 subjects were included in the exposed cohort (VF on CT) and 605 in the comparator cohort (no VF). Median age was 72 y in both cohorts and 54% were men. Mean follow-up was 2.3 and 3.48 y in the exposed and the comparator cohort, respectively, during which a total of 31 and 49 fractures were accrued. Incidence rates were 41.47 and 23.27 fractures per 1000 patient-years. The crude hazard ratio was 1.74 (1.11-2.73;  $p < 0.05$ ).

**Conclusion:** Subjects with opportunistically identified VF on CT scans performed as part of daily clinical practice and not treated with anti-osteoporosis medications face a significantly increased risk of subsequent fractures as compared to subjects with no VF. Identifying these individuals offers an opportunity to improve secondary fracture prevention.

**Acknowledgements:** UCB and Amgen co-funded this study. All statistical analyses carried out by MKS.

**Disclosures:** MKS: Institutional research grant, UCB/Amgen. Educational grant, UCB.

CL, JN, AM: Employee and stock ownership, UCB Pharma. KRO: No disclosures. CC: Personal fees from Alliance for Better Bone Health, Amgen, Eli Lilly, GSK, Medtronic, Merck, Novartis, Pfizer, Roche, Servier, Takeda and UCB. BA: Speakers fees/consulting fees from UCB, MSD, Amgen, Kyowa-Kirin and Pharmacosmos and institutional research grants from Novartis, UCB/Amgen, Kyowa-Kirin and Pharmacosmos.

P417

# FAMILIAL ASSOCIATIONS IN BONE AS MEASURED BY PQCT, HR-PQCT AND DXA

C. M. Parsons<sup>1</sup>, N. Fuggle<sup>1</sup>, M. Ó Breasail<sup>2</sup>, M. Clynes<sup>1</sup>, G. Bevilacqua<sup>1</sup>, S. Carter<sup>1</sup>, E. M. Dennison<sup>1</sup>, C. Cooper<sup>1</sup>, K. A. Ward<sup>1</sup>

<sup>1</sup>MRC Lifecourse Epidemiology Unit, Southampton, <sup>2</sup>MRC Nutrition and Bone Health Group, Cambridge, UK

**Objective:** Bone microarchitecture, as well as BMD, contributes to fracture risk. Previous studies have reported familial associations in areal BMD (aBMD), but none have studied a combination of pQCT and DXA measures. The aim of this study was to explore parent-to-child associations in bone size, geometry, and microarchitecture using data collected from the Hertfordshire Cohort Study (HCS).

**Methods:** Data from three generations of community-dwelling HCS study participants were collapsed into parent-to-child pairs to maximise statistical power. All participants underwent pQCT (Stratec XCT2000L), HR-pQCT (XTreme I, Scanco), and DXA (iDXA, GE-Lunar) (hip, spine) scans. Images of the non-dominant tibia were obtained from pQCT and HR-pQCT. Due to lack of clustering within family lines, linear regression was used to explore associations between parent-to-child bone parameters, adjusting for age and sex of parent and child, and child's social class and height. Results are presented as  $\beta$  (95% confidence interval).

**Results:** Parents ( $n=61$ ) had a mean age of 69 (range 49-88) years and 74% ( $n=45$ ) were women. Children ( $n=64$ ) had a mean age of 42 (range 18-65) years and 72% ( $n=46$ ) were women. Positive parent-to-child associations were found between tibial total volumetric BMD (vBMD,  $\text{mg}/\text{cm}^3$ ) at the 4% slice (0.47 (0.15,0.79)), and tibial cortical area ( $\text{mm}^2$ ), cortical thickness (mm) and total area ( $\text{mm}^2$ ) at the 38% slice ((0.52 (0.24,0.81), (0.37 (0.10,0.64) and (0.30 (0.01,0.60) respectively) obtained from pQCT scans. Positive parent-to-child associations were also observed for tibial trabecular vBMD ( $\text{mg}/\text{cm}^3$ ), tibial trabecular number ( $\text{mm}^{-1}$ ) and tibial trabecular thickness (mm) ((0.49 (0.11,0.88), (0.28 (0.01,0.54) and (0.32 (0.01, 0.63) respectively) obtained from HR-pQCT scans. These findings are consistent with iDXA-measured aBMD, with positive parent-to-child associations in BMD ( $\text{g}/\text{cm}^2$ ) observed at the total hip and lumbar spine ((0.41 (0.13,0.70)) and (0.47 (0.26,0.69), respectively).

**Conclusion:** This is the first study using pQCT, HR-pQCT, and iDXA imaging in parents and children. Our results demonstrated a familial association in vBMD, likely due to associations in trabecular microarchitecture and cortical bone parameters. These results provide further evidence of familial associations in bone size, strength, and geometry.

## P418

### PREVALENCE OF FRAGILITY FRACTURES IN PRIMARY CARE IN SPAIN: FINAL RESULTS OF THE PREFRAOS STUDY

C. Carbonell<sup>1</sup>, D. Martínez-Laguna<sup>2</sup>, J.-C. Bastida<sup>3</sup>, M. González<sup>4</sup>, R. M. Micó-Pérez<sup>5</sup>, F. Vargas<sup>6</sup>, M. Balcells-Oliver<sup>7</sup>, L. Canals<sup>8</sup>

<sup>1</sup>GREMPAL Investigation Group, IDIAP Jordi Gol. Health Center Vía Roma, Barcelona, <sup>2</sup>GREMPAL Investigation Group, IDIAP Jordi Gol. Health Center Sant Martí de Provençals, Barcelona, <sup>3</sup>Health Center of Marín, Pontevedra, <sup>4</sup>Health Center of Montesa, Madrid, <sup>5</sup>Health Center of Fontanars dels Alforins, EAP Ontinyent, Valencia, <sup>6</sup>Health Center Dr. Guigou, Santa Cruz de Tenerife, <sup>7</sup>Medical Dept., Amgen SA, Barcelona, <sup>8</sup>Medical Dept., Amgen GmbH, Zug, Switzerland

**Objective:** Some studies suggest underdiagnosis and inadequate treatment of osteoporosis (OP) among elderly subjects. Recent data on the prevalence of fragility fractures (FF) in this population is lacking. The objectives of this study were 1) to estimate the prevalence of FF among subjects  $\geq 70$  years old seen in Spanish primary care (PC) and 2) to describe the main OP characteristics and management of subjects with at least one FF.

**Methods:** This retrospective, observational study was conducted in Spanish PC centers and comprised two phases (A and B). Phase A included all women and men  $\geq 70$  years old listed in the investigator's medical records from November 2018-March 2020. Phase B included subjects with a recorded FF and prior consultation at the center for any reason. The main outcomes were the prevalence of FF and the prevalence by geographic regions. Only the results of Phase A are presented.

**Results:** 30 PC centers across 14 Spanish Regions participated. In Phase A, 44,062 medical records were reviewed, 20.2% (8,904) were subjects  $\geq 70$  years old. The majority of these eligible subjects were women (5,350/8,904 [60.1%]). The prevalence of FF is summarized in Table 1. Between regions, Murcia had the highest and Galicia the lowest prevalence.

**Conclusion:** This study showed the high prevalence of FF in subjects  $\geq 70$  years old, especially in women (2-3-fold more prevalent in relation to men), in the Spanish PC setting and vertebral fracture as the most common fracture. These results highlight the need to improve the risk assessment in elderly subjects.

**Disclosures:** DML: personal fees from Amgen, Lilly, Novartis, Ferrer, Rubió and Italfarmaco. JCB: personal fees from AstraZeneca, Esteve, Boehringer Ingelheim, Bayer, Abbott, Almirall, Amgen, Chiessi, FAES, Grünenthal, GSK, Lilly, Menarini, MSD, Pfizer, Recordati, Rovi, Servier; MG: personal fees from Amgen, Stada, Rubió, Grünenthal; RMP: fees from Amgen, UCB, Stada, Angelini, Gebro; FV: personal fees from Pfizer, Grünenthal, MSD, Amgen, GSK, Lilly, Bristol-Myers Squibb, Servier, P&G Pharmaceuticals, Novartis, Almirall, Sanofi, Mundipharma; MB and LC: Amgen employees.

Table 1. Prevalence of fragility fractures in subjects aged  $\geq 70$  years.

	Women (N=5,350)	Men (N=3,554)	Overall (N=8,904)
Any fragility fracture, n (%)	1,291 (24.1)	285 (8.0)	1,576 (17.7)
Vertebral	367 (6.9)	90 (2.5)	457 (5.1)
Wrist/forearm	284 (5.3)	56 (1.6)	340 (3.8)
Hip/femur	266 (5.0)	68 (1.9)	334 (3.8)
Humerus	185 (3.5)	32 (0.9)	217 (2.4)

## P419

### A STUDY TO EVALUATE THE ASSOCIATION OF MAGNESIUM LEVELS WITH HAND GRIP STRENGTH IN GERIATRIC PATIENTS WITH HIP FRACTURE

S. Das<sup>1</sup>, S. Verma<sup>2</sup>

<sup>1</sup>Ram Manohar Lohia Hospital, Delhi, <sup>2</sup>SMSR, Noida, India

**Objective:** Magnesium, is a macronutrient that plays a key role in several cellular processes. It is an essential mineral for bone metabolism. Not much is known about the association of magnesium and the risk of hip fractures in the Asian population. In this case-control study, we evaluate the relationship between serum magnesium level and the risk of incident hip fracture. The purpose of this study was to investigate the association between magnesium and hand grip strength in hip fracture risk in the geriatric population (age  $> 65$  y) residing in north India.

**Methods:** 75 patients with hip fracture (Group I) and a similar number of controls (Group II) were enrolled in the study. Samples were analyzed for serum levels of magnesium, 25 hydroxyvitamin D, alkaline phosphatase, calcium, and phosphate by immunoassay. The hand grip strength of study subjects was measured using a dynamometer. Correlation between magnesium levels and hand grip strength was analyzed in the study population.

**Results:** Among the 75 subjects, 36 were men and 39 were women. The mean age of hip fracture cases was  $63.7 \pm 8.4$  y which was comparable in men and women. Hypomagnesemia was observed in the hip fracture group ( $1.43 \pm 2.36$  mg/dl) whereas magnesium level in the control group was normal ( $2.35 \pm 3.86$  mg/dl) ( $p < 0.05$ ). 25 hydroxyvitamin D levels were significantly lower in cases ( $9.63 \pm 4.53$  ng/ml) as compared to controls ( $24.38 \pm 5.27$  ng/ml). The mean hand grip strength among the hip fracture group



(18.31±4.69 kg) was significantly lower compared to that of the control group (31.54±6.12 kg). There was a significant positive correlation between magnesium levels and hand grip strength ( $r=0.74$ ,  $p<0.05$ ) in the hip fracture population.

**Conclusion:** Hand grip strength as measured by handheld dynamometer was significantly lower in geriatric hip fracture patients, and there is a significant positive correlation between magnesium and hand grip strength.

P420

### LACTOSE MALABSORPTION AS AN ADDITIONAL RISK FACTOR OF OSTEOPOROSIS AND OSTEOPOROTIC FRACTURES IN PATIENTS WITH TYPE 1 DIABETES MELLITUS

A. B. Andrusheva<sup>1</sup><sup>1</sup>Kharkiv National Medical University, Kharkiv, Ukraine

**Objective:** To assess the probability of osteoporotic fractures (POPF) and the degree of osteodeficiency in patients with type 1 diabetes mellitus (DM) with lactase malabsorption (LM).

**Methods:** The study included 34 patients with DM type 1, which were divided into 2 groups depending on the presence or absence of LM (16 patients were group I and 18 patients group II). To diagnose LM, we used a glycemic load test with lactose, a test for hydrogen content in exhaled air, and an analysis of stool acidity. BMD was assessed by DXA, and the POPF was calculated by the FRAX and QFracture tools. The statistical significance of differences in the studied parameters was evaluated by the nonparametric method (by  $\chi^2$  criterion).

**Results:** The DXA results revealed a significant difference in the frequency of osteoporosis between the groups. In the first group 81.3% of patients had osteoporosis, while in the second group - 55.6% ( $\chi^2=4.864$ ,  $df=1$ ,  $p=0.027$ ). POPF was equally high in both groups of patients when evaluated with FRAX, while there was a significant difference in POPF among both groups using QFracture - in 87.5% patients of the first group and 61.1% of patients of the second group had high or medium values of POPF ( $\chi^2=9.01$ ,  $df=1$ ,  $p=0.003$ ). According to the QFracture algorithm, the cutoff values for the beginning of antiosteoporotic treatment were noted in 31.3% of the respondents of the first group, and the indicators that require BMD evaluation (the result is in the so-called "yellow zone") in 56.3%.

**Conclusion:** Patients with DM type 1 and LM are more likely to have osteoporosis and a significantly higher POPF compared to patients with isolated DM type 1. POPF does not always correspond to low BMD, indicating deterioration in bone quality. When deciding on the need for antiosteoporotic therapy of patients with DM type 1 and LM, it is necessary to take into account not only the results of DXA, but also the POPF assessed by the QFracture tool.

P421

### PRE-OPERATIVE COGNITION IS INVERSELY CORRELATED WITH POST-OPERATIVE DELIRIUM IN ELDERLY PATIENTS WITH ACUTE HIP FRACTURE

O. Nonyelum<sup>1</sup>, A. Nandi<sup>1</sup>, R. Khan<sup>1</sup>, K. T. Ling<sup>1</sup>, M. Seegoolam<sup>1</sup>, R. Ayesha<sup>1</sup>, G. McDevitt<sup>1</sup>, T. Anna Nida<sup>1</sup><sup>1</sup>University Hospital of Derby and Burton, Dept. of Medicine for Elderly, Queens Hospital Burton, Burton on Trent, UK

**Objective:** Delirium is common in post-operative hip fracture patients. It is associated with increased mortality, morbidity, length of stay and greater likelihood of institutionalization. Risk factors that predict greater likelihood of post-operative delirium include pre-operative dementia and cognitive impairment, presence of multiple co-morbidities, use of psychoactive medications. This study aimed: 1. To determine the relationship between pre-operative level of cognition and post-operative delirium in hip fracture patients; 2. To explore whether gender affects this relationship.

**Methods:** A retrospective, cross-sectional analysis was carried out on sequential patients with acute hip fracture attending a district general hospital between January 2019 and December 2019. Data was manually extracted from anonymized electronic health records. The 10 point Abbreviated mental test score (AMTS) was used to measure pre-operative cognitive function and the 4-point abbreviated test looking at cognition, attention span, alertness and acute fluctuation in mental function (4-AT) delirium screening tool was used to screen for post-operative delirium. SPSS 27 software package was used for statistical analysis. Descriptive statistics were used to analyse baseline patient characteristics and spearman correlation co-efficient and linear regression analysis were used to measure correlation between pre-operative AMTS and post-operative levels of 4-AT.

**Results:** 310 patients 60 years and over were analysed - 83 males and 227 females. Mean age was 82.2 y  $\pm$  8.48. There was a statistically significant negative correlation between pre-operative AMTS and post-operative 4-AT ( $r=-0.510$ ;  $p<0.001$ ). This effect persisted when gender was taken into account but was stronger in females than in males ( $r=-0.687$ ;  $p<0.001$ ) and ( $r=-0.260$ ;  $p=0.02$ ) respectively.

**Conclusion:** Pre-operative cognitive functioning negatively predicts post-operative delirium in elderly hip fracture patients. This effect is more marked in elderly hip fracture women than in the men.

P422

**ESTABLISHMENT AND CHARACTERIZATION OF A PARATHYROID STEM CELL LINE**

F. Miglietta<sup>1</sup>, G. Palmini<sup>1</sup>, F. Giusti<sup>1</sup>, S. Donati<sup>1</sup>, C. Aurilia<sup>1</sup>, L. Iamartino<sup>1</sup>, R. Zonefrati<sup>2</sup>, G. Perigli<sup>3</sup>, T. Iantomasi<sup>1</sup>, M. L. Brandi<sup>2</sup>

<sup>1</sup>Dept. of Experimental & Clinical Biomedical Sciences Mario Serio, University of Study of Florence, <sup>2</sup>Fondazione Italiana Ricerca sulle Malattie dell'Osso, FIRMO Onlus, <sup>3</sup>Center of Oncological Minimally Invasive Surgery, Dept. of Surgery & Translational Medicine, University of Florence, Florence, Italy

**Objective:** To establish of an in vitro model of parathyroid stem cell line.

**Methods:** Sporadic parathyroid adenoma (PA) samples were collected at the Azienda Ospedaliera Università di Careggi, Florence, with informed consent approved by the local Ethical Committee. The subpopulations of parathyroid stem cells (PT-SCs) have been isolated from PA samples with the sphere-formation assay<sup>1</sup>. The stem cell phenotype was assessed by cellular assays/staining, by immunofluorescence analysis, and by analyzing the expression of embryonic stem cell (ESC) and parathyroid (PT) marker genes.

**Results:** From each sample collected, we have isolated and established three PT-SCs lines, called as PT351-/PT355- and PT374-SCs. The stem cell phenotype of PT-SCs lines was confirmed by evaluating the cells capacity to differentiate into osteoblasts and into adipocytes. We have also detected the expression of ESCs marker genes (i.e., POU5F1, Nanog, KLF4 and SOX2), of PT stem cell marker genes (i.e., CD117, GCM2, SALL4 and PPAR $\gamma$ ), and we have detected the expression of CaSR and PTH, which are both recognized as PT marker genes. We have observed the protein expression of mesenchymal stem cell markers, and of FIL-A, PTH and CaSR by immunofluorescence assays. Our analyses have confirmed the parathyroid stem cell genotype of PT-SCs lines.

**Conclusion:** We have completely characterized and studied three PT-SCs lines at cellular and molecular level. Nowadays, we are also evaluating the expression levels of genes which are involved into parathyroid glands organogenesis (i.e., PAX1, Tbx1, Sox3, BMP4) and we are performing several analyses to investigate how these established cell lines respond to different calcium concentrations in terms of PTH release.

**Reference:** 1. Palmini G, et al. J Vis Exp 2016;116:58334.

**Acknowledgement:** Supported by Fondazione Italiana Ricerca sulle Malattie dell'Osso, F.I.R.M.O Onlus, Florence, Italy

P423

**EXTRACORPOREAL SHOCK WAVE THERAPY FOR PAIN CAUSED BY ARTHROSIS OF THE HIP JOINT**

E. Guryanova<sup>1</sup>, S. Lezhenina<sup>1</sup>, A. Lammert<sup>2</sup>, D. Guryanov<sup>1</sup>, V. Lysenko<sup>1</sup>, D. Belyakov<sup>1</sup>, E. Rakovich<sup>1</sup>

<sup>1</sup>Chuvash State University by I.N. Ulianov, Cheboksary, Russia, <sup>2</sup>St. Elizabeth University of Health and Social Sciences, Bratislava, Slovakia

**Objective:** Extracorporeal shockwave therapy (ESWT) plays an irreplaceable role in pain relief due to the hyperstimulation of nerve endings. The signals generated by the shock wave are sent to the gray matter of the spinal cord and help to reduce the feeling of pain by increasing impulses in the thick myelin fibers, which causes a decrease in the sensitivity of nerve endings. This study aimed to study the efficacy of ESWT for pain in hip arthrosis.

**Methods:** The study involved 69 patients aged 45-71 y (mean age 49.6 $\pm$ 6.8 y) with arthrosis of the hip joint, stages 3-4 (confirmed radiographically for at least 3 months), and with the severity of pain according to the visual analogue scale (VAS) 6.1 $\pm$ 0.6. All individuals received 10 ESWT procedures every other day for 20 d on the hip joint, as well as trigger zones in the quadriceps femoris muscle, gluteal muscles. For the procedure, we used KIMATUR 500 (Germany) with a frequency of up to 22 Hz, an effective pressure of up to 5 bar, an energy flux density of up to 0.68 mJ/mm<sup>2</sup>, for one session up to 5000 strokes. The patients' assessments of the intensity of their pain syndrome were determined by the VAS at the beginning and at the end of the treatment and one month after its completion. The Roland-Morris scale was used to determine the degree of impairment.

**Results:** ESWT leads to a decrease in pain, according to the VAS, already in the second week of treatment. After 5 ESWT sessions, pain decreases according to the VAS by more than 1 point. Further ESWT sessions led to a decrease in the intensity of the pain syndrome on average to 3.1 $\pm$ 0.4 points. One month after completion of treatment, the intensity of pain did not differ from the VAS parameters immediately after completion of the ESWT course (according to the Roland-Morris scale after treatment - 3.2 $\pm$ 1.4; p<0.05). There was a decrease in joint pain on palpation (from 3.56 $\pm$ 0.21 to 2.24 $\pm$ 0.33 points, p<0.05) and joint circumference (from 41.11 $\pm$ 3.38 to 40.05 $\pm$ 3, 21 cm, p<0.05).

**Conclusion:** ESWT is a significant alternative in the treatment of hip arthrosis pain. It is important to note the typically high tolerance of the procedure and its general level of safety, which is its significant advantage over the traditionally used non-steroidal anti-inflammatory drugs. In the presence of contraindications to non-steroidal anti-inflammatory drugs, the role of ESWT in the conservative treatment of pain syndrome is irreplaceable.

P424

**BACK PAIN AFTER SUFFERING FROM COVID-19 PNEUMONIA**E. Deomidov<sup>1</sup>, E. Guryanova<sup>1</sup><sup>1</sup>Chuvash State University by I.N. Ulianov, Cheboksary, Russia

**Objective:** To study the effect of rubbing and kneading techniques for their differentiated use in the massage procedure in patients with various manifestations of dorsalgia in patients who have had pneumonia caused by COVID-19.

**Methods:** The study included 40 patients aged 50-60 y (23 women, 17 men) with dorsalgia syndrome with muscular-tonic, neuromyopathic and neurovascular manifestations. Patients were admitted for treatment no earlier than 2 months after pneumonia. The patients were randomized into 2 groups. Group 1 received massage procedures for the neck area and chest with the predominant use of rubbing techniques of classical massage. Group 2 received massage sessions of the same zones with the predominant use of kneading and vibration techniques. The duration of one procedure is 25-30 min, for a course of treatment 10 procedures. Patients underwent an assessment of hemodynamic parameters (heart rate, blood pressure), rheovasography (RVG). The severity of pain was assessed by the VAS. The studies were carried out before and after the course of treatment and once during the second or third massage procedure. In the statistical analysis of the results obtained, the nonparametric Wilcoxon test was used (the differences are significant at  $p \leq 0.05$ ).

**Results:** At admission, the patients had complaints of chest pain of varying intensity and character (according to VAS  $4.3 \pm 0.4$  points), dyspnea according to the MRS scale averaged  $1.9 \pm 0.2$ . The patients showed limited movement in the thoracic spine. Examination revealed the smoothness of the cervical lordosis, tension of the paravertebral muscles, tenderness on palpation of the sternum. In 10% of patients, neurovascular disorders were observed in the form of pallor, cyanosis of the skin in the chest area. Rheographic studies revealed changes in peripheral circulation in the form of a decrease in blood flow intensity, a pathological shape of the curve, indicating a decrease in blood filling, an increase in tone and a decrease in the elasticity of peripheral vessels in the upper extremities. All patients tolerated massage procedures well, noting a decrease in pain intensity (according to VAS from 4 to 3 points) even after one session. Patients subjectively perceived the techniques from the rubbing group as an energetic effect, while the appearance of a more pronounced sensation of warmth and a surge of strength was noted than when using kneading techniques. Both methods had no significant effect on heart rate. It was revealed that the techniques of the group of rubbing, in contrast to the techniques of kneading, significantly increased the value of blood pressure ( $p \leq 0.01$ ). According to RVG data, massage with kneading techniques in combination with vibration caused a significant increase in the intensity of blood circulation in the limb according to the rheographic

index. In the group of patients who underwent kneading and massage, the intensity of back pain according to the VAS decreased to  $2.4 \pm 0.3$ , dyspnea according to the MRS scale was  $0.8 \pm 0.09$ .

**Conclusion:** Massage with kneading and vibration techniques had a predominant effect on the neuromuscular apparatus and peripheral circulation.

P425

**PROTECTING JOINTS AND BONE DURING INFLAMMATION: THE ROLE OF THE CALCITONIN RECEPTOR IN COLLAGEN ANTIBODY-INDUCED ARTHRITIS**T. Maleitzke<sup>1</sup>, A. Hildebrandt<sup>2</sup>, T. Dietrich<sup>2</sup>, T. Weber<sup>2</sup>, J. Appelt<sup>3</sup>, D. Jahn<sup>3</sup>, D. Zocholl<sup>4</sup>, A. Baranowsky<sup>5</sup>, G. N. Duda<sup>3</sup>, S. Tsitsilonis<sup>1</sup>, J. Keller<sup>5</sup>

<sup>1</sup>Berlin Institute of Health at Charité - Universitätsmedizin Berlin, Berlin, <sup>2</sup>Charité - Universitätsmedizin Berlin, Berlin, <sup>3</sup>Berlin Institute of Health at Charité - Universitätsmedizin Berlin, Julius Wolff Institute, Berlin, <sup>4</sup>Charité - Universitätsmedizin Berlin, Institute of Biometry and Clinical Epidemiology, Berlin, <sup>5</sup>University Medical Center Hamburg-Eppendorf, Dept. of Trauma & Orthopedic Surgery, Hamburg, Germany

**Objective:** Calcitonin (CT) has been characterized as a chondro-protective and bone sparing hormone. While pharmacological CT derived from salmon or eel has been used to treat compromised bone mass in osteoporosis, osteoarthritis, and rheumatoid arthritis (RA), data on endogenous CT signalling in RA is scarce. As CT exerts its physiological effects through the calcitonin receptor (CTR), we exposed CTR-deficient ( $\text{Calcr}^{-/-}$ ) and wildtype (WT) mice to antibody-mediated arthritis and assessed joint inflammation and chondro-osseous remodeling.

**Methods:** Collagen II-antibody-induced arthritis (CAIA) was induced and boosted with lipopolysaccharide in WT and  $\text{Calcr}^{-/-}$  mice, while control (CTRL) animals received phosphate-buffered saline. Animals were monitored daily over the course of 10 and 48 d employing the semiquantitative arthritis score. Joint inflammation, cartilage degradation, and bone integrity were assessed by histology, immunohistochemistry, gene expression analysis, and  $\mu\text{CT}$ .

**Results:** Arthritis was accompanied by systemic CT release and the CTR was abundantly expressed in the articular cartilage surface of WT CTRL and WT CAIA animals.  $\text{Calcr}^{-/-}$  CAIA and WT CAIA mice developed severe arthritic phenotypes. Compared to WT CAIA animals,  $\text{Calcr}^{-/-}$  CAIA mice demonstrated higher histological inflammation and cartilage degradation scores, accompanied by radiologically evident systemic bone loss and increased expression of markers for inflammation (Sphk, Il1b, Tgfb, Ccl2), immunomodulation (Cd14, Cd68), bone resorption (Acp5, Ctsk) and cartilage degradation (Mmp13), as well as suppressed collagen formation markers (Col1a1, Col2a1).

**Conclusion:** While pharmacological CT has been used to treat osteoporosis and bone erosions in RA, we hereby demonstrate for the first time the pivotal role of endogenous CTR signalling in experimental RA, to contain inflammation and maintain and restore bone integrity.

P426

### BONE HEALTH IN PATIENTS WITH MULTIPLE SCLEROSIS: ANALYSIS OF BONE MINERAL DENSITY AND 3D-RECONSTRUCTION OF PROXIMAL FEMUR BY DXA

M. R. Ulla<sup>1</sup>, C. Vrech<sup>2</sup>, L. R. Brun<sup>3</sup>, M. L. Brance<sup>3</sup>, E. Peralta Lopez<sup>4</sup>, M. J. Castro<sup>1</sup>, F. Martos<sup>1</sup>, S. Mazzini<sup>4</sup>, M. A. Rivoira<sup>4</sup>

<sup>1</sup>Fundación ILAIM, Córdoba, <sup>2</sup>Sanatorio Allende, Córdoba, <sup>3</sup>CONICET - Facultad de Ciencias Médicas, UNR, Rosario, <sup>4</sup>Facultad de Ciencias Médicas, UNC, Córdoba, Argentina

**Objective:** Relapsing-remitting multiple sclerosis (RRMS) is an autoimmune demyelinating disease affecting 17-18/100000 Argentinians. Corticosteroid treatment increase bone-damaging and the rate of falls and fractures. The aim of our study was to evaluate bone health through bone mineral metabolism and BMD in RRMS-patients compared to healthy controls.

**Methods:** Observational, prospective and open study in 40 RRMS-patients aged 16-59 y and 40 matched controls (C). Serum levels of calcium, ionic calcium, phosphorus, magnesium, alkaline phosphatase, PTH, osteocalcin,  $\beta$ -CrossLaps and 25(OH)vitamin D were evaluated. BMD (g/cm<sup>2</sup>) was measured by DXA on lumbar spine (LS), femoral neck (FN) and total hip (TH). 3D analysis was performed with 3D-Shaper software (Galgo Medical, Spain). A survey of physical activity, sun exposure and daily consumption was carried out. Shapiro-Wilk test and parametric or nonparametric tests were used. Data were expressed as mean $\pm$ SD; p<0.05 was considered significant.

**Results:** No differences in BMD was observed between RRMS and C in all areas analyzed (LS: C 0.998 $\pm$ 0.141 vs. RRMS 0.986 $\pm$ 0.119, p>0.05; FN: C 0.817 $\pm$ 0.123 vs. RRMS 0.794 $\pm$ 0.140, p>0.05; TH: C 0.926 $\pm$ 0.127 vs. RRMS 0.908 $\pm$ 0.131, p>0.05). In addition, the 3D analysis of the hip showed no differences: sDens (mg/cm<sup>2</sup>): C 161.8 $\pm$ 22.2 vs. RRMS 161.0 $\pm$ 24.3 p>0.05; trab vBMD (mg/cm<sup>3</sup>): C 206.7 $\pm$ 42.3 vs. RRMS 203.5 $\pm$ 44.5 p>0.05). Patients with RRMS had lower serum levels of 25(OH)vitamin D and alkaline phosphatase (21.1 $\pm$ 7.8 vs. 38.3 $\pm$ 14.8 ng/ml and 84.6 $\pm$ 36.9 vs. 136.3 $\pm$ 51.7 U/L, p<0.001, respectively). RRMS-patients performed more physical activity (1.50 $\pm$ 0.04 vs. 0.81 $\pm$ 0.05 h/d, p<0.05). Daily consumption was low in both groups (500 mg Ca/d) and 70% of RRMS patients had inadequate sun exposure.

**Conclusion:** Lower vitamin D and alkaline phosphatase did not translate into lower BMD, partially due to greater physical activity in RRMS-patients.

P427

### VERTEBRAL FRACTURES AND OSTEOPOROSIS FOLLOW-UP IN PATIENTS THAT UNDERWENT HIP FRAGILITY FRACTURE AT THE MEXICO NATIONAL INSTITUTE OF REHABILITATION IN 2018

R. Pérez-Saldaña<sup>1</sup>, R. Coronado-Zarco<sup>1</sup>, A. Olascoaga-Gómez de León<sup>1</sup>, D. D. Chávez-Arias<sup>1</sup>

<sup>1</sup>Instituto Nacional de Rehabilitación, Mexico, Mexico

**Objective:** To determine the presence of vertebral fractures and osteoporosis follow-up in patients that underwent surgery for a hip fragility fracture in 2018 at Mexico National Institute of Rehabilitation.

**Methods:** A descriptive observational cross-sectional study was carried out, from registers of patients that underwent surgery for a hip fracture during 2018. Patients over 65 y of age were included if hip fracture was considered as a fragility fracture. Hospital registries were looked up to identify spine radiographs. A telephone survey was done to update clinical information. Descriptive statistics were performed for all quantitative variables; statistical inferences were done through chi-squared test, and correlations through Pearson's R. Statistical package SPSS 17 was used.

**Results:** A total of 205 patients were included, 80% female. The average age was 79.18 ( $\pm$ 4.7) y; 184 patients were alive after a year of the incident fracture; 63.5% started on a pharmacologic treatment for osteoporosis. The most prevalent comorbidities were systemic arterial hypertension in 43%, diabetes in 30.24%. Mortality at 6 months after surgical treatment was 10.24% (only renal chronic insufficiency correlated p=0.003). Only 45.83% of patients had spine radiographs, from which vertebral fractures were present in 46%. The most frequent levels of involvement were T12 and L1.

**Conclusion:** Vertebral fractures had been previously reported in hip fracture patients with high prevalence. The lack of intentional search for this fractures condition undiagnosis, which delay the comprehensive and timely treatment of osteoporosis. In our context, only 45.83% of hip fractures were assessed for vertebral fractures. This results might show a lack of knowledge or adherence to clinical practice guidelines recommendations, and suggest the need to establish a secondary prevention program.



P428

### FREQUENCY OF OSTEOPOROTIC HIP FRACTURE IN AN ALGERIAN HOSPITAL

H. H. Hafirassou<sup>1</sup>, M. F. Farida<sup>1</sup>, N. Z. Newel<sup>1</sup>, M. C. Dahou-Makhloufi<sup>1</sup>

<sup>1</sup>Mohamed Lamine Debaghrine Hospital, Alger, Algeria

**Objective:** The hip fracture is the most serious complication of osteoporosis. It is a public health issue in elderly because of its frequency, severity and economic impact. We report the result of an 24 months investigation (May 2019-April 2021). The aim of this study was to determine the frequency of osteoporotic hip fractures and identify the risk factors of osteoporosis and falls leading to these fractures.

**Methods:** Cross-sectional, prospective, descriptive study. Patients with spontaneous or secondary low trauma hip fractures during 24 months were included. Have been collected: patient characteristics, risk factors for osteoporosis and falls, type of treatment and length of hospital stay.

**Results:** 115 cases of hip fractures were recorded. We noted a female predominance (60%) with a sex ratio of 0.60, the average age is 78.65±11.71 y. The associated comorbidities are cardiovascular (56%), diabetes (32%), dysthyroidism (12%), and chronic renal failure (6%). The fracture mechanism is dominated by the fall (93%), it is most often a domestic accident: slipping (30%), stumbling (26%), abluion (11%), falling on the stairs (7%). The risk factors for osteoporosis identified are: age >70 y (80%), female sex (60%), low BMI (18%), sedentary lifestyle (17%), corticosteroid therapy 7%, and smoking (6.3%). The risk factors of fracture: visual disturbances (40%) neuromuscular disorders in 11, 9%, poor health (more than 3 chronic diseases) in 9% of patients. The average duration of hospitalization is 5.2±2.5 d. The treatment is surgical in 81.6%.

**Conclusion:** Through this study, we found that osteoporotic hip fracture is frequent. The osteoporosis risk factors identified were female sex, advanced age, corticosteroid therapy and sedentary lifestyle. Fall risk factors were dominated by visual disturbances and neuromuscular disorders.

P429

### A CASE STUDY ON PREGNANCY ASSOCIATED OSTEOPOROSIS (PAO)

S. M. Dutson<sup>1</sup>

<sup>1</sup>Chepstow, UK

**Objective:** To share my personal experience of PAO in order to raise awareness of this rare condition and prevent nondiagnosis.

**Aims:** To give a brief outline of the trauma of PAO, from initial problems to eventual diagnosis and treatment; To discuss the emotional and physical difficulties of caring for a baby while having PAO; To flag up specific symptoms of PAO as possible indicators.

As evidence, I will include my DXA scans which show 4 vertebral wedge fractures and my bone density measurements, which charts improvements and changes over 29 years, since the original diagnosis.

This presentation will be relevant not just for anyone interested in this rare form of osteoporosis, but also professionals involved in working with postnatal women.

**Conclusion:** I hope by shining a light on this rare condition, professionals will be able to identify symptoms of PAO, leading to an early diagnosis and prompt treatment.

P430

### POST-MARKETING SAFETY SURVEILLANCE OF ANTI-OSTEOARTHRITIS DRUGS: A PROTOCOL FOR A SYSTEMATIC REVIEW OF PUBLISHED LITERATURE

G. Honvo<sup>1</sup>, J.-Y. Reginster<sup>1</sup>, A. Mobasheri<sup>2</sup>, L. Lengelé<sup>1</sup>, B. Avouac<sup>3</sup>, R. Rizzoli<sup>4</sup>, O. Bruyère<sup>1</sup>

<sup>1</sup>Division of Public Health, Epidemiology and Health Economics, University of Liège; WHO Collaborating Centre for Public Health Aspects of Musculoskeletal Health and Aging, Liège, Belgium, <sup>2</sup>Research Unit of Medical Imaging, Physics and Technology, Faculty of Medicine, University of Oulu, Oulu, Finland, <sup>3</sup>WHO Collaborating Centre for Public Health Aspects of Musculoskeletal Health and Aging, Liège, Belgium, <sup>4</sup>WHO Collaborating Centre for Public Health Aspects of Musculoskeletal Health and Aging, Liège, Belgium; Division of Bone Diseases, Geneva University Hospitals and Faculty of Medicine, Geneva, Switzerland

Recently, the safety of various anti-osteoarthritis medications was reassessed through systematic reviews and meta-analyses of phase III randomized placebo-controlled clinical trials (RCT). Despite the importance of such type of evidence, it remains limited and needs to be complemented by post-marketing safety surveillance data. The objective of this systematic literature review is to identify all the published post-marketing safety surveillance studies on pharmacological treatments in osteoarthritis (OA) patients, and to describe the characteristics and the main findings of these studies. The purpose is to provide insights on the state of post-marketing drug safety surveillance in OA, and to identify potential challenges in this setting.

This systematic review will be performed according to the methodological guidelines provided in the Cochrane handbook for systematic literature reviews, and will be reported following the PRISMA guidelines. The following bibliographic databases will be comprehensively searched, using detailed and highly sensitive search strategies: Medline (via Ovid), Cochrane Central Register

of Controlled Trials (Ovid CENTRAL), Scopus and TOXLINE (via ProQuest). The main outcome of this research is any adverse event/effect or any safety issue reported in the included studies. As a systematic review not involving quantitative synthesis, the retrieved data will only be qualitatively synthesized.

This systematic review is expected to provide an overview of the number and characteristics (design, number of patients included, duration of follow-up, etc.) of post-marketing safety surveillance studies in OA patients, as well as on outcomes of these studies. Data from the current study will help better establishing the safety profile of currently used anti-OA medications.

The dissemination plan for this systematic literature review includes:

- A publication in first-line Journal in the field.
- A presentation during a dedicated session at the WCO 2022 in Berlin.
- A wide distribution to the IOF/ESCEO database.
- A post on the ESCEO website.
- A dissemination to the network of 260+ scientific and patients societies affiliated to the Committee of National Societies of the International Osteoporosis Foundation (IOF).
- An endorsement and a dissemination through the WHO Collaborating Center for Public Health Aspects of Musculoskeletal Health and Aging network.
- PROSPERO Registration number: CRD42021227872

### P431

#### SCREENING SARCOPENIA THROUGH SARC-F IN POSTMENOPAUSAL WOMEN: A STUDY FROM A GREEK SEMI-MOUNTAINOUS MUNICIPALITY

M. Tsekoura<sup>1</sup>, A. Sofia<sup>2</sup>, S. Andreadou<sup>3</sup>, M. Moucho<sup>1</sup>, A. Paskou<sup>1</sup>, J. Gliatis<sup>4</sup>, E. Billis<sup>1</sup>

<sup>1</sup>Dept. of Physiotherapy, School of Health Rehabilitation Sciences, University of Patras, Aigio, <sup>2</sup>Pscachna General Practice Health Center, Evia, <sup>3</sup>General Hospital of Chalkida, Evia, <sup>4</sup>Dept. of Medicine, School of Health Sciences, University of Patras, Patras, Greece

**Objective:** Sarcopenia is a frequent, age-related muscle wasting, which requires proper screening and diagnosis. SARC-F has been proposed by EWGSOP2 as a screening tool to identify patients at risk of sarcopenia. Patients with sarcopenia are associated with several adverse outcomes and careful planning of the intervention strategies is important. The aim of this study is to explore the presence of sarcopenia through the use of the SARC-F in a Greek sample of postmenopausal women living in a broad semi-mountainous municipality across Greek mainland.

**Methods:** Consecutive women (154) visiting the Primary Health-care Centers of Dirfies – Messapies, Evia, Greece between May and July 2020 were invited to participate in this cross-sectional study. Eligible women had to be over 60 years old and sign an informed consent form for the study. The risk of sarcopenia was determined through the Greek SARC-F questionnaire; where a score  $\geq 4$  is considered of high risk for having sarcopenia. A self-administered questionnaire, containing medical history and demographic data was also given to all participants. In addition, T-scores were obtained from heel scans using a Sahara Bone Sonometer. A logistic regression analysis was used in order to test its associated factors.

**Results:** The sample comprised 154 postmenopausal women with an average age of  $69.4 \pm 7$  y. The prevalence of women at high risk of sarcopenia was 22.1% (n=34). The findings of this study demonstrated that postmenopausal women with high risk of sarcopenia was positively associated with age (0.01-0.04;  $p < 0.001$ ), T-score (0.04-0.08;  $p = 0.02$ ), number of falls (0.00-0.18;  $p = 0.04$ ), BMI (0.00-0.25;  $p = 0.02$ ) and number of births (0.00-0.25;  $p = 0.05$ ).

**Conclusion:** The percentage rate of postmenopausal women at high risk of sarcopenia was 22.1%. More research is needed in order to clarify the precise association of specific characteristics of postmenopausal women with high risk of sarcopenia and other factors. The results highlight the importance of early detection of sarcopenia in postmenopausal women in order to develop effective preventive and intervention programmes.

### P432

#### USING SOCIAL MEDIA AS A PATIENT EDUCATION TOOL: IS THERE A ROOM FOR BONE HEALTH EDUCATIONAL HUB?

Y. El Miedany<sup>1</sup>, M. El Gaafary<sup>2</sup>, S. Galal<sup>3</sup>, N. Fouad<sup>4</sup>, M. Hassan<sup>5</sup>

<sup>1</sup>Canterbury Christ Church University, Kent, UK, <sup>2</sup>Community & Public Health Ain Shams university, Cairo, Egypt, <sup>3</sup>Rheumatology, Physical Medicine & Rehabilitation, Ain Shams university, Cairo, Egypt, <sup>4</sup>Rheumatology & Rehabilitation, Fayoum University, Fayoum, Egypt, <sup>5</sup>Rheumatology & Rehabilitation Tanta University, Tanta, Egypt

**Objective:** Social media not only has applications for teaching and learning, but also has the potential to allow the patients to communicate, collaborate and share information. Over the past year, and as a consequence to the COVID-19 pandemic, social media has become an integral communication method for the majority of our digitally connected society. These offer tips, strategies and health services benefits for people concerned about or living with variable medical conditions. The information can also be of value for people who are caring for others or just looking into symptoms. This study aimed to assess the value of social media as social osteoporosis hub to support people and patient

communities, provide updates on osteoporosis management and fracture prevention, available services, as well as combat misconceptions.

**Methods:** The Egyptian Academy of bone health and metabolic bone disease launched a social hub for bone health and fracture prevention patient education through online patient communication. This included different forms: video presentations, Wikis (online public forum featuring text and multimedia content that can be edited by users), microblogs (format which allows users to post a large number of brief messages or updates over a short period). The people perception toward the use of social media in bone health patient education was evaluated by analyzing the people interaction and their responses reflecting their attitude toward its benefits and risks involved.

**Results:** Two education videos and 3 educational posts were published in 2 community groups. Two Wikis and 12 microblogs were also launched on 2 Facebook pages. These sites have wide range of accessibility with 34,230 persons having access to pages. The osteoporosis microblogs and Wikis were liked by 3491 (10.2% of the community group population). The video recorded educational material were viewed by 1672 persons (4.88% of the accessible persons), 484 persons reacted to the educational work (28.95% of viewed persons), 27 positive comments or queries were received (1.61% of viewed persons), the posts and videos were shared by 55 persons (3.29% of viewed persons). One post was shared internationally by 3 international osteoporosis societies in other countries.

**Conclusion:** The results of this work indicate that social media can be a useful tool for patient education in bone health and fracture prevention. It is important to leverage social healthcare marketing platforms to educate the people, answer their queries and update them on matters related to their health conditions. People communities are likely using one or more social media tools to share information and discuss their health. Asserting the society's expertise has helped to protect people from faulty information. Interactive digital communication has a role in optimizing patients' health.

**Objective:** IOF has developed a mentorship program to enable the implementation of Post-Fracture Care (PFC) coordination programs, such as Fracture Liaison Services (FLSs) worldwide. The program exchanges knowledge and skills by connecting experienced PFC program champions with any institutions willing to establish new FLS and improve the qualification of existing ones. The aim is to demonstrate the results obtained after one year of program and some recommendations on how to implement and improve the qualification of FLSs in Brazil.

**Methods:** The mentorship learning objectives included general principles of FLS, Quality Improvement and adult learning. A multidisciplinary team of mentors were selected from orthopedics and geriatrics by their experience in FLS. Before the online sessions, each mentor completed a needs assessment. Five online interactive webinars covered the learning objectives and allowed the mentors to improve their training skills. Simultaneous translation was provided for the sessions with presentation in Portuguese. This was followed by monthly action meetings to support the mentors to create new FLS and improve others already existing in one year of the IOF Capture the Fracture® FLS Mentors in Brazil work.

**Results:** The premeeting assessment identified gaps including how many patients an FLS should expect to identify as well as variability in disciplines involved in the FLS. The ability to network was a high priority. The content, interactivity, technical support and communication were highly rated by the mentors. All the mentors completed the training with 100% attendance. After one year of operation the IOF Capture the Fracture FLS Mentors in Brazil helped to create and to implement 8 new FLS and actively participated in the improvement of 12 FLSs in their position on the Capture the Fracture Best Practices Map. Currently, Brazil has 40 FLSs on the Map of Best Practices, 6 gold, 8 silver, 7 bronze, 12 blue and 7 green stars.

**Conclusion:** The IOF Capture the Fracture FLS Mentorship program has been successfully implemented in Brazil and already led to FLSs getting started and becoming more effective. Future work is focused on improving the policy environment for FLS and providing resources and tools in local languages.

P433

### HOW TO INITIATE AND DEVELOP FRACTURE LIAISON SERVICES: EXPERIENCE FROM BRAZIL RECOMMENDATIONS FROM THE IOF CAPTURE THE FRACTURE® FLS MENTORS IN BRAZIL

B. Stolnicki<sup>1</sup>, A. M. Inacio<sup>2</sup>, K. K. Tutiya<sup>3</sup>, L. F. T. Vieira<sup>4</sup>, M. Caló<sup>5</sup>, M. K. Javaid<sup>6</sup>

<sup>1</sup>PREVREFRAT, Rio de Janeiro, Brazil, <sup>2</sup>OSTI, Curitiba, Brazil, <sup>3</sup>Hospital Santa Maria Maggiore, São Paulo, Brazil, <sup>4</sup>Revita, Porto Velho, Brazil, <sup>5</sup>IOF Latin America, Buenos Aires, Argentina, <sup>6</sup>University of Oxford, Oxford, UK

P434

# EVALUATION OF BONE MINERAL DENSITY AND BONE TURNOVER MARKERS IN PATIENTS WITH ANKYLOSING SPONDYLITIS

N. Sahin<sup>1</sup>, E. Ozcan<sup>2</sup>, M. Ozkaya<sup>3</sup>, S. Erkan<sup>4</sup>, B. Omer<sup>5</sup>

<sup>1</sup>Balikesir University, Faculty of Medicine, Physical Therapy & Rehabilitation Dept., Balikesir, <sup>2</sup>Istanbul University, Istanbul Faculty of Medicine, Physical Therapy & Rehabilitation Dept., Istanbul, <sup>3</sup>Bagcilar Hospital, Physical Therapy & Rehabilitation Dept., Istanbul, <sup>4</sup>Special Biochemistry Clinic, Istanbul, <sup>5</sup>Istanbul University, Istanbul Faculty of Medicine, Biochemistry Dept., Istanbul, Turkey

**Objective:** Ankylosing spondylitis (AS) is a complex, potentially debilitating disease that is insidious in onset, progressing to deformity in spine over several years. Men are more often affected than women. Osteoporosis and vertebral fractures are now well recognized features in patients with advanced AS. The aim of this study was to compare BMD of lateral lumbar spine and hip in male patients with AS and control group.

**Methods:** 27 consecutive AS patients with a mean disease duration of 9.9 y and 23 age, height and weight-matched healthy controls were recruited for the study. The mean age of the AS patients was 39.31±12.13 and the mean age of the control group was 40.90±8.41. In both patients and control groups, BMD was evaluated for the lumbar spine and hip. Serum osteocalcin and urinary N-telopeptide (NTx) were measured as bone turnover markers in both patient and control groups.

**Results:** Osteoporosis was detected 1(4.3%) of control group and in 5(18.5%) of AS patients. The femoral neck and femur total T-scores, lateral lumbar 3 T-score values were significantly lower in AS patients compared with the control group ( $p=0.035$  and  $p=0.03$ ,  $p=0.001$ , successively). Osteocalcin and NTx levels were significantly higher in patients with AS compared with the control group ( $p<0.05$ ).

**Conclusion:** The incidence of osteoporosis is high in AS patients compare control group. The monitoring of bone turnover markers may help to prognostic of development osteoporosis in AS patients. The risk of vertebral fractures can increase in AS patients with osteoporosis. The fractures of AS patients are atypic that may be caused morbidity and in some case mortality. The patients with AS must be assessed for osteoporosis and must be treated for osteoporosis, so severe complications such as fractures can be prevented in AS.

P435

# QUALITY OF LIFE FOLLOWING ONE YEAR OF SUSTAINING HIP FRACTURE

K. X. L. Law<sup>1</sup>, J. F. Leong<sup>1</sup>, S. T. Ooi<sup>1</sup>, D. G. R. Rao<sup>1</sup>, N. S. Z. Abidin<sup>1</sup>, L. K. Belani<sup>1</sup>, S. A. Mokhtar<sup>1</sup>

<sup>1</sup>Fracture Liaison Service, Orthopaedic and Traumatology Dept., Hospital Canselor Tuanku Muhriz, Kuala Lumpur, Malaysia

**Objective:** Living in an ageing country like Malaysia, higher incidence of elderly with osteoporosis are prone to sustaining hip fractures. The ability to be mobile and selfcare is important to them so as to ensure a good quality of living towards the final decades of life. Hip fractures may lead to detrimental effects to physical health of elderly patients which in turn results in disability and death. Hence, we aim to study health-related quality of life (HRQoL) and ambulatory status following hip fractures.

**Methods:** A cross-sectional study conducted among patients aged 60 years and older with osteoporotic hip fracture from 2018-2020 in Hospital Canselor Tuanku Muhriz, Malaysia. Patient reported HRQoL (5Q-5D-5L) was collected from patients upon discharge at 6 months and 12 months. Demographics, clinical data and ambulatory status was followed up and recorded.

**Results:** A total of 139 patients (99 females, 40 males) with mean age of 77.8 y ( $\pm 8.0$ ) were identified. Majority was of Chinese ethnicity (64.0%) and 46% of patients underwent hip surgery. The EQDL index increased from 0.19±0.37 to 0.48±0.32 at 6 months follow up and 0.57±0.35 at 12 months follow up. The mean EQ VAS score (perception of overall health) increased from 46.4±13.8 to 59.4±13.3 at 6 months and 65.5±15.7 at 12 months. Factors potentially associated with HRQoL at 12 months are the prefracture ambulatory status and surgery performed. Patients who received surgery reported to have lesser problems at all follow-ups,  $p<0.001$  and  $p=0.001$ , respectively. 79.7% patients who underwent surgery were able to ambulate without requiring wheelchair at 6 months, while in nonoperative group there were only 37.3%. 29.7% of patients were ambulating independently at 12 months after surgery as compared to only 12.0% in those without surgery. 82% of the patients who had surgery returned to their prefracture ambulatory status at 12 months while 55.0% returned to their prefracture ambulation in nonoperative group.

**Conclusion:** Hip fracture has incurred a tremendous impact to one's life. Despite HRQoL improved over a period of 12 months, it did not fully return to prefracture state. Our study has shown that surgery may play a major role in returning a better quality of life following a hip fracture.



P436

# PSYCHOLOGICAL STATUS OF PATIENTS SUFFERING FROM SYSTEMIC SCLEROSIS DEPENDING ON ACTIVITY, DURATION OF THE DISEASE AND AGE OF THE PATIENTS

R. Grekhov<sup>1</sup>

<sup>1</sup>Zborovsky' Research Institute for Clinical & Experimental Rheumatology, Volgograd, Russia

**Objective:** To study the correlations between some features of psychological status of systemic sclerosis (SS) patients and clinical variants of the disease.

**Methods:** There were 70 patients suffered from SS according to 2013 ACR/EULAR classification criteria. The patients were represented by women (94%) of average age=38±3.3 y with average disease duration=14±2.6 y. To carry out the psychological examination we used the method for the formalized assessment of neurotic manifestations (L.L. Dmitrieva, 1990) [1], developed on the basis of the MMPI questions bank in the Bekhterev's Psychoneurological Institute. The questionnaire consists of 39 statements that contain such signs of neurotic conditions as fatigue, sleep disturbances, hypochondriac fixation on unpleasant somatic sensations, decreased mood, increased irritability, fears, anxiety, and selfdoubt. There are four scales: anxiety, depression, asthenia, and hypochondria, which are ranked according to a 10-point scale.

**Results:** The presence of neurotic disturbances was revealed in SS patients: the increase of anxiety (6.63±0.25 points), hypochondria (6.31±0.26) and asthenia (6.36±0.28 points) scales. Depression varied in the subclinical range (4.98±0.2). The main clinical manifestations of neurotic disorders were fatigue, emotional instability, anxiety and depressed mood. Particular attention was paid to the following clinical features of SS: degree of activity of the pathological process, duration of the disease, and age of the patients. In patients with 2nd degree of activity, there was a significant increase of the depression scores. In patients with the 3rd degree of disease activity, depression, asthenia and hypochondria come to be increased ( $p<0.05$ ). Correlation analysis showed the direct moderate relationship between SS activity and the severity of asthenia, depression and anxiety. In patients with a disease duration of 5-10 y, a significant increase ( $p<0.01$ ) of asthenia and depression scores was noted. A subsequent increase in the duration of the disease was accompanied by a significant increase in the average values of the scales of depression, anxiety and hypochondria ( $p<0.05$ ). The correlation analysis indicates direct moderate relationship between the neurotic symptoms and SS duration. Also, the increase of hypochondria score showed direct correlation with age of SS patients. Thus, according the results of correlation analysis, one of the factors predisposing to the development of neurotic disorders in SS are the activity of the disease itself, the duration of the disease, and the age of the patients.

**Conclusion:** The data we obtained indicate that some features of the clinical condition are directly related to the development of neurotic symptoms of the disease, which can lead to the appearance of negative psychosocial consequences of the disease and, therefore, complicate the process of patient adaptation and making the coping process more difficult. The importance of assessment of the SS patients' emotional state should be recognized, it is necessary to take into account the patients' beliefs, their perception of the existing disease and related problems. If the psychosocial problems of patients are not adequately solved, this can lead to a decrease in compliance and to a decrease in the effectiveness of the therapy.

**Reference:** 1. Dmitrieva LL. Zh Nevropatol Psikhiatr Im S S Korsakova 1990;90:77.

P437

# ADHERENCE TO ANTIOSTEOPOROTIC MEDICATION AFTER ONE YEAR FOLLOW-UP WITH FRACTURE LIAISON SERVICE IN TERTIARY UNIVERSITY HOSPITAL, MALAYSIA

J. F. Leong<sup>1</sup>, K. X. L. Law<sup>1</sup>, D. G. R. Rao<sup>1</sup>, S. T. Ooi<sup>1</sup>, N. S. Z. Abidin<sup>1</sup>, L. K. Belani<sup>1</sup>, M. K. Yin<sup>2</sup>, S. A. Mokhtar<sup>1</sup>

<sup>1</sup>Fracture Liaison Service, Orthopaedic & Traumatology Dept., Hospital Canselor Tuanku Muhriz, <sup>2</sup>Dept. of Pharmacy, Hospital Canselor Tuanku Muhriz, Kuala Lumpur, Malaysia

**Objective:** Adherence to medication for osteoporotic patients and those who are high risk of refracture has become a challenge as patients are required to take for long term. Fracture Liaison Service (FLS) which is a multidisciplinary approach has been implemented to ensure osteoporotic patients are on treatment and comply to their medications. Our objective is to investigate the compliance of antiosteoporosis medication, calcium and vitamin D supplementation among patients who are under our FLS.

**Methods:** Patients under the follow-up of Fracture Liaison Service from May 2019 to May 2020 taking their anti-osteoporotic medication such as bisphosphonate, denosumab, teriparatide and supplement of calcium and vitamin D were identified. Compliance on medication were evaluated after one year starting medication.

**Results:** A total of 139 patients were identified. After a year initiating antiosteoporotic treatment, 121 (87%) patients still comply taking their antiosteoporotic medication and 18 (13%) stopped taking the medication. Meanwhile, 127 (91%) patients continued taking both calcium supplement and vitamin D. Patients taking denosumab (85%) have shown better compliance of continuing their medication compared with those taking bisphosphonate (71%) and teriparatide (80%) after one year. The common reason for not continuing the medication was attributed to financial difficulties buying their medication, not necessary to take it because

they feel well, transportation problem to collect medicine, loss to follow-up, doctor's decision to stop medication and too many medications to take everyday.

**Conclusion:** Patient education is the most important factor to make sure they comply with their treatment. Financial support and reduction in price of anti-osteoporotic medication to make it affordable for patients will also increase the likelihood of patients to continue with their medication.

P438

### INVESTIGATING THE RELATIONSHIP BETWEEN BMI AND BMD AS A POTENTIAL MEDIATOR TOWARDS FRACTURE RISK PREDICTION

S. T. Ooi<sup>1</sup>, J. F. Leong<sup>1</sup>, D. G. R. Rao<sup>1</sup>, K. X. L. Law<sup>1</sup>, N. S. Z. Abidin<sup>1</sup>, L. K. Belani<sup>1</sup>, S. A. Mokhtar<sup>1</sup>

<sup>1</sup>Fracture Liaison Service, Orthopaedic & Traumatology Dept., Hospital Canselor Tuanku Muhriz, Kuala Lumpur, Malaysia

**Objective:** Decreased BMD and low BMI have long been known as significant predictors for fractures. In fact, the WHO-developed fracture risk assessment tool (FRAX) uses femoral neck BMD and BMI as input values to assess a person's 10-year probability of having a fracture. However, BMD and BMI are usually seen as independent predictors of a person's fracture risk, but several studies have indicated potential correlation between BMD and BMI. There have been speculations of a variety of factors such as fatty tissue deposition and bone adaptive remodeling, that cause persons with higher BMI to benefit from higher BMD and hence reduced fracture risk, although the exact mechanisms are not fully understood. Conversely, persons with lower BMI may suffer from the cascading effects of having lower BMD, and having less fatty deposits to protect from external impact. Hence, it is important to determine the possible relationship between BMI and BMD given the mutually reinforcing effects between these 2 variables.

**Methods:** For the purpose of this study, BMI and BMD data from 52 patients who were admitted to our Orthopedic department was collected. These patients had an average age of 74.5 y, and 50% of them were admitted due to hip-related fractures. Comprehensive BMD scans were performed, with the associated t-scores (measured in SD) being collected across hip and spine regions.

**Results:** Spearman rank-order correlation between BMI and BMD across different BMD components showed significant positive linear relationship between BMI and BMD components such as in the femur region [neck ( $r=0.339$ ,  $p=0.013$ ), trochanteric ( $r=0.381$ ,  $p=0.005$ ), intertrochanteric ( $r=0.358$ ,  $p=0.009$ ), total hip ( $r=0.367$ ,  $p=0.007$ ) and ward ( $r=0.344$ ,  $p=0.012$ ) and in the spine region L2 ( $r=0.321$ ,  $p=0.019$ ) and L3 ( $r=0.286$ ,  $p=0.038$ )].

**Conclusion:** These results indicate strongly that persons with higher BMI are likely to have higher BMD values, thereby receiving additional protection from potential fractures.

P439

### APPLICATION OF FRAX SCORE AND COMORBID HISTORY IN PREDICTING FRACTURES

D. G. R. Rao<sup>1</sup>, J. F. Leong<sup>1</sup>, S. T. Ooi<sup>1</sup>, K. X. L. Law<sup>1</sup>, N. S. Z. Abidin<sup>1</sup>, L. K. Belani<sup>1</sup>, S. A. Mokhtar<sup>1</sup>

<sup>1</sup>Fracture Liaison Service, Orthopaedic and Traumatology Dept., Hospital Canselor Tuanku Muhriz, Kuala Lumpur, Malaysia

**Objective:** The FRAX is a tool that's used to evaluate the risk of fracture in patients. FRAX takes into consideration certain patients' history to calculate the score. However, FRAX does not take into consideration common diseases such as type 2 diabetes mellitus, hypertension, and dyslipidemia which have been found to be associated with fractures. In addition to that, medications associated with the diseases stated above have been associated with both an increase and decrease in fracture risk.

**Methods:** 82 patients aged above 50 years old who were admitted to the Orthopedic wards in Hospital Universiti Kebangsaan Malaysia for either osteoporotic or low-trauma fractures, or admitted for other diagnoses were taken for this study. Those admitted for other diagnoses must not have had a previous osteoporotic or low trauma fracture. The patient's age, gender, race, FRAX scores (without BMD), comorbid history and history of medications were recorded.

**Results:** There was a significant correlation between the major osteoporotic ( $rs=-0.393$ ,  $n=66$ ,  $p<0.05$ ) and hip ( $rs=-0.374$ ,  $n=66$ ,  $p<0.05$ ) FRAX score, and the fracture status of the patient. The mean of the FRAX score for both major osteoporotic and hip fracture were higher in those with fractures (20.80; 10.99) compared to those without (10.80; 4.36). However, there was no significant correlation between comorbid history and medication history, and fracture status.

**Conclusion:** The FRAX score can be used to predict the risk of secondary fracture. Contrary to researches that state type 2 diabetes mellitus, hypertension, dyslipidemia, and associated medicines are associated with fractures; this study discovered that there was no significant relationship between them and fracture status. This could be due to the fact that this study did not capture the duration of the comorbid and medications taken by the patients.

P440

### RISK FACTORS ASSESSMENT OF PATIENTS OPERATED FOR OSTEOPOROTIC HIP FRACTURE

M. Baklaci<sup>1</sup>, Y. Kirazli<sup>1</sup>, E. Cinar<sup>1</sup>, K. Aktuglu<sup>2</sup>, N. Ozkayin<sup>2</sup>, I. Tamsel<sup>3</sup>

<sup>1</sup>Ege University School of Medicine, Dept. of Physical Medicine and Rehabilitation, <sup>2</sup>Ege University School of Medicine, Dept. of Orthopaedic Surgery, <sup>3</sup>Ege University School of Medicine, Dept. of Radiology, Izmir, Turkey

**Objective:** To evaluate patients with osteoporotic hip fractures regarding the relationship among ambulation, risk factors for osteoporosis, mortality frequency and new fracture rates in the 6-month postoperative period

**Methods:** We have included in this study, a total of 105 patients, who were operated at Ege University Faculty of Medicine for osteoporotic hip fractures. Demographic data as well as presence of previous and accompanying fractures, ambulation status, comorbidities, menopause age, family history for osteoporosis and fractures, BMD, osteoporosis treatment and blood vitamin D levels were recorded. At the 6th month after the hip fracture, the patients were evaluated again in terms of mortality, new fractures and ambulation status.

**Results:** 25 of 105 patients had died in the first 6 months. 4% of deaths occurred during hospitalization, 24% in the first month after discharge, and 72% between 2-6 months. Control vertebral x-rays were obtained in 49 patients and osteoporotic vertebral fractures were detected in 89.8% of those. Ratio of immobile patients increased from 1.9% to 31.4%. According to single regression analysis, the relationships between age, smoking history, FRAX hip fracture risk and modified Charlson comorbidity index and mortality were found to be statistically significant. In the multiple regression analysis, the relationship between BMI and smoking history and mortality was found to be statistically significant.

**Conclusion:** Osteoporosis is a common disease that does not manifest itself until complications develop. Functional loss and mortality risk are high in patients with fractures. Therefore, patients should be identified and treated before fractures develop. In addition, if individuals with osteoporotic hip fractures are followed up in fracture liaison services, which are becoming widespread worldwide, mortality and morbidity can be reduced.

P441

### DEMOGRAPHIC AND DISEASE CHARACTERISTICS OF PATIENTS WITH OSTEOPOROTIC HIP FRACTURES

Y. Kirazli<sup>1</sup>, M. Baklaci<sup>1</sup>, E. Cinar<sup>1</sup>, E. C. Selbes<sup>1</sup>, F. Calis<sup>1</sup>, N. Ozkayin<sup>2</sup>, K. Aktuglu<sup>2</sup>

<sup>1</sup>Ege University School of Medicine, Dept. of Physical Medicine and Rehabilitation, <sup>2</sup>Ege University School of Medicine, Dept. of Orthopaedic Surgery, Izmir, Turkey

**Objective:** Patients with hip fractures often have one or more risk factors for osteoporosis. This study aimed to assess the relationship of these risk factors as well as patient characteristics with patient outcomes after osteoporotic hip fractures.

**Methods:** Patient records of our university hospital were searched to identify cases of osteoporotic hip fractures that were admitted between 1 January-31 December 2017. Those subjects who could be reached by phone were included. Demographics, risk factors and ambulation status were questioned via phone calls. Clinical data were recorded from the patient files.

**Results:** 206 patients were reached by phone. Results are shown in Table. Of these patients, 75.7% were functionally independent before fracturing their hips and this ratio was found to decrease after the fracture to 53.8%.

**Conclusion:** Nearly half of our patients (46.2%) still need assistance or are wheelchair bound one year after the fracture. Elderly patients with femoral fractures have an increased risk for recurring falls and fractures which may increase their mortality and morbidity.

Table. Characteristics of patients with hip fracture (n:206)

Female sex, n (%)	146 (70.9%)
Age (mean±SD)	79.3±11
BMI, kg/m <sup>2</sup> (mean±SD)	24.9±4.1
Age at menopause (mean±SD)	42.7±5.6
Smoking, n (%)	33 (16)
Drinks alcohol, n (%)	13 (6.3)
Number of births (mean±SD)	3.06±3.01
Currently alive n (%)	149 (72.3)
Right side femoral fracture, n (%)	107 (51.9)
Right hand dominant, n (%)	178 (86.4)
Surgically treated n (%)	202 (98)
Days spent in hospital (mean±SD)	6.4±3.2
Previous known fragility fracture n (%)	44 (21.3)
New fracture after hip fracture n (%)	20 (9.7)
Concomitant fracture n (%)	13 (6.3)
Parent with fracture n (%)	5 (3)
Independent ambulation before fracture, n (%)	166 (80.5)
Independent ambulation after fracture, n (%)	111 (53.8)

P442

**DOES OSTEOPOROSIS TREATMENT AFFECT THE COURSE OF COVID-19 IN THE ELDERLY?**M. Hafizoglu<sup>1</sup>, A. Okyar Bas<sup>1</sup>, Z. Sahiner<sup>1</sup>, C. Cavusoglu<sup>1</sup>, B. B. Dogu<sup>1</sup>, M. Cankurtaran<sup>1</sup>, M. G. Halil<sup>1</sup><sup>1</sup>Dept. of Internal Medicine, Division of Geriatric Medicine, Hacettepe University Faculty of Medicine, Ankara, Turkey

**Objective:** In late 2019, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) caused COVID-19 (coronavirus disease 2019) pandemic worldwide and still keeps spreading. Atypical course of COVID-19 could be seen in elderly. Osteoporosis, as a public health problem, reflects reduced BMD and increased risk of fracture. The probable effect of antiosteoporotic drugs on the immune system may lead to consider treatment changes for osteoporosis in elderly during COVID-19 pandemic. The aim of this study was to show the correlation between osteoporosis treatments and the prevalence and clinical course of COVID-19 [1-5].

**Methods:** A total of 828 individuals who were admitted to geriatric outpatient clinics in the last 2 y and receiving osteoporosis treatment were included in the study. Patients' age, sex, comorbidities, treatments for osteoporosis, treatment durations and COVID-19 evaluations were obtained from electronic file records. Symptomatology, diagnostic methods, PCR results, and radiological findings of CT scans of the patients who had COVID-19 were noted.

**Results:** In total, 141 (17.1%) of 828 patients were male and 687 (82.9%) were female. Median age was 78 (IQR: 10). Totally 52 (6.2%) of the patients had diagnosed with COVID-19. When patients were divided into 4 groups according to the osteoporosis treatment they received (alendronate, denosumab, teriparatide, iv (intravenous) zoledronic acid), there was no difference in terms of COVID-19 symptoms, PCR results, radiological findings and COVID-19 evaluations. Treatment durations are for alendronate 15 (10) months, for denosumab 14 (12) months, for teriparatide 15 (7.25) months, for iv zoledronic acid 17 (11) months. In zoledronic acid group, a significant difference was found between treatment durations and COVID-19 evaluation ( $p=0.024$ ). Treatment changes were made in 56 (6.8%) patients during the COVID-19 pandemic, 3 (0.4%) patients were switched to alendronate, 41 (5%) patients to denosumab, 6 (0.7%) to teriparatide and 6 (0.7%) to iv zoledronic acid. There was no significant difference between treatment change and the presence of COVID-19 ( $p=0.559$ ).

**Conclusion:** To the best of our knowledge, there is no clear evidence that osteoporosis treatment affects the course of COVID-19. In our study we could not find a relationship between the actual treatments used for osteoporosis and prevalence or course of COVID-19. So during COVID-19 outbreak, it is more crucial to emphasize the importance of the treatment continuity than changing modality for bone metabolism. Considering the burden of osteoporosis in the older population, the management of osteoporosis needs to be prioritized during COVID-19 pandemic.

**References:**

1. Perrotta, F, et al. Aging Clin Exp Res 2020;32:1599.
2. Tay, HS, Harwood R. Age Ageing 2020;49:523.
3. Formenti AM, et al. Endocrine 2020;70:203.
4. Pietrobon AJ, et al. Front Immunol 2020;11:579220.
5. Yu EW et al. J Bone Miner Res 2020;35:1009.

P443

**BEWARE OF THE TOXIC POTENTIAL OF PHARMACEUTICAL VITAMIN D SUPPLEMENTS: A CROSS-SECTIONAL SURVEY FROM A TERTIARY CARE CENTRE**H. Majid<sup>1</sup>, N. Shamim<sup>1</sup>, A. Khan<sup>1</sup><sup>1</sup>Aga Khan University, Karachi, Pakistan

**Objective:** The increased awareness about vitamin D deficiency provoked significant increase in supplementation. This study aims to determine the frequency, clinical features, and pharmacological factors of hypervitaminosis D in children.

**Methods:** A retrospective cross-sectional study was conducted. All children <18 y with 25-hydroxyvitamin D (25OHD) levels performed between January 1 to December 31, 2018 at AKUH Clinical Laboratory were evaluated. Medical records of children at AKUH with vitamin D level >50 ng/ml were reviewed for clinical features and pharmacological risk factors.

**Results:** A total of 118,149 subjects were tested for serum 25OHD level in 2018, out of which 16,316 (13.8%) were children. Of these, 16.6% (n=2720) were registered at AKUH for consultation. 22% (n=602) had serum 25OHD levels >50 ng/ml. The median age and 25OHD levels were 3.1 (17.93) y and 70.1(100) ng/ml with 57.3% (n=345) boys. Use of vitamin D supplementation was reported in 33.1% (n=197) and of these 97.9% (n=193) were prescribed by physicians. Megadoses were utilized by 34.17% (n=68) while rest had taken different combination in tablets/syrups form. In megadoses, 600,000 (44.1%, n=30) and 200,000 units (45.5%, n=31) vitamin D injections were commonly prescribed. The main indications for prescribing were aches/pains (25.8%, n=51), developmental delay (25.3%, n=50), and vitamin D deficiency (24.8%, n=49). The main symptoms of hypervitaminosis D or toxicity were abdominal pain (13.7%), and constipation (15.7%).

**Conclusion:** Vitamin D supplementation should be done cautiously in children as toxicity though rare but may happen and cause serious effects specially with frequent mega doses and prolonged supplementation.



P444

### EFFECT OF DALCROZE EURHYTHMICS EXERCISE ON PHYSICAL FUNCTION AND MUSCLE IN SARCOPENIC OLDER ADULTS: THE SARCARE RANDOMIZED CONTROLLED TRIAL

M. Hars<sup>1</sup>, F. Herrmann<sup>2</sup>, T. Chevalley<sup>3</sup>, S. L. Ferrari<sup>3</sup>, G. Gold<sup>2</sup>, R. Rizzoli<sup>3</sup>, P. Vuilleumier<sup>4</sup>, A. Trombetti<sup>1</sup>

<sup>1</sup>Division of Bone Diseases, Dept. of Medicine & Division of Geriatrics, Dept. of Readaptation and Geriatrics, Geneva University Hospitals and Faculty of Medicine, <sup>2</sup>Division of Geriatrics, Dept. of Readaptation and Geriatrics, Geneva University Hospitals and Faculty of Medicine, <sup>3</sup>Division of Bone Diseases, Dept. of Medicine, Geneva University Hospitals and Faculty of Medicine, <sup>4</sup>Laboratory for Behavioural Neurology and Imaging of Cognition, Campus Biotech, University of Geneva, Geneva, Switzerland

**Objective:** Most therapeutic interventions for sarcopenia currently under development focus on increasing muscle mass. Given the growing evidence pointing towards the key role of the central nervous system in sarcopenia, it can be hypothesized that specific interventions influencing this system may also exert a significant effect on physical function in sarcopenic elders. Dalcroze eurhythmics (DE) exercise has previously been shown to increase physical performances and reduce falls in older adults at high risk for falls [1], but also to modify central nervous system activity. The SARCARE trial was mainly designed to determine i) the effectiveness of a DE exercise intervention in improving physical function and reducing falls among sarcopenic older adults, and ii) whether exercise-related benefits are associated with changes at central level. Here we report the effects on physical function and muscle.

**Methods:** The SARCARE study (ISRCTN39600964) is a single-centre, single-blind, two-arm, randomized controlled trial, in which community-dwelling sarcopenic adults aged  $\geq 65$  y were randomized (1:1) to i) a DE exercise group (2x/week 1-h supervised group-based) or ii) a CONtrol group (no exercise), and assessed at baseline, 6- and 12-month. Both groups received also regular educational lectures on relevant topics for older adults. The primary outcome was change in Short Physical Performance Battery (SPPB) score at 12 months. Secondary outcomes included, among others, changes in muscle strength and mass (assessed by DXA), falls, cognition, and quality of life.

**Results:** Among 196 randomized participants (mean age, 75.2 y; 89% women), 171 (87%) completed the study. The adherence rate to the DE exercise intervention was 81%. At 12 months, physical function improved in the DE group compared to CON group (group\*time interaction for SPPB score: 1.48, 95%CI 0.98 to 1.98;  $p < 0.001$ ). Significant improvements were also found in the DE group on muscle strength (5x chair stand time and hand grip strength,  $p < 0.01$  for both) compared to CON group, while no effect was found on muscle mass (appendicular lean mass/height<sup>2</sup>: -0.01, 95%CI -0.09 to 0.09;  $p = 0.95$ ).

**Conclusion:** A 12-month DE exercise program was effective in improving physical function and muscle strength in sarcopenic older adults, without change in muscle mass. Further analysis should help to clarify the mechanisms underlying the muscular benefits of DE training.

**Reference:** 1. Trombetti A, et al. Arch Intern Med 2011;171:525.

**Acknowledgments:** This study is funded by the Swiss National Science Foundation (grant #32003B\_166690) and FROMO Foundation.

P445

### CROSS-CULTURAL ADAPTATION OF THE GREEK VERSION OF THE EXERCISE ADHERENCE RATING SCALE

M. Tsekoura<sup>1</sup>, A. Papadopoulou<sup>2</sup>, V. Sakellari<sup>3</sup>, J. Gliatis<sup>4</sup>, E. Billis<sup>1</sup>

<sup>1</sup>Dept. of Physiotherapy, School of Health Rehabilitation Sciences, University of Patras, Aigio, <sup>2</sup>Clinical Physiotherapist, Patras, <sup>3</sup>Dept. of Physiotherapy, Faculty of Health and Care Sciences, University of West Attica, Athens, <sup>4</sup>Dept. of Medicine, School of Health Sciences, University of Patras, Patras, Greece

**Objective:** To adapt the Exercise Adherence Rating Scale (EARS) into Greek and evaluate its measurement properties, in community-dwelling older adults.

**Methods:** 23 older adults between 60-86 y, 14 women, 9 men; mean age of  $71.2 \pm 6.98$  y) were enrolled in this study. Permission for the cross-cultural adaptation was received from the developer of the EARS. Cross-cultural adaptation of the EARS was done based on Beaton guidelines (forward translation, synthesis, back translation, expert committee review, and pretesting). Participants were oriented on undertaking the prescribed home-based exercise program in the first session, and adherence behavior was assessed after 1 week, and finally reassessed after 2 weeks (test-retest reliability). Six weeks after the first assessment, they were invited again to full fill the EARS (responsiveness). The intra-class correlation coefficient (ICC2,1) and Cronbach's  $\alpha$  were used to assess test-retest reliability and internal consistency. Receiver operating characteristic (ROC) curve was analyzed to identify cutoff score, sensitivity and specificity of EARS. Ethical approval was obtained from the University of Patras and written informed consent was obtained from each participant.

**Results:** The Greek version of the EARS questionnaire (EARS-GR) was translated without major difficulties. The forward and back translation revealed no content or language-related issues. Results show high internal consistency (Cronbach's  $\alpha$  of 0.92) and excellent test-retest reliability (ICC=0.93, 95%CI=0.93-0.95) for 6-item adherence behavior. The area under the curve was 0.89 with 95%CI 0.77-1.00 at  $p = 0.003$ . The cutoff score was found 17.5 with 87% sensitivity and 79% specificity.

**Conclusion:** The EARS has been cross-culturally adapted to the Greek language. The EARS-GR was comprehensible and reliable and may thus, be used across in clinical settings and research. Further studies are recommended to investigate other psychometric properties of the EARS-GR with a larger sample including various diseases.

## P446

### INFLUENCE OF INDIVIDUAL CHARACTERISTICS ON THE CONCENTRATION OF METHOTREXATE POLYGLUTAMATES IN PATIENTS WITH RHEUMATOID ARTHRITIS

G. Gridneva<sup>1</sup>, E. Aronova<sup>1</sup>, A. Kudryavtceva<sup>1</sup>, E. Samarkina<sup>1</sup>, I. Dydykina<sup>1</sup>, Y. Muraviev<sup>1</sup>, N. Baymeeva<sup>2</sup>

<sup>1</sup>V.A.Nasonova Rheumatology Research Institute, <sup>2</sup>Mental Health Center, Moscow, Russia

**Objective:** Individual characteristics of patients with rheumatoid arthritis (RA) (such as age, gender, BMI, red blood cell volume) can influence the results of treatment with methotrexate (MTX). It has been established that in order to obtain a good and moderate therapeutic effect of MTX, it is necessary that the achieved level of polyglutamates (MTXPGs), measured in erythrocytes. This study aimed to evaluate the effect on the concentration of polyglutamates of methotrexate (MTXPGs) of individual characteristics of patients with RA.

**Methods:** The study included 60 patients with RA (26 men and 44 women) in accordance with ACR/EULAR 2010 criteria who have received at least 20 mg of MTX subcutaneously per week for at least 12 weeks. Older patients included 24 women over 55 years old and 7 men over 60 years old (group 1, n=31), the rest made up group 2 (n=29). Polyglutamates MTX with 2,3 and glutamic acid residues were measured in erythrocytes (RBCs) using tandem chromatography mass spectrometry.

**Results:** In group 1 patients, the concentration of MTXPG2, MTXPG3 and MTXPG4 was 9.0 [4.0; 8.3], 16.1 [9.0; 16.6], 24.7 [20.8; 30.2] nmol/l, in group 2, respectively 7.5 [4.1; 9.0], 16.0 [9.9; 20.0], 23.8 [17.5; 29.2] nmol/L. The differences were not statistically significant. The groups did not differ in the duration of MTX, single and cumulative doses of MTX, and the number of RBCs; in group 1, a good and moderate response to therapy was noted in 9 (29%), in group 2 - 19 (65%) responded to therapy, p=0.01. BMI in group 1 was 29±6 kg/m<sup>2</sup>, in group 2 - 25±2 kg/m<sup>2</sup> (p=0.0064). The response to therapy did not differ between the groups. The average weekly dose of MTX per 1 m<sup>2</sup> of body surface was higher in group 2 (12.6±2.2 mg vs. 11.3±2 mg, p=0.02). A correlation was found between the level of MTXPG2 and BMI (Spearman's correlation coefficient 0.268).

**Conclusion:** The concentration of MTXPGs in groups of patients of different ages did not differ. The concentration of MTXPGs did not correlate with the total volume of erythrocytes. MTXPG2 level correlates with BMI.

## P447

### RADIOFREQUENCY ECHOGRAPHIC MULTISPECTROMETRY (REMS) FOR THE DIAGNOSIS OF OSTEOPOROSIS IN PATIENTS WITH DIFFERENT BODY MASS INDEX

B. Cortet<sup>1</sup>, E. M. Dennison<sup>2</sup>, A. Diez-Perez<sup>3</sup>, M. Locquet<sup>4</sup>, M. Muratore<sup>5</sup>, X. Nogués<sup>3</sup>, D. Ovejero Crespo<sup>3</sup>, M. L. Brandi<sup>6</sup>

<sup>1</sup>University-Hospital of Lille, Dept. of Rheumatology and EA 4490, Lille, France, <sup>2</sup>Southampton General Hospital, University of Southampton, MRC Lifecourse Epidemiology Unit, Southampton, UK, <sup>3</sup>MIM (Hospital del Mar Medical Research Institute), Centro de Investigación Biomédica en Red en Fragilidad y Envejecimiento Saludable, ISCIII, Musculoskeletal Research Group, Barcelona, Spain, <sup>4</sup>University of Liège, Dept. of Public Health, Epidemiology and Health Economics, Liège, Belgium, <sup>5</sup>Vito Fazzi Hospital, ASL-LE, O.U. of Rheumatology, Lecce, Italy, <sup>6</sup>The National Observatory on Fragility Fractures, Florence, Italy

(The authors BC, ED, ADP, ML, MM, XN, DOC are equal contributors listed in alphabetical order.)

**Objective:** To assess the diagnostic performance of radiofrequency echographic multispectrometry (REMS) at the femoral neck in women with different BMI against DXA as the reference, following previous studies at the lumbar spine that suggested strong diagnostic agreement for all BMI categories [1].

**Methods:** Six European centers participated in this study. Caucasian women aged 30-90 y, without walking impairment, referred for femoral DXA were enrolled. Informed consent was obtained. The patients underwent femoral neck DXA and REMS scans of the femoral neck using standard methodology. Reports were checked and cleaned according to the usual protocol [2]. Results were analysed grouping patients by BMI, as underweight (UW), normal weight (NW), and overweight/obese (OW). DXA and REMS T-score values were used to classify patients as osteoporotic, osteopenic or healthy. The degree of correlation between DXA and REMS BMD values was quantified by calculating Pearson's correlation coefficient (r). The diagnostic concordance between both exams was assessed by Cohen's K considering the diagnostic classification based on T-score values [2].

**Results:** 3608 patients were included in the analyses: 97 (2.7%) corresponded to UW patients, 1905 (52.8%) NW patients, 1606 (44.5%) OW patients. The correlation between REMS and DXA BMD values was high, with r=0.93, 0.94 and 0.91 for UW, NW and OW patients, respectively. Sensitivity and specificity of REMS against a DXA gold standard were 98.0% and 88.0% for UW patients, 93.6% and 92.7% for NW patients, 88.2% and 98.6% for OW patients, respectively. Cohen's K was 0.86, 0.81 and 0.87 for UW, NW and OW patients, respectively.

**Conclusion:** Strong diagnostic agreement between REMS and DXA was observed for each BMI category at the femoral neck.

**References:**

1. Brandi ML, et al. POS1111, EULAR Congress 2021.
2. Di Paola M, et al. Osteoporos Int 2019;30:391.

P448

### DIFFERENTIAL EFFECTS OF TERIPARATIDE, ZOLEDRONATE AND DENOSUMAB ON HIP STRUCTURAL AND MECHANICAL PARAMETERS IN OSTEOPOROSIS (OP): A REAL-LIFE STUDY

N. Jaarah<sup>1</sup>, C. Lam<sup>1</sup>, N. Lodhia<sup>1</sup>, D. Dulnoan<sup>1</sup>, G. Hampson<sup>2</sup>

<sup>1</sup>Osteoporosis Unit, Guy's Hospital, <sup>2</sup>Osteoporosis Unit and Metabolic Bone Clinic, Guy's Hospital, London, UK

**Objective:** To evaluate and compare changes in hip geometry following treatment with different OP medications in a metabolic bone clinic.

**Methods:** We studied 244 patients with OP with mean [SD] age of 71.4[11.1] y. They were divided into 3 groups; Group A received teriparatide; n=50, F: 50, age: 72.9[7.9] y, Group B were on denosumab; n=116, F: 105, M: 11, age 72.7[10.8] y, and Group C were on intravenous zoledronate; n=78, F: 67, M: 11, age 68.5[12.8] y. BMD was measured by DXA at the lumbar spine (LS), total hip (TH) and femoral neck (FN) prior to treatment and after 2 y (Group A), after a mean treatment duration of 3.3[1.3] y (Group B) and after 3 y (Group C). Hip structural analysis (HSA) was carried out retrospectively from DXA-acquired femur images at the narrow neck (NN), the intertrochanter (IT) and femoral shaft (FS).

**Results:** BMD increased significantly at the LS (% change from baseline: mean [SEM] Group A: 9.9[1.14]%, Group B: 5.7 [0.62]%, Group C: 5.2[0.8]%, p<0.001). Increases in hip BMD were seen in Group B only (TH: 1.9[0.61]%, p=0.002). We saw a significant increase in cross-sectional area (CSA) at the NN: 3.5[1.4]%, p=0.016 in Group A and in several HSA parameters at the NN in Group C (subperiosteal width or outer diameter (OD); 2.8[0.88]%, p=0.005, the cortical width (CW); 3.0[1.0]%, p=0.01, CSA: 3.7[1.1]%, p=0.003, cross-sectional moment of inertia (CSMI); 6.1[2.3]%, p=0.021). In contrast, improvement in the HSA parameters at the IT were seen in group B (IT CSA: 3.3[0.67]%, CSMI: 5.9[1.3]%, section modulus (Z): 6.2[1.1]%, cortical thickness (Co Th): 2.6[0.78]%, buckling ratio (BR):-3.0[0.86]%, p< 0.001) with small changes at the FS (CSA: 1.2[0.4]%, p=0.005, Z:1.6 [0.76]%, p=0.04).

**Conclusion:** Analysis of the effect of OP therapies on hip geometry is useful in understanding the mechanisms of their antifracture effect and may provide additional information on their efficacy.

P449

### MEASUREMENT PROPERTIES OF THE SHORT FORM SARCOPENIA QUALITY OF LIFE (SF-SARQOL®) QUESTIONNAIRE IN AN INTERNATIONAL DATASET

A. Geerinck<sup>1</sup>, C. Beaudart<sup>1</sup>, J.-Y. Reginster<sup>1</sup>, Z. B. Wojszel<sup>2</sup>, F. De Souza Orlandi<sup>3</sup>, G. Bahat<sup>4</sup>, T. Erdoğan<sup>4</sup>, B. Montero-Errasquín<sup>5</sup>, V. Alekna<sup>6</sup>, O. Bruyère<sup>1</sup>

<sup>1</sup>Division of Public Health, Epidemiology and Health Economics, University of Liège, World Health Organization Collaborating Center for Public Health Aspects of Musculo-skeletal Health and Ageing, Liège, Belgium, <sup>2</sup>Dept. of Geriatrics, Medical University of Białystok, Białystok, Poland, <sup>3</sup>Dept. of Gerontology, Federal University of São Carlos, São Carlos, Brazil, <sup>4</sup>Division of Geriatrics, Dept. of Internal Medicine, Istanbul Medical School, Istanbul University, Istanbul, Turkey, <sup>5</sup>Dept. of Geriatrics, University Hospital Ramón y Cajal, IRYCIS, Madrid, Spain, <sup>6</sup>Faculty of Medicine, Vilnius University, Vilnius, Lithuania

**Objective:** A shorter, 14-item, version of the SarQoL® questionnaire was recently developed, and has demonstrated good clinical properties in a sample of 214 older people from Belgium. This study aimed to further investigate the measurement properties of the SF-SarQoL® in an international sample.

**Methods:** A secondary analysis of data collected from older, community-dwelling people in Brazil, Lithuania, Poland, Spain, and Turkey was performed. The 14 items of the SF-SarQoL were extracted from the original 55-item SarQoL questionnaire and used to calculate the SF-SarQoL score. Sarcopenia and probable sarcopenia was diagnosed with the EWGSOP1 or EWGSOP2 criteria. Discriminative power between sarcopenic and nonsarcopenic groups was evaluated for each country separately because of the heterogeneity between diagnostic criteria. Internal consistency was evaluated with the Cronbach's alpha and the McDonald's omega values. Correspondence between the overall quality of life (QoL) score of the short and long form of the SarQoL questionnaire was determined using the intraclass correlation coefficient (ICC). We performed a confirmatory factor analysis to investigate the structural validity of the SF-SarQoL.

**Results:** The 775 included participants had an average age of 75.8±7.8 years old, and most were women (70.6%). Sarcopenic participants had significantly (p<0.05) worse QoL scores compared to nonsarcopenic people in 4 out of the 5 included studies, confirming discriminative power. Internal consistency was high with an alpha value of 0.872 (95%CI: 0.858-0.885) and an omega value of 0.875 (95%CI: 0.862-0.888). We found a very high level of correspondence between the SarQoL and the SF-SarQoL score with an ICC of 0.907 (95%CI: 0.894-0.919). Robust fit indicators did not demonstrate good fit for a 1-factor model (CFI=0.931; TLI=0.918; RMSEA=0.169; SRMR=0.085) but improved for a 2-factor model (CFI=0.952; TLI=0.942; RMSEA=0.142; SRMR=0.076) which previously showed good fit in a Belgian sample.



**Conclusion:** The SF-SarQoL measures sarcopenia-related quality of life with less response burden than the SarQoL questionnaire and demonstrates adequate measurement properties. Its structural validity should be further investigated.

**Disclosures:** CB, JYR and OB are shareholders of SarQoL SPRL

P450

### COMPARISON OF BODY COMPOSITION BETWEEN HEALTHY SUBJECTS AND POST-COVID PATIENTS EVALUATED THROUGH DUAL FULL-BODY X-RAY ABSORPTIOMETRY

L. E. Quintanar-Trejo<sup>1</sup>, R. Coronado-Zarco<sup>1</sup>, A. Olascoaga-Gómez de León<sup>1</sup>, K. Zarco-Ordoñez<sup>1</sup>, N. C. Centeno-Morales<sup>1</sup>, X. López-Megchun<sup>1</sup>, A. Y. A. Aragón-Hernández<sup>1</sup>, J. Quinzaños-Fresnedo<sup>1</sup>

<sup>1</sup>Instituto Nacional de Rehabilitación, Mexico, Mexico

**Objective:** To evaluate the body composition in subjects after infection by the SARS-CoV-2 virus, compared with a group of healthy controls.

**Methods:** Full-body DXA (with the 2018 generation Hologic Discovery W equipment) was performed on post-COVID-19 patients three weeks after diagnosis of the infection. They were compared with a group of healthy controls of both genders, older than 18 years old, with no history of SARS-CoV-2 virus infection. The variables of the body composition were divided into: associated with visceral adipose tissue (VAT), distribution in the body fat proportion and indices of fat mass and muscle mass. Statistical analysis: measures of central tendency and dispersion were calculated for the quantitative variables, normality distribution was evaluated with the KS test. For the parametric variables, a comparison of means was performed with the Student's T-test and Pearson's correlation. For nonparametric variables, medians were compared using the Mann-Whitney U and correlated with Spearman's Rho. Registration at the Research and Ethics Committee 43/20.

**Results:** 25 controls (mean age 36.7; SD±10.5 yo) and 59 cases (mean age 42.3; SD±12.3 yo) ( $p=0.054$ ) were included. Statistically significant differences were found in the variables BMI, VAT mass, VAT volume and VAT area, fat mass index, trunk/leg fat and trunk/limb fat mass ratio. A statistically significant correlation was observed between BMI, VAT variables, fat mass index, trunk/leg fat and trunk/limb fat mass ratio.

**Conclusion:** Our results suggest that patients with COVID presented an alteration in the distribution of body mass, concentrating on the visceral area.

P451

### INFECTIOUS COMPLICATIONS AS A REASON FOR THE CANCELLATION OF BIOLOGIC DISEASE-MODIFYING ANTI-RHEUMATIC DRUGS

E. Aronova<sup>1</sup>, G. Gridneva<sup>1</sup>, A. Kudryavtceva<sup>1</sup>, I. Dydykina<sup>1</sup>, G. Lukina<sup>2</sup>

<sup>1</sup>V.A. Nasonova Research Institute of Rheumatology, <sup>2</sup>Moscow Clinical Scientific Center Loginov A.S., Moscow, Russia

**Objective:** To study infectious complications of therapy with biologics, analyze the frequency of withdrawal of bDMARDs due to infectious complications.

**Methods:** The ambispective analysis included data on 512 cases of prescribing biologics with different mechanism of action in 190 patients with rheumatoid arthritis (162 women, 28 men).

**Results:** Patients in the study group received from 2-6 bDMARDs, median (25-75%) 3 (2-3). Biologics were discontinued 331 times, of which due to the development of serious adverse reactions - 70 times, of which due to the development of infectious complications - 16 times (3% of all cases of discontinuations, 22.8% of all serious adverse reactions). During treatment with the first bDMARD, infectious complications that required discontinuation of the drug developed in 5.2% of cases ( $N=10$ ), with the second bDMARD - in 5.1% of cases ( $N=4$ ), no statistical differences were found between these groups. On the background of treatment with the third bDMARD, infectious complications led to the withdrawal of treatment in 2.6% of cases ( $N=1$ ), in the fourth - 0%, in the fifth - 14.3% of cases ( $N=1$ ) and in sixth - 0%. There was no correlation between the number of sequentially prescribed biologics and the incidence of infectious complications. 68.8% (11 cases) of serious infections occurred during the first year of therapy. Most often, serious infections developed during treatment with drugs of the TNF $\alpha$  inhibitor group (infliximab, etanercept, adalimumab, golimumab, certolizumab pegol) and tofacitinib. Out of 16 cases of infectious complications, 5 were associated with tuberculosis infection.

**Conclusion:** Infectious complications make up a significant proportion (22.8%) of all serious adverse reactions leading to the discontinuations of biologics in patients with rheumatoid arthritis. The frequency of discontinuation of bDMARDs due to infectious complications was about 5% and did not change during treatment with both the first and second biologics. It is necessary to remain alert about tuberculosis infection and examine patients before prescribing and during treatment with bDMARDs.



P452

# PHARMACY DISPENSING RECORDS FOR TOPICAL DICLOFENAC IN SWEDEN: A RETROSPECTIVE ANALYSIS OF REAL-WORLD DATA

V. Rampartaap<sup>1</sup>, E. Csoke<sup>2</sup>, D. Nair<sup>3</sup>, T. Wilcox<sup>4</sup>, J. R. Norrefalk<sup>5</sup>, V. Sethi<sup>6</sup>, G. Shanga<sup>7</sup>, K. Fabrikant<sup>8</sup>

<sup>1</sup>GlaxoSmithKline Consumer Healthcare, Amsterdam, The Netherlands, <sup>2</sup>N.A., Basel, Switzerland, <sup>3</sup>GlaxoSmithKline Consumer Healthcare, Stockholm, Sweden, <sup>4</sup>Evidera, Maryland, USA, <sup>5</sup>Karolinska Institutet, Stockholm, Sweden, <sup>6</sup>GlaxoSmithKline Consumer Healthcare, Singapore, Singapore, <sup>7</sup>GlaxoSmithKline Consumer Healthcare, New Jersey, USA, <sup>8</sup>GlaxoSmithKline Consumer Healthcare, London, UK

**Objective:** To describe prescription patterns of topical diclofenac alone or with other medications in the real world.

**Methods:** This retrospective cross-sectional study, characterizes the journey of patients prescribed topical diclofenac (Anatomical Therapeutic Chemical (ATC) code level 7) over a 12-month period (March 2019 – February 2020) in Sweden. The Swedish eHealth Agency (E-hälsomyndigheten) database of national electronic prescriptions was used as a data source. The data was assessed to measure the percentage of prescriptions filled, and the number of treatment switches as the primary outcome. Percentage of patients who filled prescriptions for co-medications such as for cardiovascular (CV), Gastrointestinal (GI), CV+ GI and other Nonsteroidal anti-inflammatory drugs (NSAIDs) taken with topical diclofenac were measured as secondary outcome.

**Results:** In Sweden, out of 14,569 patients 12,145 (83.4%) patients were identified with at least one prescription for topical diclofenac and met the study inclusion/exclusion criteria. The mean age of patients who received topical diclofenac prescription was 73 years, of which females were predominant (73.9%). However, the largest age group for topical diclofenac prescription was 85+ years (23.8%). Most of the patients 79.5% filled in 1 prescription of topical diclofenac, 12.3% patients had 2, 3.7% patients had 3, and 4.5% had >3 prescriptions of topical diclofenac during the 12-month period. For the year analysed 96.7% of the patients did not switch treatment before Month 4 and 98.1% before Month 7, irrespective of when topical diclofenac was first prescribed. No patient had more than 1 switch to topical alternatives to diclofenac. Physicians who prescribed topical diclofenac also prescribed it in combination with CV drugs (49.0%), GI drugs (30.0%), CV+GI drugs (19.3%) during the same 12-month period. At the same time, prescription of topical diclofenac with other NSAIDs (9.1%) was least observed.

**Conclusion:** This study shows that topical diclofenac was mainly prescribed to older patients above 70 years and most predominantly to females. Data suggests adherence among patients to their topical diclofenac prescription. A high proportion of patients prescribed topical diclofenac were also prescribed with drugs either for CV or/and GI conditions.

**Disclosures:** Funding for the study including the data analyses and protocol development was provided by GSK Consumer Healthcare. Vishal Rampartaap, Deepika Nair, Vidhu Sethi, Gilbert Shanga and Kate Fabrikant are employees of GSK Consumer Healthcare. Emese Csoke was employee at time of study set-up. Jan Rickard Norrefalk acted as consultant for protocol development and Teresa Wilcox provided data analysis.

P453

# CLINICAL AND DEMOGRAPHIC ASSESSMENT OF PATIENTS WITH REFRACTORY RHEUMATOID ARTHRITIS RECEIVED BIOLOGICS

E. Aronova<sup>1</sup>, G. Gridneva<sup>1</sup>, A. Kudryavtceva<sup>1</sup>, I. Dydykina<sup>1</sup>, G. Lukina<sup>2</sup>

<sup>1</sup>V.A. Nasonova Research Institute of Rheumatology, <sup>2</sup>Moscow Clinical Scientific Center Loginov A. S., Moscow, Russia

**Objective:** Refractory rheumatoid arthritis (RRA) refers to rheumatoid arthritis (RA) that is resistant (due to ineffectiveness or toxicity) to several drugs, including methotrexate and at least 2 bDMARDs with different mechanisms of action. Treatment of patients with RRA remains an urgent problem due to the difficulties arising in the choice of drug therapy. This study aimed to study the clinical and demographic characteristics of patients with RRA.

**Methods:** The anamnestic data of 40 adult patients with RRA, observed at the V.A. Nasonova RIR from 2010-2018. The study did not include patients who were sequentially treated with bDMARDs from the TNF $\alpha$  inhibitor group as the first and second drugs. Statistica software (version 12) was used for statistical processing.

**Results:** The studied group was represented mainly by women (N=32, 80%), who received from 3 to 6 bDMARDs, median 3 [3-4]. Clinical forms of RA were presented as seropositive for rheumatoid factor (RF) RA in 17 patients (42.5%), RA with extra-articular manifestations in 6 (15.0%), RA seronegative for RF in 16 (40.0%), Still's disease in adults in 1 (2.5%). The average age at the time of RA debut in the study group was 31.1 $\pm$ 17.0 y. The onset of RA in juvenile age was observed in 10 patients (25.0%). At the time of bDMARD initiation, the average age of patients was 39.8 $\pm$ 15.1 y, and the prescription of RA was 8.7 $\pm$ 6.3 y. 17 patients (42.5%) received 4 bDMARDs, 5 (12.5%) - 5 bDMARDs, 2 (5%) - 6 bDMARDs. As the first biologic in the study group, the following were prescribed: TNF inhibitors - 23 patients (57.5%), abatacept - 10 (25.5%), rituximab - 4 (10.0%), tocilizumab - 3 (7.5%). As the second bDMARD: TNF inhibitors - 15 patients (37.5%), rituximab - 10 (25%), tocilizumab - 8 (20%) and abatacept - 7 (17.5%). The first bDMARD was discontinued due to ineffectiveness in 29 patients (72.5%), due to the development of serious adverse events in 11 patients (27.5%). Second bDMARD in 31 (77.5%) and 9 (22.5%), respectively.

**Conclusion:** In the study group, patients with RRA were represented mainly by women with seronegative RA in the RF, onset of the disease at a young age and late addition of the first bDMARD (after  $8.7 \pm 6.3$  y from the onset of the disease).

P454

### PREVALENCE OF HYPOPHOSPHATASIA AND LOW SERUM ALKALINE PHOSPHATASE IN ADULTS WITH ATYPICAL FEMUR FRACTURES

E. Tsiantouli<sup>1</sup>, E. Biver<sup>1</sup>, T. Chevalley<sup>1</sup>, R. Petrovic<sup>1</sup>, D. Hannouche<sup>1</sup>, S. L. Ferrari<sup>1</sup>

<sup>1</sup>Geneva University Hospitals, Geneva, Switzerland

Hypophosphatasia (HPP) is a rare genetic disorder of alkaline phosphatase (ALP) deficiency which manifestations in adults include atypical femoral fractures (AFF). However, the prevalence of low serum ALP and HPP in AFF patients remains unknown. The aims of this study were to analyze the prevalence of low ALP and eventually identify HPP mutations in patients with AFF. For this purpose we retrospectively analyzed hospital records for serum ALP values and symptoms/signs of HPP among 80 adults admitted to the Geneva University Hospital between 2007 and 2017 with radiologically confirmed AFF. 18 (22.5%) of 80 AFF patients had at least one serum ALP value  $\leq 40$  IU/L. ALP values of AFF patients were further compared with a control group (N=23) of bisphosphonate-treated patients with prior proximal hip fracture. Lowest mean ALP values in AFF patients was not lower than in control group. However most low ALP values were associated with concomitant antiresorptive (AR) treatment and virtually all AFF patients also presented ALP values  $>40$  IU/L at other time points (i.e., without AR). Nevertheless, low ALP in AFF subjects was associated with higher percentage of bilateral AFF (44.4%), metatarsal fractures (22.2%), chronic fatigue and pain (16.6%), glucocorticoid (22.2%) and proton pump inhibitor (61.1%) medication. Eventually, 3 AFF subjects with consistently low serum ALP were tested for TNSALP mutations and one with a clinical suspicion of HPP was found to carry a rare pathogenic heterozygous variant (c.787T>C, p.Tyr263His). In conclusion, low ALP values are common among subjects with AFF, although mainly related to AR therapy. Despite the poor specificity of low ALP values in this context, persistently low values in absence of AR together with associated clinical signs of HPP may orient towards a genetic diagnosis of this rare disorder among AFF patients.

P455

### CORRELATION BETWEEN HIGHER DOSES OF VITAMIN D SUPPLEMENTS AND TOTAL CANCER INCIDENCE AND MORTALITY

R. Amir<sup>1</sup>

<sup>1</sup>Centre de Santé des Fagnes Chimay, Chimay, Belgium

**Objective:** Previous meta-analyses of randomized controlled trials of vitamin D supplementation and total cancer incidence and mortality found inconsistent results. Vitamin D supplement has been widely marketed for its claimed anticancer properties (1).

**Methods:** Low vitamin D status as a risk factor for cancer has been widely evaluated in cohort and case-control studies (2,3). The mechanisms underlying the observed significant association between vitamin D supplement and cancer mortality have not yet been fully elucidated.

**Results:** Evidence from animal and in vitro studies suggests that vitamin D plays an important role in carcinogenesis and angiogenesis, and further affects cancer mortality via several ways, such as reducing cell proliferation, stimulating apoptosis and suppressing cell differentiation of cancer cells, as well as anti-inflammatory and immunomodulatory properties (4). Observational epidemiologic studies, however, suggest divergent patterns, with evidence for a broad benefit of vitamin D weakening for cancer incidence but strengthening for cancer mortality. Studies of circulating 25(OH)D, measured either during the prediagnostic period or shortly after diagnosis of cancer, have demonstrated superior survival in cancer patients with higher circulating 25(OH)D levels (5,6).

**Conclusion:** Taking in account the synthesis of different data, efforts to achieve circulating levels of 25(OH)D around 55-135 nmol/l may contribute to reducing cancer mortality. To consistently raise the level above 75 nmol/l, at least 1500-2000 IU/d intake of vitamin D may be required for adults.

#### References:

1. Byers T. Am J Epidemiol 2010;172:1.
2. Pilz S, et al. Anticancer Agents Med Chem 2013;13:107.
3. Choi YJ, et al. World J Gastroenterol 2015;21:8868.
4. Feldman D, et al. Nat Rev Cancer 2014;14:342.
5. Song ZY, et al. Endocr Connect 2018;7:R294.
6. Vrieling A, et al. Int J Cancer 2014;134:2972.

P456

### THE RISK FACTORS AND FREQUENCY OF OSTEOPOROTIC FRACTURES OVER 10 YEARS OF FOLLOW-UP IN THE SIBERIAN POPULATION

E. Mazurenko<sup>1</sup>, O. Rymar<sup>1</sup>, L. Shcherbakova<sup>1</sup>, S. Malyutina<sup>1</sup>

<sup>1</sup>Research Institute of Internal & Preventive Medicine – Branch of the Institute of Cytology and Genetics, Siberian Branch of Russian Academy of Sciences, Novosibirsk, Russia

**Objective:** To study the frequency of osteoporotic fractures (OF) over 10 y of follow-up and risk factors for OF in people aged over 50 y (Novosibirsk).

**Methods:** In 2003-2005, a screening examination of persons aged 45-69 (n=9360) was carried out within the framework of the international project HAPIEE (Novosibirsk). The information was collected on OF during the last 12 months and risk factors for OF, registration of sociodemographic data, anthropometry, and a study of biochemical blood parameters. In 2017-2018 on the second examination (n=828), data on the frequency of OF that occurred over 10 years of observation were retrospectively collected. The analysis included 574 people who were 50-69 years old at the 1st screening (2003-2005) of the project (postmenopausal women). Statistical analysis was carried out by SPSS package (v.13.0).

**Results:** Among studied 574 subjects (mean age 59.0±5.2) there were 234 men and 340 women. During the 10-y follow-up, OF occurred in 9.6% subjects, women had OF 3 times more often than men (13.2% and 4.3%, respectively, p=0.001). Among 55 persons with fractures, 14.6% had a second re-fracture within 10 y of follow-up. Women with a history of OF during 10 y of follow-up had lower weight (p=0.021), BMI (p=0.018), waist circumference (p=0.037), hip circumference (p=0.050) compared with women without OF. Women with OF were more likely to be overweight (BMI 25-30 kg/m<sup>2</sup>) (p=0.029), while women without OF were more likely to have BMIs characteristic of obesity (p=0.004), as well as women with OF smoked more often (p=0.032) and had falls in the last 12 months (p=0.023) than women without OF. There is not a significant difference in the studied parameters in men with and without OF. According to the results of a multivariate analysis in women, the risk of OF associated with a smoking (OR=4.003 (95%CI=1.29-12.46), Ca consumption <1000 mg/d (OR=2.320 (95%CI=1.01-5.34), falls (OR=2.834 (95%CI=1.07-7.53) while BMI is negatively associated with OF (OR=0.914 (95%CI=0.85-0.99) independent of other factors. In men, we did not reveal other factors associated with OF.

**Conclusion:** In studied Siberian population sample aged 50–69 the frequency of OF during 10 y of follow-up was high and amounted to 9.6%. Women had OF 3 times more often than men p=0.001. In women, the risk of OF increased 4 times with smoking, 2 times with Ca consumption <1000 mg/d and a falls, and decreased with an increase in BMI.

**Acknowledgement:** The study was supported by RSF №20-15-00371; State target №AAAA-A17-117112850280-2

P457

### EFFECT OF PREVIOUS HOSPITALIZATION IN PATIENTS WITH HIP FRACTURE ON 12-MONTH MORTALITY

G. Vieira Factori<sup>1</sup>, A. Pereira Pinto<sup>2</sup>, J. Fonseca Ferreira<sup>3</sup>

<sup>1</sup>Faculty of Health Sciences, University of Beira Interior, Covilhã, <sup>2</sup>Guarda Local Health Unit, Orthopedics, Guarda, <sup>3</sup>Faculty of Health Sciences, University of Beira Interior, Covilhã; Guarda Local Health Unit, Rheumatology, Guarda, Portugal

**Objective:** Assess mortality at 12 months post-fracture associated with previous hospitalization. Assess overall mortality and at 6 and 24 months postfracture associated with previous hospitalization. Assess postfracture mortality associated with each specialty of previous hospitalization. Assess postfracture mortality associated with the duration of previous hospitalization. Assess the impact of prefracture hospitalization on fracture-related indicators (type of fracture and treatment, duration of postfracture hospital stay, time to surgery). Assess factors that influence 12-month mortality.

**Methods:** A retrospective cohort study of all consecutive patients admitted in the Orthopedic ward of a tertiary hospital with frailty hip fracture between 1 January 2017 and 30 June 2018 (18 months). All data were collected through revision of patients' charts and included sociodemographic data, type of fracture, fracture treatment, overall mortality and at 6, 12, and 24 months postfracture, hospitalization in the 3 months before fracture, comorbidities, and chronic medication. The sample was divided into 2 groups (with and without prefracture hospitalization), and all variables under study were compared. Mortality was evaluated concerning the existence of prefracture hospitalization and each ward in which it occurred.

**Results:** Of 538 patients with hip fracture, 501 were identified with frailty fractures, of which 75.25% were female, with a mean age of 83.88±8.53 y; of these, 71.66% with no prior fractures. Mortality at 12 months was 23.15%, with no significant association with prefracture hospitalization (23.68%, p=0.936). A classification tree identified age, sex, and fall-associated medication as determinant factors in 12-month mortality. Through a logistic regression (controlled for age, sex, and fall-associated medication), a significant association was found between prefracture hospitalization in the Orthopedic ward and 12-month mortality (p=0.042), with a 5.145 odds ratio (CI 95% 1.061-24.948).

**Conclusion:** Patients admitted to the Orthopedic ward in the 3 months before a hip fracture are at about 5 times greater risk for mortality at 12 months after fracture.

P458

### SEASONAL ANALYSIS OF VITAMIN D LEVELS IN MUSCULOSKELETAL DISEASES OUTPATIENT CLINIC IN TURKEY

S. Kanyilmaz<sup>1</sup>, O. B. Colak<sup>1</sup>, M. B. Ozdemir<sup>1</sup>, R. Akgun<sup>1</sup>, E. Demirhan<sup>1</sup>, S. Atar<sup>1</sup>, A. R. Aydogan<sup>1</sup>, M. G. Culha<sup>2</sup>, O. Kuru<sup>1</sup>

<sup>1</sup>University of Health Sciences, Prof. Dr. Cemil Tascioglu Hospital, Dept. of Physical & Rehabilitation Medicine, <sup>2</sup>University of Health Sciences, Prof. Dr. Cemil Tascioglu Hospital, Dept. of Urology, Istanbul, Turkey

**Objective:** Turkey is a vitamin D deficient country despite its sunny location (1). Patients with musculoskeletal diseases seen in Physical Medicine and Rehabilitation Outpatient Units might be potential candidates for vitamin D screening and replacement treatment.

**Methods:** We evaluated adult patients (age >18y) with musculoskeletal problems referring to outpatient unit in our Physical & Rehabilitation Medicine Dept. between July 2017- January 2019. Data was collected retrospectively from patients' hospital medical records. Patients with a serum 25-hydroxyvitamin D (25-OH vitD) laboratory result were included in the analysis. Data regarding age, gender and date were also extracted.

**Results:** We have revealed 1289 patients' records. Of these; 1125 (87.3%) were female and 164 (12.7%) were male. Mean age was 53.2±13.6 (for women; 54.27±13.17 and men: 45.83±13.96, p<0.001). Mean level of 25-OH vitD was 26.5±113.8. Mean serum level of 25-OH vitD was significantly lower in women compared to men (23.63±15.27 vs. 46.43±31.74; p:0.017). Level of 25-OH vitD differed among seasons and lowest levels were observed in spring and winter (Table1). When analyses were carried among different age groups, patients over 65 had lowest 25-OH vitD level (16.61±14.29, p<0.001).

**Conclusion:** Level of vitamin D can be low in patients with musculoskeletal conditions. Geriatric patients are more likely to be vitamin D deficient, so screening for vitamin D seems rational for elderly. Vitamin D levels tend to be lowest in winter and spring consistent with published literature (2).

Table. Serum 25-OH vitamin D levels of patients among seasons.

Season	n (%)	Serum 25-OH VitD level	Seasonal comparison	P value
Winter	161 (12.4)	21.25±12.15	winter vs. spring	0,793
Spring	314 (24.4)	21.48±16.6	winter vs. summer	0,049
Summer	363 (28.2)	23.40±14.06	winter vs. autumn	<0,001
Autumn	451 (35)	34.40±19.11	spring vs. summer	0,004

Total	1289	26.52±113.75	spring vs. autumn	<0,001
Post hoc analysis			summer vs. autumn	0,002

#### References:

1. Alpdemir M, Alpdemir MF. Int J Med Biochem 2019;2:118.
2. Ono Y, et al. J Bone Miner Metab 2005;23:147.

P459

### TERIPARATIDE RETENTION RATE ASSESSMENT (TERRA) STUDY: COMPARISON BETWEEN ORIGINATOR AND BIOSIMILAR DRUG

E. Di Donato<sup>1</sup>, M. Casella<sup>1</sup>, A. Becciolini<sup>1</sup>, F. Magalini<sup>1</sup>, D. Santilli<sup>1</sup>, F. Mozzani<sup>1</sup>, M. Riva<sup>1</sup>, A. Ariani<sup>1</sup>

<sup>1</sup>Azienda Ospedaliero-Universitaria di Parma, Dept. of Internal Medicine & Rheumatology, Parma, Italy

**Objective:** Osteoporosis (OP) is a metabolic bone disease that lead to high risk of fractures, especially of vertebrae and femur. In severe OP, antiresorptive treatment may not be sufficient; therefore, a bone forming therapeutic strategy is essential. In Europe, the only anabolic drug since now is teriparatide (TPH), a PTH analogue. As far as we know, there are no efficacy comparisons in clinical practice between originator TPH (oTPH) and biosimilar TPH (bsTPH). The aim of this study is to verify whether the retention rate of oTPH and bsTPH are similar.

**Methods:** All patients with OP who received a TPH treatment between 1 January 2013 and 30 April 2021 were enrolled. For each of them were recorded anamnestic data, the number of vertebral and femoral fractures, lumbar and femoral DXA scores, the duration of TPH treatment and the possible reason of TPH interruption. Patients were clustered in two groups, O and BS, according to the received treatment (respectively oTPH and bsTPH). The retention rate was tested with Kaplan-Meier estimator, while differences between groups were verified with Fisher's exact test or Mann-Whitney test, as appropriate. p<0.05 was considered statistically significant.

**Results:** 262 patients (median age 76 IQR 71-81, M: F 23:239) were enrolled; 4125 patients-months were observed. The majority of them (184/262) received oTPH while the other (78/262) started bsTPH treatment. The median period of observation was 18 (IQR 6-18) months. The only differences between groups O and BS were female prevalence (162/184 vs. 77/78; p=0.003) and median number of fractures (2 vs. 3; p=0.0007). The overall retention rate at 12 months was 94%. In the group BS we observed a slight higher retention rate than in group O (97% vs. 93%) but the differ-



ence was not statistically significant ( $p=0.15$ ). In both groups the main reason of discontinuation was fatigue and myalgia (prevalence of 4.3% vs. 2.6% respectively in group O and BS  $p=0.7$ ).

**Conclusion:** In this cohort of severe OP patients, TPH 1 year retention rate was higher to those reported in trials and clinical studies. There were no differences in terms of retention rate between oTPH and bsTPH. The availability of bsTPH will make the cost-benefit ratio of this treatment even more advantageous by allowing more and more patients to access bone forming strategy.

## P460

### IDENTIFICATION OF SUGGESTIVE CHANGES OF INFLAMMATORY MYOPATHY IN MILD TO MODERATE SUBACUTE POST-COVID-19 PATIENTS THROUGH ECHOGENICITY OF THE RECTUS FEMORIS MUSCLE

R. Coronado-Zarco<sup>1</sup>, A. Olascoaga-Gómez de León<sup>1</sup>, C. Díaz-Hernández<sup>1</sup>, H. Aguirre-Meneses<sup>1</sup>, L. E. Quintanar-Trejo<sup>1</sup>, K. Zarco-Ordoñez<sup>1</sup>, N. C. Centeno-Morales<sup>1</sup>, X. López-Megchun<sup>1</sup>, A. Y. A. Aragón-Hernandez<sup>1</sup>, M. A. Nuñez-Gaona<sup>1</sup>

<sup>1</sup>Instituto Nacional de Rehabilitación, Mexico, Mexico

**Objective:** To identify suggestive changes of inflammatory myopathy in mild to moderate subacute post-COVID-19 patients, through echogenicity of the rectus femoris muscle

**Methods:** We considered patients with subacute (3 weeks of diagnosis) post-COVID-19 disease, detected and treated through outpatient consultation. Musculoskeletal ultrasound was performed in rectus femoris with a standardized technique, deep was established at 6 cm and general gain at 65. We obtained, extract and analyzed transverse image of the rectus femoris muscle with Image J software. Preprocessing of the B-mode ultrasound images consisted in image decompression in DICOM format, anonymization, and semi-automatic selection of the region of interest (ROI). The distribution of the values of each pixel mapped in grayscale is obtained from the frequency histogram for the selected ROI with 8 bits resolution (256 gray levels). Cutoff point for increased echogenicity was considered with the mean gray scale of 130. Statistics: quantitative and qualitative variables were analyzed with central tendency and dispersion, frequencies and percentages respectively. Inferences were done with chi-square test. Authorization and registration of research and ethics committee.

**Results:** We included 57 patients (29 women, 28 men) with mean age of 45.5 y (SD 12.28; range from 18-68), of which 7 patients presented suggestive changes of myopathy (12.5%), and 9 (16.1%) with suspicion. Women were more affected with 6 cases and 6 suspects ( $p=0.046$ ). Only 17 patients referred myalgia, of which only 2 patients presented suggestive changes and 2 suspected.

**Conclusion:** We observed that 12.5% of patients with post-COVID-19 disease presented changes in echogenicity suggestive of myopathy and 16.1% with suspicion, with greater affection in women. Patients who report myalgia, fatigue, and weakness after COVID-19 disease may be experiencing a muscular inflammatory process that could lead to fibrosis and later degeneration. Ultrasound is a useful tool to assist timely diagnosis.

## P461

### CROWNED TOOTH SYNDROME: A CASE REPORT

R. Hassani<sup>1</sup>

<sup>1</sup>Chu Nedir Mohammed Unité Belloua, Service de Rhumatologie, Tizi-ouzou, Algeria

**Objective:** Crowned tooth syndrome is related to microcrystalline involvement (hydroxyapatite or calcium pyrophosphate) of the retro-odontoid ligament of the atlas, the manifestations of which often lead to the erroneous diagnosis of meningitis or spondylodiscitis. We report a new sighting.

**Case report:** A 36-year-old young woman, with no pathological history, presented for a rheumatology consultation complaining of acute neck pain with right scapulargia of inflammatory schedule, the sudden onset of which dates back to about 1 month, without a triggering factor or associated signs: fever and headache. The clinical examination found a patient in general preserved condition, afebrile. Straightness of the cervical spine with limitation of its mobility in all directions. Neurological examination is normal. Biology: VS: 45 H1, CRP: negative; the rest of the assessment, in particular the FNS, hepatic, renal, phosphocalcic assessment is normal. Radiology: standard radiographs are not included. The cervical tomodensitometry makes the diagnosis by objectifying a calcification of the transverse ligament of the atlas affirming the syndrome of the crowned tooth.

Crowned tooth syndrome is a clinical, biological, and radiological syndrome characterized by inflammatory neck pain, biological inflammatory syndrome, and calcium deposits in odontoid abarticular structures (a crown-like calcification around the odontoid process). Note, this syndrome is sometimes accompanied by fever and stiffness of the neck which can make you think of meningitis. The inflammatory indices are high, as in most cases of microcrystalline arthritis. The CT scan of the cervical spine centered on C1/C2 is the gold standard for positive diagnosis. The differential diagnosis of transverse ligament calcification includes deposits of hydroxyapatite and pseudogout. The treatment is based on NSAIDs, associated with a low dose and short duration corticosteroid therapy; colchicine if NSAIDs and corticosteroids fail, inducing a dramatic improvement in symptoms within 48 h and resorption of calcification within 2 weeks. It is not yet clear what the exact prevalence of this syndrome is.

**Conclusion:** This entity remains little known after its description in 1974 by Dirheimer and Wackenheim. It deserves to be because it represents a frequent cause of febrile neck pain.

P462

# ENTHESIC RESPONSE OF THE ACHILEAN AND PATELLAR TENDON TO PHYSICAL EXERCISE IN PATIENTS WITH SPONDYLOARTHRITIS IN CLINICAL REMISSION COMPARED TO HEALTHY CONTROLS

C. A. Guillén-Astete<sup>1</sup>, M. E. Tejero-Carmona<sup>2</sup>, M. Pérez-Sola<sup>2</sup>, M. Carreiras-Cuñia<sup>2</sup>, N. García-Montes<sup>1</sup>

<sup>1</sup>Ramón y Cajal University Hospital, <sup>2</sup>CEU San Pablo, Madrid, Spain

**Objective:** Entheses are the most important histopathological targets of spondyloarthritis (EspA). Recent studies have shown that in healthy volunteers, the enthesal fibrocartilage is able to adapt to mechanical stimuli. This adaptation can lead to increased thickness of the enthesis, increased calcium deposits or even neovascularization. In periods of remission, the entheses of patients with SpAs should not show inflammatory changes; however, under mechanical stress, they may behave differently from healthy subjects, which could translate into persistent latent inflammatory activity. The aim of the present study was to determine the differences in the enthesis and peri-aesthetic response to physical exercise of the patellar and Achilles tendons between patients with SpAs and healthy subjects.

**Methods:** Consecutive patients with a diagnosis of EspAs in clinical remission (ASDAS <1.3 or DAPSA <4.0) were recruited from four rheumatology clinics and healthy volunteer controls from the Faculty of Medicine (CEU San Pablo) and relatives matched for sex, age $\pm$ 4 y and BMI category. An anthropometric study was performed on all subjects. All were invited to perform a physical exercise consisting of 100 steps and 50 squats over 60 min. Before and after the physical exercise, the maximum height of the infrapatellar bursa (aBIR), height of the distal patellar enthesis (aRD), height of the retro Achilles bursa (aBRA), height of the effusion of the ARB (aeBRA), thickness of the Achilles enthesis (aA) and the presence of PD signal in the Achilles and patellar enthesis were measured. Variations in bursal heights and prevalence of PD signal before and after were compared between patients and controls.

**Results:** 24 patients and 24 healthy controls were enrolled (age 43.2 $\pm$ 5.43 y, 8 females per group; time since diagnosis 8.02 $\pm$ 2.16 y). Controls had greater lean mass (43.38 $\pm$ 6.40 vs. 37.25 $\pm$ 5.58, P=0.008) and patients, greater Achilles enthesis thickness (8.46 $\pm$ 1.21 vs. 7.42 $\pm$ 0.45, P=0.001). Table 1 summarizes the characteristics of the groups. In all cases, the height of the aRD and aBRA and the BRA occupation index increased significantly, as shown in Table 2. The change in aBRA was significantly greater in patients than in controls (+1.17 $\pm$ 0.25 vs. +0.25 $\pm$ 0.17, P<0.001), as well as in the ARB occupancy index (28.17 $\pm$ 7.47 vs. 16.08 $\pm$ 5.71, P=0.037). Table 3 exposes all the changes in the measurements, observed in the two groups. The proportion of post-exercise PD signal in patients and controls in the patellar tendon was 11/28 (39.3%) vs. 3/28 (12.5%), P=0.086 and in the Achilles tendon was 12 (50%) vs. 2 (8.3%), P=0.009.

**Conclusion:** Physical activity of the lower body leads to distension of the peri-aortic bursae of high-load tendons. This distension is more pronounced in patients than in controls. Patients,

even in remission, present a hyperemic response to physical exercise that denotes persistence of inflammatory activity not detectable at rest.

Variable	Grupo	Media	DE	p
Edad (años)	ESPA	46,25	6,06	0,951
	Control	46,38	5,46	
Talla (cm)	ESPA	168,92	5,78	0,755
	Control	169,75	8,21	
Peso (kg)	ESPA	76,00	10,27	0,221
	Control	81,58	13,68	
Masa magra (%)	ESPA	37,25	5,58	0,008**
	Control	43,38	6,40	
Fuerza flexora de mano (kg)	ESPA	33,25	10,09	0,715
	Control	34,42	8,38	
Grosor tendón rotuliano (mm)	ESPA	359,42	62,46	0,169
	Control	391,54	65,71	
Grosor tendón de Aquiles (mm)	ESPA	7,42	0,45	0,001**
	Control	8,46	1,21	

Tabla 1. Características demográficas y antropométricas de los grupos estudiados.

Variable	Grupo	Momento	Media	DE	p
Altura bursa rotuliana (mm)	ESPA	Antes	1,97	0,40	<0,001
		Después	2,20	0,39	
	Control	Antes	1,89	0,44	<0,001
		Después	2,06	0,48	
Altura bursa Aquiles (mm)	ESPA	Antes	4,32	1,04	<0,001
		Después	5,49	1,53	
	Control	Antes	4,27	0,68	<0,001
		Después	4,51	0,72	
Altura derrame bursa Aquiles (mm)	ESPA	Antes	0,31	0,24	<0,001
		Después	1,91	0,90	
	Control	Antes	0,27	0,16	<0,001
		Después	1,00	0,19	
Índice ocupación de la bursa Aquiles (%)	ESPA	Antes	7,00	5,31	<0,001
		Después	35,17	13,80	
	Control	Antes	6,29	3,22	<0,001
		Después	22,38	4,45	

Tabla 2. Medidas ecográficas realizadas antes y después del ejercicio físico en los dos grupos.

Diferencias Después-Antes	Grupo	Media	DS	p
Altura bursa rotuliana (mm)	EspA	0,23	0,14	0,204
	Control	0,17	0,09	
Altura bursa Aquiles (mm)	EspA	1,17	0,65	<0,001
	Control	0,25	0,17	
Altura derrame bursa Aquiles (mm)	EspA	1,60	1,00	0,011
	Control	0,73	0,22	
Índice Ocupación de la bursa Aquiles (%)	EspA	28,17	17,47	0,037
	Control	16,08	5,71	

Tabla 3. Magnitud comparativa de los cambios observados entre pacientes y controles en las medidas después y antes del ejercicio.

P463

**DIFFUSE IDIOPATHIC SKELETAL HYPEROSTOSIS AND METABOLIC DISORDERS: ABOUT 57 PATIENTS**A.-R. Halidou Idrissa<sup>1</sup>, N. Kawtar<sup>1</sup>, J. Saadia<sup>1</sup><sup>1</sup>Rheumatology Dept., Ibn Rochd CHU, Casablanca Faculty of Medicine & Pharmacy, Hassan II University, Casablanca, Morocco

**Objective:** Diffuse idiopathic skeletal hyperostosis (DISH) is a noninflammatory enthesopathy responsible for a musculoskeletal disorder. It involves two (according to Forestier) or three (according to Resnick) contiguous intervertebral bridges to affirm hyperostosis, with correct discs (unlike spinal osteoarthritis), and the absence of fusion of the sacroiliacs or posterior joints (unlike spondylitis). The diagnosis of DISH is radiological and presents with ossification of the entheses along the spine. For some reason, the cells responsible for building bones are depositing calcium in places where they shouldn't. No etiology has yet been determined; genetic, local, environmental and even endocrine (metabolic) factors may play a role in the development of this condition. The purpose of this work was to study the metabolic profile of patients with DISH.

**Methods:** We conducted a descriptive study in the Dept. of Rheumatology of the University Hospital of Ibn Rochd, Casablanca, from February 2020 to March 2021 (13 months). The inclusion criteria were all patients diagnosed with DISH according to Risnick's criteria. The exclusion criteria were the patients not meeting Risnick's criteria and those followed for a spondyloarthropathy included.

**Results:** 57 patients were included in this study. The average age was 64.36 (57-81), with a male predominance of 59.65%. 57.89% of the patients (n=33) had diabetes mellitus with a mean duration of 7.12 y (4-15), 49.12% of the cases had dyslipidemia, of whom 13 were under medical treatment. 36.84% of the patients were hypertensive and 50.88% had an average BMI of 33.13 kg/m<sup>2</sup> (30.49-41.26). Hyperuricemia was found in 8.77% of the patients. 56.14% of the patients had at least two metabolic disorders, dominated by the association of diabetes mellitus with obesity and dyslipidemia (45.61%). 11 patients had no metabolic disorder (19.30%). The discovery of DISH was fortuitous in 75.44% of the cases, either following routine workup or for other reasons. It was symptomatic in 24.66% of patients, revealed by stiffness of the spine. Mechanical back pain was present in 4 patients, and 7 patients had associated peripheral presentations of DISH.

**Conclusion:** The risk of occurrence of DISH seems to increase in patients with associated metabolic disorders. It is a disease that progresses slowly due to its asymptomatic feature, as noted in the vast majority of our patients. The prevention of metabolic disorders and their control can reduce the risk of DISH.

P464

**GOUT AND PSORIASIC ARTHRITIS: A FORTUITOUS ASSOCIATION OR A RELATED DISEASE?**A.-R. Halidou Idrissa<sup>1</sup>, N. Kawtar<sup>2</sup>, J. Saadia<sup>1</sup><sup>1</sup>Rheumatology Dept., Ibn Rochd CHU, Casablanca Faculty of Medicine & Pharmacy, Hassan II University, Casablanca, Morocco,

**Objective:** Gout is an arthropathy related to an abnormality in uric acid metabolism that causes hyperuricaemia. It is said to be "microcrystalline" because it is due to deposits of uric acid microcrystals in tissues, especially in the joints. Gout is a chronic condition, which can lead to systemic manifestations and severe polyarticular disease, and often responsible for significant disability over the long term. Psoriatic arthritis (PsA) is a polymorphic disease belonging to the group of spondyloarthropathies (SpA), which is present in up to 42% of people with psoriasis and is estimated to be prevalent at 0.1-1.0% in the general population. While the association of gout secondary to PsA with the presence of cutaneous psoriasis is not rare, cases of PsA without cutaneous psoriasis associated with gouty arthropathy are less frequent and little described in the literature. We report a case of these two pathologies.

**Case report:** Mr S.I.K, aged 27, followed since the age of 14 for juvenile idiopathic arthritis, treated with corticosteroids and nonsteroidal anti-inflammatory drugs. The diagnosis of PsA was made at the age of 23 according to CASPAR criteria: a chronic destructive polyarthritis that began in the lower limbs, a biological inflammatory syndrome, negative rheumatoid factor with predominant bone constructions in the distal interphalangeal joints (IPD) (Figure 1). He was put on methotrexate with an initial dose of 15 mg/week, which was replaced by salazopyrine 2 g/d due of a gastrointestinal intolerance. After 15 months, he presented with tophi over all of the proximal interphalangeal joints (PIP) bilaterally. The diagnosis of gouty arthropathy was made in the presence of tophi, arthritis of the first metatarsophalangeal joints (MTP), blood uric acid at 112 mg/L, urinary uric acid at 891 mg/24-h. In the absence of neurological and digestive signs, the clinical profile was an enzyme drop related to a partial deficiency in hypoxanthine-guanine phosphoribosyltransferase (HGPRT), however enzyme assay was not performed due to unavailability. The evolution was marked by the onset of radiological destruction of all PIPs compared to previous radiographs taken 15 months before his admission (Figure 2). The gout attack was treated with colchicine 1 mg/d with a good response after 7 d. The erythrocyte sedimentation rate increased to 21mm/1st hour vs. 73mm/1st hour, and CRP decreased from 109.34 mg/L to 13 mg/L. Then the patient was put on febuxostat 80 mg/d, and the uric acid decreased from 112 mg/L to 96 mg/L after 5 d of treatment. Regarding PsA, the patient was prescribed secukinumab.

The term of "psout" was defined by the association of PsA and gout, it is corroborated by a common ground, pathophysiology, clinical-bio-radiological presentation, and specific management, deserving the description of this new nosological concept. From



a pathophysiological point of view, these two diseases share autoinflammatory aspects. The prevalence of gout is 0.9% in the French population, that of PsA is 2 to 6%, but evaluated at 18% in rheumatology consultation, making this association a common situation. Gout is rarely due to enzymopathy, and the best known is HGPRT deficiency. This deficit, when partial, results in severe, early gout, tophaceae and complicated by renal lithiasis by major hyperuricaemia. The presence of hyper uricemia is usual in psoriasis. However, its presence before the installation of the cutaneous and articular manifestations raises the suspicion of a fortuitous association or infra-clinical cell turnover. Colchicine, traditionally used in the treatment of gout, limits the proliferation of inflammatory cells, thus shortening the gout attack. Studies have shown that febuxostat decreases uric acid levels to physiological levels in a higher proportion of patients than with allopurinol with an excellent safety profile. However, the association of PsA without associated skin psoriasis with enzymatic gout is not described in the literature and the responsibility of gout in PsA most likely influences the clinical and radiological outcome in patients, as suggested by this case. The combination of these two pathologies, as in the case of our patient, requires specific management, leading us to consider the management protocols for each of the entities.

**Conclusion:** The association of an enzymatic gout with PsA is clinically redoubtable because they are two inflammatory rheumatisms acting jointly on the joints. Thus, this association might accelerate bone destruction following an amplification of the inflammatory phenomenon by strongly affecting the functional prognosis of the joints. The management of this association consists in respecting the therapeutic protocols of each pathology, imposing rigorous monitoring, both clinically and biologically.



Figure 2. X-ray taken 15 months later, when gout was discovered. Joint destruction was more advanced on the proximal interphalangeal joints with associated subluxation.

P465

### BILATERAL HUMERAL SOLITARY BONE CYST: ABOUT A CASE

A.-R. Halidou Idrissa<sup>1</sup>, N. Kawtar<sup>1</sup>, J. Saadia<sup>1</sup>

<sup>1</sup>Rheumatology Dept., Ibn Rochd CHU, Casablanca Faculty of Medicine & Pharmacy, Hassan II University, Casablanca, Morocco

**Objective:** The solitary bone cyst (SBC) is a benign osteolytic bone tumor with fluid content. It has also been described as a pseudocystic intraosseous formation without epithelial coating, whether empty or filled with serous or blood fluid. For some authors, this lesion is not a real bone tumor but a benign cystic dysplasia. Usually asymptomatic, it is most often located in the proximal metaphyseal part of the humerus and femur in children and young adults, with a slight female predominance. In 90% of cases, the diagnosis is essentially radiological and made during the first two decades of life, exceptionally after 30 years. We report a case of a bilateral SBC discovered fortuitously in a 39-year-old patient.

**Case report:** Mrs. C.M, aged 39, with a history of pulmonary tuberculosis treated 15 y ago, and type 2 diabetes mellitus under oral antidiabetics, consulted for a mechanical pain in both of her shoulders. Standard radiographs revealed ovoid lacunae respecting the cortical bone, with an osteolytic feature, clear contours, and a bilateral "egg-cup shape" in the metaphyseal-epiphyseal regions of the 2 humeral bones. These gaps were associated with acromioclavicular osteoarthritis (Figure 1). The CT scan confirmed the diagnosis of SBC (Figure 2). However, the pain has been linked to the presence of chronic tendinopathies of the subscapular and supraspinatus tendons bilaterally, as well as the right infraspinatus tendon, and to the presence of subacromiodeltoid bursitis in the right shoulder. Regarding the bone cysts, the management consisted of radiographic monitoring with hygienic-dietetic measures in view of the risk of fractures.

SBC is common. It ranks third in frequency among bone lesions after non-ossifying fibroids and exostoses in the growing period. The majority of the cysts are discovered between 5 and 15 years



Figure 1. Standard x-ray of the hands, showing joint space narrowing in the metacarpophalangeal joints (3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup> right and 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup> left), joint space narrowing in all the PIP joints (1<sup>st</sup>, 4<sup>th</sup>, 5<sup>th</sup> right and 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup> left) and DIP joints (1<sup>st</sup>, 2<sup>nd</sup> right and 1<sup>st</sup>, 3<sup>rd</sup>, 4<sup>th</sup> left), with anterior dislocation of the 3<sup>rd</sup>, 4<sup>th</sup> right DIP and 2<sup>nd</sup> left DIP; as well as geodes and erosions on the interphalangeal joints bilaterally



(60%), 10% before 5 years; some (7%) are sequelae discovered in adulthood. It is usually a single lesion, although very rare cases of multiple locations have been described. SBC discovered incidentally in adulthood is often an old cyst that has migrated to the diaphyseal region. It is often latent or consolidated. Sometimes it remains in the metaphyseal region but becomes latent with partial union and persistence of cystic lacunae, and lacunae with fatty replacement. The patient remains completely asymptomatic until the "inaugural fracture" or until the onset of microfractures, which generate pain. The location in the proximal humerus remains particularly asymptomatic (because it is a nonbearing bone) until the inaugural fracture, which makes it possible to make the diagnosis in 95% of cases. The other 5% are discovered fortuitously. The x-ray is often sufficient to make the diagnosis. CT helps in the differential diagnosis, particularly with an aneurysmal bone cyst which has a homogeneous appearance, with or without trabeculations. Humeral cysts that have spared the growth cartilage and humeral diaphyseal cysts have the best prognosis, so the absence of growth cartilage in adulthood may explain their good prognosis. It is a benign lesion, rarely painful or disabling. In fact, the goal of treatment is to avoid fractures, and it should therefore be as simple and as less damaging as possible. The oncological resections proposed by McNamee ADDIN ENRfu are not justified. On the other hand, Morton offered to give spontaneous recovery a chance if a SBC was discovered following a fracture.

Our patient's case is rare depending on the advanced age of discovery, and multiple locations. In addition to the fact that the humerus is a non-bearing zone, associated with the absence of growth cartilage, our aim was to educate the patient regarding the risk of possible fractures.

**Conclusion:** The discovery of a SBC in adulthood is most often fortuitous due to its asymptomatic clinical nature and the rarity of possible fractures, which are the main complication. The prognosis is always better than in children or adolescents because of the absence of growth cartilage. This gives the bone good strength. The management may consist in abstaining from therapy, and is based on clinical and radiological monitoring given the risk of fracture, especially when it is a location in a non-load bearing area (humerus).



Figure 1. Standard X-ray of the shoulders showing ovoid lacunae respecting the cortical bone, with an osteolytic appearance, clear contours, and bilateral "egg-cup shape" fundus in the metaphyseal-epiphyseal regions of the 2 humeral bones. These gaps are associated with an acromioclavicular arthritis.

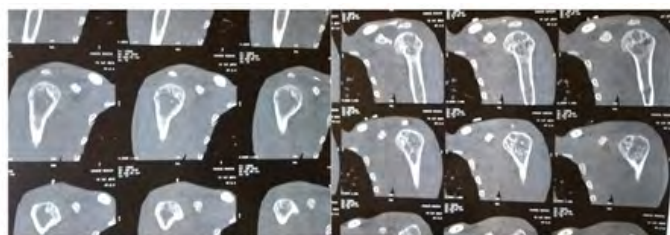


Figure 2. CT scan of the shoulders showing well-limited osteolytic formations with clear contours, respecting the cortex, and homogeneous compartmentalized fluid content. Metaphyso-epiphyseal locations. Typical SBC appearance.

P466

### LACTOBACILLUS RHAMNOSUS ENHANCES BONE HEALTH VIA MODULATING PERIPHERAL TREGS (PTREGS) IN OSTEOPOROTIC MICE

A. Bhardwaj<sup>1</sup>, L. Sapra<sup>1</sup>, R. K. Srivastava<sup>1</sup>

<sup>1</sup>Osteoimmunology Lab, Dept. of Biotechnology, All India Institute of Medical Sciences, New Delhi, India

**Objective:** Probiotics are defined as viable microorganisms that upon administration in adequate amount confer various health benefits via modulating gut microbial composition. Very few bacterial strains have been studied till date in relation to their effect on bone health. The decrease in number of Tregs leads to various inflammatory conditions of the bone such as osteoporosis, rheumatoid arthritis, etc. Probiotics induce the differentiation of peripheral Treg (pTreg) cells, thereby resulting in prevention of various inflammatory diseases. Based on these facts we were interested in investigating the role of probiotics on the modulation of bone health via its effect on pTregs. In the present study we selected *Lactobacillus rhamnosus* (LR) strain of probiotics to examine its effect on bone health in ovariectomy (Ovx) induced osteoporotic mice model. We were interested in investigating the role of LR on modulation of bone health (in Oxv induced osteoporotic mice model) via its effect on pTregs.

**Methods:** Female C57BL/6 mice were divided into three group's (n=6/group) viz. Sham, Oxv and Oxv+LR. LR was administered orally ( $10^9$  CFU/ml) and after 45 d, mice were sacrificed and tissues were analyzed for accessing the role of LR on bone health via various cutting-edge technologies such as SEM, AFM,  $\mu$ CT, FACS and ELISA.

**Results:** We observed that oral administration of LR protected mice from Oxv-induced bone loss, which was confirmed by SEM, AFM, FTIR and  $\mu$ CT analysis of bone samples. We further observed that LR-intake enhanced bone density in both cortical and trabecular bones of Oxv mice. Interestingly, it was observed that LR-intake enhances percentage of CD4<sup>+</sup>Foxp3<sup>+</sup>NRP<sup>+</sup>Treg cells (pTregs) in both bone marrow (prime site of osteoclastogenesis)

and GUT lymphoid tissues (viz. mesenteric lymph nodes, Peyer's patches, small intestine and large intestine). Furthermore, serum cytokine analysis revealed that Ovx mice administered with LR had significantly decreased levels of osteoclastogenic cytokines IL-6, IL-17 and TNF $\alpha$  along with significantly enhanced levels of anti-osteoclastogenic cytokines IL-10, IL-4 and IFN $\gamma$  with respect to Ovx group.

**Conclusion:** Taken together our results for the first time establish an osteoprotective role of LR on bone health via induction of pTregs in Ovx mice.

## P467

### **PRESCRIPTION AND USE OF ANALGESICS IN A TERTIARY CARE HOSPITAL**

C. M. Daina<sup>1</sup>, C. M. Vesa<sup>1</sup>, D. C. Zaha<sup>1</sup>, A. C. Venter<sup>1</sup>, F. L. Andronie-Cioara<sup>1</sup>, L. G. Daina<sup>1</sup>

<sup>1</sup>University of Oradea, Faculty of Medicine & Pharmacy, Oradea, Romania

**Objective:** The rational use of drug is one of the main objectives of national and European drug policy. Analgesics are found in the group of medications frequently prescribed by doctors for pain management. Pain management in the hospital consists of the administration of drugs with analgesic effect. Analgesics vary quite a bit. Depending on the type and etiology of pain, the body may respond better to one painkiller than another. Also, each person responds slightly differently to pain medication. Given these aspects, the objective of this study is to evaluate the prescription of analgesics and the combination of analgesics at a county hospital, in order to properly use these drugs by doctors.

**Methods:** A longitudinal descriptive, retrospective study was performed, based on a quantitative research, using the computer statistical database of the Clinical County Emergency Hospital of Oradea, in 2019. The prescription and consumption of analgesics in hospital departments was analyzed, by types of analgesics, on the medical, surgical, anesthesia and intensive care units, surveillance unit and advanced treatment of critical cardiac patients - USTACC, neonatology intensive care. During the analyzed period, the hospital had 861 beds in its structure, and 39,420 cases were discharged in continuous hospitalization (19463 cases first semester and 19957 cases second semester). It should be mentioned that the hospital does not have an oncology department in its structure (where the prescription of analgesics is increased). Only injectable variants of analgesic medication were analyzed. Local analgesic drugs (patches) were excluded from the analysis.

**Results:** Pain therapy in hospital is performed either using a single analgesic drug or several, in variable combination. The use of analgesic associations is practiced that act through different mechanisms, the final effect being an additive, potentiated one. The combination of three and over three analgesics was not made at the same time, but we find the analgesics prescribed throughout the hospitalization period. The administration of different

types of analgesics to the same patient is due to the fact that the initial therapy did not give results and, later, the treatment continued with other analgesics. The prescription of analgesics is performed as follows:

- Non-opioid analgesics are indicated in the treatment of low-intensity pain
- mild nonopioid/opioid analgesics or combinations of paracetamol + opioid are indicated in the treatment of moderate-intensity pain,
- Opioid analgesics are indicated in the treatment of severe pain.

Out of the total number of hospitalized patients in 2019 (39,420), 23,808 patients received at least one analgesic, which represents 60.4% of patients with analgesic treatment out of the total number of hospitalized patients.

**Conclusion:** The most widely used injectable analgesic was metamizole ampoule, with no adverse effects, according to studies and warnings received from the National Agency for Drugs and Medical Devices (agranulocytosis with a lethal prognosis). During the analyzed period, the consumption of metamizole ampoules, as well as the treated patients, decreased in number, however, metamizole ampoules still represent a therapeutic choice of first alternative. Another commonly used analgesic was infusion paracetamol, in which the number of indications increased rapidly. Alfifene and dexketoprofen have an upward trend both as therapeutic units used and as the number of patients treated.

## P468

### **MEDICAL SERVICES PROVIDED THROUGH HOME CARE**

L. G. Daina<sup>1</sup>, C. M. Vesa<sup>1</sup>, D. C. Zaha<sup>1</sup>, F. L. Andronie-Cioara<sup>1</sup>, A. C. Venter<sup>1</sup>, C. M. Daina<sup>1</sup>

<sup>1</sup>University of Oradea, Faculty of Medicine & Pharmacy, Romania, Oradea, Romania

**Objective:** Home care aims to meet the health and social needs of people in their own homes by providing appropriate and high quality care. People with acute and chronic conditions, who have a certain level of dependence and have a limited capacity to go to a health unit in order to provide the outpatient care recommended by doctors, have the right to medical care at home. The beneficiaries of home health care services are patients of all ages, suffering from chronic progressive, incurable or life-threatening diseases, who have uncontrolled symptoms or psycho-social or spiritual suffering. The purpose of the study is to evaluate the medical services provided through home care.

**Methods:** The study is based on a group of 230 patients from Bihor County, with various pathologies, who were given special care at home by the company SC.X.SA for home medical services, for a well established period. The analysis period was 2018-2019. This study is a retrospective one and in order to achieve it, we

analyzed the home care sheets of each patient. The data obtained were centralized in order to analyze the pathological events of the patients included in the study. In this study the evaluation method used was observation and the method of standardized tests.

**Results:** Characteristics of the analyzed group: 57% of patients are over 60 years old, 70% are men and 72% of patients come from rural areas. 30 patients live alone, without relatives (13%), 140 patients live with their family (61%), and 60 patients are cared for by various people (26%). The most common pathologies: oncological diseases (38%), ulcerative diseases (29%) and diabetes (9%). In terms of the type of treatment applied throughout the study, the following distribution was made: antibiotic treatment (22%), wound toilet and local dressing (39%), continuous blood glucose monitoring and insulin administration (7%), monitoring of epileptic seizures (5%), oxygen therapy (10%), administration of anticoagulant treatment subcutaneously (17%). From the beginning of the study until its end, a number of 80 patients were hospitalized due to their worsening condition.

**Conclusion:** The need for home care is undeniable. The incidence of pathologies whose recommendation is home care gradually increases from birth reaching the maximum value towards the end of life, when the patient presents a set of associated pathologies. These conditions require specialist care for a longer period of time, which makes it necessary to provide care at the patient's home.

## P469

### PREVALENCE OF LDL-CHOLESTEROL CONTROL ACCORDING TO THE NEW GUIDELINES IN ELDERLY DIABETES PATIENTS WITH VERY HIGH CARDIOVASCULAR RISK

C. M. Vesa<sup>1</sup>, A. R. Popa<sup>2</sup>, F. L. Andronie-Cioara<sup>1</sup>, L. G. Daina<sup>1</sup>, D. Galusca<sup>2</sup>, C. Laslau<sup>1</sup>, M. Popoviciu<sup>1</sup>, C. M. Daina<sup>1</sup>

<sup>1</sup>University of Oradea, Faculty of Medicine & Pharmacy, Romania, Oradea, Romania

**Objective:** Dyslipidaemia is highly prevalent in diabetes mellitus patients and its management has been much improved in the last decades by introduction of statins. Numerous studies demonstrate that very demanding LDL-cholesterol targets are necessary in patients with very high cardiovascular risk in order to prevent the macrovascular events. ESC/EASD 2019 consensus for diabetes and prediabetes gives a target of <55 mg/dL for LDL-cholesterol in diabetes mellitus patients with very high cardiovascular risk. The purpose of our study was to evaluate the value of LDL-cholesterol in a group of elderly patients with type 2 diabetes mellitus according to their pharmacological treatment for dyslipidaemia.

**Methods:** The study is a retrospective one. 145 type 2 diabetes mellitus patients from the Clinical County Hospital of Oradea treated in the Internal Medicine - Diabetes compartment between 1.09.2020 – 1.05.2021 were considered for inclusion in the study. Anamnesis, physical examination, assessment of cardiovascular risk factors, cardiological exam, diabetes duration, screening for diabetes complications, LDL-cholesterol and investigations regarding dyslipidaemia treatment were investigated. Their cardiovascular risk was determined according to the definition provided by the ESC/EASD 2019 consensus on diabetes. After applying the inclusion criteria: age ≥65 y and the presence of very high cardiovascular risk 105 patients remained in the study.

**Results:** The average age of the patients was 68.5 years, there were 60 men and 45 women. 43 patients (40.95%) had a level of LDL-cholesterol <55 mg/dL. 35 patients (33.33%) were on high-intensity statin therapy, among them 18 had an LDL-cholesterol <55 mg/dL (51.43% of 35). 14 patients (13.33%) were on high-intensity statin therapy + ezetimibe, among them 10 had an LDL-cholesterol in target (71.43% of 14). 4 patients were on state-of-the-art therapy with high-intensity statin+ ezetimibe and PCSK9 inhibitor, a newly introduced therapy for LDL-cholesterol management, among them 3 patients had LDL-cholesterol <55 mg/dL (75% of 4). 34 patients (32.38%) were on moderate-intensity statin therapy, among them only 12 patients had an LDL-cholesterol <55 mg/dL (35.29% of 35). 18 patients did not have any treatment for dyslipidaemia, mostly were not aware that they suffer of dyslipidaemia, among them none had LDL-cholesterol <55 mg/dL.

**Conclusion:** Screening for dyslipidaemia must be done in all diabetes mellitus patients. High-intensity statin therapy in combination with ezetimibe is effective in approximately 70% of cases to achieve a target of LDL<55 mg/dL. PCSK9 inhibitors need to be more widely used as they appear promising for reaching a target of LDL-cholesterol <55 mg/dL in this category of population. A periodic monitoring of LDL-cholesterol levels at 3 months needs to be done in all diabetes mellitus patients.

## P470

### INTERVENTION THRESHOLDS (ITS) FOR POSTMENOPAUSAL WOMEN: STUDY BASED ON PHILIPPINE FRAX MODEL

J. Li-Yu<sup>1</sup>, S. Lekamwasam<sup>2</sup>

<sup>1</sup>University of Santo Tomas, Faculty of Medicine & Surgery, Manila, Philippines, <sup>2</sup>Faculty of Medicine, Galle, Sri Lanka

**Objective:** The probability of major osteoporotic (MOFP) and hip fractures (HFP) derived from FRAX is widely used to identify patients with high fracture risk. This study was designed to estimate suitable ITS for the management of postmenopausal osteoporosis in Philippine women.

**Methods:** Age dependent ITS were established based on the rationale developed by the National Osteoporosis Guideline Group in the UK considering that if a woman with a prior fragility fracture



is eligible for treatment, then a woman with the same fracture probability but in the absence of a previous fracture should also be eligible. ITs were calculated for a woman of BMI 25 kg/m<sup>2</sup> aged 40-80 y with a previous fragility fracture sans other clinical risk factors. Fixed ITs were developed using a database of 1500 postmenopausal women who underwent DXA as part of routine clinical evaluation. MOFP and HFP were estimated using clinical risk factors and femoral neck BMD as input variables. Women were categorized to high risk and low risk groups according to the age dependent ITs. ROC analyses were performed with the risk category as the dependent variable and MOFP and HFP as independent variables. The best cut-points (fixed ITs) were determined considering the optimum sensitivity and specificity.

**Results:** The age dependent ITs of MOFP ranged from 1.8-6.9% and HFP ranged from 0.3-3% between 40-80 y of age. MOF IT of 3.75% and hip fracture IT of 1.25% were the best cut off values observed as the fixed IT and noninclusion BMD in the fracture risk estimations did not change the values. Hybrid IT for those <70 y was 3% for MOFR and 1% for HF. For those >70 y, the ITs are age-dependent.

**Conclusion:** ITs estimated in the current study are concordant with those reported from the neighboring countries. These can be used to identify high fracture risk patients in the Philippines.

#### P471

### INCREASED URIC ACID VALUES IN PATIENTS WITH PSORIASIS: THE RISK OF DEVELOPING PSORIATIC ARTHRITIS

L.-I. Suiu<sup>1</sup>, C. Criveanu<sup>2</sup>, F. A. Vreju<sup>2</sup>, A. E. Musetescu<sup>2</sup>, P. L. Ciurea<sup>2</sup>

<sup>1</sup>Doctoral School, University of Medicine & Pharmacy, <sup>2</sup>University of Medicine & Pharmacy, Craiova, Romania

**Objective:** Psoriatic arthritis is a chronic inflammatory joint disease, which is part of the group of disease called spondyloarthritis, associated in most cases with skin damage. It is known for the diversity of its onset, evolution and response to treatment. Psoriasis is a chronic, inflammatory, systemic disease, with skin damage and with evolutionary potential for joint damage. The aim of this study is to identify a possible link between hyperuricemia present in patients with psoriasis and their risk of developing psoriatic arthritis.

**Methods:** A group of 37 patients diagnosed with psoriasis (21 men, 16 women) was studied, of whom 13 had psoriatic arthritis. The value of serum uric acid was measured by spectrophotometric method in all patients. The normal values are for men: <7 mg/dl, and for women: <5 mg/dl. The age of psoriasis was also assessed, ranging from 3-10 y.

**Results:** Of the 24 patients in the group with psoriasis who had not developed psoriatic arthritis, 2 (8.3%) were identified as having serum uric acid values above normal. Of the 13 patients diagnosed with psoriatic arthritis 3 (23%) had hyperuricemia. Two patients who had a disease history of 3 years

did not have hyperuricemia. From the rest of the patients, who had the disease of >3 y they had hyperuricemia as follows: one (20%) at 4 y of illness, and the rest at more than 6 y of illness.

**Conclusion:** It is known that psoriasis is associated with elevated serum uric acid. Following this study we can conclude that a higher percentage of patients with psoriatic arthritis had associated hyperuricemia than patients with psoriasis who did not develop arthritis. We can also conclude that a longer history of psoriasis could predispose the patient to hyperuricemia. Therefore, this correlation may influence the evolution of patients with psoriasis to psoriatic arthritis. More specialized studies are needed to support these conclusions.

#### P472

### CHRONIC FATIGUE SCORES DEPEND ON THE LEVEL OF PHYSICAL ACTIVITY IN PATIENTS WITH RHEUMATOID ARTHRITIS

A. V. Aleksandrov<sup>1</sup>, V. A. Aleksandrov<sup>2</sup>, M. V. Nikitin<sup>3</sup>, N. V. Aleksandrova<sup>1</sup>

<sup>1</sup>Research Institute of Clinical & Experimental Rheumatology A.B. Zborovsky, Volgograd, <sup>2</sup>Volgograd State Medical University, Dept. of Hospital Therapy, Volgograd, <sup>3</sup>Sanatorium-Resort Complex "Vulan" - Scientific & Clinical Branch of the FSB Institution "National Medical Research Center for Rehabilitation and Balneology" of the Ministry of Health of the Russian Federation, Gelendzhik, Russia

**Objective:** Nonpharmacological treatment strategies can be used to reduce chronic fatigue in rheumatoid arthritis (RA) patients. This study aimed to evaluate the effect of a active lifestyle using aerobic exercise (walking) on changes in chronic fatigue in patients with RA in the short term.

**Methods:** 102 women with RA (mean age 54.8±11.3 y; duration of RA 9.5 [5;15] y; DAS28-SOE activity 2.85 [2.32;3.06] points; baseline fatigue on the VAS screening scale 71.2±9.1 points) were included in the study. Bristol Rheumatoid Arthritis Fatigue Numerical Rating Scales (BRAFF-NRS V2) was used to assess fatigue, 50-m walking test was used to assess the functional state of patients in dynamics. Patients' rehabilitation program (RP) (for 21 d) included morning hygienic exercises, dosed walking (daily, 30-60 min duration, taking into account physical exercise tolerance according to the 6MWD test) and walking in the air for up to 3-3.5 h/d.

**Results:** Patients were divided into two groups according to their level of physical activity (according to the average number of steps walked per day): group I (sedentary lifestyle) included patients with <5-6 thousand steps/d; group II (active lifestyle) included patients with ≥7-8 thousand steps/d. Physical parameters underwent significant changes in group II of RA patients (reduction of walking time and number of steps in 50-m test: p<0.001 and p=0.013, respectively) upon completion of RP. No significant changes were registered in patients with sedentary lifestyle (group I) (p=0.60 and p=0.54, respectively). In group I of RA pa-



tients, against the background of preserved fatigue scores on the NRS-severity and NRS-overcoming scales, there was even a slight increase in VAS fatigue ( $p=0.008$ ) and NRS-effect ( $p=0.01$ ). Patients with an active lifestyle (group II) demonstrated decreased fatigue severity on all scales: VAS ( $p<0.001$ ), NRS-severity ( $p<0.001$ ), NRS effect ( $p<0.001$ ), and NRS-overcoming ( $p=0.001$ ).

**Conclusion:** The BRAF-NRS is a useful research tool to identify the different aspects of fatigue most affected by nonmedicinal treatments. Increased physical activity with walking has a significant effect on fatigue in RA, suggesting a good short-term effect of aerobic exercise.

P473

### AIR POLLUTION IS A PREDICTOR OF POOR RESPONSE TO BIOLOGICAL THERAPIES IN CHRONIC INFLAMMATORY ARTHRITIDES

G. Adami<sup>1</sup>, A. Fassio<sup>1</sup>, E. Bertoldo<sup>1</sup>, O. Viapiana<sup>1</sup>, D. Gatti<sup>1</sup>, M. Rossini<sup>1</sup>

<sup>1</sup>Rheumatology Unit, University of Verona, Verona, Italy

**Objective:** There is increasing evidence that environmental air pollution is associated with both development of chronic inflammatory arthritides (CIA). The role of air pollutants on the treatment response of CIA (including psoriatic arthritis [PsA] and ankylosing spondylitis [AS]) is still unclear. The aim of the present study is to determine the association between the concentration of air pollutants and biological drug retention rates in CIA.

**Methods:** We retrieved longitudinal data of patients affected by CIA on biological therapies and of the daily concentration of air pollutants in the Verona area. We designed a case-crossover study to compare the exposure to pollutants in the 30-d and 60-d periods preceding a drug switch or swap due to disease progression referent to the 30-d and 60-d periods preceding a visit with stable treatment for at least 6 months.

**Results:** 1286 patients with CIA (888 with RA, 260 with PsA and 138 with AS) with 5454 follow-up visits were included in the study. 13,636 daily air pollution records were retrieved. We found an exposure-dependent relationship between exposure to air pollutants and CRP serum levels in CIA. At PM10 exposures of  $>50 \mu\text{g}/\text{m}^3$  and  $>40 \mu\text{g}/\text{m}^3$  we found a 150% and 65% higher risk of having CRP above 5 mg/L respectively (OR 2.564, 95%CI 2.114-3.110 and OR 1.659, 95%CI 1.440-1.910, respectively.). If the threshold was set at  $>30 \mu\text{g}/\text{m}^3$  of PM10 (below the European Union health protection limit) we still found a 38% higher risk of having altered CRP (OR 1.383, 95%CI 1.206-1.588). Among CIA patients, 280 patients (21.7%) had at least 2 follow-up visits with at least one drug switch or swap due to drug inefficacy and one visit with stable treatment for at least 6 months, serving as our sample for the case-crossover study. We found that air pollutants concentrations were higher before a switch or swap due to drug inefficacy (Figure 1A). Figure 1B shows the receiver operating characteristic (ROC) curve for the prediction of switch or swap due to drug inefficacy.

Discriminatory capacity of disease activity alone was the highest (AUC 0.841) but when the prediction model included the concentrations of air pollutants in the 60 d before the visit the discriminatory capacity increased (AUC 0.879).

**Conclusion:** We found that environmental air pollution was a determinant of poor response to biological treatment in a cohort of patients with CIA followed over a 5-y period. An intervention aimed to decrease the fossil combustion emissions might have beneficial effects on biologics persistence rate of patients with CIA.

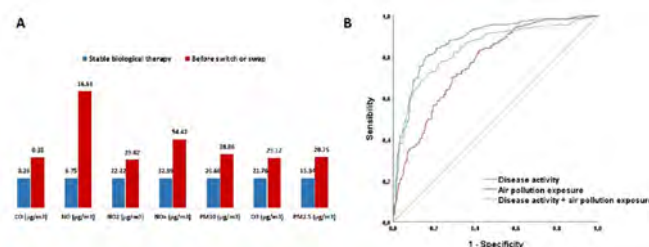


Figure 1. A) Mean concentrations of air pollutants in the 60-d period before switch or swap visit compared to the stable treatment visit.  $p<0.001$  between all groups. B) ROC curves for the prediction of switch or swap due to drug inefficacy

P474

### DIFFUSE IDIOPATHIC SKELETAL HYPEROSTOSIS (DISH) IS ASSOCIATED WITH POOR PROGNOSIS IN YOUNG PATIENTS WITH CORONARY ARTERY DISEASES (CAD)

G. Adami<sup>1</sup>, A. Fassio<sup>1</sup>, E. Bertoldo<sup>1</sup>, O. Viapiana<sup>1</sup>, D. Gatti<sup>1</sup>, M. Rossini<sup>1</sup>

<sup>1</sup>Rheumatology Unit, University of Verona, Verona, Italy

**Objective:** DISH has been largely associated with metabolic syndrome. However, it is not clear if DISH poses a risk of developing cardiovascular diseases (CVD) independently from traditional CV risk factors. In addition, an association between the extension of vertebral calcification and the severity of CAD has never been demonstrated.

**Methods:** We conducted an observational study on patients undergoing diagnostic coronarography at the cardiology department of the University of Verona, Italy. We collected clinical and radiographical data of the patients in the study, as well as the SYNTAX II score. The SYNTAX II score characterizes the anatomical extent and prognosis of CAD in terms of the number of lesions, functional importance, and complexity, SYNTAX II  $>34$  is commonly considered a poor prognostic factor for revascularization. To determine the association between severity of CAD and DISH we performed a binary logistic regression. Syntax II score

with a threshold of 34 was considered as the dependent variable, DISH and other important CVD risk factors were considered as independent variables.

**Results:** 185 patients were enrolled in the study. The mean age of the population was 66.7 y and the vast majority were men (82.9%). 44% of the cohort were diagnosed with DISH (definite diagnosis according to Resnick criteria), 114 (61%) were diagnosed with standard X-rays and 73 (39%) were diagnosed using chest HRCT. Overall, DISH was associated with an increased risk of having SYNTAX II score >34 points. In patients aged <70 y (n 110, 58.8%) the diagnosis of DISH was associated with a 7-fold higher risk of poor prognosis on SYNTAX II score independently from age, sex, glomerular filtration rate, hypercholesterolemia, diabetes, smoking status, familiarity to CVD, stroke, arterial hypertension (aOR 7.24, 95%CI 1.08-48.38, p 0.041). The extension of vertebral calcifications was associated with SYNTAX II score in all patients (rho spearman 0.378 p<0.001) and in patients aged <70 y (rho spearman 0.255 p 0.012) (Figure).

**Conclusion:** In our cohort of patients at high risk of CAD, the diagnosis of DISH was associated with complex CAD and poor prognosis independently from traditional CVD risk factors.

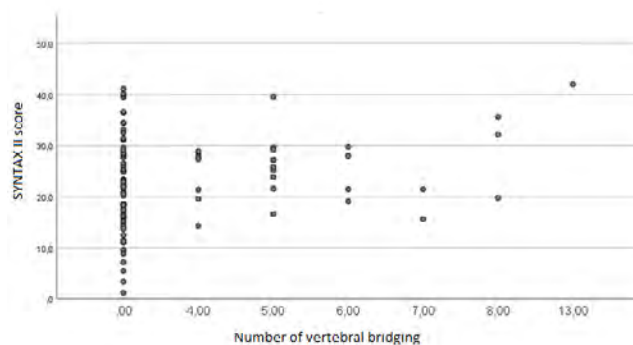


Figure. Association between extent of vertebral calcifications and complexity of CAD lesions (SYNTAX II Score).

## P475

### FRAX® PREDICTIVE ABILITY TO PREDICT MAJOR OSTEOPOROTIC FRACTURES AND HIP FRACTURES IN THE SPANISH POPULATION: THE EPIFROS ASTURIAS COHORT

M. Zwart<sup>1</sup>, R. Azagra<sup>2</sup>, A. Aguyé<sup>2</sup>, S. Tranche<sup>3</sup>, M. Saez<sup>4</sup>, G. Alvarez<sup>3</sup>, J. Alonso<sup>3</sup>, O. Quiñones<sup>3</sup>, N. Tudela<sup>3</sup>, Y. Gil<sup>3</sup>, C. Martín<sup>3</sup>, M. Díaz-Herrera<sup>2</sup>, P. Gabriel<sup>2</sup>

<sup>1</sup>Institut Calalà de la Salut, Girona, <sup>2</sup>Institut Calalà de la Salut, Barcelona, <sup>3</sup>Servicio Asturiano de Salud, Oviedo, <sup>4</sup>University of Girona, Girona, Spain

**Objective:** To assess the FRAX tool efficacy among the general population in the north of Spain where a medium hip fracture risk has been established.

**Methods:** The cohort EPIFROS-Asturias was made up of people aged 40-90 y of age. Spanish FRAX without BMD. All osteoporotic fractures (AOF), major fractures (MOF) from FRAX 2009 data register were analysed. Clinical risk factors (CRFs) included in FRAX were analysed along with the number of falls over the year prior to 2019. Risk estimation using odds ratio (OR) for variables: age (<65/≥65 y), sex (male/female), rheumatoid arthritis (RA) and others CRFs (yes/no).

**Results:** The CRFs showing significant differences when AOF are analysed: age OR 2.92 (95%CI 1.07-7.99), sex: OR 3.19 (95%CI 1.25-8.16) and RA OR 10.63 (95%CI 2.03-55.55). When MOF are analysed: age OR 4.91 (95%CI 1.10-21.90) and RA OR 18.93 (95%CI 3.50-102.39). When HF are analysed only prior fracture OR 49.27 (95%CI 4.15-585.44). The overall predictive value obtained using FRAX without BMD for MOF was 1.4 and 0.7 for HF. Compared with previous results in our country it seems that the predictive capacity of FRAX in Asturias is more efficient than in Catalunya for both MOF and HF.

**Conclusion:** The EPIFROS cohort from the Spanish general population shows statistically significant factor differences in ages ≥65 years old, females and cases of RA when all fractures were analysed. The Spanish FRAX without BMD predictive capacity used on the Asturian population shows more accuracy than in other regions of Spain like Catalonia. This may be due to the differences in the intermediate hip fractures risk in Asturias as opposed to the high hip fracture risk in Catalonia.

## P476

### EPIDEMIOLOGY OF OSTEOPOROTIC FRACTURES AND SUBSEQUENT FRACTURES IN THE ASTURIAN REGION OF SPAIN: THE EPIFROS COHORT

M. Zwart<sup>1</sup>, R. Azagra<sup>2</sup>, S. Tranche<sup>3</sup>, Y. Gil<sup>3</sup>, N. Tudela<sup>3</sup>, O. Quiñones<sup>3</sup>, J. Alonso<sup>3</sup>, G. Alvarez<sup>3</sup>, M. Saez<sup>4</sup>, A. Aguyé<sup>2</sup>, C. Martín<sup>3</sup>, P. Gabriel<sup>2</sup>

<sup>1</sup>Institut Calalà de la Salut, Girona, <sup>2</sup>Institut Calalà de la Salut, Barcelona, <sup>3</sup>Servicio Asturiano de Salud, Oviedo, <sup>4</sup>University of Girona, Girona, Spain

**Objective:** To assess the epidemiology of osteoporotic fracture (OFx) among people from general population in the north of Spain, where a moderate level of hip fracture risk has been detected.

**Methods:** The cohort EPIFROS-Asturias was made up of people aged 40-90 years old. OFx were analysed as: all osteoporotic fractures (AOF), major osteoporotic fractures (MOF): spine, hip, humerus and forearm in 2009-2019 period were analysed. Risk estimation using odds ratio (OR) for variables: age (<65/≥65 y) sex (male/female).

**Results:** 285 individuals were included. Global age 61.5±13.9 y. 129 men (45.3%). 27 AOF (21 in women) OR 3.1 (95%CI 1.2-8.1). 17 MOF (2 in <65 y and 15 in ≥65 y). The incidence increases progressively with age (<65/≥65 y) OR 4.9 (95%CI 1.1-21.8): 3 (20%)

65-74 y, 4 (26.7%) 75-84 y, 8 (53.3%) ≥85 y. Women with 21 AOF observed. 4 AOF in <65 y: 1 distal forearm, 1 humerus, 1 rib, 1 foot. 17 AOF ≥65 y: 11 MOF (2 spine, 2 hip, 6 forearm, 1 humerus) and 1 pelvis, 1 tibia/fibula, 2 foot, 2 ribs. 2 women had more than 1 OFx. Men with 6 AOF observed, 5 of them in ≥65 y: 3 MOF (1 spine, 1 proximal humerus, 1 forearm) and 2 tibia/fibula. 1 man suffers more than 1 OFx.

**Conclusion:** The epidemiology of fractures in this region of north of Spain shows that gender and age >65 y increase the risk of fractures for both men and women for any fracture or MOF combined. This is an excellent opportunity to identify people at risk of fractures and to consider the most suitable approach and treatment.

P477

### FRAILITY AS A STATE OF INCREASED RISK OF FALLS IN ELDERLY PATIENTS WITH TYPE 2 DIABETES MELLITUS: THE TUGGI COHORT

M. Zwart<sup>1</sup>, L. Troyano<sup>1</sup>, A. Costa<sup>1</sup>, A. Nuñez<sup>1</sup>, E. Fuentes<sup>1</sup>, M. Ciurana<sup>1</sup>

<sup>1</sup>Institut Calalà de la Salut, Girona, Spain

**Objective:** To evaluate the risk of falling in frail type 2 Diabetes Mellitus (2DM) patients.

**Methods:** An observational study of people aged ≥65 years old obtained from the general population. Including criteria were: 2DM ≥65 y. One year follow-up calls every 2 months asking for falls. Risk estimation using odds ratio (OR) for variables: age, comorbidity, physical performance, polypharmacy, falls.

#### Results :

107 men and women fulfilled the inclusion criteria (39% of total) (167 excluded) with a mean age of 77±6 y. 107 (100%) Barthel ≥90.

46 (43%) had 2DM complications: 6 (5.61%) neuropathy, 22 (21%) retinopathy, 8 (7.48%) altered peripheral pulses, 23 (21.5%) moderate to severe kidney disease, 8 (7.48%) ischemic heart disease, 9 (8.41%) cerebrovascular disease.

During the follow up 27 (25.23%) (14 women, 13 men) reported falls, 7 (6.5%) >1 fall.

Age ≥75 y [OR 2.71 (95%CI 1.03-7.17) p=0.04] and >1 2 DM complications conditions at baseline [OR 2.52 (95%CI 1.04-6.11) p=0.038] were associated with falls.

Frailty conditions were evaluated: The Timed Up and Go (TUG) test ≥13.5 s [OR 1.93 (95%CI 0.71-5.26) p=0.05] but it was 12.24 s and 10.37 s between fallers and non-fallers. Also remained not significant frail phenotype, Charlson comorbidity index 4, gait speed over a distance of 4 m <cutoff point, hand grip <cutoff point, polypharmacy ≥5 drugs at the same time, moderate and large (Pfeiffer >4) cognitive impairment and risk nutritional status (MNA-SF 0-11).

**Conclusion:** Risk of falling in 2 DM is usually multifactorial as complications of the disorder itself, frailty, comorbidities and geriatric syndromes that contribute to a gait disorder. Our results have shown significant differences between fallers among advanced age ≥75 y and 2 DM complications combined. TUG test is known to identify physical frailty which negatively impacts the risk of falls: further studies with large population are required to demonstrate it in 2 DM.

P478

### UROTHELIAL CARCINOMA-RELATED HYPERCALCEMIA

A. Ghemigian<sup>1</sup>, C. Chirita<sup>2</sup>, A. Goldstein<sup>3</sup>, N. Dumitru<sup>1</sup>, C. Tupea<sup>3</sup>, A. Dumitrascu<sup>3</sup>, M. Popescu<sup>4</sup>, E. Petrova<sup>1</sup>

<sup>1</sup>C.I. Parhon National Institute of Endocrinology & C. Davila University of Medicine & Pharmacy, Bucharest, <sup>2</sup>Medic Zone Centre, Bucharest, <sup>3</sup>C.I. Parhon National Institute of Endocrinology, Bucharest, <sup>4</sup>University of Medicine & Pharmacy Craiova, Craiova, Romania

**Objective:** Malignancy-related hypercalcemia might act as an iceberg top when it comes to detection of prior unknown cancer. Unless there is a mammary neoplasia, the prognostic is extremely poor. Therapy is oriented to control the calcium levels, also to target the potential bone metastasis and, of course, to control the primary oncologic disease (1-6).

**Case report:** This is a 58-year-old, menopausal female, known with type 2 diabetes mellitus under oral medication, admitted for persistent asthenia, fatigue, tendency to weight loss within last 2-3 months, thus a glycaemia control was performed and found normal (101 mg/dL, HbA1c=6.6%), but in addition to this assay, a serum total calcium was assessed and found high 12.5 mg/dL (normal: 8.5-10.2 mg/dL) under no oral uptake; also, suppressed PTH=6.26 pg/mL (normal: 15-65 pg/mL), high resorption marker CrossLaps=1.03 ng/mL (normal: 0.33-0.782 ng/mL), normal formation markers osteocalcin=30.77 ng/mL (normal: 15-46 ng/mL), P1NP=40.92 ng/mL (normal: 15-46 pg/mL), and vitamin D insufficiency 25OHD=24 ng/mL (normal >30 ng/mL), low 24-h urinary calcium 0.05 g/24-h (normal: 0.07-0.3 g/24-h). High erythrocyte sedimentation rate of 102 mm/1-h (normal <25 mm/1-h) indicated a imaging scan, hence computed tomography was performed and found a left kidney mass with retroperitoneal/adrenal infiltration of 13.53x10.65x7.6 cm, and multiple lymph nodes and intra-arterial several thrombus at left renal artery of maximum 1.68x1.14 cm; an osteocondensation area of 2.61x1.98x6.12 cm at the level of iliac bones, next to sacro-iliac articulations. Adrenal function seemed intact – morning plasma cortisol 18.74 µg/dL (normal: 6-21 µg/dL). She was referred to oncological urology, and urothelial carcinoma G4 was confirmed and removed, with fatal outcome within a few weeks later.

**Conclusion:** Hypercalcemia accompanying aggressive carcinoma is a warning sign, especially in the cases when the value itself is not very high (which on the other hand, may delay the diagnostic).

