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Abstracts

Ultrasound median nerve examination of patients with hypothyroidism

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Introduction Carpal tunnel syndrome (CTS) is the most commonly diagnosed entrapment neuropathy in patients with hypothyroidism.

Objectives To demonstrate the morphological changes in nervus medianus of patients with hypothyroidism using high-resolution ultrasound (HRUS) and to correlate TSH, fT4, autoantibody with ultrasonographic findings.

Methods A prospective cross-sectional study, in which HRUS was performed in patients with newly diagnosed untreated primary hypothyroidism. The cross-sectional area (CSA) of the median nerve (MN) was obtained using HRUS at the carpal tunnel inlet by indirect method. Furthermore, healthy volunteers underwent the same tests as the patients and have been chosen to match the patients in gender, age and body mass index (BMI).

Results Forty-four patients with hypothyroidism (30 female/14 male, average age 52.8 ± 2.875 years, average BMI 24.542 ± 0.554 kg/m²) were included in the study. There was a significant difference in the CSA of the MN at the tunnel inlet in patients with hypothyroidism (0.0984 ± 0.00564 cm²) when compared with the control group (0.0720 ± 0.00168 cm², $p < 0.001$). In fact, the CSA of the control group showed a significant difference from each patient subgroup. Furthermore, a significant difference in the CSA was seen between these subgroups.

Conclusions US examination of the MN seems to be a promising method in diagnosis of carpal tunnel syndrome in patients with autoimmune-induced hypothyroidism.

Subchondral Bone in Osteoarthritis

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Osteoarthritis (OA) is a long-term chronic disease that is characterized by the deterioration of cartilage in joints resulting in the articulation of bone with bone. A central role of the pathogenesis of OA is subchondral sclerosis that is associated with or even causes joint degeneration. Recent investigations showed that OA is associated with early bone loss due to increased bone remodelling. This is followed by slow turnover that leads to densification of the subchondral bone and complete loss of cartilage. Subchondral densification is a late event in OA that involves only the subchondral plate and calcified cartilage. However the subchondral trabecular bone beneath the subchondral plate may remain osteopenic. In experimental studies, the inducement of subchondral sclerosis without the prior stage of increased bone remodelling did not cause progressive OA. Both, early-stage increased remodelling and bone loss and the late-stage slow remodelling and subchondral densification seem to be part of the process that leads to OA. Various clinical studies showed a beneficial effect of drugs that are used for osteoporosis treatment on the progress of OA. Further studies are needed to clarify the role of subchondral bone changes in respect to the pathogenesis of OA. With accumulation of this data potential new drugs might get developed that target subchondral bone for the treatment of OA.

Sarcopenia in Ukrainian Women

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Introduction Sarcopenia is defined as an age-related reduction in muscle mass, strength and performance. Muscle mass peaks in the fourth decade and then decreases at the rate of 1 % after the age of 50 years. Prevalence of sarcopenia varies widely (5–70 %) according to age, sex, ethnicity and the criteria used for its definition [Marwaha R et al., 2014]. The aim of this study was to evaluate the normative data of lean mass in Ukrainian healthy women.

Materials and Methods 301 women aged 20–87 years (mean age 57.6 ± 0.9 yrs; mean height 1.62 ± 0.004 m; mean weight 63.5 ± 0.5 kg, body mass index 24.2 ± 0.2 kg/m²) were examined. All subjects were free of systemic disorders (endocrine, renal, hepatic etc.) and not taking medications known to affect skeletal and muscle metabolism. The women were divided into the following age-dependent groups: 20–29 yrs (n = 25), 30–39 yrs (n = 27), 40–49 yrs (n = 22), 50–59 yrs (n = 62), 60–69 yrs (n = 91), 70–79 yrs (n = 59), 80–87 yrs (n = 15). The lean and fat masses and bone mineral density (BMD) were measured by the DXA method (Prodigy, GE HC Lunar, Madison, WI, USA). Appendicular skeletal mass (ASM) was measured at all four limbs with DXA. We've also calculated the appendicular skeletal mass index (ASMI) according to the formula: ASM/height (kg/m²). Low muscle mass was based on the following definitions: European guidelines (ASMI < 5.5 kg/m²) [Cruz-Jentoft AJ et al., 2010], less than 20 % of sex-specific normal population and two SD below the mean of Ukrainian young adult females (20–39 yrs). The study results are presented in the following manner: M $\pm$ SD. A one-way ANOVA-test was used to compare the differences among the multiple groups. Multiple regression analysis was done to ascertain the association between lean mass with BMD at various sites and fat mass. Significance was set at $p < 0.05$. Statistica 6.0® StatSoft, Inc. was used for data processing purposes.

