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IOF Regionals—1st Asia-Pacific Osteoporosis Meeting

Poster Presentation Abstracts

P100
DRYNARIA FORTUNEI J. SM. PROMOTES OSTEOBLAST MATURATION BY INDUCING DIFFERENTIATION-RELATED GENE EXPRESSION AND PROTECTING AGAINST OXIDATIVE STRESS-INDUCED APOPTOTIC INSULTS

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Aims: *Drynaria fortunei J. Sm.* is one variety of the traditional Chinese medical herb Gusuibu. This study was aimed to evaluate the effects of water extracts of Kunze on regulation of osteoblast maturation and its possible mechanisms.
Methods: Primary osteoblasts prepared from neonatal rat calvarias were exposed to the water extracts of Kunze (WEK), and the cytotoxicity was assayed. Osteoblast maturation was evaluated by analyzing cell mineralization. RT-PCR was executed to determine the effects of WEK on regulation of osteoblast differentiation-related gene expression. Nitrosative stress and apoptotic cells were quantified using flow cytometry.
Results: Exposure of rat calvarial osteoblasts to WEK did not affect cell viability, but significantly promoted osteoblast mineralization. WEK induced osteoprogenitor proliferation-related insulin-like growth factor-1 mRNA, but did not affect collagen type 1 mRNA expression. Treatment with WEK likewise induced the expression of matrix maturation-related bone morphogenetic protein (BMP)-2 and BMP-6 mRNA. Consequently, WEK enhanced the levels of mineralization-related alkaline phosphatase, osteopontin, and osteocalcin mRNA in osteoblasts. In addition, exposure of osteoblasts to WEK alleviated nitrosative stress-caused apoptotic insults.
Conclusions: This study shows that WEK can promote osteoblast maturation by regulating bone differentiation-related gene expression and defending against nitrosative stress-induced apoptotic insults.

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Disclosure of Interest: None Declared

P101
THE PRELIMINARY RESEARCH OF THE MECHANISM ON THE INFLUENCE OF INTRACELLULAR CALCIUM TRANSPORTATION AND CYTOACTIVE OF HEPCIDIN ON OSTEOBLAST (HFOB1.19)

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Aims: To observe the preliminary mechanism of hepcidin on intracellular calcium transportation in osteoblast (hFOB1.19) and its cell activity.
Methods: (1) Hepcidin (100 nmol/l) treated osteoblast (hFOB1.19) for 1 h and 24 h, respectively, observe the intracellular calcium with flow cytometry (FCM). (2) Use different doses of Nimodipine (2×10^{-5} M) to block the L-type voltage dependent calcium channel of osteoblast (hFOB1.19) or use different doses of ethylenediamine tetraacetic acid (EDTA, 2×10^{-3} M, chelator of Ca^{2+}) to chelate the calcium ion in the culture medium. Twenty minutes later, the experimental groups were treated with hepcidin (final concentration is 100 nM) for 1 h. Then the flow cytometry (FCM) was used in this study to test the fluorescence intensity of calcium ion in osteoblast. (3) The hFOB 1.19 was cultured in the culture board with 12 holes. Add double distilled water into the control group and hepcidin of different concentrations into the experimental group:M1 group (final concentration is 100 nM) and M2 group (final concentration is 200 nM).

1.The ability of cell proliferation was evaluated by MTT after 24 and 48 h. 2. Annexin V/PI staining and flow cytometry were used to detect the rate of apoptosis of osteoblast 48 h later. 3. The mineralized nodes were observed by Von Kossa staining after 15 days continuous culture.
Results: (1) Hepcidin-stimulated elevation of intracellular calcium in 1 and 24 h, but there was no deference between 1 and 24 h groups ($P>0.05$). (2) There was no deference among Nimodipine, EDTA and control group ($P>0.05$). There was huge deference among the simple hepcidin group with Nimodipine, EDTA and control group ($P<0.05$). The fluorescence intensity of calcium ion in hFOB 1.19 from control group, Nimodipine group, EDTA and the simple hepcidin group were 304.076.66, 313.365.84, 315.087.28 and 455.3013.77, respectively. (3)1. Hepcidin has no effect on cell proliferation viability ($P>0.05$). 2. Hepcidin can inhibit the apoptosis of osteoblast ($p<0.05$) and promote the secretion of the nodules of osteoblast ($p<0.05$).
Conclusions: (1) The Ca^{2+} transportation was increased with the increase of hepcidin concentration out of hFOB 1.19 cells and the tendency of diversion of Ca^{2+} into cells was extremely significant. With hepcidin's effect, calcium ion may enter osteoblast by L-voltage dependent calcium channel. (2) Hepcidin can decrease rate of apoptosis in osteoblast1.19, improve the mineralization of osteoblast1.19, but it can't inhibit the cell proliferation.
Disclosure of Interest: None Declared

P102
CA-ENRICHED MINERAL WATER IS A GOOD SOURCE OF CA: A CONTROLLED SHORT-TERM STUDY IN HEALTHY WOMEN

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Aims: The importance of adequate Ca intake for bone health is well established. However, in many countries dietary Ca intake fails to meet nutritional recommendations. The main dietary Ca sources in Western diets are dairy products, but there are still some groups of people, e.g. those who are lactose intolerant, allergic to milk or vegan, who do not consume or seldom consume dairy products. The aim of this study was to investigate the acute effects of three different Ca sources: Ca-enriched mineral water (CEMW), milk (MI) and Ca supplement (CaS) on Ca and bone metabolism. In addition, we studied whether CEMW is a good Ca source by comparing the effects of CEMW with the effects of MI and CaS.
Methods: Each of 14 healthy female subjects aged 19–32 years attended four 24-h study sessions, which were randomized with regard to a Ca source (mineral water (control day), CEMW, MI and CaS), and each subject served as her own control. The meals were exactly the same on each study day and provided 305 mg of Ca. In addition, each Ca source provided 800 mg of Ca, which were taken into four equal sized doses during the study day. Twenty-four hour urine sample and six blood samples were collected on each study session.
Results: Compared with the control day, all studied Ca sources (CEMW, MI, CaS) significantly decreased serum parathyroid hormone (S-PTH) concentration ($p<0.001$, ANOVA), increased serum ionized calcium (S-iCa) concentration ($p=0.001$, ANOVA) and elevated urinary calcium excretion (U-Ca) ($p<0.001$, ANOVA). Serum total calcium (S-Ca) concentration increased only with CaS ($p<0.001$) and CEMW ($p=0.004$) but not with milk ($p=0.24$) when compared with mineral water (control day).
Conclusions: Our results show that Ca-enriched mineral water is a good Ca source. Ca-enriched mineral water, Ca supplement and milk similarly increased S-iCa and decreased S-PTH concentrations and increased U-Ca excretion. Ca-enriched mineral water can be recommended as a Ca source to individuals who do not consume dairy products.
Disclosure of Interest: None Declared

P103
GREEN CLOVER POTENTIATES THE OSTEOGENIC EFFECTS OF PHYSICAL EXERCISE THROUGH UP REGULATION ESTROGEN RECEPTOR ALPHA OSTEOBLAST CELL

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Aims: This study is to clarify the molecular mechanism of bone formation in menopause mice through intervention physical exercise and green clover leaves administration.
Methods: Using a posttest only control group design study, 28 females of Mus musculus menopause mice, about 1-year-old were enrolled in this study. The stage of menopause will be determined through vaginal smear examination in the Department of Animal Reproduction, Veterinary Faculty. All subjects in this study were randomized and allocate to four groups:1. the controlled group, which will be given 0.4 cc aqua through sonde once every day; 2. the green clover group, which will be given 0.4 cc suspension of green clover leaves extract, once every day; 3. the exercised group, on the treadmill with velocity 7–11 m/min for 60 min, 3 times every week; 4. the combination group. The experiments were conducted for 4 weeks and has received Ethical Clearance from Ethical Committee Dr. Soetomo General Hospital. The estrogen level were measured using solid phase RIA technique, estrogen receptor alpha (ERα) and extracellular signal regulated kinase 1/2 (ERK1/2)

expression in osteoblast cell from methaphysis of proximal femur, were measured using indirect immunohistochemistry technique. Descriptive data are presented by mean±SD. Before analysis all continuous variables were tested for normal distribution. Using ANOVA and multiple comparisons test for normally distribution data and the non normally distributed data were analysed using the Kruskal Wallis test and Man–Whitney test. The association between estrogen, ERα and ERK1/2 variables were assessed by Spearman's correlation and Kendall's correlation coefficient. A two-tailed *p*-value less than 0.05 was considered statistically significant.

Results: Only 27 mice were included in the analysis. The combination group significantly showed higher estrogen concentration (p=0.000). The expression of ERα and ERK 1/2 in this group also showed higher (each p=0.005). In the green clover group also showed increased in estrogen level (p=0.010), ERα and ERK 1/2 expression (p=0.036 and p=0.015, respectively); but in the physical exercise group although estrogen level increased (p=0.011), only ERK1/2 expression showed increased significant (p=0.030), but increasing in ERα is not significant (p=0.336). Both ERα and ERK1/2 were correlated with estrogen (r=0.401 and r=0.600, respectively). The expression of ERK1/2 has significance influence to the correlation between estrogen and ERα (p=0.015), otherwise the ERα expression has significant influence to the correlation between estrogen and ERK 1/2 (p=0.007).

Conclusions: It can be concluded that green clover potentiates the osteogenic effects of physical exercise through up regulation ERα, that important as a receptor to transcriptional activity in osteoblast cell function.

Disclosure of Interest: None Declared

P104
COMBINED JUMPING EXERCISE AND HONEY SUPPLEMENTATION ENHANCES TIBIAL MOMENT OF INERTIA AND MAXIMUM FORCE IN YOUNG FEMALE RATS

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Aims: This study investigates the effects of 8 weeks of combined jumping exercise and honey supplementation on BMD, cross-sectional cortical area, moment of inertia (CSMI) and maximum force of the tibia bones in young female rats.