#### References:

1. Gheorghisan-Galateanu AA, et al. Acta Endocrinologica Bucharest 2017;3:356.
2. Poiana C, et al. Maturitas 2009;62:98.
3. Bechir ES, et al. Revista de Chimie 2019;70:3515.
4. Poiana C, et al. Rom J Morphol Embryol 2011;52:187.
5. Iorga AM, et al. Exp Ther Med 2020;20:2396.
6. Poiana C, et al. Gynecol Endocrinol 2010;26:617.

P479

### HOSPITAL / CITY OSTEOPOROSIS PATIENT FOLLOW-UP

D. Poivret<sup>1</sup>, C. Weisslinger<sup>2</sup>, S. Desjeunes<sup>3</sup>, L. Schleck<sup>3</sup>, F. Alliot-Launois<sup>4</sup>

<sup>1</sup>CHR Metz-Thionville, CPTS Briey, Metz, <sup>2</sup>CHR Metz-Thionville, Briey, <sup>3</sup>CPTS Briey, Briey, <sup>4</sup>AFLAR, Paris, France

**Objective:** Densitometric osteoporosis and fracture osteoporosis are poorly diagnosed, assessed and treated. The creation of a day hospitalization and an osteoporosis course with liberal health professionals should make it possible to follow the patients over 4 years.

**Methods:** We defined a day hospitalization with an orthopedic surgeon, a rheumatologist, a doctor responsible for medical IT, a dietitian, an occupational therapist. The liberal care pathway was built around the computer tool Parceo with 2 treating physicians, a rheumatologist, a physiotherapist, a dietitian, 3 nurses.

**Results:** 6 weeks after the fracture the patient participate 2.5 day hospitalizations including the biological assessment, X-ray looking for vertebral compression, dental assessment to avoid subsequent dental avulsions, a rheumatological consultation, an individual consultation with a dietitian, an occupational therapist, a social worker for housing development assistance and a therapeutic education session on knowledge of the disease, how to provide 1.2 g of calcium in the diet, how to fit out your home. Drug treatment is defined by the rheumatologist and sent to the attending physician, a diphosphonate infusion is performed if this is the therapeutic indication selected. This assessment is sent to the attending physician.

Parceo is a computer tool that makes it possible to create a professional space in which are grouped together sheets written by each health professional for his colleagues, describing the goals and expected means in his field of activity. Thus the dietitian described the goal of an intake of 1.2 g of calcium in the diet by describing menus rich in calcium, the dietary calcium intake of the patient is assessed by a questionnaire. The patient file is opened

by the attending physician which includes the history, type of osteoporosis, clinical and laboratory data, and the proposed medical treatment. Each health professional is required to enter the data he has collected concerning his field, for example the home nurse is responsible for assessing ground balance, the pharmacist for compliance, etc.

**Conclusion:** We hope to improve the diagnosis, the assessment, the follow-up and therefore avoid the appearance of fractures in elderly people in our territory.

P480

### WHAT DO WE KNOW ABOUT TERIPARATIDE ON DELAYED AND NONUNION FRACTURE TREATMENT: A SYSTEMATIC REVIEW

B. Samões<sup>1</sup>, D. Fonseca<sup>1</sup>, T. Beirão<sup>1</sup>, F. Costa<sup>1</sup>, R. Vieira<sup>1</sup>, T. Videira<sup>1</sup>, J. Abelha-Aleixo<sup>1</sup>, P. Pinto<sup>1</sup>

<sup>1</sup>Centro Hospitalar de Vila Nova de Gaia e Espinho, Vila Nova de Gaia, Portugal

**Objective:** To systematically identify and review literature evaluating the efficacy and safety of teriparatide on delayed and non-union fractures.

**Methods:** A systematic literature search was performed in MEDLINE using the query "fracture" AND "nonunion" AND "teriparatide". All retrieved articles were screened by title and abstract and the eligible ones were kept for full text review. Reference lists were additionally searched. Original research papers encompassing treatment of delayed and non-union fractures with teriparatide in patients aged  $\geq 18$  years old were considered for inclusion.

**Results:** The systematic review identified 63 search results, of which 36 were excluded after title and abstract screening because they did not fit the purpose of the work. After full text review and addition of 5 articles from reference lists, 28 original research papers were included: 20 case reports, 6 case series and 2 longitudinal uncontrolled studies, in a total of 81 patients, 48 females (59.3%), with a median age [min, max] of 64 [19, 91] years old. Several fracture sites have been described, with the femur (n=35) and the tibia (n=26) being the most frequently affected. As for fracture mechanisms, 30 occurred after trauma and 17 were fragility fractures and, 39 patients were submitted to surgery before teriparatide. The study with the largest number of patients, however, did not describe the mechanisms nor the number of patients with previous surgery. The median time [min, max] between initial fracture and start of teriparatide was 7 [3, 36] months. Most studies used daily injection of 20  $\mu$ g teriparatide, except 4 studies that used the weekly formulation of 56.5  $\mu$ g. The median [min, max] duration of treatment was 6 [0.8, 24] months. Overall, 77 (95.1%) had fracture union following a median [min, max] time of 7 [3, 31] months. Only 1 patient (1.2%) reported minor adverse effects with teriparatide, although this information is missing in



22 patients. It should be noted that in 9 patients teriparatide was combined with revision surgery and in 1 patient with low intensity pulsed ultrasound.

**Conclusion:** Despite being an off-label use, the existing evidence suggests that teriparatide may be effective and safe for the treatment of delayed and nonunion fractures. However, there may be publication bias. Prospective randomized clinical trials are lacking and are needed to confirm these results.

P481

### COMORBID DISEASES IN PATIENTS WITH RHEUMATOID ARTHRITIS AND OSTEOPOROTIC FRACTURES

P. Kozhevnikova<sup>1</sup>, I. Dydykina<sup>1</sup>, P. Kovalenko<sup>1</sup>, A. Lila<sup>1</sup>

<sup>1</sup>V.A. Nasonova Research Institute of Rheumatology, Moscow, Russia

**Objective:** To study and compare the frequency and structure of comorbid diseases in rheumatoid arthritis (RA) patients with and without osteoporotic fractures.

**Methods:** The study included 80 women with RA, aged 30-80 y. Mean age 62.5±8.7 y. Mean disease duration 23.2±10.1 y. Most of the patients had moderate RA activity (DAS28 - 3.76±1.17), positive rheumatoid factor - 53 (66%), antibodies to cyclic citrullinated peptide - 44 (55%). All patients took a clinical examination, assessment of the anamnestic data. Comorbidity was assessed using the cumulative disease rating scale (CIRS) and the Charlson index (CCI).

**Results:** 74 (92.5%) patients had comorbidities diseases, 70% of them had hypertension (HT), 35% ischemic heart disease (IHD), 25% obesity, 20% peptic ulcer disease (PUD), 10% diabetes mellitus (DM); the total CIRS score and CCI were 7.21±3.21 and 4.66±1.76, respectively. Osteoporosis had 51 (64%) patients. Among patients with comorbid diseases, 36 (49%) had osteoporotic fractures. The patients were divided into two groups: group I - 36 patients with fractures, group II - 44 patients without fractures. Age, RA activity, disease duration, CIRS, CCI, incidence rate of IHD, PUD and DM did not differ significantly between groups. Patients of group I significantly more often had HT - 31 (86%) vs. 25 (57%) ( $p=0.004$ ), while among patients of group II there were significantly more obese patients - 5 (14%) vs. 15 (34%) ( $p=0.039$ ). Group I patients more often used glucocorticoids (GCs) for 3 months or more - 32 (88%) vs. 27 (61%) ( $p=0.004$ ).

**Conclusion:** The incidence of comorbid diseases in women with RA - 74 (92.5%). Among patients with comorbidity, osteoporotic fractures had 36 (47%) patients. In comorbidity structure there was a predominance of HT, IHD and obesity. Osteoporotic fractures are associated with HT and GCs, while obesity may be a protective factor in the development of fractures.

P482

### THE LINK BETWEEN RHEUMATOID ARTHRITIS AND AUTOIMMUNE DISEASE

M. Ghasaboghlyan<sup>1</sup>, V. Vardanyan<sup>2</sup>, V. Mukuchyan<sup>3</sup>, S. Iritsyan<sup>4</sup>, A. Petoyan<sup>5</sup>

<sup>1</sup>Vardanants Center for Innovative Medicine, <sup>2</sup>Mikaelyan Institute of Surgery, <sup>3</sup>Erebouni Medical Center, <sup>4</sup>Arabkir Medical Center, <sup>5</sup>Astghik Medical Center, Yerevan, Armenia

**Objective:** Autoimmune diseases are conditions during which individuals develop antibodies against their cells, tissues and organ systems. Autoimmune diseases can be either organ-specific or non-organ-specific in their clinical presentation. Rheumatoid arthritis (RA) is an autoimmune disease where the body's immune system attacks its healthy tissues. Systemic in nature, it mainly destructively targets the joints. It is characterized by increased levels of cytokines such as TNF. TNF appears to have an etiologic role in thyroid dysfunction, which is a common comorbidity in RA. Autoimmune thyroid disease (ATD) is a chronic disease and is the most common organ-specific autoimmune disorder, usually resulting in hypofunction of the thyroid gland. This research aims to explore the link between RA and ATD.

**Methods:** During one year, 843 patients with RA, mostly females aged 42-67 y, participated in the study. 629 of them had seropositive RA and 214 had seronegative RA. Among participants with seropositive RA, 396 developed ATD unrelated to the RA treatment strategy.

**Results:** 63% of patients with seropositive RA developed ATD regardless of the RA treatment scheme.

**Conclusion:** Our study demonstrated an increased risk of developing ATD in patient with seropositive RA. This association does not prove any causality and may also reflect the inverse relationship of an increased risk of RA in ATD patients. Further studies are warranted to explore the causal link between the two autoimmune diseases.

P483

### THE EFFICACY OF VITAMIN D USE IN PATIENTS WITH ENDOMETRIOSIS

M. Ghasaboghlyan<sup>1</sup>, N. Ghukasyan<sup>2</sup>, A. Grigoryan<sup>1</sup>, A. Hovhannisyanyan<sup>1</sup>, H. Azizyan<sup>1</sup>

<sup>1</sup>Vardanants Center for Innovative Medicine, <sup>2</sup>Erebouni Medical Center, Yerevan, Armenia

**Objective:** Endometriosis is one of the most common diseases in reproductive ages. It affects patients' quality of life and fertility. Endometriosis causes severe pain and/or infertility in reproductive women. The prevalence of endometriosis is known to be 2-10% in the reproductive age. Symptoms of endometriosis are dysmenorrhea, non-cyclic pelvic pain. One of the widely used pain scales for endometriosis-related pain is the numeric rating scale (NRS-11) for indication of severity of dysmenorrhea. The rating was 0 for no dysmenorrhea, 1-3 for mild dysmenorrhea, 4-6 for moderate dysmenorrhea, and 7-10 for severe pain. Vitamin D deficiency is an important public health problem worldwide. Epidemiological studies showed that low D concentrations are associated with various acute and chronic diseases. Current study aims to assess the effectiveness of vitamin D supplementation in the complex treatment of endometriosis.

**Methods:** This is a prospective study with 74 participants aged 19-37 years old with documented endometriosis (endometrioma of up to 5 mm). Vitamin D group presented with 37 patients who received PO vitamin D of 50,000 IU twice a week, in addition to standard therapy. The control group received only standard therapy presented with oral contraceptives and NSAIDs as needed.

**Results:** Vitamin D group demonstrated a significant decrease in pain and discomfort compared to controls. Possible mechanisms of vitamin D in pain management are anti-inflammatory effects mediated by cytokine and prostaglandin release and effects on T-cell responses. Of particular interest is the recent discovery of vitamin D mediated inhibition of prostaglandin E2, which provides a reliable mechanistic explanation.

**Conclusion:** Taking into account all the above mentioned, we conclude that administration of vitamin D as a support treatment has a distinct positive influence on patients with endometriosis.

P484

### ANALYSING DUAL-ENERGY X-RAY ABSORPTIOMETRY IMAGES USING MACHINE LEARNING

N. Kirilov<sup>1</sup>, E. Kirilova<sup>2</sup>

<sup>1</sup>Medical University of Sofia, Sofia, <sup>2</sup>UMBAL Dr. Georgi Stranski Pleven, Pleven, Bulgaria

**Objective:** Osteoporosis is a bone disease which is diagnosed through x-ray imaging methods such as DXA on different anatomical regions, i.e., hip, neck. The images acquired through DXA and their diagnostic classification is a problem, which could easily be solved using machine learning (ML). This is achieved through model training using a known dataset. The method uses x-ray image data on the above mentioned anatomical region and uses them for diagnostic. The aim of our study is to classify DXA images of healthy bone and such with low BMD using ML and in that way to diagnose osteoporosis of the hip neck.

**Methods:** In our study we used TensorFlow and Python to create a convolutional neural network (CNN) which we consequently trained to classify DXA images of the hip. The two classes consisted of one class of subjects with low BMD (osteoporosis) and another class of subjects with healthy bone (normal BMD). The dataset for training consisted of 895 images of the hip. The images were in the PNG format with dimension 800x800. The model was created with subsequent layers of nodes in the CNN. We used the open source library for Computer Vision (OpenCV) for image processing. The validation and training loss were graphically visualized using matplotlib for Python.

**Results:** The model was trained with 671 images and then tested on 224 images, which demonstrated high accuracy and low loss function. The achieved accuracy was almost 90% and the loss function as low as 0.05. We used the model to classify all 895 images of the hip. The diagnosis which the model classified for each image was compared with the actual diagnosis from the dataset using phi coefficient. The coefficient showed strong correlation of the predicted values with the actual ones reaching value of 0.750. This confirmed the high accuracy of the model.

**Conclusion:** ML is a powerful method, which could be used in the healthcare and medicine to help physicians make decisions regarding diagnosis. In our study it showed its potential to predict and classify DXA image data.

P485

# RISK FACTORS FOR FRAX-ESTIMATED 10-YEAR PROBABILITY OF MAJOR OSTEOPOROTIC FRACTURE ASSESSED WITH RADIOFREQUENCY ECHOGRAPHIC MULTISPECTROMETRY

E. Kirilova<sup>1</sup>, N. Kirilov<sup>2</sup>

<sup>1</sup>UMBAL Dr. Georgi Stranski Pleven, Pleven, <sup>2</sup>Medical University of Sofia, Sofia, Bulgaria

**Objective:** Osteoporosis is a socially significant disease with high prevalence, leading to fractures with great economic burden (1,2). Fracture risk assessment tool (FRAX) is the most popular algorithm to determine fracture risk by risk factors with or without BMD. Radiofrequency echographic multispectrometry (REMS) is an innovative approach for assessment of the ultrasound-based BMD ( $BMD_{US}$ ) of the axial skeleton with integrated FRAX software. The aim of the current study is to assess the multivariate significant risk factors for FRAX 10-y major osteoporotic fracture (MOF)  $\geq 20\%$ .

**Methods:** 274 women with mean age  $62 \pm 12$  y (range 33-88 y) underwent REMS acquisitions with evaluation of FRAX. Patients were divided into two groups: with FRAX 10-y major osteoporotic fracture (MOF)  $< 20\%$  and with FRAX MOF  $\geq 20\%$ . Multivariate logistic regression analysis was used to assess the risk factors for FRAX-estimated 10-y MOF  $\geq 20\%$ .

**Results:** Use of corticosteroids (CS), rheumatoid arthritis (RA) and  $BMD_{US}$  of the left femoral neck (FN) were independent risk factors for FRAX MOF  $\geq 20\%$  with significance of the model  $p=0.006$ . Previous fracture increased the risk of FRAX MOF  $\geq 20\%$  by a factor of 38.77, so women with a previous fracture showed about a 38.8 times higher risk of major osteoporotic fracture than women without a previous fracture. Women who used CS had about a 13.5-fold higher risk of major osteoporotic fracture than those who did not use CS. RA increased the risk by 6.92 for FRAX MOF  $\geq 20\%$ . Odds ratio for  $BMD_{US}$  of the left FN was 0.710 g/cm<sup>2</sup> hence each 1% increase in the  $BMD_{US}$  of the left FN decreased the risk for FRAX MOF  $\geq 20\%$  by 0.29%.

**Conclusion:** Previous fractures, use of CS, RA and  $BMD_{US}$  of the left FN were the only independent risk factors for FRAX-estimated 10-y MOF  $\geq 20\%$  assessed with REMS.

## References:

Vladeva S. 2014, Rheumatology aspects of the general practice. Osteoporosis. Zhanina, Stara Zagora, 1-15.

Vladeva S. 2020, The nurse as the main coordinator of post-fracture care for osteoporosis. In Collection of Reports, "Nurses and Midwives - Key Resource In Modern Healthcare Kota Design" Stara Zagora, pp 41-45 IBSN: 978-954-305-570-8.

P486

# TRENDS IN THE USE OF ANTIOSTEOPOROSIS MEDICATIONS AMONG POSTMENOPAUSAL WOMEN: THE NHANES 1999-2000 TO 2017-2018

H. Orces<sup>1</sup>

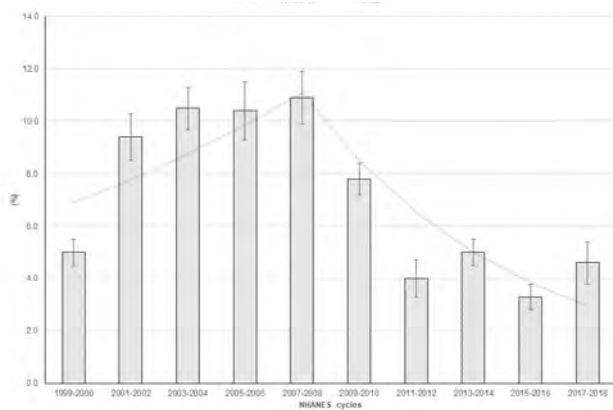
<sup>1</sup>Laredo Medical Center, Laredo, USA

**Objective:** To examine trends in the prevalence of antiosteoporosis medications (AOM) use among U.S postmenopausal women between 1999-2000 and 2017-2018.

**Methods:** The National Health and Nutrition Examination Survey cycles 1999-2000 through 2017-2018 were analyzed to examine trends in the prevalence of AOM use among women aged 50 years and older. The joinpoint regression software was used to detect points at which significant changes in the direction and magnitude of the trends occur over time. The results are presented as the average annual percent change in prevalence with their corresponding 95% confidence interval.

**Results:** A total 13,826 women with a mean age of 64.2 y comprised the study sample. Of those, 6.9% were taking AOM, accounting for an estimated 3.3 million postmenopausal women during the study period. Overall, older women and non-Hispanic white had a higher prevalence of AOM use than those who did not. Moreover, the mean use of AOM increased from 1.4 y in 1999-2000 to 6.3 y in 2017-2018. Notably, 5.1% of women were taking bisphosphonates, which was the most frequently AOM prescribed (74.2%). As shown in Figure, the prevalence of AOM use increased from 5.0% in 1999-2000 to 10.9% in 2007-2008, corresponding to an annual percent change in prevalence rate of 12.5% (95%CI, -12.2 to 44.2%). However, from the cycle 2007-2008 onwards, a significant downward trend in the prevalence of AOM use by -23.3% (95%CI, -23.3% to -37.7%) per survey cycles occurred. Similarly, the prevalence of bisphosphonates use increased by 9.9% (95%CI, -24.4% to 59.6%) from 2.2% in 1999-2000 to 8.0% in 2007-2008. Subsequently, the prevalence of bisphosphonates use markedly decreased by -22.6% (95%CI, -38.8% to -2.1%) from 8.0% in 2007-2008 to 3.7% in 2017-2018.

**Conclusion:** The progressive decrease in the prevalence of AOM use among postmenopausal between 2007-2008 and 2017-2018 may be explained by a marked downward trend in the use of bisphosphonates during the same period. Further research is needed to identify factors associated with a low prevalence in the use of AOM.



P487

### RANKL AND OSTEOPROTEGERIN ASSOCIATIONS WITH BONE MINERAL DENSITY IN ARAB POSTMENOPAUSAL WOMEN

S. Abdi<sup>1</sup>, E. Amer<sup>1</sup>, A. Ansari<sup>1</sup>, A. Alnaami<sup>1</sup>, K. Wani<sup>1</sup>, S. Sabico<sup>1</sup>, N. Aljohani<sup>2</sup>, N. Al-Daghri<sup>1</sup>

<sup>1</sup>King Saud University, <sup>2</sup>King Fahad Medical City, Riyadh, Saudi Arabia

This study aims to investigate the relationship between serum OPG and RANKL with BMD in Arab postmenopausal women. In this cross-sectional study, a total of 617 Saudi postmenopausal women were included. Anthropometric, biochemical parameters, BMD and bone markers were measured. RANKL was found to have a significant inverse correlation with NTX in the osteopenia group ( $r = -0.37$ ,  $p < 0.05$ ). OPG was found to be significantly and positively correlated with age in the osteoporosis group ( $r = 0.29$ ,  $p < 0.05$ ), while it was inversely correlated with BMD left ( $r = -0.56$ ,  $p < 0.001$ ) and BMD right ( $r = -0.37$ ,  $p < 0.05$ ) in the same group. RANKL/OPG ratio had a positive and significant correlation with BMI ( $r = 0.34$ ,  $p < 0.05$ ), T-score dual left ( $r = 0.37$ ,  $p < 0.05$ ), BMD left ( $r = 0.36$ ,  $p < 0.05$ ) and BMD right ( $r = 0.35$ ,  $p < 0.05$ ) in the osteopenia group. While it was significantly inversely correlated with WHR in the osteoporosis group ( $r = -0.38$ ,  $p < 0.05$ ). In multiple regression analysis, our data found that OPG could be a contributing factor for BMD right in the osteopenia group ( $p = 0.033$ ). Results suggest that changes of RANKL and OPG levels might be a protective mechanism contrary to the increased bone loss in postmenopausal women.

P488

### PTH1 GENETIC POLYMORPHISMS ARE ASSOCIATED WITH OSTEOPOROSIS AMONG POSTMENOPAUSAL ARAB WOMEN

S. Abdi<sup>1</sup>, A. Almiman<sup>1</sup>, A. Ansari<sup>1</sup>, A. Alnaami<sup>1</sup>, S. Sabico<sup>1</sup>, N. Aljohani<sup>2</sup>, A. Alenad<sup>1</sup>, A. Alghamdi<sup>1</sup>, M. Alokail<sup>1</sup>, N. Al-Daghri<sup>1</sup>

<sup>1</sup>King Saud University, <sup>2</sup>King Fahad Medical City, Riyadh, Saudi Arabia

**Objective:** The PTH 1 receptor (PTH1R) plays a crucial role in calcium homeostasis and bone metabolism. However, its genetic role in regulating bone turnover markers (BTMs) in postmenopausal osteoporosis (PMO) remains unclear. Herein, we explored PTH and PTHR gene variants susceptibility to osteoporosis and their association with various circulating BTM and inflammatory markers in postmenopausal women of Arab ethnicity.

**Methods:** In total, 600 postmenopausal Arab women (300-PMO and 300-control) were genotyped for selected SNPs in PTH (rs1459015, rs307253, rs6054, rs307247, rs10500783 and rs10500784), PTH1R (rs6442037, rs1138518 and rs724449 SNPs) and PTH2 (rs9288393, rs10497900 and rs897083). Anthropometrics, BTMs, and inflammatory markers were measured.

**Results:** PTH1R rs1138518 genotype C/T was found to be a significant risk factor for PMO (OR=1.49, 95%CI 1.0-2.1,  $p = 0.03$ ). The genotypes C/T and T/T of PTH1R rs1138518 were associated with 25-hydroxy-vitamin D (25(OH)D) regulation. In the PMO group, carriers of the C/T genotype had significantly lower 25(OH)D levels ( $p = 0.048$ ) than carriers of the same genotypes in the control group.

**Conclusion:** Our study concludes that the PTH1R rs1138518 genotype could be a potential risk factor for osteoporosis and 25(OH)D regulation in Arab women with PMO.



P489

### PRIMARY HYPERPARATHYROIDISM IN SAUDI ARABIA: A MULTICENTER OBSERVATIONAL STUDY

Y. Al-Saleh<sup>1</sup>, A. Alsohaim<sup>1</sup>, R. Alamoudi<sup>2</sup>, A. Alqarni<sup>3</sup>, L. Mahdi<sup>1</sup>, H. Alzanbaqi<sup>4</sup>, S. M. Nawar<sup>4</sup>, H. Alharbi<sup>4</sup>, A. Al Mullah<sup>3</sup>, M. Al Qahtani<sup>3</sup>, B. S. Salih<sup>1</sup>, F. Al Anazi<sup>5</sup>, N. Al-Daghri<sup>6</sup>

<sup>1</sup>King Abdullah International Medical Research Center, Riyadh,

<sup>2</sup>King Saud bin Abdulaziz University for Health Sciences, Riyadh,

<sup>3</sup>King Saud bin Abdulaziz University for Health Sciences, Al Ahsa,

<sup>4</sup>King Abdullah International Medical Research Center, Jeddah,

<sup>5</sup>Majmaah University, Majmaah, <sup>6</sup>King Saud University, Riyadh, Saudi Arabia

**Objective:** Primary hyperparathyroidism (PHPT) is a common cause of hypercalcemia and remains understudied within the Arabian population. The present study, which is the largest of its kind within the Gulf Cooperation Council (GCC) countries, aims to determine the demographics and clinical presentation of PHPT in Saudi Arabia.

**Methods:** In this multicenter retrospective study involving three tertiary hospitals in different geographic locations of Saudi Arabia namely, Riyadh, Al Ahsa and Jeddah, a total of 205 out of 243 confirmed PHPT cases aged 16-93 years old were included (N=96 from Riyadh; N=59 from ALAhsa and N=50 from Jeddah). Demographics, clinical manifestations, and surgical outcomes were recorded as well as laboratory and radiologic investigations including serum PTH, 25(OH)D, adjusted calcium, estimated glomerular filtration rate and nuclear scan outcome.

**Results:** PHPT cases appeared to increase over time when compared to other local studies published so far. Females outnumber males (3:1) with 86% seen as outpatients. The average age was 59.8±15.5 y. Abnormal PTH scan was seen in 171 patients (83.4%). Kidney stones was the most common renal manifestation (32 cases, 15.6%) and selective cortical bone loss was the most common skeletal manifestation (67 cases, 32.7%). Al Ahsa had the highest prevalence of multiple comorbidities at 54% and the highest prevalence of obesity as a single comorbidity (17%) compared to other regions (p<0.05). Jeddah recorded the highest prevalence of combined selective cortical bone loss with bone and joint pains (30%) (p<0.05).

**Conclusion:** Comparison of present data with previous local studies suggest a surge in PHPT cases in Saudi Arabia. Regional variations in the clinical presentation of PHPT were observed and warrant further investigation.

P490

### VITAMIN D AND DISEASE OUTCOME IN SARS-COV-2 INFECTION

L. Athanassiou<sup>1</sup>, S. Nikolakopoulou<sup>2</sup>, A. Konstantinou<sup>2</sup>, A. Spyrtantis<sup>2</sup>, O. M. Spyropoulou<sup>2</sup>, O. Mascha<sup>3</sup>, C. Samaras<sup>2</sup>, P. Athanassiou<sup>4</sup>, I. Kostoglou-Athanassiou<sup>5</sup>

<sup>1</sup>Dept. of Rheumatology, Asclepeion Hospital, Voula, Athens,

<sup>2</sup>COVID-19 Dept., Asclepeion Hospital, Voula, Athens, <sup>3</sup>Dept.

of Biochemistry, Asclepeion Hospital, Voula, Athens, <sup>4</sup>Dept.

of Rheumatology, St. Paul's Hospital, Thessaloniki, <sup>5</sup>Dept. of

Endocrinology, Asclepeion Hospital, Voula, Athens, Greece

**Objective:** Infection with the new SARS-CoV-2 or COVID-19 virus has a variable course. It may run as a mild disease or may cause severe pneumonia necessitating hospitalization. Vitamin D has immunostimulatory action and causes the release of substances necessary for combating an infection. Therefore, the relationship of vitamin D with the SARS-CoV-2 virus is under scientific evaluation. The aim was to measure vitamin D levels in a cohort of patients hospitalized with SARS-CoV-2 infection.

**Methods:** In a cohort of 43 patients, 20 male and 23 female, hospitalized with the SARS-CoV-2 infection 25(OH)D<sub>3</sub> levels were measured. 25(OH)D<sub>3</sub> levels were also measured in a group of control subjects. The patients were classified in 4 groups, a group with uncompromised respiratory function (n=17 patients), a group with mild respiratory insufficiency (n=12), a group with severe respiratory insufficiency (n=5) and a group with severe respiratory insufficiency requiring intubation (n=8). For the evaluation of the results of the present study 25(OH)D<sub>3</sub> levels were classified as deficiency (0-10 ng/ml), insufficiency (10-20 ng/ml) and sufficiency >20 ng/ml.

**Results:** 25(OH)D<sub>3</sub> levels in the SARS-CoV-2 patients were 16.16±1.55 ng/ml (mean±SEM) as compared to those in the control group, 27.28±1.94 ng/ml (p<0.001, Student's t-test). Within the group 37 patients finally survived the infection while 6 died either during hospitalization or immediately thereafter. The outcome of the infection, i.e., respiratory insufficiency or need for intubation was found to be related to the levels of 25(OH)D<sub>3</sub> (p=0.003, chi-square test).

**Conclusion:** It appears that vitamin D deficiency as assessed by the measurement of 25(OH)D<sub>3</sub> levels is prevalent in patients with severe SARS-CoV-2 infection requiring hospitalization. Vitamin D levels appear also to be related to the outcome of the infection. This result is in accordance with the immunostimulatory action of vitamin D, an action known since the very early years of its discovery.

P491

# PRIMARY HYPERPARATHYROIDISM IN THE CONTEXT OF LITHIUM TREATMENT: REPORT OF A CASE

I. Kostoglou-Athanassiou<sup>1</sup>, G. Giannopoulos<sup>2</sup>, L. Athanassiou<sup>3</sup>, A. Nomikos<sup>4</sup>, A. Fortis<sup>5</sup>, T. Kalogirou<sup>5</sup>, P. Athanassiou<sup>6</sup>

<sup>1</sup>Dept. of Endocrinology, Asclepeion Hospital, Voula, Athens, <sup>2</sup>Second Dept. of Surgery, Asclepeion Hospital, Voula, Athens, <sup>3</sup>Dept. of Rheumatology, Asclepeion Hospital, Voula, Athens, <sup>4</sup>Dept. of Pathology, Asclepeion Hospital, Voula, Athens, <sup>5</sup>Second Dept. of Medicine, Asclepeion Hospital, Voula, Athens, <sup>6</sup>Dept. of Rheumatology, St. Paul's Hospital, Thessaloniki, Greece

**Objective:** Lithium is considered a mainstay treatment option for the management of bipolar affective disorder. However, lithium administration is characterized by endocrine effects. The aim was to present the case of a patient who was on treatment with lithium for many years for the management of bipolar affective disorder and presented with a large parathyroid adenoma causing clinical hyperparathyroidism with severe hypercalcemia who was successfully treated by surgical excision of the adenoma and hypothyroidism.

**Case report:** A patient, aged 68 y, presented with severe hypercalcemia, calcium levels on admission 13 mg/dl and difficulty in walking due to osteoporosis. PTH levels on admission were 300 pg/ml. After rehydration and diuretic treatment for the management of hypercalcemia, cinacalcet was administered at a dose of 30 mg twice daily for the management of hypercalcemia. Diagnostic evaluation revealed the presence of a large parathyroid adenoma situated inferiorly to the left thyroid lobe. Surgical treatment was undertaken and the parathyroid adenoma was successfully excised. Histology revealed a large cystic parathyroid adenoma. During follow up calcium levels normalised and the patient improved clinically. During follow up a TSH level of 6.7 mIU/L was noted. Thyroxine was administered.

Lithium administration for the management of bipolar affective disorder is used successfully for many years. However, it may cause many endocrine effects. It may cause hypothyroidism and hypercalcemia due to hyperparathyroidism. Hypothyroidism is easily managed by thyroxine administration. However, hyperparathyroidism is usually due to one or more parathyroid adenomas or parathyroid hyperplasia. The optimum management of parathyroid adenomas in the case of long-term lithium treatment is surgical and usually controls hyperparathyroidism. In other reports most cases of hyperparathyroidism in the context of lithium treatment were due to one or more parathyroid adenomas.

**Conclusion:** The case of a patient presenting with endocrine disease, namely primary hyperparathyroidism and hypothyroidism due to long term lithium administration is described. The disease was successfully treated with surgical excision of the parathyroid adenoma and thyroxine administration.

P492

# MULTICENTERED JAPAN OSTEOPOROSIS LIAISON SERVICE (JOLS) STUDY FOR PREVENTION OF SECONDARY FRACTURE: REGISTRATION DATA

A. Suzuki<sup>1</sup>, Y. Yoshino<sup>1</sup>, T. Katogi<sup>2</sup>, N. Iinuma<sup>3</sup>, H. Yasuoka<sup>4</sup>, S. Ikeda<sup>5</sup>, H. Ishibashi<sup>6</sup>, S. Tanaka<sup>7</sup>, H. Hagino<sup>8</sup>, H. Ohta<sup>9</sup>, T. Kurabayashi<sup>10</sup>, Y. Takeuchi<sup>11</sup>, N. Endo<sup>12</sup>

<sup>1</sup>Dept. of Endocrinology, Diabetes & Metabolism, Fujita Health University, Toyoake, <sup>2</sup>Dept. of Rehabilitation, Seirei Sakura Citizen Hospital, Sakura, <sup>3</sup>Japan Osteoporosis Foundation, Tokyo, <sup>4</sup>Dept. of Orthopedic Surgery, Tokorozawa Meisei Hospital, Tokorozawa, <sup>5</sup>Dept. of Orthopedic Surgery, Ken-Ai Memorial Hospital, Onga, <sup>6</sup>Dept. of Orthopedic Surgery, Ina Hospital, Ina, <sup>7</sup>Dept. of Clinical Biostatistics, Graduate School of Medicine, Kyoto University, Kyoto, <sup>8</sup>School of Health Science, Faculty of Medicine, Tottori University, Yonago, <sup>9</sup>Dept. of Obstetrics and Gynecology, Kawasaki Medical School General Medical Center, Okayama, <sup>10</sup>Dept. of Obstetrics and Gynecology, Niigata City General Hospital, Niigata, <sup>11</sup>Toranomon Hospital Endocrine Center, Tokyo, <sup>12</sup>Dept. of Orthopedic Surgery, Tsubame Rosai Hospital, Tsubame, Japan

**Objective:** Fracture Liaison Service (FLS) is nowadays well accepted as effective coordinator-based system to prevent secondary fracture. Japan Osteoporosis Society offered Osteoporosis Liaison Service (OLS) including FLS for both primary and secondary prevention of osteoporotic fracture. In this study, we focus on secondary prevention after clinical vertebral fracture and hip fracture to show the efficacy of FLS in super-aging society as in Japan.

**Methods:** This multicentered historical-control study has been performed in 22 hospitals and institutions in Japan. The inclusion criteria are the newly hospitalized patients with fresh clinical vertebral fracture or hip fracture in postmenopausal women or men equal to or above 50 years old. Multidisciplinary team assesses the risk of osteoporosis, and educates the patients and their family, and registers the patients in database center in Fujita Health University during 3 months after the first fracture. The hospital staffs send letter to each patient at 6, 12, 24 and 36 months to check the adherence and secondary fracture.

**Results:** This study enrolled 1506 fracture patients (male 300/ female 1206) from 2018-2020. Their mean age was 81.6±8.5 years old. BMI in male patients (21.3±3.2 kg/m<sup>2</sup>) was same as that in female (21.4±3.6 kg/m<sup>2</sup>). There were 618 clinical vertebral fractures (primary 329/secondary 289) and 888 hip fractures (primary 537/secondary 351). Patients experienced fall in the last 1 year before admission were 457 (30.3%). Multidisciplinary intervention and guidance were performed by OLS coordinator including nurse, pharmacist, physical therapist, occupational therapist and registered dietitian.

**Conclusion:** This prospective study could enroll planned number of patients and is expected to provide useful information to improve FLS in super-aging society.

P493

# TEN-YEAR DIFFERENCES IN THE JOINT SPACE WIDTH AND OSTEOPHYTE AREA OF THE KNEE JOINT: COMPARISON BETWEEN BASELINE AND THE 4TH ROAD STUDY SURVEYS

B. Kitamura<sup>1</sup>, T. Iidaka<sup>2</sup>, C. Horii<sup>3</sup>, S. Muraki<sup>2</sup>, H. Oka<sup>4</sup>, K. Nakamura<sup>5</sup>, T. Akune<sup>6</sup>, T. Tanaka<sup>1</sup>, T. Rogi<sup>1</sup>, H. Shibata<sup>1</sup>, S. Tanaka<sup>3</sup>, N. Yoshimura<sup>2</sup>

<sup>1</sup>Institute for Health Care Science, Suntory Wellness Limited, Kyoto, <sup>2</sup>Dept. of Preventive Medicine for Locomotive Organ Disorders, 22nd Century Medical & Research Center, University of Tokyo Hospital, Tokyo, <sup>3</sup>Dept. of Orthopaedic Surgery, Sensory and Motor System Medicine, Graduate School of Medicine, University of Tokyo, Tokyo, <sup>4</sup>Dept. of Medical Research & Management for Musculoskeletal Pain, 22nd Century Medical and Research Center, University of Tokyo, Tokyo, <sup>5</sup>Towa Hospital, Tokyo, <sup>6</sup>National Rehabilitation Center For Persons With Disabilities, Saitama, Japan

**Objective:** To elucidate differences in the joint space width and osteophyte area (OPA) of the knee joints of Japanese men and women between baseline and 4<sup>th</sup> survey data after 10 y of the population-based cohort.

**Methods:** The baseline survey of the Research on Osteoarthritis/Osteoporosis Against Disability study was conducted from 2005 to 2007; 2975 participants (1041 men and 1934 women; mean age, 70.2 y) completed all examinations of knee osteoarthritis (KOA), including an interviewer administered questionnaire and radiographic examinations of both knees in the anteroposterior view of the weight-bearing position. The 4<sup>th</sup> survey was performed from 2015-2016; 2445 participants (764 men and 1681 women; mean age, 68.8 y) completed assessments identical to those at baseline. The medial minimum joint space width (mJSW) and medial tibial OPA were measured bilaterally with the KOA computer-aided diagnosis system (Windows program) by two observers (H.O. and B.K.), and interobserver variability was confirmed.

**Results:** The mean (SD) medial mJSWs at baseline were 3.22 (0.96) mm for men and 2.65 (0.95) mm for women and at the 4<sup>th</sup> survey were 3.81 (1.20) mm for men and 3.13 (1.15) mm for women. Compared to the corresponding age group, the mean medial mJSW at the 4<sup>th</sup> survey tended to be greater in both men and women of all age groups ( $p < 0.01$ ). The mean OPAs in men aged 40–49 and 60–69 y and women aged 40–49, 50–59, 60–69, and 70–79 years were significantly smaller in the 4<sup>th</sup> survey compared to the corresponding age group at baseline ( $p < 0.05$ ).

**Conclusion:** In this population-based survey, knee joint radiographic measurements, such as the medial mJSW and OPA, tended to improve over the 10-y interval. These changes in KOA parameters could decrease the occurrence and progression of KOA and prevent subsequent walking disability in the future.

P494

# TBS PARAMETERS IN PATIENTS OVER 50 YEARS OLD WITH CHRONIC KIDNEY DISEASE AND SECONDARY HYPERPARATHYROIDISM

N. Karlovich<sup>1</sup>, Y. Dydyshka<sup>2</sup>, T. Mokhort<sup>2</sup>, A. Shepelkevich<sup>2</sup>, N. Vasilieva<sup>1</sup>, E. Sazonova<sup>1</sup>, V. Labashova<sup>1</sup>

<sup>1</sup>Republic Center of Endocrinology & Medical Rehabilitation, <sup>2</sup>Belarusian State Medical University, Dept. of Endocrinology, Minsk, Belarus

**Objective:** Secondary hyperparathyroidism (SHPT) is a universal complication of chronic kidney disease (CKD), which begins to develop when the glomerular filtration rate falls below 60 ml/min. Thus, the aim was to study the features of trabecular bone score (TBS) in CKD patients.

**Methods:** This subgroup included 236 patients with CKD. Only in 33.5% (79 people) BMD corresponded to the norm, in 31.8% (75 people) osteoporosis was detected, in 34.7% (82 people) osteopenia. The research involved general clinic examination, serum bone-specific parameters, DXA performed on "Prodigy Lunar".

**Results:** Lower values of the bone quality were noted in women: an absolute value of TBS (1.25 (1.15–1.35) vs. 1.33 (1.22–1.44),  $U=2477$ ;  $p=0.009$ ) and the T-score (−0.50 (−1.60–0.50) vs. 0.00 (−1.00–1.00),  $U=2545$ ;  $p=0.045$ ). SHPT was confirmed in 31.4% (74 people), including 35.9% (33 people) of men and 28.5% (41 people) women. Comparative analysis of the BMD decreases in the regions confirmed the predominant decrease in the mineral component in the femoral neck and lower third of the radius as in the general subgroup with CKD ( $n=236$ ,  $\chi^2=245.3$   $p<0.001$ ) and in SHPT subgroup ( $n=74$ ,  $\chi^2=69.6$ ;  $p=0.001$ ). Only 36.3% (37 women) had a normal trabecular bone structure, in 22.5% (23 women) partial violations of microarchitectonics were noted, and 41.2% (42 women) had pronounced violations of the quality. In persons with SHPT lower TBS values were determined, without statistical significance of differences:  $n=166$  1.26 (1.11–1.40) vs. 1.27 (1.20–1.37),  $U=2773$ ,  $p=0.388$ . There was a tendency towards a decrease in TBS with the progression of CKD ( $\chi^2=2.37$ ;  $p=0.795$ ). A significant minimum value of TBS was established if the cause of CKD was a congenital anomaly of the urinary tract both in the general subgroup with CKD ( $\chi^2=13.8$ ;  $p=0.017$ ) and in the SHPT subgroup ( $\chi^2=13.3$ ;  $p=0.021$ ).

**Conclusion:** CKD has a negative impact on the qualitative and quantitative parameters of bone in patients over 50 years of age. At the same time, there are significant differences in parameters taking into account gender, which requires further research.

P495

# WHERE HAVE THE FRAILTY PERTROCHANTERIC FRACTURES GONE?

B. A. Bitzidis<sup>1</sup>, S. S. Spanou<sup>2</sup>, S. A. Samaras<sup>1</sup><sup>1</sup>Dept. of Trauma & Orthopaedics, Mpodosakeio General Hospital,<sup>2</sup>Dept. of Paediatrics, Mpodosakeio General Hospital, Ptolemaida, Greece

**Objective:** To evaluate the attendance of patients presenting in our institution with a frailty pertrochanteric hip fracture during the COVID-19 pandemic and the imposed quarantine and curfew and compare the results with the ones of the previous 5 y.

**Methods:** Retrospectively we checked the hospital's archives for a total period of 1 y, and from March 2020 until March 2021, regarding the patients admitted in the orthopaedic department diagnosed with a frailty pertrochanteric hip fracture during the COVID-19 pandemic.

## Results:

Petrochanteric hip fracture	March 2015 - March 2016	March 2016 - March 2017	March 2017 - March 2018	March 2018 - March 2019	March 2019 - March 2020	COVID-19 Pandemic	Total
Operative treatment	50	52	56	58	51	34	301
Conservative treatment	3	4	7	8	7	6	35

**Conclusion:** The results of our data review regarding the attendance of patients with a frailty pertrochanteric fracture in our institution over the last 5 y show an important decline during the COVID-19 pandemic. Our hospital is a COVID-19 reference institution and covers an area of 150.000 citizens in the northwestern part of Greece and the population has a steady number over the last years. The frailty pertrochanteric fractures are considered to be sustained mainly at home or during activities nearby due to the patients' limited mobility and also due to the quarantine and the curfew during the pandemic, the transfer of patients to other hospitals in other areas was not possible so the question of where all the frailty hip fractures have gone during this period of time is an update which still finds answers. Furthermore, an important question arises now while the society is trying to find its way back to normality, whether the attendance of patients with frailty pertrochanteric hip fractures will present an increase in numbers over the next period of time.

P496

# THE EFFECT OF REGION OF INTEREST ON THE MEASUREMENTS OF BONE MINERAL DENSITY OF THE PROXIMAL FEMUR

K. Uemura<sup>1</sup>, M. Takao<sup>1</sup>, Y. Otake<sup>2</sup>, H. Hamada<sup>1</sup>, W. Ando<sup>1</sup>, Y. Sato<sup>2</sup>, N. Sugano<sup>1</sup><sup>1</sup>Osaka University Graduate School of Medicine, Suita, <sup>2</sup>Nara Institute of Science & Technology, Ikoma, Japan

**Objective:** The BMD of the proximal femur is usually measured using the DXA at the region between the head-neck junction and the distal of the lesser trochanter. While some studies reported the effect of the region of interest (ROI) setting on the BMD measurements, limited information has been provided regarding the degree of change in BMD caused by the alteration of the ROI. In this study, we performed a simulation analysis using CT images to clarify the effect of changing the ROI on the measurement of the BMD.

**Methods:** Hip CT images of 75 women (mean age: 62.4 y) were analyzed herein. After the volume of the proximal femur was isolated from the CT images, the volume was rotated to account for the positional variance found during CT imaging. Then, the volume was projected towards the anteroposterior direction to generate a simulated DXA image used for analysis (Fig. a). For the simulated DXA image, the neck cut was simulated 0-10 mm distal from the head-neck junction, and the distal cut was simulated 0-40 mm distal from the tip of the lesser trochanter. The cut level was altered with a 1mm increment to create each ROI, and the mean density/pixel of each ROI was quantified as the BMD. The BMD of each ROI was compared with that at a cut level of 0 mm, and the percent changes were calculated. Analyses were performed automatically using MATLAB.

**Results:** An absolute maximum change of 1.6% was found for the neck cut when the cut level was 10 mm distal from the head-neck junction (Fig. b). For the distal cut, the BMD increased linearly as the cut level was transferred distally. The changes were 5.5% at 10 mm, 11.8% at 20 mm, 18.7% at 30 mm, and 25.4% at 40 mm (Fig. c).

**Conclusion:** Small changes in BMD were found when the neck cut level was altered. On the contrary, BMD changed substantially when the distal femur cut level was altered. We recommend confirming the ROI of the distal femur when the BMD changed significantly from the previous measurements.



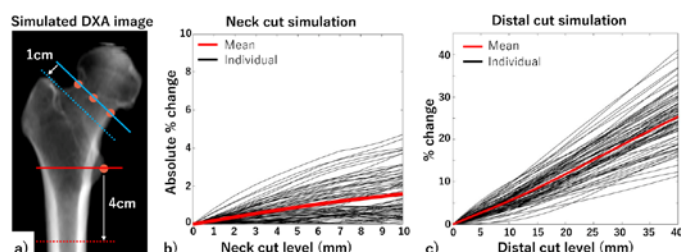


Figure. Simulated DXA image (a), results of the neck cut simulation (b), and results of the distal cut simulation.

P497

### MODELLING OF LEAN AND FAT ARTIFACTS ON TRABECULAR BONE SCORE USING A DXA PHANTOM

C. Kam<sup>1</sup>, M. Almohaya<sup>2</sup>, S. Bhullar<sup>1</sup>, D. Kendler<sup>3</sup>

<sup>1</sup>Prohealth Clinical Research, Vancouver, Canada, <sup>2</sup>King Fahad Medical City, Riyadh, Saudi Arabia, <sup>3</sup>University of British Columbia, Vancouver, Canada

**Objective:** Trabecular bone score (TBS) software analyzes image patterns from lumbar spine DXA to evaluate the architecture of trabecular bone. TBS is an independent predictor of fracture risk and can be used to adjust FRAX absolute fracture risk assessments. Low TBS values indicate deteriorated trabecular microarchitecture. TBS has limitations and cannot be used in patients who are overweight or underweight. In overweight patients, there may be deterioration of image quality due to increases in abdominal thickness. We studied the effect on TBS of increasing fat and water overlying the Hologic spine phantom region of interest (ROI) and/or reference area (ref).

**Methods:** Varying depths of water or fat were placed overlying the ROI and ref areas of the Hologic spine phantom, scanning on a Hologic Discovery densitometer. Both vegetable oil in plastic trays and 6.5 cm thickness blocks of lard were used to model overlying fat; trays of water were used to model overlying lean.

**Results:** There was severe degradation of DXA image quality and ROI edge detection when 13 cm of lard was placed over the ROI. Increasing from 0 cm to 8 cm of oil over both the ROI and ref area led to linear decreases in TBS (with 8 cm oil, decreases of 10.8%, Pearson  $r=-0.98$ ). Increasing from 0 cm to 8 cm of oil over the ROI alone led to linear decreases in TBS (with 8 cm oil, decreases of 24.7%;  $r=-0.99$ ). Increasing from 0 cm to 8 cm of oil over the ref area alone led to progressive increases in TBS (with 8 cm oil, increases of 4.1%;  $r=0.98$ ). Trays of water overlying the ROI and the ref area introduced much less artifact than trays of vegetable oil.

**Conclusion:** Increasing thickness of fat over ROI, ref, and both the ROI and ref areas introduces a significant artifact to TBS results. Artifact is much less with water than with oil. Documenting these artifacts may help to understand changes in TBS results in patients with marked changes in body weight.

P498

### DEVELOPMENT OF A REPRODUCIBLE RESEARCH PLATFORM TO ASSESS BONE MINERAL DENSITY OF THE PROXIMAL FEMUR FROM CLINICAL CT IMAGES

K. Uemura<sup>1</sup>, Y. Otake<sup>2</sup>, M. Takao<sup>1</sup>, H. Makino<sup>2</sup>, M. Soufi<sup>2</sup>, N. Sugano<sup>1</sup>, Y. Sato<sup>2</sup>

<sup>1</sup>Osaka University Graduate School of Medicine, Suita, <sup>2</sup>Nara Institute of Science & Technology, Ikoma, Japan

**Objective:** Quantitative CT (QCT) can be employed as a substitute for DXA in measuring proximal femur BMD. However, commercially available software that is not accessible from all institutions is needed to diagnose osteoporosis from QCT. We therefore aimed to 1) develop an open source reproducible research platform that quantifies BMD from CT images and 2) validate its accuracy.

**Methods:** This study analyzed 75 pairs of hip CT and DXA images of women with a diagnosis of osteoporosis (25 hips), osteopenia (25 hips), and normal (25 hips), according to the T-score calculated from the DXA measurements of the proximal femur (DXA-BMD). From the CT images, the femur and a calibration phantom were automatically segmented using pretrained codes/models available at <https://github.com/keisuke-uemura> (Fig). The proximal femoral region was isolated by manually selected landmarks, and the mean Hounsfield units within the region was quantified (CT-vHU, Fig: upper row). The region was projected onto the coronal plane to measure the areal density (CT-aHU, Fig: lower row). The calibration phantom was employed to convert the CT-vHU into CT-vBMD and the CT-aHU into CT-aBMD. Each parameter was correlated to the DXA-BMD, and the accuracy in diagnosing osteoporosis was quantified by a receiver operating characteristic (ROC) analysis.

**Results:** The correlation coefficients between the four parameters and DXA-BMD were all  $\geq 0.9$  (all  $p<0.001$ ). In the ROC analysis, the area under the curve (AUC) for diagnosing osteoporosis was  $\geq 0.96$  for all parameters.

**Conclusion:** Quantification of proximal femur BMD and diagnosis of osteoporosis from CT images were accurately performed with the system developed in this study. Given that the models necessary for segmentation are open source, researchers may apply this reproducible platform for quantifying proximal femur BMD.

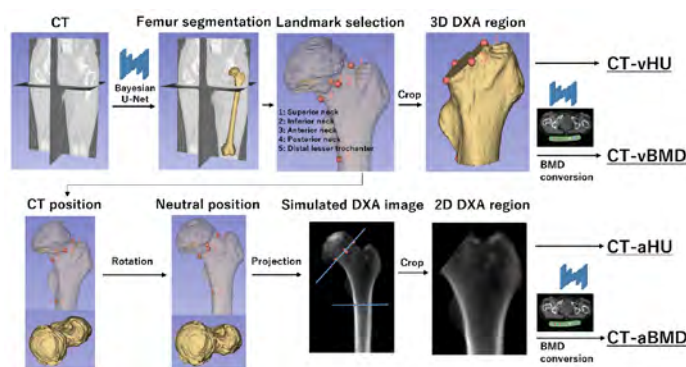


Figure. Flowchart for quantifying the CT-vHU, CT-vBMD, CT-aHU, and CT-aBMD of the proximal femur from CT images.

P499

### FAT AND LEAN ARTIFACTS OVER REGION OF INTEREST AND REFERENCE AREA OF SCANS OF A DXA PHANTOM

M. Almohaya<sup>1</sup>, C. Kam<sup>2</sup>, S. Bhullar<sup>2</sup>, D. Kendler<sup>3</sup>

<sup>1</sup>King Fahad Medical City, Riyadh, Saudi Arabia, <sup>2</sup>Prohealth Clinical Research, Vancouver, Canada, <sup>3</sup>University of British Columbia, Vancouver, Canada

**Objective:** Body weight is correlated with BMD; weight changes may alter DXA-measured bone mass due to artifact and imprecision in addition to real changes in bone mineral content (BMC). DXA instruments compare BMC over the bone region of interest (ROI) with a reference area (ref) where bone is absent. Artifact may originate from changes in the ROI, the ref area, or both. We modeled the effects of changes of lean and fat overlying the ROI and overlying the ref area.

**Methods:** Vegetable oil and water in plastic trays and 6.5 cm blocks of lard of increasing mass were placed over the Hologic spine phantom, tested on a Hologic Discovery densitometer. Each phantom was scanned in triplicate with fat or water overlying the ROI, the ref area and both.

**Results:** Placing blocks of lard and oil on the phantom overlying the ROI resulted in decreases in BMC, area and BMD values (Pearson  $r=-0.99$  for all). With 13 cm lard, BMD decreased 37% (from 0.903 g/cm<sup>2</sup> to 0.572 g/cm<sup>2</sup>). Lesser changes were observed with increases from 0 cm to 8 cm of water (BMD decreased by 1.9% with water and 10.5% with oil). BMD increased with increasing thickness of lard and oil overlying the ref area (8.8% with 13 cm of lard and 7.3% with 8 cm of oil,  $r=0.98$ ) and decreased 1.7% ( $r=-0.81$ ) with overlying 8 cm of water. Placing blocks of lard and oil overlying both ROI and ref areas resulted in decreases in both BMC and BMD (BMD  $r=-0.94$  for lard and  $r=-0.97$  for oil). Water placed over ROI and ref resulted in small increases in BMC and BMD (0.2% and 1% respectively).

**Conclusion:** Fat over both ROI and ref area leads to artifact in both ROI area and BMC. Increasing thickness of fat leads to progressive decreases in BMD. There is less artifact with increasing depth of water compared to fat. These data may help understand the DXA artifact introduced with changes in patient weight in patients monitored with DXA.

P500

### ASSESSMENT OF BONE QUALITY IN YOUNG ADULTS WITH CHRONIC KIDNEY DISEASE AND SECONDARY HYPERPARATHYROIDISM

Y. Dydyshka<sup>1</sup>, N. Karlovich<sup>2</sup>, A. Shepelkevich<sup>1</sup>, N. Vasilieva<sup>2</sup>, V. Vadzianava<sup>3</sup>, E. Brutskaia-Stempkovskaya<sup>4</sup>

<sup>1</sup>Belarusian State Medical University, Dept. of Endocrinology, <sup>2</sup>Republic Center of Endocrinology & Medical Rehabilitation, <sup>3</sup>Belarusian Medical Academy of Postgraduate Education, <sup>4</sup>Belarusian State Medical University, Dept. of General Medical Practice, Minsk, Belarus

**Objective:** The negative effect of secondary hyperparathyroidism (SHPT), including in chronic kidney disease, on bone metabolism is undoubtedly an increase in PTH alters the processes of mineralization and bone metabolism in general, increases the risk of bone fractures, and metastatic calcification is formed. Thus, the aim was to study the features of trabecular bone score (TBS) in young adults with CKD patients.

**Methods:** This subgroup included 213 patients with CKD and 34 people in the control group, SHPT was determined in 39.0% (83 people) of patients in the main group. The research involved general clinic examination, serum bone-specific parameters, DXA (BMD) and TBS of lumbar spine) performed on "Prodigy Lunar". Z-score of  $-2.0$  or less was regarded as low BMD. The TBS was performed in absolute units (gray scale pixel deviation) of the lumbar spine L1-L4 and Z-score TBS were also taken into account.

**Results:** Low bone mass was detected in 32.7% (70 people) of the examined patients. According to the results of the study, a decrease in TBS (L1-L4) (1.36 (1.24–1.44) vs. 1.44 (1.40–1.49),  $U=1211$ ;  $p<0.001$ ) and Z-score TBS (L1-L4) ( $-0.60$  ( $-2.00-0.00$ ) vs.  $0.10$  ( $-0.20-0.70$ ),  $U=545$ ;  $p=0.001$ ) was noted in patients with CKD compared with controls. There were no significant differences in the parameters of BMD and TBS in men and women in both the main and control groups, which makes it possible to evaluate these parameters without dividing by gender. There was established a direct moderate statistically significant relationship between TBS and BMD of the lumbar spine in patients with CKD ( $p=0.40$ ;  $p<0.001$ ). In patients with SHPT, lower TBS values were determined (1.32 (1.22–1.12) vs. 1.39 (1.28–1.45),  $U=2031$ ;  $p=0.078$ ). Young adults with CKD ( $X^2=7.805$ ;  $p=0.050$ ), including those with SHPT ( $X^2=2.620$ ;  $p=0.270$ ), showed a decrease in TBS with decreasing GFR, but not in dialysis patients.

**Conclusion:** Young adults with hyperparathyroidism have lower parameters of bone quality. The absence of gender differences may indicate the specificity of the effect on bone metabolism of the underlying disease.

P501

### TREATMENT OF CUTIBACTERIUM ACNES INFECTION RESULTING IN PROSTHETIC PROTRUSIO ACETABULI

W. L. P. Yuen<sup>1</sup>, R. Raghuraman<sup>1</sup>, E. D. Omar Mohamed Hussein<sup>1</sup>, L. Cheng Kiang Adrian<sup>1</sup>

<sup>1</sup>Changi General Hospital, Singapore, Singapore

**Objective:** As we face an increasingly aging population, more and more arthroplasty surgeries are performed. Hip bipolar hemiarthroplasty is commonly done for elderly patients who suffer from femoral neck fractures, with good functional outcomes.<sup>1</sup> Amongst the complications of hip bipolar hemiarthroplasty surgery, prosthetic acetabular protrusion is rare. It is thought to occur in prosthetic joint infections (PJI) due to destructive osteolysis and resorption of surrounding bone resulting in prosthesis migration.<sup>2</sup> Amongst prosthetic joint infection pathogens, Cutibacterium acnes is increasingly being implicated. It typically results in infections via biofilm production and has an indolent and nonspecific clinical presentation. It can cause significant soft tissue damage and unstable implants.<sup>3</sup> There is no gold standard for treatment of C. acnes infections yet, and we seek to contribute to current literature regarding C. acnes PJI.

**Methods:** We review the current literature surrounding the treatment of C. acnes prosthetic infections, and also discuss the treatment of a challenging case of C. acnes infection resulting in prosthetic protrusion acetabuli.

**Results:** Our patient was successfully treated with antibiotic treatment and a two-staged revision total hip arthroplasty, and recovered well postoperatively.

**Conclusion:** PJIs continue to increase as more arthroplasty surgeries are done for an increasingly elderly population. We report a PJI case which contributes to literature on C. acnes infections and prosthetic acetabular protrusion.

#### References:

1. Wang F, et al. BMC Musculoskelet Disord 2015;16:229.
2. Stiehl JB. J Arthroplasty 2007;22:283.
3. Boisrenoult P. Orthop Traumatol Surg Res 2018;104:S19.

P502

### SURGICAL TECHNIQUE FOR ALL-INSIDE REPAIR OF BUCKET-HANDLE MENISCAL TEARS

W. L. P. Yuen<sup>1</sup>, C. L. Kuo<sup>1</sup>, K. M. J. Goh<sup>1</sup>, Y. H. D. Lee<sup>1</sup>

<sup>1</sup>Changi General Hospital, Singapore, Singapore

**Objective:** Bucket-handle meniscal tears (BHMT) remain challenging to manage due to their complex pathology and technical difficulty. Subtotal meniscectomy has been shown to improve symptoms but leads to accelerated osteoarthritis in the affected compartment and poorer long-term outcomes.<sup>1</sup> BHMT repair and meniscal preservation is hence the preferred option. It can be done via inside-out, all-inside, or hybrid meniscus repair techniques. All-inside meniscus repair avoids the need for additional safety incisions, trained assistants for suture passing, and reduce concerns of soft-tissue and neurovascular complications.<sup>2</sup> We present our technique for all-inside BHMT repair.

**Methods:** We utilize the all-inside device (FAST-FIX 360 Meniscal Repair System from Smith and Nephew) for successful all-inside BHMT repair. Good anatomical reduction of the BHMT can be achieved via adequate release of perimeniscal scar tissue, and assisted with an inside-out reduction stitch. Both horizontal and vertical stitch configurations are used for the all-inside repair with the depth limiter of the device set at 16 mm for the meniscus body and 18mm for the posterior horn. We place at least five to six all-inside stitches at intervals of 3-5 mm for adequate repair of the BHMT, with a vertical stitch placed at the edge of the tear to prevent tear propagation.

**Results:** Good long-term outcomes have been shown for BHMT for all-inside techniques.<sup>2</sup> We demonstrate our all-inside technique, and share out tips for technical success.

**Conclusion:** All-inside repair of BHMT can achieve good outcomes. We present our technique for all-inside BHMT, emphasizing good reduction and stable fragment fixation. This will shorten surgery time, reduce complications, and provide predictable outcomes.

#### References:

1. Stein T, et al. Am J Sports Med. Published online 2010;38:1542.
2. Tengroetenhuysen M, et al. Knee Surgery Sport Traumatol Arthrosc 2011;19:236.

P503

**HIGH-INTENSITY LASER IN THE TREATMENT OF OSTEOARTHRITIS OF THE KNEE**V. Koevska<sup>1</sup>, B. Mitrevska<sup>1</sup><sup>1</sup>University Ss. Cyril and Methodius, Medical faculty, Skopje, Macedonia

**Objective:** Osteoarthritis of the knee is associated with the aging process. Genetic factor, body weight, previous knee injury, etc. also play an important role in the pathogenesis. In addition to traditional physical therapy, one of the possible modalities is the high-intensity laser treatment (VILT). This study aimed to show the role of VILT in osteoarthritis of the knee.

**Methods:** The study involved 36 patients, 23 (63.89%) women and 13 (36.11%) men, who were treated by the institute with VILT. For the application of VILT, a standardized protocol presented in the device was applied, every day, for a total 10 d. WOMAC was used to assess functional ability at baseline, 10 d and 1 month after treatment.

**Results:** There was no significant difference in the mean age  $p=0.7105$  and BMI  $p=0.6162$ . We found that in the WILT group the height of the WOMAC index significantly decreased from 0-time to 1 month with a significantly lowest value after 1 month ( $p=0.00001$ ).

**Conclusion:** VILT has a significant role in reducing pain and improving functional ability in patients with osteoarthritis of the knee.

P504

**THE EFFECTS OF MESENCHYMAL STEM CELL INJECTION ON THE 15TH DAY AFTER IMPLANTATION OF OK-015 INTO THE TIBIA ON GROWTH RATE OF THE LOWER INCISORS**K. Ismailova<sup>1</sup>, V. Luzin<sup>1</sup>, S. Trufanov<sup>1</sup>, D. Astrakhantsev<sup>1</sup><sup>1</sup>State Establishment of Lugansk People's Republic Saint Luka Lugansk State Medical University, Lugansk, Ukraine

**Objective:** To investigate growth of the lower incisors (LI) in rats after injection allogenic stem cells (ASC) on the 15<sup>th</sup> day after implantation of hydroxyapatite material OK-015 into the tibia.

**Methods:** 150 male rats with body weight of 190-225 g were used. Group K comprised the intact controls, group D comprised animals with 2 mm opening in the proximal part of the tibiae. Group OK consisted of the animals with the openings in the tibiae filled with material OK-015. In the group MSC15D and MSC150K animals received injections of 5E6 ASC on 15<sup>th</sup> day after intervention. ASC were obtained from red bone marrow from donor animals. After 7, 15, 30, 60 and 90 d after intervention LI were excised and

prepared for gross morphometry with 0.05 mm precision. ANOVA and other tests were performed with the use of standard software.

**Results:** LI length in the group D was lower than that of the controls from the 15<sup>th</sup> to the 90<sup>th</sup> day by 4.59%, 5.98%, 4.86%, and 4.28%. Width of the LI was lower from the 15<sup>th</sup> to the 60<sup>th</sup> day by 10.00%, 9.88%, and 6.10%. In the group OK by the 7<sup>th</sup> and the 15<sup>th</sup> days the LI shortened by 3.33% and 3.83% (in comparison with the group D). Width in the same period decreased by 6.39% and 5.83% and height – by 5.60% and 4.76%. In later terms growth of the incisor accelerated. In group MSC15D from the 30<sup>th</sup> to the 90<sup>th</sup> day length of the LI increased by 3.87%, 2.99%, and 3.63%; height of the LI increased by 6.85% on the 30<sup>th</sup> day. In MSC150K group width and height of the LI increased in comparison with OK group by 4.15% and 5.33% on the 30<sup>th</sup> day.

**Conclusion:** Injection of ASC on the 15<sup>th</sup> day after implantation of OK-015 into the tibia reduces adverse effects of intervention on LI growth. This is manifested as increase of LI dimensions in the group MSC15D in comparison with D group in the period from the 30<sup>th</sup> to the 90<sup>th</sup> day. Same effects were observed in MSC150K group in comparison with OK-015 group yet in the period from the 30<sup>th</sup> to the 60<sup>th</sup> day after intervention.

P505

**ULCERATIVE COLITIS AS A CAUSE OF HIP FRACTURE**L. Athanassiou<sup>1</sup>, I. Kostoglou-Athanassiou<sup>2</sup>, M. Nikolidaki<sup>3</sup>, D. Mathiou<sup>3</sup>, P. Giavopoulos<sup>4</sup>, A. Samolis<sup>4</sup>, P. Athanassiou<sup>5</sup>, G. Troupis<sup>4</sup>

<sup>1</sup>Dept. of Rheumatology, Asclepeion Hospital, Voula, Athens, Greece, <sup>2</sup>Dept. of Endocrinology, Asclepeion Hospital, Voula, Athens, Greece, <sup>3</sup>European University Cyprus, Nicosia, Cyprus, <sup>4</sup>Dept. of Anatomy, Medical School, University of Athens, Athens, Greece, <sup>5</sup>Dept. of Rheumatology, St. Paul's Hospital, Thessaloniki, Greece

**Objective:** Ulcerative colitis is an autoimmune inflammatory disease which affects the intestine and induces chronic inflammation and symptoms such as pain and bowel movement disturbance. The aim was to describe the case of a patient, male, age 67 y who suffered from inflammatory bowel disease and presented with a hip fracture.

**Case report:** The case of a patient, male, aged 67 years who suffered from inflammatory bowel disease is described. The disease was well controlled on treatment with mesalazine. No disease recurrence had been observed for many years. He was on treatment with cholecalciferol and 25(OH)D<sub>3</sub> levels were within normal range at various time points in the past. Testosterone levels were within normal range. The patient had a right hip fracture after a fall from his own height. The hip fracture was successfully managed by surgery. Subsequently, a diagnostic control for osteoporosis revealed a T-score of -2.7 in the left hip and a 25(OH)D<sub>3</sub> level



of 31.2 ng/ml. Alendronate was administered along with calcium and cholecalciferol orally. Thereafter, zoledronic acid was administered iv. Alendronate was discontinued and alphacalcidol orally was initiated.

**Conclusion:** Ulcerative colitis, even if adequately controlled on mild drug treatment and even if the patient is on adequate treatment with cholecalciferol seems to affect bone metabolism and may induce osteoporosis. Osteoporosis in the context of ulcerative colitis may be due to the circulation of inflammatory cytokines which affect bone metabolism and induce decreased BMD. Decreased BMD in a patient with inflammatory bowel disease may also be due to altered mucosal absorption of salts and vitamins. Therefore, osteoporosis in the context of inflammatory bowel disease should be managed promptly and aggressively.

## P506

### FRACTURE OF THE PUBIC RAMUS AS PRESENTING MANIFESTATION OF POSTMENOPAUSAL OSTEOPOROSIS

L. Athanassiou<sup>1</sup>, I. Kostoglou-Athanassiou<sup>2</sup>, D. Mathiou<sup>3</sup>, M. Nikolidaki<sup>3</sup>, A. Pastroudis<sup>4</sup>, A. Samolis<sup>5</sup>, P. Giavopoulos<sup>5</sup>, P. Athanassiou<sup>6</sup>, G. Troupis<sup>5</sup>

<sup>1</sup>Dept. of Rheumatology, Asclepeion Hospital, Voula, Athens, Greece, <sup>2</sup>Dept. of Endocrinology, Asclepeion Hospital, Voula, Athens, Greece, <sup>3</sup>European University Cyprus, Nicosia, Cyprus, <sup>4</sup>6th Dept. of Orthopedics, Asclepeion Hospital, Voula, Athens, Greece, <sup>5</sup>Dept. of Anatomy, Medical School, University of Athens, Athens, Greece, <sup>6</sup>Dept. of Rheumatology, St. Paul's Hospital, Thessaloniki, Greece

**Objective:** Fractures of the pubic ramus are relatively rare. They have been described as traumatic fractures in cases of gunshot injury and after accidents in young patients. They may also occur as stress fractures. The aim was to describe the case of a patient, female, who underwent hysterectomy and ovariectomy at the age of 45 and presented with osteoporosis and a pubic ramus fracture as a presenting manifestation of osteoporosis.

**Case report:** A female, aged 55 y who presented with a left sided pubic ramus fracture and a left sided fracture of the sacrum after a fall is described. The patient had been subjected to hysterectomy along with ovariectomy at the age of 45 y. After the operation she was not offered preventive treatment for osteoporosis. 10 y later and after a fall she presented with a left sided pubic ramus fracture and a fracture of the left side of the sacrum. She was managed conservatively. Consequently, the patient was investigated for osteoporosis. T-score of the lumbar spine was -2.6. Alendronate was administered for the management of osteoporosis.

Fractures of the pubic ramus are relatively rare. They are often observed in young patients after injury or as stress fractures following intense exercise. The development of pubic ramus fractures in

the context of osteoporosis and especially as a presenting manifestation of postmenopausal osteoporosis is rare. The diagnosis of a pubic ramus fracture is difficult and requires intense clinical suspicion. Radiological investigation which may be complemented by bone scintigraphy and computed tomography may be required for early diagnosis. Pubic ramus fractures cause intense inguinal or hip pain and may induce limping. They are managed conservatively.

**Conclusion:** The case of a patient is described in which the first manifestation of postmenopausal osteoporosis was a pubic ramus fracture.

## P507

### ASSESSING THE EFFECTIVENESS OF BISPHOSPHONATES FOR THE PREVENTION OF FRAGILITY FRACTURES: AN UPDATED SYSTEMATIC REVIEW AND NETWORK META-ANALYSES

A. Bastounis<sup>1</sup>, T. Langley<sup>1</sup>, S. Davis<sup>2</sup>, Z. Paskins<sup>3</sup>, N. Gittoes<sup>4</sup>, J. Leonardi-Bee<sup>1</sup>, O. Sahota<sup>5</sup>

<sup>1</sup>Division of Epidemiology & Public Health, School of Medicine, University of Nottingham, Nottingham, <sup>2</sup>School of Health & Related Research, Regent Court (SchARR), University of Sheffield, Sheffield, UK, <sup>3</sup>Haywood Academic Rheumatology Centre, Midlands Partnership NHS Foundation Trust & School of Medicine, Keele University, Stoke-on-Trent, <sup>4</sup>Centre for Endocrinology, Diabetes & Metabolism, University of Birmingham & Queen Elizabeth Hospital, University Hospitals Birmingham NHS Foundation Trust, Birmingham, <sup>5</sup>Queens Medical Centre, University of Nottingham, Nottingham University Hospitals NHS Trust, Nottingham, UK

**Objective:** Bisphosphonates have been found to be effective in preventing fragility fractures, but, as with all pharmacological agents, their benefit-to-risk ratio must be considered in the round. In light of recent clinical trials, there is a need to update the estimates regarding their comparative effectiveness in preventing fragility fractures. This is an update of a systematic review previously published as part of a NICE HTA report. This study aimed to update the estimates regarding the clinical effectiveness and safety of bisphosphonates (alendronate, risedronate, ibandronate, and zoledronate) for the prevention of fragility fractures.

**Methods:** Searches of 14 databases, unpublished sources and trial registries were conducted, covering the period 2014 to March 2021. Screening, data extraction and risk of bias assessment were independently undertaken by two study authors. Data was analysed using NMA embedded within a Bayesian framework. Outcomes were fractures, femoral neck BMD, mortality, adverse events and health-related quality of life.

**Results:** 25 additional eligible trials were identified, resulting in a total population of 47,007 participants. Overall, 34 trials provided data for the fracture NMA and 44 trials provided data for the BMD NMA. All treatments had beneficial effects on fractures vs.

placebo with hazard ratios varying from 0.38 (95%CI: 0.28, 0.49) to 0.77 (95%CI: 0.63, 0.91) for zoledronate and alendronate respectively. All treatments were associated with increases in BMD vs. placebo with mean percentage differences ranging from 2.25 (95%CI: 1.61, 2.87) to 4.02 (95%CI: 3.2, 4.84) for risedronate and zoledronate respectively.

**Conclusion:** Zoledronate was found to be the most effective treatment in reducing the risk of vertebral, non-vertebral, hip and wrist fractures and, in increasing femoral neck BMD. Zoledronate could be considered a first-line option for people at increased risk of fractures.

P508

### HIGHER URATE LEVELS ASSOCIATED WITH GREATER BONE MINERAL DENSITY IN OLDER ADULTS

F. Brennan<sup>1</sup>, N. Maher<sup>1</sup>, C. O'Carroll<sup>1</sup>, G. Steen<sup>1</sup>, R. Lannon<sup>1</sup>, K. McCarroll<sup>1</sup>

<sup>1</sup>St James's Hospital, Dublin, Ireland

**Objective:** Higher serum urate levels are associated with greater BMD and lower prevalence of fractures in several large studies. While first reported in 2011, the mechanism remains unclear, and some studies are conflicting. Urate is an antioxidant and may influence bone health via effects on osteoblast function. This study aimed to explore the relationship between serum urate and BMD in older Irish adults.

**Methods:** We identified patients aged >60 y at our bone health clinic who had serum urate measured and BMD assessed using DXA. Patients who were on teriparatide treatment were excluded as it is known to increase serum urate. The relationship between urate and BMD at the hip and spine was explored in multinomial regression models.

**Results:** Study included 1538 with a mean age of 74.5±8.3 y, of whom 83.6% were female. 67.1% had osteoporosis and 28.1% had osteopenia. Higher urate levels were associated with greater BMD in the spine (P=0.0001) after adjustment for age, gender, BMI, eGFR and serum 25(OH)D. In a smaller subset (n=1046) serum urate also independently predicted greater BMD at the total hip (P=0.02).

**Conclusion:** Higher serum urate was associated with greater BMD at the hip and spine in keeping with other studies. We were not able to account for thiazide diuretics which increase serum urate, reduce urinary calcium excretion and are positively associated with BMD. More research is needed to better understand the potential mechanisms underlying this relationship.

P509

### THE UTILITY OF ULTRASOUND OF THE HEEL IN DIAGNOSING OSTEOPOROSIS: EXPERIENCE FROM A BONE HEALTH CLINIC

F. Brennan<sup>1</sup>, N. Maher<sup>1</sup>, C. O'Carroll<sup>1</sup>, G. Steen<sup>1</sup>, R. Lannon<sup>1</sup>, K. McCarroll<sup>1</sup>

<sup>1</sup>St James's Hospital, Dublin, Ireland

**Objective:** Heel ultrasound can be used as an alternative to DXA scanning in assessing BMD. While not validated as a diagnostic tool, population studies show a high negative predictive value for osteoporosis. This study aimed to investigate its utility in patients attending a specialist bone health clinic.

**Methods:** Heel ultrasound results were compared to DXA diagnoses at our clinic and concordance rates, negative predictive value (NPV) and positive predictive value (PPV) were calculated. We also identified the correlation between BMD and bone ultrasound attenuation (BUA) and speed of sound (SOS) and the predictive value of heel ultrasound for hip fractures.

**Results:** 3753 patients were identified with a mean age of 67.2±8.8 y, of whom 76.5% were female. Concordance rate for osteoporosis were 87.8% (1117/1271) and osteopenia 27.4% (362/1324). Ultrasound T-scores were worse than DXA in 5% of cases. For diagnosing osteoporosis, PPV was 87.8% using (ultrasound T-score < -2.5) and NPV was 63.3% (using ultrasound T-score > -2.5). In sub-analysis (n=2822) there was only a modest correlation between total hip BMD and SOS (r<sup>2</sup>=0.24, P<0.001) and BUA (r<sup>2</sup>=0.19, P<0.001). An ultrasound T-score < -2.5 vs. normal predicted a history of hip fracture (OR 2.39, CI. 2.00 - 2.87, P<0.0001)

**Conclusion:** Ultrasound of the heel had a good positive predictive value for diagnosing osteoporosis. However, it was less effective at ruling out osteoporosis, missing about a third of cases. As a specialist centre however, many of our patients were not treatment naive and had secondary causes for their bone loss. The results suggest that ultrasound of the heel is of less value at a specialist bone health clinic.

P510

# PERIPHERAL QUANTITATIVE COMPUTED TOMOGRAPHY DERIVED BONE PARAMETERS IN MEN WITH IMPAIRED FASTING GLUCOSE AND TYPE 2 DIABETES

K. L. Holloway-Kew<sup>1</sup>, K. B. Anderson<sup>1</sup>, M. C. Tembo<sup>1</sup>, S. X. Sui<sup>1</sup>, J. Harland<sup>1</sup>, N. K. Hyde<sup>1</sup>, M. A. Kotowicz<sup>1</sup>, J. A. Pasco<sup>1</sup>

<sup>1</sup>Deakin University, IMPACT, Geelong, Australia

**Objective:** Individuals with type 2 diabetes mellitus (T2DM) are at higher risk of fracture, but paradoxically do not have reduced BMD as measured by DXA. This study investigated associations between pQCT-derived bone parameters and glycaemia status.

**Methods:** Participants were men (n=414, age 33-96 y) from the Geelong Osteoporosis Study. Diabetes was defined by fasting plasma glucose (FPG)  $\geq 7.0$  mmol/L, self-report of diabetes or antihyperglycaemic medication use. Two men with type 1 diabetes were excluded. Impaired fasting glucose (IFG) was classified as FPG 5.6-6.9 mmol/L. Bone measures were derived using pQCT (XCT 2000 Stratec Medizintechnik, Germany) at the radius (4% site: n=376, 66% site: n=348) and tibia (4%, n=366, 66%: n=355). Linear regression was used to investigate associations between glycaemia status and pQCT-derived bone parameters, adjusting for potential confounders.

**Results:** There were 301 (72.7%) men with normoglycaemia, 62 (15.0%) with IFG and 51 (12.3%) with T2DM. At the 4% site, men with T2DM had lower age-, weight- and height-adjusted bone total area at the radius (-6.5%) and tibia (-4.3%) compared to the normoglycaemia group. Trabecular and cortical area were also lower at the radius (-6.5%) and tibia (-4.4%). Cortical density was higher for men with T2DM at the radius (+5.9%) and tibia (+4.8%). Adjusted total bone density at the radial site was also higher (+4.9%). At the 66% site, adjusted polar stress strain index was lower for men with T2DM at the radius (-8.1%) and tibia (-5.6%). No differences were detected for IFG. Femoral neck BMD was not different between the three groups (normoglycaemia:  $0.954 \pm 0.136$ , IFG:  $0.982 \pm 0.121$ , T2DM:  $0.964 \pm 0.116$  g/cm<sup>2</sup>, p=0.320).

**Conclusion:** Men with T2DM had lower polar stress strain index and total bone, trabecular and cortical areas than the other two groups; however, cortical density was higher. No differences were detected between the groups for femoral neck BMD.

P511

# BATCHBMD: AN ACCURATE AND EFFICIENT DUAL-ENERGY X-RAY ABSORPTIOMETRY REPORT GENERATOR

W.-C. Huang<sup>1</sup>, W. P. Chan<sup>2</sup>

<sup>1</sup>Dept. of Computer Science & Information Engineering, National Taiwan University, <sup>2</sup>Dept. of Radiology, Wan Fang Hospital, Taipei Medical University, Dept. of Radiology, School of Medicine, College of Medicine, Taipei Medical University, Taipei, Taiwan

**Objective:** In recent years, studies have shown that structural reporting systems can increase the efficiency and accuracy of reporting. However, there is still room for further improvements especially with respect to workflow, software functionality, and reporting performance. This study evaluates the use of the stand-alone software BatchBMD, which is used to generate a self-defined DXA report from a structured report (SR).

**Methods:** The BatchBMD software extracts data from DXA and body composition SRs stored in the Picture Archiving and Communication System (PACS) per the ISCD guidelines as stated in the 2019 Official Positions for adults. The software allows users to export searched DXA reports with a single click. To determine the efficiency and accuracy of the BatchBMD software, 500 random DXA SRs from January 2020 to March 2021 were selected. Subsequently, these cases were used to compare the BatchBMD software with the former web-based reporting system which was used at Taipei Municipal Wanfang Hospital. The reporting time was defined as the time from when a radiological technologist completed an exam and submitted the SR to PACS to when the reporting radiologist reviewed and approved the generated report and submitted it to the Radiology Information System (RIS) or Hospital Information System (HIS).

**Results:** 500 randomly selected DXA SRs were generated using GE Encore software and reviewed by referring physicians. Average reporting time was 10.8 min using the former reporting system, though only 6.7 min using the BatchBMD software. The reporting error rate was 1.8% using the former reporting system, though only 0.6% using the BatchBMD software. The most common error committed by the former reporting system was related to the inaccurate identification of the position of a compression fracture, while the most common error committed by the BatchBMD software was generating an inaccurate second digit after the decimal point when computing the patient's age or appendicular skeletal muscle index.

**Conclusion:** BatchBMD software improves both the accuracy and efficiency of structured DXA reporting.

P512

### DOES LOW LEVELS OF VITAMIN D INCREASE SEVERITY IN COVID-19 PATIENTS? ARGENTINE EXPERIENCE

M. L. García<sup>1</sup>, E. Giacoia<sup>2</sup>, A. P. Lisdero<sup>1</sup>, M. González Pernas<sup>1</sup>, M. G. Crueño<sup>2</sup>, F. N. Lopez<sup>2</sup>, M. Scarabino<sup>1</sup>, E. F. Areniello<sup>1</sup>, S. Bacigaluppi<sup>1</sup>, B. Freile<sup>2</sup>, E. Moratto<sup>2</sup>, V. Pollini<sup>3</sup>, J. Netel<sup>3</sup>, M. Espósito<sup>4</sup>, D. A. Halac<sup>4</sup>, G. A. Mumbach<sup>1</sup>

<sup>1</sup>Sanatorio Méndez, <sup>2</sup>Hospital Posadas, <sup>3</sup>Hospital Morón, <sup>4</sup>Sanatorio Anchorena, Buenos Aires, Argentina

**Objective:** Vitamin D (VD) plays a role in immune response. Recent data shows that low levels of VD could worsen COVID-19 outcomes. This study aimed to establish an association between VD levels among COVID-19 patients with clinical outcomes and inflammatory markers.

**Methods:** Prospective multicentric cohort study. Consecutively recruitment. Patients were grouped according admission status and level of VD [sufficient >30 ng/ml (VDS), insufficient 20-30 ng/ml (VDI), deficient <20 ng/ml (VDD)]. The variables evaluated were age, gender, oxygen mask requirement (O2r), mechanical ventilation (MV), pre-existing comorbidities, inflammatory markers, severity of COVID-19 measured by News Score.

**Results:** 363 patients were recruited (age 53±16), 59% male, 88% from total were hospitalized, whose VD levels were significantly lower than ambulatories (19±11 vs. 24.3±14 ng/ml p:0.006). The amount between groups was VDS (15%), VDI (27%), VDD (58%). VD levels correlated negatively with hospitalization days and evolution time (p:0.045-p:0.043). Severity of COVID-19 adjusted by comorbidities was linked to a lower VD status (p:<0.001) Also an association with pronation requirement among patients with lower VD levels (p: 0.008) was observed. O2r risk was elevated among VDI (OR 2.9 95%CI 1.3-7) and VDD (OR 3 95%CI 1.4-6), multiplying the odds in 2.6 and 3.7 in presence of 1 or more comorbidities with a higher need of ICU in VDD groups (OR 4.8 95%CI 1.2-20). A negative relation between VD levels, basal ferritin and LDH was described (p:0.018 and p:0.045).

**Conclusion:** Among COVID-19 hospitalized VD level was significantly lower than ambulatory patients. There is an association between low VD with a worse course of disease needing more days of hospitalization, thus lengthening the time of sickness. VDI and VDD group had severe forms of COVID-19. VDD presented a higher risk for ICU attention. Further studies are needed to emphasize the importance of adequate levels of VD to improve COVID-19 outcomes.

P513

### LOWER CALCIUM LEVELS AND CORRELATION WITH WORSE COURSE OF COVID-19

G. A. Mumbach<sup>1</sup>, E. Giacoia<sup>2</sup>, A. P. Lisdero<sup>1</sup>, M. González Pernas<sup>1</sup>, M. G. Crueño<sup>2</sup>, E. Moratto<sup>2</sup>, M. Scarabino<sup>1</sup>, E. F. Areniello<sup>1</sup>, S. Bacigaluppi<sup>1</sup>, M. Espósito<sup>3</sup>, B. Freile<sup>2</sup>, F. N. Lopez<sup>2</sup>, V. Pollini<sup>4</sup>, M. L. García<sup>1</sup>

<sup>1</sup>Sanatorio Méndez, <sup>2</sup>Hospital Posadas, <sup>3</sup>Sanatorio Anchorena, <sup>4</sup>Hospital Morón, Buenos Aires, Argentina

**Objective:** An osteometabolic phenotype is suspected in COVID-19 patients. Calcium levels (ca) could have repercussions on clinical course and therefore investigational lines should be open. This study aimed to determine if ca could influence clinical outcomes or inflammatory markers in SARS-CoV-2 patients.

**Methods:** Prospective multicentric cohort study. Consecutively recruitment. The variables evaluated were age, gender, oxygen mask requirement (O2r), mechanical ventilation (MV), pre-existing comorbidities, inflammatory markers, severity of COVID-19 measured by News Score. Patients were grouped according Vitamin D (VD) level [sufficient >30 ng/ml (VDS), insufficient 20-30 ng/ml (VDI), deficient <20 ng/ml (VDD)]. Hypocalcemia is considered when ca was lower of 8.4 mg/dl.

**Results:** 363 patients were recruited, aged 53±16, 59% male. 88% of patients were hospitalized, no differences in ca against ambulatory patients were found. 20% of patients presented hypocalcemia. Significant differences in ca between VDS, VDI and VDD was seen (9.13±0.4-8.9±0.42-8.7±0.7 p:<0.001) observing an increase of 0.014 mg/dl of ca for each point of ng/ml of VD ca correlated with severity of the disease, noticing a drop of 0.17 mg/dl in severe cases by News score, lower ca adjusted by comorbidities had an OR 1.74 95%CI 1.08-2.85 for severity. It was also associated with O2r p:0.041, prone position p:0.029, ICU attention p:0.005, MV p:0.002, days of MV p:0.007 and mortality p:0.001, having an OR for this last of 7.9 95%CI 2.6-24. A cut off value ≤ 8.3 mg/dl of ca was related with a HR:5 95%CI 1.4-17 p:0.013 for mortality.

**Conclusion:** Low ca is frequently seen in COVID-19 patients and could be associated with worse outcomes as O2r, MV, ICU attention and mortality, perhaps because of repercussions on neurological and vascular functions. Calcemia ≤8.3 mg/dl was significantly correlated with an increase in mortality. However further studies are need it to assess its real repercussion and treatment impact.



P514

**ACTIVITIES OF TURKISH OSTEOPOROSIS SOCIETY**Y. Kutsal<sup>1</sup>, U. Akarirmak<sup>2</sup>, A. Küçükdeveci<sup>3</sup>, J. Meray<sup>4</sup>, Y. Kirazli<sup>5</sup>, M. Saridogan<sup>2</sup>, O. Özdemir<sup>1</sup>, Z. Günendi<sup>4</sup><sup>1</sup>Hacettepe University Medical Faculty, Ankara, <sup>2</sup>Istanbul University - Cerrahpaşa, Cerrahpaşa Medical Faculty, İstanbul, <sup>3</sup>Ankara University, İbni Sina Medical Faculty, Ankara, <sup>4</sup>Gazi University Medical Faculty, Ankara, <sup>5</sup>Ege University Medical Faculty, İzmir, Turkey

The Society performed various activities to increase the awareness for the prevention of osteoporotic fractures and loss of independence.

The Turkish Osteoporosis Society is a national, neutral, nonprofit organization which aims to increase the standards in the field of "osteoporosis, osteoarthritis and musculoskeletal problems" including education of health professionals, patient care and treatment.

The society was founded in 1998 by the medical school faculty members who had been working in the field of osteoporosis aiming to create or make contributions for the development of technical, scientific and social facilities and it also cooperates with international and national institutions, organizations, foundations and societies for this purpose. The Turkish Osteoporosis Society is a member of International Osteoporosis Foundation (IOF). Education- In order to prevent osteoporotic fractures, one of the priorities of the society is education for the physicians and the other health professionals. Since its foundation the society performed various activities regarding the osteoporosis prevention, early diagnosis and effective treatment approaches not only for the health professionals but for the public as well. Pharmacologic treatment and nonpharmacologic approaches, also the chronic consequences and rehabilitation are considered as the important themes in these training programmes. Congresses, symposiums and courses are organized regularly. Also various conferences and panels are organized by the society in different cities of the country with the local tutors. Recently OSTEOACADEMY-Istanbul was organized online on October 10-11, 2020 and OSTEO2021 "Osteoporosis, Osteoarthritis and Musculoskeletal Pain Congress" will be held on digital platform on October 8-10, 2021. Other important events that should be mentioned are, Turkish Osteoporosis Society organized several Clinical Densitometry Certificate Courses, which were endorsed by IOF.

**Publications:** The Turkish Journal of Osteoporosis is the society's scientific publication, which has been published regularly since 1998 and is included in the Emerging Science Citation Index-ESCI. By the Scientific Council of the Turkish Osteoporosis Society several books were published for the physicians. Also various booklets were distributed free of charge for the public. Recently 3 newspapers (osteogazette) were prepared, published and distributed in the digital platform. A consensus report entitled; "Updated approach for the management of osteoporosis in Turkey" was published in 2020. A panel of multidisciplinary experts developed

a thorough review to assist clinicians in identifying osteoporosis and associated fracture risk patients, diagnosing the disease with the appropriate available diagnostic methods, classifying the disease, and initiating appropriate treatment. The panel expects to increase the awareness of this prevalent disease, decrease consequences of osteoporosis with corresponding cost savings and, ultimately, decrease the overall burden of osteoporosis and related fractures in Turkey. The Turkish Osteoporosis Society's epidemiologic, scientific publication on the prevalence of hip fracture in Turkey has led to the national data in country based FRAX and is used in our country for risk assessment.

**Public Education Activities:** Translations of IOF publications continue to be made and shared on the society's web page. Very recently a document entitled "Osteoporosis in the Covid 19 pandemic" was prepared by the board of Directors of the society.

**Virtual Osteoporosis Congress for the Public:** A two days Osteoporosis Congress was held free of charge for the public education in April 1-2, 2021 also. Important aspects of osteoporosis prevention, early diagnosis, lifestyle modification and awareness on risk factors were discussed in detail.

**World Osteoporosis Day:** Public conferences and BMD measurements for screening (calcaneal US) are performed free of charge every year on the World Osteoporosis Day in various cities of the country. Also press conferences and press releases are prepared. In 2020 a declaration was made by the board of directors of Turkish Osteoporosis Society focusing on: "Osteoporosis is a disease that should not be overshadowed during the COVID-19 pandemic".

**Social Responsibility Projects:** Turkish Osteoporosis Society planted 1000 pine saplings in 1998 as a social responsibility project. 20 years later the planted saplings became a magnificent pine grove. In order to attract interest and raise awareness, in 2020 "Break records, not bones" campaign was organized. The Society took place in the Guinness Book of World Records for the highest number of BMD screening in 24 h.

The most important project aiming at prevention of the disease and solution of fractures is the latest one entitled; "Keep on living with healthy bones". In this context all the members of the executive board of the society prepared videos about the risk factors, signs and symptoms, diagnosis, prevention, treatment of osteoporosis. Also nutrition, physical activity and the impact on quality of life are presented in those videos in the web site of the society. The activities are announced and shared not only by the web site, but Facebook and Instagram pages as well.

**FLS:** Fracture liaison service is another solution for post fracture care. In coordination of the IOF, training of the Turkish FLS team has been started with the representatives of our society. This programme is considered as an important goal is to increase the number of FLS centers throughout Turkey.

Since 1998, a considerable number of people have been reached through various activities carried out by the Society on different platforms and have contributed to the protection of this public health issue by raising awareness of disease prevention and early diagnosis.

P515

**KINETOTHERAPY IN KNEE OSTEOARTHRITIS IN TIMES OF PANDEMIC IN REPUBLIC OF MOLDOVA**A. Vizdoagă<sup>1</sup>, V. Salaru<sup>2</sup>, L. Mazur-Nicorici<sup>2</sup>, N. Loghin-Oprea<sup>2</sup>, M. Garabaiu<sup>2</sup>, M. Cebanu<sup>2</sup>, S. Vetrilă<sup>2</sup>, V. Sadovici-Bobeică<sup>2</sup>, T. Rotaru<sup>3</sup>, M. Mazur<sup>2</sup><sup>1</sup>University Rehabilitation Center, <sup>2</sup>Nicolae Testemitanu State University of Medicine & Pharmacy of the Republic of Moldova, <sup>3</sup>Institute of Cardiology, Chisinau, Moldova

**Objective:** Kinetotherapy is proposed as a method of nonpharmacological treatment of knee osteoarthritis (OA) by the EULAR and OARSI recommendations. Since the COVID-19 pandemic was declared by the WHO in March 2020, there have been different restrictions for outpatient rehabilitation clinics in the Republic of Moldova, from banning clinic visits, limited access, or the need for additional precautions for both patient safety and health professionals. This study aimed to assess the restrictions of the kinetotherapy rehabilitation program in patients with osteoarthritis during the pandemic.

**Methods:** We performed a qualitative study of patient attitude and the impact of COVID-19 restrictions on their rehabilitation program. The sample (n=28) consisted of patients with osteoarthritis that were admitted to outpatient rehabilitation facilities associated with University Rehabilitation Center. All patients underwent a standard kinetotherapy 10 d program between September 2020-March 2021. The patient's opinions were assessed in semi-structured interview by phone calls, after completing the kinetotherapy program. The qualitative findings of the impact of pandemic restrictions on patients with OA.

**Results:** In the study were included 28 patients (9 men and 19 women). The analysis revealed 9 areas concerning challenging reasons in patients with knee OA during the rehabilitation program: certain restrictions across the country determined by infection rate, fear for traveling in public transport or becoming infected during exercise program because they cannot keep a safe distance, high rate of abandon or poor adherence to kinetotherapeutic program due to patient infection or need to respect the self-isolation, preference of individual sessions rather than group sessions, increased rate of telerehabilitation, challenges in elderly to use gadgets, post-COVID symptoms caused some limitation for the intensity of the program, increased communication needs of patients.

**Conclusion:** Kinetotherapy rehabilitation is an important part of the management of knee osteoarthritis, its realization in pandemic conditions determined several challenges, as brought challenges but also opportunities.

P516

**FREQUENCY OF HYPOVITAMINOSIS D AND ASSOCIATIONS OF 25 (OH)D PLASMA CONCENTRATION WITH INDICATORS OF DISEASE ACTIVITY IN PATIENTS WITH RHEUMATOID ARTHRITIS**A. V. Rudenka<sup>1</sup>, A. E. Buglova<sup>1</sup>, T. D. Tyabut<sup>1</sup><sup>1</sup>Belarusian Medical Academy of Postgraduate Education, Minsk, Belarus

**Objective:** Vitamin D deficiency is an important environmental risk factor that influences the prevalence and severity of several autoimmune diseases, including rheumatoid arthritis (RA). The aim of this study was to determine the frequency of vitamin D deficiency and insufficiency in patients with RA and to establish associations of plasma concentration of 25(OH)D with indicators of disease activity.

**Methods:** 156 patients with RA were enrolled in the study: 139 women (mean age 60.1±13.7 y) and 17 men (mean age 58.8±13.4 y). Clinical status, level of rheumatoid factor, C-reactive protein, total vitamin D (25(OH)D), antibodies to cyclic citrullinated peptide (ACCP) were determined. RA activity was assessed using indices DAS28 (Disease Activity Score), SDAI (Simplified Disease Activity Index) and CDAI (Clinical Disease Activity Index).

**Results:** Average levels of 25(OH)D in the surveyed sample were 25.2±13.2 ng/ml. Normal 25(OH)D, its insufficiency and deficiency were observed in 47 (30.3%), 45 (28.7%) and 64 (40.7%) patients, respectively. The average level of 25(OH)D in patients taking vitamin D preparations was 29.1±10.7 ng/ml, in those who did not take it - 21.4±12.5 ng/ml (p=0.002). Patients with vitamin D deficiency had statistically significant higher levels of DAS28 (4.5±0.2), CDAI (48.7±6.6), SDAI (22.4±2.1) and tender joints count (13.6±1.5) in comparison with those who had vitamin D insufficiency (3.5±0.4; 14.3±1.9; 27.3±4.6; 8.1±1.3) and normal 25(OH)D (3.3±0.4; 15.1±2.1; 31.0±5.6; 9.5±1.6) respectively.

**Conclusion:** The results of the study indicate a high prevalence of hypovitaminosis D in patients with RA. One of the main causes of hypovitaminosis D deficiency in patients with RA is the low level of vitamin D supplementation - 39.1%. Vitamin D deficiency in RA patients are associated with higher scores of disease activity and number of tender joints. It is advisable to prescribe vitamin D as an adjunctive therapy in patients with active RA with a potential immunomodulatory purpose, as well as for the prevention and treatment of disorders of bone metabolism.

P517

# EFFECT OF A MULTICOMPONENT MEDICAL REHABILITATION PROGRAM ON PAIN AND FATIGUE IN PATIENTS WITH OSTEOARTHRITIS AND RHEUMATOID ARTHRITIS

N. V. Aleksandrova<sup>1</sup>, A. V. Aleksandrov<sup>1</sup>, V. A. Aleksandrov<sup>2</sup>, M. V. Nikitin<sup>3</sup>, R. A. Grekhov<sup>1</sup>

<sup>1</sup>Research Institute of Clinical and Experimental Rheumatology A.B. Zborovsky, Volgograd, <sup>2</sup>Volgograd State Medical University, Dept. of Hospital Therapy, Volgograd, <sup>3</sup>Sanatorium-Resort Complex "Vulan" - Scientific and Clinical Branch of the FSB Institution "National Medical Research Center for Rehabilitation and Balneology", Gelendzhik, Russia

**Objective:** To evaluate the short-term effectiveness of a multi-component rehabilitation program based on aerobic exercises in patients with osteoarthritis (OA) and rheumatoid arthritis (RA).

**Methods:** We observed 60 patients with OA (mean age 57.4 [49.3;71.1] y, duration of disease 14.8 [5.5;21.9] y) and 74 patients with RA (mean age 52.1±9.6 y, duration of disease 9.2 [4.8;13.6] y). The following rehabilitation technologies (RT) were used at the sanatorium-resort stage of medical rehabilitation (within 21 d): I - kinesitherapy (dosed walking from 30-60 min daily), II - hydrokinesitherapy (therapeutic swimming in a pool with seawater, 10-12 procedures for 30 min daily or every other day), III - low-frequency magnetotherapy (LFM) (from 0.3-100 Hz; up to 5 mT; 10 procedures for 30 min every other day), IV - a method of functional biocontrol with biofeedback (BFB therapy) (10-12 sessions of thermal and myographic BFB therapy, for 20-25 min daily). The intensity of pain in the affected joints (while walking) was assessed using the visual analogue pain scale (VAS Huskisson). The VAS<sub>0-100</sub> and Bristol Rheumatoid Arthritis Fatigue Numerical Rating Scales (BRAFF-NRS V2) were used to assess fatigue.

**Results:** The combined use of RT-I and RT-II in OA patients (n=24) resulted in a decrease in pain intensity (p=0.041) and fatigue on the VAS<sub>0-100</sub> scale (p=0.044), and in RA patients (n=28) resulted in decreased pain on the VAS scale (p=0.031), decreased fatigue on the VAS<sub>0-100</sub> (p=0.04), NRS severity and NRS-overcoming scales (p=0.008 and p=0.013, respectively). The combined use of RT-III and RT-IV in OA patients (n=20) reduced pain (p=0.017) and the number of swollen joints (p=0.044), and in RA patients (n=22) reduced NRS-overcoming (p=0.027). The use of a multicomponent treatment regimen (combination of all RTs) in the group of OA patients (n=16) showed a significant decrease in pain intensity (p=0.022), VAS<sub>0-100</sub> fatigue (p=0.021), number of painful joints (p=0.034), and in the group of patients with RA (n=24) resulted in a decrease in pain intensity on the VAS scale (p=0.018), number of painful joints (p=0.023), level of chronic fatigue on VAS<sub>0-100</sub> (p=0.002) and all components of BRAFF-NRS (NRS-degree of severity, p=0.009 NRS-overcoming, p<0.001; NRS-effect, p=0.033).

**Conclusion:** Dynamics of joint syndrome indexes, pain and chronic fatigue demonstrate the positive result of multicomponent treatment scheme on the basis of combination of aerobic exercises and methods of modern physiotherapy in patients with RA. It is possible to achieve significant changes in the studied parameters in patients with OA even with the isolated use of aerobic exercises (walking, swimming).

P518

# GENETIC VARIATION IN VITAMIN D METABOLISM IN THE MOTHER, RATHER THAN THE FETUS, IS ASSOCIATED WITH UMBILICAL CORD BLOOD 25-HYDROXYVITAMIN D STATUS: FINDINGS FROM THE MAVIDOS RANDOMIZED CONTROLLED TRIAL

R. J. Moon<sup>1</sup>, S. D'Angelo<sup>1</sup>, E. M. Curtis<sup>1</sup>, L. Cooke<sup>2</sup>, S. R. Crozier<sup>1</sup>, K. M. Godfrey<sup>1</sup>, N. J. Graham<sup>2</sup>, J. W. Holloway<sup>2</sup>, R. Lewis<sup>2</sup>, J. Cleal<sup>2</sup>, J. H. Davies<sup>3</sup>, H. M. Inskip<sup>1</sup>, C. Cooper<sup>1</sup>, N. C. Harvey<sup>1</sup>

<sup>1</sup>MRC Lifecourse Epidemiology Unit, University of Southampton, <sup>2</sup>Human Health & Development, Faculty of Medicine, University of Southampton, <sup>3</sup>Paediatric Endocrinology, University Hospital Southampton NHS Foundation Trust, Southampton, UK

**Objective:** Single nucleotide polymorphisms (SNP) in the vitamin D metabolism pathway are associated with serum 25-hydroxyvitamin D [25(OH)D] in adulthood. The fetus is dependent on transfer of 25(OH)D across the placenta. We assessed whether maternal and/or offspring SNPs in this pathway are associated with umbilical cord blood (UCB) 25(OH)D, and if antenatal vitamin D supplementation modifies the relationships.

**Methods:** MAVIDOS is a randomised placebo controlled trial of 1000 IU/d cholecalciferol from 14 weeks gestation until delivery. UCB 25(OH)D was assessed by tandem mass spectrometry. SNPs at rs12785878 (7-dehydrocholesterol reductase, *DHCR7*), rs10741657 (25-hydroxylase, *CYP2R1*), rs6013897 (24-hydroxylase, *CYP24A1*) and rs2282679 (vitamin D binding protein [DBP], *GC*) were genotyped in maternal and UCB blood. Associations between deseasonalised 25(OH)D generated by Fourier analysis and the SNPs were assessed by linear regression for each study group using an additive model ( $\beta$ =change in 25(OH)D per additional common allele). Models were adjusted for maternal age, triceps skinfold thickness and late pregnancy smoking as these were associated with UCB 25(OH)D.

**Results:** 329 mother-offspring pairs were included (165 cholecalciferol, 185 placebo). The cholecalciferol group had higher UCB 25(OH)D (mean 42.3 nmol/l; SD 13.1) than the placebo group (mean 28.6 nmol/l; SD 12.1), p<0.001. The SNP at rs22825679 (*GC*) in the mother was associated with UCB 25(OH)D in the cholecalciferol group ( $\beta$ =4.2 nmol/l per allele; 95%CI 1.0, 7.3). The effect of this SNP in the placebo group was smaller ( $\beta$ =1.9



nmol/l per allele; 95%CI -0.6, 4.4). The other maternal SNPs and all offspring SNPs were not associated with UCB 25(OH)D in either group.

**Conclusion:** Maternal rather than fetal genetic variation in GC, encoding DBP, is associated with fetal 25(OH)D. The effect of the SNP was larger in pregnancies supplemented with cholecalciferol, suggesting a possible effect of the SNP on DBP binding affinity or concentration, which becomes more important in a vitamin D replete state. Future work needs to establish the effect of this SNP on DBP levels in pregnancy, and the role of maternal DBP in transport of 25(OH)D to and across the placenta.

P519

### NECK PAIN AMONG HEALTH WORKERS IN PRIMARY HEALTH CARE

M. Kovačević<sup>1</sup>, R. Krasnik<sup>2</sup>, D. Vukliš<sup>1</sup>, J. Zvekić-Svorcan<sup>3</sup>, A. Mikov<sup>2</sup>, J. Lačokova Krasnikova<sup>4</sup>

<sup>1</sup>University of Novi Sad, Faculty of Medicine, Novi Sad, <sup>2</sup>University of Novi Sad, Faculty of Medicine, Institute of Child and Youth Health Care of Vojvodina, Novi Sad, <sup>3</sup>University of Novi Sad, Faculty of Medicine, Special Hospital for Rheumatic Diseases, Novi Sad, <sup>4</sup>Health Center Bač, Bač, Serbia

**Objective:** Neck pain (NP) has shown as prevalent and non-ignorable health problem among health professionals. The aim of this study was to examine the presence of NP, as well as the some factors associated with the NP among health workers in primary health care.

**Methods:** A prospective cross-sectional study was conducted in the period from April 1 to May 1, 2021 and included 31 respondents of both genders employed at the Health Center Bač, Serbia. Data were collected on current neck pain and its duration, years of work experience, professional qualification and daily time spent on computer and mobile phone. Degree of disability due to neck pain was assessed with neck disability index (NDI). EZR statistical software was used for statistical analysis.

**Results:** In the examined sample (n=31; female 83.9%), the average age of the respondents was 45±13.6 y, and the average work experience was 19.4±13.9 y. Most of the respondents had a high school degree (19 (61.3%)). Average daily time spent on computer and mobile phone was 6±2.8 h and 2.8±2.8 h, respectively. Current NP was reported by 12 (38.7%) subjects, and in most of them (9 (50%)) the duration of pain was up to 6 weeks. The average NDI score was 8.6±6.9, which indicates mild disability due to the NP. Statistically significant positive correlation was found between years of work experience and NDI score (r=0.401, p=0.025), but not between NDI score and age and daily time spent on computer/mobile phone.

**Conclusion:** Our study has shown the presence of NP in a significant number of respondents working in primary health care and that years of work experience positively correlate with disability

due to NP measured with NDI. It is necessary to identify and further analyze risk factors for NP in health workers, as well as to take prevention strategies.

P520

### WHY NOT MORE CONFIDENCE IN THE BONEMARKERS PUBLISHED IN THE GERMAN DVO GUIDELINES 2017?

C. Günther<sup>1</sup>, T. Blatter<sup>1</sup>, K. U. Hafer<sup>1</sup>, O. Nikiforov<sup>1</sup>, K. Ortlepp<sup>1</sup>

<sup>1</sup>Orthopädische Fachklinik, Schwarzbach, Germany

**Objective:** In an earlier release (Osteoporose & Rheuma aktuell 1/03, 12-13) we could show, that in bisphosphonates therapy – in contrast to international literature with a 3-6 months examination interval after starting the treatment - short time monitoring of the bone marker is possible already after two weeks. In the updated DVO guidelines (valid since 28 Jan 2018) the bone markers are only given the status of a “single case decision”. Following our own clinical experiences, the bone markers are underestimated and used too seldom in spite of right and/or wrong application. This article is willing to induce a “PRO”.

**Methods:** Included were 31 patients (26 female, 5 male, all age of 67 y) with an LWS T-score < -2.5 and the related risk factors following the DVO guidelines. The patients were treated, as a basic therapy, with 800 mg calcium/d and 1000-1200 mg vitamin D /d and a weekly dose of 35 mg risedronate. As a bone marker the β-CrossLaps with the Elecsys β-CrossLaps Test (Roche Diagnostics GmbH) were taken before the beginning of the therapy in the morning between 8 and 9 and again 14 d after the start. It is important that the time of the taking of the blood sample must not differ more than 15 min ± in comparison to the first blood sample. The results have been intensely discussed with the patient, the drop of CrossLaps was visualized and the effect of the treatment was demonstrated obviously and profoundly. One year after the start of the treatment, the patients were contacted on the phone and questioned about their compliance.

**Results:** Compliance data could be collected from 83.9% (i.e., 26 out of 31). Five patients reported that their family doctor stopped the treatment. But after twelve months 21 out of the remaining 26 (80.8%) continued with bisphosphonate therapy.

**Conclusion:** In spite of extremely low persistence rates in the Grand I-Study (Hadjilov et al. Osteoporos Int 2012;23:223) – 9,6% with daily, 28,4% with weekly und 29,4% with monthly oral intake of bisphosphonates – our persistence rate is remarkably higher with 80.8%. This shows that the application of bone markers in short time monitoring after 2 weeks – along with the right application and plausible explanation of the optimistic results to the patient – is a simple but effective instrument in the leading of patients on the way to an improved compliance. Therefore we encourage all our osteological colleagues to make more generous



use of the bone markers than advised in the guidelines 2017, but always with strict control of blood samples (taken at the same time) before and after the start of the treatment. This could under special circumstances be cofinanced by the patient who will be thankful for a positive development of his wellbeing. Always remember: only the osteoporosis medication – and we have a lot of great medicines – that is really taken by the patient can make the best effect.

P521

### SERUM MICRORNAS IN OSTEOPOROTIC FRACTURE AND OSTEOARTHRITIS: A GENETIC AND FUNCTIONAL STUDY

C. Pertusa<sup>1</sup>, J. J. Tarín<sup>2</sup>, A. Cano<sup>3</sup>, M. A. García Pérez<sup>4</sup>, D. Mifsut<sup>5</sup>

<sup>1</sup>INCLIVA Health Research Institute, Valencia, <sup>2</sup>Dept. of Cellular Biology, Functional Biology and Physical Anthropology, University of Valencia, Burjassot, <sup>3</sup>Dept. of Pediatrics, Obstetrics & Gynecology, University of Valencia, Valencia, <sup>4</sup>Dept. of Genetics, University of Valencia, Burjassot, <sup>5</sup>Orthopedic Surgery and Traumatology, Clinic Hospital, INCLIVA Institute of Health Research, Valencia, Spain

**Objective:** The rising incidence of bone pathologies such as osteoporosis and osteoarthritis is negatively affecting the functional status of millions of patients worldwide. The genetic component of these multifactorial pathologies is far from being fully understood, but in recent years several epigenetic mechanisms involved in the pathophysiology of these bone diseases have been identified. The aim of the present study was to compare the serum expression of four miRNAs in women with hip fragility fracture (OF group), osteoarthritis requiring hip replacement (OA group) and control women (Ctrl group).

**Methods:** Serum expression of miR-497-5p, miR-155-5p, miR-423-5p and miR-365-3p was determined in a sample of 23 OA women, 25 OF women and 52 Ctrl women.

**Results:** Data shown that women with bone pathologies have higher expression of miR-497 and miR-423 and lower expression of miR-155 and miR-365 than control subjects. Most importantly, miR-497 was identified as an excellent discriminator between OA group and control group (AUC: 0.89,  $p < 0.000$ ) and acceptable in distinguishing from the OF group (AUC: 0.76,  $p = 0.002$ ).

**Conclusion:** Our data suggest that circulating miR-497 may represent a significant biomarker of OA, a promising finding that could contribute towards future early-stage diagnosis of this disease. Further studies are required to establish the role of miR-155, miR-423 and miR-365 in bone pathologies.

**Acknowledgments:** This work was supported by grant PI17/01875 from the Instituto de Salud Carlos III (Madrid, Spain), including funds from the EU FEDER Program.

P522

### IMPACT OF COVID-19 ON OSTEOARTHRITIS OF KNEE

A. Kaur<sup>1</sup>, M. Mitra<sup>1</sup>, D. Wadhwa<sup>1</sup>

<sup>1</sup>MVP's College of Physiotherapy, Nashik, India

**Objective:** COVID-19 is a pandemic disease which affected huge number of people all over the world. Many post COVID patients experienced exacerbated musculoskeletal symptoms especially those who had preexisting problems. Osteoarthritis [OA] of knee is a common problem that exists among the elderly because of which there is a functional limitation. COVID-19 adds on to the disability and impairment. The purpose of this study was to evaluate pain, functional impairment, and daily activity in post COVID-19 patients with knee OA. To check if there was any co-relation between COVID-19 functional status and knee function in patients with OA

**Methods:** The study included 36 patients who got infected with COVID-19 and with knee OA. They were classified based on Kellgren-Lawrence criteria and graded accordingly. Data was collected from patient telephonically during the first week of isolation and also on the 4th week when they visited the specialised post COVID rehabilitation opd. Patients rated their pain level on the basis of a visual analog scale (VAS) and completed WOMAC and the post COVID-19 functional status scales. Statistical tool: The collected data was compared for the first and the fourth week for significance. Karl Pearsons test for correlation was used to find the correlation between WOMAC and post COVID-19 functional status index.

**Results:** VAS and WOMAC scores increased significantly after COVID-19 infection. A positive co-relation existed between WOMAC and post COVID-19 functional status index.

**Conclusion:** COVID-19 has had a significant impact on pain, joint function and physical function in patients who already had OA of knee.

P523

### OSTEOPOROTIC FRACTURES IN PATIENTS WITH RHEUMATOID ARTHRITIS IN LONG-TERM PROSPECTIVE OBSERVATIONAL STUDY

P. Kozhevnikova<sup>1</sup>, I. Dydykina<sup>1</sup>, P. Kovalenko<sup>1</sup>, M. Blank<sup>1</sup>, A. Lila<sup>1</sup>

<sup>1</sup>V.A. Nasonova Research Institute of Rheumatology, Moscow, Russia

**Objective:** To determine the frequency and localization of osteoporotic fractures in rheumatoid arthritis (RA) patients with RA occurred during the long-term prospective observational study.

**Methods:** The study included 80 woman with RA, aged 40-80 y. Mean duration of observation  $8.23 \pm 1.3$  y; mean age  $62.5 \pm 8.7$  y; the mean RA duration  $23.2 \pm 10.1$  y; 74 (92.5%) were in menopause, mean age at menopause  $47.9 \pm 4.8$  y. All patients took a clinical examination, assessment of the anamnestic data, X-ray of hands, feet, thoracic and lumbar spine and DXA of lumbar spine and femoral neck.

**Results:** During the follow-up period, the number of patients with fractures was increased from 22 (27.5%) to 36 (45%). There were occurred 25 new cases of osteoporotic fractures: 6 patients with re-fractures and 14 patients with a fracture for the first time. We divided patients into two groups: group I - 20 patients with fractures, group II - 60 patients without fractures, occurred during the follow-up period. The mean age, disease duration, activity of RA and the number of patients with history of prior fracture was not significantly different in groups. The number of patients with BMD corresponding to OP at baseline was not significantly different between groups: 12 (60%) vs. 23 (38%) ( $p=0.08$ ), while in dynamics there was a significant difference: 16 (80%) vs. 30 (50%) ( $p=0.01$ ), respectively. During the follow-up period glucocorticoid therapy (GC) had 16 (80%) patients in group I vs. 28 (47%) in group II ( $p=0.01$ ). Localizations of fractures: wrist - 6 (24%), ankle - 5 (20%), vertebrae - 4 (16%), anatomical neck of the humerus - 4 (16%), others - 6 (24%).

**Conclusion:** Over the 8-y follow-up period, the number of patients with osteoporotic fractures has increased by 17.5%. Every 4th patient had a fracture. Patients with fractures were significantly more likely to take GC and had OP.

## P524

### EFFECT OF CLOSE KINETIC CHAIN EXERCISES ALONG WITH BRISK WALKING ON QUALITY OF LIFE IN PATIENT WITH POSTMENOPAUSAL OSTEOPOROSIS

M. Mitra<sup>1</sup>, A. Kaur<sup>1</sup>

<sup>1</sup>MVP's College of Physiotherapy, Nashik, India

**Objective:** Osteoporosis is a systemic skeletal disease characterised by a low BMD and increased risk of fractures. The quality of life is closely related to the presence of osteoporosis and its complications as fractures. Menopausal women represent the most important segment of population at risk. Treatment of these patients has to be comprehensive and include both, pharmacological and non-pharmacological interventions. The aim of this study was to investigate how close kinetic chain exercises and brisk walking for osteoporosis in the duration of 6 weeks can impact quality of life in patients with postmenopausal osteoporosis.

**Methods:** A randomised single-blind randomised controlled prospective trial study, which included 54 women with postmenopausal osteoporosis diagnosed. Exclusion criteria were secondary osteoporosis, lumbar sciatica, pacemaker, cardiorespiratory

instability, arrhythmia, malignant disease, neurological diseases, severe knee OA, people involve in any physical exercises in past 6 months. Patients were randomly assigned to two groups: the first group of patients in exercises group, the second group is control group of patients who did not practice exercises. Close kinetic exercises were practiced 4 times a week and brisk walking was advised for 30 min 4 times in week. Quality of life was determined with a specific questionnaire Qualeffo-41.

**Results:** Mean age of Patients were  $60.6 \pm 6.7$  y; The results showed, significant statistical difference in terms of pain, physical activity, social life, the perception of own health between the groups ( $p<0.0001$ ).

**Conclusion:** Patients who practice close kinetic chain exercises and brisk walking for osteoporosis have a significantly better quality of life than patients who do not perform exercises.

## P525

### REGIONAL FEATURES OF AGE-RELATED LOSS OF BONE MINERAL DENSITY ACCORDING TO DXA

A. Adamenka<sup>1</sup>, E. Rudenka<sup>2</sup>

<sup>1</sup>Republic Clinical Medical Center, Zhdanovich agro-town,

<sup>2</sup>Belarusian State Medical University, Minsk, Belarus

**Objective:** To identify regional features of age-related loss of BMD according to the results of DXA in elderly and old women.

**Methods:** The BMD was assessed with DXA by Lunar Prodigy Advance, GE, USA, 2018 in the lumbar spine (LS) (BMD L1-L4, g/cm<sup>2</sup>; T-score L1-L4, standard deviation (SD)) and femoral neck (FN) (BMD region total, g/cm<sup>2</sup>; T-score region total, SD). Vertebral fracture assessment in the lateral projection carried out as necessary. Statistical processing was performed using the program Statistica 10.0 (Stat Soft Inc., USA).

**Results:** There were examined 27 postmenopausal women ( $n=27$ ) aged 70 y and older (mean age  $75.3 \pm 4.5$  y). The initial BMD of all participants on average were  $0.96 (\pm 0.15)$  in the LS,  $0.75 (\pm 0.09)$  in the FN of the left femur,  $0.73 (\pm 0.07)$  g/cm<sup>2</sup> in the FN of the right femur. The rate of involutive bone mass reduction was estimated based on the results of dynamic changes in BMD at 12, 24, and 36 months. After 36 months of follow-up the BMD of the LS significantly decreased by 0.5% ( $p=0.001$ ), the BMD of the FN of the left femur significantly decreased by 5.2% ( $p=8.2 \times 10^{-7}$ ), and the BMD of the FN of the right femur significantly decreased by 5.9.% ( $p=0.0003$ ). The average rate of decrease in BMD in women with osteoporosis was 0.17% per year in the LS, 1.97% in the FN of the left femur and 1.73% in the FN of the right femur.

**Conclusion:** The difference in the rate of decrease in the BMD of the lumbar spine and the proximal femurs was associated with the presence of artifacts that overestimate the value of the average BMD of the lumbar spine and have a false positive effect on the change in BMD in dynamics (vertebral deformities - 37.0%;

degenerative-dystrophic changes leading to additional pathological ossification - 40.8%). It is preferable to evaluate the effectiveness of medical treatment of osteoporosis based on the results of BMD of the proximal femurs, which will allow you to get the correct result and reduce the time of examination of elderly and senile patients.

## P526

### BONE MINERAL DENSITY IN POSTMENOPAUSAL WOMEN WITH TYPE 2 DIABETES MELLITUS WITH AND WITHOUT DIABETIC NEPHROPATHY

S. Monov<sup>1</sup>, R. Shumnalieva<sup>1</sup>, D. Monova<sup>2</sup>

<sup>1</sup>Medical University - Sofia, Dept. of Rheumatology, <sup>2</sup>Medical University - Sofia, Medical Institute - MIA, Sofia, Bulgaria

**Objective:** Diabetes mellitus and osteoporosis are both common human diseases. Diabetic nephropathy (DN) is characterized by the presence of pathological quantities of urine albumin excretion, diabetic glomerular lesions, and loss of glomerular filtration rate in diabetics. Little evidence has been reported on relationships between BMD and albuminuria. The aim of this study is to compare the BMD in postmenopausal women with type 2 diabetes mellitus (T2DM) with and without DN.

**Methods:** We retrospectively analysed the BMD of the lumbar spine and femur using DXA in 84 postmenopausal women with T2DM with (39) and without (45) DN. The serum levels of calcium, phosphorus, total alkaline phosphatase, and urine albumin excretion were measured in all participants. Diagnosis of albuminuria was based on albumin-creatinine ratio.

**Results:** Age, BMI and time since menopause were not significantly different between the two groups. The T-scores of basal BMD at L4 were significantly lower in patients with DN ( $-0.94 \pm 0.40$ ) compared to patients without nephropathy. No significant differences in serum creatinine were detected between two groups of patients. Our data suggest that ACR was negatively associated with lumbar spine and femoral neck BMD.

**Conclusion:** Our results suggest that postmenopausal women with DN have a lower BMD and are at increased risk of osteoporosis in the lumbar spine compared with postmenopausal women without DN. ACR was negatively associated with lumbar spine and femur neck BMD. One of the explanations that have been proposed for the association between albuminuria and osteoporosis is that albuminuria is associated with reduced bone blood flow, resulting in a decreased rate of bone remodeling and the development of osteoporosis.

## P527

### QUANTIFYING THE EMPLOYER BURDEN OF PERSISTENT MUSCULOSKELETAL PAIN AT A LARGE EMPLOYER IN THE UK: A NON INTERVENTIONAL, RETROSPECTIVE STUDY OF ROLLS-ROYCE EMPLOYEE DATA

D. Roomes<sup>1</sup>, L. Abraham<sup>2</sup>, R. Russell<sup>2</sup>, C. Beck<sup>2</sup>, K. Halsby<sup>2</sup>, R. Wood<sup>3</sup>, M. O'Brien<sup>3</sup>, L. Massey<sup>3</sup>, K. Hart<sup>3</sup>, K. Burton<sup>4</sup>

<sup>1</sup>Rolls-Royce plc, Derby, <sup>2</sup>Pfizer Inc., Tadworth, <sup>3</sup>Adelphi Real World, Bollington, <sup>4</sup>University of Huddersfield, Huddersfield, UK

**Objective:** Quantify the employer burden of persistent musculoskeletal (MSK) pain to a large UK employer (Rolls-Royce [RR]).

**Methods:** A retrospective, longitudinal cohort study of RR UK employees indexed (Jan 2016 to Dec 2018) on their first MSK-related occupational health (OH) management referral (a proxy for persistent MSK pain) using linked OH and human resources data. Cases were matched 1:1 to controls without persistent MSK pain on birth year, gender and job role. All-cause and MSK-related OH referrals, sickness absence days and costs of absences (direct + indirect) were compared between cases and controls at 12 months' follow-up (FU).

**Results:** 2382 matched case-control pairs were analysed (mean age: 46 y; male: 82%; works/staff/management: 50%/38%/12%; mean FU: 31 months). Most (78%) cases were indexed on back pain (36%), lower limb disorder (23%) or upper limb disorder (20%). Significant differences in outcomes were observed between cases and controls within 12 months' FU (Table).

Table. OH referrals, sickness absences and costs of absences for cases and controls within 12 months' FU

Mean (SD) [total] – unless otherwise stated	Cases	Controls
<b>OH Referrals</b>		
MSK-related	1.2 (0.5) [2,902]	-
≥1 additional referral post-index, n (%)	439 (18)	-
All-cause	1.3 (0.6) [3,136]	0.1 (0.3) [135]
≥1 referral, n (%)	2382 (100)	118 (5)
<b>Sickness absence days</b>		
MSK-related	16.5 (45.2) [39,200]	-
≥1 sickness absence, n (%)	807 (34)	-
All-cause	34.6 (62.1) [82,341]	8.2 (31.2) [19,628]
≥1 sickness absence, n (%)	1774 (74)	1049 (44)
<b>Costs of absences (£K)</b>		
MSK-related	21 (59) [50,099]	-

All-cause	44 (81) [105,567]	11 (45) [25,676]
P<0.0001 for all comparisons		

**Conclusion:** Cases took significantly more sickness absence days vs. matched controls, resulting in higher costs to RR. Annual costs of absences equated to £105 million (~82,000 days lost) for cases; 47% of which were MSK-related. These unique data provide evidence of the employer burden caused by persistent MSK pain.

P528

### CORELATION BETWEEN TMJ JOINT DYSFUNCTION AND CERVICAL SPINE DYSFUNCTION

G. Msp<sup>1</sup>, M. Mitra<sup>1</sup>, A. Kaur<sup>1</sup>, K. Sanghvi<sup>1</sup>

<sup>1</sup>MVP's College of Physiotherapy, Nashik, India

**Objective:** The temporomandibular joint is directly related to the cervical and scapular region. This study aimed to assess any possible relationship between temporomandibular dysfunction (TMD) and cervical spine dysfunction (CSD).

**Methods:** Total 30 volunteers, 15 volunteers that were presenting clinical signs and symptoms of TMD and 15 volunteers that were presenting CSD according to Temporomandibular Dysfunction Assessment Questionnaire and Neck disability Index respectively were selected for this study. Individuals having TMD were assessed for any signs and symptoms of CSD using Neck disability Index, Index of Cervical Mobility and VAS score. Individuals having CSD were assessed for TMD using Temporomandibular Dysfunction Assessment Questionnaire, Mandibular Mobility Index and VAS score.

**Results:** Correlation test ( $p \leq 0.05$ ) was performed to verify the relationship between CSD and TMD. The increase in TMD signs and symptoms was accompanied by increase in CSD severity.

**Conclusion:** The result of this study concluded that TMD is accompanied with CSD and vice versa.

P529

### EFFECTS OF SENSORY MOTOR STIMULATION AND KINESIO TAPING ON DROOLING IN SPASTIC CEREBRAL PALSY CHILDREN

A. Kaur<sup>1</sup>, R. Kaur<sup>2</sup>, M. Mitra<sup>1</sup>

<sup>1</sup>MVP's college of Physiotherapy, Nashik, <sup>2</sup>Kaur Physiotherapy Rehabilitation Center, Hyderabad, India

**Objective:** Oral motor and oral sensory issues are frequently observed in children with cerebral palsy. Delay in feeding, failure to thrive, management of oral secretions, phonological and articulation development is often impaired. Purpose to study the effect of physiotherapy intervention to control drooling. This study is con-

ducted to assess the effectiveness of sensorimotor stimulation and kinesiotaping in controlling drooling in children with cerebral palsy.

**Methods:** Children diagnosed with cerebral palsy and satisfying the inclusion criteria was selected for the study, severity and frequency of drooling (Thomas-Stonells drooling scale) drooling quotient and drooling impact scale was used as outcome measure.

**Results:** Paired t-test of significance will be used to estimate the difference in the drooling severity and frequency, drooling quotient and impact of drooling before and after treatment. There was a significant reduction in drooling frequency, severity, drooling quotient and drooling impact scale post treatment. As the p value was  $< 0.0001$

**Conclusion:** The study concludes that sensory motor stimulation, kinesiotaping and activities are effective in controlling drooling in cerebral palsy children.

P530

### IMPACT OF RHEUMATOID ARTHRITIS ACTIVITY AND ANTICYCLIC CITRULLINATED PEPTIDES IN BONE MINERAL DENSITY DYNAMICS DURING THE 12 MONTHS THERAPY OF DENOSUMAB

P. Kovalenko<sup>1</sup>, I. Dydykina<sup>1</sup>, A. Smirnov<sup>1</sup>, E. Nasonov<sup>1</sup>

<sup>1</sup>V.A. Nasonova Research Institute of Rheumatology, Moscow, Russia

**Objective:** As it known the inflammation in rheumatoid arthritis (RA) leads to local and generalized bone loss. The use of such new antiresorptive drug as denosumab (monoclonal antibody that binds RANKL) decreases an osteoclast activity, increases BMD and also has potential influence on erosive process in RA. The aim of this study was to evaluate the effects of denosumab on BMD depending on RA activity and anticyclic citrullinated peptides (aCCP) positivity/negativity.

**Methods:** 66 postmenopausal women (mean age  $59.6 \pm 7.4$ ) with RA (mean duration  $17.7 \pm 10.4$  y) and osteoporosis (OP) received s/c denosumab 60 mg every 6 months pro 12 months. At baseline and after 12 months it was carried out DXA at 3 sites: lumbar spine (L1-L4), hip neck (HN) and distal forearm (DF) and x-ray of hands and feet (Sharp/van der Heijde score). RF-positive were 47 (72%), aCCP – 48 (74%) patients. 34 (49%) patients have continued glucocorticoids (GC). In previous studies we showed the significant evaluation of BMD in general (regardless of GC intake), the influence of different factors on BMD dynamics. The present study analyzed the BMD change in aCCP  $\pm$  groups of patients and with different RA activity levels. The mean DAS-28 was  $4.01 \pm 1.02$  and it was not changed significantly after 1 y of therapy. According to DAS-28, 5 (7.6%) patients had 0 level of RA activity, 7 (10.6%) – 1, 45 (68.1%) – 2 and 9 (13.6%) – 3, respectively.



**Results:** After therapy it was noted that in group of patients with RA activity level 0 it was not any significant changes of BMD, probably because of small number of group. In group 2 (RA activity level 1) BMD in L1-L4 was significantly increased ( $p=0.02$ ). In group 3, the largest group of patients in this study, the significant increase of BMD ( $p<0.05$ ) was noted in L1-L4, hip neck and total hip. In group 4 the significant increase of BMD was noted in L1-L4 and total hip. In aCCP "+" patients the mean BMD was significantly increased ( $p<0.05$ ) in L1-L4, hip neck, total hip and distal forearm while in aCCP "-" patients the mean BMD was significantly increased only in L1-L4 and total hip.

**Conclusion:** Our study showed that the increase of BMD after the 12 months of denosumab therapy did not depend on initial RA activity. The increase of BMD in L1-L4 was noted in patients with low, moderate and high activity, as well as in hip in patients with moderate and high activity. Also it was shown that the increase of BMD in main sites of the skeleton is observed regardless of aCCP positivity/negativity.

P531

### FRAX BASED OSTEOPOROSIS MANAGEMENT PATHWAY FOR UKRAINIAN MEN

V. Povoroznyuk<sup>1</sup>, H. Johansson<sup>2</sup>, N. Grygorieva<sup>1</sup>, M. Lorentzon<sup>3</sup>, A. Musienko<sup>1</sup>, N. C. Harvey<sup>4</sup>, E. V. McCloskey<sup>5</sup>, E. Liu<sup>2</sup>, J. A. Kanis<sup>5</sup>

<sup>1</sup>D. F. Chebotarev Institute of Gerontology NAMS of Ukraine, Kyiv, Ukraine, <sup>2</sup>Sahlgrenska Osteoporosis Centre, Institute of Medicine, University of Gothenburg, Gothenburg, Sweden, <sup>3</sup>Mary McKillop Institute for Health Research, Australian Catholic University, Melbourne, Australia, <sup>4</sup>MRC Lifecourse Epidemiology Unit, University of Southampton, Southampton, UK, <sup>5</sup>Centre for Metabolic Bone Diseases, University of Sheffield Medical School, Sheffield, UK

**Objective:** Ukrainian FRAX model for Ukraine was launched in 2016 and intervention thresholds for women were published in 2019. The impact of intervention thresholds for Ukrainian men was not explored. The aim of this research was to assess the impact of the use of these thresholds in Ukrainian men.

**Methods:** 653 men (age  $60.5 \pm 11.8$ , range 40-88 y) referred as outpatients to the Dmitry F. Chebotarev Institute of Gerontology of the National Academy of Medical Sciences of Ukraine for the evaluation of skeletal status were studied. The 10-y probabilities of hip fracture and a major osteoporotic fracture were calculated using the Ukrainian FRAX model (version 4.2) with and without femoral neck BMD.

**Results:** 174 of 653 men (26.6%) had a prior fragility fracture and would be eligible for treatment on this basis. From the 479 males without a prior fracture, 447 were at low risk (68.5%) and were not be eligible for further assessment of fracture probability. The intermediate category of risk comprised 32 men (4.9%) in whom FRAX was recalculated with the inclusion of femoral neck BMD.

Of these 23 were categorized at low risk (3.5%) and 9 at high risk (1.4%). Fracture probability calculated with BMD was higher than that without BMD. The disposition of the cohort in men was markedly different from that for women. 28% of men and 57% of women were eligible for antiosteoporotic treatment. The eligibility for treatment by FRAX alone was higher in women than in men (6.1 vs. 1.4% had a prior fragility fracture and were eligible for treatment). The requirement for BMD testing was also higher in women than in men (18.3 vs. 4.9%, respectively).

**Conclusion:** We have examined the assessment of fracture risk in Ukrainian men and compared their disposition with that of a referral population of women. 27% of men referred for skeletal assessment had a prior fracture that categorized eligibility for treatment, and this characteristic was less frequent than in Ukrainian women (51% of referrals).

P532

### BURDEN ON CAREGIVERS OF HIP FRACTURE SURVIVORS: A SYSTEMATIC REVIEW

H. K. Dias<sup>1</sup>, N. Rathnayake, T. Abeygunasekara<sup>1</sup>, S. Lekamwasam<sup>2</sup>

<sup>1</sup>Dept. of Nursing, Faculty of Allied Health Sciences, University of Ruhuna, <sup>2</sup>Dept. of Medicine, Faculty of Medicine, University of Ruhuna, Galle, Sri Lanka

**Objective:** To determine the caregivers' (CG)' burden of hip fracture (HF) patients and factors associated with CG burden.

**Methods:** A systematic search was done in PubMed using the terms "caregiver burden" or "caregiver outcome" or "caregiver stress" and "hip fracture" or "femur fracture" or "osteoporotic fracture". Original studies (English language) on CG burden of HF patients published during last 10 y were selected. Review articles, meta-analyses and case reports were excluded and we followed the PRISMA guidelines.

**Results:** The original search resulted in 100 publications and based on selection criteria 11 studies (3 qualitative and 8 quantitative) were considered for this study. Quantitative studies have used different tools such as CG burden questionnaire, Zarit burden interview, SF-36 survey and pain scales. The majority of primary CG were either spouse or daughter of the patient and unemployed. CG had experienced moderate to high level of physical and emotional burden and limitations of personal freedom, emotional stability and self-efficacy. They have reported physical pain, limited rest and sleep, lack of social support and exposure to information and high medical costs. CG burden has shown significant associations with system related factors (health care cost for treatments and palliative care, available health facilities, social support), patient related factors (existing comorbidities, functional status and activities of daily living, cognitive status) and CG related factors (age, self-efficacy and lack of exposure to information).

**Conclusion:** CG of HF survivors report moderate to high level of burden with limitations of physical, emotional and general health status. CG burden is associated with a multitude of factors related to system, patient and CG.

P533

### HOW OFTEN DO MEDICAL DOCTORS ASSESS CALCIUM AND PHOSPHATE LEVEL IN THE BLOOD SERUM IN PATIENTS WITH VITAMIN D DEFICIENCY?

N. N. Katamadze<sup>1</sup>, A. S. Shutova<sup>1</sup>, H. R. Fargieva<sup>1</sup>, V. S. Glazieva<sup>2</sup>, A. Yu. Zhukov<sup>1</sup>, A. A. Povaliaeva<sup>1</sup>, E. A. Pigarova<sup>1</sup>, L. K. Dzeranova<sup>1</sup>, I. M. Belovalova<sup>1</sup>, I. I. Dedov<sup>1</sup>

<sup>1</sup>Endocrinology Research Centre, <sup>2</sup>Lomonosov Moscow State University, Moscow, Russia

**Objectives:** Vitamin D is required to maintain a normal blood level of calcium and phosphate, which are of crucial importance for normal bone mineralization, muscle contraction, nerve conduction, and general cellular function in all cells of the body. Vitamin D deficiency causes a decrease in the efficiency of intestinal calcium and phosphorus absorption. Adequate levels of calcium and phosphate ensure optimum PTH secretion, which in turn, stimulates the production of 1,25 dihydroxyvitamin D3 by the kidney. The aim of our survey was to find out the level of awareness on the need for assessment of calcium and phosphate in patients with vitamin D deficiency among healthcare providers.

**Methods:** We conducted a national online-based survey to collect the data on how frequently medical doctors evaluate calcium status by measuring total calcium, ionized calcium, calcium corrected for albumin and phosphate levels in patients with vitamin D deficiency. The survey included 704 physicians who specialized in various fields. Endocrinologists accounted for 80% of them.

**Results:** According to the survey results, the rate of physicians who measure total serum calcium, ionized calcium, calcium corrected for albumin and phosphate level in patients with vitamin D deficiency accounted for 70.5%, 69.1%, 41.9%, and 65.6% of medical doctors respectively. The survey revealed that 92.3% of all questioned endocrinologists assess calcium and phosphate metabolism.

**Conclusion:** Sequestration of the assessment of the parameters of calcium-phosphorus metabolism before the isolated determination of the level of vitamin D, including in the dynamics of its correction, is dangerous due to the potential underdiagnosis of various forms of hyperparathyroidism and the potentiation of hypercalcemia. Our survey revealed that endocrinologists assess calcium and phosphate levels in the blood serum more frequently in compare with other medical professionals. Raising awareness among health care providers in various fields on this matter will

prevent mismanagement in terms of bone and mineral metabolism and will assist to prevent deleterious effects on patient's wellbeing.

P534

### EFFICIENCY OF PHARMACOTHERAPY FOR LOWER JAW FRACTURES

K. Kaladze<sup>1</sup>, O. Poleshchuk<sup>2</sup>, S. Kulanthaivel<sup>3</sup>, V. Kaliberdenko<sup>4</sup>, K. Balasundaram<sup>5</sup>, O. Galkina<sup>6</sup>

<sup>1</sup>Dept. of Dental Surgery and Maxillofacial Surgery, V.I. Vernadsky Crimean Federal University, Simferopol, Russia, <sup>2</sup>Dept. of Propaedeutic of Dentistry, V.I. Vernadsky Crimean Federal University, Simferopol, Russia, <sup>3</sup>Divisional Health (Zone - 6, Division - 67), Greater Chennai Corporation - Public Health and Medical Services Dept., Chennai, India, <sup>4</sup>Dept. of Internal medicine No.2, V.I. Vernadsky Crimean Federal University, Simferopol, Russia, <sup>5</sup>Dept. of Internal Medicine No.2, V.I. Vernadsky Crimean Federal University, Simferopol, Russia, <sup>6</sup>Dept. of Propaedeutic of Dentistry, V.I. Vernadsky Crimean Federal University, Simferopol, Russia

**Objective:** Acute maxillofacial trauma, accompanied by fractures of the lower jaw, more or less pronounced damage to the surrounding soft tissues, blood vessels and nerves, affects the entire body of the victim. Bone densitometry methods allow quantitatively, with high accuracy (from 2-5%) to determine the loss of bone mass in various parts of the skeleton at the stages of a person's life. This study aimed to study the structural and functional state of bone tissue in patients with mandible fracture and the effect of osteogenon preparation on fracture consolidation and bone tissue remodeling.

**Methods:** The study included 80 male patients with mandible fracture, aged 18-58 y. All patients first underwent splinting of bone fragments with a splint-brace with hook loops according to Tigerstedt. The teeth were set in the bite and fixed with a rubber rod.

Osteogenon (osseine-hydroxyapatite complex), used for systemic osteoporosis's prevention and treatment. Course is 2 tablets 2t/d for 14 d. In group II, treatment was carried out according to the generally accepted method (splinting, anti-inflammatory therapy). To assess bone metabolism, blood calcium and phosphorus were examined.

**Results:** From the initial data on the structural and functional properties of bone tissue in patients with mandible fracture made it possible to note that 40 (50%) of them had osteopenic syndrome, with high degree of reliability in comparison with the norm. Decreased levels of calcium and phosphorus in blood were noted. After treatment, the densitometric parameters significantly increased in group I. It remained within the normal range, but had a tendency to decrease in group II. Positive changes in mineral metabolism, was more pronounced in group I. So, we noted that group I treated with osteogenon had a double effect on bone tis-

sue metabolism with stimulating and inhibitory effect on osteoblasts and osteoclasts respectively which is accompanied by an increase in calcium absorption.

**Conclusion:** Initial osteopenia with corresponding changes in densitometric and metabolic parameters is a predisposing factor in the development of mandible fracture. The greatest effect on the restoration of the structural and functional properties of bone tissue by the use of the drug osteogenon.

P535

### LEVELS OF BONE METABOLISM MARKERS IN ADOLESCENTS WITH IDIOPATHIC SCOLIOSIS

O. Galkina<sup>1</sup>, V. Kaliberdenko<sup>2</sup>, Z. Dovbnya<sup>3</sup>, O. Poleshchuk<sup>3</sup>, S. Kulanthavel<sup>4</sup>, K. Balasundaram<sup>5</sup>

<sup>1</sup>Dept. of Propaedeutic of Dentistry, V.I. Vernadsky Crimean Federal University, Simferopol, Russia, <sup>2</sup>Dept. of Internal medicine No.2, V.I. Vernadsky Crimean Federal University, Simferopol, Russia, <sup>3</sup>Dept. of Propaedeutic of Dentistry, V.I. Vernadsky Crimean Federal University, Simferopol, Russia, <sup>4</sup>Divisional Health (Zone - 6, Division - 67), Greater Chennai Corporation - Public Health and Medical Services Dept., Chennai, India, <sup>5</sup>Dept. of Internal Medicine No.2, V.I. Vernadsky Crimean Federal University, Simferopol, Russia

**Objective:** The steady increase in the incidence of idiopathic scoliosis (IS) in young people necessitates the search for informative prognostic markers of the progression of this pathology, which is required for their early treatment and prevention. This study aimed to study the levels of markers of bone metabolism in young people with IS.

**Methods:** We observed 152 adolescents aged 15-16 y (62 boys, 90 girls) with varying degrees of spinal deformity and 20 volunteers in control group. The average age of the patients were 15.26±0.04 y. The levels of markers of inert metabolism, such as osteocalcin in the blood serum (an indicator of osteosynthesis) and deoxypyridinoline in the urine (an indicator of osteoresorption) were studied. The control group consisted of 20 healthy volunteers.

**Results:** Our study has revealed a decrease in the concentration of osteocalcin in 96 (63.16%) adolescents. The indicator in the group of patients with IS was 76.44±0.66 ng/ml, which is significantly lower ( $p<0.001$ ) in comparison with the control group (96.66±2.17 ng/ml) and the age norm (93.4±14.1 ng/ml). This indicated the inhibition of the osteosynthesis process due to a decrease in the activity of osteoblasts. Along with this, an increase in the level of deoxypyridinoline was noted in 41 (26.97%) patients. In the group of patients with IS, the indicator was determined as 51.78±1.08 nmolDPD/mmolCr, which is significantly higher ( $p<0.001$ ) compared to the control group (31.43±1.72 nmolDPD/mmolCr). In comparison with the generally accepted laboratory norm (no more than 59 nmolDPD/mmolCr), the marker value approached the upper (critical) limit. This result indicated an increased level of osteoresorption due to increased osteoclastic activity. A

detailed analysis of the data obtained shows that the progressive change in the indicators were accompanied by an increase in the degree of curvature of the spine.

**Conclusion:** To assess bone metabolism and early prevention of the progression of the degree of curvature of the spine in young people with IS, it is advisable to periodically determine the levels of markers of bone metabolism.

P536

### TRANSCRIPTOME ANALYSES REVEALED THE DIFFERENTIALLY EXPRESSED GENES AND PATHWAYS ASSOCIATED WITH STEROID-INDUCED OSTEONECROSIS OF THE FEMORAL HEAD

C. Wang<sup>1</sup>, C. X. Di<sup>1</sup>, Y. Guo<sup>1</sup>

<sup>1</sup>Key Laboratory of Biomedical Information Engineering of Ministry of Education, Biomedical Informatics & Genomics Center, School of Life Science and Technology, Xi'an Jiaotong University, Xi'an, China

**Objective:** Steroid-induced osteonecrosis of the femoral head (SONFH), which is caused by long-term and high-dose glucocorticoid use, has been accounting for 57% of the total femoral head necrosis. Numerous genes changed expression in bone may be the potential pathogenic factor of SONFH. However, previous researches used cell lines and mouse models to simulate the SONFH which cannot truly represent the response to glucocorticoids in human. The objective of our project is to identify the differential expression genes (DEGs) in the femoral head from patients with SONFH and healthy controls to find the new targets for SONFH therapy.

**Methods:** A total of 6 necrotic femoral head samples and 12 normal control samples were obtained from patients. After RNA extraction, reverse transcription, and adaptor ligation, the library was sequenced by the Illumina platform. Clean reads were aligned to human hg19 build and reads count for each gene was extracted by featureCount software with gencode v19 annotation file. Then, we identified the DEGs via the DESeq2 R package from Bioconductor. Finally, we did KEGG pathway enrichment analyses for DEGs by cluster profile R package.

**Results:** A total of 735 genes were identified as significant DEGs ( $P\leq 0.05$ ) in the femoral head between SONFH patients and healthy controls. Among them, 482 genes were upregulated and 253 genes were downregulated in the necrotic femoral head, respectively. KEGG enrichment analyses identified the DEGs enriched at 28 pathways ( $P\leq 0.05$ ), the novel and most enriched pathway term was protein digestion and absorption ( $P=2.06\times 10^{-7}$ ), furthermore, Toll-like receptor signaling pathway ( $P=5.2\times 10^{-3}$ ) which have been proved associated with SONFH is significantly changed as well.

**Conclusion:** Overall, by performing DEG and KEGG pathway analyses, we identified hundreds of genes dysregulated in the necrotic femoral head compared to healthy controls. In addition, the DEGs enrichment in multiple pathways could provide new insights into the SONFH pathophysiology.

**Acknowledgements:** This study is supported by the National Natural Science Foundation of China (31970569); Natural Science Basic Research Plan of Shaanxi Province (2019JM-119).

P537

### EFFICACY OF ANTIRESORPTIVE TREATMENT IN OSTEOPOROTIC OLDER ADULTS: RESULTS OF A SYSTEMATIC REVIEW AND META-ANALYSIS OF RANDOMISED CLINICAL TRIALS

B. A. Cedeno-Veloz<sup>1</sup>, J. Erviti Lopez<sup>2</sup>, M. Gutiérrez-Valencia<sup>2</sup>, L. Leache Alegría<sup>2</sup>, L. C. Saiz Fernandez<sup>2</sup>, A. M. Rodriguez-Garcia<sup>1</sup>, M. Sanchez Latorre<sup>1</sup>, R. Ramirez Velez<sup>3</sup>, M. Izquierdo<sup>3</sup>, N. Martinez-Velilla<sup>1</sup>

<sup>1</sup>Geriatric Dept., Complejo Hospitalario de Navarra, Pamplona, <sup>2</sup>Unit of Innovation and Organization, Navarre Health Service, Pamplona, <sup>3</sup>Dept. of Health Sciences, Public University of Navarra, Pamplona, Spain

**Objective:** Antiresorptive drugs are usually the first-line treatment in older adults(1). However, there is no clear evidence in older adults(2). A study based on screening for osteoporosis in older women did not reduce the incidence of osteoporosis-related fractures(3). The purpose of our update study was to determine actual evidence of antiresorptive treatment in this specific population.

**Methods:** Database Search: MEDLINE, EMBASE, Cochrane Central Register of Controlled Trials, ISI Web of Science, and Scopus will be searched for studies from inception until 31th January 2020 without language restriction.

Selection Criteria

Types of studies: RCTs

Participants: older adults (65 years old and above) with osteoporosis with or without previous fragility fracture.

Intervention: antiresorptive treatment with or without calcium/vitamin D as compared to placebo or a nonpharmacological intervention with or without calcium/vitamin D.

Comparator: No treatment

Outcomes: Primary outcome: patients with hip fracture. Secondary outcome: other fractures

Data Extraction and Management: Two review authors independently extracted data from the included trials with a previously prepared data extraction form. Any differences between review authors were resolved by discussion. The data extraction form included details of study design, randomization, blinding, assess-

ment of risk of bias, duration of treatment, follow-up, baseline characteristics, number of participants, lost to follow-up, interventions, outcomes and statistical analysis.

**Analysis:** We performed the meta-analysis according to the Cochrane handbook version 6(12). If a meta-analysis could not be performed, a narrative description of the results was provided.

**Results:** Alendronate (3 studies), clodronate (1 study), denosumab (1 study, etidronate (1 study), risedronate (1 study) and zoledronate (3 studies) were assessed as drug treatments against hip fracture. Antiresorptive treatment showed lower risk of hip fracture than control group: RR=0.75 (95%CI 0.64 to 0.87), 10 studies, I<sup>2</sup>=30%. This means a RAR of 0.41% (95%CI 0.13 to 0.69) and a NNT of 241 (95%CI 144 to 771). Considering any type of fractures, treatment was associated with lower risk: RR=0.67 (95%CI 0.62-0.71), 9 studies, I<sup>2</sup>=39%; RAR=4.43% (95%CI 3.68 to 5.18), NNT=23 (95%CI 19 to 27).

**Conclusion:** Antiresorptive drugs are widely used as a first-line drug therapy for preventing osteoporotic fracture and their efficacy for hip fracture prevention is confirmed in this study. However, the absolute magnitude of benefit is small (NNT of 241) and studies show moderate heterogeneity. The main limitations are related to the quality of the studies, which showed unclear/high risk of bias. The limited number of studies in some of the subgroup analyses is also a limitation. Antiresorptive drugs do have a significant effect on preventing hip fracture. Alendronate, denosumab, risedronate and zoledronate may have a significant role on preventing hip fracture. Evidence on very older adults come from post hoc study with inconsistency results. More randomized controlled trials in very older osteoporotic adults are needed.

P538

### CONSTRUCTION OF NON-CODING RNA MEDIATED GENE EXPRESSION REGULATORY NETWORK RELATED TO STEROID-INDUCED OSTEONECROSIS OF THE FEMORAL HEAD

C. Wang<sup>1</sup>, C. X. Di<sup>1</sup>, Y. Guo<sup>1</sup>

<sup>1</sup>Key Laboratory of Biomedical Information Engineering of Ministry of Education, Biomedical Informatics & Genomics Center, School of Life Science and Technology, Xi'an Jiaotong University, Xi'an, China

**Objective:** Steroid-induced osteonecrosis of the femoral head (SONFH) is a challenging disorder caused by long-term and high-dose glucocorticoid use. As shown previously, gene dysregulation plays an important role in the pathogenesis of SONFH. Exploring the way of gene expression regulation is helpful for further understanding the mechanism of disease and may provide a basis for drug development. The object of this project is to construct a non-coding RNA-mediated gene expression regulatory network for all dysregulated mRNA in the necrotic femoral head.



**Methods:** A total of 6 necrotic femoral head samples and 12 normal control samples were obtained from volunteers. Total RNA was isolated and used for RNA-seq library preparation. The expression of mRNA, lncRNA, and miRNA was measured for each sample. Sequencing reads of mRNA and lncRNA were aligned to human hg19 build and raw reads count for each mRNA and lncRNA was extracted by featureCount software with gencode v19 annotation file. Then, the differential expression genes (DEGs) were identified via the DESeq2 package. The target mRNA of miRNA was gotten from MirSNPInTarget, MirSNPInTarget, miRWalk and miRDB databases, the target lncRNA of miRNA were gotten from the lncBaseV2 database. At last, we constructed two types network: 1. lncRNA↓-miRNA↑-mRNA↓; 2. lncRNA↑-miRNA↓-mRNA↑.

**Results:** A total of 735 differentially expressed mRNA were identified ( $P \leq 0.05$ ) with 482 mRNA upregulated and 253 mRNA downregulated in the necrotic femoral head, respectively. And we found 176 differentially expressed lncRNA ( $P \leq 0.05$ ) with 78 lncRNA upregulated and 98 lncRNA downregulated in the necrotic femoral head. In addition, 111 differentially expressed miRNA were identified ( $P \leq 0.05$ ), among them, 77 miRNA were upregulated and 34 miRNA were downregulated in the necrotic femoral head, respectively. Through the integration of DEGs (mRNA, lncRNA, miRNA) and miRNA targets from several databases, we constructed two types of regulatory networks containing 699 mRNA, 134 lncRNA, and 106 miRNA.

**Conclusion:** Overall, we performed RNA-seq for total RNA of femoral head samples from SONFH patients and controls and then identified differentially expressed mRNA, lncRNA, and miRNA. Integrated with target gene information from multiple databases, we constructed a non-coding RNA mediated gene expression regulatory network involved almost all DEGs, this would provide a wealth of bases for the analysis of the mechanism of SONFH.

**Acknowledgements:** This study is supported by National Natural Science Foundation of China (31970569); Natural Science Basic Research Plan of Shaanxi Province (2019JM-119).

P539

## TRANSCRIPTOME ANALYSIS REVEALED HMOX1 IS A CANDIDATE GENE RELATED TO THE PATHOGENESIS OF FEMORAL HEAD NECROSIS AND IS REGULATED BY MULTIPLE MIRNA

C. Wang<sup>1</sup>, C. X. Di<sup>1</sup>, Y. Guo<sup>1</sup>

<sup>1</sup>Key Laboratory of Biomedical Information Engineering of Ministry of Education, Biomedical Informatics & Genomics Center, School of Life Science and Technology, Xi'an Jiaotong University, Xi'an, China

**Objective:** Osteonecrosis of the femoral head (ONFH) is a disease caused by reduced blood flow to bones in the joints which leads to reduced cell nutrition, especially oxygen. Although bones can adapt to this microenvironment by regulating the expression of related genes, however, it is difficult for cells to adapt to environmental changes when these genes are expressed abnormally, and then cause cell apoptosis and death. We speculate that there is a dysregulation in the expression of genes related to hypoxia adaptation in the necrotic femoral head. The purpose of this study is to identify these genes and reveal the non-coding RNA-mediated regulatory mode.

**Methods:** A total of 6 necrotic femoral head samples and 12 normal control samples were obtained from volunteers. The total RNA was extracted and sequenced by the Illumina platform. Differentially expressed gene was identified via DESeq2. To construct the miRNA-mediated regulatory network, we downloaded miRNA target mRNA from MirSNPInTarget, MirSNPInTarget, miRWalk, and miRDB databases.

**Results:** A total of 735 differentially expressed mRNA were identified ( $P \leq 0.05$ ), among them, we found *HMOX1* which codes the Heme Oxygenase 1 was downregulated in necrotic femoral head samples ( $P=0.042$ ,  $\log_2FC=-0.882$ ). It has been shown that overexpressed *HMOX1* could reduce osteoblast apoptosis caused by hypoxia in mice models, suggesting *HMOX1* may also play an important role in the pathogenesis of human femoral head necrosis. Integrate miRNA target databases and differentially expressed miRNA data, we found 8 upregulated miRNA in necrotic femoral head that potentially bound to *HMOX1* mRNA sequence, including hsa-miR-218-5p ( $P=0.025$ ,  $\log_2FC=1.07$ ), hsa-miR-552-5p ( $P=0.046$ ,  $\log_2FC=1.74$ ), hsa-miR-138-5p ( $P=9.78 \times 10^{-5}$ ,  $\log_2FC=2.28$ ), hsa-miR-4491 ( $P=0.038$ ,  $\log_2FC=1.65$ ), hsa-miR-199b-3p ( $P=0.031$ ,  $\log_2FC=0.85$ ), hsa-miR-4761-3p ( $P=0.040$ ,  $\log_2FC=1.85$ ), hsa-miR-181c-5p ( $P=0.005$ ,  $\log_2FC=0.68$ ), hsa-miR-130b-5p ( $P=0.002$ ,  $\log_2FC=0.97$ ).

**Conclusion:** Overall, DEGs analysis identified the downregulation of *HMOX1* in the necrotic femoral head as a candidate factor for the pathogenesis of ONFH, and multiple upregulated miRNA may act as its expression regulator.

**Acknowledgements:** This study is supported by National Natural Science Foundation of China (31970569); Natural Science Basic Research Plan of Shaanxi Province (2019JM-119).

P540

# MOTIF AND GENE CO-EXPRESSION ANALYSES IDENTIFIED 4 CANDIDATE TFS REGULATE HMOX1 EXPRESSION IN NECROTIC FEMORAL HEAD

C. Wang<sup>1</sup>, C. X. Di<sup>1</sup>, Y. Guo<sup>1</sup>

<sup>1</sup>Key Laboratory of Biomedical Information Engineering of Ministry of Education, Biomedical Informatics & Genomics Center, School of Life Science and Technology, Xi'an Jiaotong University, Xi'an, China

**Objective:** Osteonecrosis of the femoral head (ONFH) is a condition caused by a compromise of the blood supply of the femoral head and may lead to progressive destruction of the hip joint. We have identified the downregulation of *HMOX1* expression as a candidate marker for ONFH and constructed a miRNA-mediated regulatory network. However, there may be other ways involved in the regulation of gene expression, such as transcription factor (TF) regulation. The object of this project is to identify whether there are TFs that could bind to the *HMOX1* promoter region and regulate its expression.

**Methods:** Firstly, we compared the expression among all transcripts of *HMOX1* and use the transcript with the highest expression value for the following analyses. Next, we defined the 2 kb upstream and downstream of the transcription start site as promoter according to the genecode v19 annotation file and extracted the genome sequence of the promoter via samtools faidx software. Then, we used fimo software to predict the binding motif of TFs from the JASPAR database with p-value set to  $1 \times 10^{-4}$ , the TFs have at least one motif found in the *HMOX1* promoter was treated as a candidate regulator of *HMOX1*. Finally, the regulator TF which expression was lower in the necrotic femoral head and positively correlated with *HMOX1* treats as the true regulator of *HMOX1*.

**Results:** By comparing the expression levels of different transcripts of *HMOX1*, we found the expression of transcripts ENST00000216117.8 (FPKM: 128.58) was significantly higher than the other four transcripts of *HMOX1* (ENST00000412893.1:  $3.27 \times 10^{-6}$ ; ENSG00000100292.12: 2.36; ENST00000481190.1: 1.23; ENST00000494998.1: 0.60). The motif analyses in the ENST00000216117.8 promoter region found that 535 TFs have at least one motif in this region. Among them, only 7 TFs were down-regulated in the necrotic femoral head, including *STAT1*, *EFNA2*, *POU4F2*, *PRDM1*, *EOMES*, *GATA3*, *TBX21*. Coexpression analyses found that the expression of *STAT1* ( $R=0.495$ ,  $P=0.037$ ), *EOMES* ( $R=0.615$ ,  $P=0.007$ ), *GATA3* ( $R=0.527$ ,  $P=0.025$ ) and *TBX21* ( $R=0.535$ ,  $P=0.022$ ) were positively correlated with the expression of *HMOX1*, suggesting that these four TFs may contribute to the downregulation of *HMOX1* in the necrotic femoral head.

**Conclusion:** Overall, through motif and gene co-expression analyses, we identified four TFs which have potential binding ability to the promoter region of *HMOX1* and co-expressed with *HMOX1*. The project provides deep insight into the regulatory mechanism of *HMOX1* and the methods used in the present research could be applied to find other dysregulated genes in the disease.

**Acknowledgements:** This study is supported by National Natural Science Foundation of China (31970569); Natural Science Basic Research Plan of Shaanxi Province (2019JM-119).

P541

# MUSCULOSKELETAL HEALTH IN ANDROGEN DEPRIVATION THERAPY (ADT) FOR PROSTATE CANCER

E. Ziguora<sup>1</sup>, N. Veronese<sup>2</sup>, A. Floris<sup>1</sup>, C. Schiavone<sup>3</sup>, F. Campodonico<sup>4</sup>, M. Ennas<sup>4</sup>, A. Pilotto<sup>5</sup>

<sup>1</sup>Bone Unit, Dept. of Geriatric Care, Orthogeriatrics & Rehabilitation, Galliera Hospital, Genova, <sup>2</sup>Dept. of Medicine, University of Palermo, Palermo, <sup>3</sup>Radiotherapy Unit, Dept. of Radiology, Galliera Hospital, Genova, <sup>4</sup>Urology Unit, Dept. of Abdominal Surgery, Galliera Hospital, Genova, <sup>5</sup>Dept. of Geriatric Care, Orthogeriatrics & Rehabilitation, Galliera Hospital and Dept. of Interdisciplinary Medicine, University of Bari, Genova, Italy

**Objective:** In this study we aimed to quantify the prevalence of osteoporosis and sarcopenia in ADT-treated men (>12 weeks) for prostate cancer.

**Methods:** 49 ADT-treated men (mean age 77 years old, range 58-92) who referred to our Bone Unit of Galliera Hospital were recruited. Bone metabolism parameters, before antifracture treatment, were assessed by the laboratory. BMD was performed by DXA. BMI was calculated. Muscle strength was measured using hand grip dynamometry (HD). Body composition was estimated by bioelectrical impedance analysis (BIA). X-rays of thoracic and lumbar spine were performed.

**Results:** 33 patients, were already under cholecalciferol supplementation at the first visit and presented a range of 21-43.4 ng/ml of serum 25-OH vitamin D. "Naive" patients, who did not take cholecalciferol presented a range of 4-16.9 ng/ml. Even with low 25-OH vitamin D levels, only 2 cases of secondary hyperparathyroidism were noted. C-terminal collagen crosslinks (CTX) in serum were high in all of them, with a media of 768.4 pg/ml. All patients were overweight (BMI=27.5±2). HD revealed relatively low muscle strength: 20.8±10 kg. Muscle mass as Skeletal Muscle Mass Index estimated by BIA was between 8.2 kg/m<sup>2</sup> and 11.2 kg/m<sup>2</sup> with a media of 9.41 kg/m<sup>2</sup>. Only 11 of them had a normal T-score in DXA, 11 of them were osteoporotic and the 27 were osteopenic. Five of them had vertebral fractures due to fragility, as detected by X-rays.

**Conclusion:** ADT treatment can compromise bone and muscle health with physical function consequences and lose of autonomy. The assessment of muscle mass, muscle strength and bone density should be included in the routine evaluation of this population. A straight collaboration between bone health specialists, urologists and radiotherapists is necessary.

P542

# TRANSCRIPTOME ANALYSES REVEALED THE DIFFERENTIALLY EXPRESSED GENES AND PATHWAYS ASSOCIATED WITH OSTEOPOROSIS

B. Yang<sup>1</sup>, B. C. Liu<sup>1</sup>, Y. H. Chang<sup>1</sup><sup>1</sup>Dept. of Orthopaedics Shaanxi Provincial People's Hospital, Xi'an, China

**Objective:** Osteoporosis is a disease that increases the risk of fractures due to decreased bone density. As previous studies showed that dysregulation of bone tissue gene expression which changes cell function is one of the causes of osteoporosis. Here, we collected femoral head samples from patients with femoral neck fractures and patients undergoing femoral head replacement for other non-fracture reasons. We aim to identify the new gene and pathways involve in the pathology of osteoporosis via differential gene expression analyses and function enrichment analysis,

**Methods:** A total of 10 femoral head samples from patients with femoral neck fractures and 5 control samples were collected. the library was sequenced by the next generation sequencing platform (Illumina). Raw data were filtered via trimmomatic software. Clean reads were aligned to human hg19 build via hisat2 software, raw reads count for each gene was extracted by feature-Count software with gencode v19 annotation file. Then, the DEGs were identified via the DESeq2 R package from Bioconductor. Finally, we did GO enrichment analyses for DEGs via clusterprofile package from Bioconductor.

**Results:** A total of 693 genes were identified as significant DEGs ( $P \leq 0.05$ ) between osteoporosis patients and controls. Among them, 228 genes were upregulated and 465 genes were downregulated in osteoporosis samples, respectively. GO enrichment analyses identified that the upregulated genes in osteoporosis samples were enriched at 429 GO terms ( $P \leq 0.05$ ), and the downregulated genes were enriched in 651 GO terms. Interestingly, the most enriched GO terms of downregulated genes in osteoporosis samples is Ossification (GO:0001503,  $P = 1.45 \times 10^{-17}$ ), in addition, there were several other GO terms associated with bone phenotype, including extracellular matrix organization (GO:0030198,  $P = 1.74 \times 10^{-11}$ ), extracellular structure organization (GO:0043062,  $P = 1.87 \times 10^{-11}$ ), skeletal system morphogenesis (GO:0048705,  $P = 5.71 \times 10^{-9}$ ), bone development (GO:0060348,  $P = 2.40 \times 10^{-8}$ ), osteoblast differentiation (GO:0001649,  $P = 5.71 \times 10^{-9}$ ).

**Conclusion:** Overall, by performing DEG and GO enrichment analysis, we identified hundreds of genes downregulated in osteoporosis samples, and they enriched in multiple biological processes related to bone formation. It further showed that the dysregulation of gene expression is a key factor in the occurrence of osteoporosis and would provide potential candidate genes for further mechanism research.

**Acknowledgements:** This study is supported by the National Natural Science Foundation of China (31970569); Natural Science Basic Research Plan of Shaanxi Province (2019JM-119).

P543

# CONSTRUCTION OF NONCODING RNA MEDIATED GENE EXPRESSION REGULATORY NETWORK RELATED TO OSTEOPOROSIS

B. Yang<sup>1</sup>, B. C. Liu<sup>1</sup>, Y. H. Chang<sup>1</sup><sup>1</sup>Dept. of Orthopaedics Shaanxi Provincial People's Hospital, Xi'an, China

**Objective:** Osteoporosis occurs when bone density decreases, which is manifested by thinning and weakening of bones. By comparing the gene expression of the femoral head from osteoporosis patients and normal controls, we showed that the osteoporosis downregulated gene enriched in multiple bone development GO terms. Dysregulation of gene expression is a pivotal factor for the pathogenesis of osteoporosis, however, the mechanism underlying the dysregulated mRNA is unknown. The object of this project is to construct a noncoding RNA-mediated gene expression regulatory network for downregulated genes in osteoporosis samples.

**Methods:** To construct the noncoding RNA-mediated gene expression regulatory network, we measured mRNA, lncRNA, and miRNA expression by the next generation sequencing technology for 10 femoral head samples from patients with femoral neck fractures and 5 control samples. The differential expression genes (DEGs) were identified via the DESeq2 package. The target mRNA of miRNA were gotten from MirSNPInTarget, MirSNPInTarget, miWalk, and miRDB databases, the target lncRNA of miRNA was gotten from the lncBaseV2 database. Finally, we constructed the network for downregulated mRNA: lncRNA↓-miRNA↑-mRNA↓.

**Results:** We identified 35 upregulated miRNA and 99 upregulated lncRNA in osteoporosis samples. We integrated the above results, miRNA target genes from several databases, and the differentially expressed mRNA from our previous results, we constructed a gene expression regulatory network involved 229 mRNA, 68 lncRNA, and 33 miRNA. In this network, the mean target mRNA number of each miRNA was about 30, the mean target lncRNA number of each miRNA was 2.

**Conclusion:** We constructed a gene expression regulatory network through the integration of differentially expressed mRNA, lncRNA, and miRNA and miRNA potential targets from several databases. This would provide insight into the pathogenesis of osteoporosis.

**Acknowledgements:** This study is supported by National Natural Science Foundation of China (31970569); Natural Science Basic Research Plan of Shaanxi Province (2019JM-119).

P544

# EFFECT OF COMBINED THERAPY ON THE INFLAMMATION BIOMARKERS IN PATIENTS WITH RHEUMATOID ARTHRITIS

S. S. Spitsina<sup>1</sup>, L. N. Shilova<sup>2</sup>, A. A. Trofimenko<sup>3</sup>, E. E. Mozgovaya<sup>3</sup>, S. A. Bedina<sup>3</sup>

<sup>1</sup>Federal State Budgetary Institution "Research Institute of Clinical and Experimental Rheumatology A.B. Zborovsky"; Volgograd State Medical University, <sup>2</sup>Volgograd State Medical University, <sup>3</sup>Federal State Budgetary Institution "Research Institute of Clinical and Experimental Rheumatology A.B. Zborovsky", Volgograd, Russia

**Objective:** To evaluate efficiency of combination therapy including infliximab (IF) in RA patients by means of inflammation markers (ESR, CRP) and serum pro-inflammatory (TNF $\alpha$ , IL-1) cytokines.

**Methods:** 18 patients with RA diagnosis were included in the 30-week study. The average age of patients was 46.0 $\pm$ 8.4 y, disease duration 13.2 $\pm$ 5.3 y. 83.3% of patients were seropositive for rheumatoid factor, 66.8% were ACCP-positive. Each patient was treated with methotrexate (MT) 12.5-20 mg/week. IF was administered at the dose of 3 mg/kg, according to the common scheme. Patients were examined at week 0 (before the inclusion), week 14, and week 30 after beginning of IF therapy.

**Results:** All patients had DAS28-CRP(4)>5.6. ESR and CRP have decreased by the 30th week. The average VAS score at week 0 was 68.3 mm, at week 30 - 26.0 mm. There were 50% of patients with good response to IF therapy, 33.3% with moderate one, and 16.7% without significant effect. Serum concentrations of pro-inflammatory cytokines (TNF $\alpha$ , IL-1) at week 30 were substantially decreased compared to initial levels along with trend of RF, ESR and CRP normalization as well as improvement of clinical manifestations (Table).

Table. Dynamics of clinical and laboratory markers in combination therapy (Me)

Indicator	0 week	14 week	30 week
RF, IU/l	45295 [12830; 134920]	25375 [7080; 80350]	9920 [5600; 110230]
ESR, mm/h	37 [4; 40]	10.5 [3; 51]	10 [2; 30]
CRP, mg/l	20.8 [4.6; 194.8]	2.65 [0.4; 33.4]	5.2 [1.1; 9]
DAS28-CRP(4)	5.63 [4.38; 6.24]	4.5 [2.5; 6.76]	3.58 [2.25; 4.91]
TNF $\alpha$ , pg/ml	6.92 [3.46; 11.03]	–	2.09 [1.74; 4.06]
IL-1, pg/ml	8.18 [4.64; 10.12]	–	3.25 [2.1; 6.45]

**Conclusion:** Tight correlation between shifts of TNF $\alpha$ , IL-1 levels with common clinical and laboratory markers of RA activity against the background of combined IF-MT treatment enables us to use these innovational biomarkers for RA treatment monitoring.

P545

# RISK OF FRACTURE IN GLUCOCORTICOID REQUIRING DISEASES: AN ANALYSIS ON A NATIONWIDE DATABASE

G. Adami<sup>1</sup>, A. Fassio<sup>1</sup>, E. Bertoldo<sup>1</sup>, O. Viapiana<sup>1</sup>, D. Gatti<sup>1</sup>, M. Rossini<sup>1</sup>

<sup>1</sup>Rheumatology Unit, University of Verona, Verona, Italy

**Objective:** Glucocorticoid-induced osteoporosis (GIOP) is the most common form of secondary osteoporosis. Glucocorticoids (GCs) are prescribed to patients affected by inflammatory diseases that are themselves independent risk factors for osteoporosis. The aim of the present study was to determine the risk of fracture associated with chronic GC use and a variety GC requiring diseases.

**Methods:** We conducted a retrospective cohort analysis of a nationwide cohort (DeFRACalc79 database). DeFRACalc79 is an algorithm for the estimation of the fracture risk that considers many risk factors, including glucocorticoid use. We used multi-variable regression analysis adjusting for several risk factors for fracture and GC intake to estimate the independent role of glucocorticoid requiring illnesses on fracture risk.

**Results:** We found that GCs, at doses  $\geq$ 5 mg/d for >3 months, were associated with a 60% increased risk of vertebral or hip fractures (aOR 1.58, 95%CI 1.43-1.76) and with a 30% increased risk of fragility fractures of any kind (aOR 1.32, 95%CI 1.20-1.45). We found that patients with rheumatoid arthritis (RA), connective tissue diseases (CTDs), chronic obstructive pulmonary disease (COPD) and neurological diseases (ND) were at greater risk of vertebral or hip fracture (crude ORs 1.31, 1.20, 1.92 and 2.97 respectively). After adjusting for potential confounders (i.e., GCs, age, BMD levels, menopause and familiar history of fractures) COPD and ND remained significantly associated with an increased risk of vertebral or hip fractures (aORs 1.33, 95%CI 1.18-1.49 and 2.43, 95%CI 2.17-2.74). RA, COPD, IBD and ND also significantly increased the risk of non-vertebral, non-hip fractures (aORs 1.23, 1.42, 1.52 and 1.94 respectively). Figure shows the risk of fracture in different diseases.

**Conclusion:** GC requiring diseases were independently associated with an increased risk of fractures: COPD and ND with both vertebral and non-vertebral fracture risk while RA and IBD were inde-



pendently associated only with non-vertebral, non-hip fractures.

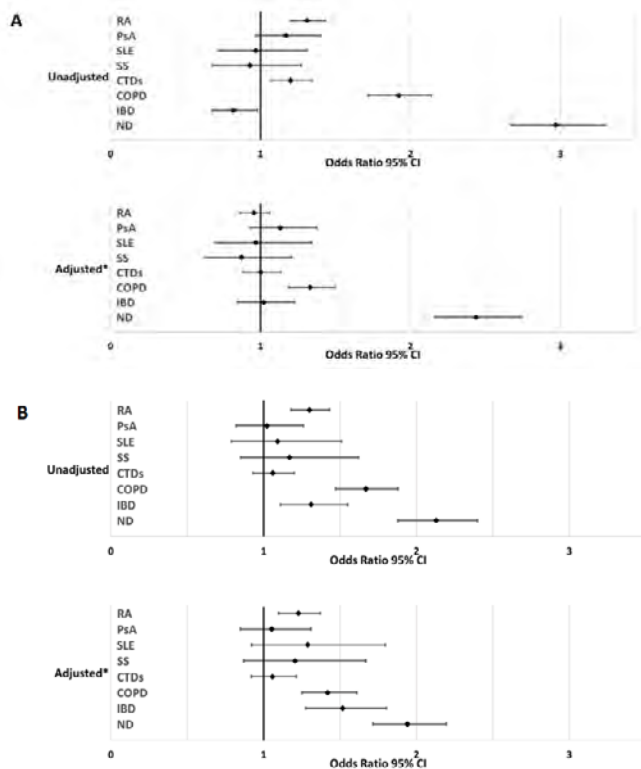


Figure. Forest plot showing the risk of vertebral or hip fractures in different diseases (panel A) and nonvert nonhip fractures (panel B). Upper panel unadjusted analyses, lower panel adjusted analyses.

P546

### PREVALENCE OF MUSCULOSKELETAL SYMPTOMS OF COVID-19 AMONG HEALTHCARE PROFESSIONALS OF THE UNIVERSITY HOSPITAL OF IBN ROCHD OF CASABLANCA

H. El Moutaouakil<sup>1</sup>, K. Nassar<sup>1</sup>, S. Janani<sup>1</sup>

<sup>1</sup>Ibn Rochd University Hospital, Dept. of Rheumatology, Casablanca, Morocco

**Objective:** Since the beginning of the COVID-19 outbreak in March 2020, healthcare professionals were the first line of defense against the new coronavirus. Subject to a significant risk of contamination, healthcare workers still continue to serve the population. However, little data are available on the prevalence of SARS-CoV-2 infection, and its various clinical features in this population. The aim of this study is to assess the prevalence of osteo-articular manifestations among doctors and nursing staff in the Ibn Rochd University Hospital of Casablanca.

