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ABSTRACT

World Congress on Osteoporosis, Osteoarthritis, and Musculoskeletal Diseases (WCO-IOF-ESCEO 2021): Non-Sponsored Symposia Abstracts

NSS1
CANCER TREATMENT INDUCED OSTEOPOROSIS—REALLY IMPORTANT?

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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, and Use of Glucocorticoid Use 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 Summarizes 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

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The introduction of bone targeted treatments has transformed the clinical care of patients with bone metastases from solid tumors 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 signaling, appears to predict treatment benefit in the 80% of women with normal levels of MAF expression in primary breast tumors, 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 tumor cells to other organs and an excess rate of visceral metastases and breast cancer deaths.

NSS3
CONCEPTS IN THE SURGICAL TREATMENT OF SKELETAL METASTASES

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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 postfracture surgery.
Keywords: Pathologic fractures, Surgical treatment, Impending fractures, Spinal metastases

NSS4
THE ASIA PACIFIC CONSORTIUM ON OSTEOPOROSIS—A BRIEF INTRODUCTION
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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 multipronged 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
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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 AMONG EXPERTS FROM 19 COUNTRIES AND REGIONS
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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. Twenty nine 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. Three 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.
Sixteen 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[1]
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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 access 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
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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
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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
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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
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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

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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 noncoding 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

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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

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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

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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% Cl: 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

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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

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Objective(s): SARC-F[1] is recommended by the European Working Group on Sarcopenia in Older People (EWGSOP2) for sarcopenia case finding[2]. 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.[3] 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.
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NSS18

CHECK YOUR PAST, KNOW YOUR FUTURE

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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 140,000 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 disk 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

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The main mineral constituents of bone are calcium and phosphorus, alongside magnesium, chloride, fluoride, and citrate. The interaction between al these and the bone cells and matrix, results in the normal composition, physical and chemical properties, strength, and

complexity of bones. The somehow inevitable bine 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 ana 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 modeling. 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
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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 showes 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 artropathies 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
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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 nonspecific 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
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Introduction: Work-related musculoskeletal disorders (MSDs) are a group of disorders confined basicly 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 nonneutral postures, unsuitable instruments, nonergonomic 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
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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 among 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 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

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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 disk lesion with or without radiculopathy, myofacial 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.

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NSS25

IDENTIFICATION, RISK, AND DIAGNOSIS: DO YOU BELIEVE IN TESTS?

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We are in the midst of an osteoporotic pandemic for decades, and global fragility fracture numbers continue to rise exponentially. Causal factors include the aging of the world's population, while many people live with multiple competing or contributing comorbidities, 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 multifactorial process linked to individual patient risk factors such as low BMD, aging 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.

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NSS26

TO MASK OR NOT TO MASK: PREVENTION OF OSTEOPOROTIC FRACTURES: LESSONS FROM THE COVID-19 PANDEMIC

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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[1].

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[2]. A number of lifestyle changes may also have a positive impact in the community, with low cost[3]. These are only 2 of the many concepts that may find a way in our communication developments to decrease the burden of fragility fractures.

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NSS27

HOW AWARENESS COULD CHANGE A COMMON FATE?

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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 it's goals, it engages into a plan. Like the Fracture Liasion Services (FLS) innitiatives. It is so cost-effective and clever that it spreaded rapidly around the world, establishing treatment goals for postfractured patients and medical teams. These services reduced the gap between clinical diagnostic and effective treatment use. They do a lot for postfractured individuals. But not so much for pre-frectured 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 diagostic and treatment? Private and public sectors? Doctors and patients? The COVID pandemia brought changes into people's houses, changing their habits. And also changed societies innitiatives. As virtual interaction became more needed; online 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 transmition 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 techonoly we can achieve a proactive attitude against fragility fractures and flatten the osteoporosis curve.

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NSS28

OSTEOPOROSIS IN 2020+: FLATTENING THE CURVE OF FRAGILITY FRACTURES

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SARS/COV19 pandemia have literaly 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 pandemia. 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 fractureed adults accomplishes 1-year of postfracture 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, postfractured treatment or both? How could we shorten the gap between diagnosis and treatment?