Results We observed a significant decrease of ASM with age (20–29 yrs 16.5 ± 0.4 kg, 30–39 yrs 16.4 ± 0.3 kg, 40–49 yrs 17.0 ± 0.5 kg, 50–59 yrs 16.9 ± 0.3 kg; 60–69 yrs 16.5 ± 0.2 ; 70–79 yrs 15.8 ± 0.3 ; 80–87 yrs 15.3 ± 0.3 ; $F = 2.7$; $p = 0.01$). The ASMI values corresponding to a cut-off of low muscle mass by the definitions used were as follows: < 5.5 kg/m² (European guideline), < 5.7 kg/m² (< 20th percentile of sex-specific population), < 4.8 kg/m² (two SD below the mean of young Ukrainian females aged 20–39 yrs). The prevalence of low muscle mass in women aged 65 yrs and older based on the above three criteria was 12 %, 16 % and 1.7 %, respectively. ASM was positively correlated with total fat mass ($r = 0.20$, $p = 0.0006$) and BMD at all sites (BMD of spine ($r = 0.22$, $p = 0.0002$), BMD of femoral neck ($r = 0.29$, $p < 0.0001$)).

Conclusion Peak muscle mass among Ukrainian women is achieved in the fifth decade. The cut-off value of ASMI (< 4.8 kg/m²) defined as two SD below the mean of reference young population was lower in this study compared with Rosetta Study (< 5.5 kg/m²). According to sex-specific cutoff (ASMI < 5.7 kg/m²), this index was similar to the data of Health ABC study (< 5.67 kg/m²) [Cruz-Jentoft AJ et al., 2010]. Appendicular skeletal mass was positively correlated with total fat mass and BMD at all sites.

Vitamin D status in IBD patients: a comparison of three different assays

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Objectives Vitamin D is a fat soluble secosterol that is produced in the skin after sun exposure. Epidemiological studies show significant associations of vitamin D deficiency and immune mediated diseases. Plasma 25 (OH) vitamin D3 concentration is a reliable biomarker for vitamin D status but variability of assays makes adequate monitoring of vitamin D difficult.

Aim To determine the correlation between three different assays for measuring plasma concentration of 25 (OH) vitamin D3.

Methods Blood samples from 50 IBD patients were evaluated in a blinded way in three different laboratories using diverse assays of 25 (OH) vitamin D monitoring such as high-performance liquid chromatography (A), IDS-automated immunoassay (B) and competitive binding assay (C).

Results 25 (OH) vitamin D concentrations assessed by competitive binding assay were in the range of 3.0 ng/ml to 39.3 ng/ml, by high-performance liquid chromatography of 4.6 ng/ml to 53.2 ng/ml and by automated immunoassay of 9.0 ng/ml to 48.0 ng/ml. All vitamin D assays showed a linear quantitative correlation (Pearson $r = 0.69$ for A vs. B, 0.69 for A vs. C and 0.63 for B vs. C). The agreement of 25 (OH) vitamin D assays in sorting patients into distinct 25 (OH) vitamin D categories varied from 60 % to 76 %.

Conclusion There is a significant bias between all three methods. The difference in 25 (OH) vitamin D assays has a significant impact on results, patient classification, and treatment recommendation. Our results indicate the need towards further standardizing assays for 25 (OH) vitamin D measurement.

Vitamin D Levels and Comorbidities in Austrian Patients

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Vitamin D deficiency is prevalent in Europe but vitamin D levels show a high variation between different countries. In our cross-sectional study, we determined the prevalence of vitamin D deficiency in patients of all age groups treated in seven Austrian hospitals in the years 2012 and 2013. The correlation between vitamin D levels and age, serum markers and bone turnover markers was tested. Moreover, we evaluated the association of vitamin D deficiency with different comorbidities.