**Methods:** Cross-sectional study conducted between October and December 2020 using an anonymous self-administered questionnaire, given to healthcare professionals working at the Ibn Rochd

University Hospital of Casablanca. Inclusion criteria: Only people who had been contaminated by the COVID-19 virus were invited to answer the questionnaire. Epidemiological, clinical and evolutionary data were collected and analyzed.

**Results:** Our study included 59 respondents. The mean age was 34.72 ( $\pm 11.73$ ) y, the sex ratio F/M was 3.7. The main comorbidities were in order of frequency: obesity (16.9%), cardiometabolic syndrome, (11.9%), lung disease (11.9%), degenerative rheumatism (10.16%), and chronic inflammatory rheumatism (5.08%). 10.1% of respondents had toxic habits. In terms of vaccination status, 11.8% were vaccinated against influenza in the current year and 11.8% were vaccinated against pneumococcus. 93.2% of respondents were symptomatic, and the common signs were: fever (50.9%), cough (40.7%), flu syndrome (44.06%), anosmia and ageusia (53.23%). The osteoarticular signs were mainly: arthromyalgia (57.62%), back pain (72.9%), costalgia (11.8%) and ostealgia (10.16%). The management of the COVID-19 disease was at home in 86.4% of cases and in an intensive care unit in 6.7% of cases. All the cases received azithromycin, vitamin C, zinc and vitamin D. 16.9% of the cases received hydroxychloroquine, 40.7% of them needed thromboprophylaxis, and corticosteroids were necessary in 3.4% of cases. The outcome was favorable in all patients with an average healing time of 11.64 d ( $\pm 2.2$ ), with the disappearance of general signs and OA signs in 71.2% of cases.

**Conclusion:** From the onset of symptoms and into the most severe stages of COVID-19 disease, musculoskeletal symptoms are consistently present in the majority of reported cases. However, the pathophysiology explaining the involvement of the musculoskeletal system remains unknown (1). In our study, COVID-19 disease was predominantly benign in healthcare professionals, with regression of osteoarticular signs after convalescence.

**Reference:** 1. Cipollaro L, et al. J Orthop Surg Res 2020;15:178.

P547

### NEOPLASTIC HYPERCALCEMIA IN A RHEUMATOLOGY DEPARTMENT: CASES REPORT

H. El Moutaouakil<sup>1</sup>, K. Nassar<sup>1</sup>, S. Janani<sup>1</sup>

<sup>1</sup>Ibn Rochd University Hospital, Dept. of Rheumatology, Casablanca, Morocco

**Objective:** Malignancies are a common cause of hypercalcemia. About 20 to 30% of patients with tumor disease have had at least one episode of hypercalcemia. Its occurrence during certain neoplasms is a factor of poor prognosis, associated with significant mortality. The oncology and hematology departments were for a long time the first interfaces with these patients. The objective of our work is to discern the epidemiological and etiological characteristics of neoplastic hypercalcemia in a rheumatology department.

**Methods:** A descriptive study conducted at the rheumatology department of the Ibn Rochd hospital university of Casablanca, over a period of 9 y, between 2010 and 2019, including all patients in whom the diagnosis of neoplastic hypercalcemia was retained. Epidemiological, clinical, biological, radiological, etiological, and evolutionary data were collected and analyzed.

**Results:** We have enrolled 6 patients; the mean age was 52 y ( $\pm 14.32$ ) with extremes ranging from 32-68 y. The sex ratio was 1. The co-morbidities of the patients were distributed as follows: hypertension in 1 case and chondrocalcinosis in 1 of the cases. All patients were symptomatic, and all of them had general and musculoskeletal, and neuropsychic, and digestive signs. The mean value of total serum calcium was 118.16 mg/l ( $\pm 18.64$ ) and the mean value of corrected serum calcium was on average 122 mg/l ( $\pm 19.47$ ), a hypercalciuria was noted in 1 patient, PTH level was normal in all patients, GFR  $< 60$  ml/mn was found in 1 patient. Serum protein electrophoresis showed a monoclonal peak in 2 patients and a polyclonal peak in 2 patients as well. On complete blood count, 5 out of 6 patients had normochromic normocytic anemia, and half had leukocytosis. Two patients had electrical disturbances on the electrocardiogram. An x-ray of the spine was requested in 2 patients, and have shown osteolytic lesions in one patient, and a vertebral fracture above T6 in another patient, a skull x-ray was necessary in 2 patients and had objectified geodic lesions and, a thoracic-abdominopelvic CT scan revealed diffuse osteolytic lesions in 5 out of 6 patients with the presence of a pulmonary process in 2 patients, a PET-Scan in 1 patient revealed diffuse osteolytic lesions with a pulmonary process and hyper-metabolic mediastinal lymphadenopathy. The causes of hypercalcemia in this series were secondary to hematologic malignancy in 2 cases, metastasis in 2 cases, and a combination of the two in 1 case.

**Conclusion:** Neoplastic hypercalcemia remains rare in rheumatology, its etiologies are dominated by bone metastases. Management is now multidisciplinary and requires early diagnosis and effective treatment.

P548

### THE PROFILE OF OSTEOPOROTIC FRACTURES IN OBESE WOMEN

H. El Moutaouakil<sup>1</sup>, K. Nassar<sup>1</sup>, S. Janani<sup>1</sup>

<sup>1</sup>Ibn Rochd University Hospital, Dept. of Rheumatology, Casablanca, Morocco

**Objective:** A low BMI has long been considered a classic risk factor for the occurrence of fractures. However, contrary to what one might think, a high mass index is absolutely not a protective factor according to the latest publications, with the presence of some particularities depending on gender. The aim of this study is to determine the different fracture aspects in a population of obese women.

**Methods:** Descriptive retrospective study, conducted in the rheumatology department of the Ibn Rochd hospital university over a total period of 5 y between 2015-2020, relating to obese patients in whom BMI  $\geq 30$  kg/m<sup>2</sup> with an osteoporotic fracture. Any fracture that had occurred in women with a BMI  $< 30$  kg/m<sup>2</sup> was excluded.

**Results:** Out of a total of 1200 files used, 120 obese women were identified, 16 of whom had a fracture. The average age was 68.31 y ( $\pm 8.82$ ). The mean BMI was 34.17 kg/m<sup>2</sup> ( $\pm 3.006$ ), 68.7% had secondary osteoporosis (all causes), 12.5% had postmenopausal osteoporosis and 18.7% had osteopenia. 8 patients had at least one vertebral fracture, 6 patients had a wrist fracture, 1 patient had a leg fracture and one patient had an ankle fracture. All occurring before the start of treatment with an average duration of 2.5 y. All patients received an antiosteoporosis treatment once connected to the consultation, with an average duration of treatment of 36.4 months ( $\pm 30.62$ ), a densitometric gain was noted in 31.2% of the patients. None of these patients fractured during treatment.

**Conclusion:** It is now well established that a BMI threshold of around 25 kg/m<sup>2</sup> provides a protective effect on the risk of fracture. Beyond this threshold, the fracture incidence no longer varies, and obesity appears to be more deleterious than protective. Despite the small number of our series, our results match those of the literature, with an increased risk of vertebral fractures and the occurrence of other atypical sites, particularly leg and ankle.

P549

### POOR TRABECULAR MICROARCHITECTURE AND 12-YEAR FRACTURE RISK IN MEN: THE PROSPECTIVE STRAMBO STUDY

P. Szulc<sup>1</sup>, D. Foesser<sup>1</sup>, R. Chapurlat<sup>1</sup>

<sup>1</sup>INSERM 1033, Lyon, France

**Objective:** Our prior study shows that poor trabecular microarchitecture at distal radius predicts fractures in older men followed prospectively for 12 y. The aim of this study is to assess whether bone microarchitecture predicts different types of fracture in similar models.

**Methods:** Among 825 men aged 60–87, 160 men had fragility fractures over 12 y (spine 68, nonspine 103, major osteoporotic fractures [MOF] 61). Bone microarchitecture was assessed at distal radius and distal tibia by HR-pQCT (Xtreme-CT Scanco). Femoral neck areal BMD (aBMD) was measured by DXA (Hologic Discovery A).

**Results:** After adjustment for age, weight, femoral neck aBMD, prior falls and fractures, low trabecular number (Tb.N) at distal radius was associated with higher risk of MOF (HR=1.56 /SD decrease, 95%CI: 1.16–2.08,  $p < 0.005$ ). In a similar model, high trabecular separation standard deviation (Tb.1/N.SD, index of trabecular distribution heterogeneity) was associated with higher

risk of MOF (HR=1.30 /SD, 95%CI: 1.14–1.48,  $p<0.001$ ). Low Tb.N and high Tb.1/N.SD were also predictive of nonspine fracture (HR=1.50 /SD decrease, 95%CI: 1.20–1.89,  $p<0.001$  and HR=1.23 per SD, 95%CI: 1.10–1.39,  $p<0.001$ ). The most discriminating threshold for distal radius Tb.N was 1.72/mm for MOF (HR=2.23, 95%CI: 1.28–3.89,  $p<0.005$ ) and 1.75/mm for nonspine fractures (HR=1.89, 95%CI: 1.22–2.93,  $p<0.005$ ). The most discriminating threshold for Tb.1/N.SD was 233  $\mu$ m for MOP (HR=1.98, 95%CI: 1.12–3.49,  $p<0.05$ ) and 205  $\mu$ m for nonspine fracture (HR=2.12, 95%CI: 1.32–3.38,  $p<0.005$ ). Other HR-pQCT indices at distal radius and those at distal tibia did not predict these fractures. HR-pQCT indices did not predict vertebral fracture.

**Conclusion:** After adjustment for relevant confounders, low Tb.N and high Tb.1/N.SD at distal radius were associated with higher risk of MOF and nonspine fracture in older men followed prospectively for 12 y.

## P550 MIRNA PROFILES IN EWING SARCOMA CANCER STEM CELLS

S. Donati<sup>1</sup>, G. Palmini<sup>1</sup>, C. Aurilia<sup>1</sup>, C. Romagnoli<sup>1</sup>, F. Miglietta<sup>1</sup>, I. Falsetti<sup>1</sup>, T. Iantomasi<sup>1</sup>, R. Zonefrati<sup>2</sup>, G. Galli<sup>1</sup>, A. Franchi<sup>3</sup>, G. Beltrami<sup>4</sup>, D. A. Campanacci<sup>5</sup>, R. Capanna<sup>3</sup>, M. L. Brandi<sup>2</sup>

<sup>1</sup>Dept. of Experimental & Clinical Biomedical Sciences, University of Florence, Florence, <sup>2</sup>Fondazione Italiana Ricerca sulle Malattie dell'Osso (FIRMO Onlus), Florence, <sup>3</sup>Dept. of Translational Research and of New Technologies in Medicine & Surgery, University of Pisa, Pisa, <sup>4</sup>Ortopedia Oncologica Pediatrica, AOU Careggi-AOU Meyer, Florence, <sup>5</sup>SOD Ortopedia Oncologica e Ricostruttiva, AOU Careggi, Florence, Italy

**Objective:** Ewing Sarcoma (EWS) is a malignant mesenchymal-derived tumour which usually arises in bone and rarely in soft tissues. In this study we have evaluated the presence of EWS cancer stem cells (EWS-CSCs) and we have investigated which is the miRNAs expression profile that characterizes the established EWS-CSCs lines to find new molecular diagnostic/prognostic factors for EWS.

**Methods:** The EWS samples have been collected at the Unit Ortopedia Oncologica e Ricostruttiva, AOU Careggi, Florence, with informed consent approved by the local Ethical Committee. We have established primary EWS cell lines (ES) from each samples. Then we have isolated a putative CSCs line from each one of the established ES lines. The CSCs phenotype has been evaluated and confirmed by several cellular and molecular analyses and after that miRNAs expression levels of a panel of 15 miRNAs have been evaluated by specific TaqMan qRT-PCR assays.

**Results:** We have established five primary ES lines and we have isolated the CSCs from each. The stemness of each isolated ES-CSCs lines was evaluated inducing CSCs towards three different phenotypes, analysing specific mesenchymal end embryonic

stem cells marker genes and proteins and evaluating their clonogenic capacity. We have also confirmed the neoplastic capacity of these lines through invasion and migration assays. Finally, we have analysed several miRNAs obtaining a preliminary miRNAs expression profile in ES-CSCs lines.

**Conclusion:** We have settled five new in vitro human models of ES-CSCs. The preliminary results obtained about the analysis of the miRNAs expression profile in these lines identifying a common miRNA code, that could be used to develop new molecular therapies against EWS and to find which miRNA could be represent novel EWS biomarkers.

**Acknowledgement:** Supported by FIRMO Onlus.

## P551 IN VITRO HUMAN HYPERTROPHIC CHONDROCYTES MODELS AND RET INVOLVEMENT ON BONE FORMATION AND ELONGATION

C. Aurilia<sup>1</sup>, G. Palmini<sup>1</sup>, C. Romagnoli<sup>1</sup>, S. Donati<sup>1</sup>, F. Miglietta<sup>1</sup>, G. Galli<sup>1</sup>, D. A. Campanacci<sup>2</sup>, M. L. Brandi<sup>3</sup>

<sup>1</sup>Dept. of Experimental & Clinical Biomedical Sciences Mario Serio, University of Florence, <sup>2</sup>SOD Ortopedia Oncologica e Ricostruttiva, AOU Careggi, University of Florence, <sup>3</sup>Fondazione Italiana Ricerca sulle Malattie dell'Osso, FIRMO Onlus, Florence, Italy

**Objective:** To investigate the possible role of RET in osteogenic differentiation and mineralization process.

**Methods:** Growth plate (GP) lines were obtained by enzymatic digestion and mechanical dispersion, and cultured in growth medium. Characterization of GP lines as hypertrophic chondrocytes (HCs) was evaluated through several cellular and molecular analysis. We have evaluated the expression of RET gene and protein in our established cell lines. After that we have evaluate the role of RET in osteoblastogenesis treating GP lines with RET ligands.

**Results:** GP finite cell lines were established and characterized as HCs. The osteogenic differentiation assay has shown the capacity of the HCs lines to differentiate into osteoblasts vs. the articular cartilage (AC) cell line. All the HCs lines have showed a positive expression of RET gene and the presence of RET protein vs. the AC line. Osteogenic differentiation assay under treatment with RET ligands has reported that these are both able to induce a rapid increase of alkaline phosphatase levels and an early consequent mineralization process in vitro.

**Conclusion:** In this work we have established three primary cell lines of HCs. For the first time we have evaluated and discovered the presence of RET gene and protein in human in vitro established HCs models. On the base of the scientific evidences about a possible role of RET in osteoblastogenesis we hypothesise that this could be involved also in the osteogenic differentiation of HCs and in the endochondral ossification process also. Our obtained data on the role of RET in osteogenic differentiation of HCs

lines showed an effective involvement of RET in it. Nowadays, we are evaluating the gene expression levels of osteogenesis and of RET during mineralization process under treatment with RET ligands, and we are starting to study the role of RET in chondrogenic differentiation of established GP lines.

**Acknowledgement:** Supported by FIRMO Onlus.

P552

### EFFECTS OF ANTIOXIDATIVE VITAMINS ON BONE HEALTH: A SYSTEMATIC REVIEW OF META-ANALYSIS STUDIES

O. T. Tabatabaei-Malazy<sup>1</sup>, P. K. Khashayar<sup>2,3</sup>, B. L. Larijani<sup>4</sup>

<sup>1</sup>Non-Communicable Diseases Research Center, Endocrinology & Metabolism Population Sciences Institute, Tehran, Iran,

<sup>2</sup>Cardiovascular Dept., College of Medical, Veterinary and Life Sciences, University of Glasgow, Glasgow, UK., Glasgow, UK,

<sup>3</sup>Gent University, Gent, Belgium, <sup>4</sup>Endocrinology and Metabolism Research Center, Endocrinology and Metabolism Clinical Sciences Institute, Tehran, Iran

**Objective:** The key role of oxidative stress on bone health is well known. While antioxidative vitamins are important for development and maintenance of bone mass or bone formation, there are controversial findings in this regard. The aim of the current systematic review is to critically assess the meta-analyses of observational/ trials evaluating the influence of these vitamins on bone health.

**Methods:** Relevant studies from Web of Science, PubMed, Scopus, and Cochrane Library databases based on Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist until May 2021 were searched. All meta-analyses that evaluated the effect of antioxidative vitamins (A, C, E, K, B groups, and beta carotene) on bone health were included. Meta-analyses of in vitro, animal or review studies were excluded.

**Results:** Thirteen meta-analyses were included. Higher dietary intake of retinol or total vitamin A slightly (5-6%) decreases total fracture risk, while significantly increasing (29-40%) the risk of hip fracture. Blood retinol levels of 1.99 to 2.31  $\mu\text{mol/L}$  are considered optimal for bone health. Higher  $\beta$ -carotene intake significantly reduces (>20%) the risk of osteoporosis, hip and all types of fractures. Significant reduction of hip fracture risk (50%) in absence of any effect on the risk of vertebral fracture was reported with vitamin K1. Based on meta-analyses of trials, B vitamin supplementation is not effective in preventing fracture or improving bone turnover. Consumption of high doses of vitamin C significantly reduces the risk of osteoporosis and hip fracture. A 5% reduction in hip fracture risk is reported per every 50 mg/d consumption of vit C. High intake of vitamin E significantly reduces (44%) fracture risk. Higher levels of homocysteine and B12 are significantly associated with increased (4%). Decreased (4%) risk of fracture was observed per  $\mu\text{mol/L}$  increase in homocysteine or per 50 pmol/L increase in B12 concentrations.

**Conclusion:** Due to insufficient evidence, their routine supplementations with antioxidative vitamins are not recommended as a fracture-preventative factor. More well conducted observational/ trials are required to confirm the effects beside determining their effective doses on bone health.

P553

### CAUSES OF PERMANENT DISCONTINUATION OF DICLOFENAC IN THE TREATMENT OF KNEE OSTEOARTHRITIS

B. Bengana<sup>1</sup>, S. Abdellaoui<sup>1</sup>, I. Kalouda<sup>1</sup>, A. Boukabous<sup>1</sup>, S. Lefkir - Tefiani<sup>1</sup>

<sup>1</sup>Rheumatology Department, University Hospital of Benimessous, Algiers, Algeria

**Objective:** Knee osteoarthritis is a disabling chronic degenerative rheumatism responsible of chronic pains which require the regular consumption of non-steroidal anti-inflammatory drugs (NSAIDs) and whose side effects are not negligible. Diclofenac remains the most prescribed and consumed in the treatment of knee osteoarthritis but with an increased risk of cardiovascular events, particularly if it is consumed over a long period. Through this work we will try to find out the frequency and causes of stopping diclofenac permanently in real life after a long period of consumption.

**Methods:** It is a retrospective study carried out on medical files of patients followed for knee osteoarthritis and who regularly consume diclofenac continuously over a period of >3 y (2015-2018), we evaluated the frequency of discontinuation diclofenac and its causes.

**Results:** We collected 107 cases, 90 women (84%) for 17 men (16%), the mean age was 59.9 y (between 42-86 y), the mean BMI was 29.89  $\text{kg/m}^2$ , concerning the different radiographic stages of knee osteoarthritis: 11% were at stage 2 of Kellgren-Lawrence, 68% stage 3 and 22% at stage 4, knee osteoarthritis was bilateral in 94%. The final discontinuation of diclofenac affected 72/107 patients (67%), among the causes of discontinuation: 16/72 had kidney problems (22%), 24/72 had digestive problems (33%) and 32/72 had cardiovascular pathologies (45%). There was a significant relationship between the dosage of diclofenac and its permanent discontinuation ( $p<0.002$ ).

**Conclusion:** In our sample, the continuous consumption of diclofenac for the treatment of knee osteoarthritis knows a definitively stopping in more than 2/3 of cases, for renal, digestive or cardiovascular inconveniences, this is all the more true if the daily dose diclofenac is important.



P554

**HOW VERTEBRAL FRACTURES AFFECT BALANCE IN POSTMENOPAUSAL WOMEN?**D. Okutan Kuzu<sup>1</sup>, S. Tuzun<sup>1</sup><sup>1</sup>IUC-Cerrahpasa School of Medicine, İstanbul, Turkey

**Objective:** To evaluate the effect of previous vertebral fracture on balance and physical performance and its relationship with fall and fracture risk in a population with postmenopausal osteoporosis.

**Methods:** 95 patients, at the age of 50 and above with postmenopausal osteoporosis and/or osteoporotic vertebral fractures according to WHO criteria were included in this study. Two groups with (n=45) and without (n=50) vertebral fractures and two groups with single level (n=29) and multiple level vertebral fractures (n=16) were statistically compared. Detailed clinical history of the patients were collected, and demographic data were recorded. The presence of vertebral fracture and kyphosis, FRAX scores, DXA measurements, serum 25(OH)D values, Tandem stance and gait test, Timed Up and Go test (TUG), Berg balance scale (BBS) were performed. Stability index, fall index (FI) and Fourier frequencies were also measured with computed static posturography.

**Results:** In the group with vertebral fractures, the probability of FRAX-major osteoporotic fracture, lumbar total T-score with DXA and TUG time were significantly higher and the BBS score was lower compared to the group without vertebral fracture. Kyphotic posture was more prominent in the group with vertebral fractures. The group with vertebral fracture was found unsuccessful in Tandem stance and gait tests compared to the group without vertebral fracture. The probability of FRAX-major osteoporotic fractures was significantly higher in patients with multiple level fractures compared to the patients with a single level fracture. There was a strong positive correlation between the probability of FRAX-major osteoporotic and FRAX-hip fracture in both groups. There was also a moderately negative correlation between TUG and BBS, and between the BBS and FI.

**Conclusion:** This study showed that the presence of vertebral fracture had a negative impact on balance and physical performance leading an increase in the probability of fracture and fall, in patients with postmenopausal osteoporosis. In this population, the probability of fracture and fall parameters should be evaluated separately.

P555

**ESTABLISHMENT AND CHARACTERIZATION OF A CANCER STEM CELL LINE FROM CHONDROSARCOMA**I. Falsetti<sup>1</sup>, G. Palmmini<sup>1</sup>, C. Aurilia<sup>1</sup>, S. Donati<sup>1</sup>, F. Miglietta<sup>1</sup>, T. Iantomasi<sup>1</sup>, R. Zonefrati<sup>1</sup>, G. Galli<sup>1</sup>, A. Franchi<sup>2</sup>, R. Capanna<sup>2</sup>, M. L. Brandi<sup>3</sup>

<sup>1</sup>Dept. of Experimental and Clinical Biomedical Sciences, University of Florence, Florence, <sup>2</sup>Dept. of Translational Research and of New Technologies in Medicine & Surgery, University of Pisa, Pisa, <sup>3</sup>Fondazione Italiana Ricerca sulle Malattie dell'Osso (FIRMO Onlus), Florence, Italy

**Objective:** Chondrosarcoma (COS) is a rare type of sarcoma which arises in bones and joints, where transformed cells produce an excess of cartilage. In this study we have evaluated the presence of cancer stem cells inside COS.

**Methods:** The human COS sample have been collected at the Unit Ortopedia Oncologica e Ricostruttiva, AOUC Careggi, Florence, with informed consent approved by the local Ethical Committee. First, we have established primary COS cell line (COS). From which we have isolated a putative subpopulation of CSCs by the sarcosphere assay<sup>1</sup>. Their CSCs phenotype has been evaluated by inducing isolated CSCs line towards osteogenic and adipogenic phenotypes, analysing specific mesenchymal stem cells markers proteins, analysing the expression of embryonic stem cells marker genes, evaluating their clonogenic capacity.

**Results:** We have established a primary COS line and its respective CSCs line (COS-CSCs). The CSCs phenotype of the isolated line from the primary COS line was confirmed by observing the capacity of COS-CSCs into osteoblasts and into adipocytes, by showing the presence of the mesenchymal and embryonic stem cells markers into the cell line and by evaluating a good rate as clonogenic capacity.

**Conclusion:** We have established a primary cell culture of this rare bone sarcoma. We have characterized and studied a COS-CSCs line at cellular and molecular level. We are currently completing the characterization of COS-CSCs line evaluating their migration/invasion capacity through cell biology analyses and by evaluating the expression of the regulatory genes of these processes. We are also starting the study of micro-RNAs to identify the miRNA profile of COS-CSCs line that could be used to develop new molecular therapies against COS.

**Reference:** 1. Palmmini G, et al. J Vis Exp 2016;116:53884.

**Acknowledgement:** Supported by FIRMO Onlus.

P556

**LIPID EXCHANGE DISORDERS IN PATIENTS WITH CHRONIC INFLAMMATORY JOINT DISEASES**L. N. Shilova<sup>1</sup>, S. S. Spitsina<sup>2</sup>

<sup>1</sup>Volgograd State Medical University, <sup>2</sup>Federal State Budgetary Institution "Research Institute of Clinical and Experimental Rheumatology A.B. Zborovsky"; Volgograd State Medical University, Volgograd, Russia

**Objective:** Investigation of relationship between lipid profile of patients with rheumatoid (RA) and psoriatic (PsA) arthritis during methotrexate (MT) treatment, and identification their associations with the main predisposing factors.

**Methods:** We enrolled 15 patients with PsA and 20 with RA, treated with MT from 10-20 mg for at least 6 months. The exclusion criterion was the presence of a concomitant disease that could affect lipid metabolism.

**Results:** The age of PsA patients was  $48.2 \pm 10.56$  y, the history of the articular syndrome was from 7 months to 5 y. All the patients had DAS28-CRP(4) from 4.28 to 5.01. BMI was  $31.03 \pm 4.4$  kg/m<sup>2</sup>. The mean total cholesterol (TC) value was  $6.04 \pm 1.55$  mmol/L, and an increase of the TC levels was found in 80% of cases. Changes in TG, LDL-C and HDL-C were nonsignificant. The values of apolipoproteins A1 and B did not go beyond the reference range (apoB - 1.32 g/L, apoA1 - 1.59 g/L). Correlation analysis showed a positive TC relationship with age, overweight, and PsA duration. The age of RA patients was  $53.8 \pm 9.4$  years, and disease history of  $4.8 \pm 3.0$  y. All the patients had DAS28-CRP(4)  $\geq 7.06$ , and 80% of them were RF positive. BMI was  $28.3$  kg/m<sup>2</sup>. An increase TC level was revealed in 80% of cases. Mean TC value was  $5.63 \pm 1.6$  mmol/L. An increased level of TG was found in 40% of cases, LDL-C in 80%, and decrease of HDL-C in 60%. Mean HDL-C concentration was  $1.09 \pm 0.2$  mmol/L, and mean LDL-C was  $3.74 \pm 1.16$  mmol/L. The majority of patients had type II hyperlipidemia with a high degree of atherogenicity: IIa - 12 people, IIb - 8 people. Correlation analysis revealed direct TC relationships with age, menopause, and overweight. The duration of RA was directly correlated with TC ( $r=0.189$ ), LDL-C ( $r=0.159$ ). CRP level negatively correlated with HDL-C ( $r=-0.169$ ).

**Conclusion:** TC increase was the most pronounced shift in lipid biomarkers. Lipid profile indicators are interrelated with traditional and disease-associated factors.

P557

**LONG-TERM OUTCOME OF A PATIENT WITH SEVERE FACTOR VIII DEFICIT AFTER THREE JOINTS REPLACEMENT SURGERIES: A CASE REPORT**E. Nikolikj Dimitrova<sup>1</sup>, V. Koevska<sup>1</sup>, B. Mitrevska<sup>1</sup>, C. Gjerakaroska Savevska<sup>1</sup>, M. Gocevska<sup>1</sup>, M. Manoleva<sup>1</sup>, B. Kalchovska Ivanovska<sup>1</sup>

<sup>1</sup>University Clinic of Physical Medicine and Rehabilitation, University Ss Cyril and Methodius, Skopje, Macedonia

**Objective:** People with severe deficit of factor VIII may develop haemophilic arthropathy due to recurrent joint bleeding. It leads to permanent deformities, limited range of motion, muscle wasting, misalignment, loss of mobility, and extremities of unequal lengths. They may also develop degenerative osteoarthritis of the hips. Total joint replacement is often used to improve the quality of life of these patients. The postoperative rehabilitation is crucial for better outcome of these patients. The purpose of this article is to present postoperative rehabilitation treatment of a patient with severe haemophilia A and functional outcome after three joint replacement surgeries on the lower extremities with five years follow-up.

**Case report:** A patient, at the age of 48 at follow-up, with severe haemophilia A, hip replacement surgery with total hip prosthesis on his both hips, and total knee replacement surgery on the right knee were undertaken. Prophylaxis was done with concentrate of human coagulation factor VIII. The patient also received physical therapy treatment before surgery to reduce pain and disability, as well as he performed postoperative rehabilitation after all surgical treatments. The postoperative rehabilitation treatment programs consisted of exercise therapy, occupational therapy, physical therapy modalities and education. Patient assessment was made with Numeric Rating Scale (NRS) for pain, clinical findings, Harris Hip Score and Functional Independence Score in Haemophilia (FISH) for disability. At follow-up assessment 5 y after the last operative treatment, the patient was subjectively and functionally significantly better than before the surgery treatments. He still has moderate pain in both ankles and the right shoulder periodically (NRS 3). Harris Hip Score was 82.8 points, which means good results and FISH score was 16 points. His gait on shorter distance was without a cane, and for longer distance with a cane.

**Conclusion:** People with severe hemophilia A may have successful functional outcome after multiple joint replacement surgeries. These results may remain during the next few years. The close collaboration between all team members are very important for achieving good results.

P558

**CAN INTRANASAL CORTICOSTEROIDS INDUCE OSTEOPOROSIS?**M.-R. Mitroi<sup>1</sup>, S.-A. Preda<sup>2</sup>, D.-M. Albulescu<sup>3</sup>, M.-J. Țuculina<sup>4</sup>, A. Căpitănescu<sup>1</sup>, G. Mitroi<sup>5</sup><sup>1</sup>University of Medicine & Pharmacy, Dept. of Otorhinolaryngology,<sup>2</sup>University of Medicine & Pharmacy of Craiova, Faculty of DentalMedicine, <sup>3</sup>University of Medicine & Pharmacy, Dept. of Anatomy,<sup>4</sup>University of Medicine & Pharmacy of Craiova, Faculty of DentalMedicine, <sup>5</sup>University of Medicine & Pharmacy, Dept. of Urology, Craiova, Romania

**Objective:** Glucocorticoids remain a cornerstone of guideline-based management of persistent asthma and allergic rhinosinusitis [1-4]. Glucocorticoid-induced osteoporosis (GIO) is the most common iatrogenic cause of secondary osteoporosis and an issue of concern for physicians treating patients with inhaled or oral glucocorticoids either continuously or intermittently. The aim of this study is to investigate the BMD in a group of patients with allergic rhinosinusitis.

**Methods:** 13 adult patients with a diagnosis of allergic rhinosinusitis and a history of at least 20 years of intranasal corticosteroids treatment were included in this study. Nasal endoscopy, skin prick tests, and nasal cytology were evaluated in all subjects. The BMD of the patients was measured by DXA.

**Results:** According to the T-scores, 4 patients were measured to have <-2.5 SD T-score, considered as osteoporosis.

**Conclusion:** This study shows that prolonged intranasal corticosteroids treatment in patients with allergic rhinosinusitis may induce osteoporosis [5-11].

**References:**

1. Mitroi M, et al. Mol Med Rep 2019;19:2792
2. Mitroi M, et al. Rom J Morphol Embryol 2011;52:1051
3. Ene CG, et al. Rev Chim (Bucharest) 2019;70:2108
4. Calina D, et al. J Clin Med 2020;9:2395
5. Constantin, C et al. Rev Chim (Bucharest) 2019;70:2401
6. Enescu AS, et al. Rom J Morphol Embryol 2017;58:145
7. Harza M, et al. Rom J Morphol Embryol 2014;55:123
8. Mitroi G, et al. Rom J Morphol Embryol 2015;56:1319
9. Andronesi AG, et al. Rom J Morphol Embryol 2016;57:1125
10. Rusescu A, et al. Rev Chim (Bucharest) 2018;69:642
11. Salan AI, et al. Rom J Morphol Embryol 2018;59:839

P559

**MONITORING BISPHOSPHONATE TREATMENT IN PRIMARY CARE: PINP AND OSTEOPOROSIS IN SHEFFIELD EVALUATION (POSE STUDY)**L. Mattia<sup>1</sup>, C. Mark-Wagstaff<sup>1</sup>, B. Abrahamsen<sup>2</sup>, S. Davis<sup>1</sup>, N. Peel<sup>3</sup>, R. Eastell<sup>1</sup>, M. Schini<sup>1</sup><sup>1</sup>University of Sheffield, Sheffield, UK, <sup>2</sup>University of Southern Denmark, Odense, Denmark, <sup>3</sup>Sheffield Teaching Hospitals, Sheffield, UK

**Objective:** To evaluate whether Sheffield PINP monitoring algorithm (1) is associated with better treatment persistence, BMD increase, reduced fracture risk and is cost-effective compared to standard care.

**Methods:** Inclusion criteria were referral from Sheffield GPs, BMD scans performed between 2012-2013 and report advising initiation of oral bisphosphonate and monitoring. 906 patients were recruited and retrospectively divided into Group A (intention to monitor, with baseline PINP, n=588) and Group B (no intention to monitor, without baseline PINP, n=318). The model described by Davis et al (2) was used to extrapolate life-time costs and quality-adjusted life-years (QALYs).

**Results:** No differences were found in baseline characteristics between groups (age, gender, BMI, BMD and major risk factors for fractures). More patients in Group A started oral treatment (77.4% vs. 49.1%; p<0.001), but there were no differences in the presence of gap in treatment >3 months and in treatment duration. More patients in Group A had follow-up DXA scan at 4-6 y from baseline (46.9% vs. 29.2%; p<0.000) and higher change of total hip BMD (+2.74% vs. +0.42%; p=0.003). Fewer new fractures occurred in Group A but this was not statistically significant. Patients in Group A were more likely to change management (p=0.005) including switching to zoledronate (p=0.03). The increased prescribing in Group A resulted in increases in both costs (£30.19) and QALYs (0.0039) relative to the no intention to monitor strategy, giving an incremental cost effectiveness ratio (ICER) of £7,660 in the probabilistic sensitivity analysis.

**Conclusion:** Patients monitored with PINP are more likely to start oral treatment, switch to zoledronate, have follow-up DXA scans and a greater increase of hip BMD. PINP monitoring has the potential to be cost-effective in a UK NHS setting given that interventions with an ICER under £20,000 are generally considered to be cost-effective in a UK context (3).

**References:**

1. Eastell R, et al. EJE 2018
2. Davis S, et al. Health Technol Assess 2020
3. Guide to the methods of technology appraisal 2013. NICE, London UK. 2013

**Acknowledgment:** The project was funded by Roche Diagnostics

P560

### LATIN AMERICAN CONSENSUS ON THE MANAGEMENT OF GLUCOCORTICOID INDUCED OSTEOPOROSIS: A PRELIMINARY COMMUNICATION

O. D. M. Messina<sup>1</sup>, P. E. C. Clark<sup>2</sup>, L. M. S. Mendez Sanchez<sup>3</sup>, M. L. P. Peralta<sup>4</sup>, S. Cerdas<sup>5</sup>, C. Campusano<sup>6</sup>, L. F. Vidal Neira<sup>7</sup>, M. L. Lazaretti Castro<sup>8</sup>, J. Morales Torres<sup>9</sup>, N. C. Harvey<sup>10</sup>, J.-Y. Reginster<sup>11</sup>, C. F. Zerbinì<sup>12</sup>

<sup>1</sup>IRO, Buenos Aires, Argentina, <sup>2</sup>Head Clinical Epidemiology Unit, Hospital Infantil Federico Gomez Faculty of Medicine UNAM, Mexico, Mexico, <sup>3</sup>Epidemiology Unit Hospital Infantil Federico Gomez, Mexico, Mexico, <sup>4</sup>Epidemiology Unit, Mexico, Mexico, <sup>5</sup>Endocrinology Unit, San José, Costa Rica, <sup>6</sup>Clinica Universidad de Los Andes, Santiago de Chile, Chile, <sup>7</sup>CEDOR, Lima, Peru, <sup>8</sup>UNIFESP, Sao Paulo, Brazil, <sup>9</sup>Hospital Aranda de la Parra, Guanajuato, Mexico, <sup>10</sup>Epidemiology Unit, Southampton, UK, <sup>11</sup>Division of Public Health, Epidemiology Unit, Liege, Belgium, <sup>12</sup>CEPIC, Sao Paulo, Brazil

Glucocorticoid (GC) induced osteoporosis (GCIOP) is the most frequent form of secondary osteoporosis in clinical daily practice. GC therapy is frequently indicated to treat autoimmune and chronic inflammatory diseases. Two of the most devastating untoward effects are bone loss and fractures. Doses as low as 2.5 mg of prednisone for more than 3 months can impair bone integrity. Population at risk is defined based on the dose and duration of GC therapy and should be stratified according to FRAX, major osteoporotic fracture, prior fracture and bone density values (BMD). General measures include to prescribe the lowest dose of GC to control the underlying disease for the shortest possible time, maintain adequate Vitamin D levels and calcium intake, maintain mobility and prescribe a bone acting agent in patients at high risk of fracture. These agents include oral and IV bisphosphonates, denosumab and teriparatide. The aim of this consensus is to update the management of GCIOP according to the reality of clinical practice in Latin American countries.

**Methods:** To develop this position paper a multidisciplinary panel of experts including methodologists and key experts in the use of chronic glucocorticoids including a patient or patient advocate, will define the scope of the consensus; this will follow with a systematic literature search to find all relevant papers including guidelines and systematic reviews. A set of consensus statements will be derived from the literature review including the grading recommendation and an adaptation to the local context in Latin America when needed. A questionnaire with a list of statements will be sent by mail to a larger group of physicians of diverse specialties known to prescribe glucocorticoids (rheumatologists, endocrinologists, primary care physicians, dermatologists among others) for a Delphi process aggregating and anonymizing feedback. Responses to the statements will be collected and analyzed, items may be dropped or added for subsequent rounds. Cron-

bach's  $\alpha$  will be used as measure of internal consistency and the inter-rater agreement between participants in each round will be evaluated using intraclass correlation coefficient with 95% confidence intervals. Manuscript will be drafted and will be available for comments to all members of the group before submission and publication.

P561

### PRIMARY DISABILITY DUE TO MUSCULOSKELETAL DISEASES IN THE IRKUTSK REGION (EAST SIBERIA, RUSSIAN FEDERATION)

I. L. Petrun'ko<sup>1</sup>, L. V. Men'shikova<sup>2</sup>, N. V. Sergeeva<sup>1</sup>

<sup>1</sup>"Head bureau of medical-social expertise in Irkutsk region" of Ministry of Labour and Social Development of RF, <sup>2</sup>Irkutsk State Medical Academy of Postgraduate Education – Branch Campus of the Federal State Budgetary Educational Institution of Further Professional Education "Russian Medical Academy of Continuing Professional Education", Irkutsk, Russia

**Objective:** Patients with diseases of the musculoskeletal system and connective tissue have an increased prevalence and disability. This study aimed to examine primary disability due to musculoskeletal diseases in the Irkutsk region (East Siberia, Russian Federation) in 2010-2020.

**Methods:** The method of solid data base for persons recognized as disabled for the first time for 2010-2020 in Irkutsk region due to musculoskeletal diseases. Level calculated at 10.000 of the adult population, structure - in percentage.

**Results:** Primary disability due musculoskeletal diseases in the Irkutsk region is higher than in the Russian Federation. There is a decrease of percent of primary disability from 11.7% in 2010 to 6.0% (2018), 6.1% (2019) and to 7.6% (2020) and in its level in adults from 10.4 in 2010 to 5.9 in 2015 and to 4.4 to 10 thousand of population. The first place (45.5% - 40.5%) in the structure of primary disability in adults takes osteoarthritis, in the working-age population - dorsopathies (45.9% - 29.1% in 2020). In the persons of retirement age osteoarthritis takes the first place (from 75.1% to 61.3%). In the working-age population it occupies the second place (from 31.6% - 38.2% to 29.1% in 2020). In the third place, as in people of working age, and at retirement age, is rheumatoid arthritis (10-12%).

**Conclusion:** The level of primary disability is higher in urban residents and women. Reducing the level of disability due musculoskeletal diseases was reached by both the greater availability of high quality and high tech medical care for patients (operative treatment, early mobilization and rehabilitation), as well as changes in regulatory documents on disability criteria.



P562

**ECHOCARDIOGRAPHIC ASSESSMENT OF LEFT HEART FUNCTION IN PATIENTS WITH RHEUMATOID ARTHRITIS**S. S. Spitsina<sup>1</sup>

<sup>1</sup>Federal State Budgetary Institution "Research Institute of Clinical and Experimental Rheumatology A.B. Zborovsky"; Volgograd State Medical University, Volgograd, Russia

**Objective:** Assessment of the essential echocardiographic parameters of left heart chambers in rheumatoid arthritis (RA).

**Methods:** Patients with RA and symptoms arisen at least 3 months before were included in the study. The exclusion criteria were presence of symptomatic coronary heart disease, arterial hypertension, or diabetes mellitus.

**Results:** All the included persons (n=24) were women. Their age was  $49.6 \pm 7.9$  y, and disease duration was from 0.5-12.0 y. DAS28-CRP(4) index was  $5.0 \pm 0.6$ . All the patients were treated with basic antirheumatic drugs as well as NSAIDs therapy; in 25% of cases glucocorticoids were also applied. Weight excess according to their BMI was found in 16.7% of patients, but neither high blood glucose concentrations nor low GFR were revealed. Mean total cholesterol was  $5.59 \pm 0.92$  mmol/l. No low ejection fractions were registered in patients studied. Mean interventricular septum (IVS) thickness was  $8.9 \pm 1.0$  mm whereas 25.0% patients had high IVS thickness ( $>10$  mm). Mean left ventricle (LV) myocardial mass index was  $90.42 \pm 23.85$  g/m<sup>2</sup>, with patients had its mild (25.0%), moderate (8.3%) or pronounced (8.3%) increase. Mean LV posterior wall thickness was  $0.92 \pm 0.12$  cm, and 41.6% patients had it 11 mm or more. Mild LV diastolic dysfunction was also revealed in all the cases (decreased mean average E/A ratio,  $0.87 \pm 0.24$ ). In 92% of individuals, Grade 1 mitral or tricuspid regurgitation have been found in 92% patients, 8.3% had grade 2 tricuspid regurgitation, and 42% ultrasound manifestations of aortic atherosclerosis.

**Conclusion:** There are certain morphological and functional changes of heart in RA even in absence of arterial hypertension, or any other primary heart disease. Most common type of echocardiographic changes includes concentric LV hypertrophy with diastolic dysfunction, mild valvular dysfunction without ventricle dilation, and aortic atherosclerosis.

P563

**TUMOR-INDUCED OSTEOMALACIA: DIAGNOSTIC AND REHABILITATION CHALLENGES**Z. Abilov<sup>1</sup>, A. Zhukov<sup>1</sup>, A. Povaliaeva<sup>1</sup>, E. Pigarova<sup>1</sup>, L. Rozhinskaya<sup>1</sup>, K. Slashuk<sup>1</sup>, G. Melnichenko<sup>1</sup>

<sup>1</sup>Endocrinology Research Centre, Moscow, Russia

**Objective:** Tumor-induced osteomalacia (TIO) is a rare paraneoplastic syndrome, which is characterized by renal phosphate wasting and disordered bone mineralization. Due to a non-specific symptoms, small size and slow growth of the tumor, it can take far more than several years to make a correct diagnosis since the appearance of the first symptoms, which may lead to irreversible consequences despite successful treatment. We present a case of the patient with TIO and secondary hyperparathyroidism (SHPT) caused by hungry bone syndrome.

**Case report:** A 65-y woman had 12-y history of severe lower back pain, decrease in height by 16 cm during life, multiple atraumatic fractures of the ribs and pelvic bones. The patient moved around using a wheelchair, but initiation of therapy with alfacalcidol 3 mcg/d, cholecalciferol 15 000 IU/week, calcium 1000 mg/d in 2014 improved her condition and she began to move independently. However pain syndrome is contained exclusively by narcotic analgesics (tramadol 200 mg/d). Tumor was localized in 2018 using somatostatin receptor scintigraphy with <sup>99m</sup>Tc-Tektrotyd in the left inguinal region, which was resected (pathology - mesenchymal tumor, FGF23+). After tumor removal SHPT was observed during 2 following years despite medical treatment with alfacalcidol 3 mcg, cholecalciferol 15000 IU/week and calcium 2000 mg/d, which corresponded to hungry bone syndrome. Normalization of SHPT was achieved only after 2 y of treatment. The BMD increase was significant and continued throughout the 3 years after surgery: +127.7% at hip, +23.4% - lumbar spine, +3.2% - radius. Despite the normalization of the biochemical parameters and increase in BMD, patient's quality of life continues to be significantly reduced. The patient has to use cane and walk for short distances because of multiple bone fractures and severe pain syndrome.

**Conclusion:** Our clinical case illustrates that despite the successful results of surgical removal of the tumor, a long course of rehabilitation may be required. Severe pain syndrome due to multiple fractures, hungry bone syndrome and secondary hyperparathyroidism is a challenge in the treatment of these patients. Early diagnosis and initiation of the therapy can reduce the number of complications and improve quality of life parameters.

P564

**ASSESSMENT OF PAIN SYNDROME IN PATIENTS WITH SPONDYLOARTHRITIC PSORIATIC ARTHRITIS**S. S. Spitsina<sup>1</sup>

<sup>1</sup>Federal State Budgetary Institution "Research Institute of Clinical and Experimental Rheumatology A.B. Zborovsky"; Volgograd State Medical University, Volgograd, Russia

**Objective:** To assess the severity of pain and quality of life in patients with spondyloarthritic psoriatic arthritis (PsA), as well as the effectiveness of therapy with methotrexate (MT).

**Methods:** We examined 15 patients with PsA receiving MT (at a dose of 10-20 mg/week) as a basic therapy for at least 6 months. DAS28-CRP(4), DAPSA, the visual analogue scale (VAS), Likert scale were used. The quality of life was assessed using the BASDAI, SF-36, HAQ-DI, DLQI, QIDS SR-16. Skin manifestations of psoriasis was assessed by the PASI index, BSA.

**Results:** Among patients there were 12 men, 3 women. The age of the patients was 48.2±10.56 y, the duration of the articular syndrome was from 7 months to 5 y, the duration of the skin syndrome was from 1.5-22 y. All patients had DAS28-CRP(4) from 4.28-5.01; DAPSA from 23-26.8. The activity of the disease according to the VAS by the patient was 61±8.9 mm, by the doctor - 58±4.2 mm, according to the Likert scale - 2.5 points. The presence of pain and functional limitations negatively affected all parameters of quality of life. Physical (41.64±10.9) and mental (39.22±9.2) indicators changed according to SF-36. HAQ-DI values ranged from 0.50-1.25, BASDAI - from 3.4 to 5.6, DLQI - from 7 to 12, QIDS SR-16 - from 5 to 10. PASI, as an indicator of the severity and severity of psoriasis, ranged from 4-13.6 points, the BSA index in assessing the prevalence of skin manifestations - from 2 to 9.8%.

**Conclusion:** All patients with spondyloarthritic PsA did not achieve remission or low activity while taking MT as a DMARD. In 100% of patients, despite long-term use of MT in a stable dosage, moderate clinical and laboratory activity of the disease remained, which affected all indicators of quality of life (both physical and mental, including manifestations of mild depression).

P565

**VITAMIN D STATUS AMONG RESIDENTS OF DIFFERENT REGIONS OF RUSSIAN FEDERATION**D. Marmalyuk<sup>1</sup>, G. Runova<sup>1</sup>, M. Saliba<sup>1</sup>, N. Bulanov<sup>1</sup>, V. Fadeyev<sup>1</sup>

<sup>1</sup>Sechenov University, Moscow, Russia

**Objective:** To study the vitamin D status depending on age, season and geographical regions of Russian Federation.

**Methods:** In this retrospective study we analyzed 115,694 anonymised blood samples from "In vitro" commercial laboratory database. The samples were collected from 2012-2017 in the central, northwestern and southern regions of Russian Federation. Serum levels of vitamin D (25(OH)D) were measured using chemiluminescent assay. The participants over the age of 16 were included in this study.

**Results:** The median age was 45 [33; 58] y. 25(OH)D median value was 23.9 [17.0; 31.6] ng/ml. It was found that from 2012-2017, 69.5% of all samples had levels of 25(OH)D <30 ng/ml. There was no significant difference between prevalence of vitamin D deficiency (<20 ng/ml) in 2012 and 2017 (33.5% vs. 35%, p=0.188). The difference between number of samples with 25(OH)D <20 ng/ml in winter and summer was significant (35% vs. 30%, p=0.06). There was no evidence that number of participants with 25(OH)D in normal range (30-60 ng/ml) was different in various residential areas: central region 28.4%, northwestern region 30.1% and southern region 21.8% (p>0.05). However, severe deficiency (<10 ng/ml) was statistically higher in northwestern region (p<0.05). The analysis of different age groups had shown that 25(OH)D deficiency and severe deficiency were higher in group <20 y (42% and 7.7%) as compared with 20-29 y (31.5% and 3.9%) and 40-59 y (32% and 5.3%), p=0.000 for all. Moreover, only 22.6% in group <20 y was in normal range, what was comparable with group >80 y (18.1%), p=0.1.

**Conclusion:** We demonstrate that vitamin D deficiency is widespread in Russian Federation. No differences in vitamin D status has been observed in various regions. Lower prevalence of 25(OH)D <20 ng/ml in summer was discovered. The lowest level of vitamin D was observed in groups <20 and >80 y.

P566

# PATIENTS FUNCTIONALLY CAPACITY AFTER OSTEOPOROTIC FRACTURES

C. Mazeda<sup>1</sup>, S. P. Silva<sup>1</sup>, P. Vilas-Boas<sup>1</sup>, B. Figueiredo<sup>1</sup>, A. Barcelos<sup>1</sup>

<sup>1</sup>Centro Hospitalar Baixo Vouga, Aveiro, Portugal

**Objective:** Osteoporotic fractures imposes a significant health care burden globally with the medium and long-term functional consequences being catastrophic. This study aimed to analyze the relationship between type of fracture, co-morbidities and functional dependence.

**Methods:** This was a retrospective cohort study that involved patients with a fragility fracture observed in a Fracture Liaison Service (FLS). Sociodemographic, clinical data and patients' outcomes, after 12 months, were collected. The data covered the period between 1 January 2019 to 31 December 2020 and was collected from the hospital database. A general descriptive analysis was performed, p-value <0.05 was statistically significant.

**Results:** A total of 187 patients were included (158 females, 29 males) averaging 76.98±11.99 years old. Most frequent comorbidities included hypertension, diabetes mellitus, dyslipidemia, chronic renal disease, thyroid pathology and depressive syndrome. Osteoporosis risk factors, such as alcohol consumption and corticotherapy, were also evaluated. The majority of fractures were hip fractures (62.6%), followed by vertebral (15%), tibia (13.4%), humerus (6.4%), and wrist (2.7%). In the prefracture period, most patients were autonomous (58.8%) and only 12.3% were total functionally dependent. After one year of follow-up, a general decrease in autonomy was observed (43.3% were autonomous, 19.3% were total functionally dependent, 5.9% died and 7.5% were lost for follow-up). No statistically significant differences between the two periods were found (p=0.704). In 22% of patients who were functionally independent before the fracture (81 patients), they became partially dependent for activities of daily living, after one year of follow-up. The type of fracture is associated with alterations in functional dependence (p=0.015). No statistically relevant differences were found between different comorbidities (p<0.05). The use of systemic corticotherapy were related to vertebral fracture (p=0.02).

**Conclusion:** FLS has a fundamental roll to promote an early patients recovery to the pre-fracture functional capacity and counsel the patient about the potential rehabilitative benefits.



P567

# PHYSICAL THERAPY PROTOCOL FOR THE PREVENTION OF METABOLIC BONE DISEASE OF PREMATURE

L. C. Sousa<sup>1</sup>, J. Romano<sup>2</sup>, A. M. Ribeiro<sup>1</sup>, R. Amorim<sup>1</sup>, L. Palhau<sup>1</sup>

<sup>1</sup>Centro Hospitalar Universitário do Porto, <sup>2</sup>Unidade Local de Saúde de Matosinhos, Porto, Portugal

**Objective:** Metabolic bone disease of prematurity (MBDP) is characterised by reduced mineralization of the skeleton due to nutritional and biomechanical factors. Physical inactivity due to lack of mechanical stimuli and fetal movements against the uterine wall is a proposed contributor. As such, physical therapy intervention has been proposed for MBDP treatment. The aim of this paper is to review the published physical interventions in MBDP, in order to compile a protocol with defined selection and follow-up criteria and an objective physical therapy intervention.

**Methods:** A scientific review was performed using MEDLINE (PubMed), COCHRANE Library and Physiotherapy Evidence Database (PEDro). Clinical trials evaluating a physiotherapy intervention were selected for protocol elaboration. Major outcomes considered included growth and bone mineralization.

**Results:** Preterm infants with very to extremely low birth weight (<1500 g) are eligible. Other MBDP risk factors should be considered for referenciation to PRM. Intervention begins between 1-2 weeks of life. The proposed protocol consists of a tactile/kinesiotherapeutic stimulation - 6 soft strokes per region, bilaterally (shoulder-to-wrist, along the chest wall, hip-to-feet, occipital-facial-cervical and cervical-to-pelvis), in supine, for 15 min, followed by passive mobilization with soft articular compression based on the intervention proposed by Moyer-Mileur et al., 1995 - 10 reps of extension and flexion in each joint in a cephalocaudal direction for 15 min. Sessions are performed once a day for 30 min, 5-6 d/week, 30 min after feeding. The intervention is maintained, at least, until the infant reaches a weight of 2000 g or until discharge. Post-discharge follow-up will include growth, neuromuscular maturity parameters and adverse skeletal events (deformities, fractures).

**Conclusion:** MBDP's clinical spectrum can range from asymptomatic to a higher incidence of fragility fractures in the neonate. Long term consequences are poorly defined. Rehabilitation programs have proven to improve linear growth, daily weight gain and bone mineralization in the short term. By describing and implementing this protocol we hope to draw attention to PRM's role in improving standard of care for premature newborns.

P568

### ASSESSMENT OF THE MAIN INDICATORS OF THE HEMOSTASIS SYSTEM IN PATIENTS WITH RHEUMATOID ARTHRITIS

K. V. Zhigulina<sup>1</sup>, S. S. Spitsina<sup>2</sup>

<sup>1</sup>City Clinical Emergency Hospital 25, <sup>2</sup>Federal State Budgetary Institution "Research Institute of Clinical and Experimental Rheumatology A.B. Zborovsky"; Volgograd State Medical University, Volgograd, Russia

**Objective:** To assess the main indicators of blood coagulogram in patients with rheumatoid arthritis (RA), to determine their relationship with the degree of activity, duration and systemic manifestations of the disease.

**Methods:** 100 patients with RA were examined. The state of the blood coagulation system was determined according to the following indicators: prothrombin index (PTI) according to Quick (%), fibrinogen (g/l), activated partial thromboplastin time (APTT, s), international normalized ratio (INR).

**Results:** Among the surveyed there were 76% of women and 24% of men. The average age of the patients was  $53.7 \pm 12.25$  y, the duration of the disease was  $6.13 \pm 3.69$  y. Seropositive RA was detected in 63%. All patients had moderate to high RA activity (32% and 68%). Pathology of the cardiovascular system was detected in 84% of patients. More significant changes in the coagulogram were recorded in patients with systemic manifestations and concomitant cardiac pathology compared with the articular form: increased PTI ( $107.20 \pm 1.26\%$  and  $103.68 \pm 3.21\%$ , respectively) and fibrinogen ( $6.4 \pm 0.8$  g/l and  $5.1 \pm 0.76$  g/l); decrease in INR ( $0.83 \pm 0.06$  and  $0.96 \pm 0.14$ ) and APTT ( $27.5 \pm 1.21$  s and  $34.1 \pm 2.4$  s). The same trend persisted in the group of patients with a disease duration of  $>7$  y. Correlation analysis between coagulogram parameters and disease activity showed a direct positive relationship between IPT and ESR ( $r=+0.23$ ), fibrinogen and ESR ( $r=+0.34$ ), fibrinogen and CRP ( $r=+0.32$ ). Also, inverse correlations were obtained between INR and ESR ( $r=-0.24$ ), APTT and ESR ( $r=-0.22$ ), APTT and CRP ( $r=-0.26$ ).

**Conclusion:** In RA patients, an increase in PTI and fibrinogen level, a decrease in INR, and a shortening of APTT were found, which indicates activation of the blood coagulation system, hypercoagulation. The revealed disorders correlate with RA activity, disease duration, presence of systemic manifestations and concomitant cardiovascular pathology.

P569

### CARBOHYDRATE IMBALANCE IN PATIENTS WITH GOUTY ARTHRITIS

K. V. Zhigulina<sup>1</sup>, S. S. Spitsina<sup>2</sup>

<sup>1</sup>City Clinical Emergency Hospital 25, <sup>2</sup>Federal State Budgetary Institution "Research Institute of Clinical and Experimental Rheumatology A.B. Zborovsky"; Volgograd State Medical University, Volgograd, Russia

**Objective:** To study the incidence of carbohydrate metabolism disorders in patients with gouty arthritis (GA).

**Methods:** The study included 40 patients with primary chronic GA, diagnosed on the basis of S. Walles criteria and with impaired carbohydrate metabolism. Among the examined men prevailed (65%), the average age of the patients was 52 y. A family history of gouty arthritis was observed in 25 patients. The average duration of the disease was  $8.2 \pm 3.5$  y. All patients underwent daily fasting measurements of blood sugar levels with a glucometer, and a study of glycosylated hemoglobin was carried out.

**Results:** All patients were hospitalized in the rheumatology department. The onset of GA was observed on average at  $35.6 \pm 10.0$  y. Tofus form was diagnosed in 26 (65%) patients, 14 (35%) did not have tophus. The average level of fasting blood glucose is  $8.4 \pm 2.8$  mmol/l. Type 2 diabetes mellitus had 10 (25%) patients. In 25 (62.5%), impaired glucose tolerance was noted. Impaired fasting glucose was observed in 5 (12.5%) patients. The average level of glycosylated hemoglobin was  $7.0 \pm 1.5\%$ . At the time of examination, 8 (20%) were receiving hypoglycemic therapy. In the course of the study, complications of diabetes mellitus were identified. Diabetic retinopathy was most often detected in 6 (15%) patients; nephropathy at the stage of microalbuminuria was detected in 5 (12.5%) patients.

**Conclusion:** The study revealed a fairly high prevalence of carbohydrate metabolism disorders in patients with gouty arthritis. Careful monitoring of both the course of gout and its inherent comorbid pathology is necessary due to the numerous complications and concomitant disorders.



P570

# DENOSUMAB IN MEN: 6 YEARS RETROSPECTIVE, REAL-WORLD CLINICAL PRACTICE SINGLE CENTRE STUDY (OSTEOPROM). OSTEOPOROSIS TREATMENT AND FRACTURES DATA – PART 1

D. Pokšāne<sup>1</sup>, I. Rasa<sup>2</sup>

<sup>1</sup>Latvian Osteoporosis & Bone Metabolic Diseases Association; Rīga Stradiņš University, <sup>2</sup>Latvian Osteoporosis & Bone Metabolic Diseases Association, Rīga East Clinical University Hospital (RECUH), Rīga Stradiņš University, Rīga, Latvia

**Objective:** Osteoporosis represents a considerable threat to global health and national healthcare systems. It is a disease that causes bones to become weak and lose their strength, making them break more quickly than normal bones. Globally 20–25% of fragility fractures occur in men. In the coming decades' prevalence of osteoporotic fractures to increase due to population ageing, e.g., hip fractures to rise more in men than in women; men are twice as likely to die after a hip fracture. The treatment approaches to male osteoporosis are diverse. Osteoporosis in men is an under-recognized and undertreated disease.

**Methods:** We analyzed the effectiveness of osteoporosis treatment in men with denosumab (Dmab) from August 2014 to January 2021. We studied BMD changes and fractures in the men retrospective cohorts in a real-world clinical setting using patients (pts) data from single-centre (OsteoProM). We collected and analyzed at the beginning and end of the study: BMD changes of the spine L1/L4 and in some cases total spine, right and left femoral neck by using DXA and 1 case by QCT; risk factors; lab data (serum Ca, iPTH, vitamin D); comorbidities and concomitant medications. Men were divided into 6 groups according to the number of Dmab injections (inj): group (grp) 1 (12–13 inj.), grp 2 (9–11 inj.), grp 3 (8 inj.), grp 4 (6–7 inj.), grp 5 (4–5 inj.), grp 6 (1–3 inj.). This grp was divided into 2 subgroups: 6A1 (BMD in spine L1/L4) and 6A2 (BMD in a total of the spine); grp 6B BMD made by QCT.

**Results:** Over the last 6 y, women with OP was 691 (89.2%) and men 84 (10.8%). We analyzed a total of 37 (44%) of 84 men who received Dmab. Men an average age 63.2±10.4SD y. The average BMI (kg/m<sup>2</sup>) was 24.3±3.7SD. BMD analyzed by DXA scans in 36 pts (97.3%) and QCT in 1 pt (2.7%). Men with idiopathic osteoporosis were 83.8%, glucocorticoid-induced osteoporosis 10.8%, secondary osteoporosis 5.4%. At the beginning of the study, men with at least 1 fracture were 56.7% (62.0% in the spine, 9.5% hip, 14.3% forearm, 28.6% ribs, 28.6% other types of fractures). At the end of the study, men with at least 1 fracture were 2 (5.4%) – grp 6A2 (left olecranon) and grp 2 (vL1). DXA was made for all pts at the beginning of the study (n=37) and at the end of the study 43.2% (n=16). The most significant BMD gain in the 1st grp 12.8% (n=2). Then in the subgroup 6A2 – 9% (n=3); grp 2 (n=4), and grp 5 – 7.8% (n=2). The least significant gain was in the grp 3 – 2.8% (n=2). In the grp 4 – 6.6% (n=4) and in the subgroup 6A1 – 3.8% (n=2). Also, total right and left BMD was analyzed (n=12); more significant gain was in grp 1st in the right hip – 4.7% and left hip –

5.9% (n=2). Lab data, data about co-morbidities and concomitant medications will be presented later. During the study, no cardiovascular events were detected.

**Conclusion:** Dmab is effective in increasing BMD at the lumbar spine and the hip. The most significant BMD increased after 12–13 Dmab injections. The study indicates that Dmab is effective and safe.

P571

# EVALUATION OF DIABETES MELLITUS IN A COHORT OF FRAIL OLDER ADULTS

S. Mc Gettigan<sup>1</sup>, A. Mohamed<sup>2</sup>, I. Pillay<sup>1</sup>, M. J. Brassill<sup>1</sup>

<sup>1</sup>Tipperary University Hospital, Clonmel, <sup>2</sup>University Hospital Limerick, Limerick, Ireland

**Objective:** To identify the prevalence of diabetes in a cohort of frail older adults who attended Tipperary University Hospital (TUH) and explore the relationship between frailty and diabetes in this group. Prognosis and treatment of diabetes can vary greatly in the presence of frailty.

**Methods:** A multidisciplinary team provide liaison geriatric input to frail older adults in TUH. This team carries out comprehensive geriatric assessments (CGAs) on patients identified using a VIP tool or via inpatient consults. These CGAs were accessed and reviewed regarding frailty scores, history of falls, diabetes diagnosis, medications and diabetes complications including hypoglycaemia.

**Results:** CGAs were reviewed for 213 patients from September to November 2019. 58 patients had a diagnosis of diabetes (27.2%), and all were type 2 diabetics. The median age was 84. The average Clinical Frailty Scale score was 5.4 indicating mild to moderate frailty. Over two-thirds of patients (n=137) were on >5 medications. 76 patients had a history of falls, and 24 (31.5%) of those had diabetes. 21 patients were prescribed either sulphonylureas and/or insulin. One patient had a sulphonylurea stopped on admission following CGA. Five patients had a documented history of hypoglycaemia, 2 of these patients were on insulin and one was on a sulphonylurea. The median HbA1c was 49 mmol/mol. 15 patients had complications associated with diabetes, including 3 with diabetic retinopathy and 6 with diabetic neuropathy. The median duration of diabetes was 9.5 y.

**Conclusion:** The management of frail older adults with type 2 diabetes is complicated by multimorbidity and increased risk of adverse effects of treatment such as hypoglycaemia. The assessment of frailty should be a routine component of a diabetes review for all older adults, and then glycaemic targets and medication choices should be adjusted accordingly.

P572

**MAIN OSTEOSARCOPENIA RISK FACTORS IN STABLE COPD PATIENTS**A. K. Suleymanova<sup>1</sup>, I. A. Baranova<sup>1</sup><sup>1</sup>The Russian National Research Medical University N.I. Pirogov, Moscow, Russia

**Objective:** It is known that COPD is often combined with osteoporosis and sarcopenia, which are often under-diagnosed. The aim of the study was to analyze the main osteosarcopenia risk factors.

**Methods:** This cross-sectional study included 132 patients with stable COPD (102 males/30 females, mean age 67.6±8.2 y). All patients were assessed of symptoms and risk of exacerbations according to GOLD consensus report (ABCD assessment). Sarcopenia and its severity were diagnosed for all subjects according to the algorithm developed by the EWGSOP2 criteria. The Appendicular Skeletal Muscle Mass and BMD were estimated using DXA. Osteoporotic fractures were revealed by X-ray or anamnesis. The vitamin D level was assessed by chemiluminescent immunoassay on microparticles according to international standards. Key risk factors were evaluated using multiple logistic regression analysis.

**Results:** Sarcopenia was diagnosed in 41.7% of COPD patients. A low BMD (osteopenia or osteoporosis) was diagnosed in 84.8% of patients. A combination of these two pathologies or osteosarcopenia was found in 38.6% of COPD patients (n=51). Moreover, 9.9% of patients had severe osteosarcopenia characterized by osteoporotic fractures, severe muscle weakness and atrophy. Osteosarcopenia was found at any "ABCD" groups and severity airflow limitation. However, very severe airflow limitation (OR=5.8 (95%CI 1.4-2.0, p=0.01)), use of systemic glucocorticoids (OR=4.7 (95%CI 1.1-10.5, p=0.03)), low BMI (OR=1.3 (95%CI 1.1-1.3, p<0.01)), group D by GOLD (OR=4.7 (95%CI 2.5-5.0, p=0.02)), low blood vitamin D concentration (OR=10.5 (95%CI 1.1-83.3, p=0.03)) were the main osteosarcopenia risk factors.

**Conclusion:** Osteosarcopenia is a frequent pathology in COPD patients (38.6%), almost one in ten patients has osteoporotic fractures. The COPD clinical severity, the use of systemic glucocorticoids, low BMI and very severe airflow limitation, as well as low blood vitamin D levels are the main osteosarcopenia risk factors.

P573

**DISCORDANCE IN DXA DERIVED T-SCORES AT THE HIP AND SPINE IN OSTEOPOROSIS**E. Brennan<sup>1</sup>, A. McDonough<sup>1</sup>, N. Maher<sup>1</sup>, C. O'Carroll<sup>1</sup>, N. Fallon<sup>1</sup>, H. McNulty<sup>2</sup>, M. Ward<sup>3</sup>, R. Lannon<sup>1</sup>, K. McCarroll<sup>1</sup><sup>1</sup>St James's Hospital, Dublin, Ireland, <sup>2</sup>University of Ulster, Belfast, UK, <sup>3</sup>University of Ulster, Belfast, Northern Ireland

**Objective:** There is often significant discordance between T-scores of the hip and spine and in some patients only one site can be measured. This study aimed to identify the importance of site-specific T-scores in diagnosing osteoporosis.

**Methods:** We analysed data from participants of the Trinity, University of Ulster and Dept. of Agriculture Study (TUDA) cohort who all had BMD measurements of both the spine and hip and a diagnosis of osteoporosis using standard ISCD criteria.

**Results:** 746 participants were identified with a mean age of 71.7±7.3, of whom 82.5% were female. Osteoporosis was identified in 82.8% in the spine, in 53.4% in the hip and in 13.9% osteoporosis was identified on the basis of only hip T-scores. The concordance rate for osteoporosis at the spine and hip was 36.1%. In 70% of cases, T-scores were lower in the neck of femur vs. total hip. Differences in site diagnosis was largely between osteoporosis and osteopaenia though in 7.7% there was a mismatch due to osteoporosis of spine and normal hip BMD. Hip osteoporosis was independently predicted by male gender (p<0.001), older age (P<0.001) and lower BMI (P<0.001).

**Conclusion:** In the vast majority, spine BMD inferred a DXA diagnosis of osteoporosis. However, in one in eight, a diagnosis of osteoporosis was based on only hip BMD. Multiple factors cause discordance including greater bone loss in the spine due to menopause, drugs and other secondary causes. Greater spine BMD readings occur in osteoarthritis while factors like BMI may impact the hip more. However, fragility fractures at either site independent of T-score can also indicate osteoporosis.

P574

**SARCOPENIA AND FRACTURES IN COPD PATIENTS**A. K. Suleymanova<sup>1</sup>, I. A. Baranova<sup>1</sup><sup>1</sup>The Russian National Research Medical University N.I. Pirogov, Moscow, Russia

**Objective:** Sarcopenia is a progressive and generalized skeletal muscle disorder that is associated with increased likelihood of adverse outcomes. The aim of the study was to analyze the main predictors and consequences (fracture development) of sarcopenia in COPD patients.

**Methods:** In the cross-sectional study 132 patients with stable COPD (102 males/30 females, mean age  $67.6 \pm 8.2$  y) were included. Sarcopenia and its severity were diagnosed according to the algorithm of the EWGSOP2. Muscle mass was evaluated using DXA. Vertebral fractures were diagnosed using semiquantitative morphometry in routine DXA. The main key risk factors were evaluated in multiple logistic regression analysis.

**Results:** Sarcopenia was diagnosed in 55 (41.7%) patients. 44 patients (33.3%) had severe sarcopenia. Sarcopenia was registered at any groups of COPD (the ABCD assessment tool). However, low FEV1 (OR=1.3 (95%CI 1.0-1.6,  $p < 0.001$ )), use of systemic glucocorticoids (OR=3.4 (95%CI 1.2-12.7,  $p = 0.03$ )), low BMI (OR=1.3 (95%CI 1.2-1.4,  $p < 0.001$ )), group D (OR=4.0 (95%CI 1.2-13.7,  $p = 0.03$ )) were the main predictors of sarcopenia. Osteoporotic fractures were present in 35 patients (26.5%). Half of all patients with fractures ( $n = 17$ ) had asymptomatic vertebral fractures, which we first diagnosed using morphometric analysis. Multiple fractures were in 18 patients (13.6%). Patients with sarcopenia have osteoporotic fractures more often than patients without sarcopenia (OR=2.8 (95%CI 1.3-6.2,  $p = 0.02$ )).

**Conclusion:** Sarcopenia is a frequent pathology in COPD patients and it is associated with the severity of the underlying disease, the use of systemic glucocorticoids, low BMI and airflow limitation. Sarcopenia significantly increases the risk of osteoporotic fractures such as vertebral fractures which may be without symptoms.

P575

**EXPERIENCE WITH TERIPARATIDE AS TREATMENT OF OSTEOPOROSIS IN THE MOSCOW REGION OF THE RUSSIAN FEDERATION**K. A. Krasulina<sup>1</sup>, I. V. Kryukova<sup>1</sup>, A. V. Dreval<sup>1</sup>, E. Y. Polyakova<sup>1</sup>, I. A. Barsukov<sup>1</sup><sup>1</sup>Moscow Regional Research and Clinical Institute (MONIKI), Moscow, Russia

**Objective:** To evaluate the efficacy of teriparatide in patients with different forms of osteoporosis in real clinical practice in the Moscow region of the Russian Federation.

**Methods:** The study included 83 patients with osteoporosis: 1) primary (42 postmenopausal women, 7 men  $> 50$  y), 2) glucocorticoid-induced (25 women, 4 men), 3) as a result of other causes (2 women, 3 men). The average age was  $65 \pm 13$  (22-92) y. The diagnosis of osteoporosis was made using densitometry (DXA, T-score is  $< -2.5$ SD in the lumbar spine or hip) and/or a history of low-energy hip, vertebral or multiple fractures. All patients were treated with teriparatide 20  $\mu$ g/d. Treatment efficacy was assessed by DXA after 12 and 24 months and the new reported fractures. Procollagen type 1 N-terminal propeptide (P1NP) was tested in 8 patients at baseline and after 3 months of therapy.

**Results:** Initially, patients had multiple (27 (32.53%)), vertebral (32 (38.55%)) and femoral (3 (3.61%)) fractures. A statistically significant increase in P1NP level from  $55.6 \pm 5.6$  to  $76.8 \pm 12.3$  ng/ml ( $p = 0.02$ ) after 3 months was found in women with postmenopausal osteoporosis ( $n = 7$ ), that reflected the early treatment effectiveness. One man with senile osteoporosis also showed a rise in P1NP from 49.3 to 61.8 ng/ml. After 2 y of therapy, T-score and BMD increased from the initial  $-2.77 \pm 1.17$ SD and  $0.77 \pm 0.14$  g/cm<sup>2</sup> to  $-2.52 \pm 0.91$ SD and  $0.82 \pm 0.1$  g/cm<sup>2</sup> ( $p < 0.001$ ,  $n = 70$ ) respectively. Patients with postmenopausal osteoporosis without type 2 diabetes mellitus ( $n = 32$ ) showed an increase in T-score in the spine from  $-2.83 \pm 1.06$ SD to  $-2.58 \pm 1.24$ SD ( $p = 0.014$ ) and in the femoral neck from  $-2.16 \pm 0.77$ SD to  $-1.88 \pm 0.84$ SD ( $p = 0.046$ ). In the glucocorticoid-induced osteoporosis group, there was an improvement in T-score in the spine ( $-2.18 \pm 0.87$  vs.  $-2.77 \pm 1.09$  ( $p = 0.011$ )) and in the hip ( $-1.71 \pm 0.88$  vs.  $-2.09 \pm 0.63$ ), but not statistically significant ( $p = 0.609$ ). There were no new cases of fractures and adverse events associated with the therapy.

**Conclusion:** The use of teriparatide in patients with both primary and secondary osteoporosis in real clinical practice in the Moscow region of the Russian Federation has shown a significant increase in BMD without new cases of fractures and it is characterized by acceptable tolerability profile.

P576

### EFFECTIVENESS AND SAFETY OF PHARMACOLOGICAL AND NONPHARMACOLOGICAL THERAPY FOR RHEUMATOID ARTHRITIS: AN OVERVIEW OF REVIEWS

E. Sanchez-Vazquez<sup>1</sup>, L. Mendez-Sanchez<sup>1</sup>, P. Clark<sup>1</sup>, B. Araiza<sup>1</sup>, E. Diaz<sup>1</sup>

<sup>1</sup>National Autonomus University of Mexico (Universidad Nacional Autónoma de México) and Hospital Infantil de Mexico Federico Gómez, Clinical Epidemiology Research Unit, Mexico City, Mexico

**Objective:** Compare the efficacy and safety of DMARD synthetic and biological as well as nonpharmacological therapies in patients with rheumatoid arthritis (RA).

**Methods:** Systematic reviews were included that met the selection criteria: the efficacy outcomes studied were ACR, EULAR, and DAS28. The overlap of the included primary studies was assessed, as well as the risk of bias of the RS included using the ROBIS tool. PROSPERO ID: 255892.

**Results:** This "Overview of Reviews" was prepared following the guidelines of the Cochrane manual 2019. 61 related systematic reviews were included. An overlap of 0.61% (slight) was found. The overall risk assessment indicated a 45% predominance for low risk of bias.

We found 61 comparisons of both pharmacological and nonpharmacological interventions with measures of effect that reached statistical significance. For biologic DMARDs, the intervention with infliximab stood out among all those in the anti-TNF group for ACR20, 50, and 70 outcomes, with an OR efficacy (95%CI) of 6.93 (3.52-13.66) for ACR50. For non-anti-TNF biologic DMARDs, the highest effect measures were for tocilizumab OR 7.22 (4.52-11.53) for ACR70. Methotrexate stands out for conventional DMARDs OR (95%CI) 4.54 (2.51-6.61) and tofacitinib RR 3.87 (2.44-6.668). For non-pharmacological therapy, all of them report measures of effect statistically significant for the DAS28 and ACR20 efficacy outcomes: For exercise, the percentage of change DAS28 was 34.6% with  $p=0.01$ . For psychological therapy mindfulness, the mean difference DAS28 was  $-0.29$   $p<0.00001$ , and for tripterygium supplementation RR 3.81 (1.79-8.09) for ACR20.

**Conclusion:** Of all the notable comparisons, those with the greatest clinical relevance are pharmacological interventions, and of these therapies with biological DMARDs, especially anti-TNF since their comparisons are against other DMARDs and not against placebo in the majority as well as they own reporting the highest effect measures among all.

**Acknowledgments:** We are grateful for the support provided by the Master's Degree and Ph.D. Degree in Medical, Dental and Health Sciences Program of UNAM, as well as the support of CONACyT Mexico.

P577

### MULTIPLE BROWN TUMORS IN A PATIENT WITH PRIMARY HYPERPARATHYROIDISM: A CASE REPORT

Z. Abilov<sup>1</sup>, E. Piskunova<sup>1</sup>, M. Demina<sup>1</sup>, E. Pigarova<sup>1</sup>, E. Mamedova<sup>1</sup>, K. Slashuk<sup>1</sup>, Z. Belaya<sup>1</sup>

<sup>1</sup>Endocrinology Research Centre, Moscow, Russia

**Objective:** Brown tumors are rare focal giant-cell lesions caused by hyperparathyroidism. Due to the lack of clinical and radiological hallmarks the diagnosis may be delayed. The differential diagnosis between brown tumors and odontogenic cysts, bone metastasis and other similar conditions may be challenging. We present a case of a 30-y.o. woman with multiple brown tumors due to primary hyperparathyroidism.

**Case report:** A year ago, the patient started experiencing pain in the lower jaw, toothache, edema and hyperemia at the area of 38, 42-45 teeth. This condition was misdiagnosed as an odontogenic cyst and these teeth were extracted without significant effect. CT of the skull revealed multiple tumors 20x30 mm and 30x40 mm in the projection of 42-45 teeth. Histological sections showed osteoclast-like multinucleated giant cells, multiple hemorrhages and deposits of hemosiderin. 18F-FDG PET/CT showed a metabolically active tissue in the multiple solid areas of upper and lower jaw and osteolytic lesions of sternum, shoulders, Th7, Th12, L1, L5 vertebrae and ribs. Labs revealed severe hypercalcemia (3.9 mmol/l), elevated PTH (1790 pg/ml) and AP (514 IU/l), low P (0.3 mmol/l), consistent with primary hyperparathyroidism (PHPT). US confirmed a tumor in the upper right parathyroid gland 20x18x13mm, nephrolithiasis. BMD Z-score was low - L1-L4 -3.4, neck -3.1, total hip -2.6, radius 33% -4.3. Due to a high risk of hypercalcemic crisis patient received denosumab 60 mg s.c. After parathyroidectomy the patient had a hypocalcemia due to hungry bone syndrome and discharged on alfacalcidol 1 mcg/d, cholecalciferol 10000 IU/d, calcium 1000 mg/d, with subsequent cancellation alfacalcidol and increase of calcium dose up to 3000 mg/d. After 1-y labs showed a normalization of serum Ca (2.15 mmol/l), PTH (21.3 pg/ml), P (1.02 mmol/l) and high levels of osteocalcin (55.18 ng/ml) and CTx (1.18 ng/ml), consistent with intense bone remodeling. DXA showed a significant increase in BMD: +65.6% at hip, +64.1% - lumbar spine, +32.3% - radius. **Conclusion:** Our clinical case shows the consequences of untimely diagnosis of PHPT and rare combination of multiple brown tumors of fascial and other bones. Despite low prevalence of PHPT with brown tumors, a systemic examination and careful differential diagnosis is required.



P578

### SPORADIC RECURRENT PRIMARY HYPERPARATHYROIDISM CAUSED BY MULTIPLE ECTOPIC ADENOMAS

E. Mizeva<sup>1</sup>, A. Eremkina<sup>1</sup>, E. Bibik<sup>1</sup>, N. Mokrysheva<sup>1</sup><sup>1</sup>Endocrinology Research Centre, Moscow, Russia

**Objective:** Primary hyperparathyroidism (PHPT) is usually caused by sporadic adenoma typically located posterior to the thyroid gland. Multiple and/or ectopic adenomas are rare and present a severe challenge in parathyroid surgery.

**Methods:** We present a clinical case of the patient with sporadic recurrent PHPT with an unusual presentation of twice ectopic adenomas.

**Results:** A 49-year-old woman presented with dysmobility syndrome, the pains in the large bones, joints, in the epigastric, seizures. The PHPT complicated by severe hypercalcemia, osteoporosis with osteitis fibrosa cystica and recurrent nephrolithiasis was first diagnosed in 2010. The contrast-enhanced CT revealed an ectopic formation 25x19x25 mm into the anterior mediastinum. The patient was managed with video assisted thoracoscopic surgery, the histological examination confirmed the typical adenoma. Normocalcemia was achieved combined with a moderate PTH increase regarded as secondary hyperparathyroidism.

The PHPT recurrence had diagnosed since 2015, but 99mTc-MIBI scintigraphy and CT remained negative. Due to the osteoporosis and hypercalcemia progression, conservative therapy was prescribed (bisphosphonates followed by denosumab in combination with cinacalcet). In 2019 CT and 99mTc-MIBI showed the formation 7x14x12 mm nearby the right ventricular pericardium. In 2020 a sternotomy with parathyroidectomy was performed followed by hypocalcemia and PTH normalization. The histological characteristics corresponded to adenoma from chief cells. 3 months later, the patient underwent a gradual withdrawal of alfacalcidol and calcium supplements because of mild hypercalcemia, hypercalciuria and increased PTH, what evidenced the persistence of the disease. A scintigraphy with SPECT/CT revealed a focus 4x3x6 mm in the same area without active accumulation. Mutations in *MEN1* and *CDC73* genes were excluded.

**Conclusion:** The multiple parathyroid adenomas in ectopic locations in the same patient are uncommon and lead to failure after the initial surgery. They can be difficult to identify and require combined imaging modalities and surgical approaches, that can improve the clinical decision making.

P579

### A WORLDWIDE BIBLIOMETRIC ANALYSIS OF PUBLISHED LITERATURE ON TRABECULAR BONE SCORE

H. Dehghanbanadaki<sup>1</sup>, H. Aazami<sup>2</sup>, S. Noorali<sup>1</sup>, H. Yarmohammadi<sup>1</sup>, A. Ghasemzadeh<sup>3</sup>, M. Sanjari<sup>1</sup>, K. Khalaji<sup>1</sup>, M. J. Mansourzadeh<sup>1</sup>, A. Ostovar<sup>1</sup>, N. Fahimfar<sup>1</sup>

<sup>1</sup>Osteoporosis Research Center, Endocrinology and Metabolism Clinical Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran, <sup>2</sup>Metabolic Disorders Research Center, Endocrinology and Metabolism Molecular-Cellular Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran, <sup>3</sup>Dept. of Medicine and Endocrinology, Austin Health, University of Melbourne, Melbourne, Australia

**Objective:** Trabecular bone score (TBS), as a texture indicator of bone microarchitecture, predicts the risk of fracture from DXA, independently of BMD. This study aims to explore the bibliometric profile of literature published on TBS.

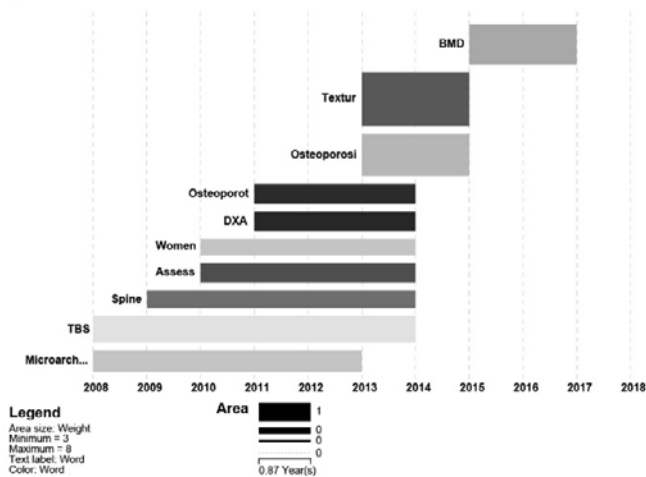
**Methods:** We searched Scopus for "trabecular bone score" or "trabecular score" from the beginning to the end of 2020 and related documents were included for bibliometric analysis. All extraction was done in one day, 26 March 2021. Excel, VOS viewer, and Science of Science (Sci2) software were used.

**Results:** From all 625 articles, 438 original and 90 review articles were included. These documents had 9192 citations and an H-index of 48. The first paper was published in 2008 and the numbers were increased to more than 90 papers in 2018. Top three countries were USA (n=130 documents), Switzerland (n=101) and Italy (n=67). "Osteoporosis International" (n=80), "Journal of Clinical Densitometry" (n=49), and "Bone" (n=38) had the highest participation in publishing. Keyword occurrence analysis showed that research hotspots on TBS were "TBS and BMD predict the risk of osteoporotic fracture", "TBS evaluates bone quality from DXA independent of BMD", and "TBS assesses a vertebral fracture risk in breast cancer, primary hyperparathyroidism, and diabetes". The most share of articles were on human studies (n=409) with the top three underlying diseases of diabetes (n=36), osteoporosis (n=20), and hyperparathyroidism (n=17). The bursting words of the titles and abstracts were shown in Figure 1a and Figure 1b, respectively. "Prevent", "Reproduct" and "Chronic" were the bursting words of the abstracts during recent years.

**Conclusion:** This study reported the most active countries and journals published on TBS. Although in the beginning, TBS were used to predict fractures, considering the bursting words, in the near future, it can be expected to be used in other areas of osteoporosis as well.

## Temporal Visualization

## a) Title



## b) Abstract

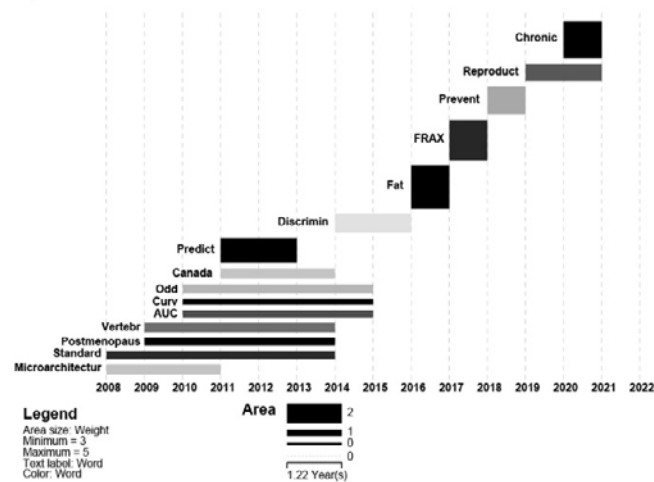


Figure. The bursting (emerging and fading) words of titles (a) and abstracts (b) of TBS articles. The area size of each word represents its weight which is affected by its frequency.

P580

## OSTEOPOROSIS AND SARCOPENIA IN RHEUMATOID ARTHRITIS PATIENTS: ASSOCIATION WITH VITAMIN D STATUS AND CALCIUM INTAKE

N. Toroptsova<sup>1</sup>, O. Dobrovolskaya<sup>1</sup>, N. Demin<sup>1</sup>, M. Cherkasova<sup>1</sup>, E. Samarkina<sup>1</sup>, O. Nikitinskaya<sup>1</sup>

<sup>1</sup>V.A. Nasonova Research Institute of Rheumatology, Moscow, Russia

**Objective:** To assess vitamin D status and dietary calcium intake (DCI) in relation to BMD and sarcopenia (SP) in women with rheumatoid arthritis (RA).

**Methods:** 86 patients (pts) (mean age 58.1±8.5 y) with RA, confirmed by the criteria of ACR/EULAR (2010), were enrolled. The examination included assessment of the DCI and vitamin D level (25(OH)D), muscle strength (MS) tests (hand grip strength, "chair stand" test), DXA of lumbar spine, proximal hip and whole body. Osteoporosis (OP) confirmed according to WHO criteria, SP in the presence of low MS and reduced appendicular muscle mass (AMM) or appendicular mass index (AMI) – AMM/height<sup>2</sup> (kg/m<sup>2</sup>).

**Results:** Low BMD was detected in 62 (72.1%) pts: OP in 24 (27.9%), and osteopenia in 38 (44.2%). Reduced MS was found in 74 (86.0%) pts - probable SP, but only 21 (24.4%) pts had also a low AMI and/or AMM confirmed SP. 26 (30.2%) pts had DCI accordingly with the recommended standards. The median of DCI was 737[539; 1073] mg/d, in pts with OP - 565[401; 853] mg/d, while in women with normal BMD - 870[783; 1204] mg/d (p=0.038) and with osteopenia - 720[539; 765] mg/d (p>0.05). Vitamin D insufficiency was found in 40 (46.5%) and deficiency - in 28 (32.6%) pts. 25(OH)D did not differ in pts with OP, osteopenia, and normal BMD and was 22.7[16.2; 29.6] ng/ml, 22.4[18.9; 27.8] ng/ml and 22.0[17.7; 26.9] ng/ml, respectively. Only 42 (49%) pts received supplements of cholecalciferol with/without calcium: 41% of pts with low vitamin D level and 78% women with normal 25(OH)D (p<0.01). Hand grip strength did not associate with 25(OH)D in RA pts. The median values of AMM/AMI in individuals who received vitamin D and calcium supplements were 17.4[15.9; 19.1] kg/ 7.0[6.2; 8.1] kg/m<sup>2</sup>, comparing to pts without supplements - 19.5[18.0; 20.5] kg/ 7.5[6.6; 7.9] kg/m<sup>2</sup> (p>0.05). Pts with and without SP had 25(OH)D level 20.8[17.6; 26.8] ng/ml and 24.7[20.4; 33.8] ng/ml, respectively (p=0.039).

**Conclusion:** 79.1% of women with RA had low levels of vitamin D. 25(OH)D was significantly lower in RA pts with SP. No association was found between 25(OH)D and BMD. DCI was significantly lower in pts with OP compared to those with normal BMD. There were no significant differences in both AMM/AMI values and MS, depending on the additional intake of calcium and vitamin D.

P581

# CLINICAL IMPACT OF FRAX-BASED INTERVENTION THRESHOLDS IN CHILEAN OLDER WOMEN

L. Imaicela Naula<sup>1</sup>, E. Lopez Gavilanez<sup>2</sup>

<sup>1</sup>AECE Research Group, The Association of Clinical Endocrinologists of Ecuador, <sup>2</sup>AECE Research Group, The Association of Clinical Endocrinologists of Ecuador; Servicio Endocrinología, Hospital Docente Policía Nacional Guayaquil No.2. Ecuador, Guayaquil, Ecuador

**Objective:** To evaluate the clinical impact of age-specific FRAX-based intervention and assessment thresholds in older women of the Chilean population.

**Methods:** 1123 women aged 60-94 were selected from the 2016-2017 National Health Survey (ENS 2016-2017). We calculate the risk of major osteoporotic fractures and femur neck with the FRAX model specific to the Chilean population. And we calculate the proportion of women eligible for intervention and measurement of BMD.

**Results:** On average 3% of the population qualified for intervention and 59% for assessment with BMD. The proportion of the population potentially eligible for intervention varied from 0.73-6.31% depending on age, and the proportion eligible for assessment with BMD varied from 42.50-62.46% depending on age.

Table 1. Women potentially eligible for Intervention and BMD assessment

age (years)	above an IT			between an AT	
	N	n	%	n	%
60-64	285	7	2.46	178	62.46
65-69	273	2	0.73	158	57.88
70-74	216	11	5.09	133	61.57
75-79	176	11	6.25	105	59.66
80-84	111	7	6.31	67	60.36
85-89	40	0	0	17	42.50
90-94	22	0	0	13	59.09
≥60	1123	38	3.38	671	59.75

IT Intervention threshold; AT assessment threshold

**Conclusion:** In Chilean older women, applying these intervention and assessment thresholds based on the FRAX model avoids unnecessary intervention in low-risk subjects and reduces the number of referrals to DXA scanning and the unnecessary cost of routine BMD measurement.

P582

# OSTEOPOROSIS, FRACTURES AND FRACTURE RISK IN RHEUMATOID ARTHRITIS PATIENTS

O. Dobrovolskaya<sup>1</sup>, O. Nikitinskaya<sup>1</sup>, A. Efremova<sup>1</sup>, N. Toroptsova<sup>1</sup>

<sup>1</sup>V.A. Nasonova Research Institute of Rheumatology, Moscow, Russia

**Objective:** To assess the risk of major osteoporotic fracture (MOF) in rheumatoid arthritis (RA) patients (pts) based on the identification of individuals with osteoporosis (OP), previous fragility fractures (FF) and high 10-y probability of a MOF.

**Methods:** 295 postmenopausal women with RA confirmed according to ACR/EULAR criteria (2010) were included in the study (mean age 63±7 y). The median RA duration was 11[4; 16] y, and postmenopause - 13[6; 20] y. 121 (41%) pts were treated with glucocorticoids (GCs). A survey was conducted to identify pts with risk factors and a history of FF. All pts underwent DXA of the proximal femur and lumbar spine. The 10-y probability of a MOF was assessed using the FRAX tool. In pts treated with GCs at a dose >7.5 mg in prednisolone equivalent FRAX estimates of probabilities of a MOF were adjusted according to the recommendations [1].

**Results.** OP in at least one region of interest (ROI) was found in 97 (32.9%), osteopenia in 128 (43.4%), normal BMD in 70 (23.7%) pts. 83 (28.1%) pts had a prior FF: 44 (14.9%) - 1, 20 (6.8%) - 2, and 19 (6.4%) - 3 or more. 68 (23%) pts had vertebral fracture, 47 (15.9%) - distal forearm fracture and only 2 (0.7%) - hip fracture, among them OP in at least one ROI was found in 71 (85.5%) pts and normal BMD in 3 (3.6%) persons. The 10-y probability of a MOF was calculated in 198 RA pts without OP. The median FRAX value for these pts was 16% [9; 26]. 38 (19.2%) pts were at very high risk, 34 (17.2%) at low risk, and 126 (63.6%) at moderate risk. After recalculation of fracture risk with including femoral neck BMD in pts at moderate risk additional 27 (13.6%) became at high risk, 3 (1.5%) at very high risk, and 96 (76.0%) at low risk. Thus, 68 (34.3%) RA pts without low BMD were at very high or high risk and 130 (65.7%) at low risk of MOF assessed by FRAX. Additionally, 97 pts had OP, 3 persons with a history of FF after age of 40 years old had normal BMD and low risk of fracture according to FRAX.

**Conclusion:** Our study demonstrated that 165 (55.9%) postmenopausal women with RA had high risk of fractures and indications for anti-osteoporotic treatment based on the results of BMD measurement and a 10-year probability of MOF using FRAX tool.

**Reference:** 1. Kanis JA, et al. Osteoporos Int 2011;22:809.

P583

### A FRACTURE LIAISON SERVICE IMPLEMENTATION AFTER TWO YEARS: A RETROSPECTIVE COHORT STUDY

S. P. Silva<sup>1</sup>, C. Mazedo<sup>1</sup>, P. Vilas-Boas<sup>1</sup>, B. Figueiredo<sup>1</sup>, A. Barcelos<sup>1</sup>

<sup>1</sup>Centro Hospitalar Baixo Vouga, Aveiro, Portugal

**Objective:** This study aims to evaluate the implementation of a Fracture Liaison Service (FLS), describing the profile and outcome of patients evaluated.

**Methods:** Retrospective study of patients, aged 50 or over, observed between 2019-2020, in a FLS in our hospital for a fragility fracture. A baseline questionnaire was made in the first visit. One year later, patients were asked about their functional disability, therapeutic compliance, and new fractures. Demographic, comorbidities, and clinical results were collected. Descriptive analysis used medians and interquartile range (IQR) for continuous data as frequencies and percentages for qualitative variables.

**Results:** A total of 297 patients were followed up and 85 patients were loss to follow-up over the period study. 83% were female with a median age of 79 (IQR 17.50) years old. Most of the patients (62.3%) who suffered a fracture were functionally independent before the fracture occurred. The types of fractures found in this study included: trochanteric fractures (103 patients, 48.6%), vertebral fractures (25 patients, 11.8%), malleolar fractures (16 patients, 7.5%), humeral fractures (10 patients, 4.7%) and other fractures (15 patients, 7.1%). 25 patients (11.8%) never had fracture but were evaluated for other osteoporosis (OP) risk factors. The OP risk factors founded in this study were corticotherapy (8.5%), history of parental hip fracture (9.0%), early menopause (23.2%), diabetes mellitus (23.6%), inflammatory rheumatic disease (2.8%), thyroid disease (10.4%), smoking (6.1%) and alcohol abuse (7.1%). Moreover, 2 patients (0.9%) were diagnosed with osteogenesis imperfecta. All patients received nutritional advice, lifestyle recommendations and fall prevention information and 63.2% of the patients started OP medication. In follow-up, 107 patients (50.4%) were functionally independent after the fracture, and 76 patients (46.3%) kept compliant with prescribed medication. Only 6 (2.8%) patients had a new fracture. 12 patients (5.7%) died over the period study. No incidence of osteonecrosis of the jaw was reported.

**Conclusion:** The implementation of a FLS has enhanced the identification and initiation of treatment in patients with high risk of OP. Further, it helps to evaluate pharmacological compliance, to prevent new fractures.

P584

### CORRELATION BETWEEN THE AMERICAN SOCIETY OF ANAESTHESIOLOGY (ASA) SCORE AND THE NOTTINGHAM HIP FRACTURE SCORE (NHFS) IN ELDERLY PATIENTS WITH ACUTE HIP FRACTURE

N. Obiechina<sup>1</sup>, A. Michael<sup>2</sup>

<sup>1</sup>Queen's Hospital, Burton, <sup>2</sup>Russells Hall Hospital, Dudley, UK

**Objective:** The American Society of Anaesthesiology (ASA) score is a well recognized, validated scoring tool for pre-operative physical status in surgical patients and has been used in risk stratification of hip fracture patients in the UK for decades. The Nottingham Hip Fracture Score (NHFS) is also a validated tool that predicts 30-d mortality post hip fracture surgery. It incorporates age, gender, mini mental test score, number of comorbidities, preoperative haemoglobin, living in an institution and malignancy. Aims: To assess the relationship between ASA and NHFS in elderly hip fracture patients. To determine whether the presence or absence of frailty affects this relationship.

**Methods:** A retrospective, cross-sectional analysis was carried out on acute hip fracture patients 60 y and older admitted to a UK district general hospital. Data was extracted manually from the electronic records. Patients with incomplete data were excluded. Rockwood clinical frailty scale (CFS) was used to group patients into pre-frail and frail groups. Patients with a score of 1-4 (i.e., very fit, well, managing well and vulnerable) were considered pre-frail while those with a score of 5-9 (i.e., mildly, moderately, severely and very severely frail and the terminally ill) were considered frail. SPSS 27 software was used for statistical analysis. Descriptive statistics was used to portray baseline characteristics. Spearman correlation coefficient and linear regression was used to assess correlation.

**Results:** 263 patients were included in the analysis. Mean age was 82.2 y±8.48. 73 (28%) of the patients were pre-frail and 190 (72%) were frail. There was statistically significant positive correlation between ASA and NHFS ( $r=0.490$ ;  $p<0.001$ ). This relationship was much stronger in the pre-frail than in the frail group of patients ( $r=0.521$ ;  $p<0.001$ ) and ( $r=0.282$ ;  $p<0.001$ ) respectively.

**Conclusion:** In our sample of elderly patients with acute hip fracture, the ASA score was positively correlated with the NHFS and the correlation was stronger in pre-frail patients compared to in the frail patients.



P585

# **SARCOPENIA SCREENING TOOL (SARC-F) SCORE AND ROCKWOOD CLINICAL FRAILITY SCALE (CFS) IN PATIENTS 60 YEARS AND OLDER WITH ACUTE HIP FRACTURE**

N. Obiechina<sup>1</sup>, A. Michael<sup>2</sup><sup>1</sup>Queen's Hospital, Burton, <sup>2</sup>Russells Hall Hospital, Dudley, UK

**Objective:** SARC-F is a well validated screening tool for identifying patients with sarcopenia. It has five components, which include strength, assistance with walking, rising from a chair, climbing stairs and falls. It is based on patients' or their carers' rating of their abilities. SARC-F has been shown to have high specificity (94.4-98.7%) but low sensitivity (4.2-9.9%). It is important to screen patients with acute hip fracture for sarcopenia, to detect those at risk for adverse outcomes. SARC-F can be used as a screening tool for these patients, as many of them are not mobile in the immediate peri-operative period. Sarcopenia and frailty overlap; with low grip strength and slow gait speed (in Fried phenotype of frailty) being characteristic of both, and treatment options overlap. Aims: Is there a correlation between sarcopenia and frailty in acute hip fracture patients?

**Methods:** A retrospective, cross-sectional analysis was carried out on consecutive patients, 60 y and older, admitted with acute hip fracture to a district general hospital in a 12-month period. Sarcopenia screening tool (SARC-F) was completed during interviews conducted by the occupational therapists. Rockwood Clinical Frailty Scale (CFS) was used to assess frailty. Data was manually extracted from anonymized electronic health records. Patients with incomplete data were excluded from the analysis. SPSS 27 was used for statistical analysis. Descriptive statistics were used to assess baseline characteristics of the patients studied. Spearman's correlation coefficient and linear regression was used to determine and quantify correlation.

**Results:** 310 patients were included: 83 men and 227 women. Mean age was 82.2 y±8.48. There was a strong positive correlation between SARC-F score and Rockwood CFS ( $r=0.835$ ;  $p<0.001$ ). When broken down by gender this relationship persisted ( $r=0.765$ ;  $p<0.001$  in males and  $r=0.864$ ;  $p<0.001$  in females).

**Conclusion:** SARC-F score is strongly positively correlated with Rockwood CFS in patients 60 y and older with acute hip fracture. This was not confounded by gender.

P586

# **LORECIVIVINT (SM04690), AN INTRA-ARTICULAR, SMALL-MOLECULE CLK/DYRK INHIBITOR THAT MODULATES THE WNT PATHWAY, AS A POTENTIAL TREATMENT FOR MENISCAL INJURIES**

T. Seo<sup>1</sup>, V. Deshmukh<sup>1</sup>, Y. Yazici<sup>1</sup><sup>1</sup>Biosplice Therapeutics, Inc., San Diego, USA

**Objective:** Meniscal injuries are the most common knee pathology associated with pain, stiffness, and swelling. Meniscal damage is a frequent MRI finding in knee osteoarthritis (OA). Efforts to repair meniscal damage are largely unsuccessful and do not prevent progression of degenerative changes that lead to knee OA. Regulation of the Wnt pathway during meniscal development suggests that manipulation of this pathway may influence meniscal regenerative capacity. Lorecivivint (LOR) is an intra-articular (IA), small-molecule CLK/DYRK inhibitor that modulates the Wnt pathway. In preclinical studies, LOR was evaluated for its protective and anabolic effects in ex vivo explants and in a rat model of chemically induced inflammatory meniscal degeneration.

**Methods:** Effects of LOR (30 nM) on matrix metalloproteinase (MMP) expression in cultured rat menisci treated with IL-1 $\beta$  were measured by qRT-PCR. In vivo, a single IA injection of LOR (0.3 mg) or vehicle was given immediately after injection of monosodium iodoacetate (MIA). Knees were harvested on Days 1, 4, and 11 and menisci were isolated. Anti-inflammatory effects were evaluated by qRT-PCR for *TNFA* and *IL6* expression. Meniscal protection was evaluated by qRT-PCR for MMPs and aggrecanase. Anabolic effects were evaluated by qRT-PCR for collagens.

**Results:** In ex vivo meniscal explants, LOR inhibited expression of *MMP1*, *MMP3*, and *MMP13* compared with DMSO ( $P<0.01$ ). In vivo, LOR significantly decreased expression of MMPs and aggrecanase ( $P<0.05$ ) and reduced expression of inflammatory cytokines *TNFA* and *IL6* compared with vehicle in the rat model of inflammatory meniscal degeneration at Day 4 after MIA injection. Additionally, LOR increased expression of collagen types I, II, and III at Day 11 after MIA injection (Fig. 1).

**Conclusion:** LOR exhibited protective effects in the meniscus ex vivo and in vivo by reducing catabolic enzyme expression compared with control. Anti-inflammatory effects of LOR were demonstrated by inhibition of inflammatory cytokine expression. Compared with vehicle, LOR increased collagen expression in vivo, indicating potential meniscal anabolic effects. These data support further investigation of LOR as a potential structure-modifying treatment for meniscal injuries.

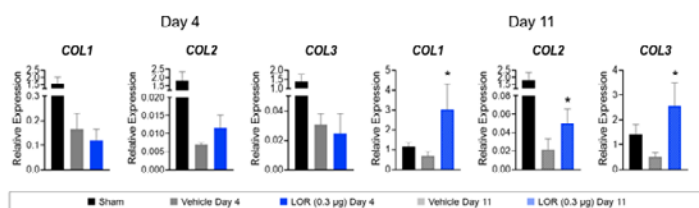


Figure 1. LOR increased collagen gene expression in vivo. A single IA injection of monosodium iodoacetate (MIA; 3 mg) was immediately followed by a single IA injection of LOR (0.3 µg) or vehicle at 10 weeks of age. Knees were harvested on Days 1, 4, and 11 after injection and menisci were isolated. Gene expression was measured by qRT-PCR. N=3, Mean ± SEM, \*P<0.05, one-way ANOVA

## P587

### LORECEVIVINT (SM04690), AN INTRA-ARTICULAR, SMALL-MOLECULE CLK/DYRK INHIBITOR THAT MODULATES THE WNT PATHWAY, PROVIDED CARTILAGE-PROTECTIVE EFFECTS IN AN ANIMAL MODEL OF POST-TRAUMATIC OA

T. Seo<sup>1</sup>, V. Deshmukh<sup>1</sup>, Y. Yazici<sup>1</sup>

<sup>1</sup>Biosplice Therapeutics, Inc., San Diego, USA

**Objective:** Osteoarthritis (OA) is characterized by cartilage thinning, bone remodeling, and inflammation. Post-traumatic OA, which develops after acute direct joint trauma, accounts for ~12% of OA cases. Current therapeutic options focus on alleviating symptoms and pain and not disease modification. Lorecevivint (LOR), an intra-articular (IA), small-molecule CLK/DYRK inhibitor that modulates the Wnt pathway, induced chondrogenesis, protected cartilage, and reduced inflammation in animal studies. A single IA LOR injection was evaluated in a rat model of knee instability to determine its protective and regenerative effects when injected after post-traumatic OA induction.

**Methods:** Post-traumatic OA was surgically induced in rats by combining anterior cruciate ligament transection with partial medial meniscus transection (ACLT+pMMx). LOR (0.3 µg) or vehicle was injected into the damaged knee IA space at 2, 3, or 4 weeks after OA induction. OA-induced (n=10/group) or sham-operated (surgery without ACLT+pMMx; n=5/group) rats were sacrificed at the injection timepoint (baseline) or 12 weeks after LOR/vehicle injection (study end). Histological grades were assessed using summed anterior and posterior medial femoral condyle (MFC) and medial tibial plateau (MTP) OARSI scores (cartilage damage stage and grade). Weight distribution was assessed at several timepoints with an incapacitance meter. One-way ANOVA with Dunnett's multiple comparison test was used for statistical analysis.

**Results:** ACLT+pMMx surgeries increased OARSI scores by 2 weeks compared with sham surgeries. LOR treatment at Weeks 2, 3, and 4 led to significant decreases (P<0.05) in total OARSI scores (Table 1) at study end compared with vehicle treatment. Rats treated with LOR for 12 weeks and rats at baseline had similar OARSI scores, suggesting that LOR treatment arrested cartilage damage progression. Significant improvements (P<0.05)

were observed in the weight distribution of LOR-treated rats in the 3- and 4-week groups at 6 and 12 weeks after their respective IA injections compared with vehicle-treated rats.

**Conclusion:** LOR exhibited cartilage-protective effects and slowed disease progression in the ACLT+pMMx model in vivo. LOR has potential as a structure-modifying treatment for OA.

Table 1: OARSI scores

Week-2 Injection	Sham-operated (14 weeks after surgery)	Baseline (BL) (2 weeks after surgery)	Vehicle (12 weeks after injection)	LOR (12 weeks after injection)
Total score	5.99	19.17	31.36	19.19
SEM	1.07	1.55	2.48	1.81
P value versus BL				0.9999
P value versus vehicle				0.0004

Week-3 Injection	Sham-operated (15 weeks after surgery)	Baseline (BL) (3 weeks after surgery)	Vehicle (12 weeks after injection)	LOR (12 weeks after injection)
Total score	6.09	23.17	30.45	21.20
SEM	1.25	1.36	1.42	1.00
P value versus BL				0.4522
P value versus vehicle				0.0001

Week-4 Injection	Sham-operated (16 weeks after surgery)	Baseline (BL) (4 weeks after surgery)	Vehicle (12 weeks after injection)	LOR (12 weeks after injection)
Total score	6.97	16.88	24.95	18.63
SEM	1.32	1.04	1.74	1.61
P value versus BL				0.6257
P value versus vehicle				0.0111

## P588

### IMPACT OF LONG-TERM SYSTEMIC CORTICOSTEROIDS ON BONE MINERAL DENSITY DURING DIFFUSE INFILTRATING LUNG DISEASE

A. Chebbi<sup>1</sup>, H. Snene<sup>1</sup>, A. Fazaa<sup>2</sup>, H. Bliedch<sup>1</sup>, S. Miladi<sup>2</sup>, K. Ben Abdelghani<sup>2</sup>, N. Mehiri<sup>1</sup>, A. Laatar<sup>1</sup>, N. Ben Salah<sup>1</sup>, B. Louzir<sup>1</sup>

<sup>1</sup>Université Tunis El Manar, Faculté de Médecine de Tunis, Service de Pneumologie, CHU Mongi Slim La Marsa, <sup>2</sup>Université Tunis El Manar, Faculté de Médecine de Tunis, Service de Rhumatologie, CHU Mongi Slim La Marsa, Tunis, Tunisia

**Objective:** To assess the impact of systemic corticosteroid therapy (SCT) indicated in the treatment of diffuse infiltrating lung disease (DILD) on the BMD assessed by bone densitometry.

**Methods:** Prospective study conducted in the pneumology department of Mongi Slim-La Marsa Hospital for one year (2019), involving patients with DILD in whom SCT was indicated in association with preventive measures (calcium and vitamin D). After written consent, each patient had the first measurement of BMD before starting SCT and then a control measure between 6 and 12 months after the start of treatment.

**Results:** 28 patients were enrolled (medium age=55.8 y; sex ratio F/H=3.5). All had the first measure of BMD and only 12 had a control measure (interruption due to COVID-19 pandemic). In the remaining group, the DILD treated were related to sarcoidosis (n=4), idiopathic nonspecific interstitial lung disease (n=3), Gougerot Sjögren's syndrome (n=2), HSP (n=1), Myositis (n=1), and System-

ic Lupus Erythematosus (n=1). The average dose of prescribed SCT was 0.75 mg/kg/d. Based on the measurement of the L1-L4 vertebrae, at the first measurement of the BMD, 4 patients had no abnormalities, 3 had osteopenia and 5 had osteoporosis while at the control measure, 3 patients had no abnormalities, 3 had osteopenia and 6 had osteoporosis. Based on the measurement of the right femur, at the first measurement of the BMD, 5 patients had no abnormalities, 5 had osteopenia and 2 had osteoporosis while at the control measure, 3 patients had no abnormalities, 6 had osteopenia and 3 had osteoporosis. This difference between initial and control BMD was significant for the measurement at the right femur ( $p=0.001$ ). Age was correlated with the decline of BMD in the L1-L4 vertebrae ( $p=0.024$ ).

**Conclusion:** SCT is responsible for a significant decrease in BMD despite preventive measures, hence the importance of routine osteoporosis screening and collaborative management with rheumatologists.

P589

### EFFECTS OF ACUTE EXERCISE ON BONE TURNOVER MARKERS IN MIDDLE-AGED AND OLDER ADULTS: A SYSTEMATIC REVIEW

C. Smith<sup>1</sup>, A. Tacey<sup>1</sup>, J. Mesinovic<sup>2</sup>, D. Scott<sup>3</sup>, X. Lin<sup>1</sup>, T. C. Brennan-Speranza<sup>4</sup>, J. R. Lewis<sup>5</sup>, G. Duque<sup>6</sup>, I. Levinger<sup>1</sup>

<sup>1</sup>Victoria University, Melbourne, <sup>2</sup>Monash University, Melbourne, <sup>3</sup>Deakin University, Melbourne, <sup>4</sup>University of Sydney, Sydney, <sup>5</sup>Edith Cowan University, Perth, <sup>6</sup>University of Melbourne, Melbourne, Australia

**Objective:** This systematic review examines the effects of acute aerobic (AE), resistance (RE) and impact exercises on bone turnover markers (BTMs) in middle and older-aged adults.

**Methods:** We searched PubMed, SCOPUS, Web of Science and EMBASE up to 22 April 2020. Eligibility criteria included randomised controlled trials (RCTs) and single-arm studies that included middle-aged (50-65 y) and older adults (>65 y) and, a single-bout, acute-exercise (AE, RE, impact) intervention with measurement of BTMs. PROSPERO registration number CRD42020145359.

**Results:** 13 studies were included; 8 in middle-aged (n=275, 212 women/63 men, mean age=57.9±1.5 y) and 5 in older adults (n=93, 50 women/43 men, mean age=68.2±2.2 y). 11 studies included AE (7 middle-aged/4 older adults), and two included RE (both middle-aged). AE significantly increased C-terminal telopeptide (CTX), alkaline phosphatase (ALP) and bone ALP in middle-aged and older adults. AE also significantly increased total osteocalcin (tOC) in middle-aged men and procollagen I C-terminal propeptide and crosslinked C-terminal telopeptide of type I collagen in older women. RE alone decreased ALP in older adults. In middle-aged adults, RE with impact had no effect on tOC or BALP, but significantly decreased CTX. Impact (jumping) exercise alone increased

procollagen type 1 N propeptide and tOC in middle-aged women. Quality assessment results identifies a lack of RCTs, low quality evidence, small sample sizes and large variance study protocols.

**Conclusion:** Acute exercise is an effective tool to modify BTMs, however, responses appear to be exercise modality-, intensity-, age- and sex-specific. Higher quality and larger RCTs are needed in this area.

P590

### HIP FRACTURES: OSTEOPOROSIS AND REHABILITATION

B. Mitrevska<sup>1</sup>, E. Nikolic Dimitrova<sup>1</sup>, V. Koevska<sup>1</sup>, C. Gerakaroska Savevska<sup>1</sup>, M. Gocevska<sup>1</sup>, B. Kalcovska Ivanovska<sup>1</sup>, M. Manoleva<sup>1</sup>, E. Grkova Miskovska<sup>1</sup>

<sup>1</sup>University Clinic of Physical Medicine & Rehabilitation, Medical faculty, University Ss Cyril and Methodius, Skopje, Macedonia

**Objective:** Regarding femoral fractures, in addition to the fracture of the femoral neck, fractures in the proximal part of the femur are more common. Pertrochanteric fractures are about four times more common than femoral neck fractures. This study aimed to evaluate the effects of physical therapy and rehabilitation with magnetic therapy vs. interference currents

**Methods:** The research included 90 patients, divided in two groups: study group - 45 patients, treated with kinesiotherapy and magnetic therapy and control group - 45 patients, treated with kinesiotherapy and interference currents. Measurement of the range of motion was performed at four time points.

**Results:** Regarding the functional status, the range of motion in all joints of the lower extremities, in our study was performed a measurement of the range of motion in the hip, knee and ankle at four time points, on admission, discharge, and controls after 6 and 12 months. Overall, there were improvements in the measurements at all time points, and a significant difference of the examined group, in relation to the control, was obtained for flexion with straight and bent knee, for extension, abduction of the hip, for flexion and extension of the knee on physical examination after 12 months. When measuring adduction, internal and external rotation, dorsal and plantar flexion of the ankle, there was no significant difference between the two groups at all measured time points.

**Conclusion:** Kinesiotherapy in combination with physical modalities leads to an increase in the range of motion of the joints in hip fractures.

P591

### SEX DIFFERENCES IN THE ASSOCIATIONS BETWEEN CARDIOVASCULAR RISK FACTORS AND PHYSICAL FUNCTION: THE GAMBIAN BONE AND MUSCLE AGEING STUDY (GAMBAS)

A. Zengin<sup>1</sup>, M. Ó Breasail<sup>2</sup>, C. P. Parsons<sup>3</sup>, L. M. Jarjou<sup>4</sup>, R. E. Janha<sup>4</sup>, M. Jobe<sup>4</sup>, A. Prentice<sup>2</sup>, C. Cooper<sup>3</sup>, P. R. Ebeling<sup>1</sup>, K. A. Ward<sup>3</sup>

<sup>1</sup>Dept. of Medicine, School of Clinical Sciences, Faculty of Medicine, Nursing and Health Sciences, Monash University, Clayton, Victoria, Melbourne, Australia, <sup>2</sup>MRC Nutrition and Bone Health Group, Cambridge, UK, <sup>3</sup>MRC Lifecourse Epidemiology Unit, University of Southampton, Southampton, UK, <sup>4</sup>MRC Unit The Gambia at the London School of Hygiene and Tropical Medicine, Keneba, Gambia

**Objective:** In sub-Saharan Africa, the prevalence of obesity, cardiovascular disease (CVD) and impaired physical function are increasing due to rapid urbanisation. We investigated the associations between cardiac-workload, arterial stiffness, peripheral vascular calcification (PVC) and physical function in Gambian adults.

**Methods:** We recruited 249 women and 239 men aged 40-75+ y. Supine blood pressure and heart rate were measured and used to calculate rate pressure product (RPP) and pulse pressure (PP). Presence of PVC was determined from tibia pQCT scans. Physical function was assessed by a force platform to measure muscle force (kN) and power (kW) during a chair rise test (CRT) and single 2-leg-jump (s2LJ); hand dynamometer measured hand grip strength (HGS). Body composition was assessed with DXA; body size corrections were made by dividing by height squared (kg/m<sup>2</sup>) giving fat mass index (FMI) and appendicular lean mass index (ALMI). Sex-interactions were tested (denoted as p-int) after adjustment for age and height. Data are expressed as 10% percent difference in RPP or PP, per one-unit difference in physical functions measures. Values are  $\beta$ -coefficients with 95% confidence intervals. Mediation analyses were performed with the mediator as ALMI/FMI.

**Results:** Mean age was similar in women (61±13 y) and men (61±12 y). BMI was higher in women vs. men (21.9±3.7 vs. 20.9±3.1, p=0.0009). There was a greater negative association between RPP and s2LJ power after adjustments in men (-0.02 kW: -0.05, 0.03) vs. women (0.04 kW: 0.004, 0.08), p-int=0.017; with no other significant interactions. In men, there were greater negative associations between PP and CRT power (-0.008 kW), s2LJ power (-0.03 kW) and HGS (-0.48 kg) vs. women (all p-int<0.01). In men, presence of PVC was associated with lower s2LJ power (-0.2 kW: -0.4, 0.02, p-int=0.037) and HGS (-2.3 kg: -4.2, -0.4, p-int=0.016). In men, FMI mediated the association between RPP and CRT power (p=0.002), s2LJ force (p<0.001) and s2LJ power (p=0.001). There was no significant mediation by ALMI; there were no mediation by ALMI or FMI in women.

**Conclusion:** Multiple markers of CVD were associated with poorer physical function in men, and these were mediated by FMI. There is a need to identify preventative strategies to slow/prevent the rising burden of CVD and poor physical function in sub-Saharan Africa.

P592

### APFFA PRIMARY CARE TOOLKIT: EMPOWERING FRAGILITY FRACTURE EDUCATION

Y. Choi<sup>1</sup>, K. Bruce<sup>2</sup>, D.-C. Chan<sup>3</sup>, J. Close<sup>4</sup>, M. Kheradi<sup>2</sup>, J. K. Lee<sup>5</sup>, L. Mercado-Asis<sup>6</sup>, P. J. Mitchell<sup>7</sup>, R. D. Blank<sup>8</sup>

<sup>1</sup>Evidencia Medical Communications Pty Ltd, Sydney, Australia, <sup>2</sup>Viva! Communications Pty Ltd, Sydney, Australia, <sup>3</sup>Superintendent Office, National University Hospital Hsin-Chu Branch, Hsinchu, Taiwan, <sup>4</sup>Prince of Wales Hospital, Sydney, Australia, <sup>5</sup>Beacon Hospital, Petaling Jaya, Malaysia, <sup>6</sup>University of the Philippines, Manila, Philippines, <sup>7</sup>Synthesis Medical NZ Limited, Auckland, New Zealand, <sup>8</sup>Garvan Institute of Medical Research, Sydney, Australia

**Objective:** The Asia Pacific Fragility Fracture Alliance (APFFA) is a federation committed to reducing the burden of low trauma fracture throughout the region. Education on fracture prevention to those at the forefront of patient care is an important part of this effort.

**Methods:** APFFA has curated educational materials developed by others (<https://apfracturealliance.org/education-directory/>) and developed a Primary Care Physician (PCP) Education Toolkit (<https://apfracturealliance.org/education-toolkit/>). Here we describe the toolkit and report its introduction during the COVID-19 pandemic.

**Results:** The PCP Education Toolkit is designed as a half-day educational program together with supporting resources to highlight the role of primary care providers in this effort. The educational program includes a lecture focused on the burden of fracture, a lecture focused on clinical assessment of fracture risk, a discussion kit, and materials to assist with meeting planning. The discussion kit is designed to be adaptable to local practices and constraints. The supporting material features a patient handbook that gives practical advice on nutrition, home safety, and issues to be raised during medical encounters. COVID-19 hampered rollout of these materials. In addition, APFFA has relied on its constituent organizations to provide educational content to promote best practices in acute fracture management, rehabilitation, and secondary fracture prevention through the development of an education directory. The directory includes synopses and links to high quality materials from around the world.

**Conclusion:** The PCP Education Toolkit was designed with the expectation that the program would be presented as live meetings. The pandemic made this infeasible. Despite the restrictions, the PCP Education Toolkit materials have been enthusiastically received in New Zealand and disseminated by Osteoporosis NZ. As



the world emerges from the pandemic, we are looking to present this material in more venues in 2022 and beyond. The toolkit is available free of charge at the above address.

**Acknowledgements:** Development of the PCP Education Toolkit and Education Directory was funded via an unrestricted grant from Amgen Asia to APFFA and its content was developed independently by APFFA.

P593

### OSTEOGENIC POTENTIAL OF PHYSICAL ACTIVITIES AND THEIR ASSOCIATIONS WITH BONE MASS IN YOUNG ADULTS: THE RAINE STUDY

C.-A. Ng<sup>1</sup>, D. Scott<sup>2</sup>, M. Sim<sup>3</sup>, K. Zhu<sup>4</sup>, A. Siafarikas<sup>5</sup>, N. Hart<sup>3</sup>, M. M. Cervo<sup>1</sup>, J. Tan<sup>6</sup>, P. Chivers<sup>7</sup>

<sup>1</sup>Dept. of Medicine, School of Clinical Sciences at Monash Health, Monash University, Clayton, <sup>2</sup>Institute of Physical Activity and Nutrition, School of Exercise and Nutrition Sciences, Deakin University, Burwood, <sup>3</sup>School of Medical and Health Sciences, Edith Cowan University, Joondalup, <sup>4</sup>Medical School, University of Western Australia, Perth, <sup>5</sup>Dept. of Endocrinology and Diabetes, Perth Children's Hospital, Nedlands, <sup>6</sup>School of Nursing, Midwifery, Health Sciences and Physiotherapy, University of Notre Dame Australia, Fremantle, <sup>7</sup>Institute for Health Research, University of Notre Dame Australia, Fremantle, Australia

**Objective:** Physical activity questionnaires traditionally utilised in research only assess metabolic equivalents of task (METs). It is unclear whether mechanical loading intensity and rate during habitual physical activity is associated with skeletal health. We investigated how physical activity of high loading intensities and rates, assessed at ages 17 and 20 y, (1) compares with physical activity measured in METs, and (2) is associated with BMD at age 20 y.

**Methods:** A subset of 826 participants from the Raine Study Gen2 were assessed for physical activity energy expenditure over the past week via the International Physical Activity Questionnaire (IPAQ) at ages 17 and 20 y. Subsequently, loading scores were estimated from the IPAQ, reflecting the total loading intensity and application rate of physical activity. Whole-body, leg and arm BMD at age 20 y were assessed by DXA.

**Results:** Bland-Altman minimal detectable change for physical activity Z-scores at age 17 and 20 y were 1.59 SD and 1.33 SD, respectively; greater than the a priori minimal clinically important change of 0.5 SD. Loading score, but not IPAQ score, had a significant positive association with whole body and leg BMD after adjustment for covariates ( $\beta=7.52$  and  $24.80$  mg/cm<sup>2</sup> and  $\beta=7.51$  and  $24.36$  mg/cm<sup>2</sup> respectively for age 17 and 20 y loading scores). IPAQ score at age 20 y, but not loading score, had a significant positive association with arm BMD following adjustment ( $\beta=14.43$  mg/cm<sup>2</sup>). There was no significant association between 3 y change in IPAQ or loading score and bone mass.

**Conclusion:** This study revealed clinically important disagreement in associations of self-reported METs and loading scores estimates with bone health in young adults. Participation in physical activity with higher loading was significantly associated with whole body and leg BMD, while higher energy expenditure was significantly associated with arm BMD. Coupling traditional energy expenditure questionnaire outcomes with bone-loading estimates may improve understanding of the location-specific skeletal benefits of physical activity in young adults.

P594

### LOW PLASMA 25(OH) VITAMIN D LEVEL AND COVID-19 IN PATIENTS OF THE OLDER AGE GROUP

M. Fominykh<sup>1</sup>, O. Khromtsova<sup>1</sup>, K. Dorokhina<sup>1</sup>

<sup>1</sup>Federal State Budget Educational Institution of Higher Education "Ural State Medical University" of the Ministry of Health of the Russian Federation, Ekaterinburg, Russia

**Objective:** COVID-19 infection, which destroys the health of people and the economy of countries, is a serious challenge to world science and medicine. Global efforts to defeat this disease have identified a number of risk factors and prognostic markers, one of which is a deficiency of vitamin D in the blood serum. Vitamin D is known to stimulate innate immunity and modulate acquired immunity. In the UK, the Royal College of Physicians of London noted that patients who died from COVID-19 suffered from a serious vitamin D deficiency. According to research, older people are more at risk of vitamin D deficiency due to lack of sunlight (most of the time spent indoors) and malnutrition, so they may have worse outcomes of COVID-19 infection. Although there is no direct evidence of the effect of vitamin D status on COVID-19 infection, vitamin D deficiency may worsen the course of COVID-19, especially in the elderly patient group. This study aimed to evaluate associations of plasma 25(OH)D status with the likelihood of coronavirus disease (COVID-19) infection.

**Methods:** The study included 68 women who applied for an out-patient appointment in the Central clinical hospital № 7 (Ekaterinburg (RF) in the period from February 1 to April 30, 2021 who were tested for COVID-19 infection and who had at least one previous blood test for plasma 25(OH)D level. Low plasma 25(OH)D level was defined as plasma 25-hydroxyvitamin D concentration below the level of 30 ng/mL.

**Results:** Among 68 individuals, 23.5% were COVID-19-positive, and 76.5% COVID-19-negative. The mean plasma vitamin D level was significantly lower among COVID-positive patients in comparison with the negative ones (27.2 ng/mL (95%CI 19.29-31.55) vs. 29.1 (95%CI 26.0-32.2)). The women' age ranged from 52-87, the mean 67.9. Next, we divided the patients into two age groups: the first group was middle-aged and elderly (50 women), the second group was senile (18 women). The mean age in the first group was 64.1 y, in the second group-80.7. Among the senile group, vi-

tamin D levels in the COVID-19 group were generally significantly lower than in the COVID-19 negative group (20.8 vs. 37.7 nmol/L),  $p < 0.05$ . There were no statistically significant data on the relationship between COVID-19 and vitamin D deficiency in the first group. All patients with COVID-19 in the older age group were hospitalized due to their age.

**Conclusion:** Low plasma 25(OH)D level appears to be an independent risk factor for COVID-19 infection in patients of the older age group.

P595

### APFFA-FFN HIP FRACTURE REGISTRY TOOLBOX: A RESOURCE TO SUPPORT REGISTRY IMPLEMENTATION

P. J. Mitchell<sup>1</sup>, H. Seymour<sup>2</sup>, E. Ahern<sup>3</sup>, M. Costa<sup>4</sup>, J. Magaziner<sup>5</sup>, J. K. Lee<sup>6</sup>, D.-C. Chan<sup>7</sup>, R. D. Blank<sup>8</sup>, J. Close<sup>9</sup>

<sup>1</sup>School of Medicine, University of Notre Dame Australia, Sydney, Australia, <sup>2</sup>Dept. of Geriatrics and Aged Care, Fiona Stanley Hospital, Murdoch, Australia, <sup>3</sup>Dept. of Geriatric Medicine, Cork University Hospital, County Cork, Ireland, <sup>4</sup>Oxford Trauma, Nuffield Dept. of Orthopaedics, Rheumatology and Musculoskeletal Sciences, University of Oxford, Oxford, UK, <sup>5</sup>University of Maryland School of Medicine, Baltimore, USA, <sup>6</sup>Beacon Hospital, Petaling Jaya, Malaysia, <sup>7</sup>Superintendent Office, National University Hospital Hsin-Chu Branch, Hsinchu, Taiwan, <sup>8</sup>Garvan Institute of Medical Research, Sydney, Australia, <sup>9</sup>Falls, Balance and Injury Research Centre, Neuroscience Research Australia, Sydney, Australia

**Objective:** Hip fracture registries provide a mechanism to benchmark care provided by hospitals against clinical standards. As of May 2021, registries have been established in approximately one tenth of countries worldwide. A hip fracture registry toolbox is intended to provide practical tools to support registry development.

**Methods:** The toolbox has been developed as a collaboration between the Asia Pacific Fragility Fracture Alliance (APFFA) Hip Fracture Registry Working Group and the Fragility Fracture Network (FFN) Hip Fracture Audit Special Interest Group.

**Results:** The toolbox summarises essential components of national quality improvement programmes for hip fracture care. This features best practice clinical standards, including quality indicators (e.g., measures relating to pain assessment, time to surgery, early mobilisation, secondary fracture prevention and multidisciplinary management). Hip fracture registries provide the technical infrastructure for hospital teams to benchmark the care they provide against quality indicators. The toolbox also focuses on practical aspects of registry establishment including clinical leadership and engagement, getting buy-in from diverse stakeholders, building the case for change, registry planning and funding, piloting a registry, governance and ethics considerations, and a minimum common data set and data dictionary.

A summary of the extensive literature on multidisciplinary care of hip fracture patients is provided, in addition to detailed case studies of national registries in Australia and New Zealand, Spain and the UK. A series of short interviews published on YouTube complement the toolbox with experience from leaders of well-established registries.

**Conclusion:** The APFFA-FFN hip fracture registry toolbox provides a distillation of the global experience to date in establishing national registries. The toolbox is free for download from [www.apfracturealliance.org/HFR-toolbox](http://www.apfracturealliance.org/HFR-toolbox) and is intended to support colleagues throughout the world who would like to establish a registry in their country.

**Acknowledgement:** Development of the Hip Fracture Registry Toolbox was funded via an unrestricted grant from Amgen Asia to APFFA and its content was developed independently by APFFA and FFN.

P596

### GENE SET ENRICHMENT ANALYSES REVEALED MULTIPLE GENE SET ASSOCIATED WITH STEROID-INDUCED OSTEONECROSIS OF THE FEMORAL HEAD

C. Wang<sup>1</sup>, W. Tian<sup>1</sup>, Y. Guo<sup>1</sup>

<sup>1</sup>Key Laboratory of Biomedical Information Engineering of Ministry of Education, Biomedical Informatics & Genomics Center, School of Life Science and Technology, Xi'an Jiaotong University, Xi'an, China

**Objective:** Steroid-induced osteonecrosis of the femoral head (SONFH), which is caused by long-term and high-dose glucocorticoid use, has been accounting for 57% of the total femoral head necrosis. In our previous study, we collected femoral head sample from patients with SONFH and normal control, the followed KEGG pathway enrichment analyses identified several known and novel pathway associated with SONFH, but there are many pathways related to biological processes that are not included in the KEGG pathway database, in addition, In addition, KEGG pathway enrichment analysis does not use the information about the magnitude of gene expression changes. Gens set enrichment analyses could make up for above two shortcomings. The object of this project is to identify gene sets that involve in the pathogenesis of SONFH via gene set analyses.

**Methods:** Based on the 735 differentially expressed genes (DEGs,  $P \leq 0.05$ ) identified between femoral head samples from patients with SONFH and those from normal control. Then, we ranked the DEGs according to the  $\log_2$ (Fold-change) from largest to smallest and stored the ranked DEGs list in a file with the suffix '.rnk'. Next, the human gene set annotation file (msigdb.v7.4.symbols.gmt), which contain all gene set, was downloaded from GSEA web set. Finally, the rank DGEs list file and the gene set annotation file were loaded to the GSEA desktop software and the "Run GSEAPre-

ranked" tools was used for the gene set enrichment analyses with the default parameters and the enrichment score (ES) and FWER p-Value were calculated by the GSEA software.

**Results:** The DEGs were significantly enriched in 11 gene sets (FWER  $p$ -val  $\leq 0.01$ ). The most enriched gene set was NABA\_CORE\_MATRISOME (ES=0.656, FWER  $p$ -val  $\leq 0.0001$ ). Other significantly enriched gene sets including HADDAD\_B\_LYMPHOCYTE\_PROGENITOR (ES=0.749, FWER  $p$ -val  $\leq 0.001$ ), NABA\_ECM\_GLYCOPROTEINS (ES=0.690, FWER  $p$ -val  $\leq 0.001$ ), GOMF\_EXTRACELLULAR\_MATRIX\_STRUCTURAL\_CONSTITUENT (ES=0.632, FWER  $p$ -val  $\leq 0.001$ ), GOMF\_STRUCTURAL\_MOLECULE\_ACTIVITY (ES=0.560, FWER  $p$ -val  $\leq 0.000$ ), GOCC\_COLLAGEN\_CONTAINING\_EXTRACELLULAR\_MATRIX (ES=0.489, FWER  $p$ -val  $\leq 0.001$ ), HAY\_BONE\_MARROW\_STROMAL (ES=0.438, FWER  $p$ -val=0.002), HP\_ABNORMAL\_JAW\_MORPHOLOGY (ES=0.509, FWER  $p$ -val=0.004), HP\_APLASIA\_HYPOPLASIA\_INVOLVING\_THE\_SKELETON (ES=0.484, FWER  $p$ -val=0.005), YTATTTNR\_MEF2\_02 (ES=0.536, FWER  $p$ -val=0.005), GSE9509\_LPS\_VS\_LPS\_AND\_IL10\_STIM\_IL10\_KO\_MACROPHAGE\_30MIN\_DN (ES=0.685, FWER  $p$ -val=0.008).

**Conclusion:** Overall, by performing gene set enrichment analyses, we identified 11 candidate gene sets associated with SONFH and this could provide new insights into the SONFH pathophysiology.

**Acknowledgements:** This study is supported by the National Natural Science Foundation of China (31970569); Natural Science Basic Research Plan of Shaanxi Province (2019JM-119).

## P597

### ASSOCIATION BETWEEN HAND GRIP STRENGTH AND FRACTURE RISK FRAX-BASED IN ECUADORIAN WOMEN

J. Valdiviezo Jara<sup>1</sup>, I. Jaramillo Encalada<sup>1</sup>, A. Segura Mestanza<sup>1</sup>, J. Argüello Andrade<sup>1</sup>, K. Gaibor Urgiles<sup>1</sup>, L. Peñarreta Leon<sup>1</sup>, G. Gordillo Mendoza<sup>1</sup>, D. García López<sup>2</sup>, E. Lopez Gavilanez<sup>2</sup>

<sup>1</sup>AECE Research Group, Association of Clinical Endocrinologists of Ecuador, <sup>2</sup>AECE Research Group, Association of Clinical Endocrinologists of Ecuador; Servicio Endocrinología. Hospital Docente Policía Nacional Guayaquil No.2. Ecuador, Guayaquil, Ecuador

**Objective:** To assess the relationship between hand grip strength (HGS), age, BMI, waist-hip ratio (WHR), and 10-y fracture risk based on FRAX model Ecuador without BMD in Ecuadorian women.

**Methods:** 2288 women 60 y and older were selected. A questionnaire recorded demographic and anthropometric data, a personal and family history of frailty fractures, current smoking, alcohol intake, fall history, daily physical activity, glucocorticoids use, and causes of secondary osteoporosis. A portable dynamometer was used to measure HGS. For the statistical analysis, we use the

Epidat 4.2 software. Pearson's coefficient was used to evaluate the association between HGS, age, BMI, and the 10-year fracture probability based on the FRAX model without BMD.

**Results:** The mean age was 70 (7.8), BMI 27.21(7.22), WHR 96.35(14.38), HGS 16.93(5.55), FRAX Major Osteoporotic Fracture and Hip Fracture score were 2.90(2.35) and 1.23(1.45) respectively. Table 1 presents the linear correlation analysis between HGS, age, BMI, WHR, and FRAX score of the patients studied.

Table 1. Pearson's correlation coefficient between HGS, age, BMI, WHR and FRAX score of study subjects

Variables	<i>r</i>	CI 95%	<i>p</i>
Age (yr)	-0.07	-0.111; -0.029	0.001
WHR (cm)	0.315	0.278; 0.351	0.000
BMI	-0.014	-0.055; -0.027	0.50
FRAX MOF*	-0.378	-0.413; -0.342	0.000
FRAX HF*	-0.369	-0.404; -0.333	0.000

\*without BMD; MOF Major Osteoporotic Fracture; HF Hip fracture

**Conclusion:** Low HGS is associated with a high FRAX score and can contribute to fracture risk prediction. HGS measurement combined with FRAX can be used in osteoporosis screening before proceeding with costly measurement of BMD.

## P598

### MEASUREMENT OF TIBIA BONE MINERAL DENSITY AND STRUCTURE USING ULTRALOW DOSE MULTIDETECTOR CT SCANNER

M. Malekzadeh<sup>1</sup>, J. Keyak<sup>2</sup>, N. Mobini<sup>3</sup>, S. Abbasi-Rad<sup>3</sup>, N. Tofighirad<sup>4</sup>, M. Shamsi<sup>5</sup>, A. Abbasian Ardakani<sup>1</sup>, M. B. Shiran<sup>1</sup>, H. Saligheh Rad<sup>6</sup>

<sup>1</sup>Medical Physics Dept., School of Medicine, Iran University of Medical Sciences, Tehran, Iran, <sup>2</sup>Dept. of Radiological Sciences, Dept. of Biomedical Engineering and Dept. of Mechanical and Aerospace Engineering, University of California, Irvine, USA, <sup>3</sup>Medical Physics and Biomedical Engineering Dept., Tehran University of Medical Sciences, Tehran, Iran, <sup>4</sup>Azad University of Tehran, Farhikhtegan Hospital, Tehran, Iran, <sup>5</sup>Imaging Center, Laleh Hospital, Tehran, Iran, <sup>6</sup>Quantitative Medical Imaging Systems Group, Research Center for Molecular and Cellular Imaging, Tehran University of Medical Sciences, Tehran, Iran

**Objective:** Lack of access to pQCT and HR-pQCT in our local area motivated us to examine the feasibility of whole body CT under hybrid iterative reconstruction (HIR) algorithms, ultralow dose setting, to quantify volumetric BMD (vBMD) and bone structure of the lower extremity.

**Methods:** 50 healthy volunteers, 28 women and 22 men, age 30-60 years old with T-score  $>-1$ , were recruited to be scanned with a Philips-Brilliance scanner. To minimize dose, tibial (38% distal)



vBMD was quantified with either a liquid (50, 100 and 200 mg/cm<sup>3</sup> dipotassium hydrogen phosphate (K<sub>2</sub>HPO<sub>4</sub>)) or a solid (50, 100 and 250 mg/cm<sup>3</sup> calcium hydroxyapatite (CHA)) calibration phantom and we applied a crosscalibration equation between liquid and solid phantoms to obtain equivalent densities. Bone structure was analyzed by semi-automated segmentation using MATLAB software.

**Results:** After applying the crosscalibration equation,  $BMD_{K_2HPO_4} = 1.34 BMD_{CHA} + 13.43$ , the cortical vBMD were  $1188.07 \pm 29.38$  CHA mg/cm<sup>3</sup> and  $1600.92 \pm 39.51$  K<sub>2</sub>HPO<sub>4</sub> mg/cm<sup>3</sup>, which the CHA result is comparable to pQCT solid based measurements in the literature (1). The cortical thickness was about 5 mm. The effective dose was in the daily background level, about 10µSV.

**Conclusion:** In comparison with the existing literature, the results provide novel insight into peripheral bone quantification for this weight-bearing bone under ultralow dose setting in whole body CT, which might be an alternative to pQCT with an acceptable radiation dose. Improvement of acquired image resolution and control on delivered radiation doses have brought an opportunity to use an advanced clinical CT-Scanner to quantify vBMD and macrostructure of extremities. However, using advanced images acquisition set up and reconstruction algorithms are required to reach an acceptable level of sensitivity and specificity to identify patients at the risk of the fragility fracture. We strongly recommend a comparison of cortical vBMD from QCT HIR with BMD from pQCT and HR-pQCT in a community where these modalities are available.

**Reference:** 1. Darling AL, et al. Bone 2013;55:36.

## P599

### USE OF SALVIA OFFICINALIS MOUTHWASH IN THE TREATMENT OF PERI-IMPLANTITIS

G. Ciavoi<sup>1</sup>, R. Iurcov<sup>1</sup>

<sup>1</sup>University of Oradea, Faculty of Medicine & Pharmacy, Oradea, Romania

**Objective:** Peri-implantitis is a complication following an implant insertion in the maxillary or mandibular bone. Failure to stop the process can lead to loss of the implant. Salvia officinalis L. (Salviae folium) extract is recognized for its anti-inflammatory and antimicrobial effects. The aim of our study was to determine the effectiveness of mouthwash based on Salvia officinalis extract (SM) vs. commercial mouthwash (CM).

**Methods:** We used mouthwash with Salvia officinalis extract and commercial mouthwash in a group randomly divided of 32 patients with peri-implantitis. Patients were trained to ensure proper oral hygiene and use mouthwash. They were monitored at 24 h, 3 d and one week.

**Results:** There was an improvement in symptoms, at 24 h control (decreased pain, inflammation and local bleeding) at 10 patients (62.5%) in the CM group and 9 patients (56.2%) in the IM group.

At 3 d, the onset of the healing process was found in 11 (68.7%) patients in the CM group and 9 (56.2%) in the IM group. At one week the healing occurred in 14 (87.5%) patients in the CM group. 2 patients (1 from each group) needed surgery with implant removal. 3 patients (1 from CM group and 2 from IM group) need other surgical procedures.

**Conclusion:** There are no significant differences between the 2 groups in terms of therapeutic results. Due to their reduced side effects and therapeutic effects similar to commercial products, they can be an alternative to conventional treatments or an adjunct in therapy.

## P600

### PHYSICAL ACTIVITY DURING THE COVID-19 PANDEMIC IN COMMUNITY-DWELLING GREEK OLDER ADULTS

M. Tsekoura<sup>1</sup>, M. Roukounaki<sup>1</sup>, E. Giannoulidou<sup>1</sup>, G. Kolokithas<sup>2</sup>, A. Sakellariopoulou<sup>2</sup>, A. Gridelas<sup>2</sup>, E. Billis<sup>1</sup>, J. Gliatis<sup>3</sup>, C. Matzaroglou<sup>1</sup>, V. Sakellari<sup>4</sup>, E. Tsepis<sup>1</sup>

<sup>1</sup>Dept. of Physiotherapy, School of Health Rehabilitation Sciences, University of Patras, Aigio, <sup>2</sup>Dept. of Elderly, Open Care Centres for the Elderly, Social Organization Municipality of Patras, Patras, <sup>3</sup>Dept. of Medicine, School of Health Sciences, University of Patras, Patras, <sup>4</sup>Dept. of Physiotherapy, Faculty of Health and Care Sciences, University of West Attica, Athens, Greece

**Objective:** To investigate the self-reported impact of the COVID-19 pandemic on physical activity (PA) amongst Greek older adults.

**Methods:** This was a cross-sectional study involving 350 adults, all over 60 y of age. Participants were recruited from community centers of Achaia (Open Care Centers for Older Adults), in Western Greek mainland during the period of January-March 2021. The information was gathered through telephone interviews. Questions on social demographics, health history, diagnosis, quarantine and hospitalization were asked, as well as impact of the pandemic health status and physical activity behavior. The level of PA was assessed via the International Physical Activity Questionnaire (IPAQ) questionnaire while anxiety and depression via the Hospital and Anxiety and Depression scale (HADS). The study protocol was approved by the Ethical Committee of the University of Patras.

**Results:** 350 older adults (265 women, 85 men; mean age of  $72.28 \pm 6.73$  y) completed the survey. About half of the sample (n=153; 43.5%) reported a decrease in physical activity due to the pandemic and social isolation restrictions. From the total sample, 211 older adults (59.9%) recorded fear of COVID-19 infection and 9 participants (2.6%) reported to have been diagnosed with the COVID-19 infection. The findings of this study demonstrated that PA was associated with place of living ( $r=0.55$ ;  $p \leq 0.001$ ), incidence of falls ( $r=0.45$ ;  $p \leq 0.001$ ), COVID-19 infection ( $r=0.6$ ;  $p \leq 0.001$ ), fear of COVID-19 infection ( $r=0.045$ ;  $p \leq 0.05$ ) and anxiety ( $r=0.5$ ;  $p \leq 0.001$ ).



**Conclusion:** In summary, a decline in PA due to COVID-19 pandemic was reported by the majority of Greek older adults. Results of the present study show that the COVID-19 pandemic may have induced PA behavior changes in many older adults, which may accelerate their risk of developing frailty, sarcopenia and disability. Interventions to improve PA in older adults should take account social and community factors and should be key components of current and future pandemic plans, particularly for vulnerable groups.

P601

### FEMORAL NECK WARD'S TRIANGLE BONE MINERAL DENSITY: A FORGOTTEN INDICATOR OF BONE LOSS

M. Malekzadeh<sup>1</sup>, S. Abbasi-Rad<sup>2</sup>, M. B. Shiran<sup>1</sup>, J. Keyak<sup>3</sup>, M. Asadi<sup>4</sup>, J. Abolghasemi<sup>5</sup>, A. Ghasem-Zadeh<sup>6</sup>, H. Saligheh Rad<sup>7</sup>

<sup>1</sup>Medical Physics Dept., School of Medicine, Iran University of Medical Sciences, Tehran, Iran, <sup>2</sup>Medical Physics and Biomedical Engineering Dept., Tehran University of Medical Sciences, Tehran, Iran, <sup>3</sup>Dept. of Radiological Sciences, Dept. of Biomedical Engineering and Dept. of Mechanical and Aerospace Engineering, University of California, Irvine, USA, <sup>4</sup>Endocrinology and Metabolism Research Center, Endocrinology and Metabolism Clinical Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran, <sup>5</sup>Dept. of Biostatistics, School of public health, Iran University Medical of Sciences, Tehran, Iran, <sup>6</sup>Dept. of Endocrinology and Medicine, Austin Health, University of Melbourne, Melbourne, Australia, <sup>7</sup>Quantitative Medical Imaging Systems Group, Research Center for Molecular and Cellular Imaging, Tehran University of Medical Sciences, Tehran, Iran

**Objective:** Cortical and trabecular bone are important for bone strength. Osteoporotic fractures are caused by both cortical thinning and trabecular bone loss. The hip is considered a cortical bone site but both cortical and trabecular bone contribute to femoral bone strength. We hypothesized that Ward's triangle BMD, assessed by DXA, can be an indicator of trabecular bone loss or increased cortical porosity and may predict risk of fragility fracture.

**Methods:** We conducted a retrospective study of 50 healthy participants, 28 women and 22 men, age 30-60 years old, with T-score >-1. The trabecular bone score (TBS) of L<sub>1</sub>-L<sub>4</sub> and the longitudinal relaxation time (T<sub>1</sub>) of cortical bone free water distal tibia (38%) were quantified using iNsign<sup>™</sup> software and variable repetition time (VTR) technique and short echo time (STE) in a 1.5 T clinical magnetic resonance imaging (MRI), respectively.

**Results:** The mean Ward's triangle BMD and its area were 0.66±0.13 g/cm<sup>2</sup> and 1.19±0.09 cm<sup>2</sup>, respectively. In women the BMD of ward's triangle were significantly correlated positively with TBS and negatively with cortical bone free water, r=0.46 and

r=-0.46, respectively. The correlations between BMD of Ward's triangle and TBS and T<sub>1</sub> were 0.62 and -0.57, respectively, and were higher in men compared with women (Table).

Table 1. The correlation between femur parts BMD and T<sub>1</sub> and TBS.

BMD (g/cm <sup>2</sup> )		T <sub>1</sub> (ms)	TBS
Ward's	Total	-0.52**	0.52**
	Male	-0.57**	0.62**
	Female	-0.46*	0.46**
Neck		-0.36**	0.31*
Troch		-0.27	0.31*
Inter-troch		-.038**	0.38**
Proximal-Femur		-.038**	0.37**

\*\*Correlation is significant at the 0.01 level (2-tailed). \* Correlation is significant at the 0.05 level (2-tailed).

**Conclusion:** BMD of Ward's triangle could be a sensitive indicator for early detection of bone loss in the femoral neck. Further studies and improvement in DXA image analysis software would improve the sensitivity and specificity of Ward's triangle on prediction of fragility fracture.

**Acknowledgements:** The authors would like to thank from Med-Imaps company (Geneva Switzerland) and their Iranian branch Takapo Teb providing us with the TBS software for free.

P602

### IN SILICO STUDY OF THE ACVR1-SMAD1 PROTEIN COMPLEX INVOLVED IN FIBRODYSPLASIA OSSIFICANS PROGRESSIVA (FOP)

D. Ortiz-López<sup>1</sup>, A. Salas Burgos<sup>1</sup>, I. Quevedo Langenegger<sup>2</sup>

<sup>1</sup>University of Concepción, Faculty of Biological Sciences. Pharmacology Dept., <sup>2</sup>University of Concepción, Faculty of Medicine, Concepción, Chile

**Objective:** Fibrodysplasia ossificans progressiva (FOP) is a rare and aggressive disease caused by point mutations at the intracellular part of the ACVR1 receptor, that trigger extracellular bone growth replacing connective tissues. The ACVR1 protein is a transmembrane protein with kinase activity classified as a TGF-β factor receptor class 1. This receptor takes part in the skeleton development by BMP signaling through the activation of the SMAD1/5/8 transcription factors by phosphorylation. There are no structures for the protein complex ACVR1-SMAD1/5/8 which has been identified as a transient complex, thus, it is difficult to

obtain its structure using X-ray diffraction or other experimental methods. For this reason, we aimed to obtain a molecular model of the ACVR1-SMAD1 protein complex using *In silico* methods.

**Methods:** The initial protein complex was predicted using molecular docking considering spatial restrictions over the interacting residues determined from published mutagenesis results. Molecular dynamics simulations were executed to explore the complex stability, interprotein interactions, and the feasibility of the phosphorylation reactions. Those simulations consider the wildtype (WT) ACVR1, and the mutant variants ACVR1 Q207D and R206H, which correspond to the most frequent FOP mutations.

**Results:** Docking results show that just one cluster of models can adjust restrictions. After 500ns of simulations, the complex preserves its general shape. In the WT complex we identified two different conformations where the phosphorylation reaction is highly probable. The mutant variants present changes in dynamic fluctuations of the GS domain with effects over the active site dynamics.

**Conclusion:** We obtained the first model for the protein complex ACVR1-SMAD1, which enables us to identify distinctive interactions of the complex. FOP mutations at the GS domain show long distance effects on the active site dynamics.

## P603

### SF-36 PHYSICAL FUNCTION AND GENERAL HEALTH DOMAINS ARE INDEPENDENT PREDICTORS OF ACUTE HOSPITAL LENGTH OF STAY AFTER HIP FRACTURE SURGERY

C. H. S. Sim<sup>1</sup>, C. Y. Howe<sup>1</sup>, X. K. K. Tay<sup>1</sup>, R. Ganguly<sup>2</sup>, T. S. Howe<sup>1</sup>, S. B. J. Koh<sup>1</sup>

<sup>1</sup>Singapore General Hospital, <sup>2</sup>Duke-NUS, Singapore, Singapore

**Objective:** Various premorbid demographics and co-morbidities may impact healthcare burden, but it is less understood how pre-fracture physical function and quality of life may modify these effects. The aim of this study was to determine which quality of life and physical function domains impact acute hospital burden, using length of stay (LOS) for patients after hip surgery as a proxy for healthcare resource,

**Methods:** We analyzed the association between 36-Item Short Form Survey (SF-36) domains, EuroQol-5D (EQ-5D) and Parker Mobility Score (PMS) vs. LOS, taking into account patient and hospital factors. This retrospective study examines hip fracture data from a large tertiary hospital in Singapore over the period of 2017-2020. Prefracture SF-36, EQ-5D and PMS based on recall at hospitalization were correlated with LOS using binary logistic regression on SAS. Age, gender, race, marital status, payer type, ASA score, TTS, type of surgery, fracture type, POD1 mobilization, and discharge disposition were analyzed as potential confounders.

**Results:** 1045 patients were included in this study with 704 females and 341 males. The mean age was 79.5±8.57 y (range 60-105) with an average LOS 13.64±10.0 d (range 2-114). On univariate analysis, PMS, EQ-5D and all domains of SF-36 except bodily pain, emotional role and mental health were associated significantly with LOS. Amongst the QOL and PMS scores, only the domains of SF-36 Physical Function (PF) (OR=0.993, p=0.0068) and general health perception (GH) (OR 0.992, p=0.0230) remained significant on the multivariate model.

**Conclusion:** After accounting for functional decline related to age and comorbidity, our study showed that premorbid scores of SF36 PF and GH domains remain independent significant factors associated with LOS in hip fracture patients after surgery. PH and GH before a hip fracture impacts acute hospital LOS as recovery trajectories and needs for caregiving may differ. Together with demographics, co-morbidities and fracture patterns, premorbid SF36 physical function and general health may serve to predict health resource consumption, and better stratify resource allocations and rehabilitative programs.

## P604

### PHARMACODYNAMICS OF ORAL CHOLECALCIFEROL IN HEALTHY SUBJECTS WITH VITAMIN D DEFICIENCY: A RANDOMIZED OPEN-LABEL STUDY

A. D. Fassio<sup>1</sup>, D. G. Gatti<sup>1</sup>, M. R. Rossini<sup>1</sup>, C. B. Benini<sup>1</sup>, E. B. Bertoldo<sup>1</sup>, O. V. Viapiana<sup>1</sup>, C. D. Dartizio<sup>1</sup>, M. G. Gatti<sup>1</sup>, I. G. Gavioli<sup>1</sup>, G. A. Adami<sup>1</sup>

<sup>1</sup>Rheumatology Unit, University of Verona, Verona, Italy

**Objective:** In the present study, we describe the results of this study focusing on the pharmacodynamic effects of these three different treatment regimens on vitamin D metabolites, regulators of calcium and phosphate homeostasis, bone turnover markers, and Wnt inhibitors.

**Methods:** This is an open-label, randomized, parallel group study in healthy vitamin D deficient subjects (baseline 25OHD <20 ng/mL) receiving cholecalciferol with three different schedules: 10,000 IU/d for 8 weeks followed by 1000 IU daily for 4 weeks; group A, 50,000 IU/week for 12 weeks; group B and 100,000 IU every other week for 12 weeks; group C. 1,25-dihydroxyvitamin D (1,25OH2D), 24,25-dihydroxyvitamin D (24,25OH2D), PTH, ionized calcium, FGF-23, C-terminal telopeptide of type I collagen (CTX-I), procollagen type I N-terminal propeptide (PINP), bone alkaline phosphatase (BALP), Dkk-1 and sclerostin were dosed at baseline, day 28, 53, 84, 112.

**Results:** Baseline characteristics of the enrolled subjects are reported in Table. The absolute changes of all the tested biomarkers are depicted in Figure. 1,25OH2D, increased at each time points. The increase was greater (p<0.05) for group A vs. B and C at day 28, and vs. group B at day 56. No significant difference among

groups was seen for the other biomarkers. 24,25OH2D remained stable over time. PTH decreased at day 84. FGF-23 increased at all time points. CTX-I, PINP slightly increased at day 28. BALP, decreased from day 56 onward. Dkk-1 increased from day 56 onward, while sclerostin did not show significant changes.

**Conclusion:** The results of our study in healthy vitamin D-deficient subjects show relevant effects of vitamin D supplementation on multiple regulators of calcium, phosphate and bone metabolism, without any major differences among the three treatment schedules.

**Disclosures:** Davide Gatti has received advisory board honoraria, consultancy fees and/or speaker fees from Amgen, Celgene Eli-lilly, MSD-Italia, Organon, UCB.

Maurizio Rossini has received advisory board honoraria, consultancy fees and/or speaker fees from Abiogen, Amgen, Abbvie, BMS, Celgene, Eli-Lilly, Galapagos, Grunenthal, MSD, Novartis, Pfizer, Sanofi, Sandoz, Theramex, UCB.

Table. Subjects demographic at baseline. No statistical differences were observed among groups.

Baseline characteristics		ALL subjects (n=75)	Group A (n=25)	Group B (n=25)	Group C (n=25)
Demo-graphic					
Age - years	Years (SD)	34.1 (10.2)	30.2 (10)	36.7 (8.8)	35.4 (11)
Sex					
Male	N (%)	31 (41.3%)	12 (48%)	7 (28%)	12 (48%)
Female	N (%)	44 (58.7%)	13 (52%)	18 (72%)	13 (52%)
Weight (kg)	Mean (SD)	66.7 (12.4)	65.2 (13.5)	67.4 (9.8)	67.6 (13.7)
BMI (Kg/m <sup>2</sup> )	Mean (SD)	23.1 (2.6)	22.6 (2.9)	23.4 (2.1)	23.2 (2.8)

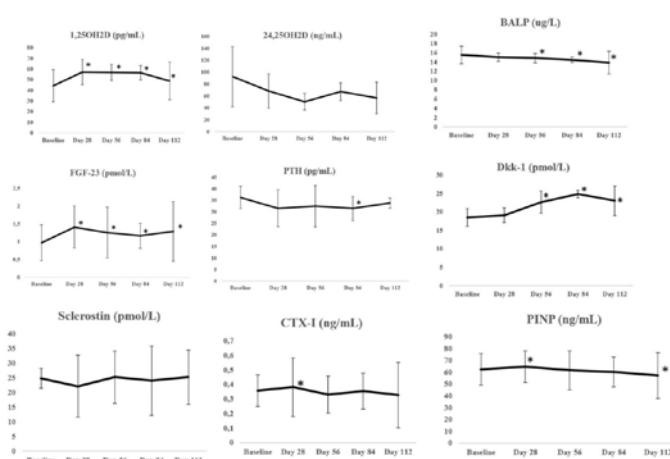


Figure. Absolute changes of the overall cohort of 1,25OH2D, 24,25OH2D, PTH, FGF-23, BALP, CTX-I, PINP, Dkk-1 and sclerostin \* p<0.05 with respect to baseline. Error bars show standard deviation.

## P605

### ASSOCIATIONS BETWEEN BONE HEALTH, AND OBESITY, SARCOPENIA, AND SARCOPENIC OBESITY IN INDIAN OLDER ADULTS

A. Gandham<sup>1</sup>, D. Scott<sup>2</sup>, M. P. Bonham<sup>1</sup>, B. Kulkarni<sup>3</sup>, S. Kinra<sup>4</sup>, M. M. Cervo<sup>4</sup>, P. R. Ebeling<sup>1</sup>, A. Zengin<sup>1</sup>

<sup>1</sup>Monash University, Melbourne, Australia, <sup>2</sup>Deakin University, Melbourne, Australia, <sup>3</sup>Osmania University, Hyderabad, India, <sup>4</sup>London school of Hygiene & Tropical Medicine, London, UK

**Objective:** Older adults with the comorbid sarcopenia and obesity, sarcopenic obesity have poorer BMD compared with obese counterparts in primarily Caucasian populations, but studies in diverse populations are currently unavailable. We investigated whether BMD was associated with obesity, sarcopenia and sarcopenic obesity in Indian adults.

**Methods:** 1057 adults aged >50 y were included. DXA measured fat and lean mass and BMD at the hip, spine and whole body. Obesity was defined by body fat percentage (cut points- men: >25%, women: >35%); sarcopenia was defined using the revised Asian Working Group for Sarcopenia definition with low hand grip strength (men: <28 kg, women: <18 kg) and appendicular lean mass index (ALMI) (men: <7.0 kg/m<sup>2</sup>, women: <5.4 kg/m<sup>2</sup>). Participants were classified into four groups as having one of the following: nonsarcopenic nonobesity (NSNO), obesity alone, sarcopenia alone or sarcopenic obesity. Linear regression analyses were performed and adjusted for confounders including age, sex and smoking status; data are presented as  $\beta$ -coefficients and 95% confidence intervals.

**Results:** Older adults with sarcopenia alone had significantly lower hip BMD (-0.069; -0.086, -0.051) and whole body BMD (-0.039; -0.061, -0.017) compared with those with NSNO, while those with

sarcopenic obesity had significantly lower spine BMD vs. obesity alone and NSNO groups, after adjustments (all  $p < 0.05$ ). Although older adults with obesity had higher hip BMD (0.026; 0.007, 0.045), they had lower whole body BMD (-0.039; -0.061, -0.017) compared to the NSNO group, after adjustments.

**Conclusion:** Sarcopenic obesity is associated with poorer bone health in Indian older adults compared to those with obesity and NSNO. The protective effect of obesity maintaining BMD appears to be lost in Indian older adults with comorbid sarcopenia.

P606

### THE IMPACT OF PHARMACOLOGICAL INTERVENTIONS FOR OLDER ADULTS WITH SARCOPENIA: A SYSTEMATIC REVIEW OF RANDOMIZED CONTROLLED TRIALS

A. L. Lee<sup>1</sup>, C. McArthur<sup>2</sup>, H. A. A. Alrob<sup>1</sup>, G. I. Ioannidis<sup>1</sup>, J. D. A. Adachi<sup>1</sup>, L. T. Thabane<sup>1</sup>, J. L. Lee<sup>1</sup>, A. P. Papaioannou<sup>1</sup>

<sup>1</sup>McMaster University, Hamilton, <sup>2</sup>Dalhousie University, Halifax, Canada

**Objective:** Sarcopenia is a common clinical syndrome that can increase risk of adverse outcomes such as falls or fractures in older adults. Previous studies have shown that exercise or nutritional supplements can be an effective treatment for older adults with sarcopenia. However, the effect of pharmacological treatment on muscle mass, muscle strength, and physical function for older adults with sarcopenia is uncertain. The aim of this study is to investigate the effect of pharmacological interventions on muscle mass, muscle strength, and physical function for older adults with sarcopenia.

**Methods:** We systematically searched MEDLINE, EMBASE, and the Cochrane Central Registry of Controlled Trials from inception to February 2019 to identify randomized controlled studies (RCTs) examining the effects of pharmacological interventions on muscle mass, muscle strength, and physical function in older adults aged 65 years or older with sarcopenia.

**Results:** We screened a total of 2166 records and included six RCTs that investigated the effects of pharmacological interventions on muscle mass, muscle strength, and physical function in older adults with sarcopenia. Very low quality evidence suggests that vitamin D supplementation for 6 months may improve muscle mass as measured by Appendicular Skeletal Muscle mass in vitamin D deficient presarcopenic older patients (mean difference: 5.31 kg, 95%CI: 3.60 to 7.02). However, very low to low quality evidence suggests that there is no statistically significant change in muscle mass, muscle strength or quality of life with pharmacological treatment including testosterone, vitamin D, selective androgen receptor modulator, or angiotensin converting enzyme inhibitors at 5 and 6 months.

**Conclusions:** Our systematic review found pharmacological interventions might not improve muscle mass, muscle strength and physical function for older adults with sarcopenia, although the quality of the evidence is very low. Future high quality trials are required to establish the effects of pharmacological treatment for people with sarcopenia.

P607

### PERFORMANCE OF THREE SCREENING QUESTIONNAIRES TO ASSESS VITAMIN D STATUS IN THE GENERAL POPULATION

C. Shadoun<sup>1</sup>, O. Bruyère<sup>2</sup>, E. Cavalier<sup>3</sup>

<sup>1</sup>WHO Collaboration Center for Public Health Aspects of Musculoskeletal Health and Ageing, University of Liège, <sup>2</sup>University of Liège, Division of Public Health, Epidemiology and Health Economics, <sup>3</sup>Clinical Chemistry Dept., University Hospital of Liège, Liège, Belgium

**Objective:** Vitamin D deficiency is a major public health problem and should be detected. To date, the only reliable test to determine vitamin D status is a blood test for 25-hydroxyvitamin D determination, but this should not be used as a screening tool, especially in healthy subjects. Our objective is to evaluate the performance of several predictive simple, rapid, inexpensive questionnaires of vitamin D status and to determine whether they could be an effective alternative to blood testing in a general population.

**Methods:** This is a cross-sectional study involving a sample of 81 subjects recruited from the staff of the CHU and University of Liège, Belgium (50.6°N). All participants were asked to answer three questionnaires aimed to assess the vitamin D status. Blood sample was collected and serum 25(OH)D was measured by LCMS/MS and served as the reference. ROC curve analysis as well as sensitivity, specificity, positive and negative predictive values were determined for each questionnaire. Sensitivity analysis was performed on a subsample of nonsupplemented subjects only.

**Results:** 38.3% of the total sample was vitamin D deficient with a serum 25(OH)D level below 20 ng/mL and 50.6% of subjects were taking vitamin D supplementation. The median age was 35.0 [28.0 - 43.0] years and the mean BMI was 24.4±3.54 kg/m<sup>2</sup>. Analyses on the whole sample showed that questionnaire 1, 2 and 3 had a sensitivity of 87.1%, 83.9%, 100%, a specificity of 78.0%, 20.0%, 4.00%, a positive predictive value of 71.1%, 39.4%, 39.2% and negative predictive value of 90.7%, 66.7%, 100%, respectively. Sensitivity analysis showed that questionnaire 1, 2 and 3 had a sensitivity of 96.4%, 82.1%, 100%, a specificity of 8.93%, 16.7%, 0.00%, a positive predictive value of 71.1%, 69.7%, 70.0% and negative predictive value of 50.0%, 28.6%, respectively.

**Conclusion:** This study could not demonstrate the effectiveness of questionnaires in predicting vitamin D status in a population of healthy adults.



P608

### THE ROLE OF LOW FREQUENCY EXTRACORPOREAL SHOCKWAVE THERAPY IN CALCANEAL EXOSTOSIS

I.-R. Marcu<sup>1</sup>, V. D. Caimac<sup>1</sup>, D. D. Dop<sup>1</sup>, C. O. Rogoveanu<sup>1</sup><sup>1</sup>University of Medicine & Pharmacy of Craiova, Craiova, Romania

**Objective:** Calcaneal exostosis is a spinal bone proliferation on the plantar surface of the calcaneus bone. The present study aimed to determine the efficacy and safety of shockwave therapy (SWT) in patients with calcaneal exostosis.

**Methods:** We performed a prospective observational study on a group of 60 patients with the diagnosis of calcaneal exostosis established following the radiological examination, who performed the outpatient physical treatment. All patients included in the study received 2000 shocks 2 or 3 times a week, a total of 5 sessions, at a pressure of 3-4 bar and at a frequency of 10-15 Hz. We used the following evaluation models: morning pain on the first step and pressure on the heel were evaluated using a visually analogous scale (VAS), the comfortable walking time was also recorded, the score Roles and Maudsley, the evaluation of the quality of life were also recorded. The assessment of patients was performed at the inclusion in the study and after 14 d of treatment.

**Results:** VAS mean scores were statistically significantly reduced after rehabilitation treatment from  $7.8 \pm 0.4$  at baseline to  $2.1 \pm 0.8$  at 14 d. Regarding the evaluation of the comfortable walking duration, the patients started from an average comfortable walking duration of 2 h for 51 patients (85%) and 1 h for 9 patients (15%), which shows a statistically significant decrease compared to the initial values ( $p < 0.001$ ). For the Roles and Maudsley score, the starting value was 4 for both women and men; after 15 d of treatment 85% of patients reached a score of 1 or 2. The quality of life questionnaire shows that the end of the therapy sessions with low energy shockwaves, weather sensitivity, pain, muscle fatigue and sleep disorders decreased in almost all patients.

**Conclusion:** Extracorporeal SWT in patients with calcaneal exostosis has the advantage of efficacy, safety and noninvasiveness. This therapy has been shown to be effective in relieving pain and increasing patients' quality of life.

P609

### ASSOCIATION BETWEEN GAIT DEVICES AND REHABILITATION PROGRAM IN HIP OSTEOARTHRITIS

I.-R. Marcu<sup>1</sup>, V. D. Caimac<sup>1</sup>, D. D. Dop<sup>1</sup>, C. O. Rogoveanu<sup>1</sup><sup>1</sup>University of Medicine & Pharmacy of Craiova, Craiova, Romania

**Objective:** To determine the role of association between daily use of cane and rehabilitation program in patients with hip osteoarthritis, using a randomized, controlled trial.

**Methods:** The study included two groups of patients (1- study group and 2- control group) either 32 patients, males and females, diagnosed with hip osteoarthritis. The inclusion criteria were: hip pain score between 3-7 (on a 0-10 visual analogue scale- VAS), stable doses of nonsteroidal anti-inflammatory drugs (NSAIDs), no regular physical-kinetic exercise or use of canes previous to the study. Each patient of the study group used a gait device daily (cane) and was instructed in how to use the cane on the contralateral side. The patients of the two groups followed the same rehabilitation program. Kinetic program was prepared with paraffin thermotherapy, massage with tonic and vasoactive effect on leg muscles and analgesic electrotherapy (TENS, interferential currents). Physical and kinetic treatment lasted 14 d.

The clinical and functional parameters assessed were pain, physical dysfunctions, disabilities, drugs consumption- NSAIDs, quality of life. We used the following scales: hip pain in a VAS, Tinetti Gait Scale, Tinetti Balance Scale, 36-Item Short Form Survey questionnaire (SF-36).

**Results:** The improvement of the pain score was 47.5% for group 1 and 38.4% for group 2, for physical dysfunctions- 30.2% for group 1 and 23.6% for group 2, for disabilities (gait disturbances)- 39.7% for group 1 vs. 31.5% for group 2; drug consumption (NSAIDs)- 45.4% for group 1 vs. 36.1 for group 2. The functional status evaluated using SF-36 questionnaire was improved with 43.8% for group 1 and 35.3% for group 2.

**Conclusion:** This study showed the effect of association between gait devices and rehabilitation program at the patients with hip osteoarthritis in improving clinical and functional parameters. We concluded that combination of gait devices and physical-kinetic program is more effective compared to single use of the rehabilitation tools in patients with hip osteoarthritis.

P610

**MRI EVALUATION OF OSTEOCHONDRITIS DISSECANS OF THE KNEE**A. C. Venter<sup>1</sup>, L. G. Daina<sup>1</sup>, I. Oswald<sup>1</sup>, F. L. Andronie-Cioara<sup>1</sup>, A. Husar<sup>1</sup>, C. M. Daina<sup>1</sup><sup>1</sup>University of Oradea, Faculty of Medicine & Pharmacy, Oradea, Romania,

**Objective:** Osteochondritis dissecans is a subchondral focal infarction limited to a small portion of the bone but may also include articular cartilage. It is a circumscribed aseptic necrosis with vascular etiology, but repetitive or limited trauma also plays an important role. The disease occurs frequently between 5-50 y with maximum incidence in adolescence, in the weight-bearing joints: medial condyle of the femur, talus, tibial plateau. Aim: MRI features of osteochondritis dissecans of the femur.

**Methods:** We evaluated 14 patients (9 males, 5 females, aged between 19-47 y) who underwent MRI examination of the knee in the Imaging Dept. of the County Clinical Hospital in Oradea. The examination revealed both articular cartilage lesions as well as subchondral lesions.

**Results:** The subchondral fracture associated with edema occurs hyposignal in the T1-weighted sequences and the cartilage defect with or without associated subchondral bone edema is visible on the fat-saturated sequences. We grouped the patients in 4 stages following the MRI examination, namely: in stage I - bone edema, in stage IIa - with subchondral cyst formation, in stage IIb with incomplete separate subchondral fragment; the lesions are considered stable. In stage III - fluid can be seen around a partially detached osteochondral fragment, the lesions are considered unstable, in stage IV - the osteochondral fragment is completely detached. In stage I we included 2 patients- 14%, in stages IIa and IIb we included 4 patients- 28%, in stage III we included 5 patients-36% and in stage IV we included 3 patients- 22%.

**Conclusion:** MRI examination of the knee plays an important role in the evaluation of osteochondritis dissecans lesions providing excellent anatomical details; evaluates cartilage thickness, signal changes inside the cartilage, subchondral bone/bone cartilage interface as well as cartilage repair tissue.

P611

**EFFECTS OF AN EXERCISE PROGRAM ON IMPROVING QUALITY OF LIFE AND FUNCTIONAL STATUS IN OSTEOPOROTIC PATIENTS**I.-R. Marcu<sup>1</sup>, V. D. Caimac<sup>1</sup>, D. D. Dop<sup>1</sup>, C. M. Borcan<sup>2</sup>, C. O. Rogoveanu<sup>1</sup><sup>1</sup>University of Medicine & Pharmacy of Craiova, <sup>2</sup>Clinical Hospital of Neuropsychiatry Craiova, Neurorehabilitation Clinic, Craiova, Romania

**Objective:** Exercise programs were proven to have a significant role on decreasing back pain intensity and disability on osteoporotic patients. We conducted a randomized controlled clinical trial to determine the effects of physical exercises in reducing back pain, depression and improving physical function and quality of life to these patients.

**Methods:** All patients were diagnosed with postmenopausal osteoporosis using BMD evaluation and received bisphosphonates treatment for at least 6 months. The study included 64 women randomly assigned to a control group (32 patients) and an exercise group (32 patients). The patients in the control group received only bisphosphonates in stable doses. The patients in the exercise group followed the drug antiresorptive therapy and a standardized exercise program aimed to improve posture, spinal mobility and to strengthen spinal extensors, abdominal muscles and lower limbs muscles, exercises for improving gait and balance. The exercise program was performed for approximately one hour, three times/week, 6 weeks. The patients were assessed baseline and after 6 weeks, using the following tools: a visual analogue scale for spinal pain (VAS), Beck Depression Inventory and Quallefo-41 for measuring the quality of life in patients with osteoporotic vertebral deformities.

**Results:** Spinal pain evaluated on a VAS reduced by 43.5% in the exercise group and by only 12.6% in the control group after 6 weeks of treatment. There also was a significant difference between groups regarding Beck Depression Inventory, the exercise group showing an improvement from 14.2 to 11.6 and the control group deteriorating from 13.9 to 14.3. The exercise group also showed significantly greater improvements for Qualeffo-41 scores compared to the control group, especially on pain and social function subscales. We also established a statistically significant correlation between the improving of spinal pain score and Beck Depression Inventory score in the exercise group patients.

**Conclusion:** The results support the benefits of a standardized exercise program in the clinical management of patients with osteoporosis, by reducing spinal pain, depression and improving their quality of life. The exercise pain was well accepted by all patients and no adverse events were reported.

P612

### A PILOT STUDY OF THE EFFECT OF ARCH STIFFNESS ON LOWER LIMB JOINT KINEMATICS DURING UNEXPECTED GAIT TERMINATION

X. Z. Cen<sup>1</sup>, D. Sun<sup>1</sup>, I. Bíró<sup>2</sup>, Y. D. Gu<sup>1</sup><sup>1</sup>Faculty of Sports Science, Ningbo University, Ningbo, China,<sup>2</sup>Faculty of Engineering, University of Szeged, Szeged, Hungary

**Objective:** The efficacy of the arch stiffness index as a criterion to evaluate injury susceptibility is well documented; however, the effect of arch stiffness on lower limb biomechanics, especially during gait termination, is poorly understood. Therefore, this study aimed to investigate how arch stiffness affects the kinematics of lower limb joints during unplanned gait termination.