NSS29

INTRODUCTION—OVERVIEW OF FLS IN LATIN AMERICA

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Although there are many different cultures, with some exceptions, public and private sectors do not act sinergistically 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: healthcare 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 undobtely the FLS.

NSS30

SITUATION OF THE FLS IN MEXICO: BARRIERS AND STRENGTHS

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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 increasing 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

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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. Forty two 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 it's 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 assignement 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 POSTFRACTURE OUTCOMES IN COLOMBIA?

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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 antiosteoporosis medication (antiresorptives or anabolic therapy) and, after 1 year of establishing the FLS, 43 % received it postfracture. The time to surgery was shorted (76% in the first 5 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 multidisciplinary group. These results from this first national register, show an increment in antiosteoporosis treatment with reductions in postfracture 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
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FLS is more than a program. It is an attitude that fulfills the healthcare gap between a fracture and the patient's pharmachological management. Although it starts after a fracture, the range of it's initiative goes a long way beyond lowering the risk of fracture with a drug. It represents an enhancement to cost-efectiveness on a scenario traditionally dragged by lobger life-expectancy.

NSS34
AUTOIMMUNE RHEUMATIC DISEASES AND OSTEOPOROSIS
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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
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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 (TNFa) induces osteoclastogenesis and facilitates the survival of mature osteoclasts. The osteoclastogenic effect of TNFa 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
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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
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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
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"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 medical 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
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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 aging 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
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"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
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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 nontraumatic 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.
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NSS42
IMPROVING THE COMMUNICATION OF FRACTURE RISK—WHAT CAN WE LEARN FROM THE LITERATURE?

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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)

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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 centers 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, colored 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 online 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 colored 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

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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 s chair test, balance with joint-feet and semitandem stance and, 4 m 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 ± 6.3 yrs) were included in the MATCH intervention. MATCH intervention was feasible and implementable as: (1) it took only 15–20 min 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?

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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-m TUG, and normal 4-m walking tests), muscle power (10-rep chair test), muscle endurance (30 s chair test), quality of life and perceived health (EQ-5D), and level of physical activity (RAPA) were assessed pre- and postintervention 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?

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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 h/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, and 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 ± 7, 80 ± 6, and 70 ± 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-m walking speed also improved, Web-Ex: − 1.7 s.; CEDECOMS: − 0.5 s.; CONTR: − 0,9 s. 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 ± 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

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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

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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 counseling, 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

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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

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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 ± 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

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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
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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
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Depression is a form of severe and chronic stress. During chronic stress cortisol levels increase and 24-h 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
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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
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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. The 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
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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
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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 nonspecific 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

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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 psychoemotional 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

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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 nonpharmacological treatment including exercises, massage, manual therapy, and others as the primary treatment for myofascial pain.

NSS60

NONPHARMACOLOGICAL TREATMENT IN CHRONIC MUSCULOSKELETAL PAIN

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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 nonpharmacological correction of such manifestations is neuromotor retraining of the patient with the help of biofeedback.

NSS61

MEDITERRANEAN DIET AND SARCOPENIA

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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

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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 favorable influence on cardiovascular system. In a 1-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 reduction 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

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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 antiinflammatory of this healthy dietary pattern and a better architecture for knee cartilages.

NSS64

THE BIOLOGY OF THE ACTIVE FORMS OF VITAMIN K

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Vitamin K is the name given to a class of fat-soluble homologs that confer biological activity on seventeen vitamin K-dependent proteins (VKDPs). Vitamin K achieves this by acting as an essential cofactor for the posttranslational modification of specific glutamate residues (Glu) to γ-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 procoagulants (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_1) which is made almost exclusively by plants. The other dietary forms are members of the menaquinone series (K_2) 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_2 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