Data sets of more than 16,000 patients (67 % women, 33 % male) were analyzed. Vitamin D insufficiency (< 30 ng/ml) and deficiency (< 20 ng/ml) were found in 71 % and 42 % of patients, respectively. In every age group more than half of the patients had vitamin D concentrations < 30 ng/ml. Vitamin D insufficiency was more frequent in male patients. Serum bone markers were within the normal range in the majority of patients in every age decade. Vitamin D levels neither correlated with age nor with serum parameters. Vitamin D insufficiency was most frequently observed in patients with type-1 and type-2 diabetes mellitus, adipositas, chronic kidney disease and chronic inflammatory bowel disease.

Vitamin D insufficiency is frequent in the Central European population, independent of age and gender. Due to the role of vitamin D as a key regulator of bone turnover and also extra-osseous pathway, determination of vitamin D levels should be integrated into routine medical examination.

Trabecular Bone Score in Clinical Practice

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Introduction Osteoporosis is considered as a disease primarily of women; however, around 25 % of the individuals with osteoporosis

are men. BMD measurement by DXA is the gold standard used to diagnose osteoporosis and assess fracture risk. However, BMD does not take into account microarchitecture alterations. Trabecular Bone Score (TBS, Med-Imaps, France) is an index of bone microarchitectural texture extracted from posterior-anterior spine DXA.

The aim of this study was to assess the role of TBS in clinical practice.

Materials and Methods We examined 176 healthy women aged 40–79 years (mean age 53.4 ± 0.6 yrs) and 117 men aged 40–79 years (mean age 59.8 ± 0.9 yrs). Bone mineral density (BMD) of whole body, PA lumbar spine and proximal femur were measured by DXA method (Prodigy, GE HC Lunar, Madison, WI, USA) and PA spine TBS was assessed by TBS iNsight® software package installed on the available DXA machine (Med-Imaps, Pessac, France).

Results We have observed a significant decrease of TBS as a function of age ($F = 6.56$; $p = 0.0003$) whereas PA spine BMD was significantly increasing with age ($F = 4.04$; $p = 0.008$) in the examined women. This contradiction can be traced to spinal osteoarthritis and degenerative diseases progressing with age in the elderly patients. TBS was significantly lower in women with duration of PMP over 4 yrs ($p = 0.003$) in comparison with women without menopause; BMD of spine significantly decreased in women with duration of PMP over 7–9 yrs ($p = 0.02$). So, the TBS can detect changes in the state of bone tissue at an earlier stage than BMD. We have observed a significant decrease of TBS in men with ageing ($F = 2.44$; $p = 0.05$). Overall TBS values in men are lower than the age-matched TBS values in women.

Conclusion TBS is an independent parameter, which has a potential diagnostic value of its own, without taking into account the BMD results.

Bone Metabolism after Bariatric Surgery

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Background The role of Sclerostin (Scl), as a key regulator of bone formation, after Roux-en-Y gastric bypass (RYGB) or laparoscopic sleeve gastrectomy (SG) is still unclear.

Objectives Evaluation of Sclerostin serum levels after surgery and correlations with bone turnover markers and areal bone mineral density (BMD) changes.

Study Design A prospective observational single-center two-arm study in premenopausal women with morbid adipositas over 24 months. Measures of BMD and lab values were taken prior to surgery and after 1, 3, 6, 9, 12, 18, and 24 months.

Results 52 premenopausal obese women after RYGB (40 ± 8 years, BMI 43.4) or SG (41 ± 7 years, BMI 45.7) completed the study. Scl increased by $\Delta +50.5$ % at 30 ± 5 days after surgery and remained elevated with a maximum of $\Delta +120$ % six months after surgery. CTX rapidly and continuously increased by $\Delta +170$ % (peak month 9 $\Delta +190$ %), PINP to lesser extent (peak $\Delta +73$ % at month 12) and steadily declined to a change of $\Delta +36$ % ($P < 0.001$ for all). Scl increases were significantly positively correlated with CTX and PINP increases and significantly negatively correlated with BMD loss. BMD independently declined regardless of RYGB and SG. Elevations of Scl, CTX, PINP, and phosphate ($p < 0.001$), but not iPTH, were significant discriminating factors for BMD loss (AUC 0.915).