**Methods:** A total of 67 asymptomatic male participants (mean age: 22.7±0.9) were recruited to complete the gait biomechanical tests. All were classified by calculating the arch stiffness index using three-dimensional arch morphological scanning and participated in unplanned gait termination tests to acquire kinematic data using a motion capture system. An inverse kinematics algorithm was performed in Visual 3D software to calculate the hip, knee, ankle, and metatarsophalangeal (MTP) joint angles. Parameters were compared between stiff and flexible arches using an independent-samples T-test.

**Results:** During gait termination, compared with the stiff arch, the subjects with flexible arch had a significantly larger range of motion on the frontal plane of the knee joint ( $p<0.001$ ). The stiff arch group showed a greater range of joint motion on the sagittal plane of the ankle joint ( $p<0.001$ ). On the frontal plane, the joint range of motion in the flexible arch group was greater ( $p=0.044$ ). For the MTP joints, the joint angle on the frontal plane of the stiff arch group was significantly greater than that of the flexible arch group ( $p<0.001$ ).

**Conclusion:** The difference in biomechanical characteristics caused by different arch stiffness was mainly concentrated in the distal joints. During planned and unplanned gait termination, the arch needs to bear and disperse the impact load transmitted to the foot, and the flexible arch is more likely to be compressed to reduce the height of the medial longitudinal arch, resulting in the limited windlass mechanism. These results may add additional insights into the arch function and injury susceptibility during gait termination.

P613

### ANTI-INFLAMMATORY AND CHONDROPROTECTIVE EFFECTS OF CELECOXIB AND GLUCOSAMINE SULFATE ON HUMAN OSTEOARTHRITIC CHONDROCYTES EXPOSED TO IL-1 $\beta$

S. Cheleschi<sup>1</sup>, S. Tenti<sup>1</sup>, A. Fioravanti<sup>1</sup><sup>1</sup>Rheumatology Unit, Dept. of Medicine, Surgery and Neuroscience, Azienda Ospedaliera Universitaria Senese, Policlinico Le Scotte, Siena, Italy

**Objective:** To investigate the possible anti-inflammatory and chondroprotective effects of a combination of celecoxib and glucosamine sulfate (GS), currently included among the pharmacological strategies for osteoarthritis (OA) management, in human OA chondrocytes exposed to the negative stimulus of IL-1 $\beta$ . The mechanism of action underlying their repairing activities was also explored.

**Methods:** Chondrocytes were treated with celecoxib (1.85  $\mu$ M) and GS (9  $\mu$ M), alone or in combination, for 24 h and 48 h, in presence of IL-1 $\beta$  (10 ng/mL). After treatment, the gene expression and supernatant release of the main pro-inflammatory cytokines, metalloproteinases (MMPs), and type II collagen (Col2a1) were assessed by qRT-PCR and ELISA. Apoptosis and mitochondrial superoxide production were measured by flow cytometry, the anti-apoptotic marker, B-cell lymphoma (BCL)2, and the major antioxidant enzymes by qRT-PCR. The activation of NF- $\kappa$ B was examined analyzing p50 subunit by western blot. The implication of the pathway in celecoxib and GS-mediated effects was assessed by the use of a specific NF- $\kappa$ B inhibitor (BAY-11-7082, 2 h preincubation).

**Results:** Celecoxib and GS, tested alone or coincubated with IL-1 $\beta$ , significantly reduced the gene expression and supernatant release of cyclooxygenase 2, prostaglandin E2, IL-1 $\beta$ , IL-6, TNF- $\alpha$ , MMP-1, MMP-3, MMP-13, while increased Col2a1, in comparison to basal condition or IL-1 $\beta$  stimulus. Both drugs also reduced apoptosis and superoxide production, the transcriptional levels of superoxide dismutase, catalase, nuclear factor erythroid 2, increased BCL2 and limited p50 NF- $\kappa$ B nuclear translocation. The combination of celecoxib and GS demonstrated a more significant inhibitory effect on IL-1 $\beta$  stimulus on inflammation, apoptosis, oxidative stress and cartilage turnover, than was observed by each treatment alone. Furthermore, celecoxib and GS effects were potentiated by the preincubation of the cells with BAY-11-7082.

**Conclusion:** Our results demonstrated the synergistic effect of celecoxib and GS on OA chondrocytes metabolism, apoptosis and oxidative stress, probably through the modulation of NF- $\kappa$ B signaling pathway; these findings may provide a powerful rationale for the combined use of celecoxib and GS for the treatment of OA.

P614

### DIVERSIFIED RISK FACTORS FOR RECURRENT FRACTURES, FALLS, AND MORTALITY AMONG PATIENTS WITH FRAGILITY FRACTURES PARTICIPATING IN A FRACTURE LIAISON SERVICE PROGRAM

C. Chia-Ter<sup>1</sup>, Y. Rong-Sen<sup>2</sup>, H. Wei-Jia<sup>3</sup>, C. Ding-Cheng<sup>4</sup>

<sup>1</sup>Dept. of Internal Medicine, National Taiwan University Hospital, Bei-Hu Branch, Taipei, <sup>2</sup>Dept. of Orthopedics, National Taiwan University Hospital, Taipei, <sup>3</sup>Dept. of Geriatrics & Gerontology, National Taiwan University Hospital, Taipei, <sup>4</sup>Superintendent Office, National Taiwan University Hospital Hsin-Chu Branch, Hsin-Chu, Taiwan

**Objective:** Significant gap exists regarding the care for patients with fragility fracture and osteoporosis, especially for different outcomes. We examined the influences of lifestyle interventions on risk factors of 1-y mortality, falls, and recurrent fractures of our fracture liaison service (FLS) program participants.

**Methods:** Totally 600 patients participated in our FLS program, whose protocol was adapted from the 13 best practice framework (BPF) standards published by the International Osteoporosis Foundation. We performed baseline assessments and provided follow-up care for 1 year, followed by classifying the entire cohort into 4 groups: those without lifestyle interventions from baseline to 1-y (Group 1), without interventions at baseline but with interventions at 1-y (Group 2), with interventions at baseline but without intervention at 1-y (Group 3), and with interventions throughout the study period (Group 4). We compared risk factors for recurrent fractures, falls, and mortality among different categories of lifestyle interventions including protein, calcium, vitamin D<sub>3</sub> supplementation, and exercise groups, using univariate and Cox proportional hazard regressions.

**Results:** The mean age of participants in our cohort was 77.5±10.5 y, with 72% female. The 1-y mortality and incidence of fall, recurrent fractures were 9.5%, 33.2%, and 3.0%, respectively. Cox regression revealed that for exercise intervention, group 4 exhibited a significantly lower risk of mortality (odds ratio 0.201, p<0.001), while group 3 had a lower risk of fall (odds ratio 0.466, p=0.026) compared to group 1. For protein supplement and calcium supplement interventions, groups 2 (odds ratio 0.83, p=0.003) and 4 (odds ratio 0.5, p<0.001) were both associated with a lower risk of mortality but remained comparable regarding other endpoints. For vitD<sub>3</sub> supplement intervention, groups 2 (odds ratio 0.084, p<0.001) and 4 (odds ratio 0.21, p<0.001) exhibited a significantly lower risk of mortality but higher risk of fall (groups 2 odds ratio 1.855, p=0.023; groups 3 odds ratio 2.027, p=0.039; group 4 odds ratio 1.803, p=0.022) compared to group 1.

**Conclusion:** In this study, we identified that variations of different combinations of lifestyle interventions could be important risk factors for incident falls, recurrent fractures, and mortality among FLS participants.

P615

### KNEE SYNOVITIS AS PROGRESSION FACTOR OF OSTEOARTHRITIS IN PATIENTS WITH SHORTER DISEASE DURATION

N. Kashevarova<sup>1</sup>, E. Taskina<sup>1</sup>, D. Kusevich<sup>1</sup>, L. Alekseeva<sup>1</sup>

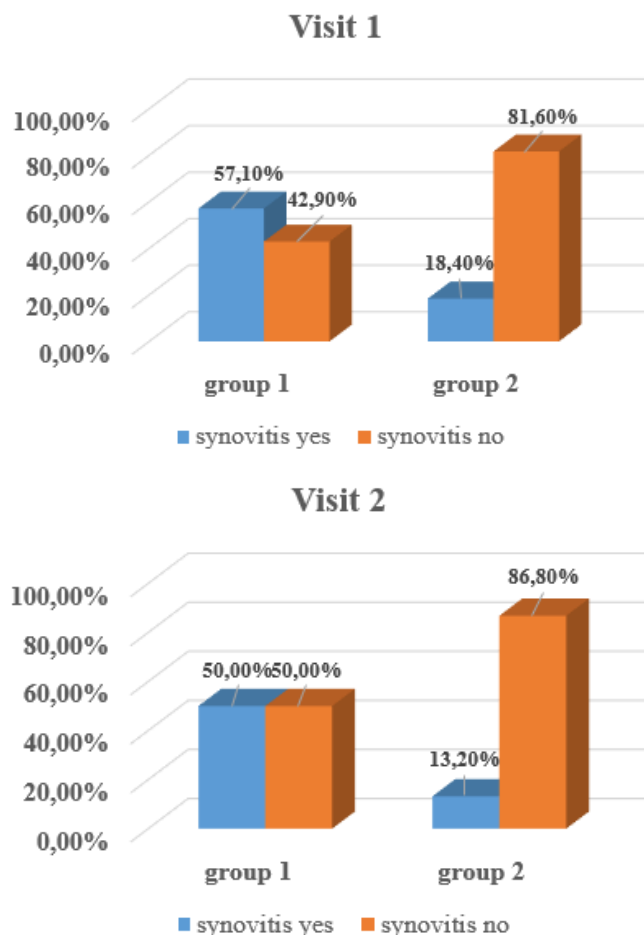
<sup>1</sup>V.A. Nasonova Research Institute of Rheumatology, Moscow, Russia

**Objective:** Assessment of relationship between knee synovitis and progression risk of OA in patients with <5-y disease duration at 5-y prospective study.

**Methods:** At 5-y study enrolled 110 females with primary knee OA (according to ACR criteria), 52/110 had <5-y disease duration (mean age 59.11±8.95, mean disease duration 3.46±1.32). All patients had case report form and were checked by knee ultrasound (US) and X-ray (K-L classification). There are 22(42.3%) patients from 52 had 1 stage, 24(46.2%) had 2 stage, and 6(11.5%) had 3 stage at baseline.

**Results:** At 5-y follow-up period, the progression of knee OA was detected 1st group with progression by X-ray stage increasing (n=14) and 2<sup>nd</sup> no progression group (n=38). In both groups' patients were similar by ages (58.29±7.68 vs. 56.05±8.74 y.o., p>0.05) and disease duration (3.43±1.34 vs. 3.47±1.33 y, p>0.05). However, at 1st group knee pain while walking was more intensive (60.36±18.33 vs. 48.71±17.81 mm, p=0.043), higher BMI (34.45±4.60 vs. 28.92±4.92 kg/m<sup>2</sup>, p=0.001) and more often was diagnosed synovitis by US (57.1% vs. 18.4%, RR=3.1, 95%CI 1.38-6.96, p=0.009). After 5-y (Visit 2) at 1st group patients had more intensive knee pain while walking (69.64±18.49 vs. 55.76±12.76, p=0.003), higher BMI (35.74±5.83 vs. 30.64±4.64, p=0.002), more often was diagnosed synovitis by US (50 vs. 13.2%, RR=3.8 (95%CI 1.4-10.0), p=0.009), statistically significant differences were established. In patients from 1st group more often was found out the irregularity of articular cartilage surface and heterogeneity - 100 vs. 50.5% RR=1.6 (95%CI 1.2-2.1), p=0.003) and 85.7 vs. 42.1%, RR=2.0 (95%CI 1.3-3.1), p=0.005), respectively. The Spearman test was used to analyze X-ray stage and OA progression associated factors. We found that most important factors were knee pain while walking (R=0.34, p<0.05), BMI (R=0.46, p<0.01) and knee synovitis by US (R=0.41, p<0.01). After multiple analysis was performed that significant factor of progression in knee OA is synovitis (p<0.05).





**Conclusion:** Synovitis was more often identified in patients with next progression of knee OA both at baseline and after 5-y follow up period. It is significance factor of knee OA progression.

P616

### UNDERTREATMENT OF HIP FRAGILITY FRACTURES IN THE PRIMARY CARE SETTING: A 5-YEAR NATIONWIDE PERSPECTIVE FROM PORTUGAL

V. Trindade Pedrosa<sup>1</sup>, B. Oliveira Pinto<sup>1</sup>, R. Baptista Leite<sup>2</sup>, M. Castro Guimarães<sup>1</sup>, F. C. Araújo<sup>3</sup>

<sup>1</sup>Unidade de Saúde Familiar Kosmus, <sup>2</sup>Unidade de Saúde Familiar São Martinho de Alcabideche, <sup>3</sup>Hospital de Sant'Ana - Santa Casa da Misericórdia de Lisboa, Cascais, Portugal

**Objective:** To determine the treatment rate following hip fractures in the Primary Health Care (PHC) setting in Portugal from 2016-2020 and to characterize prescription patterns of antiosteoporotic drugs in this context.

**Methods:** We conducted an observational, cross-sectional, retrospective study using data from the PHC database Bilhete de Identidade - Cuidados de Saúde Primários (BI-CSP). BI-CSP is a national primary care database (except Madeira and the Azores)

presenting information on demographics, health indicators, drug prescription and primary care units' management and organization. Grouped and anonymized data on any prespecified variable over a period of time (for instance, diagnosis or treatment) can be obtained through the application of filters. The classification tool used is the International Classification of Primary Care, 2nd Edition. We included in our study all individuals registered in the PHC in Portugal who sustained a hip fracture after the age of 50 y. Treatment rates were determined after considering any prescription of an anti-osteoporotic drug to these patients in the PHC, from 2016 (BI-CSP inception) to 2020. The frequency of prescription for each type of drug was also assessed. All outcomes of interest were extracted to a data extraction sheet created for this purpose. Descriptive statistics were generated using Microsoft Office Excel® 2016. This study was approved by the local ethics committee.

**Results:** We identified a total of 44725 hip fractures in Portugal between 2016-2020, 33668 (75.3%) in female patients. Most hip fractures were recorded in the North- (17387) and Lisbon- (14353) Regional Health Administrations (RHA). Only 6282 (14.0%) patients were treated with antiosteoporotic therapies following hip fracture. The RHA with the highest treatment rate was the Algarve (15.2%) and the lowest was Alentejo (10.9%). National and regional prescription patterns are shown in Table 1. Bisphosphonates were the most frequently used therapies, particularly alendronic acid (66.7%), ibandronic acid (18.8%) and zoledronic acid (8.7%). Denosumab, raloxifene and teriparatide were prescribed by family physicians in 5.1%, 1.1% and 1.0% of patients after hip fracture.

RHA	RIS (%)	AL (%)	IA (%)	ZA (%)	Cal (%)	T (%)	D (%)	R (%)	SR (%)	Total (n)
N	70 3,0%	1500 65,1%	359 15,6%	230 10,0%	0 0%	19 0,8%	99 4,3%	27 1,2%	0 0%	2304
C	20 1,6%	865 67,7%	172 13,5%	86 6,7%	0 0%	11 0,9%	110 8,6%	14 1,1%	0 0%	1278
LVT	66 3,1%	1427 66,0%	323 14,9%	197 9,1%	0 0%	28 1,3%	98 4,5%	22 1,0%	0 0%	2161
ALT	2 0,8%	177 72,8%	45 18,5%	12 4,9%	0 0%	3 1,2%	2 0,8%	2 0,8%	0 0%	243
ALG	3 1,0%	224 75,7%	30 10,1%	24 8,1%	0 0%	1 0,3%	12 4,1%	2 0,7%	0 0%	296
Total (n)	161	4193	929	545	0	62	321	67	0	6282

Table 1: Prescription patterns following hip fracture in primary care in Portugal. RHA - regional health administration; N - north region; C - center region; LVT - Lisbon region; ALT - Alentejo region; ALG - Algarve region; RIS - sodium risedronate; AL - alendronic acid; IA - ibandronic acid; ZA - zoledronic acid; Cal - salmon calcitonin; T - teriparatide; D - denosumab; R - raloxifene; SR - strontium ranelate

**Conclusion:** Only a minority of patients received anti-osteoporotic treatment following fragility hip fractures in the primary care setting in Portugal. The most frequently used therapies were, by far, bisphosphonates namely alendronic acid.

**Disclosure:** Filipe C. Araújo has received speaker fees from Novartis and Amgen.

P617

# RISK FACTORS OF OSTEOPOROSIS AND CRITERIA FOR HIGH RISK OF FRACTURES IN PATIENTS WITH CHRONIC HEART FAILURE BEFORE AND AFTER HEART TRANSPLANTATION

V. A. Sujayeva<sup>1</sup>, V. V. Spiryna<sup>1</sup>, E. V. Rudenka<sup>2</sup>, O. V. Koshlataya<sup>1</sup>, T. A. Dubovik<sup>1</sup>, N. A. Vasilyeva<sup>3</sup>

<sup>1</sup>Republican Scientific and Practical Center "Cardiology",  
<sup>2</sup>Belarusian State Medical University, <sup>3</sup>Republican Centre for Medical Rehabilitation and Balneotherapy, Minsk, Belarus

**Objective:** To assess risk factors of osteoporosis (OP) and determine criteria of high risk of fractures in patients with chronic heart failure (CHF) before and after heart transplantation (HT).

**Methods:** 95 patients with CHF before and after HT (mean age 53.8±9.5 y) were enrolled. The period after HT ranged from 0-26 months (mean 8.5±8.9 months). After HT patients received mycophenolate mofetil (MMF) 1-1.5 g/d, tacrolimus with maintenance of target concentration, methylprednisolone 250 mg intravenously I-II days, from day III oral prednisolone 1 mg/kg/d for 4 weeks, with further dose reduction until 0.1 mg/kg/d for 3 months. DXA, vertebral morphometry, spine X-ray were performed in 80 subjects. 10-y fracture probability was calculated using FRAX scale (Fracture Risk Assessment Tool). Laboratory diagnostics included lipid spectrum, total and ionized calcium, phosphorus, 25-hydroxyvitamin D, PTH, osteocalcin,  $\beta$ -CrossLaps.

**Results:** According to DXA normal BMD was observed in 35 (44%), osteopenia in 3 (3%), osteoporosis in 42 (53%) patients. Vertebral fractures were diagnosed in 18 (23%) of 80 patients with CHF before and after HT. Vertebral fractures in 10 (56%) out 18 patients developed with normal BMD. The patients with CHF before and after HT had hypocalcemia (20.5%), hyperparathyroidism (50.7%), as well as hypovitaminosis D in 85% of all patients. Increased level of bone resorption markers  $\beta$ -CrossLaps were observed in 1/3 of the examined patients. Statistically significant positive relationship was found between level of low density lipoproteins and  $\beta$ -CrossLaps, suggesting that bone resorption was higher in patients with high LDL.

**Conclusion:** We found that traditional risk factors of OP (hypertension, diabetes mellitus, thyroid disease) in the group of patients with CHF before and after HT were with the same frequency in persons with osteoporosis and in patients with normal BMD. The main risk factors of osteoporosis in patients with CHF before and after HT were: development of a graft rejection reaction in the postoperative period, low dose of mycophenolate mofetil (<1500 mg/d), plasma tacrolimus concentration >10 mg/ml, no loop diuretics, no statins.

P618

# PREDICTIVE FACTORS OF FRAGILITY FRACTURES: ASSESSMENT OF PATIENTS OBSERVED AT EMERGENCY DEPARTMENT FOR FRACTURES

C. Soares<sup>1</sup>, S. Azevedo<sup>1</sup>, H. Parente<sup>1</sup>, F. Guimarães<sup>1</sup>, E. Costa<sup>2</sup>, J. Rodrigues<sup>1</sup>, D. Peixoto<sup>1</sup>, J. Costa<sup>1</sup>, F. Teixeira<sup>1</sup>, C. Afonso<sup>1</sup>, D. Faria<sup>1</sup>

<sup>1</sup>ULSAM, Ponte de Lima, <sup>2</sup>Hospital de Braga, Braga, Portugal

**Objective:** To assess the predictive factors for fragility fractures (FF).

**Methods:** Retrospective monocentric study that included patients with FF (wrist, hip and vertebrae), observed at the emergency department (ED) in a tertiary center between 1 January 2017 and 31 December 2018. The search for fractures was performed through ICD9 codes and clinical data was collected. We excluded totally dependent patients or in palliative care, peri-prosthetic fractures and patients with osteometabolic diseases other than osteoporosis. We identified 1673 FF and after calculating a representative sample (90%CI) 457 FF were included. To identify predictors of FF we performed a multivariate analysis including variables with a significant association in univariate analysis and those with clinical relevance. SPSS was used for statistical analysis and significance level was defined as 2-sided  $p < 0.05$ .

**Results:** 172 patients with hip fracture, 173 with wrist fracture and 112 with vertebral fracture were included. Most patients were women (79.9%) with a mean age of 77.6 (SD=10.3) years old at the time of the fracture. 16% of patients had a previous BMD test and 7.4% were on antiosteoporotic drugs. We found an association between the occurrence of a FF and previous visits to the ED due to falls ( $p < 0.001$ ), number of comorbidities ( $p = 0.006$ ), previous diagnosis of chronic pulmonary disease ( $p = 0.002$ ), hematologic disease ( $p = 0.005$ ) or malignancy ( $p = 0.024$ ) and previous diagnosis of osteoporosis based on BMD test ( $p = 0.036$ ). No associations were found between the number or type of medication taken daily, previous fractures and their localization nor the presence of other specific comorbidities other than those mentioned above. Multivariate analysis showed that previous visits to the ED due to falls ( $p = 0.002$ ) and malignancy ( $p = 0.026$ ) remained associated with the occurrence of new FF after the adjustment for comorbidities, smoking, alcoholism and corticosteroid therapy.

**Conclusion:** Our study showed that previous visits to the ED due to falls and diagnosis of malignancy are independent predictors of FF. In the presence of these comorbidities screening for osteoporosis must be considered and the need for treatment should be assessed.

P619

### ADIPOSE TISSUE-DERIVED MESENCHYMAL STEM CELLS AS BIOASSAY TO CLEARLY UNDERSTAND THE EFFECTS OF CANNABINOIDS ON BONE MINERALIZATION

G. Palmi<sup>1</sup>, S. Donati<sup>1</sup>, C. Romagnoli<sup>1</sup>, F. Giusti<sup>1</sup>, F. Miglietta<sup>1</sup>, C. Aurilia<sup>1</sup>, G. Galli<sup>1</sup>, T. Iantomasi<sup>1</sup>, P. Chiarugi<sup>1</sup>, M. L. Brandi<sup>2</sup>

<sup>1</sup>Dept. of Experimental & Clinical Biomedical Sciences, University of Florence, <sup>2</sup>Fondazione Italiana Ricerca sulle Malattie dell'Osso (FIRMO Onlus), Florence, Italy

**Objective:** To date, we are still not sure of the role of cannabinoids and of endocannabinoids system on several physiological processes, including bone mineralization. Therefore, in this study we developed a bioassay to evaluate the role of the endocannabinoid system and anandamide (AEA) in osteoblastogenesis.

**Methods:** Adipose-tissue derived mesenchymal stem cells (preadipocytes (PA)) are able to differentiate in several cellular lineages, and in particular to differentiate into osteoblasts, producing alkaline phosphatase (ALP), collagen, osteocalcin and hydroxyapatite (HA) deposits. To start studying the effects/role of the endocannabinoid system on the mineralization process we have evaluated the in vitro effects of a range of AEA concentrations on ALP activity and mineralization, of three primary PA lines.

**Results:** For the first time we have observed that all the tested AEA concentrations inducing a significant increase of ALP activity as well as an equal increase in the production of HA deposits during in vitro osteogenic differentiation.

**Conclusion:** For the first time, thanks to the established bioassay of PA lines, we reported that our findings indicate that cannabinoids and the endocannabinoid system play an important role in supporting bone mineralization. In relation to the obtained results, we are currently evaluating not only the expression levels of osteogenic marker genes and of the endocannabinoid system genes, but also the modulation of osteogenic microRNAs (miRNAs) during in vitro osteoinduction with the several concentrations of AEA. After that, we will proceed to evaluate the role of other cannabinoids which are important phytochemicals of *Cannabis sativa*. The main aim of all these future perspectives is to clarify the role of cannabinoids on mineralization, which is still unknown due to the lack of valid human in vitro models, but also to identify new natural components of cannabis that may in future, thanks to the results obtained in these studies, play a role in the regeneration of bone tissue in pathological states, such as osteoporosis.

**Acknowledgements:** Supported by Fondazione Ente Cassa di Risparmio di Firenze and by FIRMO Onlus.

P620

### CARDIOVASCULAR RISK IN PATIENTS WITH OSTEOARTHRITIS: RESULTS OF THE ALL-UKRAINIAN STUDY "PARTNER"

O. Iaremenko<sup>1</sup>, O. Volodko<sup>2</sup>, N. Hrechanyk<sup>3</sup>, L. Vedenkina<sup>4</sup>, N. Ahafonova<sup>5</sup>, S. Brusentseva<sup>6</sup>, H. Doroshenko<sup>7</sup>, M. Komkina<sup>1</sup>

<sup>1</sup>Bogomolets National Medical University, Kyiv, <sup>2</sup>Rivne City Hospital #2, Rivne, <sup>3</sup>Dnipro Regional Clinical Hospital I.I. Mechnikov, Dnipro, <sup>4</sup>Poltava Regional Clinical Hospital M.V. Sklifosovsky, Poltava, <sup>5</sup>Kryvyi Rih City Hospital #8, Kryvyi Rih, <sup>6</sup>Kryvyi Rih City Hospital #9, Kryvyi Rih, <sup>7</sup>Kharkiv City Outpatient Clinic #6, Kharkiv, Ukraine

**Objective:** Osteoarthritis (OA) is extremely common in adults aged 60 and over and predicts cardiovascular diseases (CVD) [1]. 38% of people with OA have CVD compared to 9% of people without OA [2]. There are no studies on the prevalence of CVD among patients with OA in Ukraine. The aim of the study "PARTNER" was to study the prevalence of cardiovascular risk in patients with OA.

**Methods:** The multicenter PARTNER study (Prevalence of cardiovascular risk in newly diagnosed primary osteoarthritis patients) included 4769 patients with newly diagnosed OA who consulted medical center doctors in 22 regions of Ukraine in August 2019 - March 2020.

**Results:** Full data were collected from 3936 patients, including 65.9% women and 50% patients aged 50-59 y. A significant number of these patients (2946 - 75%) even without the calculation of SCORE were classified as people with high or very high risk of cardiovascular complications, as they already had atherosclerotic cardiovascular disease (55%), diabetes mellitus (21%), very high levels of blood pressure (15%) and/or cholesterol and chronic kidney disease (5%). According to the results of the SCORE calculation, we identified another 127 patients with very high cardiovascular risk. Total number of OA patients with high and very high cardiovascular risk reached 3073 (78%). So patients with newly diagnosed primary OA in Ukraine are much more likely to have cardiovascular pathology compared to data from other countries.

**Conclusion:** Among patients with newly diagnosed primary OA in Ukraine there is a significant prevalence of cardiovascular pathology and a high risk of developing serious cardiovascular events, according to the results of the "PARTNER" study. This must be taken into account when choosing NSAIDs in such patients especially when long-term therapy is required.

#### References:

1. Veronese N, et al. J Nutr Health Aging 2018;22:371.
2. Hall AJ, et al. Eur J Prev Cardiol 2016;23:938.

P621

# ORTHOGERIATRIC PATIENT BLOOD MANAGEMENT IMPROVES CLINICAL OUTCOMES: PRELIMINARY RESULTS FROM A CLINICAL OBSERVATIONAL STUDY

M. Ferracci<sup>1</sup>, C. Panara<sup>1</sup>, M. Baroni<sup>1</sup>, L. Parretti<sup>1</sup>, A. Villa<sup>2</sup>, M. Marchesi<sup>3</sup>, N. Albi<sup>3</sup>, G. Rinonapoli<sup>4</sup>, V. Boccardi<sup>1</sup>, A. Caraffa<sup>4</sup>, P. Mecocci<sup>1</sup>, C. Ruggiero<sup>1</sup>

<sup>1</sup>Geriatric & Orthogeriatric Unit, SM Misericordia Hospital, <sup>2</sup>Dept. of Clinical Pathology, SM Misericordia Hospital, <sup>3</sup>Regional Blood Center, Immunotransfusion Service, SM Misericordia Hospital, <sup>4</sup>Orthopedic & Traumatologic Unit, SM Misericordia Hospital, Perugia, Italy

**Objective:** Anemia is a common condition among orthogeriatric patients leading to RBC transfusions and poor outcomes. Compared to usual care (UC), we evaluated the impact of a patient blood management (PBM) on the transfusion rate, haemoglobin (Hb) levels at discharge and 1-month follow-up and their correlation with functional outcomes.

**Methods:** Prospective observational clinical study with historical controls conducted in a high volume trauma center, evaluating orthogeriatric patients aged  $\geq 65$  y with hip fracture. The PBM group includes patients who received ferric carboxymaltose (FCM) in combination with folic acid and vitamin B12. The UC group includes patients who had not undergone treatment with any component of the triple therapy. Main outcomes are Hb levels at discharges and at 1-month follow-up visit, RBC units transfused over the hospital stay, and length of hospital stay. Both groups received orthogeriatric comanagement during the hospital stay, then orthopaedic and geriatric assessment at 1-month follow-up.

**Results:** Overall, 419 patients were included: 215 in the PBM group and 204 in the UC group. Groups were homogeneous with regard of age, prefracture comorbidities, and polypharmacy, in both groups women were predominant. The majority of fractures were trochanteric and femoral neck types. Compared to patients belonging to UC group, those in the PBM group had higher Hb levels both at discharge ( $p=0.0329$ ) and at 1-month follow-up visit ( $p=0.0009$ ), and tended to use lower RBC units during hospital stay. PBM group experiences similar length of hospital stay as compared with UC group. Hb levels were positively associated with pre-fracture functional state ( $p=0.014$ ); a tendency was confirmed between higher Hb levels and functional recovery at 1 month-follow-up ( $p=0.065$ ).

**Conclusion:** The PBM in the orthogeriatric setting may improve patients' clinical outcomes after hospital stay and until 1 month from surgery by possibly reducing the healthcare burden.

P622

# ASSOCIATIONS OF MARKERS OF ADIPOSITY AND INFLAMMATION WITH BONE PHENOTYPE: RESULTS FROM THE MRC NATIONAL SURVEY OF HEALTH AND DEVELOPMENT

R. Durdin<sup>1</sup>, C. Parsons<sup>2</sup>, D. Kuh<sup>3</sup>, E. M. Dennison<sup>1</sup>, R. Cooper<sup>4</sup>, C. Cooper<sup>1</sup>, K. A. Ward<sup>1</sup>

<sup>1</sup>MRC Lifecourse Epidemiology Unit, University of Southampton and NIHR Southampton BRC, Southampton, <sup>2</sup>MRC Lifecourse Epidemiology Unit, University of Southampton, Southampton, <sup>3</sup>MRC Unit for Lifelong Health and Ageing, University College London, London, <sup>4</sup>Musculoskeletal Science and Sports Medicine Research Centre, Manchester Metropolitan University, Manchester, UK

**Objective:** To investigate associations of IL-6, adiponectin and leptin with DXA and pQCT-measured bone phenotypes at age 60-64 y.

**Methods:** The MRC National Survey of Health and Development (NSHD) is a prospective birth cohort study; 766 men and 820 women in these cross-sectional analyses had DXA (total hip, spine, whole body areal BMD (aBMD)) and pQCT scans (radius: 4% (total and trabecular volumetric BMD (vBMD)) and 50% (cortical vBMD, medullary area) sites) at age 60-64 y. Sex-stratified multiple linear regression was used to determine associations between standardised inflammatory markers (log(IL-6) and adiponectin) and bone, adjusted for sex-specific fat mass residuals (the residual of fat mass after adjustment for lean mass and height). For leptin, to avoid multicollinearity, leptin residuals were used (the residual of log(leptin) after adjustment for fat mass and height). Results are presented as standardised beta (95%CI); beta is standard deviation (SD) change in outcome per SD increase in inflammatory marker.

**Results:** IL-6 was not associated with aBMD in men, and in women there were positive associations (total hip:  $0.09(0.02,0.17)$ ). IL-6 was negatively associated with total vBMD in men ( $-0.09(-0.17,-0.01)$ ) and positively associated in women ( $0.10(0.02,0.18)$ ). Leptin residuals were not associated with aBMD in men, and in women associations existed at the total hip only ( $0.08(0.01,0.15)$ ). Leptin residuals were positively associated with cortical vBMD (men:  $0.10(0.01,0.18)$ ; women:  $0.11(0.03,0.19)$ ) and negatively associated with medullary area (men:  $-0.10(-0.18,-0.01)$ ; women:  $-0.14(-0.21,-0.06)$ ) in men and women. In men and women, adiponectin was negatively associated with aBMD at all sites (total hip men and women:  $-0.21(-0.28,-0.14)$ ) and with trabecular vBMD (men:  $-0.16(-0.24,-0.09)$ ; women:  $-0.17(-0.25,-0.09)$ ). In women, adiponectin was associated with cortical vBMD ( $-0.11(-0.19,-0.03)$ ) and total vBMD ( $-0.19(-0.27,-0.11)$ ).

**Conclusion:** Overall, these results highlight differing associations between different markers of inflammation and adiposity and bone. They suggest that inflammaging may influence healthy bone ageing.



P623

# ESTABLISHMENT OF A HUMAN PRIMARY CELL LINE FROM ECTOPIC CALCIFICATION FROM A PATIENT WITH TUMORAL CALCINOSIS WITH A NEW GALNT3 MUTATION TO STUDY MINERALIZATION AND THE PRESENCE OF STEM CELLS INSIDE THE LESION

G. Palmini<sup>1</sup>, G. Galli<sup>1</sup>, S. Donati<sup>1</sup>, F. Miglietta<sup>1</sup>, C. Aurilia<sup>1</sup>, F. Franceschelli<sup>1</sup>, R. Zonefrati<sup>2</sup>, T. Iantomasi<sup>1</sup>, A. Franchi<sup>3</sup>, L. Masi<sup>4</sup>, G. Beltrami<sup>5</sup>, M. L. Brandi<sup>2</sup>

<sup>1</sup>Dept. of Experimental and Clinical Biomedical Sciences, University of Florence, Florence, <sup>2</sup>Fondazione Italiana Ricerca sulle Malattie dell'Osso (FIRMO Onlus), Florence, <sup>3</sup>Dept. of Translational Research and of New Technologies in Medicine and Surgery, University of Pisa, Pisa, <sup>4</sup>SOD Malattie del Metabolismo Minerale e Osseo, AOU Careggi, Florence, <sup>5</sup>Ortopedia Oncologica Pediatrica, AOU Careggi-AOU Meyer, Florence, Italy

**Objective:** Tumoral calcinosis (TC) is characterized by ectopic calcifications which are lobulated, well demarcated and most frequently located in the soft tissues of the periarticular regions. In this study we have established a primary cell line from TC lesion from a patient with TC with a new GALNT3 gene mutation to perform functional studies on the mineralization process and to evaluate the presence of a stem cell subpopulation inside these lesions to understand the molecular and cellular mechanisms which lead to the progression of TC.

**Methods:** A tissue sample of TC ectopic calcification was collected at the Azienda Ospedaliero-Universitaria Careggi, Florence. TC primary cell culture, from the tissue sample of the calcification, has been set up after enzymatic treatment and mechanical dispersion. Using an assay, which is based on the capacity of cancer stem cells to grow in stressful conditions, we have evaluated the capacity of the isolated primary TC line to form spherical colonies.

**Results:** We have established a primary cell line of TC, marked as TC1 cell line for future functional studies on mineralization process. Since we have hypothesized that the ectopic calcifications could present a core of stem cells through the sphere formation assay we have tried to isolate this cellular subpopulation. In these months we have observed the capacity of TC1 line to form spherical colonies from which we have isolated a putative stem cell line of TC, called as TC1-SCs.

**Conclusion:** We have established a primary cell line directly from the calcified soft-tissue lesion from a patient with TC due to a new GALNT3 mutation to proceed with functional studies on the mineralization process, which are in progress. For the first time we have also observed the presence of stem cells inside the TC lesions. We are currently proceeding to confirm the stem cell phenotype of the isolated TC1-SCs line, to study the expression levels of osteogenic marker genes and of all the genes related to the FGF23 pathway during osteogenic differentiation.

**Acknowledgement:** Supported by FIRMO Onlus.

P624

# PHARMACY DISPENSING RECORDS FOR TOPICAL DICLOFENAC AND CONCOMITANT MEDICINES IN GERMANY: A RETROSPECTIVE ANALYSIS OF REAL-WORLD DATA

D. Deutsch<sup>1</sup>, K. Fabrikant<sup>2</sup>, V. Sethi<sup>3</sup>, G. Shanga<sup>4</sup>, V. Rampartaap<sup>5</sup>, T. Wilcox<sup>6</sup>, E. Csoke<sup>7</sup>

<sup>1</sup>GSK Consumer Healthcare, Munich, Germany, <sup>2</sup>GSK Consumer Healthcare, London, UK, <sup>3</sup>GSK Consumer Healthcare, Singapore, Singapore, <sup>4</sup>GSK Consumer Healthcare, Warren, USA, <sup>5</sup>GSK Consumer Healthcare, Amsterdam, The Netherlands, <sup>6</sup>Evidera, Wilmington, USA, <sup>7</sup>Basel, Switzerland

**Objective:** To describe dispensing patterns of topical diclofenac alone or with other medications in real world.

**Methods:** This retrospective, cross-sectional study characterizes the journey of patients buying topical diclofenac (Voltaren Schmerzgel or Voltaren Schmerzgel forte) over a 12-month period (March 2019 - February 2020) in Germany. Data was obtained from a large pharmacy dispensing platform including data from 3,974,695 patients. Number of dispensing per patient and number of treatment switches were measured as the primary outcome. Percentage of patients that also fill prescriptions of other medications such as for cardiovascular (CV), gastrointestinal (GI), CV+GI and other nonsteroidal anti-inflammatory drugs (NSAIDs) taken concomitantly with topical diclofenac were measured as secondary outcome.

**Results:** In Germany 95,085 patients were included in the analysis with at least one purchase for topical diclofenac. The mean age of patients who received topical diclofenac was 72 y and the majority were female (61%). However, the largest age group for topical diclofenac dispensing was 75-79 y (18%). Most of the patients received one dispensing of diclofenac (70.8%), 15.4% patients received 2, 5.8% patients received 3, and 8.0% received >3 dispensings of topical diclofenac during the 12-month period. Most of the patients did not switch treatment irrespective of when topical diclofenac was first dispensed - before Month 4 (77.3%) or before Month 7 (78.0%) of the year analysed. Patients who bought topical diclofenac, frequently received it in combination with CV drugs (74.3.0%), GI drugs (35.4%), or both (30.9%) during the same 12-month period. Hardly any patients bought both topical and oral NSAIDs at the same time (0.95%).

**Conclusion:** This retrospective study shows that topical diclofenac was mainly dispensed to older patients above 70 years and predominantly to females. Based on repurchasing, data suggests strong users' satisfaction with their topical diclofenac (low percentage of switches). A high proportion of patients buying topical diclofenac were also receiving drugs either for CV or/and GI conditions.

**Disclosures:** Daniela Deutsch, Kate Fabrikant, Vidhu Sethi, Gilbert Shanga, and Vishal Rampartaap are employees of GSK Consumer Healthcare that sponsored the project. Emese Csoke was employee of GSK Consumer Healthcare at time of project set-up. Teresa Wilcox provided data analysis.

## P625

### PATTERNS OF PLASMA ANTI-THYROID HORMONE ANTIBODIES IN AUTOIMMUNE RHEUMATIC DISEASES WITH THYROID LESION

O. A. Rusanova<sup>1</sup>, O. I. Emelyanova<sup>1</sup>, A. S. Trofimenko<sup>1</sup>

<sup>1</sup>Federal State Budgetary Institution "Research Institute of Clinical and Experimental Rheumatology A.B. Zborovsky", Болград, Russia

**Objective:** Comprehensive study of interrelations between endocrine and immune functions over decades has provided a framework for paradigm of functional cohesion of these two systems. New field of innate immunity research regarding natural antibodies (NABs), that can be produced without antigen exposure and can provide with several physiological functions, was developed. NABs have considerable similarities with autoantibodies emerged in different systemic autoimmune disorders, and rheumatic diseases, among others. Anti-thyroid antibodies, including anti-T4 and anti-T3 autoantibodies, can also be referred to NABs. Aim: Assessment of anti-thyroid hormone antibody spectra in various rheumatic diseases.

**Methods:** The research was performed in accordance with the Helsinki Declaration statements. 160 rheumatic patients with clinical signs of thyroid dysfunction and/or abnormal values of plasma TSH, T4, T3, or anti-TPO were included in the study. Further clinical, ultrasound, and laboratory survey was performed to establish type of thyroid lesion. Anti-T3 and anti-T4 antibodies were measured by ELISA in plasma samples.

**Results:** High prevalence of thyroid lesions was demonstrated as for RA (59.37%, n=95), SLE (26.26%, n=42), and systemic sclerosis (14.37%, n=23). The most common types of thyroid involvement were found to be hyperthyroidism and Hashimoto's thyroiditis. Patients with rheumatic diseases, including low TSH (34%) and low T3 (45%). Occurrence of antithyroid antibodies in RA, in SLE, and systemic sclerosis was found to be 35%, 42%, and 28%, respectively.

**Conclusion:** Diagnosis and immunological typing of thyroid involvement in systemic rheumatic diseases have major clinical importance as a result of strong interplay between efficiency of immunotherapy and altered thyroid function. Anti-T3 and anti-T4 antibodies can, in particular, neutralize hormones from medicines, and, therefore, decrease effect of basic treatment in autoimmune rheumatic diseases.

## P626

### THE NUMBER OF MEDICATIONS IS ASSOCIATED WITH FRACTURES IN A POPULATION OF DIALYZED OLDER PATIENTS WITH FRAILTY

D. Azzolino<sup>1</sup>, S. Vettoretti<sup>2</sup>, M. M. Poggi<sup>3</sup>, A. Soldati<sup>3</sup>, M. Cesari<sup>1</sup>

<sup>1</sup>Dept. of Clinical and Community Sciences, University of Milan, Geriatric Unit, IRCCS Istituti Clinici Scientifici Maugeri, <sup>2</sup>Unit of Nephrology, Dialysis and Kidney Transplantation, Fondazione IRCCS Ca' Granda Ospedale Maggiore Policlinico di Milano, <sup>3</sup>Specialisation School in Geriatrics, University of Milan, Milan, Italy

**Objective:** The use of multiple medications is frequently observed in older people, especially in those with multimorbidity. The so-called polypharmacy has been associated with adverse health-related outcomes. In particular, among the most serious consequences of polypharmacy the risk of falls and consequent fractures are well-established [1,2]. However, it is noteworthy that the frailest individuals are often excluded from clinical research, limiting the applicability of evidence to specific populations. Older persons with chronic kidney disease (CKD) undergoing hemodialysis indeed represent a growing population of patients characterized by high vulnerability but still marginally studied. Aim of the study was to explore the relationship between the number of prescriptions and fractures in older patients with CKD undergoing hemodialysis.

**Methods:** A retrospective, cross-sectional study was conducted on data coming from 107 older patients with CKD undergoing hemodialysis. Sociodemographic, clinical, and biological data were recorded. A 24-item Frailty Index (FI) was computed according to the model proposed by Searle and colleagues. Unadjusted and adjusted logistic regression models were performed to test the association of prescribed medications with history of fractures.

**Results:** A total of 107 older patients undergoing hemodialysis were included in the study. The mean patient age was 79.1 (standard deviation, SD=7.7) y; 38 (35.5%) participants were women. The mean number of prescribed medications was 9.94 (SD=3.87). The median FI was 0.25 (interquartile range, IQR=0.17-0.29). The number of prescribed medications was significantly associated with fractures (OR 1.18, 95%CI 1.06-1.32, p=0.003), even after adjustment for potential confounders (OR 1.16, 95%CI 1.03-1.30, p=0.016).

**Conclusion:** The number of medications is associated with fractures in a population of frail older people undergoing hemodialysis. Further studies are needed to clarify the cause-effect relationship between polypharmacy and fractures in older persons with severe CKD. If the number of medications will be confirmed as a risk factor for fracture, interventions based on deprescribing will become essential in older persons with CKD undergoing hemodialysis.

**References:**

1. Lai S-W, et al. *Medicine* (Baltimore) 2010;89:295.
2. Fried TR, et al. *J Am Geriatr Soc* 2014;62:2261.

**Disclosure:** MC has received honoraria from Nestlé Health Science for presentations at scientific meetings and being part of expert advisory boards.

## P627

### SCREENING FOR HIGH RISK OF FRACTURES IN PRIMARY CARE IN THE RUSSIAN FEDERATION

E. Gladkova<sup>1</sup>, O. Lesnyak<sup>1</sup>, V. Tanaev<sup>2</sup>, I. Zabezhinskaya<sup>2</sup>, M. Kolbin<sup>2</sup>, Y. Ilyusin<sup>3</sup>

<sup>1</sup>North-Western State Medical University I.I. Mechnikov, <sup>2</sup>City Polyclinic №25 of the Nevsky District, <sup>3</sup>Administration of the Nevsky District, St. Petersburg, Russia

**Objective:** Osteoporosis constitutes a major public health problem, through its association with age-related fractures, particularly of the hip, vertebrae, distal forearm, and humerus. Early identification of high-risk individuals for prevention is a priority in osteoporosis research. To reduce the burden of osteoporotic fractures, we need a system of medical care based on the interaction of primary care doctors and specialists.

**Methods:** All primary care physicians were trained in the calculation and assessment of fracture risk using the FRAX calculator. FRAX was assessed in men and women aged 40 and over, who applied for an appointment at the city polyclinic №25 of the Nevsky district of St. Petersburg for any reason. If a high risk of fractures was detected, primary care doctors prescribed antiosteoporotic therapy or referred the patient to the rheumatologist. A high risk of fracture was identified if the FRAX score above the threshold of therapeutic intervention, and in the case of an suffered low-energy fracture.

**Results:** In 2017-2020, 11013 residents were calculated risk FRAX. During this period, 2416 patients with a high risk of fractures were identified, which amounted to 31% of the total subject population. The incidence of osteoporosis increased more 10 times in 2020. So, in 2017, it was 28.3/100 000 of the population, and in 2020 - 316.7/100 000. As a result of the study, a cohort was formed for follow-up.

**Conclusion:** Screening for osteoporosis using the FRAX calculator is a simple and effective method for identifying patients at high risk of fractures. Long-term follow up is needed to determine whether these initial results are followed by actual reductions in osteoporotic fractures.

## P628

### VITAMIN D STATUS AND ASSOCIATED VDR GENE POLYMORPHISM IN BELARUSIAN POSTMENOPAUSAL WOMEN

P. Marozik<sup>1</sup>, E. Rudenka<sup>2</sup>, K. Kobets<sup>1</sup>, A. Rudenka<sup>3</sup>, V. Samokhovec<sup>3</sup>

<sup>1</sup>Institute of Genetics and Cytology of the National Academy of Sciences of Belarus, <sup>2</sup>Belarusian State Medical University, <sup>3</sup>Belarusian Medical Academy of Post-Graduate Education, Minsk, Belarus

**Objective:** Vitamin D plays an important role bone diseases prevention, including osteoporosis (OP). The biological action of vitamin is realized through its receptor, coded by *VDR* gene. Therefore, *VDR* gene polymorphism can influence vitamin D supplementation effectiveness. The objective of this work was to reveal the effects of *VDR* gene Apal rs7975232, BsmI rs1544410, TaqI rs731236, FokI rs2228570 and Cdx2 rs11568820 variants on 25(OH)D level in Belarusian women with OP.

**Methods:** Patients were recruited at 1st Minsk city clinic (Minsk, Belarus). In total, 602 women met inclusion criteria, of them 355 patients with OP and 247 subjects from control group. BMD was evaluated by DXA (GE Lunar, USA), serum vitamin D was determined by electrochemiluminescence immunoassay (Cobas e411, Roche, Switzerland). *VDR* gene variants markers were determined using the quantitative PCR.

**Results:** We revealed significant association of rs1544410, and rs731236 gene variants with 25(OH)D level, which is gene/dose dependent: the lowest vitamin level was typical for reference genotype, intermediate – for heterozygotes and the highest – for the bearers of minor homozygous genotypes ( $P < 0.01$ ). The opposite gene/dose relationship was revealed for rs11568820 variant. We also assessed the distribution of each *VDR* variant genotypes in different groups of study participants according to vitamin D level (defined as sufficient, insufficient, deficient). Using  $\chi^2$ -test, a significant difference in genotype distribution between groups was revealed only for rs731236 variant ( $\chi^2 = 12.8$ ,  $P = 0.012$ , Figure). The G/G genotype was over-represented in group of participants with "sufficient" state, while A/A genotype was associated with vitamin D deficiency.

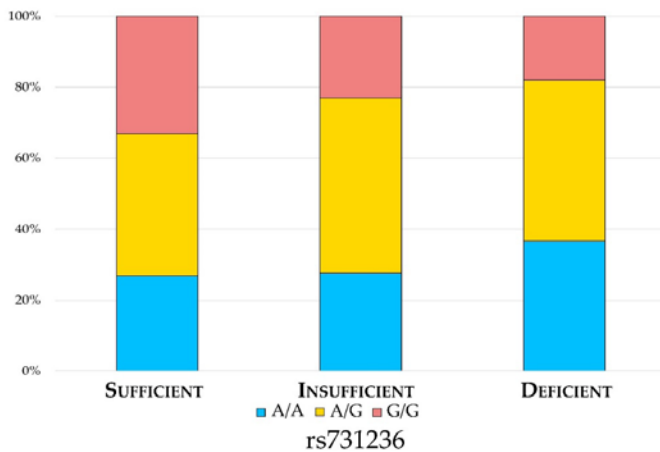


Figure. The association of serum 25(OH)D levels with VDR rs731236 genotype distribution in groups based on vitamin D status.

**Conclusion:** The data shows that the increased level of circulating 25(OH)D is observed in bearers of unfavorable VDR genotypes, associated with decreased receptor expression, possibly due to altered metabolic feedback loops or effectiveness of vitamin metabolism. VDR gene variants should be considered for personalized vitamin D supplementation.

## P629

### THE BURDEN OF ILLNESS RELATED TO OSTEOPOROSIS IS SIMILAR TO ARTHRITIS AND FIBROMYALGIA: THE CIMPACO STUDY GROUP

L. Yang<sup>1</sup>, J. J. Carey<sup>2</sup>, B. McGowan<sup>2</sup>, E. Doherty<sup>3</sup>, S. O'Higgins<sup>4</sup>, B. Whelan<sup>5</sup>, C. Silke<sup>5</sup>, M. O'Sullivan<sup>6</sup>, A. Gsel<sup>7</sup>, F. Heaney<sup>7</sup>, C. Armstrong<sup>7</sup>, B. Connaughton<sup>7</sup>, N. Harrington<sup>5</sup>, S. Walsh<sup>4</sup>, B. McGuire<sup>4</sup>

<sup>1</sup>School of Engineering, National University of Ireland, Galway, Galway, <sup>2</sup>School of Medicine, National University of Ireland, Galway, <sup>3</sup>Health Economics and Policy Analysis Centre, National University of Ireland, Galway, <sup>4</sup>Centre for Pain Research, School of Psychology, National University of Ireland, Galway, <sup>5</sup>Dept. of Rheumatology, Our Lady's Hospital, Manorhamilton, <sup>6</sup>Rheumatology Sligo, Sligo, <sup>7</sup>Dept. of Rheumatology, University Hospital Galway, Galway, Ireland

**Objective:** Musculoskeletal Diseases (MSK) represent the largest illness burden in Europe. Osteoporosis is common, but the burden of illness associated with this disease is under appreciated by governments, health professionals and patients. Although Ireland has one of the highest fracture incidences worldwide, formal epidemiology studies addressing the illness burden are limited.

**Methods:** A multidisciplinary expert group of rheumatology, health economics and psychology professionals designed a multifaceted questionnaire to understand the burden of illness for 5 types of arthritis, fibromyalgia syndrome and osteoporosis. 2000 patients with a diagnosis of ankylosing spondylitis, fibromyalgia syndrome, gout, osteoarthritis, osteoporosis, psoriatic arthritis or rheumatoid arthritis were invited to complete a detailed 16-page questionnaire, following IRB approval and informed consent. Prevalence estimates for the Republic of Ireland (RoI) for each illness were estimated using 2016 USA and UK reports and national RoI 2016 census population statistics.

**Results:** Osteoporosis affects around 200,000 Irish adults and results in 30,000 to 40,000 clinical fragility fractures each year. 652 completed questionnaires were returned and available for analysis. Osteoporosis is associated with significant pain, disability, depression, limited activity and healthcare costs. Pain, disability and depression rates were similar to arthritis and fibromyalgia syndrome.

Table. Comparison of Age, Gender, Health Assessment Questionnaire (HAQ), Pain, Depression and Activity Limitations between Different Musculoskeletal Disorders.

MSK	Number	Age (mean (SD))	Gender (Female)	HAQ	Pain (mean (SD))	Depression ≥50% of time	Limited Activity
Osteoporosis	102	60.1 (14.9)	63 (61.8%)	1.1 (0.8)	3.1 (1.1)	45.1%	67.6%
Ankylosing Spondylitis	93	56.3 (14.0)	52 (55.9%)	0.9 (0.8)	2.8 (1.1)	41.0%	49.5%
Fibromyalgia Syndrome	99	59.9 (13.8)	72 (72.7%)	1.3 (0.6)	3.6 (0.9)	55.6%	80.8%
Gout	73	61.2 (11.7)	39 (53.4%)	0.7 (0.7)	2.8 (1.2)	35.5%	38.4%
Osteoarthritis	174	59.3 (14.9)	103 (59.2%)	1.1 (0.8)	3.2 (1.1)	45.4%	69.0%
Psoriatic Arthritis	114	55.2 (14.1)	60 (52.6%)	0.8 (0.8)	2.8 (1.0)	35.9%	54.4%
Rheumatoid Arthritis	309	57.7 (13.9)	191 (61.8%)	1.0 (0.8)	2.9 (1.0)	43.6%	62.5%

**Conclusion:** The burden of illness associated with osteoporosis is substantial, and similar to arthritis in our clinic populations. Studies addressing quality of life for people with osteoporosis is an important consideration in addition to fracture prevention.



P630

# APPLICATION OF DIFFERENT APPROACHES TO DETECTION OF PATIENTS WITH A HIGH RISK OF FRACTURES IN THE RUSSIAN POPULATION

E. Gladkova<sup>1</sup>, O. Lesnyak<sup>1</sup>, O. Ershova<sup>2</sup>, I. Scripnikova<sup>3</sup>, O. Anoshenkova<sup>4</sup>, K. Belova<sup>2</sup>, I. Belousova<sup>5</sup>, A. Dreval<sup>6</sup>, B. Zavodovskij<sup>7</sup>, A. Latfullin<sup>8</sup>, I. Kryukova<sup>6</sup>, N. Leonova<sup>9</sup>, J. Poljakova<sup>6</sup>, E. Poljakova<sup>6</sup>, A. Akhatov<sup>8</sup>, J. Ahverdjan<sup>7</sup>, M. Ilyin<sup>2</sup>, E. Leykauskene<sup>9</sup>, L. Sivordova<sup>7</sup>, M. Grebenkina<sup>1</sup>, A. Kasimova<sup>1</sup>, I. Kolchinskij<sup>1</sup>

<sup>1</sup>North-Western State Medical University I.I. Mechnikov, St. Petersburg, <sup>2</sup>Federal State Budgetary Educational Institution of Higher Education "Yaroslavl State Medical University", Yaroslavl, <sup>3</sup>Federal State Budgetary Institution "National Medical Research Center for Therapy and Preventive Medicine", Moscow, <sup>4</sup>Federal State Budgetary Institution of Higher Education "Siberian State Medical University", Tomsk, <sup>5</sup>Federal State Budgetary Institution "North Caucasian Federal Scientific and Clinical Center of the Federal Medical and Biological Agency", Lermontov, <sup>6</sup>Moscow Regional Research and Clinical Institute M.F. Vladimirskiy (MONIKI), Moscow, <sup>7</sup>Federal State Budgetary Institution "Zborovsky Research Institute of Clinical and Experimental Rheumatology", Volgograd, <sup>8</sup>Medical Center "BARS MED", Kazan, <sup>9</sup>Multi-field Medical Clinic "Anturium", Barnaul, Russia

**Objective:** To compare the clinical and cost-effectiveness of two approaches to identifying patients at high risk of fractures: ISCD recommendations for referral to DXA densitometry and the 10-year fracture risk assessment tool (FRAX).

**Methods:** We conducted a multicenter, cross-sectional study of postmenopausal women who did not receive anti-osteoporosis therapy. The sample included 4042 postmenopausal women aged 40 years and older, residents of 6 cities of the Russian Federation. Two approaches to identifying patients at high risk of fractures were analyzed: referral of patients to densitometry based on the 2019 ISCD recommendations, and identification of patients at high risk of fractures based on the calculation of the 10-year risk of fractures using the FRAX algorithm. Indicators of diagnostic value of the methods were evaluated: sensitivity, specificity and accuracy of the test, and the cost of diagnosing one case of high risk of fractures.

**Results:** The analysis showed that the use of a strategy based on the recommendations of the ISCD leads to an unreasonably high number of densitometric studies and an increase in the cost of diagnosing high risk fractures. The use of the FRAX algorithm made it possible to identify a larger number of patients with optimal use of the DXA resource. The proportion of individuals who needed densitometry was 71.4% and 54.0% for ISCD and FRAX, respectively ( $p=0.0001$ ). The sensitivity index of the method using the FRAX score was 86.3% and did not differ from that (85.1%) when detecting osteoporosis based on the ISCD recommendations ( $p=0.07$ ). The FRAX method demonstrated higher specificity when compared with the ISCD recommendations approach (43.4% and

31.9%, respectively,  $p=0.002$ ) and accuracy (55.4% for FRAX and 42.2% for ISCD recommendations,  $p=0.001$ ). The use of FRAX reduced the cost of diagnosing 1 case of high-risk fractures by 1.9 times compared to the use of the ISCD recommendations.

**Conclusion:** So, when comparing the diagnostic value of methods for identifying patients with a high risk of fractures, it seems appropriate to use the FRAX questionnaire. With sensitivity indicators comparable to the ISCD recommendations, this method is characterized by higher specificity and accuracy, which minimizes the cost of diagnosing a high risk of fractures.

P631

# COVID-19 AND CHRONIC INFLAMMATORY RHEUMATISM: RESULTS OF A SINGLE CENTER STUDY

N. Bahaz<sup>1</sup>, F. Mechid<sup>1</sup>, R. Benaziez<sup>1</sup>, N. Zehraoui<sup>1</sup>, H. Hafirassou<sup>1</sup>, A. Rahmoune<sup>1</sup>, A. Ferhat<sup>1</sup>, S. Benaziez<sup>1</sup>, Y. Sadeg<sup>1</sup>, C. Dahou-Makhloufi<sup>1</sup>

<sup>1</sup>Rheumatology department, Mohamed Lamine Debaghine hospital. Algiers, Algeria, Algiers, Algeria

**Objective** to describe clinical and therapeutic characteristics of patients with chronic inflammatory rheumatism (CIR) contracting COVID-19

**Methods:** It is a single center observational study during May 2020- April 2021. We study the demographic data, body mass index (BMI), comorbidities, disease activity, DAS28 for rheumatoid arthritis (RA) and ASDAS for spondyloarthritis (SpA). We compare the disease activity before and after COVID-19.

**Results:** 43 patients with CIR and infected by the coronavirus were collected, 58, 14% were female. 48, 83% had RA and 51, 16% had SpA, (ankylosing spondyloarthritis 39, 53%, psoriatic arthritis 6, 97% and enteric rheumatism 4, 65%). The mean age was 49,  $41 \pm 12$ , 25 years (30- 76 years), the mean BMI was 27,  $93 \pm 5.54$  kg / m<sup>2</sup>. 81, 39% of patients had at least one comorbidity, the most frequent was hypertension in 34, 88%. 74, 41% patients were on bDMARDs and 51, 16% were on csDMARDs alone or combined with bDMARDs. 30, 23% were on oral glucocorticoids, the medium dose was 5,76mg/ day of prednisone. The diagnosis of COVID19 was made with PCR, serological testing and / or chest CT. 2 patients had COVID19 after CD 20 inhibitor and one of them had a pulmonary embolism. No patient was transferred to intensive care unit and no deaths were noted. The mean DAS28 was 3,66 and the mean ASDAS was 2,68. The disease activity before COVID 19 was low compared to activity after COVID-19 ( $p=0,03$  for SpA,  $p=0,02$  for RA)

**Conclusion:** Through this study, we find that patients were overweight, comorbidities were frequent and disease activity was low before contracting COVID-19.

No conflicts of interest

## References

- [1] Michalis P. Migkos and al. Use of conventional synthetic and biologic disease modifying anti-rheumatic drugs in patients with rheumatic diseases contracting COVID-19: a single center experience. *Rheumatology International* (2021) 41:903–909
- [2] Cong Ye and al. Clinical features of rheumatic patients infected with COVID-19 in Wuhan, China. *Ann Rheum Dis* 2020; 79:1007–1013.

## P632

## THE IMPACT OF COVID-19 ON POPULATION-LEVEL DRUG UTILIZATION OF ALENDRONATE

E. H. Tan<sup>1</sup>, D. Robinson<sup>1</sup>, A. Jödicke<sup>1</sup>, M. Mosseveld<sup>2</sup>, K. B. Nielsen<sup>3</sup>, C. Reyes<sup>4</sup>, A. Voss<sup>5</sup>, E. Marconi<sup>6</sup>, F. Lapi<sup>6</sup>, J. Reinold<sup>5</sup>, K. Verhamme<sup>2</sup>, L. Pedersen<sup>3</sup>, M. De Wilde<sup>2</sup>, M. Far<sup>4</sup>, M. Aragón<sup>4</sup>, P. Bosco-Levy<sup>7</sup>, R. Lassalle<sup>7</sup>, D. Prieto-Alhambra<sup>1</sup>

<sup>1</sup>Centre for Statistics in Medicine, Nuffield Dept. of Orthopaedics, Rheumatology and Musculoskeletal Sciences, University of Oxford, Oxford, UK, <sup>2</sup>Dept. of Medical Informatics, Erasmus University Medical Centre, Rotterdam, The Netherlands, <sup>3</sup>Dept. of Clinical Epidemiology, Aarhus University Hospital, Aarhus, Denmark, <sup>4</sup>Fundació Institut Universitari per a la recerca a l'Atenció Primària de Salut Jordi Gol i Gurina, Barcelona, Spain, <sup>5</sup>Dept. of Clinical Epidemiology, Leibniz Institute for Prevention Research and Epidemiology – BIPS, Bremen, Germany, <sup>6</sup>Health Search, Italian College of General Practitioners and Primary Care, Florence, Italy, <sup>7</sup>Univ. Bordeaux, INSERM CIC-P1401, Bordeaux PharmacoEpi, Bordeaux, France

**Objective:** Alendronate [ALN] is the most common osteoporosis medication prescribed in Europe. During the COVID-19 pandemic, non-urgent visits to primary care were restricted, affecting the initiation of new treatments. This study aimed to describe the effect of COVID-19 on the prescription of ALN to new users in three European databases.

**Methods:** We included patients aged  $\geq 18$  y and registered for  $\geq 1$  y in the following databases: Clinical Practice Research Datalink (CPRD, UK), Integrated Primary Care Information Project (IPCI, Netherlands), and Sistema d'Informació per al Desenvolupament de la Investigació en Atenció Primària (SIDIAP, Spain). The number of new users of ALN was obtained from prescription records between March 2019 and September 2020 (June 2020 for SIDIAP, July 2020 for IPCI). New users were defined as patients without a prescription for ALN in the preceding year. Monthly incidence of use was calculated as incidence rate (IR), where the numerator was all new users of ALN in a given calendar month, and the denominator was person-years (PY) of people available in the dataset on that given calendar month, who were not users of ALN as of the last day of the prior calendar month and did not use ALN in the previous year. The IR was compared before and after March 2020, when lockdown was imposed due to COVID-19.

**Results:** The number of new users of ALN were 1582 in CPRD, 3898 in IPCI and 13,109 in SIDIAP. Prior to lockdown, there was a general upwards trend of new use in CPRD, with IR (per 10,000 PY) increasing from 21.8 to 33.3 between March 2019 and March 2020. Similar trends were seen in SIDIAP and IPCI. After March 2020, the start of lockdown, rates of new use of ALN rapidly decreased in all countries from 33.3 to 12.7 for CPRD, 30.7 to 20.9 for IPCI and 27.1 to 11.6 for SIDIAP. Recovery after the initial lockdown was observed with incidence of new use reaching pre-pandemic levels in IPCI (28.9) and CPRD (27.5) as of June and September 2020 respectively. As of June 2020, new ALN use in SIDIAP (13.9) had not reached pre-pandemic levels.

**Conclusion:** Following the COVID-19 pandemic lockdowns in March 2020, the initiation of ALN declined in the immediate months after in three European countries however recovery to pre-pandemic rates have been seen.

**Acknowledgments:** This project was funded by UCB Pharma and Amgen Inc.

## P633

## OSTEOPENIC SYNDROME AND INDICATORS OF BONE MINERAL DENSITY IN ELDERLY WOMEN WITH OSTEOARTHRITIS OF THE KNEE JOINT

E. V. Usova<sup>1</sup>, T. A. Raskina<sup>1</sup>, Y. V. Averkieva<sup>1</sup>, O. S. Malyshenko<sup>1</sup>, M. V. Koroleva<sup>2</sup>, M. V. Letaeva<sup>1</sup>

<sup>1</sup>Federal State Educational Institution of Higher Education “Kemerovo State Medical University” Ministry of Health of the Russian Federation, <sup>2</sup>Federal State Educational Institution of Higher Education “Kemerovo State Medical University”, Kemerovo, Russia

**Objective:** To compare the incidence of osteopenic syndrome and BMD in older women with and without osteoarthritis (OA) of the knee joint.

**Methods:** The study includes 26 patients (average age  $63.4 \pm 6.51$  y) with OA of the knee joint established according to the ACR criteria (1991). The control group was composed of 28 women without clinical signs of OA (average age  $64.7 \pm 7.29$  y). The BMD (g/cm<sup>2</sup>) and the T-score (standard deviation, CO) of the femur neck and lumbar spine (LI-LIV) were evaluated by DXA method (Lunar Prodigy Primo, USA). DXA data were interpreted using the following reference intervals: normal BMD (T-score  $\geq -1$  CO), osteopenia (OPe) (T-score  $-1$  to  $-2.5$  CO) and osteoporosis (OP) (T-score  $< -2.5$  CO).

**Results:** OPe were statistically significantly more frequent in OA patients (46.2%) than in the control group (17.9%),  $p=0.024$ . In contrast, OP was significantly higher among women in the control group (78.6%), compared to OA patients (50%),  $p=0.036$ . The frequency of detection of a normal BMD was comparable in these groups (3.8 vs. 3.6%)  $p=0.077$ . In the analysis of BMD indicators depending on locale, the BMD of the femur neck in patients with

OA was found to be 0.823 (0.758; 0.897) g/cm<sup>2</sup>, corresponding to -1.60 (-2.00; -1.02) T-score CO, of the lumbar spine - 1.000 (0.864; 1.050) g/cm<sup>2</sup> and -1.70 (-3.00; -1.10) CO by T-score. For women in the control group, the following BMD values are recorded: 0.769 (0.710; 0.833) g/cm<sup>2</sup> and 0.922 (0.867; 0.950) g/cm<sup>2</sup>, corresponding to -1.95 (-2.42; -1.50) CO and -2.20 (-2.60; -1.90) CO for the T-score of the femur neck and the lumbar spine, respectively. A comparative analysis showed that the BMD of the lumbar spine was significantly higher in women with OA compared to the control group ( $p=0.018$ ). When comparing the BMD and the T-score of the femur neck, no significant difference is made between the study groups ( $p>0.05$ ).

**Conclusion:** OPe was significantly more frequent in OA patients and OP in women's control group. The BMD in the lumbar spine is statistically higher among women with OA than in the control group.

## P634

### TREATMENT PATTERNS FOR OSTEOPOROSIS MEDICATIONS IN FIVE EUROPEAN COUNTRIES: A MULTINATIONAL REAL WORLD COHORT ANALYSIS

D. E. Robinson<sup>1</sup>, E. H. Tan<sup>1</sup>, A. Jödicke<sup>1</sup>, M. Mosseveld<sup>2</sup>, K. Bødkergaard<sup>3</sup>, C. Reyes<sup>4</sup>, A. Voss<sup>5</sup>, E. Marconi<sup>6</sup>, F. Lapi<sup>6</sup>, J. Reinold<sup>5</sup>, K. Verhamme<sup>2</sup>, L. Pedersen<sup>3</sup>, M. De Wilde<sup>2</sup>, M. Far<sup>4</sup>, M. Aragón<sup>4</sup>, P. Bosco-Levy<sup>7</sup>, R. Lassalle<sup>7</sup>, D. Prieto-Alhambra<sup>1</sup>

<sup>1</sup>Centre for Statistics in Medicine, Nuffield Dept. of Orthopaedics, Rheumatology and Musculoskeletal Sciences, University of Oxford, Oxford, UK, <sup>2</sup>Dept. of Medical Informatics, Erasmus University Medical Centre, Rotterdam, The Netherlands, <sup>3</sup>Dept. of Clinical Epidemiology, Aarhus University Hospital, Aarhus, Denmark, <sup>4</sup>Fundació Institut Universitari per a la recerca a l'Atenció Primària de Salut Jordi Gol i Gurina, Barcelona, Spain, <sup>5</sup>Dept. of Clinical Epidemiology, Leibniz Institute for Prevention Research and Epidemiology – BIPS, Bremen, Germany, <sup>6</sup>Health Search, Italian College of General Practitioners and Primary Care, Florence, Italy, <sup>7</sup>Univ. Bordeaux, INSERM CIC-P1401, Bordeaux PharmacoEpi, Bordeaux, France

**Objective:** Describe the patterns of use of different osteoporosis medications and the switching between osteoporosis medications in the 2 years after starting treatment in 5 European countries.

**Methods:** Routinely collected data from five European databases was used, Integrated Primary Care Information Project (IPCI, Netherlands), Health Search Database (HSD, Italy), Clinical Practice Research Datalink (CPRD, UK), Sistema d'Informació per al Desenvolupament de la Investigació en Atenció Primària (SIDIAP, Spain) and Nationwide linked Danish registries (NDR, Denmark). Osteoporosis medications were categorised as alendronate [ALN], other oral bisphosphonates (ibandronate and risedronate), intravenous bisphosphonates (ibandronate and zoledronate),

denosumab [DENO], teriparatide and selective estrogen receptor modulators (raloxifene, bazedoxifene and lasofozifene). Prescriptions (dispensations in SIDIAP) after 2018 (2016 in NDR) were identified in patients aged  $\geq 18$ . Patients were new users when they were not prescribed the same drug class in 1 year prior to cohort entry, respectively. Proportions (number and percent) of each patient starting each medication, and key descriptive characteristics were identified. Sankey diagrams were produced depicting switching at 6 month intervals between each drug category including censoring and stopping for each database [results not shown].

**Results:** A total of 2738, 34,823, 11,039, 10,757 and 38,141 new users of osteoporosis medications were identified in CPRD, SIDIAP, IPCI, HSD and NDR respectively. In all databases the most common new prescription was ALN (~85% in CPRD and NDR, ~55% in SIDIAP, IPCI and HSD). Within 2 years, 3%, 4.3%, 6.2%, 2.3%, and 1.6% of ALN users switched (CPRD, SIDIAP, IPCI, HSD and NDR, respectively). Switching in DENO users was less frequent (range 0.6% in NDR to 1.7% in SIDIAP) than ALN. Switching of other medication use was similar. At 6 months, adherence to ALN was low with <80% of patients still reported to use the drug in all databases (range 44% in HSD to 71% in CPRD).

**Conclusion:** Switching of osteoporosis medications was uncommon in all databases and more common in ALN user than DENO users. Less than 80% of ALN users were persistent at 6 months.

**Acknowledgements:** This project was funded by UCB Pharma and Amgen Inc.

## P636

### THE BURDEN OF ILLNESS ASSOCIATED WITH MUSCULOSKELETAL DISEASES IS PARTLY EXPLAINED BY MULTIMORBIDITY: THE CIMPACO STUDY GROUP

L. Yang<sup>1</sup>, J. J. Carey<sup>2</sup>, B. McGowan<sup>2</sup>, E. Doherty<sup>3</sup>, S. O'Higgins<sup>4</sup>, B. Whelan<sup>5</sup>, C. Silke<sup>5</sup>, M. O'Sullivan<sup>6</sup>, A. Gsel<sup>7</sup>, F. Heaney<sup>7</sup>, C. Armstrong<sup>7</sup>, B. Connaughton<sup>7</sup>, N. Harrington<sup>5</sup>, S. Walsh<sup>4</sup>, B. McGuire<sup>4</sup>

<sup>1</sup>School of Engineering, National University of Ireland, Galway, <sup>2</sup>School of Medicine, National University of Ireland, Galway, <sup>3</sup>Health Economics and Policy Analysis Centre, National University of Ireland, Galway, <sup>4</sup>Centre for Pain Research, School of Psychology, National University of Ireland, Galway, <sup>5</sup>Dept. of Rheumatology, Our Lady's Hospital, Manóramhamilton, <sup>6</sup>Rheumatology Sligo, Sligo, <sup>7</sup>Dept. of Rheumatology, University Hospital Galway, Galway, Ireland

**Objective:** Musculoskeletal Diseases (MSK) are associated with disability, reduced quality and quantity of life and significant healthcare costs. Epidemiologic studies usually focus on single diagnoses, though multimorbidity is common.



**Method:** A multidisciplinary expert group of rheumatology, health economics and psychology professionals designed a multifaceted questionnaire to understand the burden of illness for 5 types of arthritis, fibromyalgia syndrome and osteoporosis. 2000 patients with a diagnosis of ankylosing spondylitis, fibromyalgia syndrome, gout, osteoarthritis, osteoporosis, psoriatic arthritis or rheumatoid arthritis were invited to complete a detailed 16-page questionnaire, following IRB approval and informed consent. Prevalence estimates for the Republic of Ireland (RoI) for each illness were estimated using 2016 USA and UK reports and national RoI 2016 census population statistics.

**Results:** 652 completed questionnaires were returned and available for analysis. All diagnoses were associated with significant pain, disability, depression, limited activity and healthcare costs. A significant proportion of respondents reported at least 1 or more comorbidities. A strong association was noted between the number of comorbidities and disability, pain, reduced quality of life and healthcare costs.

Table. Age, gender, Health Assessment Questionnaire (HAQ), pain, depression and activity impairment of patients with 1, 2 or 3 or more musculoskeletal disorders.

Number of MSK	Number	Age (SD)	Gender (%)	HAQ	Pain	Depression $\geq 50\%$ of time	Limited Activity
Single Diagnosis	394	56.9 (14.3)	220 (55.8)	0.7 (0.7)	2.7 (1.1)	35.8%	55.6%
2 Diagnoses	178	58.7 (13.7)	109 (61.2)	1.1 (0.7)	3.1 (1.0)	46.6%	68.0%
3 or more Diagnoses	65	60.0 (14.3)	44 (67.7)	1.3 (0.8)	3.5 (1.1)	52.3%	66.2%

**Conclusion:** Multimorbidity is common in musculoskeletal diseases and strongly linked to disability and reduced quality of life. This warrants further consideration in epidemiologic studies and patient management strategies.

## P637

### FRACTURE RISK ASSOCIATED WITH COMORBIDITIES AND MEDICATION USE IN PATIENTS SCREENED IN A FRACTURE LIAISON SERVICE

F. Nazaré<sup>1</sup>, F. Cunha Santos<sup>2</sup>, A. S. Pinto<sup>2</sup>, S. Paiva Dinis<sup>2</sup>, C. Vaz<sup>3</sup>, J. F. Ferreira<sup>3</sup>

<sup>1</sup>Faculty of Health Sciences, University of Beira Interior, Covilhã, <sup>2</sup>Guarda Local Health Unit, Rheumatology, Guarda, <sup>3</sup>Faculty of Health Sciences, University of Beira Interior, Covilhã, Guarda Local Health Unit, Rheumatology, Guarda, Portugal

**Objective:** Assess the risk of fracture associated with comorbidities and with chronic medication. Associate comorbidities and chronic medication as bone-related risk factors and risk factors related to falls. Determine the prevalence of risk factors related to bone and related to fall, in this population.

**Methods:** Observational, cross-sectional and retrospective study of consecutive patients followed at a fracture liaison service of a tertiary hospital between 1 January 2017 and 31 August 2020 with both comorbidities and chronic medication systematically assessed. Comorbidities were classified according to the International Statistical Classification of Diseases and Related Health Problems - 10 and chronic medication according to the Anatomic Therapeutic Chemical classification and were categorized as associated with decreased bone mass or risk of falling. Number of previous fractures and BMD were correlated with the number of risk factors analysed.

**Results:** Of the 189 patients referred to the fracture liaison service, 154 patients were included. 89% were female, with an average age of  $77.4 \pm 10.0$  y with 81.8% with  $\geq 70$  y. 91.6% have at least one bone risk factor, 92.2% at least one fall risk factor and only one patient without any risk factor (0.6%). 87% had at least one fall-related comorbidity and 77% were medicated with at least one fall-enhancing drug.  $6.13 \pm 3.4$  risk factors were identified in average. Patients with  $\geq 2$  fractures have more fall-related comorbidities (p-value=0.029).

**Conclusion:** Multiple risk factors were identified, with heterogeneous overlaps and a multitude of combinations. This points to the need for an integrated assessment of all risk factors related to falls, in addition to bone risk factors assessment in a fracture liaison service. It also reinforces the importance of including systematic assessment of fall risk in this population, and the subsequent implementation of fall prevention strategies.

## P638

### XANTHINE OXIDOREDUCTASE ACTIVITY IN BLOOD DEPENDING ON THE FUNCTIONAL CLASS OF RHEUMATOID ARTHRITIS PATIENTS

E. E. Mozgovaya<sup>1</sup>, S. A. Bedina<sup>1</sup>, A. S. Trofimenko<sup>1</sup>, M. A. Mamus<sup>1</sup>, S. S. Spitsina<sup>1</sup>, I. A. Zborovskaya<sup>1</sup>

<sup>1</sup>Research Institute of Clinical and Experimental Rheumatology A.B. Zborovsky, Volgograd, Russia

**Objective:** The full life of RA patients depends on the preservation of their functional capabilities. The preservation of the patient ability to carry out professional, nonprofessional activities, self-service are estimated by the functional class. Obviously, it is associated with the severity of the clinical picture: RA activity, the presence of extra-articular manifestations, the severity of bone resorption. Xanthine oxidoreductase (XOR), which has pro-oxidant activity, can aggravate these processes. This study aimed to evaluate the changes of XOR interconvertible forms (xanthine



oxidase (XO), EC 1.17.3.2 and xanthine dehydrogenase (XDH), EC 1.17.1.4 activities in plasma and lysed red blood cells (RBCs) depending on the functional class of RA patients.

**Methods:** Diagnosis of RA was verified using the ACR/EULAR criteria (2010). XO and XDH activities were measured in plasma and lysed RBCs by spectrophotometric method [1]. The results were expressed as Me ( $Q_{25}$ ;  $Q_{75}$ ). Spearman's correlation coefficient was used. Differences were considered significant when  $p < 0.05$ .

**Results:** 77 patients (57 females, 20 males) were enrolled in the study. Mean age of patients was 45 (37; 49) y, mean RA duration was 8 (6; 10) y. 16 (20.8%) patients had low disease activity (DAS 28), moderate and high disease activities were determined in 49 (63.6%) and 12 (15.6%) cases, respectively. Extra-articular manifestations were revealed in 32 (41.6%) patients. Most RA patients had II and III radiological stages (by Steinbrocker criteria): 39 (50.6%) and 24 (31.2%), respectively. 30 (39%) patients were related to the second functional class, 40 (51.9%) to the third functional class, 7 (9.1%) to the fourth functional class. The XO and XDH activities of lysed RBCs as well as the XO activity of plasma were correlated with the functional class of RA patients ( $p < 0.001$ ). High functional classes of RA were characterized by more high XO activities in plasma and RBCs as well as lower XDH activities in RBCs.

**Conclusion:** Our results indicate that the deterioration in the functional capabilities of RA patients are accompanied by an increase activity of XO (oxidase form of XOR), which produces reactive oxygen species that have a damaging effect on body tissues.

**Reference:** 1. Zborovskaya IA, et al. Russian J Pain 2018;3:47

## P639

### SCLERODERMA SYSTEMIC: CLINICAL AND IMMUNOLOGICAL PROFILE OF 22 CASES

R. Hassani<sup>1</sup>, M. Djennane<sup>1</sup>, L. Igueni<sup>1</sup>

<sup>1</sup>University Hospital Center of Tizi-ouzou, Dept. of Rheumatology, Tizi-ouzou, Algeria,

**Objective:** Systemic sclerosis is an autoimmune connective tissue disease, arterioles and microvessels. It is characterized by fibrosis and vascular obstruction may affect in particular the skin, gastrointestinal tract, lung and kidney. The purpose of our work is to clarify the clinical and immunological profile of 22 patients with systemic sclerosis (SS).

**Methods:** This is a retrospective study spanning from January 2009 to April 2019 on 22 cases (SS) hospitalized at University Hospital Rheumatology Dept. of Tizi-ouzou.

**Results:** These 03 men and 19 women whose average age was 49 y [25-81 y], the duration of progression of the disease is 6 y on average. The skin involvement was present in 19 sclerosus atrophy type patients in 17 cases (89%) with melanodermic appearance in 3 cases and presence of telangiectasia in 4 cases. It was a limit-

ed form in 16 cases, 1 case SC diffuse scleroderma sine 5 cases. Raynaud's phenomenon was present in 20 cases (91%) with pulp ulcers in 7 cases. 1 case of subcutaneous calcinosis was noted. The articular manifestations are noted in 17 patients (77%), they are the type of arthritis in 10 cases (59%), monoarthritis law 1 case knee, left hip 1 case, and inflammatory polyarthralgia in 10 cases (59%). Pulmonary involvement was found in 8 cases (36%) type interstitial lung disease in 7 cases and 1 case of precapillary PAH. The digestive involvement was noted in 6 patients (27%) dominated by esophageal involvement in all cases. Cardiac involvement was noted in 4 patients (18%) type of pericarditis in 3 cases, and 1 case of congestive heart failure. Renal involvement in turn was noted in 4 patients with type of transient proteinuria averaging 0.24g/24. Bone densitometry was performed in 09 patients showed osteoporosis in 6 cases. An immunological assessment was performed in 17 patients found positive FAN in 16 of them [anti-Scl-70 (50%), anticentromere (23%)]. 14 patients have inflammatory syndrome knowing that 2 patients had lupus partner, 2 other inflammatory myopathy, 2 other rheumatoid arthritis, 2 other Sjögren's syndrome and one patient with primary biliary cholangitis. The evolution was marked by the occurrence of joint deformities in 5 cases, acro-osteolysis in one case and a cardiac decompensation in a case.

**Conclusion:** Our series confirms the predominance of female (SS) in its limited cutaneous form. It is characterized by its association with antitopoisomerase type I (anti-Scl-70) which are usually very specific diffuse cutaneous forms with a high frequency of joint damage (77%) source of functional and aesthetic damage.

## P640

### EFFECTIVENESS OF COGNITIVE BEHAVIOURAL THERAPY ON PAIN AND FUNCTION FOLLOWING TOTAL KNEE REPLACEMENT IN ADULTS WITH OSTEOARTHRITIS: SYSTEMATIC REVIEW AND META-ANALYSIS

O. Caliskan<sup>1</sup>, A. Begde<sup>1</sup>, M. Hall<sup>2</sup>, G. Pope<sup>2</sup>

<sup>1</sup>National Centre of Sports and Exercise Medicine, School of Sports and Exercise Science, Loughborough University, Loughborough, <sup>2</sup>Division of Physiotherapy & Rehabilitation Sciences, Clinical Sciences Building, Nottingham City Hospital, University of Nottingham, Nottingham, UK

**Objective:** Total knee replacement (TKR) is a largely successful procedure, and 66% of patients who have undergone it report that "it feels normal". However, around 20% of patients experience chronic pain postoperatively without a clear reason, such as instability. Preoperative depression, pain elsewhere, and negative thoughts are related to poor outcomes following TKR. Cognitive-behavioural therapy (CBT) is short-term psychotherapy consisting of between 5-20 sessions used to improve outcomes for

people at risk of prolonged postoperative pain. This study aimed to investigate the effectiveness of CBT in addition to usual care, on pain and function following TKR.

**Methods:** A systematic search for randomised controlled trials (RCTs) was conducted up to August 2020 using the following databases: Cochrane Library, Medline, AMED, PubMed and EMBASE. Studies were assessed for quality using The PEDro scale. Searches and study selection, quality assessment and data extraction were carried out by two independent researchers. The primary outcome was pain, and physical function was a secondary outcome. Effect sizes were calculated using the standardised mean difference (SMD) and were pooled using the random-effects model in RevMan.

**Results:** 5 RCTs with 557 participants were included in the review. All studies were judged as high quality studies scoring  $\geq 8$  out of a possible 11 against the Pedro scale. Meta-analysis of all studies for pain between 3 and 6 months showed the pooled SMD was -0.25 (95%CI: -0.64, 0.14) with  $I^2=74\%$  and  $p=0.20$  (figure 1). Another meta-analysis of three of five included studies whose VAS and NRS results alone at 12 months showed that the pooled SMD was 0.01 (95%CI: -0.19, 0.21) with  $I^2=0\%$  and  $p=0.91$  for pain. Two studies reported effectiveness of CBT on WOMAC physical function at six months (pooled SMD=-0.48 (95%CI: -1.53, 0.58)) and two studies used the 6-minute walk test at 12 months (pooled SMD was 0.08 (95%CI: -0.16, 0.32))

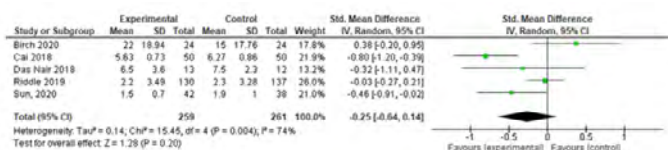


Figure 1: Pain Intensity (3-6 Months)

**Conclusion:** CBT added to usual care is slightly more effective than usual care alone on pain and physical function in the first 6 months. At 12 months, the effects on pain and physical function had disappeared. Overall, there was no statistically significant difference between groups.

P641

## GENETIC MARKERS OF OSTEOGENESIS IMPERFECTA IN BELARUSIAN PATIENTS

K. Kobets<sup>1</sup>, P. Marozik<sup>1</sup>, A. Pachkaila<sup>2</sup>, E. Rudenka<sup>3</sup>

<sup>1</sup>Institute of Genetics and Cytology of the National Academy of Sciences of Belarus, <sup>2</sup>Belarusian Medical Academy of Postgraduate Education, <sup>3</sup>Belarusian State Medical University, Minsk, Belarus

**Objective:** Pathogenic substitutions in the coding part of the type 1 collagen genes *COL1A1* and *COL1A2* negatively affect the formation of the quaternary structure of collagen protein, impairing bone strength. This can lead to various bone pathologies, including osteogenesis imperfecta (OI). This disease of the connective

tissue manifests itself at an early age by curvature, shortening of bones, accompanied by difficulty in movement, frequent fractures, and more. The frequency of OI in the population is 1 per 10,000 - 20,000 people. In order to simplify the diagnosis of OI among the selected patients, an analysis of *COL1A1* and *COL1A2* mutations was performed.

**Methods:** To identify pathogenic mutations in the *COL1A1* and *COL1A2* genes, 92 samples of OI patients were sequenced using MiSeq (Illumina) custom panel. NGS results were verified using Sanger sequencing. Pathogenicity was assessed based on international guidelines for NGS data analysis.

**Results:** In total, 34 mutations were identified in the protein-coding sequence of the collagen genes *COL1A1* and *COL1A2* in 58 patients. The pathogenic mutations identified during the experiment are listed in the figure 1. Previously undescribed substitutions are highlighted in red, and already known pathogenic ones are highlighted in blue. In the *COL1A1* gene, 9 previously undescribed mutations were found: c.G4123A, c.A4103G, c.C3982A, c.2550delA, c.2238delT, c.2114delA, c.G868C, c.G662A, c.G3653A. For the most severe immobilized patients were identified c.C3982A and c.G868C with phenotypic features of types I and III OI, respectively. Among 5 new mutations of the *COL1A2* gene: c.1036-2A>G, c. G1856A, c.G2359A, c.G2387C, c.G2809T the carrier of the c.G2359A gene replacement moves with the help of a wheelchair, has OI type III.

**Conclusion:** The revealed mutations will help in the future to carry out a more accurate diagnosis of osteogenesis imperfecta and identify the type of this disease during molecular genetic testing.

**Acknowledgement:** This work was carried out within the framework of the Union State project ("DNA identification") for 2017-2021, task 6.3.

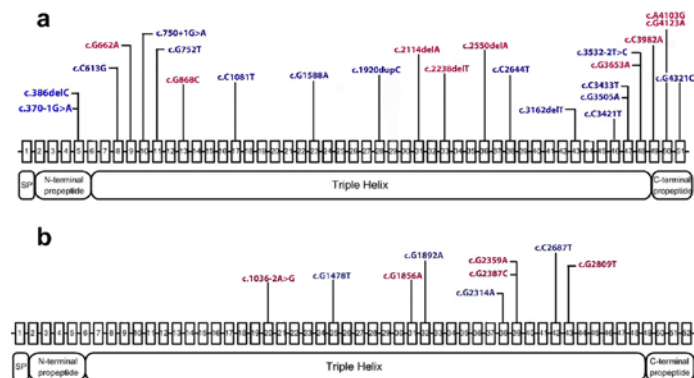


Figure. Identified mutations associated with osteogenesis imperfecta. a – *COL1A1* gene; b – *COL1A2* gene.

P642

### THE COURSE OF OSTEOARTHRITIS DEPENDING ON DISEASE DURATION (PRELIMINARY DATA)

E. Taskina<sup>1</sup>, N. Kashevarova<sup>1</sup>, K. Telyshev<sup>1</sup>, E. Strebkova<sup>1</sup>, E. Sharapova<sup>1</sup>, L. Alekseeva<sup>1</sup>, A. Lila<sup>1</sup>

<sup>1</sup>V.A. Nasonova Research Institute of Rheumatology, Moscow, Russia

**Objective:** To assess the effect of osteoarthritis (OA) duration on clinical manifestations and radiographic properties of the disease

**Methods:** 128 female knee osteoarthritis patients meeting the ACR osteoarthritis criteria were enrolled in this prospective study. Patients had varying radiologic stages (I-III according to Kellgren-Lawrence) and signed an informed consent. Mean patient age was 57.4±7.6 y (38-72), duration of the disease was 6.0 (4-8) y. An individual study card was filled out for each patient, which included anthropometrics, disease history and clinical examination data, visual analog scale (VAS) knee pain evaluation, WOM-AC, KOOS, DN4 indices and concomitant disease information. All patients underwent plain knee radiography and knee ultrasonography. Most of the patients (72%) had stage II osteoarthritis, 16% had stage I, and stage III was detected in 12% of patients.

**Results:** Patients were divided into 2 groups: the first group included females with short disease duration (<5 y, n=38), the second group included patients with OA duration over 5 y (n=90). The patients in the first group were significantly younger in comparison to the other group (54 (46-58) vs. 62.5 (58-68) years old, p=0.003), had lower VAS knee pain when walking (43 (30-50) vs. 50 (40-57) mm, p=0.04), lower DN4 (1 (0-2) vs. 2 (1-3) points, p=0.0003), better global VAS patient health parameters (37 (30-46) vs. 45 (35-59) mm, p=0.008) and better KOOS index values (61 (53-83) vs. 47 (36-55) points, p=0.0001). When assessing weight and BMI, there were no significant intergroup differences (p>0.05), however, patients with short disease duration had lower waist circumference values (87 (84-95) vs. 92 (88-104) cm, respectively, p=0.003). When assessing knee radiograms, the shorter duration group had smaller median osteophyte values both in the medial and in the lateral condylar compartments of the femur (1.3 (1-4.5) vs. 3.3 (2.8-5.8) mm, p=0.05 and 1.4 (1-2.1) vs. 4.3 (2.5-7.1) mm, respectively, p=0.02); ultrasonography showed larger intact cartilage in the short duration group (medially 1.5 (1.3-1.6) vs. 1.2 (0.9-1.5) mm, p=0.02, laterally – 1.6 (1.4-1.7) vs. 1.4 (1.2-1.6) mm, p=0.03). There was also an intergroup difference in terms of glycated hemoglobin levels (5.3 (4.8-5.5)% vs. 5.7 (5.6-5.9)%, p=0.0003). The Spearman correlation analysis confirmed positive correlations (p<0.05) between short OA duration and higher intact cartilage values by US, better KOOS index. Moreover, negative relation was established between the disease duration (Table) and age, osteophyte size, waist circumference, hip circumference, glycated hemoglobin values, menopause duration, radiologic lateral joint space, VAS knee pain.

Table. Correlation coefficients between short disease duration and OA risk and progression factors.

Parameter	OA duration less than 5 years	P value
HbA1c, %	-0.56	<0.0001
Age, years	-0.48	<0.0001
KOOS, points	0.45	<0.0001
DN4, points	-0.38	0.0001
Lateral femoral condyle osteophyte size, mm	-0.34	0.02
Waist circumference, cm	-0.32	0.002
Medial cartilage (US), mm	0.3	0.02
Lateral cartilage (US), mm	0.3	0.03
General patient health (VAS), mm	-0.29	0.005
Lateral knee joint space, mm (X-ray)	-0.23	0.03
VAS knee pain, mm	-0.21	0.04

**Conclusion:** Our data confirms that patients with short OA duration showed more favorable disease course: knee pain was less intense, KOOS index values were better, neuropathic pain descriptors were less frequent, instrumental means of evaluation showed a more intact cartilage and smaller osteophytes. In addition, in short duration group there were lower glycated hemoglobin levels, lower waist circumference with comparable weight and BMI, which may indicate more significant prevalence of metabolic syndrome in patients with longstanding OA.

P643

### FALLS IN OSTEOPOROSIS: SARCOPENIA, A RISK FACTOR TO BE CONSIDERED

E. Ziguora<sup>1</sup>, N. Veronese<sup>2</sup>, R. Sulpasso<sup>3</sup>, A. Floris<sup>1</sup>, A. Piana<sup>1</sup>, M. Spanio<sup>4</sup>, A. Pilotto<sup>5</sup>

<sup>1</sup>Bone Unit, Dept. of Geriatric Care, Orthogeriatrics and Rehabilitation, Galliera Hospital, Genova, <sup>2</sup>Dept. of Internal Medicine and Geriatrics, University of Palermo, Palermo, <sup>3</sup>Dept. of Interdisciplinary Medicine, University of Bari, Bari, <sup>4</sup>Dept. of Clinical Engineering and Communication, Genova, <sup>5</sup>Dept. of Geriatric Care, Orthogeriatrics and Rehabilitation, Galliera Hospital and Dept. of Interdisciplinary Medicine, University of Bari, Bari, Italy

**Objective:** To investigate the presence of sarcopenia and the sarcopenia-related parameters in women with osteoporosis who had 3 or more falls during the last year.

**Methods:** 20 women (mean age  $77 \pm 10$  years old) who referred to our Bone Unit from December 2019 to February 2020 were examined. They all were under treatment for osteoporosis and had 3 or more falls during the last year. Strength was measured using the hand grip dynamometer (HD). Body composition was estimated by Bioelectrical Impedance Analysis (BIA). The physical performance was evaluated by Short Physical Performance Battery (SPPB) and by Timed Up and Go test (TUG). Frailty was evaluated using the Selfy Multidimensional Prognostic Index (Selfy-MPI) that includes information about cognitive and functional status, nutrition, comorbidity, number of drugs and social factors; MPI 1 is for low, MPI 2 is for moderate and MPI 3 is for high risk of frailty. Only women with Selfy-MPI 1 were included.

**Results:** They all presented strength  $< 16$  kg with a media of 7.3 kg (dinamopenia). The BMI was  $20.6 \text{ kg/m}^2$  (range  $14\text{--}25.6 \text{ kg/m}^2$ ) and the skeletal muscle mass index (SMI), as revealed by BIA, was under  $6 \text{ kg/m}^2$  in all of them (sarcopenia). No correlation between strength, muscle mass (SMI) and BMI was found. Only 3 of them presented SPPB  $> 8$ , whereas TUG was over 12 s in only one subject.

**Conclusion:** The assessment of sarcopenia in osteoporotic patients should be included in the evaluation of the risk of falls in order to prevent fractures, physical disability and functional impairment.

## P644

### THE EFFECTS OF STATIN USE ON BONE MINERAL DENSITY

A. McDonough<sup>1</sup>, E. Laird<sup>2</sup>, C. F. Hughes<sup>3</sup>, H. McNulty<sup>3</sup>, M. Ward<sup>3</sup>, J. J. Strain<sup>3</sup>, A. Anne<sup>2</sup>, C. Cunningham<sup>4</sup>, K. McCarroll<sup>1</sup>

<sup>1</sup>Bone Health and Osteoporosis Unit, Mercer's Institute for Successful Ageing, St. James's Hospital, Dublin, Ireland, <sup>2</sup>Trinity College Dublin, Dublin, Ireland, <sup>3</sup>Ulster University, Coleraine, UK, <sup>4</sup>Mercer's Institute for Successful Ageing, St. James's Hospital, Dublin, Ireland

**Objective:** Statin use has been associated with greater BMD and reduced fracture risk in several studies. However, studies are conflicting and the potential mechanism by which it may impact on BMD is unknown, with the effect potentially limited to lipophilic statins. This study aimed to explore the relationship between statin use and BMD in older, Irish adults.

**Methods:** Study participants were derived from the Trinity Ulster Dept. of Agriculture (TUDA) patient cohort of over 5000 community-dwelling, Irish adults aged  $> 60$  y. Participants who were treatment naïve to osteoporosis medications and had BMD mea-

surements of the spine and hip using DXA were included. The relationship between statin use and BMD was explored in multinomial regression models.

**Results:** We identified 3663 patients, mean age 73.4 y (range 60–98.8), 58.5% female with 55.6% ( $n=2,046$ ) were using statins. Statin use was positively associated with BMD at the total hip ( $P=0.01$ ) and spine ( $P=0.01$ ), before and after adjustment for age, gender, BMI, smoking and alcohol use, steroid use, physical frailty (Timed Up and Go), cardiovascular disease history and serum CRP. We identified a non-significant difference ( $P=0.88$ ) in BMD between users of lipophilic vs. hydrophobic statins. There was no association between statin use and bone turnover markers.

**Conclusion:** We identified that statin use was independently associated with greater BMD at the total hip and spine. Whilst there was no difference in BMD between different statin classes, the study may have been underpowered to detect this. The mechanism by which statins may affect BMD is unclear, with some studies suggesting both anabolic and anti-resorptive effects. Our findings were independent of cardiovascular disease and CRP, suggesting a mechanism not related to inflammation or endothelial/vascular dysfunction. Furthermore, statins appeared to have no effect on bone turnover markers. Given the widespread use of statins, any positive effect on BMD (albeit small) could have a big impact on bone health at a population level. More research is needed to better understand the mechanisms and effect of statins on BMD.

## P645

### DOWN SYNDROME: AN ACCELERATED UNDIAGNOSED MUSCULOSKELETAL AGING

E. Zigoura<sup>1</sup>, C. Prete<sup>2</sup>, B. Senesi<sup>2</sup>, A. Floris<sup>1</sup>, M. Vigo<sup>1</sup>, M. Fama<sup>1</sup>, C. Borello<sup>1</sup>, O. Parodi<sup>1</sup>, A. Pilotto<sup>3</sup>

<sup>1</sup>Bone Unit, Dept. of Geriatric Care, Orthogeriatrics and Rehabilitation, Galliera Hospital, Genova, <sup>2</sup>Down Syndrome Centre, Dept. of Geriatric Care, Orthogeriatrics and Rehabilitation, Galliera Hospital, Genova, <sup>3</sup>Dept. of Geriatric Care, Orthogeriatrics and Rehabilitation, Galliera Hospital and Dept. of Interdisciplinary Medicine, University of Bari, Bari, Italy

**Objective:** To evaluate the prevalence of low bone mass density and low muscle mass in adults with Down syndrome (DS).

**Methods:** 20 adults with DS (mean age 38 years old) were referred to our day hospital of the Geriatric Dept. of Galliera Hospital, Genoa, from October 2020 to April 2021. Information about nutritional status, comorbid conditions and pharmacological treatment were collected. BMI was calculated. Bone metabolism parameters were assessed by the laboratory. Strength was measured using the hand grip test. Body composition was estimated



by Bioelectrical impedance analysis (BIA). BMD was assessed by DXA at the femoral neck and at the lumbar spine. X-rays were performed in patients with low back pain.

**Results:** Almost all patients were overweight (17 out of 20) with BMI=28±2.3 kg/m<sup>2</sup> and 16 of them had vitamin D deficiency (media 15.5 ng/ml). DXA revealed a low bone mass density in all of them with a z-score -1.5±0.6 and a T-score -2.5±0.6. They all presented low hand grip test; 6.7±0.5 kg for the women and 12.4±0.7 kg for the men. Skeletal muscle mass index was 9.4±1.2 kg/m<sup>2</sup> in men and 7.86±0.7 kg/m<sup>2</sup> in women. X-rays revealed vertebral fractures due to fragility in three of them.

**Conclusion:** DS individuals present low BMD, and dinamopenia rather than sarcopenia. Low muscle mass indexes were not strictly associated with reduced hand grip strength. The assessment of muscle mass and bone density should be included in the routine evaluation of this population so as to prevent fragility fractures and loss of autonomy in DS population.

## P646

### OSTEOPOROSIS IN PATIENTS WITH TURNER SYNDROME

S.-A. Preda<sup>1</sup>, M.-J. Țuculina<sup>2</sup>, L.-E. Stoica<sup>3</sup>, A. Camen<sup>4</sup>, M.-R. Mitroi<sup>5</sup>, N. Ionovici<sup>6</sup>, A. Boicea<sup>6</sup>, F. Nechita<sup>7</sup>, D.-M. Albulescu<sup>8</sup>, A.- Enescu<sup>8</sup>, G. Mitroi<sup>9</sup>

<sup>1</sup>University of Medicine & Pharmacy of Craiova, Faculty of Dental Medicine, <sup>2</sup>University of Medicine & Pharmacy of Craiova, Faculty of Dental Medicine, <sup>3</sup>University of Medicine & Pharmacy Craiova, Dept. of Dermatology Clinic, <sup>4</sup>University of Medicine & Pharmacy Craiova, Dept. of Oral & Maxillofacial surgery, <sup>5</sup>University of Medicine & Pharmacy, Dept. of Otorhinolaryngology, <sup>6</sup>University of Medicine & Pharmacy, Dept. of Medicine & Professional Diseases, <sup>7</sup>University of Medicine & Pharmacy Dept. of Medical Psychology, <sup>8</sup>University of Medicine & Pharmacy, Dept. of Anatomy, <sup>9</sup>University of Medicine & Pharmacy, Dept. of Urology, Craiova, Romania

**Objective:** Turner syndrome (TS) is a rare disorder that affects female subjects with an incidence of 1/2500 to 1/3000 live female newborns, being the consequence of a numerical gonosomal distortion. Clinical semiology of patients with TS is: stature hypotrophy, late puberty/ovarian failure. Bone age is generally delayed compared to the chronological one, the progression is slow secondary being the consequence of an inadequate production of sex hormones. [1-10]. Craniofacial development is delayed with 2-3 y while dental development is early (6 months - 3.5 y). Typical modifications in the facial skeleton are: reduced development of the cranial base, hypertelorism, maxillary hypoplasia, micrognathia, high palatal arch, bilateral crossing with or without palatoschisis, open anterior bite, malocclusion class II. The

identification cases with Turner syndrome with female phenotype, chromosomal studies, evaluation of BMD, study of dental morphology. [3,5,9-12].

**Methods:** The study was performed on 21 cases of TS, with age between 11.8-18.2 y. The karyotype study was performed, the BMD was assessed by DXA, the assessment of various craniofacial anthropometric variables was done by lateral cephalometry.

**Results:** On 68% of cases (14 cases) osteoporosis was highlighted, the karyotype study specified the diagnosis of TS. The craniofacial morphological characteristics of the group we studied showed a reduction of the posterior base of the skull, the reduction of the length of the mandible and maxilla, the retrognathion of the mandible and maxilla. Even if our group included a small number of subjects, the values obtained by us fall into the craniofacial typology characteristic of children with growth hormone deficiency.

**Conclusions:** The initiation of growth hormone replacement therapy proves good therapeutic tolerance as well as a good recovery of stature deficiency by periodically evaluating anthropometric and developmental indices in dynamics under permanent growth hormone replacement therapy. It is necessary to increase bone mass to correct osteoporosis and reduce the incidence of fractures [13-16].

#### References:

1. Popescu SM, et al. Rev Chim (Bucharest) 2019;70:1439
2. Dăguci L, et al. Rom J Morphol Embryol 2020;61:1
3. Dăguci C, et al. Rom J Morphol Embryol 2014;55:401
4. Răescu M, et al. Environ Eng Manag J 2010; 9:1521
5. Voinea Georgescu R, et al. Rom J Oral Rehab 2020;12:13
6. Tonescu IG, et al. Rom J Oral Rehab 2021;13:138
7. Cenușoiu A, et al. Rom J Oral Rehab 2021;13:57
8. Stoica LE, et al. Rom J Morphol Embryol 2015;56:827
9. Pătrașcu V, et al. Rom J Morphol Embryol 2010;51:171
10. Pirici I, et al. Rom J Morphol Embryol 2014;55(Suppl 2):675
11. Nacea JG, et al. Rom J Morphol Embryol 2019;60:195
12. Dincă D, et al. Rom J Morphol Embryol 2019;60:255
13. Ștefănescu M, et al. Rom J Morphol Embryol 2017;58:1393
14. Gheorghiță LM, et al. Rom J Oral Rehab 2020;12:216
15. Cotocel CC, et al. Rom J Morphol Embryol 2019;60:1053
16. Nechita D, et al. Rom J Morphol Embryol 2019;60:1059

P647

**BASIC PRINCIPLES OF BONE CELL BIOLOGY**

S.-A. Preda<sup>1</sup>, M.-J. Țuculina<sup>2</sup>, L.-E. Stoica<sup>3</sup>, A. Camen<sup>4</sup>,  
M.-R. Mitroi<sup>5</sup>, N. Ionovici<sup>6</sup>, A. Boicea<sup>6</sup>, F. Nechita<sup>7</sup>, D.-M.  
Albulescu<sup>8</sup>, A.- Enescu<sup>8</sup>, G. Mitroi<sup>9</sup>

<sup>1</sup>University of Medicine & Pharmacy of Craiova, Faculty of Dental Medicine, <sup>2</sup>University of Medicine & Pharmacy of Craiova, Faculty of Dental Medicine, <sup>3</sup>University of Medicine & Pharmacy Craiova, Dept. of Dermatology Clinic, <sup>4</sup>University of Medicine & Pharmacy Craiova, Dept. of Oral & Maxillofacial Surgery, <sup>5</sup>University of Medicine & Pharmacy, Dept. of Otorhinolaryngology, <sup>6</sup>University of Medicine & Pharmacy, Dept. of Medicine and Professional Diseases, <sup>7</sup>University of Medicine & Pharmacy Dept. of Medical Psychology, <sup>8</sup>University of Medicine & Pharmacy, Dept. of Anatomy, <sup>9</sup>University of Medicine & Pharmacy, Dept. of Urology, Craiova, Romania

Far from being an inert envelope surrounding the bone marrow, thus protecting hemopoiesis and the development of the immune system, bone is a complex organ, constantly changing under the control of hormones, cytokines, central and sympathetic nervous systems, and which itself functions as an endocrine organ. As in other complex organs, bone function is controlled by a range of specialized cell types; they are located on the bone surface or inside the mineralized matrix. [1,2-7].

Osteoblasts are those cells that form the bone matrix. However, cells on the osteoblast line have a wide range of functions and confusion has arisen when the term "osteoblasts" is used to describe cells in other stages of the osteoblast line that are not prepared to actively form a bone matrix.. Mature osteoblasts are easily recognized histologically as cuboidal cells, mononuclear cells that are found in groups on the matrix that synthesized them. [3,5,8-13].

They are full of alkaline phosphatase (ALP) and predominantly synthesize type I collagen and noncollagen proteins, including osteocalcin, osteonectin, bone sialoprotein, and bone proteoglycans I (biglycan) and II (decorin). They possess many receptors, including the receptor (PTH1R) for PTH and PTHrP, allowing them to respond to growth factors and cytokines produced by osteoblastic line cells.

Osteocytes are terminally differentiated osteoblasts that have been trapped inside the bone matrix. They become embedded in gaps in the bone matrix, connect with each other and with the cell surface through their intercellular processes full of canalicular fluid content. Osteocytes are the most abundant bone cells (85-90%) and have a long lifespan. [7,9,14-16].

Osteocyte-derived sclerostin. Osteocytes have long been thought to function as sensors of pressure change and microaggression, but the new approaches have recently been adopted through studies of osteocyte function, largely as a result of the discovery of genes mutations in associated with either osteoporosis or syndrome of increased bone mass.

Indeed, the ideas regarding the control of bone formation were significantly revised after the discovery of sclerostin, the protein produced by the *sost* gene. In bones, it is produced primarily by osteocytes and strongly inhibits bone formation by inhibiting Wnt signaling. [15-16].

References:

1. Popescu SM, et al. Rev Chim (Bucharest) 2019;70:1439
2. Dăguci L, et al. Rom J Morphol Embryol 2020;61:1
3. Dăguci C, et al. Rom J Morphol Embryol 2014;55:401
4. Răescu M, et al. Environ Eng Manag J 2010; 9:1521
5. Voinea Georgescu, R et al. Rom J Oral Rehab 2020;12:13
6. Tonescu IG, et al. Rom J Oral Rehab 2021;13:138
7. Cenușoiu A, et al. Rom J Oral Rehab 2021;13:57
8. Stoica LE, et al. Rom J Morphol Embryol 2015;56:827
9. Pătrașcu V, et al. Rom J Morphol Embryol 2010;51:171
10. Pirici I, et al. Rom J Morphol Embryol 2014;55(Suppl 2):675
11. Nacea JG, et al. Rom J Morphol Embryol 2019;60:195
12. Dincă D, et al. Rom J Morphol Embryol 2019;60:255
13. Ștefănescu M, et al. Rom J Morphol Embryol 2017;58:1393
14. Gheorghiță LM, et al. Rom J Oral Rehab 2020;12:216
15. Cotocel CC, et al. Rom J Morphol Embryol 2019;60:1053
16. Nechita D, et al. Rom J Morphol Embryol 2019;60:1059

P648

**OSTEOPOROSIS AND GINGIVAL INFLAMMATION**

S.-A. Preda<sup>1</sup>, G. Mitroi<sup>2</sup>, L.-E. Stoica<sup>3</sup>, A. Camen<sup>4</sup>, M.-  
R. Mitroi<sup>5</sup>, N. Ionovici<sup>6</sup>, A. Boicea<sup>6</sup>, F. Nechita<sup>7</sup>, D.-M.  
Albulescu<sup>8</sup>, A.- Enescu<sup>8</sup>, M.-J. Țuculina<sup>9</sup>

<sup>1</sup>University of Medicine & Pharmacy of Craiova, Faculty of Dental Medicine, <sup>2</sup>University of Medicine & Pharmacy, Dept. of Urology, <sup>3</sup>University of Medicine & Pharmacy Craiova, Dept. of Dermatology Clinic, <sup>4</sup>University of Medicine & Pharmacy Craiova, Dept. of Oral & Maxillofacial Surgery, <sup>5</sup>University of Medicine & Pharmacy, Dept. of Otorhinolaryngology, <sup>6</sup>University of Medicine & Pharmacy, Dept. of Medicine and Professional Diseases, <sup>7</sup>University of Medicine & Pharmacy Dept. of Medical Psychology, <sup>8</sup>University of Medicine & Pharmacy, Dept. of Anatomy <sup>9</sup>University of Medicine & Pharmacy of Craiova, Faculty of Dental Medicine, Craiova, Romania

**Objective:** The present study starts from the hypothesis that in chronic marginal periodontitis a major role is represented by general systemic factors, such as osteoporosis (OP), menopause being the most common. Although the involvement of osteoporosis in the alteration of the marginal periodontium is relatively little studied in the literature, some studies have shown that there

are clinical and etiopathogenetic correlations between them, the presence of osteoporosis inducing severe forms of periodontitis, the most common form being dystrophic periodontitis. [1-9].

**Methods:** The case study is represented by 42 patients, with age between 42-75 y. These patients were divided into two groups: a group with osteoporosis and periodontitis comprising 25 patients and a control group with 17 patients without osteoporosis and periodontitis. On patients included in the study, the oral cavity examination was performed by a dentist. We assessed the gingival index inflammation (GI). Evaluation of BMD in order to establish the diagnosis of osteopenia/osteoporosis was performed by DXA and we evaluated the values of the T-score.

**Results:** Both osteoporosis and periodontal disease are destructive bone diseases. We calculated the correlation coefficients and the correlations between the parameters of osteoporosis and periodontal indices on the group with osteoporosis and periodontal disease, but also on the control group. Comparing the groups with osteoporosis and periodontal disease and without osteoporosis and periodontal disease we observed a highly significant correlation between BMD and GI, which means that the bone mass density is a predictor for the gingival inflammation index.

**Conclusion:** The association between osteoporosis and periodontal disease has been reported in several studies, but this association has not yet been confirmed, as these studies have contradictory results and the relationship remains unclear. Given that the study was limited and was conducted on a small group of patients for a good understanding of the correlations between the two systemic diseases, longitudinal studies on much larger groups are needed. [7-16].

#### References:

1. Popescu SM, et al. Rev Chim (Bucharest) 2019;70:1439
2. Dăguci L, et al. Rom J Morphol Embryol 2020;61:1
3. Dăguci C, et al. Rom J Morphol Embryol 2014;55:401
4. Răescu M, et al. Environ Eng Manag J 2010; 9:1521
5. Voinea Georgescu, R et al. Rom J Oral Rehab 2020;12:13
6. Tonescu IG, et al. Rom J Oral Rehab 2021;13:138
7. Cenușoiu A, et al. Rom J Oral Rehab 2021;13:57
8. Stoica LE, et al. Rom J Morphol Embryol 2015;56:827
9. Pătrașcu V, et al. Rom J Morphol Embryol 2010;51:171
10. Pirici I, et al. Rom J Morphol Embryol 2014;55(Suppl 2):675
11. Nacea JG, et al. Rom J Morphol Embryol 2019;60:195
12. Dincă D, et al. Rom J Morphol Embryol 2019;60:255
13. Ștefănescu M, et al. Rom J Morphol Embryol 2017;58:1393
14. Gheorghită LM, et al. Rom J Oral Rehab 2020;12:216
15. Cotocel CC, et al. Rom J Morphol Embryol 2019;60:1053
16. Nechita D, et al. Rom J Morphol Embryol 2019;60:1059

P649

## FRAGILITY FRACTURES ARE A LEADING REASON FOR EMERGENCY HOSPITAL ADMISSION AND A LARGE ILLNESS BURDEN IN IRELAND

D. O'Sullivan<sup>1</sup>, J. Carey<sup>2</sup>, B. McGowan<sup>3</sup>, E. Doherty<sup>4</sup>, S. O'Higgins<sup>5</sup>, B. Whelan<sup>6</sup>, C. Silke<sup>6</sup>, M. O'Sullivan<sup>6</sup>, A. Gsel<sup>2</sup>, F. Heaney<sup>2</sup>, C. Armstrong<sup>2</sup>, B. Connaughton<sup>2</sup>, N. Harrington<sup>7</sup>, S. Walsh<sup>5</sup>, B. McGuire<sup>5</sup>

<sup>1</sup>School of Medicine, National University of Ireland Galway, Galway, <sup>2</sup>Dept. of Rheumatic Diseases, Galway University Hospital, Galway, <sup>3</sup>Dept. of Rheumatic Disease Sligo and Manorhamilton University Hospitals, Sligo, <sup>4</sup>Dept. of Health Economics, National University of Ireland Galway, Galway, <sup>5</sup>Centre for Pain Research, National University of Ireland Galway, Galway, <sup>6</sup>Dept. of Rheumatic Diseases Sligo and Manorhamilton University Hospitals, Sligo, <sup>7</sup>Dept. of Rheumatic Disease Sligo and Manorhamilton University Hospitals, Leitrim, Ireland

**Objective:** Identify and compare total numbers of hospitalised patients, length of stay and annual bed days of patients diagnosed with osteoporotic hip and forearm fractures and other common diagnoses.

**Methods:** Data on the 17 most frequently coded diagnoses for emergency admissions to public hospitals in the Republic of Ireland between 2010-2016 were extracted using ICD-10 coding from the Hospital In Patient Enquiry system. Data was extracted by one author (BMcG). Extracted data included number of admissions, hospital bed days and mean length of stay.

**Results:** A total of 946,217 admissions accounting for 6,044,055 bed days occurred between 2010-2016. The most frequent diagnostic groups were cardiovascular disease, infection, regional pain, fractures and miscellaneous. The single most frequently coded diagnosis was pain in the throat and chest (13.4%), while fracture of the femur (3.1%) was the least frequent. Fracture of the forearm ranked 15th (3.6%). Femoral fractures had the longest mean length of stay at 17.6 d, followed by stroke at 17.4 d, while fracture of the forearm ranked 14th at 2.7 d. Femoral and forearm fractures accounted for 10% of total bed days.

**Conclusion:** Fragility fractures are a common reason for acute public hospital admission in the Republic of Ireland and account for a large proportion of hospital bed days.

Proportion of Bed Days for Main Diagnostic Groups



**Disclosure:** J Carey served on several committees for, taught courses for, and Past-President of The International Society for Clinical Densitometry, is a member of The Committee for Scientific affairs for The International Osteoporosis Foundation, and is a founding member of, and current president of The Irish DXA Society.

P650

**Y NEUROPEPTIDE AND BONE HOMEOSTASIS**

S.-A. Preda<sup>1</sup>, M.-J. Țuculina<sup>2</sup>, L.-E. Stoica<sup>3</sup>, N. Ionovici<sup>4</sup>, A. Boicea<sup>4</sup>, F. Nechita<sup>5</sup>, D.-M. Albușescu<sup>6</sup>, A.- Enescu<sup>6</sup>, G. Mitroi<sup>7</sup>

<sup>1</sup>University of Medicine & Pharmacy of Craiova, Faculty of Dental Medicine, <sup>2</sup>University of Medicine & Pharmacy of Craiova, Faculty of Dental Medicine, <sup>3</sup>University of Medicine & Pharmacy Craiova, Dept. of Dermatology Clinic, <sup>4</sup>University of Medicine & Pharmacy, Dept. of Medicine and Professional Diseases, <sup>5</sup>University of Medicine & Pharmacy Dept. of Medical Psychology, <sup>6</sup>University of Medicine & Pharmacy, Dept. of Anatomy, <sup>7</sup>University of Medicine & Pharmacy, Dept. of Urology, Craiova, Romania

NPY-immuno-reactive fibers were identified in bone tissue some time ago, associated with blood vessels. This anatomical location led to the presumption that the role of NPY in vasoregulation is inside the spinal cord. In its role as a critical mediator of homeostasis, NPY responds to serum leptin changes in hypothalamus. Thus, the identification of centrally mediated skeletal effects when leptin signaling changed indicated the possibility of central action of NPY and was the first investigated. [1-5].

The central actions of NPY on bone homeostasis - The tightly integrated biology of leptin and NPY inside hypothalamus made NPY earlier a candidate for the central leptin pathway in the bone. Indeed, an experiment showed that intracerebroventricular infusion of NPY in wild-type mice produced a significant reduction in spongy bone volume after the NPY viral vector specifically limited to the hypothalamus. [4-9].

This bone loss was associated with a reduction the amount of minerals (up to seven times), indicating an inhibition of osteoblastic activity on the cortical and spongy surfaces, without a

modification in the number of osteoblasts or markers of bone resorption. In hypothalamus, NPY acts to trigger responses to starvation; these include increased food consumption and reduced energy expenditure. Thus, the continuous production of NPY by the viral construct is perceived inside hypothalamus as a marker of significant calorie deprivation, which triggers responses to hunger. [10-13].

As a result, overexpression of NPY in mice led to a 60% increase in body weight over 3 weeks, while bone mass (such as the tibia) was significantly reduced. This result highlights the strong interactions between central perceptions of nutritional status, such as increased NPY expression and bone mass maintenance. Consistent with the central role of NPY in inhibiting osteoblast activity, NPY-null mice show skeletal bone growth. This increased bone mass results from an increase of mineral storage rate in the cortical and spongy surfaces. This increase in osteoblastic activity is supported by increased expression of osteogenic bone transcription factor, RUNX2 and Osterix in the bone of NPY-null mice [14-16].

## References:

1. Popescu SM, et al. Rev Chim (Bucharest) 2019;70:1439
2. Dăguci L, et al. Rom J Morphol Embryol 2020;61:1
3. Dăguci C, et al. Rom J Morphol Embryol 2014;55:401
4. Răescu M, et al. Environ Eng Manag J 2010; 9:1521
5. Voinea Georgescu, R et al. Rom J Oral Rehab 2020;12:13
6. Tonescu IG, et al. Rom J Oral Rehab 2021;13:138
7. Cenușoiu A, et al. Rom J Oral Rehab 2021;13:57
8. Stoica LE, et al. Rom J Morphol Embryol 2015;56:827
9. Pătrașcu V, et al. Rom J Morphol Embryol 2010;51:171
10. Pirici I, et al. Rom J Morphol Embryol 2014;55(Suppl 2):675
11. Nacea JG, et al. Rom J Morphol Embryol 2019;60:195
12. Dincă D, et al. Rom J Morphol Embryol 2019;60:255
13. Ștefănescu M, et al. Rom J Morphol Embryol 2017;58:1393
14. Gheorghită LM, et al. Rom J Oral Rehab 2020;12:216
15. Cotocel CC, et al. Rom J Morphol Embryol 2019;60:1053
16. Nechita D, et al. Rom J Morphol Embryol 2019;60:1059



P651

**INFECTIONS UNDER BIOTHERAPY DURING SPONDYLOARTHRITIS**R. Hassani<sup>1</sup>, M. Djennane<sup>1</sup><sup>1</sup>University Hospital Center of Tizi-ouzou, Dept. of Rheumatology, Tizi-ouzou, Algeria,

**Objective:** The use of biotherapies for almost 18 years has improved the prognosis of several inflammatory diseases especially spondyloarthritis. The tolerance of biotherapies depends on several factors including the type of molecule used and the patient's comorbidities. Infection is one of main complications of these biotherapies. This study aimed to study the profile of infectious complications occurred in patients with spondyloarthropathy receiving biological treatment (antiTNF $\alpha$ ).

**Methods:** This is a descriptive retrospective study of patients with spondyloarthropathy put under biological treatment over a period of 14 y (2005-2019). Collection of patient demographics: gender and age; spondyloarthropathy type, type of biological therapy, duration of treatment. Identify the type, specify the frequency and determine the occurrence of interval infections in biological treatment.

**Results:** Of the 209 cases included, we found 25 infections in 21 patients (10%) presented with at least one infection. They are divided into 14 men and 7 women, mean age 47 y (25 – 67 y). 19 of them had an axial spondyloarthritis, 16 mixed spondyloarthritis and one had psoriatic arthritis. The occurrence of infections was 16 cases under adalimumab, etanercept in 3 cases, 2 cases in infliximab. The patients were on biological treatment for 3.5 y on average and the infection appears after an average of 12 months (15 d - 36 months). The infection was bacterial (60%), viral (28%), fungal (12%). Infections have concerned the respiratory tract in more than half of the cases (64%) or 16 infections; integumentary apparatus in 20% of cases and less frequently the urinary and digestive systems. The treatment of infections was in all medical cases. No appeal to the final adoption of biological treatment.

**Conclusion:** Our series confirms the susceptibility of patients on biological therapy to infections. Official infectious agents are primarily and essentially opportunistic bacterial origin, dominated by lung infections including tuberculosis and second skin infections. Decrease the risk of infection through stock pre-systematic therapy and doctor-patient vigilance imperative during treatment.

P652

**DELAYED PERIAPICAL HEALING IN PATIENTS WITH ENDOCRINE DISEASES**M.-J. Tuculina<sup>1</sup>, S.-A. Preda<sup>2</sup>, L.-E. Stoica<sup>3</sup>, M.-R. Mitroi<sup>4</sup>, G. Mitroi<sup>5</sup><sup>1</sup>University of Medicine & Pharmacy of Craiova, Faculty of Dental Medicine, <sup>2</sup>University of Medicine & Pharmacy of Craiova, Faculty of Dental Medicine, <sup>3</sup>University of Medicine & Pharmacy Craiova, Dept. of Dermatology Clinic, <sup>4</sup>University of Medicine & Pharmacy, Dept. of Otorhinolaryngology, <sup>5</sup>University of Medicine & Pharmacy, Dept. of Urology, Craiova, Romania

**Objective:** To highlight the coronaradicular and periodontal modifications that may occur over time in teeth that have undergone a history of endodontic treatment, and the identification of various risk factors that contribute to the healing of periapical lesions. Among the factors incriminated in the delayed healing of periapical lesions we can note the presence of endocrine diseases and diabetes [1-7].

**Methods:** In order to follow the dental and periodontal modifications of the teeth that underwent an endodontic treatment, a retrospective study was performed. Were analyzed 320 retroalveolar, isometric, orthoradial radiographs. Radiographs were analyzed by negatoscope. The teeth on these radiographs were divided into two groups. Group 1 includes 210 teeth in patients with endocrine diseases and diabetes, who have endodontic treatments, with a total of 306 channels. The radiographs were performed 6 months to 3 y after the canal fillings. Group 2 includes 110 teeth, with endodontic treatment, in patients without endocrine disorders.

The teeth from both groups were evaluated in terms of coronaroot and apical periodontium modifications. During the coronaradicular modifications we followed the coronaradicular fractures, the caries recurrences and the secondary caries, the radicular resorptions. In the apical periodontium changes we referred to the presence of widening of the periradicular space in a cap form (radiological image of chronic fibrous apical periodontitis), the presence of granulomas and cysts. Conventionally, the radiolucency image over 0.5 cm was considered a cyst, and below 0.5 cm granuloma. On the other hand, we also analyzed the correctness of the root fillings, with reference to their length and tightness. The canal obturation was considered incomplete if it ended more than 2 mm from the radiological apex, correct, at 0-2 mm from the radiological apex or with excess if the obturator material passed beyond the radiological apex (according to the criteria of the European Society of Endodontics). The root filling was considered tight if it had a uniform density, without porosity and free spaces.

**Results:** The dental status of endodontically treated teeth was both dental restoration by filling and prosthetic restoration by metal-ceramic microprostheses. In terms of the frequency of secondary caries, the difference between the two groups is not significant. Also, the coronar fracture did not show a significant

difference in the two groups. With a significant difference, it was found that periapical healing was much delayed in patients with endocrine disorders, but also diabetes.

**Conclusion:** The number of endodontically treated teeth that require endodontic reintervention is high. The quality level of endodontic treatments is low. The frequency of chronic apical periodontitis in teeth with endodontic treatment is high. Periapical healing has been delayed in teeth of patients with endocrine disorders. [8-16].

#### References:

1. Popescu SM, et al. Rev Chim (Bucharest) 2019;70:1439
2. Dăguci L, et al. Rom J Morphol Embryol 2020;61:1
3. Dăguci C, et al. Rom J Morphol Embryol 2014;55:401
4. Răescu M, et al. Environ Eng Manag J 2010; 9:1521
5. Voinea Georgescu, R et al. Rom J Oral Rehab 2020;12:13
6. Tonescu IG, et al. Rom J Oral Rehab 2021;13:138
7. Cenușoiu A, et al. Rom J Oral Rehab 2021;13:57
8. Stoica LE, et al. Rom J Morphol Embryol 2015;56:827
9. Pătrașcu V, et al. Rom J Morphol Embryol 2010;51:171
10. Pirici I, et al. Rom J Morphol Embryol 2014;55(Suppl 2):675
11. Nacea JG, et al. Rom J Morphol Embryol 2019;60:195
12. Dincă D, et al. Rom J Morphol Embryol 2019;60:255
13. Ștefănescu M, et al. Rom J Morphol Embryol 2017;58:1393
14. Gheorghită LM, et al. Rom J Oral Rehab 2020;12:216
15. Cotocel CC, et al. Rom J Morphol Embryol 2019;60:1053
16. Nechita D, et al. Rom J Morphol Embryol 2019;60:1059

P653

### THE PREVALENCE OF NECARIOUS CAVITY LESIONS ON PATIENTS WITH ENDOCRINE DISEASES

M.-J. Țuculina<sup>1</sup>, S.-A. Preda<sup>2</sup>, L.-E. Stoica<sup>3</sup>, G. Mitroi<sup>4</sup>, M.-R. Mitroi<sup>5</sup>

<sup>1</sup>University of Medicine & Pharmacy of Craiova, Faculty of Dental Medicine, <sup>2</sup>University of Medicine & Pharmacy of Craiova, Faculty of Dental Medicine, <sup>3</sup>University of Medicine & Pharmacy Craiova, Dept. of Dermatology Clinic, <sup>4</sup>University of Medicine & Pharmacy, Dept. of Urology, <sup>5</sup>University of Medicine & Pharmacy, Dept. of Otorhinolaryngology, Craiova, Romania

The loss of hard dental tissue in the absence of bacterial action is a multifactorial condition that causes dental wear, with one of its known forms of attrition, erosion or abrasion. Attrition is a physiological dental wear, caused by direct contact between the teeth,

abrasion is wear caused by a mechanical/frictional process, and erosion is the dissolution of the tooth caused by a chemical process. [1-7].

In our study, there was an increased prevalence of gastroesophageal reflux disease in patients with endocrine diseases. As a result of gastroesophageal reflux, the teeth are continuously subjected to an acid action that causes a marked erosion of the tooth surfaces. [6-9].

We also noticed an increased prevalence of damage to the occlusal surfaces, as well as the teeth in the lateral area, characteristic of gastroesophageal reflux.

Erosive dental lesions were characterized either by a loss of surface gloss highlighted in clean and dry enamel, or by the appearance of typical yellow areas on the tooth surface, caused by exposure of the dentin underlying the enamel thinned by the action of acids. [10-14].

The management of these teeth involved coronary restoration with composite fillings, but also devitalization of teeth with increased hypersensitivity, followed by a prosthetic restoration.

#### References:

1. Popescu SM, et al. Rev Chim (Bucharest) 2019;70:1439
2. Dăguci L, et al. Rom J Morphol Embryol 2020;61:1
3. Dăguci C, et al. Rom J Morphol Embryol 2014;55:401
4. Răescu M, et al. Environ Eng Manag J 2010; 9:1521
5. Voinea Georgescu, R et al. Rom J Oral Rehab 2020;12:13
6. Tonescu IG, et al. Rom J Oral Rehab 2021;13:138
7. Cenușoiu A, et al. Rom J Oral Rehab 2021;13:57
8. Stoica LE, et al. Rom J Morphol Embryol 2015;56:827
9. Pătrașcu V, et al. Rom J Morphol Embryol 2010;51:171
10. Pirici I, et al. Rom J Morphol Embryol 2014;55(Suppl 2):675
11. Nacea JG, et al. Rom J Morphol Embryol 2019;60:195
12. Dincă D, et al. Rom J Morphol Embryol 2019;60:255
13. Ștefănescu M, et al. Rom J Morphol Embryol 2017;58:1393
14. Harza M, et al. Rom J Morphol Embryol 2014;55:123

P654

**HORMONAL FACTORS, RISK FACTORS IN THE APPEARANCE OF BRUXISM**M.-J. Țuculina<sup>1</sup>, S.-A. Preda<sup>2</sup>, G. Mitroi<sup>3</sup>, M.-R. Mitroi<sup>4</sup>, L.-E. Stoica<sup>5</sup>

<sup>1</sup>University of Medicine & Pharmacy of Craiova, Faculty of Dental Medicine, <sup>2</sup>University of Medicine & Pharmacy of Craiova, Faculty of Dental Medicine, <sup>3</sup>University of Medicine & Pharmacy, Dept. of Urology, <sup>4</sup>University of Medicine & Pharmacy, Dept. of Otorhinolaryngology, <sup>5</sup>University of Medicine & Pharmacy Craiova, Dept. of Dermatology Clinic, Craiova, Romania

**Objective:** The etiology of bruxism is not fully known, most likely involving many factors in the mechanism of production. The risk factors are complex in nature, initially being incriminated morphological factors (occlusion modifications with premature occlusal contacts or occlusal interferences in maximum intercuspation). However, depressive states, vitamin D deficiencies or hormonal modifications can influence the appearance and treatment of bruxism. [1-5]. The management of bruxism involves a multidisciplinary effort, based on the causal factors identification and the application of a targeted therapy, taking into account as many aspects of each individual. Among management possibilities is included occlusal adjustments (coronoplasty), orthodontic interventions (performed with occlusal splints, correction of malocclusions), restorative treatment (pulp therapy followed by coverage crowns), psychotherapy (due to frequent association with stress and depression), physiotherapy (when muscle pain and stiffness are associated), drugs (anti-anxiety agents, sedatives, tranquilizers, muscle relaxants), biofeedback (to lower muscle tension), electrical methods (electrogalvanic stimulation), behavioral changes. [4-9].

**Methods:** The study included a number of 146 patients with various hormonal disorders and 62 patients with vitamin D deficiency. The patients were consulted in a dental office during 2017-2020. Patients also benefited from an ENT, neurological, ophthalmological consultation.

**Results:** The oro-dental clinical examination highlighted the characteristic dental facets of wear, pain of the lifting muscles of the mandible, muscle tension, myofascial pain, clicks at the temporomandibular joint, trismus. ENT clinical examination showed an increased frequency of patients with tinnitus, ear pain, ear infections or apnea. From a neurological point of view, bruxism determined the appearance of constant headache, temporary pain, insomnia, with the consequent presence of anxiety, depression, vertigo and stress. Patients with bruxism showed hypersensitivity to light, orbital or periorbital pain, but also difficulty accommodating vision.

**Conclusion:** Hormonal factors and vitamin D deficiency can cause significant modifications in the body, which causes a combination of factors that promote the appearance of bruxism. [10-13].

**References:**

1. Răescu M, et al. Environ Eng Manag J 2010; 9:1521
2. Andreescu CF, et al. Rom J Morphol Embryol 2013;54(Suppl 3):811
3. Bechir ES, et al. Mater Plast 2019;56:964
4. Bechir ES, et al Rev Chim (Bucharest) 2019;70:3176
5. Bechir ES, et al Rev Chim (Bucharest) 2018;69:3565
6. Bătăiosu M, et al. Rom J Morphol Embryol 2015;56:77
7. Stoica LE, et al. Rom J Morphol Embryol 2015;56:827
8. Pătrașcu V, et al. Rom J Morphol Embryol 2010;51:171
9. Pirici I, et al. Rom J Morphol Embryol 2014;55(Suppl 2):675
10. Nacea JG, et al. Rom J Morphol Embryol 2019;60:195
11. Dincă D, et al. Rom J Morphol Embryol 2019;60:255
12. Ștefănescu M, et al. Rom J Morphol Embryol 2017;58:1393
13. Harza M, et al. Rom J Morphol Embryol 2014;55:123

P655

**COMPARISON OF THE INFLUENCE OF THE DISEASE ACTIVITY INDICES AND ULTRASOUND SIGNS ON RADIOLOGICAL PROGRESSION IN PATIENTS WITH RHEUMATOID ARTHRITIS**A. Volkov<sup>1</sup>, O. Alekseeva<sup>1</sup>, A. Smirnov<sup>1</sup>, A. Demina<sup>1</sup><sup>1</sup>Nasonova Research Institute of Rheumatology, Moscow, Russia

**Objective:** Rheumatoid arthritis (RA) is the most common chronic inflammatory arthritis. Its prognosis has improved substantially due to the appearance of biological therapies, and especially due to the improvement in the strategy and management of the disease. The goal in RA should be to achieve remission, as it is widely accepted, would prevent structural and functional damage. There is some debate and controversy as there are different opinions on the influence of disease activity used indexes, both clinical and by ultrasonography, on radiological progression. This study aimed to compare the influence of disease activity by indices (DAS28, SDAI, and CDAI) and ultrasound signs (greyscale (GS) and presents of power Doppler (PD) signal) on radiological progression in patients with rheumatoid arthritis

**Methods:** 85 RA pts, mean age 53,0 [44,0; 61,0] y, mean disease duration 8 [4; 24] months were treated by treat-to-target concept. After the first year of therapy, management was following real clinical practice rules until the termination of the study (4 y FUP). The wrist, MCP2 and MCP3, PIP2, PIP3, MTP2, and MTP5 joints of the clinically dominant side were examined by US (GS and PD). Clinical, laboratory parameters, and US examination were performed at baseline, at Mo 3, 6, 9, and 12. The X-ray was conducted before treatment, at 12 Mo, and the end of the study. Structural damage progression was evaluated by change in the Sharp van der Heijde score (its subcomponents, the erosion score) between baseline and 4 y. The effect of clinical indices and ultrasound signs de-

terminated at different follow-up times on radiological progression was analyzed. Descriptive statistical methods and the Cox regression model were used.

**Results:** 13% of patients had radiological progression by the first year of follow-up, 39% by the fourth year. Cox regression model showed that clinical disease activity accordingly DAS28 and SDAI at 3 months, associated with 4-y X-ray progression (HR 1.28 (95%CI 1.01-1.63),  $p=0.04$ , and 1.02 (95%CI 1.00-1.05),  $p=0.04$ , respectively). Ultrasound signs (GS, PD, and their combinations) had no independent predictor value. Ultrasound signs only in combination with clinical and laboratory signs had such an effect. Presence of activity according to PD at the baseline (HR 3.68 (95%CI 1.03-13.15), with SJC at the 9th month (HR 1.14 (95%CI 0.98-1.35) and ESR at the 6 months (HR 1.04 (95%CI 1.02-1.07) of follow up increase the chance of detecting progression. This model demonstrated acceptable significance:  $R^2=0.60$ .

**Conclusion:** Thus, PD-synovitis with other US parameters had no independent predictor value. PD-synovitis with other parameters (clinical and laboratory) along with activity indices has a prognostic value for increasing destructive radiographic changes in patients with rheumatoid arthritis.

## P656

### STUDY ON THE INFLUENCE OF HORMONAL FACTORS AND SYSTEMIC OSTEOPOROSIS IN PERIODONTAL DISEASE PROGRESSION IN POSTMENOPAUSAL WOMEN

M.-J. Țuculina<sup>1</sup>, S.-A. Preda<sup>2</sup>, G. Mitroi<sup>3</sup>, M.-R. Mitroi<sup>4</sup>, L.-E. Stoica<sup>5</sup>

<sup>1</sup>University of Medicine & Pharmacy of Craiova, Faculty of Dental Medicine, <sup>2</sup>University of Medicine & Pharmacy of Craiova, Faculty of Dental Medicine, <sup>3</sup>University of Medicine & Pharmacy, Dept. of Urology, <sup>4</sup>University of Medicine & Pharmacy, Dept. of Otorhinolaryngology, <sup>5</sup>University of Medicine & Pharmacy Craiova, Dept. of Dermatology Clinic, Craiova, Romania

**Objective:** The analyzing of the hypothesis that in marginal periodontitis general systemic factors play an important role, such as osteoporosis (PO), the most common being the postmenopausal [1-6].

**Methods:** The primary diagnosis of periodontal disease is based on clinical examination, but also on radiological examination. The cases included in the study were selected and monitored by the Endocrinology Outpatient Clinic and the private dental office during 2016-2019. The study was performed on 25 patients, with age between 45-79 y. These patients were divided into two groups: a group with osteoporosis and periodontitis (14 patients) and a control group without osteoporosis and periodontitis (11 patients).

**Results:** Our study proved that there are clinical and etiopathogenetic correlations between osteoporosis and altered marginal periodontium, the presence of osteoporosis inducing severe forms of periodontitis, the most common form being destructive periodontal disease. The clinical study showed a shiny, dry, pale or erythematous gum with bleeding at touch. Radiological examination revealed a representative loss of alveolar bone.

**Conclusion:** Hormonal modifications on postmenopausal women are involved in the onset and evolution of periodontal disease [7-11].

#### References:

1. Bechir ES, et al. Rev Chim (Bucharest) 2019;70:3176
2. Dăguci L, et al. Rom J Morphol Embryol 2020;61:449
3. Bechir ES, et al. Mater Plast 2019;56:964
4. Bechir ES, et al. Rev Chim (Bucharest) 2019;70:3176
5. Bechir ES, et al. Rev Chim (Bucharest) 2018;69:3565
6. Bătăiosu M, et al. Rom J Morphol Embryol 2015;56:77
7. Pirici I, et al. Rom J Morphol Embryol 2014;55(Suppl 2):675
8. Nacea JG, et al. Rom J Morphol Embryol 2019;60:195
9. Dincă D, et al. Rom J Morphol Embryol 2019;60:255
10. Ștefănescu M, et al. Rom J Morphol Embryol 2017;58:1393
11. Harza M, et al. Rom J Morphol Embryol 2014;55:123

## P657

### LONG TERM SYSTEMIC CORTICOSTEROID EXPOSURE: ADVERSE EFFECTS

L.-E. Stoica<sup>1</sup>, M.-J. Țuculina<sup>2</sup>, M.-R. Mitroi<sup>3</sup>, G. Mitroi<sup>4</sup>, S.-A. Preda<sup>5</sup>

<sup>1</sup>University of Medicine & Pharmacy Craiova, Dept. of Dermatology Clinic, <sup>2</sup>University of Medicine & Pharmacy of Craiova, Faculty of Dental Medicine, <sup>3</sup>University of Medicine & Pharmacy, Dept. of Otorhinolaryngology, <sup>4</sup>University of Medicine & Pharmacy, Dept. of Urology, <sup>5</sup>University of Medicine & Pharmacy of Craiova, Faculty of Dental Medicine, Craiova, Romania

The use of systemic corticosteroids represents a common practice worldwide for the treatment of autoimmune diseases, including skin conditions. However, the potential benefits of these medications are offset by side effects that may occur after long-term use. Among the dermatological diseases, we mention pemphigus vulgaris, the most common and serious form of pemphigus. The classic skin rash consists of the presence of large blisters, containing a serocitrin liquid, located on the apparently healthy skin, without being preceded or accompanied by annoying subjective symptoms. The appearance at the beginning is monomorphic, the blisters converge, and later they break leaving large denuded areas. Subsequently, the appearance of the eruption becomes polymorphic, as the blisters are in different stages of evolution [1-3]. In



the absence of treatment, the rash tends to generalize, the general condition of the patient worsens, associated with rapid weight loss, even cachexia, digestive disorders, fever and even death in less than a year. The main objectives of treatment are to stop the evolution of the disease, the healing of skin and mucous lesions. Subsequently, the goal is to prevent relapses and avoid side effects that may occur following systemic corticosteroid therapy. We will present the most common side effects following systemic corticosteroid therapy according to data from current literature, along with their management strategies. Systemic corticosteroid therapy currently remains the gold standard for the treatment of pemphigus vulgaris. The limitations of this therapeutic strategy are the common side effects, especially the negative impact on the bone, the treatment itself being a source of complications. Finding a replacement agent for long-term corticosteroid therapy remains a controversial topic in the literature [4,5].

#### References:

1. Pirici I, et al. Rom J Morphol Embryol 2014;55(Suppl 2):675
2. Nacea JG, et al. Rom J Morphol Embryol 2019;60:195
3. Dincă D, et al. Rom J Morphol Embryol 2019;60:255
4. Ștefănescu M, et al. Rom J Morphol Embryol 2017;58:1393
5. Harza, M, et al. Rom J Morphol Embryol 2014;55:123

## P658

### SUBCHONDRAL BONE MINERAL DENSITY IN SUBJECTS WITH KNEE OSTEOARTHRITIS

N. Grygorieva<sup>1</sup>, N. Zaverukha<sup>1</sup>, M. Bystrytska<sup>1</sup>, V. Povoroznyuk<sup>1</sup>

<sup>1</sup>D. F. Chebotarev Institute of Gerontology NAMS of Ukraine, Kyiv, Ukraine

**Objective:** For a long period of time osteoarthritis (OA) was known as a primary disorder of articular cartilage, however more animal and human studies confirm the importance of changes in the subchondral bone structure. Development and progression of OA are associated with the increased subchondral bone remodeling manifested by the changes in BMD. The aim to study the subchondral BMD in patients with knee osteoarthritis (KOA).

**Methods:** 48 women aged 48-76 y were included being divided into two groups: 1<sup>st</sup> one of the subjects without OA of any localization or any other illnesses or conditions that may influence the bone (control group, n=24, average age 63.21±7.23 y), and 2<sup>nd</sup> group of patients with KOA (n=24, average age 62.40±7.26 y, Kellgren-Lawrence grades II-III). The women from both groups did not differ significantly in main anthropometrical parameters and postmenopausal period duration. BMD of the total body was measured using DXA. Subchondral BMD was analyzed on the areas of the proximal tibia and distal femur by regional measurements.

**Results:** Our study showed significantly lower BMD on affected with KOA compared to the intact lower extremity (LE) in patients with KOA (0.897±0.103 vs. 0.928±0.087 g/cm<sup>2</sup>, p<0.05) however, in the control group there were no differences between right and left LE. In patients with KOA, the BMD of the intact LE did not differ from the control group at the same time BMD of the affected lower extremity was by 11.1% lower (0.897±0.103 vs. 0.997±0.132 g/cm<sup>2</sup>, p<0.05) compared to BMD of the lower extremity from the control group.

In patients with KOA, the subchondral distal femoral and proximal tibia BMD was significantly lower on affected LE (0.735±0.119 vs. 0.765±0.101 g/cm<sup>2</sup>, p<0.05, and 0.746±0.129 vs. 0.802±0.121 g/cm<sup>2</sup>, p<0.05, respectively) unlike the control group where was no differences detected. The difference was more pronounced at the level of the proximal tibia and was equal to 7.5%.

**Conclusion:** The current study showed significant differences in LE BMD and subchondral BMD of the proximal tibia/distal femur between affected and intact LE in the patients with KOA that reflect the important changes in bone mineral parameters.

## P659

### PSEUDOTUMORAL SWELLING OF THE RIGHT SHOULDER RELATED TO RHEUMATOID SYNOVITIS

S. Yanis<sup>1</sup>, H. Houda<sup>1</sup>, C. Hayet<sup>2</sup>, B. Ryma<sup>1</sup>, D. Chafia<sup>1</sup>

<sup>1</sup>Rheumatology Dept. Mohamed Lamine Debaghine Hospital,

<sup>2</sup>Orthopedic Dept. Djilali Bounaama Hospital, Alger, Algeria

**Objective:** Rheumatoid synovitis is an inflammation of the synovial membrane, often found in rheumatoid arthritis (RA), the management of which has been improved since the advent of biotherapy and new therapeutic strategies. However, certain clinical forms are potentially confused with osteoarthritis or a tumoral condition. In this case, we report a particular form of pseudo-tumoral synovitis of the shoulder in a patient with RA.

**Case report:** Mr B.F., 50 years old, has had rheumatoid arthritis for 15 y, treated by methotrexate at 15 mg/week with partial response. The patient presented with synovial hypertrophies affecting several joints (MCP, PPI, wrists and ankles) for which he underwent surgical management (synovectomies and tenosynovectomies). Clinical examination found a significant painful swelling on the anterior part of the right shoulder with limitation of movements, we note the presence of several surgical scars on the hands, wrists and ankles. General examination: no lymphadenopathy, no obvious infection or general signs. The biological assessment: without abnormalities, ESR=25 mmh<sup>1</sup>, CRP=14 mg/. The right shoulder X-ray: thickening of the soft parts next to the shoulder. Ultrasound of the right shoulder shows a heterogeneous mass measuring 35/173/154 mm corresponding to inactive synovitis. MRI of the right shoulder: significant hypertrophy of the synovium within the bursa under acromio deltoid in the form of

hypertrophy of the synovial villi largely filling the lumen of the bursa giving an enlargement of the latter (35/173/154mm). The patient was referred to surgery for total synovectomy for which the histological study found an inflammatory infiltrate (lymphocytes, plasma cells, polynuclear neutrophils and monocytes) placed on a background of fibrin organized in the form of a body of rice. in connection with rheumatoid arthritis.

**Conclusion:** This observation highlights a particular form of synovitis seen during RA (pseudotumoral form) requiring surgical management.

P660

### PEMPHIGUS VULGARIS: CASE REPORT

L.-E. Stoica<sup>1</sup>, M.-J. Ţuculina<sup>2</sup>, M.-R. Mitroi<sup>3</sup>, G. Mitroi<sup>4</sup>, S.-A. Preda<sup>5</sup>

<sup>1</sup>University of Medicine & Pharmacy Craiova, Dept. of Dermatology Clinic, <sup>2</sup>University of Medicine & Pharmacy of Craiova, Faculty of Dental Medicine, <sup>3</sup>University of Medicine & Pharmacy, Dept. of Otorhinolaryngology, <sup>4</sup>University of Medicine & Pharmacy, Dept. of Urology, <sup>5</sup>University of Medicine & Pharmacy of Craiova, Faculty of Dental Medicine, Craiova, Romania

Pemphiguses are autoimmune bullous diseases that result from the alteration and disappearance of interkeratinocytic cohesion following the action of autoantibodies on desmosomes. Pemphigus vulgaris is the most common and most serious form of pemphigus. It affects both sexes equally and is common, especially in people aged 50-70 y, but can begin at any age. The etiopathogenesis of pemphigus is a complicated process still under study [1-4].

We will present the clinical case of a 64-year-old patient who was hospitalized in the Craiova Dermatovenereology Clinic in June 2020 for a polymorphic itchy, painful rash consisting of multiple erosions and crusts, located on the scalp, back and submammary regions. The first presentation of the patient was in 2014, with multiple large bullous lesions, crusts and postbullous erosions spread throughout the body. Following the histopathological examination, the diagnosis of pemphigus vulgaris was established. The patient underwent treatment with methylprednisolone 250 mg/d, for 3 d, with good clinical response. Subsequently, the dose was progressively reduced to 8 mg/d as maintenance treatment. Over time, the patient suffered numerous relapses despite systemic corticosteroid therapy, relapses that received the same treatment with the progressive decrease of the dose as at the initial hospitalization. During this period (2014-2020) the patient developed asthma (2014), type 2 diabetes (2017), cataracts (2018), osteoporosis (2019) following systemic corticosteroid therapy. To be mentioned, the patient suffered from primary hypertension (2008) and glaucoma (2013). In 2020, a new episode of recurrence with rapid spread of lesions, and due to comorbidities it was no longer possible to use pulse-corticotherapy. Methotrexate 10 mg prefilled syringe was administered (3 administrations, 1 ad-

ministration/week), with a favorable outcome. After this episode, the patient continued with the maintenance dose of 8 mg oral methylprednisolone/d.

Pemphigus vulgaris, requires long-term, low-dose corticosteroid therapy. Despite the low doses, the negative impact on patients persists. Moreover, in the case of these autoimmune diseases, where treatment options are limited, these treatment strategies appear to be ineffective. Thus, the risk/benefit ratio should be considered when approaching a systemic corticosteroid regimen and other therapeutic options are worth trying [5-6].

#### References:

1. Stoica LE, et al. Rom J Morphol Embryol 2015;56:827
2. Pătraşcu V, et al. Rom J Morphol Embryol 2010;51:171
3. Pirici I, et al. Rom J Morphol Embryol 2014;55(Suppl 2):675
4. Nacea JG, et al. Rom J Morphol Embryol 2019;60:195
5. Dincă D, et al. Rom J Morphol Embryol 2019;60:255
6. Ştefănescu M, et al. Rom J Morphol Embryol 2017;58:1393

P661

### HIGH TIBIAL OSTEOTOMY BY HEMICALLOTASIS USING DYNAMIC AXIAL FIXATOR: RADIOLOGICAL PRECISION AND FUNCTIONAL OUTCOME

V. Khanna<sup>1</sup>, M. Parihar<sup>2</sup>, A. Yadav<sup>3</sup>

<sup>1</sup>Dept. of Orthopaedics, Kailash Hospital, Khurja, <sup>2</sup>Dept. of Orthopaedics, Mangal Anand Hospital, Mumbai, <sup>3</sup>Dept. Of Orthopaedics, Grant Medical College & Sir JJ Group Of Hospital, Mumbai, India

**Objective:** Medial compartment osteoarthritis (OA) of the knee has been seen as the initial stage of OA in the majority of cases. Isolated cases of medial compartment OA do not warrant extensive surgery such as Total knee replacement but rather high tibial osteotomies. Conventional techniques using internal fixation may lead to overcorrection due to the dynamic component of malalignment. The long-term functional outcome following surgery depends on the precision of correction of alignment. This study has assessed the precision of correction of alignment using dynamic axial fixator along with a 3 y functional follow-up.

**Methods:** We report the outcome of 45 patients (50 knees) who underwent hemicallotasis with a dynamic axial fixator for medial compartment OA of the knee. The radiological assessment was done with the help of the hip-knee-ankle (HKA) angle. The functional scoring was done via IKDC, Oxford knee score, WOMAC, and KOOS score.

**Results:** The mean follow-up was 3 y. Preoperatively mean HKA angle was  $173 \pm 3^\circ$ , whereas postoperative mean HKA angle was  $184 \pm 3^\circ$ . Target correction of HKA angle was achieved in 45 of 50 patients (90%). Whereas, there was under correction in 3 patients

(6%) and overcorrection in 2 (4%) patients. There was a significant improvement in the postoperative functional score as compared to the preoperative scoring. A positive correlation was seen between the HKA angle and the functional scores. Complications like superficial pin tract infection were seen in 3 (6%) patients, deep infection in 1 (2%), and early union of osteotomy in 1 (2%) patient leading to undercorrection.

**Conclusion:** Precision is of utmost importance while correcting the alignment in HTO. The presence of a dynamic component of malalignment may lead to suboptimal alignment postoperatively. The use of a dynamic axial fixator helps in achieving calculated correction with low complication rates along with no residual implant in the knee postcorrection.

P662

### CHARACTERISTICS OF IMBALANCE OF ANTIENDOTOXIN IMMUNITY IN PATIENTS WITH SYSTEMIC LUPUS ERYTHEMATOSUS AND ITS INFLUENCE ON PERSISTENT SYSTEMIC INFLAMMATION

D. Shaduro<sup>1</sup>, V. Beloglazov<sup>2</sup>, V. Kaliberdenko<sup>1</sup>, S. Kulanthaivel<sup>3</sup>, K. Balasundaram<sup>4</sup>, K. Ostrovskyy<sup>5</sup>

<sup>1</sup>Dept. of Internal Medicine No.2, V.I. Vernadsky Crimean Federal University, Simferopol, Russia, <sup>2</sup>Dept. of Internal Medicine No.2, V.I. Vernadsky Crimean Federal University, Simferopol, Russia, <sup>3</sup>Divisional Health (Zone-6, Division-67), Greater Chennai Corporation - Public Health and Medical Services Dept., Chennai, India, <sup>4</sup>Dept. of Internal medicine No.2, V.I. Vernadsky Crimean Federal University, Simferopol, Russia, <sup>5</sup>Pharmaceutical Product Development, Warsaw, Poland

**Objective:** Systemic lupus erythematosus (SLE) is one of the most severe autoimmune inflammatory diseases of the connective tissue which causes mortality. This study aimed to study the imbalance of antiendotoxin immunity in patients with SLE and its influence on the persistent systemic inflammation

**Methods:** We have examined 48 patients who were diagnosed with SLE I-II degree with an average age of 36.4±1.8 y. And control group consisted of 40 healthy volunteers. According to the degree of disease activity patients were divided into two groups: I degree- 41.7%, II degree - 58.3%. The study of blood samples was carried out by means of blood cold chain and antiendotoxin antibody of classes A, M and G (anti-LPS-IgA, anti-LPS-IgM and anti-LPS-IgG respectively) was determined by ELISA. The amount of C-reactive protein (CRP) in the blood serum was determined by "sandwich" variant ELISA using biotin streptavidin system of signal amplification. To estimate the amount of endogenous intoxication (EI) we determined the average weight molecules which were evaluated by the ultraviolet absorption spectrum in protein-free fractions of blood serum. Circulating immune complexes (CIC) were determined by precipitation method in 4.2% solution of polyethylene glycol.

**Results:** Patients with SLE demonstrated a drastic increase in titer of specific anti-LPS-IgG index and EI, on the background values of the normative anti-LPS-IgA and IgM, which indicate the chronic endotoxic aggression. The observed correlations between specific anti-LPS-IgG on the one hand and CRP and CIC on the other hand, confirm the association of imbalance of antiendotoxin immunity to systemic inflammation in patients with SLE. So we can assume that the imbalance of humoral antiendotoxin immunity has a significant role in maintenance of autoimmune lupus inflammation. The high levels of CIC, CRP, molecular average weight (EI) are the combined results of both autoimmune process and endotoxemia which contribute to the target organ damage which worsens the clinical course of SLE.

**Conclusion:** Elimination of LPS, the normalization of the intestinal bioflora and strengthening the barrier function of the mucous membranes is a new priority and pathogenetically recommended direction in treating SLE.

P663

### FRACTURE RATES AND ECONOMIC OUTCOMES BY AGE GROUPS IN PATIENTS WITH OSTEOPOROSIS RECEIVING RISEDRONATE GASTRO-RESISTANT (GR) VS. IMMEDIATE RELEASE BISPHOSPHONATES (IRB): A CLAIMS DATA ANALYSIS

F. Thomasius<sup>1</sup>, S. Palacios<sup>2</sup>, A. Alam<sup>3</sup>, M. Boolell<sup>3</sup>, F. Vekeman<sup>4</sup>, G. Gauthier<sup>4</sup>

<sup>1</sup>Frankfurter Hormon und Osteoporosezentrum, Frankfurt, Germany, <sup>2</sup>Palacios' Institute of Women's Health, Madrid, Spain, <sup>3</sup>Theramex, London, UK, <sup>4</sup>STATLOG, Montreal, Canada

**Objective:** To compare fracture rates and economic outcomes between women with osteoporosis treated with risedronate GR vs. IRB. Risedronate GR can be taken with food and has a higher oral bioavailability<sup>†</sup> than IRB.

**Methods:** Women with osteoporosis were selected from a large US claims database (2009-2019). The index date was the first dispensing date for an oral bisphosphonate. Patients were classified into the GR or IRB cohort based on the treatment initiated on that date and matched 1:1 based on demographic and clinical characteristics. Patients were observed for ≥2 y following the index date. Incidence rates (IRs) of fractures and healthcare resource utilization per 1000 patient-years were compared between the two cohorts using IR ratios (IRRs). Outcomes were assessed overall and by age group (< 65 y, ≥ 65 y and ≥75 y).

**Results:** The 2726 patients in each cohort (median age: 60.0 y) were observed for 4.5 y on average. The IR of fractures was significantly lower in the GR cohort vs. the IRB cohort for any fracture sites (GR: 34.65, IRB: 42.13; IRR=0.83, p<0.05) and spine fractures (GR: 10.84, IRB: 15.13; IRR=0.71, p<0.05). Results remained consistent across stratifications by age group (Table). At each

time point considered over the observation period, the rate of incident fracture was lower in the GR cohort, reaching statistical significance at 36 months (fracture rate; GR=7.08%; IRB=8.67%,  $p=0.037$ ). The IR of hospitalizations was lower in the GR vs. the IRB cohort (GR: 106.74, IRB: 124.20; IRR=0.86,  $p<0.05$ ) leading to significantly lower hospitalization costs among GR patients (average per-patient-per-year; GR: \$3,611; IRB: \$4,603,  $p<0.05$ ).

**Conclusion:** Women with osteoporosis had a lower incidence of fractures when they are treated with risedronate GR compared to IRB. These results are consistent with the hypothesis that the bioavailability and therefore the efficacy of risedronate GR is independent of food intake and is higher than IRB.

Table.

	N	IR GR	IR IRB	IRR (95%CI)
All	2,726	34.65	42.13	0.83 (0.70 - 0.97) *
< 65 y	1,896	23.69	24.37	0.96 (0.75 - 1.24)
≥ 65 y	830	58.65	80.79	0.74 (0.60 - 0.91) *
≥ 75 y	392	81.22	102.84	0.80 (0.61 - 1.05)

†Risedronate GR SmPC

\*Significant at the 5% level

**Acknowledgement:** This study was funded by Theramex

**Disclosure:** F. Thomasius has received fees for lectures and consultancy or investigator fees from Amgen, Gedeon Richter, Lilly, Hexal, Kyowa Kirin, Hologic, Novartis, Stada, Synexus, Theramex, and UCB. S. Palacios is a consultant for Pfizer, Amgen, MSD, Procare, Health, Bayer, Besins, Séréllys Shinogi, Exeltis, Gedeon Richter, Theramex, and UCB. A. Alam and M. Boelle are employees of Theramex. F. Vekeman and G. Gauthier are employees of STATLOG, Inc., which has received research funding from Theramex for this study.

## P664

### PLASMA RICH IN GROW FACTORS (PRGF) LONG TERM TREATMENT EFFECTS IN BISPHOSPHONATE-RELATED OSTEONECROSIS OF THE JAWS

A. Pătru<sup>1</sup>, E. Ciucă<sup>1</sup>, A. Boicea<sup>2</sup>, S.-A. Preda<sup>3</sup>, M.-J. Tuculina<sup>4</sup>, A. Camen<sup>1</sup>

<sup>1</sup>University of Medicine & Pharmacy Craiova, Dept. of Oral & Maxillofacial Surgery, Craiova, Romania, <sup>2</sup>University of Medicine & Pharmacy, Dept. of Medicine & Professional Diseases, <sup>3</sup>University of Medicine & Pharmacy of Craiova, Faculty of Dental Medicine, <sup>4</sup>University of Medicine & Pharmacy of Craiova, Faculty of Dental Medicine, Craiova, Romania

Prevention and treatment modalities for the patients with, or at risk of bisphosphonate-related osteonecrosis of the jaws (BRONJ) are still controversial and it have been changing over last few years. Interrupting bisphosphonate therapy does not seem to be beneficial in terms of time and can be used mostly in patient with osteoporosis. The purpose of this presentation is to evaluate the long term therapeutical effect of plasma rich in grow factors on bone healing in cases with BRONJ after 18 months observation period after teeth extraction or others oral surgery interventions. Biostimulant effects of PRGF add into bone defects reduce the healing time and local pain immediately after oral surgery. They improve the final reparative process of bone and mucosa, increase inorganic matrix of bone and osteoblast mitotic index and stimulate lymphatic and blood capillaries growth in the affected area. PRGF could be one of the modality for BRONJ treatment, being safe and well tolerated, and it permits the minimally invasive surgical treatment like teeth extraction of early stages of the disease [1-8].

#### References:

1. Mitroi M, et al. Mol Med Rep 2019;19:2792
2. Ene CG, et al. Rev Chim (Bucharest) 2019;70:2108
3. Dragoescu et al. Rom J Morphol Embryol 2017;58:1279
4. Andronesi AG, et al. Rom J Morphol Embryol 2016;57:1125
5. Ruscescu A, et al. Rev Chim (Bucharest) 2018;69:642
6. Salan AI, et al. Rom J Morphol Embryol 2018;59:839
7. Rauten AM, et al. J Immunol Res. 2016;2016:4072543
8. Stoica LE, et al. Rom J Morphol Embryol. 2015;56(Suppl 2):827



P665

**OSTEOPOROSIS IN PATIENTS WITH CHRONIC RHINOSINUSITIS AND NASAL POLYPOSIS**M.-R. Mitroi<sup>1</sup>, S.-A. Preda<sup>2</sup>, M.-J. Țuculina<sup>3</sup>, D.-M. Albulescu<sup>4</sup>, A. Căpitănescu<sup>1</sup>, G. Mitroi<sup>5</sup><sup>1</sup>University of Medicine & Pharmacy, Dept. of Otorhinolaryngology,<sup>2</sup>University of Medicine & Pharmacy of Craiova, Faculty of Dental Medicine, <sup>3</sup>University of Medicine & Pharmacy of Craiova, Faculty of Dental Medicine, <sup>4</sup>University of Medicine & Pharmacy, Dept. of Anatomy, <sup>5</sup>University of Medicine & Pharmacy, Dept. of Urology, Craiova, Romania**Objective:** To investigate the BMD in a group of patients with chronic rhinosinusitis with nasal polyposis (CRSwNP) with asthma [1-5].**Method:** 24 adult patients with a diagnosis of CRSwNP, and a history of at least one course of oral corticosteroids (OCS) during the last year, were included in this study. The BMD of the patients was measured by DXA.**Results:** During the last 12 months, the mean number of OCS courses was 1.32. According to the t-scores, 11 patients were measured to have  $\leq -1$  SD t-score lumbar spine, which is considered to be osteopenia, and 3 patients had  $< -2.5$  SD t-score, considered as osteoporosis.**Conclusions:** This study shows that one moderate course of OCS annually may be used without high risk of causing osteopenia/osteoporosis in patients with CRSwNP [6-9].**References:**

1. Mitroi M, et al. Mol Med Rep 2019;19:2792
2. Mitroi M, et al. Rom J Morphol Embryol 2011;52:1051
3. Ene CG, et al. Rev Chim (Bucharest) 2019;70:2108
4. Tsoukalas et al Metabolites 2020;10:502
5. Musat G, et al. Mol Clin Oncol 2020;12:258
6. Mitroi G, et al. Rom J Morphol Embryol 2015;56:1319
7. Andronesi AG, et al. Rom J Morphol Embryol 2016;57:1125
8. Rusescu A, et al. Rev Chim (Bucharest) 2018;69:642
9. Salan AI, et al. Rom J Morphol Embryol 2018;59:839

P666

**CHRONIC RHINOSINUSITIS WITH NASAL POLYPOSIS: NEW THERAPEUTIC APPROACHES**M.-R. Mitroi<sup>1</sup>, S.-A. Preda<sup>2</sup>, M.-J. Țuculina<sup>3</sup>, D.-M. Albulescu<sup>4</sup>, A. Căpitănescu<sup>1</sup>, G. Mitroi<sup>5</sup><sup>1</sup>University of Medicine & Pharmacy, Dept. of Otorhinolaryngology,<sup>2</sup>University of Medicine & Pharmacy of Craiova, Faculty of Dental Medicine, <sup>3</sup>University of Medicine & Pharmacy of Craiova, Faculty of Dental Medicine, <sup>4</sup>University of Medicine & Pharmacy, Dept. of Anatomy, <sup>5</sup>University of Medicine & Pharmacy, Dept. of Urology, Craiova, Romania**Objective:** Chronic rhinosinusitis associated with nasal polyposis (CRSwNP) affects 4% of the general population. As a chronic condition, it requires chronic pharmacological treatment [1-6]. Intranasal and systemic corticosteroids (CS) represent the "gold standard" treatment for CRSwNP. The present study aims to evaluate two treatment methods in CRSwNP: topical corticosteroids and antistaphylococcal vaccine.**Methods:** 28 adult patients with a diagnosis of chronic rhinosinusitis with nasal polyposis were included in this study. 14 patients received treatment with topical corticosteroid and the other 14 received antistaphylococcal vaccine. The results were evaluated at 3 and 6 months. SNOT-22 test results and nasal endoscopy were evaluated in all subjects.**Results:** The group of patients who were treated with topical corticosteroids had a notably improved score on the SNOT-22 test, as well as a better endoscopic score compared to the group that received vaccine treatment.**Conclusion:** This study shows that intranasal corticosteroids treatment in patients with chronic rhinosinusitis with nasal polyposis is more effective than administration of topical antistaphylococcal vaccine [4, 5, 7-13].**References:**

1. Mitroi M, et al. Mol Med Rep 2019;19:2792
2. Mitroi M, et al. Rom J Morphol Embryol 2011;52:1051
3. Ene CG, et al. Rev Chim (Bucharest) 2019;70:2108
4. Constantin C, et al. Rev Chim (Bucharest) 2019;70:2401
5. Musat G, et al. Mol Clin Oncol 2020;12:258
6. Enescu AS, et al. Rom J Morphol Embryol 2017;58:145
7. Harza M, et al. Rom J Morphol Embryol 2014;55:123
8. Mitroi G, et al. Rom J Morphol Embryol 2015;56:1319
9. Andronesi AG, et al. Rom J Morphol Embryol 2016;57:1125
10. Gheorghita MI, et al. Rom J Morphol Embryol 2017;58:585
11. Rusescu A, et al. Rev Chim (Bucharest) 2018;69:642
12. Salan AI, et al. Rom J Morphol Embryol 2018;59:839
13. Şurlin P, et al. Ann Anat 2018;219:51

P667

# ADVANTAGES OF STANDARDIZED PREOPERATIVE NERVE BLOCK VS. CONVENTIONAL ANALGESIA IN ELDERLY PATIENTS WITH HIP FRACTURE

C. M. Olarte<sup>1</sup>, A. M. López<sup>1</sup>, J. Tihanyi<sup>1</sup>, A. Libos<sup>1</sup>, S. Renza<sup>1</sup>, L. Ricaurte<sup>2</sup>, A. F. Patiño<sup>1</sup>, D. C. Morales<sup>1</sup>, V. Sanint<sup>1</sup>, R. F. Pesantez<sup>1</sup>, J. E. Salavarría<sup>1</sup>

<sup>1</sup>Hospital Universitario Fundación Santa Fe de Bogotá, <sup>2</sup>Hospital Infantil Universitario de San José, Bogotá, Colombia

**Objective:** To determine the advantages of preoperative nerve block vs. conventional analgesia during hospital stay in elderly patients with hip fracture. Additionally, to compare hospital opioid consumption between patients with blockade and those with conventional analgesia as well as to determine the risk factors associated with delirium.

**Methods:** A two-arm prospective cohort study was carried out with ambispective data collection in patients 65 y or older treated for a fragility fracture of the hip in two 4th level hospitals in Bogotá, Colombia.

**Results:** The study sample comprised a total of 218 patients of which 119 received conventional analgesic management and 99 fascia iliaca nerve block. There was no relationship between blockage and development of delirium, however, it was found that delirium was associated with older age ( $p=0.010$ ), admission to the ICU ( $RR=1.20$ ,  $p=0.021$ ), urinary tract infection ( $RR=2.32$ ,  $p=0.002$ ) and respiratory failure ( $RR=3.05$ ,  $p=0.001$ ). Patients without blockade presented a greater opioid consumption compared to those who received blockade (27.61 vs. 16.34 mg,  $p=0.03$ ), as well as a longer duration of surgery time (90.84 vs. 81.08 min,  $p=0.030$ ) and hospital stay (6.06 vs. 5.41 d). Additionally, it was found that the blockage acts as a protective factor to present pressure ulcers ( $RR=0.76$ ). **Conclusion:** In the present study, the cohort who received preoperative nerve block showed a lower opioid consumption, a shorter surgical time and hospital stay, which improves the outcomes of orthogeriatric management and can positively influence the functionality and future morbidity and mortality of these patients. On the other hand, delirium is an important complication in elderly patients with hip fracture that have multiple comorbidities, cognitive impairment, and severe physiological stress. In this study, the preoperative nerve block did not show a decrease in delirium, this may be associated with confounding factors due to its multifactorial etiology and the size of the sample collected.

P668

# OSTEOPOROSIS RISK ASSESSMENT USING THE IOF AND FRAX QUESTIONS AND OTHER FACTORS

A. Zayeva<sup>1</sup>, D. Shaduro<sup>1</sup>, E. Teifukova<sup>2</sup>, S. Kulanthaivel<sup>3</sup>, V. Kaliberdenko<sup>1</sup>, K. Balasundaram<sup>4</sup>

<sup>1</sup>Dept. of Internal Medicine No.2, V.I. Vernadsky Crimean Federal University, Simferopol, Russia, <sup>2</sup>Bakhchisaray Central Regional Hospital, Bakhchisaray, Russia, <sup>3</sup>Divisional Health (Zone-6, Division-67), Greater Chennai Corporation - Public Health and Medical Services Dept., Chennai, India, <sup>4</sup>Dept. of Internal medicine No.2, V.I. Vernadsky Crimean Federal University, Simferopol, Russia

**Objective:** Osteoporosis is a systemic metabolic disease of the skeleton, characterized by an increased tendency to slightly traumatic bone fractures due to a decrease in bone mass and impaired bone tissue quality [1]. Our objective was to study the data of scientific research on calciuria, to create a questionnaire for questioning healthy and sick people with the aim of preventing and treating osteoporosis, to conduct testing on patients, and to study the prevalence of risk factors for osteoporosis in the population.

**Methods:** During the survey, in addition to the basic data, patients were asked to answer the questions of the International Osteoporosis Foundation (IOF) and fracture risk assessment tool (FRAX), and the author's questionnaire was also presented to identify other factors. 100 patients were interviewed and their average age were  $63 \pm 25$  y.

**Results:** As a result of the survey, it was found that all respondents are at risk by at least one criterion. 50% of the respondents noted a history of pathological fractures, 25% took glucocorticoids in high concentrations, and 11% suffered from rheumatoid arthritis, which significantly affects the condition of the bones. Also, among women, a high risk of postmenopausal osteoporosis was noted, as one in five women reported early onset of menopause, interruptions in the menstrual cycle for more than 12 months, and removal of appendages during their lifetime. Separate attention should be paid to the identification of a strong positive correlation ( $R=0.901$ ;  $P<0.001$ ) between the fracture suffered and regular walks or vitamin D intake with a low average value of the second indicator.

**Conclusion:** It may be advisable to identify a large risk group using an IOF survey, and then offer a BMD study and, therefore, a FRAX questionnaire. The questionnaire we have developed allows us to expand the range of identifying risk factors for osteoporosis and to identify high-risk groups for early initiation of preventive measures.

**Reference:** 1. Popova-Petrosyan EV, et al. Current Women's Health Reviews 2020;16:26

P669

### THE IMPACT OF POSTOPERATIVE HYPOPARATHYROIDISM ON FRACTURES IN A TERRITORY-WIDE COHORT OF ELECTIVE TOTAL THYROIDECTOMY FOR BENIGN DISEASES: A 10-YEAR FOLLOW-UP

D. T. W. Lui<sup>1</sup>, M. M. H. Fung<sup>2</sup>, C. H. Lee<sup>1</sup>, C. H. Y. Fong<sup>1</sup>, Y. C. Woo<sup>1</sup>, B. H. H. Lang<sup>2</sup>

<sup>1</sup>The University of Hong Kong, Dept. of Medicine, Queen Mary Hospital, <sup>2</sup>The University of Hong Kong, Dept. of Surgery, Queen Mary Hospital, Hong Kong, China

**Objective:** The low bone turnover state in hypoparathyroidism may have potential deleterious effects on bone. Little is known about its impact on fracture risk. As postsurgical hypoparathyroidism is the most common cause of hypoparathyroidism, we assessed its impact on incident fracture risk in a territory-wide cohort of patients who underwent elective total thyroidectomy for benign pathologies.

**Methods:** All elective total thyroidectomies performed in 14 major hospitals across the territory from 1995-2014 were analyzed using an electronic health database. Permanent postsurgical hypoparathyroidism (PPH) was defined by the requirement of oral calcium and calcitriol shortly postoperatively and continued for  $\geq 6$  months. Those with albumin-corrected calcium  $< 1.90$  mmol/L on  $\geq 1$  occasion beyond one year post-operation were considered suboptimally controlled. Fractures were identified by ICD9-CM codes 805 (vertebral), 812 (humeral), 813-814 (wrist and forearm), and 820 (hip). Each patient was followed up until an index fracture, death, or 31 May 2020, whichever was earlier. Multivariable Cox regression analysis was used to identify clinical predictors of fractures.

**Results:** Among 4123 eligible patients, 460 (11.2%) had PPH. Over a median of 10.3 y, 126 patients suffered from an incident fracture (2.77 per 1000 person-years). The median time from thyroidectomy to fracture was 7.2 y. Fracture incidence did not differ between those with and without PPH (2.89 vs. 2.76 per 1000 person-years, respectively,  $p=0.848$ ). There were no differences in fracture rates over upper extremities, lower extremities and vertebrae between groups. Subgroup analyses according to the adequacy of PPH control did not reveal significant differences in fracture events. Age, history of fall, diabetes and baseline anti-depressant use independently predicted post-thyroidectomy fractures.