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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 postmenopausal 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_1 concentration, used as a marker of vitamin K_1 intake, is associated with reduced fracture risk in post menopausal osteoporosis with adjusted odds ratio (95% CI) per μg/L increase in vitamin K_1 of 0.550 (0.310–0.978). The optimum intake of vitamin K needed to maximize 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_1 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

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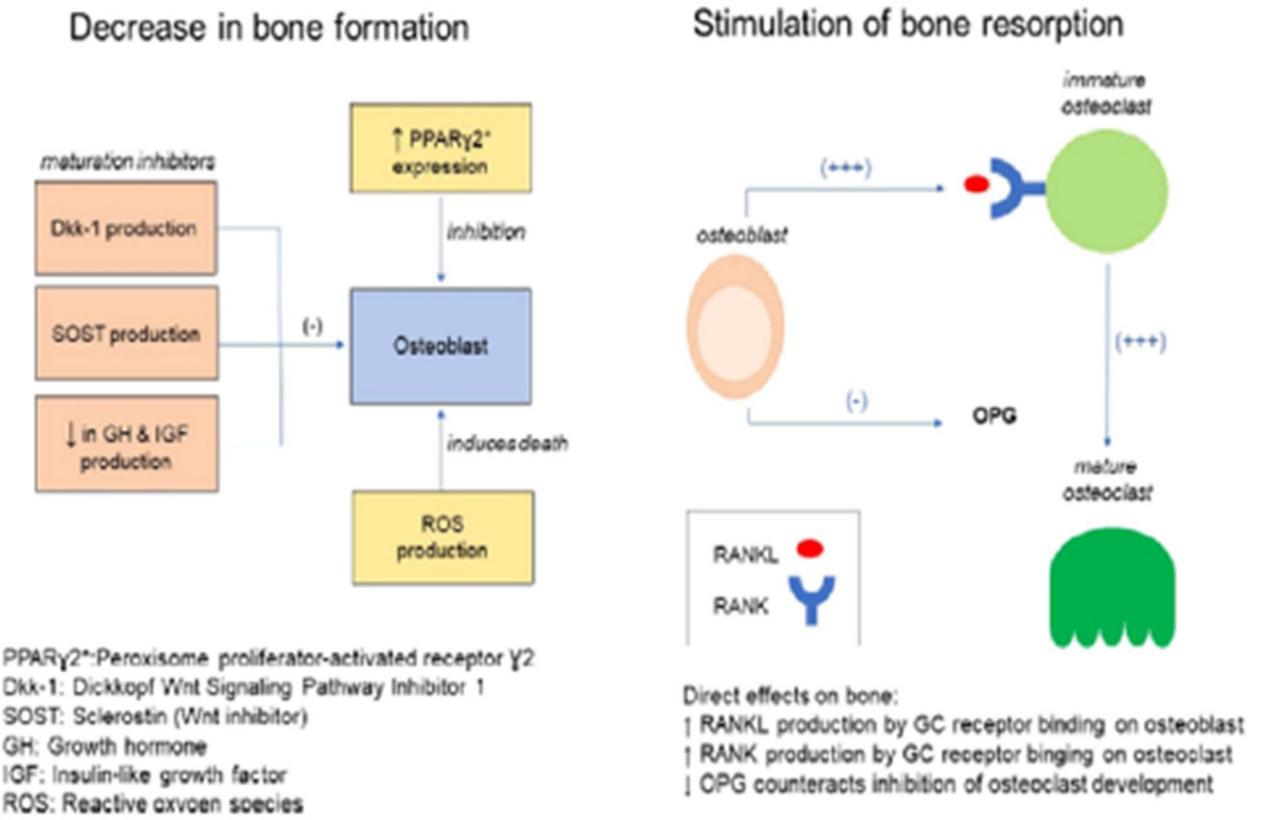
Glucocorticoids (GCs) are frequently used for the treatment of a variety of inflammatory and autoimmune diseases. A meta-analysis showed that 3% of the population aged 50 years or more have ever been treated with GCs, and this percentage increases to 5.2% among those aged 80 years and older. GC therapy 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 antiosteoporotic 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 toward 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 (Fig. 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

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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