Methods: Forty-eight 12-week old female rats were divided into four groups: Sedentary without supplementation control group (C), sedentary with honey supplementation group (H), jumping exercise group (J), and combined jumping exercise and honey supplementation group (JH). Jumping exercise consisted of 40 J/day for 5 day/week at the height of 40 cm. Oral honey supplementation was given to the rats at the dosage of 1 g/kg body weight/rat/day, for 7 day/week. At the end of the study, proximal volumetric total BMD, trabecular BMD, mid shaft cortical volumetric BMD, cross-sectional area, cross-sectional moment of inertia, and maximum force of the left tibia were measured for comparison. Data were analysed using one-way ANOVA.

Results: No significant differences were observed in tibial proximal total BMD and trabecular BMD in H, J, and JH groups compared with the control (C) group. J group elicited significant greater tibial midshaft cortical volumetric BMD compared with C group (p<0.05). There were significant greater tibial midshaft cortical area and CSMI in JH group than that in the C and H groups (p<0.05). JH group exhibited highest tibial proximal total and trabecular BMD, midshaft cortical area and CSMI values among the groups. Similarly, tibial maximum force value was significantly greater in JH compared to C group and H group, respectively.

Conclusions: These findings suggest that a combination of jumping exercise and honey supplementation may elicit synergistic beneficial effects on tibial BMD, geometry and maximum force in general compared to jumping exercise or honey supplementation alone in rats.

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Disclosure of Interest: None Declared

P105
HERBAL EXTRACT AND NUTRITIONAL BONE-BUILDING SUPPLEMENT SYNERGISTICALLY STIMULATE BONE FORMATION IN HUMAN OSTEOBLAST CELLS IN VITRO

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Aims: Dietary recommendation for osteoporosis prevention and treatment includes supplementation with calcium and vitamin D. However, other nutrients were found to be beneficial to bone health, including those found in commercially available nutritional bone-building supplements. The objective of our study was to investigate the effects on bone formation in vitro of the water-soluble extract of a nutritional bone-building supplement (bb) alone and in combination with the antioxidant-rich polyphenolic extract of a commercially available herbal product (g+).
Methods: Human osteosarcoma SaOS-2 or cloned CD34+ cells were cultured in HAM's F-12-supplemented media and varying combinations of bb and g+ were added on day 8 and every 2–3 days thereafter. Cells were stained with von Kossa and subjected to image analysis to quantified bone formation. Alkaline phosphatase activity (ALP) was measured from sonicates.
Results: Data showed that bb had a significant time-dependent (two-way ANOVA, $p<0.001$) and dose-dependent effect (one-way ANOVA ($P<0.0001$)), in both cell lines. When compared to 1 mg/ml calcium, the effect of 1.0 mg/ml bb, was found to be 2.35±0.28× more effective than calcium alone. This could indicate that the other components of bb are necessary for the stimulation of bone formation. Varying doses of g+ alone or combined with 0.5 mg/ml bb, showed that at all concentrations tested (0.8–2.0), the effect was significantly higher in the presence of bb, and at the highest concentration 6× more effective than the 2.0 mg/mlg+ alone (significant, at $p<0.005$). Additionally, varying doses of bb alone or combined with 1.2 mg/mlg+ showed that there was a significant dose effect of bb alone (one-way ANOVA, $P<0.0005$) and with g+ (one-way ANOVA, $p<0.001$). At the highest treatment 1.0 mg/ml bb plus g+ was 6× more effective than bb alone (significant, $p<0.05$). ALP activity showed that both bb and g+ alone or in combination resulted in the maturation of the cells.
Conclusions: Bone formation in vitro was significantly enhanced by a combination of g+ and bb better than calcium alone. This effect was further enhanced by the addition of a polyphenol extract with antioxidant properties. The results could suggest that herbal extracts in combination with a nutritional bone-building supplement may be a good alternative or complement for the prevention and treatment of osteoporosis.
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P106
THE ROLE OF S100A6 IN REGULATION OF OSTEOBLASTOGENESIS

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Aims: In this research, we aimed to study the mechanism of the inhibitory effects of adipoctyes on osteoblastogenesis through S100A6.
Methods: Human MSCs were transfected stably with shS100A6 RNA and bone osteoblastogenesis and mineralization were evaluated.
Results: A progressive adipogenesis with age in bone marrow is associated with reduced bone formation and loss of bone mass. In elderly adults and osteoporotic patients at all ages, increase of bone marrow adipose tissue and decrease of matrix structure are often observed. However, the role of bone marrow adipocytes in the aging bone tissues remains unknown. In our previous study, we used two different modes of co-cultures of adipocytes and osteoblasts, which were derived from human mesenchymal stem cells (hMSC), to study the effects of hMSC-derived adipocytes on osteoblastogenesis. We identified S100A6 in osteoblastogenesis, which is regulated by hMSC-derived adipocytes, suggesting the possible role of S100A6 in the regulatory effects of adipocytes on osteoblastogenesis. In this research, we aimed to study the mechanism of the inhibitory effects of adipoctyes on osteoblastogenesis. S100A6 is one of the members in S100 calcium-binding protein family, and is reported to be an oncogenic transcriptional factor playing a major role in cancer metastasis. However, the role of S100A6 in bone formation is unknown. We hypothesized that S100A6 may play a crucial role in regulation of osteoblastogensis by hMSC-derived adipocytes. To confirm the involvement of S100A6 in osteoblastogenesis, we transfected hMSC with siRNA of S100A6 during osteoblastogenesis, and found that the number of pre-osteoblasts decreased in cells transfected with siRNA of S100A6 compared to cells subjected to negative control. The alkaline phosphatase (ALP) positive area and ALP activity also decreased significantly after transfection of S100A6 siRNA. These suggest that S100A6 may be involved in osteoblastogenesis. To further study the mechanism of S100A6 regulating bone formation, we examined expression of bone formation marker such as Runx2, and found that Runx2 expression was significantly reduced in the transfected cells compared to the nontransfected cells. We also found that the reduced osteogenesis activity, measured by ALP positive area, its activity, and Runx2 expression level, was associated with the decreased expression level of β-catenin after transfection with siRNA of S100A6 in human preosteoblasts.
Conclusions: Data from this study suggest that S100A6 may play an important role in adipocytes regulatory process

of osteoblastogenesis through Wnt signaling pathway. This is the first study that tackles the mechanism of S100A6 regulating osteoblastogenesis.

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Disclosure of Interest: None Declared

P107
TAURINE INHIBITS OSTEOBLAST APOPTOSIS VIA THE TAURINE TRANSPORTER/ERK SIGNALING PATHWAY

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Aims: The aim of this study was to investigate the activities of taurine on apoptosis of mouse osteoblastic cell line MC3T3-E1.
Methods: Cell apoptosis was determined by measurement of cytoplasmic nucleosomes. Release of cytochrome c from mitochondria into cytosol and the phosphorylation of ERK1/2 were determined by Western blot analysis. The enzyme substrate was used to assess the activation of caspase-3 and caspase-9. The [^{3}H]taurine was used to measure the taurine uptake activity. Small-interfering RNA (siRNA) was used to down-regulate the expression of taurine transporter (TAUT).
Results: Taurine inhibited apoptosis of MC3T3-E1 cells induced by serum deprivation. Taurine also suppressed cytochrome c release and caspase-3 and caspase-9 activation in serum-deprived MC3T3-E1 cells. Taurine induced ERK phosphorylation. Either knockdown of the TAUT or treatment with the ERK-specific inhibitor PD98059 blocked the activation of ERK by taurine and abolished the anti-apoptotic effect of taurine in MC3T3-E1 cells.

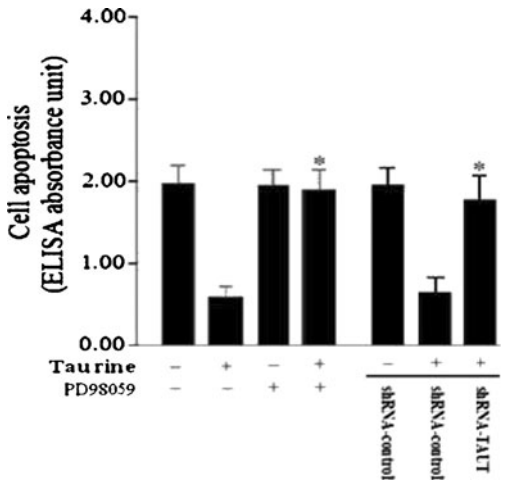

Fig. 2 Taut and ERK signaling pathways mediate the anti-apoptotic effect of taurine in MC3T3-E1 cells. The bars represent the mean ± SD (n=5; *P<0.05 vs. taurine-treated control).

Conclusions: The present results demonstrate for the first time that taurine inhibits serum deprivation-induced osteoblast apoptosis via the TAUT/ERK signaling pathway.

Disclosure of Interest: M. Yulin Grant / Research Support from: the grant No.A2009778 from the Medical Research Fund of Guangdong Province.

P108
PREVALENCE OF OSTEOPROSIS IN TYPE 2 DIABETES

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Aims: Incidence of osteoporosis may differ in type 1 as compared to type 2 (T2DM) diabetes. This perspective will address the prevalence of osteoporosis and osteopenia in T2DM and some biochemical parameters.
Methods: In this cross-sectional study 60 patients with T2DM (40 women and 20 men), aged between 40 and 50 years were selected. Those who had other known diseases or used medications affecting BMD were excluded based on history and physical examination. We used LUNAR (DPX-IQ) device for densitometry in lumbar spine and femoral neck regions and WHO criteria for interpretation.
Results: From 60 patients, one had osteoporosis (male) (1.7%) and 15 had osteopenia (25%). There were 8 males (13.3%) and 7 females (11.7%) in this group. Mean of age, diabetes duration, HbA1C, 25(OH)D, serum calcium and phosphorus was 45.8±3.5 years, 6.6±5.4 years, 9.2±2%, 41.8±31.3 ng/ml, 9.3±0.4 mg/ml and 3.6±0.5 mg/dl, respectively. There was a positive significant correlation between BMD, gender and diabetes duration but no correlation were found between BMD and serum calcium, phosphorus, HbA1C, 25(OH)D levels and BMI.
Conclusions: We found high incidence of osteopenia in T2DM (more common in males than females) and positive correlation with diabetes duration.