**Conclusion:** PPH was not uncommon after elective total thyroidectomy. We did not observe a significant difference in fracture risk between patients with and without PPH. The impact of PPH control on fracture risk remained to be determined. Nevertheless, clinicians should still take care of the traditional clinical risk factors of osteoporosis which predicted fractures in this post-thyroidectomy cohort.

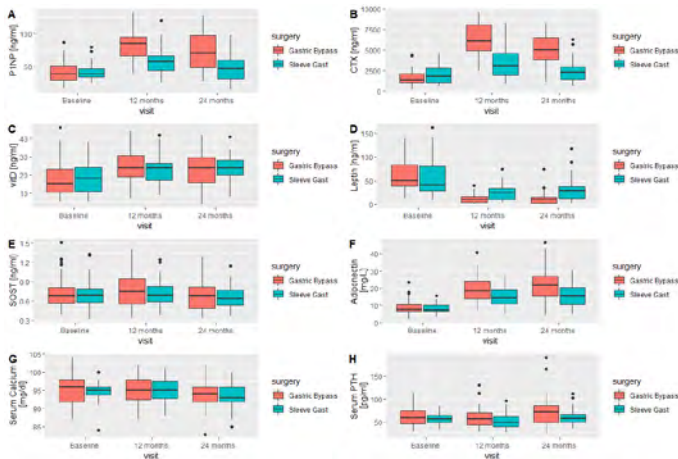
P670

### A COMPARISON OF CHANGES IN BONE TURNOVER MARKERS AFTER ROUX-EN-Y GASTRIC BYPASS AND SLEEVE GASTRECTOMY, AND THEIR ASSOCIATION WITH MARKERS OF INTEREST: THE ABOS-OS STUDY

J. Paccou<sup>1</sup>, D. Thuillier<sup>2</sup>, M. Courtalin<sup>1</sup>, P. Pigny<sup>2</sup>, J. Labreuche<sup>2</sup>, B. Cortet<sup>2</sup>, F. Pattou<sup>2</sup>

<sup>1</sup>Rheumatology, <sup>2</sup>Lille University, Lille, France

Roux-en-Y gastric bypass (RYGB) but not sleeve gastrectomy (SG) increases the risk of major osteoporotic fractures (MOF). However, it remains unclear whether the same degree of high turnover bone loss is associated with SG, which is now more common than RYGB. The aim of this study was to compare changes in bone turnover markers (BTMs) after RYGB and SG, and to investigate their association with pre-defined markers of interest. An ancillary investigation of a prospective cohort was conducted at a tertiary care center in France. SG patients with severe obesity  $\geq 40$  y were matched one-to-one to RYGB patients (controls) for age, sex, BMI and menopausal status. Bone turnover markers, as well as pre-defined markers of interest (calciotropic hormones, total calcium, insulin, sclerostin and adipokines), were measured at baseline, 12 and 24 months after bariatric surgery. Sixty-four patients (66% women) had a mean (SD) age of 49.6 y (5.1) and a mean (SD) BMI of 45.0 kg/m<sup>2</sup> (6.0). From baseline to 12 months, a significant increase in BTMs was observed in both groups ( $p$ -values  $< 0.001$ ). Moreover, RYGB was associated with a greater increase in C-terminal telopeptide (CTX) and procollagen type 1 N-terminal propeptide (P1NP) compared to SG ( $p$ -values  $< 0.0001$ ). From 12 to 24 months, a significant decrease in BTMs was observed in both groups, but no significant differences were found between RYGB and SG. However, BTMs did not return to baseline levels. Thus, a high degree of bone turnover was maintained in both groups up to 24 months. The changes in P1NP and CTX at 12 months were independently associated with the type of surgical procedure, after adjusting for weight or each predefined marker of interest (all  $p < 0.0001$ ). In conclusion, RYGB was associated with a greater increase in BTMs than SG at 12 and 24 months. These findings may partly explain the higher risk of MOF observed after RYGB.



P671

### FEATURES OF BLOOD COUNTS IN RHEUMATOID ARTHRITIS AND REACTIVE ARTHRITIS AND ADDITIONAL POSSIBILITIES FOR DIFFERENTIAL DIAGNOSIS

D. Shaduro<sup>1</sup>, V. Kaliberdenko<sup>1</sup>, S. Kulanthaivel<sup>2</sup>, K. Balasundaram<sup>3</sup>, R. Mnevets<sup>4</sup>, I. Ostrovska<sup>5</sup>

<sup>1</sup>Dept. of Internal medicine No.2, V.I. Vernadsky Crimean Federal University, Simferopol, Russia, <sup>2</sup>Divisional (Zone-6, Division-67), Greater Chennai Corporation - Public Health and Medical Services Dept., Chennai, India, <sup>3</sup>Dept. of Internal medicine No.2, V.I. Vernadsky Crimean Federal University, Simferopol, Russia, <sup>4</sup>ESC Institute of Biology and Medicine of Taras Shevchenko National University of Kyiv, Kyiv, Ukraine, <sup>5</sup>Dept. of Therapy, Shevchenkivskiy District Outpatient Dept. #2, Kyiv, Ukraine

**Objective:** Rheumatoid arthritis (RA) is an autoimmune rheumatic disease of unknown etiology, characterized by the development of chronic erosive arthritis (synovitis) and systemic inflammatory lesions of internal organs. Reactive arthritis (ReA) - nonsuppurative "sterile" inflammatory diseases of the musculoskeletal system, induced by infections of extra-articular localization, primarily of the urinary or intestinal tract. The differential diagnosis of rheumatoid arthritis with reactive arthritis (ReA) deserves special attention. This study aimed to study the features of blood counts in rheumatoid arthritis and reactive arthritis and its additional possibilities for differential diagnosis.

**Methods:** Study consist of 100 patients with two groups of 50 patients each with RA and ReA. The average age of patients were 45±28 y. RA is often accompanied by anemic syndrome. In the case of differential diagnosis of RA and ReA, when detecting low hemoglobin levels, one should think about rheumatoid arthritis. In addition, the phenomenon of thrombocytopenia is characteristic of RA.

**Results:** From our data low hemoglobin levels and thrombocytopenia were detected which is a characteristic of RA. The phenomena of leukocytosis, eosinophilia, monocytosis, as well as a shift of the leukocyte formula to the left were detected which is a characteristics of reactive arthritis. With the manifestation of RA and a short duration of the disease (up to 5 y), the level of A-CCP is low. The detection sensitivity of the A-CCP method increases with the duration of the disease and rarely reflects the presence of the disease, but rather determines the degree of its activity. In the differential diagnosis of these diseases, one should pay attention to the frequent synchronous and unidirectional increase in the levels of ESR, CRP and seromucoids in cases of ReA. The high value of RF and seromucoids in diseases accompanied by arthritis is more evidence in favor of the diagnosis of RA, and, accordingly, excludes the presence of reactive arthritis.

**Conclusion:** From the results, the features of the blood counts in the RA and ReA are almost similar. But our study gives special distinctive characteristics which provides a way for additional possibilities in differential diagnosis and early treatment with prevention of complications.

P672

### HEALTH-RELATED QUALITY OF LIFE OF PATIENTS WITH A RECENT FRACTURE AT FRACTURE LIAISON SERVICE: A THREE-YEAR FOLLOW-UP STUDY

N. Li<sup>1</sup>, M. van Oostwaard<sup>2</sup>, J. van den Bergh<sup>2</sup>, M. Hilgsmann<sup>1</sup>, A. Boonen<sup>3</sup>, S. van Kuijk<sup>4</sup>, L. Vranken<sup>2</sup>, S. Bours<sup>3</sup>, C. Wyers<sup>2</sup>

<sup>1</sup>Dept. of Health Services Research, CAPHRI Care and Public Health Research Institute, Maastricht University, Maastricht, <sup>2</sup>Dept. of Internal Medicine, VieCuri, Medical Centre, Venlo, <sup>3</sup>Dept. of Internal Medicine, Division of Rheumatology, Maastricht University Medical Centre, and CAPHRI Research Institute, Maastricht, <sup>4</sup>Dept. of Clinical Epidemiology and Medical Technology Assessment, Maastricht University Medical Centre, Maastricht, The Netherlands

**Objective:** To estimate the 3-y health-related quality of life (HRQoL) of patients with a recent fracture presenting at Fracture Liaison Service (FLS) and to explore factors associated with health state utility value (HSUV).

**Methods:** Data from a 3-y prospective observational study in patients attending the FLS was used. Patients' HSUVs were derived from the EQ-5D-5L and SF-6D and calculated at six time-points: baseline, 3, 6, 12, 24, 36 months. Multiple imputation was applied for missing data. Linear mixed-effects regression analysis with random intercept and slope was applied to compare mean HSUV between baseline and each time point, and to explore the course of HSUV over 3 y. A backward stepwise elimination was applied to identify factors associated with HSUV.



**Results:** A total of 499 patients were included. The yearly change of HSUV was not significant over 36 months ( $P=0.52$ ) although the mean HSUV at 6 months (mean difference (MD): 0.015, 95%CI: 0.002-0.029;  $P=0.02$ ) and 12 months (MD: 0.018, 95%CI: 0.004-0.032;  $P=0.01$ ) were slightly but significantly higher compared to baseline. There was no significant difference in the course of HSUV between the predefined ten fracture categories ( $P=0.86$ ), but the HSUV of the combined group of patients with femoral, vertebral or multiple fractures was 0.096 units ( $P<0.001$ ) lower compared to patients with other fractures. Subsequent fracture, prevalent vertebral fracture, osteoporosis medication use, use of walking aid, previous falls and BMI were identified factors associated with EQ-5D HSUV. Comparable results were identified using SF-6D HSUV.

**Conclusion:** The 3-y change in HSUV was not statistically significant although significant improvements were observed at 6 and 12 months compared to baseline. Six factors were negatively associated with EQ-5D HSUV.

## P673

### ADMISSION OF HIP FRACTURE PATIENTS DURING COVID-19 PANDEMIC: A SYSTEMATIC REVIEW

R. Lekamwasam<sup>1</sup>, B. Lekamwasam<sup>2</sup>, T. Abeygunasekara<sup>3</sup>, N. Rathnayake<sup>3</sup>

<sup>1</sup>Faculty of Medicine, University of Colomb, Colombo, <sup>2</sup>District General Hospital, Hambantota, <sup>3</sup>Faculty of Allied Health Sciences, University of Ruhuna, Galle, Sri Lanka

**Objective:** COVID-19 pandemic and measures taken to control the spread of virus led to changes that can potentially influence the disease incidence and health seeking behavior of people. This systematic review assessed the pattern of admission of hip fracture patients during the pandemic.

**Methods:** The study was done adhering to the PRISMA guidelines. A PubMed search was done on 17<sup>th</sup> May 2021 using keywords "COVID-19" or "SARS-CoV-2" and "hip fracture". Original studies published in English language, related to hospital admissions were selected by two authors independently. Discrepancies were resolved by consensus and data were collected using a predetermined datasheet.

**Results:** The initial search returned 147 publications and 39 were related to admission of incident hip fractures. Studies have compared admissions during 2020 with previous years; 2019 and 2018. In general, there was a significant reduction of admissions due to fractures/trauma but eight studies reported no change in hip fracture admissions during pandemic (Miranda,2021; Onizuka,2021; Nia,2021; Donovan,2020; Karia,2020; Ogliari,2020; Yu,2020 and Nunez,2020). While two studies reported a slight increase in the rate of hip fracture admissions (Dolci,2020 and Pintado,2020) three studies reported a decrease in hip fracture admissions during the pandemic (Zhong,2021; Vaishya,2021 and Park,2020). One study reported a longer gap between the time of

injury and hospital admission (Jarvis,2021) while another found more males presenting with hip fracture compared to females (Nazemi,2021).

**Conclusion:** The reduction of the total number of fractures is probably related to less road traffic accidents and sport related injuries during pandemic. Hip fractures in old age which are mostly due to low energy trauma occurring indoors have largely remained unchanged or slightly increased despite movement restrictions during the pandemic.

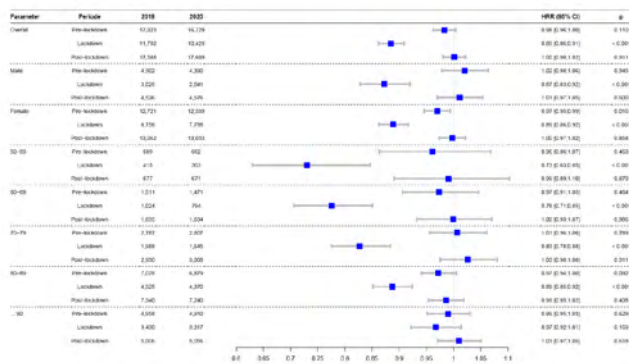
## P674

### THE IMPACT OF THE FIRST NATION-WIDE COVID-19 LOCKDOWN ON HIP FRACTURES IN FRANCE: EVIDENCE FROM A NATIONAL STUDY

J. Paccou<sup>1</sup>, X. Lenne<sup>2</sup>, G. Fichet<sup>2</sup>, D. Theis<sup>2</sup>, B. Cortet<sup>2</sup>, A. Bruandet<sup>2</sup>

<sup>1</sup>Rheumatology, <sup>2</sup>Lille University, Lille, France

The COVID-19 pandemic has posed a number of unprecedented challenges to the healthcare system in France, where hip fractures in the elderly population are a major public health concern. The aim of this study was to assess the impact of the COVID-19 pandemic on the absolute number of hip fractures in patients aged 50 y and older. Data from the French National Hospital Database on hospitalizations for hip fracture from January 1 to July 31, 2020 (study period), and from January 1 to July 31, 2019 (control period) were classified by gender, age group (50–59, 60–69, 70–79, 80–89, over 89 y) and hospital type. During the first nation-wide lockdown (March 16, 2020 to May 10, 2020), COVID-19 had a notable effect on the absolute number of hip fractures: 10,429 patients (75% women; mean age, 83.7 y) were hospitalized, as opposed to 11,782 patients (74% women; mean age, 82.9 y) over the same period of time in 2019, with a corresponding hospitalization rate ratio (HRR) of 0.89 [95%CI, 0.86–0.91;  $p<0.001$ ]. This decrease was observed both in women (-11%) and men (-13%). When the absolute number of hip fractures were compared by age groups, the decrease was observed in all age groups, except in patients over 89 y (HRR=0.97 [95%CI, 0.92-1.01];  $p=0.169$ ). The number of hip fractures decreased from 4925 to 4370 in the 80-89 years age group (HRR=0.89 [95%CI, 0.85-0.92];  $p<0.001$ ). During the lockdown, HRRs decreased by 33% (HRR=0.67 [95%CI, 0.85-0.92];  $p<0.001$ ) and 24% (HRR=0.76 [95%CI, 0.73-0.79];  $p<0.001$ ) in public university hospitals and public general hospitals respectively, whereas they increased by 46% (HRR=1.46 [95%CI, 1.38-1.54];  $p<0.001$ ) in private hospitals. In conclusion, hospitalizations for hip fractures in France fell by 11% during the first nation-wide COVID-19 lockdown. Further studies are required to investigate the long-lasting consequences of the COVID-19 pandemic on the incidence of osteoporotic fracture and the management of osteoporosis.



P675

### A HEAD-TO-HEAD COMPARISON OF EQ-5D-5L AND SF-6D IN DUTCH PATIENTS WITH FRACTURES VISITING FRACTURE LIAISON SERVICE

N. Li<sup>1</sup>, A. Boonen<sup>2</sup>, J. van den Bergh<sup>3</sup>, C. Wyers<sup>3</sup>, M. van Oostwaard<sup>3</sup>, S. van Kuijk<sup>4</sup>, L. Vranken<sup>3</sup>, S. Bours<sup>2</sup>, M. Hilgsmann<sup>1</sup>

<sup>1</sup>Dept. of Health Services Research, CAPHRI Care and Public Health Research Institute, Maastricht University, Maastricht, <sup>2</sup>Dept. of Internal Medicine, Division of Rheumatology, Maastricht University Medical Centre, and CAPHRI Research Institute, Maastricht University, Maastricht, <sup>3</sup>Dept. of Internal Medicine, VieCuri, Medical Centre, Venlo, <sup>4</sup>Dept. of Clinical Epidemiology and Medical Technology Assessment, Maastricht University Medical Centre, Maastricht, The Netherlands

**Objective:** To explore the comparative performance of EQ-5D-5L and SF-6D utilities including agreement, construct and longitudinal validity for patients visiting a Fracture Liaison Service (FLS) after a recent fracture.

**Methods:** Data from a 3-y prospective observational study of patients aged over 50 y attending the FLS in the Netherlands were used. All subjects were interviewed using a standardized questionnaire including the EQ-5D-5L and SF-36 over a 3-y time period. Floor and ceiling effects were evaluated by calculating the proportion of sample in the worst and best possible health states. Agreement was evaluated by intraclass correlation coefficients and Bland-Altman plots. Two aspects of construct validity were assessed: convergent and known-groups validity. Spearman's rank correlation coefficients were applied to assess convergent validity, and Mann-Whitney U test or Kruskal-Wallis H test was used to explore known-groups validity, effect size was also reported. Longitudinal validity was explored using standardized response mean and effect size.

**Results:** A total of 499 patients (mean age 64.6 y, 71.3% female) were included. Baseline mean (median) EQ-5D-5L score was 0.813 (0.852), and ceiling effect of 21.0%. Baseline mean SF-6D score was 0.766 (0.788), and ceiling effect of 1.2%. Both instru-

ments yielded no floor effect. Agreement between the EQ-5D-5L and the SF-6D was good with ICC of 0.791 (95%CI: 0.707-0.846), however discrepancies were indicated by the Bland-Altman plot. EQ-5D-5L and SF-6D index scores were highly correlated with an overall Spearman correlation coefficient of 0.754. Moderate correlations were identified between domains. Both EQ-5D-5L and SF-6D scores demonstrated statistically significant differences in some known-groups (gender, fracture type, previous fall, osteoporosis medication use). The responsiveness of both instruments to change in health utility over 3 y was negligible/ trivial. EQ-5D-5L was however relatively more responsive than SF-6D in most scenarios. SF-6D appeared to be more responsive to detect changes for patients with subsequent fracture during follow-up.

**Conclusion:** Both EQ-5D-5L and SF-6D are valid measures for patients with a recent fracture. Even though these two measures had good agreement, interchangeability could be questioned. Relatively moderate correlation and similar evidence of discriminative validity were suggested by both instruments in our patient population, however, no clear conclusion could be made regarding which instrument is more effective in detecting clinically relevant differences.

P676

### BONE MINERAL DENSITY CHANGES BY GEOGRAPHIC REGION IN WOMEN WITH ENDOMETRIOSIS TREATED WITH RELUGOLIX COMBINATION THERAPY: RESULTS FROM THE PHASE 3 SPIRIT PROGRAM

M. R. McClung<sup>1</sup>, R. Venturella<sup>2</sup>, F. Petraglia<sup>3</sup>, S. J. Imm<sup>4</sup>, R. B. Wagman<sup>4</sup>, S. L. Ferrari<sup>5</sup>

<sup>1</sup>Oregon Osteoporosis Center, Portland, USA, <sup>2</sup>Magna Graecia University of Catanzaro, Catanzaro, Italy, <sup>3</sup>University of Florence, Florence, Italy, <sup>4</sup>Myovant Sciences, Inc., Brisbane, USA, <sup>5</sup>Geneva University Hospital, Geneva, Switzerland

**Objective:** In the Phase 3, placebo-controlled SPIRIT 1/2 studies, once-daily relugolix combination therapy (Rel-CT: relugolix 40 mg, estradiol 1.0 mg, norethindrone acetate 0.5 mg) reduced dysmenorrhea, non-menstrual pelvic pain (NMPP) and dyspareunia in premenopausal women with endometriosis-associated pain (EM). Rel-CT was associated with minimal BMD loss over 24 weeks (wks). To characterize safety in patients from different regions, we assessed if there was geographical variation in skeletal response to Rel-CT.

**Methods:** Premenopausal women (age 18–50 y) with moderate-to-severe dysmenorrhea and NMPP were randomized 1:1:1 to receive Rel-CT or placebo (PBO) for 24 wks, or Delayed Rel-CT (relugolix 40 mg alone then Rel-CT; both for 12 wks). Lumbar spine (L1–L4) BMD was assessed by DXA at baseline, Wk 12 and 24. Change in BMD from baseline was summarized by treatment group. Analyses were stratified by geographical region (Europe, North America [NA], Rest of World [RoW]).

**Results:** In the pooled SPIRIT studies (N=1251), mean% change from baseline at 24 wks in lumbar spine BMD were 0.12% for PBO, -0.72% with Rel-CT, and -1.94% with Delayed Rel-CT. By region, results with Rel-CT were similar at 12 and 24 wks in Europe, NA and RoW (Table). Similar results were seen at the proximal femur.

Table.

	N	Least squares mean (SE)% change from baseline in lumbar spine BMD	
		Wk 12	Wk 24
Overall			
PBO	416	0.09% (0.16)	0.12% (0.18)
Rel-CT	418	-0.49% (0.16)	-0.72% (0.17)
Delayed Rel-CT	417	-1.76% (0.17)	-1.94% (0.18)
Europe			
PBO	265	0.39% (0.59)	0.42% (0.60)
Rel-CT	270	-0.33% (0.59)	-0.49% (0.60)
Delayed Rel-CT	265	-1.70% (0.59)	-1.94% (0.60)
NA			
PBO	89	0.00% (0.29)	0.12% (0.33)
Rel-CT	90	-0.45% (0.29)	-0.85% (0.32)
Delayed Rel-CT	91	-0.97% (0.29)	-0.94% (0.32)
RoW			
PBO	62	-0.29% (0.38)	-0.36% (0.38)
Rel-CT	58	-0.33% (0.39)	-0.69% (0.38)
Delayed Rel-CT	61	-2.20% (0.39)	-2.38% (0.39)

**Conclusions:** Compared with relugolix alone, Rel-CT minimized BMD loss over 24 wks. Similar results with Rel-CT were observed among different geographic regions. Rel-CT is a potential option to provide therapeutic benefit while preserving BMD for women with EM.

**Disclosures:** Consulting fees: MM, SF (Myovant Sciences). Employee/stock: SJI, RBW (Myovant Sciences). This study was funded by Myovant Sciences.

## P677

### HORTON'S DISEASE ABOUT A CASE

S. Yanis<sup>1</sup>, C. Ouardia<sup>1</sup>, H. Houda<sup>1</sup>, B. Ryma<sup>1</sup>, D. Chafia<sup>1</sup>

<sup>1</sup>Rheumatology Departement Mohamed Lamine Debaghine Hospital, Alger, Algeria,

**Objective:** Horton's disease or giant cell arteritis is the most common systemic vasculitis of large and medium caliber arteries, most often affecting people over 50 years old. This vasculitis is associated in 40% of cases with polymyalgia rheumatica. The definitive diagnosis is based on biopsy of the temporal artery. We report the case of a patient with giant cell arteritis.

**Case report:** Mr KA, 69 years old with no medical history, who consults for a recent onset of an inflammatory scapalgia associated with diffuse headaches predominantly temporal and intermittent jaw claudication, all evolving in a context of fever, weight loss of 13 kg in 3 months and profound asthenia. A history of morning stiffness exceeding 1 h was found. Clinical examination revealed painless limited movements of the shoulders predominantly on abduction and flexion, an induration of the temporal arteries with decreased pulsation on the right side, and a recent reduction in visual acuity on the same side. Investigations: ESR=105 mmh<sup>-1</sup>; CRP=65 mg/l. Ultrasound of the shoulders: tenosynovitis of the biceps brachii bilaterally. Vascular echo-doppler of the temporal arteries finds a diminished flow in both temporal arteries especially on the right side, without a halo sign. Biopsy of the right temporal artery: granulomatous arteritis made of intimal thickening with histiocytes in contact with the internal elastic limiter and an inflammatory giant cell infiltrate. The patient was put on corticosteroids at a dose of 0.7 mg/kg/d associated with adjuvant measures with a spectacular response after 5 d marked by a disappearance of clinical signs and a negatization of the biologic inflammatory features.

**Conclusion:** Horton's disease remains a rare condition whose functional prognosis can be threatened especially by the risk of blindness, hence early diagnosis and adequate management must be initiated.

P678

### THE RELATIONSHIP BETWEEN METABOLIC SYNDROME AND OSTEOARTHRITIS

E. A. Taskina<sup>1</sup>, N. G. Kashevarova<sup>1</sup>, E. A. Strebkova<sup>1</sup>, E. P. Sharapova<sup>1</sup>, L. I. Alekseeva<sup>1</sup>, A. M. Lila<sup>1</sup>

<sup>1</sup>V.A. Nasonova Research Institute of Rheumatology, Moscow, Russia

**Objective:** To evaluate the relationship between MS and its components and clinical and radiological manifestations of knee OA.

**Methods:** The prospective study included 125 women with Kellgren-Lawrence stage II-III knee OA (ACR). The average age of pts was 54.2±7.6 y.o., the average disease duration was 8(4-12) y. An individual map was filled out for each patient, including anthropometric indicators, anamnesis and clinical, instrumental examination data. MS according to the IDF.

**Results:** MS is diagnosed in 60% of pts. The pts were divided into 2 groups, according to the presence or absence of MS (Table). Pts with MS had a more severe clinical course of knee OA: higher levels of the total WOMAC, pain and functional failure; synovitis and pronounced cartilage defects and bone marrow edema (according to WORMS) were more often detected. The laboratory examination revealed higher concentrations of COMP, insulin, cholesterol, and TG in patients with MS. Spearman correlation analysis showed positive correlations between MS and knee pain according to VAS ( $r=0.35$ ,  $p=0.02$ ), dimensions of medial osteophytes of the femur (mm) ( $r=0.41$ ,  $p=0.01$ ), synovitis ( $r=0.23$ ,  $p=0.05$ ), CRP ( $r=0.31$ ,  $p<0.0$ ), COMP ( $r=0.49$ ,  $p<0.01$ ) and leptin ( $r=0.4$ ,  $p<0.01$ ).

Table.

Parameter	Pts with MS (n=75)	Pts without MS (n=50)	p
Dimensions of medial osteophytes of the femur, mm, Me	4.5 (2.3-5.7)	2.1(1.3-3)	0.01
Knee pain (VAS),mm, Me	47 (40-60)	40 (33-51)	0.07
Leptin, ng/ml, Me	33.9(25.5-48.2)	24.7(15.1-32.1)	0.008
COMP, ng/ml, Me	30.4(23.5-43.6)	20.3(18.6-30.4)	0.001

**Conclusion:** It has been demonstrated that the metabolic phenotype of OA has a more severe course. The correlation analysis showed significant positive associations between MS and knee pain according to VAS, sizes of osteophytes, synovitis, CRP, leptin, insulin, and COMP. The results obtained confirm that the therapy of this phenotype should include therapeutic interventions aimed not only at OA, but also at the components of MS.

P679

### PREDICTION OF SUSTAINED BIOLOGIC AND TARGETED SYNTHETIC DISEASE MODIFYING ANTIRHEUMATIC DRUG FREE REMISSION IN RHEUMATOID ARTHRITIS PATIENTS

T. Burkard<sup>1</sup>, R. D. Williams<sup>2</sup>, E. Vallejo-Yagüe<sup>1</sup>, T. Hügler<sup>3</sup>, A. Finkch<sup>4</sup>, D. Kyburz<sup>5</sup>, A. M. Burden<sup>1</sup>

<sup>1</sup>ETH Zurich, Zurich, Switzerland, <sup>2</sup>Erasmus University Medical Centre, Rotterdam, The Netherlands, <sup>3</sup>Lausanne University Hospital, Lausanne, Switzerland, <sup>4</sup>University Hospital Geneva, Geneva, Switzerland, <sup>5</sup>University Hospital Basel, Basel, Switzerland

**Objective:** To develop a prediction model of sustained remission following biologic or targeted synthetic disease modifying anti-rheumatic drug (b/tsDMARD) stop in rheumatoid arthritis (RA).

**Methods:** We conducted an explorative cohort study among b/tsDMARD RA treatment episodes courses stopped due to remission in the Swiss Clinical Quality Management registry (SCQM) [2008-2019]. The outcome was sustained b/tsDMARD free remission of ≥12 months. We applied logistic regression model selection algorithms using stepwise, forward, backward selection, and penalized regression to identify patient characteristics predictive of sustained b/tsDMARD free remission. We compared c-statistics corrected for optimism between models. The three models with highest c-statistics were validated in new SCQM data until 2020 (validation dataset).

**Results:** We identified 302 eligible episodes of which 177 episodes (59%) achieved sustained b/tsDMARD free remission. Two backward and one forward selection model with 8, 4, and 7 variables, respectively, obtained highest cstatistics corrected for optimism of  $c=0.72$ ,  $c=0.70$ , and  $c=0.69$ , respectively. In the validation dataset (47 eligible episodes), the models performed with  $c=0.99$ ,  $c=0.80$ , and  $c=0.74$ , respectively, and excellent calibration. The best model included the following 8 variables (measured at b/tsDMARD stop): RA duration, b/tsDMARD duration, other pain/anti-inflammatory drug use, quality of life (EuroQoL), DAS28-erythrocyte sedimentation rate score, health assessment questionnaire (HAQ) score, education, and interactions of RA duration and other pain/anti-inflammatory drug use, and of b/tsDMARD duration and HAQ score.

**Conclusion:** Our results suggest that models with up to 8 variables may predict sustained b/tsDMARD free remission with good efficiency. External validation is warranted. Our results suggest that a model with up to 8 variables (identified at b/tsDMARD stop due to remission) may predict sustained b/tsDMARD free remission with good efficiency. External validation is warranted.

**Acknowledgements:** The SCQM is financially supported by pharmaceutical industries and donors ([www.scqm.ch/sponsors](http://www.scqm.ch/sponsors)). A variety of rheumatology offices and hospitals contribute to SCQM ([www.scqm.ch/institutions](http://www.scqm.ch/institutions)).



P680

# OSTEOPOROTIC THORACOLUMBAR FRACTURE'S MANAGEMENT: A CASE REPORT

A. Aguirre<sup>1</sup>, P. Sevilla<sup>1</sup><sup>1</sup>San Pedro Hospital, Logroño, Spain

**Objective:** As life expectancy increases so does elderly population and osteoporosis rates. Osteoporosis is defined as a decrease of the BMD with clinically states on an increase of the bone fragility and subsequent fractures. The spine is the most common site for osteoporotic fractures and these can result in significant morbidity and potential mortality even though they are likely to heal without complication. Although conservative is the initial treatment option for most of these osteoporotic fractures, in some of them operative treatment is indicated as it was on the case we report. Our objective is to expose a case report of a patient who needed surgical treatment of an osteoporotic lumbar fracture after failure of the conservative treatment.

**Case report:** We present the case of a 77-year-old woman who came to our hospital with a lumbar back pain after she falling from a chair, she did not have any neurological focality, and she was immobilized with an orthosis. An X-ray test was taken (Figure 1) where we could see an osteoporotic L1 fracture which has lost more than 50% of the height and with a Farcy angle of 22°. We consider this fracture as unstable and we decided to do a posterior percutaneous transpedicular fixation including the superior and the inferior vertebral bodies, D12 -L1 -L2. (Figure 2) We decided not to do any augmentation technique. After 2 months of follow up, the patient is happy with the result, her back pain does not restrict her everyday activities and the L1 vertebral body has not shown any signs of increasing collapse.



Figure 1. Lateral X-Ray of L1 acute fracture

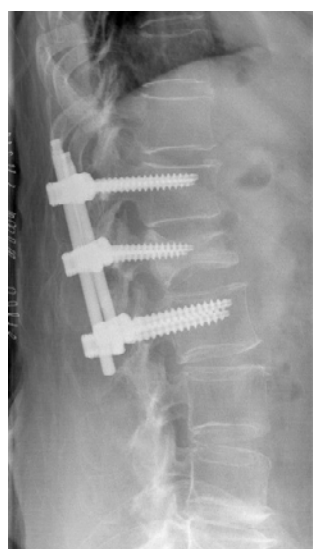


Figure 2. Percutaneous posterior instrumentation D12-L2, post-operative X-Ray

**Conclusion:** Elderly and female are two of the biggest risk factors for osteoporosis. It is important to diagnosis this fractures and to treat them, but above all it is essential to prevent these fractures.

P681

# MORTALITY RISK ASSOCIATED WITH OSTEOPOROTIC FRAGILITY FRACTURE

S. Azevedo<sup>1</sup>, H. Parente<sup>1</sup>, C. Soares<sup>1</sup>, J. Ramos Rodrigues<sup>1</sup>, F. Guimarães<sup>1</sup>, D. Santos-Faria<sup>1</sup>, D. Peixoto<sup>1</sup>, J. Tavares-Costa<sup>1</sup>, C. Afonso<sup>1</sup>, F. Teixeira<sup>1</sup><sup>1</sup>Rheumatology Dept., Unidade Local de Saúde do Alto Minho, Ponte de Lima, Portugal

**Objective:** To assess predictive factors of mortality occurring after a FF.

**Methods:** We performed a retrospective monocentric study that included patients with a FF observed at the emergency department (ED) in a tertiary center, between 1 January 2017 and 31 December 2018, with 2-4 y follow-up after FF (until 31 December 2020). 1673 FF were identified. After calculating a representative sample (90%CI), 172 hip, 173 wrist and 112 vertebral fractures were included. In multivariate analysis we included variables with a significant association in univariate analysis and those with clinical relevance.

**Results:** There was a total of 457 patients evaluated, out of these 79.9% (365) were woman with a mean age of 77.6 (SD=10.3) years old at the time of their FF. 120 patients (26.3%) died during the follow-up period, 35.9% of the men and 23.8% of women inserted in this study. Of these patients 46.5% had a hip fracture and 20.5% a vertebral fracture. We found an association between mortality

and male gender ( $p=0.024$ ), age (older patients had a bigger mortality,  $p<0.001$ ), hip fracture ( $p<0.001$ ), more daily different medications ( $p<0.001$ ) and comorbidities ( $p=0.001$ ), daily oral corticosteroid treatment ( $p=0.024$ ), normal or low body index mass (BMI) ( $p<0.001$ ), previous visits to the ED due to falls ( $p=0.022$ ), type 2 diabetes ( $p=0.022$ ), cardiac disease ( $p<0.001$ ), neurologic disease ( $p<0.001$ ), chronic kidney disease ( $p<0.001$ ) and no osteoporosis treatment started after FF ( $p=0.007$ ). No associations were found between mortality and previous fractures before the fracture included in this study, anxiolytic or antiepileptic treatment, arterial hypertension, dyslipidemia or other comorbidities. After adjustment for gender, daily medication, comorbidities, anti-osteoporotic treatment, previous visits to the ED due to falls and type 2 diabetes, the main predictors of mortality were age ( $p<0.001$ ), hip fracture ( $p=0.004$ ), daily corticosteroid treatment ( $p=0.009$ ), normal or low BMI ( $p<0.001$ ) and cardiac ( $p=0.041$ ), neurologic ( $p=0.049$ ) or chronic kidney disease ( $p<0.001$ ).

**Conclusion:** Age, hip fracture and certain comorbidities seem to be associated with higher mortality after a FF. We need to consider these comorbidities and actively search for osteoporosis in these patients to prevent FF.

P682

### EFFECTIVENESS OF CALCIUM CITRATE IN COMPARISON WITH CALCIUM CARBONATE FOR THE MANAGEMENT OF CHRONIC HYPOPARATHYROIDISM

A. Palermo<sup>1</sup>, G. Tabacco<sup>1</sup>, F. Vescini<sup>2</sup>, G. Sanson<sup>3</sup>, G. Incognito<sup>1</sup>, A. Falchetti<sup>4</sup>, D. Bosco<sup>5</sup>, A. Santonati<sup>5</sup>, P. Pozzilli<sup>1</sup>, N. Napoli<sup>1</sup>, S. Manfrini<sup>1</sup>, P. Trimboli<sup>6</sup>, G. Mazziotti<sup>7</sup>, R. Cesareo<sup>8</sup>, A. M. Naciu<sup>1</sup>

<sup>1</sup>Unit of Endocrinology and Diabetes, Campus Bio-Medico University, Rome, <sup>2</sup>Dept. of Endocrinology and Diabetes, Santa Maria della Misericordia Hospital, Udine, Italy, <sup>3</sup>Clinical Dept. of Medical, Surgical and Health Sciences, University of Trieste, Trieste, Italy, <sup>4</sup>Dept. of Endocrine and Metabolic Diseases, IRCCS, Istituto Auxologico Italiano, Milan, Italy, <sup>5</sup>Dept. of Endocrinology, San Giovanni Addolorata Hospital, Rome, Italy, <sup>6</sup>Clinic for Endocrinology and Diabetology, Lugano Regional Hospital, Ente Ospedaliero Cantonale, Lugano, Switzerland, <sup>7</sup>Dept. of Biomedical Sciences, Humanitas University, Milan, Italy, <sup>8</sup>UOS Malattie Metaboliche, Santa Maria Goretti Hospital, Latina, Italy

**Objective:** Hypoparathyroidism(HypoPT) is characterized by a deficient secretion/action of PTH associated with low calcium level. It was clearly demonstrated that HypoPT managed with conventional therapy is strictly associated with increased risk of nephrolithiasis. Citrate salts are widely used in the treatment of nephrolithiasis, due to their inhibitory effect on kidney stone formation. Up to now, there are no studies aimed to assess the efficacy of calcium citrate(Ca Cit) for the management of HypoPT. This study aimed to assess the impact of Ca Cit vs. calcium carbonate

(Ca Carb) on the nephrolithiasis risk, to investigate its ability to preserve normal calcium levels and its impact on quality of life (QOL) in HypoPT.

**Methods:** We designed a randomized, double-blind crossover study and enrolled subjects with postsurgical chronic HypoPT. From one week before randomization and during all study period, all patients were instructed to adhere to a specialized diet at home (low sodium and oxalate intake). Each subject was randomized to drug A (Ca Cit) or drug B (Ca Carb) for one month and then crossover to the other supplement for another month. At each visit, all participants underwent a clinical, biochemical examination including calcium-phosphorus metabolism and nephrolithiasis risk evaluation on 24-h urine specimens.

**Results:** After consecutive screening, 24 patients with HypoPT (mean age  $54.7\pm12.5$  y, 21 female) have been enrolled. No difference in baseline anthropometric characteristics and laboratory biomarkers was found between groups. While the serum calcium levels remain stable in both groups, a reduction of both urinary oxalate/creatinine ratio ( $-2.46\pm11.93$  vs.  $7.42\pm17.63$ ,  $p=0.029$ ) and potassium excretion ( $-5.66\pm14.36$  vs.  $5.00\pm14.90$ ,  $p=0.013$ ) was found in Ca Cit group compared with Ca Carb. At follow-up, seven patients (30.4%) suffered from constipation after Ca Carb supplementation compared to one (4.3%) after Ca Cit ( $p=0.047$ ). No difference between groups was found for relative changes in SF-36 and fatigue score.

**Conclusion:** In HypoPT, Ca Cit was able to preserve normal calcium levels and even though it reduced oxalate/creatinine ratio, it did not reduce the overall lithogenic risk in comparison to Ca Carb. Ca Cit might have a positive impact on HypoPT QOL by reducing constipation.

P683

### RHEUMATOID ARTHRITIS PATIENT CLUSTERS WITH FIRST-TIME BIOLOGIC OR TARGETED SYNTHETIC DISEASE MODIFYING ANTI-RHEUMATIC DRUGS IDENTIFIED THROUGH DEEP LEARNING

M. Kalweit<sup>1</sup>, A. M. Burden<sup>2</sup>, T. Hügler<sup>3</sup>, T. Burkard<sup>2</sup>

<sup>1</sup>University of Freiburg, Freiburg, Germany, <sup>2</sup>ETH Zurich, Zurich, Switzerland, <sup>3</sup>Lausanne University Hospital, Lausanne, Switzerland

**Objective:** To use deep learning to describe patient groups with first-time biologic or targeted synthetic disease modifying anti-rheumatic drug (b/tsDMARD) in rheumatoid arthritis (RA).

**Methods:** We conducted a descriptive study among RA patients with first-time b/tsDMARD use in the Swiss Clinical Quality Management registry (SCQM) between 1999-2018. The date of the first-time b/tsDMARD use was the cohort entry. Patients with a DAS28-erythrocyte sedimentation rate (esr) record  $\leq 6$  months of first-time b/tsDMARD use were eligible. At cohort entry, patients were clustered using deep embedded clustering via an adaptive deep neural network. We defined the numbers of clusters in differ-

ent runs to be 3, 4, and 5. We further performed the clustering process twice with differing specifications. Features were measured at cohort entry and included demographics, RA disease burden/duration, lifestyle factors, and conventional synthetic (cs) DMARD and prednisone use.

**Results:** A total of 24 identified clusters comprised 362-1481 patients per cluster among 3516 unique patients. Each cluster was similar to at least 1 other cluster based on patient characteristics. Thus, we could group all clusters into 6 distinct groups. First, clusters with highest frequencies of individual csDMARD and prednisone use and a tendency towards seropositive and no family history of rheumatic diseases. Second, clusters of men with highest frequency of smoking and BMI. Third, clusters of seronegative patients with lowest frequency of prednisone use. Fourth, clusters of women with high disease burden/duration. Fifth, clusters of younger patients with low disease burden/duration and a tendency towards seropositivity. Sixth, clusters of older patients.

**Conclusion:** This study suggests that deep learning can be used to identify different RA patient groups with first-time b/tsDMARD use.

**Acknowledgements:** Pharmaceutical industries and donors support SCQM financially ([www.scqm.ch/sponsors](http://www.scqm.ch/sponsors)). Rheumatology offices and hospitals contribute data to SCQM ([www.scqm.ch/institutions](http://www.scqm.ch/institutions)).

## P684

### FALLS IN WOMEN WITH RHEUMATOID ARTHRITIS

A. Y. Feklistov<sup>1</sup>, O. V. Dobrovolskaya<sup>1</sup>, O. A. Nikitinskaya<sup>1</sup>, N. V. Toroptsova<sup>1</sup>

<sup>1</sup>V.A. Nasonova Research Institute of Rheumatology, Moscow, Russia

**Objective:** In a retrospective study, to identify the frequency of falls and the factors that affect them in pts with RA

**Methods:** 93 women (mean age 61.2±10.7 y) with RA, confirmed in accordance with the criteria of ACR/EULAR (2010), were enrolled. The median duration of the disease was 12.4 [4.0;18.0] y. Baseline assessments included socio-demographic, medical and lifestyle related risk factors: age, BMI (kg/m<sup>2</sup>), fall occurrence in the last 12 months; ESR (mm/h); CRP (mg/l), creatinine (mkmol/l), uric acid (mmol/l), pain (VAS) ranging from 0-100 mm; disease activity, measured by the Disease Activity Score 28/ESR (DAS-28/ESR); anti-RA treatment, smoking, dizziness, visual impairment, physical function, assessed by the HAQ; risk of falling - the 5-time sit down-to-stand up test, hand grip strength and the Short Battery of physical performance.

**Results:** 44 (47.3%) pts with RA had at least one fall, among them 19 (20.4%) experienced multiple (>1) falls during the past year. Persons with falls were older and had a lower BMI. There was a significant positive correlation by Spearman between falls and age of RA pts ( $r=0.28$ ,  $p<0.05$ ), DAS 28 ( $r=0.29$ ,  $p<0.05$ ), pain on

the VAS ( $r=0.33$ ,  $p<0.05$ ). Smoking ( $r=0.24$ ,  $p<0.05$ ), dizziness ( $r=0.22$ ,  $p<0.05$ ). In univariate logistic regression analyses age (OR 1.06; 95%CI 1.01-1.10;  $p=0.041$ ), smoking (OR 3.6; 95%CI 1.01-13.6;  $p=0.032$ ) and aseptic femoral head necrosis (OR 3.40; 95%CI 0.90-12.87;  $p=0.046$ ) were associated with falls. Number of medications, duration of rheumatoid arthritis, functional capacity, and physical tests showed no associations with history of falls in the past year.

**Conclusion:** We observed that the frequency of falls is quite common in RA population. The occurrence of falls in our sample of RA pts bears relation to age, smoking and presence of aseptic femoral head necrosis. We found out no relation to disease activity, functional capacity, or physical performance tests.

## P685

### LOW TRABECULAR BONE SCORE AND INFLAMMATION IN CROHN'S DISEASE PATIENTS

I. Soare<sup>1</sup>, A. Sirbu<sup>2</sup>, B. Mateescu<sup>3</sup>, M. Diculescu<sup>4</sup>, C. Tieranu<sup>5</sup>, L. Cima<sup>2</sup>, S. Martin<sup>2</sup>, S. Fica<sup>2</sup>

<sup>1</sup>University of Medicine & Pharmacy Carol Davila Bucharest, <sup>2</sup>Endocrinology Dept. Elias Hospital, University of Medicine & Pharmacy Carol Davila Bucharest, <sup>3</sup>Gastroenterology Dept., Colentina Hospital, University of Medicine & Pharmacy Carol Davila Bucharest, <sup>4</sup>Gastroenterology Dept. Clinical Institute Fundeni, University of Medicine & Pharmacy Carol Davila Bucharest, <sup>5</sup>Gastroenterology Dept. Elias Hospital, University of Medicine & Pharmacy Carol Davila Bucharest, Bucharest, Romania

**Objective:** Bone impairment is a common complication in inflammatory bowel disease. Trabecular bone score (TBS) is a relatively new parameter in assessment of bone microarchitecture. The aim of the study was to provide its utility in patients with Crohn's disease (CD).

**Methods:** 48 patients diagnosed with CD were included in this study. Intestinal (fecal calprotectin) and blood inflammatory profile [erythrocytes sedimentation rate (ESR), protein C reactive, fibrinogen], were performed to all of them. BMD lumbar spine and hip were evaluated with DXA, with TBS calculation. A TBS value <1.35 is considered low TBS. We divided the patients into two groups in order to analyze the differences.

**Results:** The patients included in the study had a median age 44 (23) y, median BMI 24.4 (7.3) kg/m<sup>2</sup> and disease duration 7 (6) y. Mean TBS was 1.38±0.1 and nearly one-third of them had TBS <1.35 (35.4%). When compared between the groups, patients with low TBS had higher calprotectin level and ESR level (120 (284) vs. 30 (148) mcg/g,  $p=0.03$ , respectively 17 (20) vs. 8(11) mm/h,  $p=0.04$ ). Although higher values in lower TBS group, protein C reactive and fibrinogen were not significantly different. Significantly lower BMD values at both lumbar spine and hip sites were found in these patients (0.91±0.19 vs. 1.1±0.13,  $p<0.001$ , respectively 0.76±0.13 vs. 0.93±0.12,  $p<0.001$ )

**Conclusion:** TBS could represent a good tool for assessment of bone abnormalities in CD in active inflammatory state. Higher calprotectin and ESR levels are seen in patients with low TBS. Prospective studies should be conducted in order to see if TBS values improves with decrease of inflammation.

P686

### DYSFUNCTION OF THE RESPIRATORY MUSCLES, EXERCISE TOLERANCE AND CHARLSON COMORBIDITY INDEX IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE

E. Kochetova<sup>1</sup><sup>1</sup>Petrozavodsk State University, Petrozavodsk, Russia

**Objective:** To investigate dysfunction of the respiratory muscles, exercise tolerance and Charlson comorbidity index in patients with chronic obstructive pulmonary disease (COPD).

**Methods:** 76 patients with COPD were observed (34 patients with COPD 2 Stage, 33 patients with COPD 3 Stage, 9 patients with COPD 4 Stage). The investigated group was made by the patients having the long experience of smoking. The average age in this group was  $61.01 \pm 5.05$  y. Research of function of external breath was studied with multimodal installation "Master-Lab/Jaeger". Maximal inspiratory pressure (MIP) and maximal expiratory pressure measurements were performed, using a body plethysmography machine. The Respiratory muscle strength was assessed by measuring Pi max and Pe max mouth pressures (kPa, % Pred). Comorbidity was assessed by the Charlson Comorbidity Index, exercise tolerance test was evaluated by the 6-min walk (6MWD).

**Results:** Indicators Pi max of the strength of the respiratory muscles were in COPD patients with 2 stage  $7.83 \pm 2.04$  kPa ( $75.27 \pm 19.79\%$ ), in patients with COPD 3 Stage  $6.85 \pm 2.03$  kPa ( $65.86 \pm 19.25\%$ ), in patients with stage 4 COPD  $5.61 \pm 1.59$  kPa ( $53.77 \pm 15.19\%$ ). Indicators Pe max of the strength of the respiratory muscles were in COPD patients with 2 stage  $12.19 \pm 5.22$  kPa ( $92.29 \pm 27.56\%$ ), in COPD patients with 3 Stage  $9.94 \pm 2.9$  kPa ( $74.3 \pm 21.97\%$ ), in COPD patients with 4 stage  $9.02 \pm 1.99$  kPa ( $67.88 \pm 14.83\%$ ). 6MWD in COPD patients with 2 Stage was  $378.4 \pm 96.5$  m, in patients with 3 stage was  $351.4 \pm 114.16$  m, in patients with 4 Stage was  $224.28 \pm 123.4$  m. Charlson comorbidity index in COPD patients with 2 Stage was  $3.74 \pm 0.96$  points, in COPD patients with 3 Stage was  $4.21 \pm 0.99$  points, in COPD patients with 4 Stage was  $4.5 \pm 1.07$  points.

**Conclusion:** Dysfunction of respiratory muscles in COPD patients with stage 4 was maximum, the significant decrease of Pi max, a reduction of exercise tolerance and the highest rate of comorbidity were detected compared with the parameters of patients with COPD stages 2 and 3.

P687

### TRABECULAR BONE SCORE IN YOUNG CROHN DISEASE PATIENTS: CASE CONTROL STUDY

I. Soare<sup>1</sup>, A. Sirbu<sup>1</sup>, M. Diculescu<sup>2</sup>, B. Mateescu<sup>3</sup>, C. Tieranu<sup>4</sup>, S. Martin<sup>5</sup>, M. Ionescu<sup>4</sup>, S. Fica<sup>5</sup>

<sup>1</sup>University of Medicine & Pharmacy Carol Davila Bucharest, <sup>2</sup>Gastroenterology Dept. Clinical Institute Fundeni, University of Medicine & Pharmacy Carol Davila Bucharest, <sup>3</sup>Gastroenterology Dept., Colentina Hospital, University of Medicine & Pharmacy Carol Davila Bucharest, <sup>4</sup>Gastroenterology Dept. Elias Hospital, University of Medicine & Pharmacy Carol Davila Bucharest, <sup>5</sup>Endocrinology Dept. Elias Hospital, University of Medicine & Pharmacy Carol Davila Bucharest, Bucharest, Romania

**Objective:** Low BMD is a common complication associated with inflammatory bowel disease (IBD) patients. Multiple risk factors are linked, including chronic inflammation, glucocorticoid treatment, malabsorption. However, the impact in young adults is still on debate.

**Methods:** 52 premenopausal women and men <50 y IBD patients and 53 age, sex, BMI matched healthy subjects were included in the study. BMD ( $\text{g}/\text{cm}^2$ ) of the lumbar spine and hip was analyzed using DXA and trabecular bone score (TBS) was calculated by each spine DXA examination. Low BMD was considered as  $Z\text{-score} < -2\text{SD}$ .

**Results:** 33 Crohn's disease (CD) and 19 ulcerative colitis (UC), with median age 33 (17) y and disease duration 5 (7) y, mean age at diagnosis  $26.9 \pm 10.3$  SD y, median BMI  $22.2$  ( $5.4$ )  $\text{kg}/\text{m}^2$  were enrolled in the study. 53 age, BMI, gender matched healthy subjects comprised the control group. All DXA parameters were significantly lower in IBD patients than in controls: LS BMD ( $1.07 \pm 0.17$  vs.  $1.16 \pm 0.16$ ,  $p=0.005$ ), hip BMD ( $0.91 \pm 0.13$  vs.  $0.98 \pm 0.13$ ,  $p=0.01$ ) and TBS ( $1.40 \pm 0.1$  vs.  $1.45 \pm 0.099$ ,  $p=0.01$ ). Moreover, low BMD prevalence was higher in IBD patients when compared to controls. ( $\chi^2=8.5$ ,  $p=0.003$ ).

**Conclusion:** Low BMD represents an important complication that can occur even in younger adults, and long term follow up should be offered in order to decrease the risk of fragility fractures.



P688

### DXA-BASED BONE STRAIN INDEX IN NORMOCALCEMIC PRIMARY HYPERPARATHYROIDISM

G. Tabacco<sup>1</sup>, C. Messina<sup>2</sup>, L. Rinaudo<sup>3</sup>, S. Falcone<sup>4</sup>, R. Cesareo<sup>5</sup>, S. Manfrini<sup>1</sup>, N. Napoli<sup>1</sup>, F. M. Ulivieri<sup>6</sup>, A. Palermo<sup>1</sup>, A. Naciu<sup>1</sup>

<sup>1</sup>Unit of Endocrinology and Diabetes, Campus Bio-Medico University of Rome, Rome, <sup>2</sup>IRCCS Istituto Ortopedico Galeazzi, Milano, <sup>3</sup>TECHNOLOGIC Srl, Torino, <sup>4</sup>Unit of Endocrinology & Metabolic Diseases, CTO A. Alesini Hospital, University Tor Vergata, Rome, <sup>5</sup>UOS Malattie Metaboliche, Santa Maria Goretti Hospital, Latina, <sup>6</sup>Casa di Cura La Madonnina, Milan, Italy

**Objective:** Normocalcemic hyperparathyroidism (NHPT) is a condition characterized by levels of albumin-adjusted total serum calcium and ionized calcium consistently within normal limits associated with constantly elevated PTH values after ruling out secondary causes of high PTH. Although few previous studies reported bone impairment in patients with NHPT, the largest recent cross-sectional evaluation showed no significant reduction of BMD and trabecular bone score nor increased number of fragility vertebral fractures compared to controls. No definitive data are available on the bone quality assessment in NHPT. Bone strain index (BSI) is a new tool to estimate bone strength. It applies the finite element analysis on lumbar spine and femoral neck DXA images. Higher BSI values indicate lower bone strength. This study aimed to assess the lumbar spine (LS), femoral neck (FN), and total hip (TH) BSI in NHPT compared to controls and PHPT

**Methods:** Design: cross-sectional study. Setting: Outpatient clinic. Patients: 40 NHPT, 50 PHPT and 100 age- and sex-matched control subjects. Main outcome measures: LS-BSI, FN-BSI, TH-BSI.

**Results:** LS-BMD, FN-BMD, TH-BMD was not different between NHPT and both PHPT and controls. TBS was not different between NHPT and both PHPT and controls. FN-BSI was lower in NHPT compared to PHPT ( $1.36 \pm 0.23$  vs.  $1.51 \pm 0.33$ ,  $p=0.03$ ), while there were no differences between NHPT and controls. TH-BSI was lower in NHPT compared to PHPT ( $1.52 \pm 0.3$  vs.  $1.72 \pm 0.41$ ,  $p=0.028$ ), while there were no differences between NHPT and controls. LS-BSI was not different between NHPT and both PHPT and controls.

**Conclusion:** In NHPT, BSI is not impaired showing a bone quality phenotype similar to controls.

P689

### SEVERE OSTEITIS FIBROSA CYSTICA IN YOUNG PATIENT WITH PRIMARY HYPERPARATHYROIDISM AND THE RARE MUTATION OF MEN1

E. Bibik<sup>1</sup>, D. Sazonova<sup>1</sup>, A. Sheikhova<sup>1</sup>, A. Eremkina<sup>1</sup>, N. Mokrysheva<sup>1</sup>

<sup>1</sup>Endocrinology Research Centre, Moscow, Russia

**Objective:** Multiple endocrine neoplasia type 1 (MEN1) is a rare inheritable syndrome. None of the described *MEN1* mutations has been associated with peculiar symptoms, a genotype-to-phenotype correlation doesn't exist. In most cases, primary hyperparathyroidism (PHPT) is the initial manifestation of MEN1 in the 2 to 4 decade of life, that can be mostly asymptomatic.

**Methods:** We presented a clinical case of 23-year-old patient with severe bone complications of PHPT and *MEN1* mutation of uncertain significance.

**Results:** At admission his main complaints included severe pains in the knees limited his mobility, as well as in the left wrist, lumbar spine, polyuria and intensive headaches. There was no family history of endocrinopathies. Since adolescence, he underwent multiple low-energy fractures of the right tibia, left clavicle, humerus and femur. The histopathological examination assumed "brown tumors". Lab tests confirmed PHPT: albumin-adjusted calcium  $2.96$  mmol/l ( $2.1-2.55$ ), PTH  $208.8$  pg/ml ( $16-65$ ), osteocalcin  $97.53$  ng/ml ( $11-43$ ),  $\beta$ -CTx  $1.68$  ng/ml ( $0.01-0.69$ ), 24-h urinary calcium  $8.22$  mmol ( $2.5-8$ ), GFR  $120$  ml/min/ $1.73$  m<sup>2</sup>. There was a significant reduction in BMD especially in femur neck to  $-3.0$  SD using Z-score. US, CT scan and scintigraphy with <sup>99m</sup>Tc-sestamibi detected a formation ( $20 \times 14 \times 13$  mm) of the left inferior parathyroid gland (PG). Hormonal tests and MRI excluded other pituitary and pancreatic pathology. A genetic test was performed. The exon 10 of *MEN1* (NM000244.3) had a rare heterozygous variant c.1609G>T, p.Gly537Cys (rs587780843) with an uncertain clinical significance. The surgical revision was carried out, left inferior PG in upper thymus horn was removed and PTH decreased to  $1.22$  pg/ml. On the sixth day after surgery hypocalcemia developed (total calcium  $2.05$  mmol/l) which was managed with oral calcium supplementation and alfacalcidol. Morphological examination revealed benign adenoma with atypical localization. Conclusion: Low-energy fractures due to cystic bone transformations at young age requires an extensive diagnostics and checking hereditary forms of PHPT.

P690

**ECHINACEA SP. IN THE PREVENTION OF OSTEOPOROSIS**C. Burlou Nagy<sup>1</sup>, M. Foghis<sup>1</sup>, T. F. Borze<sup>1</sup><sup>1</sup>University of Oradea, Faculty of Medicine & Pharmacy, Oradea, Romania

**Objective:** Numerous scientific studies have shown the effect of echinalkamide and echinacoside on inhibiting osteoclast differentiation and their mechanism as a potential therapeutic agent for osteoclast-associated diseases. In this regard, natural alternatives are being explored to prevent bone loss and the risk of fracture induced by osteoporosis and less desired side effects. Many osteoclast suppressants are associated with anti-inflammatory and antioxidant properties. *Echinacea purpurea* has already been studied for its effect on anti-inflammatory and antioxidant activity and has been found to be effective in inflammation-related osteoclastogenesis. Future research will focus on the potential signaling pathway in cocultures treated with echinacoside and echinalkamide.

**Results:** Analyzing the studies, echinalkamide has the greatest antioxidant and anti-inflammatory effects, and echinacoside causes significant increases in cell proliferation, alkaline phosphatase activity, collagen secretion, osteocalcin levels and mineralization, which indicates their inclusion in a potential treatment for osteoporosis, leading to improved mineral density and bone biomechanical properties. The data from the studies show that echinacoside promotes bone regeneration by increasing the ratio of osteoprotegerin and by stimulating signaling pathways in cells. The results suggest that echinacoside and echinalkamide stimulate cell proliferation, differentiation and mineralization by regulating osteoprotegerin and stimulating signaling pathways.

**Conclusion:** Therefore, *Echinacea purpurea* can be considered a promising medicinal plant product for the prevention and treatment of osteoporosis. Currently, on the pharmaceutical market there is a pharmaceutical preparation in the form of capsules, with *Echinacea* in combination with *Gentiana* which can be recommended for the prevention of osteoporosis.

P691

**THE CASE OF IGG4 RETROPERITONEAL FIBROSIS IN A FEMALE PATIENT**N. Klyaus<sup>1</sup>, E. Zvereva<sup>2</sup>, S. Benevolenskaya<sup>1</sup>, L. Mitrofanova<sup>1</sup>, O. Moiseeva<sup>1</sup>, M. Gordeev<sup>1</sup><sup>1</sup>Federal State Budgetary Institution "Almazov National Medical Research Centre" of the Ministry of Health of the Russian Federation, <sup>2</sup>LLC AVA-PETER, Saint-Petersburg, Russia

**Objective:** To show the difficulties in diagnosis of such rare clinical condition as IgG4-related retroperitoneal fibrosis and to illustrate the importance of the histological examination of small salivary gland.

**Methods:** Here we describe the case of IgG4 retroperitoneal fibrosis in a female patient.

**Results:** A 47-year-old female patient has presented with abdominal and back pain, oliguria, low-grade fever and weakness. Previously the patient was treated by urologist, neurologist and gastroenterologist without significant effect. On the abdominal and pelvic CT scan there were no pathological changes detected. But using CT angiography (CTA) we identified luminal narrowing of the abdominal aorta under the renal arteries by 20 mm till aortic bifurcation, due to the periaortic soft tissue mass with a thickness maximum - 14 mm. Due to the hypothesis about the autoimmune nature of the disease this patient was examined by a rheumatologist. Clinical data of rheumatological pathology were not identified. The patient underwent nailfold capillaroscopy - normal pattern was detected. Rheumatoid factor, antibodies to DNA, titers of antinuclear factor and anti-neutrophil cytoplasmic antibodies were within normal limits. The laboratory inflammatory activity wasn't also detected (ESR 9 mm/h, CRP 0,8 mg/l). Further, we investigated the level of the serum immunoglobulins G4. It was not elevated (0.32 g/l). We decided to perform the biopsy of small salivary gland. In histological and immunohistochemical analysis using monoclonal antibodies to human IgG and monoclonal antibodies to human IgG4 we revealed plasma cells infiltration with the expression of IgG4. Therefore, we considered retroperitoneal fibrosis as a IgG4-related disease. The patient resumed systemic steroid therapy with a positive effect. On the control CTA after 3 months, previously visualized formation of paraortic soft tissues was not detected.

**Conclusion:** Our case underlines the importance of histological examination of small salivary gland in patients with retroperitoneal fibrosis.

P692

**SMOKING AND OSTEOPOROSIS IN THE MAXILLARY AND MANDIBULAR BONES**M. Pantor<sup>1</sup>, D. Domocos<sup>1</sup>, C. Burlou Nagy<sup>1</sup>, M. Foghis<sup>1</sup>, T. F. Borze<sup>1</sup><sup>1</sup>University of Oradea, Faculty of Medicine & Pharmacy, Oradea, Romania

**Objective:** Osteoporosis is a condition that occurs frequently in the elderly, mostly women, with a sedentary lifestyle, smokers, patients who avoid sun exposure, alcohol users or who have certain chronic conditions (diabetes, malignancies). of the maxillary bones is especially evident in the case of requesting patients to restore masticatory or physiognomic function with the help of dental implants or total prosthesis. was to identify the relationship between smoking patients and the existence of osteoporosis of the maxillary bones.

**Methods:** Between 12.04.2019-25.02.2020 we recorded 100 patients (75 smokers and 25 nonsmokers) aged 30-78 y, 50 women and 50 men. The diagnosis of osteoporosis in the jaw bones was made with DXA. Patients were randomized into 4 groups: I-smokers under 10 cigarettes/d, II- 10-20 cigarettes/d, III-over 20 cigarettes/d, IV-nonsmokers.

**Results:** Out of the 100 patients, 75 showed signs of osteoporosis in different degrees. Of these, 47 (62,2%) women and 28 (37,8%) men. The most frequent cases were highlighted in group III - smokers over 20 cigarettes/d - 21 patients (84%), 15 (71.4%) women and 6 (28.6%) men. The least cases were in the group of nonsmokers 7 - 3 women and 4 men (28%). In terms of age, 5 cases were 30-45 y, the remaining 95 are 45-78 y (68 women, 27 men).

**Conclusion:** Smoking has a definite effect on osteoporosis. Also the percentage of women was significantly higher than that of men. Age also has a significant effect, the presence of osteoporosis was highlighted almost exclusively.

P693

**SPONTANEOUS RUPTURE OF BAKER'S CYST: CASE SERIES WITH TWO-YEAR FOLLOW-UP**G. Ocampos<sup>1</sup>, M. Rezende<sup>1</sup>, G. Camanho<sup>1</sup>, R. Gobbi<sup>1</sup><sup>1</sup>Institute of Orthopedics & Traumatology, Hospital das Clínicas, Faculty of Medicine, University of São Paulo (IOT-HC-FMUSP), São Paulo, Brazil

**Objective:** To describe a series of acute spontaneous rupture of Baker's cysts with 2-y follow-up.

**Methods:** 16 consecutive patients with symptomatic ruptured popliteal cyst were treated acutely with anti-inflammatory measures and physical therapy.

**Results:** All patients had good resolution with conservative treatment for an average period of one week, and there was no recurrence of cyst rupture in any case, in the 2-y follow-up period.

**Conclusion:** Spontaneous rupture of Baker's cyst in adult patients can be very symptomatic and disabling, but once diagnosed, it evolves well with conservative treatment and rarely relapses.

P694

**RECURRENT FOCAL EPILEPSY SEIZURES AND BASAL GANGLIA CALCIFICATION AS THE MANIFESTATION OF PSEUDOHYPOPARATHYROIDISM**O. O. Golounina<sup>1</sup>, G. E. Runova<sup>1</sup>, Y. S. Eremina<sup>1</sup>, D. E. Marmalyuk<sup>1</sup>, T. Y. Tselovalnikova<sup>1</sup>, V. V. Fadeev<sup>1</sup><sup>1</sup>I.M. Sechenov First Moscow State Medical University of the Ministry of Health of the Russian Federation (Sechenov University), Moscow, Russia

**Objective:** Pseudohypoparathyroidism (PHP) is a rare heterogeneous group of disorders characterised by end-organ resistance to the PTH. We report on a 21-year-old male patient who presented with seizures and various other neurological manifestations due to sporadic PHP that was presumably caused by epigenetic changes.

**Case report:** Patient A. was admitted to our endocrine clinic at the age of 17 with complaints of intermittent cramps in the arms and legs, abdominal pain, headache, weakness, fatigue. At the age of 12, he developed focal epileptic seizures followed by confusion for few minutes. He was diagnosed with epilepsy and anti-convulsant therapy was prescribed, however his electroencephalography was unremarkable. Clinical examination revealed short neck, rare teeth, polythelia (four nipples), however, patient's vital signs and cognitive function were within normal limits. Trousseau's and Chvostek symptoms were absent. Height – 167 cm, weight – 63 kg. He had no family history of any endocrine or neurologic diseases. Laboratory test results revealed severe hypocalcemia (1.52 mmol/L; 2.08–2.65), elevated serum phosphorus (1.88 mmol/L; 0.78–1.65) and decreased magnesium concentration (0.59 mmol/L; 0.65–1.05), elevated serum intact PTH level (34.5 pmol/L; 1.3–6.8) and thyroid stimulating hormone. In addition, hypocalciuria (0.27 mmol/24-h; 2.50–7.50) and hypophosphaturia (10.26 mmol/24-h; 12.9–42.0) were found. Computed tomography of brain showed bilateral basal ganglia calcification. Based on the medical history, laboratory tests a diagnosis of PHP was considered. Neither mutations nor copy number variations were detected in the *GNAS* during genetic analysis. Considering the absence of Albright's hereditary osteodystrophy and mutations in the *GNAS* gene, our patient was most likely affected by the PHP type 2 due to epigenetic changes. The patient was treated with calcium carbonate 2.5 g/d in divided doses and alfacalcidol.

dol 2 µg, normal level of calcium and phosphorus were achieved in the serum without hypercalciuria, as well as normalization of PTH level. We also plan to withdraw anticonvulsant therapy.

**Conclusion:** This case illustrates the clinical, biochemical and genetic challenges in the diagnosis of the PHP that should be considered in the diagnostic investigation of patients with hypocalcaemia and seizures.

P695

#### EFFECT OF ANGIOPOIETIN-LIKE PROTEIN TYPE 4 ON OSTEOPOROTIC DISORDERS IN RHEUMATOID ARTHRITIS PATIENTS WITH METABOLIC SYNDROME

V. A. Aleksandrov<sup>1</sup>, A. V. Aleksandrov<sup>2</sup>, L. N. Shilova<sup>1</sup>, G. Y. Osmano<sup>2</sup>, N. V. Aleksandrova<sup>2</sup>

<sup>1</sup>Volgograd State Medical University, Dept. of Hospital Therapy,

<sup>2</sup>Research Institute of Clinical & Experimental Rheumatology A.B. Zborovsky, Volgograd, Russia

**Objective:** To evaluate the potential role of angiotensin-like protein type 4 (ANGPTL4) on the risk of osteoporotic disorders in patients with rheumatoid arthritis (RA) and metabolic syndrome (MS).

**Methods:** 88 patients with reliable RA were included in the study. Determination of ANGPTL4 in serum was performed by enzyme immunoassay using a commercially available RayBio Human ANGPTL4 ELISA Kit test system (RayBiotech, USA). The presence of MS in RA patients was established using the criteria of the National Educational Program on Cholesterol (NCEP/ATPIII 2004) and the International Diabetes Federation (IDF). All RA patients underwent osteodensitometry (Lunar DPX, GE, USA) with estimation of bone tissue condition according to T-criterion.

**Results:** ANGPTL4 values in RA patients correlated with age of RA onset ( $r=-0.658$ ,  $p<0.001$ ), DAS-28 disease activity ( $r=0.449$ ,  $p=0.001$ ), C-reactive protein level ( $r=0.488$ ,  $p=0.003$ ), ESR ( $r=0.458$ ,  $p=0.002$ ), serum vitamin D ( $r=-0.417$ ), urinary calcium ( $r=0.797$ ,  $p=0.032$ ), triglycerides ( $r=0.42$ ,  $p=0.018$ ), and the presence of insulin resistance (by HOMA-IR index) ( $p=0.033$ ) and osteopenia ( $r=0.439$ ). Significantly high levels of ANGPTL4 ( $p=0.027$  compared with RA without MS) and low indices of BMD ( $p=0.03$  compared with RA without MS) were observed in RA patients with metabolic syndrome (MS) ( $n=36$ ).

Multivariate analysis of variance revealed a significant increase in ANGPTL4 in the serum of RA patients with reduced BMD ( $p=0.007$ ) and marked metabolic changes ( $p<0.001$ ). These factors and their interactions can explain a significant proportion of the variability in ANGPTL4 ( $R^2=0.32$ ,  $p<0.05$ ).

**Conclusion:** Direct involvement of ANGPTL4 in the mechanisms of osteoporosis development in RA patients is possible, including effects on osteoclast differentiation and activation processes, which may lead to decreased periarticular BMD and increased risk of low energy fractures.

P696

#### CERVICAL SPINE INVOLVEMENT IN RHEUMATOID ARTHRITIS AND ANTI-CITRULLINATED PROTEIN ANTI BODIES

N. Bahaz<sup>1</sup>, F. Mechid<sup>1</sup>, C. Dahou-Makhloufi<sup>1</sup>, A. Ladjouze<sup>2</sup>, S. Lefkir-Tafiani<sup>3</sup>, A. Abi Ayad<sup>4</sup>

<sup>1</sup>Rheumatology department, Mohamed Lamine Debaghine hospital. Algiers, Algeria, Algiers, Algeria, <sup>2</sup>Dept. of rheumatology, Ben Aknoun hospital Algiers, Algeria, Algiers, Algeria, <sup>3</sup>Rheumatology department, Beni Messous hospital, Algiers, Algeria, <sup>4</sup>Rheumatology department, Ain Naadja hospital, Algiers, Algeria

**Objective:** To study a relationship between cervical spine involvement and anti citrullinated protein antibodies (ACPA) in rheumatoid arthritis.

**Methods:** We conducted a multicenter, prospective, descriptive, cross-sectional study in 300 patients with rheumatoid arthritis between 2013-2018. We collected demographic, clinical (Body mass index (BMI), disease duration, DAS28, HAQ), biological (CRP, ESR, the rheumatoid factor, ACPA) and radiological data. We study the relationship between cervical spine involvement (CSI) and ACPA

**Results:** 80, 3% were female), the mean age was 51,  $17\pm12,68$  years, the BMI was  $26,11\pm5,25$ , 67, 66 % had comorbidities, the most frequent were osteoporosis (30%), obesity (24%), hypertension (21,7%). RA mean duration was  $13\pm9$  years, mean DAS 28 was  $4,68\pm1,5$  mean HAQ was  $1,01\pm0,69$ , mean CRP was  $15,50\pm12$  mg/L, mean ESR was  $41,89\pm26,8$ mm, rheumatoid factor was positive in 70,6% and ACPA were positives in 77,3%. The standard x-rays of cervical spine found 53 (17, 66%) patients with CSI. The various lesions of the cervical spine were atlantoaxial subluxations 13%, 3,66% of lateral atlanto-axial subluxations, vertical subluxations in 0,66%, C1C2 arthropathies in 2,33% spondylolisthesis in 2%, and 0,33% of spondylodiscitis. The results of the univariate and multivariate analysis did not find a relationship between CSI and ACPA ( $p=0,71$ ).

**Conclusion:** Cervical spine involvement in rheumatoid arthritis was common in our study. The anticitrullinated protein antibodies are associated with higher clinical activity of the disease. They are important predictors of radiological signs of erosion, which makes us think that we can find a relationship between ACPA and CSI in rheumatoid arthritis.

No conflicts of interest

#### References:

- [1] M. Blom et al. Long-term follow-up of the cervical spine with conventional radiographs in patients with rheumatoid arthritis (RA). Scand J Rheumatol 2013; 42:281-8.
- [2] Kuchi Avni and al. Atlanto-axial instability in rheumatoid arthritis Mac Med Review 2014; 68(2): 76-81 DOI: 10.2478/mm-2014-0015



P697

### BONE MINERAL DENSITY AND PROXIMAL FEMUR 3D-DXA ANALYSIS IN TYPE I DIABETES: PRELIMINARY STUDY

M. L. Brance<sup>1</sup>, L. Rista<sup>2</sup>, V. I. Rojas<sup>3</sup>, P. Diaz Baclini<sup>4</sup>, L. R. Brun<sup>4</sup>

<sup>1</sup>Reumatología y Enfermedades Óseas, <sup>2</sup>Centro de Diabetes y Nutrición, <sup>3</sup>Centro de Diabetes y Nutrición, <sup>4</sup>Laboratorio de Biología Ósea. Facultad de Ciencias Médicas. UNR, Rosario, Argentina

**Objective:** Type 1 DM (T1DM) is associated with low BMD and increase fracture risk related to poor diabetic control or coexistent diabetic complications. BMD by DXA may be considered an inadequate predictor of fracture risk in DM. Using pQCT and HR-pQCT, a detrimental in the cortical compartment have been demonstrated in T1DM. This study aimed to evaluate BMD and cortical and trabecular compartment by proximal femur 3D-DXA analysis in T1DM.

**Methods:** Adults T1DM men and premenopausal women (n=27) and healthy subjects (n=27) as control group (CG) matched by age, sex and BMI. BMD (g/cm<sup>2</sup>) was measured by DXA (Hologic) on lumbar spine (LS), right femoral neck (FN) and total hip (TH). The 3D analysis was performed with 3D-Shaper software (v2.9, Galgo Medical, Spain): cortical BMD (sDens - mg/cm<sup>2</sup>) and trabecular volumetric BMD (trab vBMD - mg/cm<sup>3</sup>). Data were expressed as mean±SD and p<0.05 was considered significant.

**Results:** 55.6% women (n=15) and 44.4% men (n=12) were included. Mean age: CG 30.2±9.3 y (range: 19-49) and T1DM 29.1±9.6 y (range: 18-49). The T1DM group had 13.8±8.6 y at DM diagnosis and the following biochemical parameter at the moment of BMD: glucemia 154.2±59.5 mg/dl (CI95 130.1-178.2); HbA1c 8.3±1.4% (CI95 7.6-8.8); calcemia: 9.3±0.4 mg/dl (CI95 9.0-9.4); 25OHD: 29.9±7.9 ng/dl (CI95 26.3-33.5); PTH: 29.9±7.9 pg/ml (CI95 26.3-33.5). Three T1DM patients had any coexistent diabetic complications (retinopathy or nephropathy); 59.3% were under multiple doses of insulin and 40.7% using an infusion pump. LS BMD=CG: 1.042±0.142 vs. T1DM: 0.988±0.131, p=ns; right FN BMD=CG: 0.873±0.130 vs. T1DM: 0.853±0.174, p=0.645; right TH BMD=CG: 0.979±0.115 vs. T1DM: 0.959±0.174, p=0.615; cortical BMD sDens: CG: 166.5±19.9 vs. T1DM: 163.0±26.8, p=0.589; trab vBMD: CG: 214.3±32.1 vs. T1DM: 214.2±53.7, p=0.991.

**Conclusion:** No differences between T1DM and CG were observed in BMD and cortical and trabecular compartment by 3D-DXA probably associated to good DM control and few previous DM complications.

P698

### FORMATION OF THE SKELETAL BONES IN INFANTILE RATS AFTER 90-DAY EXCESSIVE CAFFEINE INTAKE

A. Movenko<sup>1</sup>, V. Bogachenko<sup>1</sup>, N. Kononenko<sup>1</sup>, V. Nazarenko<sup>1</sup>

<sup>1</sup>State Establishment of Lugansk People's Republic Saint Luka Lugansk State Medical University, Lugansk, Ukraine

**Objective:** To investigate growth rate of the femur, the hipbone, and the first lumbar vertebra in infantile rats after long-term caffeine intake.

**Methods:** 18 infantile rats were distributed into 3 groups with 6 animals in each. Animals of the first group (K-90i) were the intact controls; the second group (C-90i) comprised the animals that received caffeine daily at 120 mg/kg of body weight by oral gavage. Animals of the third group (CM-90i) received caffeine in the same way as group 2 did. Also these rats received treatment with subcutaneous injections of mexidol at 50 mg/kg of body weight daily. In 90 d after administration of both drugs animals were killed by anesthetized decapitation. The hipbone, the femur, and the first lumbar vertebra were excused and prepared for gross measurements. All data were analyzed with the use of standard software.

**Results:** In animals of the group C-90i by the 90<sup>th</sup> day length of both femur and hipbone were lower than those of K-90i by 7.10% and 4.18% as well as height of body of the L1 vertebra – by 10.34%. Other gross sizes also decreased in comparison with the controls width of the hipbone – by 10.03%, width of the proximal femoral epiphysis – by 7.11%. Lateral and antero-posterior sizes of the femoral shaft both decreased by 4.72% and 4.92%. In animals of the group CM-90i (in comparison with C-90i group) length of the hipbone and the femur increased by 3.02% and 6.81% and height of body of the L1 vertebra – by 6.52%. Also width of the proximal femoral epiphysis and both cross sizes of the femoral shaft increased by 6.81%, 4.96%, and 4.60% respectively.

**Conclusion:** Excessive 90-d caffeine intake results in decrease of both longitudinal and appositional growth rate of the skeletal bones namely the hipbone, the femur, and the L1 vertebra. Administration of mexidol to animals taking excessive caffeine results in restoration of growth rate of the skeletal bones in infantile rats.

P699

# ROLE OF ANGIOPOIETIN-LIKE PROTEINS TYPES 3 AND 4 IN PREDICTING AXIAL FRACTURE RISK IN PATIENTS WITH RHEUMATOID ARTHRITIS

V. A. Aleksandrov<sup>1</sup>, A. V. Aleksandrov<sup>2</sup>, L. N. Shilova<sup>1</sup>, G. Y. Osmanova<sup>2</sup>, N. V. Aleksandrova<sup>2</sup>, I. A. Zborovskaya<sup>2</sup>

<sup>1</sup>Volgograd State Medical University, the Dept. of Hospital Therapy,

<sup>2</sup>Research Institute of Clinical & Experimental Rheumatology A.B. Zborovskiy, Volgograd, Russia

**Objective:** Early detection of osteoporosis signs in rheumatoid arthritis (RA) patients at increased risk of osteoporotic fractures presents an opportunity for timely lifestyle adjustments or prescription of drug therapy, which positively affects both the cost effectiveness of treatment and the quality of life of patients. This study aimed to investigate the role of ANGPTL types 3 and 4 in predicting the risk of fractures on axial support areas (lumbar vertebrae and femoral neck) in patients with rheumatoid arthritis.

**Methods:** 88 patients with reliable RA (mean age, 54.19±11.97 y, and duration of disease, 11.21±8.65 y) were included in the study. To determine ANGPTL4 in serum, we used the RayBio Human ANGPTL4 ELISA Kit test system (RayBiotech, USA), for ANGPTL3 determination - test system Human Angiopoietin-like Protein 3 ELISA (Bio Vendor, Czech Republic). All RA patients underwent osteodensitometry (Lunar DPX, GE, USA) with estimation of BMD.

**Results:** Significant positive correlation was found between the level of ANGPTL3 and the presence of osteoporosis ( $r=0.36$ ,  $p=0.039$ ) and between ANGPTL4 and the presence of osteopenia ( $r=0.44$ ,  $p=0.028$ ). There was evidence of a close association between ANGPTL3 and osteoporotic changes in the femoral neck ( $BMD_{Total}$   $r=-0.33$ ,  $p=0.042$ ;  $BMD_{Troch}$   $r=-0.36$ ,  $p=0.038$ ;  $BMD_{Wards}$   $r=-0.44$ ,  $p=0.009$ ), and ANGPTL4 and osteoporotic changes in the spine ( $BMD_{L1-L4}$   $r=-0.37$ ,  $p=0.025$ ). It was found that patients with elevated levels of ANGPTL3 (more than 445 ng/mL) had osteoporotic fractures in the femoral neck in 33.8% of cases, while those with decreased levels (less than 248 ng/mL) had 5.9% ( $\chi^2=5.257$ ,  $p=0.022$ ). In the group of RA patients with elevated levels of APPB4 (>3 SD), osteoporotic fractures in the spine were also observed in a higher percentage of cases ( $\chi^2=4.93$ ,  $p=0.04$ ).

**Conclusion:** Presumably the determination of angiopoietin-like proteins types 3 and 4 can be used in isolation to diagnose osteoporosis in RA patients at an earlier stage, contributing to independent and accurate prediction of fracture risk by axial support areas.

P700

# OSTEOPOROSIS AND CARDIOVASCULAR DISEASE RISK SCORES IN THE ELDERLY POPULATION: RESULTS FROM BUSHEHR ELDERLY HEALTH (BEH) PROGRAM

N. Fahimfar<sup>1</sup>, F. Zahedi Tajrishi<sup>2</sup>, S. Gharibzadeh<sup>3</sup>, M. Sanjari<sup>1</sup>, K. Khalaji<sup>1</sup>, G. Shafiee<sup>4</sup>, R. Heshmat<sup>4</sup>, I. Nabipour<sup>5</sup>, B. Larijani<sup>6</sup>, A. Ostovar<sup>1</sup>

<sup>1</sup>Osteoporosis Research Center, Endocrinology & Metabolism Clinical Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran, <sup>2</sup>School of Medicine, Johns Hopkins University, Maryland, USA, <sup>3</sup>Dept. of Epidemiology & Biostatistics, Research Centre for Emerging & Reemerging Infectious Diseases, Pasteur Institute of Iran, Tehran, Iran, <sup>4</sup>Chronic Diseases Research Center, Endocrinology & Metabolism Population Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran, <sup>5</sup>The Persian Gulf Marine Biotechnology Research Center, The Persian Gulf Biomedical Sciences Research Institute, Bushehr University of Medical Sciences, Bushehr, Iran, <sup>6</sup>Endocrinology & Metabolism Research Center, Endocrinology & Metabolism Clinical Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran

**Objective:** Previous research suggests BMD might be an independent predictor of cardiovascular disease (CVD) risk. This study aimed to investigate the correlation between BMD and well known CVD risk scores in the elderly population.

**Methods:** We used the data from the 2nd phase of the BEH program. BMD was measured using DXA method. The CVD risks were estimated for all participants using the original coefficients and variables provided by the ACC/AHA Pooled Cohort Equations CV Risk. Considering the nonnormal distribution of CVD risks, nonparametric tests were used. Spearman rank test was applied to assess the correlation between CVD scores and BMD in different sites including femoral neck, and spine. The estimated risks were compared in participants with and without osteoporosis.

**Results:** A total of 2405 participants (1160 men) with a mean age of 69.3 (±6.4) y were included. ACC/AHA risk score showed a significant negative correlation with the femoral neck t-score in both men (Spearman's rho: -0.147, p-value: <0.001) and women (Spearman's rho: -0.269, p-value: <0.001). In women, a significant negative correlation was detected with the spinal t-score (Spearman's rho: -0.123, p-value: <0.001). The comparison of CVD risks in the osteoporotic and non-osteoporotic population are provided in Table. In all, individuals with both femoral neck and spinal osteoporosis showed a higher CVD risk than the non-osteoporotic population.

**Conclusion:** The results showed a significant correlation between the femoral neck and spinal t-scores with the ACC/AHA CVD risk score. The median risk scores of CVD were significantly higher in individuals with osteoporosis in different sites in both men and women.

Table. The median CVD risk scores in the osteoporotic and non-osteoporotic elderly population.

		Osteoporosis +	Osteoporosis -	P-value
Women	Femoral neck	0.197	0.131	<0.001
	Spinal	0.172	0.143	0.0001
Men	Femoral neck	0.289	0.240	0.003
	Spinal	0.221	0.252	0.005

## P701

### STRENGTH OF THE HUMERUS IN RATS AFTER IMPLANTATION OF OK-015 INTO THE TIBIA AND IV ADMINISTRATION OF MESENCHYMAL STEM CELLS ON THE 24TH DAY AFTER INTERVENTION

N. Pashchenko<sup>1</sup>, V. Luzin<sup>1</sup>, I. Frolov<sup>1</sup>, Y. U. Venidiktova<sup>1</sup>

<sup>1</sup>State Establishment of Lugansk People's Republic Saint Luka Lugansk State Medical University, Lugansk, Ukraine

**Objective:** To test strength features of the humerus in rats after implantation hydroxyapatite material OK-015 into the tibia and intravenous injections of allogenic mesenchymal stem cells (MSC) 24 d after intervention.

**Methods:** In the study 72 male rats were distributed into several groups. Group K consisted of intact animals. Group D comprised animals with fracture of the tibia modeled as a 2 mm round opening in the proximal part of the tibia. In animals of group OK the openings in the tibiae were filled with hydroxyapatite material OK-015. Animals of MSC24 group received IV injections of MSC (5E6 per injection) in 24 d after implantation of OK-015. Observation terms were 30, 60, and 90 d after implantation. MSC were obtained from the red bone marrow of donor animals. Phenotyping was performed with the use of indirect fluorescent immunoassay with the help of the markers to MSC of the cell culture. Strength features were tested with the help of three-point bending technique at loading speed of 0.25 mm/min up to destruction. Distance between support points of the loading device was 10 mm. Statistical analysis of the data obtained was performed by means of standard software.

**Results:** Fracture of the tibia resulted in decrease of strength of the humerus with manifestations peak registered by the 30<sup>th</sup> and the 60<sup>th</sup> days after intervention. In the OK group strength exhibited decrease in early terms of observation with faster restoration in later terms. In MSC24 group no significant changes as compared

with the controls were found. Comparing data from MSC24 group with OK group we found out that specific sag values increased on the 30<sup>th</sup> and the 90<sup>th</sup> days by 6.30% and 5.16%.

**Conclusion:** Administration of MSC on the 24<sup>th</sup> day after implantation of OK-015 into the tibia slightly optimizes elasticity of the humerus on the 30<sup>th</sup> and the 90<sup>th</sup> day of the experiment. Hence administration of the stem cell in order to reduce systemic effects of fractures and surgery on the skeleton must be started shortly after onset of adverse event.

## P702

### EFFECTS OF QUERCETIN AND THIOTRIAZOLIN ON BONE FORMATION IN PRESENILE DIABETIC RATS WITH TIBIA FRACTURE

A. Torba<sup>1</sup>, V. Luzin<sup>1</sup>, D. Lugovskov<sup>1</sup>, N. Botnar<sup>1</sup>

<sup>1</sup>State Establishment of Lugansk People's Republic Saint Luka Lugansk State Medical University, Lugansk, Ukraine

**Objective:** Improvement of bone formation in presenile diabetic rats with tibia fracture using thiotriazolin (TTZ) and quercetin (QU).

**Methods:** In the experiment we used 210 rats with body weight of 290-300 g aged 17-18 months. 1<sup>st</sup> group consisted of intact rats, 2<sup>nd</sup> group consisted of rats with tibia fracture made in the proximal part of the tibia. Diabetes mellitus (3<sup>rd</sup> group) was caused by a single intraperitoneal injection of streptozotocin (Sigma-Aldrich, USA) at 55 mg/kg. In 72 h we performed blood sugar test in these animals and picked those in which blood sugar level was 12 mmol/l or above. In animals of 4<sup>th</sup> group fracture of the tibia was modeled after diabetes development. Last two groups of diabetic rats with the tibia fracture received intraperitoneal TTZ (117.4 mg/kg daily) and intragastric QU (0.32 g/kg daily). The humeri (H), the hipbones (HB), and L3 vertebra (LV) were excised and prepared for gross measurements.

**Results:** In 3<sup>rd</sup> group growth also slowed in the same period yet restoration of growth rate was not observed, by the 90<sup>th</sup> days sizes of the H, HB and LV decreased in comparison with the controls by 4.67-7.74%. In 4<sup>th</sup> group in comparison with 2<sup>nd</sup> group growth deceleration even progressed by the 60<sup>th</sup> and the 90<sup>th</sup> days. In animals that received QU sizes of the bones grew in comparison with those of 4<sup>th</sup> group beginning from the 60<sup>th</sup> day yet stayed outside confidence interval. In animals that received TTZ width of the H shaft by the 60<sup>th</sup> and the 90<sup>th</sup> days increased in comparison with that of 4<sup>th</sup> group by 5.88% and 4.84%. Width of HB, width of LV body and antero-posterior size of the H shaft increased by 5.27%, 4.12%, and 4.76% by the 90<sup>th</sup> day.

**Conclusion:** Diabetes and fracture in rats result in inhibition of growth rate by the 60<sup>th</sup> and the 90<sup>th</sup> days. Fracture in diabetes has more adverse effects on bone growth in the same period. Administration of QU and TTZ to diabetic animals with fracture results in restoration of growth rate. TTZ is more effective than QU.

P703

### PREDICTIVE VALUE OF TIP APEX DISTANCE IN INTERTROCHANTERIC FRACTURE MANAGED BY PROXIMAL FEMORAL NAILING

V. Khanna<sup>1</sup><sup>1</sup>Dept. of Orthopaedics, Kailash Hospital, Khurja, India

**Objective:** Tip apex distance (TAD) is a well established method of prediction of outcome in intertrochanteric fractures managed by dynamic hip screw. This retrospective study was done to assess the significance of TAD in the management of intertrochanteric fractures by proximal femoral nail.

**Methods:** The study was done in a tertiary care center where 174 follow-up patients operated for intertrochanteric fractures with proximal femoral nail were included in the study. The radiological outcome of patients was assessed using the neck-shaft angle, neck length, and offset whereas the functional status was assessed using the Harris hip score and the Lower extremity functional scoring system. These functional and radiological outcomes were compared with the TAD for any significant findings.

**Results:** The tip apex distance on the postoperative X-ray was found to be 22.93 +3.88 mm. The Lower Extremity Functional Score was found to be 70.71+8.153. The Harris Hip Score was found to be 85.408+9.586. Change in the neck length as compared to the uninjured hip was found to be 1.46+1.705. Change in the offset and neck-shaft angle was 1.38+1.567 and -2.61+1.27 respectively. There were 8 cases of screw cut out and 8 cases of superficial infection.

**Conclusion:** The Harris hip score and the LEFS increased with decreasing values of the TAD. The neck shaft angle, neck length, and offset all decreased with the increase in the TAD. The Harris hip score and the LEFS decreased with the decrease in the neck shaft angle, Neck length, and offset. On examining the 2 groups one with TAD <25 mm and the other with TAD >25mm it was seen that both functionally and radiologically, the outcome was better in the group having TAD <25 mm. This study indicates that the Tip Apex Distance can be used as a useful predictor of the outcome of the proximal femoral nail in intertrochanteric fractures.

P704

### THE EFFECTS OF THIAZIDE USE ON BONE MINERAL DENSITY

A. McDonough<sup>1</sup>, E. Laird<sup>2</sup>, L. Hoey<sup>3</sup>, C. F. Hughes<sup>3</sup>, H. McNulty<sup>3</sup>, M. Ward<sup>3</sup>, J. J. Strain<sup>3</sup>, A. Molloy<sup>2</sup>, C. Cunningham<sup>4</sup>, K. McCarroll<sup>1</sup>

<sup>1</sup>Bone Health and Osteoporosis Unit, Mercer's Institute for Successful Ageing, St. James's Hospital, Dublin, Ireland, <sup>2</sup>Trinity College Dublin, Dublin, Ireland, <sup>3</sup>Ulster University, Coleraine, UK, <sup>4</sup>Mercer's Institute for Successful Ageing, St. James's Hospital, Dublin, Ireland

**Objective:** Thiazide diuretics are widely used drugs in the treatment of hypertension. Previous studies have described a positive influence on BMD and fracture risk. We aim to explore the effect of thiazide use on BMD in an older, Irish Population.

**Methods:** Study participants were derived from the Trinity Ulster Dept. of Agriculture (TUDA) patient cohort of over 5,000 community-dwelling, Irish adults aged >60 y. Participants who were treatment naïve to osteoporosis medications and had BMD measurements of the spine and hip using DXA were included. The relationship between thiazide use and BMD was explored in multinomial regression models.

**Results:** We identified 3663 patients, mean age 73.4 y (range 60-98.8), 58.5% female and 20.4% (n=747) were taking thiazides. Thiazide use was positively associated with BMD at the femoral neck (P=0.04), total hip (P=0.003) and spine (P=0.0001), before and after adjustment for age, gender, BMI, smoking and alcohol use, steroid use, physical frailty (Timed Up and Go) and dietary calcium intake. Thiazides were also associated with significantly lower bone turnover markers (P<0.0001) and a higher serum calcium level, independent of PTH (P<0.0001). The association with hip fracture was not significant (P=0.06).

**Conclusion:** We identified that thiazide use was independently associated with greater BMD at the femoral neck, total hip and spine. Thiazides reduce urinary excretion of calcium, and may also increase intestinal and skeletal calcium absorption, potentially explaining their impact on BMD. Thiazides can be considered for treatment of hypertension in older people who are at risk of osteoporosis or fracture. However, this needs to be balanced with the risk of orthostatic hypotension and falls, particularly in those with frailty.



P705

# CHANGE IN KYPHOSIS DOES NOT AFFECT THE RISK OF FALLING IN POSTMENOPAUSAL OSTEOPENIC AND OSTEOPOROTIC WOMEN

D. Nikolaou<sup>1</sup>, S. Rizou<sup>1</sup>, G. Lyritis<sup>1</sup>, V. Nikolaou<sup>2</sup>, G. Babis<sup>2</sup>, E. Chronopoulos<sup>2</sup>

<sup>1</sup>Hellenic Osteoporosis Foundation, Athens, Greece, <sup>2</sup>2nd Orthopedic Dept., Konstantopoulion Hospital, School of Medicine, National and Kapodistrian University of Athens, Athens, Greece

**Objective:** To examine the annual change in kyphosis and its influence on the risk of falling in postmenopausal osteopenic and osteoporotic women.

**Methods:** This prospective observational study included 498 postmenopausal Greek women exceeding the 50<sup>th</sup> year of age, suffering from either osteoporosis or osteopenia. Data on age, height, weight, and self-reported falls were collected. Additionally, we evaluated the degree of the kyphosis angle, the balance, the mobility, the functionality and the hand grip strength on both hands of each participant via the use of the Debrunner kyphometer, the Berg Balance Scale, the Timed-Up-and-Go test, the 30 Seconds Sit-to-Stand test and the Jamar Hydraulic Hand Dynamometer, respectively. All of the above mentioned data were recorded at the baseline visit and the 1year follow-up visit for each participant.

**Results:** All examined variables presented a statistically significant change at the 1 year follow-up visit. Nevertheless, the annual change in kyphosis did not show any association with the risk of falling in postmenopausal osteopenic and osteoporotic women.

**Conclusion:** No association was shown between the annual change in kyphosis and the risk of falling in postmenopausal osteopenic and osteoporotic women, nor bears any substantial prognostic value for future falls.

P706

# INFECTIONS IN THE STRUCTURE OF COMORBID PATHOLOGY IN PATIENTS WITH INFLAMMATORY DISEASES OF THE JOINTS

N. V. Muravyeva<sup>1</sup>, B. S. Belov<sup>1</sup>, M. M. Baranova<sup>1</sup>, M. A. Litvinova<sup>1</sup>, T. V. Korotaeva<sup>1</sup>

<sup>1</sup>V.A. Nasonova Research Institute of Rheumatology, Moscow, Russia

**Objective:** To evaluate the significance of infections in the structure of comorbid pathology in patients with inflammatory diseases of the joint (IDJ) during a single-stage retrospective study.

**Methods:** The study included 437 patients with IDJ (259 women, 178 men, mean age 45 y): 172 - rheumatoid arthritis, 169 - ankylosing spondylitis, 74 - psoriatic arthritis, 22 - undifferentiated spondylarthritis. The majority of patients (n=343) received immunosuppressive therapy (glucocorticoids, methotrexate, leflunomide, biological drugs). The patients were interviewed by a research doctor with the completion of a unified questionnaire. Additional information was obtained from medical records.

**Results:** The following comorbid pathology was documented in patients with IDJ: cardiovascular diseases - 30.1%, gastrointestinal diseases - 27.2%, respiratory diseases - 12.5%, endocrine system diseases - 10.9%, urogenital diseases - 9.1%, skin diseases, except for psoriasis - 4.2%. 653 cases of respiratory tract infections (RTI) and ENT organs and 537 cases of infections of other localization were diagnosed. RTI and ENT organs included acute nasopharyngitis (n=273), tonsillitis (n=110), pneumonia (n=69, including 29 caused by the SARS-CoV2 virus), acute bronchitis (n=54), sinusitis (n=52), influenza (n=47), otitis (n=41), tuberculosis (n=7). Infections of other localizations were represented by herpes-viral infections (n=184), mycoses (n=121), urinary tract infections (n=84), conjunctivitis and blepharitis (n=63), skin infections (n=26), intestinal infections (n=25), genital infections (n=22), osteomyelitis, purulent arthritis, nervous system infections (2 cases each), chronic hepatitis A, B and C, rubella, measles, HIV infection (1 case each). After the debut of IDJ, an increase in the frequency of acute nasopharyngitis, acute bronchitis, sinusitis, herpes-viral infections, and mycoses was noted. Serious infections requiring hospitalization and/or intravenous administration of antibiotics were diagnosed in 78 patients. Of these, 64% of cases were caused by RTJ and ENT organs (pneumonia, including those caused by the SARS-CoV2 virus, acute bronchitis, sinusitis, purulent otitis), 36% - by other infections (intestinal infections, purulent paraproctitis, acute salpingitis, purulent endometritis).

**Conclusion:** The problem of infections in patients with IDJ still remains relevant. Further studies are needed on large samples of patients with the aim of studying the prevalence of infections depending on the therapy (primarily, biological drugs), as well as the search for significant risk factors.

P707

# COMPARISON OF MEAN A BLOOD PRESSURE AND HEART RATE AFTER A SUSTAINED ISOMETRIC CONTRACTION TEST FOR 3 MINUTES AT 30% OF MAXIMUM STRENGTH BETWEEN SUBACUTE POST-COVID-19 PATIENTS AND HEALTHY CONTROLS

A. Olascoaga-Gómez de León<sup>1</sup>, X. López-Megchun<sup>1</sup>, N. C. Centeno-Morales<sup>1</sup>, L. E. Quintanar-Trejo<sup>1</sup>, K. Zarco-Ordoñez<sup>1</sup>, A. Y. A. Aragón-Hernández<sup>1</sup>, J. Quinzanos-Fresnedo<sup>1</sup>, R. Coronado-Zarco<sup>1</sup>

<sup>1</sup>Instituto Nacional de Rehabilitación, Mexico, Mexico

**Objective:** To compare autonomic blood pressure and heart rate response to isometric sustained contraction in patients in subacute SARS-CoV-2 infection.

**Methods:** Subjects in subacute SARS-CoV-2 infection (3 weeks after diagnosis confirmation), and healthy volunteers were invited. Autonomic function test was performed using grip dynamometry described by Ewing, 1973. Measure of grip force was performed using Jamar type hydraulic dynamometer (kg), maximum strength was obtained by mean of 3 repetitions of dominant arm, with 1-min interval between each one. Test consisted of performing voluntary isometric contraction of 30% of maximum strength for 3 min. A 2-min recovery period was granted. Blood pressure and heart rate was monitored with a digital baumanometer (Omron HEM-7322T), of the nondominant arm. Registration was done 3 times, at the beginning of the test, at the end of the test and after recovery. Registration of the research and ethics committee were obtained. Statistical analysis: For qualitative variables, frequencies and percentages were calculated. Quantitative variables were compared with central tendency and dispersion measures. Inferential analysis depending on parametric or non-parametric behavior (Shapiro Wilk) were calculated by means or medians differences. Repeated measures factorial analysis was adjusted for age and baseline mean blood pressure and heart rate as co-variables.

**Results:** We analyzed 50 subjects, 25 in each group. Statistical significant differences between group ages (cases X=46.3, DS14.7; control X=36.8, DS 10; p=0.02), mean strength (cases X=29.1, DS 9.4; Control 33.1, DS 8.6; p=0.02), for mean arterial pressure in recovery (case 95.5, SD 10; control 88.1, SD 10; p=0.01) and heart rate in recovery (case X=78.6, SD 12.9; 71.6. 1, SD 11.8; p=0.05). Results of repeated measures factorial analysis adjusted for age a had significant statistical difference between the comparison of both groups in the three measurements (p=0.001; global significance p=0.07 with statistical power of 66% for mean arterial pressure and global significance p=0.089 with 65% statistical power for heart rate).

**Conclusion:** We found differences in blood pressure and heart rate in patients in subacute COVID-19. Autonomic cardiovascular response to sustained isometric contraction and recovery are affected. Muscle strength of post-COVID-19 patients is decreased

compared to controls. Limitations of our study are sample size (statistical power of 65% and 66%) and age differences between groups.

P708

# MEDITERRANEAN DIET ADHERENCE AND ITS ASSOCIATIONS WITH BONE QUALITY, CHRONIC INFLAMMATION, AND PHYSICAL FUNCTION IN SARCOPENIC OBESE OLDER ADULTS

M. M. Cervo<sup>1</sup>, T. McCaffrey<sup>2</sup>, B. De Courten<sup>1</sup>, C.-A. Ng<sup>1</sup>, A. Gandham<sup>1</sup>, P. Ebeling<sup>1</sup>, D. Scott<sup>1</sup>

<sup>1</sup>Dept. of Medicine, School of Clinical Sciences at Monash Health, Monash University, <sup>2</sup>Dept. of Nutrition and Dietetics, School of Clinical Sciences at Monash Health, Monash University, Clayton, Australia

**Objective:** Sarcopenic obesity adversely impacts bone health of older adults. However, it is still unclear how diet, particularly Mediterranean dietary patterns, may exert favourable effects on bone quality and inflammation in sarcopenic obese older adults. This study aimed to determine associations between adherence to Mediterranean diet and high sensitivity C-reactive protein, physical function, bone turnover markers and bone quality in sarcopenic obese older adults.

**Methods:** 50 sarcopenic obese older adults with mean age 70.8±6.7 y were included in this cross-sectional study. Adherence to Mediterranean diet was assessed using MEDI-LITE (literature-derived Mediterranean diet) score which was obtained using a validated 3-d food record. Bone quality was determined using bone turnover markers as well as distal tibial volumetric BMD and microarchitecture which were assessed using HR-pQCT. Physical function such as gait speed, and hand grip strength were assessed by walking a 2.44-m course and using a dynamometer respectively. Serum samples were analysed for hs-CRP, C-terminal telopeptide of type 1 collagen (CTX), procollagen type 1 N-terminal propeptide (PINP), and 25-hydroxyvitamin D (25OHD).

**Results:** A higher MEDI-LITE score, indicating greater adherence to Mediterranean diet, was associated with lower cortical porosity ( $\beta$ : -0.010; 95%CI: -0.018, -0.001) in the fully adjusted model; and higher cortical cross-sectional area ( $\beta$ : 3.845 mm; 95%CI: 0.591, 7.100) in the unadjusted model. Sarcopenic obese older adults who had higher adherence to Mediterranean diet had higher cortical cross-sectional area ( $\beta$ : 14.282 mm; 0.691, 27.874); cortical volumetric BMD ( $\beta$ : 65.128 mg HA/cm<sup>3</sup>; 95%CI: 15.438, 114.818); and cortical thickness ( $\beta$ : 0.168 mm; 95%CI: 0.002, 0.315); as well as lower cortical porosity ( $\beta$ : -0.010; 95%CI: -0.018, -0.001) compared with those who less adhere to Mediterranean diet. Those who greatly adhere to Mediterranean diet had lower hs-CRP ( $\beta$ : -1.182 mg/L (95%CI: -2.152, -0.212) in the sex-adjusted model. MEDI-LITE scores were not associated with physical function and bone turnover markers.

**Conclusion:** Greater adherence to Mediterranean diet is associated with better cortical bone quality, which may be an important target for fracture and falls risk prevention especially in sarcopenic obese older adults.

P709

### MANAGEMENT APPROACHES OF MALE OSTEOPOROSIS

M. R. Păcurar<sup>1</sup>, D. Păcurar<sup>1</sup>, M. I. Popescu<sup>1</sup>, K. Babes<sup>1</sup>

<sup>1</sup>University of Oradea, Faculty of Medicine & Pharmacy, Oradea, Romania

**Objective:** With the aging of our society, the prophylaxis and management of osteoporosis has become a public health challenge.

**Methods:** A 80-year-old male patient presents to our department for: chronic pain in his right knee associated with limping gait. His past medical history is significant only for moderate renal failure. He takes no medication, other than OTC analgesics. He is a non-smoker and denies alcohol consumption.

**Results:** Physical examination revealed: BP=110/80 mmHg, HR=70 BPM, SO<sub>2</sub> on room air=98%, respiration rate=18 breaths/min, temperature=36.4°C. He is awake and alert. Locomotor system examination: bilateral paravertebral muscular contracture in the inferior dorsal and lumbar region, painful lumbar flexion, bilateral crepitus present during knee movement, increased sensitivity at right pes anserinus, severely limited right hip in all axis of movement, (+) Patrick on the right side, limping gait. ECG: normal sinus rhythm, without pathological findings. Lab work: altered kidney function, mild hypercholesterolemia, hypocalcemia, and decreased vitamin D levels. Multi-level X-ray results: lumbar L4/L5 and L5/S1 discopathy, lumbar spondylarthrosis, multiple spinal compressions, bilateral gonarthrosis, right hip pseudoarthrosis. DXA results indicate low bone density (T-score lumbar spine -3.5, T-score left femoral neck=-2.8, the right one was excluded because of severe pathology). Abdominal US: right kidney atrophy. We initiated antiosteoporotic treatment, vitamin D and Calcium supplements, analgic electrotherapy, thermotherapy, therapeutic massage and physical therapy exercises, adapted to the current conditions. The patient was referred to an orthopedic specialist for hip replacement.

**Conclusion:** While evidence regarding the prophylaxis, diagnosis and treatment of osteoporosis has continuously expanded over the last few years, gaps in the literature still exist with the management of some particular cases, like the one we presented.

P710

### IMPACT OF HOME CONFINEMENT DURING THE COVID-19 PANDEMIC ON WOMEN WITH OSTEOPOROSIS: RESULTS OF THE ECTO SURVEY

E. Casado<sup>1</sup>, S. González<sup>2</sup>, I. Aristegui<sup>3</sup>

<sup>1</sup>Rheumatology Dept., University Hospital Parc Taulí, Sabadell, <sup>2</sup>Obstetrics & Gynecology Dept., HM Gabinete Médico Velázquez, Madrid, <sup>3</sup>Theramex Healthcare, Madrid, Spain

**Objective:** The home confinement of the Spanish population for 2 months due to the COVID-19 pandemic could have a negative effect on women with osteoporosis and worsen their risk of fracture. This study aimed to analyze the impact of confinement due to the COVID-19 pandemic on the health and lifestyle of women with osteoporosis in Spain, as well as on adherence to treatment for fracture prevention.

**Methods:** Between April 14 and June 19, 2020, Spanish women diagnosed with osteoporosis and undergoing active treatment were invited to anonymously answer an online questionnaire of 19 questions using the Survey Monkey tool (<https://www.surveymonkey.com/r/survey>). The study obtained the approval of the CEIm and had the scientific endorsement of the SEIOMM (Spanish Society for Bone and Mineral Research) and the AEEM (Spanish Association for the Study of Menopause), and with the collaboration of AECOSAR (Spanish Association with Osteoporosis and Osteoarthritis).

**Results:** 543 women (age 63±9.4 y) from 15 autonomous communities (52% from Madrid or Catalonia) answered the survey. 65% had been diagnosed with osteoporosis in the last 5 y and 31% had had a previous fragility fracture. 62% of the patients were receiving oral bisphosphonates, 27% denosumab, 4% selective estrogen receptor modulators (SERM), 4% teriparatide, 2% zoledronic acid, and 1% menopausal hormone therapy (MHT). 75% of the women decreased their physical activity during confinement, and only 7% increased it. 11% of women reported fewer falls, compared to 5% who reported having fallen more than before. 7% and 11% of the women increased their consumption of alcohol and tobacco respectively. Although 64% of the women did not perceive changes in their general health, 32% reported having worse health than before. 51% of the women felt sadder and up to 57% perceived that they had greater anxiety than before confinement. During confinement, a loss of adherence to the main treatment for osteoporosis was observed in 14% of the women (7% abandoned it and 7% confessed that they forgot more than usual), and this loss was significantly greater in women younger than 59 y (22% vs. 13% of those older than 59 y;  $p < 0.05$ ). Loss of adherence according to treatment was: MHT/SERM 46%, teriparatide 20%, zoledronic acid 14%, denosumab 6% and oral bisphosphonates 6%. Although 9% and 6% of women were non-adherent to calcium and vitamin D supplements respectively, it's remarkable that 20% of women increased their dairy products intake. A significant association was observed between the health perception and treatment adherence

( $p < 0.05$ ), being the women with worse health perception less adherent to osteoporosis treatment. No association was found between adherence and emotional state (anxiety or depression).

**Conclusion:** Home confinement during the COVID-19 pandemic had a negative impact on both some lifestyle habits and the health perception among women with osteoporosis, experiencing most of them a worsening of their emotional state. Although overall treatment adherence was good, younger women and/or those who received daily treatments had a higher proportion of treatment discontinuation.

P711

### NEW PERSPECTIVES OF CHONDROITIN SULFATE: COMBINATION OF INTRAARTICULAR AND INTRAMUSCULAR ROUTE OF RECEIVING IN KNEE OA

E. Sharapova<sup>1</sup>, N. Kashevarova<sup>1</sup>, D. Kusevich<sup>1</sup>, E. Taskina<sup>1</sup>, L. Alekseeva<sup>1</sup>, A. Lila<sup>1</sup>

<sup>1</sup>V.A. Nasonova Research Institute of Rheumatology, Moscow, Russia

**Objective:** Assessment of effectiveness and safety of chondroitin sulfate intraarticular and intramuscular scheme of receiving in patients with knee OA in compare with intramuscular course

**Methods:** in study were enrolled 150 patients with knee OA (2-3 stages by Kellgren-Lawrence classification). After randomization patients were divided into two groups 1:1. 1st group got 5 intraarticular injection in target knee with 200 mg dose once every 3 d, next treatment was 16 intramuscular injection with 200 mg dose every other day. 2nd group got 25 intramuscular injection with escalation of dose: first 3 injection in dose 100 mg, from 4th injection dose was stable – 200 mg, every other day. All patients received NSAIDs (meloxicam 15 mg/d). Measurement of effectiveness was by WOMAC index, pain by visual analog scale (VAS), McGill Pain Questionnaire (MPQ).

**Results:** After compare of two scheme of Chondroitin Sulfate treatment at 1st group was lower intensity of pain by VAS that at 2nd group ( $16,81 \pm 13,49$  vs.  $21,88 \pm 13,24$ ;  $p < 0,0001$ , respectively). WOMAC index, pain, stiffness, and functional limitations and pain by MPQ questionnaire were similar. There was no significant difference between 1st and 2nd groups. No serious adverse events was identify. Adverse events in follow-up period were detected in 3.3% (5/150), all AEs were stopped by the end of study.

**Conclusion:** Chondroitin sulfate have significant analgesic effect in combination scheme of treatment, and it was anti-inflammatory action lead to docked of synovitis. Both schemes decreased pain, stiffness, improved function. This data opens new possibilities of chondroitin sulfate usage in knee OA with synovitis. Good safety profile of chondroitin sulfate might be special considerations for patients with comorbidities.

P712

### SOFT BONE IS WEAK: PROSPECTIVE, BLINDED INTRAOPERATIVE ASSESSMENT OF BONE CORRELATES WITH T-SCORE

B. Nickel<sup>1</sup>, D. Krueger<sup>1</sup>, G. Borchardt<sup>1</sup>, L. Andersen<sup>1</sup>, R. Illgen<sup>1</sup>, D. Hennessy<sup>1</sup>, N. Binkley<sup>1</sup>, P. Anerson<sup>1</sup>

<sup>1</sup>University of Wisconsin, Madison, USA

**Objective:** Intuitively, intraoperative physician assessment (IPA) of bone would be an excellent measure of quality as surgeons gain insight into bone strength through haptic feedback while bone preparation is performed. However, no studies evaluate a surgeon's ability to do so. Our purpose was to investigate IPA of bone quality in patients undergoing total knee arthroplasty (TKA) with a) lowest T-score BMD b) custom regions of interest (ROI) in distal femur BMD.

**Methods:** Prospectively, 70 patients identified as primary TKA candidates by 3 surgeons received pre-operative DXA (spine, hip, wrist, VFA and TBS). Intraoperatively, the surgeon assessed bone quality on a 5 point scale based on tactile feedback to resistance with preparation: 1=excellent, 2=above average, 3=normal, 4=below average and 5=poor. This IPA was recorded in the operative note. Demographic data, DXA results and IPA scale between surgeons was compared by factorial ANOVA. Lowest T-score (L-spine, femoral neck/total hip and 3 radius) and custom regions were correlated to IPA using Spearman's correlation.

**Results:** Mean IPA was  $2.74 \pm 1.2$  with no statistical difference ( $p = 0.284$ ) between surgeons. Demographic data, BMD, and lowest T-score of patients (38 surgeon A, 25 surgeon B and 7 surgeon C) not differ between surgeons. Mean age was  $65.8 \pm 7.6$  y and BMI  $31.4 \pm 5.1$  kg/m<sup>2</sup>. IPA directly correlated with lowest T-score ( $R = 0.482$ ) and ROI ( $R = 0.587 - 0.645$ ). Based on lowest T-score, no patients with osteoporosis were classified as above average bone quality and none with normal BMD were classified as having poor bone

**Conclusion:** Novel IPA provides valuable information that can identify patients with below average/poor bone quality and expedite treatment ideally decreasing periprosthetic fracture risk. Reproducibility between three surgeons highlights potential for universal implementation and future studies may validate IPA in hip replacement aiding implant fixation selection.



P713

**CARDIOVASCULAR DISEASES AND BONE MASS: TRADITIONAL RISK PROFILE**M. R. Păcurar<sup>1</sup>, D. Păcurar<sup>1</sup>, M. I. Popescu<sup>1</sup>, K. Babes<sup>1</sup><sup>1</sup>University of Oradea, Faculty of Medicine & Pharmacy, Oradea, Romania

**Objective:** Low BMD appear to be independent risk factor for cardiovascular morbidity and mortality in both postmenopausal women and men.

**Methods:** We present the case of a 73 year-old-female patient, hospitalised in our department for persistent symptoms: progressive stiffness and moderate pain in her cervico-dorso-lumbar spine, associated with radicular pain, bilateral hip and knee pain and limping gait. Her past medical history is significant for left hip replacement, arterial hypertension (stabilized on antihypertensive medication) and dyslipidemia (treated with statins). She is a nonsmoker and denies alcohol consumption.

**Results:** Physical examination revealed: BMI=29.4 kg/m<sup>2</sup>, BP=135/85 mmHg, HR=74 BPM, respiration rate=16 breaths/min, SO<sub>2</sub>=99% on room air, temperature=36.7°C. She is awake and alert. Locomotor system examination: moderate superior dorsal kyphosis, flattening of sagittal spinal curvature, painful lumbar flexion/extension, increased sensitivity at percussion of lumbar spinous apophysis, (+) Patrick on the right side, bilateral crepitus present during knee movement, limping gait. Lab work: nonspecific inflammatory response, hypocalcemia and decreased vitamin D levels. ECG: normal sinus rhythm with moderate ST-T changes and left ventricular hypertrophy. Echocardiography confirmed moderate left ventricular hypertrophy with preserved ejection fraction, without any cavity dilation or wall motion pathology. Multilevel X-ray results: lumbar discopathy, lumbar spondylarthrosis, severe L4 spinal compression, bilateral gonarthrosis, right coxarthrosis, and left hip prosthesis. DXA results indicate low bone density (T-score lumbar spine -3.5, T-score femoral neck=-3.5). Abdominal US: nephrolithiasis. After we completed the diagnostic workup, we established the following treatment: initiation of antiosteoporotic drugs, vitamin D and calcium supplements (close monitoring of calcium and vitamin D levels), antialgic drugs and rehabilitation program (consisting of-antalgic electrotherapy, thermotherapy, therapeutic massage and physical therapy exercises), adapted to the current conditions.

**Conclusion:** This particular case outlines the correlation between osteoporosis, cardiovascular diseases and lipid metabolism. Oxidized lipids have been suggested as a potential mechanism for low BMD and vascular calcification. Evidence based medicine suggests that abnormal lipid metabolism has detrimental effects on bone formation, especially in postmenopausal women. Still, the best way to counteract this complex processes is the preventive medicine, not well established by the available research today.

P714

**CHALLENGES IN THE MANAGEMENT OF HEART FAILURE IN OSTEOPOROTIC PATIENTS**M. R. Păcurar<sup>1</sup>, D. Păcurar<sup>1</sup>, M. I. Popescu<sup>1</sup>, K. Babes<sup>1</sup><sup>1</sup>University of Oradea, Faculty of Medicine & Pharmacy, Oradea, Romania

**Objective:** Heart failure and osteoporosis are frequently associated conditions, particularly in elderly. Management of both conditions in period of exacerbations can be really challenging.

**Methods:** We present the case of a 50-year-old female patient. From her medical history we find out that she suffers from heart failure of an unknown origin, severe osteoporosis, right thyroid cyst and parathyroid adenoma that was surgically removed a few years ago. She reports chronic dyspnea with fluctuations, light-headedness, reduced exercise tolerance and chronic generalized pain. She was on chronic medications for her heart failure and antiosteoporotic drugs. She is a nonsmoker and has no history of substance use.

**Results:** At presentation the patient has a normal BMI, BP=115/70 mmHg, HR=118 BPM, respiration rate=18/min, SO<sub>2</sub>=98% on room air, T=36.7°C. She is awake and alert, answers questions in full sentences. Cardiac examination reveals regular mild tachycardia with murmurs and gallops along with diffuse bilateral crackles. Her lower extremities are not edematous or tender. An ECG was performed: sinus rhythm, mild tachycardia, RBBB, a borderline PR interval and premature ventricular complexes. Bedside echocardiogram reveals a dilated left ventricle with reduced ejection fraction, severe mitral insufficiency, moderate tricuspid insufficiency with pulmonary hypertension, interventricular septum aneurysm and no pericardial effusion or intracardiac masses. Lab work: dyslipidemia, altered hepatic and renal function, mild hyperglycemia. After this findings we decided to adjust cardiac medication, to temporarily stop the antiosteoporotic drug and to refer her to a cardiac surgeon for severe valve pathology management.

**Conclusion:** Heart failure and osteoporosis are a public health issue of growing importance, because their impact on healthcare utilization, morbidity and mortality. We also know that a close relationship exists between heart failure and osteoporosis. In this particular case we intended to outline the challenges in the management of a young patient with two severe conditions that interfere.

P715

# LOW BONE MINERAL DENSITY IMPACT ON CARDIOVASCULAR DISEASES

M. R. Păcurar<sup>1</sup>, D. Păcurar<sup>1</sup>, M. I. Popescu<sup>1</sup>, K. Babes<sup>1</sup><sup>1</sup>University of Oradea, Faculty of Medicine & Pharmacy, Oradea, Romania

**Objective:** Low BMD has been related to increased cardiovascular pathology and accelerated atherosclerosis.

**Methods:** A 63-year-old female patient is referred to our cardiology department with a chronic intermittent atypical chest pain. She also had vague joint aches and mild fatigue over the past few months. She has had no recent illnesses and specifically denies having fever, cough, dyspnea or syncope. Her past medical history reveals osteoporosis (on chronic treatment), mild dyslipidemia (with normal cholesterol values on statin medication) moderate arterial hypertension (stable on antihypertensive drugs) and mild/moderate depression (treated by psychological counseling only). She is a nonsmoker and has no history of substance use.

**Results:** At presentation: BMI=32 kg/m<sup>2</sup>, HR=82 BPM, respiration rate=16/min, BP=120/80 mmHg. She has an oxygen saturation of 99% on room air. Her temperature was 36.5°C. She was awake and alert, and no apparent respiratory distress was present at the time. Cardiac examination reveals normal sinus rhythm without any murmurs, rubs or gallops. No wheezing, crackles or edema were found at the time of examination. Lab work: unremarkable. ECG revealed: mild nonspecific ST-T changes. Echocardiogram: left ventricular hypertrophy with a normal ejection fraction (LVEF of 62% estimated by modified Simpson method), no dilation of ventricle/atrium or wall motion abnormalities were present at that time. We performed a submaximal exercise stress test. We consider necessary to stop the test because of significant ST-T changes on stress ECG. We have to mention that stress test had no impact on patient chest pain. The vasopressor response at stress was normal with medication. Coronarography indicated 90% left main vessel stenosis, with good response after stenting the lesion and pain free. After 3 months the patient was reassessed for osteoporotic treatment as well.

**Conclusion:** Evidence based medicine demonstrates that atherosclerotic calcification and bone mineralization share similar mechanisms and the two of them are highly organized processes that interfere. It is well recognized that arterial calcification is not a passive process of calcium/phosphate deposition, but instead a complex active plaque formation, similar in structure with inorganic bone matrix. This particular case outlines the importance of reconsider the management of such case even if the ischemic pre evaluation test is inconclusive.

P716

# CURRENT BUT NOT PAST, BONE-SPECIFIC PHYSICAL ACTIVITY LEVELS ARE ASSOCIATED WITH BONE MINERAL DENSITY IN RETIRED RUGBY PLAYERS

I. Entwistle<sup>1</sup>, P. Francis<sup>2</sup>, M. Lees<sup>3</sup>, P. Hume<sup>4</sup>, K. Hind<sup>1</sup><sup>1</sup>Durham University, Durham, UK, <sup>2</sup>Institute of Technology Carlow, Carlow, Ireland, <sup>3</sup>University of Toronto, Toronto, Canada, <sup>4</sup>Auckland University of Technology, Auckland, New Zealand

**Objective:** Regular participation in weight-bearing sports is osteogenic. However, it is not clear if the benefits are sustained after cessation of sport or if current exercise levels in later life are more influential. This study investigated differences in BMD and its association with past and current levels of physical activity in retired rugby players and retired noncontact athletes and nonathletes.

**Methods:** 88 retired male rugby players (46.1±10.5 y; 100±15.1 kg; 1.80±0.08 m; 42 elite, 46 community level) and 50 retired noncontact athletes and nonathletes (49.8±14.5 y; 86.5±14.5 kg; 1.77±0.06 m) received a DXA scan (GE Lunar iDXA, GE Healthcare, Madison, WI) for the measurement of femoral neck BMD. A bone-specific physical activity questionnaire (BPAQ) (Weeks and Beck, 2008) was used to derive scores for current (cBPAQ) and past (pBPAQ) physical activity.

**Results:** Retired rugby players had higher femoral neck BMD compared to the non-rugby group (1.102±0.169 gcm<sup>2</sup> v 1.018±0.144 gcm<sup>2</sup>, p=0.004) but after adjustment for body mass, these differences were not statistically significant (p=0.096). The rugby group had higher pBPAQ scores (127.44±43.17 vs. 80.92±49.12, p<0.001) but there were no differences in cBPAQ scores (3.55±5.22 vs. 2.56±2.74, p=0.659). In the rugby group cBPAQ was moderately correlated with femoral neck BMD (r=0.40, p<0.001) but there were no associations with pBPAQ and BMD (r=0.06, p=0.581). No significant correlations between current or past BPAQ and femoral neck BMD were seen in the non-rugby group.

**Conclusion:** The long-term effects of rugby participation on bone density may be less important than current levels of bone-specific physical activity. It is important that former rugby players continue to engage in osteogenic physical activities post retirement from sport to support bone health.

P717

# BILATERAL DISTAL RADIUS FRACTURES IN ELDERLY PATIENTS WITH OSTEOPOROSIS: THE ROLE OF CALCIUM AND VITAMIN D IN THE PREVENTION OF REFRACTURES

P. Sevilla Ortega<sup>1</sup>, A. Aguirre Etxebarria<sup>1</sup><sup>1</sup>Hospital San Pedro, Logroño, Spain

**Objective:** Distal radius fractures represent 15% of all fractures and up to 90% of wrist fractures. They may occur in women over the age of 40 after low-energy trauma associated with underlying osteoporosis [1]. Osteoporosis is a “silent disease” and fragility fracture is a common presentation [2]. A correct approach to these patients should be followed by a secondary prevention of osteoporosis in order to reduce the risk of suffering new fractures.

Our objective is to review the incidence of bilateral distal radius fractures and refractures in elderly patients with osteoporotic bone that have been susceptible to conservative treatment.

**Methods:** We present a 82-year-old female patient with non-simultaneous bilateral dorsally displaced distal radius fracture (2009 and 2012) treated conservatively, as well as its subsequent evolution.

**Results:** After the first episode, treatment with calcium and vitamin D was started for underlying osteoporosis, diagnosed by bone densitometry. On two occasions, controls were carried out at 1, 2, 4 and 6 weeks until consolidation of fractures was observed in plain radiography (Figure 1). One year later, the patient was asymptomatic and had resumed normal activities.



Figure 1. PA and lateral right wrist radiograph (2012). Results after six weeks of conservative treatment.

Nine years after the last fracture, she fell from heights and was diagnosed with a right distal radius refracture (Figure 2A), without indication for surgical treatment. A closed reduction and immobilization with a below-elbow cast splint are performed (Figure 2B), and a subsequent follow-up similar to previous episodes was carried out. There have been no incidents to date.



Figure 2. A. AP and lateral right wrist radiograph (2021). Dorsally displaced distal radius refracture and distal ulna fracture. B. Right wrist radiograph after a closed reduction and immobilization with cast.

**Conclusion:** Low-energy wrist fractures are hallmarks of osteoporosis. Patients with osteoporosis who suffer fragility fractures have an increased risk of suffering both refractures and fractures in other locations due to their poor bone stock [3]. Adequate calcium intake, together with sufficient levels of vitamin D, have proven to be a good option to maintain a healthy bone state [4]. However nowadays it doesn't completely eliminate the possibility of future injuries.

## References

1. Bahari S, et al. Injury 2007;38:759
2. Tulipan J, et al. Orthop Clin North Am 2015;46:541
3. Talbot JC, et al. Injury 2007;38:1236
4. Martín-Laguna D. Rev Osteoporos Metab Miner 2019;11(Suppl 1):S13

P718

## RETIRED RUGBY PLAYERS POSSESS SUPERIOR LEAN MASS AND STRENGTH BUT NOT MUSCLE QUALITY

L. Entwistle<sup>1</sup>, P. Francis<sup>2</sup>, M. Lees<sup>3</sup>, P. Hume<sup>4</sup>, K. Hind<sup>1</sup>

<sup>1</sup>Durham University, Durham, UK, <sup>2</sup>Institute of Technology Carlow, Carlow, Ireland, <sup>3</sup>University of Toronto, Toronto, Canada, <sup>4</sup>Auckland University of Technology, Auckland, New Zealand

**Objective:** The age-associated loss of muscle mass and strength, otherwise known as sarcopenia, represents a major health challenge. We investigated the impact of previous participation in rugby codes by assessing differences in lean mass, body fat percentage, muscle strength and quality in retired rugby players and retired noncontact athletes and nonathletes.

**Methods:** In this cross-sectional study, 88 retired male rugby players (46.1±10.5 y; 100±15.1 kg; 1.80±0.08 m; 42 elite; 46 community level) and 51 retired noncontact athletes and nonathletes (49.7±14.4 y; 86.7±14.5 kg; 1.77±0.06 m) were assessed for body composition using DXA. Appendicular lean mass (ALM) and appendicular lean mass index (ALMI) were calculated. Cohorts from the rugby group (n=59) and non-rugby group (n=42) underwent hand grip strength testing and muscle quality (hand grip strength per unit of arms lean mass; MQ) was calculated. Sarcopenia prevalence was determined, using the following cut-points: ALMI <7.23 kg/m<sup>2</sup>; hand grip strength <37.2 kg.

**Results:** Total lean mass (68.3±9.1 kg vs. 57.9±8.0 kg), ALM (32.7±5.0 kg vs. 27.3±4.3 kg), and hand grip strength (51.7±8.8 kg vs. 44.1±7.6 kg) were significantly higher in the rugby group (p<0.001). There were no between-group differences in body fat percentage or MQ. The prevalence of sarcopenia was significantly higher in the non-rugby group, ALMI <7.23 kg/m<sup>2</sup> (8% vs. 0%; p=0.017); hand grip strength <37.2 kg (19% vs. 3%; p=0.015).

**Conclusion:** Retired competitive rugby code players have superior levels of hand grip strength and lean mass in later life. It is not clear if this represents genetic influences on self-selection or a sustained effect of previous participation in a highly physical sport.

P719

## MULTIPLE MYELOMA SCREENING WITHIN A FRACTURE LIAISON SERVICE (FLS)

G. Agarwal<sup>1</sup>, C. Milan<sup>1</sup>, Z. Mohsin<sup>1</sup>, S. Mahoney<sup>1</sup>, G. White<sup>1</sup>, P. Stevens<sup>1</sup>, S. Connacher<sup>1</sup>, P. Osborne<sup>1</sup>, R. Eckert<sup>1</sup>, A. Sami<sup>1</sup>, D. Prieto-Alhambra<sup>1</sup>, K. Ramasamy<sup>1</sup>, M. K. Javaid<sup>1</sup>

<sup>1</sup>Oxfordshire Fracture Prevention Service, Oxford University Hospitals Foundation NHS Trust, Oxford, UK

**Objective:** A key role of the FLS is screening for secondary causes of osteoporosis. Myeloma is a recognised secondary cause and early diagnosis improves survival. In 2019, the Royal Osteoporosis Society recommended that all patients attending FLS have universal screening for myeloma based on serum electrophoresis, serum free light chains and urine electrophoresis. This study aimed to examine the impact of universal myeloma screening within an FLS.

**Methods:** We sampled all patients seen by the Oxfordshire FLS between January-April 2018. Screening is only recommended in those who are recommended antiosteoporosis therapy. The completion rates and outcomes of screening were checked using the hospital and FLS databases.

**Results:** Of 950 patients identified by the FLS, 584 had some form of myeloma screening. Of these, 438 (75%) were female, 371 (64%) aged over 75 y and 178 (30%) sustained a hip fracture. Overall, 577 (99%) had serum electrophoresis measured, 525 (90%) had serum free light chains and 407 (70%) had urine electrophoresis. 327 (56%) patients had complete screening. Three patients had newly diagnosed myeloma and referred to Haematology services. Furthermore, 46 patients had a detectable serum paraprotein with a likely diagnosis of monoclonal gammopathy of uncertain significance (MGUS) requiring annual surveillance.

**Conclusion:** Addition of universal myeloma screening to laboratory testing, identified myeloma in 1 in 195 patients, and its precursor state MGUS in 1 in 13 patients, which may have otherwise been missed. Further analysis with long-term follow-up is needed to clearly define the value of diagnosing MGUS within the FLS setting, establish the benefits vs. costs and methods to improve screening completion rate.

Table.

Outcome	n	% Female	% Aged over 75 y	% Hip fracture	% Complete Screen
Normal	509	75%	61%	30%	64%
Myeloma – New	3	67%	100%	0%	33%
Myeloma – Known	1	0%	100%	0%	0%
MGUS – New	46	70%	83%	39%	61%
MGUS – Known	24	83%	79%	33%	63%
Hypogammopathy	128	70%	75%	43%	78%
Polyclonal hypergammopathy	41	71%	63%	29%	76%



P720

**MANAGEMENT OF HIP FRACTURE DURING THE COVID-19 PANDEMIC**

M. Komornicki<sup>1</sup>, M. Buttazzoni<sup>1</sup>, B. Boietti<sup>1</sup>, A. V. Kitaigrodsky<sup>1</sup>, M. E. Vera<sup>1</sup>, P. A. I. Slullitel<sup>1</sup>, G. S. Carabelli<sup>1</sup>, J. D. Barla<sup>1</sup>, G. G. García Barreiro<sup>1</sup>, J. A. Benchimol<sup>1</sup>, M. Diehl<sup>1</sup>

<sup>1</sup>Hospital Italiano de Buenos Aires, Capital Federal, Argentina

**Objective:** The outbreak of coronavirus disease produced a significant impact in health care systems and led to changes in usual hip fracture (HF) care. In Argentina a nationwide mandatory and prolonged lockdown was implemented. HF is associated with a higher risk of new fractures and mortality. The impact of COVID pandemic on HF patients in Argentina is unknown. This study aimed to compare treatment and outcomes after HF during the pandemic vs. the same period in 2019.

**Methods:** Observational retrospective study comparing 2020 (03/20/2020 - 07/20/2020) and 2019 (03/20/2019 - 03/20/2019) cohort. Data were obtained from the institutional HF registry and the electronic medical record. Clinical Frail Scale and Charlson Index were assessed. In 2020 in-hospital bisphosphonate (BP) use and telemedicine were implemented. Bivariate analysis of qualitative variables was performed with chi<sup>2</sup> or Fisher and for quantitative variables, t-test or Wilcoxon. STATA 14 software was used.

**Results:** Both cohorts (2019 n:113, 2020 n:74) were similar in age (88 vs. 86.5), sex, BMI, previous fractures, osteoporosis treatment, fracture type, PTH and vitamin D, but 2020 cohort presented greater frailty (p<0.0001) and Charlson index (p<0.0001). Covid test was negative in all patients. Median time to surgery was 1 (1-2) d (p 0.9) and in-hospital endocrinological evaluation was performed in >80% in both cohorts (p 0.61). BP treatment was 30% in 2019 vs. 54% in 2020 (p 0.009). Zoledronic acid (ZOL) was used in 85% of cases without severe adverse effects. Endocrinological follow up was 25% in the 2019 cohort vs. 43.1% (telemedicine) in 2020 (p 0.01). No significant differences in hospital stay, new fractures, readmissions and 3-month mortality were found.

**Conclusion:** Surgical and in-hospital evaluation were similar during Covid pandemic. Postoperative ZOL was safe and increased access to treatment. Telemedicine improved follow-up. Length of hospitalization, readmissions and 3-month mortality were similar.

Table 1. Secondary prevention after hip fracture during Covid-19 pandemic in 2020 vs 2019.

Variables	2019 n: 113	2020 n:74	p
Calcium + VD (I+HC) n,(%)	20 (17.7)	43 (58.1)	0.0001
BF treatment (I+HC) n,(%)	35 (30.1)	40 (54)	0.002
ZOL treatment (I+HC) n,(%)	31 (27.4)	34 (45.9)	0.009
Time from surgery to ZOL days*	53 (41-88)	2.5 (2-4)	0.0001
ZOL adverse effects n,(%)	0/1 (0)	2/32 (6.9)	0.786
Endocrinological follow up n,(%)	28 (25)	31 (43.1)	0.010
Face-to-face consultation n,(%)	25 (22.3)	1 (1.4)	0.0001
Telemedicine consultation n,(%)	5 (4.5)	30 (41.7)	0.0001

I: in-hospital, HC: Home Care, ZOL: zoledronic acid, VD: vitamin D, \*median-RIC

P721

**FAMILY SPONDYLOARTHRITIS: RESULTS OF A MONOCENTRIC STUDY**

F. Mechid<sup>1</sup>, N. Bahaz<sup>1</sup>, C. Dahou-Makhloufi<sup>1</sup>

<sup>1</sup>University of Algiers Benyoucef Benkhedda, Mohamed Lamine Debaghine Hospital., Algiers, Algeria

**Objective:** To report our experience about observations of families of spondyloarthritic patients, followed in our department.

**Methods:** This is a retrospective study including patients with spondyloarthritis during a period from 2010 to 2020 with family history of spondyloarthritis. The diagnosis of spondyloarthritis was retained according to the New-York, AMOR and/or ASAS criteria. We have described the clinical, biological and therapeutic aspects of these patients.

**Results:** We identified eight families of spondyloarthritis composed of 12 men and 5 women. The mean age of onset was 28.56 y (14-58 y). There were 13 cases of ankylosing spondylitis, 1 case of enteropathic arthritis, 2 case of psoriatic arthritis, and 1 case

of late onset peripheral spondyloarthritis. Thirteen patients had axial and peripheral form. Uveitis was associated in 5 cases. Sacroiliitis has been detected in 14 patients. All patients had at least one severity factor: onset before age 16 (1 case), dactylitis (1 case), increased CRP (7 cases), coxitis (9 cases), and NSAID failure (14 cases). Four patients were tested for HLA-B27 and three were positive. Among 17 patients, 11 required biotherapy and 3 required total hip replacement.

**Conclusion:** Our findings reveal that ankylosing spondylitis is the most common form of family spondyloarthritis. The majority of our patients required biotherapy and three benefited from a hip replacement.

P722

### IMMUNOGENICITY AND SAFETY OF 23-VALENT PNEUMOCOCCAL POLYSACCHARIDE VACCINE IN PATIENTS WITH IMMUNO-INFLAMMATORY RHEUMATIC DISEASES

N. V. Muravyeva<sup>1</sup>, B. S. Belov<sup>1</sup>, M. S. Naumtseva<sup>1</sup>, M. M. Baranova<sup>1</sup>, M. V. Cherkasova<sup>1</sup>, T. V. Korotaeva<sup>1</sup>

<sup>1</sup>V.A. Nasonova Research Institute of Rheumatology, Moscow, Russia

**Objective:** To study the immunogenicity and safety of the 23-valent polysaccharide pneumococcal vaccine (PPV-23) in patients with immuno-inflammatory rheumatic diseases (IIRDs).

**Methods:** The open prospective study included 145 patients (96 women, 49 men, age 22-76 y). Rheumatoid arthritis was diagnosed in 79 patients, ankylosing spondylitis – in 31, systemic scleroderma – in 16, psoriatic arthritis – in 12, and dermatomyositis/polymyositis – in 7. At the time of inclusion in the study, most patients had high or moderate disease activity. Most patients had at least two cases of lower respiratory tract infections (bronchitis, pneumonia) in their immediate history, 2 patients reported a monthly exacerbation of chronic sinusitis, 1 patient – the development of otitis every 2-3 months, requiring the use of antibacterial drugs. PPV-23 was administered in an amount of 1 dose (0.5 ml) subcutaneously in the deltoid muscle against the background of anti-rheumatic therapy. The level of antibodies to pneumococcal capsular polysaccharide was determined using the EIA PCP IgG kit before vaccination, 1, 3 and 12 months after vaccination.

**Results:** At 1, 3 and 12 months after vaccination, the concentration of antibodies to pneumococcal capsule polysaccharide was significantly higher compared to the baseline values ( $p=0.01$ ,  $p=0.005$  и  $p=0.01$ , respectively). In 80.7% of patients, vaccination tolerance was good. Reactions at the injection site (pain, swelling and hyperemia of the skin up to 2 cm in diameter), resolved independently after 1-5 days, were observed in 26 patients. In 2 patients, a severe local reaction was registered in the form of pain in the arm, infiltration and hyperemia of the skin up to 8 and 15

cm in diameter, respectively, accompanied by low-grade fever in one patient for 2 days, and febrile fever in the other for 3 days. In both cases, these symptoms were completely stopped after administration of paracetamol and antihistamines. Exacerbation of IIRDs and the emergence of new autoimmune disorders were not detected. During the follow-up period, no patients developed lower respiratory tract infections. Patients suffering from frequent sinusitis and otitis reported the absence of these infections after vaccination.

**Conclusion:** The obtained data indicate satisfactory immunogenicity and good tolerability of PPV-23 in patients with IIRDs. Further studies are needed to better assess the immunogenicity and safety of vaccine, as well as to study of the influence of anti-rheumatic therapy on the effectiveness of immunization.

P723

### RISK OF SUBSEQUENT FRACTURE ADMISSION IN MEXICO USING REAL WORLD DATA

M. K. Javai<sup>1</sup>, E. S. Tejeda-Chávez<sup>2</sup>, F. Torres-Naranjo<sup>3</sup>, L. Mendez<sup>4</sup>, J. C. Viveros<sup>5</sup>, A. Olascoaga-Gómez de León<sup>6</sup>, R. Garcia-Gaeta<sup>2</sup>, M. Y. Perez-Avalos<sup>7</sup>, R. Pinedo-Villanueva<sup>1</sup>, S. Wullich<sup>8</sup>, M. Caló<sup>8</sup>, C. A. Ruiz-Esparza-Macías<sup>2</sup>

<sup>1</sup>University of Oxford, NDORMS, Oxford, UK, <sup>2</sup>Servicios de Salud, Jalisco, Mexico, <sup>3</sup>Centro de Investigación Ósea y de la Composición Corporal, CIO, Mexico, <sup>4</sup>University of Medicine UNAM, Mexico City, Mexico, <sup>5</sup>ISSTE Leon, Guanajuato, Mexico, <sup>6</sup>National Institute of Rehabilitation, Mexico City, Mexico, <sup>7</sup>Centro Universitario del Norte, Universidad de Guadalajara, Guadalajara, Mexico, <sup>8</sup>International Osteoporosis Foundation/ Latin America Region, Buenos Aires, Argentina

**Objective:** It is well recognised that patients admitted with a fragility fracture are at high risk of subsequent fracture. The expected rates of re-fracture in the first few years are essential when modelling the expected benefits and budget impact from Fracture Liaison Services to inform their prioritisation for policymakers. At present, there is a paucity of local re-fracture data for Mexico.

**Methods:** We compared the rates of re-fracture over a 1-y period using routine admission data from the Health Services Jalisco, one of the health systems in the western region of Mexico (state of Jalisco). Fracture sites were coded using ICD10 discharge codes into the hip, spine and other fracture sites, excluding the face, digits, skull and scaphoid. To exclude duplicate admission coding, subsequent admissions within 90 d of the index fracture admission date with the same ICD10 code were excluded.

**Results:** In 2017, there were 1,007 admissions with fragility fractures leading to occupancy of 7712 bed days. 69% of all fragility fracture admissions were for hip fractures (78.9% of all fragility fracture bed days). Of the admissions with hip fractures, men had a 2-d longer length of stay than women ( $p=0.042$ ) even though they were 4 years younger ( $p<0.001$ ). Women with hip fractures

made up 46.2% of admitted fractures in adults aged 50 y and over, and 50% of total bed days. Men with hip fractures made up 22.8% of all admitted fractures and 28.2% of total bed days. Few patients (2.8%) were admitted with spine fractures. After excluding readmissions within 90 d with the same fracture site code, 43 patients (4.2%) had readmission for fracture within 12 months of the index fracture. 22 patients (3.3%) were readmitted with a second hip fracture and had a nonsignificant longer length of stay from first admission (7 vs. 8.5 median days ( $p=0.12$ )).

**Conclusion:** We have described the local refracture readmission rates at 12 months following index admissions for hip, spine and other fractures for one of the health system in the western region of Mexico. These findings will be critical for understanding the potential patient, clinical and economic benefits from Fracture Liaison Services.

Table. Index fractures in 2017:

	Total				Women			Men		
	Site				Site			Site		
	Total	Hips	Spines	Other	Hips	Spines	Other	Hips	Spines	Other
n	1,007	695	28	284	465	18	183	230	10	101
Age (y)	73.4 (13)	77.6 (11.7)	68.3 (12.9)	63.6 (10.6)	79.0 (10.9)	72.4 (12.8)	64.2 (10.5)	74.7 (12.7)	60.8 (9.6)	62.6 (10.7)
Length of stay (median, IQR)	7.6 (2-11)	8 (3-12)	4 (1-10.5)	2 (1-5)	6 (3-12)	3 (1-10)	2 (0-4)	8 (4-13)	4 (2-13)	2 (1-5)
Number of bed days	7,712	6,082	210	1,420	3,909	135	813	2,173	75	607

## P724

### "CHARCOT'S FOOT": A DIAGNOSIS NOT TO BE MISSED!

R. Hassani<sup>1</sup>, M. Djennane<sup>2</sup>

<sup>1</sup>University Hospital Center of Tizi-ouzou, Dept. of Rheumatology, Tizi-ouzou, Algeria,

**Objective:** Charcot's foot is a rare nervous osteoarthropathy; described by Charcot; it is an extremely serious complication of diabetic neuropathy leading to deformities of the foot by the non-infectious destruction of bones and joints. We report an observation. The interest of this observation is to show on the one hand the role of the education of diabetic patients in the early diagnosis of Charcot's foot, on the other hand the difficulty of management requiring a multidisciplinary team.

**Case report:** 32-year-old patient, type 1 diabetic, diagnosed 11 years ago, poorly balanced under insulin therapy and at the stage of degenerative complications: CKD stage 3, diabetic neuropathy of both lower limbs. He presented in consultation with a swollen right foot, melanodermal with enlargement of the anteroposterior diameter and lateral diameter, plantar flattening, associated with lymphedema extending to the leg, progressing for 1 year in total indolence and rendering the difficult walk. Standard radiographs reveal diffuse bone transparency, destructive lesions of the talocrural joint with multiple geodes. Biology: glycemia: 2.2 g/l, HbA1c: 9%, absence of inflammatory syndrome, Ca: 85mg/l, clearance: 58 ml/min.

Charcot's foot affects 9% of diabetics with sensory neuropathy and the involvement of young people is rare. The average age of diagnosis of diabetic neuroarthropathy is 57 y, with an average duration of diabetes of 15 y (80% over 10 y and 60% over 15 y). This impairment was observed in our young diabetic patient with 11 y of development of diabetes due to chronic glycemic imbalance. Charcot's neuroarthropathy still suffers from delayed diagnosis due to the lack of specificity of the initial clinical signs. It can induce irreversible bone complications responsible for high morbidity and mortality. The prognosis depends on an early diagnosis and treatment with the aim of limiting the deformity through the immobilization of the cast and the discharge.

**Conclusion:** Regular and rigorous podiatry examination in diabetic patients allows early diagnosis and adequate treatment of any neurological or vascular complication.

## P725

### CLINICAL PROFILE OF OSTEOPOROTIC PATIENTS TREATED WITH ZOLEDRONIC ACID

S. N. Negadi<sup>1</sup>, E. Tabti<sup>1</sup>, S. Benabadji<sup>1</sup>, A. Lounici<sup>1</sup>

<sup>1</sup>Internal Medicine Dept., University Hospital Center, Laboratory of Research on Diabetes, Faculty of Medicine University of Tlemcen, Tlemcen, Algeria,

**Objective:** Prevention of fractures with bisphosphonates has been shown most clearly in patients with osteoporosis. Zoledronate is administered by intravenous injection at intervals of 1 year or longer, it is preferred over oral bisphosphonates by a majority of patients,<sup>1</sup> and it has had a satisfactory safety profile.<sup>2-3</sup> Zoledronic acid decreases the risk of vertebral and nonvertebral (including hip) fractures. The objectives of the study are to identify patients with osteoporosis treated with zoledronate.

**Methods:** Prospective study starting from July 2017 and ongoing involving osteoporotic patients (postmenopausal, postcortisone and secondary) with or without fracture treated with zoledronic acid. A biological assessment (serum creatinine, calcium level and vitamin D), a BMD test and oral evaluation were performed before the infusion of zoledronic acid. Calcium 1000 mg/d and

vitamin D 800 IU/d have been prescribed for these patients. We discussed with the patient the rare potential risks of atypical fracture of the femur or osteonecrosis of the jaw.

**Results:** We collected 14 patients treated with zoledronate, 11 women (cortisonic osteoporosis: 7 patients, postmenopausal osteoporosis: 3 patients and osteoporosis secondary to primary hyperparathyroidism: 1 patient) and 3 men (cortisonic osteoporosis), the average age is 59 y. The pathologies justifying corticosteroid therapy were rheumatoid arthritis in 6 patients, 2 cases of lupus and 2 cases of sarcoidosis. The mean T-score at the hip was -2.6 and the mean T-score at the spine was -2.9. The risk factors for fracture were age >60 (10 patients), BMI <19 (3 patients), history of fracture in 10 patients (hip: 5 patients, vertebra: 2 patients, wrist: 3 patients and ankle: 3 patients), history of prolonged corticosteroid therapy (10 patients), early menopause (2 patients), type 2 diabetes (3 patients), celiac disease (1 patient), Vit D deficiency (6 patients) and treatments promoting osteoporosis (proton pump inhibitors: 9 patients and levothyroxine: 2 patients).

**Conclusion:** Zoledronic acid once a year is an effective and generally well tolerated treatment option for patients with osteoporosis, its indication in our patients was severe osteoporosis with severe fracture.

#### References:

1. McClung M. et al. Bone 2007;41:122.
2. Black DM, et al. N Engl J Med 2007;356:1809.
3. Lyles KW, et al. N Engl J Med 2007;357:1799.

## P726

### POST-FRACTURE CARE PROGRAMMES START OFFSETTING INITIAL INVESTMENT TWO YEARS AFTER THEIR IMPLEMENTATION: PRELIMINARY FINDINGS FROM A MICROSIMULATION MODEL OF BENEFIT AND BUDGET IMPACT

R. Pinedo-Villanueva<sup>1</sup>, E. Burn<sup>1</sup>, C. Cooper<sup>2</sup>, M. K. Javaid<sup>1</sup>, CTF Partnership Study Group<sup>3</sup>

<sup>1</sup>University of Oxford, Oxford, UK, <sup>2</sup>University of Southampton, Southampton, UK, <sup>3</sup>Nyon, Switzerland

**Objective:** To describe the yearly incremental costs and quality-adjusted life years (QALYs) of a postfracture care (PFC) programme implementation in comparison to current practice in various countries.

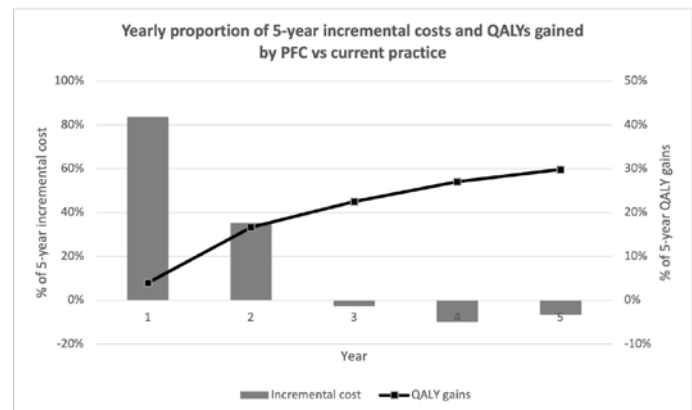
**Methods:** A microsimulation model was developed where adult men and women aged 50 y and older with a fragility fracture of the hip, spine, or other major site transit through health states of subsequent refracture of any site, or refracture free taking into account imminent fracture risk. The model was run for five years over monthly cycles. Introduction of a PFC programme was com-

pared to current practice for several countries. Hospital inpatient and outpatient, social care, and secondary fracture prevention costs were considered, with number of refractures and QALYs as primary outcomes. All main antiosteoporotic drugs were available to be recommended to patients, each characterised by a fracture site specific time-lag effect and relative risk reduction over baseline refracture rates. PFC performance for identification, assessment, treatment, and monitoring were built into the model reflecting achievable treatment and adherence rates.

**Results:** Cost levels and distribution over time were found to be highly sensitive to medication time-lag effects for vertebral, hip and other fracture sites. With many drugs taking 6-12 months after treatment initiation to reveal their full effect, 84% of the 5-y added costs of PFC over current practice were concentrated on the first year, due to the combination of PFC (especially medication) costs as well as hospital and social care for patients who still refracture. The second year reported 35% of the 5-y incremental costs, with the PFC alternative offsetting initial investment after that. QALY gains during the first year were 4% of the total 5-y gain over current practice, with the following years increasingly contributing between 17% and 30%. The figure shows the percentage of 5-y incremental costs and QALYs gained and their distribution over the first 5 y of PFC operation.

**Conclusion:** Our model shows that the investment necessary to implement a PFC programme not only generates significant and growing quality of life gains for patients, but also that its annual costs become lower than those under current practice after the second year of PFC implementation.

**Acknowledgment:** This study received funding from the International Osteoporosis Foundation.





P727

**UNIQUE ASSOCIATION: RHEUMATOID ARTHRITIS, LUPUS, SYSTEMIC SCLERODERMA AND GOUGEROT-SJÖGREN SYNDROME**R. Hassani<sup>1</sup>, M. Djennane<sup>2</sup>, L. Igueni<sup>1</sup><sup>1</sup>University Hospital Center of Tizi-ouzou, Dept. of Rheumatology, Tizi-ouzou, Algeria,

**Objective:** Rheumatoid arthritis (RA) is an autoimmune disease, often associated with other diseases in this family. We report an exclusive observation of an overlap syndrome where RA is associated with lupus, scleroderma sine scleroderma and secondary Gougeot-Sjögren syndrome.

**Case report:** 51-year-old patient with a history of hypothyroidism and hypertension, has presented an erosive and deforming RA for a dozen years, initially put on DMARDs then on anti-TNF $\alpha$  (Adalimumab), hospitalized for Raynaud's phenomenon, erythematous lesions infiltrated in the interarticular areas of the fingers, arms and anterior face of the thighs, erythema malar, telangiectasias in the neckline and upper face of the back with non-scarring alopecia associated with inflammatory polyarthralgia, a dry cough, dyspnea of exertion and dry eye syndrome. Biology: leukopenia 3000 e/mm<sup>3</sup>, ESR: 85 mm H1, CRP: 10mg/l, liver enzymes: 2 nle, renal function: normal and 24 h proteinuria: negative. Immunology: FAN positive with anti DNA 560 IU, anti-SSA / Ro (52/60) and anti-Scl70 Ab: positive. Bone and articular ultrasound: bilateral radio-carpal synovitis, Cardiac ultrasound: without abnormalities, thoracic CT: interstitial pulmonary fibrosis located in the basal segment of the lower lobes. Functional respiratory test: normal. Capillaroscopy: rarefying organic microangiopathy. Biopsy of accessory salivary glands: Chisholm grade 4 lymphocytic sialadenitis. Bone densitometry finds osteoporosis. The diagnosis of overlap syndrome: RA, scleroderma sine scleroderma, lupus, associated with secondary Gougeot-Sjögren syndrome was retained in this patient. Under plaquenil, mycophenolate mofetil, diltiazem, adalimumab, low-dose prednisone, the outcome was favorable

**Conclusion:** The coexistence of several autoimmune pathologies involves diagnostic and therapeutic difficulties. The pathophysiological mechanisms underlying these associations have not yet been elucidated, but a predisposing genetic ground is increasingly implicated.

P728

**REYNOLDS SYNDROME: A CASE REPORT**R. Hassani<sup>1</sup>, M. Djennane<sup>2</sup>, L. Igueni<sup>1</sup><sup>1</sup>University Hospital Center of Tizi-ouzou, Dept. of Rheumatology, Tizi-ouzou, Algeria,

**Objective:** In systemic scleroderma (SS), the prevalence of liver damage is approximately 1%. Cholangitis is the most frequently described liver disease in association with scleroderma, constituting a rarely described entity: Reynolds syndrome. We report an observation.

**Case report:** 47-year-old patient, mother of 02 children after 02 early abortions and 07 premature deliveries; hospitalized for exploration of Raynaud's phenomenon associated with inflammatory polyarthralgia. The examination found a patient with a generalized melanodermal appearance, skin thickening of the fingers of the hands extending beyond the metacarpophalangeal joints; unilateral edema of the left foot painful, hot, keeping the cup with pulse present. A biological inflammatory syndrome, hepatic cytolysis, hepatic anicteric cholestasis. Immunological assessment: centromeric FAN > 1/1000, cytoplasmic 1/320: anti-centromere B antibodies, anti-mitochondria M2 antibodies positive with anti-cardiolipin IgM 23 MPL/ml and anti-prothrombin IgM 19 MPL/ml. Capillaroscopy: severe rarefying organic microangiopathy. A normal respiratory function test with FVC: 92%.

Computed tomography (high resolution): does not find signs of interstitial lung disease. Cardiac ultrasound without abnormalities. Esogastroduodenal fibroscopy: hatched appearance of the duodenal mucosa, the anatomopathological study of the biopsies of which shows total villous atrophy which may correspond to celiac disease. Arterial echodoppler of the lower limbs: occlusion of the distal left pedal artery. The diagnosis retained is Reynolds syndrome (limited cutaneous systemic sclerosis + primary biliary cholangitis) associated with secondary APS; celiac disease has not been confirmed. Under nonsteroidal anti-inflammatory drugs, diltiazem, ursodeoxycholic acid, Low molecular weight heparin then anti-vitamin K, the evolution was favorable.

**Conclusion:** The association SS-Primary biliary cholangitis constitutes a rare but not fortuitous pair, which imposes an increased monitoring in order not to ignore the impact of the hepatic damage on the overall prognosis of scleroderma and the possibility of association with other autoimmune pathologies.

P729

# THE RELATIONSHIP BETWEEN HAND GRIP STRENGTH AND REGIONAL MUSCLE MASS IN ELDERLY ASIANS

J. Chan<sup>1</sup>, Y.-C. Lu<sup>2</sup>, R. O. Kosik<sup>3</sup>

<sup>1</sup>Postbaccalaureate Prehealth Studies Program, New York University, New York, USA, <sup>2</sup>Dept. of Radiology, Wan Fang Hospital, Taipei Medical University, Taipei, Taiwan, <sup>3</sup>Dept. of Radiology, School of Medicine, College of Medicine, Taipei Medical University, Taipei, Taiwan

**Objective:** Although previous research has demonstrated a correlation between muscle strength and regional muscle mass, few studies have investigated the relationship between hand grip strength (HGS) and muscle mass in older Asian adults. This study aims to determine the relationship between HGS and muscle mass in older Asian adults.

**Methods:** We retrospectively reviewed the DXA records of older adults from one medical institution in Taipei, Taiwan, from January 2019 to September 2020. The inclusion criteria were: 1) aged 60 and older, 2) underwent a full-body DXA scan, and 3) performed hand grip measurements. Duplicate results, incomplete records, patients with a history of stroke, and patients with other neurological diseases were excluded. Regional skeletal muscle mass (upper and lower extremities as well as trunk) was measured using DXA. HGS was measured using a Jamar handheld dynamometer, with the maximum value of three attempts recorded for analysis. Sarcopenia was diagnosed according to the definition provided by the Asian Working Group for Sarcopenia (2019).

**Results:** Of the 907 healthy participants, the prevalence of sarcopenia was 33.89% in men and 13.77% in women. In both sexes, HGS and regional muscle mass showed a consistent decline after 60 y of age. The rates of decline per decade in upper extremity muscle mass, lower extremity muscle mass, trunk muscle mass, and HGS were 6.69%, 4.95%, 3.54%, and 12.30%, respectively, in men, and 3.35%, 4.44%, 1.81%, and 12.48%, respectively, in women. In men, HGS significantly correlated with upper ( $r=0.576$ ,  $p<0.001$ ) and lower extremity muscle mass ( $r=0.532$ ,  $p<0.001$ ). In women, the correlations between HGS and upper extremity muscle mass ( $r=0.262$ ,  $p<0.001$ ) and lower extremity muscle mass ( $r=0.364$ ,  $p<0.001$ ) were less strong, though also statistically significant.

**Conclusion:** Muscle mass and HGS decline with advancing age in both older men and women though the correlation is stronger in men than in women. HGS measurements are an accurate proxy of muscle mass in older Asian adults, particularly males.

P730

# ASSOCIATION OF SPONDYLOARTHRITIS AND CELIAC DISEASE: A CASE REPORT

R. Hassani<sup>1</sup>, M. Djennane<sup>2</sup>, L. Igueni<sup>1</sup>

<sup>1</sup>University Hospital Center of Tizi-ouzou, Dept. of Rheumatology, Tizi-ouzou, Algeria,

**Objective:** Ankylosing spondyloarthritis is a chronic inflammatory rheumatism in which the general signs such as weight loss, anorexia, pallor are not very important and may be part of an associated condition. We report an observation where these signs are the result of an association with Celiac disease.

**Case report:** This is a 34-year-old young woman with a history of hypothyroidism, followed for 5 y for axial ankylosing spondyloarthritis with bilateral sacroileitis treated with a biological agent (anti-TNF $\alpha$ ). Under treatment appear diffuse polyalgia, muscle wasting with weight loss leading to hospitalization. The clinical examination found a patient in general preserved condition, skin-mucous paleness, afebrile, weighing 47 kg. Cervical hyperlordosis, exaggerated dorsal kyphosis, without spinal stiffness; bilateral scapulargia with slight limitation of abduction. Generalized atrophy with muscle weakness. A normal neurological exam. Biology: VS: 39 H1, CRP: negative, HB: 9.7g/dl (normochromic normocytic anemia), CA: 103mg/l  $\uparrow$ , Phos: 17mg/l  $\downarrow$ , 24-h calciuria: 38 mg/24-h  $\downarrow$ , PTH: 1447pg/ml  $\uparrow$ , albumin: 47 g/l, Vit D collapsed at 4 ng/ml  $\downarrow\downarrow$ , renal and hepatic results are normal. Radiology: standard radiographs show: diffuse bone demineralization, funnel-shaped deformation of the thorax, several tiered vertebral compression (fish vertebrae), pelvis in the heart of a playing card; bone densitometry: objective osteoporosis with a spine T-score: -5, neck: -4. Signs in favor of deficiency osteomalacia. The etiological research concluded with celiac disease on the following results: positive celiac serology: anti-tissue transglutaminase antibody IgA: 258.7 IU/ml, esogastroduodenal fibroscopy with duodenal biopsy found: total villous atrophy stage 4 according to the Marsh classification. The treatment undertaken is: a gluten-free diet, calcium and vitamin D supplementation; further treatment with IV bisphosphonates. The short-term course resulted from complete pain relief with weight gain and normalization of biological indices.

Celiac disease is a dysimmune disease whose digestive symptoms are the best known, however, joint involvement (polyarthralgia, arthritis, osteoporosis) is often precocious and unrecognized. Anemia and chronic asthenia are all symptoms that should motivate the search for specific antibodies. The goal of early diagnosis is to prevent the onset of other systemic conditions and to avoid complications such as fractures or cancer, especially lymphoma. Celiac disease is associated with an autoimmune disease in almost a third of cases (rheumatoid arthritis, Gougerot-Sjögren syndrome). Knowing these potential associations makes it possible to make an earlier diagnosis in patients whose

only manifestation is the associated disease. The association of spondyloarthritis and celiac disease is rare. Only a few observations have been reported in the literature.

**Conclusion:** The celiac disease-SPA association is rare, but it suggests the existence of physiopathological mechanisms common to these two pathologies.

P731

## INFECTIONS UNDER BIOTHERAPIES

R. Hassani<sup>1</sup>, M. Djennane<sup>2</sup>

<sup>1</sup>University Hospital Center of Tizi-ouzou, Dept. of Rheumatology, Tizi-ouzou, Algeria,

**Objective:** Biotherapies are now part of the therapeutic arsenal of chronic inflammatory rheumatism such as rheumatoid arthritis, ankylosing spondylitis and psoriatic arthritis. Commonly used biotherapies are anti-TNF agents (infliximab, etanercept, adalimumab and certolizumab), an antibody targeting the B cell (rituximab), an inhibitor of lymphocyte co-stimulation (abatacept) and an antibody targeting the IL-receptor. 6 (tocilizumab). These biological agents are started up in a specialized hospital environment. These biotherapies obey initiation rules according to the data of the marketing authorization, national and international recommendations. These biological agents are highly effective in chronic inflammatory rheumatism.

**Methods:** This is a descriptive retrospective study including patients hospitalized in our rheumatology department between 2006-2018 undergoing biotherapy.

**Results:** Of the 265 files included, we found 23 infections in 18 patients (6.79%) who presented at least one infection under biotherapy: 13 women and 5 men, on average 39 years old. It was either rheumatoid arthritis (10 patients), ankylosing spondylitis (8 patients), or psoriatic arthritis (1 patient). All patients were on conventional treatment before switching to biotherapy. Infections occurred with adalimumab in 39%, etanercept in 39%, tocilizumab in 8.6% (there were no infections observed in patients on infliximab). The infection was of bacterial origin in 87.07% of cases: 5 pulmonary infections (2 under adalimumab and 3 under etanercept) including 2 tuberculosis (one under adalimumab and one under etanercept), 4 ENT infections (2 under etanercept, one under tocilizumab and one under adalimumab), 4 urinary tract infections (including 3 under adalimumab and one under etanercept), a digestive infection (under adalimumab) a soft tissue abscess (under adalimumab), 2 genital (one under adalimumab, one under etanercept), an ocular under etanercept, 3 cutaneous (one under tocilizumab, one under etanercept and one under adalimumab). A viral origin of the infection was noted in 8.69% of cases: one under adalimumab and one under etanercept, while for mycoses it only represented 4.24% of the aetiologies identified. Treatment was medical in 100% of cases and the outcome was favorable in all patients without recourse to definitive discontinuation of biotherapy.

**Conclusion:** The infections reported in our series are clearly more frequent under adalimumab-type treatment and bacteria are the pathogens most implicated in our patients, which is confirmed by the data in the literature.

P732

## RESEARCH ON THE DIAGNOSIS AND TREATMENT OF OSTEOPOROSIS IN DEPARTMENT OF RHEUMATOLOGY & IMMUNOLOGY IN CHINA

L. Xiaomei<sup>1</sup>, Z. Xiaofeng<sup>1</sup>

<sup>1</sup>Rheumatology & Immunology Dept., Peking Union Medical College Hospital, Peking, China

**Objective:** To investigate the level of osteoporosis diagnosis and treatment among doctors in the Dept. of Rheumatism & Immunology in China.

**Methods:** From October 1, 2020 to March 31, 2021, 1000 rheumatology immunologists from 29 provinces nationwide were involved through Chinese Rheumatism Data Center (CRDC). The scanning tools, the diagnostic criteria, and the therapeutic regimens for osteoporosis were investigated.

**Results:** More than 60% (64.2%) of rheumatologists believe that rapid bone loss occurs within 6 months of glucocorticoids (GCs) use. However, half of the rheumatologists approximately (50.1%) were not familiar with the diagnostic criteria of osteoporosis. 72.7% of rheumatologists said that they will use DXA for osteoporosis diagnosis. Only 28.7% of rheumatologists said they will combine DXA and vertebral fracture assessment to screen osteoporosis in patients. Besides, the use of fracture risk assessment tool (FRAX) in rheumatology is about 25%. Among these physicians, merely 20.6% of them choose bisphosphonate, calcium, and vitamin D for patients at high fracture risk.

**Conclusion:** The screening, diagnosis and treatment of osteoporosis in rheumatology department has not attracted much attention. It is urgent to improve the management level of osteoporosis and grasp the algorithm for diagnosis and treatment leading to reduce the risk of osteoporosis fracture effectively.

**Acknowledgement:** The authors thank the physicians who participated in this investigation. Thank Chinese Rheumatism Data Center (CRDC) for collecting the data. This work was supported by Sandoz (China) Pharmaceutical Co., Ltd.

P733

# LEVELS OF 25OHD IN SUPPLEMENTED AND NOT SUPPLEMENTED SUBJECTS AND RELATION WITH AGE, BMI AND SEASONS

J. Mansur<sup>1</sup><sup>1</sup>Center of Endocrinology and Osteoporosis, La Plata, Argentina

**Objective:** To determine total 25OHD levels in supplemented and not supplemented patients during 2020 and to analyze the relationship between 25OHD with age, BMI and season in the not supplemented group.

**Methods:** total 25OHD was dosed in 446 subjects. 278 patients did not receive supplementation and 168 received it.

**Results:** Patients without supplementation were younger ( $51.9 \pm 14.9$  vs.  $62.5 \pm 11.1$  y,  $p < 0.0001$ ) and had lower 25OHD levels ( $21.4 \pm 8.7$  vs.  $39.1 \pm 10.8$  ng/mL,  $p < 0.0001$ ). Not supplemented group: 25OHD levels were similar in all ages and no differences were observed between normal and overweight patients. Subjects with obesity had lower 25OHD than those normal and overweight:  $19.3 \pm 7.6$  vs.  $21.8 \pm 8.8$  ng/mL,  $p = 0.049$ . A negative correlation was found between BMI and 25OHD:  $r = -0.13$ ,  $p = 0.03$ . No correlation with age was observed. 25OHD seasonal values were: winter (n:104)  $18.6 \pm 7.0$  ng/mL, fall (n:63)  $23.4 \pm 9.0$  ng/mL, spring (n:79)  $20.6 \pm 8.0$  ng/mL and summer (n:32)  $28.3 \pm 10.3$  ng/mL, with significant differences between winter and fall ( $p < 0.01$ ), winter and summer ( $p < 0.001$ ), fall and summer ( $p < 0.05$ ) and spring and summer ( $p < 0.001$ ). Supplemented group: 25OHD levels were: 100.000 IU/monthly (n:78):  $43.6 \pm 11.2$  ng/mL; 100.000 IU/bimonthly (n:20):  $33.19 \pm 12.3$  ng/mL; 100.000 IU/quarterly (n:17):  $38.5 \pm 9.4$  ng/mL; 1.000 IU//d (n:6):  $34.33 \pm 7$  ng/mL; 2.000 IU/d (n:22):  $35.57 \pm 6$  ng/mL; 3.000 IU/d (n:7):  $35.67 \pm 11$  ng/mL and 4.000 IU/d (n:5):  $39.76 \pm 8$  ng/mL. A desirable value of 25OHD  $> 30$  ng/mL was found in 82.6% and in 15.1% of the supplemented and not supplemented subjects respectively.

**Conclusion:** Patients supplemented with vitamin D had better 25OHD values. In not supplemented subjects age is not a factor that influences 25OHD levels (maybe because older people have a lower level only when exposed to the sun in summer). Obesity is associated with lower values and a negative correlation between 25OHD and BMI was found. In summer the values are higher although with an average lower than the desirable levels. Supplemented subjects are older and achieved a desirable 25OHD level regardless of the treatment regimen.

P734

# ANTIOSTEOPOROTIC TREATMENT AFTER HIP FRACTURE IS ASSOCIATED WITH LOWER ALL-CAUSE MORTALITY: A NATIONWIDE POPULATION STUDY

T.-W. Tai<sup>1</sup>, C.-H. Wu<sup>2</sup>, C.-C. Li<sup>3</sup>, C.-F. Huang<sup>4</sup>, W.-P. Chan<sup>5</sup><sup>1</sup>Dept. of Orthopedics, National Cheng Kung University Hospital, College of Medicine, National Cheng Kung University, Tainan,<sup>2</sup>Dept. of Family Medicine, National Cheng Kung University Hospital, College of Medicine, National Cheng Kung University, Tainan, <sup>3</sup>Dept. of Family Medicine, National Cheng Kung University Hospital, College of Medicine, Tainan, <sup>4</sup>Dept. of Family Medicine, National Yang Ming Chiao Tung University Hospital, I-Lan, <sup>5</sup>Dept. of Radiology, Wan Fang Hospital, Taipei Medical University, Taipei, Taiwan

**Objective:** Mortality after osteoporotic hip fractures is high. Postoperative care is as important as surgery itself to prevent a second fracture and improve outcomes, and the effect of anti-osteoporosis treatment after hip fractures on overall mortality is controversial. This nationwide population study aimed to determine whether anti-osteoporosis treatment might reduce overall mortality after hip fracture surgery.

**Methods:** We conducted this cohort study by using the National Health Insurance Research Database (NHIRD) of Taiwan to identify patients admitted for surgery because of hip fractures from 2008-2018. The subsequent use and duration of antiosteoporotic medication and other parameters were analyzed. The national death registration record was retrieved to identify mortality.

**Results:** A total of 59,943 patients admitted for hip fracture surgery were identified. The 22,494 patients (37.5%) who received anti-osteoporotic medication showed a lower all-cause mortality rate than the other 37,449 patients (62.5%) who did not receive further treatment (hazard ratio (HR): 0.69, 95% confident interval (CI): 0.67-0.70,  $p < 0.0001$ ). Patients who received antio-osteoporotic medication for more than 1, 2, and 3 y had reduced all-cause mortality risk, by 0.57 (0.54-0.60), 0.42 (0.38-0.46), and 0.29 (0.26-0.33), respectively.

**Conclusion:** Antiosteoporosis treatment was associated with lower all-cause mortality after hip fracture surgery. A longer duration of treatment was also associated with lower mortality. Post-operative treatment for osteoporosis is crucial for patients with hip fracture.



P735

### ASSESSMENT OF THE RISK EXAMINATION AND THERAPY INITIATION USING THE RUSSIAN NATIONAL REGISTRY FOR THE PATIENTS ENROLLED INTO FRACTURE LIAISON SERVICES

K. Belova<sup>1</sup>, A. Akhatov<sup>2</sup>, E. Bublik<sup>3</sup>, E. Gladkova<sup>4</sup>, K. Gordgeladze<sup>5</sup>, E. Dudinskaya<sup>6</sup>, D. Ladygina<sup>7</sup>, M. Morozova<sup>8</sup>, Y. Polyakova<sup>9</sup>, L. Sivordova<sup>9</sup>, V. Tanaev<sup>10</sup>, O. Lesnyak<sup>11</sup>

<sup>1</sup>Yaroslavl Regional Emergency Care Hospital N.V. Solovyev, Yaroslavl State Medical University, Yaroslavl, <sup>2</sup>Clinic of Innovation Medicine, Kazan, <sup>3</sup>"Central clinical hospital with outpatient health center" of the Business Administration for the President of the Russian Federation, Moscow, <sup>4</sup>North-Western State Medical University I.I. Mechnikov, St. Petersburg Clinical Rheumatology Hospital № 25, St. Petersburg, <sup>5</sup>Yaroslavl State Medical University, Yaroslavl, <sup>6</sup>Russian National Research Medical University N.I. Pirogov, Moscow, <sup>7</sup>"Central clinical hospital with outpatient health center" of the Business Administration for the President of the Russian Federation, Moscow, <sup>8</sup>Yaroslavl Regional Emergency Care Hospital N.V. Solovyev, Yaroslavl, <sup>9</sup>Research Institute of Clinical and Experimental Rheumatology A.B. Zborovsky, Volgograd, <sup>10</sup>Clinical rheumatology hospital № 25, St. Petersburg, <sup>11</sup>North-Western State Medical University I.I. Mechnikov, St. Petersburg; Clinical rheumatology hospital № 25, St. Petersburg, Russia

**Objective:** Fracture Liaison Services (FLS) aimed to prevent secondary fragile fracture are established in many countries. For today 16 FLS have been established in Russian Federation. A common national FLS patients' database was created for the unified data to analyze of FLS effectiveness and reveal the main problems of their organization. This study aimed to evaluate the effectiveness of the risk examination and therapy initiation in several FLS in RF using the registry data. **Methods:** In June 2019, the Russian Association on Osteoporosis started a project for the development of a registry of low energy fractures in patients recruited to FLS (PROMETHEUS Registry). Today 6 FLS enter the patients' data in it. To assess the effectiveness of patient evaluations and initiation of the therapy, we used the criteria of key performance indicators [1]. **Results:** As of 10.03.2021, data on 387 patients were introduced in the register, mean age is 71.95±10.23 y. Among them, 46.25% received a hip fracture, 20.41% vertebral fractures, 16.80% proximal humerus fractures, the rest had fractures of other localizations. The risk of fractures was assessed in all the patients (100%). FRAX assessment was calculated in 95,61%, a high risk was found in 160 (41.18%). DXA was performed in 152 (39,28%) patients. Among those patients who needed this examination to determine the risk of subsequent fractures after other assessment it was performed in 63,24% cases. The risk of falls was assessed in 100% of cases. It was determined to be high in 343 (88.63%) patients. Various measures to reduce this risk were recommended in 304 (88.63%) patients, educational programs were conducted in 299 (87.17%) cases. The appointment of an-

tiosteoporotic treatment was performed in 241 (62.27%). In 12 (3.10%) patients the risk of subsequent fractures was determined as low. The most common reasons for lack of treatment recommendation were the presence of contraindications 70 (18.09%), among them the most common was hypocalcemia (63 (16.27%) persons), and the need for further examination 31 (8.01%). **Conclusion:** The FLS Registry is a very important tool to improve care for patients with osteoporotic fractures and to reveal the problems in the organization of the medical care. Acknowledgements The PROMETHEUS Registry has received support from Amgen Grant for Russian Association on Osteoporosis.