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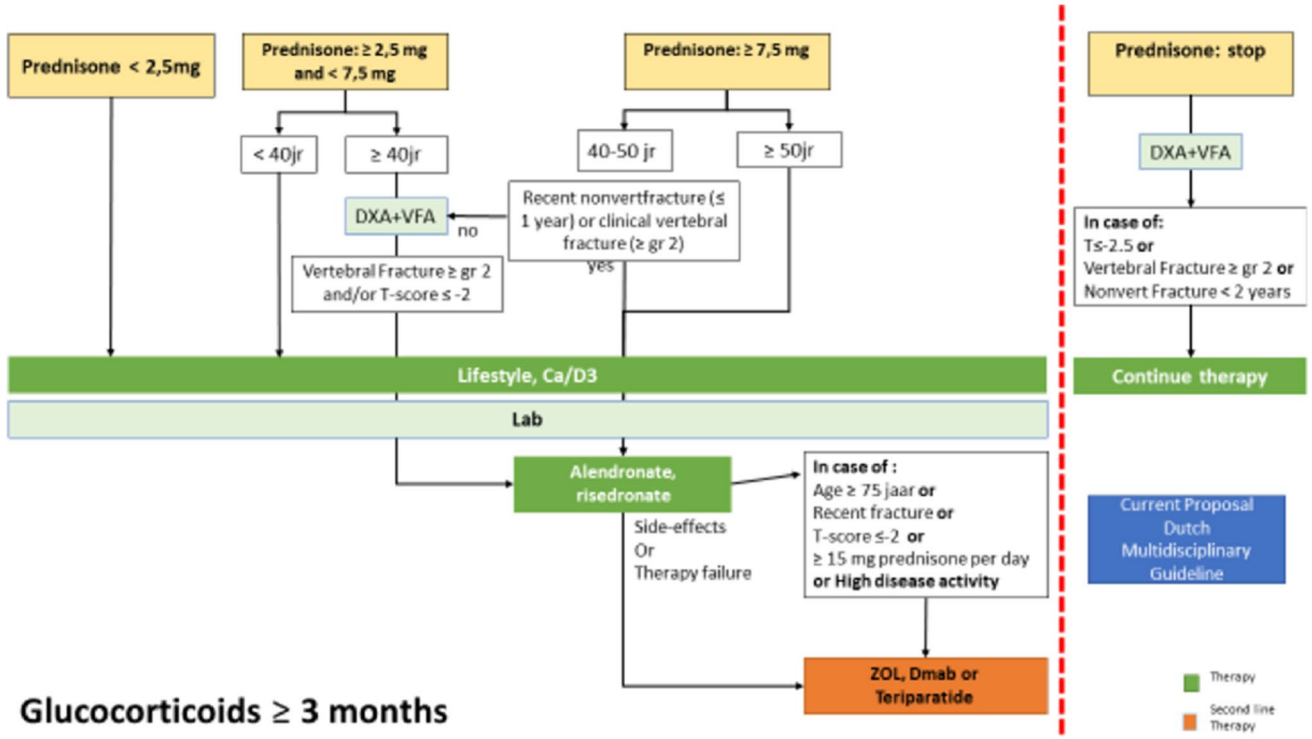
Long term glucocorticoid therapy is frequently indicated to treat autoimmune and chronic inflammatory diseases in daily clinical practice. Two of the most devastating untoward effects are bone loss and fractures. Doses of 7.5 mg of prednisone for more than 3 months can substantially impair bone integrity, and even longterm use of lwo 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 3 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
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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
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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 analyzes 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 deterioration. 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 nonvertebral 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.

NSS71

OSTEOCLASTS OFF: QUALITY OF BONE AND FRACTURE RISK IN THE HYPOPARATHYROIDISM

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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?

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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

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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.

NSS74

THE SHORT-FORM SARQOL® QUESTIONNAIRE—DEVELOPMENT AND VALIDATION OF A SHORT FORM MEASURE

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Quality of life is a complex, multifaceted 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 nonsarcopenic 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.
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.