Disclosure of Interest: None Declared

P109
FREQUENCY OF VITAMIN D DEFICIENCY IN UKRAINIAN PEOPLE OF DIFFERENT AGES

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Aims: The aim of sturdy was to study the frequency of vitamin D deficiency amount Ukrainian people of different age.

Methods: The study involved 129 patients aged 20–79 years old who were hospitalized in the department of age changes of musculoskeletal system of "Institute of Gerontology AMS of Ukraine". They suffered osteoarthritis of knee or hip joint (7.1 and 16.2% accordingly), osteochondrosis (55.8% of cases) or postmenopausal osteoporosis (was diagnosed in 20.9% of patients). The average age of the subjects was 55.8±1.3 years. Vitamin D level was assessed with the 25-(OH)-Vitamin D EIA Kit by means of the Immunodiagnostic Enzyme-Immuno-Assay (EIA) for quantitative determination of 25-(OH)-Vitamin D in human serum and plasma. BMD was examined by DXA.
Results: The vitamin D-deficiency was diagnosed in 14.7% patients and vitamin D-insufficiency in 55.0%. The most vulnerable group for the development of deficiency of vitamin D was group of people 50–69 years. Only 25.7 and 20.7% of patients of that group had level of 25-(OH)-vitamin D in the normal range. Vitamin D has effect on BMD.
Due to DXA, 40.8% of patients had normal BMD, 49.0% osteopenia, and 10.2% osteoporosis. The decreasing of the level of 25-(OH)-vitamin D leads to declining the *T*-score of densitometry ($r=-0.125$, $P<0.05$) and, accordingly, the improvement of osteopenic syndrome.
Conclusions: Patients of aged group 50–69 years are most susceptible to deficiency and insufficiency of vitamin D. The decreasing of the level of 25-(OH)-vitamin D leads to improvement of osteopenic syndrome.
Disclosure of Interest: None Declared

P110
NO SUITABLE METHOD IS AVAILABLE FOR DIAGNOSIS OF WOMAN OSTEOPOROSIS BUT LIMITED DXA

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Aims: Searching new tools on woman osteoporosis diagnosis.
Methods: A review in a worldwide basis on state of the art problem is performed.
Results: Despite many years of experience, no suitable method is available for diagnosis of woman osteoporosis but DXA, which due to poor correlation involving visible symptoms and treatment creates a constant need for new research and refinement of our methods and therapy. These circumstances warrant such new measures. The main limitation for a proper inference from DXA is that only 2Dinformation is got from detectors, and therefore all 3D information is lost, as it is integrated out due to the nature of detector. It is very difficult to make good inference of the bone strength. But there are anisotropic problems too, and therefore we will make different inferences. Therefore it is deduced, that this method seems to be very sensitive to error, and it is necessary to know how to deal with these errors. Risk factors are to be considered but these conditions are not one disease and does not mean the issue. With and without risk factors there are and there are not fractures. With and without good bone mass there are and there are not fractures.
Conclusions: A mathematical, physical and physiological 5-dimensional model must be developed in order to gauge bone properties including geometry (2D DXA), space, time, motion and stress. After getting that it would be needed to determine a normal cut-off of bone strength.
Disclosure of Interest: None Declared

P111
COMPARISON OF THE OSTEOGENIC INDEX OF DIFFERENT THERAPEUTIC EXERCISES BETWEEN STROKE PATIENTS AND HEALTHY OLDER ADULTS

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Aims: The aim of the study was to compare the osteogenic index of selected exercises between stroke patients and healthy subjects.
Methods: 61 stroke subjects and thirty healthy subjects participated in this study. Each subject performed six exercises in random order: walking with self-selected speed ($WALK_{self}$), walking with maximal speed ($WALK_{max}$), stepping onto a 4-in.riser (STEP), sit-to-stand (STS), jumping (JUMP) and marching (MARCH). The peak ground reaction force (GRF) on the hemiparetic side (stroke subjects), and the non-dominant side (control subjects) were measured. The number of loading cycles achieved during a 1-minute period was recorded for each exercise. The osteogenic index (OI) was computed by the formula: $\mathrm{OI} = \mathrm{Peak\,GRF}/(\mathrm{body\,weight})\,\mathrm{In}(\mathrm{number\,of\,loading\,cycles} + 1)$.
Results: The control group had significantly higher OI than the control group in all six exercises ($p<0.05$). STEP had significantly higher OI than other exercises in stroke subjects ($p<0.001$). Both STEP and JUMP had significantly higher OI than other exercises in control subjects ($p<0.001$).
Conclusions: The OI differed depending on the exercises selected and the diagnostic group. The whether stepping/

jumping exercises may improve bone health in these groups will require further investigations.

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Disclosure of Interest: None Declared

P112

SIZE CORRECTED BONE MINERAL MEASURES OF CHILDREN WITH GROWTH HORMONE DEFICIENCY (GHD) AND EFFECT OF ONE YEAR GROWTH HORMONE (GH) REPLACEMENT

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Aims: GHD has frequently perceived to be a cause of low bone mass accrual. The confounding effects of poor growth limit the interpretation of prior studies of bone health in GHD. The objective of this study was to assess whole body (WB) bone measures corrected for size and relation of WB bone mineral content (BMC) with lean body mass (LBM) in children suffering from GHD at baseline as well as after 1 year of GH replacement.

Methods: WB BMC, WB Bone area (BA), and LBM were measured in 31 GHD children (aged 5–12 years) and 75 controls (aged 4–12 years) by using DXA. Multiple linear regression model used calculate size adjusted WB BA and WB BMC using control population. Muscle and bone relationship was studied by first assessing LBM for height and then determining WB BMC for LBM. All values were converted to *Z* score and compared with control. *Z*-Score value −2 SD was chosen to represent the cut-off between normal and abnormal.

Results: At diagnosis size corrected WB BMC was not significantly different from control whereas size adjusted WB BA (−0.55±1.15, $p<0.02$), and LBM SDS (−0.57± 1.75, $p<0.04$) was significantly reduced compared to control, although all the values were within the normal range. One year GH replacement resulted in significant increase in WB BA, LBM for Ht and WB BMC for LBM SDS ($p<0.01$, 0.0001, & 0.03) compared to baseline but size corrected WB BMC SDS was not significantly different from baseline.

Conclusions: Our results demonstrate that size corrected WB BMC of GHD children was within normal range and did not increase significantly during GH therapy. Growth hormone may primarily act on other functional determinants of bone strength like muscle strength, bone size, geometry, and turnover rather than on the density of the bone.

Disclosure of Interest: None Declared

P113

CASE CONTROL STUDY OF OSTEOPOROTIC HIP FRACTURES IN INDIA

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Aims: To study the bone parameters of men and women with Osteoporotic hip fractures and associated factors contributing to fractures**.**

Methods: A total number of 146 subjects (73 males and 73 females) with hip fractures following trivial injury in the age group of 40–70 were recruited for the study along with age, sex and socio economic background matched subjects as controls with out past history of fractures were recruited. Subjects on medication or with chronic diseases that might affect BMD were excluded. Demographic particulars including family history of fractures and personal habits such as smoking, alcohol consumption, physical activity, social status, parity and menopause were recorded. Clinical examination, DXA scanning for BMD, Anthropometric measurements, Biochemical parameters related bone metabolism were also done for all subjects and the data were analyzed with the statistical package SPSS (Windows version 14.0).

Results: The mean age of male subjects was 59.1 years while the mean age for females was 63.6 years. Similarly, the mean BMI in males was 18 as compared to 19 in female subjects with fractures. The BMD of both genders at the hip was significantly lower in cases than the controls ($P<0.001$). DXA scan findings at hip showed significant differences in the prevalence of osteoporosis in subjects with fractures compared to controls. (36% vs. 6% in males and 74% vs. 52% in females, $P<0.001$). Similarly the values at femur neck for cases and control were 51% vs. 19% in males and 76% vs. 41% in females respectively ($P<0.001$). At spine though the prevalence of osteoporosis was high in both cases and controls it was not significantly different. The vitamin D levels were significantly (14.4±11 vs. 33.8±9.1 ng/ml, $P<0.001$) lower in the cases with fractures than the controls. There was a trend for higher PTH concentrations in the cases as compared to controls (56.9±54.4 vs. 37.6±26.2, $p=0.08$).