**Reference:** 1. Javaid MK, et al. Osteoporos Int 2020;31:1193.

P736

### STATE OF THE BONE TISSUE IN CHILDREN DURING THE GROWTH SPURT TAKING INTO ACCOUNT THE VDR GENE POLYMORPHISM

T. Frolova<sup>1</sup>, D. McGowan<sup>2</sup>, N. Osman<sup>1</sup>, N. Stenkova<sup>3</sup>, I. Sinialeva<sup>1</sup>

<sup>1</sup>Dept. of Pediatrics, Kharkiv National Medical University, Kharkiv, Ukraine, <sup>2</sup>Spine & Orthopedic Surgery Associates, Kearney, USA, <sup>3</sup>Dept. of Pediatrics, Kharkiv National Medical University, Kharkiv, Ukraine

**Objective:** The research is aimed at establishing the specifics of the structural and functional state of bone tissue in children during the growth spurt with respect to the BSML polymorphism of the VDR gene.

**Methods:** 205 children aged 9-17 years were examined. They divided into three groups: group I 50 children whose height increased by 8-12 cm for the current year; group II included 46 children whose have grown to greater than 12 cm in present year; group III included 109 children with no growth spurt. All 205 children were evaluated with medical history, physical exam, and calcaneal bone density measurement with Sonost-2000. Bone density with DXA measured in 32 children. Z-score <-2.0 considered significantly low bone density in immature skeleton.

**Results:** A decrease in the BMD as observed through UD was diagnosed in 24 children (48.0%) of group I, the Z-score in the group was -1.8 [-0.7; -3.1]; in 28 children (60.87%) of group II, the Z-score was -1.96 [-0.8; -2.4]; in 43 children (39.45%) of group 3, Z-score was -1.68 [0.4; -3.2] (p<0.05). DXA was used to examine 32 children with a decrease in BMD. In 18 of them (56.25%) a decrease in BMD was diagnosed as shown by ultrasound. The number of children with a decreased BMD in group I reached 38.9% while in group II it was 50.0% (p<0.05). The following variants of polymorphisms of BSML were found: a normal genotype variant was found in 48.76% of children; a heterozygous mutation was detected in 41.32% of children; and 9.92% of children showed a homozygous mutation. The most common heterozygous mutation of the BSML polymorphism of the VDR gene with a reduced BMD occurs

in children of group 1 (43.48%) and group 3 (41.11%). The lowest percentage of heterozygous mutations was found in children of group 2 (37.50%).

**Conclusion:** In contrast to children of groups 1 and 3, the presence of mutations in the BSML polymorphism of the VDR gene is not the principal reason for a decreased BMD in the children of a school age in the period of an intensive growth spurt. Decreased BMD is mainly caused by a delayed bone mass accumulation against the background of an intensive linear skeletal growth.

P737

### VARIABILITY OF SARCOPENIA CUTOFF VALUES AMONG WOMEN: A SYSTEMATIC REVIEW

N. Rathnayake<sup>1</sup>, S. Lekamwasam<sup>2</sup>, T. Abeygunasekara<sup>1</sup>, G. Liyanage<sup>2</sup>, S. Subasinghe<sup>1</sup>

<sup>1</sup>Faculty of Allied Health Sciences, University of Ruhuna, <sup>2</sup>Faculty of Medicine, University of Ruhuna, Galle, Sri Lanka

**Objective:** EWGSOP recommend country and gender specific cutoff values (2 SD below the mean of specific measure) derived from young healthy population to identify the sarcopenia. This systematic review was focused to identify the variability in sarcopenic cutoff values derived according to EWGSOP guidelines.

**Methods:** A systematic search was done following the PRISMA Statement in PubMed using the terms "Sarcopenia", "Cutoff values" or "Cutoff thresholds" and "Women" or "Females" and "EWGSOP". Original studies which were published up to April 2021 in English language were reviewed with the agreement of authors. Studies observed main three measures of sarcopenia; muscle mass as Relative Appendicular Skeletal Muscle Mass (RSMI), muscle strength as Hand Grip Strength (HGS) and physical performance as Gait Speed (GS) were included. Review articles, meta-analyses and case-reports were excluded.

**Results:** Search strategy returned 37 studies published from year 2013. Of them only eight met all inclusion criteria. Only three studies identified cutoff values for all three measures while other studies investigated either one or two measures. Two studies determined the cutoff values for RSMI using DXA while five studies used BIA. Five studies found the HGS cutoff values and GS cutoff values were identified only in three studies. DXA measured RSMI cutoff values were 3.69 kg/m<sup>2</sup> and 5.03 kg/m<sup>2</sup> in Singapore and Sri Lanka respectively. BIA measured RSMI cutoff values ranged from 5.51-8.89 kg/m<sup>2</sup> in Turkey, Philippine and Poland. BIA measured RSMI cutoff values were greater compared to those measured with DXA. HGS cutoff values ranged from 9.66-16.8 kg in Philippine, South Korea, Sri Lanka, Turkey and Singapore while GS cutoff values ranged from 0.65-0.96 m/s in Philippine, Sri Lanka and Singapore.

**Conclusion:** A wide intercountry and intracountry variation of sarcopenia cutoff values in women was observed. The differences in the cutoff values depend on the body composition and height of

the relevant subjects in the area in accordance with their genetics and socioeconomic background even the subjects belong to a same country or a region.

P738

### EFFECTS OF ROMOSUZUMAB ON BONE MINERAL DENSITY IN POSTMENOPAUSAL WOMEN WITH OSTEOPOROSIS: A META-ANALYTIC SYNTHESIS OF RANDOMIZED CONTROLLED TRIALS

M. Azharuddin<sup>1</sup>, M. Sharma<sup>2</sup>

<sup>1</sup>Dept. of Pharmaceutical Medicine, Pharmacology, School of Pharmaceutical Education & Research, <sup>2</sup>Dept. of Pharmacology, School of Pharmaceutical Education & Research, Jamia Hamdard, New Delhi, India

**Objective:** Worldwide, osteoporosis in postmenopausal women remains a substantial public health burden. In postmenopausal women, normal bone turnover cycles are impaired, resulting in reduced BMD and increased risk of vertebral and non-vertebral fracture. Romosozumab has been indicated to be effective treatment and associated with increased BMD in postmenopausal women. However, the evidence of efficacy and safety of this new drug is not well documented. Therefore, we estimated the effect of romosozumab on changes in BMD and incidence of new adverse events using a meta-analytic approach.

**Methods:** A systematic search on PubMed/MEDLINE, Cochrane Library, Web of Science, and Clinical trial.gov was performed from the inception to April 2021. The outcome measures were changes in lumbar spine, total hip and femoral neck BMD, incidence of adverse events, and fractures. A random-effects model was used to calculate the weighted mean difference (WMD) and relative risks (RR) with a 95% confidence interval (CI).

**Results:** A total of 10 RCTs were included in this metanalytic synthesis. Results from meta-analysis showed that BMD was significantly increased at the lumbar spine (WMD=12.61, 95%CI 8.52-16.70, p<0.00001), total hip (WMD=3.71, 95%CI 2.42-5.01, p<0.00001) and femoral neck (WMD=3.21, 95%CI 1.75-4.68, p<0.00001). There was also significant difference in increasing BMD at lumbar spine (WMD=6.19, 95%CI 4.23-8.14, p<0.00001), total hip (WMD=3.15, 95%CI 2.66-3.64, p<0.00001) and femoral neck (WMD=3.08, 95%CI 2.59-3.57, p<0.00001) in patients with romosozumab compared to other therapies (teriparatide/alendronate). Romosozumab significantly lowers the risk of new vertebral and non-vertebral fracture compared with control group. Additionally, there was no significant difference in the incidence of overall adverse events in patients with romosozumab compared to placebo and other active treatment (RR 1.00, 95%CI 0.98-1.02, p<0.94) and (RR 0.98, 95%CI 0.89-1.07, p<0.64).

**Conclusion:** The current evidence suggests, romosozumab showed higher gains in BMD, and significantly lower the risk of fracture in postmenopausal women with osteoporosis. Further, RCTs are required to confirm the present findings.

P739

### QUALITY ASSESSMENT OF TRADITIONAL AND CONVENTIONAL MEDICINE CLINICAL PRACTICE GUIDELINES FOR OSTEOPOROSIS

J. H. Kim<sup>1</sup>, B. K. Seo<sup>2</sup>, Y. C. Park<sup>2</sup>, B. H. Goo<sup>1</sup>, S. S. Nam<sup>2</sup>, Y. H. Baek<sup>2</sup>

<sup>1</sup>Department of Acupuncture and Moxibustion, Kyung Hee University Hospital at Gangdong, Seoul, South Korea, <sup>2</sup>Department of Acupuncture & Moxibustion Medicine, College of Korean Medicine, Kyung Hee University, Seoul, South Korea

**Objective:** The aim of this study was to systematically assess the quality, methodology, and consistency of recently developed traditional and conventional medicine CPGs that focus on the management of osteoporosis and provide helpful recommendations for patients with osteoporosis.

**Material and Methods:** From June 2020 to July 2020, CPGs with osteoporosis targeting any age were systematically retrieved. All CPGs of traditional and conventional medicine related to the assessment and diagnosis, management, and clinical therapeutic and pharmacological recommendations with osteoporosis were eligible for inclusion in this study. The excluded documents included guidelines without recommendations, secondary publications derived from CPGs, consensus statements or consensus conferences based on the opinion of panelists, systematic reviews, editorials, clinical trials, and single-author documents. The quality of CPGs was independently examined by three assessors using the Appraisal of Guidelines for Research and Evaluation II (AGREE II) instrument. AGREE II consists of six domains; scope and purpose, stakeholder involvement, rigor of development, clarity of presentation, applicability and editorial independence. Consequently, selected CPGs were graded as recommended (A), recommended with modifications (B), or not recommended (C), and the specific treatments and preventive recommendations in the CPGs were summarized.

**Results:** The quality of the 15 CPGs assessed varied across the AGREE II domains. The overall quality ranged from 3.0-6.0 out of 7. The domain that had the highest scores were 'clarity of presentation', with a mean value of 69.0 % (range 46-83 %); 'editorial independence' had the lowest score of 30.2% (range 0- 75%). The conventional CPGs focused on pharmacological treatments, calcium and vitamin D intake, and prevention, while the traditional CPGs consistently emphasized on herbal medicine and non-pharmaceutical treatment and management.

**Conclusions:** Further development of clinical practice guidelines will require improvement in domains where low item scores have been obtained in the quality assessment in this present study. Further research is needed on alternative modalities for oste-

oporosis, especially complementary approaches, and higher quality clinical practice guidelines are needed to facilitate evidence-based clinical practice.

#### Acknowledgement

This research was supported by a grant of the Korea Health Technology R&D Project through the Korea Health Industry Development Institute (KHIDI). (Grant number : HF20C0013)

P740

### COMBINATION OF SCLERODERMA WITH COVID-19

O. Vorobeva<sup>1</sup>, A. Lastochkin<sup>1</sup>, E. Guryanova<sup>1</sup>

<sup>1</sup>Chuvash State University I.N. Ulianov, Cheboksary, Russia

**Objective:** Systemic scleroderma is difficult against the background of COVID-19. Since systemic scleroderma is a severe autoimmune disease associated with ischemic disorders due to obliterating microangiopathy, the development of fibrosis of the epidermis and internal organs (lungs, heart, digestive tract, kidneys), this leads to hemodynamic disorders. The aim of the study is to describe the pathological material obtained as a result of the death of a 53-year-old patient, a woman, from COVID-19 pneumonia associated with systemic scleroderma.

**Methods:** The resulting slides were stained with hematoxylin and eosin.

**Results:** A sectional study reveals signs of bilateral total pneumonia, with damage to both lungs. Histological examination revealed signs of massive death of type 1 alveolocytes and damage to the capillary endothelium (these signs contribute to the exudation of fluid and protein components into the intra-alveolar space, this leads to an increase in pulmonary edema). In the course of the alveolar passages, alveolar sacs, alveoli, hyaline membranes are formed, an accumulation of serous-hemorrhagic exudate, polymorphonuclear leukocytes is revealed in the alveoli, which are located along the interalveolar septa, in which rheological disorders in the form of erythrocytic sludges are determined (one). The signs of scleroderma with indurative skin changes were revealed. Histological examination: the dermis is sclerosed, atrophy of the skin appendages is revealed. In the vascular endothelium, there is a proliferation of smooth muscle cells, mucoid swelling of the intima, in some areas with fibrinoid necrosis, narrowing of the lumen of blood vessels, microthrombi. The heart showed signs of scleroderma lesions of the endo- and myocardium. Histological examination reveals interstitial edema, muscle fibers are unevenly fragmented, cardiomyocytes are hypertrophied in places, some of them with dystrophic changes; there is a diffuse fine-mesh proliferation of connective tissue. In places, there are foci of cardiomyocyte necrosis, marginal sclerosis and shortening of the chordae of the mitral valve with the development of its prolapse. In the brain and lungs, edema occurs with the accumulation of edematous fluid pericellular and perivascular.



**Conclusion:** It is likely that systemic scleroderma led to an aggravation of the course of viral pneumonia due to hemodynamic disturbances against the background of diffuse fibrosis in organs with the development of respiratory failure.

P741

# MACRO-MICROSCOPIC APPEARANCE OF THE ADRENAL GLANDS AFTER IMPLANTATION OF HYDROXIAPATITE INTO THE TIBIA AND LOCAL INJECTIONS OF MESENCHYMAL STEM CELLS ON THE 10TH DAY AFTER INTERVENTION

I. Solov'Yova<sup>1</sup>, V. Luzin<sup>1</sup>, S. Oberemok<sup>1</sup>, A. Samokish<sup>1</sup>

<sup>1</sup>State Establishment of Lugansk People's Republic Saint Luka Lugansk State Medical University, Lugansk, Ukraine

**Objective:** To investigate macro-microscopic appearance of the adrenal glands in rats after implantation of hydroxyapatite into the tibia and administration of mesenchymal stem cells (MSC) on the 10<sup>th</sup> day after intervention

**Methods:** 120 male rats with body weight of 190-225 g were used. Animals were distributed into five groups. Group 1 consisted of the intact controls. Group 2 consisted of the animals with tibia fracture modeled as 2 mm round opening in the tibia. In animals of the group 3 the same 2 mm opening was filled with hydroxylapatite material OK-015. Animals of the groups 4 and 5 underwent the same interventions as the animals of two previous groups but also received injections of MSC (5E6 cells per injection) into intervention area. MSC were obtained from donor animals. Phenotyping of the MSC was performed by means of indirect fluorescent immunoassay. Observation terms were 15, 30, 60, and 90 d after fracture modeling. Sections of the adrenal glands were HE stained and photographed using light microscope. Data analysis included variation statistics.

**Results:** In animals of the group 2 in the period from the 7<sup>th</sup> to the 90<sup>th</sup> day cross-section area of the adrenal gland increased due to increase of the cortex (observed mostly from the 7<sup>th</sup> to the 90<sup>th</sup> day). In the group 3 cross-section area with both cortex and medulla increased on the 7<sup>th</sup> day (in comparison with the group 2) and then decreased in the period from the 30<sup>th</sup> to the 90<sup>th</sup> day. In the group 4 total section area and cortical area narrowed in comparison with the group 2 decreased in the period from the 15<sup>th</sup> to the 60<sup>th</sup> day by 12.44%, 11.71%, and 5.86%, and by 13.67%, 13.18%, and 5.83% respectively. In that group 5 total area decreased in comparison with the group 3 in the period from the 15<sup>th</sup> to the 60<sup>th</sup> day by 5.23%, 7.52%, and 4.08% respectively. Cortical area also narrowed by 4.99%, 9.15%, and 5.03%. Also by the 15<sup>th</sup> day, medullary area decreased by 6.97%

**Conclusion:** Injections of the MSC into intervention area reduces hypertrophic reaction of the adrenal gland to surgical intervention in the tibia.

P742

# SHOULD WOMEN BE TRAINED IN OSTEOPOROSIS PREVENTION?

S. Lezhenina<sup>1</sup>, E. Guryanova<sup>1</sup>, A. Lammert<sup>2</sup>, N. Arkhipova<sup>1</sup>, A. Vasilieva<sup>1</sup>, M. Bondarchuk<sup>1</sup>, E. Ivanov<sup>1</sup>, D. Guryanov<sup>1</sup>

<sup>1</sup>Chuvash State University I.N. Ulianov, Cheboksary, Russia, <sup>2</sup>St. Elizabeth University of Health and Social Sciences, Bratislava, Slovakia

**Objective:** Lifestyle plays an important role in human health. It is possible to reduce the prevalence of functionally significant injuries and their associated health consequences by reducing the prevalence of osteoporosis in women. One way to accomplish this is through health education and health promotion programs. This study aimed to identify the educational requirements to help women prevent osteoporosis, based on the presence of modifiable risk factors for the disease in the age groups (16-30 years old; 31-64 years old; 65-75 years old).

**Methods:** The survey was conducted among 567 women in the city of Cheboksary (Chuvash Republic, Russia). The CINDI (Countrywide Integrated Noncommunicable Diseases Intervention) Health Monitor questionnaire was used. Women were divided by age into 3 groups: group 1 (16-30 years old), group 2 (31-64 years old) and group 3 (65-75 years old). In all three age groups, the prevalence of modifiable risk factors for osteoporosis (tobacco smoking, unhealthy diet, excessive alcohol consumption, low physical activity, extreme values for BMI) and the influence of these factors on the patients' assessment of their own health were monitored. The results were compared between groups of respondents. ANOVA Statistical Analysis - Version 2021.2 and Fisher's exact test was used for statistical evaluation.

**Results:** Significant differences were found in the frequency of tobacco smoking - group 1 smoked the most (16-30 years old;  $p < 0.05$ ); inappropriate eating habits were most pronounced in group 1 (16-30 years old; ANOVA statistical analysis test  $< 0.05$ ); excessive alcohol consumption was highest in group 1 (16-30 years old;  $p < 0.05$ ); insufficient physical activity was significant and increased with age ( $p < 0.05$ ). Smoking affected the patients' own health assessment only in group 1 (16-30 years old;  $p < 0.05$ ), inappropriate eating habits in group 2 (31-64 years old;  $p < 0.05$ ), excessive alcohol consumption did not affect any of the groups of respondents own health assessments ( $p > 0.05$ ). Physical activity affected all groups' own health assessment (16-30 years old, 31-64 years old, 65-75 years old;  $p < 0.05$ ), the extreme BMI values affected only group 3's (65-75 years old;  $p < 0.05$ ) and group 2's (31-64 years old;  $p < 0.05$ ) own health assessments.

**Conclusion:** The study found that risk factors for osteoporosis are most common in the group of young women who have low levels of health education regarding prevention of osteoporosis. Timely information and elimination of modifiable risk factors will help to delay the onset of the disease and prevent the occurrence of complications.



P743

### THE EFFECTS OF IMPLANTATION OF CERAMIC HYDROXYAPATITE INTO THE TIBIA ON GROSS MORPHOLOGY OF THE SPLEEN

V. Bibik<sup>1</sup>, V. Luzin<sup>1</sup>, E. Statsenko<sup>1</sup>, N. Zabolotnaya<sup>1</sup>

<sup>1</sup>State Establishment of Lugansk People's Republic Saint Luka Lugansk State Medical University, Lugansk, Ukraine

**Objective:** To investigate dynamic changes of gross morphology of the spleen after implantation of ceramic hydroxyapatite material into a defect in the tibia.

**Methods:** In the experiment we used 90 male rats with body weight of 190-225 g. Animals were separated into three groups. Group 1 comprised intact animals, group 2 comprised animals with 2 mm opening in the proximal parts of both tibiae, and group 3 comprised animals with openings in tibiae filled with hydroxyapatite material OK-015. On the 7<sup>th</sup>, the 15<sup>th</sup>, the 30<sup>th</sup>, the 60<sup>th</sup>, and the 90<sup>th</sup> day after intervention, the animals were decapitated and the spleen were collected for further gross measurements with 0.05 mm precision. ANOVA and other tests were performed with the use of standard software.

**Results:** After defect formation relative weight of the spleen in the period from the 7<sup>th</sup> to the 90<sup>th</sup> day was greater than that of the controls by 8.88%, 8.53%, 11.65%, and 6.71% respectively. Volume values of the spleen exceeded those of the controls for the period from the 7<sup>th</sup> to the 90<sup>th</sup> day by 10.25%, 18.33%, 16.29%, 9.84%, and 7.07%. After OK-015 implantation, relative weight of the spleen increased in comparison with the values of the group 2 on the 7<sup>th</sup> and the 15<sup>th</sup> day by 5.87% and 6.12% and volume values in the same period – 10.20% and 11.89%. On the 30<sup>th</sup> and the 90<sup>th</sup> days relative weight of the spleen in the group 3 decreased by 6.41% and 7.96%. Also, volume of the spleen decreased in comparison with the values of the group 2 in the period from the 30<sup>th</sup> to the 90<sup>th</sup> day by 9.53%, 8.93%, and 8.02%.

**Conclusion:** Formation of a defect in the tibia results in compensatory hypertrophy of the spleen in the period from the 7<sup>th</sup> up to the 90<sup>th</sup> day after intervention. Implantation of OK-015 into both tibiae results in manifestations of alterations of the spleen in the beginning of the experiment (the 7<sup>th</sup> and the 15<sup>th</sup> days) with further faster restoration in later terms - beginning from the 30<sup>th</sup> day.

P744

### IDENTIFYING THE CURRENT TRENDS IN OSTEOPOROSIS RESEARCH: A REVIEW OF HIGHLY CITED PAPERS PUBLISHED IN 2016-2020

M. J. Mansourzadeh<sup>1</sup>, H. Moheimani<sup>2</sup>, N. Panahi<sup>2</sup>, M. Sanjari<sup>2</sup>, K. Khalaji<sup>2</sup>, A. Soltani<sup>1</sup>, N. Fahimfar<sup>2</sup>, B. Larijani<sup>3</sup>, A. Ostovar<sup>2</sup>

<sup>1</sup>Evidence Based Medicine Research Center, Endocrinology and Metabolism Clinical Sciences Institute, Tehran University of Medical Sciences, <sup>2</sup>Osteoporosis Research Center, Endocrinology and Metabolism Clinical Sciences Institute, Tehran University of Medical Sciences, <sup>3</sup>Endocrinology and Metabolism Research Center, Endocrinology and Metabolism Clinical Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran

**Objective:** To compile a list of the recent highly-cited papers on osteoporosis across the Web of Science, determine their characteristics and identify the current research trends in the field.

**Methods:** We searched the Web of Science Clarivate Analytics database on February 18<sup>th</sup>, 2021. The search strategy included osteoporosis and associated keywords to identify all related papers published in 2016-2020. The highly cited papers were imported to an EndNote library and assessed by two independent investigators who further removed irrelevant articles based on titles and abstracts. The remaining papers were classified by document type, author, journal, affiliated institutions, and funding bodies. VOSviewer software was used for network visualization.

**Results:** Our search retrieved 160 highly cited papers. Reviewers removed 66 irrelevant articles. The remaining 94 papers had received 12748 total citations (135.6 citations per paper). Most were secondary studies (44.7%, including review articles, meta-analyses, and guidelines), followed by primary preclinical/animal (31.9%) and clinical/epidemiological studies (23.4%). All papers excluding guidelines and preclinical studies were further classified based on their subject category: Osteoporosis/fracture risk factors (10.6% of total), interventions (26.6%), and epidemiology/burden (8.5%). Figure1 shows the keyword co-occurrence network, associated with the highly cited papers. Respectively, the total number (most frequent contributor) of associated journals, countries, and institutions were 55 (eight papers from Osteoporosis International), 37 (52 from the USA), and 426 (13 from the University of California System, 12 from the University of Sheffield). The papers were authored by a total of 787 independent investigators (an average of 10.4 authors per paper). "Cooper C" with seven and "Harvey NC", "Kanis JA", and "Lorentzon M" with six papers were the most prolific contributors. US governmental institutions and pharmaceutical companies were the most frequent funders.

**Conclusion:** Most highly cited papers in the field of osteoporosis published in 2016-2020 are secondary studies, carried out by the US institutions with Grants from the US government and pharmaceutical corporations. Excluding guidelines and preclinical studies, the hottest investigative topics were comparative intervention

and risk factor assessments. The current research trends in osteoporosis highlighted in this study can guide the direction of future studies.

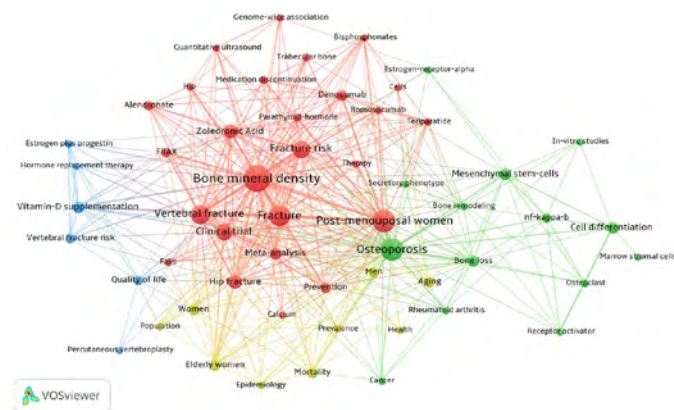


Figure 1. Keyword co-occurrence network, associated with the highly-cited papers in the field of osteoporosis (2016–2020).

**P745**  
**TRANSITION RATE TO OSTEOPOROSIS AND**  
**FRAGILITY FRACTURES AT THE SPINE OR HIP**  
**IN ELDERLY NONOSTEOPOROTIC ASIAN USING**  
**FRAX TOOL**

Y.-C. Lu<sup>1</sup>, W.-C. Huang<sup>1</sup>, Y. C. Lin<sup>2</sup>, W. P. Chan<sup>1</sup>

<sup>1</sup>Dept. of Radiology, Wan Fang Hospital, Taipei Medical University,  
<sup>2</sup>Dept. of Family Medicine, Wan Fang Hospital, Taipei Medical  
University, Taipei, Taiwan

**Objective:** The development of FRAX® has been validated and is used to estimate the risk of osteoporotic fractures worldwide. However, only a few studies determine the transition rate from normal BMD or low bone mass to osteoporotic fractures by FRAX. This study aims to evaluate the rate of transition to osteoporosis and fragility spine or hip fractures in elderly nonosteoporotic Asians on various 10-year probabilities of fracture.

**Methods:** We reviewed DXA medical records from one institution in Taipei, Taiwan between January 2010 and December 2020. We excluded those patients who had osteoporosis or vertebral compression fractures or hip fractures at the first time from the DXA records or of treatment for osteoporosis. Finally, we recruited 1639 consecutive patients (1218 postmenopausal women and 421 men; age 50 years or older) who underwent repeated BMD testing and mean follow-up duration of  $3.2 \pm 2.0$  ys. We used FRAX tool to assess the 10-y probability of a major osteoporotic fracture (MOF) and stratified participants into four groups: Level 1 (MOF, <10%), Level 2 (10-15%), Level 3 (15-20%), and Level 4 (20% and higher). Outcome measures were estimated by any newly developed vertebral or hip fractures in follow-up exams.

**Results:** There were 197 participants (12.0%) having vertebral or hip fractures at the follow-up study. No significant differences were observed between women (12.7%) and men (10.0%) ( $p=0.140$ ). The transition rates to osteoporosis by MOF of levels 1-4 were significantly different in both sexes ( $p<0.001$ ). The transition rates to osteoporosis of level 1, 2, 3, and 4 were 19.0%, 31.5%, 47.2%, and 55.9% for women, respectively, and 14.4%, 31.1%, 46.2%, and 100.0% for men, respectively; whereas there were 4.2%, 12.2%, 14.7%, and 21.7% women, respectively, and 5.4%, 29.5%, 19.2%, and 100% men, respectively, having fractures in follow-up scans. There was no significant difference of incident fragility fractures between women and men in all groups, except for the Level 2 ( $p=0.001$ ).

**Conclusion:** Our results demonstrate that 31% or higher of both sexes will develop osteoporosis, and over 15% women and 27% men will develop osteoporotic fractures using 10-y FRAX risk of MOF of 10% or higher in approximately 3 y, even though they are not osteoporotic at baseline DXA exam.

P746  
PREVALENCE OF PROBABLE SARCOPENIA IN  
COMMUNITY-DWELLING OLDER GREEK PEOPLE: A  
CROSS-SECTIONAL STUDY

M. Tsekoura<sup>1</sup>, E. Billis<sup>1</sup>, K. Fousekis<sup>1</sup>, C. Matzaroglou<sup>1</sup>, E. Tsepis<sup>1</sup>, J. Gliatis<sup>2</sup>

<sup>1</sup>Dept. of Physiotherapy, School of Health Rehabilitation Sciences, University of Patras, Aigio, <sup>2</sup>Dept. of Medicine, School of Health Sciences, University of Patras, Patras, Greece

**Objective:** To assess the prevalence rate of probable sarcopenia and to determine the factors associated with it in Greek older people.

**Methods:** A total of 402 Greek community-dwelling individuals participated in this cross-sectional study. Recruitment was targeted towards people 60 y and over, living independently at their own home. Probable sarcopenia was estimated based on cut-off values for hand grip strength as recommended by the EWGSOP2 (hand grip strength <27 kg in men or <16 kg in women). Reported determinants (age, height, weight, sociodemographic characteristics, chronic diseases, fear of falls and life style of the participants) were obtained through a questionnaire survey. The assessors were trained and experienced physiotherapists in all testing procedures. Grip strength was assessed in the seated position using a SAEHAN dynamometer. Calf circumference was assessed with inelastic tape. A logistic regression analysis was performed in order to determine associated risk factors.

**Results:** The sample comprised 402 participants (292 women, 110 men), with a mean age of 71.51±7.63 y. Overall, 25.4% of the elderly participants were identified with probable sarcopenia: 36.4% in men and 21.2% in women. The findings of this study

demonstrated that probable sarcopenia was positively associated with age, gender, BMI, skeletal muscle mass index, calf circumference and comorbidities.

**Conclusion:** There was a 25.4% prevalence of probable sarcopenia in Greek elderly living in Western Greece. Results, highlights the importance of detection of hand grip strength and probable sarcopenia in older people in order to develop effective strategies of prevention and intervention of sarcopenia.

P747

### HIP STRUCTURAL ANALYSIS AND INCIDENT FRACTURE OVER 20 YEARS OF FOLLOW UP: A TIME-UPDATING SURVIVAL ANALYSIS

K. B. Anderson<sup>1</sup>, M. Mohebbi<sup>1</sup>, M. C. Tembo<sup>1</sup>, P. G. Rufus<sup>1</sup>, N. K. Hyde<sup>1</sup>, J. A. Pasco<sup>1</sup>, M. A. Kotowicz<sup>1</sup>, K. L. Holloway-Kew<sup>1</sup>

<sup>1</sup>Deakin University, IMPACT, Geelong, Australia

**Objective:** Hip structural analysis (HSA) uses DXA scans of the hip to calculate geometric variables of the narrow neck (NN), intertrochanter (IT) and shaft (S) which have the potential to complement BMD for assessment of fracture risk. This study aimed to determine whether HSA parameters were associated with risk for incident low trauma fracture.

**Methods:** Participants were women (n=1412, age 20-94 y) from the Geelong Osteoporosis Study. HSA was calculated using dedicated software from Lunar DPX-L hip scans. Low trauma incident fractures were self-reported and radiologically confirmed. Participants were followed from first DXA hip scan with HSA calculation to first fracture, death, or end of the study period (31/12/2016) for 21996.7 person years follow up. Time-updating Cox-proportional hazards modelling was used to investigate associations between HSA parameters and incident fracture.

**Results:** Incident fractures were reported for 348 participants. Adjusting for age, BMI, prior fracture, alcohol consumption, mobility and steroid use, NN BMD, cross-sectional area, cross-sectional moment of inertia, section modulus and cortical thickness were negatively associated with fracture. IT BMD, cross-sectional area, cross-sectional moment of inertia and section modulus were also negatively associated with fracture. Negative associations were seen at S BMD, cross-sectional area, section modulus and cortical thickness. Endocortical diameter of S was positively associated with fracture and buckling ratio at all three sites was similarly associated. After further adjustment for femoral neck BMD, the associations between fracture and buckling ratio at the IT (HR 1.04, 95%CI 1.00-1.08) and S (HR 1.15, 95%CI 1.01-1.30) were sustained.

**Conclusion:** A greater buckling ratio at the intertrochanter and shaft is associated with an increased risk for fracture, independent of femoral neck BMD, and may be useful for improving fracture risk prediction based on BMD alone.

P748

### FUNCTIONAL FINDINGS IN PATIENTS WITH KNEE OSTEOARTHRITIS IN RELATION TO THEIR CURRENT/FORMER PROFESSION

M. Mašić<sup>1</sup>, M. Kovačević<sup>1</sup>, D. Vukliš<sup>1</sup>, R. Krasnik<sup>2</sup>, A. Mikov<sup>2</sup>, J. Zvekić-Svorcan<sup>3</sup>, N. Milenović<sup>3</sup>

<sup>1</sup>University of Novi Sad, Faculty of Medicine, <sup>2</sup>University of Novi Sad, Faculty of Medicine, Institute of Child and Youth Health Care of Vojvodina, <sup>3</sup>University of Novi Sad, Faculty of Medicine, Special Hospital for Rheumatic Diseases, Novi Sad, Serbia

**Objective:** Osteoarthritis (OA) of the knee is the most common osteoarthritis type and the factors influencing the functional status of the affected individuals are numerous. The aim of this study was to assess the functional status of patients with knee OA according to the work they perform or have previously performed.

**Methods:** This prospective cross-sectional study involved 30 patients of both sexes, aged  $\geq 55$  y, who were referred to the Special Hospital for Rheumatic Diseases Novi Sad, Serbia due to knee OA. All subjects had a radiographic finding of the knee that corresponded to the Kellgren-Lawrence score of 2 or 3 as well as a disease activity score of  $\geq 3$  determined on a visual analog scale (VAS), which was also used to assess their subjective pain level. All patients also completed the Lequesne functional index for knee osteoarthritis, which was analyzed according to the type of work patients currently or previously performed. Prior to commencing the study, consent of the Hospital Ethics Committee was obtained and all participants signed an informed consent. Statistical analysis was performed using the software package SPSS ver. 24.

**Results:** The study sample comprised of 30 individuals (27 women and 3 men) with an average age of  $68.73 \pm 5.80$  y. Majority (44.8%) of the participants currently or previously worked in professions that involved prolonged standing and hard physical work, while for 31% and 24% work activities mostly required standing still, and squatting and kneeling, respectively. The average VAS score for pain was  $6.83 \pm 2.00$ , and the VAS global assessment of the disease score was  $7.40 \pm 1.54$ , with the mean Lequesne index value of  $12.30 \pm 3.24$ . The Lequesne index value was statistically significantly different in subjects performing different tasks ( $F=6.51$ ,  $p<0.01$ ). The highest value was recorded in relation to professions that involved prolonged standing with hard physical work ( $14.27 \pm 2.44$ ), followed by standing still ( $11.2 \pm 3.15$ ), while the lowest average value of this index was associated with professions that mostly relied on squatting or kneeling ( $9.86 \pm 2.94$ ).

**Conclusion:** Type of work significantly affects the functional findings in patients with osteoarthritis of the knee, especially if it is harder physical work that places significant load on knees.

P749

# RELEVANCE OF DIAGNOSIS AND TREATMENT OF OSTEOPOROSIS FOR PHYSICAL AND REHABILITATION MEDICINE PHYSICIANS

A. Marchenkova<sup>1</sup>

<sup>1</sup>National Medical Research Center of Rehabilitation and Balneology" of Ministry of Health of Russian Federation/ Dept. of Somatic Rehabilitation, Moscow, Russia

**Objectives:** There is a high prevalence of osteoporosis (OP) among patients of the older age undergoing rehabilitation. Therefore, it is obvious that physical and rehabilitation medicine physicians should be well oriented in this medical problem. This study aimed to study the relevance of the problem of osteoporosis (OP) for physical and rehabilitation medicine physicians, their awareness of the main methods of diagnosis, treatment and prevention of this disease, as well as the frequency of their use in daily clinical activity.

**Methods:** A cross-type study was carried out using a questionnaire survey. The study included 157 doctors (M-34, F-123) of 8 medical specialties working in 27 specialized medical institutions on the profile of "medical rehabilitation. The questionnaire for doctors consisted of 21 items of special questions.

**Results:** 90.45% of the surveyed doctors believed that the problem of OP is relevant for their clinical activities, 100% of the respondents indicated that the presence of OP significantly affects the rehabilitation prognosis and 95.54% on the degree of effectiveness of medical rehabilitation. According to the respondents, patients with OP make up on average 30.0% [20.0; 50.0] (0-90) of the total flow of patients. 92.36% (145/157) of doctors indicated that they know the risk factors for OP, 98.73% (155/157) - methods for diagnosing OP, 68.79% (108/157) - methods for treating OP, 80.25% (126/157) - methods of preventing OP, 47.13% (74/157) - what is FRAX. However, 35.01% (55/157) of the respondents considered their level of awareness of the problem sufficient for managing patients with OP. Diagnostic procedures for OP are recommended by the all endocrinologists (100%) and the majority of traumatologists (72.73%), gynecologists (66.67) and cardiologists (64.28%), as well as on average half (50%) neurologists and therapists. Endocrinologists (100%), gynecologists (66.67%) and therapists (60%) are mainly involved in the treatment of OP. 32.48% (51/157) of physicians have ever referred their patients to a BMD assessment.

**Conclusion:** The problem of OP is relevant for the clinical activities of physical and rehabilitation medicine physicians and there is the need for advanced training on the problem of OP among these specialists.

P750

# THE EFFECT OF CALCIUM AND VITAMIN D3 ON CALCIUM HOMEOSTASIS AND FALLS INCIDENCE IN PATIENTS WITH HIGH FRACTURE RISK UNDERGOING MEDICAL REHABILITATION

L. Marchenkova<sup>1</sup>, V. Vasileva<sup>1</sup>

<sup>1</sup>National Medical Research Center of Rehabilitation and Balneology" of Ministry of Health of Russian Federation, Dept. of Somatic Rehabilitation, Moscow, Russia

**Objective:** Vitamin D and calcium deficiencies is of particular importance in older patients undergoing medical rehabilitation and having a high risk of fractures. Preventing falls and fractures, including during the course of rehabilitation, is an important challenge that can be addressed in these patients, in particular through improved nutrition and vitamin D and calcium supplementation. This study aimed to evaluate the effect of long-term calcium and vitamin D3 intake on calcium homeostasis and fall's rate in patients with high fracture risk starting rehabilitation course.

**Methods:** The study enrolled 119 men and women aged 50-80 y.o. with high absolute fracture probability by FRAX who started medical rehabilitation. 41 patients have been receiving antiresorptive therapy already comprised group 1, other patients were randomized into groups 2 (n=39) and 3 (control, n=39). In groups 1 and 2, a food supplement containing calcium citrate 1000 mg and vitamin D3 600 IU was prescribed for 12 months. All patients undergo laboratory examination, food calcium intake and fall assessment at baseline, in 6 and 12 months

**Results:** Daily calcium intake in the study sample (n=119) was 782.9±243.4 mg. Vitamin D deficiency was detected in 38.4% of the examined. An increase in 25(OH)D level was noted in groups 1 and 2 after 6 and 12 months (p<0.01). Patients in group 1 showed an increase in serum osteocalcin and calcium levels after 6 and 12 months (p<0.05). In group 3, there was an increase of immunoreactive PTH levels after 6 (p<0.05) and 12 months (p<0.01), C-terminal telopeptide of type I collagen level and alkaline phosphatase activity after 12 months (p<0.05). In group 1, there was also a decrease in proportion of patients who fell after 6 months ( $\chi^2=4.97$ , p=0.026) and a decrease in the total number of falls after 12 months ( $\chi^2=4.89$ , p=0.027). Group 2 showed a decrease in the number of patients who fell after 6 and 12 months ( $\chi^2=48.58$ , p=0.0034 at both stages of the study) and the number of falls in general after 6 months ( $\chi^2=6.02$ , p=0.0142).

**Conclusion:** The obtained data allow us to recommend prescription of dietary supplements containing calcium and vitamin D3 as a part of complex rehabilitation of patients with high fracture risk.



P751

# THE ROLE OF MACROPHAGE MIGRATION INHIBITORY FACTOR IN ACTIVITY AND PROGRESSION OF ANKYLOSING SPONDYLITIS

Y. G. Gazar<sup>1</sup>, M. H. Hanafy<sup>1</sup>, M. E. Elrefi<sup>2</sup><sup>1</sup>Al-Azhar University Hospitals, <sup>2</sup>Military Hospitals, Rheumatology, Cairo, Egypt

**Objective:** Ankylosing Spondylitis (AS) is a chronic inflammatory form of arthritis that predominantly affects the axial joints and has a global prevalence of 1%. Disease progression is marked by osteoproliferation and bone fusion in the axial joints, causing considerable loss of mobility. Migration inhibitory factor (MIF) is a potent pro-inflammatory cytokine implicated in several diseases. Elevated serum MIF levels have been reported in AS the role of MIF in bone formation has been a subject of controversy. Aim: Detection of the level of MIF in AS patients and correlate the level with disease activity and progression.

**Methods:** This cross-sectional case-control study was concluded on 70 randomly selected people from the internal medicine department in Kobry El-Kobba Military Hospital and from the rheumatology and rehabilitation department in El-Hussein university hospital. The population study was divided into two groups: Group A: (50) Patients with AS who met the European Spondyloarthropathy Study Group (ESSG) criteria for AS (30) and Group B: (20) Healthy controls. Serum MIF by ELISA was measured. X-rays cervical & lumbosacral vertebrae (dorsal, lateral) views were obtained. m-SASS scores (based on radiographic findings to detect progression) were assessed. MSK U/S on Tendo Achilles affected in AS patients were done.

**Results:** The mean age of all patients was (38.2±8.4)y. Regarding the gender of the patients, the majority (65.7%) of patients were males, while (34.3%) were females. (88%) of AS patients had cervical erosion or sclerosis, (46%) had dorsal erosion or sclerosis, (92%) had lumbosacral erosion or sclerosis, with m-SASS score of (11±6.1). Regarding musculoskeletal U/S, (72%) had evidence of inflammation and erosion. Highly significant increase in ESR, CRP, and MIF levels in the A group; compared to the control B group; with a highly significant statistical difference ( $p<0.01$ ). the increase in smoking, ESR, and MIF level; had an independent effect on increasing the probability of progression occurrence; with a significant statistical difference ( $p<0.05$  respectively). MIF level at a cutoff point (>51) predicted patients with progression, with fair accuracy (74%), sensitivity=53% and specificity=94% ( $p=0.0056$ ).

Table 1. Radiological data among 50 AS subjects.

Variables		Frequency (%)
X-ray "vertebrae"	Cervical erosion or sclerosis	44 (88%)
	Dorsal erosion or sclerosis	23 (46%)
	Lumbosacral erosion or sclerosis	46 (92%)
	m-SASS score	11±6.1
U/S	Effusion & Inflammation (U/S)	36 (72%)

U/S: musculoskeletal ultrasound.

Table 2. Comparison between the 2 groups as regards basic clinical and drug history data using Mann-Whitney's U and chi-square tests.

Variable		Non-progressor group (35)	Progressor group (15)	Mann-Whitney's U test
Median (IQR)		Median (IQR)	P value	
Disease duration (y)		13 (11.2-17.5)	20 (16.5-23)	=0.0028**
BASDAI score		4 (2-4)	3 (2-4)	=0.9313
Variable		Non-progressor group (35)	Progressor group (15)	Chi-square test
			P value	
Smoking	+ve	10 (28.6%)	10 (66.7%)	=0.012*
HTN	+ve	6 (17.1%)	3 (20%)	=0.8114
DM	+ve	6 (17.1%)	2 (13.3%)	=0.7389
NSAIDs	+ve	18 (51.4%)	9 (60%)	=0.5812
DMARDs	+ve	30 (85.7%)	14 (93.3%)	=0.4520
TNFi	+ve	5 (14.3%)	2 (13.3%)	=0.9298

**Conclusion:** MIF play an important role in the pathogenesis of AS and has a link between chronic inflammation, new bone formation, and disease progression and can be used as an indicator for activity and disease progression

P752

# THE BENEFITS OF COMBINING PHYSICAL THERAPY IN THE CONSERVATIVE TREATMENT OF MORTON'S NEURALGIA

V. D. Caimac<sup>1</sup>, I.-R. Marcu<sup>1</sup>, A.-M. Bumbea<sup>1</sup>, C. O. Rogoveanu<sup>1</sup>

<sup>1</sup>University of Medicine & Pharmacy of Craiova, Craiova, Romania

**Objective:** Appreciation of the effects on pain and gait obtained by combining the physical therapeutic means in the 14-day conservative therapeutic program dedicated to patients diagnosed with Morton's neuritis.

**Methods:** We organized a prospective, observational, randomized study for a group of 42 patients with Morton's neuritis. The patients were randomly divided into a control group that received only specific medication and a study group in which the treatment also included physical therapy (ultrasound, laser, orthosis, massage). Patients were evaluated at baseline and after 14 d of treatment. The parameters we followed were: pain (assessed using a visual analogous scale for pain) and disability (ADL 24 and ability of walking).

**Results:** Score values for functional parameters have improved: the value of the VAS score for pain decreased by 45.3% in group 2 compared to 34.1% in group 1 ( $p=0.00053$ ); ADL score improved (52.5% in group 2 vs. 41.1% in group 1) and locomotor capacity progressed more in patients in group 2 (43.3%) compared to group 1 (31.4%). The results had statistical significance ( $p<0.05$ ).

**Conclusion:** The results highlight the improvement of pain and of functional parameters in the study group, which certifies the efficiency of the physical means of treatment applied within the non-surgical therapeutic program, to patients with Morton's neuritis. These findings motivate the continuation of the study over a longer period of time and a larger number of patients.

P753

# POLYMORPHISM OF THE RS12409277 PRDM16 GENE AND ITS RELATION WITH ANTHROPOMETRIC AND DENSITOMETRIC PARAMETERS IN POSTMENOPAUSAL WOMEN IN EASTERN SLOVAKIA

M. Mydlárová Blaščáková<sup>1</sup>, K. Hricová<sup>2</sup>, J. Poráčová<sup>3</sup>, S. Tomková<sup>4</sup>, A. Avuková<sup>1</sup>, Z. Tomková<sup>5</sup>

<sup>1</sup>University of Prešov in Prešov, Faculty of Humanities and Natural Sciences, Dept. of Biology, Prešov, <sup>2</sup>University of Prešov in Prešov, Faculty of Humanities and Natural Sciences, Dept. of Biology, Hospital Košice-Šaca a.s., Prešov, Košice-Šaca, <sup>3</sup>University of Prešov in Prešov, Faculty of Humanities and Natural Sciences, Dept. of Biology, Prešov, <sup>4</sup>Osteocentre, Hospital Košice-Šaca a.s., Košice-Šaca, <sup>5</sup>Osteocentre s.r.o., Prešov, Slovakia

**Objective:** The *PRDM16* gene is generally studied in relation to white and brown adipose tissue. The aim of our work was to determine the possible association of the polymorphism rs12409277 *PRDM16* gene with selected anthropometric and densitometric parameters in postmenopausal women in eastern Slovakia.

**Methods:** The research group consisted of 96 postmenopausal women, which we divided according to the T-score into: osteoporosis (OP=31), osteopenia (OPE=50) and control group (CG=15). Genomic DNA was isolated from peripheral blood using a commercial NucleoSpin® Blood Macherey-Nagel kit according to a standard protocol. Real-time PCR and TaqMan® SNP Genotyping Assay according to the appropriate protocol were used for genotypic analysis. Densitometric measurement of postmenopausal women was conducted with a body densitometer DXA (DXA Hologic Discovery, Waltham, MA, USA). From anthropometric parameters, we measured body weight (DM – 117, Dimarson Elektroniks, Kyiv, Ukraine), body height (DIN 862, KINEX Measuring, Prague, Czech Republic), waist circumference and hip circumference.

**Results:** Based on the Chi-square test, we found statistical significance ( $p<0.008$ ) in the representation of genotypes and also in the representation of alleles ( $p<0.003$ ) among the observed groups of postmenopausal women. In the CT and TT genotype, we found statistically significant differences in anthropometric parameters: body weight, BMI, waist and hip circumference, and densitometric parameters: T-score total left hip ( $p<0.004$ ), Z-score total left hip ( $p<0.009$ ), Z-score neck left hip ( $p<0.002$ ) and BMD total left hip ( $p<0.005$ ). Based on correlation analysis, we found a statistical dependence of BMI and CT genotype ( $p<0.013$ ) and BMI and TT genotype ( $p<0.002$ ) in the rs12409277 *PRDM16* gene polymorphism.

**Conclusion:** The rs12409277 polymorphism of the *PRDM16* gene as well as the gene itself has been little studied in terms of BMD and the risk of fractures. Our results provide initial information on the representation of genotypes and alleles of the rs12409277 *PRDM16* gene polymorphism in the East Slovak population of postmenopausal women.

**Acknowledgment:** This work was supported the project VEGA no. 1/0461/19.

P754

# DIACEREIN POSTMARKETING ASSESSMENT: A PROSPECTIVE OBSERVATIONAL STUDY ON THE EFFECTIVENESS AND SAFETY OF DIACEREIN IN A REAL-LIFE SETTING

I. B. Belyaeva<sup>1</sup>

<sup>1</sup>North-West State Medical University I.I. Mechnikov, 25th City Clinic of Rheumatology, Saint-Petersburg, Russia

**Objective:** To assess the effectiveness and safety of diacerein when used according to its marketing authorisation.

**Methods:** This prospective, open, non-controlled, observational trial in two Russian centres included patients with symptomatic knee or hip osteoarthritis (OA) who were about to initiate a treatment with 50 mg diacerein twice daily. WOMAC and pain on walking using a 100 mm visual analogue scale (VAS) were evaluated at baseline and three month visits. Patients assessed their overall well-being using a 0-100 point scale at baseline, three months and via a telephone survey at five intermediate timepoints. The rate of responders to treatment according to the OMERACT-OARSI criteria was calculated at three months. Adverse events were collected at each timepoint.

**Results:** In total 61 patients were enrolled, 57 of them completed the study. The trial population had a mean age of  $61 \pm 9$  y and a BMI of  $32 \pm 7$  kg/m<sup>2</sup>; 90% were women. Most of the patients (98%) suffered from knee OA, 33% had hip OA (Kellgren-Lawrence graded II-III); concomitant hand OA was present in 38% of the trial population. 95% of patients had at least one comorbidity, mostly cardiovascular diseases. A significant reduction in pain on walking was observed under diacerein treatment ( $p < 0.001$ ) with a mean change from baseline at three months of 22.11 mm (95%CI: -25.82, -18.41). WOMAC pain, stiffness and function subscores were also significantly reduced after three months ( $p < 0.001$ ). The patient's assessment of overall wellbeing significantly increased compared with baseline from Week 4 ( $p = 0.0034$ ); change from baseline at three months was 17.78 mm (95%CI: -13.68, -21.89;  $p < 0.001$ ). The OMERACT-OARSI responders' rate was 61%. Interestingly, symptoms of concomitant low back pain and hand OA also improved during the study ( $p < 0.001$ ). The incidence of adverse reactions was 41%. Among them, the most common were diarrhoea and abdominal pain (49% and 34%, respectively). No occurrence of gastric/duodenal ulcer was observed, as well as no change in concomitant cardiovascular diseases.

**Conclusion:** Diacerein was shown to be an effective and safe symptomatic treatment of knee and hip OA in patients with various comorbidities.

**Disclosure:** Trial was funded by TRB Chemedica.

P755

# INSTRUMENTAL AND BIOCHEMICAL INDICATORS OF THE STATE OF BONE TISSUE IN OSTEOMALACIA AND OSTEOPOROSIS

A. Ignatiev<sup>1</sup>, T. Ermolenko<sup>1</sup>, N. Turchin<sup>1</sup>

<sup>1</sup>Odessa National Medical University, Odessa, Ukraine

**Objective:** A decrease in BMD, which occurs in osteomalacia (OM) and osteoporosis (OP), is accompanied by a decrease in the strength properties of bone structures and an increase in the risk of fractures. Despite the same clinical outcome (fractures), the morphostructural, etiological, and pathogenetic characteristics of OP and OM differ qualitatively. The aim was to study the diagnostic criteria for osteomalacia and osteoporosis in postmenopausal women.

**Methods:** We examined 157 postmenopausal (PM) women aged  $57.5 \pm 1.2$  y, of which 103 women were diagnosed with OP (group I) and 24 morphometrically diagnosed with OM (group II), control group (III) - 30 practically healthy women. X-ray densitometry was performed (osteodensitometer Hologic Discovery (USA)). The level of 25(OH)D in the blood serum was determined by the enzyme immunoassay on a EUROIMMUN analyzer (Germany). Bone resorption marker C-terminal telopeptide of collagen type 1 (CTx), osteocalcin (OC) and PTH - by immunochemiluminescent method, phosphorus level - by a spectrophotometric method using a Cobas 6000 analyzer (Roche Diagnostics, Switzerland). The level of osteoprotegerin (OPG) was determined by an enzyme-linked immunosorbent assay on an AxsymSystem apparatus (Abbot, Germany). Statistical processing was performed using Microsoft Office Excel and Statistica 10.0 software. Student's t-test was used for mathematical processing. When assessing the strength of the correlation coefficients, the Chaddock scale was used.

**Results:** Analysis of the data obtained showed a decrease in BMD ( $p < 0.05$ ) in groups I and II. However, BMD neck, T-test neck, Z-test neck in the group of women with OM were significantly reduced ( $p < 0.05$ ), in comparison with the group with OP. The levels of 25(OH)D, OC, OPG were also reduced ( $p < 0.05$ ) in the second group of women compared with the first group. We obtained higher ( $p < 0.05$ ) indices of PTH and STx in the group of patients with OM in comparison with the group with OP. Correlation analysis of the obtained results showed a relationship between the level of 25(OH)D and indicators of structural and functional changes in CT: 25(OH)D and CTx ( $r = -0.669$ ;  $p = 0.001$ ), 25(OH)D, and BMD neck ( $r = 0.736$ ;  $p = 0.002$ ). There was also a direct relationship between BMD neck and CTx ( $r = -0.463$ ;  $p = 0.002$ ).

**Conclusion:** In the PM of women with OM, in comparison with the PM in women with OP, significantly larger ( $p < 0.05$ ) changes in the structural and functional state of CT, biochemical markers of CT resorption and remodeling, as well as lower ( $p < 0.05$ ) content level 25(OH)D. The content level 25(OH)D is highly informative in terms of predicting and diagnosing a decrease in BMD and the

risk of fractures. The biochemical marker of CTx resorption has a high informative value in terms of predicting, timely diagnosis, and the effectiveness of the reduction treatment.

P756

### CLINICAL CHARACTERISTICS, TREATMENT AND REMISSION OF PATIENTS WITH BONE PAGET IN A TERTIARY HOSPITAL CENTER

J.-P. Baldivieso Achá<sup>1</sup>, C. Valero-Martínez, F. Gutierrez Rodriguez, I. González Álvaro<sup>1</sup>, J.-A. García Vadillo<sup>1</sup>

<sup>1</sup>Princess University Hospital, Madrid, Spain

**Objective:** To evaluate the characteristics, administered treatment and its response in patients with Paget's disease treated in the last 5 y in our center.

**Methods:** Retrospective observational study of patients with bone Paget treated in the last 5 y in the Rheumatology Service of an urban tertiary hospital assigned to the care of 325,000 inhabitants. The histories of patients with Paget who have attended our consultations at least once during the last 5 y were reviewed. Demographic data, type of affection, established treatments, remission and duration of this were collected. Total remission was considered when the clinical reason for the indication remitted with treatment and/or serum alkaline phosphatase levels normalized. Partial remission was considered when symptoms and/or alkaline phosphatase were reduced by >50%. The statistical study was carried out with stata. The quantitative variables analyzed were described with mean and standard deviation. The categorical variables were expressed with absolute and relative frequencies. In the univariate analysis to study the factors related to the response to treatment, the chi-square and Pearson's test were applied. All tests were considered a significance level  $p < 0.05$ .

**Results:** A total of 105 patients (50.4% men) were seen with a mean age of 81 (DS10.49) years for men and 83 (DS 11.30) y for women. Of these, 29 (27.6%) had not required treatment throughout their disease, presenting a significantly higher percentage of monostotic involvement (72.5% vs. 27.5%), and a lower initial alkaline phosphatase 99, 5 IU/l [77-124] in relation to 195 IU [144-229] in patients who received treatment. The remaining 76 (72.38%) patients had received a total of 73 cycles of i.v treatment with zoledronate and 37 with oral aminobisphosphonates (oral BPP). In 91.11% of the zoledronate cycles, total remission and normalization of serum alkaline phosphatase levels were obtained with a mean duration of 48 months; and in 72.73% of those treated with oral BPP, complete remission was also obtained, with a mean duration of 96 months. During the follow-up period, 4 died in the untreated group and 5 in the treated group. No malignancy to osteosarcoma was observed. In the last 5 y, only 24 new patients were diagnosed

**Conclusion:** In our patients with active bone Paget with the iv administration of zoledronate 4-5 mg, we observed a prolonged total remission greater than 4 y in 91% of the treated patients. A

higher percentage of patients in relation to those treated with oral bisphosphonates, but it is striking that the mean duration of this remission is longer.

P757

### BONE QUALITY IN ADULT WISTAR RATS OFFSPRING IS ASSOCIATED WITH PRENATAL AND POSTNATAL NUTRITIONAL MANIPULATION

E. Armeni<sup>1</sup>, N. Syggelos<sup>1</sup>, A. Augoulea<sup>1</sup>, N. Mili<sup>1</sup>, S. Paschou<sup>1</sup>, G. Kaparos<sup>2</sup>, H. Vafaei<sup>3</sup>, I. Dontas<sup>4</sup>, K. Marinou<sup>5</sup>, G. Vaggos<sup>6</sup>, P. Raptou<sup>4</sup>, E. Makarios<sup>1</sup>, K. Nicolaidis<sup>7</sup>, I. Lambrinoudaki<sup>1</sup>

<sup>1</sup>2nd Dept. of Obstetrics and Gynecology, National and Kapodistrian University of Athens, Aretaieio Hospital, Athens, Greece, <sup>2</sup>Biochemical Laboratory, National and Kapodistrian University of Athens, Aretaieio Hospital, Athens, Greece, <sup>3</sup>Dept. of Obstetrics & Gynecology, Faghihi Hospital, Shiraz University of Medical Sciences, Shiraz, Iran, <sup>4</sup>Laboratory for Research of the Musculoskeletal System, Th. Garofalidis, National and Kapodistrian University of Athens, KAT Hospital, Athens, Greece, <sup>5</sup>Greek Ministry of Rural Development and Food, Dept. of Animal Welfare for Farm and Laboratory Animals, Athens, Greece, <sup>6</sup>Dept. of Obstetrics & Gynecology, General Hospital of Arta, Arta, Greece, <sup>7</sup>Harris Birthright Research Centre for Fetal Medicine, King's College Hospital, London, UK

**Objective:** The impact of nutrition on skeletal growth seems to begin in utero. The very early programming of bone development affects bone mass accumulation, growth and development from early on. Skeletal acquisition tends to be more rapid at the latter vs. earlier stage of the gestational period, while the process starts tapering from the 39<sup>th</sup> week of gestation. This study aimed to evaluate the impact of perinatal food manipulation on skeletal characteristics and insulin levels of Wistar rats at the age of 1 y.

**Methods:** 67 first-time pregnant rats were randomized, to receive either normal diet (control diet, CD), food-restricted (FR), or fat-enhanced diet (FF), from the 12th gestational day. The rats gave birth on the 21st day of pregnancy. Pups born to FR-mothers were subsequently divided into: fetal growth restricted (FGR) and non-FGR, based on their birth weight. Manipulation of maternal diet continued through the lactation period. Following delivery, all neonates were cross-fostered until the 25th day postpartum. Pups born to normally fed mothers were lactated by FR-, FF- or CD-fed mothers. A similar process was followed for the pups born to mothers FF- or FR-during pregnancy. All pups were weaned to the diet of their foster mother, on the 26th day postpartum, and continued to receive the same diet until one year of age. Bone density was assessed by pQCT.

**Results:** CD/CD had higher values of total bone density and total/subcortical area compared to FF/FF rats. The FF/FF group had higher subcortical density when compared to the FF/FR group. Pups receiving CD throughout the experiment had higher values



of all assessed skeletal parameters in comparison to pups FGR/CD. Pups food restricted postnatally had lower values of all assessed skeletal parameters compared to non-FGR/FF rats. Pups FGR/FF had higher insulin levels compared to rats FF/FR. Comparable levels of insulin were identified in rats receiving high fat diet postnatally, irrespective of prenatal food-restriction or high fat diet.

**Conclusion:** We observed distinct skeletal acquisition and insulin levels' profiles in Wistar rats who experienced perinatal food manipulation before birth and until their first year of life.

P758

### IMPROVING COMMUNICATION OF FRACTURE RISK GLOBALLY: INSIGHTS FROM INTERVIEWS WITH PATIENTS. THE RISKCOMMUNICATION STUDY OR RICO STUDY

C. Beaudart<sup>1</sup>, S. Silverman<sup>2</sup>, Z. Paskins<sup>3</sup>, A. Boonen<sup>4</sup>, J.-F. Kaux<sup>5</sup>, S. Fujiwara<sup>6</sup>, M. Hilgsmann<sup>1</sup>

<sup>1</sup>Dept. of Health Services Research, CAPHRI Care and Public Health Research Institute, Maastricht University, Maastricht, The Netherlands, <sup>2</sup>Cedars-Sinai Medical Center, Los Angeles, USA, <sup>3</sup>School of Medicine, Keele University, Staffordshire, UK, <sup>4</sup>Dept. of Internal Medicine, Division of Rheumatology and CAPHRI Care and Public Health Research Institute, Maastricht University Medical Center, Maastricht, The Netherlands, <sup>5</sup>Physical Medicine, Rehabilitation and Sports Traumatology, University and University Hospital of Liège, Liège, Belgium, <sup>6</sup>Dept. of Pharmacy, Yasuda Women's University, Hiroshima, Japan

**Objective:** Lack of or low quality communication between patient and healthcare provider may partially explain poor initiation and adherence to anti-osteoporosis treatment. In this study, we aimed to gain insights into patients' understanding and preferences for various approaches for communication of fracture risk, derived from a risk algorithm, with the goal of improving osteoporosis treatment and management.

**Methods:** Individual physical or online interviews with patients at risk for fractures were organized in 4 different countries (Belgium, The Netherlands, United States and Japan). A semi-structured workbook developed following a scoping literature review and experts insight was used to conduct interviews. Using an example of a personal risk of 21% for any fracture in the next 10 y, four main fracture risk presentations were used to guide these interviews: verbal/written presentation of the percentage fracture risk, various types of coloured graphs, icon arrays, and icon arrays with or without treatment effect on fracture risk. Patients were asked to critically reflect on the different framing presentations for fracture risk, to suggest alternatives for improvement and to rank their preference.

**Results:** A total of 26 women (mean age of 70.5 y) at risk for fractures participated in the study. Thirteen (50%) had an history of fracture, 18 (69.2%) were on antiosteoporosis medication and 4 (15.4%), 11 (42.3%), 5 (19.2%) considered themselves at low, moderate and high risk of fracture respectively. Most patients (76.9%) preferred coloured graphs over other presentations. Icon arrays of baseline fracture risk were never a preferred method of risk communication. Most patients also reported that presenting the risk of fracture with and without treatment would be more convincing to initiate a treatment. Participants also suggested that fracture risk communication should be supported with additional data, such as the consequences of fractures. Most patients would value the development of a visual tool to better understand fracture risk.

**Conclusion:** Insights from these interviews suggest the importance of a patient-centered approach to fracture risk communication. A larger global survey is currently being developed to provide additional insights into patients' understanding and preferences for fracture risk communication and assess potential cultural and geographical differences in the optimal way to communicate fracture risk.

**Acknowledgement:** Amgen, Inc. funded this investigator initiated study. \*The RICO project is endorsed by the Epi/QOL working group.

P759

### OSTEOPOROSIS AND PREVALENT VERTEBRAL FRACTURES ARE ASSOCIATED WITH INSULIN RESISTANCE IN NON-DIABETIC POSTMENOPAUSAL WOMEN

E. Armeni<sup>1</sup>, A. Augoulea<sup>1</sup>, S. Paschou<sup>1</sup>, A. Soureti<sup>1</sup>, G. Kaparos<sup>2</sup>, D. Rizos<sup>3</sup>, A. Antoniou<sup>4</sup>, K. Panoulis<sup>1</sup>, I. Lambrinoudaki<sup>1</sup>

<sup>1</sup>2nd Dept. of Obstetrics and Gynecology, National and Kapodistrian University of Athens, Aretaieio Hospital, <sup>2</sup>Biochemical Laboratory, National and Kapodistrian University of Athens, Aretaieio Hospital, <sup>3</sup>Hormonal Laboratory, National and Kapodistrian University of Athens, <sup>4</sup>1st Dept. of Radiology, National and Kapodistrian University of Athens, Aretaieio Hospital, Athens, Greece

**Objective:** Diabetes mellitus is a recognized risk factor of osteoporosis and low bone density, while recent data is suggesting a possible association between prediabetes and bone fragility. This study aimed to assess the possible link between the diagnosis of prevalent fractures of the lumbar spine (LS) and/or a diagnosis of osteoporosis and insulin resistance in a postmenopausal population.

**Methods:** A total of 322 postmenopausal consecutive outpatients were retrieved for this cross-sectional study. We included women without significant insulin resistance (homeostasis model assessment, HOMA-IR<5), no clinically overt cardiovascular dis-

ease, normal thyroid function, and no evidence of gynecological malignancy. We obtained fasting venous blood samples, for biochemical and hormonal assessment. DXA was used to estimate bone density at the lumbar spine (LS) and femoral neck (FN). The prevalence of vertebral fractures (VFs) was estimated using plain LS radiographs.

**Results:** VFs were prevalent in 7.5% of our women (24/322). Osteoporosis was evident at the LS in 8.8% of women (19/216), and at the FN in 14.8% (31/209) of women. Measures of bone density correlated significantly with age, menopausal age and HOMA-IR values (FN, BMD r-coefficient=0.143, p-value=0.040; LS, T-score r-coefficient=0.149, p-value=0.028; FN, T-score r-coefficient=0.147, p-value=0.033. The presence of LS- or FN-osteoporosis associated with lower values of HOMA-IR (HOMA-IR values, osteoporosis vs. osteopenia/normal density at LS,  $1.2 \pm 0.4$  vs.  $1.7 \pm 0.9$ , p-value=0.018; at the FN:  $1.3 \pm 0.6$  vs.  $1.6 \pm 0.9$ , p-value=0.091) as well as with higher follicular stimulating hormone (FSH) levels and age. Multivariable logistic regression models showed that the prevalence of VFs associated with HOMA-IR values (1<sup>st</sup> vs. 4<sup>th</sup> quartile, 2.5% vs. 7.5%, p-value 0.018 after bootstrapping for 1000 samples). A diagnosis of LS-osteoporosis associated with HOMA-IR values (1<sup>st</sup> vs. 4<sup>th</sup> quartile, 13.7% vs. 1.8%, p-value=0.030 after bootstrapping for 1000 samples) as well as menopausal age. A diagnosis of FN-osteoporosis associated with HOMA-IR levels (1<sup>st</sup> vs. 4<sup>th</sup> quartile, 16.9% vs. 4.5%, p-value=0.040 after bootstrapping for 1000 samples). All models were adjusted for age, BMI, FSH, and estradiol.

**Conclusion:** High normal insulin resistance is associated with lower rates of VFs, LS- and FN-osteoporosis, as estimated by levels of HOMA-IR, in a nondiabetic postmenopausal population.

P760

### THE PATIENTS ON DENOSUMAB FOR TREATMENT OF OSTEOPOROSIS GET SIGNIFICANT IMMUNITY AND PROTECTION FROM COVID-19

S. B. Bajaj<sup>1</sup>

<sup>1</sup>Falls Institute Of India, Nagpur, India

**Objective:** To explain the importance of giving priority to denosumab while treating the older adults with osteoporotic fragility fractures as they are more prone to acquire COVID-19.

**Methods:** The principal investigator is a Consultant Orthogeriatrician having special interest in the prevention, diagnosis and treatment of osteoporotic fragility fractures. Since June 2018, he is using denosumab for avoiding fractures in senior citizens. The final selection is done on the basis of DXA Scan along other innumerable clinical risk factors considered in FRAX. Since then his 30 patients are on regular 6 monthly dose of denosumab. The very first patient was given first dose on 30 June 2018. She has completed total 5 doses. Those who have completed at least 3 doses are included in this study. Two patients are lost to follow up and one patient died due to non-COVID diagnosis. The beneficiaries are be-

tween 60-92 y of age. Except only one male, rest all are females. **Results:** The results of this 24 months follow up study are promising, result-oriented, cost-effective and prudent. Not a single patient suffered from COVID-19 like symptoms. Not a single patient required hospital admission or oxygen therapy at home. For very first time and then before giving next dose, every time CTX (BTM) was done. The beneficiaries are monitored regularly for calcium, vitamin D and other dietary supplements along-with the rest mandatory guidelines about exercising, pranayam, yoga, etc. **Conclusion:** The clinicians and consultants in the field of osteoporotic fragility fractures should consider about initiating denosumab on priority basis to older adults who are otherwise more prone to acquire COVID-19.

P761

### THE RELIABILITY OF MEASURING MUSCLE QUANTITY AND QUALITY WITH EXTENDED-FIELD-OF-VIEW ULTRASOUND AT NINE BODY SITES

J. van den Broeck<sup>1</sup>, S. Héréus<sup>1</sup>, M. De Maeseneer<sup>2</sup>, A. Scafoglieri<sup>1</sup>

<sup>1</sup>Vrije Universiteit Brussel, <sup>2</sup>Universitair Ziekenhuis Brussel, Brussels, Belgium

**Objective:** Loss of muscle mass is associated with physical disability and mortality. Ultrasound is a field-based method for the quantification of muscle quantity and quality. The extended-field-of-view (EFOV), as an ultrasound technique, makes it possible to measure muscle thickness (MT), cross-sectional area (CSA) and echogenicity (EG). EFOV seems to be reliable and valid at, particularly, the lower extremities. For the scope of regional and whole body composition the reliability of multiple measuring sites needs to be confirmed. For this reason, we wanted to assess the intra- and inter-rater reliability of EFOV ultrasound for measuring muscle quantity and quality at 9 different body sites.

**Methods:** 25 healthy adults (12 men, 13 women) were included in this study. The ultrasound measurements were performed using a Mindray M7 (Shenzhen Mindray Bio-Medical Electronics Co., Ltd.) with a linear probe (10 MHz). The MT, CSA, and EG of the tibialis anterior, gastrocnemius (caput mediale), rectus femoris, biceps femoris, rectus abdominis, erector spinae, biceps brachii, triceps brachii, and forearm extensor muscles were measured. Reliability analysis was performed with ICC (two way random). ICC values 0-0.20 were considered as poor, 0.21-0.4 slight, 0.41-0.6 moderate, 0.61-0.8 substantial, and  $\geq 0.81$  as excellent.

**Results:** The age of the participants ranged from 19-61 years old. The intra-rater reliability for the quantification of muscle quantity and quality was substantial to excellent, with ICCs varying between 0.79-0.98. The ICC's for the inter-rater reliability for all variables (MT, CSA, and EG) of the tibialis anterior, gastrocnemius, rectus abdominis, biceps brachii, and forearm extensor muscles

ranged from 0.61-0.87. For the rectus femoris, biceps femoris, erector spinae, and triceps brachii muscles, the ICC's ranged from 0.47-0.85.

**Conclusion:** The quantity and quality of tibialis anterior, biceps brachii, gastrocnemius (caput mediale), and rectus abdominis muscles can be reliably measured with EFOV ultrasound. The quantity of rectus femoris and forearm extensor muscles and the quality of biceps femoris and erector spinae muscles can also be measured reliably. The triceps brachii seems to be unreliable for ultrasound measurement.

P762

### PHYSICAL ACTIVITY IN KNEE OSTEOARTHRITIS PATIENTS IN TIMES OF PANDEMIC COVID-19

M. E. Erraoui<sup>1</sup>, I. G. Ghoulani<sup>2</sup>

<sup>1</sup>Rheumatology Dept., Hassan II Hospital, University Hospital, Faculty of Medicine, Ibn Zohr University, <sup>2</sup>Rheumatology Dept., 1st FAR Medical Surgical Center, University Hospital, Ibn Zohr University, Agadir, Morocco

**Objective:** Knee osteoarthritis is a source of pain and functional disability. However, maintaining regular physical activity greatly contributes to the preservation of muscle strength, in particular the quadriceps, thus cushioning the loads on a knee. In times of COVID-19, this activity was abandoned following confinement dictated by the state of health emergency, which can affect the scalability of the degenerative process of the knee. This study aimed to evaluate physical activity in knee OA patients in COVID-19 time.

**Methods:** Cross-sectional study conducted with adult patients aged 15- 69 followed for knee osteoarthritis selected according to the ACR or Kellgren-Lawrence criteria, seen in rheumatology consultation. The exclusion criteria were patients aged <15 y and >69 y. 50 patients participated in the study. The pain assessment was evaluated by the VAS. The assessment of knee osteoarthritis by WOMAC and physical activity by IPAQ short version.

**Results:** In the 50 patients included, the mean age was 54±6 y, with a predominance of women 88% (44). The mean BMI was 31±4. In our sample, 18% (9) of patients had hypertension and 6% (3) had diabetes. The involvement is bilateral in 72% (36) of cases, left unilateral in 18% (9) and right unilateral in 10% (5). The x-ray of the knees under load showed in 28% (14) a left knee osteoarthritis stage III and in 28% (14) a right knee osteoarthritis stage II. There was no difference between the pain VAS before and during the COVID-19 pandemic with a mean of eight. The mean WOMAC score was 49±13. The median total activity score of the IPAQ was 1975 metabolic task equivalent (MET) -min/week and the time spent sitting was 325 min/d. For the level of physical activity during the last 7 d at this COVID-19 time, 74% (37) had moderate activity, 26% (13) had low activity while no patient had an intense level. There is a statistically significant positive correlation ( $p=0.04$ ) between the time spent sitting and the WOMAC score. A negative correlation between the MET level and the

WOMAC was found, but which is statistically insignificant. For activity level, it was only influenced by age and pain VAS ( $p=0.05$ ). **Conclusion:** Our knee OA patients had moderate activity at the time of the pandemic and the level of pain; high WOMAC and age were the only factors limiting this activity.

P763

### THE CALCIUM, VITAMIN D3 AND VITAMIN B12 (INSUFFICIENCY AND DEFICIENCY BOTH) ARE THE SIGNIFICANT RISK FACTORS FOR COVID-19

S. B. Bajaj<sup>1</sup>

<sup>1</sup>Falls Institute of India, Nagpur, India

**Objective:** To explain the significance of sufficient daily intake of calcium, vitamin D3 & vitamin B12 to prevent COVID-19.

**Methods:** The Principal Investigator is a Consultant Orthogeriatrician with Home Visit Practice since last 32 y. He has treated more than 100 COVID-19 patients by visits between Feb 2020 to April 2021. The SARS-CoV-2 detection was confirmed by RT-PCR. Comprehensive Geriatric Assessment (CGA) was the mandatory base before the initiation of treatment. CGA is based mainly on blood tests.

**Results:** The data of 15 months for 100 patients shown very conclusive results as follows: A) Sr calcium (8.10-10.4 mg/dl): Out of 100 patients, 56 were having calcium bet 8.1-8.9 mg/dl, 10 patients had <8.1 mg/dl calcium and two were extremely deficient (3 mg/dl & 7 mg/dl only). About 32=patients had calcium >9 mg/dl. Not a single patient had calcium >10.4 mg/dl. B) Vitamin D3 (30-100 ng/ml): out of 100 patients, 38 were having insufficient vit D3 between 10-30 ng/ml, 8 were having vitamin D deficiency (VDD: <10 ng/ml). Actually, 3 were severely deficient with only 5, 5.6 & 7.5 ng/ml. Around 36 patients were having vit D3 normal but on very lower side (bet 30-40 ng/ml). Only 16 were having it above 40 ng/ml. There was not a single patient having vit D3 toxicity i.e., >100 ng/ml. C) Vit B12 (120-914 pg/ml): out of 100 patients, 60 were having vit B12 between 120-200 pg/ml, 10 were deficient having <120 pg/ml. Actually, one was severely deficient (88 pg/ml). There were 20 patients between 200-300 pg/ml. Only 8 patients were above 300 pg/ml. Two had hypervitaminosis B12 (>1500, >2000 pg/ml).

**Conclusion:** The recommended daily allowance (RDA) should be kept in mind to fight COVID-19. The diet rich in calcium, vit D3 and vit B12 is very important for maintaining and adding to the immunity in the fight against COVID-19.

P764

# COMPARISON OF IL-17A LEVELS AND BONE MINERAL DENSITY IN POSTMENOPAUSAL WOMEN WITH AND WITHOUT PRIMARY HYPERPARATHYROIDISM

I. Yankova<sup>1</sup>, G. Ivanova<sup>1</sup>, A. Shinkov<sup>1</sup>, G. Kirilov<sup>1</sup>, R. Kovatcheva<sup>1</sup>

<sup>1</sup>Dept. of Endocrinology, Medical University of Sofia, Sofia, Bulgaria

**Objective:** Primary hyperparathyroidism (PHPT) is a common cause of secondary osteoporosis in postmenopausal women. Bone damage is characterized by greater involvement of cortical than trabecular bone, in contrast to postmenopausal osteoporosis. IL17A plays an important role in bone metabolism as it stimulates osteoclast differentiation and bone resorption. The aim of our study was to compare IL-17A levels with BMD and other serum markers of bone metabolism in postmenopausal women with and without PHPT, in order to estimate the possible role of IL-17A in PTH-induced bone remodeling.

**Methods:** The study included 161 postmenopausal women (mean age 61.9 ( $\pm$ 8.19)) with biochemical data of PHPT and 54 age-matched postmenopausal women as controls in the absence of drugs or other diseases known to affect bone metabolism. Serum markers of mineral metabolism, RANKL, OPG and IL-17A were determined. BMD was measured at the lumbar spine (LS), total hip (TH), femoral neck (FN) and distal one-third of the nondominant radius (DR) by DXA.

**Results:** Women with PHPT had higher levels of IL-17A than the control group (31.85, 19.8-44.4 pg/ml vs. 13.9, 3.1-26.6 pg/ml,  $p<0.001$ ). RANKL, OPG and RANKL/OPG did not differ between the two groups ( $p>0.05$ ). LS BMD and DR BMD were lower in the PHPT group than in the controls (LS 0.92, 0.82-1.03 vs. 1.06, 0.92-1.19,  $p<0.001$ ; DR 0.54, 0.45-0.57 vs. 0.58, 0.54-0.62,  $p<0.001$ ), whereas there was no difference in FN and TH BMD ( $p=0.59$  and  $p=0.63$ , respectively). IL-17A correlated positively with serum calcium and PTH ( $\rho=0.36$ ;  $p<0.001$  and  $\rho=0.19$ ,  $p=0.04$ , respectively) and negatively with serum inorganic phosphate ( $\rho=-0.31$ ;  $p<0.001$ ). We found no correlation between IL-17A and RANKL, OPG, RANKL/OPG or BMD at any skeletal site in the whole group. A positive correlation between IL-17A levels and FN T-score was observed in the women with PHPT ( $\rho=0.3$ ,  $p=0.04$ ).

**Conclusion:** Higher levels of IL-17A in PHPT group suggest a possible role in the PTH-induced bone remodeling. The combined bone density pattern is probably the effect of the constantly high PTH on the trabecular as well as the cortical bone.

P765

# EFFICIENCY OF PHYSICAL THERAPY IN NONSURGICAL TREATMENT OF PATIENTS WITH CARPAL TUNNEL SYNDROME

V. D. Caimac<sup>1</sup>, A.-M. Bumbea<sup>1</sup>, I.-R. Marcu<sup>1</sup>, C. O. Rogoveanu<sup>1</sup>

<sup>1</sup>University of Medicine & Pharmacy of Craiova, Craiova, Romania

**Objective:** Appreciation of the usefulness of including in the conservative medical assistance of patients diagnosed with carpal tunnel syndrome of therapeutic means of physiotherapy, in order to control pain and to improve the functional parameters of the upper limb.

**Methods:** We organized a descriptive, retrospective study that included a number of 45 patients diagnosed with carpal tunnel syndrome. Patients were divided into two groups: group 1 included patients who benefited only from specific drug treatment and group 2 included patients in whom the association between medication and means specific to physical medicine was made (laser therapy, sonophoresis, ionization, orthosis). The therapeutic interval taken into account was 10 days. The evaluated parameters were represented by: pain (assessed using the visual analogue scale, VAS, for pain), joint mobility of the fist (assessed on the flexion-extension axis) and the Short Disability Assessment Questionnaire for Arm, Shoulder and Hand (Quick DASH).

**Results:** The values of the parameters appreciated in evolution improved: the value for VAS score for pain decreased by 43.1% in group 2 compared to 32.3% in group 1 ( $p=0.000054$ ), the mobility for flexion increased (33.4% in group 2, 26.2% in group 1), the mobility for joint extension also increased (31.1% for group 2 and 23.2% in group 1), Quick DASH score improved (52.7% in group 2 and 41.3% in group 1). The results were statistically significant ( $p<0.05$ ).

**Conclusion:** The results demonstrate effective pain control and improvement of functional parameters in the study group. This fact recommends the use of specific means of physical medicine and rehabilitation in the complex conservative therapeutic program addressed to patients with carpal tunnel syndrome.



P766

# IMPROVING THE EFFECTIVENESS OF THE TREATMENT OF CHRONIC PAIN SYNDROME IN SPONDYLOARTHRITIS

A. Pronin<sup>1</sup>, Y. Karakulova<sup>2</sup>

<sup>1</sup>City Clinical Hospital №4 Neurosurgical Department, <sup>2</sup>Dept. of Neurology and Medical Genetics, Perm, Russia

**Objective:** Back pain is an urgent and socially significant problem of modern healthcare. More than 90% of the world's population has been found to experience one or more episodes of back pain during their lifetime. According to various authors, in Russia, degenerative diseases of the spine, which in most cases are clinically manifested by pain, account for up to 76% of all cases and 72% of days of temporary disability in the outpatient network, and in neurological hospitals 56 and 48%, respectively. The above suggests that spinal pain is also an economic problem. The intensive development of surgical technologies has made it possible to significantly expand the possibilities for high quality treatment of patients with chronic pain syndrome. 1. Radiofrequency denervation of the facet joints (RFD) is one of the most effective treatments for chronic back pain. 2. Alternative invasive methods of treatment are ineffective and relieve pain for a short time. 3. Relief of pain in the lower back NSAIDs - can lead to complications of the gastrointestinal tract. 4. Radiofrequency denervation of facet joints (RFD) does not require a long stay in a medical institution and after its implementation the patient can return to work in the near future. Purpose of the study: 1. To study the clinical and neurological, emotional, cognitive status and the quantitative content of neopterin, NSE in the blood serum of patients. 2. Predicting the effectiveness of radioparticle denervation of facet joints at the preoperative level in patients with spondyloarthritis

**Results:** All patients had severe pain syndrome before radiofrequency denervation of the facet joints at the L4-S1 level. The mean NSE levels in the serum of patients before surgery were significantly higher in spondyloarthritis of the intervertebral joints before surgery (1.6 mg/ml) than after RFD (1.4 mg/ml). The study of neopterin in patients at the preoperative level showed an average value of 9.5 nmol/L, after surgery 10.1 nmol/L.

**Conclusion:** The results of the study showed that NSE in the serum of patients before and after RFA is associated with back pain and varies from patient to patient. The study of neopterin in blood serum before and after surgery did not show a significant decrease after surgery in individual patients.

P767

# NUTRITION STATUS AND INFLAMMATORY POTENTIAL OF THE DIET AND RISK OF OSTEOSARCOPENIA: THE BUSHEHR ELDERLY HEALTH (BEH) PROGRAM

G. Shafiee<sup>1</sup>, M. Nasiri<sup>2</sup>, R. Heshmat<sup>1</sup>, M. Ebrahimi<sup>2</sup>, A. Ostovar<sup>3</sup>, N. Fahimfar<sup>3</sup>, I. Nabipour<sup>4</sup>, B. Larijani<sup>5</sup>

<sup>1</sup>Chronic Diseases Research Center, Endocrinology and Metabolism Population Sciences Institute, Tehran University of Medical Sciences, Tehran, <sup>2</sup>Dept. of Internal Medicine, Faculty of Medicine, Sina Hospital, Tehran University of Medical Sciences, Tehran, <sup>3</sup>Osteoporosis Research Center, Endocrinology and Metabolism Clinical Sciences Institute, Tehran University of Medical Sciences, Tehran, <sup>4</sup>The Persian Gulf Tropical Medicine Research Center, Bushehr University of Medical Sciences, Bushehr, <sup>5</sup>Endocrinology and Metabolism Research Center, Endocrinology and Metabolism Clinical Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran

**Objective:** Osteosarcopenia is an increasingly recognized geriatric disorder with a considerable prevalence which increases morbidity and mortality. Inflammation and poor nutritional status are major risk factors for many age-related diseases. Specific nutrients and dietary patterns have been associated with inflammatory markers. This study aimed to investigate the association of inflammatory potential of the diet and daily nutritional intake with osteosarcopenia.

**Methods:** A total of 2426 Iranian adults aged  $\geq 60$  y, participating in stage II of the BEH program, a population-based prospective cohort study, were included in this study. Osteopenia/osteoporosis was defined as a T-score  $\leq -1.0$  SD below the mean values of a young healthy adult. We defined sarcopenia as reduced skeletal muscle mass plus low muscle strength and/or low physical performance. Osteosarcopenia was considered as the presence of both osteopenia/osteoporosis and sarcopenia. Dietary nutrient intakes and dietary inflammatory index (DII) score were estimated from a 24-h recall method. Associations between DII score and osteosarcopenia were determined by linear and logistic regression.

**Results:** Among 2392 participants, 532 (22.2%) had osteosarcopenia with mean age  $73.2 \pm 7.4$  y. The mean of DII was  $0.07 \pm 0.37$  in osteosarcopenic group and  $-0.12 \pm 0.04$  in normal group ( $P < 0.001$ ). Also, the medians of energy intake, intake of protein and carbohydrate were significantly lower in osteosarcopenic group. There were no significant differences in total fat and all types of fatty acids between the osteosarcopenic and normal groups. The DII score was positively associated with the risk of osteosarcopenia, even after adjusting for potential covariates [aOR: 1.11(1.03-1.20)]. Also, participants with the higher tertile of DII (pro-inflammatory diet) were more likely to have risk of osteosarcopenia [aOR: 1.51(1.12-2.03)].

**Conclusion:** Results demonstrated a diet with more pro-inflammatory potential was associated with high risk for osteoporosarcopenia. Also, our results suggested an inverse association between daily protein, energy and carbohydrate intakes with osteosarcopenia in community-dwelling older Iranian adults. Further studies are required to confirm these findings.

P768

### COGNITIVE FRAILTY: PREVALENCE ESTIMATES AND ASSOCIATION WITH BODY COMPOSITION IN OLDER MEN: CROSS-SECTIONAL, POPULATION-BASED DATA

X. Sui<sup>1</sup>, L. Holloway-Kew<sup>1</sup>, K. Hyde<sup>1</sup>, J. Williams<sup>1</sup>, C. Tembo<sup>1</sup>, A. Pasco<sup>1</sup>

<sup>1</sup>Deakin University, Geelong, Australia

**Objective:** Cognitive frailty, the co-presence of physical frailty and cognitive impairment, is associated with adverse health outcomes. We examined the prevalence of cognitive frailty for Australian men and investigated the association of cognitive frailty with body composition.

**Methods:** This cross-sectional study involved 312 men ages 60-96 y from the Geelong Osteoporosis study. Frailty was identified by low hand grip strength (HGS, kg) measured by dynamometry, and slow gait speed using a timed 4-m walk (m/s). Cognitive function was assessed in four domains: psychomotor function, memory, learning, and executive function using a computer-based program. Cognitive impairment in each domain is scores beyond 2SD of poor performance; impairment at least in one domain with muscle slowness or weakness is cognitive frailty. Prevalence estimates were standardised to the Australian population. Appendicular lean mass and total body fat mass were measured by DXA and adjusted by height or BMI. Logistic regression analysis were applied to investigate the association between cognitive frailty and body composition.

**Results:** There were 48 (15.4%) men with cognitive impairment in any domain, and 4 (1.3%) and 93 (30.4%) with muscle weakness or slowness, respectively. Prevalence estimates of cognitive frailty was 8.6% (95%CI: 6.1-11.1). The prevalence of cognitive frailty increased across age groups ( $p < 0.001$ ) with 2.1% in people aged 60-69 y, 5.5% in aged 70-79 y, and 30.0% in aged 80+ y. Cognitive frailty was associated with age (OR 1.15; 95%CI 1.10-1.21;  $p < 0.001$ ). Cognitive frailty was associated with ALM/height<sup>2</sup> (OR 0.56; 95%CI 0.32-0.96;  $p < 0.05$ ) and ALM/BMI (OR 0.02; 95%CI 0-0.93;  $p < 0.05$ ) independent of age.

**Conclusion:** This is the first Australian study to report cognitive frailty prevalence. Future studies are warranted to explore the underlying pathophysiology and intervention programs to cognitive frailty.

P769

### SKELETAL MANIFESTATIONS OF KLIPPEL TRENAUNAY WEBER SYNDROME: A CASE REPORT

V. Khanna<sup>1</sup>

<sup>1</sup>Dept. of Orthopaedics, Kailash Hospital, Khurja, India

It is a congenital vascular disorder that consists of a "triad" of symptoms affecting either one or more limbs. This "triad" constitutes bone and soft tissue hypertrophy, varicose veins, and cutaneous hemangioma. Bony and soft tissue hypertrophy may lead to the affected limb becoming either very large or very small. Cutaneous hemangioma may present either as a port-wine stain or nevus. This is generally accompanied by varicose veins which are often very numerous. It is most commonly seen in childhood or adolescent age groups. This report describes the skeletal manifestation along with diagnostic signs of Klippel Trenaunay syndrome.

**Case report:** A 35-year-old man reported with the triad associated with Klippel Trenaunay syndrome. On clinical examination, substantial port wine stain was seen and radiographs showed multiple bony outgrowths whereas MRI showed multiple varicosities displaying heterogeneous hyperintense signals on T2 Weighted Images and T1 hypointensity with hypertrophy of soft tissue in the left lower limb. He was concerned with cosmetic issues caused due to the hypertrophy of the lower limbs. Due to the various vascular malformations and since the patient did not have any functional impairment it was deemed unwise to offer him surgical intervention. Hence, the patient was counselled regarding the nature of his condition and no intervention was done for this patient.

P770

### LOW-LEVEL INFLAMMATION AND COMORBID PATHOLOGY IN OSTEOARTHRITIS

Y. Polyakova<sup>1</sup>, L. Seewordova<sup>1</sup>, Y. Akhverdyan<sup>1</sup>, E. Papichev<sup>1</sup>, B. Zavodovsky<sup>1</sup>

<sup>1</sup>Federal State Budgetary Institution "Research Institute of Clinical and Experimental Rheumatology A.B. Zborovsky", Volgograd, Russia

**Objective:** The combination of osteoarthritis (OA) with metabolic disorders and diseases of the cardiovascular system leads to a significant deterioration in the quality of life and a

high level of physical disability. Aim: Determination of the level of nicotinamide phosphoribosyltransferase (Namp1) in the serum of patients with OA without comorbid diseases (CR), with OA and cardiovascular diseases (CVD), with OA, CVD and metabolic syndrome (MS) to clarify significant risk factors for the production of pro-inflammatory cytokines in patients with OA.

**Methods:** 120 people were examined: 30 people - a group without significant diseases, 20 patients with OA, 40 - with OA and CVD, and 30-with OA, CVD and MS. The average level of Namppt in the blood serum was minimal and amounted to  $24.3 \pm 2.86$  ng/ml ( $M \pm SD$ ), in patients with OA without significant comorbid diseases -  $27.21 \pm 5.7$  ng/ml ( $p=0.02$ ), the highest in patients with OA, CVD and MS -  $42.29 \pm 12.77$  ng/ml ( $p<0.0001$ ).

**Results:** There was no difference in the dependence of the level of circulating Namppt in patients with OA without CR and patients with OA and GB ( $p=0.08$ ), there was a significant difference in the level of Namppt in patients with OA without CR and OA in combination with CHD, the maximum level of Namppt was detected in patients with MS. This group had the largest waist size (OT) -  $105.13 \pm 13.39$ , the highest BMI -  $33.6 \pm 4.99$ .

**Conclusion:** A significant positive correlation was found between Namppt, ESR, and CRP. A high association of Namppt with BMI was found in patients with OA without CR ( $rs=0.6803$ ), and with OT in patients with OA and MS ( $rs=0.6395$ ). Discussion. The main source of Namppt was thought to be abdominal fat cells. Namppt has been proven to synthesize monocytes, macrophages, dendritic cells, T cells, and B cells. Visceral fat is more active than subcutaneous and lean tissue. Normally, the level of Namppt correlates with BMI, in MS - with the volume of visceral fat, in acute damage - with the intensity of the inflammatory process. The level of Namppt in the serum of patients with OA increases with an increase in comorbid pathology, has a direct correlation with highly sensitive CRP, ESR, and simple anthropometric indicators - BMI and OT. OT most accurately reflects the severity of abdominal obesity and low level inflammation, companions of the metabolic syndrome. The positive correlation between laboratory markers of inflammation and OT confirms the role of Namppt as a proinflammatory cytokine in the pathogenesis of cardiovascular disease progression in patients with OA and MS. Abdominal obesity is the leading risk factor for maintaining low-level inflammation, and it is a modifiable factor in contrast to age and heredity. The study showed a link between laboratory markers of inflammation, anthropometric indicators, and Namppt concentrations. Overweight and increased waist circumference are the most significant predictors of low-level inflammation in patients with OA and comorbidity, and are positively correlated with higher concentrations of highly sensitive C-reactive protein and ESR.

P771

## OSTEOSARCOPENIA AND BIOMARKERS OF BONE HEALTH IN IRANIAN OLDER PEOPLE: THE BUSHEHR ELDERLY HEALTH (BEH) PROGRAM

G. Shafiee<sup>1</sup>, M. Fathi<sup>2</sup>, M. Moghaddassi<sup>3</sup>, R. Heshmat<sup>1</sup>, M. Ebrahimi<sup>2</sup>, A. Salimzadeh<sup>3</sup>, A. Ostovar<sup>4</sup>, I. Nabipour<sup>5</sup>, B. Larijani<sup>6</sup>

<sup>1</sup>Chronic Diseases Research Center, Endocrinology and Metabolism Population Sciences Institute, Tehran University of Medical Sciences, Tehran, <sup>2</sup>Dept. of Internal Medicine, Faculty of Medicine, Sina Hospital, Tehran University of Medical Sciences, Tehran, <sup>3</sup>Rheumatology Research Center, Sina Hospital, Tehran University of Medical Sciences, Tehran, <sup>4</sup>Osteoporosis Research Center, Endocrinology and Metabolism Clinical Sciences Institute, Tehran University of Medical Sciences, Tehran, <sup>5</sup>The Persian Gulf Tropical Medicine Research Center, Bushehr University of Medical Sciences, Bushehr, <sup>6</sup>Endocrinology and Metabolism Research Center, Endocrinology and Metabolism Clinical Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran

**Objective:** Osteosarcopenia is referred to as co-incidence of osteoporosis/osteopenia and sarcopenia which is defined as a geriatric syndrome with a significant prevalence that increases morbidity and mortality. There are some predictive factors that can show an increased risk of incidence of osteosarcopenia. This study aimed to consider the association of bone turnover markers and also some other risk factor like vitamin D deficiency with osteosarcopenia in elderly.

**Methods:** We carried out a cross-sectional study on a random sample including 400 elder participants of BEH study, in Iran. Osteopenia/osteoporosis was defined as a T-score  $\leq -1.0$  SD below the mean values of a young healthy adult. We defined sarcopenia as low muscle strength with reduced skeletal muscle mass. Osteosarcopenia was considered as the presence of both osteopenia/osteoporosis and sarcopenia. We estimated the age-standardized prevalence of osteosarcopenia for men and women, separately. We used multivariable logistic regression to address the factors associated with osteosarcopenia.

**Results:** The total prevalence of osteosarcopenia was 19.1%. The results showed that there was a statistically significant difference in osteocalcin (OC), C-terminal cross-linked telopeptide (CTX), and tartrate resistant acid phosphatase (TRAP) were between the normal and osteosarcopenia groups. No statistically significant difference was observed in bone alkaline phosphatase (BALP), vitamin D, calcium, phosphorous, and ALP between the compared groups. In the multivariable logistic regression model, OC and CTX were associated with increased likelihood of osteosarcopenia [adjusted OR=1.023(1.002-1.045 for OC, 4.363(1.389-15.474 for CTX)]. Furthermore, TRAP increases the odds of osteosarcopenia in crude model [OR=1.333 (1.070- 1.660)].

**Conclusion:** We observed osteosarcopenia in around 19.1% of our elder population that is a slightly high prevalence for a developing country. Any change in the density of bone biomarkers particularly OC, CTX, and TRAP should be considered as a predictor of osteosarcopenia.

P772

### IS THERE A RELATIONSHIP BETWEEN THE C174G POLYMORPHISM OF INTERLEUKIN-6 AND OSTEOPOROSIS?

S. Y. Tsarenok<sup>1</sup>, V. V. Gorbunov<sup>1</sup>, T. A. Aksenova<sup>1</sup>

<sup>1</sup>Chita State Medical Academy, Chita, Russia

**Objective:** The Wnt signaling pathway and immune factors play an important role in the regulation of bone remodeling; therefore, the IL-6 gene is considered as a candidate gene for postmenopausal osteoporosis. The role of IL-6 in the development of osteoporosis has been determined; this cytokine activates bone resorption by increasing RANK activity. This study aimed to study the C174G polymorphism of the IL-6 gene in women with osteoporosis and osteoporotic fractures.

**Methods:** 162 women of the postmenopausal period, living in the Trans-Baikal Territory, of Russian nationality were examined (age from 60-76 years old). Verification of the diagnosis of osteoporosis was performed according to the current recommendations: with a high 10-y fracture risk according to FRAX, with a history of low-energy fracture, or with X-ray densitometry with T-score values of -2.5 SD and below. Osteoporosis was diagnosed in 76 patients, 86 women with coronary artery disease without osteoporosis made up the comparison group. Statistical analysis was performed using the  $\chi^2$  test and the odds ratio. Our statistical analysis showed that the distribution of genotypes of the studied IL-6 gene polymorphism in the examined women obeys the Hardy-Weinberg law ( $p > 0.05$ ).

**Results:** We did not find significant differences in the distribution of alleles in the comparison group and in the group of women with osteoporosis. When studying the frequency of occurrence of different variants of genotypes of C174G IL-6 polymorphism, no statistically significant differences were also found between the comparison group and the group of women with osteoporosis (Table 1). However, it should be noted that the C allele and CC genotype were more common in the group of women with osteoporosis, and the odds ratios were 1.21 and 1.36, respectively.

Table 1. Frequency of alleles and genotypes of the C174G polymorphism of the IL-6 gene.

Polymorphism IL-6 gene C174G  Control group, N=86		Frequency		$\chi^2$ , p	OR	95%CI
		Women with osteoporosis, N=76				
Allele	C	0,480	0,53	0,36	1,21	0,79-1,876
	G	0,52	0,47		0,82	0,53-1,26
Geno- type	CC	25,3	31,6	0,36	1,36	0,69-2,68
	GG	28,6	25,0	0,69	0,83	0,41-1,66
	CG	46,1	43,4	0,67	0,89	0,48-1,65

Table 2. Frequency of alleles and genotypes depending on the localization of osteoporotic fractures.

Polymorphism IL-6 gene C174G  Control group, N=86		Frequency		X2, p	OR	95%CI
		Wom- en with oste- opo- rosis,  N=76				
Radial bone fracture						
Allele	C	0,49	0,55	0,32	1,26	0,789-2,038
	G	0,51	0,45		0,97	0,789-2,038
Geno- type	CC	25,3	33,9	0,25	1,28	0,842-1,958
	GG	28,6	23,2	0,96	0,83	0,507-1,381
	CG	46,1	42,9	0,69	0,92	0,606-1,398
Vertebral fractures						
Allele	C	0,49	0,42	0,49	0,73	0,326-1,723
	G	0,51	0,58		0,978	0,326-1,723
Geno- type	CC	25,3	15,4	0,43	0,57	0,136-2,421
	GG	28,6	30,8	0,87	1,096	0,365-3,289
	CG	46,1	53,8	0,6	1,31	0,472-3,632
Hip fracture						
Allele	C	0,49	0,5	0,96	1,0	0,345-3,036
	G	0,51	0,5		0,978	0,345-3,036
Geno- type	CC	25,3	14,3	0,51	0,514	0,065-4,046
	GG	28,6	14,3	0,41	0,43	0,055-3,474
	CG	46,1	71,4	0,019	5,5	0,65-43,8



As can be seen from Table 2, the association of the C174G polymorphism of the IL-6 gene with fractures of the radius and vertebral fractures was not established, although the carriage of the C and CC alleles of the genotype is accompanied by a slight increase in the risk of fractures of the radius (OR was 1.26 and 1.28, respectively). With regard to hip fracture, it was found that the presence of the CG genotype of the C174G polymorphism of the IL-6 gene is associated with a fivefold increase in its risk (OR - 5.5, 95%CI - 0.65-43.8).

**Conclusion:** Thus, the C174G polymorphism of the IL-6 gene is associated with an osteoporotic hip fracture: carriers of the CG genotype have a 5.5-fold increased risk of hip fracture. The association of this polymorphism with the presence of osteoporosis and other localizations of osteoporotic fractures has not been established.

P773

### NAILFOLD CAPILLAROSCOPY IN EARLY STAGES OF MIXED CONNECTIVE TISSUE DISEASE IN EGYPTIAN PATIENTS

Y. G. Gazar<sup>1</sup>, H. H. Hamoud<sup>1</sup>, S. I. Ismail<sup>2</sup>

<sup>1</sup>Al-Azhar University Hospitals, <sup>2</sup>National Research Center, Cairo, Egypt

**Objective:** Mixed connective tissue disease (MCTD) is a systemic autoimmune disease with a high titer of anti-U1RNP and a number of clinical pictures mainly Raynaud's phenomenon. Nailfold capillaroscopy (NFC) is a noninvasive diagnostic tool for patients with different connective tissue diseases (CTDs) that permit the detection of local microvascular changes that correlate with systemic vascular involvement. Aim of the study: comparing the results of NFC in patients with systemic sclerosis to determine the chief characteristics of skin microangiopathy in early MCTD and trying to describe a characteristic MCTD pattern in Egyptian patients.

**Methods:** This cross-sectional study included 40 patients diagnosed with mixed connective tissue disease according to Alarcón-Segovia and Villareal criteria and 20 patients with confirmed systemic sclerosis according to ACR and EULAR classification criteria for systemic sclerosis. Nailfold examination for study subjects was done describing architectural, derangement, capillary density changes, mega capillary and enlarged loops, microhemorrhages, and angiogenesis.

**Results:** Of the 60 patients studied, 49 (81.7%) patients were females and 11 were males with a mean age of 31 y. Three of the 20 patients diagnosed with systemic sclerosis had arthritis. Out of 60 patients, 53.3% had thickened skin, 19 patients exhibited puffy fingers, 6 patients showed rash and none had swollen joints. Skin thickening was significantly higher in systemic sclerosis patients (85%) compared to 37.5% in the MCTD population. Patients presented with various comorbidities, the most common of which was Fatigue (26.7%) and myositis (23% of patients). There is a significant negative correlation of -0.508 (P=0.022) between the

enlargement scores and illness duration in systemic sclerosis patients. Those patients also exhibited a statistically significant positive correlation of 0.520 (P=0.019) between hemorrhage score and the number of tender joints. Alternatively, patients diagnosed with mixed connective tissue disease exhibited a significant positive correlation between the architecture scores of their joints and both; the duration of their illness (0.347; P=0.028) and the number of swollen joints (0.424 P=0.006). Mixed connective tissue disease patients also showed a significant correlation of 0.423 (P=0.007) between their hemorrhage scores and their age at the time of the study.

Table 1. Capillaroscopy scores according to some clinical findings among the mixed type.

Variables	Positive	Negative	#p-value
<b>Skin thickening</b>			
Architecture	1.0 (1.0–1.0)	1.0 (1.0–1.0)	0.868
Density	2.0 (1.0–2.0)	1.0 (0.0–2.0)	0.094
Enlargement	0.0 (0.0–1.0)	1.0 (0.0–1.0)	0.562
Hemorrhage	0.0 (0.0–1.0)	0.0 (0.0–0.0)	0.244
Neoangiogenesis	0.0 (0.0–0.0)	0.0 (0.0–0.0)	0.543
Total	4.0 (2.0–5.0)	3.0 (1.0–4.0)	0.233
<b>Puffy fingers</b>			
Architecture	1.0 (1.0–1.0)	1.0 (1.0–2.0)	0.932
Density	2.0 (0.0–2.0)	1.0 (0.0–2.0)	0.360
Enlargement	1.0 (0.0–1.0)	0.0 (0.0–1.0)	0.588
Hemorrhage	0.0 (0.0–1.0)	0.0 (0.0–0.0)	0.100
Neoangiogenesis	0.0 (0.0–0.0)	0.0 (0.0–0.0)	0.441
Total	5.0 (2.0–6.0)	3.0 (1.0–4.0)	0.078
<b>Anemia</b>			
Architecture	1.0 (1.0–1.0)	1.0 (1.0–2.0)	0.799
Density	1.0 (0.0–2.0)	1.0 (0.0–2.0)	0.824
Enlargement	1.0 (0.0–1.0)	0.0 (0.0–1.0)	0.483

Hemorrhage	0.0 (0.0–1.0)	0.0 (0.0–0.0)	0.679
Neoangiogenesis	0.0 (0.0–0.0)	0.0 (0.0–0.0)	0.949
Total	4.0 (2.0–5.0)	3.0 (1.0–4.0)	0.824
Fatigue			
Architecture	1.0 (1.0–1.0)	1.0 (1.0–1.0)	0.794
Density	1.0 (1.0–2.0)	1.0 (0.0–2.0)	0.842
Enlargement	0.0 (0.0–1.0)	1.0 (0.0–1.0)	0.724
Hemorrhage	0.0 (0.0–0.0)	0.0 (0.0–1.0)	0.346
Neoangiogenesis	0.0 (0.0–0.0)	0.0 (0.0–0.0)	0.450
Total	2.5 (1.0–4.0)	4.0 (1.0–5.0)	0.379

Data presented as median (1st-3rd interquartile). #Mann Whitney test. \*Significant

Table 2. Correlation between capillaroscopy scores and other variables.

		Arch	Dense	Enlarg	He	Neo-ang	Total
SSc							
Age	r	-0.004	0.221	-0.219	-0.098	0.280	0.035
	p	0.987	0.349	0.353	0.680	0.231	0.884
Duration	r	-0.210	-0.087	-0.508	-0.332	0.181	-0.378
	p	0.373	0.715	0.022*	0.153	0.445	0.100
Tender	r	0.215	0.040	0.171	0.520	0.355	0.409
	p	0.363	0.868	0.472	0.019*	0.125	0.074
Swollen	r	0.128	0.342	0.145	0.202	0.293	0.369
	p	0.591	0.140	0.543	0.394	0.210	0.109
Mixed							
Age	r	0.201	0.190	-0.135	0.423	0.020	0.216
	p	0.215	0.240	0.405	0.007*	0.904	0.181
Duration	r	0.347	0.122	0.079	0.234	0.053	0.293
	p	0.028*	0.454	0.629	0.146	0.744	0.067
Tender	r	0.171	-0.027	0.260	-0.054	-0.138	0.082
	p	0.291	0.869	0.105	0.739	0.394	0.615
Swollen	r	0.424	0.287	-0.040	0.041	0.149	0.306
	p	0.006*	0.072	0.808	0.801	0.359	0.055

Spearman correlation. \*Significant

**Conclusion:** NFC is a noninvasive, rapid, easy, cost-effective method for studying nailfold capillaries in MCTDs. In this study, the results obtained were qualitatively satisfactory for a clear delineation of the nailfold capillaries features in MCTD. Therefore, it aids in the recognition of alternations in nailfold capillaries making early diagnosis of MCTD possible and thus preventing morbidities and sequelae of the disease.

## P774

### THE ASSOCIATION BETWEEN MUSCLE INDICATORS AND BONE MASS DENSITY AND RELATED RISK FACTORS IN THE DIABETIC ELDERLY POPULATION: BUSHEHR ELDERLY HEALTH (BEH) PROGRAM

R. Heshmat<sup>1</sup>, M. Nikfarjam<sup>1</sup>, G. Shafiee<sup>1</sup>, S. Gharibzadeh<sup>2</sup>, A. Ostovar<sup>3</sup>, I. Nabipour<sup>4</sup>, B. Larijani<sup>5</sup>

<sup>1</sup>Chronic Diseases Research Center, Endocrinology & Metabolism Population Sciences Institute, Tehran University of Medical Sciences, Tehran, <sup>2</sup>Dept. of Epidemiology & Biostatistics, Pasteur Institute of Iran, Tehran, <sup>3</sup>Osteoporosis Research Center, Endocrinology & Metabolism Clinical Sciences Institute, Tehran University of Medical Sciences, Tehran, <sup>4</sup>The Persian Gulf Tropical Medicine Research Center, Bushehr University of Medical Sciences, Bushehr, <sup>5</sup>Endocrinology & Metabolism Research Center, Endocrinology & Metabolism Clinical Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran

**Objective:** Decreased muscle mass and strength and bone mass density are one of the complications of the aging process. Studies show that the prevalence of sarcopenia and osteoporosis may be higher in patients with diabetes. Therefore, this study was aimed to investigate the relationship between muscle mass and strength indices and bone mass density in diabetic elderly.

**Methods:** This cross-sectional study was conducted based on the data collected during the BEH Program, stage II. Diabetes was defined as FPG  $\geq 126$  mg/dl or HbA1C  $\geq 6.5$  or taking antidiabetic medication. DXA (Discovery WI, Hologic Inc, USA) was used to measure BMD, fat mass, trabecular bone score (TBS) and muscle mass. Muscle strength was measured by grip strength. Osteoporosis were defined as the BMD of  $\geq 2.5$  SD below the average value of young normal adults (T-score of  $\leq -2.5$  SD) in the femoral neck, or lumbar spine (L1-L4) or total hip. To determine the relationship between skeletal muscle index (SMI) and strength on bone status in a continuous scale (BMD L1-L4, BMD total hip, BMD femoral neck, and TBS L1-L4) and estimate the effect of SMI and muscle strength on osteoporosis from linear regression and Pearson's correlation coefficient and modified Poisson regression was used for analysis, respectively.

**Results:** In this study, 759 diabetic elderly were included. SMI and muscle strength were related to BMD in the spinal L1-L4, femur neck, total hip, and TBS L1-L4 after adjusted in full models (P-value  $< 0.001$ ). Only, in model 2 (adjusted for age and sex effect),

there was no significant relationship between muscle strength and BMD in spinal L1-L4 and TBS L1-L4. Also, increased SMI and muscle strength was associated with decreased osteoporosis in crude and adjusted models.

**Conclusion:** In this study, it was revealed that the reduction of SMI in elderly patients with diabetes was significantly associated with decreased bone mass density and TBS. Besides moreover, the muscle strength was also associated with BMD and TBS. So, muscle strength and muscle mass should be measured separately ever since both are independently associated with BMD.

P775

### SOCIOECONOMIC INEQUALITIES IN OSTEOSARCOPENIA AMONG COMMUNITY DWELLING OLDER PEOPLE: FINDINGS FROM THE BUSHEHR ELDERLY HEALTH (BEH) PROGRAM

R. Heshmat<sup>1</sup>, M. Raznahan<sup>2</sup>, G. Shafiee<sup>1</sup>, A. Ostovar<sup>3</sup>, N. Fahimfar<sup>3</sup>, I. Nabipour<sup>4</sup>, B. Larijani<sup>5</sup>

<sup>1</sup>Chronic Diseases Research Center, Endocrinology & Metabolism Population Sciences Institute, Tehran University of Medical Sciences, Tehran, <sup>2</sup>Maternal, Fetal & Neonatal Research Center, Tehran University of Medical Sciences, Tehran, <sup>3</sup>Osteoporosis Research Center, Endocrinology & Metabolism Clinical Sciences Institute, Tehran University of Medical Sciences, Tehran, <sup>4</sup>The Persian Gulf Tropical Medicine Research Center, Bushehr University of Medical Sciences, Bushehr, <sup>5</sup>Endocrinology & Metabolism Research Center, Endocrinology & Metabolism Clinical Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran

**Objective:** Osteosarcopenia is a common problem in elderly with the adverse outcomes. Although social inequalities in health have been recognized for centuries but it is unknown in osteosarcopenia. The aim of this study was to investigate the socioeconomic inequality of osteosarcopenia among the Iranian older people.

**Methods:** A total of 2426 adults aged  $\geq 60$  y, participating in the stage II of BEH program, a population-based prospective cohort study; were included in this study. Osteosarcopenia was defined as having osteopenia/osteoporosis with sarcopenia. Socioeconomic status (SES) was measured by an asset index, constructed using principal component analysis, income, education level, and employment status. The Concentration Index and the Lorenz curve were used to illustrate the levels of inequality for osteosarcopenia.

**Results:** The prevalence of osteosarcopenia was 532 (22.2%). The results of study showed that the concentration index of osteosarcopenia which is respectively obtained 0.0293, 0.0435, and 0.0301 for total, women, and men, by indicating that the intended outcome is not equally distributed among different socioeconomic groups. Osteosarcopenia was statistically significant and more prevalent in the richest individuals compared to the other

quintiles in our study. The positive concentration index of the variables such as men, individuals with high body mass, and those receiving greater daily protein indicated that had higher Socioeconomic status. However, the negative values of the variables such as the history of falling more than once and fracture after the age of 45 y, as well as disabled individuals showed that had lower socioeconomic status (lower economic quintile). The total contribution (%) of the variables considered in nonlinear model explained 91.65% of the economic inequality of osteosarcopenia, while 8.35% of total inequality cannot to be justified by the variables in our study.

**Conclusion:** It was concluded that socioeconomic status plays an important role in happening osteosarcopenia among Iranian older people. It seems to be necessary a focus on reducing the economic inequalities among osteosarcopenic people in Iran.

P776

### IMMEDIATE EFFECT OF PILATES EXERCISE THERAPY IN YOUNG ADULTS WITH NONSPECIFIC LOW BACK PAIN

D. Wadhwa<sup>1</sup>, A. Kaur<sup>1</sup>, J. Khan<sup>1</sup>

<sup>1</sup>MVPS College of Physiotherapy, Nashik, Maharashtra, India,

**Objective:** Low back pain affects the person's ability to keep balance, especially in challenging conditions. This study aimed to study the immediate effect of pilates exercise therapy on pain and dynamic postural control in young adults with nonspecific low back pain (NSLBP).

**Methods:** A quasi-experimental study consisted of 30 subjects. The inclusion criteria was age 20-40 y, both genders, subjects with NSLBP since at least 3 months and 4-7 on Numerical Pain Rating Scale (NPRS). The exclusion criteria was neurological and respiratory disease, spine surgery, medication or condition affecting balance, regular practice of pilates or any specific exercise program in the last 6 months. The outcome measures were taken pre- and postintervention. They were SEBT (Star Excursion Balance Test) and NPRS. The exercise session composed of 4 exercises viz. The single leg stretch (level 1), the pelvic press (level 1), swimming (level 1), opposite arm and leg reach (bird dog) (level 1). Each set was performed with 10 reps.

**Results:** The p-value of pre and post treatment was significant.

Table.

	Pre	Post	P value	T value	Significance
	Mean $\pm$ SD	Mean $\pm$ SD			
NPRS	5.633 $\pm$ 0.9643	4.433 $\pm$ 0.9353	< 0.0001	9.872	Significant

SEBT	Anterior	79.483± 8.082	84.067± 8.602	0.0377	2.127	Significant
	Posterolateral	53.367± 11.031	58.4± 11.273	<0.0001	11.850	Significant
	Posteromedial	47.967± 8.181	52.867± 8.089	0.0231	2.333	Significant

**Conclusion:** Pilates exercises immediately reduced the pain and improved dynamic postural control in young adults with NSLBP.

## P777

### RECOVERY OF QUALITY OF LIFE IS ASSOCIATED WITH LOWER MORTALITY 5 YEARS POSTFRACTURE: THE AUSTRALIAN ARM OF THE INTERNATIONAL COSTS AND UTILITIES RELATED TO OSTEOPOROTIC FRACTURES STUDY (AUSICUROS)

J. Talevski<sup>1</sup>, K. Sanders<sup>1</sup>, S. Vogrin<sup>1</sup>, G. Duque<sup>1</sup>, A. Beauchamp<sup>2</sup>, E. Seeman<sup>1</sup>, S. Iuliano<sup>1</sup>, A. Svedbom<sup>3</sup>, F. Borgström<sup>4</sup>, J. A. Kanis<sup>5</sup>, A. Stuart<sup>6</sup>, S. Brennan-Olsen<sup>6</sup>

<sup>1</sup>The University of Melbourne, Melbourne, Australia, <sup>2</sup>Monash University, Melbourne, Australia, <sup>3</sup>ICON Plc, Stockholm, Sweden, <sup>4</sup>Quantify Research, Stockholm, Sweden, <sup>5</sup>University of Sheffield, Sheffield, UK, <sup>6</sup>Deakin University, Geelong, Australia

**Objective:** To determine whether recovery of HRQoL 12-months postfracture is associated with lower 5-y all-cause mortality.

**Methods:** This prospective study included 524 older adults (mean age: 70.2 y; % female: 79.2) with a fracture (150 hip, 261 distal forearm, 61 vertebral, 52 humerus) recruited from 8 study centers across Australia. HRQoL was assessed using the EuroQoL questionnaire (EQ-5D-3L) at baseline (including recall of the patient's HRQoL prior to fracture), and at 4- and 12-months postfracture. Recovery of HRQoL was calculated as the difference between EQ-5D-3L utility scores at prefracture and 12 months and then dichotomized (a HRQoL change score  $\geq 0$  was categorized as 'recovered' and a score  $< 0$  was categorized as 'not recovered'. All-cause mortality data was ascertained from the Australian National Death Index. Linkage between AusICUROS participants and National Death Index data was undertaken using secure probabilistic linkage software. Overall survival was compared between the two HRQoL groups (recovered vs. not recovered) using a two-sided log-rank test. Cox proportional hazards models were used to assess the association between all-cause mortality within 5 y and HRQoL recovery (vs. nonrecovery). Analyses by fracture type was not undertaken due to insufficient sample size.

**Results:** Overall, 279 participants (53.2%) recovered to their prefracture HRQoL at 12-month follow-up. There were 70 deaths (13.4%) during the 5 y postfracture. Mortality rate was highest in hip fracture participants (24.7%), followed by vertebral (16.4%),

humeral (13.5%) and distal forearm fracture participants (6.1%). After adjustment for age, sex, prefracture HRQoL, and fracture site, mortality risk was lower in participants who recovered their prefracture HRQoL at 12 months compared to those who did not (HR=0.56, 95%CI: 0.33-0.96, p=0.034).

**Conclusion:** This study provides evidence that HRQoL recovery post-fracture is associated with improved 5-y survival in older adults. Our results suggest that current postfracture interventions known to improve HRQoL may also have the potential to prevent deaths in older adults after fracture.

## P778

### ASSOCIATION OF BONE TURNOVER MARKERS WITH TRABECULAR BONE SCORE AND BONE MINERAL DENSITY AMONG PRE- AND POSTMENOPAUSAL WOMEN: A STUDY FROM SRI LANKA

H. Rathnayake<sup>1</sup>, S. Lekamwasam<sup>2</sup>, C. Wickramatilake<sup>1</sup>, J. Lenora<sup>3</sup>

<sup>1</sup>Dept. of Biochemistry, Faculty of Medicine, University of Ruhuna,

<sup>2</sup>Dept. of Medicine, Faculty of Medicine, University of Ruhuna,

<sup>3</sup>Dept. of Physiology, Faculty of Medicine, University of Ruhuna, Galle, Sri Lanka

**Objective:** Data on the association between bone turnover markers (BTMs) and BMD/trabecular bone score (TBS) are not available for Sri Lankans. This study evaluated the association of serum BTMs with BMD and TBS among pre- and postmenopausal women.

**Methods:** A descriptive cross-sectional study was conducted in Galle District, Southern Province, Sri Lanka. Community dwelling women aged 20-70 y (n=347) were recruited using multistage stratified random sampling technique. Menopausal status was defined as the presence of amenorrhea for more than 12 consecutive months due to natural causes. BMDs of hip (THBMD), femoral neck (FNBMD), lumbar spine (LSBMD) and total body (TBBMD) were measured by DXA (Hologic Discovery, Bedford, MA, USA). TBS was estimated by TBS iNspire® software. Serum crosslinked C-telopeptide of type I collagen (CTX; bone resorption marker) and procollagen type I N-propeptide (PINP; bone formation marker) were measured using ELISA. Partial correlation (adjusted for possible confounders) was used to assess the correlations.

**Results:** In premenopausal women, CTX showed significant negative correlations with LSBMD, TBBMD and TBS and PINP showed weak but significant negative correlation with LSBMD (Table). In postmenopausal women, CTX showed significant negative correlations with BMDs of all sites and TBS nevertheless, PINP did not show significant correlations with BMDs or TBS.

Table: Correlations of BTMs with BMD and TBS according to menopausal status.



Variable	Premenopausal women (n=207)		Postmenopausal women (n=140)	
	CTX (ng/mL)	PINP (pg/mL)	CTX (ng/mL)	PINP (pg/mL)
	r (p)	r (p)	r (p)	r (p)
THBMD (g/cm <sup>2</sup> )	-0.13 (0.06)	-0.09 (0.21)	-0.31 (<0.001)*	-0.03 (0.76)
FNBMD (g/cm <sup>2</sup> )	-0.11 (0.11)	0.03 (0.68)	-0.11 (0.028)*	0.02 (0.80)
LSBMD (g/cm <sup>2</sup> )	-0.24 (0.001)*	-0.14 (0.042)*	-0.28 (0.001)*	-0.01 (0.87)
TBBMD (g/cm <sup>2</sup> )	-0.22 (0.001)*	-0.12 (0.10)	-0.34 (<0.001)*	-0.02 (0.79)
TBS	-0.21 (0.002)*	-0.04 (0.56)	-0.30 (<0.001)*	-0.12 (0.17)

\*Correlation was significant at 0.05 level

**Conclusion:** Bone resorption marker CTX has better association with BMDs and TBS in women regardless of menopausal status than bone formation marker, PINP. This may indicate the imbalance between bone resorption and formation in adult women even before the onset of menopause.

P779

### ORAL CALCITRIOL USE, VERTEBRAL FRACTURES AND VASCULAR CALCIFICATIONS IN HEMODIALYSIS PATIENTS: RESULTS FROM VITAMIN K ITALIAN (VIKI) STUDY

M. Fusaro<sup>1</sup>, A. Aghi<sup>2</sup>, C. Politi<sup>3</sup>, T. L. Nickolas<sup>4</sup>, P. Khairallah<sup>4</sup>, M. C. Mereu<sup>5</sup>, G. Tripepi<sup>3</sup>

<sup>1</sup>National Research Council (CNR) – Institute of Clinical Physiology (IFC), Pisa, Italy, <sup>2</sup>Dept. of Medicine, Clinica Medica 1, University of Padua, Padova, Italy, <sup>3</sup>CNR-IFC, Clinical Epidemiology of Renal Diseases and Hypertension, Ospedali Riuniti, Reggio Calabria, Italy, <sup>4</sup>Division of Nephrology, Dept. of Medicine, Columbia University Irving Medical Center, New York, USA, <sup>5</sup>Independent Research, Cagliari, Italy

**Objective:** Chronic Kidney Disease patients are characterized by alterations in bone and vascular metabolism associated to adverse clinical outcomes such as fractures, cardiovascular events and mortality. Dysregulation of vitamin D hormonal system, in levels of calcium, phosphate, PTH, FGF23/Klotho are the main responsible of these changes. We want to evaluate if oral calcitriol use can play a protective role on fractures in hemodialysis (HD) patients.

**Methods:** We included 387 HD patients of the VIKI database, a multicenter cross-sectional study. Biomarkers measured: vitamin K, VKDPs, vitamin 25(OH) D, ALP, PTH, Ca, P. Spine radiograph performed to define the presence of vertebral fractures (VF) and vascular calcification (VC). VF was indicated as >20% reduction of vertebral body height and VCs were quantified by measuring the length of calcium deposits along the arteries.

**Results:** 45.7% of patients were treated with oral calcitriol. No biochemical differences was observed between the treated and untreated patients. VFs were significantly lower in patients receiving oral calcitriol (48.6% vs. 61%, P=0.015), the presence of VCs was similar (aortic: 81.9% vs. 79.5% respectively, P=0.552; iliac: 52.0% and 59.5%, P=0.167). In a multivariable logistic regression analysis, after adjustment for all potential confounders, oral calcitriol was associated with a marked reduction (-40.2%) of the odds of fractures (OR: 0.598, 95%CI: 0.363-0.985, P=0.043).

**Conclusion:** We found a significant association between oral calcitriol use and lower VF rate in HD patients. Further prospective and interventional studies are needed to confirm these findings.

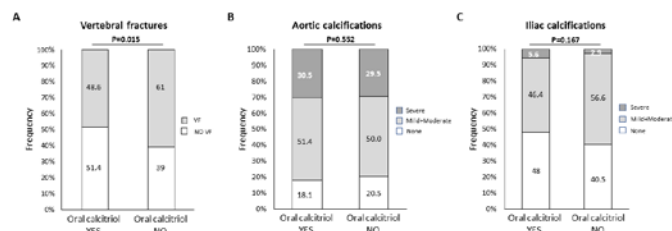


Figure. Frequency of vertebral fractures and vascular calcifications by oral calcitriol treatment (Yes/No). A. Rate of vertebral fractures. B. Rate and severity of aortic calcifications. C. Rate and severity of iliac calcifications.

P780

### THE EFFECTIVENESS OF FRAGILITY SCORE MEASURED BY RADIOFREQUENCY ECHOGRAPHIC MULTI SPECTROMETRY (REMS) FOR THE ASSESSMENT OF INCIDENT FRACTURE RISK

D. Ciardo<sup>1</sup>, P. Pisani<sup>1</sup>, F. A. Lombardi<sup>1</sup>, R. Franchini<sup>1</sup>, F. Conversano<sup>1</sup>, S. Casciaro<sup>1</sup>

<sup>1</sup>National Research Center - Institute of Clinical Physiology, Lecce, Italy

**Objective:** To evaluate the effectiveness of Fragility Score (FS) [1], measured by radiofrequency echographic multi spectrometry (REMS) technology, in identifying women with incident osteoporotic fractures within 5 y.

**Methods:** Caucasian women between 30-90 y were scanned with REMS and DXA at lumbar spine and/or femoral neck. During an up to 5-y follow-up, the occurrence of osteoporotic fractures was

recorded. The ability of the FS to discriminate between patients with and without incident fragility fractures was subsequently evaluated and compared with the discriminatory ability of the T-score calculated with DXA and with REMS. In particular, the associations between lumbar spine FS and major osteoporotic fractures and between femoral neck FS and hip osteoporotic fractures were investigated.

**Results:** 583 couples of lumbar spine REMS and DXA scans and 524 couples of femoral neck scans were analysed. During the follow-up, 82 patients (14.1%) sustained a major osteoporotic fracture and 11 (2.1%) sustained a hip fracture. Comparing the areas under the curve (AUCs), the FS showed a statistically significant higher capability to discriminate between patients with/without fragility fractures with respect to T-scores (Fig.1): for lumbar spine, AUC was 0.80 for FS, 0.66 for DXA T-score and 0.70 for REMS T-score; for femoral neck, AUC was 0.84 for FS, 0.66 for DXA T-score and 0.69 for REMS T-score.

**Conclusion:** The Fragility Score, measured at reference anatomical sites by a nonionizing REMS scan, showed an ability to discriminate incident fractures at a higher rate than T-score values measured by DXA or REMS, representing an effective diagnostic tool for the early identification and treatment of bone fragility.

**Reference:** 1. Pisani P et al. Measurement 2017;101:243.

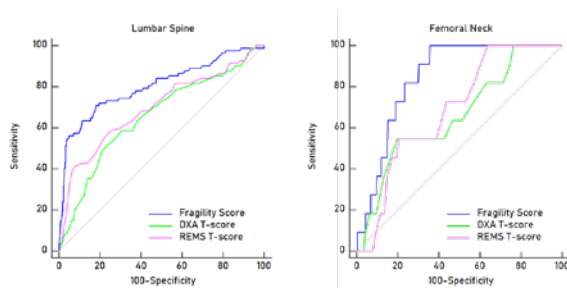


Fig.1: ROC curve analysis comparing the performance of Fragility Score, DXA T-score and REMS T-score in discriminating women with and without incident fragility fracture. In particular, the left graph shows the performance of parameters derived from lumbar spine acquisitions in identifying major osteoporotic fractures, whereas the right graph shows the performance of parameters derived from femoral neck acquisitions in identifying osteoporotic fractures at the hip.

P781

### THIRTY YEARS OF HIP FRACTURE IN AUSTRIA; IS THE WORST OVER?

H. P. Dimai<sup>1</sup>, B. Reichardt<sup>2</sup>, E. Zitt<sup>3</sup>, H. Concin<sup>3</sup>, O. Malle<sup>1</sup>, A. Fahrleitner-Pammer<sup>1</sup>, A. Svedbom<sup>4</sup>, W. Brozek<sup>5</sup>

<sup>1</sup>Division of Endocrinology & Diabetology, Dept. of Internal Medicine, Medical University of Graz, Graz, Austria, <sup>2</sup>Austrian Health Insurance Fund, Eisenstadt, Austria, <sup>3</sup>Agency for Preventive and Social Medicine, Bregenz, Austria, <sup>4</sup>ICON Plc, Stockholm, Sweden, <sup>5</sup>Agency for Preventive and Social Medicine, Bregenz, Austria

**Objective:** Austria is among the countries with the highest hip fracture incidence worldwide, exceeded only by Sweden and Denmark (1). Nationwide hip fracture incidences over a period of 20

years (1989-2008) have shown an initial steep increase, followed by a levelling off during the last few years of observation (2). The purpose of the present study was to follow up on hip fracture incidences for another 10 y (2009-2018), and to analyze trends over the entire period of 30 y.

**Methods:** ICD-10 code classes S72.0, S72.1, and S72.2 were applied. For the entire population  $\geq 50$  y of age, all data were retrieved from the Statistics Austria database and its hospital discharge register. Annual absolute numbers, crude and age-standardized incidences were stratified by sex and 5-y age intervals, and calculated by using a correction factor for multiple registrations.

**Results:** Annual discharges due to hip fracture increased between 1989 (n=9572) and 2006 (n=15,941), followed by a sideways movement until 2018 (Fig.1). In women, numbers rose from 7528 (1989) to a maximum of 11,811 (2006), to drop to 11,105 in 2018. In contrast, number of hip fractures in men increased steadily from 2044 (1989) to a maximum of 4958 in 2018. Age-standardized incidence rates in women peaked at 689/100,000 (2003), and in men at 294/100,000 (2006). Thereafter, they decreased in women to 517/100,000 (2018), and to 242/100,000 in men (Fig.2). For both sexes, an incidence rate ratio (IRR) of 0.984 (95%CI 0.981-0.987) was observed, corresponding to an average annual decrease in age-standardized hip fracture incidence of 1.6% (1.3-1.9%) from 2009-2018.

Fig. 1 Annual hospital discharges due to hip fracture (1989-2018)

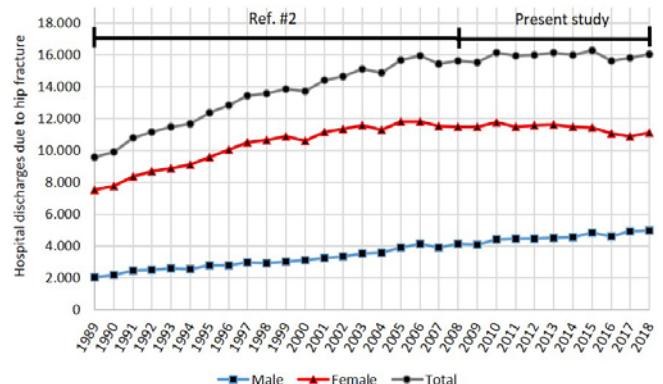
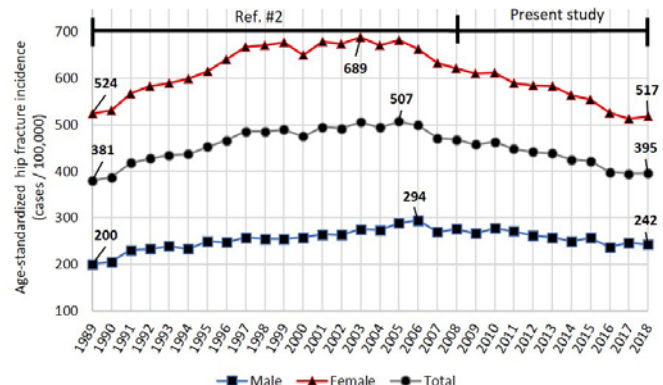


Fig. 2 Age-standardized hip fracture incidence (1989-2018)



**Conclusion:** While absolute numbers of hip fracture in women showed a slight decrease during the last 10 y of observation, numbers in men continued to increase since 1989, suggesting that at least in men the worst is not yet over. Age-standardized incidences nevertheless decreased in both men and women, and this may be interpreted as a trend into the right direction.

**References:**

Kanis JA, et al. *Osteoporos Int* 2012;23:2239

Dimai HP, et al. *Osteoporos Int* 2011;22:685

P782

**UNUSUAL BUT COMMON COMPLICATION OF OSTEOPOROSIS TREATMENT: A CASE SERIES OF BRONJ**

T. C. Goh<sup>1</sup>, J. Sivashanumugam<sup>1</sup>, R. Muthusamy<sup>1</sup>, A. Gerarde Paul<sup>2</sup>

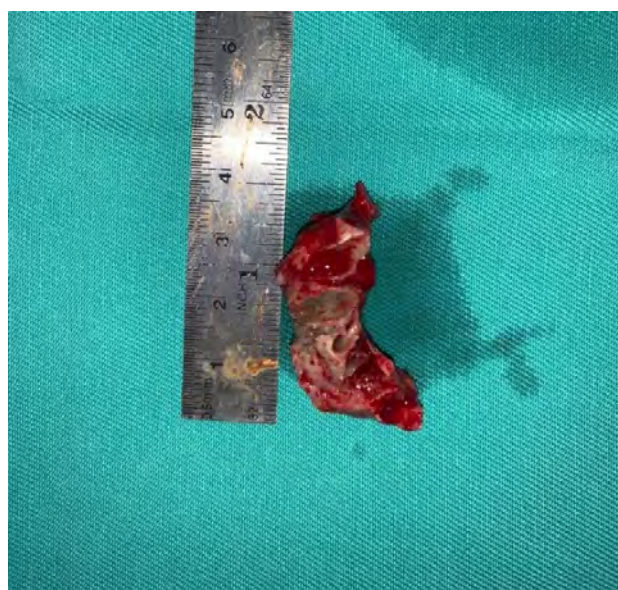
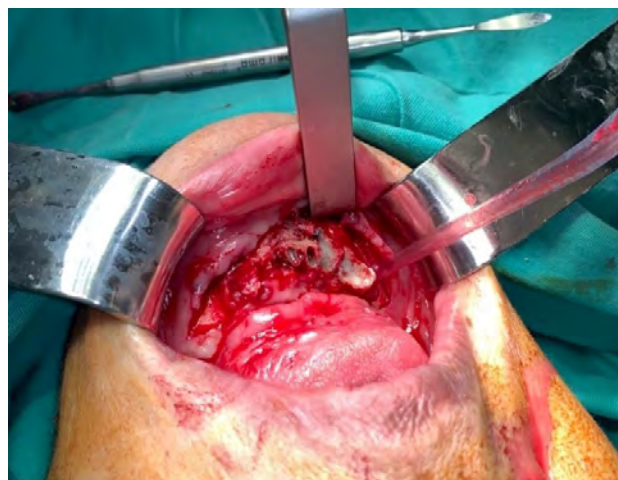
<sup>1</sup>Hospital Lahad Datu, Lahad Datu, Malaysia, <sup>2</sup>Hospital Queen Elizabeth, Kota Kinabalu, Malaysia

**Objective:** Bisphosphonates are commonly used in Malaysia especially in Borneo's tertiary hospital due to its easy availability and is cheap. Its act as bone resorption inhibitors in healthy individuals. Usage of bisphosphonate has risen to 73% in Malaysia compared to other mode of therapy, especially in postmenopausal group of women more than 50 years old. It has been known for subtrochanteric pathological fractures with its prolonged use. However, there has been increased reports of Bisphosphonate Related Osteonecrosis of Jaw (BRONJ) in the last decade. This case series highlights three patients with history of monthly bisphosphonate use for treatment of osteoporosis and pathological fracture, resulting in BRONJ with a very unfavorable outcome.

**Case report:** Initial presentation and chief complaints varied among the patients, from a referral of osteoporotic patient on bisphosphonate for BMD test to a patient on bisphosphonate treatment for pathological femur fracture. The other was referred from orthopaedic clinic to dental clinic for evaluation of loose tooth. She had an extraction of right mandibular molar and noticed poor healing of socket without pain. Although the presenting scenarios were different, all the patients were well on the path of osteonecrosis of the jaw with poor outcomes.

**Conclusion:** As BRONJ is a fairly new entity in medical literature, its incidence is low at 0.01-0.04% with oral bisphosphonates. BRONJ is thought to be caused by trauma to dentoalveolar structures that have a limited capacity for bone healing due to greater bone turnover in jaw and this explains why there are greater bisphosphonate deposition in the jaw vs. extra gnathic sites. The mechanism of injury is different for atypical fracture secondary to prolonged use of bisphosphonate as it has been suggested that prolonged suppression of bone turnover under long term administration may impair ability of bone to remodel. This leads to accumulation of microdamage and compromised bone strength

ultimately progressing to a stress fracture. Bisphosphonates are a crucial weapon in our orthopaedic armory. Therefore, we should stress the importance of obtaining comprehensive oral/dental examination, prophylaxis, and treatment prior to starting bisphosphonate treatment in our clinic.





P783

### SYMPTOMS OF MUSCULOSKELETAL DISORDERS AND ITS ASSOCIATION WITH PREVIOUS EXERCISE HABITS IN POST COVID-19 PATIENTS

A. Kaur<sup>1</sup>, M. Mitra<sup>1</sup>, D. Wadhwa<sup>1</sup><sup>1</sup>MVP's College of Physiotherapy, Nashik, India

**Objective:** COVID-19 is a pandemic disease affecting a huge number of people all over the world. Regardless of the variety of symptoms and signs, recovered post covid patients complained of musculoskeletal symptoms which have been ignored since its first identification. This study aimed to find out the different types of the musculoskeletal disorder symptoms experienced by post COVID-19 patients and to explore the association among those symptoms and previous exercise habits before getting infected with COVID-19.

**Methods:** A descriptive type of cross-sectional study was conducted having 100 patients. Participants in study were selected using a purposive sampling technique. Inclusion criteria: patients with a history of positive COVID-19 test and received medical management prior to 4 weeks; patients complained of musculoskeletal symptoms; age 30-60 y. Exclusion criteria: positive COVID-19 test during study; age <30 and >60. Data collection was done by using a structured questionnaire comprised of demographic information, musculoskeletal related symptoms and physical activity related information using face to face interview. Statistical analysis was done using descriptive statistics by frequency and percentages and association were made by using the chi-square test and Karl Pearsons test.

**Results:** Among the 100 participants, 69 were male and 31 were female with a mean age of 48.24 y. In the location of pain status, 63 complained of pain in the head and neck, 18 in the upper limb, 45 in the lower limb and 36 in the back. Besides, 80% of patients complained of global weakness. A significant association was found between exercise before COVID and severity of post COVID musculoskeletal complaints ( $p < 0.001$ )

**Conclusion:** Musculoskeletal symptoms are features of post COVID-19 syndrome and it is mainly believed to arise from the over-inflammatory response due to marked elevation in creatine kinase and lactate dehydrogenase levels. The patients who were regularly performing exercise before COVID-19 infection developed less musculoskeletal complaints compare to other sedentary post COVID patients.

P784

### CASPASE-1 INHIBITION AFFECTS CD36 EXPRESSION AND RANKL/OPG RATIO IN DIFFERENTIATING CHONDROCYTES

A. Ramesova<sup>1</sup>, B. Vesela<sup>1</sup>, E. Svandova<sup>1</sup>, E. Matalova<sup>1</sup><sup>1</sup>Dept. of Physiology, University of Veterinary Sciences Brno, Brno, Czech Republic

**Objective:** Caspases are cysteine proteases known particularly from apoptosis and inflammation but with emerging essential functions also beyond these processes, including chondrogenesis. General caspase inhibition in differentiating chondrocytes pointed to modulation of the fatty acid translocase Cd36. As a key candidate responsible for the effect appears caspase-1 due to its roles in inflammation but also lipid metabolism. Both molecules are considered to be involved in inflammation-related pathologies including osteoarthritis. Notably, engagement of fatty acids in bone homeostasis has been associated with the expression of Rankl and Opg, components of the master regulatory system in bone remodelling being present also in chondroblasts. The aim of this study was to challenge chondrogenic micromass cultures by a selective caspase-1 inhibitor to evaluate any modulations in Cd36 expression. Additionally, the expression of Rankl and Opg was followed.

**Methods:** The well established in vitro model of chondrogenesis, derived from mouse embryonic front limbs, was used for the research purpose. A pharmacological inhibitor of caspase-1 (Z-WEHD-FMK) was added to the experimental group which was cultured for 7 d in parallel with control micromasses. Samples were harvested, RNA isolated, cDNA prepared and expression levels of Cd36, Rankl, and Opg quantified by qPCR.

**Results:** In the Z-WEHD-FMK treated group, expression of Cd36 was significantly upregulated as well as expression of Opg, whereas Rankl was downregulated. Immunocytofluorescence confirmed these modulations on protein level. To determine if there is any association between Cd36 and Rankl/Opg expressions, Cd36 was silenced in micromass cultures. Cd36 silencing caused increased expression of Rankl and decreased Opg expression, which are opposing trends to caspase-1 inhibition (and Cd36 upregulation).

**Conclusion:** The presented results demonstrate novel functions of caspase-1 in chondrocyte differentiation and pathways connected with lipid metabolism through fatty acid transporter Cd36. The detected effect of Cd36 on the Rankl/Opg ratio is important in relation to bone remodelling and metabolism as well as pathologies such as osteoarthritis.

**Acknowledgement:** Research supported by the Czech Science Foundation (GA CR 19-12023S).



P785

### PARTICIPATION OF NEUTROPHIL EXTRACELLULAR TRAPS IN AUTOIMMUNE RHEUMATIC DISEASES

A. Trofimenko<sup>1</sup>, M. Mamus<sup>1</sup>, S. Bedina<sup>1</sup>, E. Mozgovaya<sup>1</sup>, S. Spitsina<sup>1</sup>

<sup>1</sup>Research Institute of Clinical & Experimental Rheumatology A.B. Zborovsky, Volgograd, Russia

Neutrophil extracellular traps (NETs) are specific extracellular netlike structures which consist of interlaced nuclear chromatin strands decorated with various molecules of nuclear and cytoplasmic origin, primarily histones, neutrophilic elastase, cathepsin G, azurocidin, myeloperoxidase, and peptidylarginine deiminase 4 (PAD4). NETs assembling process is now commonly referred as NETosis. It can proceed either with cell death, or in so called vital form, when the cells not only can be viable, but also retain some effector functions. Generation of NETs can be initiated by microorganisms, bacterial wall constituents, antibodies, cytokines, as well as phorbol esters in vitro. Principal role in NETosis performance is attributed to ROS, especially NADPH oxidase and mitochondrial ROS generation pathways. PAD4 is another critical NETosis enzyme, essential for NET formation. Abundant citrullination of NETs constituents is a mandatory property, which means appearance of citrullinated neoepitopes accessible to immune system as a result of NETosis. NET formation is therefore a phenomenon of particular interest in the search for initiating antigen of anticitrulline autoantibodies in rheumatoid arthritis. Progression of the disease has been demonstrated to be associated with NET markers accumulation. Furthermore, fibroblasts from RA model were revealed to ingest NETs and stimulate production of antibodies to citrullinated histones. A number of NET-associated molecules, including modified dsDNA and histones, are known to be leading autoantigens in systemic lupus erythematosus. Pre-activated low-density neutrophils from SLE patients can easier reveal NETosis and outthrow more autoantigens. Multiple studies regarding role of NETs in rheumatoid arthritis, systemic lupus erythematosus, vasculitides, gout, and thrombotic conditions, are under performance, and the information is continuously updated.

P786

### BARRIERS AND EXPECTATIONS FOR PATIENTS IN POSTOSTEOPOROTIC FRACTURES CARE IN FRANCE: THE EFFEL STUDY

R. Launois<sup>1</sup>, E. Cabout<sup>1</sup>, D. Benamouzig<sup>2</sup>, L. Velpry<sup>3</sup>, K. Briot<sup>4</sup>, F. Alliot<sup>5</sup>, L. Perrin<sup>6</sup>, L. Grange<sup>7</sup>, R. Sellami<sup>8</sup>, C. Touboul<sup>8</sup>, J.-M. Joubert<sup>6</sup>, C. Roux<sup>4</sup>

<sup>1</sup>REES France, Paris, <sup>2</sup>Centre National de la Recherche Scientifique, Science Po, Paris, <sup>3</sup>Département de sociologie et d'anthropologie, Université Paris 8, Paris, <sup>4</sup>Service de Rhumatologie, Hôpital Cochin, AP-HP, Paris, <sup>5</sup>Association Française de Lutte Anti-Rhumatismale, Paris, <sup>6</sup>UCB Pharma, Colombes, <sup>7</sup>Service de Rhumatologie, CHU Grenoble-Alpes, Echirolles, <sup>8</sup>Kantar Health, Gentilly, France

**Objective:** To quantify the relative importance of barriers to better secondary prevention of osteoporotic fractures and of care expectations expressed by patients with osteoporotic fractures in France. The aim of this poster is to show how economic analysis techniques can be used to quantify the relative value that the patient attaches to the difficulties and facilities he/she has experienced in implementing a personal approach to secondary prevention of osteoporosis.

**Methods:** A qualitative exploration of potential barriers to care and expectations was undertaken through a systematic literature review and in-depth patients interviews. A list of 21 barriers and 21 expectations were identified. These were presented to 324 subjects with osteoporotic fracture, identified in a representative sample of the French population, in the form of best-worst scaling questionnaires. Patients rated the relative importance of the attributes and arithmetic mean importance scores were calculated and ranked. A Bayesian hierarchical model was also performed in order to generate a relative importance score. Latent class analysis was performed to identify potential subgroups of patients with different response profiles.

**Results:** Seven barriers were rated as the most important, relating to awareness of osteoporosis and coordination of care. The highest-ranked barrier, "my fracture is not related to osteoporosis", was significantly more important than all the others (mean importance score: 0.45 [95%CI: 0.33-0.56]). A similar ranking of attributes was obtained with both the arithmetic and the Bayesian approach. For expectations, no clear hierarchy of attributes was identified. Latent class analysis discriminated three classes of respondents with significant differences in response profiles (the educated environmentalists, the unaware, and the victims of the system).

**Conclusion:** The use of quantitative and qualitative approaches in combination provides a better understanding of research issues than either approach alone. Better quality of care of osteoporosis and effective secondary fracture prevention will require improvements in patient education, training of healthcare professionals and coordination of care. Further research for the sequential valuation of the patient's experience in the delivery of secondary osteoporosis prevention from the patients' perspective is needed.

P787

# METABOLIC OSTEOARTHRITIS AND LEPTIN: RELATIONSHIPS IN PATIENTS WITH OBESITY THERAPY

E. A. Strebkova<sup>1</sup>, L. I. Alekseeva<sup>1</sup><sup>1</sup>V.A. Nasonova Research Institute of Rheumatology, Moscow, Russia

**Objective:** To evaluate the relationships between leptin and the clinical manifestations of OA and the components of the MS in the context of obesity therapy.

**Methods:** 50 female (mean age 56.5±5.8 y) with Kellgren-Lawrence stage II-III knee OA and obesity (BMI >30 kg/m<sup>2</sup>). 62% of pts were diagnosed MS. Pts were divided into 2 groups. Group 1 (n=25) took orlistat 120 mg 3 times/d for 6 months. Group 2 (n=25) had a hypocaloric diet and exercise for 6 months. The clinical course of OA was determined by the WOMAC and VAS. All pts underwent a laboratory examination: a biochemical blood test, leptin was determined by PCR.

**Results:** High leptin levels (p<0.01) were determined in pts with more than 3 MS components. The correlation analysis showed positive correlations between leptin and WOMAC pain (r=0.36, p=0.02), and VAS pain (r=0.51, p=0.01), and weight (r=0.56, p<0.01), and waist circumference (r=0.38, p<0.01). Group 1 had a significant decrease of body weight by 10.07% (p<0.05), the indicators of the WOMAC index improved (p<0.05) after 6 months. Group 2 had a not significant decrease of body weight by 0.84% (p>0.05), and worse indicators of clinical manifestations of OA. 24% of pts from group 1 showed a decrease in the number of MS components. Group 1 had a significant decrease of the level of leptin (p=0.05). We found positive correlations between a decrease of leptin and a decrease of the total WOMAC (p=0.01). Pts with a decrease in the number of MS components had a significantly lower leptin levels (p=0.01).

**Conclusion:** Leptin is a predictor of a worse course of the metabolic OA. We observed a decrease in the level of leptin, in the number of MS components, and an improvement in the clinical manifestations of OA against the background of a significant decrease in body weight. Thus, the treatment of obesity in pts with the metabolic OA and other interventions aimed at reducing the level of leptin may contribute to reducing the progression of knee OA.

P788

# ADRENAL CUSHING SYNDROME AND BILATERAL TUMOURS: BONE STATUS

A. Ghemigian<sup>1</sup>, C. Chirita<sup>2</sup>, N. Dumitru<sup>1</sup>, C. Tupea<sup>3</sup>, A. Dumitrascu<sup>3</sup>, E. Petrova<sup>1</sup>, M. Popescu<sup>4</sup><sup>1</sup>C.I. Parhon National Institute of Endocrinology & C. Davila University of Medicine & Pharmacy, Bucharest, <sup>2</sup>Medic Zone Centre, Bucharest, <sup>3</sup>C.I. Parhon National Institute of Endocrinology, Bucharest, <sup>4</sup>University of Medicine & Pharmacy Craiova, Craiova, Romania

**Objective:** A challenging situation in adrenal tumours field is related to the presence of bilateral masses of similar dimensions with mild autonomous cortisol secretion and cardiometabolic, respective high osteoporotic fracture risk complications. The decision of adrenalectomy is delicate because adrenal arteries catheterise is not available in many centres while bilateral adrenalectomy, despite being feasible one time during laparoscopic approach due to recent progress in surgery, complicates the clinical picture with chronic adrenal insufficiency requiring lifelong substitution (1-5).

**Case report:** This is a 64-year-old female, who was accidentally detected in 2017 with bilateral adrenal tumours starting from a routine abdominal ultrasound. She has a history of controlled arterial hypertension, hyperlipemia, and a surgical removal of a mammary benign fibroadenoma a decade ago. The initial computed tomography showed a right adrenal tumour of 1.4x2 cm, and a left adrenal tumour of 2.2x1.6 cm. At that moment, a central DXA scan was also performed and a lumbar T-score of -2.5SD confirmed osteoporosis; she was offered denosumab every 6 months, and 3 y later she achieved a lumbar T-score of -2.1 SD (without prevalent fragility fractures). The adrenal hormonal profile was stationary: morning plasma cortisol of 19 µg/dL (normal: 6-21 µg/dL) and after 1 mg dexamethasone suppression test of 2.43 µg/dL (normal <1.8 µg/dL), morning plasma ACTH of 4.8 pg/mL (normal: 6-66 pg/mL), in addition to normal glucose profile, also 25-hydroxyvitamin D (under daily 1000 UI), and suppressed bone turnover markers. Adrenalectomy was postponed and she continued denosumab. In 2020, MRI showed a right adrenal tumour of 1.8x1 cm, and a left adrenal tumour of 2.2x1.8 cm and an additional tumour at the level of the same gland of 1 cm. Low-normal ACTH was of 7 pg/mL (normal: 6-66 pg/mL) in association with increased morning plasma cortisol of 744 nmol/L (normal: 66-327) and stationary BMD-DXA profile. Left adrenalectomy was recommended, but the patient refused it.

**Conclusion:** This case highlights the fact that bone loss might be expected in bilateral adenomas with potential cortisol overexpression, even a clear correlation between endocrine features, adrenal imaging and DXA, as gold standard in menopausal women for this particular topic, is difficult to establish.

## References:

1. Poiana C, et al. Maturitas 2009;62:98.

2. Gheorghisan-Galateanu AA, et al. Acta Endocrinologica Bucharest 2017;3:356.
3. Iorga AM, et al. Exp Ther Med 2020;20:2396.
4. Poiana C, et al. Bone Res 2013;1:275.
5. Sandru F, et al. Exp Ther Med 2020;20:3389.

## P789

### REHABILITATION PROGRAM IN A YOUNG PATIENT WITH PRIMARY OSTEOPOROSIS AND SECONDARY ASEPTIC NECROSIS OF THE FEMORAL HEAD

K. C. Kamal<sup>1</sup>, M. R. Traistaru<sup>1</sup>, D. O. Alexandru<sup>1</sup>, A. M. Kamal<sup>1</sup>, D. T. Maria<sup>1</sup>, D. Kamal<sup>2</sup>

<sup>1</sup>University of Medicine & Pharmacy of Craiova, <sup>2</sup>SAMA Medical Center, Craiova, Romania

**Objective:** We present the case of a 32 years old woman that started having severe pain, stiffness in her left hip and disability in gait 3 years after she suffered a Garden III left femoral fracture, and was diagnosed with severe primary osteoporosis.

**Methods:** Physical examination showed shortening of the left limb by 1.5 cm, severe pain and limited range of movement in left hip joint. Weakness of the hip muscles was noted and the ability to stand and balance on left lower limb was diminished. MRI of left femoral hip joint revealed loss of sphericity, contour irregularities and flattening of the left femoral head, highlighting a subchondral area in hyposignal T1, T2 and STIR, located superior antero-externally, with dimensions of 3.4/1.5 cm, surrounded by lysereum in hyposignal T1, T2, hypersignal STIR and diffuse bone edema. BMD was measured by DXA and showed: L1-L4 BMD: 0.764 g/cm<sup>2</sup>; T-score -3.2; Z-score -3. The laboratory tests revealed no abnormality.

Our patient was diagnosed with stage 2 secondary aseptic necrosis of the femoral head. The patient refused pharmacological treatment for osteoporosis, she received analgesics and followed a 6 months complex rehabilitation program: posture (activity modification), physical therapy (thermotherapy; electrotherapy TENS, laser, NMES), classic and special massage (Cyriax), kinetic and occupational therapy. We assessed the pain and functional status before and after the treatment using the visual analogue scale (VAS), 6-min walk test, Timed Up and Go test, Harris Hip Score and SF-36 scale, before and after the rehabilitation program.

**Results** VAS score was 8 before and 4 after the rehabilitation program; 6-min walk was 170 m before and 260 m after; Timed Up and Go=39 s before and 21 s after; Harris Hip Score was 34 before rehabilitation and 48 after, and the SF 36 score was 36 before rehabilitation and 50 after the rehabilitation program.

**Conclusion:** Taking into account that trauma is the most common cause of NACF, young patients should be monitored frequently, especially if they suffer from other conditions such as osteoporosis.

## P790

### SPONDYLODISCITIS ASSOCIATED WITH LUMBAR DISC HERNIATION IN A PATIENT WITH A HISTORY OF PENILE CANCER

K. C. Kamal<sup>1</sup>, M. R. Traistaru<sup>1</sup>, D. O. Alexandru<sup>1</sup>, A. M. Kamal<sup>1</sup>, D. T. Maria<sup>1</sup>, D. Kamal<sup>2</sup>

<sup>1</sup>University of Medicine & Pharmacy of Craiova, <sup>2</sup>SAMA Medical Center, Craiova, Romania

**Objective:** We present the case of a 75-year-old man with penile cancer history (12 y ago), who had several episodes of low back pain (LBP), in the last year, that improved at rest, and had in the last 3 weeks an intense LBP that severely affected his functionality.

**Methods:** The physical examination showed dorsal kyphosis, lumbar scoliosis, paravertebral muscle contracture, pain and increased sensitivity in the lumbar spine and paravertebral muscles, significant decrease in range of movement in the lumbar spine. Laboratory assessments revealed no abnormality, other than the value of ESR that was 37 mm/h, C-reactive protein value of 19 mg/L. Urine cultures were positive for E. coli. MRI of the penis, inguinal and pelvic area showed no abnormalities. Spine MRI with contrast administration revealed median and paramedian L4-L5 disc herniation with imprint on the dura mater; T2/STIR hyperintense and T1 hypointense signal L4-L5 intervertebral disc and adjacent vertebral bodies, extended high gadophilia in L4 and L5 vertebral bodies, L4-L5 disc and anterior and posterior vertebral ligaments; L3-L4 and L5-S1 disc protrusions. As the patient had difficulty urinating sometimes, he was referred to a urologist who found that the patient was suffering from a mild urethral stricture, for which he intervened noninvasively by gradually enlarging the urinary meatus during several treatment sessions.

**Results:** 6 months after the end of the urological treatment, antibiotic therapy for 12 weeks, bed rest and immobilization for 2 weeks, and then ambulation using a brace and physical therapy, a new MRI of the spine was performed and found a marked improvement of the previous imaging aspect, with a significant reduction of contrast enhancement, aspects correlated with the significant improvement of the patient's pain and functional status, assessed by visual analogue scale for pain and Short Form-36 Physical Functioning scale.

**Conclusion:** In this case the urethral stricture after the penile cancer removal surgery was incriminated in developing spondylo-discitis but sometimes an underlying malignancy can represent a risk factor as well. Surveillance after a penile cancer diagnosis is life-long because these patients have the potential to develop recurrent disease or a new primary tumor.

P791

# RELATIONSHIPS BETWEEN MTOR EXPRESSION AND METABOLIC OSTEOARTHRITIS

E. A. Strebkova<sup>1</sup>, L. I. Alekseeva<sup>1</sup><sup>1</sup>V.A. Nasonova Research Institute of Rheumatology, Moscow, Russia

**Objective:** To evaluate the relationships between mTOR expression and the clinical manifestations of OA in pts with different BMI.

**Methods:** The study included 73 females with Kellgren-Lawrence stage II-III knee OA. The pts were divided into 2 groups: group 1 (n=50) with obesity (BMI >30 kg/m<sup>2</sup>) and group 2 (n=23) with normal or increased body weight (BMI <30 kg/m<sup>2</sup>). The average age of pts with obesity is 56.5±5.87 y, without obesity 58.7±5.43 y. Clinical manifestations were evaluated by a WOMAC. RNA was isolated from the pts' blood samples, which was used to determine the expression of mTOR.

**Results:** OA develops at an earlier age in obese pts, than in non-obese pts (p<0.001). Group 1 had a high BMI >30 kg/m<sup>2</sup> at the onset of OA. Obese pts had more severe knee OA is significantly more often detected: stage III was determined in 10% of obese pts and in 4.35% without obesity (p<0.001). Significantly higher values of the WOMAC index pain, stiffness, joint functional failure, and total WOMAC were observed in obese pts (p<0.05). Obese pts had higher VAS pain (p<0.05) compared to pts with a lower BMI. Obese pts had a higher mTOR expression (p<0.05), compared to non-obese pts. High mTOR expression was associated with VAS knee pain (r=0.78; p<0.05) and WOMAC pain (r=0.89; p<0.05) in obese pts.

Table. Correlation of mTOR.

Parameters	mTOR (1 group, n=50)	mTOR (2 group, n=23)
Body weight	p>0.05	p>0.05
Pain VAS	r=0.78; p<0.05	p=0.07; r=0.45
Pain WOMAC	r=0.89; p<0.05	p > 0.05
Total WOMAC	p > 0.05	p > 0.05

**Conclusion:** Our study showed that pts with obesity and knee OA have higher rates of mTOR expression, compared to pts with normal body weight. High mTOR expression correlates with the severity of knee pain in obese pts. Thus, the evaluation of mTOR expression in obese pts and knee OA plays an important role in predicting the severity of clinical manifestations of OA, and may influence the choice of personalized therapy tactics for such pts.

P792

# EPIDEMIOLOGY AND ECONOMIC BURDEN OF FRAGILITY FRACTURES IN AUSTRIA

C. Muschitz<sup>1</sup>, M. Hummer<sup>2</sup>, J. Grillari<sup>3</sup>, A. Hlava<sup>2</sup>, A. Birner<sup>2</sup>, M. Hemetsberger<sup>4</sup>, H. P. Dimai<sup>5</sup>

<sup>1</sup>St. Vincent Hospital, Medical Dept. II, Vienna, <sup>2</sup>Austrian National Public Health Institute, Vienna, <sup>3</sup>Ludwig Boltzmann Institute for Experimental & Clinical Traumatology at the AUVA Research Center, Vienna, <sup>4</sup>Hemetsberger Medical Services, Vienna, <sup>5</sup>Medical University of Graz, Dept. of Internal Medicine, Division of Endocrinology & Diabetology, Graz, Austria

**Objective:** Fragility fractures are frequently associated with long hospital stays, loss of independence and increased need for care in the elderly, with consequences often leading to premature death. The aim of this study was to estimate the number of fragility fractures and associated healthcare costs in Austria in 2018.

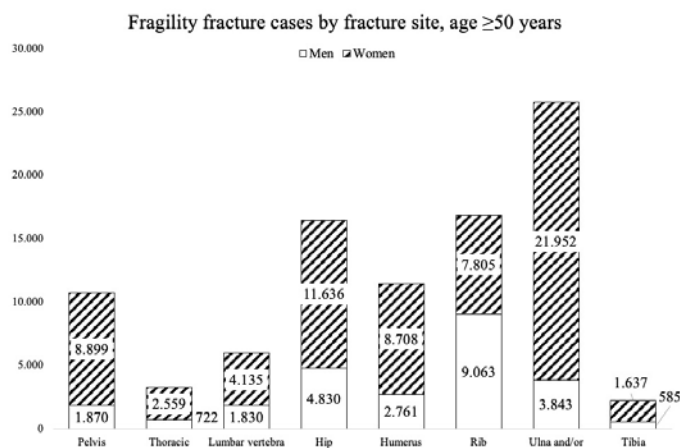
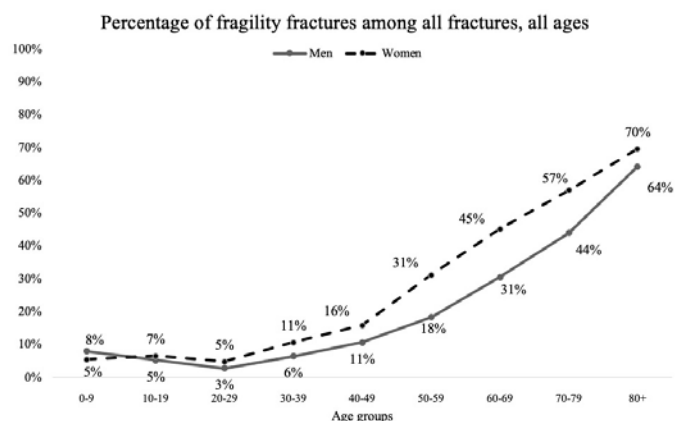
**Methods:** The number of in-patients with relevant ICD-10 diagnoses in all Austrian public hospitals was derived from discharge documentation covering all public hospitals in Austria; out-patient cases were estimated from trauma hospital data. Fractures resulting from falls from standing height in patients aged ≥50 years were used as a proxy for fragility fractures. The direct costs of these cases were calculated using the average cost of the corresponding in-patient hospital stay and the average cost for the out-patient stay. This study was approved by the ethics committee of the medical university of Vienna.

**Results:** The estimated number of fragility fractures for 2018 was 92,835 cases, corresponding to a prevalence of 2600/100,000 inhabitants aged ≥50 y. A constant increase in the proportion of fragility fractures among all fractures was observed with increasing age in both, men and women (Figure). These fractures amounted to direct costs of >157 million €.

**Conclusion:** Fragility fractures are a frequent and costly event in Austria. Due to the ageing of the population, the number of fragility fractures and their associated costs are expected to increase even further.

**Disclosures:** Financial support: Amgen GmbH, Vienna, Austria. MHe has received consulting fees from Amgen outside scope of the present work and holds Amgen equity. JG is scientific advisor, cofounder, and shareholder of TAmRNA GmbH and Evercyte GmbH.





## P793

### PATIENTS' CHARACTERISTICS RELATED TO BONE MINERAL DENSITY EVOLUTION AT DENOSUMAB DISCONTINUATION: THE REOLAUS BONE PROJECT

G. Liebich<sup>1</sup>, E. Gonzalez Rodriguez<sup>2</sup>, O. Lamy<sup>3</sup>

<sup>1</sup>Faculty of Biology and Medicine, University of Lausanne,  
<sup>2</sup>Interdisciplinary Center for Bone Diseases, Rheumatology Service, Lausanne University Hospital and University of Lausanne,  
<sup>3</sup>Interdisciplinary Center for Bone Diseases, Rheumatology Service, and Internal medicine Service, Medicine Dept., Lausanne University Hospital and University of Lausanne, Lausanne, Switzerland

**Objective:** At denosumab discontinuation (DD) a relay by bisphosphonates (BPs) is needed to prevent the loss of the BMD gained under denosumab, and reduce the risk of spontaneous vertebral fractures. This study aimed to compare patients losing BMD after DD and those with stable values.

**Methods:** Patients who received  $\geq 2$  injections and with a follow-up  $> 1$  y after DD at Lausanne University Hospital were included. BMD in T-scores was measured at DD, and 1 and 2 years after.

BTMs were measured regularly, and expressed in% of the upper limit of the norm for premenopausal women. Losers (BMD loss  $\geq 0.2$  DS at lumbar spine (LS)) were compared to Non-losers.

**Results:** 161 postmenopausal women stopped denosumab after  $8.0 \pm 2.9$  injections: age  $65.8 \pm 9.5$  y, BMI  $23.3 \pm 3.5$ , 47.8% had previous fractures, 19.0% were exposed to anti-aromatase. 38.5% received BPs before denosumab and 94.4% after DD. During the first year after DD patients lost LS BMD (mean  $\Delta T$ -score:  $-0.25 \pm 0.39$  SD), while it stabilized on the second year ( $\Delta T$ -score  $0.03 \pm 0.41$  SD). During the first year after DD, 54.3% of patients were defined as Losers at LS (mean  $\Delta T$ -score:  $-0.50 \pm 0.24$  SD), while 45.7% were Non-losers ( $\Delta T$ -score  $0.05 \pm 0.30$  SD). Losers had a longer denosumab treatment,  $9.08 \pm 2.55$  vs.  $7.55 \pm 2.60$  injections ( $p < 0.01$ ), and shorter BPs treatment before it ( $40.5 \pm 22.6$  vs.  $65.9 \pm 50.6$  months,  $p = 0.05$ ). During the first year,  $\beta$ -CrossLaps (CTX) were higher in Losers vs. Non-losers (AUC:  $80.2 \pm 41.4\%$  vs.  $57.9 \pm 31.1\%$ ,  $p < 0.01$ ; highest reached value:  $119.7 \pm 55.7\%$  vs.  $93.5 \pm 52.3\%$ ,  $p < 0.01$ ), and negatively correlated with LS BMD evolution ( $p < 0.01$ ). More Losers needed  $\geq 3$  zoledronate perfusions to control the rebound (41% vs. 10% of Non-losers;  $p < 0.01$ ). We obtained similar results on the whole 2 y of follow-up.

**Conclusion:** Shorter BPs treatment before denosumab, longer denosumab treatment, and higher post-denosumab CTX levels predict a greater loss of BMD on the two years following denosumab discontinuation.

## P794

### SEASONAL DIFFERENCES IN VITAMIN D LEVELS IN MEXICAN CHILDREN AND ADOLESCENTS

D. Lopez-Gonzalez<sup>1</sup>, D. Montiel-Ojeda<sup>1</sup>, L. Mendez-Sanchez<sup>1</sup>, M. Guagnelli<sup>2</sup>, P. Clark<sup>1</sup>

<sup>1</sup>Hospital Infantil de Mexico Federico Gomez, <sup>2</sup>Universidad Nacional Autonoma de Mexico, Mexico, Mexico

**Objective:** Seasonal serum vitamin D (VD) level variability is a relatively well-described phenomenon. This means that for people living in greater latitudes, VD levels during summer tend to be higher than during winter. This phenomenon impacts VD deficiency reported in diverse populations. In contrast, seasonal variation tends to be milder or even nonexistent in populations located closer to the equator, where it is generally assumed that sun exposure is sufficient to prevent this deficiency. In Mexico, VD deficiency prevalence described in children goes from 10% to 20%. However, no seasonal variation has been reported. This study aimed to establish the seasonal differences in VD levels in Mexican 5-20 y.

**Methods:** Cross-sectional study, in a subsample of healthy subjects aged 5-20 y, from schools in Mexico City. The included subjects were evaluated during the period from fall 2016 to winter 2017. Subjects that fulfilled inclusion criteria were scheduled for assessment including pediatric, nutritional assessment and blood samples. Serum concentrations of vitamin D were mea-

sured through chemiluminescence assay by using the Liaison 25-hydroxyvitamin D total assay. We used descriptive statistics for demographic data. Then we looked for differences between groups by student T-test adjusted for multiple comparisons. We also explored the association of other variables like age and gender with the VD levels.

**Results:** We studied 816 subjects. The VD <20 mg/dl frequency was 42% (n=442). According with their BMI category 66% of the subjects had normal weight, 17% overweight and 13% obesity. The mean VD levels were lower during winter 2017 ( $17.04 \pm 5.1$  mg/dL) in comparison with the other seasons ( $p < 0.05$ ). The risk of VD levels <20 ng/mL during winter in comparison with the other seasons was 2.9 (95%CI 2.2 to 3.9,  $P < 0.001$ ). This risk was similar in the multiple logistic model ( $\beta = 2.8$ , 95%CI 2.05 to 3.8,  $P < 0.001$ ), adjusted for other variables as age, sex, BMI Z-score, milk consumption, physical activity and sedentarism.

**Conclusion:** In Mexican children the VD deficiency was 42%, there was a lower level of VD during winter in comparison with the other season, other risk factor associated was age, sex (female) and higher BMI.

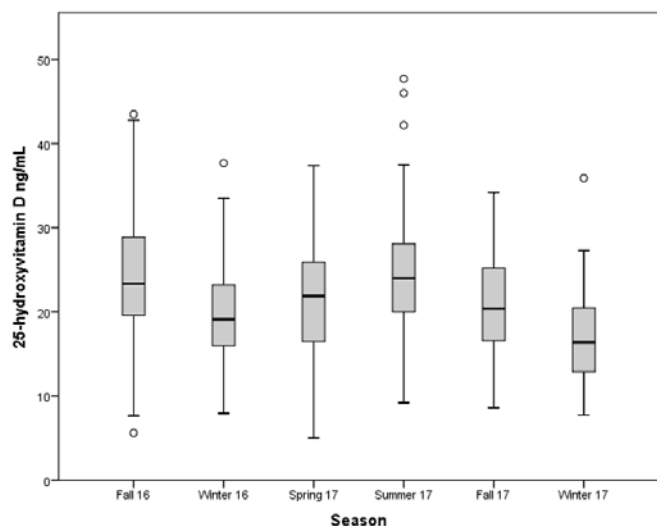


Figure 1. Box plot of seasonal variation in serum 25-hydroxyvitamin D (25OHD) level. The mean VD level during winter17 was significantly lower than that during summer spring and fall 2017.

P795

## 68 GA-DOTATATE FOR TUMOR LOCALIZATION IN TUMOR-INDUCED OSTEOMALACIA

M. B. Zanchetta<sup>1</sup>, M. Bastianello<sup>2</sup>, M. Chirico<sup>3</sup>, A. De Salazar<sup>3</sup>, M. Cimin<sup>3</sup>, C. Balonga<sup>1</sup>, G. Mumbach<sup>4</sup>, Y. Mocarbel<sup>5</sup>, A. Pignatta<sup>6</sup>, J. M. Roganovich<sup>7</sup>, J. R. Zanchetta<sup>1</sup>

<sup>1</sup>IDIM, Universidad del Salvador, Buenos Aires, <sup>2</sup>Cemic, Hospital Universitario, Buenos Aires, Argentina, Buenos Aires, <sup>3</sup>Cemic, Hospital Universitario, Buenos Aires, <sup>4</sup>Instituto de Ortopedia y Traumatología, Posadas, Misiones, <sup>5</sup>Division de Endocrinología, Hospital de Clinicas, Universidad de Buenos Aires, Buenos Aires, <sup>6</sup>Servicio de Endocrinología, Hospital Interzonal, San Juan Bautista, San fernando del valle de Catamarca, <sup>7</sup>Clinica Ambar, Posadas, Argentina

**Objective:** Tumor-induced Osteomalacia (TIO), whose surgical resection is curative, represents a diagnostic challenge. Anatomical identification is generally not viable both for conventional methods and for traditional metabolic markers such as FDG PET. Therefore, we explore the utility of 68Ga DOTATATE positron emission tomography (PET)/computed tomography (CT) for localization of TIO.

**Methods:** Between December 2019 and March 2021, PET CT studies with 68Ga DOTATATE were performed in 5 TIO patients aged between 42-67 y who had several previous inconclusive conventional morphometabolic studies.

**Results:** In all patients the presence of a nodular soft tissue lesion was detected with intense avidity for uptake by the radiotracer, obtaining SUV max values between 8.3-19.8. These lesions were located in the head and neck (n=3) and in the appendicular system (n=2). Four (80%) of the lesions presented bone involvement of the adjacent structures and all with the uncharacteristic enhancement of the intravenous contrast. At the time of this work, 2 of the 5 patients underwent surgery, both presenting histological confirmation of the resected lesion.

**Conclusion:** As previously described in the literature, according to our series of cases, 68Ga DOTATATE could be the tool of choice for the detection and topographic localization of mesenchymal tumors producing TIO. This new possibility brings hope to patients and families with this condition that causes a catastrophic impact on quality of life.

**Disclosure:** This study was funded by Ultragenyx as an Investigator Sponsored Trial.

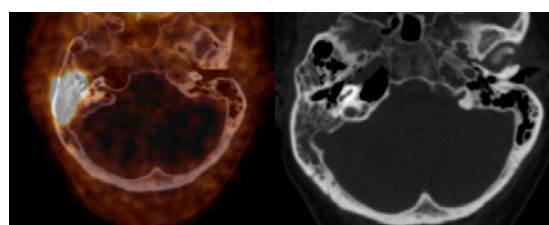


Figure 1. Mastoid cells on the right side without the corresponding pneumatization, showing occupancy by tissue of intermediate hypercaptant density that reaches SUV max 9.4.