Conclusion Rapid and sustained increase of Scl, CTX and to lesser extent PINP causes an uncoupling in bone metabolism and results in BMD loss at all skeletal sites.

Age-related Features of Relationship between Structural-Functional State of Bone and Development of Knee Osteoarthritis in Postmenopausal Women

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The aim was to study the age-related particularity of relationship between structural-functional state of bone tissue and development of knee osteoarthritis (KOA) in women of postmenopausal period.

Material and Methods 175 women in postmenopausal period aged 50–79 years with knee osteoarthritis were examined, the control group consisted of 60 healthy women. A diagnosis of osteoarthritis was performed due to the criteria of American Rheumatology Association (1995), the stage by Kellgren-Lourens' classification. Bone state was measured by dual-energy X-ray absorptiometry "Prodigy" (DXA), calcaneus quantitative ultrasound (QUS) densitometry "Sahara", digital X-ray radiogrammetry (DXR) of the II–IV metacarpal bones (OSTIM+).

Results We found a significant correlation between indices of ultrasound densitometry and presence and stage of KOA in postmenopausal women. In patients with stage I of KOA densitometry data were significantly higher compared with healthy women, but in patient with stage III of KOA they were significantly lower (stiffness index: 0 st. KOA: 76.5 ± 16.4 ; I: 83.6 ± 15.9 ; II: 71.0 ± 13.6 ; III: 67.8 ± 14.1 ; $F = 4.33$, $p = 0.005$). Analysis of aging particularities showed that significant differences of ultrasound densitometry data were in postmenopausal women aged 50–59 and 60–69 years with knee osteoarthritis, but were not in patients 70–79 years old. In postmenopausal women we did not found significant relationship between indices of DXA (lumbal spine, neck, total femur) and digital X-ray absorptiometry and presence/stage knee osteoarthritis, except bone mineral density (BMD) of total body and total spine. The indices of BMD of total spine were significantly higher in postmenopausal women with stage III of KOA compared with healthy patients and women with early stages of osteoarthritis (0 st. KOA: 0.90 ± 0.12 ; I: 1.00 ± 0.10 ; II: 1.01 ± 0.15 ; III: 1.08 ± 0.12 g/cm²; $F = 7.31$, $p = 0.0001$).

Conclusion Presence and stage of KOA had significant influence on ultrasound densitometry, but not on DXA indices (lumbal spine, neck, total femur) and digital X-ray absorptiometry.

Therapeutic adherence to osteoporosis treatment in Slovak patients

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Objective Adherence of patients to therapy is a major determinant of therapeutic success, which is not included in most clinical studies. This is especially true for chronic diseases with few subjective symptoms, such as osteoporosis. The aim of our study was to describe and to analyze the therapeutic adherence to several widely used anti-osteoporotic medications in real-world medicine in Slovakia.

Methods Using a retrospective approach, data about drug prescriptions for 8223 patients from 3 consecutive years were analyzed regarding compliance and persistence. Compliance was measured as medication possession ratio and ratio between the supply of the drugs in the treatment time according to the prescriptions and the time of observation. Persistence was assessed as the percentage of patients who used the drug without a gap for the given time period.

Results The average compliance was 70 %, 59 %, and 4 % for 6, 12, and 24 months, respectively. Average persistence was very low with 54 %, 42 %, and 22 % for 6, 12, and 24 months, respectively. Total average persistence was only 9.8 months. Medications with lower frequency of application tended to be associated with higher adherence.

Conclusion In conclusion, the therapeutic adherence to anti-osteoporotic treatments varies between the available drugs and drug regimens. In general, the adherence is very low but comparable to previously published studies from other countries. This variability of adherence should be considered in clinical decision making together with the variability of therapeutic efficiency found in clinical studies.

Administration of vitamin D supplements in postmenopausal women

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Background Postmenopausal women are traditionally regarded as the population most affected by vitamin D deficiency; likewise this is about the most frequently seen population for a general practitioner, as well as for a number of other specialists. Development of an adequate tailored approach to the treatment of underlying vitamin D deficiency in this population is a challenging task and needs further investigation.