Conclusions: This study shows that fractures occurred 10 years earlier compared to western populations and confirms that low BMI as a strong risk factor for osteoporosis. Prevalence of osteoporosis is significantly high in cases compared to controls.
Acknowledgements: Director, National Institute of Nutrition
Disclosure of Interest: None Declared

P114
PREDICTION PROXIMAL FEMORAL FRACTURE FORCE AND PROFILE USING FINITE ELEMENT SIMULATION

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Aims: In the present work, a finite element model coupled to quasi-brittle damage is developed in order to predict the force-displacement curve and the profile of the fractured area of proximal femur under excessive load. The motivation of this work was to propose a precise model that can predict maximal force at fracture and fracture pattern of the proximal femur more accurately than the previous models.
Methods: A damage law which distinguishes between difference in damage growth in tension and compression is proposed based on experimental results. When the damage parameter reaches a critical value inside an element, the element mechanical contribution to the stiffness matrix is set to zero leading to the redistribution of the stress state in the crack tip. Once a crack is initiated the propagation direction is simulated by the propagation of the broken elements of the mesh.
Results: To illustrate the potential of the proposed approach, the left femur of a male (age 61) previously investigated by Keyak and Falkinstein, 2003 (Model B: male, age 61) was simulated till complete fracture under one-legged stance load. The proposed damaged model leads to more precise results concerning the shape of the force-displacement curve (yielding and fracturing) and the profile of the fractured edge.
Conclusions: The proposed damage law model based on both experimental observation leads to more precise results concerning the shape of the curve (yielding and fracturing) and the profile of the fractured edge than obtained by Keyak and Falkinstein, 2003.
References: Keyak JH and Falkinstein Y. Medical Engineering & Physics 2003;25:781
Acknowledgements: This work has been supported by French National Research Agency (ANR) through TecSan program (Project MoDos, n°ANR-09-TECS-018).
Disclosure of Interest: None Declared

P115
MINERAL DENSITY OF PEDIATRIC THALASSEMIC PATIENTS PRIOR TO ALLOGENIC HEMATOPOIETIC STEM CELL TRANSPLANTATION

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Aims: ß-thalassemia major is a hemoglobin disorder that effects bone negatively. It is curable by hematopoietic stem cell transplantation (HSCT) that by itself can deteriorate bone status. We assessed the prevalence of low bone mass in pediatric thalassemic patients before HSCT.
Methods: BMD of 26 pediatric thalassemic patient, from three classes of disease (mean age: 7.5±3.6), tested before HSCT with a Norland XR-46 device. Female to male ratio was 10/16.
Results: No patient had *Z*-score less than −2. Age had positive effect on BMD of femur and spine (*P*-values=0.00 and 0.00, respectively) and negative effect on *Z*-score of spine (*P*-value=0.001). Female sex had positive effect on *Z*-score of spine (*P*-value=0.011). Being class 3 thalassemic patient, had no negative effect on BMD and *Z*-score of patients.
Conclusions: "Low BMD for age" is not common in Iranian pediatric thalassemic patients prior HSCT.
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Disclosure of Interest: None Declared

P116
MODELING OF PEDIATRIC SPINE BMD WITH CONSIDERATION OF ANTHROPOMETRIC PARAMETERS

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Aims: Previous descriptions of children's areal BMD (aBMD) assessed by DXA relative to age have focused on segmenting diverse populations by race and gender, without adjusting for anthropometric variables, or have included the effects of anthropometric variables over a relatively homogeneous population. The aim of our study is to create model distributions for aBMD in normal children and adolescents, taking into account the relevant anthropometric parameters that prove to have an influence on aBMD.

Methods: The BMD in Childhood Study is a prospective, longitudinal study of healthy children ages 6–20 years, who were followed yearly over 6 years[1]. The data set included 987 boys and 902 girls with a total of 7,655 observations. We evaluated the contribution of gender, race, age, height, weight, percent body fat and sexual maturity to variations in aBMD values. Due to the relatively small number of data points when subgroups by age, gender, race, weight, etc., were considered, a smoothing approach was required. An additional concern was the mutual dependency of variables, for which smoothing of one parameter might result in undesired smoothing of another parameter. We transformed the given variable space first into an orthogonal space of independent variables. We then applied smoothing to these orthogonal variables and back transformed them into the original space. The decision to include a variable in the final model was determined by performing *F* tests comparing models containing the variable with models excluding the variable.

Results: We found that (1) an age/gender/race (black/non black) model provides a root mean square error (RMSE) of 0.1029 g/cm^2, similar to that of a previous publication[1]; (2) omitting race and adding weight and percent body fat improves the model's RMSE to 0.0862 g/cm^2; (3) replacing weight by height worsens the RMSE by 15% to 0.0989 g/cm^2; (4) male and female sexual maturity indicators with weight, height and percent body fat in the model improve the RMSE only by 0.001 g/cm^2; and (5) with height but not weight in the model, the sexual maturity indicators improve the RMSE by 0.006 g/cm^2. By balancing high adjusted R^2 values and low mean square errors with clinical needs, a model using age, gender, race, weight and percent body fat is proposed. However, a practical model with easily measured parameters, which include age, gender, race, weight and height, represents an alternative model, worsening the RMSE slightly by 0.005 g/cm^2.

Conclusions: The proposed models provide narrower distributions and slight shifts of aBMD values compared to the traditional model, which includes only age, gender and race. Thus, these models might constitute a better comparative standard for a specific child with given anthropometric values and should be less dependent on the anthropometric characteristics of the cohort used to devise the models.

References: [1]Kalkwarf H et al., J Clin Endocrinol Metab 2007;92:2087

Disclosure of Interest: None Declared

P117
BONE MINERAL DENSITY IN FEMALE PROFESSIONAL ATHLETES

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Aims: The present study was designed to assess the effect of weight-bearing and non-weight-bearing exercises on the BMD values of a group of female professional athletes.

Methods: The case control study was conducted on 59 healthy female athletes aged between 20 and 30 years who were a member of the country's national teams in the past 3 years. They were involved in weight-bearing (soccer and golf) and nonweight bearing (swimming and rowing) exercises. The BMD values of the L1–L4 anteroposterior lumbar spine and femoral subregions were recorded using a DXA bone densitometer and compared to that of a group of age and sex-matched nonathletes.

Results: Mean BMD values at all the studied sites were highest among the footballers and lowest among the golf players. Except for the spine, post hoc analysis revealed a significant difference between the BMD values at all the studied sites. As for spine, a significant difference was only seen in the BMD values of the footballers and that of golf players. There was no significant difference between the BMD values of the controls and those involved in either weight bearing or nonweight bearing exercises. Between groups, there was a significant difference in the values reported at different sites (Table).

Table—BMD values at different sites based on the exercises in which the athletes were involved.

BMD	Swimming	Rowing	Golf players	Footballer	*P*-value*
Femoral Neck	0.93±0.13	1.01±0.13	0.91±0.12¥	1.06±0.13¥	0.008
Femoral Trochanter	0.75±0.71¥	0.80±0.12	0.73±0.13§	0.89±0.09¥§	0.001
Total Hip	0.94±0.09¥	1.00±0.13	0.93±0.14§	1.07±0.10¥§	0.006
Spine L1-4	1.16±0.13	1.16±0.12	1.11±0.11¥	1.26±0.15¥	0.035

* Analysis of Variances (ANOVA)
¥, §: significant at *p*-values < 0.05, Tukey post hoc test

Conclusions: The considerable difference noted in BMD values at different sites in footballers and golf players points out the great influence of weight bearing exercises on the bone structure. The bones' response to exercises is site-specific. High-impact weight bearing exercises stressing bones in a variety of directions are more effective in improving BMD values. Athletes involved in nonweight bearing exercises, therefore, should keep an eye on their BMD values and do certain weight bearing exercises to strengthen their bones.
Disclosure of Interest: None Declared

P118
BODY WEIGHT AND SERUM CALCIUM LEVEL DETERMINE THE BONE MINERAL DENSITY VARIATIONS AMONG HEALTHY SRI LANKAN PRE-SCHOOL CHILDREN

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Aims: BMD values and the factors that contribute to bone accrual during early period of growth are poorly documented in Sri Lanka.
Methods: We measured the BMD and content (BMC) of spine and hip using DXA (Hologic Discovery) in a representative sample of preschool children (n=105) in Southern Sri Lanka and studied their anthropometry and micronutrient status (iron, zinc, calcium, ceruloplasmin, free thyroxin, vitamin A and vitamin D) in order to study the associations of such measurements with bone mineral status.
Results: Mean (SD) spine BMDs of boys and girls were 0.451 (0.052) and 0.447 (0.051) g/cm^2, respectively (p=0.70). Boys had significantly higher bone area compared to girls (mean 25.58 vs. 24.05 cm^2, p=0.02). There were significant differences in BMDs of femur, trochanter and intertrochanteric area, with boys having higher values compared to girls but no significant difference in total spine Z-score (p=0.54). The mean Z-score of males and females were −0.65 and −0.54, respectively. The total spine BMD showed significant correlations with weight-for-age (r=0.47; p<0.001), height-for-age (r=0.39; p<0.001) and weight-for-height (r=0.34; p=0.02) Z-scores. Total spine BMC also showed significant correlations with weight-for-age (r=0.53; p<0.001), height-for-age (r=0.46; p<0.001) and weight-for-height (r=0.33; p<0.001). After controlling for other independent variables studied (anthropometry and biochemical), weight and serum calcium accounted for 26% of the BMD variation (r^2=0.26; p<0.001). One unit change in body weight (1 kg) or serum calcium (1 mmol/l) was associated with change in spine BMD by 0.510 g/cm^2 or 0.160 g/cm^2, respectively. When the cutoff value of 11.5 g/dl for hemoglobin was used to define anemia, 50% of subjects (n=53) were found to be anemic (26 boys and 27 girls). The serum calcium levels of the anemic children were significantly lower when compared with non-anemic children; serum calcium values were 1.12 (0.3) and 1.24 (0.2) mmol/l, respectively (p=0.04). There were no significant correlations between DXA measurements and hemoglobin or other serum estimations. The BMD/ BMC and bone area positively correlated with age.
Conclusions: Anthropometric measurements and serum calcium determined BMD and BMC accrual in this group of children. Low serum calcium is probably related to inadequate dietary intake as children with low serum calcium were also anemic.
Disclosure of Interest: None Declared

P119
PERSISTENT LOW BONE MASS IN ADOLESCENT GIRLS WITH IDIOPATHIC SCOLIOSIS—A 4 YEAR PROSPECTIVE LONGITUDINAL STUDY BEYOND SKELETAL MATURITY