P796

### DIFFERENCES BETWEEN LATERAL AND ANTERIOR-POSTERIOR DEVELOPMENT OF THE HUMAN FIBULA AS A FUNCTION OF ACTIVITY LEVEL AND USE OF THE FOOT: A CROSS-SECTIONAL STUDY

L. Pisani<sup>1</sup>, N. Pilot<sup>1</sup>, S. Luscher<sup>2</sup>, L. Mackler<sup>2</sup>, J. Rittweger<sup>3</sup>, A. Ireland<sup>4</sup>, J. L. Ferretti<sup>2</sup>, G. Cointry<sup>2</sup>, R. Capozza<sup>2</sup>

<sup>1</sup>Unidad de Estudios Biomecánicos Osteomusculares, Universidad del Gran Rosario, Rosario, Argentina, <sup>2</sup>Centro de Estudios de Metabolismo Fosfo-Cálcico, Rosario, Argentina, <sup>3</sup>German Aerospace Center, Cologne, Germany, <sup>4</sup>Manchester Metropolitan University, Manchester, UK

**Objective:** To evaluate the lateral (L) and anterior-posterior (AP) structural stiffness of the fibula in men subjected to different regimes of physical activity with different use of the foot.

**Methods:** Crude or cortical-area adjusted cross-sectional moments of inertia for L (LMI) and AP bending (APMI) and the corresponding Bone Strength Indices (LBSI, APBSI) of the whole fibulae (pQCT, 18 scans/bone at 5% bone length increments) and the maximal dynamometric force of foot rotation/eversion and one-leg jump (Ff, Fj) were determined in groups of 18-30 y healthy males who were untrained sedentary (SC, 15), moderately active (AC, 15), runners (Run, 15), soccer players (Soc, 30) and rugby players (Rug, 15), and in 10 males with spinal cord injury (SCI) and 9 anthropometrically-paired, active controls (sciC).

**Results:** Along a wide range of bone sites, all LMI and LBSI values were significantly higher in Rug and Soc and lower in Run and SC than in AC (BSI: +412%, +12%, -18%, -24%). All APMI and APBSI values were significantly higher in Rug, similar in Run and lower in SC compared with AC (BSI: +47%, +14%, +1(ns), -9%). The LMI/APMI ratio ('shape index') increased in the order: SC -32% < Run -28% < Soc -7% < Rug +3% and was lower in SCI than in sciC (-25%, p<0.01). Both LMI and LBSI correlated more closely with Ff than with Fj (p<0.001, p<0.05), with Ff increasing in the order SC<Run<Soc<Rug.

**Conclusion:** The progressive values of the L-related (not AP-related) indicators and shape index suggest that the development of fibula stiffening was stimulated in Soc and Rug (which train foot rotation/eversion) but strikingly unaffected or even impaired in Run (which do not) with respect to AC, in consonance with results in SC and SCI and with the lower-left shift of their data in the correlation graphs with Ff. This foot-related behavior of the fibula associated with specific muscle strength points out the high relevance of directionality in the mechanical control of bone structure.

P797

### OSTEOPOROSIS IN MIDDLE-AGED WOMEN: WHAT IS THE IMPACT OF MULTIMORBIDITY AND MEDICATION USE? A CROSS-SECTIONAL POPULATION-BASED STUDY

A. V. Guedini de Moraes<sup>1</sup>, L. H. Costa-Paiva<sup>1</sup>, A. O. Pedro<sup>1</sup>

<sup>1</sup>UNICAMP, Campinas, Brazil

**Objective:** Osteoporosis is a multifactorial disease influenced by many clinical factors. Some of these factors are nonmodifiable, while others can be avoided, ameliorated and prevented. From the perspective of the middle-aged women and their physician, this is of importance since longevity and aging process is associated to chronic conditions, medication use and multimorbidity that may affect bone health. Many of these chronic diseases may affect women during the menopause transition. Therefore, it is important to know which medications are most used by middle-aged women and which ones can potentially have adverse skeletal effects. This study aimed to evaluate the association between self-reported osteoporosis and multimorbidity and medication use, in Brazilian middle-aged women.

**Methods:** A secondary analysis of household survey data from a previous cross-sectional, population-based study conducted with a sample of 749 women of a population of 257,434 female urban residents in the age bracket of interest (45-60 y). Associations between self-reported osteoporosis and chronic diseases, multimorbidity, and medication use were evaluated. Simple and multiple Poisson regression analyses (with a forward stepwise selection of variables) were performed to evaluate the significance of the factors associated with self-reported osteoporosis (95%CI for the prevalence ratio). The level of statistical significance was set at 5%.

**Results:** Mean age of participants was 52.5±4.4 y. Mean age at menopause was 46.5±5.8 y. About 79% of women reported having some kind of chronic disease. The most prevalent morbidities were hypertension (36%), depression (34%), anxiety (27%), osteoarticular diseases (27%), dyslipidemia (22%), asthma (10.5%), and diabetes mellitus (10.4%). Only 21.6% denied having morbidities. The prevalence of self-reported osteoporosis was 7.3%. Among those women with osteoporosis, 67.3% reported using specific drugs to treat bone loss. The specific intake of drugs for osteoporosis treatment correspond to 7.6% of the overall prevalence of medication use. Only 6% of the entire studied population reported using calcium and vitamin D supplementation. The overall prevalence of medication use was 68.8%, with the drugs predominantly consisting of those used for cardiovascular diseases (34.6%), oral lipid-lowering agents (13%), anxiolytics (12%), treatment of osteoarticular diseases (12%), and treatment of diabetes (9.6%). Only 19.5% of the participants reported previous or current use of hormone replacement therapy. The overall frequency of polypharmacy was 23%. After multiple regression analysis, the main factors associated with self-reported osteoporosis were having osteoarthritis/osteoarthritis (PR=2.86; 95%CI: 1.58-5.17;

$p \leq 0.001$ ), multimorbidity (PR=2.61; 95%CI: 1.43-4.75;  $p=0.002$ ), and treatment for ischemic heart disease (PR=3.28; 95%CI: 1.02-10.56;  $p=0.046$ ). Strength & limitations: This observational study provides an epidemiological contribution. The meticulous methodology and the representativeness of the population sample permit these conclusions to be extrapolated to the entire population of middle-aged women residing in the metropolitan region of Campinas, Brazil. Some limitations of this study must be considered, particularly bearing in mind that much of the data was self-reported, which may lead to biases.

**Conclusion:** The prevalence of morbidities and medication use among middle-aged women was high in a relatively young population. Osteoporosis was reported by approximately 8% of women, highlighting the importance of menopause transition. However, only 2/3 of the osteoporotic women reported using specific drugs for its treatment. Furthermore, it was observed a low prevalence of calcium and vitamin D supplementation. Women with self-reported osteoporosis were more likely to use medicine for ischemic heart disease, to have osteoarticular disease, besides having multimorbidity. Our findings reinforce the need to address women earlier, preferably in the period before the menopausal transition, to promote health through lifestyle modifications, thus preventing the onset of chronic degenerative diseases at earlier ages. Furthermore, clinicians should be aware to select drugs for the treatment of chronic conditions in this specific group of women, considering the potential side effects on bone health.

**Acknowledgement:** São Paulo Research Foundation - FAPESP 2016/08089-9.

P798

### RESULTS OF THE ASSOCIATION BETWEEN ULTRASOUND THERAPY AND PHYSICAL EXERCISE PROGRAM IN KNEE OSTEOARTHRITIS

I.-R. Marcu<sup>1</sup>, A.-M. Bumbea<sup>1</sup>, V. D. Caimac<sup>1</sup>, C. O. Rogoceanu<sup>1</sup>

<sup>1</sup>University of Medicine & Pharmacy of Craiova, Craiova, Romania

**Objective:** Ultrasound therapy is chosen as a thermal agent for knee osteoarthritis because it penetrates selectively into deep structures, increasing their mobility, reducing muscular spasm and decreasing pain. The aim of this study is to show the effect of association between ultrasound therapy and kinetic program for reducing pain, stiffness and improving knee motion.

**Methods:** We conducted a prospective randomized study that included 52 patients with knee osteoarthritis, randomly assigned in two groups: the study group formed of 26 patients treated with ultrasound therapy and kinetic program (group 1) and the control group (26 patients) that followed an exercise program, without ultrasound therapy. The assessment was made at the beginning of the study and after 14 d of therapy using the next parameters: pain evaluated on a visual analogue scale (VAS), 6-min walking distance test (6MWD), WOMAC.

**Results:** In group 2 (with physical exercise treatment), the pain in the knee was reduced from 70.2 to 51.4 mm on VAS scale. The 6MWD test recorded an average improvement of 15.6 m. The WOMAC scale recorded a score drop from 74.2 to 41.4. Group 1, with kinetic program and ultrasound therapy, presented better results: the VAS scale improved from 71.3 to 34.5, the 6MWD test proved a growth in the walking capacity with 23.4 meters, the WOMAC scale recorded a significant drop, from 78.4 to 32.3. The results showed a better improvement in the study group compared to the control group and were statistically significant ( $p < 0.05$ ).

**Conclusion:** The patients with knee osteoarthritis showed improvement of all the tested parameters, in the general group, but in the group with exercise program combined with ultrasound therapy the results were better. We concluded that combination of ultrasound therapy and kinetic program is more effective compared to single use of physical exercise in patients with knee osteoarthritis.

P799

### SINGLE VERTEBRA BMD VALUES IN DIAGNOSIS OF OSTEOPOROSIS AND PREDICTION OF COMPRESSION FRACTURES

W. P. Chan<sup>1</sup>, Y.-C. Lu<sup>2</sup>, W.-C. Huang<sup>3</sup>, C. Poon-Ung<sup>4</sup>

<sup>1</sup>Dept. of Radiology, Wan Fang Hospital, Taipei Medical University, Dept. of Radiology, School of Medicine, College of Medicine, Taipei Medical University, <sup>2</sup>Dept. of Radiology, Wan Fang Hospital, Taipei Medical University, <sup>3</sup>Dept. of Computer Science and Information Engineering, National Taiwan University, <sup>4</sup>Dept. of Radiology, Taiwan Adventist Hospital, Taipei, Taiwan

**Objective:** For diagnosing osteoporosis, the ISCD official position on spine region of interest suggests that BMD based diagnostic classification should not be made using a single vertebra. The guidelines do not mention whether only a single vertebra is still effective in diagnosing osteoporosis or predicting vertebral compression fractures (VCFs). This study aims to compare the ISCD rule with single vertebra method in diagnosing osteoporosis or predicting VCFs.

**Methods:** We retrospectively evaluated 14285 consecutive cases (5236 men over aged 50 and 9049 postmenopausal women) with DXA exams at a single institution from 2007-2020; 2939 cases (female 2089) had more than two follow-up exams. Of these 2939, 385 patients (13.1%; 82 males, 303 females) had newly developed vertebral fractures in follow-up exams.

**Results:** The inconsistency between the two diagnostic methods was 17.3% ( $p < 0.001$ ). In baseline studies, 1270 patients (1071 females) with low bone mass were reclassified as osteoporosis. In follow-up examinations, there was significant difference between the ISCD rule and the single vertebra method in diagnosing osteoporosis ( $p < 0.001$ ). In 385 cases with VCFs, in men, there was more osteoporosis with use of the single vertebra method (26.8%) than that of the ISCD rule (8.5%); similar results were found in wom-



en (51.2% vs. 24.8%, respectively). These two methods offered different ability to distinguish with or without VCFs ( $p < 0.001$ ). In men, sensitivity in prediction of VCFs was 0.09 (ISCD rule) vs. 0.27 (single vertebra method), specificity 0.96 vs. 0.89, positive predictive value 0.18 vs. 0.21, and negative predictive value was 0.91 vs. 0.92, respectively; whereas in women, sensitivity were 0.25 (ISCD rule) vs. 0.51, specificity 0.90 vs. 0.71, positive predictive value 0.29 vs. 0.23, and negative predictive value was 0.88 vs. 0.90, respectively.

**Conclusion:** Single vertebra method offers simple rule in analysis spine BMD T-score and detects more osteoporosis than that of ISCD rule, thereby providing early intervention on osteoporosis management to patients and potentially reduce VCFs if these patients would have been treated in our cohort. Our findings demonstrate less specificity in predicting VCF, especially in females, using single vertebral method in our originally untreated non-osteoporotic population in Taiwan.

## P800

### TOLERANCE OF INJECTABLE BISPHOSPHONATES IN THE TREATMENT OF MALIGNANT OSTEOLYSIS

S. Miladi<sup>1</sup>, A. Fazaa<sup>1</sup>, L. Souebni<sup>1</sup>, W. Belhaj<sup>1</sup>, M. Sellami<sup>1</sup>, K. Ouennich<sup>1</sup>, S. Kassab<sup>1</sup>, S. Chekili<sup>1</sup>, K. Ben Abdelghani<sup>1</sup>, A. Laatar<sup>1</sup>

<sup>1</sup>Rheumatology Dept., Slim Hospital, Tunis, Tunisia

**Objective:** Injectable bisphosphonates (BP) have a great contribution in the treatment of malignant osteolysis. The aim of this work was to evaluate the short- and long-term tolerance of these drugs.

**Methods:** A retrospective study has been conducted over a 12-y period [2000-2012] at the rheumatology department of Mongi Slim Hospital. 57 patients followed for malignant osteolysis and treated with injectable BP were integrated into this study. Tolerance was judged by the occurrence of side effects.

**Results:** In the studied population, there were 16 women and 41 men with an average age of 64 y. 19 patients were followed for multiple myeloma while 38 patients were followed for bone metastasis. The most commonly used injectable BP was zoledronate: 45 patients were treated by zoledronate and 15 patients by pamidronate. In the pretherapy blood test, hypocalcemia was reported in 5 cases and renal failure in 7 cases. The stomatological examination was performed in half of the cases and did not disprove injected BP. The average number of cures per patient was 9. As immediate adverse effects, after the first infusion, flu-like syndrome appeared in 9 cases (3 on pamidronate and 6 on zoledronate) and febrile mental confusion in 1 case (zoledronate) which regressed spontaneously. Hypocalcemia (up to 1.57 mmol/L) has been reported in 14 cases (3 on pamidronate and 11 on zoledronate) and persisted in half of the cases. A decrease in creatinine clearance of 20 mL/min has been noted in one case and was not attributed to other treatment or disease activity. Anterior uveitis

has been diagnosed after the second cure of zoledronate in one patient. Bone side effects including osteonecrosis of the jaw (following the fourth cure of zoledronate) and pathological fractures have been reported in two patients. The average follow-up in our study was 13 months. The reason for stopping BP was its adverse effects in 4 cases and fatal progression of the underlying disease in 9 cases. Meanwhile, half of the patients were lost of sight.

**Conclusion:** BP seem to be well tolerated however our weak follow-up and the large number of patients lost of sight do not allow us to have definitive conclusions. A pretherapeutic assessment as well as a rigorous follow-up are necessary in order to improve the safety profile of these products.

## P801

### A NEW ELASTIC BAND STRENGTH TEST FOR CORE STABILITY MUSCLES IN PEOPLE WITH CHRONIC LOW BACK PAIN

F. Franco-Lopez<sup>1</sup>, M. D. M. Muñoz Gomez<sup>2</sup>, A. Buendía-Romero<sup>1</sup>, J. Diaz-Moron<sup>3</sup>, J. Courel-Ibáñez<sup>4</sup>

<sup>1</sup>Sport Science Faculty, Murcia University, Murcia, <sup>2</sup>Rheumatology Dept., Hospital Torrecárdenas, Almería, <sup>3</sup>QuironSalud Hospital, Murcia, <sup>4</sup>Physical Activity and Sports Dept., Sports Sciences Faculty, Murcia University, Murcia, Spain

**Objective:** To identify the test-retest reliability of a submaximal rowing strength test using elastic bands to evaluate the CORE stability muscles force in people with chronic low back pain who underwent or not a surgery process (arthrodesis and discectomy).

**Methods:** 18 people (age  $50 \pm 13$  y; weight  $81.8 \pm 11.2$  kg; 44.4% women) with chronic low back pain and unfamiliar with the test completed two testing sessions in two separate days (48-72 h between). Participants performed two unilateral elastic band exercises (Rowing and Palov's press) with dominant and non-dominant hands. Force (N) was monitored in real time using a portable sensor anchored to the wall. The test consisted of a 5-s unilateral sustained contraction. Participants increased the load progressively until moderate muscular failure was noticed (i.e., loss of  $>10$  N within the last 3 s). The best record was considered for the analysis. Reliability was examined by computing standard error of measurement (SEM), coefficient of variation (CV%) and intraclass correlation coefficient (ICC).

**Results:** The tests were highly reliable with low errors and high correlation coefficients, both with dominant hands (rowing: SEM=18.8 N, CV=12.0%, ICC > 0.901; Palov's press: SEM=12.9, CV=8.4%, ICC=0.960) and non-dominant hands (rowing: SEM=14.0 N, CV=8.8%, ICC=0.947; Palov's press: SEM=18.8, CV=12.2%, ICC=0.961). No discomfort or pain was reported during or after the tests.

**Conclusion:** A new, easy to implement and reliable test is provided to evaluate the strength of CORE stability muscles in people with low back pain using elastic bands. Coaches and practitioners may

benefit from this practical tool both to evaluate the strength and to design tailored exercise prescriptions for people with chronic low back pain who underwent or not a surgery process.

P802

### KNOWLEDGE, ATTITUDES AND PRACTICES OF POSTMENOPAUSAL WOMEN REGARDING VITAMIN D AND OSTEOPOROSIS

Y. Bastos-Silva<sup>1</sup>, A. O. Pedro<sup>1</sup>, L. Aguiar<sup>1</sup>, L. F. Baccaro<sup>1</sup>, L. H. Costa-Paiva<sup>1</sup>

<sup>1</sup>UNICAMP, Campinas, Brazil

**Objective:** Vitamin D has a direct influence on musculoskeletal health, and vitamin D deficiency is related to lower bone density and greater bone resorption and to a higher incidence of fractures. To assess knowledge, attitudes and practices regarding vitamin D and osteoporosis in postmenopausal women.

**Methods:** This was a cross-sectional study carried out with 260 postmenopausal women who underwent routine consultations at the menopause outpatient clinic of Campinas State University-São Paulo. Women aged 50 y or older with amenorrhea for at least 12 months were included. From an interview, sociodemographic information and health data were collected, and knowledge about vitamin D, habits related to vitamin D, and knowledge about osteoporosis were evaluated using the Facts on Osteoporosis Quiz (FOOQ) questionnaire.

**Results:** A total of 67.31% of women answered less than half of the questions about knowledge of vitamin D, 58.85% performed their day-to-day activities mostly outdoors, and 53.85% said they did not expose themselves sufficiently to the sun in their daily lives. The average knowledge score on the FOOQ was 15.83 ( $\pm 3.75$ ). The variables education level, number of correct FOOQ answers and total self-care score were associated with the highest score for knowledge of vitamin D.

**Conclusion:** Knowledge about vitamin D and osteoporosis in this group of postmenopausal women was limited. High levels of education, knowledge about osteoporosis and selfcare were factors associated with knowledge about vitamin D.

P803

### POTENTIAL ROLE OF RADIOFREQUENCY ECHOGRAPHIC MULTISPECTROMETRY TO ASSESS BONE STATUS IN WOMEN WITH LUMBAR SPINE OSTEOARTHRITIS

C. Caffarelli<sup>1</sup>, M. D. Tomai Pitinca<sup>1</sup>, A. Al Refaie<sup>1</sup>, M. De Vita<sup>1</sup>, S. Catapano<sup>1</sup>, F. Tramonte<sup>1</sup>, S. Gonnelli<sup>1</sup>

<sup>1</sup>Dept. of Medicine, Surgery and Neuroscience, University of Siena, Siena, Italy

**Objective:** BMD measured by DXA represents the gold standard for osteoporosis diagnosis. However, osteoarthritis lesions lead to an overestimation of spine BMD and explain part of the discrepancies in BMD results. Recently, an innovative echographic approach for osteoporosis diagnosis, defined as radiofrequency echographic multispectrometry (REMS), has been introduced and clinically validated. This new technology could represent an innovative diagnostic tool which seems to be able to investigate bone quality and to provide an estimation of fracture risk independently of BMD by the analysis of bone microarchitecture. This study aimed to evaluate whether the use of the REMS technique may improve the identification of osteoporosis in subjects with osteoarthritis at lumbar spine.

**Methods:** In a cohort of 110 consecutive postmenopausal ( $63.2 \pm 11.3$  y) women with lumbar osteoarthritis we measured BMD at the lumbar spine, at femoral neck and total hip using a DXA device; In all women, an echographic scan of the same anatomical sites was performed with the REMS technique was also carried out. The presence of lumbar osteoarthritis was evaluated on baseline radiographs by using Kellgren-Lawrence classification.

**Results:** The mean values of BMD at different skeletal sites, expressed as T-score, obtained by DXA and REMS technique showed that BMD T-score by REMS were significantly lower than those obtained by DXA technique both at lumbar spine ( $p < 0.01$ ) and at all femoral subregions ( $p < 0.05$ ). Moreover, the percentage of women classified as "osteoporotic", on the basis of BMD by REMS was markedly higher with respect to those classified by DXA (35.1% vs. 9.3%, respectively). On the contrary, the percentage of women classified as osteopenic or normal by DXA was higher with respect to that by REMS (67.4% and 23.3% vs. 60.4% and 4.5%, respectively).

**Conclusion:** Our study shows that lumbar spine osteoarthritis, a common finding in postmenopausal women, affects the results of spine BMD leading to its overestimation. REMS technology by the analysis of native raw unfiltered ultrasound signals appears to be able to recognize and overcome the most common artifacts, such as osteoarthritis, which affect the value of the BMD by DXA.

P804

**A SURROGATE FRAX MODEL FOR ETHIOPIA**H. Johansson<sup>1</sup>, S. Hailu<sup>2</sup>, E. Liu<sup>1</sup>, M. Lorentzon<sup>1</sup>, L. Vandenput<sup>1</sup>, N. C. Harvey<sup>3</sup>, E. V. McCloskey<sup>4</sup>, J. A. Kanis<sup>1</sup>

<sup>1</sup>Mary McKillop Institute for Health Research, Australian Catholic University, Melbourne, Australia, <sup>2</sup>Black Lion Specialized Hospital, Addis Ababa University, Addis Ababa, Ethiopia, <sup>3</sup>MRC Lifecourse Epidemiology Unit, University of Southampton, Southampton, UK, <sup>4</sup>Centre for Metabolic Bone Diseases, University of Sheffield, Sheffield, UK

**Objective:** FRAX models are frequently requested for countries with little or no data on the incidence of hip fracture. In such circumstances, the International Society for Clinical Densitometry and International Osteoporosis Foundation have recommended the development of a surrogate FRAX model, based on country-specific mortality data but using fracture data from a country, usually within the region, where fracture rates are considered to be representative of the index country. This abstract describes the development and characteristics of a surrogate FRAX model for Ethiopia.

**Methods:** The FRAX model used the ethnic-specific incidence of hip fracture in coloured men and women living in South Africa, combined with the death risk for Ethiopia.

**Results:** The surrogate model gave somewhat lower 10-y fracture probabilities for men and women at all older ages compared to the model for coloured from South Africa, reflecting a higher mortality risk in Ethiopia. There were very close correlations in fracture probabilities between the surrogate and authentic models ( $r \geq 0.998$ ) so that the use of the Ethiopia model had little impact on the rank order of risk. It was estimated that 10,862 hip fractures arose in 2015 in individuals over the age of 50 y in Ethiopia, with a predicted increase by almost 4 times to 41,962 in 2050.

**Conclusion:** The surrogate FRAX model for Ethiopia provides an opportunity to determine fracture probability within the Ethiopia population and help guide decisions about treatment.

P805

**SELF-CARE AGENCY AND ASSOCIATED FACTORS IN POSTMENOPAUSAL WOMEN**Y. Bastos-Silva<sup>1</sup>, L. H. Costa-Paiva<sup>1</sup>, A. O. Pedro<sup>1</sup>, L. Aguiar<sup>1</sup>, P. Pacello<sup>1</sup>, L. F. Baccaro<sup>1</sup>

<sup>1</sup>UNICAMP, Campinas, Brazil

**Objective:** The ageing process in women is marked by several changes, including the transition to menopause. The evaluation of self-care management is essential and has great relevance for

public health. The aim of the present study was to evaluate self-care management and associated factors in postmenopausal women.

**Methods:** This study was a cross-sectional study performed with 260 postmenopausal women who attended routine consultations at the Menopause Outpatient Clinic of the Hospital of the State University of Campinas-SP. Women aged 50 years or older with amenorrhea for at least 12 months were included. The women were interviewed by a researcher during the routine consultation, and the self-care agency assessment was performed using the Appraisal of Self-Care Agency Scale-Revised (ASAS-R) questionnaire.

**Results:** The average total self-care score for the women in this study was 62.27 ( $\pm 9.64$ ). Higher ASAS-R scores were associated with performing outdoor activities, better self-perceived health, and a higher score on knowledge about vitamin D. Active smoking was associated with a lower self-care score.

**Conclusion:** We observed that the self-care management of postmenopausal women was satisfactory and was associated with lifestyle, self-perceived health, and knowledge about vitamin D.

P806

**RADIOFREQUENCY ECHOGRAPHIC MULTISPECTROMETRY AS A NONINVASIVE AND COMPLEMENTARY TOOL FOR OSTEOPOROSIS DIAGNOSIS IN ELDERLY WOMEN WITH TYPE 2 DIABETES**M. D. Tomai Pitinca<sup>1</sup>, C. Caffarelli<sup>1</sup>, A. Al Refaie<sup>1</sup>, M. De Vita<sup>1</sup>, S. Catapano<sup>1</sup>, F. Tramonte<sup>1</sup>, S. Gonnelli<sup>1</sup>

<sup>1</sup>Dept. of Medicine, Surgery and Neuroscience, University of Siena, Siena, Italy

**Objective:** Patients with diabetes mellitus (T2DM) present higher BMD values from DXA compared with nondiabetic subjects. This paradox could be explained by the fact that BMD, even if it represents a major determinant of bone strength, does not take into account other factors which influence bone strength. Recently, an innovative echographic approach for osteoporosis diagnosis, defined as radiofrequency echographic multispectrometry (REMS), has been introduced and clinically validated. This study aimed to evaluate whether the use of the REMS technique may improve the identification of osteoporosis in T2DM patients.

**Methods:** In a cohort of 90 consecutive postmenopausal elderly (70.5 $\pm$ 7.6 y) women with T2DM and in 90 healthy age-matched controls we measured BMD at the lumbar spine (LS-BMD), at femoral neck (FN-BMD) and total hip (TH-BMD) using a DXA device; In all women, an echographic scan of the same anatomical sites was performed with the REMS technique.

**Results:** DXA measurements were all higher in T2DM than in non-T2DM women; instead, all REMS measurements were lower in T2DM than in non-T2DM women. Moreover, the percentage of

T2DM women classified as “osteoporotic”, on the basis of BMD by REMS was markedly higher with respect to those classified by DXA (47.0% vs. 28.0%, respectively). On the contrary, the percentage of T2DM women classified as osteopenic or normal by DXA was higher with respect to that by REMS (48.8% and 23.2% vs. 38.6% and 14.5%, respectively). T2DM women with fragility fractures presented lower values of both BMD-LS by DXA and BMD-LS by REMS with respect to those without fractures; however, the difference was significant only for BMD-LS by REMS ( $p < 0.05$ ).

**Conclusion:** BMD by DXA values, as expected, were higher in women with T2DM than in controls, whereas REMS-estimated BMD values were lower in women with T2DM than in controls. Therefore, our data suggest that REMS-estimated BMD could be a good diagnostic tool in demonstrating the diabetes-associated bone disease and that REMS technology may represent a useful approach to enhance the diagnosis of osteoporosis in patients with T2DM.



**Fig. 1.** Radiograph of left knee showing ankylosis secondary to bone bridges

P807

### FIBRODYSPLASIA OSSIFICANS PROGRESSIVA: CASE REPORT OF A TERMINAL PATIENT

M. D. M. Munoz-Gomez<sup>1</sup>

<sup>1</sup>Rheumatology Dept., Hospital Torrecárdenas, Almería, Almería, Spain

The patient was a 29-year-old woman, with a history of type 1A diabetes and primary amenorrhea secondary to cervical agenesis. At the age of 10 y, she was examined because she had developed a tumor in the cervical region, with no previous injury; she underwent a radiological study and bone biopsy that was compatible with myositis ossificans. Over the years, large ectopic ossifications developed in her shoulders, hips, knees, ankles and paravertebral muscles, which produced a marked secondary thoracolumbar scoliosis and a considerably generalized functional limitation. A plain radiology study of the affected areas showed the existence of exuberant bone bridges at different stages of maturation, that provoked the locking and ankylosing of a number of joints, including a knee (Fig. 1), the spine and a shoulder. The patient was treated with bisphosphonates and calcium supplements with vitamin D for 5 y, while she was also being followed by the rehabilitation service; however, none of these measures was capable of arresting the course of the disease, which led to the physical disability of the patient.

Fibrodysplasia ossificans progressiva is a rare disease of unknown origin that is characterized by a progressive heterotopic ossification of the muscles and other structures in which connective tissue is abundant<sup>1</sup>. In recent years, there has been an advance in our knowledge of the etiological and pathogenic mechanisms of this disorder, which implicates the receptor of bone morphogenetic protein (BMP), the so called activin A type I receptor/activin-like kinase 2 (AVCR1/ALK2)<sup>2,3</sup>. Some authors have suggested that blocking the activity of the AVCR1/ALK2 receptor through the development of therapeutic agents that behave like signal transduction inhibitors that encode these proteins may be useful<sup>4</sup>. In this respect, we know that dorsomorphin, a small molecule produced by the zebrafish, inhibits BMP type I receptors (including ALK2—implicated in the etiology and pathogenesis of the disease—and other activin-like kinases like ALK3 and ALK6)<sup>5</sup>; however, given the lack of specificity of this molecule, further studies are needed in this line of research, as well as the development of in vivo models to determine the potential efficacy of this molecule in the prevention of the flares of ossification that occur in this serious disease.

#### References:

1. Connor JM, et al. J Med Genet 1982;19:35.
2. Kaplan FS, et al. Hum Mutat 2009;30:379.
3. Morales-Piga A, et al. Reumatol Clin 2014;10:389.
4. Pignolo RJ, et al. Pediatr Endocrinol Rev 2013;10(Suppl 2):437.
5. Yu PB, et al. Nat Chem Biol 2008;4:3.



P808

**A SURROGATE FRAX MODEL IN ZIMBABWE**

H. Johansson<sup>1,2</sup>, E. Liu<sup>1</sup>, M. Lorentzon<sup>1,2</sup>, L. Vandenput<sup>1,2</sup>, N. C. Harvey<sup>3</sup>, E. V. McCloskey<sup>4</sup>, F. Paruk<sup>5</sup>, R. Ferrand<sup>6,10</sup>, C. Ndhlovu<sup>7</sup>, S. Dela<sup>8</sup>, C. Gregson<sup>9</sup>, B. Cassim<sup>5</sup>, J. A. Kanis<sup>1,4</sup>

<sup>1</sup>Mary McKillop Institute for Health Research, Australian Catholic University, Melbourne, Australia, <sup>2</sup>Sahlgrenska Osteoporosis Center, Institute of Medicine, University of Gothenburg, Göteborg, Sweden, <sup>3</sup>MRC Lifecourse Epidemiology Unit, University of Southampton, Southampton, UK, <sup>4</sup>Centre for Metabolic Bone Diseases, University of Sheffield, Sheffield, UK, <sup>5</sup>College of Health Sciences, University of KwaZulu-Natal, Durban, South Africa, <sup>6</sup>Biomedical Research and Training Institute, Harare, Zimbabwe, <sup>7</sup>Internal Medicine Unit, University of Zimbabwe Faculty of Medicine and Health Sciences, Harare, Zimbabwe, <sup>8</sup>Dept. of Internal Medicine, Edendale Hospital, School of Clinical Medicine (SCM), University of KwaZulu-Natal, Durban, South Africa, <sup>9</sup>Musculoskeletal Research Unit, Bristol Medical School, University of Bristol, Bristol, UK, <sup>10</sup>London School of Hygiene and Tropical Medicine, London, UK

**Objective:** FRAX models are frequently requested for countries with little or no data on the incidence of hip fracture. In such circumstances, the International Society for Clinical Densitometry and International Osteoporosis Foundation have recommended the development of a surrogate FRAX model, based on country-specific mortality data but using fracture data from a country, usually within the region, where fracture rates are considered to be representative of the index country. This abstract describes the development and characteristics of a surrogate FRAX model for Zimbabwe.

**Methods:** The FRAX model used the ethnic-specific incidence of hip fracture in Black men and women living in South Africa, combined with the death risk for Zimbabwe in 2015-2019. The number of hip fractures in 2015 and 2050 were estimated based on United Nations predicted changes in population demography.

**Results:** The surrogate FRAX model gave somewhat lower 10-year fracture probabilities for men and women at all older ages compared to the model for Black men and women in South Africa, reflecting the competing higher mortality risk in Zimbabwe. There were very close correlations in fracture probabilities between the surrogate Zimbabwean and the Black South African models ( $r \geq 0.998$ ) so that the use of the Zimbabwe model had little impact on the rank order of risk, i.e., a person at the  $x^{\text{th}}$  percentile of risk with one model will be at the  $x^{\text{th}}$  percentile of risk with the other. It was estimated that 1023 hip fractures arose in 2015 in individuals age 50 years and older in Zimbabwe, with a predicted 3.8-fold increase expected by 2050, when 3900 hip fractures are expected nationally.

**Conclusion:** The surrogate FRAX model for Zimbabwe (<https://www.sheffield.ac.uk/FRAX/tool.aspx?country=81>) provides an opportunity to determine fracture probability within the Zimba-

bwean population and help guide decisions about treatment. Research is underway to derive novel Zimbabwean hip fracture incidence data with which to refine this FRAX model.

P809

**BONE VESSEL RELATIONSHIPS: ASSOCIATION BETWEEN CALCIFICATIONS OF THE ILIAC ARTERIES WITH VERTEBRAL FRACTURES IN HEMODIALYSIS PATIENTS - RESULTS FROM THE VIKI STUDY**

M. Fusaro<sup>1</sup>, C. Politi<sup>2</sup>, A. Aghi<sup>3</sup>, F. Taddei<sup>4</sup>, E. Schileo<sup>4</sup>, T. L. Nickolas<sup>5</sup>, P. Khairallah<sup>5</sup>, M. L. Brandi<sup>6</sup>, S. L. Ferrari<sup>7</sup>, M. C. Mereu<sup>8</sup>, G. Tripepi<sup>2</sup>, R. De Caterina<sup>9</sup>

<sup>1</sup>National Research Council (CNR) – Institute of Clinical Physiology (IFC), Pisa, Italy, <sup>2</sup>CNR-IFC, Clinical Epidemiology of Renal Diseases and Hypertension, Ospedali Riuniti, Reggio Calabria, Italy, <sup>3</sup>Dept. of Medicine, Clinica Medica 1, University of Padua, Padova, Italy, <sup>4</sup>Bioengineering and Computing Laboratory, IRCCS Istituto Ortopedico Rizzoli, Bologna, Italy, <sup>5</sup>Division of Nephrology, Dept. of Medicine, Columbia University Irving Medical Center, New York, USA, <sup>6</sup>Dept. of Surgery and Translational Medicine, University of Florence, Florence, Italy, <sup>7</sup>Service des Maladies Osseuses, Département de Médecine, HUG, Genève, Switzerland, <sup>8</sup>Independent Research, Cagliari, Italy, <sup>9</sup>Chair of Cardiology, Cardiovascular Division, Pisa University Hospital, University of Pisa, Pisa, Italy

**Objective:** Vascular calcification and fragility fractures are common age-related disorders and associated with high morbidity and mortality especially in endstage renal disease. Skeletal disorders occur in dialysis patients. Few studies have provided data on the prevalence of vertebral fractures (VFs) and their association with large artery calcifications. We evaluated the relationship of iliac arteries calcifications (IACs) and abdominal aorta calcifications (AACs) with the risk for VFs in hemodialysis (HD) patients.

**Methods:** The VIKI Study is a cross-sectional study involving 387 HD patients from 18 Italian dialysis centers. Biochemical data included bone health markers such as vitamin K levels, vitamin 25(OH)D, alkaline phosphatase, PTH, calcium, phosphate, osteocalcin and Matrix Gla Protein. The presence of VF, IACs and AACs were determined through standardized spine lateral radiographs. A >20% reduction of vertebral body height was considered a VF. We quantified vascular calcifications by measuring the length of calcium deposits along the arteries classifying the degree of severity for the IACs and AACs with a specific score (mild: 0.1–3 cm; moderate: 3.1–5 cm; and severe >5 cm) previously validated for AACs.

**Results:** The prevalence of IACs was 56.1%, and of AACs 80.6%. After adjusting for confounding variables, the presence of IACs was associated with 73% higher odds of VF ( $p=0.028$ ), whereas we found no association ( $p=0.294$ ) for AACs. The presence of IACs associated with VF irrespective of calcification severity.

Patients with IACs had lower levels of the vitamin K2, menaquinone 7 (MK7) (0.99 vs. 1.15 ng/ml;  $p=0.003$ ), and deficiency of this marker became greater when adjusting for triglyceride levels (0.57 vs. 0.87 ng/ml;  $p<0.001$ ).

**Conclusion:** The presence of IACs, regardless of their extent, appears to be a clinically relevant risk factor for VFs. The association is further enhanced by including vitamin K, a main player in bone and vascular health, in the model. Prospective studies are needed to confirm these findings both in chronic kidney disease patients and in the general population.

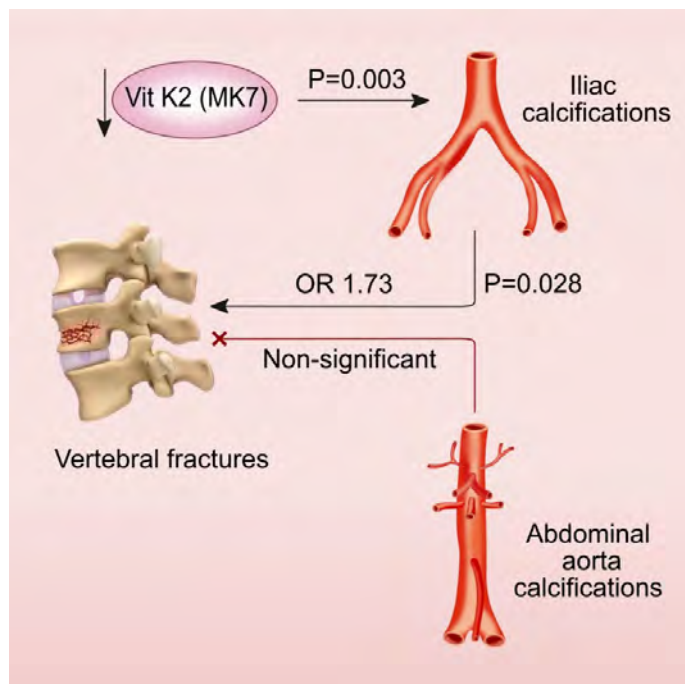


Figure. Graphical representation of the main results of our study

P810

### WHAT TO DO AFTER REBOUND-ASSOCIATED VERTEBRAL FRACTURES FOLLOWING DENOSUMAB DISCONTINUATION? A REAL LIFE STUDY

C. Pelegrin<sup>1</sup>, V. Farías<sup>1</sup>, F. Jercovich<sup>1</sup>, M. B. Zanchetta<sup>1</sup>

<sup>1</sup>IDIM Institution, Buenos Aires, Argentina

**Objective:** To investigate BMD and bone turnover markers (BTM) changes after restarting osteoporosis treatment with denosumab (Dmab), zoledronate or teriparatide, in postmenopausal women who had sustained rebound-associated vertebral fractures (RAVFs) following Dmab discontinuation.

**Methods:** We performed a retrospective observational study. We examined lumbar spine (LS), femoral neck (FN) and total hip (TH) DXA scans (Lunar Prodigy Advance, software 13.6) and assessed C-telopeptide (CTX) (normal value 74-550 pg/mL) and osteocalcin (BGP) (normal value 11-43 ng/mL), at the time of the reinstitution treatment (RT) and after one year of follow-up.

**Results:** We included nine women (mean age 66 y, range 52-84) that came to our center after RAVFs occurrence. The duration of Dmab treatment before the RAVFs was 24 months (range 11-77). 78% had received bisphosphonates before Dmab and 33% had suffered prevalent vertebral fractures. Median number of RAVFs was 2 (range 1-5). None of them had received bisphosphonates after stopping Dmab. After one year of the RT with Dmab ( $n=4$ ), teriparatide ( $n=3$ ) and zoledronate ( $n=2$ ) there were no significant gain or loss in any of the DXA regions. Figure shows the 12-month percentage changes from BMD RT according to the different treatment used. CTx and BGP levels significantly decreased with Dmab ( $p=0.030$  and  $p=0.002$ , respectively) and did not show a significant change with zoledronate or teriparatide. However, we observed an increasing trend in CTx and BGP levels with teriparatide (CTX +117.6%,  $p=0.524$ ) (BGP +186.9%,  $p=0.443$ ). No patient suffered additional vertebral fractures.

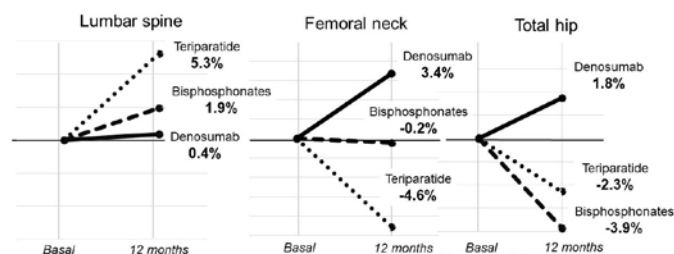


Figure. 12-month % of changes from BMD baseline according to reinstitution treatment.

**Conclusion:** In this group of patients with RAVFs after Dmab discontinuation there were no significant changes with all treatment regimens after 1 y and BTM significantly decreased with Dmab. However, we observed tendencies and probably in the future we will be able to provide additional information on the BMD and BTM behavior after RAVFs using different treatment regimens. It is important to note that no patient suffered additional fractures. Nevertheless, the sample is small and larger studies are needed to reach stronger conclusions regarding what treatment to use after RAVFs.

P811

**FRAX BASED INTERVENTION THRESHOLDS FOR PAKISTAN**

H. Johansson<sup>1</sup>, G. Naureen<sup>2</sup>, R. Iqbal<sup>3</sup>, L. Jafri<sup>4</sup>, A. Khan<sup>4</sup>, M. Umer<sup>5</sup>, E. Liu<sup>1</sup>, L. Vandenput<sup>1</sup>, M. Lorentzon<sup>1</sup>, E. V. McCloskey<sup>6</sup>, J. A. Kanis<sup>1</sup>, N. C. Harvey<sup>7</sup>

<sup>1</sup>Mary McKillop Institute for Health Research, Australian Catholic University, Melbourne, Australia, <sup>2</sup>Faculty of Medicine, Dentistry and Health Sciences, University of Melbourne, Melbourne, Australia, <sup>3</sup>Depts of Community Health Sciences and Medicine, Aga Khan University, Karachi, Pakistan, <sup>4</sup>Dept. of Pathology & Laboratory Medicine, Aga Khan University, Karachi, Pakistan, <sup>5</sup>Dept. of Orthopaedics, Aga Khan University, Karachi, Pakistan, <sup>6</sup>Centre for Metabolic Bone Diseases, University of Sheffield, Sheffield, UK, <sup>7</sup>MRC Lifecourse Epidemiology Unit, University of Southampton, Southampton, UK

**Objective:** The fracture risk assessment algorithm FRAX® has been recently calibrated for Pakistan, but guidance is needed to apply fracture probabilities to clinical practice.

**Methods:** The age-specific ten-year probabilities of a major osteoporotic fracture were calculated in women with average BMI (25 kg/m<sup>2</sup>) to determine fracture probabilities at two potential intervention thresholds. The first comprised the age-specific fracture probabilities associated with a femoral neck T-score of -2.5 SD. The second approach determined age-specific fracture probabilities equivalent to a woman with a prior fragility fracture without BMD. The parsimonious use of BMD was additionally explored by the computation of upper and lower assessment thresholds for BMD testing.

**Results:** When a BMD T-score  $\leq -2.5$  SD was used as an intervention threshold, FRAX probabilities in women aged 50 y were approximately 2-fold higher than in women of the same age but with an average BMI and no risk factors. The relative increase in risk associated with the BMD threshold decreased progressively with age such that, at the age of 80 y or more, a T-score of -2.5 SD was actually protective. The 10-y probability of a major osteoporotic fracture by age, equivalent to women with a previous fracture, rose with age from 2.1% at the age of 40 y to 17%, at the age of 90, and identified women at increased risk at all ages.

**Conclusion:** Intervention thresholds based on BMD alone do not effectively target women at high fracture risk, particularly in the elderly. In contrast, intervention thresholds based on fracture probabilities equivalent to a 'fracture threshold' target women at high fracture risk.

P812

**A SURROGATE FRAX MODEL FOR NEPAL**

H. Johansson<sup>1</sup>, D. Pandey<sup>2</sup>, E. Liu<sup>1</sup>, M. Lorentzon<sup>1</sup>, L. Vandenput<sup>1</sup>, N. C. Harvey<sup>3</sup>, E. V. McCloskey<sup>4</sup>, J. A. Kanis<sup>1</sup>

<sup>1</sup>Mary McKillop Institute for Health Research, Australian Catholic University, Melbourne, Australia, <sup>2</sup>National Trauma Centre in Kathmandu, Kathmandu, Nepal, <sup>3</sup>MRC Lifecourse Epidemiology Unit, University of Southampton, Southampton, UK, <sup>4</sup>Centre for Metabolic Bone Diseases, University of Sheffield, Sheffield, UK

**Objective:** FRAX models are frequently requested for countries with little or no data on the incidence of hip fracture. In such circumstances, the International Society for Clinical Densitometry and International Osteoporosis Foundation have recommended the development of a surrogate FRAX model, based on country-specific mortality data but using fracture data from a country, usually within the region, where fracture rates are considered to be representative of the index country. This abstract describes the development and characteristics of a surrogate FRAX model for Nepal.

**Methods:** The FRAX model used the ethnic-specific incidence of hip fracture in Indian men and women living in Singapore, combined with the death risk for Nepal (UN, 2015-2019).

**Results:** The surrogate model gave somewhat lower 10-y fracture probabilities for men and women at all older ages compared to the model for coloured from Singapore Indians, reflecting a higher mortality risk in Nepal. The surrogate model for Nepal was similar to the Indian surrogate model using the same fracture risk. There were very close correlations in fracture probabilities between the surrogate and authentic models, so that the use of the Nepal model had little impact on the rank order of risk. It was estimated that 6711 hip fractures arose in 2015 in individuals over the age of 50 y in Nepal, with a predicted increase by more than 3 times to 22,768 in 2050.

**Conclusion:** The surrogate FRAX model for Nepal provides an opportunity to determine fracture probability within the Nepal population and help guide decisions about treatment.

P813

### EPIDEMIOLOGY OF HIP FRACTURES IN SAUDI ARABIA: DEVELOPMENT OF A COUNTRY SPECIFIC FRAX MODEL

H. Johansson<sup>1</sup>, Y. Saleh<sup>2</sup>, E. Liu<sup>1</sup>, M. Lorentzon<sup>1</sup>, L. Vandenput<sup>1</sup>, N. C. Harvey<sup>3</sup>, E. V. McCloskey<sup>4</sup>, J. A. Kanis<sup>1</sup>

<sup>1</sup>Mary McKillop Institute for Health Research, Australian Catholic University, Melbourne, Australia, <sup>2</sup>King Saud University for Health Sciences, Saudi Osteoporosis Society, Riyadh, Saudi Arabia, <sup>3</sup>MRC Lifecourse Epidemiology Unit, University of Southampton, Southampton, UK, <sup>4</sup>Centre for Metabolic Bone Diseases, University of Sheffield, Sheffield, UK

**Objective:** To describe the epidemiology of hip fractures in Saudi Arabia, which was then used to develop the country-specific fracture prediction FRAX<sup>®</sup> tool.

**Methods:** Hip fractures (ICD 10: S72.0, S72.1, S72.2) were identified occurring in years 2017 and 2018 in representative hospitals from various regions (Riyadh, Dammam, Makkah Al Mokaramah, Jazan, Al-Jouf, Al-Baha, Tabouk, Najran and Hail). A total of 15 hospitals that admit and operate on patients with hip fractures were selected, representing approximately 12.8% of the country's population. Age- and sex-specific incidence of hip fracture and national mortality rates were incorporated into a FRAX model for Saudi Arabia. Fracture probabilities were compared with those from neighbouring countries having FRAX models.

**Results:** The incidence of hip fracture applied nationally suggested that the estimated number of hip fractures nationwide in persons over the age of 50 y for 2015 was 2949 and is predicted to increase to 20,328 in 2050. Hip fracture rates were comparable with estimates from Abu Dhabi and Kuwait. By contrast, probabilities of a major osteoporotic fracture or hip fracture from the age of 70 y were much lower than those seen in Abu Dhabi and Kuwait due to higher mortality estimates for Saudi Arabia. The remaining lifetime probability of a hip fracture from the age of 50 y was 4.6% in women and 3.7% in men. These probabilities were lower than those in Abu Dhabi (8.9 and 8.1%, respectively).

**Conclusion:** The FRAX model should enhance accuracy of determining fracture probability among the Saudi Arabian population and help guide decisions about treatment.

P814

### ASSESSMENT OF FRACTURE RISK TOOLS IN CARE HOME RESIDENTS: A MULTICENTRE OBSERVATIONAL PILOT STUDY

E. Ihama<sup>1</sup>, A. Pandyan<sup>2</sup>, C. Roffe<sup>2</sup>

<sup>1</sup>Pilgrim Hospital, Boston, <sup>2</sup>Keele University, Keele, UK

**Objective:** Fragility fractures are common in care home residents but established tools have not been tested in this population. Aim: To identify the most practicable tool for use.

**Methods:** Design: Multicentre prospective observational cohort pilot study. Setting: 18 care homes in Boston, UK. Assessments: Frailty risk score at baseline with FRAX, QFractureScore, Garvan nomogram, BMI and TUGT for each participant. Outcomes: falls, fractures, combined falls & fractures. Follow-up; 12 months.

**Results:** 217/618 (35%) residents in the 18 care homes were enrolled. 147 (68%) had mental capacity, 70 (32%) did not. There were 325 falls and 10 fractures in participants during the study. At the same time there were 1671 falls and 103 fractures in residents not participating in the study. Multiple regression analyses showed that only age had a statistically significant association with falls ( $\chi^2(1)=5.7775$ ,  $p=0.0162$ ), fractures ( $\chi^2(1)=4.7269$ ,  $p=0.0297$ ) and combined falls & fractures ( $\chi^2(1)=4.7269$ ,  $p=0.0297$ ). C-statistics were: falls; FRAX 0.544, BMI 0.610, QFractureScore 0.554, Garvan nomogram 0.579, TUGT 0.656, fractures; FRAX 0.655, BMI 0.708, QFractureScore 0.736, Garvan nomogram 0.712, TUGT 0.590, combined falls and fractures, c-statistics were same as for fractures. Fifty-four participants (25%) died during follow-up. Charlson comorbidity index predicted mortality,  $R^2=0.021$  ( $p=0.034$ ).

**Conclusions:** QFractureScore, BMI and Garvan nomogram were good predictors of fractures and combined falls and fractures, Of these BMI is the easiest to use and therefore most suitable for this population. Only age had statistically significant association with the outcomes. Thus using BMI, age and CCI, an algorithm was designed for frailty risk assessment for care home residents

**Disclosure:** This study was for a Doctor of Medicine degree at Keele University. It was privately funded.



P815

# FROM OSTEOPENIA TO OSTEOPOROSIS DURING COVID-19 PANDEMIC LOCKDOWN

A. Ghemigian<sup>1</sup>, N. Dumitru<sup>1</sup>, G. Voicu<sup>2</sup>, E. Petrova<sup>1</sup>, M. Popescu<sup>3</sup>

<sup>1</sup>C.I. Parhon National Institute of Endocrinology & C. Davila University of Medicine & Pharmacy, Bucharest, <sup>2</sup>C.I. Parhon National Institute of Endocrinology, Bucharest, <sup>3</sup>University of Medicine and Pharmacy Craiova, Craiova, Romania

**Objective:** COVID-19 pandemic and associated rules including lockdown periods of time associate limited physical activity which otherwise is boost of bone formation, increased risk of sarcopenia and developing vitamin D deficiency, as well as depression requiring medication. Any of these or together might increase the risk of osteoporotic fracture (1-5). We aim to present the aggravation of bone profile after first 15 months since pandemic emerged.

**Case report:** This is a 59-year-old, nonsmoker, menopausal female, who was admitted for non-specific bone and joints pain since last months, also associating persistent lumbar pain. She associated treated hypothyroidism of post-thyroidectomy type (for a benign multinodular goiter), controlled arterial hypertension, hyperlipemia. Prepandemic bone assays showed a 25-hydroxyvitamin D of 27 ng/mL (she started vitamin D supplementation with 1000 UI/d of cholecalciferol), normal PTH and bone turnover markers, normal profile X-Ray (screening) of the thoracic-lumbar spine; central DXA (GE Lunar Prodigy device) showed L1-4 BMD of 0.953 g/cm<sup>2</sup>, T-score of -2.3SD, Z-score of -1.1SD, neck BMD of 0.796 g/cm<sup>2</sup>, T-score of -1.7 SD, Z-score of -0.7 SD, total hip BMD of 0.951g/cm<sup>2</sup>, T-score of -0.4SD, Z-score of 0.2 SD. Current evaluation, after limited physical activity and lockdown periods, she showed normal serum calcium, high CrossLaps of 0.75 ng/mL, normal osteocalcin of 31 ng/mL, high P1NP of 91 pg/mL (normal:15-65 pg/mL), and PTH of 31 pg/mL, 25OHD of 32 ng/mL (under supplements), normal TSH under daily 50 µg of levothyroxine. The profile X Ray of the spine showed a new T4 vertebral fracture while DXA-BMD at L1-4 decreased to 0.814 g/cm<sup>2</sup>, with a T-score of -3 SD, Z-score of -1.9 SD, neck BMD of 0.745 g/cm<sup>2</sup>, T-score of -2.3 SD. In the meantime, she was diagnosed with depression and started therapy with SSRIs. She also needed several stomatological interventions, thus daily 20 µg of teriparatide was recommended in addition to vitamin D 1000UI/d.

**Conclusion:** This aspect of real life medicine during pandemic is an argument for serial checking the bone status after first year of pandemic even in patients who were not at high fracture risk.

## References:

1. Poiana C, et al. Maturitas 2009;62:98.
2. Bechir ES, et al. Revista de Chimie 2018;70:3176.
3. Radu L, et al. Revista de Chimie 2018;69:3483.
4. Poiana C, et al. Bone Res 2013;1:275.
5. Sandru F, et al. Exp Ther Med 2020;20:3389.

P816

# BMD ACCURACY ERRORS IN PHANTOMLESS CALIBRATION OF CT SCANS: A SIMULATION STUDY

S. Bartenschlager<sup>1</sup>, O. Chaudry<sup>1</sup>, P. Dankerl<sup>2</sup>, M. Uder<sup>2</sup>, K. Engelke<sup>1</sup>

<sup>1</sup>Institute of Medical Physics, <sup>2</sup>Dept. of Radiology, University Hospital Erlangen, Erlangen, Germany

**Objective:** For opportunistic screening, internal calibration is one option to convert measured CT values to BMD. CT values of two internal calibration materials (ICM) must be determined. In this study, we simulated the impact of accuracy errors of the measured CT values of selected ICMs on BMD.

**Methods:** Simulations used the base-material decomposition approach to obtain BMD of bone-equivalent hydroxyapatite (HA) from combinations of two ICMs, namely subcutaneous adipose tissue (SAT)/blood, SAT/skeletal muscle (SM) and SAT/SM including 20% fat. Errors in measured CT values were assumed to originate from an inaccurate water calibration of the CT scanner or an impact of plaques on blood, edema on SAT and unknown fat content on SM. Realistic CT accuracy errors were estimated from a cohort of 121 elderly women (age 71.5 ± 5.2 y) and were used by the simulation to calculate the resulting percentage BMD accuracy errors.

**Results:** It was assumed that the ICM CT value distribution arises from a convolution of the true population variance with CT variations due to scanner instabilities characterized by the CT value distribution of air. Then the population variance  $\sigma_{pop}$  can be obtained from a deconvolution of the measured CT value distribution of a given ICM with the distribution of air (Table (top)). Lowest BMD errors  $\Delta BMD_{HA}$  were obtained for the combinations SAT/blood or SAT/SM, whereas an increased fat content in muscle also increases the BMD error (Table (bottom)). There was no impact of the water miscalibration.

**Conclusion:** The use of SM as ICM may result in larger BMD errors due to unknown fat content. The combination blood/SAT produced the lowest BMD accuracy errors. The important effect of contrast agents and longitudinal precision errors on internal calibration still needs to be evaluated.

Table. The population dependent standard deviation obtained by deconvolution (top) was used in the simulation as input for the accuracy error of the ICM CT value, yielding the percentage BMD error when using different ICM combinations for internal calibration (bottom).

	SAT	Blood	SM
$\sigma_{\text{pop}}$ [HU]	3.09	1.70	6.75

	Blood/SAT	SM/SAT	Fatty SM/SAT
$\Delta\text{BMD}_{\text{HA}}$ [%] with $\sigma_{\text{pop}}$	6.94	14.22	18.18

P817

### ARE LOCAL POPULATION CHARACTERISTICS RELATED TO ANTIOSTEOPOROSIS MEDICATION (AOM) DISPENSED IN ENGLAND? AN ECOLOGICAL STUDY

S. S. Janjua<sup>1</sup>, A. Sami<sup>2</sup>, H. Boardman<sup>1</sup>, L. S. Toh<sup>1</sup>, M. K. Javaid<sup>2</sup>

<sup>1</sup>Division of Pharmacy Practice and Policy, School of Pharmacy, University of Nottingham, Nottingham, <sup>2</sup>Nuffield Dept. of Orthopaedics, Rheumatology and Musculoskeletal Sciences, Botnar Research Centre, University of Oxford, Oxford, UK

**Objective:** Determine whether population characteristics of Clinical Commissioning Group (CCG) areas are associated with prevalence of AOM dispensed via community pharmacies in England.

**Methods:** This ecological study used the Open Prescribing database, to analyse items of AOM dispensed via community pharmacies in England in 2019. CCG areas were mapped to Health Authority (HA) areas by population numbers from the Office for National Statistics. Characteristics of the local HA population which coincided with a CCG area were analysed to explore association with rate of AOM/1000 people aged over 65 y. CCG and HA areas with population and geographical discrepancies were excluded. Linear regression analysis of population characteristics was carried out to see if they were individually related to rate of AOM/1000 people aged over 65 y. This was followed by entry of population characteristics into a multilinear regression model. Outliers were identified, removed and the multilinear regression model repeated.

**Results:** 94 CCGs were included in the analysis. Linear regression analysis showed percentage of population aged over 65 y, Male Healthy Life Expectance (MHLE), Female Healthy Life Expectancy (FHLE), percentage Smoked, percentage Active adults and Alcohol related Hospital admissions/100,000 for a CCG area were all significantly associated ( $p < 0.05$ ) with the rate of AOM/1000 people aged over 65 y. Multilinear regression ( $n=94$ ) was conducted, outliers identified and removed and the multilinear regression model repeated for 85 CCG areas. B values of -0.256 (percentage

population over 65 y), 0.286 (MHLE), -0.228 (FHLE), -0.021 (percent smoked), -0.71 (percent Active adults) and 0.386 (Alcohol related Hospital admissions/100,000) were obtained. Percentage population aged over 65 y and Alcohol related Hospital admissions/100,000 were significant predictors of rate of AOM/1000 population aged over 65 y ( $P \leq 0.05$ ).

**Conclusion:** In England, the rate of AOM/1000 population aged over 65 years is significantly associated with the percentage of people over 65 y and rate of Alcohol related hospital admissions/100,000 for a CCG area ( $n=85$ ). Population characteristics of MHLE, FHLE, percentage people who Smoke, and percent Active adults are also associated, although not significantly ( $p \geq 0.05$ ).

P818

### CORRELATION BETWEEN FREE RADICALS AND REACTIVE OXYGEN SPECIES (ROS)

R. Amir<sup>1</sup>

<sup>1</sup>Centre de Santé des Fagnes Chimay, Chimay, Belgium

**Objective:** A free radical is an atom or group of atoms that have one or more unpaired electrons. Radicals can have positive, negative or neutral charge. A prominent feature of radicals is that they have extremely high chemical reactivity, which explains not only their normal biological activities, but how they inflict damage on cells.

**Methods:** Persistent oxidative stress is one of the major causes of most lifestyle-related diseases, cancer and the aging process (1-2). Oxidative stress arises from the strong cellular oxidizing potential of excess ROS (3). There are many types of radicals, but those of most concern in biological systems are derived from oxygen, and known collectively as ROS. Many antioxidant supplements could not prevent cancer, myocardial infarction and atherosclerosis, but rather conversely increase mortality (4-5).

**Results:** It is well known that it is important to be aware of side effects when developing an effective antioxidant for the prevention of oxidative stress-related diseases. ROS are generated inside the body throughout our daily lives, such as during hard exercise, smoking, exposure to ultraviolet rays or air pollution, aging, physical or psychological stress (6-7). Inside every aerobic organism, ROS are generated when breathing consumes oxygen.

**Conclusion:** ROS are one of the major causes of acute and chronic diseases. Acute oxidative stress arises from various different situations: inflammation, cardiac or cerebral infarction, organ transplantation, heavy exercise, cessation of operative bleeding and others (8).

#### References:

1. Andersen JK. Nat Med 2004;10 suppl:S18.
2. Finkel T, et al. Nature 2000;408:239.
3. Wallace DC. Annu Rev Genet 2005;39:359.
4. Steinhilber SR. Am J Cardiol 2008;101:14D.
5. Hickam DG. ACP J Club 2007;147:4.

6. Harma M, et al. Eur J Appl Physiol 2006;97:505.
7. Agarwal R. BMC Nephrol 2005;6:13.
8. Ferrari R. et al. Cardiovasc Drugs Ther 1991;5(Suppl 2):277.

P819

### BUROSUMAB TREATMENT IN ADULT PATIENTS AFFECTED BY SEVERE X-LINKED HYPOPHOSPHATEMIC RICKETS

G. Marcucci<sup>1</sup>, L. Cianferotti<sup>1</sup>, L. Masi<sup>2</sup>, M. Duradoni<sup>3</sup>, C. Fossi<sup>1</sup>, S. Parri<sup>1</sup>, M. L. Brandi<sup>4</sup>

<sup>1</sup>Bone Metabolic Diseases Unit, Dept. of Experimental and Clinical Biomedical Sciences, University of Florence, <sup>2</sup>Bone Metabolic Diseases Unit, University Hospital of Florence, <sup>3</sup>Dept. of Information Engineering, University of Florence, <sup>4</sup>Fondazione Italiana di Ricerca sulle Malattie dell'Osso (FIRMO), Florence, Italy

**Objective:** X-linked hypophosphatemia (XLH) is a rare disease caused by *PHEX* gene mutations. The objective of this study is to report clinical, biochemical results and effects on motor function and quality of life in two adult XLH patients treated with burosumab. They have been previously treated with standard therapy and had severe clinical complications.

**Methods:** Two adult male patients (Caucasian; aged 59 and 52), with XLH diagnosis in childhood, have been treated for 6 months with burosumab (1 mg/kg: 90 and 60 mg respectively) subcutaneously every 28 d. Blood and urinary exams were performed at baseline and then monthly. Questionnaires (Quality of Life: 36-Item Short Form Survey) and tests (Brief Pain Inventory, 6-Min Walk Test, Time Up & Go Test and Grip test) were performed at baseline and after 6 months.

**Results:** Serum phosphate levels, below the normal range (1.6 and 1.7 mg/dl; normal range: 2.5-4.9) at baseline, quickly increased and normalized as early as 2 weeks. In the first patient, normal phosphatemia level was maintained for all period, while in the second patient phosphatemia level reduced to just below the normal range (2.2-2.4 mg/dl) from 3 to 6 months. No severe adverse events were reported. In both patients, a statistically significant increase ( $p=0.02$ ) of serum procollagen 1 N-terminal propeptide was described at 6 months. The questionnaire on quality of life showed an improvement trend at 6 months compared to the baseline for some scores (perception of general health and vitality) and all tests on joint-bone pain and motor function also showed a tendency to improvement.

**Conclusion:** These case reports contribute to establishing efficacy of burosumab treatment (1-4) also in adulthood with severe musculoskeletal manifestations. In addition, our results suggest that the currently recommended burosumab dosage (1 mg/kg) may not always be optimal for all patients and perhaps some minor adjustments may be needed. Furthermore, in the future, quality of life questionnaires and specific muscle function tests could be used on a large scale in XLH patients treated with burosumab.

### References:

1. Haffner D, et al. Nat Rev Nephrol 2019;15:435.
2. Insogna KL, et al. J Bone Miner Res 2018;33:1383.
- 3) Portale AA, et al. Calcif Tissue Int 2019;105:271.
- 4) Marcucci G, et al. Osteoporos Int 2018;29:2369.

**Acknowledgments:** BOND-ERN, ENDO-ERN, and Kyowa Kirin s.r.l.

P820

### PROGNOSTIC FACTORS IN A RAPIDLY PROGRESSIVE DERMATOMYOSITIS

S. C. Dinescu<sup>1</sup>, S. C. Firulescu<sup>1</sup>, D. C. Parvanescu<sup>1</sup>, B. A. Chisalau<sup>1</sup>, C. Criveanu<sup>1</sup>, A. L. Barbulescu<sup>1</sup>, C. E. Gofita<sup>1</sup>, A. E. Musetescu<sup>1</sup>, A. Florescu<sup>1</sup>, P. L. Ciurea<sup>1</sup>, A. F. Vreju<sup>1</sup>

<sup>1</sup>University of Medicine & Pharmacy Craiova, Craiova, Romania

We present the case of a 49 year-old female patient admitted to the emergency department after developing severe muscle weakness of the arms and thighs, marked oedema extending along the proximal segments of the limbs, erythematous rash of the face, chest and arms. Patient history included bilateral surgical removal of cystic formations of increased size, which were not labelled as malignant. The patient's general state altered since one week, she became bed ridden, with muscle weakness involving also the neck flexors.

Laboratory tests based on the clinical suspicion of dermatomyositis revealed very high muscle enzymes – creatin kinase, aspartate transaminase, lactate dehydrogenase. The autoimmune panel for antinuclear antibodies was positive for anti-Ro52, but a myositis antibody panel was not available. Electromyography and muscle biopsy confirmed the diagnosis of inflammatory myopathy. Further evaluation by musculoskeletal ultrasound detected a marked subcutaneous oedema and typical features of acute myositis which include loss of "starry sky" appearance, hyperechoic muscle tissue and also a proximally increased degree of stiffness on elastography.

The patient showed partial clinical response after three day course of methylprednisolone 1 g/d and was further maintained on a dose of 0.5 g/d. Although subcutaneous oedema receded and the patient gained some muscle strength, a major concern was the persistent and progressive dysphagia. Immunosuppressive therapy with methotrexate 7.5mg/week was initiated along with maintenance of high dose corticosteroid. The patient developed severe dysphagia, with need of parenteral nutritional support and repetitive tracheobronchial aspiration. A major concern at this point was the risk of aspiration pneumonia. Lack of clinical improvement prompted also the use of intravenous immunoglobulin which was administered in two doses of 0.5 g/kg. Three weeks from admission, the patient develops acute respiratory failure and dies after cardiorespiratory arrest.

This case report describes a severe form of dermatomyositis in which presence of multiple prognostic factors was linked to a very poor outcome. These factors include corticosteroid resistance, acute presentation with extensive subcutaneous oedema and upper dysphagia. Although immunosuppressive therapy should be added in refractory cases, initial response to high dose corticosteroid is crucial in clinical forms with rapid progression.

P821

### SHORT- AND LONG-TERM PROGNOSTIC FACTORS ASSOCIATED WITH FUNCTIONAL RECOVERY IN ELDERLY PATIENTS WITH HIP FRACTURE: A SYSTEMATIC REVIEW

B. Araiza-Nava<sup>1</sup>, L. Méndez-Sánchez<sup>1</sup>, B. M. Martínez-Hernández<sup>2</sup>, P. Clark<sup>1</sup>, M. L. Peralta-Pedrero<sup>3</sup>, F. Guzmán-Jiménez<sup>4</sup>

<sup>1</sup>Faculty of Medicine of National Autonomous University of Mexico (Universidad Nacional Autónoma de México)/ Clinical Epidemiology Research Unit Hospital Infantil de Mexico Federico Gomez, <sup>2</sup>Faculty of Medicine of National Autonomous University of Mexico (Universidad Nacional Autónoma de México), <sup>3</sup>Faculty of Medicine of National Autonomous University of Mexico (Universidad Nacional Autónoma de México), Dermatologic Center Dr. Ladislao de la Pascua, <sup>4</sup>Faculty of Medicine of National Autonomous University of Mexico (Universidad Nacional Autónoma de México), UMAE Hospital de Traumatología y Ortopedia Lomas Verdes, Instituto Mexicano del Seguro Social, Mexico, Mexico

**Objective:** To identify short and long-term factors (biological, clinical, and sociodemographic) associated with functional recovery of elderly hip fracture patients after hospital discharge; and assess the use of the hip fracture core-set and key-performance indicators for secondary refractures reduction. (Javaid-MK-2020)

**Methods:** A search was performed in seven electronic databases. Observational studies reporting predictors after usual care of elderly patients with hip fracture diagnoses receiving surgical or conservative treatment were included. Primary outcomes considered were part of the domains corresponding to functional capacity. The protocol was registered in PROSPERO (CRD42020149563).

**Results:** Of 3873 references identified, and after the screening and selection process, 43 studies were included. Forty-nine functional measures were identified for ten functional outcomes, including BADLs, IADLs, ambulation and, mobility. Biological characteristics such as age, sex, comorbidities, cognitive status, nutritional state, and biochemical parameters are significantly associated. Determinants such as contact and size of social network and those related to institutional care quality are relevant for functional recovery at six and 12 months. Age, prefracture function, cognitive status, and complications continue to be associated five years after discharge. We found 74 associated factors

to functional recovery of elderly hip fracture patients. Ten of the studies reported rehabilitation programs as suggested in KPI 9; none used the complete hip fracture core-set.

**Conclusion:** Most of the associated factors for functional recovery of elderly hip fracture were biological, sociodemographic, or inherent factors to patients' baseline characteristics, including their pre-fracture functional capacity. For the core-set and KPIs, we found an insufficient use and report. This study reports 49 different instruments to measure functional capacity.

P822

### EFFECT OF MODIFIED SURYA NAMASKAR ALONG WITH PRANAYAMA ON BALANCE AND QUALITY OF LIFE IN GERIATRIC PATIENT WITH OSTEOPOROSIS

A. Kaur<sup>1</sup>, M. Mitra<sup>1</sup>, G. Kaur<sup>2</sup>

<sup>1</sup>MVP's College of Physiotherapy, Nashik, <sup>2</sup>Wellness Forever, Mumbai, India

**Objective:** Osteoporosis is a systemic skeletal disease characterised by a low BMD and increased risk of fractures. While the quality of life of an individual is affected by fall accidents, management of post-fall disability in the elderly could be a huge economic burden to the society. Treatment of these patients has to be comprehensive and include both, pharmacological and nonpharmacological interventions. This study aimed to investigate how modified surya namaskar (modified sun salutations using a chair) along with pranayama in the duration of 6 weeks can impact the balance and quality of life in geriatric patient with osteoporosis.

**Methods:** This quasi experimental study was conducted on 33 patients both male and female with diagnosed osteoporosis, ages between 60-75 y, having no mobility problems, 27 of whom completed the 6 week exercise sessions program. Patients with asymmetric gait pattern, use of an assistive device for walking, evidence of neuromuscular illness, major orthopedic diagnosis in the lower back, pelvis, or lower extremities were excluded from the study. Session included warm up (seated shoulder circles, wrist rolls, sit to stand, standing heel and toe raises, abduction, and heel walking.), pranayama (breathing exercises), modified surya namaskar (modified sun salutations using a chair) followed by relaxation. Before and after treatment protocol the patients balance was assessed using Timed Up and Go Test (TUG), Patients quality of life was evaluated using Nottingham Health Profile. Statistical analyses of the data was carried out by comparing of the values obtained before and after treatment protocol by using paired parametric t test.

**Results:** The mean age of the participants with osteoporosis were 66.00±3.87 y. After sessions, there was a statistically significant decrease in their TUG mobility scores (p<0.05) and their quality of life scores were better than scores obtained before sessions (p<0.05).



**Conclusion:** This study concluded that modified surya namaskar along with pranayama has the potential to alleviate problems related with balance and quality of life in geriatric patient with osteoporosis.

P823

### A META-ANALYTIC SYNTHESIS OF DPP4 INHIBITORS COMPARED TO SULFONYLUREAS AS ADD-ON THERAPY TO METFORMIN AND RISK OF FRACTURES IN PATIENTS WITH TYPE 2 DIABETES: EVIDENCE FROM RANDOMIZED CONTROLLED TRIALS

M. Azharuddin<sup>1</sup>, M. Sharma<sup>2</sup>

<sup>1</sup>Dept. of Pharmaceutical Medicine, Pharmacology, School of Pharmaceutical Education and Research, Jamia Hamdard, New Delhi, India, <sup>2</sup>Dept. of Pharmacology, School of Pharmaceutical Education and Research, Jamia Hamdard, New Delhi, India

**Objective:** Type 2 diabetes mellitus (T2DM) affects bone metabolism and increased risk of fracture among elderly population. There is no consensus on the selection of specific drug therapies when metformin not adequately responsive in T2DM. Evidence from the published clinical studies suggested inconclusive results regarding effect of anti-diabetic medications on the fracture risk. Therefore, this study aimed to determine effect of DPP-4 Inhibitors compared to sulfonylureas as add-on therapy to metformin in inadequately controlled patients with T2DM.

**Methods:** A systematic literature search on PubMed/Medline was conducted to identify randomized controlled trials (RCTs) in patients with T2DM. RCTs comparing DPP-4 Inhibitors vs. sulfonylureas as add-on therapy to metformin in T2DM patients were included. We calculated Peto odd ratio with 95%CI with fixed effect model to compare DPP-4 Inhibitors vs. sulfonylureas as add-on therapy to metformin. Meta-analysis was performed by using RevMan 5.3 software.

**Results:** A total 7 RCTs including 8584 patients with 48 fracture cases. From the included studies patient age, fasting blood glucose level, HbA1c, BMI, and duration of diabetes were ranged from 54.30-72.60 y, 8.9-9.2 mmol/L, 7.5-8.1%, 30-32.5 kg/m<sup>2</sup>, and 5.5-7.6 y respectively. Duration of trials were ranged from 30-104 weeks. Results from meta-analysis showed nonsignificant association between overall risk of fracture and DPP-4 inhibitors compared to sulfonylureas as add-on therapy to metformin in inadequately controlled patients with T2DM (Peto odd ratio: 1.45, 95%CI: 0.82-2.57; p=0.21). There was no significant heterogeneity amongst the studies ( $I^2=0\%$ ; p=0.86).

**Conclusion:** The current result suggests no detrimental effect of DPP-4 inhibitors on fractures risk compared to sulfonylureas in patients with T2DM. The DPP-4 inhibitors and sulfonylureas can be considered as options for add-on therapy to metformin in in-

adequately controlled T2DM patients. Further long term follow-up RCTs and real world studies are required to confirm the present findings.

P824

### COEXISTENCE OF SARCOPIENIA IS MORE WITH SEVERE OSTEOPOROSIS: A STUDY IN A TERTIARY LEVEL HOSPITAL IN BANGLADESH

M. I. Majumder<sup>1</sup>

<sup>1</sup>Central Medical College, Cumilla, Bangladesh

**Objective:** Sarcopenia is decline of muscle mass leading to impaired gait, significant disability which is strongly associated with osteoporosis(OP). Bone-muscle unit development and deterioration maintains a linear relationship at various ages. Severe sarcopenia is low muscle mass plus low muscle strength with low physical performance. This observational study was done to see the coexistence of severity of sarcopenia with severe OP in small population of Bangladesh.

**Methods:** Total 498 osteoporosis patients were included in this study. Study place was medicine and Orthopaedic Dept. of Central Medical College Hospital, Cumilla, Bangladesh in the period between January-December 2020. OP was assessed by BMD estimation with DXA using GE Healthcare Lunar Prodigy densitometer, considering T-score < -2.5 and -1 to -2.5. Fracture was determined by X-ray. Sarcopenia was determined by relative skeletal muscle index (RSMI) by DXA ( $\leq 7.26$  kg/m<sup>2</sup> for men and  $\leq 5.45$  kg/m<sup>2</sup> for women) hand grip strength (HGS) (<30 kg in males, <20 kg in females) by Jamar dynamometer. Other aspects of sarcopenia was assessed by walking speed (<0.8 m/s), Timed Up and Go test (TUG) (>20 s).

**Results:** Among 498 patients, 467(93.78%) were female and 31(6.22%) were male with average age  $63 \pm 10$  years ranging 32-100 y. 111(22.29%) patients had severe OP with vertebral compression fracture 87(17.47%) and femoral neck fracture 24(4.82%) and remaining 387(77.71%) patients were osteoporotic without fracture. In severe OP group T-score of lumbar spine was  $-4.08 \pm 1.19$  and femoral neck  $-4.03 \pm 1.49$  respectively with average RSMI  $5.21 \pm 1$  kg/m<sup>2</sup>, HGS- right  $15.01 \pm 5.08$  kg and left  $13 \pm 5.1$  kg, Walking speed  $0.58 \pm 0.12$  m/s and TUG-  $15.51 \pm 3.96$  s having p value 0.0004. On other hand in OP without fracture T-score of lumbar spine was  $-3.35 \pm 0.94$  and femoral neck  $-2.96 \pm 1.07$  respectively with average RSMI  $5.41 \pm 0.89$  kg/m<sup>2</sup>, HGS- right  $17.35 \pm 4.32$  kg and left  $15 \pm 4.2$  kg, Walking speed  $0.64 \pm 0.1$  m/s and TUG  $13.46 \pm 2.05$  s having p value 0.007.

**Conclusion:** Sarcopenia is very much prevalent in osteoporotic patients and severe sarcopenia is more coexistent with severe OP as assessed with multiple parameters with statistical significance in small section of Bangladeshi population.

P825

# MAGNETIC RESONANCE IMAGING VS. MUSCULOSKELETAL ULTRASOUND IN DETECTING MENISCUS LESIONS

A. E. Musetescu<sup>1</sup>, P. L. Ciurea<sup>1</sup>, A. F. Vreju<sup>1</sup>, C. Criveanu<sup>1</sup>, S. C. Dinescu<sup>1</sup>, A. Barbulescu<sup>1</sup>, B. Chisalau<sup>1</sup>, A. M. Bumbea<sup>1</sup>, A. Florescu<sup>1</sup>

<sup>1</sup>University of Medicine & Pharmacy of Craiova, Craiova, Romania

**Objective:** Musculoskeletal ultrasound (MUS) is an important imaging method useful in detecting both degenerative and inflammatory changes in peripheral joints [1]. MRI is considered the gold standard in assessing musculoskeletal lesions [2]. The detection of meniscus tears is of great importance in determining the cause of acute knee pain [3]. The aim of our study is to determine the value of MUS in detecting meniscus lesions compared to MRI.

**Methods:** The study included 32 patients with mean age of 58.6 y and a male:female ratio of 23:9. The mandatory criteria for inclusion in the study were the presence of mechanical knee joint pain, lasting for more than 2 weeks with suspicion of a post-traumatic meniscus lesion, with positive clinical maneuvers for meniscus tears. The patients underwent clinical evaluation, laboratory tests, MUS examinations and MRI of the affected knee. MUS scans of knee were performed using a MyLabSix machine with a multi-frequency array probe. The patients also underwent arthroscopy of the affected knee.

**Results:** The laboratory tests performed excluded other inflammatory pathologies of the knee. Clinical maneuvers were positive for medial or lateral meniscus lesions in 59.37% of patients. MUS assessed the presence of meniscus tears in 71.87% of patients with the visualization of meniscal cysts in 25% of patients. The MRI of the painful knee demonstrated the presence of meniscus tears in 87.5% of patients, while the meniscal cysts were evidenced in 25% of patients. The sensitivity and specificity of MUS compared to MRI in detecting meniscus lesions were 89% vs. 94% and 48% vs. 51%.

**Conclusion:** Although MRI remains the gold standard in assessing musculoskeletal lesions, MUS may be useful in the initial assessment and fast diagnosis of meniscus lesions, being able to provide a faster, dynamic and cost efficient examination.

## References:

1. Lapadat AM, et al. Rom J Morphol Embryol 2020;61:73.
2. Musetescu AE, et al. Rev Chim (Bucharest) 2019;70:1067.
3. Florescu A. Life-Basel 2021;11:218.

P826

# COVID-19 AS A HISTORIC EVENT AND AS A COLLECTIVE TRAUMA

Y. Athanassiou<sup>1</sup>

<sup>1</sup>Faculty of Philology, University of Athens, Athens, Greece

Pandemics have always been a driving force in human history. From mythology and the Iliad to Thucydides' clinical description of the Athenian plague in the second book of the History of the Peloponnesian War and, of course, the recent outbreak of COVID-19 in December 2019, pandemics disrupt the flow of history; they appear as multifaceted crises that destabilize the social and political status quo. The threat of a plague, the threat of contagion and death, weakens social, economic, and political ties. The state struggles to maintain the validity of its power; its authority is shaken by the appearance of the epidemic. Social inequalities become more and more obvious. Isolation and fear dominate.

However, even if pandemics shake us to our core as a collective, if we want to truly understand the social and political gravity of epidemics, we must turn our attention in the way they affect the psyche of the individual. This effect, multiplied, creates a seismic shift that forces a nation and, in the case of COVID-19, possibly the first true global pandemic, humanity to redefine itself after every epidemic. Plagues challenge above all the individual, who is the pillar of the social contract; they force her to rethink her place in the community, her identity. They constitute crises that hinder communication which is vital for human beings. And, crucially, as COVID-19 proved to humanity, pandemics obstruct our ability to give meaning in everyday rituals, through which the individual forms bonds with others and comprehends the world around her. The feeling of futility that spreads in the social web, and the inability to define the self in a fluid and uncertain environment, work as catalysts for the chain reactions that follow a health crisis.

P827

# ASSESSMENT OF OSTEOPOROSIS IN ANKYLOSING SPONDYLITIS

A. E. Musetescu<sup>1</sup>, P. L. Ciurea<sup>1</sup>, A. F. Vreju<sup>1</sup>, C. Criveanu<sup>1</sup>, S. C. Dinescu<sup>1</sup>, A. Barbulescu<sup>1</sup>, B. Chisalau<sup>1</sup>, A. M. Bumbea<sup>1</sup>, A. Florescu<sup>1</sup>

<sup>1</sup>University of Medicine & Pharmacy of Craiova, Craiova, Romania

**Objective:** Osteoporosis is a common complication of inflammatory rheumatic diseases such as ankylosing spondylitis (AS) [1]. The studies regarding the incidence of osteoporosis are controversial since AS is also marked by new growth of bone leading to the development of syndesmophytes and subsequent vertebral

ankyloses [2, 3]. The aim of our study is to assess the incidence of osteoporosis/osteopenia in AS patients compared to a healthy control group.

**Methods:** The study included 26 patients with AS with mean age of 38.9 y and a male:female ratio of 23:3 and 26 age and sex-matched controls with no risk factors for osteoporosis. The mandatory criteria for inclusion in the study diagnosis of ankylosing spondylitis according to the The assessment of Spondyloarthritis International Society (ASAS) criteria for axial spondyloarthritis with duration of disease activity of minimum 2 y. The BMD of the forearm and hip were assessed using DXA scanner.

**Results:** Patients with AS had significantly lower T-score at the forearm and neck of femur than controls (T-score  $p=0.03$  and  $p=0.015$ , respectively). We also assessed the inflammatory markers and diseases activity scores such as ASDAS and the (Bath Ankylosing Spondylitis Disease Activity Index) BASDAI. Lower T-scores at the neck of the femur were associated with ASDAS ( $p=0.0032$ ), BASDAI ( $p=0.0045$ ) and C reactive protein levels ( $p=0.0037$ ).

**Conclusion:** In our study group, the incidence of low T-scores was more prominent in patients with AS than healthy controls and were also associated with disease activity and inflammatory markers.

#### References:

1. Dragoescu AN, et al. J Pers Med 2020;11:2.
2. Musetescu AE, et al. Rev Chim (Bucharest) 2018;69:1122.
3. Florescu A. Life-Basel 2021;11:218.

## P828

### THYROID HORMONE REPLACEMENT AND OSTEOPOROSIS IN EUTHYROID POSTMENOPAUSAL WOMEN: EXPERIENCE FROM A SINGLE CENTER

J. Vilas-Boas<sup>1</sup>, C. Mazedo<sup>1</sup>, S. Silva<sup>1</sup>, A. Barcelos<sup>1</sup>

<sup>1</sup>Centro Hospitalar do Baixo Vouga - Aveiro, Aveiro, Portugal

**Objective:** To evaluate the BMD and number of fractures in osteoporotic postmenopausal women treated with thyroid hormone replacement therapy (THR) in a cross-sectional study. Long term THR has been suggested to be inversely correlated with BMD and increased risk of fractures. It is still unclear if THR has a negative effect on bone remodeling even in sustained euthyroid patients.

**Methods:** Data regarding 49 postmenopausal osteoporotic women with ongoing THR treatment was collected from a single Portuguese center orthopedic ward between 2019-2021. Patients treated for at least one year with thyroxine, regardless of the dose, due to primary or secondary hypothyroidism and with normal thyroid hormone levels (T4 and TSH) were included. Patients with a potential secondary osteoporosis risk factor were excluded. BMD was measured using a DXA scanner if considered clinically appropriate. History of fragility fractures was questioned.

Patients were compared with a control comprised of postmenopausal osteoporotic woman without thyroid pathology, using the Mann-Whitney U Test. The level of significance was chosen as  $<0.05$ .

#### Results:

Feature	Intervention Group (n=49)	Control Group (n=164)	p-value
Age	$\bar{x}$ 76.1 $\pm$ SD 8.6	$\bar{x}$ 79.6 $\pm$ SD 10.3	0.428
BMI	$\bar{x}$ 28.27 $\pm$ SD 4.75	$\bar{x}$ 26.83 $\pm$ SD 4.47	0.207
Number fragility fractures	$\bar{x}$ 1.32 $\pm$ SD 0.6	$\bar{x}$ 1.29 $\pm$ SD 1.1	0.135
T-score femoral neck	$\bar{x}$ -3.05 $\pm$ SD 2.1	$\bar{x}$ -2.17 $\pm$ SD 3.3	0.236
T-score lumbar spine	$\bar{x}$ -2.58 $\pm$ SD 0.9	$\bar{x}$ -2.80 $\pm$ SD 1.65	0.428

Regarding the intervention group at the time of investigation, the mean replacement dosage of levothyroxine was 0.124 $\pm$ 0.088 mcg/d. The mean time of treatment with THR was 9.2 $\pm$ 5.7 y.

**Conclusion:** In this cohort no statistically significant differences were found regarding number of fragility fractures of any site and BMD between euthyroid osteoporotic postmenopausal women treated with THR and osteoporotic postmenopausal woman without thyroid pathology. Due to the transversal nature of this study no data from previous hormone thyroid status was recorded. This study indicates that THR maintaining a euthyroid state in hypothyroid patients results in no increased bone loss or risk of fracture in postmenopausal women. For robust conclusions, we need large prospective cohort studies.

## P829

### ASTRAGALUS TINCTURA AS MEDICATION FOR STRUCTURAL CHANGES OF THE BONES IN JUVENILE RATS EXPOSED TO FORMALDEHYDE VAPORS

V. Nizhel'Sky<sup>1</sup>, V. Luzin<sup>1</sup>, Y. Shutov<sup>1</sup>, I. Belik<sup>1</sup>

<sup>1</sup>State Establishment of Lugansk People's Republic Saint Luka Lugansk State Medical University, Lugansk, Ukraine

**Objective:** To test the effects of *Astragalus tinctura* on the proximal epiphyseal cartilages of the humeri in juvenile rats exposed to formaldehyde vapors.

**Methods:** 72 month-old rats with body weight of 130-150 g were used. Animals were distributed into three groups as follows: group1 comprised intact animals, group 2 consisted of the animals exposed to formaldehyde vapors in concentration 2.766 mg/m<sup>3</sup> 60 min everyday. Animals of the group 3 were exposed to formaldehyde vapors and received *A. tinctura* by oral gavage at

100 mg/kg of body weight daily. Observation terms were 10, 20, 30, 60, and 90 d. Animals of the group 3 were withdrawn from the experiment only 10<sup>th</sup> and the 30<sup>th</sup> day. HE stained sections of the proximal epiphyses of the humeri were photographed under the light microscope and images were used for histomorphometry. The data obtained were analyzed with the use of variation statistics methods.

**Results:** In the first group primary spongiosa share decreased as compared to the control animals in the period from the 10<sup>th</sup> to the 90<sup>th</sup> day of observation by 3.93%, 4.34%, 4.74%, 6.83%, and 7.35% respectively. Osteogenic zone narrowed in the period from the 20<sup>th</sup> to the 90<sup>th</sup> day by 4.38%, 7.06%, 8.44%, and 9.23%. Number of osteoblasts in this period also decreased by 4.21%, 4.98%, 7.43%, and 7.94%. After administration of *A. tinctura* significant differences between the groups 2 and 3 were registered only by the 30<sup>th</sup> day. Width of the whole growth plate increased by 4.01%, osteogenic zone widened by 5.13% and number of osteoblasts increased by 4.22% (all in comparison with the group 2).

**Conclusion:** Exposure to formaldehyde vapors results in inhibition of activities of the proximal growth plate. Inhibition in this case grows with time. Administration of *A. tinctura* to the animals exposed to formaldehyde leads to restoration of growth plate functioning beginning from the 30<sup>th</sup> day after administration of medication.

## P830

### MAGNETIC RESONANCE IMAGING IN EVALUATING LUMBAR SPINE DISC HERNIATIONS

A. Florescu<sup>1</sup>, P. L. Ciurea<sup>1</sup>, A. F. Vreju<sup>1</sup>, C. Criveanu<sup>1</sup>, S. C. Dinescu<sup>1</sup>, A. Barbulescu<sup>1</sup>, B. Chisalau<sup>1</sup>, A. M. Bumbea<sup>1</sup>, A. E. Musetescu<sup>1</sup>

<sup>1</sup>University of Medicine & Pharmacy of Craiova, Craiova, Romania

**Objective:** MRI is one of the most important modern imaging techniques used for assessing lumbar spine disc herniations [1, 2]. The radiologist can detect and characterize a disc herniation and correlate clinical information with medical imaging data [3]. The main objective of our study is to determine which lumbar intervertebral disc is most frequently affected by using MRI in order to ease the decision regarding the therapeutic approach.

**Methods:** The study included a total of 32 patients (18 men, 14 women) between 40-60 y of age with a mean age of 48.93 y. The patients underwent clinical evaluation and MRI of the lumbar spine. The inclusion criteria consisted of radiating pain and/or numbness in the inferior limbs and herniated lumbar intervertebral discs. The MRI examinations were performed using a 1.5T GE machine.

**Results:** In the current study, disc herniation was most common in the L5-S1 (59.37%), closely followed by L4-L5 (46.87%). Disc herniation was less common at L1-L2 (0.06%), L2-L3 (15.62%) and L3-L4 (15.62%). Disc migration was encountered in 12 patients,

with the L4-L5 intervertebral disc being the most commonly affected (7 patients). Disc migration occurred on a mean distance of 8 mm.

**Conclusion:** MRI has proven extremely useful in accurately detecting the etiology of the radiating pain and/or numbness in the inferior limbs. Furthermore, MRI examinations of the lumbar spine play a central role regarding the therapeutic approach of herniated lumbar intervertebral discs.

References:

1. Musetescu AE, et al. Rev Chim (Bucharest) 2019;70:1067.
2. Florescu A. Life-Basel 2021;11:218.
3. Musetescu AE, et al. Rev Chim (Bucharest) 2018;69:1122.

## P831

### WEDGE SHAPE CALCULATION IN HIGH TIBIAL OSTEOTOMY BY ASSESSING THE OPENING WEDGE OF HEMICALLOTASIS USING A DYNAMIC AXIAL FIXATOR IN OSTEOARTHRITIS KNEE

V. Khanna<sup>1</sup>

<sup>1</sup>Dept. of Orthopaedics, Kailash Hospital, Khurja, India

**Objective:** Medial compartment osteoarthritis is generally seen in the initial stages of osteoarthritis. This leads to malalignment of the lower limb which in turn leads to further degeneration of the medial compartment of the knee joint. The management constitutes high tibial osteotomy which involves the correction of the alignment. Opening wedge osteotomy generally leads to an empty space being formed which may or may not be filled up with bone graft with internal fixation. The base of the wedge depends on the amount of correction required. However, due to the triangular shape of the tibia, the wedge is of different sizes posteriorly as compared to anteriorly. This study predicts the shape of the wedge from medial to lateral and posterior to anterior with the help of hemicallotasis wedge opening while using the dynamic external fixator for HTO in OA knee.

**Methods:** A total of 40 knees in which HTO was performed using the dynamic axial fixator were taken. Exclusion criteria consisted of patients in whom the preoperative and postoperative X-rays were not in the same rotation. Inclusion criteria consisted of patients in whom the posterior slope did not significantly change in the postoperative X-rays as compared to the preoperative X-rays. This led to the inclusion of 32 X-rays in this study. The wedge opening was calculated in the anterior surface and the maximum opening of the osteotomy in the lateral and AP view X-rays. This was then compared to the width of the tibia to find out any correlation between the same.

**Results:** In the 32 X-rays it was seen that the opening of the anterior cortex was not significant as compared to the maximum opening of the wedge. There was no correlation between the



width of the tibia and the difference in wedge opening. There was no significant change in the posterior slope of the proximal tibia in the postop as compared to the preop X-rays.

**Conclusion:** This study gives a great insight into the shape of the wedge opening in the HTO tibia. The wedge should be maximum at the medial cortex and should be sloping laterally and anteriorly. However, the sample size is small and large scale studies are required for the validation of this study.

P832

### DISTRIBUTION OF DUAL-ENERGY X-RAY ABSORPTIOMETRY MACHINES IN IRAN

M. Sanjari<sup>1</sup>, F. Hajivalizadeh<sup>2</sup>, K. Khalagi<sup>1</sup>, N. Fahimfar<sup>1</sup>, S. Mohseni<sup>3</sup>, A. Raeisi<sup>4</sup>, B. Larijani<sup>5</sup>, A. Ostovar<sup>1</sup>

<sup>1</sup>Osteoporosis Research Center, Endocrinology and Metabolism Clinical Sciences Institute, Tehran University of Medical Sciences, Tehran, <sup>2</sup>Musculoskeletal Disease Dept., Center for Non-Communicable Diseases Prevention and Control, Ministry of Health of Iran, Ministry of Health & Medical, Tehran, <sup>3</sup>Radiation Medicine Engineering Dept., Shahid Beheshti University, GC, Tehran, <sup>4</sup>School of Medicine, Shiraz University of Medical Sciences, Shiraz, <sup>5</sup>Endocrinology and Metabolism Research Center, Endocrinology and Metabolism Clinical Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran

**Objective:** According to the osteoporosis guidelines, measuring BMD is the main method of osteoporosis diagnosis. This study aims to investigate the distribution of DXA machines in the provinces of Iran and their inequality based on the socio-economic development status of the provinces.

**Methods:** All public and private clinics with DXA machines were identified across the country and the number of standard DXA machines was counted. Then, the number of standard devices per one million populations over 50 years was calculated by province. To investigate inequality in the distribution of DXA machines between the provinces, the concentration index (CI) was calculated. For this purpose, we plotted the cumulative proportion of the number of DXA machines per 1 million >50 y population of each province against the cumulative proportion of the socioeconomic rank of the provinces (poor to rich) (1).

**Results:** There were 299 standard DXA machines across the country. Of these, 58 (19.4%) of machines were available in public clinics and 243 (81.3%) were in the clinics located in the capital city of the provinces. The distribution of DXA machines in Iran is illustrated in Figure 1. The CI of the distribution of DXA machines between the provinces was estimated as 0.13, 95%CI: (0.005-0.25) (Figure 2).

**Conclusion:** DXA machines are not evenly available in most parts of Iran. More machines are needed to improve access to osteoporosis diagnostic services in remote areas.

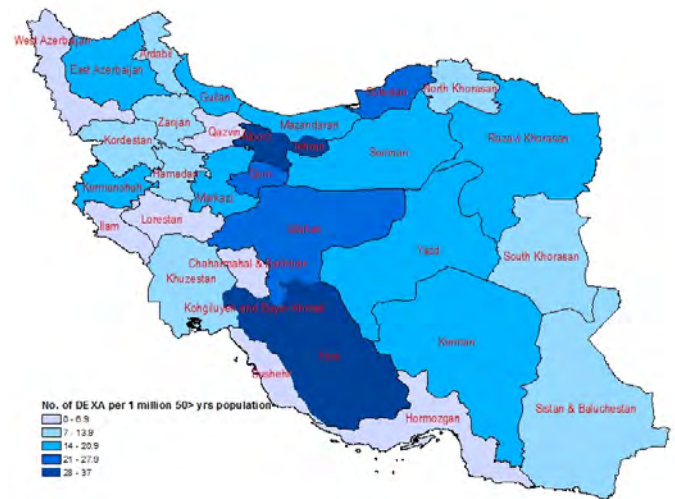


Figure 1. Distribution of DXA machines in Iran.

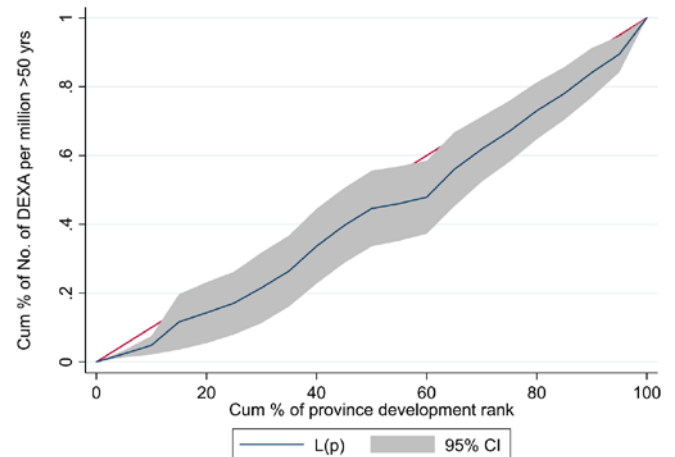


Figure 2. Lorenz curve; the cumulative proportion of number of DXA machines per million 50+ years population vs. the cumulative proportion of the socioeconomic rank of the provinces (low to high).

P833

### OCCURRENCE OF NEW FRACTURES DURING TREATMENT WITH ALENDRONIC ACID IN SEVERE OSTEOPOROSIS

H. El Moutaouakil<sup>1</sup>, K. Nassar<sup>1</sup>, S. Janani<sup>1</sup><sup>1</sup>Ibn Rochd University Hospital, Dept. of Rheumatology, Casablanca, Morocco

**Objective:** Alendronate is one of the drugs that has shown statistically significant efficacy in reducing the number of fractures in women after menopause. Its mechanism of action is based on the inhibition of osteoclasts, and on bone turnover. However, apart from generally tolerated gastrointestinal disturbances, the occurrence of fractures during treatment with alendronic acid remains rare. We report a series of 4 patients who had a fracture under alendronic acid.

**Methods:** Retrospective, descriptive study conducted in the rheumatology department of the Ibn Rochd hospital university over a period of 5 y from 2015 to January 2020, on patients in whom an osteoporotic fracture occurred during treatment with alendronic acid. Before retaining the patients, we had excluded all fractures that had occurred with other antiosteoporotics, and those who had not presented any fractures during the treatment sequence.

**Results:** Out of a total of 1200 files used, 4 patients were identified. The mean age was 72.5 ( $\pm 4.12$ ), a history of personal fracture was noted in  $\frac{3}{4}$  of the patients, the fractures were distributed as follows: a wrist fracture in 3 patients, a fracture of the upper extremity of the femur occurred bilaterally in one patient, with a mean time to onset of 2.5 y. A history of fracture in a 1st-degree relative was not found in any patient, osteoporosis was postmenopausal in 1 case, cortisone in 1 case, iatrogenic in 1 case, and senile in 1 case. The vitamin D level was low in all patients despite the correction. A T-score for the L1-L4 lumbar spine was on average -3.525 ( $\pm 0.22$ ), and for the femoral neck at -2.675 ( $\pm 1.004$ ). Treatment with alendronic acid was started in all patients, with a mean duration of 75 months (6.25 y), a vertebral fracture occurred in two patients and a wrist fracture in two patients during follow-up, a change of treatment towards zoledronic acid was carried out in two patients, towards denosumab in a patient after ineffectiveness of zoledronic acid. The cause of the fracture was poor adherence to treatment in one patient, the added risk factor for osteoporosis in two patients.

**Conclusion:** Fractures added during treatment with alendronic acid are rare, but they should be kept in mind, given the difficulty and complexity of their management. It is first necessary to look for the causes of fractures before attributing them to treatment. Adherence to treatment, regular monitoring and prevention of falls remain the most important preventive measures in case of osteoporosis.

P834

### USE OF ELECTRONIC MEDIA AS AN OPTION FOR CONTINUING MEDICAL CARE IN A FRACTURE LIAISON SERVICE DURING COVID-19 CONTINGENCY

E. Torres-Naranjo<sup>1</sup>, D. F. Solórzano-Moreno<sup>1</sup>, A. C. Guzmán-Rico<sup>1</sup>, M. C. Casanova-Munguía<sup>1</sup><sup>1</sup>Centro de Investigación Ósea y de la Composición Corporal, CIO, Guadalajara, Mexico

**Objective:** Infection by SARS-Cov-2 (COVID-19) has affected practically all the world. Health care systems were overwhelmed and were issued general recommendations urging people to avoid hospitals and doctor's offices unless strictly necessary. These measures represented a challenge to provide continuity of health care for Fracture Liaison Services (FLS). Some pragmatic adaptations were proposed for continuing delivery of medical attention, including telemedicine. The primary objective of this study was to assess the feasibility of telehealth videoconferencing (TVC) as a media for medical consultations of previously functional and adherent patients in an urban-based FLS during the COVID pandemic. Secondary objectives were to estimate the utility of TVC to achieve continuity of treatment and evaluate the satisfaction with the medical care provided.

**Methods:** Functional and adherent patients with at least 6 months in treatment were monitored using a mobile device-based video-conference platform, the proportion of successful connection evaluated feasibility. Patient perception of usefulness, ease of use, effectiveness, reliability, and satisfaction were evaluated using the Telehealth Usability Questionnaire (TUQ).

**Results:** 100 sequential FLS patients taken from the database were monitored through a teleconferencing platform; in 87% of the patients, it was feasible to conduct a successful monitoring consultation. However, 40% of the cases required the support of caregivers to carry out the task. Usefulness, ease of use, effectiveness, reliability, and satisfaction were highly rated using the Telehealth Usability Questionnaire (TUQ), with most patients agreeing to continue treatment.

**Conclusion:** Based on our observations, the use of electronic media is a feasible option for successful health interactions with previously functional and adherent patients in an urban fracture liaison service setting during a health contingency.

P835

### APPLICATION OF A DIPOTASSIUM PHOSPHATE PHANTOM FOR ASYNCHRONOUS CALIBRATION QCT

Z. Artyukova<sup>1</sup>, A. Petraikin<sup>1</sup>, A. Smorchkova<sup>1</sup>, E. Akhmad<sup>1</sup>, D. Semenov<sup>1</sup>, L. Nisovtsova<sup>1</sup>, M. Lobanov<sup>1</sup>

<sup>1</sup>Research and Practical Clinical Center for Diagnostics and Telemedicine Technologies, Moscow, Russia

**Objective:** To develop an asynchronous calibration QCT method that employs a dipotassium phosphate phantom (PHK), and to compare the changes in BMD of the vertebrae with the data from the asynchronous calibration QCT method used in routine clinical practice.

**Methods.** The study was conducted using a 64-slice CT scanner. BMD was evaluated using two methods: 1) Asynchronous calibration QCT processed by the QCT Mindways software 2) QCT-PHK using the PHK phantom. Both methods measured BMD values for L1-L2 vertebrae.

**Methods:** The first method was applied in accordance with the manufacturer's guidelines. The BMD values were measured in the spongy substance of the human vertebrae in the 3-dimensional region of interest. The CT scanner was calibrated monthly using the Model 4 asynchronous phantom, following the manufacturer's recommendations. The second method was based on the in-house PHK phantom that imitated the lumbar spine. The phantom contained "vertebrae" filled with K<sub>2</sub>HPO<sub>4</sub> in various concentrations, representing the normal/osteopenia/osteoporosis values, respectively. Paraffin patches were used to simulate the fat. Similar to QCT, we picked a region of interest that corresponded to the spongy layer. The resulting HU values were converted into BMD using the linear calibration obtained from the PHK phantom scans.

**Results:** The statistical comparison of the patient's vertebrae BMD using the QCT and QCT-PHK methods yielded a significant Pearson linear correlation  $R^2=0.977$  ( $p<0.05$ ). The Bland-Altman plot shows the lack of correlation between the difference in measured values and the average BMD. Also, it was observed that the positive systematic BMD bias of +4.50 mg/ml in QCT, may be attributed to the differences in phantom configurations. The Wilcoxon signed-rank test showed that the difference for the breakdown into the normal/osteopenia/osteoporosis groups using the ACR criteria for both methods turned out unreliable after the adjustment for the systematic bias.

**Conclusion:** The results of the BMD measurement using the in-house asynchronous calibration QCT-PHK method correlate well with that of the QCT Mindways. The developed method could be used for opportunistic screening for osteoporosis, and AI-assisted automated detection of BMD.

P836

### FAVORABLE OUTCOME OF PAGET'S DISEASE OF THE BONE AFTER 4 YEARS OF DISCONTINUATION OF ORAL BISPHOSPHONATE THERAPY

R. I. Rosca<sup>1</sup>, A. S. Dumitrascu<sup>1</sup>, S. Vladiu<sup>1</sup>, A. Goldstein<sup>1</sup>, A. M. Arnautu<sup>1</sup>, D. M. Tilici<sup>1</sup>, C. A. Nacea<sup>1</sup>, R. Danculescu Miulescu<sup>1</sup>

<sup>1</sup>Endocrinology - National Institute of Endocrinology C.I. Parhon, Bucharest, Romania

**Objective:** Paget's disease of the bone (PDB) represents a benign skeletal condition characterized by acceleration of bone turnover in one or more areas. The pathophysiology of this disorder consists in an abnormally rapid bone resorption followed by osteoblast overactivity resulting in an abnormal, fragile, disorganized bone. We present a case of asymptomatic PDB presented in an endocrinology department for another endocrine disorder. Bone was evaluated using plain radiographs, computed tomography, radionuclide bone scan with <sup>99m</sup>Tc-HDP and DXA. The informed consent was obtained.

**Case report:** A 50-year-old female first presented in our clinic in 2015 for examining a thyroid nodule. Biochemical examination showed a serum total alkaline phosphatase (ALP) of 266 u/L (normal 38-105 u/L), normal thyroid biochemical profile and an enlarged thyroid gland with a benign nodule of 8/4 mm. Repeated evaluations showed a dynamic increase in ALP values 266 u/L to 375 u/L indicating possible PDB. Imaging showed: multiple osteolytic lesions of the L4 vertebrae, bilateral hip bone, greater trochanter and left femur alternating with areas of bone sclerosis, cortical thickening of the femoral bone, cranial vault thickening. Whole body scan revealed: increased uptake in the skull, spine, sternum, pelvis, left femur and bilateral tibia. Biochemical markers of bone resorption - CrossLaps 1.31 ng/ml (normal 0.162-0.436 ng/ml) and bone formation - osteocalcin 45.95 ng/ml (normal 11-43 ng/ml) were elevated. DXA of the pelvic bones showed unilaterally elevated left hip BMD and a T-score of 3.5 DS. Active multistotic PDB was confirmed and oral bisphosphonate therapy with 35 mg risedronate 6 d/week for 2 months was initiated, along with combined oral vitamin D and calcium supplements. We have been following this patient for 4 y during which biochemical and radiological remission was achieved.

**Conclusion:** Many patients with Paget's disease of bone are asymptomatic, and the disease is discovered accidentally during check-ups for other conditions. Asymptomatic patients with active disease should be treated especially if they are at risk of further complications. Treatment with bisphosphonates showed evidence of remission for at least 3 y requiring constant follow-up every 6 months.

P837

### THE ASSOCIATION OF OSTEOSARCOPENIA AND WHO CARDIOVASCULAR RISK SCORES IN THE ELDERLY POPULATION: RESULTS FROM BUSHEHR ELDERLY HEALTH (BEH) PROGRAM

N. Fahimfar<sup>1</sup>, G. Shafiee<sup>2</sup>, S. Gharibzadeh<sup>3</sup>, M. Sanjari<sup>1</sup>, K. Khalaji<sup>1</sup>, R. Heshmat<sup>2</sup>, I. Nabipour<sup>4</sup>, B. Larijani<sup>5</sup>, A. Raeisi<sup>6</sup>, A. Ostovar<sup>1</sup>

<sup>1</sup>Osteoporosis Research Center, Endocrinology and Metabolism Clinical Sciences Institute, Tehran University of Medical Sciences, Tehran, <sup>2</sup>Chronic Diseases Research Center, Endocrinology and Metabolism Population Sciences Institute, Tehran University of Medical Sciences, Tehran, <sup>3</sup>Dept. of Epidemiology and Biostatistics, Research Centre for Emerging and Reemerging Infectious Diseases, Pasteur Institute of Iran, Tehran, <sup>4</sup>The Persian Gulf Marine Biotechnology Research Center, The Persian Gulf Biomedical Sciences Research Institute, Bushehr University of Medical Sciences, Bushehr, <sup>5</sup>Endocrinology and Metabolism Research Center, Endocrinology and Metabolism Clinical Sciences Institute, Tehran University of Medical Sciences, Tehran, <sup>6</sup>School of Medicine, Shiraz University of Medical Sciences, Shiraz, Iran

**Objective:** There are some reports on the association of cardiovascular disease (CVD) with both osteoporosis and sarcopenia. This study aimed to explore the association between a newly developed CVD risk score and osteosarcopenia in the elderly population.

**Methods:** Male participants of the second phase of the BEH program were included in this analysis. Osteosarcopenia was defined as having both osteopenia/osteoporosis and sarcopenia. The CVD risk was defined as the 10-y risk for major cardiovascular events estimated using the lab-based version of the WHO updates Cardiovascular Risk Charts. The participants were considered high risk if the CVD risk was  $\geq 20\%$ . The estimated risks were compared in men with and without osteosarcopenia.

**Results:** In all, 2392 participants (1161 men) with a mean age of 69.3 ( $\pm 6.3$ ) y were studied. The median (IQR) CVD risks were 0.340 (0.2142) and 0.230 (0.128) in men with and without osteosarcopenia, respectively ( $P < 0.001$ ). In women, the corresponding values were 0.260 (0.148) and 0.208 (0.138) in individuals with and without osteosarcopenia, respectively ( $P < 0.001$ ). The proportion of individuals with high CVD risk were higher among the participants with osteosarcopenia compared to those without osteosarcopenia in both men and women (Table).

**Conclusion:** This study displayed a significant association between WHO CVD risk score and osteosarcopenia. Further studies are required to investigate common pathways of cardiovascular and musculoskeletal systems.

Table. The prevalence of high-risk population for CVD in the osteosarcopenic and nonosteosarcopenic elderly population.

		Osteosarcopenia +	Osteosarcopenia -	P-value
CVD High-risk population (%) <sup>*</sup>	Women	70.7	53.6	<0.001
	Men	87.6	63.9	<0.001

<sup>\*</sup>High-risk was defined as having the CVD risk score  $\geq 0.20$

P838

### VARIATIONS IN BMD DEPENDING ON AGE AND GENDER, BASED ON DXA DATA FROM AN OUTPATIENT CITY CLINIC OF MEGAPOLIS

A. Petraikin<sup>1</sup>, Z. Artyukova<sup>1</sup>, F. Petraikin<sup>2</sup>, A. Smorchkova<sup>1</sup>, N. Kudryavtsev<sup>1</sup>, Y. Vasilev<sup>1</sup>, A. Vladzimirsky<sup>1</sup>

<sup>1</sup>Research and Practical Clinical Center for Diagnostics and Telemedicine Technologies, <sup>2</sup>Lomonosov Moscow State University, Moscow, Russia

**Objective:** To evaluate the distribution patterns for male/female patients with osteopenia/osteoporosis, who underwent DXA in one of the outpatient clinics of Moscow. To compare the age distribution for femur BMD with NHANESIII.

**Methods:** We analyzed the studies from the DXA database (Lunar Prodigy Advance) available in the outpatient clinic of Moscow (population coverage: 250,000 patients). 5781 patients were selected after the screening (448 males; 20-92 y.o.; >50: 79.3% and 5333 females 20-93 y.o.; >50: 91.7%). This paper is based solely on original studies. BMD and T-scores were evaluated for the following sites: femoral neck (FN), total hip (TH), and spine L1-4 (SP). Precision and accuracy were estimated on a one-off basis using an in-house PHantom Kalium (for fat/no fat conditions is 0.83/0.85% and 4.94/-1.17%). Age distribution for femur BMD (FN,TH) was compared to NHANESIII following the Hologic-Lunar conversion.

**Results:** According to the WHO diagnostic criteria and based on the measurements of all sites in patients, the occurrence of osteoporosis/osteopenia was 8.8%/48.2% in men and 27.3%/51.2% in women. The acquired data were adjusted for the age distribution in the general population. The dependence between BMD and the patients' age was compared against the NHANES III data (mean relative BMD values were calculated). For the 20-50 y.o. patients the FN/TH in men:-7.4/-6.9%; in women:-8.3/-5.8%. The differences were significant ( $p < 0.05$ ) across all the comparisons. For the >50 y.o. interval, FN/TH in men:-1.3/-0.17%; in women: 1.4/5.9%. The differences were significant ( $p < 0.05$ ) only for TH in female patients. This cohort comprises most of the studied patients, so the BMD age distribution structure seems to closely resemble that of the general population.



**Conclusion:** The analysis of the DXA database of the outpatient city clinic revealed that in patients over 50 y.o. the occurrence of osteoporosis/osteopenia was 18.8%/48.2% in men, and 27.3%/51.2% in women, which seems to correlate with the data for the general population. We demonstrated a positive decrease in BMD compared to NHANESIII (FN,TH) in patients below 50 y.o. which can be attributed to the high frequency of secondary osteoporosis.

**Acknowledgement:** The reported study was funded by RFBR №20-015-00260A

P839

### EVALUATION OF THE PLATELET RICH PLASMA EFFICACY ON PATIENTS DIAGNOSED WITH UPPER LIMB EXTENSOR TENDINOPATHY

B. A. Bitzidis<sup>1</sup>, S. S. Spanou<sup>2</sup>, S. N. Samaras<sup>1</sup>

<sup>1</sup>Dept. of Trauma and Orthopaedics, Mpodosakeio General Hospital, <sup>2</sup>Dept. of Paediatrics, Mpodosakeio General Hospital, Ptolemaida, Greece

**Objective:** We wanted to evaluate the platelet rich plasma (PRP) efficacy on patients diagnosed with forearm extensor tendons' tendinopathy based on patient related outcomes (PROs).

**Methods:** After obtaining the approval of our Hospital's Ethics Committee, from January 2018 to December 2020 we recruited a total of 94 patients. In our research we included adult patients (18-76 y.o.) with no known blood pathology who were primarily diagnosed with forearm extensor tendons' tendinopathy. All the recruited patients had not received any other treatment before the application of the PRP preparation and had a full blood count within normal rates. All the participants had given written consent and answered voluntarily and anonymously the Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire before and at 6-8 weeks interval since the ambulatory application of the 2 ml autologous PRP preparation on their lateral epicondyle. The DASH questionnaire is a self-administered specific measurement tool which has been previously validated for the Greek population. It uses 30 items to measure physical function and symptoms in persons with musculoskeletal disorders of the upper extremity for the previous seven days. The scoring system is on a 0-100 scale and higher values mean greater disability [1]. None of the participants had physiotherapy or any other additional treatment after the PRP application until the second assessment.

**Results:** From the initial group of the 94 participants, 16 patients did not attend their 1.5-2 month follow-up assessment and were not included in the final data analysis. In our cohort (n=78) there were 47 males and 21 patients (9 females) have been diagnosed with lateral epicondylitis of their non-dominant hand. None of the patients developed any local pathology after the PRP application or any allergic reaction. The average DASH score was 73 before the PRP application and 36 at the 6-8 weeks post PRP application assessment. The gender parameter seemed to play an important

role on PROs as females had an initial mean Dash score of 67 and a 44 afterwards. Patients regardless of age and sex considered that their everyday quality of life was severely affected in case their dominant hand was affected as they presented higher average DASH scores of 87 and 46 respectively.

**Conclusion:** According to our data based on PROs, the application of PRP on patients diagnosed with forearm extensor tendons' tendinopathy has a favorable effect on their symptoms and disability. The results are affected by the patients' specific characteristics.

#### Reference:

1. [http://www.dash.iwh.on.ca/sites/dash/files/downloads/quickdash\\_info\\_2010.pdf](http://www.dash.iwh.on.ca/sites/dash/files/downloads/quickdash_info_2010.pdf)

P840

### THE ROLE OF PHYSICAL THERAPY IN THE RECOVERY OF COMPLEX REGIONAL PAIN SYNDROME IN THE PATIENT WITH STROKE

A. M. Bumbea<sup>1</sup>, R. Traistaru<sup>1</sup>, R. Marcu<sup>1</sup>, V. D. Caimac<sup>1</sup>, A. E. Musetescu<sup>1</sup>, O. Rogoveanu<sup>1</sup>

<sup>1</sup>University of Medicine & Pharmacy, Craiova, Romania

**Objectives:** To highlight the role of physical therapy in patients with stroke and complex regional pain syndrome (CRPS) compared to conventional therapy.

**Methods:** 62 patients divided into two groups were studied. The study group included 32 stroke and CRPS patients who received, in addition to conventional therapy with analgesics and non-steroidal drugs, vitamin D3 in therapeutic doses, physical treatment involving massage, physical therapy, and analgesic electrotherapy. The control group received only pharmacological treatment consisting of analgesics (painkiller), nonsteroidal drugs and vitamin D3. Patients were evaluated clinically, functionally, goniometric joint measures, ADL (activity of daily living) scale and VAS scale was used for pain.

**Results:** It was found that the study group obtained much better functional scores compared to the control group, and the pain was reduced by a percentage of 38.6% compared to the control group.

**Conclusion:** Early kinetic physical therapy improved patients' symptoms and functionality was also improved in patients with complex regional pain syndrome.

P841

**BEREAVEMENT AND THE USE OF ANTIDEPRESSIVE AGENTS AS A CAUSE OF FRACTURES**

Y. Athanassiou<sup>1</sup>, I. Kostoglou-Athanassiou<sup>2</sup>, M. Nikolidaki<sup>3</sup>, D. Mathiou<sup>3</sup>, P. Giavopoulos<sup>4</sup>, A. Samolis<sup>4</sup>, P. Athanassiou<sup>5</sup>, G. Troupis<sup>4</sup>

<sup>1</sup>Faculty of Philology, University of Athens, Athens, Greece, <sup>2</sup>Dept. of Endocrinology, Asclepeion Hospital, Voula, Athens, Greece, <sup>3</sup>European University Cyprus, Nicosia, Cyprus, <sup>4</sup>Dept. of Anatomy, Medical School, University of Athens, Athens, Greece, <sup>5</sup>Dept. of Rheumatology, St. Paul's Hospital, Thessaloniki, Greece

Bereavement is a form of severe stress. It may cause depression which may require the use of antidepressive agents for its treatment. The aim was to describe the case of a patient who developed osteoporosis and fractures after bereavement, depression and the use of antidepressive agents.

The case of a female patient aged 52 y who presented with fractures is described. The patient had a negative family history for osteoporosis. Her twin sister had normal BMD and reported no fractures. The patient reported menopause at the age of 50 y. At the age of 50 she had suffered a fragility fracture of the 3<sup>rd</sup> metatarsal bone of the right lower extremity. At the age of 51 she had a fragility fracture of the cuboid bone of the right foot. The fractures were managed conservatively. A detailed history was taken including all agents administered in the past for different pathologies. It was found that the patient had lost a son after an accident at the age of 42 y. She developed depression and was treated with antidepressive agents, including selective serotonin reuptake inhibitors. BMD was measured in the left hip and a T-score of -2.6 was found. Alendronate was administered along with calcium and cholecalciferol.

Bereavement is a form of severe stress and may cause depression. Depression has a negative effect on bone metabolism and is a risk factor for the development of fractures. Antidepressive agents, in particular selective serotonin reuptake inhibitors may have adverse effects on bone metabolism and may be related to the development of fractures. Thus, bereavement and the subsequent depression may adversely affect bone metabolism and may be a risk factor for fractures. The use of antidepressive agents, such as selective serotonin reuptake inhibitors may also be a risk factor for osteoporosis. In conclusion, the case of a patient is described who developed fractures and osteoporosis after bereavement and depression requiring treatment with antidepressants.

P842

**SPINAL ORTHOSES PRESCRIPTION FOR VERTEBRAL FRAGILITY FRACTURES: THE SPIN-VER SURVEY**

A. De Sire<sup>1</sup>, A. Ammendolia<sup>1</sup>, A. Gimigliano<sup>2</sup>, R. Tiberi<sup>3</sup>, C. Cisari<sup>3</sup>, M. Invernizzi<sup>3</sup>

<sup>1</sup>Dept. of Medical and Surgical Sciences, University of Catanzaro "Magna Graecia", Catanzaro, <sup>2</sup>ASST Fatebenefratelli-Sacco, Milan, <sup>3</sup>Dept. of Health Sciences, University of Eastern Piedmont, Novara, Italy

**Objective:** Aim of this survey was to investigate the common clinical practice in terms of prescription of spinal orthoses for patients with vertebral fragility fractures (VFFs).

**Methods:** In this nationwide cross-sectional survey, entitled "Spinal orthoses Prescription IN VERtebral fractures (SPIN-VER)" Survey, we involved a cohort of Italian Physical and Rehabilitation Medicine physicians commonly involved in the management of patients with VFFs in their outpatient clinics. All study participants were recruited from April 2020 to May 2020, through an email recruitment strategy and were asked to participate to an online 13-item questionnaire investigating information on outpatients assessed by the physicians, spinal orthoses prescription, and anti-osteoporotic therapy.

**Results:** We included data collected from 126 PRM physicians that completed the survey. They came from all over the Italian country: 54 (42.9%) were from northern Italy, 23 (18.2%) from central Italy, whereas 49 (38.9%) were from southern Italy. Almost half of physicians involved in the survey reported to assess >100 patients per month and 14.3% of participants managing over 200 patients per month. 71 participants (56.3%) reported a prevalence of 20-50% of osteoporotic patients and 13 (10.3%) reported a diagnosis of osteoporosis in even >50% of their patients. The 66.7% of participants reported the absence of VFFs in low back pain patients in more than 20% of cases.

**Conclusion:** A correct management of VFFs is mandatory to improve pain and reduce disability in fragile osteoporotic patients. The results of the SPIN-VER survey showed that most of PRM physicians prescribe spinal orthoses in outpatients suffering from VFFs, albeit this therapeutic intervention is not fully supported by evidence, partly due to the large gap in the current literature.

P843

### BONE HEALTH AND ORAL HYGIENE STATUS IN A COHORT OF BREAST CANCER WOMEN BEFORE STARTING ANTI-OSTEOPOROSIS THERAPY: CROSS-SECTIONAL STUDY

A. De Sire<sup>1</sup>, M. Ferrillo<sup>2</sup>, C. Cisari<sup>3</sup>, P. L. Foglio Bonda<sup>4</sup>, M. Migliario<sup>4</sup>, M. Invernizzi<sup>3</sup>

<sup>1</sup>Dept. of Medical and Surgical Sciences, University of Catanzaro "Magna Graecia", Catanzaro, <sup>2</sup>Dept. of Surgical Sciences, University of Turin, Turin, <sup>3</sup>Dept. of Health Sciences, University of Eastern Piedmont, Novara, <sup>4</sup>Dept. of Translational Medicine, University of Eastern Piedmont, Novara, Italy

**Objective:** To assess bone health and oral hygiene status in a cohort of breast cancer (BC) women before starting an anti-osteoporosis therapy for their cancer treatment-induced bone loss.

**Methods:** In this observational cross-sectional study, we recruited postmenopausal women with a diagnosis of invasive BC surgery performed at least 12 months earlier, undergoing tamoxifen or aromatase inhibitors adjuvant hormone therapy. The following data regarding bone health were also collected: previous femoral and vertebral fragility fractures, lumbar spine (LS) and femoral neck (FN) BMD, Fracture Risk Assessment tool (FRAX<sup>®</sup>) major and hip fractures risk, and serum levels of 25-hydroxyvitamin D (25(OH)vit. D), calcium, PTH, and alkaline phosphatase. Furthermore, all participants underwent a specialistic oral health evaluation, including the following outcomes: Decayed, Missing and Filled Permanent Teeth Index; Oral Hygiene Index (OHI), and Plaque Control and Record Index.

**Results:** Out of 128 subjects recruited, 122 postmenopausal BC women (mean aged 55.6±10.4 y) were included in the final analysis. The mean LS BMD was 1.049±0.147 g/cm<sup>2</sup>, whereas the mean FN BMD was 0.747±0.109 g/cm<sup>2</sup>; 23% of BC women had osteoporosis and 52.5% had osteopenia. the mean serum level of 25(OH)vit.D was 23.9±16. ng/ml, and 89 patients (72.9%) reported hypovitaminosis D ([25(OH)vit.D] <30 ng/ml). The OHI showed that only 11.5% (n=14) had good oral hygiene while 35.3% had a sufficient oral health and 53.2% (n=65) had an insufficient status. There were no statically significant correlations (p>0.05) among oral health indexes and BMD or vitamin D status.

**Conclusion:** BC women had high prevalence of osteopenia/osteoporosis, hypovitaminosis D, and a very high prevalence of mild/moderate periodontitis and low oro-dental care. This study might be a starting point for future works investigating the correlation between BC, osteoporosis and oral health to define a patient-oriented multidisciplinary management.

P844

### USE OF THE SERGI EQUATION TO ESTIMATE THE APPENDICULAR MUSCLE MASS IN THE MEXICAN POPULATION: AN EXPLORATORY STUDY

J. Morales Vargas<sup>1</sup>, J. L. Morales Torres<sup>1</sup>, P. V. Miranda Alatraste<sup>2</sup>, A. G. Guadian Moreno<sup>1</sup>, J. Pesqueira Ornelas<sup>1</sup>

<sup>1</sup>Morales Vargas Centro de Investigación SC, León, <sup>2</sup>Instituto Nacional de Ciencias Médicas Salvador Zubirán, Mexico, Mexico

**Objective:** Sarcopenia is the age-related loss of skeletal muscle that can result in decreased muscle strength and physical performance. To make the diagnosis, evaluation of muscle mass is recommended through measurement of appendicular muscle mass (AMM) and appendicular muscle mass index (AMMI). In Mexico, access to DXA devices is limited, so it is necessary to develop new ways to identify subjects with low AMM. This study aimed to evaluate the concordance between the Sergi equation and the DXA measurement to estimate the appendicular muscle mass in the Mexican population.

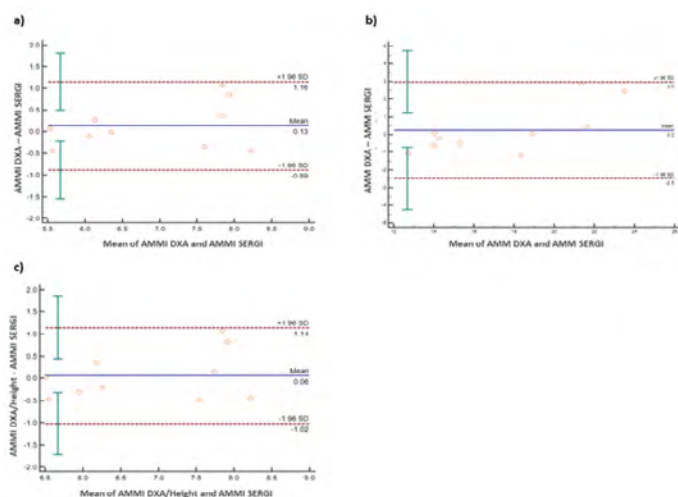
**Methods:** Cross-sectional study design. Participants: 5 men and 5 women residents of León, Mexico. Measurements: height, weight and hand grip strength were evaluated. A body composition analysis was done by bioelectric impedance analysis (BIA) and by DXA.

**Results:** Table presents the characteristics of the study subjects. A good correlation was found between AMM DXA and AMM Sergi (r=0.971, p<0.000), AMMI DXA and AMMI Sergi (r=0.90, p<0.000) and AMMI DXA/Height and AMMI Sergi (r=0.888 p<0.001). Through the Bland Altman analysis, good agreement was found between the variables (Figure). The ICC was obtained to evaluate the concordance between AMM DXA and AMM Sergi (ICC=0.9672, 95%CI 0.8680 to 0.9919), AMMI DXA and AMMI Sergi (ICC=0.9407, IC 0.7614 to 0.9853), AMMI DXA / Height and AMMI Sergi (ICC=0.9335, IC 0.7324 to 0.9835).

**Conclusion:** The findings of this study confirm, in a preliminary way, that the Sergi equation presents a good agreement with the DXA analysis to estimate AMM in older Mexican adults. In Mexico, its use can make the diagnosis and follow-up of patients with sarcopenia more accessible.

Table.

Descriptive Statistics	All, mean (+/- SD) n=10	Men mean(+/-SD) n=5	Women mean (+/- SD) n=5
Age	69.8 (+/-6.44)	72 (+/-6.44)	67 (+/-1.34)
Weight	66.23 (+/-11.21)	74.06 (+/-9.11)	58.40 (+/-6.84)
Height	158.53 (+/-7.47)	162.98 (+/-7.74)	154.08 (+/-4.0)
BMI	26.35 (+/-3.69)	27.98 (+/-3.63)	24.73 (+/-3.31)
Arm. Circ.	30.09 (+/-2.93)	31.18 (+/-2.41)	29.00 (+/-3.25)
Tricipital fold	21.15 (+/-5.73)	19.6 (+/-5.22)	22.70 (+/-6.37)
Max. Strength	25.7 (+/-6.41)	28.2 (+/-7.98)	23.20 (+/-3.63)
AMM DEXA	17.51 (+/-4.39)	21.20 (+/-2.85)	13.81 (+/-1.04)
AMM SERGI	17.26 (+/-3.35)	20.25 (+/-1.51)	14.27 (+/-0.825)
AMMI DEXA	7.00 (+/-1.19)	8.08 (+/-0.25)	5.92 (+/-0.47)
AMMI SERGI	6.77 (+/-0.93)	7.4 (+/-0.93)	6.15 (+/-0.38)
AMMI DEXA/Height	6.89 (+/-1.19)	7.96 (+/-0.44)	5.82 (+/-0.430)
Resistance	546 (+/-77.85)	492.48 (+/-62.60)	599.64 (+/-50.40)
Reactance	54.65 (+/-13.62)	52.06 (+/-18.18)	57.24 (+/-8.37)
Phase Angle	5.99 (+/-1.25)	5.92 (+/-1.42)	6.06 (+/-1.22)
Resistance Index	47.37 (+/-10.81)	54.95 (+/-10.37)	39.80 (+/-3.52)



P845

### HYPERTHYROID MEN HAVE REDUCED GLOBAL STRENGTH OF THE PROXIMAL FEMUR IN 3D-SHAPER ANALYSIS

A. P. Barbosa<sup>1</sup>, M. R. Mascarenhas<sup>1</sup>, R. Winzenrieth<sup>2</sup>

<sup>1</sup>Faculty Medicine University Lisboa, Lisboa, Portugal, <sup>2</sup>Galgo Medical SL, Barcelona, Spain

**Objective:** Hyperthyroidism is an important cause of secondary osteoporosis and fragility fractures because it induces bone loss, mainly cortical. The 3D-SHAPER software incorporates a model-based algorithm to analyze the bone in 3D from a standard DXA scan, allowing the study of both trabecular and cortical compartments of the proximal femur. This study aimed to analyze both cortical and trabecular compartments of the proximal femur in men with hyperthyroidism.

**Methods:** A group of 21 men aged <50 y with nontreated hyperthyroidism was paired by age and height with a control group (n=21). The BMD (g/cm<sup>2</sup>) at the lumbar spine and at the proximal femur were evaluated by DXA (QDR DiscoveryW, Hologic, EUA). The 3D analysis of the DXA scans was done with the software 3D-SHAPER v2.10 (Galgo Medical, Spain) and evaluated several parameters namely vBMD integral total (mg/cm<sup>3</sup>), vBMD integral neck (mg/cm<sup>3</sup>), and neck Z (cm<sup>3</sup>). Adequate statistical tests were used according to parameter normality distribution, significance P<0.05.

**Results:** The mean age and height were identical. The means (±SD) of the BMD, integral and neck vBMD and neck Z are described in Table.

Groups	CONTROL (n=21)	HYPERTHYROIDISM (n=21)	P
Lumbar spine BMD g/cm <sup>2</sup>	1.093 (±0.1)	0.981 (±0.1)	0.007
Proximal femur BMD g/cm <sup>2</sup>	1.094 (±0.1)	0.973 (±0.1)	0.005
vBMD Integral Total mg/cm <sup>3</sup>	359.7 (±55.5)	318.4 (±46.2)	0.012
vBMD Integral Neck mg/cm <sup>3</sup>	431.2 (±78.7)	381.9 (±55.4)	0.024
Neck Z cm <sup>3</sup>	1.24 (±0.32)	1.04 (±0.25)	0.037

**Conclusion :** This study of men with nontreated hyperthyroidism aged <50 y showed a significant decrease of the BMD at the lumbar spine and at hip. The 3D analysis of the proximal femur highlighted the negative effect of the disease in both cortical and trabecular compartments and so a reduction of the global strength at the proximal femur, which can be risk factors for osteoporotic femur fractures.

P846

### RELATIONSHIP BETWEEN FRAILTY AND FRAX IN PREDICTING FUTURE FRACTURES IN ELDERLY PATIENTS WITH ACUTE HIP FRACTURES

R. Khan<sup>1</sup>, O. Nonyelum<sup>1</sup>, A. Nandi<sup>1</sup>, K. T. Ling<sup>1</sup>, M. Seegoolam<sup>1</sup>, M. Bhaskar<sup>1</sup>

<sup>1</sup>University Hospital of Derby and Burton, Dept. of Medicine for Elderly, Queens Hospital Burton, Burton on Trent, UK

**Objective:** Frailty is common in older patients and has been associated with increased of falls and fractures. FRAX is a WHO fracture risk prediction tool that has been extensively validated in different population groups. It incorporates clinical risk factors for osteoporosis with and without BMD to predict a 10-y probability of sustaining a major osteoporotic fracture and hip fracture. Acute hip fracture patients are frequently frail with an increased risk of falls and fractures but frailty scores are not routinely incorporated into fracture risk assessment tools. Aims: 1. To determine if there is a correlation between frailty and FRAX in predicting 10-y probability of sustaining a major osteoporotic or hip fracture; 2. To assess the impact of gender on this relationship.

**Methods:** A retrospective, cross-sectional analysis of patients admitted with acute hip fracture to a district general hospital was carried out. Anonymized data was manually extracted from electronic records. Rockwood clinical frailty score (CFS) was used to calculate frailty score and FRAX UK (without BMD) was used to calculate fracture risk. Patients younger than 60 y and patients with incomplete data were excluded from analysis. SPSS 27 software was used for statistical analysis. Descriptive statistics was



used to assess baseline characteristics; spearman correlation co-efficient and linear regression were used to determine correlation.

**Results:** 195 patients were included in analysis – 49 males and 146 females. Overall mean age was  $82.3 \pm 8.13$ ; mean age in the males was  $80.6 \pm 7.1$  and in the female patients  $82.8 \pm 8.4$ . There was statistically significant positive correlation between CSF and FRAX overall and in the female patients but not in the men ( $r=0.221$ ;  $p<0.001$ ;  $r=0.481$ ;  $p<0.001$ ;  $r=0.163$ ;  $p=0.163$ ;  $p=0.26$  for major osteoporotic fractures and  $r=0.314$ ;  $p<0.001$ ;  $r=0.440$ ;  $p<0.001$ ;  $r=0.165$ ;  $p=0.26$  for future hip fractures respectively).

**Conclusion:** Frailty is associated with increased 10-y probability of major osteoporotic and hip fractures in elderly female patients with acute hip fractures but not in males.

## P847

### INCREASING THE QUALITY OF LIFE IN PATIENTS WITH OSTEOPOROSIS AND STROKE BY COMBATING SPASTICITY USING INCOBOTULINUMTOXIN A INJECTION

A. M. Bumbea<sup>1</sup>, O. Rogoveanu<sup>1</sup>, V. D. Caimac<sup>1</sup>, A. E. Musetescu<sup>1</sup>, R. Marcu<sup>1</sup>, R. Traistaru<sup>1</sup>

<sup>1</sup>University of Medicine & Pharmacy, Craiova, Romania

**Objective:** Prolonged immobilization of the stroke patient will increase the degree of osteoporosis and the risk of fragility fractures. We aim to increase the quality of life in patients with osteoporosis and stroke by combating spasticity using treatment with incobotulinumtoxin A administered focally intramuscularly with ultrasound guidance.

**Methods:** We studied 34 stroke patients who had a bone density test - DXA score of  $<-2.5$  SD. The study group, 17 patients, received treatment with bisphosphonates, vitamin D3 and incobotulinumtoxin A every 3 months. Patients were monitored for 9 months. The control group, also 17 patients, received only conventional treatment with bisphosphonates and vitamin D3. The evaluation consisted of health-related quality of life assessed using the Romanian version with 15 items. Fall events were counted in each patient during the study.

**Results:** We noticed that the study group received more good scores at the evaluation every 3 months. Functionality has been improved; patient compliance with this treatment has increased. The fall events were reduced to the study group.

**Conclusion:** Using modern methods of spasticity therapy in patients with osteoporosis and stroke has reduced the number of falls and thus the risk of fragility fracture, which demonstrates the effectiveness of this approach in the neurological patient associated with osteoporosis to increase the quality of life.

## P848

### BONE AND THYROID GLAND PATHOLOGY IN RHEUMATOID ARTHRITIS

E. Deseatnicova<sup>1</sup>, V. Frunze<sup>1</sup>, L. Groppa<sup>1</sup>

<sup>1</sup>State Medical and Pharmaceutical University Nicolae Testemitanu, Chisinau, Moldova

**Objective:** To study the presence of osteoporosis and thyroid gland pathology in patients with rheumatoid arthritis (RA) and to determine their correlation with disease activity.

**Methods:** A total of 59 RA patients and 48 non-RA patients were included in the study, with the mean age of  $54.2 \pm 9.6$  and  $55.1 \pm 10.2$  y respectively. To appreciate osteoporosis BMD was measured by DXA, using WHO criteria. The presence of thyroid gland pathology was estimated by TSH, free thyroxine (fT4), antithyroglobulin antibody (TgAb), and antithyroid peroxidase antibody (TPOAb). Disease activity was measured by DAS-28-ESR.

**Results:** Mean disease duration of RA was  $9.6 \pm 5.6$  y. Mean duration of menopause was  $5 \pm 2.6$  y in RA group and  $4.9 \pm 1.8$  y in non-RA group. RA patients were in 89% positive for rheumatoid factor and in 72% positive for antiCCP antibodies. Osteoporosis at the level of hip was confirmed in 41% of cases in patients with RA and only in 17% of cases in control group, while osteoporosis at the level of lumbar spine was more common for non-RA patients in 48 vs. 13% in RA. Clinical hypothyroidism was reported in 20.33% patients with RA and 2.08% without RA. Clinical hyperthyroidism was found in 3.38% patients with RA patients. Subclinical hyperthyroidism was reported in 11.86% patients with RA and in 4.16% patients without RA. Subclinical hypothyroidism was reported in 3.38% patients with RA and in 2.08% patient without RA. Total of 30.5% patients with RA and 4.16% patients without RA had TgAb, while TPOAb were found in 37.28% patients with RA and in 6.25% patients without RA. ESR ( $35.5 \pm 24.2$  vs.  $18.4 \pm 5.0$  mm/h) was significantly higher in patients RA. Low disease activity was found in 3.39% patients, moderate disease activity was in 20.34% patients, high disease activity was in 76.27% patients. High disease activity positively correlated with the presence of osteoporosis and thyroid gland pathology ( $r=0.58$  and  $r=0.34$ , respectively), at the same time the presence of thyroid gland pathology was associated with lower BMD.

**Conclusion:** The relationship between RA and osteoporosis was confirmed, while concomitant thyroid pathology contributed to more evident loss of BMD. Bone loss at hip level was more characteristic for RA. Presence of both osteoporosis and thyroid gland pathology correlated with high disease activity by DAS28-ESR.

P849

### VITAMIN D STATUS IN POSTMENOPAUSAL WOMEN WITH PRIMARY HYPERPARATHYROIDISM

E. V. Brutsкая-Stempkovskaya<sup>1</sup>, A. P. Shepelkevich<sup>1</sup>, Y. V. Dydyshka<sup>1</sup>

<sup>1</sup>Belarusian State Medical University, Minsk, Belarus

**Objective:** To study the vitamin D status in postmenopausal women with primary hyperparathyroidism (PHPT).

**Methods:** We studied 52 postmenopausal women with PHPT (the main group), average age 64.4±7.592 y. The control group was 52 postmenopausal women without PHPT, average age 62.3±6.287 y in physiological menopause. Examination: total calcium, phosphorus, albumin, creatinine, PTH, 25(OH)D, BMD measurements by DXA, LVA.

**Results:** There were no differences in the age, height, weight, BMI, age of menopause starting, duration of menopause in both groups. The level of vitamin D in postmenopausal women with PHPT was significantly lower (15.9 (10.8-21.1) ng/ml) in comparison with the control group (20.9 (16.5-24.6) ng/ml, U=944.0, p=0.014). The vitamin D level >30 ng/ml in the main group was detected in 9.6% cases, in the control group – 15.4% ( $\chi^2=0.79$ , p=0.374). The vitamin D level 20-29 ng/ml in the main group was detected in 19.2% cases, in the control group – 48.1% ( $\chi^2=9.69$ , p=0.0019). The vitamin D level <20 ng/ml in the main group was detected in 71.2% cases vs. the control group 38.5% ( $\chi^2=11.22$ , p=0.0008).

Significant increase of the vitamin D deficiency (<20 ng/ml) was found in postmenopausal women with PHPT in comparison with the control group.

**Conclusion:** The results of the study detected the significant increase of the vitamin D deficiency (<20 ng/ml) in postmenopausal women with PHPT in comparison with the control group.

P850

### VERTEBRAL FRACTURES IN PATIENTS WITH HIP FRACTURE

S. Dinis<sup>1</sup>, A. S. Pinto<sup>1</sup>, F. Santos<sup>1</sup>, L. Matos<sup>2</sup>, C. Pontinha<sup>3</sup>, P. Rocha<sup>3</sup>, G. Monteiro<sup>3</sup>, I. Neves<sup>3</sup>, A. R. Batista<sup>3</sup>, S. Anunciação<sup>3</sup>, C. Vaz<sup>1</sup>, J. Ferreira<sup>1</sup>

<sup>1</sup>Rheumatology Dept., Local Health Unit of Guarda, <sup>2</sup>Nutrition Dept., Local Health Unit of Guarda, <sup>3</sup>Orthopedics ward, Local Health Unit of Guarda, Guarda, Portugal

**Objective:** Vertebral fractures (VF) are the most common fragility fractures and despite its value as a powerful predictor of future fracture risk and mortality are often undiagnosed. This study aimed to assess the prevalence of undiagnosed VF in a cohort of hip fracture patients.

**Methods:** We retrospectively identified all hip fractures admitted to our fracture liaison service (FLS) between January 2017 and August 2020. Spine images and clinical reports of this patients were reviewed. The data was analysed using SPSS version 27.

**Results:** From a total of 162 patients who were admitted to our FLS, we included 90 referred because of hip fracture. 84% were female with a mean age of 80.4 y (SD: 7.7). Of the 49 (54.4%) patients who had spine images available for analysis, 26 (53.1%) had a VF on imaging review. Among these 26 patients, only 2 (7.7%) had previously diagnosed VF and 6 (23.1%) had symptoms suggestive of fracture. The majority (92.3%) of patients who had radiological evidence of VF were previously undiagnosed.

**Conclusion:** Patients with hip fracture admitted to our FLS had a high prevalence of undiagnosed spine fractures. This highlights the need for a screening strategy for the presence of VF in hip fracture patients in order to identify those at greatest risk and offer an appropriate treatment at earlier stages.

P851

### FRAGILITY FRACTURES IN MEXICO: BEST PRACTICE PROPOSAL THROUGH FRACTURE LIAISON SERVICES (FLS)

L. Mendez-Sanchez<sup>1</sup>, P. Clark<sup>1</sup>, M. Caló<sup>2</sup>, M. K. Javaid<sup>3</sup>, FLS Mexico Group<sup>4</sup>

<sup>1</sup>Unidad de Epidemiología Clínica, Hospital Infantil de México Federico Gómez. Facultad de Medicina, Universidad Nacional Autónoma de México (UNAM), Mexico city, Mexico, <sup>2</sup>International Osteoporosis Foundation, Oficina regional para América Latina, Buenos Aires, Argentina, <sup>3</sup>The Botnar Research Centre, Nuffield Dept. of Orthopaedics, Rheumatology and Orthopaedic Sciences, University of Oxford, Oxford, UK, <sup>4</sup>G Aguilar-Esparza, P. Clark, R Coronado-Zarco, M. K. Javaid, F Medina-Rodríguez, L Méndez-Sánchez, A Olascoaga-Gómez de León, E Ramírez-Pérez, E Reyes-Padilla, B. I. Sánchez-Trampe, R Torres-González, J. M. Viruega-Avalos., Mexico city, Mexico

In Mexico, the fragility fractures (FF) represent a public health problem; recent reports state rates of almost 2,000 cases for every 100,000 inhabitants with an expected sevenfold increase by 2050 (Clark.P-2005). Hip fracture cases will go up from 155,875 to 226,886 in 2050 (5.2 to 7.2 times more than those registered in 2005) (Johansson.H-2011). According to ICUROS-Mx study mortality after FF was 20.2%. Quality of life after FF is affected significantly (Borgstrom.F-2013). The costs related with the handling of nonpharmacological low bone mass (osteopenia), osteoporosis and FF are high in our country; they reach over 5,191 million (MXP) in 2010 and \$ 7,575 million pesos in 2020 (Carlos.F-2013).

The Mexican health care system comprises two sectors: public and private, offers coverage to 82.2% of the 119.5 million inhabitants registered in that year. An example is Instituto Mexicano del Seguro Social (IMSS) Victorio-de-la-Fuente-Narváez where the traumatology unit alone will require a budget greater than

315,000,000 million (MXP) per year as per 2050 forecasts. We show the direct costs derived from the most frequent FF according to the Group Related Diagnosis (GRP) published in 2017 by the IMSS with costs updated to 2020 (Gilma.A-2014).

Fracture Liaison Services (FLS) with a worldwide successful experience for the care of FF patients offer diverse and feasible models enable to adapt to different Health Systems settings. The aim of this review is to put forward the possible implementation of the International Osteoporosis Foundation (IOF) Capture the Fracture® program in Mexico.

The initial experience in the implementation of the Capture the Fracture program in diverse Mexican institutions shows us that this program is feasible of being adapted for being implemented in countries with fragmented health system such as Mexico.

The fishbone diagram below (Figure 1) lists the barriers impacting the development of FLSs in Mexico. These barriers include a series of factors required for an effective and efficient FLS. All these factors were exacerbated by the COVID-Sars2.

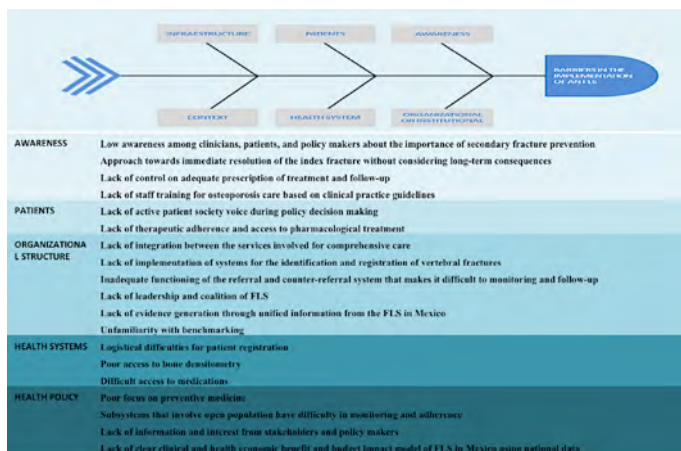


Figure 1. Barrier for FLS implementations in Mexico.

**Conclusion:** Fragility fractures represent a health problem in Mexico and in the world. This study reviews and puts forward the implementation of FLS as a feasible and cost-effective alternative in health institutions in our country.

**Disclosure:** MKJ has received honoraria and grant support from Amgen, UCB and Kyowa Kirin Hakin.

P852

## TREATMENT OF OSTEOPOROSIS WITH TERIPARATIDE

E. Alddafari<sup>1</sup>, E. Tabti<sup>1</sup>, Z. Zetla<sup>1</sup>, A. Lounici<sup>1</sup>

<sup>1</sup>Dept. of Internal Medicine, Diabetes Research Lab, Medical Center University of Tlemcen, Faculty of Medicine, University of Tlemcen, Tlemcen, Algeria

**Objective:** Teriparatide is recombinant human PTH analog (1-34) [rhPTH(1-34)] indicated for treatment of patient with osteoporosis associated with high risk for fracture due to sustained systemic glucocorticoid therapy, postmenopausal women and increase of bone mass in men with primary or hypogonadal osteoporosis. This work is to study the clinical profile of patients with osteoporosis treated with teriparatide.

**Methods:** 4-y prospective study including patients with osteoporosis treated with teriparatide. Indications for treatment are postmenopausal osteoporosis (PMO), corticoid-induced osteoporosis (CIO), severe osteoporosis. Osteoporosis is defined by a femoral neck T-score and/or lumbar spine  $\leq -2.5$  by DXA. the treatment by teriparatide injection 20 ug/d during 24 months.

**Results:** we collected 18 patients 17 women and 01 men treated with teriparatide, the average age is 56 y among them there 11 cases of CIO, were 4 cases of PMO, 1 case of hyperparathyroidism, and 1 of celiac disease, the underlying pathologies were rheumatoid arthritis (RA) in 5 patients, one case of Gougerot-Sjögren syndrome, 1 case Churg-Strauss syndrome, 1cas of Horton, 2 cases of scleroderma, and 1 case systemic lupus erythromatoes; 8 patients had at least of fracture, 4 of them presented fracture spine. As example from our study, patient with OP CIO with underlying pathologies rheumatoid arthritis the DXA before treatment at femoral neck T-score  $< -2.8$  and, lumbar spine  $< -3.4$  by DXA at 24 months of treatment with teriparatide a which gain femoral neck T-score  $< -0.3$  and, lumbar spine  $< -0.3$ .

**Conclusion:** The majority of our patients treated by teriparatide have a severe osteoporosis complicated with fractures; however the teriparatide can lessen the number of fractures of the spine and other bones fracture related to osteoporosis, or who have several risk factors for fracture.

P853

**EXTRASKELETAL CALCIFICATION AND BONE DISTURBANCES IN HEMODIALYSIS PATIENTS**L. Martynyuk<sup>1</sup>, S. Butvyn<sup>1</sup><sup>1</sup>Ternopil National Medical University, Ternopil, Ukraine

**Objective:** To study the prevalence of disorders of mineral metabolism and parathyroid glands function and to rule out factors which lead to extraskeletal calcification (EC) in chronic kidney disease (CKD) patients receiving hemodialysis.

**Methods:** We examined 157 adults (58 men, 79 women) with CKD 5 stages on hemodialysis, mean age  $51.2 \pm 14.5$  y from a single dialysis center. The laboratory investigations included evaluation of PTH, serum total and ionized calcium, serum phosphate, serum level of alkaline phosphatase concentrations. PTH level in serum was evaluated by solid phase chemiluminescent immunoassay. All patients had undergone Echocardiography examination and lateral abdominal X-ray examination.

**Results:** Overall, 67 (42.67%) of patients had bicuspidal, aortic valve or both valves calcification either peripheral artery calcification. Patients with EC had significantly more prominent disturbances in mineral metabolism compared to group of patients without calcification. Phosphorous concentration in group with EC showed  $2.37 \pm 0.09$  vs.  $1.97 \pm 0.05$ ,  $p < 0.01$  in group without EC. Calcium level was significantly higher in group with EC ( $2.32 \pm 0.05$  vs.  $2.19 \pm 0.02$ ,  $p < 0.05$ ). On the other hand it was not significant difference in PTH level ( $574.16 \pm 119.2$  vs.  $520.78 \pm 50.40$ ,  $p > 0.05$ ). Patients were divided into groups according to KDIGO recommendations for PTH levels in order to establish the association between PTH levels and EC. In patients with low levels of PTH incidence of EC was significantly higher compared to those with target PTH levels (31.34 vs. 12.2%,  $p < 0.05$ ). On the other hand in patients with higher levels of PTH in which it was observed more than 6 times increase of this hormone over the upper limit level, incidence of EC was significantly higher compared to those with PTH within target levels (43.28 vs. 25.6%,  $p < 0.05$ ). In patients with target PTH levels (2 to 6 times increase over the upper limit) incidence of EC was significantly lower compared to those with elevated either decreased PTH levels (25.37 vs. 62.2%,  $p < 0.01$ ).

**Conclusions:** EC is present in 67% of hemodialysis patients and is associated with hypercalcemia and hyperphosphatemia. Both low and increased levels of PTH contribute significantly in development of EC in dialysis patients compared to those with target PTH levels.

P854

**CONSUMPTION OF SEVERAL MACRO-, MICROELEMENTS AND VITAMIN D BY PERIMENOPAUSAL AGE FEMALES WITH ARTERIAL HYPERTENSION**L. Kezhun<sup>1</sup><sup>1</sup>Grodno State Medical University, Grodno, Belarus

**Objective:** To evaluate the dietary body supply with macro-, microelements and vitamin D and their interrelation with endothelial function in perimenopausal period women with arterial hypertension (AH).

**Methods:** We investigated 102 women of the perimenopausal period with AH stage II aged 50 (46; 52): group I – 41 women without endothelial dysfunction (ED), group II – 61 women with ED. ED was diagnosed in endothelium dependent vasodilatation (EDVD) assessed by computed impedancemetry during reactive hyperemia test when  $\Delta dz/dt < 12\%$  was related to ED. The levels of nitrate/nitrites (NO) in blood plasma were determined by spectrophotometry using Griess reagent. The evaluation of calcium (Ca), phosphorus (P), magnesium (Mg), sodium (Na), molybdenum (Mo) and vitamin D consumption was performed by the analysis of actual 3 d food intake.

**Results:** EDVD in group I was  $39.2(30.3; 53.3)\%$ , in group II –  $12.7(-22.8; 0.3)\%$ , ( $p < 0.01$ ). The level of NO in blood plasma was higher ( $p = 0.01$ ) in group I – 23.4 (14.4; 32.8) as compared to group II – 12.5 (9.4; 21.5) mmol/l. Women in groups I and II showed verifiable difference in P consumption 975.8 (811.8; 1228.5) vs. 875.4 (710.2; 1044.4) mg/d ( $p = 0.04$ ); Mg – 242.6 (217.4; 299.8) vs. 221.9 (181.1; 253.7) mg/d, ( $p = 0.02$ ); Na – 1088.6 (626; 1684.5) vs. 816.6 (506.9; 1081.5) mg/d, ( $p = 0.03$ ); Mo – 39.6 (32.5; 57.6) vs. 30.7 (20.1; 42.8) mg/d, ( $p = 0.01$ ), respectively. The Ca consumption (group I – 496.3 (398.3; 668.2) mg/d, group II – 547.5 (331.6; 612.2) mg/d and vitamin D consumption (group I – 0.32 (0.16; 1.51) mcg/d, group II – 0.23 (0.08; 1.08) mcg/d) in both groups showed no difference ( $p > 0.05$ ). Group II showed correlation between NO level and P ( $R = -0.28$ ), Ca ( $R = -0.32$ ), Mo ( $R = -0.31$ ) consumption, in group I – between EDVD and Na ( $R = -0.39$ ) consumption, the level of NO and Mg ( $R = -0.37$ ) consumption. Both groups showed established positive correlation between vitamin D consumption and Ca, P intake.

**Conclusion:** In women of the perimenopausal period with AH having ED showed verifiable lower P, Mg and Mo dietary consumption. The intake of P, Ca, Na and Mg is associated with endothelial function. Deficiency of vitamin D intake with food was revealed in all investigated women with AH.



P855

### A SCIATICA REVEALING A BONE LYMPHOMA: CASE REPORT

A. Gharout<sup>1</sup>, F. Mechid<sup>1</sup>, H. E. Ouelaa<sup>2</sup>, N. Bahaz<sup>1</sup>, N. Zehraoui<sup>1</sup>, H. Hafirassou<sup>1</sup>, C. Dahou-Makhloufi<sup>1</sup>

<sup>1</sup>CHU Mohamed Lamine Debaghine, Algiers, Algeria, <sup>2</sup>CHU Annaba, Annaba, Algeria

**Objective:** Non-Hodgkin's malignant lymphoma (NHML) is rare and difficult to diagnose. The primary bone location represents <5% of NHML. Diffuse large B cell lymphomas are the most common variety, accounting for one-third of all lymphomas. These lymphomas are predominant in men with a peak frequency between the sixth and seventh decades. We report the case of a young women with bone lymphoma revealed by sciatica.

**Case report:** Miss K.M 19 years old, with no particular history, was hospitalized for exploration of bilateral pygalgia which progressed for 1 year accompanied by left S1 sciatica with inflammatory appearance. The general condition was moderate and the clinical examination found rachidian syndrome, pressure pain of the sacroiliacs, hypoaesthesia in the posterior side of the left thigh and a palpable mass at the level of the upper internal quadrant of the right breast. Biology showed inflammatory syndrome, regenerative anemia, moderate acute inflammatory response to serum protein electrophoresis, and severe renal failure. the phosphocalcic balance was normal and the LDH level was high (426 iu/l), Radiographs of the pelvis and spine were normal, MRI of the pelvis revealed bony lesions of the pelvic bones extending to soft muscle tissue and the left S1 root. Bone biopsy with anatomopathological and immunohistochemical study concluded in a diffuse large cell B lymphoma reaching the psoas muscle and infiltrating the bone marrow. As part of the extension workup, a PET scan was performed, showing support for multiple lymphomatous locations: mammary, renal, bone and mediastinal lymphadenopathy. Chemotherapy according to the R-CHOP protocol was recently started in hematology.

**Conclusion:** Primary bone lymphoma is rare, the particularity of our observation lies in the occurrence of this hemopathy in a young woman. Lymphoma is often difficult and late to diagnose. The patient's clinical symptoms and multifocal PET scan were already evidence of an advanced stage of the disease.

P856

### BONE MINERAL DENSITY AND BODY WEIGHT IN POSTMENOPAUSAL WOMEN

A. Fazaa<sup>1</sup>, S. Miladi<sup>1</sup>, S. Bouzid<sup>1</sup>, L. Souabni<sup>1</sup>, S. Kassab<sup>1</sup>, S. Chekili<sup>1</sup>, K. Ben Abdelghani<sup>1</sup>, A. Laatar<sup>1</sup>

<sup>1</sup>Dept. of Rheumatology, Mongi Slim Hospital, Tunis, Tunisia

**Objective:** The variance in BMD is known to be largely regulated by genetic factors. However, other modifiable factors such as BMI might have an impact on bone density.

The aim of this study was to investigate the relation between BMD and body weight in postmenopausal women.

**Methods:** This was a cross-sectional study that included postmenopausal women. Weight (in kg) and height (m) were measured for each patient and BMI (in kg/m<sup>2</sup>) was calculated according to WHO criteria. BMD of lumbar spine (L1-L4) and femoral neck were measured using DXA. Mann-Whitney U-test and Pearson's correlation test were used to investigate the association between the study variables. A 0.05 significance level was considered.

**Results:** 67 postmenopausal women with a mean age of 64.3 (46-91) y were included in this study. 33 women had healthy weight and 34 were overweight or obese. In the healthy weight group, 66.7% of patients had osteoporosis. However, in the overweight or obese group, only 35.5% had osteoporosis. This difference was statistically significant (p=0.001). Mean BMD of lumbar spine was significantly higher in the overweight or obese group compared to the healthy weight group (0.848±0.025 vs. 0.944±0.041; p=0.05). When BMD of femoral neck was measured, no statistically significant difference was found between the two groups (0.742±0.023 vs. 0.823±0.045; p=0.2). BMI was correlated with BMD of lumbar spine (p=0.03; r=0.301) but not with BMD of femoral neck (p=0.343; r=0.138).

**Conclusion:** Postmenopausal women who were overweight or obese had a significantly higher BMD of lumbar spine. Significant positive correlation was also observed between BMI and lumbar spine BMD.

P857

### RELATIONSHIP BETWEEN BONE MINERAL DENSITY OF THE AXIAL SKELETON AND KNEE OSTEOARTHRITIS (PRELIMINARY DATA)

E. A. Taskina<sup>1</sup>, N. G. Kashevarova<sup>1</sup>, E. A. Strebkova<sup>1</sup>, E. P. Sharapova<sup>1</sup>, L. I. Alekseeva<sup>1</sup>, A. M. Lila<sup>1</sup>

<sup>1</sup>V.A. Nasonova Research Institute of Rheumatology, Moscow, Russia

**Objective:** To evaluate the effect of BMD of the axial skeleton on the clinical manifestations and radiological picture of knee osteoarthritis (OA).

**Methods:** The prospective study included 100 women (mean age 59.3±8.6 y.o.) with a reliable diagnosis of I-III Kellgren-Lawrence stage of knee OA (ACR). OA duration was 8(4-12) y. An individual map was filled out for each patient, including anthropometric indicators, anamnesis and clinical, instrumental examination data.

**Results:** Osteoporosis (OP) and/or osteopenia of the axial skeleton were detected in 29% of pts (group 1), normal BMD in 71% (group 2). Pts with reduced BMD were older ( $64.8 \pm 6.6$  vs.  $56.7 \pm 9.9$  y,  $p=0.002$ ), had a greater Me of pain intensity, as well as significantly higher values of stiffness and functional failure (FF) by WOMAC and lower values of the KOOS index (Table). Associations between the stage of OA and total hip BMD ( $\text{g}/\text{cm}^2$ ) were revealed ( $r=0.5$ ,  $p=0.01$ ). The Spearman correlation analysis confirmed positive correlations ( $p<0.05$ ) between decreased BMD (OP and osteopenia) and OA duration ( $r=0.24$ ), age ( $r=0.4$ ), stiffness by WOMAC ( $r=0.32$ ), FF by WOMAC ( $r=0.3$ ), knee pain ( $r=0.3$ ), and negative correlations - weight ( $r=-0.32$ ), KOOS score ( $r=-0.4$ ) and uric acid ( $r=-0.3$ ).

Table. Comparative characteristics of patients with OA and reduced BMD compared to patients with OA and normal BMD

Parameters	Group 1	Group 2	p
Pain VAS, mm	50(40-71)	44(25-51)	0.03
Stiffness WOMAC, mm	105(59-127)	61(40-90)	0.02
FF WOMAC, mm	820(460-1027)	520(289-780)	0.02
KOOS	47 (34-55)	66(47-82)	<0.01

**Conclusion:** The high BMD values in the lumbar spine and proximal femur are more often observed in pronounced stages of OA, and associations between the OA stage and the total hip BMD are confirmed. However, in pts with OP/osteopenia in the axial skeleton, compared women with normal BMD, a more severe course of OA was noted: greater pain intensity, high values of the WOMAC index and low values of the KOOS index.

P858

### CAN THE TREATMENT OF PHEOCHROMOCYTOMAS/PARAGANGLIOMAS REVERSE THEIR NEGATIVE EFFECTS ON BONE METABOLISM?

E. Kardalas<sup>1</sup>, A. Chatzidafni<sup>1</sup>

<sup>1</sup>Evangelisches Krankenhaus Bethesda, Moenchengladbach, Germany

**Objective:** Pheochromocytomas and paragangliomas (combined PPGL) are catecholamine-producing tumors, which are associated with deteriorated bone metabolism (BM), reduced bone mass density (BMD) and secondary osteoporosis. Surgical treatment of PPGLs could reverse these effects and restore the normal bone function. Aim of this study was to evaluate whether BM and BMD significantly improve 12 months after successful treatment of PPGL.

**Methods:** Parameters of BM and BMD in the femoral neck (FN) and the lumbar spine (LS) were evaluated in 67 patients before and 1 y after the surgical treatment of PPGL. 50,7% of the patients

were female with a mean age and BMI of 49.7 y and  $26.7 \text{ kg}/\text{m}^2$  respectively. The main presenting symptom was a pheochromocytoma crisis while PPGL had a mean diameter of 4.8 cm. Regarding comorbidities, 23/67 patients suffered from diabetes mellitus type 2, 38/67 patients had arterial hypertension and 35/67 patients had reduced BMD (27 presented with osteopenia and 8 with osteoporosis).

**Results:** At baseline, mean T-Score in the FN and LS were -1.05 and -0.95 respectively. Mean BMD in FN was 0,78 and in LS 0,84. Regarding BM markers, mean P1NP and BGP values were  $45.67 \text{ } \mu\text{g}/\text{L}$  and  $22.7 \text{ ng}/\text{ml}$  respectively while mean  $\beta$ -CrossLaps value was  $0.55 \text{ ng}/\text{ml}$ . 1 y after surgical treatment of the PPGL, mean T-Score in both the FN and LS was higher, more specifically -0.88 and -0.83 respectively (16% and 12% increase). Equally, mean BMD in both sites was increased. Moreover, both bone formation (mean values of P1NP  $37.76 \text{ } \mu\text{g}/\text{L}$  and of BGP  $22.39 \text{ ng}/\text{ml}$ ) and resorption markers (mean value of  $\beta$ -CrossLaps  $0.39 \text{ ng}/\text{ml}$ ) were decreased. The rise of the number of patients with normal BMD values (43/67 patients, +12%) mirrored the positive effect of PPGL treatment on bone turnover.

**Conclusion:** The results of this study show that PPGL has an often underdiagnosed, though detrimental effect on BM and BMD. Furthermore, this study underlines the rapid improvement of BM and BMD parameters after effective surgical treatment of PPGL. Conclusively, the effects of PPGL on bone tissue health should be taken into consideration and monitored in our routine clinical practice.

P859

### SPONTANEOUS HIP FRACTURE IN PATIENTS TAKING GLUCOCORTICOIDS: TWO CASE REPORTS

L. Franeckova<sup>1</sup>

<sup>1</sup>Military University Hospital Prague, Dept. of Medicine 1st Faculty of Medicine Charles University and Military University Hospital Prague, Prague 6, Czech Republic

**Objective:** Treatment with glucocorticoids causes osteoporosis with loss of bone mass and a higher risk of fractures than is expected on the basis of the measured BMD targeting mainly vertebrae as well as proximal femur. The risk of fractures depends on the daily and accumulated dose of glucocorticoids.

**Case report:** The first case report concerns a 44-year-old female patient with complicated course of Behcet disease treated with immunosuppressive drugs (azathioprine, methotrexate, cyclosporine) and prednisolone at an average dose of 30 mg per day, with preventive application of calcium and vitamin D. After 16 months of treatment the patient started to complain of spontaneously occurring pain in her right groin area disabling her from placing weight on her right lower limb. An x-ray of her right hip did not show any pathological signs. It was recommended that the patient use crutches to reduce weight bearing on her

right lower limb. After 3 weeks a healing basicervical fracture of the femoral neck was confirmed by magnetic resonance and computer tomography. BMD measurements showed a normal value.

The second case history presents a 59-year-old woman treated for giant cell arteritis with prednisolone, without calcium due to established primary hyperparathyroidism. After 7 months of corticoid therapy, she complained of a suddenly occurring pain in her hip and the inability to put weight on it. An x-ray of her hip showed no pathology. All weight bearing was eliminated from the left lower limb. A subcapital fracture of the femoral neck and avascular necrosis of the femoral head were established by magnetic resonance after 2 weeks.

**Conclusion:** Suddenly occurring pain in the hip with no trauma may be a symptom of a spontaneous fracture of the femoral neck or avascular necrosis of the femoral head in patients taking glucocorticoids, despite the fact that x-rays and BMD are normal. Eliminating weight bearing on the affected limb by using crutches is crucial, until the reason for the pain is clarified by magnetic resonance, possibly computer tomography or bone scan. The second case history also proves the possibility of avascular necrosis as a complication of a subcapital fracture of the femoral neck.

## P860

### BONE DENSITY PATTERN IN MULTIPLE MYELOMA

A. Fazaa<sup>1</sup>, S. Miladi<sup>1</sup>, L. Souabni<sup>1</sup>, F. Rouatbi<sup>1</sup>, S. Chekili<sup>1</sup>, S. Kassab<sup>1</sup>, K. Ben Abdelghani<sup>1</sup>, A. Laatar<sup>1</sup>

<sup>1</sup>Dept. of Rheumatology, Mongi Slim Hospital, Tunis, Tunisia

**Objective:** Several studies show a decrease in BMD in multiple myeloma (MM), particularly at the vertebral site. These densitometric data explain the high incidence of fractures not related to tumor lysis during this pathology. This study aimed to evaluate the bone density pattern in patients with MM.

**Methods:** Retrospective study of a series of patients with diagnosed MM (SWOG criteria) and in which a study of BMD over lumbar spine and hip sites was performed (DXA test) before any treatment interfering with bone metabolism. The presence of osteopenia or osteoporosis was based on a lower T-score according to the WHO classification.

**Results:** The diagnosis of MM was defined in 44 patients. A study of BMD was performed in 14 of these patients when diagnosed. The BMD study revealed abnormalities in 11 cases out of 14 (78.5%): these were osteoporosis (n=8) including 5 in the lumbar spine and hip sites, 2 in the lumbar spine and 1 in the femoral site, or vertebral osteopenia (n=3). There were 4 men and 7 women, aged on average 70.5 y [54-81]. All women were menopausal. The MM development pattern corresponded to bone pain (n=5), back pain or inflammatory lumbo-radicular pain (n=4), or vertebral fractures (n=4). In one case the diagnosis was made at a systematic assessment of diffuse osteoporosis. Standard radiographs

showed bone abnormalities for all patients with multilevel compression of vertebrae (n=7) and punched out lytic images (n=7). According to the Durie & Salmon stage, one patient was at stage I, one at stage II and nine at stage III. Six patients had IgG isotype, three patients IgA and two patients had light chain MM.

**Conclusion:** Consistent with the literature data, our study shows that diffuse osteoporosis is common and early in the MM. In parallel with the tumor osteolysis, osteoporosis increases the axial fracture risk. The practice of a systematic study of bone densitometry at the diagnosis of MM will identify patients at risk of vertebral fracture, candidates for chemotherapy and more intensive antiresorptive treatment.

## P861

### BONE MINERAL DENSITY PROFILE IN PSORIATIC ARTHRITIS

A. Fazaa<sup>1</sup>, S. Miladi<sup>1</sup>, S. Bouzid<sup>1</sup>, L. Souabni<sup>1</sup>, S. Kassab<sup>1</sup>, S. Chekili<sup>1</sup>, K. Ben Abdelghani<sup>1</sup>, A. Laatar<sup>1</sup>

<sup>1</sup>Dept. of Rheumatology, Mongi Slim Hospital, Tunis, Tunisia

**Objective:** Juxta-articular osteoporosis is frequent in psoriatic arthritis (PsA). Recent studies have suggested that PsA is associated with general bone density loss. The aim of this study was to evaluate BMD and to determine risk factors of bone rarefaction in psoriatic arthritis patients.

**Methods:** This was a retrospective cohort study of 23 PsA patient. Patients were distributed into three groups: patients with osteoporosis, osteopenia, or normal bone density according to WHO criteria. Results were correlated with demographic data, disease characteristics and laboratory blood tests.

**Results:** 23 PsA patients with a mean age of 55.3 y were included in this study; 6 males and 13 females. Results are summed up in the Table.

	Osteoporosis (n=6; 26%)	Osteopenia (n=7; 30.5%)	Normal bone density (n=10; 43.5%)	P
Mean age	51,16	58.2	48.2	
Sex ratio	1	0.16	0.42	0.448
Mean disease duration (y)	16.6	15.8	6.5	0.1
Mean ESR (mm)	51	33	35	0.608
Mean CRP (mg/l)	8	20	14	0.187

Mean BMI (kg/m <sup>2</sup> )	22.2	31	25.6	0.041
Meno-pause	N=3	N=6	N=4	0.068
Form:				
Axial	N=0	N=1	N=2	0,356
Peripheral	N=3	N=3	N=1	
Combined	N=3	N=3	N=7	
Corticosteroids	N=2	N=6	N=4	0.132
Methotrexate	N=3	N=6	N=9	0.415

**Conclusion:** PsA was associated with osteopenia and osteoporosis. Bone density loss was more important when BMI was low.

## P862

### BMD AND PROXIMAL FEMUR 3D-DXA ANALYSIS IN SYSTEMIC LUPUS ERYTHEMATOSUS AND SPONDYLOARTHRITIS

M. L. Brance<sup>1</sup>, S. Di Gregorio<sup>2</sup>, A. Razzini<sup>3</sup>, A. De Sogos<sup>3</sup>, L. R. Brun<sup>3</sup>

<sup>1</sup>Reumatología y Enfermedades Óseas, Rosario, Argentina, <sup>2</sup>Cetir/Ascires, Barcelona, Spain, <sup>3</sup>Laboratorio de Biología Ósea, Facultad de Ciencias Médicas, UNR, Rosario, Argentina

**Objective:** Chronic inflammation in rheumatoid arthritis (RA), systemic lupus erythematosus (SLE) and spondyloarthritis (SPA) has a negative impact on bone mass even in premenopausal women. Recently we evaluate BMD, sarcopenia and 3D-DXA parameters in RA patients. Aim: to evaluate BMD and cortical and trabecular compartment by proximal femur 3D-DXA analysis in SLE and SPA patients.

**Methods:** Adults SLE (n=13) and SPA (n=15) were included and compared to healthy subjects (n=28) as control group (CG) matched by age, sex and BMI. BMD (g/cm<sup>2</sup>) was measured by DXA (Hologic Discovery Wi) on right femoral neck (FN) and total hip (TH). The 3D-DXA analysis was performed with 3D-Shaper software (v2.9, Galgo Medical, Spain). The cortical BMD (sDens - mg/cm<sup>2</sup>) and trabecular volumetric BMD (trab vBMD - mg/cm<sup>3</sup>) were considered. Data were expressed as mean±SD and p<0.05 was considered significant.

**Results:** 13 SLE patients (age: 47.4±10.1), 15 SPA (11 women, 4 men, age: 53.9±13.1) and 28 CG (age: 50.7±12.1) were included. Biochemical parameter at the moment of BMD: calcium: 9.2±0.5 mg/dl (95%CI 9.0-9.5); phosphate: 3.6±0.6 mg/dl (95%CI 3.5-4.2); 25OHD: 29.8±5.9 ng/dl (95%CI 26.8-34.7); PTH: 26.9±4.5 pg/ml (95%CI 26.3-33.5). No statistical differences were found among

groups (ANOVA, Bonferroni's multiple comparison test): Right FN BMD=CG: 0.795±0.132; LES: 0.718±0.104; SPA: 0.764±0.122; p=ns; Right TH BMD=CG: 0.921±0.127; LES: 0.832±0.126; SPA: 0.909±0.129; p=ns; cortical BMD sDens=CG: 165.4±23.3; LES: 147.8±27.4; SPA: 160.8±27.8; p=ns; trab vBMD=CG: 194.3±43.9; LES: 183.7±47.2; SPA: 179.2±48.0; p=ns. However, patients with LES has consistently lower bone parameters compared with CG (~10%).

**Conclusion:** SLE and SPA patients has no differences in BMD and cortical and trabecular compartment by 3D-DXA compared to controls. A tendency to lower bone mass would seem to be observed in the LES group but a larger number of patients is required to confirm it.

## P863

### CHARACTERIZATION OF PATIENTS WITH CLASSIC FRAGILITY FRACTURES IN A HIGH COMPLEXITY CENTER IN COLOMBIA, 2019

L. K. Hoyos<sup>1</sup>, A. P. González<sup>1</sup>, S. A. Rodríguez<sup>1</sup>, D. F. Fernández<sup>1</sup>, K. T. Rangel<sup>1</sup>

<sup>1</sup>E.S.E Hospital Universitario San Rafael de Tunja, Tunja, Colombia

**Objective:** Osteoporosis is the most common metabolic bone disease, fragility fractures are its most common complication and for many years it has been a disease that has been given little importance in Colombia. Aim: clinically characterize patients older than 50 y, with fragility fractures, treated in a hospital in Colombia.