Objectives To assess the efficacy and safety of vitamin D and calcium supplements in postmenopausal women with and without vitamin D deficiency and to verify which subgroups may be less susceptible to the proposed treatment to potentially adjust the treatment scheme.

Methods We have randomized 70 hospitalized women aged 46–87 years (mean 64.9 ± 9.5) into either of the two groups: treatment (50 subjects, 65.1 ± 8.8 years old, BMI 27.22 ± 4.51 kg/m²) and control (20 subjects, 64.5 ± 11.1 years old, BMI 26.68 ± 4.95 kg/m²) for a 6-month treatment from 1st Oct 2013 onwards. Patients with confounding factors in terms of bone metabolism were excluded from the study. Subjects in the main group received 1000 mg calcium and 3800 IU vitamin D during the titration phase (mean 51.96 ± 12.28 days, but the duration was calculated on an individual basis according to the baseline 25 (OH) D level, as well as the body mass). Maintenance dose (1000 mg calcium, 1800 IU vitamin D) was then administered till the end of the study. Biochemistry (calcium, phosphor, alkaline phosphatase, lipids, as well as 25 (OH) D) was being made throughout the study.

Results As early as 3 months after starting the treatment there was a significant increase ($p < 0.001$) in 25 (OH) D levels in the treatment group: 35.60 ± 8.21 nmol/l as compared to baseline levels of 25.20 ± 9.76 nmol/l. Remarkably, the treatment was most effective in the oldest subgroup (> 70 yrs), as well as in subjects with the BMI 25.0 – 28.99 kg/m². The difference in pre- and post-treatment 25 (OH) D values was the largest in the previously deficient patients. After the treatment, there were no changes in calcium levels, although the phosphor level had slightly diminished (1.15 ± 0.15 mmol/l as compared to the initial 1.18 ± 0.15 mmol/l; $p = 0.02$), and so did PTH (36.69 ± 11.39 pg/ml as compared to baseline 40.02 ± 10.79 pg/ml; $p = 0.03$). Alkaline phosphatase levels increased from 60.81 ± 23.69 IU/l to 71.00 ± 16.24 IU/l ($p = 0.04$).

Conclusions The suggested treatment scheme was proven to be effective across all age groups in postmenopausal women. It was marginally less effective in patients with obesity as it might have been expected due to the need to build up their depot reserves. As the treatment turned out to be effective, relatively quick, and had a reasonable safety profile it may be beneficial for all vitamin D-deficient postmenopausal women.

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Hyperuricemia, Bone Mineral Density and TBS of Ukrainian Men

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Aim To determine the prevalence of hyperuricemia affecting Ukrainian men in relation to bone mineral density and TBS.

Objects Ukrainian men ($n = 132$), age of the examined patients from 50 to 80 years. Average age of examined patients was 58.2 ± 1.3 years. According to the levels of uric acid in the blood serum, all patients were divided in four quartiles.

Methods Uric acid level in blood plasma was determined by the uricase-peroxidase method, bone mineral density – by means of the Prodigy unit (GE Medical systems, model 8743, 2005). The TBS was evaluated using the installed TBS iNsight® software for an X-ray densitometer (Med-Imaps, Pessac, France).

Results The rate of hyperuricemia affecting the Ukrainian men was 23 % in the age group of 50–59-year-olds, 33 % in the age group of

60–69-year-olds, 29 % in the age group of 70–79-year-olds. The frequency of osteoporosis in men with hyperuricemia was lower compared with men who had a normal level of uric acid (4 % and 17 % at the level of the lumbar spine, and 4 % and 15 % at the level of femoral neck). Bone mineral density was significantly higher in case of men having the highest levels of uric acid in the lumbar spine ($F = 2.78$; $p = 0.04$), radius 33 % ($F = 3.96$; $p = 0.01$) and total body ($F = 2.70$; $p = 0.04$). TBS was significantly higher in patients who had the lowest levels of uric acid compared with patients who had the highest level of uric acid ($Q1 = 1.17 \pm 0.02$, $Q4 = 1.04 \pm 0.02$; $p < 0.05$).

Conclusions We determined that men with low levels of uric acid had significantly lower levels of bone mineral density, but the TBS in men who have the highest levels of uric acid is higher.

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