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Aims: Adolescent idiopathic scoliosis (AIS) is a spinal deformity with unknown cause, which mainly affects girls in peripubertal period. Previous study demonstrated that about 30% AIS girls had lower bone mass (DXA Z-score≤−1) at the time of diagnosis. Does low bone mass in AIS girls still occur when they reached skeletal maturity or even peak bone mass? The aims of this longitudinal study are (1) to investigate whether low bone mass persists until maturity in AIS girls and (2) to compare the bone accretion rate between AIS with low bone mass and normal bone mass.
Methods: 366 AIS girls with aged 11–16 and 276 age-and sex-matched normal control were recruited. At baseline, bilateral hips BMD were measured by DXA in both AIS and control group. Body weight, standing height, armspan and year since menarche (YSM) were recorded in all cases, while the degree of spinal curvature (Cobb angle) was measured from a standard X-ray in AIS patients. Full set of assessment was repeated in AIS patients at the time when skeletal maturity is reached. All the BMD data were adjusted with age and YSM. Low bone mass was defined as adjusted Z-score BMD≤−1SD. AIS patients were sub-classified into persistent low bone mass AIS group (adjusted Z-score BMD≤−1 at both baseline and maturity) and normal bone mass AIS group (adjusted Z-

score BMD>−1 at both baseline and maturity) for analysis. Independent *t*-test and repeated measures ANOVA were used.
Results: At baseline, 35.8% (131/366) AIS girls had lower bone mass than those of the control. Within those 131 AIS with low bone mass, 97 of them had persistent low bone mass at maturity. The average Cobb angles for all AIS patients at baseline and maturity are 31.2° and 38.9°, respectively. In generally, persistent low bone mass AIS group (n=97) had lower body weight and BMI, shorter armspan and delayed onset of menarche at baseline as well as at maturity than that of normal bone mass AIS group (n=204), however, the differences did not reach statistical significant (all, $p>0.05$). Repeated measures analysis showed a significant difference between groups over time in BMD ($F_{(1, 298)}=12.76$, $p<0.01$).
Conclusions: This is the first prospective study to monitor the changes of BMD in AIS girls from the time of diagnosis to skeletal maturity. Our results indicated that persistent low bone mass manifested in 27% (97/366) of AIS girls at skeletal maturity. Rate of bone accretion was slower in AIS with persistent low bone mass. Suboptimal BMD at skeletal maturity (in this study, age 17) is likely to develop a significant lower peak bone mass in adulthood. Therefore, to identify AIS girl who are at risk of low bone mass is of great clinical interests.
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Disclosure of Interest: V. Hung: None Declared, T.-P. Lam: None Declared, L. Qin Grant/Research Support from: Research Grant Council - The Government of Hong Kong SAR, B. Ng: None Declared, H.-Y. Yeung Grant/Research Support from: Research Grant Council - The Government of Hong Kong SAR, J. Cheng Grant/Research Support from: Research Grant Council - The Government of Hong Kong SAR

P120
BONE MASS DENSITY (BMD) DURING AND AFTER LONGTIME TREATMENT WITH STRONTIUM-RANELATE

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Aims: Bone densitometry with DXA cannot be used to monitor changes in bone calcium and bone mass during and after treatment with Strontium-ranelate (SrR), because replacement of 1 mol% of Ca in bone with Sr causes an "overestimation" of BMD that average 10% due to the higher atomic number of Sr than Ca.[1,2,3] The aim is to show the influence of the Sr bone content on BMD after long time treatment with SrR.
Methods: After 5 years treatment with either placebo or 2 g SrR/day, 32 osteoporotic females (mean age 80 years, SD 5 years) volunteered to participate in a 3 years prolonged study with active SrR-treatment. Relative content of Sr in ultra distal (UD) radius by DPA[2] as well as BMD by DXA were measured simultaneous every 6 months at the same measuring site. After termination of active SrR treatment, 26 participants were measured again after 3 and 6 months.
Results: The relative content of Sr during the treatment follows a power function, while the BMD corrected for influence of Sr with 10% per% bone Sr-content decreased during the study like in placebo treated patients[3]. After treatment, the decline in Sr-content follows the power function model with the parameters calculated during treatment, and this supports the assumption that the change in BMD is caused exclusively by change in Sr-content.
Relative Sr content in UD radius measured by DPA, and the influence of bone strontium content on BMD shown as correction factors for DXA-measured BMD at the termination of SrR-treatment, and the relative retention of Sr 3 and 6 months after termination of treatment are shown in the table.

Duration of treatment	n	Relative Sr content (SD) in UD radius measured by DPA	Corresponding correction factors for BMD measured by DXA
3–4 years	15	0.63 (0.39)%Sr	$1/(1+10*0.0063)=0.941$
7–8 years	11	1.13 (0.54)% Sr	$1/(1+10*0.00113)=0.898$
Months after stop of treatment	n	Retention of Sr (SD) in UD radius relative to Sr content at treatment stop measured by DPA	Corresponding relative retention of Sr (SD) calculated from BMD measured by DXA if changes only caused by changes in Sr
3	25	0.73(0.16)	0.783(0.061)
6	24	0.67(0.16)	0.664(0.076)

$p<0{,}01$ for 3–4 years of treatment group vs. 7–8 years of treatment group (student test)

Conclusions: Sr retention in bones influences BMD measurements during SrR-treatment and several years after SrR-treatment termination, and it is impossible to make individual corrections of BMD due to unknown individual relative bone Sr content.
References: 1) Christoffersen J et al., Bone 1997;20:47; 2) Pors Nielsen S et al., J Clin Densit 2004;7:262; 3) Bärenholdt O et al. Bone 2009;45:200
Disclosure of Interest: N. Kolthoff Other: Former co-investigator in Servier international multicentre trials, O. Bärenholdt Other: Former co-investigator in Servier international multicentre trials

P121
EFFECT OF EXERCISE PROGRAM ON LUMBAR BONE MINERAL DENSITY IN POSTMENOPAUSAL WOMEN

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Aims: The purpose of this study was to investigate the effect of exercise program on lumbar BMD.
Methods: The study was carried out on 34 postmenopausal women with clearly criteria inclusion in the study. The height, weight, and waist circumference was measured pre and post exercise. Women in the age range of 47–75 years were included in the study. All participants had medical examinations, completed questionnaires regarding medical history and BMD measurement of the lumbar spine before and after exercise program. They was subjected to a structured exercise program three times a week, using a variety of exercise that challenge all major muscle.
Results: The average age of the subjects studied was 64.3 years. The mean BMD of the lumbar spine and hip prior to exercise was −2.42 g/cm^2, with range −4.79 g/cm^2 and −0.6 g/cm^2. Post exercise the mean BMD was −2.10 g/cm^2 (range −3.9 g/cm^2 and 1.2 g/cm^2) with statistical significance of p-value < 0.001.
Conclusions: A regular exercise program three times a week using a variety of exercise has been shown to significantly increase BMD even in postmenopausal women. This study provides further evidence that exercise plays an important role in bone mineral formation.
Disclosure of Interest: None Declared

P122
QUANTITATIVE ULTRASOUND FOR DETECTION OF DERANGED BONE QUALITY AND BONE DENSITY AND PROGNOSTICATION OF CURVE PROGRESSION IN ADOLESCENT IDIOPATHIC SCOLIOSIS (AIS)—A PROSPECTIVE COHORT STUDY TILL SKELETAL MATURITY

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Aims: AIS is a complex three-dimensional spinal deformity associated with low bone mass. It has a prevalence of 2–3% affecting mainly children 10–16 years old. The main challenge in managing AIS is to predict which curve will progress so that appropriate treatment can be prescribed. Previous investigation showed that low bone mass, as measured by DXA, was one of the adverse prognostic factors for AIS. Quantitative ultrasound (QUS) can be used to assess both bone density and bone quality. The objective of this study was to evaluate the use of QUS in adolescent AIS subjects as a radiation-free modality for predicting curve progression in AIS.
Methods: 294 AIS girls were recruited at 11–16 years old and followed till skeletal maturity. 269 age-matched healthy girls were recruited as controls for providing the normal reference values for derivation of Z-score of QUS parameters. QUS measurements, namely BUA (Broadband Ultrasound Attenuation), VOS (Velocity of Sound) and SI (Stiffness Index) of the calcaneum, BMD of femoral neck, menarche history, ages and Cobb angle of the major curve were recorded at baseline as independent variables. Curve progression was defined as an increase of Cobb angle >5° (the predictive outcome). Forward stepwise selection with the logistic regression model and the ROC Curve were used for statistical analysis.
Results: At baseline, the mean age was 13.4 years old (SD=1.23), 73(24.8%) were premenarchal and the mean Cobb angle was 26.3° (SD=8.2). Z-score of BUA, VOS and SI were ≤0 in 202 (68.7%), 194 (66%) and 202 (68.7%) of AIS subjects, respectively. The average follow up was 3.4 years (SD=1.57). Initial univariate analysis indicated all independent variables had p-values < 0.2. Logistic regression analysis indicated the p-values of their regression coefficients were: age (p<0.001), menarchal status (p<0.001), Cobb angle (p=0.008), BMD (p=0.084), BUA (p=0.722), VOS (p=0.112) and SI (p=0.027). SI, age, menarchal status and Cobb angle were therefore included in the final prediction model. The adjusted odds ratio for Z-score of SI≤0 was 2.00 (95% CI: 1.08–3.71). The area under the ROC curve was 0.831 (95% CI: 0.785–0.877). The predictive model had a sensitivity of 0.847 and a specificity of 0.665 at a probability cutoff of 0.368.
Conclusions: QUS measurements indicated the presence of deranged bone density and bone quality in AIS subjects. SI is an independent and significant prognostic factor for AIS and can be used as a radiation-free parameter for predicting

curve progression in combination with initial Cobb angle, age, and menarchal status.

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P123

MALE OSTEOPOROSIS IN ASIA: IS IT TOO LATE FOR THE METROPOLITAN MEN?

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Aims: This retrospective study aims to characterize the demographics, risk factors and to evaluate the suitability of FRAX® scoring in all male patients presenting with fracture neck of femur (NOF) in 2 years.

Methods: The medical records of all male patients presenting with fracture NOF during Jan 08 to Dec 09 were scrutinized for demographics, risk factors, BMD measurements and FRAX® scoring. The Hong Kong Chinese FRAX® calculator was used for Chinese and Malays, whilst the US Asian calculator was used for Indians.