**Methods:** Observational, descriptive and cross-sectional study. 139 patients with fragility fractures were included.

**Results:** The most frequent types of fractures, in order of prevalence, are: lower radius epiphysis representing 20.7% (n=30), femoral neck 18.6% (n=27) and upper humerus epiphysis with 13, 8% (n=20); 64.8% (n=94) of the population was female, with an average age at the time of the fracture of 73.1(±12.4) y; 56.6% (n=82) of the studied population had some type of comorbidity, the most frequent being type 2 diabetes mellitus, rheumatoid arthritis, kidney failure and cardiovascular disease. It is important to note that only 4.1% (n=6) of the patients had a diagnosis of osteoporosis and only 0.7% (n=1) received treatment, the prescribed treatment was alendronate. The hospital stay was approximately 4.9 (±5.5) d; only 2.8% (n=4) had some type of complication, infectious complications being the most frequent; 2.8% (n=4) required ICU management. 6.9% (n=10) died during hospitalization, while 8.3% (n=11) died 30 d after discharge and 12.4% (n=17) died one year. 11.2% (n=12) had densitometry one year after the fracture; currently 92.5% (n=99) are without medical follow-up for osteoporosis.

**Conclusion:** In Colombia, osteoporosis continues to be a silent disease, so it is important to make medical personnel aware of the need for early intervention, knowing the behavior of this dis-



ease in our population justifies the implementation of programs that have shown a decrease in impact on health and cost. inexpensive like Capture The Fracture.

## P864

### DENSITOMETRIC PROFILE OF THE ELDERLY MAN

S. Miladi<sup>1</sup>, A. Fazaa<sup>1</sup>, F. Ben Messaoud<sup>1</sup>, L. Souabni<sup>1</sup>, M. Sallami<sup>1</sup>, K. Ouenniche<sup>1</sup>, S. Kassab<sup>1</sup>, S. Chekili<sup>1</sup>, K. Ben Abdelghani<sup>1</sup>, A. Laater<sup>1</sup>

<sup>1</sup>Teaching Hospital Mongi SLIM, Rheumatology Dept., La Marsa, Tunisia

**Objective:** To estimate the frequency of osteoporosis (OP) in a cohort of elderly men, then to investigate the particularities of its treatment at this age.

**Methods:** We conducted a retrospective, monocentric study of 59 men older than 65 y. We analyzed their BMD and medical records for risk factors for OP, signs of secondary OP, complications, and drugs received. In the absence of a consensus to define male OP and its border threshold we used the WHO definition as stated for postmenopausal Caucasian women.

**Results:** The mean age of the male was 71.3 y [65-92 y]. 46% of patients were osteoporotic, 32% osteopenic, and 22% had normal BMD. In search of risk factors: low calcium intake was noted in all patients, 3 patients were skinny (all osteoporotic), no patient reported alcohol consumption, 32 were smokers (of whom 87.5% had OP or osteopenia), only 3 patients maintained regular physical activity and they had normal BMD. No patient reported a family history of OP, and 23.7% had a personal history of fracture, including 6 involving the upper end of the femur (UEFF). 36 patients and 21 others had either a disease or a drug predisposing to OP. Therapeutically, 74.5% of the patients were putted on calcium and vitamin D supplementation and 46% were putted on bisphosphonates (2/3 osteoporotic and 1/3 osteopenic). During the follow-up, 7 patients developed new vertebral fractures and 2 patients developed UEFF. One patient died one year after the occurrence of UEFF.

**Conclusion:** Male OP is more common than one would think. Even in the elderly, the search for an etiology or a contributing factor is necessary. Education of elderly men to reduce modifiable risk factors is warranted to avoid OP and its sometimes fatal complications.

## P865

### DATA SUGGESTIVE OF INFLAMMATORY MYOPATHY IN SUBACUTE POST-COVID-19 PATIENTS

A. Olascoaga-Gómez de León<sup>1</sup>, R. Coronado-Zarco<sup>1</sup>, C. Hernández-Díaz<sup>1</sup>, K. Zarco-Ordoñez<sup>1</sup>, N. C. Centeno-Morales<sup>1</sup>, L. E. Quintanar-Trejo<sup>1</sup>, X. López-Megchun<sup>1</sup>, A. Y. A. Aragón-Hernandez<sup>1</sup>, J. Quinzanos-Fresnedo<sup>1</sup>

<sup>1</sup>Instituto Nacional de Rehabilitación, Mexico, Mexico

**Objective:** Identify muscle inflammatory pattern in subacute post-COVID-19 patients with musculoskeletal ultrasound. To analyze the association between echogenicity of the rectus femoris and grip strength in post-COVID19 patients.

**Methods:** An observational cross-sectional study was conducted in patients in a subacute post-COVID-19 state. BMI was evaluated, dominant/nondominant grip strength was evaluated using Jamar dynamometer; cross-sectional area and angle of penetration of the bilateral rectus femoris were measured by MSK ultrasound; by image analysis with ImageJ software, the mean echogenicity of the cross-sectional area of the rectus femoris was calculated. For echogenicity, a cutoff point of 130 was established for suggestive cases if it was bilateral, and suspicious if it was unilateral. Central tendency and dispersion were calculated for quantitative variables, frequencies and percentages for qualitative variables. Correlations were made with Pearson's p, and the chi-square test for qualitative variables. The protocol was submitted to the research and ethics committee.

**Results:** 44 patients (25 women, 19 men) were analyzed, with a mean age of 41.1 y (SD 12.7; range 18-68). The BMI had a mean of 27.29 (SD 5.03; range 18-41.1). The grip strength of the dominant hand was 30.5 mmHg ( $\pm 9.9$ ), the nondominant hand was 29.2 mmHg ( $\pm 9.9$ ). For the cross-sectional areas and the angle of peneation right and left of the rectus femoris 5.6 cm<sup>2</sup> ( $\pm 2.3$ ) and 5.6 cm<sup>2</sup> ( $\pm 2.1$ ), and 8.4° ( $\pm 2.6$ ) and 8.6° ( $\pm 3.3$ ) respectively. The echogenicity of the rectus femoris right and left was 100 ( $\pm 29.7$ ) and 127 ( $\pm 32.2$ ) respectively. Dominant and nondominant grip strength positively correlated with bilateral cross-sectional areas ( $r=0.478$  and  $r=0.514$ ;  $p=0.001$  and  $p=0.001$ ). The dominant grip strength showed a negative correlation with the right rectus femoris echogenicity ( $r=-0.459$ ;  $p=0.002$ ). By echogenicity, 5 cases were identified as suggestive and 7 suspicious, no statistical significance was found when correlated with the Borg scale ( $p=0.38$  and  $p=0.441$ ).

**Conclusion:** Data suggestive of inflammatory myopathy were identified through musculoskeletal ultrasound, which may represent a useful and low-cost tool for the study of post-COVID-19 sequelae. Grip strength decreased in relation to the intensity of muscle echogenicity in postCOVID-19 patients. It was observed that the greater the grip force, the greater the cross-sectional areas of the rectus femoris muscle. The greater the grip strength, the greater the cross-sectional area of the rectus femoris was observed.

P866

# ANXIETY LEVEL IN PATIENTS WITH OSTEOARTHRITIS OF TEMPOROMANDIBULAR JOINT VALIDATED BY CONE BEAM CT

T. Badel<sup>1</sup>, D. Zadavec<sup>2</sup>, S. Kocijan Lovko<sup>3</sup>, S. Anić Milošević<sup>1</sup>, I. Savic Pavicin<sup>1</sup>, V. Jerolimov<sup>4</sup>, L. Krapac<sup>5</sup>

<sup>1</sup>School of Dental Medicine, <sup>2</sup>Clinical Hospital Center Sestre milosrdnice, <sup>3</sup>Psychiatry Hospital Sv Ivan, <sup>4</sup>Croatian Academy of Sciences and Arts, <sup>5</sup>Academy of Medical Sciences of Croatia, Zagreb, Croatia

**Objective:** To determine the association of clinical signs of TMJ osteoarthritis with patients' anxiety and with the duration of pain before the first examination.

**Methods:** From 2001- 2011, a total of 112 patients were treated for osteoarthritis, which has been diagnosed by means of MRI. This study included patients (n=53, mean age 47.7±17.2 y; 96.2% female) with further confirmed osteoarthritis using cone beam CT (CBCT). All patients had painful symptoms of TMJ, with or without sounds and with limited mouth opening. The clinical diagnostics included RDC/TMD Axis I and manual functional analysis of the stomatognathic system. The psychological assessment was carried out by Spielberger's State-Trait Anxiety Inventory (STAI). The radiological analysis by CBCT included an assessment of bone changes of cortical and subchondral bone of TMJ joint surfaces. The control group included the students of the School of Dental Medicine (n=50, mean age 23.8±2.0 y; 76% female) without asymptomatic disc displacement and OA changes (confirmed by MRI) for anxiety variables and mouth opening measurements.

**Results:** The control group was younger than the group of patients (p=0.003), had a higher rate of mouth opening and a lower rate of anxiety compared to patients, which was statistically significant. The mean pain on the VAS scale was 6.2±1.3. Radiological signs of osteoarthritis of painful joints independent of the body side (n<sub>joints</sub>=62) included deformities caused by: generalized sclerosis and hypertrophy of bone surfaces, erosion of cortical bone, formation of subchondral cysts, osteophyte formation and bone particle findings within the joint. The analysis of sounds (average pain on VAS) showed crepitation in 45.2% (VAS=5.9±1.4), clicking in 25.8% (VAS=6.2±1.3) of joints, and without any pathological sounds there were 29% (VAS=6.7±1.1) of diseased joints (n<sub>joints</sub>=62, p=0.126). The difference in the occurrence of bruxism (p=0.238) between patients (45%) and students (32%) was not found. However, a significantly higher anxiety on STAI 2 (p=0.029) was found in patients with bruxism. These patients suffered pain before the first examination, on average/median 26±67.1/10 (range: 0.2-456) months, thus showing a significant association with higher levels of anxiety on STAI 1 (p=0.045) and STAI 2 (p=0.034).

**Conclusion:** CT diagnosis is considered the gold standard for detection of bone deformities because the interpretation of the variable finding implies the identification of osteoarthritic changes in the TMJ with an unclear clinical finding.

P867

# EFFECT OF GYNAECOLOGICAL HISTORY IN BONE MINERAL DENSITY IN WOMEN WITH RECENT FRACTURE

A. S. Pinto<sup>1</sup>, F. Cunha Santos<sup>1</sup>, S. Paiva-Dinis<sup>1</sup>, L. Matos<sup>1</sup>, C. Pontinha<sup>1</sup>, P. Rocha<sup>1</sup>, G. Monteiro<sup>1</sup>, I. Neves<sup>1</sup>, A. R. Batista<sup>1</sup>, S. Caseiro Anunciação<sup>1</sup>, C. C. Vaz<sup>1</sup>, J. F. Ferreira<sup>1</sup>

<sup>1</sup>Unidade Local de Saúde da Guarda, Guarda, Portugal

**Objective:** To verify if gynaecological history is related to BMD in patients with osteoporotic fracture.

**Methods:** We perform a retrospective study of patients followed in our fracture liaison service, from January of 2017 until February 2020. Descriptive statistics of continuous variables were reported as mean±SD if normally distributed or as median and quartiles if non-normally distributed. Descriptive analysis of categorical variables were displayed as frequency or proportions. It was done a multivariate logistic regression with controlling of age and BMI.

**Results:** 72 female patients were included, with a mean age of 76.01 (±10.42) y, BMI mean of 25.77 kg/m<sup>2</sup> (±4.76). Menarche age of 13.14 (±1.73) y, menopause mean age of 48.23 (±5.48) y and parity mean of 2.28 (±1.56). In lumbar spine, 47.5% presented osteoporosis by BMD and 31.1% osteopenia; in femoral neck, 47.4% presented osteoporosis and 35.1% osteopenia. After multivariate logistic regression (Table 1), it was found that menarche age over 14 y and fertility years over 35 y were protectors against loss of BMD. Menopause age ≤45 y showed to be a predictor of osteoporosis. When we evaluated BMD of the femoral neck (Table 2), high parity showed to be a protector and menarche age ≥14 y is a predictor of osteoporosis.

**Conclusion:** Menarche age has shown controversial data concerning BMD; this study has shown similar results to those published by Ho, S.C. Prolonged duration of fertility period and late menopause has been pointed as protector factors of BMD in diverse studies. Other studies have shown controversial data about the relation of parity and BMD.

Table 1. Multivariate logistic regression with age and BMI control, in BMD of the lumbar spine.

Variables	B	Osteopenia (T-score lumbar)	B	Osteoporosis (T-score lumbar)
<b>Parity</b>				
≤2	Reference	Reference	Reference	Reference
≥3	-0.270	p=0.780	-1.101	p=0.170

<u>Menarche age</u>				
<14 y	Reference	Reference	Reference	Reference
≥14 y	0.631	p=0.980	-18.943	p<0.001
<u>Menopause age</u>				
≤ 45 y	-1.013	p=0.480	17.347	p<0.001
>45 y	Reference	Reference	Reference	Reference
<u>Last delivery age</u>				
≤ 35 y	Reference	Reference	Reference	Reference
>35 y	0.924	p=0.357	2.159	p=0.053
<u>Fertility duration</u>				
≤ 34 y	Reference	Reference	Reference	Reference
35-40 y	0.983	p=0.341	-16.123	p<0.001
>40 y	1.266	p=0.391	-16.778	p<0.001

Table 2. Multivariate logistic regression with age and BMI control, in BMD of femoral neck.

Variables	B	Osteopenia (T-score femoral neck)	B	Osteoporosis (T-score femoral neck)
<u>Parity</u>				
≤2	Reference	Reference	Reference	Reference
≥3	0.27	p=0.986	-5.358	p=0.015
<u>Menarche age</u>				
<14 y	Reference	Reference	Reference	Reference
≥14 y	-1.253	p=0.336	3.709	p=0.049
<u>Menopause age</u>				
≤ 45 y	Reference	Reference	Reference	Reference
>45 y	20.829	p<0.001	-3.260	p=1.000
<u>Last delivery age</u>				
≤ 35 y	Reference	Reference	Reference	Reference
>35 y	19.112	p<0.001	19.887	p=0.058

<u>Fertility duration</u>				
≤ 34 y	Reference	Reference	Reference	Reference
35-40 y	-22.660	p<0.001	4.468	p=1.000
>40 y	-21.194	p<0.001	1.108	p=1.000

## P868

### PREVENTION OF THE RISK OF SARCOPENIA IN POST COVID-19 ELDERLY PATIENTS

R. D'Amico<sup>1</sup>, E. D'Amico<sup>2</sup>

<sup>1</sup>IRCSS Oasi Troina, Troina, <sup>2</sup>Dept. of Geriatrics Hospital of Patti, Health Authority of Messina School of Medicine, University of Messina, Patti Messina, Italy

**Objective:** To evaluate the effects of combined drug treatment and occupational therapy in the basic instrumental activities of daily life, in physical ability and in the risk for sarcopenia in post COVID-19 elderly subjects.

**Methods:** 7 post COVID-19 elderly people (M 3, F 4, mean age 82 + 6) hosted in an extended care unit were included in the study. The design of the study included tests performed before and after follow-up such as: 1) Mental State Examination (MMSE); 2) Geriatric Depression Scale (GDS); 3) Activities of Daily Living (ADL); 4) Instrumental Activities of Daily Living (IADL); 5) Short Physical Performance Battery (SPPB). SPPB is a combination of a balance test based on 3 increasingly difficult positions, a 4-m walking route and a repeated stand up test aimed at elderly reduced physical ability patients (score ≥5 and ≤9) who are therefore classified as fragile and at risk of disability. The subjects of the study showed: 1) Mean MMSE score was 23.7±8.3; 2) Mean GDS score was 13±1.8. In the group 3 subjects showed an ADL score <3, 6 had IADL <4. All subjects were specifically treated pharmacologically for comorbidities. Through SPPB evaluation we detected a mean score of 6 in physical ability. The dedicated nursing focused on personal care (hygiene and clothing): mild help needed, assistance in every phase of the activity; self-assurance (physical and/or psychological) and risk of fall due to low vision and walking difficulty; movement (deambulation and transfer), self-sufficient transfers and supervised walking outside one's room. To improve ADL and IADL a 6-d/week occupational therapy programme was introduced. This focused on teaching patients how to compensate and adapt either physically and socially. Presence or absence of cooperation in ADL is strongly linked to the depression level. This depression is also strongly linked to the evaluation of life quality.

**Results:** Before and after a 2-month follow-up we detected: 1) GDS score 13±1.8 vs. score 8±1.7 (p<0.01); 2) ADL 3/6 score vs. 5/6 score (p<0.01); 3) IADL 4/8 score vs. 6/8 score (p<0.01); 4) SPPB score 6 vs. 8 (p<0.01).

**Conclusion:** The combination of drug treatment and occupational therapy in post COVID-19 patients showed an improvement both in ADL and IADL. We have also linked the increased physical ability to the risk reduction of sarcopenia. The occupational therapist approach was customized in order to make the patients more self-assured and independent.

P869

### COMPARATIVE EVALUATION OF BONE TURNOVER MARKERS IN OVARIETOMIZED DIABETIC RATS TREATED WITH CANAGLIFLOZIN AND LIRAGLUTIDE

N. Timkina<sup>1</sup>, A. Simanenkov<sup>1</sup>, A. Andreeva<sup>1</sup>, A. Shimshilashvili<sup>1</sup>, V. Timofeeva<sup>1</sup>, T. Vlasov<sup>2</sup>, T. Karonova<sup>1</sup>

<sup>1</sup>Almazov National Medical Research Centre, <sup>2</sup>Pavlov First Saint-Petersburg State Medical University, Saint Petersburg, Russia

**Objective:** In menopause (M) there is a high level of BR (bone remodeling), and BMD is decreased. In DM BR is usually low and BMD is normal or high. In women with M and DM BR may develop individually. We investigated bone turnover markers (BTM) in ovariectomized rats with experimental type 2 DM and to compare liraglutide (LIRA) and canagliflozin (CANA) effect on bone metabolism.

**Methods:** Female Wistar rats were subjected to bilateral ovariectomy. Type 2 DM was modelled in some of the rats by high-fat diet and streptozotocin + nicotinamide. The groups were made: "CRL" (control, n=7), "M" (rats after ovariectomy, n=5), "DM" (rats with DM without Tx (treatment) for 12 weeks, n=3), "DM+M" (rats with DM after ovariectomy, n=5), "DM+M+LIRA" (rats with DM after ovariectomy, Tx with LIRA 0.06 mg/kg for 8 weeks, n=5), "DM+M+CANA" (rats with DM after ovariectomy, Tx with CANA 25 mg/kg for 8 weeks, n=5). Blood samples for BTM evaluation were obtained prior to euthanasia.

**Results:** OCL (osteocalcin) was higher in the "CRL" group (16.97 (14.36; 18.19) ng/mL) compared to the "DM", "M", "DM+M" groups. OCL was higher in "DM+M" compared to "DM", but lower than in "CRL" group. OPG (osteoprotegerin) was higher in the "CRL" (12.27 (8.42; 14.65) pmol/L) compared to the "DM", "M", "DM+M". OPG was higher in "DM+M" than "DM", though lower than in "CRL" group. OPG was lower in "DM+M+LIRA" than in "DM+M" (1.7 (1.15; 1.87) vs. 9.1 (6.52; 10.99), p<0.000) and lower in "DM+M+CANA" than "DM+M" (1.88 (1.73; 3.8) vs. 9.1 (6.52; 10.99), p=0.001). The negative effect on OPG level was more pronounced in "DM+M+LIRA" than in "DM+M+CANA" (1.7 (1.15; 1.87) vs. 1.88 (1.73; 3.8), p=0.023). RANKL level was higher in the "M" group compared to "CRL" and "DM+M". There was no difference between "CANA" and "LIRA" groups. The highest Ca (calcium) level was in "DM+M" (2.73 (2.69; 2.89) mmol/L), the significant difference was in comparison to "CRL". Ca was higher in "DM+M+CANA" compared to "DM+M+LIRA" (2.82 (2.69; 2.97) and 2.64 (2.6; 2.73), p=0.09).

**Conclusion:** BR increasing in M manifests in high OCL, OPG, RANKL levels. LIRA treatment is associated with lower OPG and Ca levels than CANA Tx, which might reflect more prominent negative influence of LIRA on bone resorption in M and DM conditions.

P870

### PERCUTANEOUS TREATMENT OF HYPEREXTENSION INJURIES OF THE ANKYLOTIC UPPER THORACIC SPINE: A REPORT OF 2 CASES

M. Baptista<sup>1</sup>, J. Nunes<sup>1</sup>, P. Pinho<sup>1</sup>, P. Cunha<sup>1</sup>, T. Barbosa<sup>1</sup>, C. Correia<sup>1</sup>, P. Varanda<sup>1</sup>, B. Direito-Santos<sup>1</sup>

<sup>1</sup>Dept. of Orthopedic Surgery and Traumatology, Hospital de Braga, Braga, Portugal

**Objective:** Ankylotic spines may result from ankylosing spondylitis or diffuse idiopathic skeletal hyperostosis. Due to increased vertebral rigidity, ankylotic patients have higher risk of unstable spine fractures after lower energy trauma. Thus, hyperextension type fractures of the spine (AOSpine type B3) become common in these patients. Our objective is to report 2 cases of hyperextension type fractures in elder patients with ankylotic spines, successfully treated with isolated percutaneous pedicular screw fixation (PPSF).

**Methods:** The first was a 85-year-old male who suffered a minor fall with thoracolumbar trauma, with no neurological deficits. CT scan and MRI of the spine revealed an ankylotic spine with a transosseous hyperextension fracture at T6 level. Surgical fixation was performed, with PPSF of T4-5-7-8, with no complications observed. The second case was a 72-year-old female, who presented after a fall from a tree (3 m) with posterior thoracic pain and no neurological deficits. Study with CT scan and MRI showed a transosseous hyperextension fracture at T5-T6 levels, in an ankylotic spine, with associated rib fractures. She was treated with PPSF of T3-4-5-6-7-8, having no surgical complications.

**Results:** Both patients presented a quick recovery, regaining autonomous ambulation by the third postoperative day. At last follow-up (3 and 1 y, respectively), both patients reported no pain or late complications. Radiographic evaluation shows complete fracture healing, with no segmental deformities at the fractured level.

**Conclusion:** The safety of PPSF in the upper thoracic spine has been questioned and its usage remains highly controversial in flexion-distraction injuries with ligamentous involvement, for not allowing fusion. However, the soft-tissue ossification in ankylotic patients turns these into purely transosseous hyperextension fractures, which allow complete fracture healing with this minimally invasive fixation, requiring no additional fusion procedures. That, allied to frequently happening in frail elderly patients, makes PPSF an ideal option to safely treat these injuries in neurologically intact cases.



P871

**INFLUENCE OF BARIATRIC SURGERY ON 25-OH-VITAMIN D AND PTH IN OBESE PATIENTS**S. H. Scharla<sup>1</sup>, U. G. Lempert<sup>1</sup><sup>1</sup>Practice Endocrinology & Diabetes, Bad Reichenhall, Germany

**Objective:** Obesity is associated with vitamin D deficiency and potential calcium malabsorption. Bariatric surgery is performed for the treatment of obesity with increasing frequency, but may aggravate malabsorption and increase the risk of osteoporosis and fractures. Therefore, supplementation of vitamin D (alongside with minerals and other vitamins) is part of the follow-up program after bariatric surgery. We present data on the vitamin D status and PTH before and after bariatric surgery.

**Methods:** We studied 23 obese patients before bariatric surgery and 25 patients after bariatric surgery. 25-OH-Vitamin D was used as an estimate for vitamin status. 25-OH-vitamin D and PTH were measured by the automated methods of Roche Diagnostics (Mannheim) using a COBAS 411 platform. Clinical Chemistry (calcium, phosphate, alk. phosphatase, creatinine) were measured by routine standard methods. Group differences were evaluated with t-test and Pearson correlation analyses were done.

**Results:** The BMI in the group before surgery was  $49.9 \pm 8.4 \text{ kg/m}^2$ , and after surgery  $34.6 \pm 7.8 \text{ kg/m}^2$  (mean $\pm$ SD),  $p < 0.001$ . The age of the patients was  $40.9 \pm 10.7 \text{ y}$ . 25-OH-vitamin D serum concentrations were  $49.9 \pm 21.8 \text{ nmol/l}$  and  $72.7 \pm 37.3 \text{ nmol/l}$  after surgery ( $p < 0.05$ ). The physiological range for 25-OH-vitamin D is 50-125 nmol/l. PTH was  $23.2 \pm 17 \text{ ng/l}$  before surgery and  $36.7 \pm 19.2 \text{ ng/l}$  after surgery ( $p < 0.05$ ), the normal range for PTH being 10-65 ng/l). There was a significant negative correlation between BMI and 25-OH-vitamin D in patients before surgery ( $r = -0.46$ ,  $p = 0.03$ ). After surgery, this relationship was not significant anymore ( $r = 0.17$ ,  $p = 0.41$ ). There was no significant correlation between BMI and PTH. 25-OH-vitamin D and PTH were negatively correlated. This correlation was not significant before surgery ( $r = -0.36$ ,  $p = 0.09$ ), but after surgery ( $r = -0.39$ ,  $p = 0.05$ ).

**Conclusion:** Obese patients displayed vitamin D insufficiency, as has been described in former studies. The vitamin D status was significantly improved after bariatric surgery, which resulted also in a substantial weight loss. Since 25-OH-vitamin D is negatively correlated with BMI, the reduction in BMI may explain the increase in 25-OH-vitamin D. However, the widely used vitamin supplementation after surgery may also contribute to the better vitamin D status.

P872

**THE LOCAL USE OF A THERAPEUTIC COMPOSITION TO INCREASE OSSEOINTEGRATION**A. Sepici Dincel<sup>1</sup>, E. Ergunol<sup>2</sup>, R. Orkun<sup>3</sup>, D. Dayanir<sup>4</sup>, O. Ekim<sup>5</sup>, U. Altay<sup>6</sup>, I. A. Ozkul<sup>7</sup>

<sup>1</sup>University of Gazi, Faculty of Medicine, Dept. of Medical Biochemistry, Ankara, Turkey, <sup>2</sup>Cyprus International University, Faculty of Dentistry, Nicosia, Cyprus, <sup>3</sup>University of Çankırı Karatekin, Faculty of Dentistry, Dept. of Anatomy, Çankırı, Turkey, <sup>4</sup>University of Gazi, Faculty of Medicine, Dept. of Histology and Embryology, Ankara, Turkey, <sup>5</sup>University of Ankara, Faculty of Veterinary Science, Dept. of Anatomy, Ankara, Turkey, <sup>6</sup>Cyprus University of Health and Social Sciences, Faculty of Dentistry, Morpho, Cyprus, <sup>7</sup>Emeritus, University of Ankara, Faculty of Veterinary Science, Department of Pathology, Ankara, Turkey

**Objective:** Our study was related to a therapeutic composition of sclerostin and dickkopf -1 antibody support early bone formation around dental implants and graft materials in extraction sockets. The dual inhibition of two proteins secreted within the bone microenvironment and targeting Wnt/ $\beta$ -catenin pathway modulation which may enhance the potential bone formation increasing osseointegration and accelerating healing in dental implantation and bone volume augmentation in filling of insufficient bone sites, and methods of local administration.

**Methods:** Male rabbits (3-month-old, weight  $\approx 2.5\text{-}3 \text{ kg}$ ) of five, tooth extraction and treatment groups were fully randomized among all rabbits to ensure any bias. Before tooth extraction, the allowed amount of whole blood was drawn. Comparison of the experimental animals was done according to the groups (control, graft control, scl-ab, dkk-1 ab, and scl+dkk-1 ab group of different ratios and time intervals as 2 and 4 weeks. Related measurements were carried out by using microcomputed tomography, hematoxylin-eosin and immunohistochemical staining.

**Results:** Osteoconductive growth was observed. Around the graft material throughout the extraction area, mature bone tissue formations in the form of lamellas and partly osteoid tissue areas were observed at dual usage. PCT/TR2020/050731).

**Conclusion:** The combination of scl-ab and dkk-1 ab, which are targeted, used with graft materials in local applications, has the potential to increase bone healing rate and bone quality.

P873

### THE SIGNIFICANCE OF THE OA SCHOOL AT THE TIME OF THE COVID-19 PANDEMIA

D. B. Bobek<sup>1</sup>, J. A. Aksentijevic<sup>1</sup>, M. L. Mijacika<sup>1</sup>

<sup>1</sup>Clinical Hospital Dubrava International University Liberas, Zagreb, Croatia

**Objective:** To determine the advantages of conducting OA school in parallel with classical physical therapy in persons with chronic OA of the knee.

**Methods:** We conducted a randomized study of patients attending osteoarthritis school (OA school) and those who underwent classical physical therapy in a Clinical Hospital Dubrava. Patients with OA of the knee were randomized in a 1:1 ratio to the application of OA school or to undergo classical physical therapy. One year after the onset of the pandemic COVID-19, patients in both groups were interviewed by telephone to compare the morbidity and function of were treated with physical therapy as part of the OA school and classical physical therapy. The main test comparing the above results was WOMAC. The Short Physical Performance Battery (SPPB) and The International Classification of Functioning, Disability and Health (ICF) used to evaluate function and mobility.

**Results:** We enrolled 100 patients with a mean age of 71 y; 50 patients were assigned to each group. Baseline characteristics, including severity of pain and level of disability, were similar in the two groups. The mean ( $\pm$ SD) baseline WOMAC scores were 33 in the OA school group and 27 in the classical physical therapy group. At 1 y, the mean scores were 58 and 60, this is how we established better long-term results of the osteoarthritis school. After a year without physical therapy (because of COVID-19) the results of other tests were also beneficial to the OA school.

**Conclusion:** OA school is more effective than regular physical therapy at long-term effectiveness for relieving pain and improving physical function in patients with chronic OA of the knee.

P874

### CANAGLIFLOZIN, EMPAGLIFLOZIN AND SITAGLIPTIN INFLUENCE ON BONE TURNOVER MARKERS AND BONE MORPHOLOGY IN DIABETIC RATS

A. V. Simanenкова<sup>1</sup>, N. V. Timkina<sup>1</sup>, N. Y. Semenova<sup>1</sup>, A. K. Khalzova<sup>2</sup>, O. S. Fuks<sup>1</sup>, T. D. Vlasov<sup>2</sup>, T. L. Karonova<sup>1</sup>

<sup>1</sup>Almazov National Medical Research Centre, <sup>2</sup>Pavlov First Saint-Petersburg State medical university, St. Petersburg, Russia

**Objective:** To compare bone turnover markers (BTM) and bone structure in diabetic rats treated with canagliflozin (CANA), and empagliflozin (EMPA) and sitagliptin (SITA).

**Methods:** 4 weeks after type 2 diabetes mellitus induction male Wistar rats were divided into groups: "DM" (n=4), "SITA" (n=4) (50 mg/kg), "CANA" (n=4) (25 mg/kg), "EMPA" (n=4) (2 mg/kg) for 8 weeks. Control "CRL" animals (n=4) received vehicle. Blood glucose level (BGL) was studied every 3<sup>rd</sup> day. Blood samples for osteocalcin (OCL), osteoprotegerin (OPG), RANKL were obtained prior to euthanasia. Femur samples were collected for histological examination.

**Results:** OCL in "DM" (10.69 [9.97; 11.03] ng/mL) was lower than in "CRL" (49.1 [47.98; 54.57]). OCL in "SITA" (19.57 [17.85; 24.44]) and "EMPA" (16.0 [15.72; 17.0]) was higher than in "DM". All drugs decreased OPG (6.28 [3.06; 9.99], 1.26 [1.04; 1.88] and 1.85 [1.19; 1.9] pmol/L for SITA, EMPA, CANA). Both SGLT-2i caused more prominent decrease in OPG than SITA. RANKL in "SITA" (248.38 [220.81; 300.96] pg/mL) and "EMPA" (254.1 [231.62; 284.0]) did not differ from "CRL" (247.81 [205.36; 289.67]). CANA increased RANKL (342.86 [280.0; 355.29]) in comparison with other drugs. OPG/RANKL ratio did not differ between the "CRL" (0.53 [0.38; 0.66]) and "DM" (0.53 [0.19; 0.58]) and was higher comparing with treatment groups (0.24 [0.01; 0.45], 0.005 [0.003; 0.007], 0.005 [0.003; 0.007] for "SITA", "EMPA", "CANA"). The lowest OPG/RANKL ratio was in "EMPA" and "CANA", with no differences between them. Area of epiphyseal bone trabeculae was decreased in "EMPA" and "CANA" (56.3 [50.0; 61.1]% and 52.7 [47.3; 60.7]%), compared with "CRL" (62.5 [55.1; 71.3]%). BGL was normal in all treatment groups.

**Conclusion:** Both EMPA and CANA cause increase in bone resorption, SITA has neutral effect on bone remodeling, independently on BGL.

P875

### TBS SCORES OF LUMBAR VERTEBRAE: COMPARISON WITH FOREARM BONE MINERAL DENSITY

K. Chun<sup>1</sup>, M. Coco<sup>2</sup>

<sup>1</sup>Montefiore Medical Center, Dept. of Radiology, Bronx, USA, <sup>2</sup>Coco, Maria, Bronx, NY, USA

**Objective:** Osteoporosis is commonly diagnosed using BMD measurements from spine and hip sites. Patients with degenerative changes in the spine and hip bones can have falsely elevated BMD measurements in DXA scans, potentially misdiagnosing osteoporosis. Low forearm BMD for these patients may indicate generalized osteoporosis.

**Methods:** We reviewed a total of 1081 stored consecutive cases from a bone densitometer for patients referred between November 2020 and May 2021 for the DXA measurement. Demographics, TBS-score of lumbar vertebrae, and T-scores from three sites (spine, hip and 1/3 radius of forearm) were recorded. For each case, the BMD measurement for each site was coded as meeting criteria for osteoporosis, osteopenia, or normal bone density.

**Results:** A total of 107 patients (median age 73 y) exhibited osteoporotic forearm BMD (T-score below -2.5 SD) only, while other sites showing normal to osteopenic range from 1081 patients. TBS spine measurement evaluated using the same bone densitometer with equipment specific calibrated TBS software. 53 patients median age 71 y) had osteoporotic forearm BMD, 27 patients having osteoporosis both by spine TBS and concomitant forearm osteoporosis. Conventional lumbar BMD measured normal/osteopenia. TBS scores were highly correlated with forearm DXA ( $p < 0.009$ ). Another 54 patients met the same criteria for osteoporosis in forearm BMD without demonstrable osteoporosis BMD data either in the spine, hip or both sites. TBS software was not available for these patients for measurements.

**Conclusion:** BMD for the forearm is not generally considered in the diagnosis of osteoporosis. However, 107 of 1081 cases, or approximately 10%, had forearm BMD alone in the osteoporotic range, corroborating with TBS score in the osteoporotic range. This suggests that forearm BMD alone  $\pm$  TBS measurements of lumbar DXA, may be sufficient to diagnose generalized osteoporosis. This may lead to increased treatment of osteoporosis.

P876

### TREATMENT PROCESSES OF PATIENTS WITH POSTMENOPAUSAL OSTEOPOROSIS DURING COVID-19 PANDEMIC

A. Kavaklı<sup>1</sup>, I. Aktaş<sup>1</sup>, F. Ünlü Özkan<sup>1</sup>, P. Akpınar<sup>1</sup>

<sup>1</sup>University of Health Sciences, Dept. of Physical Medicine and Rehabilitation, Fatih Sultan Mehmet Training and Research Hospital, Istanbul, Turkey

**Objective:** We aimed to determine the effects of COVID-19 pandemic on treatment continuity and habits of patients diagnosed with postmenopausal osteoporosis.

**Methods:** Patients followed up from the Physical Medicine and Rehabilitation Clinic with the diagnosis of postmenopausal osteoporosis were included in the study. Continuation of the treatment and exercise and eating habits of the patients who received oral and parenteral therapy were questioned during the pandemic period. Perceived Stress Scale 14 (PSS) values were also recorded. Data was statistically analyzed between the groups. Significance was evaluated at the  $p < 0.05$  level.

**Results:** 179 patients with a mean age of 68.1 y were questioned. 76 patients were using oral alendronate 70 mg/week. 84 patients were using sc denosumab 60 mg/6 months. 14 patients were using iv zoledronic acid 5 mg/y. 5 patients were using oral ibandronic acid 150 mg/month. 21 of 84 patients using denosumab were stopped treatment for 4-12 weeks and 8 were discontinued treatment for more than 12 weeks. 12 of 76 patients using alendronate were stopped treatment for 4-12 weeks and 6 were discontinued treatment for more than 12 weeks. 4 of 14 patients using zoledronic acid were stopped treatment for 4-12 weeks and 2 were discontinued treatment for more than 12 weeks. 1 of 5 patients

using ibandronic acid were stopped treatment for 4-12 weeks, 2 were discontinued treatment for more than 12 weeks. 51 of the patients stated that they exercised regularly before the pandemic, and 18 could continue exercising during the pandemic period. 25 patients stated that they could not exercise or walk due to pandemic precautions and anxiety, 6 patients due to health problems, and 2 patients for other reasons. Considering the continuity of treatment and the tendency to quit; there was no statistically significant difference between oral and parenteral treatment groups. In terms of stress level, no statistically significant difference was found between the groups in PSS-14 values ( $p > 0.05$ ).

**Conclusion:** The continuation of the treatment and physical activity levels of the patients who received medical treatment with the diagnosis of postmenopausal osteoporosis were affected by the pandemic process. It is important to develop new strategies that will facilitate the treatment and health services for situations that may cause disruptions in health care such as pandemics and natural disasters.

P877

### SPECIFIC COLLAGEN PEPTIDES IMPROVE BONE ELASTIC STRUCTURE IN POSTMENOPAUSAL WOMEN

D. Z. Zeggio<sup>1</sup>

<sup>1</sup>Zeta 92 srl, Vicenza, Italy

**Objective:** Investigations in rodents as well as in vitro experiments have suggested an anabolic influence of specific collagen peptides (SCP) on bone quality both bone formation and BMD. The goal of the study was to investigate the effect of 120 d daily oral administration of 15 g SPC group on BMD in postmenopausal women with primary, osteoporosis reduction of BMD undergoing drug holiday and food diary control.

**Methods:** 10 women were enrolled in this study denominated "area test 120". The primary endpoint was the change in BMD after 120 d on either the left femoral neck or the lumbar spine.

**Results:** A total of 9 woman completed the study, but all subjects were included in the intention-to-treat (ITT) analysis (age 61.2  $\pm$  7.2 y; BMI 23.6  $\pm$  3.6 kg/m<sup>2</sup>; average T-score -2.61). In the SCP group the BMD increased significantly (average T-score -2.13  $p = 0.184$ ).

**Conclusion:** These data demonstrate that the intake of SCP increased BMD in postmenopausal women with primary, osteoporosis reduction of BMD undergoing drug holiday and diary food control. In addition, SCP supplementation was associated with a favourable shift in bone markers, indicating increased bone formation and reduced bone degradation.

P878

# ULTRASOUND-GUIDED INTRA-ARTICULAR INJECTION: EFFICACY OF HYALURONIC ACID COMPARED TO PEPTIDES IN THE TREATMENT OF KNEE OSTEOARTHRITIS

F. N. Kesiktas<sup>1</sup>, H. Yilmaz<sup>2</sup>, M. Corum<sup>1</sup>

<sup>1</sup>University of Health Sciences, Istanbul Physical Medicine and Rehabilitation Research Hospital, PMR, <sup>2</sup>Kamu Hastaneleri 3. Bölge Başkanlığı, Istanbul, Turkey

**Objective:** Osteoarthritis (OA) is a degenerative joint disease which causes pain and functional impairment. there is no definitive cure for OA. Intra-articular injections may be useful in terms of pain and functional status, in knee OA. Hyaluronic acid (HA) and peptide molecules recently begin to be used. The aim of this study was to compare the efficacy of intra-articular peptide injection with that of the HA in the persons with OA. to make the procedure more accurate and assessment more objective, we use ultrasonography (US) with power Doppler.

**Methods:** We performed a retrospective evaluation of a cohort of patients with knee OA, from our injection outpatient clinic, treated by US-guided joint injection of HA and Peptide. The patients were divided according to the type of treatment they underwent: group I (N=54), patients treated with HA (three US-guided knee injections one week apart); group II (N=35), patients treated with Peptide (once US-guided knee injection). All patients were monitored for 3 months, evaluating: subjective pain using a 10-cm Visual Analogue Scale; pain, stiffness, functionality using the Western Ontario and McMaster Universities Arthritis Index (WOMAC), Lequesne Index and Health Assessment Questionnaire (HAQ).

**Results:** A total of 89 patients with knee OA were evaluated (women 86.5%) with a mean age of 57.5±7.8 y. There was no difference for age, BMI and knee OA degree between groups. All the subjects analyzed showed a significant pain reduction at the end of therapy and 3 months after treatment. WOMAC was statistically significantly improved from baseline in both groups examined. WOMAC pain score of peptide group was lower than HA group at the 3 months follow up (p<0.05). Other WOMAC subgroups and total were same at the 3 months follow up. Both groups had statistically significant HAQ improvement (p<0.01), there was not any difference at the end of therapy and three months follow up between groups.

**Conclusion:** This study demonstrated the efficacy of OA treatment with peptide is similar to HA. Unique dose peptide injection was cheaper from three injection of HA and because of three times application, HA was more painful.

P879

# RELATIONSHIP BETWEEN SARCOPENIA AND ATHEROSCLEROSIS OF THE CAROTID ARTERIES IN MEN WITH CORONARY HEART DISEASE

T. Raskina<sup>1</sup>, I. Grigoreva<sup>2</sup>, O. Malyshenko<sup>1</sup>, Y. Averkieva<sup>1</sup>, M. Letaeva<sup>1</sup>, M. Koroleva<sup>1</sup>

<sup>1</sup>Kemerovo State Medical University, <sup>2</sup>Kemerovo City Clinical Hospital №4, Kemerovo, Russia

**Objective:** To study the relationship between sarcopenia and atherosclerosis of the carotid arteries in men with coronary heart disease (CHD).

**Methods:** 79 men aged over 50 y with verified CHD were examined (mean age 63 (57; 66) y). To assess muscle mass, the total area (cm<sup>2</sup>) of the lumbar muscles of the axial section at the level of the 3rd lumbar vertebra (L3) was determined using multispiral computed tomography on a 64-slice computer tomograph "Somatom Sensation 64" (Siemens AG Medical Solution, Germany). The ratio of the obtained index of the area of skeletal muscle to the square of the patient's growth index determined the "musculoskeletal index L3". The media considered the threshold value to be 52.4 cm<sup>2</sup>/m<sup>2</sup>. Evaluation of muscle strength was performed using a mechanical wrist dynamometer DC-25. Muscle function was examined using a short physical performance battery (SPPB). The severity of atherosclerotic lesions of the carotid arteries was assessed by color duplex scanning with the study of the intima-media thickness (IMT), the presence of atherosclerotic plaques (ASB) and the degree of artery stenosis. In accordance with the recommendations of the EWGSOP (2010, 2018), the patients were divided into 3 groups: 1<sup>st</sup> - 31 patients without sarcopenia, 2<sup>nd</sup> - 21 patients with presarcopenia, and 3<sup>rd</sup> - 27 patients with sarcopenia.

**Results:** IMT in the group of patients with sarcopenia is significantly higher than that in men without sarcopenia (p=0.005). The most severe lesion of the carotid arteries with multiple ASB and stenosis 50% or more was significantly more frequent in men with sarcopenia compared with the group of patients with presarcopenia (48.15 vs. 9.5%, p=0.015) and without sarcopenia (48.15 vs. 12.9%, p=0.013). According to the results of the correlation analysis, a significant negative relationship was established between the severity of carotid atherosclerosis and the musculoskeletal index (r=-0.227, p=0.047).

**Conclusion:** An increase in IMT is associated with a decrease in muscle mass, which indicates a more severe atherosclerotic lesion of the carotid arteries in men aged over 50 y with verified CHD and sarcopenia.



P880

**PREDICTORS OF MUSCLE MASS LOSS IN MEN WITH CORONARY HEART DISEASE**T. Raskina<sup>1</sup>, I. Grigoreva<sup>2</sup>, M. Letaeva<sup>1</sup>, O. Malysenko<sup>1</sup>, Y. Averkieva<sup>1</sup>, M. Koroleva<sup>1</sup><sup>1</sup>Kemerovo State Medical University, <sup>2</sup>Kemerovo City Clinical Hospital №4, Kemerovo, Russia**Objective:** To identify predictors of muscle loss in men with coronary heart disease (CHD).**Methods:** 79 men aged over 50 y with verified CHD were examined (mean age 63 (57; 66) y). To assess muscle mass, the total area (cm<sup>2</sup>) of the lumbar muscles of the axial section at the level of the 3<sup>rd</sup> lumbar vertebra (L3) was determined using multispiral computed tomography on a 64-slice computer tomograph "Somatom Sensation 64" (Siemens AG Medical Solution, Germany). The ratio of the obtained index of the area of skeletal muscle to the square of the patient's growth index determined the "musculoskeletal index L3" (SMI). The media considered the threshold value to be 52.4 cm<sup>2</sup>/m<sup>2</sup>. Evaluation of muscle strength was performed using a mechanical wrist dynamometer DC-25. Muscle function was examined using a short physical performance battery (SPPB). The construction of a predictive model of a decrease of SMI below the threshold value was performed using the binary logistic regression method. Threshold values for parameters associated with a decrease in media were determined using ROC analysis.**Results:** According to the results of binary logistic regression, it was found that significant predictors of a decrease in the musculoskeletal index in this work were the indicators of BMI, a short physical performance battery (SPPB) and total cholesterol level (TC) (R<sup>2</sup>=57.9%).It was shown that an increase in BMI by 1 kg/m<sup>2</sup> reduces the likelihood of a decrease of SMI below the threshold value by 1.5 times (OR 0.657, 95%CI: 0.531-0.813), an increase in the result of a SPPB by 1 point reduces the likelihood of a decrease of SMI by 3,2 times (OR 0.313, 95%CI: 0.145-0.677), and an increase in the TC level by 1 mmol/L, on the contrary, is associated with an increased risk of a decrease in the SMI by 1.9 times (OR 1.914, 95%CI: 1.166 -3.141). According to the results of the ROC analysis, it was revealed that the BMI indicator has a reliable predictive ability to detect a decrease in mass media. The threshold value of BMI, providing sensitivity of 81.3% and specificity of 64.5%, was ≤30.1 kg/m<sup>2</sup>. The threshold value of SPPB providing a sensitivity of 52.1% and a specificity of 74.2% was a result of ≤10 points. The threshold value of total cholesterol was > 4.7 mmol / L with a sensitivity of 56.3% and a specificity of 87.1%.**Conclusion:** The results of study indicate the presence of common pathogenetic mechanisms of sarcopenia and cardiovascular diseases, which determines the relevance of further research in this area.

P881

**BLOOD LIPID PROFILE IN MEN WITH CORONARY HEART DISEASE AND SARCOPENIA**T. Raskina<sup>1</sup>, I. Grigoreva<sup>2</sup>, M. Letaeva<sup>1</sup>, Y. Averkieva<sup>1</sup>, O. Malysenko<sup>1</sup>, M. Koroleva<sup>1</sup>, V. Fanaskov<sup>3</sup><sup>1</sup>Kemerovo State Medical University, <sup>2</sup>Kemerovo City Clinical Hospital №4, <sup>3</sup>Kuzbass Clinical Hospital for War Veterans, Kemerovo, Russia**Objective:** To study the characteristics of lipid metabolism in men with coronary artery disease (CHD) and sarcopenia.**Methods:** 79 men aged over 50 y with verified CHD were examined (mean age 63 (57; 66) y). The diagnosis of sarcopenia was based on the recommendations of EWGSOP (2010, 2018) with the determination of three parameters - muscle strength (mechanical wrist dynamometer DC-25), muscle mass (multispiral computed tomography) and muscle function (short physical performance battery). Total cholesterol (TC), triglycerides (TG), high-density lipoprotein cholesterol (HDL-C) and low-density lipoprotein cholesterol (LDL-C) were determined in fasting blood serum by spectrophotometric method. In accordance with the recommendations EWGSOP, the patients were divided into 3 groups (EWGSOP, 2010): 1<sup>st</sup> - 31 patients without sarcopenia, 2<sup>nd</sup> - 21 patients with presarcopenia, and 3<sup>rd</sup> - 27 patients with sarcopenia.**Results:** The TC level in patients negatively correlated with the musculoskeletal index (r=-0.315, p=0.005) and the total area of skeletal muscles at the 3<sup>rd</sup> lumbar vertebra level (r=-0.277, p=0.013). In a comparative analysis it was found that TC level in men with CHD and sarcopenia was significantly higher compared to that in patients with CHD and without sarcopenia (5.20 (3.75; 6.00) mmol/L vs. 3.90 (3.40; 4.60) mmol/L, p=0.03). Based on the regression analysis, a direct relationship between the TC level and the risk of a decrease in the musculoskeletal index was established (OR 1.914, 95%CI: 1.166-3.141). According to ROC-analysis, the threshold value of total cholesterol was >4.7 mmol/L with a sensitivity of 56.3% and a specificity of 87.1%.**Conclusion:** The presence of sarcopenia in men with CHD is associated with more severe proatherogenic abnormalities in the blood lipid profile. Hypercholesterolemia is an additional predictor of muscle loss.

P882

### RELATIONSHIP OF SARCOPENIC SYNDROME AND CORONARY ARTERY ATHEROSCLEROSIS IN MALE PATIENTS WITH ISCHEMIC HEART DISEASE

T. Raskina<sup>1</sup>, I. Grigoreva<sup>2</sup>, M. Letaeva<sup>1</sup>, M. Koroleva<sup>1</sup>, Y. Averkieva<sup>1</sup>, O. Malyshenko<sup>1</sup>, A. Kokov<sup>3</sup>

<sup>1</sup>Kemerovo State Medical University, <sup>2</sup>Kemerovo City Clinical Hospital №4, <sup>3</sup>Research Institute for Complex Issues of Cardiovascular Diseases, Kemerovo, Russia

**Objective:** To study the relationship between severity of coronary atherosclerosis and sarcopenia in men with coronary heart disease (CHD).

**Methods:** 79 men aged over 50 y with verified CHD were examined (mean age 63 (57; 66) y). To assess muscle mass, the total area (cm<sup>2</sup>) of the lumbar muscles of the axial section at the level of the 3<sup>rd</sup> lumbar vertebra (L3) was determined using multispiral computed tomography on a 64-slice computer tomograph "Somatom Sensation 64" (Siemens AG Medical Solution, Germany). The ratio of the obtained index of the area of skeletal muscle to the square of the patient's growth index determined the "musculoskeletal index L3" (SMI). The media considered the threshold value to be 52.4 cm<sup>2</sup>/m<sup>2</sup>. Evaluation of muscle strength was performed using a mechanical wrist dynamometer. Muscle function was examined using a short physical performance battery (SPPB). The variant of coronary atherosclerosis was assessed according to coronary angiography: variant A - one- and two-vessel lesion; variant B - three-vessel lesion; variant C - lesion of the left trunk of the coronary artery in combination (or without) with hemodynamically significant narrowing of any other coronary arteries.

In accordance with the recommendations EWGSOP, the patients were divided into 3 groups (EWGSOP, 2010): 1<sup>st</sup> - 31 patients without sarcopenia, 2<sup>nd</sup> - 21 patients with presarcopenia, and 3<sup>rd</sup> - 27 patients with sarcopenia.

**Results:** The severity of coronary atherosclerosis in patients negatively correlated with the musculoskeletal index ( $r = -0.227$ ,  $p = 0.047$ ). In a comparative analysis, a higher incidence of lesion of the left trunk of the coronary artery±any other arteries was found in the group of patients with CHD and sarcopenia compared to that in patients with CHD and presarcopenia and without sarcopenia (29.6% vs. 20.0% and 13.3%, respectively). According to the results of the ROC analysis, it was found that impaired blood flow in three vessels or the left trunk of the coronary artery±any other arteries was associated with a decrease in SMI with a sensitivity of 68.1% and a specificity of 56.7% (AUC was 0.634; 95%CI: 0.515-0.741;  $p = 0.028$ ; Youden's index 0.248).

**Conclusion:** A higher incidence of the prognostically unfavorable variant of coronary lesions in patients with CHD and sarcopenia was found, which makes further research in this area relevant.

P883

### DENUSOMAB PERSISTENCE DURING THE COVID PANDEMIC

A. Spångaus<sup>1,2</sup>, K. Rzepecka<sup>3</sup>, M. Woisetschläger<sup>4,5</sup>

<sup>1</sup>Dept. of Acute Internal Medicine and Geriatrics & Dept. Endocrinology, Linköping University Hospital, <sup>2</sup>Dept of Health, Medicine and Caring Sciences, Linköping University, <sup>3</sup>Primary health center in Johannelund, <sup>4</sup>Dept. of Radiology and Dept. of Medical and Health Sciences, <sup>5</sup>Center for Medical Image Science and Visualization (CMIV), Linköping University, Linköping, Sweden

**Objective:** To investigate the effect of the COVID-19 pandemic on denosumab persistence.

**Methods:** All patients who initiated denosumab treatment at our outpatient care (osteoporosis/endocrinology unit) between 2016-2019 were included and date of injections were recorded from case records. Persistence was analyzed regarding 2-y persistence and 1-y persistence. Persistence was defined as a maximum interval of either 1) 8 months (m) [6+2m], or 2) 9m [6+3m].

**Results:** In total 171 patients were included. Mean age was 74.3±10.2 y (range 35-93 y) and 87% were women. Age and gender distribution did not differ significantly between the year of denosumab initiation. The 2-y persistence rate (8-m interval permitted) was lower in patients starting denosumab 2019 than those starting 2016-2018, i.e., 69% vs. 83%,  $p = 0.044$ . No significant difference was seen analyzing 1-y persistence in the same groups (87 vs. 91%,  $p = 0.410$ ). When using a more liberal persistence definition, i.e., 9+m interval permitted, no difference was seen between 2 y persistence, 77 vs. 83%,  $p = 0.341$ .

**Conclusion:** The present study indicates that a higher number of patients got their injection later than recommended during the pandemic, but despite high pressure on our healthcare system and health concerns in the general population, no significant influence on denosumab persistence using a more liberal interval allowance was seen in this outpatient osteoporosis group.

**Disclosure:** AS received lecture fees from Amgen Inc. and Mylan.

P884

**PHYSICIANS PREFERENCES FOR VITAMIN D PRESCRIPTION**

S. Shutova<sup>1</sup>, N. N. Katamadze<sup>1</sup>, H. R. Fargieva<sup>1</sup>, V. S. Glazieva<sup>1</sup>, E. A. Pigarova<sup>1</sup>, L. K. Dzeranova<sup>1</sup>, I. M. Belovalova<sup>1</sup>, I. I. Dedov<sup>1</sup>

<sup>1</sup>Endocrinology Research Centre, Moscow, Russia

**Introduction:** Disorders of mineral homeostasis leading to decreased bone density and fractures are strongly associated with severe vitamin D deficiency in most people. Currently, the most effective mean of preventing osteoporosis is long-term intake of vitamin D in various dosage forms, which are aqueous solutions, oil drops, tablets/capsules and granules.

**Aim:** The aim of our study was to assess the priority of prescribing of different forms of vitamin D based on a comparative analysis in a national study.

**Materials and methods:** We conducted a national online-based survey which included 704 physicians specialized in various fields (endocrinologists accounted for 80% of them).

**Results:** The largest number of doctors (35,2%) do not have any preference in prescribing the form of vitamin D. The second place in priority of appointment (28,3%) is occupied by an aqueous solution. Oil drops are prescribed in 21 percent of cases. Administration of capsules, tablets and granules is far behind (10,8%, 3,9% and 0,8% respectively).

**Conclusion:** Aqueous solution of vitamin D has the greatest bioavailability among the other dosage forms, that determines predominance of its appointment. Moreover, a lot of people have severe limitations regarding medication's intake, such as unwillingness to take medications in a gelatinous frill - capsules (people adhering to vegetarianism) or inability to consume fats, which lower the frequency of an administration of vitamin D in capsules containing gelatin and vitamin D in the form of oil drops. Domination of "all the same" position reflects the absence of doctor's affiliation with pharmaceutical companies. Thereby the best bioavailability and absence of potential patient's negativism determine the leading position of the administration of aqueous solution among the other forms of vitamin D.

P886

**FREQUENCY AND RISK FACTORS FOR LOW BONE MINERAL DENSITY IN POSTMENOPAUSAL WOMEN WITH SYSTEMIC SCLERODERMA**

A. O. Efremova<sup>1</sup>, N. V. Toroptsova<sup>1</sup>, N. V. Demin<sup>1</sup>, O. V. Dobrovolskaya<sup>1</sup>, M. N. Starovoitova<sup>1</sup>, O. A. Nikitinskaya<sup>1</sup>

<sup>1</sup>Nasonova Research Institute of Rheumatology, Moscow, Russia

**Objective:** To determine the frequency and risk factors for low bone mineral density (BMD) in postmenopausal women with systemic scleroderma (SSc)

**Patients and methods:** 113 postmenopausal women with SSc were enrolled in the study: 77 (68.1%) with limited and 36 (31.9%) with diffuse cutaneous subtype. Patients with overlap rheumatic syndromes were not included. The median age was 59.5 [54.0; 63.0] years, the median duration of the disease was 10.0 [6.0; 15.0] years. 94 (83.2%) patients were treated with glucocorticoids (GC), the median duration of GC use - 10.0 [6.0; 15.0] years. Dual energy X-ray absorptiometry (DXA) of the lumbar spine (LS), the femoral neck (FN) and the total hip (TH) was performed. Osteoporosis (OP) was diagnosed with a T-score < -2.5 SD and osteopenia - with a T-score from -1SD to -2.5 SD in any region of interest. Traditional risk factors of OP were analyzed, and the search for specific risk factors for low BMD in patients with SSc was carried out using multivariate linear regression analysis.

**Results.** The median LS BMD was 0.95 [0.87; 1.04] g/cm<sup>2</sup>, the FN BMD -0.78 [0.69; 0.86] g/cm<sup>2</sup> and the TH BMD - 0.81 [0.74; 0.91] g/cm<sup>2</sup>. Low BMD at least in one region of interest was detected in 106 (93.8%) patients: OP - in 51 (45.1%) and osteopenia - in 55 (48.7%) women. OP was significantly more common in patients with the diffuse form (63.9%) compared to the limited form SSc (36.4%) (p=0.0062). 41 (36.2%) women had a history of low-trauma fracture, among them 25 (61.0%) patients had OP, 14 (34,1%) - osteopenia and only 2 (4.9%) persons - normal BMD. OP was significantly more common in patients with interstitial lung disease (ILD) (p=0.0014), with finger contractures (p=0.0065), positive for anti-Scl 70 (p=0.022) and anti-nuclear antibodies (ANA) measured by indirect immunofluorescence (IFI) using Hep-2 (p=0.0038). Median level of 25(OH)D was 19.68 [14.31; 23.72] ng/ml. Low vitamin D level was detected in 91.2% of patients: 44.2% women had hypovitaminosis D, 41.6% - vitamin D deficiency and 5.3% - severe deficiency (25(OH)D less than 10 ng/ml) with no significant difference between patients with diffuse and limited form.

In multivariate linear regression analyses the duration of GC use was negatively associated with LS BMD (b=-0.007, R<sup>2</sup>= 0.196, p <0.00093). The following factors associated with FN BMD: BMI(b=0.007, R<sup>2</sup>=0.208, p<0.00093), creatinine clearance (CrCl) (b=0.313, R<sup>2</sup>=0.213, p<0.00037), duration of

postmenopause ( $b=-0.223$ ,  $R^2=0.134$ ,  $p<0.00000$ ), duration of proton-pump inhibitors (PPI) use ( $b=-0.277$ ,  $R^2=0.291$ ,  $p<0.00000$ ), cumulative dose of GC ( $b=-0.269$ ,  $R^2=0.134$ ,  $p<0.00000$ ), and with TH BMD - BMI ( $b=0.493$ ,  $R^2=0.244$ ,  $p<0.00000$ ), CrCl ( $b=0.313$ ,  $R^2=0.150$ ,  $p<0.00016$ ) and cumulative dose of GC ( $b=-0.219$ ,  $R^2=0.289$ ,  $p<0.00029$ ).

**Conclusions.** Low BMD was found in 93.8% of postmenopausal women with SSc, among them 45.1% had OP. OP was significantly more common in patients with a diffuse cutaneous subtype. 91.2% of the patients had low level of vitamin D. BMI and CrCl were positively, and the cumulative dose of GC was negatively associated with FN and TH BMD. The duration of postmenopause and PPI use negatively affected FN BMD, and the duration of GC use had a negative effect on LS BMD.

P887

### THE FREQUENCY OF SARCOPENIA AND FACTORS ASSOCIATED WITH MUSCLE MASS IN WOMEN WITH SYSTEMIC SCLERODERMA (PILOT STUDY)

A. O. Efremova<sup>1</sup>, N. V. Toroptsova<sup>1</sup>, O. A. Nikitinskaya<sup>1</sup>, N. V. Demin<sup>1</sup>, O. V. Desinova<sup>1</sup>

<sup>1</sup>Nasonova Research Institute of Rheumatology, Moscow, Russia

**Objective:** to identify the frequency of sarcopenia (SP) and risk factors for low muscle mass in women with systemic scleroderma (SSc).

**Patients and methods:** 47 women aged > 40 years who met the 2013 ACR/EULAR classification criteria for SSc were recruited. Among them 29 (61.7%) patients with limited and 18 (38.3%) - with diffuse form of the disease. Pregnant or breast-feeding women and patients with overlapping rheumatic syndromes were not included. 17 (36.2%) women were of fertile age and 30 (63.8%) - postmenopausal. The median age was 53.9 [48.0;62.0] years, and the median duration of the disease was 6.0 [1.0;12.0] years. Muscle strength was measured using hand dynamometry and "Chair rising" test. All patients underwent whole-body dual energy X-ray absorptiometry (DXA). The appendicular muscle mass index (AMI) was calculated as the ratio of appendicular muscle mass (AMM) to height squared ( $\text{kg}/\text{m}^2$ ). Physical performance was assessed using a gait speed test and the Short Battery of physical performance (SPPB). Sarcopenia (SP) was diagnosed according to the updated EWGSOP2 criteria [1]. Associations between AMM, AMI and SSc disease characteristics were analyzed in univariate linear regression analysis.

**Results:** 10 (21.3%) women with SSc were classified as having SP (6.4% - severe sarcopenia). Among them 6 (33.3%) patients with diffuse and 4 (13.8%) with limited form of the disease ( $p > 0.05$ ). Patients with SP did not differ from patients without SP in age, BMD and the frequency of OP, number of fractures, skin score, positivity of Scl 70 and ACA, the nutritional status assessed by MNA-SF. At the same time, they were significantly

more likely to fall ( $p=0.039$ ), they had a lower BMI ( $p=0.044$ ), a longer disease duration ( $p=0.039$ ) and a higher cumulative dose of glucocorticoids (GC) ( $p=0.045$ ). Univariate linear regression analysis revealed that AMM and AMI were positively associated with BMI ( $b=0.44$ ,  $p<0.05$  and  $b=0.15$ ,  $p<0.01$ , respectively) and MNA-SF ( $b=0.37$ ,  $p<0.01$  and  $b=0.11$ ,  $p=0.02$ , respectively), and negatively - with the Rodman skin score ( $b=-0.17$ ,  $p=0.04$  and  $b=-0.06$ ,  $p=0.01$ , respectively) and falls during the past year ( $b=-2.54$ ;  $P=0.02$  and  $b=-0.96$ ,  $P<0.01$ , respectively). Additionally, a negative association with the cumulative dose of glucocorticoids (GC) was found for AM ( $b<-0.01$ ,  $p=0.04$ ).

**Conclusions:** SP was diagnosed in 23.1% of women with SSc with no significant difference between the limited and diffuse forms of the disease. BMI and the nutritional status positivity associated with AMM and AMI, while Rodman skin score and a history of falling in the past year negatively. A high cumulative dose of GC negatively affected the AMM value. Although age is the main risk factor for sarcopenia in the general population, it did not differ between SSc patients with low and normal AMM and AMI in our study.

Cruz-Jentoft AJ, Bahat G, Bauer J, et al. Sarcopenia: revised European consensus on definition and diagnosis. Age Ageing. 2019 Jan 1;48(1):16-31. doi: 10.1093/ageing/afy169.

P888

### DEVELOPMENT OF A CLINICAL PREDICTION TOOL FOR PREOPERATIVE PREDICTION OF 1-YEAR POSTOPERATIVE FUNCTIONAL OUTCOME OF INTERTROCHANTERIC FRACTURE

N. Adulkasem<sup>1,4</sup>, P. Phinyo<sup>2,3,4</sup>, J. Khorana<sup>2,5</sup>, D. Preuksakorn<sup>1</sup>, T. Apivatthakakul<sup>1</sup>

<sup>1</sup>Department of Orthopedics, Faculty of Medicine, Chiang Mai University, Chiang Mai, Thailand, <sup>2</sup>Center for Clinical Epidemiology and Clinical Statistics, Faculty of Medicine, Chiang Mai University, Chiang Mai, Thailand, <sup>3</sup>Department of Family Medicine, Faculty of Medicine, Chiang Mai University, Chiang Mai, Thailand, <sup>4</sup>Musculoskeletal Science and Translational Research (MSTR) Cluster, Chiang Mai University, Chiang Mai, Thailand, <sup>5</sup>Division of Pediatric Surgery, Department of Surgery, Faculty of Medicine, Chiang Mai University, Chiang Mai, Thailand

**Objective:** Ambulatory status restoration is an important therapeutic goal for patients with intertrochanteric fractures. Several studies had identified prognostic factors associated with functional endpoints after the operation. We aimed to develop a practical tool for preoperative prediction of good postoperative ambulatory status at 1-year for each patient with intertrochanteric fracture.

**Methods:** We performed a secondary analysis of a retrospective cohort of patients with intertrochanteric fractures who were operated on at Chiang Mai University hospital between January 2017 and February 2020 to derive clinical prediction models. Several



factors were preselected as candidates for model derivation, such as the patients' sex, body mass index, Charlson's comorbidity index, and preinjury New Mobility Score (NMS). Multivariable fractional polynomial (MFP) procedure with logistic regression was used for statistical modeling.

**Results:** A total of 221 patients with intertrochanteric fractures were included in the secondary analysis. Of these, 160 (72.4%) had good postoperative ambulatory status (NMS  $\geq 5$ ) at 1-year. Male sex, body mass index, Charlson's comorbidity index, and preinjury NMS were incorporated in the final logistic model. Only preinjury NMS was transformed into second-degree fractional polynomial, while the rest were fitted with linear terms. The final logistic model showed an acceptable discriminative ability [Au-ROC of 0.77 (95%CI 0.70 to 0.85)] and model calibration. For applicability, the model was presented as a user-friendly mobile web application.

**Conclusion:** Our newly-derived clinical prediction tool showed acceptable discrimination and calibration in predicting postoperative ambulatory status at 1-year in patients with intertrochanteric fractures using only four simple predictors. This tool would allow physicians to provide patients and their families with individualized preoperative predictions of postoperative ambulatory status. However, the model should be further evaluated in an external dataset before being implemented in practice.

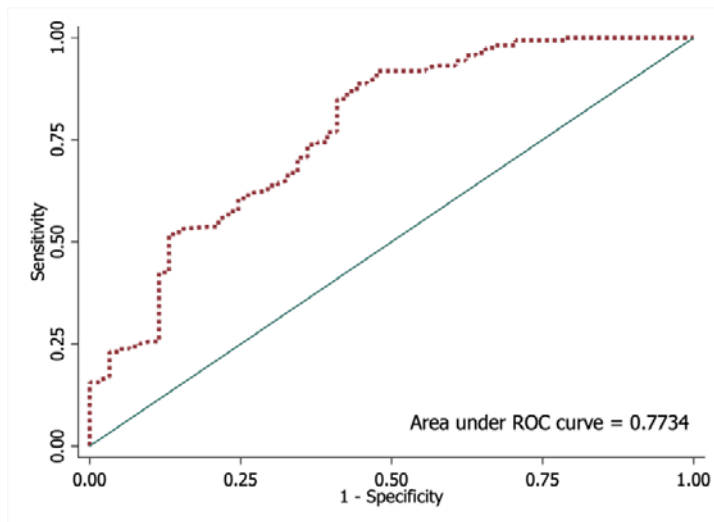


Fig 1. Area under ROC of the developed model

## Preoperative intertrochanteric fracture prediction tool for postoperative functional outcome

> Information for user

> Pre injury new mobility score (NMS)

9

Charlson's comorbidities index (CCI) ⓘ

0

BMI

0.00

kg/m<sup>2</sup>

Gender

Female

logg odds Probability

5.7916

Probability of postoperative ambulation

99.70 %

likelihood ratio of walking

199.80

1 year postoperative ambulation prediction

Good

good likelihood of walking  
(likelihood ratio >5)

Fig. 2 The web application interface of the predicting model



10TH INTERNATIONAL CONFERENCE  
ON CHILDREN'S BONE HEALTH

2-5 July 2022

DUBLIN, IRELAND

ABSTRACT DEADLINE:

14 February 2022

#### KEY TOPICS:

- Bone development and growth
- Bone assessment
- Bone fragility and metabolism
- New bone diagnostics
- Epidemiology
- Bone health in chronic and rare diseases
- Novel drug targets and medical therapies
- Nutrition and rickets
- Physical activity and muscle-bone relationships
- Advances in orthopaedic surgery
- Genetics and metabolomics of bone signalling and structure



*"This conference was amazing, both in terms of speakers and organisation"*

*"One of the friendliest and best organised conferences I have ever attended"*

*"I spent four wonderful, inspiring, exciting days"*

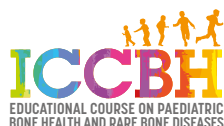
## ICCBH Bone School

[www.iccbhboneschool.org](http://www.iccbhboneschool.org)

30 JUNE – 1 JULY 2022  
DUBLIN, IRELAND

#### Who should attend?

- Clinical paediatric, adult and endocrine trainees and fellows with an interest in bone disease
- Clinical and translational researchers



14TH INTERNATIONAL CONFERENCE  
ON OSTEOGENESIS IMPERFECTA

# OI2022

30 AUGUST -  
2 SEPTEMBER 2022

SHEFFIELD, UK

ABSTRACT DEADLINE: 25 APRIL 2022

[www.oI2022.org](http://www.oI2022.org)



## ICCBH NEW INVESTIGATOR NETWORKING GROUP

**AIMS:** Keep the community connected and support career development

**TARGET AUDIENCE:** Early-career clinical and basic researchers with focus on paediatric bone health from anywhere in the world

CONTACT: [iccbh-ni@googlegroups.com](mailto:iccbh-ni@googlegroups.com)

### Monthly eBulletin

Please email us at [iccbh@ectsoc.org](mailto:iccbh@ectsoc.org) to join our current awareness service for new papers, grant and job opportunities, events and more.



**ABSTRACT SUBMISSION & REGISTRATION  
OPEN OCTOBER 2021**

**14TH INTERNATIONAL CONFERENCE  
ON OSTEOGENESIS IMPERFECTA**

# **OI2022**

**30 AUGUST - 2 SEPTEMBER 2022**

**SHEFFIELD, UK**

**ABSTRACT DEADLINE:  
FRIDAY 25 APRIL 2022**

# **OI2022**

The meeting will  
be of interest to:

**Metabolic bone specialists  
Endocrinologists  
Adult physicians  
Paediatricians  
Dentists  
Geneticists  
Genetic counsellors  
Nephrologists  
Neurosurgeons  
Orthopaedic surgeons  
Nurses  
Occupational therapists  
Physiotherapists  
Psychologists  
Radiologists  
Molecular biologists  
Cell and stem biologists**

MEETING CHAIR:

**Nick Bishop** *(Sheffield, UK)*

SCIENTIFIC PROGRAMME COMMITTEE

**Joan Marini**, CHAIR *(USA)*

**Franco Antoniazzi** *(Italy)*

**Darko Anticievic** *(Croatia)*

**Nick Bishop** *(UK)*

**Peter Byers** *(USA)*

**Raymond Dalglish** *(UK)*

**Anne de Paepe** *(Belgium)*

**Francois Fassier** *(Canada)*

**Antonella Forlino** *(Italy)*

**Francis Glorieux** *(Canada)*

**Richard Kruse** *(USA)*

**Gerard Pals** *(The Netherlands)*

**Cathleen Raggio** *(USA)*

**Marianne Rohrback** *(Switzerland)*

**Oliver Semler** *(Germany)*

**Lena Lande Wekre** *(Norway)*



**[www.oI2022.org](http://www.oI2022.org)**

For further information contact  
Janet Crompton  
[iccbh@ectsoc.org](mailto:iccbh@ectsoc.org)



WORLD CONGRESS  
ON OSTEOPOROSIS,  
OSTEOARTHRITIS AND  
MUSCULOSKELETAL  
DISEASES



2021 VIRTUAL



Abstract Book

**Author Index**



Aazami H.	P579	Akguen D.	P253
Abbasi-Rad S.	P598 , P601	Akgun R.	P458
Abbasian Ardakani A.	P598	Akhatov A.	P630 , P735
Abdellaoui S.	P262 , P264 , P553	Akhmad E.	P835
Abdelmomen I.	P370 , P372	Akhverdyan Y.	P770
Abdi S.	P487 , P488	Akol J.	P176
Abdulla N.	P370 , P372	Akpınar P.	P876
Abelha-Aleixo J.	P480	Aksenova T. A.	P772
Abeygunasekara T.	P322 , P366 , P532 , P673 , P737	Aksentijevic J. A.	P873
Abi Ayad A.	P696	Aktaş I.	P876
Abidin N. S. Z.	P406 , P408 , P411 , P412 , P435 , P437 , P438 , P439	Aktuglu K.	P440 , P441
Abilov Z.	P563 , P577	Akune T.	OC25 , P493
Abolghasemi J.	P601	Akıncı A.	P316
Abozaid H.	P144	Al Anazi F.	P489
Abraham L.	OC8 , P184 , P275 , P527	Al Mukaddam M.	OC34
Abrahamsen B.	P288 , P415 , P559	Al Mullah A.	P489
Abram F.	P280	Al Qahtani M.	P489
Abu Alrob H.	OC12	Al Refaie A.	P803 , P806
Abu Rouse K.	P128	Al Saedi A. A.	P379
Abu Zaid M.	P113	Al-Ahmar R.	P128
Adachi J. D. A.	OC12 , P110 , P154 , P606	Al-Daghri N.	P487 , P488 , P489
Adamenka A.	P525	Al-Saleh Y.	P489
Adami G.	OC19 , P198 , P199 , P387 , P473 , P474 , P545	Alam A.	OC17 , P663
Adami G. A.	P604	Alam F.	P370 , P372
Adams L.	OC20	Alam I.	P114
Adel Y.	P113	Alam Z.	P114
Adulkasem N.	P888	Alamoudi R.	P489
Afonso C.	P618 , P681	Albergaria B.	P254
Agarwal G.	P719	Albi N.	P621
Aghi A.	P779 , P809	Albulescu D.-M.	P558 , P646 , P647 , P648 , P650 , P665 , P666
Aguiar L.	P802 , P805	Alddafari F.	P852
Aguiar-Moreira C.	P320	Alekna V.	P449
Aguirre A.	P680	Aleksandrov A. V.	P472 , P517 , P695 , P699
Aguirre Etxebarria A.	P120	Aleksandrov V. A.	P472 , P517 , P695 , P699
Aguirre Etxebarria A.	P717	Aleksandrova N. V.	P472 , P517 , P695 , P699
Aguirre Etxebarria A.	P118 , P119	Alekseeva L.	OC31 , P122 , P615 , P642 , P711
Aguirre-Meneses H.	P460	Alekseeva L. I.	P678 , P787 , P791 , P857
Aguyé A.	P475 , P476	Alekseeva O.	P655
Ahafonova N.	P620	Alemadi S.	P370 , P372
Ahern E.	P595	Alenad A.	P488
Ahmed N.	P144	Alexandru C. M.	P206 , P207 , P212 , P213
Ahverdjian J.	P630	Alexandru D. O.	P789 , P790
Aifei W.	P123 , P124	Algan M. E.	P320
Aimeur C.	P292	Alghamdi A.	P488
Aizawa T.	P150	Alharbi H.	P489
Ajerouassi A.	P219	Ali R.	P113
Ajnetdinova A.	P335	Aliazis K.	P385
Akarırmak U.	P514	Aljohani N.	P487 , P488
Akarırmak U.	ESPRM-ESCEO-IOF2	Alliot F.	P786
Akcay S.	P289	Alliot-Launois F.	P479
		Almiman A.	P488

Almohaya M.	P497 , P499	Arbatin J.	P176
Alnaami A.	P487 , P488	Arden N. K.	P395 , ESCE02
Alokail M.	P488	Areniello E. F.	P512 , P513
Alonso J.	P475 , P476	Argüello Andrade J.	P597
Alpantaki K.	P304 , P305 , P306 , P307	Ariani A.	P459
Alqarni A.	P489	Aristegui I.	P710
Alrob H. A. A.	P606	Arjmand B.	P271
Alsaed O.	P370 , P372	Arkhipova N.	P742
Alsohaim A.	P489	Armbrrecht G.	OC29
Alt W.	OC24	Armeni E.	P757 , P759
Altan L.	P316	Armstrong C.	P313 , P629 , P636 , P649
Altay U.	P872	Arnautu A. M.	P836
Alvarez G.	P475 , P476	Aronova E.	P384 , P446 , P451 , P453
Aly H.	P113	Arouca M.	P323 , P325
Alzanbaqi H.	P489	Artyukova Z.	P835 , P838
Amer E.	P487	Asadi M.	P601
Amir R.	P115 , P116 , P295 , P455 , P818	Asma A.	P128
Ammendolia A.	P842	Assadi R.	P247 , P265 , P334 , P336 , P337
Amorim R.	P567	Astrakhantsev D.	P504
Amphansap T.	P189 , P190 , P191	Atallah A.	P254
Anastasilakis A. D.	P385	Ataman S.	P316
Ancuta I.	P179	Atar S.	P301 , P458
Andersen L.	P712, OCs6	Athanassiou L.	NSS8 , NSS36 , NSS55 , P490 , P491 , P505 , P506
Anderson K. B.	P510 , P747	Athanassiou P.	NSS9 , NSS34 , NSS54 , P490 , P491 , P505 , P506 , P841
Ando W.	P496	Athanassiou Y.	P826 , P841
Andreadou S.	P431	Aubertin-Leheudre M.	NSS45
Andreeva A.	P869	Augoulea A.	P757 , P759
Andretta M.	P199	Aung N.	OC2
Andriolo B.	P254	Aurilia C.	P422 , P550 , P551 , P555 , P619 , P623
Andronic O.	P253	Avdeeva V. A.	P326
Andronie-Cioara F. L.	P467 , P468 , P469 , P610	Averkiera J.	P407 , P409
Andrusha A. B.	P420	Averkiera Y.	P879 , P880 , P881 , P882
Anerson P.	P712, OCs6	Averkiera Y. V.	P633
Anghel D.	P180	Avila H.	P320
Anikin S.	OC31	Avouac B.	P430
Anić Milošević S.	P866	Avram C.	NSS18
Anna Nida T.	P421	Avuková A.	P753
Anne A.	P644	Axelsson K. F.	OC14
Anoshenkova O.	P630	Axmedov I.	P258
Ansari A.	P487 , P488	Aydogan A. R.	P458
Antonio L.	P151	Aydoğdu S.	P316
Antoniou A.	P759	Ayesha R.	P421
Antony B.	P368	Ayoub S.	P292
Anunciação S.	P850	Azagra R.	P475 , P476
Apiromyanont K.	P191	Azevedo S.	P618 , P681
Apivatthakakul T.	P888	Azizyan H.	P483
Appelt J.	P425	Azzolino D.	P626
Aragón M.	P632 , P634	Babes K.	P709 , P713 , P714 , P715
Aragón-Hernandez A. Y. A.	P450 , P460 , P707 , P865	Babis G.	P705
Araiza B.	P576		
Araiza-Nava B.	P821		
Araújo F. C.	P616		

Baccaro L. F.	P802 , P805	Batista A. R.	P850 , P867
Bacigaluppi S.	P512 , P513	Baujat G.	OC34
Badel T.	P866	Baymeeva N.	P446
Baek Y. H.	P739	Beauchamp A.	OC23 , P777
Bahat G.	NSS15 , P449	Beaudart C.	NSS42 , NSS73 , OC13 , OC21 , P394 , P449 , P758 , OCs8 , OCs11
Bahaz N.	P398 , P631 , P696 , P721 , P855	Becciolini A.	P459
Baikousis A. B.	P349 , P352 , P353 , P354	Becheru E. D.	P161 , P206 , P207 , P208 , P209 , P211 , P213 , P224
Baili G.	P202	Beck C.	P527
Bajaj S. B.	P760 , P763	Beck C. G.	P230
Bakirtzi S. M.	P362	Bedina S.	P785
Baklaci M.	P440 , P441	Bedina S. A.	P544 , P638
Balasundaram K.	P534 , P535 , P662 , P668 , P671	Begde A.	P640
Balcazar J. L.	P320	Beirão T.	P480
Balcells-Oliver M.	P418	Belani L. K.	P406 , P408 , P411 , P412 , P435 , P437 , P438 , P439
Baldivieso Achá J.-P.	P756	Belaya Z.	P308 , P309 , P577
Baleanu F.	P277	Beletsiotis A.	P141 , P142 , P143
Ballauri I.	P385	Belhaj W.	P800
Balonga C.	P795	Belik I.	P829
Balyasnikova N. A.	P244	Bell A.	P324
Bandeira F.	NSS70	Beloglazov V.	P662
Banica T.	OC30	Belousova I.	P630
Bannuru R. R.	ESCE01 , ESCE02	Belov B.	P229
Baptista Leite R.	P616	Belov B. S.	P706 , P722
Baptista M.	P870	Belova K.	P630 , P735
Baranova I. A.	P572 , P574	Belovalova I. M.	P178 , P308 , P533 , P884
Baranova M. M.	P706 , P722	Beltrami G.	P550 , P623
Baranowsky A.	P425	Belyaeva I. B.	P754
Barbagallo M.	OC11 , P148	Belyakov D.	P423
Barbosa A. P.	P845	Ben Abdelghani K.	P104 , P105 , P106 , P588 , P800 , P856 , P860 , P861 , P864
Barbosa T.	P870	Ben Messaoud F.	P864
Barbounis T.	P385	Ben Salah N.	P588
Barbulescu A.	P825 , P827 , P830	Benabadji S.	P725
Barbulescu A. L.	P820	Benamouzig D.	P786
Barcelos A.	P566 , P583 , P828	Benaziez R.	P398 , P631
Barcelos A. B.	P281	Benaziez S.	P631
Bardesono F.	P296 , P297	Benchimol J. A.	P720
Barla J. D.	P720	Benevolenskaya S.	P691
Baroni M.	P396 , P621	Bengana B.	P262 , P264 , P292 , P553
Barreal-Gómez A.	P266 , P267	Benini C. B.	P604
Barsukov I. A.	P575	Benoit F.	P277
Bartenschlager S.	P816	Beramtane Raaf N.	P292
Bartolini F.	P199	Berdyugin K. A.	P195 , P196 , P197
Barulin A.	NSS57	Berdyugina O. V.	P195 , P196 , P197
Bashkova I. B.	P294	Berenbaum F.	OC8
Bashlakova N.	P137 , P138	Berglund S. K.	OC34
Bassett P.	P109	Bergmann P.	P277
Bastianello M.	P795	Bernal D. A.	P320
Bastida J.-C.	P418		
Bastos-Silva Y.	P802 , P805		
Bastounis A.	P507		
Batalov A. B.	P399		

Bernardelli A.	P387	Boonen A.	OC13 , P672 , P675 , P758, OCs8, OCs11
Bertoldo E.	P198 , P473 , P474 , P545	Borcan C. M.	P611
Bertoldo E. B.	P604	Borchardt G.	P712, OCs6
Betancur J. F.	P320	Borello C.	P645
Bevilacqua G.	P257 , P319 , P417	Borges J.	NSS71
Bezlyudnaya N. V.	P294	Borgstrom F.	P164
Bhardwaj A.	P383 , P466	Borgström F.	OC23 , P777
Bhaskar M.	P846	Borissova A. M.	P373
Bhattia P.	OC4	Borja V. H.	P367
Bhullar S.	P497 , P499	Borze T. F.	P690 , P692
Bianco A. R.	P396	Bosco D.	P682
Biasioli L.	OC2	Bosco-Levy P.	P632 , P634
Bibik E.	P578 , P689	Botnar' N.	P702
Bibik V.	P743	Botta A.	OC33
Billis E.	P362 , P431 , P445 , P600 , P746	Bouhedja N.	P153 , P158 , P159
Bin C.	P124	Boukabous A.	P262 , P264 , P292 , P553
Binkley N.	P712, OCs6	Bours S.	OC13 , P672 , P675, OCs11
Birkhaeuser M.	ISGE-ESCE01	Bouzid S.	P856 , P861
Birner A.	P792	Brance L.	P320
Bischoff-Ferrari H.	OC27	Brance M. L.	P426 , P697 , P862
Bitzidis B. A.	P495 , P839	Brandi M. L.	NSS41 , PL10 , OC9 , OC33 , P361 , P363 , P393 , P422 , P447 , P550 , P551 , P555 , P619 , P623 , P809 , P819 , SY1 , SY8
Biver E.	MTE3 , P454	Brassill M. J.	P571
Björnelid O.	P173	Brennan F.	P508 , P509 , P573
Black D. M.	OC19	Brennan-Olsen S.	OC23 , P164 , P777
Blanch-Rubió J.	OC19	Brennan-Speranza T. C.	OC20 , P589
Blank M.	P523	Breuille D.	P271
Blank R. D.	P592 , P595	Briot K.	OC9 , P389 , P397 , P786
Blatter T.	P520	Brosa M.	P284
Bleckenhorst L. C.	OC20	Brown M. A.	OC34
Blibech H.	P588	Brown M. T.	OC8
Blizzard L.	P368	Brozek W.	P781
Blumenfeld E.	P246	Bruandet A.	P674
Boardman H.	P817	Bruce K.	P592
Bobak M.	P242	Brudin L.	P173
Bobek D. B.	P873	Brun L. R.	P426 , P697 , P862
Boccardi V.	P396 , P621	Brusentseva S.	P620
Body J.-J.	P277	Brutskaya-Stempkovskaya E.	P500
Bogachenko V.	P698	Brutskaya-Stempkovskaya E. V.	P849
Bogdanov V.	P330	Bruyère O.	MTE6 , OC6 , OC21 , OC28 , P392 , P394 , P430 , P449 , P607 , ESCE02
Boicea A.	P646 , P647 , P648 , P650 , P664	Bubba V.	P396
Boietti B.	P720	Bublik E.	P735
Bojinca M.	NSS20	Buckinx F.	NSS46
Bonadonna P.	P387	Buendía-Romero A.	P801
Bonakdari H.	P280	Buglova A. E.	P516
Bondarchuk M.	P742	Bulanov N.	P565
Bonet Madurga F.	OC19		
Bonham M. P.	P605		
Bonifacio M.	P387		
Bonnard F.	P394		
Boolell M.	OC17 , P663		



Buldu M. T.	P109	Casado E.	P710
Bultink I. E. M.	NSS66	Casanova-Munguía M. C.	P834
Bumbea A. M.	P130 , P131 , P825 , P827 , P830 , P840 , P847	Casas N.	P320
Bumbea A.-M.	P752 , P765 , P798	Casciaro S.	P780
Burden A. M.	OC7 , P679 , P683	Caseiro Anunciação S.	P867
Burianov O.	P259	Casella M.	P459
Burkard T.	OC7 , P679 , P683	Cassim B.	P808
Burlou Nagy C.	P690 , P692	Castiglioni C.	P296 , P297
Burn E.	P726	Castro Guimarães M.	P616
Burton K.	P527	Castro M. J.	P426
Bushmakín A. G.	OC8 , P275	Catapano S.	P803 , P806
Busija L.	OC23	Cattani G.	P198
Bussell M. E.	EL4	Cauley J. A.	OC5 , P278 , OCs1
Buttazzoni M.	P720	Cavalier E.	MTE11 , OC28 , P607
Butvyn S.	P853	Cavaliere A.	P199
Byrnes E.	OC20	Cavusoglu C.	P442
Bystrytska M.	P658	Cawthon P. M.	OC5 , P278 , OCs1
Bíró I.	P612	Cebanu M.	P515
Bødkergaard K.	P634	Cedeno-Veloz B. A.	P231 , P232 , P537
Cabout E.	P786	Ceglia L.	OC27
Caffarelli C.	P803 , P806	Cen X. Z.	P612
Cai Y.	P401	Centeno-Morales N. C.	P450 , P460 , P707 , P865
Caimac V. D.	P608 , P609 , P611 , P752 , P765 , P798 , P840 , P847	Cerdas S.	P560
Calis F.	P441	Cervo M. M.	P593 , P605 , P708
Caliskan O.	P640	Cesareo R.	P682 , P688
Caló M.	P433 , P723 , P851	Cesari M.	P626
Camanho G.	P693	Cevei M.	P121
Camargo O.	P323 , P325	Chafia D.	P659 , P677
Camen A.	P646 , P647 , P648 , P664	Chamakioti I.	P304 , P305 , P306 , P307
Campanacci D. A.	P550 , P551	Chan D.-C.	P380 , P592 , P595
Campodonico F.	P541	Chan J.	P729
Campusano C.	P560	Chan W. P.	P511 , P745 , P799
Canals L.	P418	Chan W.-P.	P734
Candela M.	P320	Chandran M.	NSS4 , NSS6
Canhão H. C.	P281	Chang C.-B.	P380
Cankurtaran M.	P442	Chang Y. H.	P542 , P543
Cannata-Andía J. B.	CSA-OC2	Changhai D.	P155
Cano A.	P521	Chaniotakis K.	P307
Cao C.	P117	Chantelot C.	P188
Capanna R.	P550 , P555	Chapurlat R.	P549
Capota R.	P209 , P210	Charles A.	P277
Capozza R.	P796	Chatzidafni A.	P858
Cappelleri J. C.	OC8 , P275	Chaudhary K.	P101
Carabelli G. S.	P720	Chaudry O.	P816
Caraffa A.	P396 , P621	Cheah M. H.	P140
Carbonell C.	P418	Chebby A.	P588
Carey J.	P313 , P649	Chekili S.	P104 , P105 , P106 , P800 , P856 , P860 , P861 , P864
Carey J. J.	NSS25 , P629 , P636	Cheleschi S.	P613
Carlsson M.	P173	Chen C.	P117
Carreiras-Cuiña M.	P462	Chen T.	P108
Carter S.	P417	Chen W.-J.	P222
		Chen X.	P110

Cheng Kiang Adrian L.	P501	Clynes M. A.	OC16
Cheok G.	P378	Coco M.	P875
Cheok G. J. W.	P359	Coendo C.	P394
Cherkasova M.	P580	Cohen-Solal M.	OC9
Cherkasova M. V.	P722	Cointry G.	P796
Cheung A. M.	OC34	Colacelli M. D.	P338
Chevalley T.	OC22 , P444 , P454	Colak O. B.	P458
Cheverda M. D.	P166	Colangelo L.	P215
Chia-Ter C.	P614	Cole S.	P414
Chiarugi P.	P619	Coleman R.	NSS2 , PL3
Chichasova N.	OC31	Colgan S. M.	P324
Chien K.-L.	P177	Combailia J.	P381
Chikina M.	P174	Compston J. E.	ROS-IOF-ESCEO1
Chinchilla S. P.	P402	Conaghan P. G.	OC8
Chirico M.	P795	Concepcion M. A.	P283
Chirita C.	P478 , P788	Concha D. C.	P127
Chisalau B.	P825 , P827 , P830	Concin H.	P781
Chisalau B. A.	P820	Connacher S.	P719
Chivers P.	P593	Connaughton B.	P629 , P636 , P649
Choi Y.	P592	Cons-Molina F.	P320
Chotiyarnwong P.	P165 , P189	Conversano F.	P780
Chronopoulos E.	P201 , P202 , P705	Cooke L.	P518
Chua D.	P378	Cooper C.	PL1 , OC2 , OC5 , OC11 , OC13 , OC15 , OC16 , P257 , P278 , P319 , P355 , P374 , P382 , P391 , P395 , P415 , P417 , P518 , P591 , P622 , P726 , SY2 , SY6 , ESCEO2 , OCs1 , OCs2 , OCs4 , OCs11
Chun K.	P875	Cooper J.	OC2
Chuquihuara A. J.	P320	Cooper R.	P622
Chávez-Arias D. D.	P427	Coronado-Zarco R.	P427 , P450 , P460 , P707 , P865
Ciaccia A.	P199	Correia C.	P870
Cianferotti L.	P819	Cortet B.	P188 , P303 , P346 , P392 , P397 , P447 , P670 , P674
Ciardo D.	P780	Corthesy J.	P271
Ciavoi G.	P599	Corum M.	P878
Cicuttini F.	P108 , P368	Costa A.	P477
Cima L.	P685	Costa E.	P618
Cimin M.	P795	Costa F.	P480
Cinar E.	P440 , P441	Costa J.	P618
Ciofu C.	P179	Costa M.	P595
Cioroianu G. O.	P234 , P237 , P239 , P240	Costa-Paiva L. H.	P797 , P802 , P805 , OCs9
Cipriani C.	P215	Coteur J.	OC18
Cirimbilli A.	P396	Courel-Ibáñez J.	P801
Cisari C.	P842 , P843	Courtalin M.	P670
Ciucă E.	P664	Crabtree N.	P382
Ciuffi S.	OC33	Criveanu C.	P471 , P820 , P825 , P827 , P830
Ciurana M.	P477	Crosera L.	P387
Ciurea P. L.	P471 , P820 , P825 , P827 , P830	Crowley R.	OC9
Civile V.	P254	Crozier S. R.	P518
Cinel M.	P413	Cruño M. G.	P512 , P513
Clark E.	ROS-IOF-ESCEO5		
Clark P.	P367 , P576 , P794 , P821 , P851		
Clark P. E. C.	P560		
Cleal J.	P518		
Close J.	P592 , P595		
Clynes M.	P417		

Csata Z. S.	P121	Dela S.	P808
Csoke E.	P452 , P624	Delabrière I.	P188
Culha M. G.	P458	Delai P.	OC34
Cunha Branco J. C. B.	P281	Delbar A.	P188
Cunha P.	P870	Delisle J.	SICOT-ESCEO-IOF3
Cunha Santos F.	P637 , P867	Dell'Orco S.	P199
Cunningham C.	P644 , P704	Demin N.	P580
Curtis E. M.	MTE4 , OC2 , OC5 , OC15 , P518 , OCs1	Demin N. V.	P886 , P887
Czerwinski E.	OC10	Demina A.	P655
Córdoba C.	P290	Demina M.	P577
Căpitănescu A.	P558 , P665 , P666	Demirhan E.	P301 , P458
D'Amelio P.	OC33	Demir ?.	P413
D'Amico F.	P868	Demurtas J.	OC6
D'Amico R.	P868	Dennison E. M.	NSS61 , MTE5 , OC5 , OC16 , P257 , P319 , P374 , P417 , P447 , P622 , OCs1 , OCs2
D'Angelo S.	OC15 , P518	Deomidov E.	P424
D/O Vas Dev Bajaj P.	P298	Desamericq G.	P389
Dahou-Makhloufi C.	P398 , P631 , P696 , P721 , P855	Deseatnicova E.	P848
Dahou-Makhloufi M. C.	P428	Deshmukh V.	P586 , P587
Dai W.	P401	Desinova O. V.	P887
Daina C. M.	P467 , P468 , P469 , P610	Desjeunes S.	P479
Daina L. G.	P467 , P468 , P469 , P610	Deutsch D.	P624
Dakovaska L.	P373	Di C. X.	P536 , P538 , P539 , P540
Dalle S.	P263	Di Donato E.	P459
Danciulescu Miulescu R.	P836	Di Gregorio S.	P862
Dankerl P.	P816	Di Monaco M.	P296 , P297
Danyliuk S.	P259	Diacinti D.	P215
Dartizio C. D.	P604	Diacinti D.	P215
Das S.	P375 , P410 , P419	Dias H. K.	P532
Dashdamirova S.	P312	Diaz Baclini P.	P697
Davies J. H.	P518	Diaz E.	P576
Davis S.	P507 , P559	Diaz-Herrera M.	P475
Dawson-Hughes B.	OC27	Diaz-Moron J.	P801
Dayanır D.	P872	Dibbets-Schneider P.	P369
De Caterina R.	P809	Diculescu M.	P685 , P687
De Courten B.	P708	Diehl M.	P720
De Cunto C. L.	OC34	Dietrich T.	P425
De Maeseneer M.	P761	Diez-Perez A.	OC13 , P447 , SY7 , OCs11
De Salazar A.	P795	Difranco M.	P369
De Schepper J.	OC18 , SY8	Dimai H. P.	P369 , P781 , P792
De Sire A.	P842 , P843	Dimitrova A.	P315
De Sogos A.	P862	Dincer F.	ESPRM-ESCEO-IOF1
De Souza Orlandi F.	P449	Dinescu S. C.	P820 , P825 , P827 , P830
De Vita M.	P803 , P806	Ding C.	P108 , P368
De Wilde M.	P632 , P634	Ding D.	P117
De Wit M.	SY4	Ding-Cheng C.	P614
Dedeyne L.	P151 , P263	Dinis S.	P850
Dedov I. I.	P178 , P308 , P533 , P884	Dionyssiotis Y.	NSS10 , NSS37 , NSS47 , NSS56
Degli Esposti L.	P199	Direito-Santos B.	P870
Dehghanbanadaki H.	P579	Djennane M.	P639 , P651 , P724 , P727 , P728 , P730 , P731
Dejaeger M.	P287		
Del Pino-Montes J.	P402		

Dobrianskyi D.	P386	Dydyshka V.	P126
Dobrovol'skaya O.	P580 , P582	Dydyshka Y.	P494 , P500
Dobrovol'skaya O. V.	P684 , P886	Dydyshka Y. V.	P849
Dogu B. B.	P442	Dzeranova L. K.	P178 , P329 , P330 , P533 , P884
Doherty E.	P629 , P636 , P649	Dzhush M. B.	P193
Dominguez L.	OC11	Díaz-Hernández C.	P460
Domocos D.	P692	Diraçoğlu D.	P316
Don A. F.	P408 , P411	Eastell R.	P302 , P559 , SY1
Donati S.	P363 , P422 , P550 , P551 , P555 , P619 , P623	Ebeling P.	P355 , P382 , P708
Donta I.	P201 , P202	Ebeling P. R.	EL3 , P591 , P605 , OCs4
Dontas I.	P757	Ebrahimi M.	P767 , P771
Dop D. D.	P608 , P609 , P611	Eckert R.	P719
Dorais M.	P279	Efremova A.	P582
Dorofeev Y.	P139 , P152	Efremova A. O.	P886 , P887
Dorokhina K.	P594	Egorov K.	P274
Doroshenko H.	P620	Egorova O.	P229
Dovbnya Z.	P535	Eissa M.	P113 , P144
Draghici A.	P167 , P168 , P205 , P206 , P208 , P209 , P210 , P211 , P213	Ekim O.	P872
Dretakis K.	P306 , P307	El Gaafary M.	P113 , P144 , P432
Dreval A.	P630	El Miedany Y.	P113 , P144 , P432
Dreval A. V.	P575	El Moutaouakil H.	P546 , P547 , P548 , P833
Drushlyakova A.	NSS60	El-Shanawany A.	P113
Duante C.	P283	Eliseev M.	P174
Dubovik T. A.	P617	Eliseeva T. A.	P244 , P245
Dubovitskaya T.	P308	Elistratov E. D. G.	P365
Duda G. N.	P425	Elizondo-Alanis L. J.	P320
Dudinskaya E.	P735	Elolemy G.	P113
Dueñas-Laita A.	P402	Elrefi M. E.	P751
Dulnoan D.	P448	Elshanawany A.	P144
Dumitrascu A.	P161 , P167 , P168 , P205 , P206 , P207 , P208 , P210 , P211 , P478 , P788	Emelianov V. U.	P294
Dumitrascu A. S.	P836	Emelyanova O. I.	P625
Dumitru N.	P168 , P205 , P206 , P207 , P208 , P209 , P210 , P211 , P256 , P339 , P478 , P788 , P815	Emir B.	P184 , P230
Duncan E.	PL8	Emsellem C.	P381
Dupont J.	P151 , P263	Endo N.	P492
Duque G.	NSS13 , OC20 , OC23 , P589 , P777	Enescu A. -	P646 , P647 , P648 , P650
Duque G. D.	P379	Engelke K.	P816
Duradoni M.	P819	Enkeleda S.	NSS50
Duran S.	P320	Enkin A.	P269
Durdin R.	OC15 , P622	Ennas M.	P541
Durkee S.	OC24	Ensrud K.	P278
Dutson S. M.	P429	Ensrud K. E.	OC5
Dvoret'ski L. I.	P244 , P245	Entwistle I.	P716 , P718
Dworkin R. H.	OC8 , P275	Enwu L.	OC14
Dydykina I.	P122 , P384 , P446 , P451 , P453 , P481 , P523 , P530	Erdoğan T.	P449
		Eremina Y. S.	P694
		Eremkina A.	P335 , P578 , P689
		Ergunol E.	P872
		Erkan S.	P434
		Ermolaeva L.	P274
		Ermolenko T.	P755
		Erraoui M. E.	P762
		Ershova E.	P192



Ershova O.	P630	Ferreira J.	P850
Erviti Lopez J.	P231 , P537	Ferreira J. F.	P321 , P637 , P867
Escobar A.	P320	Ferretti J. L.	P796
Espejo-Polidura S.	P270 , P347	Ferrillo M.	P843
Espósito M.	P512 , P513	Fica S.	P685 , P687
Eusebi P.	P288	Ficheur G.	P674
Fabrikant K.	P452 , P624	Fielding R. A.	OC5 , OCs1
Fadeev V. V.	P694	Figueiredo B.	P566 , P583
Fadeyev V.	P565	Filipovich A.	P248 , P249 , P250 , P251 , P252 , P272 , P273
Fahimfar N.	P271 , P345 , P579 , P700 , P744 , P767 , P775 , P832 , P837	Fineman M.	OC26
Fahrleitner-Pammer A.	OC10 , P781	Finkch A.	P679
Falchetti A.	P682	Fioravanti A.	P613
Falcone S.	P688	Firpo F. C.	P185
Fallon N.	P573	Firulescu S. C.	P820
Falsetti I.	P550 , P555	Florescu A.	P236 , P239 , P820 , P825 , P827 , P830
Fama M.	P645	Florescu D. N.	P233
Fan T.	P108	Floris A.	P541 , P643 , P645
Fanaskov V.	P881	Foesser D.	P549
Far M.	P632 , P634	Foghis M.	P690 , P692
Farcas M.	P121	Foglio Bonda P. L.	P843
Fardellone P.	P397	Fojtik P.	P310
Fargieva H. R.	P178 , P533 , P884	Fominykh M.	P594
Faria D.	P618	Fong C. H. Y.	P669
Farida M. F.	P428	Fonseca D.	P480
Farouk O.	P113	Fonseca Ferreira J.	P457
Farzadfar F.	P271	Fortis A.	P491
Farías V.	P810	Fossi C.	P819
Fassio A.	P198 , P199 , P387 , P473 , P474 , P545	Fouad N.	P113 , P432
Fassio A. D.	P604	Fousekis K.	P362 , P746
Fathi M.	P771	Fracassi E.	P198
Fathi N.	P113 , P144	Franceschelli F.	P623
Fatjona K.	NSS49	Franchi A.	P550 , P555 , P623
Fazaa A.	P104 , P105 , P106 , P588 , P800 , P856 , P860 , P861 , P864	Franchini R.	P780
Fedkov D.	P386	Francis P.	P716 , P718
Feklistov A. Y.	P684	Franco-Lopez F.	P801
Ferhat A.	P631	Franekova L.	P859
Ferhatlar N.	P301	Freiburger M.	P297
Ferlin A.	MTE12	Freile B.	P512 , P513
Fermanoglou S.	P385	Freire G.	P325
Fernan C.	P230	Frolov I.	P701
Fernandes J.	MTE9 , SICOT-ESCEO-IOF1	Frolova T.	P736
Fernandez N.	OC22	Frunze V.	P848
Fernández D. F.	P863	Fu S.	P108
Ferracci M.	P396 , P621	Fuentes E.	P477
Ferrand R.	P808	Fugaru O.	P129 , P131
Ferrari S.	SY8	Fuggle N.	MTE8 , OC16 , P319 , P417
Ferrari S. L.	OC10 , OC22 , P444 , P454 , P676 , P809	Fujiwara S.	P288 , P758 , , OCs8
		Fukada S. Y.	NSS69
		Fuks O. S.	P874
		Fung K.	OC2
		Fung M. M. H.	P669

Fusaro M.	P779 , P809	Ghasem-Zadeh A.	P601
Gabriel P.	P475 , P476	Ghasemzadeh A.	P579
Gadallah N.	P113 , P144	Ghemigian A.	P161 , P167 , P168 , P205 , P206 , P207 , P208 , P209 , P210 , P211 , P212 , P213 , P224 , P225 , P256 , P339 , P356 , P478 , P788 , P815
Gaibor Urgiles K.	P597	Ghemigian M.	P207 , P356
Galal S.	P113 , P144 , P432	Ghozlani I. G.	P762
Galkina O.	P534 , P535	Ghukasyan N.	P483
Galli G.	P550 , P551 , P555 , P619 , P623	Giacoa E.	P512 , P513
Galusca D.	P469	Giangregorio L.	OC12
Gandham A.	P605 , P708	Giannopoulos G.	P491
Ganeb S.	P113	Giannoulitou E.	P600
Ganguly R.	P603	Giavopoulos P.	P505 , P506 , P841
Ganry H.	P303	Gielen E.	MTE2 , OC10 , P151 , P263
Garabajiu M.	P515	Gil Y.	P475 , P476
Garcia-Gaeta R.	P723	Gillain S.	OC21 , P394
García Barreiro G. G.	P720	Gimigliano A.	P842
García López D.	P597	Gimigliano F.	P260
García M. L.	P512 , P513	Giorgadze E.	P285
García Pérez M. A.	P521	Gittoes N.	P507
García Vadillo J.-A.	P756	Giusti F.	P422 , P619
García-Bea A.	P402	Gjerakarska Savevska C.	P557
García-Montes N.	P347 , P348 , P462	Gkiomisi A.	P385
Gaslain Y.	P381	Gladkova E.	P627 , P630 , P735
Gasparik A. I.	P121	Glazieva V. S.	P178 , P533 , P884
Gatti D.	P198 , P199 , P473 , P474 , P545	Gliatis J.	P377 , P431 , P445 , P600 , P746
Gatti D. G.	P604	Glukhova S.	P384
Gatti M. G.	P604	Gobbi R.	P693
Gauthier G.	OC17 , P663	Gocevska M.	P557 , P590
Gavioli I. G.	P604	Godfrey K. M.	P518
Gavrila B.	P179	Goemaere S.	OC13 , OC30 , , OCs11
Gayko O.	P147	Gofita C.	P234 , P240
Gaykovaya B.	P152	Gofita C. E.	P820
Gaytán-González A.	P405	Gogas Yavuz D.	P289 , P312
Gazar Y. G.	P751 , P773	Goh K. M. J.	P502
Gazi S.	P201 , P202	Goh S.	P331 , P332
Gazoni F.	P254	Goh T. C.	P782
Gažová A.	P216	Gokce Kutsal Y.	NSS22
Gebeva0 Popova M. P.	P399	Gold G.	OC22 , P444
Geerinck A.	NSS72 , NSS74 , P449	Goldstein A.	P206 , P207 , P208 , P225 , P478 , P836
Genç H.	P316	Golounina O.	P308
Georgopoulos N. G.	P350 , P351	Golounina O. O.	P694
Geormaneanu C.	P239 , P240	Gomon U.	P269
Geraci G. F.	P185	Gonnelli S.	P803 , P806
Gerakarska Savevska C.	P590	Gonzalez Rodriguez E.	P371 , P793
Gerarde Paul A.	P782	González A. P.	P863
Gerrand C.	P109	González B.	P290
Ghaleb R.	P113	González M.	P418
Ghandehari H.	OC3	González Pernas M.	P512 , P513
Gharibzadeh S.	P271 , P345 , P700 , P774 , P837		
Gharout A.	P855		
Ghasaboghlyan M.	P482 , P483		

González S.	P710	Gutierrez Rodriguez F.	P756
González Álvaro I.	P756	Gutiérrez-Valencia M.	P231 , P537
González-Mendoza R. G.	P405	Guzmán-Jiménez F.	P821
Goo B. H.	P739	Guzmán-Rico A. C.	P405 , P834
Gorbunov V. V.	P772	Götz C.	P369
Gordeev M.	P691	Günendi Z.	P514
Gordgeladze K.	P735	Günther C.	P520
Gordillo Mendoza G.	P597	Gąsowski J.	NSS17
Gordon B.	P246	Habib H. C.	P185 , P186
Gordon R.	P246	Habibović A.	P340
Gorochoy E.	P308	Hadji P.	NSS1
Graessel S.	NSS14	Hafer K. U.	P520
Graham N. J.	P518	Hafrassou H.	P398 , P631
Grange L.	P786	Hafrassou H. H.	P428
Graptov X.	P153 , P158 , P159	Hafrassou H.	P855
Grebenkina M.	P630	Hafizoglu M.	P442
Grego S.	P199	Hagino H.	P492
Gregson C.	P808	Hailu S.	P804
Grekhov R.	P436	Hajivalizadeh F.	P832
Grekhov R. A.	P517	Halac D. A.	P512
Gridelas A.	P600	Halidou Idrissa A.-R.	P357 , P463 , P464 , P465
Gridneva G.	P384 , P446 , P451 , P453	Halil M. G.	P442
Griffith L.	OC12	Hall J. A.	P275
Grigoreva I.	P879 , P880 , P881 , P882	Hall M.	P640
Grigoryan A.	P483	Halsby K.	P184 , P527
Grillari J.	P792	Halseth A.	OC26
Grkova Miskovska E.	P590	Hamada H.	P496
Gromova M.	P125 , P390	Hamidi Z.	P107
Gronskaya S.	P309	Hamoud H. H.	P773
Grootjans W.	P369	Hampson G.	NSS65 , P448
Groppa L.	P848	Hamraeva N.	P258
Gruzmanov A.	P293	Hamrick M.	NSS12
Grygorieva N.	P531 , P658 , OCs3	Hanafy M. H.	P751
Grzywinski Y.	P271	Hannouche D.	P454
Gsel A.	P629 , P636 , P649	Hans D.	P371
Gu Y. D.	P612	Harland J.	P510
Guadian Moreno A. G.	P844	Harrington D. J.	NSS64
Guagnelli M.	P794	Harrington N.	P629 , P636 , P649
Guagnelli M. A.	P367	Harris E. C.	P391 , P395
Guangfeng R.	P155	Hars M.	OC22 , P444
Gudnason V.	OC1	Hart K.	P527
Gueldini de Moraes A. V.	P797 , OCs5	Hart N.	P593
Guillemin G. G.	P379	Harvey N. C.	OC1 , OC2 , OC4 , OC5 , OC14 , OC15 , OC32 , OC35 , P278 , P374 , P518 , P531 , P560 , P804 , P808 , P811 , P812 , P813 , ESCEO-IOF1 , ROS-IOF-ESCEO2 , OCs1 , OCs2 , OCs3
Guillén-Astete C. A.	P266 , P267 , P270 , P347 , P348 , P462	Hasab El Naby M.	P113
Guimarães F.	P618 , P681	Hassan M.	P144 , P432
Guimarães-Oliveira L.	P320	Hassan W.	P113 , P144
Guk M. D.	P166	Hassani R.	P461 , P639 , P651 , P724 , P727 , P728 , P730 , P731
Gumru S.	P316		
Guo Y.	P536 , P538 , P539 , P540 , P596		
Guryanov D.	P423 , P742		
Guryanova E.	P423 , P424 , P740 , P742		

Haugen I. K.	ESCE02	Huang W.-J.	P380
Havryliuk H.	P259	Huang X.	P154
Hayet C.	P659	Huber B.	OC18
Heaney F.	P313 , P629 , P636 , P649	Hughes C. F.	P644 , P704
Hemetsberger M.	P792	Hui Z.	P124
Hennessy D.	P712, OCs6	Hume P.	P716 , P718
Hepgüler S.	P316	Hummer M.	P792
Hernández G.	P402	Hunter H.	P117
Hernández-Díaz C.	P865	Husar A.	P610
Herrmann F.	OC22 , P444	Hyde K.	P768
Herteleer M.	P287	Hyde N. K.	P510 , P747
Hertsen I.	P200	Héréus S.	P761
Heshmat R.	P271 , P345 , P700 , P767 , P771 , P774 , P775 , P837	Hügler T.	OC7 , P679 , P683
Hidalgo Ovejero A. M.	P232	Iamartino L.	P393 , P422
Hildebrandt A.	P425	Iannacone A.	P215
Hildegard H. H.	P404	Iantomasi T.	P361 , P363 , P422 , P550 , P555 , P619 , P623
Hiligsmann M.	NSS43 , OC13 , P672 , P675 , P758, OCs8, OCs11	Iarenenko O.	P386 , P620
Himcheva I.	P315	Ibovi Mouondayi A. A.	P300
Hind K.	P716 , P718	Ibragimov K.	P258
Hlava A.	P792	Ibrahim M.	P113
Ho A. J.	P112 , P176	Iconaru L.	P277
Hochberg M. C.	ESCE02	Ignatiev A.	P755
Hoekstra H.	P287	Igueni L.	P639 , P727 , P728 , P730
Hoey L.	P704	Ihama F.	P814
Hofbauer L. C.	OC10	Iidaka T.	OC25 , P257 , P493
Holloway J.	OC16	Iinuma N.	P492
Holloway J. W.	P518	Ikeda S.	P492
Holloway-Kew K. L.	P510 , P747	Illgen R.	P712 , OCs6
Holloway-Kew L.	P768	Ilyin M.	P630
Honvo G.	OC6 , P392 , P430	Ilyina O.	P293
Horga D. A.	P238	Ilyusin Y.	P627
Horii C.	OC25 , P257 , P493	Imaicela Naula L.	P581
Houda H.	P659 , P677	Imm S. J.	P676
Hovhannisyan A.	P483	Inacio A. M.	P433
Howe C. Y.	P603	Incognito G. G.	P682
Howe J.	OC18	Innocenti M.	P361
Howe T. S.	P298 , P359 , P360 , P378 , P603	Inskip H. M.	P518
Hoyos L. K.	P863	Invernizzi M.	P842 , P843
Hrdý P.	P310	Ioannidis G.	OC12
Hrechanyk N.	P620	Ioannidis G. I.	P606
Hricová K.	P753	Iolascon G.	P260 , P261 , ESCE0-IOF3
Hsiao E. C.	OC34	Iolascon G. I.	P226
Hsieh T.-J. H.	P222	Ionele C.	P233 , P235 , P236 , P238
Hsiung C. A.	P222	Ionescu M.	P687
Hsu C.-C.	P222	Ionescu R.	NSS19
Hsu H.-Y.	P177	Ionovici N.	P646 , P647 , P648 , P650
Hsu L.-Y.	P177	Iqbal R.	P811
Huang C.-F.	P156 , P734	Irazoque F.	P320
Huang J.	P117	Ireland A.	P796
Huang W.-C.	P511 , P745 , P799	Iritsyan S.	P482
		Isaia G.	OC33
		Ishankulova N.	P258



Ishibashi H.	P492	Jódar Gimeno E.	OC10
Isla Sarasa P.	P118 , P119 , P120	Jödicke A.	P632 , P634
Ismail S. I.	P773	Kabatsy M.	P147 , P200
Ismailova K.	P504	Kakadiya G.	P101 , P102 , P103 , P175 , P220 , P221
Iuliano S.	P777	Kaladze K.	P534
Iurcov R.	P599	Kalchovska Ivanovska B.	P557
Ivanov E.	P742	Kalcovska Ivanovska B.	P590
Ivanova G.	P764	Kaliberdenko V.	P534 , P535 , P662 , P668 , P671
Ivanova O.	OC31	Kalinchenko B.	NSS59
Ivashkivskyi O. I.	P193	Kalogirou T.	P491
Izquierdo M.	P231 , P232 , P537	Kalouda I.	P553
Jaarah N.	P448	Kalweit M.	P683
Jackuliak P.	P216 , P217	Kam C.	P497 , P499
Jafri L.	P811	Kamal A. M.	P789 , P790
Jahn D.	P425	Kamal C.	P129 , P130 , P131
Jain Mch D. R.	P214 , P223	Kamal D.	P129 , P130 , P131 , P789 , P790
Jameson K.	P319	Kamal K. C.	P789 , P790
Jameson K. A.	P257	Kamenický P.	OC9
Jamshidi A.	P280	Kanis J. A.	OC1 , OC4 , OC5 , OC14 , OC23 , OC32 , OC35 , P164 , P278 , P531 , P777 , P804 , P808 , P811 , P812 , P813 , OCs1, OCs3
Janani S.	P182 , P183 , P204 , P219 , P247 , P265 , P300 , P546 , P547 , P548 , P833	Kanno A.	P150
Janha R.	P382 , OCs4	Kannu P.	OC34
Janha R. E.	P591	Kanyilmaz S.	P458
Janjua S. S.	P817	Kanyilmaz S.	P301
Jaramillo Encalada I.	P597	Kaparos G.	P757 , P759
Jarjou L.	P355 , P382	Kaplan F. S.	OC34
Jarjou L. M.	P591 , OCs4	Kapoor S.	P109
Javaheri B.	P203	Karakulova Y.	P766
Javaid K.	MTE10 , SICOT-ESCEO-IOF2 , ESCEO-WHOCC1	Karaseva E.	P335
Javaid M.	OC9	Karczewski D.	P253
Javaid M. K.	P414 , P433 , P719 , P723 , P726 , P817 , P851	Kardalas E.	P858
Jeiranashvili N.	P285	Kariki E. P.	P268
Jelastopulu E. J.	P350 , P351	Karlovich N.	P494 , P500
Jercovich F.	P810	Karlsson M. K.	OC5 , P278 , OCs1
Jerina J.	NSS52	Karonova T.	P869
Jerkovich F.	P338	Karonova T. L.	P874
Jerolimov V.	P866	Kashevarova N.	OC31 , P122 , P615 , P642 , P711
Jiadong W.	P123	Kashevarova N. G.	P678 , P857
Jiang X.	P401	Kasimova A.	P630
Jimenez Salazar S.	P194	Kassab S.	P104 , P105 , P106 , P800 , P856 , P860 , P861 , P864
Jobe M.	P591 , OCs4	Katamadze N. N.	P178 , P533 , P884
Johansson H.	OC1 , OC4 , OC5 , OC14 , OC32 , OC35 , P278 , P531 , P804 , P808 , P811 , P812 , P813 , OCs1 , OCs3	Katogi T.	P492
Jones G.	P368	Kaufman J.-M.	MTE1 , OC30
Jordhani M.	P111	Kaur A.	P522 , P524 , P528 , P529 , P776 , P783 , P822
Joshi D.	P175 , P221	Kaur G.	P822
Joubert J.-M.	P786		
Juturu V.	OC24		

Kaur R.	P529	Kocevska B.	P376
Kaux J.-F.	OC21 , P758, OCs8	Kochetova E.	P686
Kavaklı A.	P876	Kocijan Lovko S.	P866
Kawtar N.	P300 , P357 , P463 , P464 , P465	Kodirov M.	P160
Kazmin A. I.	P317 , P318	Koevska V.	P503 , P557 , P590
Keen R.	OC9 , OC34 , SY1	Koh J.	P378
Keller J.	P425	Koh J. S. B.	P298 , P359 , P360
Kendler D.	P497 , P499	Koh S. B. J.	P603
Kendler D. L.	P324	Kokkalis Z. K.	P350 , P351
Kennedy S.	OC3 , OC26	Kokov A.	P882
Keshtkar A. A.	P107	Kolbin M.	P627
Kesiktas F. N.	P878	Kolchinskij I.	P630
Ketenci A.	P316	Kolokithas G.	P600
Keyak J.	P598 , P601	Kolovos S.	P414
Kezhun L.	P854	Kolta S.	OC9
Khairallah P.	P779 , P809	Komkina M.	P620
Khalagi K.	P345 , P832	Komornicki M.	P720
Khalaji K.	P579 , P700 , P744 , P837	Kononenko N.	P698
Khaled H.	P113	Konstantinou A.	P490
Khalzova A. K.	P874	Koppo K.	P151 , P263
Khan A.	NSS41 , P443 , P811	Korenskaya E. G.	P157 , P227 , P228
Khan A. A.	P324	Koroleva M.	P407 , P409 , P879 , P880 , P881 , P882
Khan J.	P776	Koroleva M. V.	P633
Khan R.	P421 , P846	Korolik O. D.	P228
Khanna V.	P661 , P703 , P769 , P831	Korotaeva T. V.	P706 , P722
Khashayar P. K.	P552	Korovessis P. K.	P349 , P350 , P352 , P353 , P354
Khaydarov V.	P139	Koshlataya O. V.	P617
Kheradi M.	P592	Kosik R. O.	P729
Khimion L.	P259	Kostoglou-Athanassiou I.	NSS11 , NSS35 , NSS53 , P490 , P491 , P505 , P506 , P841
Khorana J.	P888	Kotowicz M. A.	P510 , P747
Khorsandi D.	P381	Koulouvaris P.	P163
Khromtsova O.	P594	Koureta T.	P304
Khwaja A.	P302	Koutserimpas C.	P304 , P305 , P306 , P307
Kienzle A.	P253	Kovacs S.	OC28
Killinger Z.	P216 , P217	Kovalenko P.	P481 , P523 , P530
Kim E.	P192	Kovaleva E.	P335
Kim J. H.	P739	Kovatcheva R.	P764
Kincha-Polishchuk M. D.	P166	Kovačević M.	P519 , P748
Kinra S.	P605	Koyanagi A.	P148
Kirazli Y.	P440 , P441 , P514	Kozhevnikova P.	P481 , P523
Kirazlı Y.	NSS23	Kraev K. K.	P399
Kirilov G.	P764	Krampera M.	P387
Kirilov N.	P484 , P485	Krapac L.	P866
Kirilova E.	P484 , P485	Krasnik R.	P519 , P748
Kitaba N.	OC16	Krasulina K. A.	P575
Kitaigrodsky A. V.	P720	Kremenitskaya A.	P169
Kitamura B.	P493	Krikelis M.	P201 , P202
Kitcharanant N.	P165 , P314	Kripa E.	P215
Klyaus N.	P691	Krueger D.	P712, OCs6
Knaub K.	OC24	Kryukova I.	P630
Kobets K.	P628 , P641		
Kocevska A.	P376		

Kryukova I. V.	P575	Lapauw B.	OC30
Ku J.	P222	Lapi F.	P632 , P634
Kucukdeveci A. A.	NSS24	Larijani B.	P107 , P271 , P345 , P700 , P744 , P767 , P771 , P774 , P775 , P832 , P837
Kudryavtceva A.	P446 , P451 , P453	Larijani B. L.	P552
Kudryavtsev N.	P838	Larroude M. S.	P320
Kudryavtseva A.	P384	Laskou F.	P257 , P319 , P374 , OCs2
Kuh D.	P622	Laslau C.	P469
Kulanthaivel S.	P534 , P535 , P662 , P668 , P671	Laslop A.	ESCEO4
Kulkarni B.	P605	Lassalle R.	P632 , P634
Kulyk M. S.	P193	Lastochkin A.	P740
Kuo C. L.	P502	Latfullin A.	P630
Kurabayashi T.	P492	Launois R.	P786
Kurth A.	NSS3 , SY8	Laurent M. R.	P287
Kuru O.	P301 , P458	Law K. X. L.	P406 , P408 , P411 , P412 , P435 , P437 , P438 , P439
Kurushina O.	NSS58	Lazaretti Castro M. L.	P560
Kusevich D.	P122 , P615 , P711	Lačokova Krasnikova J.	P519
Kutsal Y.	P514	Le Rouzic O.	P346
Kužma M.	P216 , P217	Leache Alegría L.	P231 , P537
Kužmová Z.	P216 , P217	Lebel H.	P246
Kwok T.	OC5 , P278 , OCs1	Lechtenboehmer C.	OC7
Kyburz D.	P679	Lee A.	OC12
Kyselovič J.	P216	Lee A. L.	P606
Küçükdeveci A.	P514	Lee A. M.	OC2
L. S. Mexico Group F.	P851	Lee C. H.	P669
Laatar A.	P104 , P105 , P106 , P588 , P800 , P856 , P860 , P861	Lee J.	OC12
Laater A.	P864	Lee J. K.	P592 , P595
Labashova L.	P126	Lee J. L.	P606
Labashova V.	P494	Lee Y. H. D.	P502
Labreuche J.	P670	Lees M.	P716 , P718
Lachmann R.	OC9	Lefkir - Tafiani S.	P292 , P553
Ladang A.	OC28	Lefkir- Tafiani S.	P696
Ladjouze A.	P696	Lefkir-Tafiani S.	P262 , P264
Ladjouze-Rezig A.	P292	Legroux I.	P346
Ladygina D.	P735	Lekamwasam B.	P673
Laga Cuen A. C.	P118 , P119 , P120	Lekamwasam R.	P673
Lai P. S. M.	P140	Lekamwasam S.	P322 , P366 , P470 , P532 , P737 , P778
Laird E.	P644 , P704	Lemesle P.	P153 , P158 , P159
Lakatos P.	OC10	Lempert U. G.	P871 , OCs10
Lal A.	P164	Lems W. F.	NSS68
Lam C.	P448	Lengelé L.	OC21 , OC28 , P430
Lambrinoudaki I.	PL9 , P757 , P759	Lenne X.	P674
Lammert A.	P423 , P742	Lenora J.	P778
Lampropoulou S.	P362	Leonardi-Bee J.	P507
Lamy O.	P371 , P793	Leong J. F.	P406 , P408 , P411 , P412 , P435 , P437 , P438 , P439
Lane N.	OC5 , OCs1	Leonova N.	P630
Lane N. E.	OC26	Leroy S.	P288
Lang B. H. H.	P669	Leslie W.	OC1 , OC12
Lang C.	P108	Lesnyak O.	P311 , P627 , P630 , P735
Langdahl B.	OC10		
Langley T.	P507		
Lannon R.	P508 , P509 , P573		

Lespessailles E.	P303	Loghin-Oprea N.	P515
Letaeva M.	P407 , P409 , P879 , P880 , P881 , P882	Lombardi F. A.	P780
Letaeva M. V.	P633	Lopes D. L.	P281
Letizia Mauro G.	OC19	Lopez F. N.	P512 , P513
Leung J.-P.	P324	Lopez Gavilanez E.	P581 , P597
Levinger I.	OC20 , P589	Lopez V. A.	OC26
Lewiecki M.	P308	Lopez-Gonzalez D.	P794
Lewis J. R.	OC20 , P589	Lorentzon M.	OC1 , OC4 , OC5 , OC14 , OC32 , OC35 , P278 , P531 , P804 , P808 , P811 , P812 , P813 , OCs1 , OCs3
Lewis R.	P518	Lounici A.	P725 , P852
Leykauskene E.	P630	Louzir B.	P588
Lezhenina S.	P423 , P742	Lu S.	P108
Li C.-C.	P734	Lu Y.-C.	P729 , P745 , P799
Li G.	P110 , P154 , P170	Lucattelli E.	P361
Li J.	P108	Lugovskov D.	P702
Li J. J.	P134 , P136	Lui D. T. W.	P669
Li N.	OC13 , P672 , P675 , OCs11	Lukina G.	P384 , P451 , P453
Li X.	P162	Luscher S.	P796
Li Z.	P170	Lutf A.	P370 , P372
Li-Yu J.	P470	Luzin V.	P504 , P701 , P702 , P741 , P743 , P829
Libanati C.	OC10 , P288 , P415	Lyrilis G.	P705
Libos A.	P667	Lysenko V.	P423
Liebich G.	P793	Lyubomirsky G.	NSS7
Lifanova L. S.	P245	López A. M.	P667
Liguori S.	P260 , P261 , ESCEO-IOF3	López Y Taylor J. R.	P405
Liguori S. L.	P226	López-Megchun X.	P450 , P460 , P707 , P865
Lila A.	OC31 , P481 , P523 , P642 , P711	Lübbecke-Wolff A.	P391 , P395
Lila A. M.	P678 , P857	Ma J.	P108
Lila V.	OC31	Mackler L.	P796
Lim E. M.	OC20	Madi K.	P203
Lim W. H.	OC20	Magalini F.	P459
Lin H.-H.	P177	Maganeva I.	P330
Lin T.	P108	Magaziner J.	P595
Lin X.	P589	Maggi S.	EL1 , OC6 , OC11
Lin Y. C.	P745	Mahadzir H.	P406
Ling K. T.	P421 , P846	Mahdavi-Mazdeh M.	P107
Linglart A.	ESCEO-WHOCC2	Mahdi L.	P489
Liow L. M. H.	P360	Maher N.	P508 , P509 , P573
Lisdero A. P.	P512 , P513	Maheu E.	P303
Lissens M.	NSS48	Mahoney S.	P719
Litsne H.	OC14	Majid H.	P443
Litvinova M. A.	P706	Majumder M. I.	P824
Liu B.	P132 , P133 , P135	Makarios E.	P757
Liu B. C.	P542 , P543	Makarova V.	P169
Liu E.	OC1 , OC32 , P278 , P531 , P804 , P808 , P811 , P812 , P813 , OCs3	Makhlouf Y.	P104 , P105 , P106
Liyanage G.	P366 , P737	Makino H.	P498
Lo N. N.	P298 , P359 , P360	Makras P.	P385
Lobanov M.	P835	Makris K.	P201 , P202
Locquet M.	OC21 , OC28 , P394 , P447	Maleitzke T.	P425
Lodhia N.	P448	Malekzadeh M.	P598 , P601



Malle O.	P781	Mateescu B.	P685 , P687
Malyschenko O.	P407 , P409 , P879 , P880 , P881 , P882	Matellán-Fernández I.	P266 , P267
Malyschenko O. S.	P633	Mathiou D.	P505 , P506 , P841
Malyutina S.	P242 , P243 , P456	Matos L.	P850 , P867
Mamedova E.	P309 , P577	Mattia L.	P559
Mamus M.	P785	Matzaroglou C.	P362 , P600 , P746
Mamus M. A.	P638	Mavragani C. P.	P201 , P202
Mancilla E. E.	OC34	Mazanko K.	P386
Manfrini S.	P682 , P688	Mazeda C.	P566 , P583 , P828
Manoleva M.	P557 , P590	Maziar S.	P107
Mansourzadeh M. J.	P345 , P579 , P744	Mazur M.	P515
Mansur J.	P733	Mazur-Nicorici L.	P515
Mansurov D.	P139	Mazurenko E.	P242 , P243 , P456
Mao T.-Y.	P156	Mazurenko M.	P269
Marchenkova A.	P749	Mazurenko O.	P218
Marchenkova L.	P750, OCs7	Mazurenko S.	P218 , P269 , P274 , P293
Marchesi M.	P621	Mazzini S.	P426
Marcocci C.	OC33	Mazziotti G.	P682
Marconi E.	P632 , P634	Mašić M.	P748
Marcu I.-R.	P608 , P609 , P611 , P752 , P765 , P798	Mc Gettigan S.	P571
Marcu R.	P840 , P847	McAlindon T. E.	ESCE01 , ESCE02
Marcucci G.	P819	McArthur C.	OC12 , P606
Mari A.	P305 , P307	McCabe J.	P313
Maria D. T.	P789 , P790	McCaffrey T.	P708
Marini F.	OC33	McCarroll K.	P508 , P509 , P573 , P644 , P704
Marino R.	OC34	McCloskey E. V.	OC1 , OC4 , OC14 , OC32 , OC35 , P278 , P288 , P531 , P804 , P808 , P811 , P812 , P813 , CSA-OC3 , ROS-IOF- ESCE04 , OCs3
Marinou K.	P757	McClung M. R.	PL2 , P676
Mark-Wagstaff C.	P559	McDevitt G.	P421
Markman J. D.	P275	McDonough A.	P573 , P644 , P704
Markova G.	P181	McGowan B.	OC13 , P629 , P636 , P649 , OCs11
Marković V.	P340	McGowan D.	P736
Marmalyuk D.	P565	McGuire B.	P629 , P636 , P649
Marmalyuk D. E.	P694	McNulty H.	P573 , P644 , P704
Marozik P.	P628 , P641 , OCs5	Mechid F.	P398 , P631 , P696 , P721 , P855
Martel-Pelletier J.	P279 , P280	Mecocci P.	P396 , P621
Martin S.	P685 , P687	Medhat B.	P113
Martinez R. M.	P320	Medina A. M.	P127
Martinez-Velilla N.	P231 , P232 , P537	Medina Orjuela A.	NSS32
Martos F.	P426	Medina P. J.	P282
Martuscelli D.	P325	Mehiri N.	P588
Martynyuk L.	P853	Meier C.	CSA-OC1
Martín C.	P475 , P476	Mellström D.	OC5 , P278 , OCs1
Martínez-Hernández B. M.	P821	Melnichenko G.	P308 , P309 , P563
Martínez-Laguna D.	P418	Mendez L.	P723
Mascarenhas M. R.	P845	Mendez Sanchez L. M. S.	P560
Mascha O.	P490	Mendez-Sanchez L.	P576 , P794 , P851
Masi L.	P623 , P819		
Massazza G.	P296 , P297		
Massey L.	P527		
Massmann J.	OC29		
Matalova E.	P784		

Men'shikova L. V.	P561	Mocarbel Y.	P795
Meray J.	P514	Moghaddassi M.	P771
Mercado-Asis L.	P592	Mohamed A.	P571
Mereu M. C.	P779 , P809	Mohamed S.	P113
Mesinovic J.	P589	Mohannad N.	P113
Messina C.	P688	Mohebbi M.	P747
Messina D. O.	P320	Moheimani H.	P744
Messina O. D. M.	P560	Mohseni S.	P832
Mester-Nagy B.	P121	Mohsin Z.	P719
Miagkova M.	P327 , P328	Moiseeva O.	P691
Michael A.	P400 , P584 , P585	Mokhort T.	P494
Michaylova E.	P373	Mokhtar S. A.	P406 , P408 , P411 , P412 , P435 , P437 , P438 , P439
Micó-Pérez R. M.	P418	Mokrysheva N.	P330 , P335 , P578 , P689
Mifsut D.	P521	Mole E.	P201 , P202
Migliaccio S.	OC33	Molina J. F.	P320
Migliario M.	P843	Molloy A.	P704
Migliavacca E.	P271	Monfort J.	P381
Miglietta F.	P422 , P550 , P551 , P555 , P619 , P623	Monov S.	P526
Mihalcea S.	P121	Monova D.	P526
Mijacika M. L.	P873	Montaño J. A.	P320
Mijea C.	P180	Monteiro G.	P850 , P867
Mikov A.	P519 , P748	Montero-Erasquín B.	P449
Miladi S.	P104 , P105 , P106 , P588 , P800 , P856 , P860 , P861 , P864	Montesa M.-J.	P290
Milan C.	P719	Montesino N.	P290
Milano E.	P296 , P297	Montiel-Ojeda D.	P367 , P794
Milenović N.	P748	Moon R. J.	P518
Mili N.	P757	Moraes P. R.	P403 , P404
Minh Nguyen H.	OC29	Morales D. C.	P667
Minisola S.	OC19 , OC33 , P215	Morales Torres J.	P560
Miranda Alatríste P. V.	P844	Morales Torres J. L.	P844
Mirobidov U.	P160	Morales Vargas J.	P844
Mitchell P.	NSS5	Morales-Torres J.	P320
Mitchell P. J.	P592 , P595	Morales-Torres J. L. A.	NSS26
Mitra A. K.	P298 , P359 , P360	Moratto E.	P512 , P513
Mitra M.	P522 , P524 , P528 , P529 , P783 , P822	Moretti A.	P260 , P261 , ESCEO-IOF3
Mitrevska B.	P503 , P557 , P590	Moretti A. M.	P226
Mitrofanova L.	P691	Morin S.	OC12
Mitroi G.	P558 , P646 , P647 , P648 , P650 , P652 , P653 , P654 , P656 , P657 , P660 , P665 , P666	Morisset A.	P324
Mitroi M.-R.	P558 , P646 , P647 , P648 , P652 , P653 , P654 , P656 , P657 , P660 , P665 , P666	Morozova M.	P735
Mizeva E.	P578	Mortada M.	P113
Mnevets R.	P671	Moschou D.	P201 , P202
Mo Costabella F.	P371	Mosseveld M.	P632 , P634
Moayyeri A.	P288 , P415	Mostert J. M.	P369
Mobasheri A.	PL5 , P430 , ESCEO2	Moucho M.	P431
Mobini N.	P598	Moutschen M.	OC21
		Movenko A.	P698
		Mozgovaya E.	P785
		Mozgovaya E. E.	P544 , P638
		Mozzani F.	P459
		Msp G.	P528
		Mugisha A.	P277
		Mujeeb Q.	P400

Mukuchyan V.	P482	Netel J.	P512
Mumbach G.	P795	Neubauer S.	OC2
Mumbach G. A.	P512 , P513	Neves I.	P850 , P867
Munoz-Gomez M. D. M.	P807	Newel N. Z.	P428
Munroe P. B.	OC2	Newman A. B.	OC5, OCs1
Muraki S.	OC25 , P493	Ng C.-A.	P593 , P708
Muratore M.	P447	Nicholas N.	P374, OCs2
Muraviev Y.	P446	Nickel B.	P712, OCs6
Muravyeva N. V.	P706 , P722	Nickolas T. L.	P779 , P809
Musatova M. S. A.	P365	Nicolaes J.	P415
Muschitz C.	P792	Nicolaides K.	P757
Musetescu A.	P234	Niculescu D.	P237
Musetescu A. E.	P235 , P239 , P471 , P820 , P825 , P827 , P830 , P840 , P847	Nielsen K. B.	P632
Musienko A.	P531, OCs3	Nijs S.	P287
Muthusamy R.	P782	Nikfarjam M.	P774
Muzzammil M.	P149	Nikiforov O.	P520
Muzzi Camargos B.	NSS27 , NSS28 , NSS29 , NSS33 , P320	Nikitin M. V.	P472 , P517
Muñoz Gomez M. D. M.	P801	Nikitinskaya O.	P580 , P582
Mydlárová Blaščáková M.	P753	Nikitinskaya O. A.	P684 , P886 , P887
Méndez-Sánchez L.	P821	Nikolaev N. S.	P294
Müller M.	P253	Nikolakopoulos P.	P385
N. Feige J.	P271	Nikolakopoulou S.	P490
Nabipour I.	P271 , P345 , P700 , P767 , P771 , P774 , P775 , P837	Nikolaou D.	P705
Nacea C. A.	P836	Nikolaou V.	P705
Naciu A.	P688	Nikolic Dimitrova E.	P590
Naciu A. M.	P682	Nikolidaki M.	P505 , P506 , P841
Nair D.	P452	Nikolikj Dimitrova E.	P557
Najafi M.	P107	Nisovtsova L.	P835
Nakamura K.	OC25 , P493	Nixon A.	OC9
Nakatis Y.	P218	Nixon M.	OC9
Nam S. S.	P739	Nizhel'Sky V.	P829
Nandi A.	P421 , P846	Nobin R.	P173
Naoum S.	P304 , P305 , P306 , P307	Nobody N.	SL1 , SY2
Napoli N.	P682 , P688	Nogués X.	P447
Naranjo A.	P284	Nomikos A.	P491
Nasiri M.	P767	Nonyelum O.	P421 , P846
Nasonov E.	P530	Noorali S.	P579
Nassar K.	P182 , P183 , P204 , P219 , P247 , P265 , P546 , P547 , P548 , P833	Nordqvist O.	P173
Naumtseva M. S.	P722	Norrefalk J. R.	P452
Naureen G.	P811	Novikova A.	P174
Nawar S. M.	P489	Novosad P.	P310
Nazarenko V.	P698	Noël E.	P303
Nazaré F.	P637	Ntani G.	P391 , P395
Ndhlovu C.	P808	Ntanos I.	P268
Nechita F.	P646 , P647 , P648 , P650	Nunes J.	P870
Negadi S. N.	P725	Nunes M.	P321
Negru M. M.	P180	Nurković J. S.	P340 , P341 , P342 , P343 , P344
		Nuti R.	OC33
		Nuñez A.	P477
		Nuñez-Gaona M. A.	P460
		O'Brien M.	P527
		O'Carroll C.	P508 , P509 , P573

O'Higgins S.	P629 , P636 , P649	Overell S.	P164
O'Kelly J.	P389	Ozcan E.	P434
O'Sullivan D.	P313 , P649	Ozdemir M. B.	P458
O'Sullivan M.	P629 , P636 , P649	Ozkaya M.	P434
Oates M.	OC10	Ozkayin N.	P440 , P441
Oberemok S.	P741	Ozkok S.	NSS16
Obiechina N.	P400 , P584 , P585	Ozkul I.A.	P872
Ocampos G.	P323 , P325 , P693	O'Neill T. W.	P151
Ohana N.	P145	Paccou J.	OC2 , P188 , P346 , P670 , P674
Ohlsson C.	OC5 , P278 , OCs1	Pacello P.	P805
Ohta H.	P492	Pachkaila A.	P641
Oka H.	OC25 , P493	Packalen M.	P324
Okutan Kuzu D.	P554	Palement P.	P279
Okyar Bas A.	P442	Paiva Dinis S.	P637
Okyar Baş A.	P413	Paiva J.	OC2
Olan F.	P320	Paiva-Dinis S.	P867
Olarte C. M.	P667	Palacios S.	OC17 , P663
Olascoaga-Gómez de León A.	NSS30 , P427 , P450 , P460 , P707 , P723 , P865	Palermo A.	P682 , P688
Olimjonova F.	P258	Palhao L.	P567
Oliveira Pinto B.	P616	Palmes-Saloma C.	P282
Olivi P.	P198	Palmini G.	P363 , P422 , P550 , P551 , P555 , P619 , P623
Olsen K. R.	P415	Panahi N.	P271 , P345 , P744
Omar Mohamed Hussein E. D.	P501	Panara C.	P621
Omelchenko T.	P259	Pandey D.	P812
Omer B.	P434	Pandyan A.	P814
Ong T.	P140	Pankiv I.	P364
Ooi S. T.	P408 , P412 , P435 , P437 , P438 , P439	Pankiv V.	P388
Orces H.	P486	Panoulis K.	P759
Orkun R.	P872	Pantazidou G. P.	P349 , P350 , P351 , P352 , P353 , P354
Orlandi M.	P215	Panteleev A. A.	P317 , P318
Orsolini G.	P198 , P387	Pantor M.	P692
Ortiz-López D.	P602	Paoletta M.	P260 , P261 , ESCEO-IOF3
Ortlepp K.	P520	Paoletta M. P.	P226
Orwoll E.	OC5 , P278 , OCs1	Papachatzopoulos S.	P385
Osborne P.	P719	Papadimitropoulou S. L.	P362
Osman N.	P736	Papadopoulos E.	P163
Osmanova G. Y.	P695 , P699	Papadopolou A.	P445
Ostovar A.	P271 , P345 , P579 , P700 , P744 , P767 , P771 , P774 , P775 , P832 , P837	Papagelopoulos P.	P163
Ostrovskaya I.	P671	Papagiannis G.	P163
Ostrovskyy K.	P662	Papaioannou A.	OC12
Oswald I.	P610	Papaioannou A. P.	P606
Otake Y.	P496 , P498	Papaioannou I. P.	P349 , P350 , P351 , P352 , P353 , P354
Otlocan L.	P180	Papatheodorou A.	P385
Otteva E.	OC31	Papavasiliou K.	ESCEO-IOF2
Ouardia C.	P677	Papichev E.	P770
Ouelaa H. E.	P855	Paramonova O. V.	P157 , P227 , P228
Ouennich K.	P800	Pardina Lanuza N.	P118 , P119 , P120
Ouenniche K.	P104 , P105 , P106 , P864	Parente H.	P618 , P681
Ovejero Crespo D.	P447	Parihar M.	P661



Park Y. C.	P739	Petrache O.	P180
Parodi O.	P645	Petraglia F.	P676
Parretti L.	P621	Petraikin A.	P835 , P838
Parri S.	P819	Petraikin F.	P838
Parsons C.	OC16 , P382 , P622, OCs4	Petrela E. P.	P146
Parsons C. M.	P355 , P417	Petrova E.	P161 , P167 , P168 , P205 , P206 , P207 , P208 , P209 , P210 , P211 , P212 , P213 , P224 , P225 , P256 , P339 , P356 , P478 , P788 , P815
Parsons C. P.	P591	Petrovic R.	P454
Partnership Stuy Group C. T. F.	P726	Petrunko I. L.	P561
Paruk F.	P808	Peñarreta Leon L.	P597
Parvanescu D. C.	P820	Pflimlin A.	P188
Paschou S.	P757 , P759	Phan-Udom C.	P189
Pasco A.	P768	Phinyo P.	P888
Pasco J. A.	P510 , P747	Piana A.	P643
Pashchenko N.	P701	Piechnik S.	OC2
Paskins Z.	P507 , P758, OCs8	Pigarova E. A.	P178 , P326 , P329 , P330 , P533 , P563 , P577 , P884
Paskou A.	P431	Pignatta A.	P795
Pastroudis A.	P506	Pignolo R. J.	OC34
Patamarat A.	P314	Pigny P.	P670
Patel H. P.	P319 , P374, OCs2	Pijoán-Moratalla C.	P266 , P267 , P270 , P347
Patiño A. F.	P667	Pillay I.	P571
Pattou F.	P670	Pilot N.	P796
Payer J.	P216 , P217	Pilotto A.	OC11 , P541 , P643 , P645
Pedersen L.	P632 , P634	Pinedo-Villanueva R.	P414 , P723 , P726
Pedro A. O.	P797 , P802 , P805, OCs9	Pinho P.	P870
Peel N.	P302 , P559	Pinto A. S.	P321 , P637 , P850 , P867
Peihua C.	P155	Pinto D.	SY3
Peixoto D.	P618 , P681	Pinto N.	P325
Pelegrin C.	P810	Pinto P.	P480
Pelletier J.-P.	P279 , P280	Pinzon Tovar A.	P194
Pepe J.	OC33 , P215	Piotrowicz K.	NSS17
Peralta Lopez E.	P426	Pisani L.	P796
Peralta M. L. P.	P560	Pisani P.	P780
Peralta-Pedrero M. L.	P821	Piskunova E.	P577
Pereira Pinto A.	P457	Png M. A.	P298 , P359 , P360 , P378
Peres M.	P323	Poggi M. M.	P626
Pereverzev V. S.	P317 , P318	Pohl H. H.	P403
Perez-Avalos M. Y.	P723	Poivret D.	P479
Perez-Castrillón J. L.	P402	Pokšane D.	P241 , P255 , P570
Perez-Romero M. A.	P320	Polanco M. A.	P320
Perigli G.	P422	Poleschchuk O.	P534 , P535
Perka C.	P253	Politi C.	P779 , P809
Perkisas S.	EUGMS-ESCEO-IOF2	Poljakova E.	P630
Perrin L.	P786	Poljakova J.	P630
Perrone V.	P199	Pollini V.	P512 , P513
Perry T. A.	ESCEO2	Polyakova E. Y.	P575
Pertusa C.	P521	Polyakova Y.	P735 , P770
Pesantez R. F.	P667	Polyzos S. A.	P385
Pesqueira Ornelas J.	P844	Ponce Vargas A.	OC19
Petersen S. E.	OC2		
Petersson A.	P173		
Petković P.	P340		
Petoyan A.	P482		

Pontinha C.	P850 , P867	Ralston S. H.	ROS-IOF-ESCEO3
Poon-Ung C.	P799	Ramasamy K.	P719
Popa A. R.	P469	Ramesova A.	P784
Pope G.	P640	Ramirez J. F.	NSS38
Popescu M.	P224 , P339 , P356 , P478 , P788 , P815	Ramirez Velez R.	P231 , P232 , P537
Popescu M. I.	P709 , P713 , P714 , P715	Ramos Rodrigues J.	P681
Popova V. P.	P399	Rampartaap V.	P452 , P624
Popoviciu M.	P469	Rangel K. T.	P863
Poráčová J.	P753	Rani R. A.	P408 , P411
Poulain L.	P153 , P158 , P159	Rao D. G. R.	P408 , P412 , P435 , P437 , P438 , P439
Povaliaeva A. A.	P178 , P329 , P330 , P533 , P563	Raptis K.	P304 , P305 , P306 , P307
Povoroznyuk V.	P531 , P658, OCs3	Raptou P.	P757
Pozo-Notario M.	P348	Rasa I.	P241 , P255 , P570
Pozzilli P.	P682	Rascón A.	P367
Preda S.-A.	P558 , P646 , P647 , P648 , P650 , P652 , P653 , P654 , P656 , P657 , P660 , P664 , P665 , P666	Raskina T.	OC31 , P407 , P409 , P879 , P880 , P881 , P882
Prenni V.	P396	Raskina T. A.	P633
Prentice A.	P355 , P382 , P591, OCs4	Rateman H.	NSS67
Prete C.	P645	Rathnayake H.	P778
Preuksakorn D.	P888	Rathnayake N.	P366 , P532 , P673 , P737
Prevotat A.	P346	Rattanaphonglekha C.	P191
Prieto-Alhambra D.	P284 , P632 , P634 , P719	Raum K.	OC29
Prince R.	OC20	Raynauld J.-P.	P279
Prokofev I.	P358	Rayner J.	OC2
Prokofiev P. I. A.	P365	Raznahan M.	P775
Pronin A.	P766	Razzini A.	P862
Puchta H.	OC2	Reginster J.-Y.	OC6 , OC11 , OC13 , OC21 , OC28 , P394 , P430 , P449 , P560 , ESCEO2, OCs11
Puisieux F.	P188	Reichardt B.	P781
Puyuelo Jarne I.	P118 , P119 , P120	Reichenbach S.	OC7
Pérez-Mitru A.	P284	Reiner M.	P324
Pérez-Saldaña R.	P427	Reinold J.	P632 , P634
Pérez-Sola M.	P462	Renza S.	P667
Păcurar D.	P709 , P713 , P714 , P715	Repantis T. R.	P349 , P352 , P353 , P354
Păcurar M. R.	P709 , P713 , P714 , P715	Rey P.	P338
Pătru A.	P664	Reyes C.	P632 , P634
Qizilbash N.	OC19	Rezende M.	P323 , P325 , P693
Quan X.	P108	Ribeiro A. M.	P567
Quevedo Langenegger I.	P602	Ribom E.	OC5 , P278, OCs1
Quintanar-Trejo L. E.	P450 , P460 , P707 , P865	Ricaurte L.	P667
Quinzaños-Fresnedo J.	P450 , P707 , P865	Rice J. B.	P230
Quiñones O.	P475 , P476	Rinaudo L.	P688
Raducu I. C.	P168 , P205 , P208 , P210 , P213 , P224	Rinonapoli G.	P396 , P621
Raesi A.	P832 , P837	Rios C. R.	P320
Raghuraman R.	P501	Rista L.	P697
Rahmoune A.	P631	Rittweger J.	P796
Raisi-Estabragh Z.	OC2 , OC15	Riva M.	P459
Rakovich E.	P423	Rivas D.	OC27
Ralston S.	OC9	Rivoira M. A.	P426
		Rizos D.	P759
		Rizou S.	P705

Rizzoli R.	NSS62 , OC11 , OC13 , OC22 , P430 , P444 , OCs11	Rudenka A.	P628 , OCs5
Robinson D.	P632	Rudenka A. V.	P516
Robinson D. E.	P634	Rudenka E.	P525 , P628 , P641
Robinson R. L.	P230	Rudenka E. V.	P617
Rocha P.	P850 , P867	Rufus P. G.	P747
Rodrigues A. M. R.	P281	Ruggiero C.	P396 , P621
Rodrigues J.	P618	Ruiz-Esparza-Macias C. A.	P723
Rodriguez M.	P283	Rumi M.	P114
Rodriguez-Garcia A. M.	P231 , P232 , P537	Runova G.	P565
Rodríguez S. A.	P863	Runova G. E.	P694
Roffe C.	P814	Rusanova O. A.	P625
Roganovich J. M.	P795	Ruseva B.	P315
Rogi T.	P493	Rush E.	NSS41
Rogoveanu C. O.	P608 , P609 , P611 , P752 , P765 , P798	Russell R.	P527
Rogoveanu I.	P233 , P235 , P236 , P238	Rylands A.	OC9
Rogoveanu O.	P129 , P130 , P840 , P847	Ryma B.	P659 , P677
Rogoveanu O. C.	P233 , P234 , P235 , P236 , P237 , P238 , P239 , P240	Rymar O.	P242 , P243 , P456
Rojas V. I.	P697	Rzepecka K.	P883
Rolland Y.	NSS44	Saadia J.	P357 , P463 , P464 , P465
Romagnoli C.	P361 , P363 , P550 , P551 , P619	Saber H.	P113
Roman-Gonzalez A.	P320	Sabico S.	P487 , P488
Romano J.	P567	Sacerdotianu M.	P235
Romeijn S. R.	P369	Sadeg Y.	P631
Romero E.	P320	Sadovici-Bobeică V.	P515
Ronchev Y. R.	P399	Saez M.	P475 , P476
Rong-Sen Y.	P614	Sahin N.	P434
Roomes D.	P527	Sahiner Z.	P442
Rosa M. M.	ESCEO3	Sahota O.	P507
Rosca R. I.	P836	Saiyed Z.	OC24
Rosen C. J.	SL2	Saiz Fernandez L. C.	P231 , P537
Rosenblum R. H.	P145	Sakellari V.	P377 , P445 , P600
Rosengren B. E.	OC5 , P278 , OCs1	Sakellaropoulou A.	P600
Roshani S.	P271	Salam S.	P302
Rosseli D.	NSS39	Salaru V.	P515
Rossini M.	P198 , P199 , P387 , P473 , P474 , P545	Salas Burgos A.	P602
Rossini M. R.	P604	Salavarrieta J. E.	P667
Rotaru T.	P515	Saleh Y.	P813
Rotman-Pikielny P.	P145	Saliba M.	P565
Rouatbi F.	P860	Saligheh Rad H.	P598 , P601
Roukounaki M.	P600	Salih B. S.	P489
Roux C.	OC13 , P786 , OCs11	Salimzadeh A.	P771
Rozhinskaya L.	P308 , P309 , P329 , P330 , P563	Salinas C. R.	P320
Rozhinskaya L. Y.	P326	Sallami M.	P864
Ruan G.	P117	Salzano S.	P199
Rubek Nielsen B.	EUGMS-ESCEO-IOF1	Samad Z. A.	P406
Ruci D.	P111	Samama P.	P389
Ruci V.	P111	Samaras C.	P490
		Samaras S. A.	P495
		Samaras S. N.	P839
		Samarkina E.	P446 , P580
		Sami A.	P719 , P817
		Samokhovec V.	P628 , OCs5

Samokish A.	P741	Seghers-Aguilar L.	P270 , P347
Samolis A.	P505 , P506 , P841	Segura Mestanza A.	P597
Samvelyan H. J.	P203	Selbes E. C.	P441
Samões B.	P480	Sellami M.	P104 , P105 , P106 , P800
Sanchez Latorre M.	P231 , P537	Sellami R.	P786
Sanchez R. G.	P320	Semel D. C.	P275
Sanchez-Santos M. T.	P414	Semenov D.	P835
Sanchez-Vazquez E.	P576	Semenova E.	P218
Sanders K.	OC23 , P164 , P777	Semenova N. Y.	P874
Sanghvi K.	P528	Semenova T.	P274
Sanghvi M.	OC2	Senesi B.	P645
Sangiorgi D.	P199	Seo B. K.	P739
Sanint V.	P667	Seo T.	P586 , P587
Sanjari M.	P345 , P579 , P700 , P744 , P832 , P837	Sepici Dincel A.	P872
Sanson G.	P682	Sergeeva N. V.	P561
Santilli D.	P459	Sethi V.	P452 , P624
Santonati A.	P682	Sevilla Ortega P.	P118 , P119 , P120 , P717
Santos F.	P254 , P850	Sevilla P.	P680
Santos F. C.	P321	Seymour H.	P595
Santos-Faria D.	P681	Shabalina M.	P274
Sapra L.	P383 , P466	Shadoun C.	OC21 , P607
Saridogan M.	P514	Shaduro D.	P662 , P668 , P671
Sarli M.	P338	Shafiee G.	P345 , P700 , P767 , P771 , P774 , P775 , P837
Sarli S. M.	P186	Shalnova S.	P327 , P328
Sas T.	P236 , P237 , P240	Shamim N.	P443
Sato Y.	P496 , P498	Shamsi M.	P598
Satybaldyev A.	P181	Shanga G.	P452 , P624
Saunders-Hastings P.	P288	Shapiro M.	P324
Savic Pavicin I.	P866	Sharapova E.	OC31 , P642 , P711
Sazhnev M. L.	P317 , P318	Sharapova E. P.	P678 , P857
Sazonova D.	P689	Shaul J.	OC18
Sazonova E.	P494	Shcherbakova L.	P242 , P243 , P456
Sazonova O. V.	P291	Shcherbakova S. J. G.	P365
Scafoglieri A.	P761	Sheikhova A.	P689
Scarabino M.	P512 , P513	Shepelkevich A.	P494 , P500
Scharla S. H.	P871 , , OCs10	Shepelkevich A. P.	P849
Schepman P.	P230	Shepelkevich P.	P126
Schett G.	PL7	Shestakova M.	P308
Schiavone C.	P541	Shevroja E.	P371
Schileo E.	P809	Shiao M.-S.	P156
Schini M.	P302 , P559	Shibata H.	P493
Schleck L.	P479	Shilova L. N.	P157 , P227 , P228 , P544 , P556 , P695 , P699
Schlögl M.	OC27	Shimshilashvili A.	P869
Schnitzer T. J.	OC8	Shinkov A.	P764
Schousboe J. T.	OC5, OCs1	Shiran M. B.	P598 , P601
Schön C.	OC24	Shiroma E. J.	OC5, OCs1
Scott D.	P589 , P593 , P605 , P708	Shivacheva T.	P187
Scripnikova I.	P630	Shkireeva S.	P311
Sedaghat M.	P107	Shmidt E.	OC31
Seegoolam M.	P421 , P846	Shodiyev O.	P160
Seeman E.	P777	Shreef H.	OC4
Seewordova L.	P770		



Shubeska Stratrova S.	P376	Soureti A.	P759
Shumnalieva R.	P526	Sousa L. C.	P567
Shutov Y.	P829	Souza M.	P325
Shutova A. S.	P178 , P533 , P884	Spanio M.	P643
Siafarikas A.	P593	Spanou S. S.	P495 , P839
Siddique S.	P171 , P172	Spesivtseva V.	P137 , P138
Sierra A. S.	P127	Spichko A.	P139
Siggeirsdottir K.	OC1	Spiryna V. V.	P617
Sigurdsson G.	OC1	Spitsina S.	P785
Silke C.	P629 , P636 , P649	Spitsina S. S.	P544 , P556 , P562 , P564 , P568 , P569 , P638
Silva L.	P299	Spitz E.	P246
Silva S.	P828	Spivacow R.	P338
Silva S. P.	P566 , P583	Spyrantis A.	P490
Silverman S.	P230 , P758 , , OCs8	Spyropoulou O. M.	P490
Sim C. H. S.	P603	Spångeus A.	P883
Sim M.	OC20 , P593	Srivastava R.	P383
Simanenkova A.	P869	Srivastava R. K.	P466
Simanenkova A. V.	P874	Staines K. A.	P203
Simeonova T.	P315	Starovoitova M. N.	P886
Simsek I.	OC3 , OC26	Stasi S.	P377
Singh A.	P368	Statsenko E.	P743
Singh D. K. A.	P406	Steen G.	P508 , P509
Sinialeva I.	P736	Stefanova K.	P315
Sirbu A.	P685 , P687	Stenkova N.	P736
Sivashanumugam J.	P782	Stevens P.	P719
Sivordova L.	P630 , P735	Stevenson H.	P184
Skjødt M. K.	P415	Stevenson J. C.	ISGE-ESCEO2
Skrame K. S.	P146	Stitkitti N.	P189 , P191
Skrepnik N.	OC3	Stoica L.-E.	P646 , P647 , P648 , P650 , P652 , P653 , P654 , P656 , P657 , P660
Skripnikova I.	P327 , P328	Stoicanescu D.	P121
Skuratov M. D.	P166	Stolnick B.	NSS31
Slashuk K.	P563 , P577	Stolnicki B.	P299 , P433
Slatkovska L.	P324	Strahs A.	OC34
Slullitel P. A. I.	P720	Strain J. J.	P644 , P704
Smirnov A.	P122 , P384 , P530 , P655	Strebkova E.	OC31 , P642
Smirnova O.	P386	Strebkova E. A.	P678 , P787 , P791 , P857
Smith C.	OC20 , P589	Strukov S. V. I.	P365
Smith L.	OC6 , OC11 , P148	Stuart A.	OC23 , P777
Smorchkova A.	P835 , P838	Su'An T.	P155
Snene H.	P588	Subasinghe S.	P366 , P737
Soare I.	P685 , P687	Sugano N.	P496 , P498
Soares C.	P618 , P681	Sui S. X.	P510
Sofia A.	P431	Sui X.	P768
Soldati A.	P626	Suiu L.-I.	P471
Solov'Eva V.	P169	Sujayeva V. A.	P617
Solov'Yova I.	P741	Suleymanova A. K.	P572 , P574
Soltani A.	P271 , P744	Sulikashvili T.	P285
Solórzano-Moreno D. F.	P405 , P834	Sulpasso R.	P643
Soriot-Thomas S.	P303	Sultonov I.	P258
Souabni L.	P856 , P860 , P861 , P864	Sun D.	P612
Souebni L.	P104 , P105 , P106 , P800		
Soufi M.	P498		

Sun W.	OC9	Tembo C.	P768
Suplotova L. A.	P326	Tembo M. C.	P510 , P747
Surquin M.	P277	Tenti S.	P613
Suzuki A.	P492	Ternynck C.	P188
Svandova E.	P784	Terrier J.	P346
Svedbom A.	OC23 , P164 , P777 , P781	Thabane L.	OC12 , P170
Swearingen C. J.	OC3 , OC26	Thabane L. T.	P606
Syddall H. E.	OC5, OCs1	Thakkar S.	P230
Syggelos N.	P757	Theis D.	P674
Szulc P.	P549	Therdyothin A.	P189 , P190 , P191
Sánchez-Martín J.	P284	Thomas E.	P302
Tabacco G.	P682 , P688	Thomas K.	OC2
Tabatabaei-Malazy O. T.	P552	Thomas T.	P397
Tabra S.	P113	Thomasius F.	OC17 , P663
Tabti E.	P725 , P852	Thomson R.	OC2
Tacey A.	P589	Thuillier D.	P670
Taddei F.	P809	Tian W.	P596
Tai T.-W.	P734	Tianxiang F.	P155
Taieb V.	P288	Tiberi R.	P842
Takao M.	P496 , P498	Tieranu C.	P685 , P687
Takeuchi Y.	P492	Tihanyi J.	P667
Talesa G. R.	P396	Tikhonchuk N.	P276
Talevski J.	OC23 , P164 , P777	Tilici D. M.	P836
Tambiah J.	OC3	Timkina N.	P869
Tamsel I.	P440	Timkina N. V.	P874
Tan E. H.	P632 , P634	Timofeeva V.	P869
Tan E. S. E.	P360	Timoshanko J.	OC10
Tan J.	P593	Tinjaca Montaña K. M.	P194
Tanaev V.	P627 , P735	Tkachenko A.	P139 , P152
Tanaka S.	OC25 , P257 , P492 , P493	Tofghirad N.	P598
Tanaka T.	P493	Toh L. S.	P817
Tanasi I.	P387	Tomai Pitinca M. D.	P803 , P806
Tanchoco C.	P282	Tomková S.	P753
Tarantino U.	OC33	Tomková Z.	P753
Tardif G.	P280	Topolyanskaya S. V.	P244 , P245
Tarín J. J.	P521	Torba A.	P702
Tashinova L.	P258	Toronjo-Urquiza L.	P302
Taskaynatan M. A.	ESPRM-ESCEO-IOF3	Toroptsova N.	P580 , P582
Taskina E.	OC31 , P122 , P615 , P642 , P711	Toroptsova N. V.	P684 , P886 , P887
Taskina E. A.	P678 , P857	Torres-Naranjo F.	P405 , P723 , P834
Tavares-Costa J.	P681	Toth M.	P144
Tay K.	P378	Touboul C.	P786
Tay K. X. K.	P298 , P359 , P360	Tournis S.	P201 , P202
Tay X. K. K.	P603	Tournoy J.	P151
Tchetina E.	P181	Traistaru M. R.	P789 , P790
Teifukova E.	P668	Traistaru R.	P129 , P130 , P131 , P234 , P237 , P840 , P847
Teixeira E.	P320	Tramonte F.	P803 , P806
Teixeira F.	P618 , P681	Tranche S.	P475 , P476
Tejeda-Chávez E. S.	P723	Trandafir A. I.	P211 , P212
Tejero-Carmona M. E.	P462	Tremollières F.	P397
Tell-Lebanon O.	P145	Trevisani V.	P254
Telyshev K.	OC31 , P642	Triantafyllou A.	P163

Trifonova B.	P373	Vaggos G.	P757
Trifonova E. P.	P291	Vakulenko O. N.	P244 , P245
Trimboli P.	P682	Valdiviezo Jara J.	P597
Trindade Pedrosa V.	P616	Valero-Martínez C.	P756
Tripepi G.	P779 , P809	Valim A. R. M.	P403 , P404
Trofimenko A.	P785	Vallejo-Yagüe E.	P679
Trofimenko A. A.	P544	Vandenput L.	OC1 , OC14 , OC32 , P804 , P808 , P811 , P812 , P813
Trofimenko A. S.	P625 , P638	Vanderschueren D.	P151
Trombetti A.	OC22 , P444	Varanda P.	P870
Troshina E.	P192	Vardanyan V.	P482
Troshina E. A.	P326	Vargas F.	P418
Trost W.	OC22	Vargas J. V.	P127
Troupis G.	P505 , P506 , P841	Varone B.	P325
Troyano L.	P477	Vasilev Y.	P838
Trufanov S.	P504	Vasileva V.	P750 , OCs7
Trushyna A.	P137 , P138	Vasiliadis A.	P141 , P142
Tsagareli M.	P285	Vasilieva A.	P742
Tsai M.-C.	P177	Vasilieva N.	P494 , P500
Tsarenok S. Y.	P772	Vasilyeva N. A.	P617
Tsatlidou M.	P141 , P142	Vasquez Awad D.	NSS40
Tsatsaragkou A.	P305	Vasylets V.	P276
Tsekoura M.	P362 , P377 , P431 , P445 , P600 , P746	Vaz C.	P321 , P637 , P850
Tselovalnikova T. Y.	P694	Vaz C. C.	P867
Tsepis E.	P362 , P600 , P746	Vazhev Z. V.	P399
Tsiantouli E.	P454	Vechasilp J.	P191
Tsitsilonis S.	P425	Vedenkina L.	P620
Tsoriev T.	P308	Vekeman F.	OC17 , P663
Tsurko V.	P390	Veloz J. A.	P320
Tudela N.	P475 , P476	Velpry L.	P786
Tuncer T.	P316	Venidiktova Y. U.	P701
Tupea C.	P256 , P339 , P478 , P788	Venn A.	P368
Turchin N.	P755	Venter A. C.	P467 , P468 , P610
Turk D. C.	P275	Venturella R.	P676
Tutiya K. K.	P433	Vera M. E.	P720
Tuzun S.	P554	Vercellone A.	P199
Twito O.	P145	Verhamme K.	P632 , P634
Tyabut T. D.	P516	Verma S.	P375 , P410 , P419
Törnqvist A. E.	P203	Veronese N.	NSS63 , EL2 , OC6 , OC11 , P148 , P541 , P643
Ubertazzo L.	P199	Verroken C.	OC30
Ucb U. C.	MTE13	Vesa C. M.	P467 , P468 , P469
Uder M.	P816	Vescini F.	P682
Uemura K.	P496 , P498	Vesela B.	P784
Ulivieri F. M.	P688	Vetrilä S.	P515
Ulla M. R.	P426	Vettoretti S.	P626
Umer M.	P811	Viapiana O.	P198 , P199 , P473 , P474 , P545
Ungureanu B.	P233 , P238	Viapiana O. V.	P604
Urazovskaya I.	P139 , P152	Vidal Neira L. F.	P560
Urrego-Laurín C.	P348	Videira T.	P480
Usova E. V.	P633	Vidovic E.	P392
Uyar M.	P316	Vieira Factori G.	P457
Vadzianava V.	P500		
Vafaei H.	P757		

Vieira L. F. T.	P433	Wang Z.	OC10
Vieira R.	P480	Wani K.	P487
Vigo M.	P645	Ward A.	OC16
Viktrup L.	OC8	Ward K.	MTE7 , P374 , P382, OCs2
Vikulova O.	P335	Ward K. A.	OC15 , P278 , P355 , P417 , P591 , P622
Vilas-Boas J.	P828	Ward M.	P573 , P644 , P704
Vilas-Boas P.	P566 , P583	Watts J.	OC23
Villa A.	P621	Weber T.	P425
Vinogradova I.	OC31	Wei C.	P117
Visser M.	PL6	Wei-Jia H.	P614
Viveros J. C.	P723	Weisslinger C.	P479
Vjollca N.	NSS51	Weiya Z.	P155
Vladoiu S.	P836	Werys K.	OC2
Vladzimirskyy A.	P838	Westbury L. D.	OC5 , P374, OCs1, OCs2
Vlasis K.	P305	Whelan B.	P629 , P636 , P649
Vlasov T.	P869	White A.	P230
Vlasov T. D.	P874	White G.	P719
Vogiatzis S.	P141	White K.	P246
Vogrin S.	P777	Wickramatilake C.	P778
Vogrin S. V.	P379	Wigley C.	P109
Voicu G.	P161 , P167 , P168 , P205 , P206 , P209 , P210 , P212 , P225 , P256 , P815	Wilcox T.	P452 , P624
Voinea I. A.	P161 , P167 , P168 , P205 , P207 , P209 , P210 , P213 , P224	Williams A.	OC9
Vojinović R.	P340	Williams D. A.	P275
Volkov A.	P655	Williams G. R.	PL4
Volodko O.	P620	Williams J.	P768
Vorobeva O.	P740	Williams R. D.	P679
Vorotsova M.	P309	Wiluzanski D.	P320
Voss A.	P632 , P634	Winzenrieth R.	P845
Vranken L.	P672 , P675	Woisetschlager M.	P883
Vrech C.	P426	Wojszel Z. B.	P449
Vreju A. F.	P820 , P825 , P827 , P830	Wong K. C.	P298 , P359 , P360 , P378
Vreju F. A.	NSS21 , P471	Woo Y. C.	P669
Vuilleumier P.	OC22 , P444	Wood R.	P527
Vukliš D.	P519 , P748	Woolford S.	OC15
Vukov M.	P373	Wu C.-H.	P734
Vyderko M. D.	P166	Wullich S.	P723
Vygodin V.	P327 , P328	Wyers C.	P672 , P675
Vizdoagă A.	P515	Xasanov F.	P258
Wadhwa D.	P522 , P776 , P783	Xergia S.	P362
Wagman R. B.	P676	Xiaofeng Z.	P732
Wahab N. A.	P406	Xiaomei L.	P732
Walker U. A.	OC7	Xiaoshuai W.	P155
Walker-Bone K.	P391 , P395	Xin W.	P155
Wallander M.	OC14	Xu Y.	P132 , P133 , P135
Walsh J.	OC9 , P302	Xu Y. J.	P134 , P136
Walsh S.	P629 , P636 , P649	Yaccobi E.	P145
Wanby P.	P173	Yadav A.	P661
Wang C.	P536 , P538 , P539 , P540 , P596	Yakupova S.	OC31
		Yang B.	P542 , P543
		Yang L.	P155 , P162 , P629 , P636
		Yang R.	OC8
		Yang R. Y.	P275



Yang R.-S.	P380	Zhou M.	P108
Yanis S.	P659 , P677	Zhu K.	P593
Yankova I.	P764	Zhu X.	P162
Yarmohammadi H.	P579	Zhu Z.	P108 , P117
Yasuoka H.	P492	Zhukov A. Yu.	P330 , P533 , P563
Yavropoulou M. P.	P385	Zhukova V.	P386
Yazici Y.	OC3 , OC26 , P586 , P587	Zidrou C.	P141 , P142 , P143
Yeh T.-L.	P177	Zigoura E.	OC11 , P541 , P643 , P645
Yilmaz H.	P878	Zinchenko V.	P147 , P200
Yin M. K.	P406 , P437	Zitt E.	P781
Yiying M.	P155	Ziyadullayev S.	P258
Yordanova-Laleva P.	P315	Zmierczak H.-G.	OC30
Yoshimura N.	OC25 , P257 , P493	Zocholl D.	P425
Yoshino Y.	P492	Zonefrati R.	P361 , P363 , P422 , P550 , P555 , P623
Youjia X.	P123 , P124	Zonova E.	OC31
Yuen W. L. P.	P501 , P502	Zonova E. V.	P291
Zaballa E.	P391 , P395	Zumaraga M. P.	P282 , P283
Zabezinskaya I.	P627	Zurita-Prada P. A.	P348
Zabolotnaya N.	P743	Zvekić-Svorcan J.	P519 , P748
Zadavec D.	P866	Zvereva E.	P691
Zaha D. C.	P467 , P468	Zwart M.	P475 , P476 , P477
Zahedi Tajrishi F.	P700	Zyma M. D.	P166
Zaimi E. Z.	P146	van Kuijk S.	P672 , P675
Zakraoui L.	P104 , P105 , P106	van Oostwaard M.	P672 , P675
Zambom Ferrasi F.	P232	van den Bergh J.	P672 , P675
Zamora E. A.	P320	van den Broeck J.	P761
Zancheta M. B.	P320	Çay H. F.	P316
Zanchetta J. R.	P795	Ó Breasail M.	OC16 , P355 , P382 , P417 , P591 , OCs4
Zanchetta M. B.	P338 , P795 , P810	Ölmez A.	P316
Zanchetta Z. B.	P186	Öneş K.	P316
Zanotti R.	P387	Özdemir O.	P514
Zarain A. J.	P320	Ünlü Özkan F.	P876
Zarco-Ordoñez K.	P450 , P460 , P707 , P865	Țuculina M.-J.	P558 , P646 , P647 , P648 , P650 , P652 , P653 , P654 , P656 , P657 , P660 , P664 , P665 , P666
Zare-Bidaki F.	P107		
Zaverukha N.	P658		
Zavodovskij B.	P630		
Zavodovsky B.	P770		
Zayeava A.	P668		
Zborovskaya I. A.	P638 , P699		
Zeggio D. Z.	P877		
Zehraoui N.	P631 , P855		
Zeng D.	P108		
Zengin A.	P355 , P382 , P591 , P605 , OCs4		
Zerbini C. F.	P560		
Zetla Z.	P852		
Zhang J.	P257		
Zhang R.	P162		
Zhang Z.	P117		
Zhaohua Z.	P155		
Zhelyabina O.	P174		
Zheng Z.	OC35		
Zhigulina K. V.	P568 , P569		

The logo features the letters 'WCO' in a large, white, sans-serif font, with a stylized globe icon integrated into the letter 'O'. Below 'WCO', the text 'IOF-ESCEO' is written in a smaller, white, sans-serif font. The entire logo is set against an orange rounded rectangular background.

WCO  
IOF-ESCEO

2022 BERLIN

WORLD CONGRESS ON  
OSTEOPOROSIS, OSTEOARTHRITIS  
AND MUSCULOSKELETAL DISEASES

March 24-27, 2022

Berlin | Germany  
Hub27 Messe Berlin

WORLD'S LEADING CLINICAL CONFERENCE  
ON BONE, JOINT AND MUSCLE HEALTH

Congress Organizer Sinklar Congress Management B.V.  
Congress Secretariat [www.humacom.com](http://www.humacom.com)

[www.WCO-IOF-ESCEO.org](http://www.WCO-IOF-ESCEO.org)