Results: 450 male patients were admitted with fracture NOF over 2 years. The mean age was 71(±16) and BMI 22(±3.6). Only 18% (80/450) had sustained a major trauma. The mean FRAX® for major osteoporotic 10-years fracture risk was 7.8% and 10-yr hip fracture risk was 4.7% (calculated in 178 patients). In a subgroup of 38 Chinese patients, the FRAX® calculated *T*-score was higher compared to the adjusted *T*-score with the reference Chinese male population (Table 1). The risk was higher by 6% (6.4% vs. 12.4%, paired *t*-test $p<0.001$) if the population adjusted *T*-scores are used in the calculation when compared to the total hip BMD measurements. 84% (309/370) of all fragility fracture patients, suffered from a chronic condition leading to increased fall risk. 3% (14/450) died during the admission for the fracture.

Table 1: Demographics and FRAX scoring in male patients with fracture neck of femur

		ALL
Total no		450
Fragility #		370 (82%)
Mean age		71±16
Mean BMI (no. of pts info available)		22.0±3.6 (200 pts)
Mean BMD (no. of pts info available)		0.70±0.13 (67 pts)
Mean local BMD *T*-score (no of pts)		−3.08±1.04 (38 pts)
Mean FRAX calculated *T*-score		−1.59±1.11
Mean FRAX risk of major #	Total Hip BMD	6.44%±3.51
	Local *T*-score	12.41%±7.34
Mean FRAX risk of hip #	Total Hip BMD	3.42%±3.11
	Local *T*-score	8.55%±7.04

Local *T* score: Calculated *T* score when adjusted with the reference local Chinese male population

Conclusions: Since increased fall risk accounts for a significant number of fragility fractures, early screening and prophylaxis for osteoporosis should be considered in these high risk individuals. In our population FRAX® scoring may be more useful if the population adjusted *T*-score is used in the FRAX® calculator instead of absolute BMD measurements. Large-scale population studies are needed to clarify this further.

Disclosure of Interest: None Declared

P124

PREDICTION OF THE YOUNG'S MODULUS OF CANCELLOUS BONE STEREOLITHOGRAPHY REPLICAS FROM A COMBINATION OF ULTRASOUND VELOCITY AND BUA

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Aims: To determine in spatially magnified replica models of cancellous bone exhibiting three different material Young's modulus values, a) the validity of the fundamental relationship relating elastic modulus (E) with ultrasound velocity (v) and apparent density (ρ), and b) the validity of replacing density by broadband ultrasound attenuation (BUA).

Methods: μCT scans of four human natural tissue cancellous bone samples from calcaneus, iliac crest, femoral head and lumbar spine were converted into 15× magnified replica models using stereolithography resins exhibiting three material Young's modulus values (317 MPa, 2,040 MPa,

and 9,650 MPa, respectively). The experimental system consisted of a) two bespoke ultrasound transducers with a centre frequency of 100 kHz and 35 mm element diameter, aligned co-axially with one acting as transmitter, the other as receiver; b) a 400 V spike generator and c) a 14-bit digitiser card operating at 20 MHz. Measurements of ultrasound velocity were performed using the substitution technique. BUA measurements were performed over a frequency range of 50–150 kHz, chosen to exhibit spatial matching between voxel size and ultrasound wavelength in the magnified replica models with conventional clinical measurements performed over a 200 kHz to 600 kHz frequency range at the human calcaneus. The Young's modulus (YM) of the porous framework was calculated using finite element analysis. All assessments were performed in the four cancellous bone structures, in each of the three resins, and in each of the three orthogonal directions.

Results: By re-arranging the fundamental velocity equation, $v = \sqrt{(E/\rho)}$, an ultrasound elasticity parameter defined as $v^2.\rho$ may be created. Coefficients of Determination (R^2%) for the prediction of Young's modulus of 88.2%, 92.7% and 94.1% were obtained for the three resins, respectively; when pooled, an R^2% of 90.9% was obtained. When apparent density was replaced by BUA, such that $YM = v^2.BUA$, individual resin R^2% values for the prediction of Young's modulus of 82.3%, 94.2% and 78.6% were obtained; with a pooled R^2% value of 83.2%.

Conclusions: We have successfully validated the concept of deriving an Ultrasound Elasticity parameter for prediction of the Young's modulus of cancellous bone using a combination of velocity and BUA.

Disclosure of Interest: None Declared

P125

THE CORTICAL CHANGE OF PROXIMAL FEMUR IN THE ELDERLY AND CLINICAL SIGNIFICANCE

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Aims: To study the cortical change of proximal femur in the elderly and its clinical significance.

Methods: 61 patients admitted for primary hip arthroplasty were divided into two groups. There were 23 patients aged below 60 years old in group 1 and 38 patients aged in the 60 year old or above in group 2. There were three patients with the fracture of femoral neck in group 1 and 19 in group 2. The proximal femur was examined with CT scan. The parameters were defined from the CT films taken at T_{20} (the neck at 20 mm higher than the apex of lesser trochanter), T_0 (the level of the apex of lesser trochanter) and N level (the level of femoral isthmus). The parameters included the long and wide dimensions of the neck and marrow cavity, cortex thickness on long and wide dimensions and medial cortex at T_{20} level; included the long and wide dimensions of the intertrochanter region and marrow cavity and the cortex thickness on long and wide dimensions at T_0 Level and included the long and wide dimensions of the femoral isthmus and marrow cavity and the cortex thickness on long and wide dimensions at N level.

Results: The wide dimension of marrow cavity was larger and cortex on the wide dimension was thinner at T_{20} level in group 2 than in group 1($P<0.05$).The long dimension of marrow cavity was larger and cortex was thinner at N level in group 2 than in group 1($P<0.05$).There was not significant difference at T_0 level between group 2 and group 1. It suggested that the antero-posterior cortex became thinner earlier than the medial cortex in the femoral neck. The cortex was thinned and marrow cavity was enlarged in the proximal femur of the patients aged 60 years or above.

Conclusions: Cortical thinning and loss of trabecular bone are important for bone fragility. Fracture occurs when applied loads produce stresses which exceed bone strength. The peak trabecular stresses occurred within the primary compressive system of trabeculae and the peak cortical stresses within the inferomedial neck during all phases of gait. During impact from a fall, large compressive stresses were developed in the region of the superior-posterior neck and posterior trochanteric region, the peak magnitude being 4.3 times that present during gait [1]. In our series, there were more patients with fracture of femoral neck in group 2 than in group 1. The fracture of femoral neck was spiral and marked by comminution of the posterior/superior cortex. It suggested bone strength of femoral neck decreased by the antero-posterior thinned cortex might be an important factor of fracture during a fall.

References: [1] Lotz JC et al., Osteoporos Int 1995;5:252

Disclosure of Interest: None Declared

P126

CROSS-CALIBRATION BETWEEN THREE DXA SYSTEMS: GE-LUNAR DPX-L, NORLAND XR-46 AND HOLOGIC DISCOVERY WI

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Aims: One of the challenges of clinical densitometry is the inability to compare BMD values obtained on different densitometers. The 2007 ISCD guidelines recommends that cross calibration be performed to compare BMD results

followed up on different DXA systems. Shepherd et al. (1) have derived a generalized equation for the least significant change (GLSC) for patient's BMD followed up on different DXA systems. The same authors have also shown that a substantial loss in sensitivity to change occurs even when comparing scans taken on different scanners using similar technology (2). The aim of this study was to perform a cross calibration between three different models of DXA scanners; two pencil beam DXA; GE Lunar DPX-L and Norland XR-46 and a fan beam DXA; Hologic Discovery Wi, to establish the GLSC.

Methods: 30 normal healthy females aged 24–56 years (mean age 37.13±10.07 years) were recruited. Each subject had lumbar spine and left femoral neck BMD measured once on the Lunar and Norland, and twice with repositioning on the Hologic, within 30 days.

Results: BMD values measured on the Hologic was highly correlated to the GE-Lunar DPX-L (r=0.98 for lumbar spine and femoral neck) and Norland XR-46 (r=0.99 for lumbar spine and r=0.95 for femoral neck). When the baseline and follow-up measurements are taken on the same DXA system, the least significant change (LSC)=2.77 * Precision error. Table 1 shows the LSC on the three DXA systems.

Table 1. LSC on the three DXA systems.

	Lumbar spine	Femoral neck
GE Lunar DPX-L	2.5%	3.9%
Norland XR-46	2.8%	5.5%
Hologic Discovery Wi	2.4%	2.0%

The GLSC was calculated using the cross calibration tool available on the ISCD website. The GLSC between Lunar and Hologic was 4.5% for the spine and 8.3% for the femoral neck. The GLSC between Norland and Hologic was 5.4% for the spine and 9.2% for the femoral neck. The GLSC was 1.8 (spine) to 2.1 (hip) times larger than the LSC when comparing scans between the GE Lunar DPX-L and Hologic Discovery Wi. The GLSC was between 1.7 and 1.9 times larger than the LSC when comparing scans between the Norland XR-46 and the Hologic Discovery Wi.

Conclusions: From this study, we found that the GLSC was larger than the LSC and the largest GLSC was seen when comparing femoral neck scans done on the GE Lunar DPX-L and Hologic Discovery Wi. Hence the GLSC must be used when comparing scans on different DXA systems in order to be 95% confident that a true change in BMD has occurred.

References: 1. Shepherd JA and Lu Y, J Clin Densitom 2007;10:249; 2. Shepherd JA et al., J Clin Densitom 2008;11:237

Disclosure of Interest: None Declared

P127

HIP GEOMETRY IN SINGAPOREAN WOMEN WITH HIP FRACTURES

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Aims: A new application for DXA using the Hip Structural Analysis (HSA) software allows for the geometric measurements of the proximal femur. In a previous study, we found that Chinese women had a longer hip axis length and lower femoral neck BMD. Cortical thickness and bone width are also important risk factors for hip fractures. The aim of this study was to investigate the hip geometry in the contralateral hip in Singaporean women with hip fractures compared to non fractured controls, and to compare any differences among the three major races.

Methods: We reviewed all patients aged 50 years and above who had a DXA performed on the Hologic Discovery Wi between January 2007 and December 2009. The group was divided into two groups: women who had an osteoporotic hip fracture and women with no history of fractures. We excluded those cases with no hip scans or poor scan image of the hip. The final group consisted of 381 women with hip fractures (mean age 76.92±8.8) and 766 women (mean age 65.86±5.9) with no fractures. Among the fracture patients, 291 (76.4%) were Chinese, 41 (10.8%) Malays and 43 (11.3%) Indians. The HSA software generates profiles of pixel values at the three points in the proximal femur: narrow neck (NN), intertrochanter (IT), and femoral shaft (FS). The Cross Sectional Area (CSA) is an index of resistance to axial compressive loads while the Section Modulus (SM) reflects the bending strength. The Buckling Ratio (BR), defined as the ratio of the outer radius to the cortical thickness, is a measure of the cortical bone instability. Differences in baseline femur geometry at the three regions of the hip in the fracture and non fracture group, and among the three races were compared using t-tests.

Results: Femoral neck BMD was strongly correlated with NN BR (r=−0.822) and moderately correlated with NN SM (r=0.738). Hence a decline in BMD was associated with an increase in bone instability (BR) and a decrease in bone strength (SM). There was an average increase of 17% per decade in BR in the fracture patients. At the NN, IT and FS regions, the fracture group had significantly lower BMD, less cortical thickness (0.115 cm vs. 0.149 cm) and lower SM and CSA (p<0.001). The fracture patients also had significantly higher BR (16.08 vs. 11.49, p<0.001). There was no difference in hip axis length and neck shaft angle

between the fracture and control group. In the fracture group, Indians had significantly higher femoral neck BMD, CSA and SM and lower BR at both the NN and IT ($p<0.05$) compared to the Chinese and Malays.

Conclusions: Women who fractured their hip had significantly decreased BMD, thinner cortex, lower bone strength and greater bone instability in their contralateral hip compared to controls. This could predispose them to a higher risk of a second hip fracture. The results also suggest some ethnic differences in BMD and hip geometry among the three major races which should be further investigated in future studies.

Disclosure of Interest: None Declared

P128
VALIDATION OF FRAX® IN FRACTURE AND NON FRACTURE SUBJECTS IN SINGAPORE

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Aims: The FRAX® tool was developed for the use in postmenopausal women and men aged 50 years and older with *T*-scores in the osteopenic range, not on treatment and without spine or hip fractures. FRAX® was found to stratify fracture risk more accurately than BMD alone. The FRAX® tool has yet to be widely validated in our local population as current models of FRAX® for fracture probability in South East Asia remain sparse. The aim of this study was to perform a retrospective validation study on the current models of FRAX® and to compare the predictive probability of fracture risk between patients who sustained a first osteoporotic fracture and patients without a history of fracture.

Methods: The study included men and women aged 50 years and above who were referred for DXA scan from January 2009 to July 2010 during their hospital stay. Cases were patients who had a first fragility fracture of the hip, spine, wrist or humerus and had femoral neck BMD performed within 3 months of the incident fracture. Controls were patients referred for DXA scan for further investigation and management of risk factors for fractures. Patients with metabolic bone disorders or on bone specific treatment for more than 3 months were excluded. Applying the inclusion and exclusion criteria, the final group consisted of 131 cases (104 females, 27 males) and 132 controls (108 females, 24 males). Mean age was 76.58± 7.58 for cases and 75.72±7.79 for controls. Clinical data was obtained through interviews and medical records. Using the FRAX® tool, the 10-year probability of a hip fracture or major osteoporotic fracture was computed for each individual, using US-Asian, Hong Kong and China models.

Results: The average 10-year probability of major fracture was consistently higher in the fracture than in the non-fracture group: US-Asian (15.90 vs. 15.49), Hong Kong (18.90 vs. 18.34) and China (4.07 vs. 3.66). The average 10-year probability of hip fracture was also higher in the fracture group: US-Asian (6.69 vs. 6.57), Hong Kong (10.43 vs. 10.07) and China (1.99 vs. 1.77). However, fracture probability varied depending on the FRAX® database used. In the fracture group, the 10-year probability of a major fracture was 4.6 times higher using the Hong Kong model compared to the China model, even though both cohorts were classified as Chinese. Similarly, the 10-year probability of a hip fracture was 5.2 times higher in the Hong Kong model.

Conclusions: Cases were found to have a higher probability of fracture compared to controls. The results show that there were differences in the 10-year probability of fracture using FRAX® models from different population cohorts. In order to increase the sensitivity of FRAX® to detect those at high fracture risk, there is an urgent need to develop our local FRAX® model based on the epidemiological data of fracture and mortality rates in Singapore. Future work should also investigate if ethnic specific data on fracture probability will increase the prognostication ability of FRAX® models.

Disclosure of Interest: None Declared

P129
BONE HEALTH IN HEALTHY INDIAN POPULATION AGED 50 YEARS AND ABOVE

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Aims: BMD is an important determinant of morbidity and mortality in postmenopausal women and elderly males, which is reported to be less in Indians than Western population. However, there is limited information of the bone health status in elderly Indians.

Methods: The study was carried in 1,600 healthy subjects more than 50 years of age residing in Delhi, India. These subjects, who were divided in three groups: Group-1 (50–60 years), Group-2 (61–70 years), and Group-3 (>70 years), underwent anthropometric, biochemical and hormonal evaluation for vitamin D status. BMD was measured by DXA at lumbar spine, hip and distal radius; and by peripheral DXA at forearm and calcaneum.

Results: A total of 792 males and 808 postmenopausal females, with a mean age of 58.0±10.3 years and 57.3± 8.5 year respectively (range 50–90 years) were evaluated for bone mineral health status. Osteoporosis was present in 562 subjects (35.1% in all; M:F::24.6:42.5) and osteopenia in 792 (49.5% in all; M:F::54.3:44.9). There was significant increase in prevalence of osteoporosis with increasing age in females, but not in males. BMD at all sites were positively correlated with BMI except distal radius (r= 0.037, p=0.14). Total body BMD was negatively correlated with serum phosphate (r −0.138, p<0.00001), ALP (r −0.184, p<0.00001) and PTH levels (r −0.099, p< 0.00001), respectively. No significant correlation was observed between serum 25(OH)D levels and BMD at any site. Peripheral DXA measuring BMD at forearm and calcaneous showed strong positive correlation with BMD measured at all sites by central DXA. Peripheral DXA had sensitivity of 88%, specificity of 55% with negative and positive predictive value of 89% and 52%, respectively, at *T*-score −2.5 at peripheral sites compared to central DXA.

Table 1. Prevalence of Osteopenia and Osteoporosis.

Age Groups	Male			Female		
	Osteopenia	Osteoporosis	Normal	Osteopenia	Osteoporosis	Normal
50–60	268 (54.4%)	128 (26.0%)	97 (19.7%)	260 (50.5%)	200 (38.8%)	55(10.7%)
60–70	75 (54.0%)	25 (18.0%)	39 (28.1%)	80 (38.3%)	111 (53.1%)	18 (8.6%)
>70	87 (54.4%)	43 (26.9%)	36 (18.6%)	22 (26.5%)	55 (66.3%)	6 (7.2%)
Total	430 (54.3%)	196 (24.8%)	166 (21.0%)	362 (44.9%)	366 (42.5%)	79 (9.8%)
P-	value	0.123			<0.00001	

Conclusions: Osteoporosis/osteopenia was present in endemic proportions in subjects older than 50 years of age residing in North India. Role of Peripheral DXA as a screening tool for diagnosis of osteoporosis has been highlighted.
Disclosure of Interest: None Declared

P130
BONE REMODELLING STATUS IN PATIENTS WITH MULTIPLE SCLEROSIS

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Aims: One of the major concerns for patients with multiple sclerosis (MS) is developing osteoporosis, especially when corticosteroid treatment is used. The aim of the present study is to compare the bone turn-over markers in patients with multiple sclerosis and healthy control subjects.
Methods: A total of 176 subjects were enrolled in this case-control. Ninety-one MS patients with mean age of 35.26±8.76 years were randomly selected from the Committee on Multiple Sclerosis Registry. The control group was composed of 85 healthy subjects who were recruited from the Iranian Multicenter Osteoporosis Study (IMOS). Fasting serum levels of parathyroid hormone (PTH), 25 (OH)D3, osteocalcin and cross laps were measured in two groups. Hip and spine BMD were measured using DXA.
Results: Our findings showed significant differences in hip BMD and its *T*-score and *Z*-score values between MS patients and the control group. Osteoporosis prevalence at hip area of the MS patients was almost 5 times higher than the control group [OR=4.66, (95% CI 0.97–22.27), RR=4.29, (95% CI 0.95–19.32), p-value=0.03]. No significant difference was found in BMD L2-L4, BMD *T*-score and BMD *Z*-score of lumbar area between two groups. The PTH and cross laps serum concentrations in MS patients were significantly higher than the control group. We did not find significant difference in serum osteocalcin level between the two groups.
Conclusions: We concluded that in our study the serum levels of bone resorption markers in MS patients were significantly higher than the healthy control group. This may explain, at least in part, the elevated susceptibility of MS patients for developing osteoporosis.
Disclosure of Interest: None Declared

P131
COMPARISON OF CALCANEAL BONE DENSITY IN UNDERGROUND VERSUS OVERGROUND MINING LABORS

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Aims: The aim of this study was to assess values of lifestyle and occupational factors including physical activity, job, calcium intake, sun exposure and smoking in mining labors.
Methods: From Oct 2007 to May 2008, 800 males (age between 35 and 55 years) in two equal separate groups, underground and overground mine labors, were evaluated with dual X-ray and laser (DXL) calscan for measurement of calcaneus BMD.
Lifestyle factors including smoking, calcium intake, environmental condition, physical activity, underground and overground job (standing or sitting station) and sun exposure were evaluated by the investigators through a specifically designed questionnaire.
Results: Linear regression revealed that BMD is significantly associated with job (p<0.05), smoking (p<0.05), calcium intake (p<0.05), and years of physical activity (p<0.001).

Conclusions: This study suggests that years of physical activity, standing position job and mechanical loading were the strongest predictors of calcaneus BMD.
Disclosure of Interest: None Declared

P132
THE EFFECTS OF PREGNANCY AND LACTATION ON BONE MINERAL DENSITY

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Aims: We performed a prospective study of BMD in 38 women during their first full term pregnancy until 12 months postpartum.
Methods: BMD measurements at lumbar spine (L_2-L_4 [LS]) and forearm (distal 33% [RD] and ultra-distal [RUD] region of the radius) were made within 3 months before conception, after delivery, 6 and 12 months postpartum. In midpregnancy the DXA examination was carried out only at the forearm. Patients were grouped according to duration of lactation as Group I, II, III (0–1; 1–6; 6–12 months).
Results: During pregnancy, there was a significant difference between baseline and delivery ($p<0.001$) in the LS, RUD and RD BMD values. In Group I, there was no statistically significant difference in LS BMD between visits following pregnancy. The RUD BMD loss was recovered by 6 months postpartum (PP6). Group II showed continuous bone loss from delivery until PP6 at LS and RUD. In Group III, the LS BMD loss continued throughout the lactation period. The RUD BMD dropped (4.9%) till 6 months postpartum then increased by 3.0% as measured at 12 months postpartum (PP12). There was no significant change in RD BMD in any of three groups during lactation. At LS bone loss between delivery and PP12 correlated well with the duration of lactation ($r=-0.727$; $p<0.001$).
Conclusions: We suggest that calcium needed for fetal skeletal growth during pregnancy was gained from maternal trabecular and cortical sites and that needed for infant growth during lactation was drawn mainly from the maternal trabecular skeleton in our patients. The effect of pregnancy and lactation on maternal bone mass was spontaneously compensated post weaning.
Disclosure of Interest: None Declared

P133
POPULATION BASED REFERENCE STANDARDS OF PEAK BONE MINERAL DENSITY OF INDIAN MALES AND FEMALES—AN ICMR MULTI-CENTRE TASK FORCE STUDY

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Aims: To determine the Normative Values of BMD at hip, forearm and lumbar spine of healthy Indian males and females aged 20–29 years
Methods: A total of 808 subjects including 404 males and 404 females belonging to the stratum of Higher Income Group (HIG) who apparently had no constraints to their growth during childhood, were enrolled in the study. Stringent inclusion and exclusion criteria were followed for the enrollment.
Results: The reference standards of BMD obtained in the present study at the three sites namely, total hip, forearm and lumbar spine were 0.988±0.131, 0.611±0.052 and 0.976±0.105 gm/cm^2, respectively, in males and 0.901±0.111, 0.538±0.044 and 0.954±0.095 gm/cm^2, respectively, in females. The estimates obtained in the present study were found to be significantly lower than the corresponding NHANES III and Hologic reference standards currently under use. The impact of various demographic, physical, clinical and biochemical factors on BMD at the three sites was also assessed. Amongst the demographic parameters, the nature of physical activity performed had a strong impact on BMD. Amongst the physical parameters, height, weight and BMI all significantly affected BMD with weight alone contributing maximum to the BMD. Amongst the biochemical parameters, serum albumin, serum alkaline phosphatase, serum vitamin D and serum PTH had all affected BMD at one site or the other. It was further observed that even when dietary intake of calcium was <800 mg/day, a higher level of serum vitamin D might ensure significant rise in BMD.
Conclusions: The Normative Values of BMD obtained in the present study at the three sites namely, total hip, forearm and lumbar spine were 0.988±0.131, 0.611±0.052 and 0.976±0.105 gm/cm^2 respectively in males and 0.901±0.111, 0.538±0.044 and 0.954±0.095 gm/cm^2, respectively, in females.
Disclosure of Interest: None Declared

P134
DETERMINATION OF PLASMA ASCORBIC ACID CONTENT AND GLUTHATIONE REDUCTASE ACTIVITY IN OSTEOPOROTIC WOMEN

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Aims: Reduction of BMD is the result of imbalance between bone formation and destruction, which depends

to different factors such as oxidative stress and antioxidants activities. The aim of this study is investigation of the relationship between plasma ascorbic acid (AA) concentration and Glutathione Reductase (GR) as some of antioxidants with low BMD; Osteoporosis.
Methods: Ferric reducing ascorbic acid concentration; FRASC a spectrophotometric assay, was used for measurement of ascorbic acid concentration. GR activity was determined spectrophotometrically at 339 nm. Femur and Lumbar *T*-score value were measured for bone density evaluation in Jami clinic, Tehran, Iran. Patient group (n=76) classified as sever and mild against control group (n=76).
Results: In severe osteoporotic group (T-core<−2.5) Plasma ascorbic acid level is 47.31±36.07 mM and GR activity value is 90.01±58.57 U/L. In mild osteoporotic group (−1.7<*T*−score<−1.0) Plasma ascorbic acid level is 70.28± 61.58 mM and GR activity value is 66.72±19.80 U/L. In total osteoporotic group (−1.0>*T*-score) Plasma ascorbic acid level is 54.73±46.65 mM and GR activity value is 82.35±50.33 U/L. In control group (Femoral and Lumber *T*-score≥−1) Plasma ascorbic acid level is 74.55±67.60 mM and GR activity value is 64.71±31.26 U/L.
Conclusions: Our results support an association between plasma levels of AA, GR and BMD. 1) Control group AA and GR activity values are significantly more and less than patient group, respectively (p<0.01). 2) Mild AA and GR activity values are significantly more and less than sever group, respectively (p<0.001). 3) Control group AA and GR activity values are significantly more and less than sever patient group (p<0.001).
Plasma ascorbic acid level has positive and GR activity values has negative relationship with *T*-score in total participants (r=0.192; p<0.01, r=−0.278; p<0.001, respectively).It seems that GR activities are increased as compensatory respond to bone deficiency and AA value decreasing may needs to supplementation in osteoporosis prevention.
Acknowledgements: This research has been supported by Tehran University of medical Sciences (TUMS) and Toxicology and food chemistry Center of Excellent.
Disclosure of Interest: None Declared

P135
RELATIONSHIP OF HORMONAL STATUS AND BONE STATE IN MEN

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Aims: The aim of the study was to determine the relationship of hormonal status and bone state in men.
Methods: We have examined 96 men aged from 30 to 79 years (M±m): age—54,4±1,3 years; height—1,75± 0,01 m; weight—84,9±1,5 kg), divided them into age dependent subgroups 30–49 (n=36; age - 41,2±1,2 years) and 50–79 years (n=60; age—64,4±1,1 years). Levels of testosteron (Test, nmol\l) and sex hormone-binding globulin (SHBG, nmol\l) were determined by means of chemiluminescent immunoanalysis method. The BMD (g/cm^2) was evaluated for the total body, spine (L_1-L_4), femur (neck, trochanter and total) and radius (ultradistal, 33% and total) using DXA by the Prodigy instrument (GE Medical systems, 2005).
Results: The correlation analysis of age dependent subgroups: in the group of 30–49 years there is a positive correlation between Test and BMD ultradistal radius (r= 0,49, p<0,05), along with the negative correlation between SHBG and Total body in the group of 50–79 years (r= −0,31, p<0,05). In the group of 60–79 years (n=38; age— 69,7±1,0 years) we have found a negative correlation between SHBG and Total body (r=−0,60, p<0,001), SHBG and trochanter (r=−0,47, p<0,05), SHBG and Totalfemur (r=−0,48, p<0,05). Patients of 50–79 year age group with normal bone, osteopenia and osteoporosis were chosen in correspondence to the WHO criteria. For analysis' sake, we have joint the osteopenia and osteoporosis patients. Normal mineral density of lumbar spine was found in 83,3%, osteopenia and osteoporosis—17,7%, while in total femur—75% и 25% respectively. SHBG in normal femur BMD subgroup (41,1±2,6) was considerably lower than in osteopenia and osteoporosis subgroup (54,4± 5,6, p<0,05).
Conclusions: Thus, we have revealed a positive correlation between testosterone levels and ultradistal radius BMD and negative correlation between SHBG and total body BMD in patients of 50–79 year age group, trochanter and total femur in patients of 60–79 year age group.
Disclosure of Interest: None Declared

P136
OSTEOPOROSIS AND SCI

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Aims: osteoporosis is a bone disease that occurs because of minerals to the bone and increase.
Methods: Review of article.
Results: It is difficult prevent bone demineralization after SCI. Exercise, limited caffeine and alcohol, stop smoking and extra calcium and vitD and use medication, same as bisphosphonate suggested.
Conclusions: After SCI patient´s metabolism changes. The body begins loosing large amounts of calcium and other minerals in the urine (demineralization). The bone loss may be enhanced by lack of muscle traction on bone or by other

neural factors associated with SCI. The factors increase osteoporosis related to such as age, sex and hormonal (PTH). Sublesional osteoporosis is characterized by excessive bone resorption at the hip and knee region after SCI, resulting in a lifetime increased risk of lower extremity fracture. The differences between SCI induced osteoporosis and other causes of bone loss have become clear. The test allows monitoring of osteoblastic and osteoclastic activity at the microscopic level.

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Disclosure of Interest: None Declared

P137

Abstract Withdrawn

P138

PLASMA SUPEROXIDE DISMUTASE ACTIVITY AND BONE MINERAL DENSITY IN IRANIAN WOMEN, IN GLANCE TO SMOKING AND MENOPAUSE

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Aims: Osteoporosis is a silent and prevalent disease affecting 50% of Iranian women and men over 50. According to 1991 WHO report, after heart failure, brain-failure and cancer, osteoporosis is the fourth factor threatening human's health. Free radicals have an important role in many diseases and there are some antioxidants such as superoxide dismutase (SOD) that change the oxygen free radicals to some compounds that are less harmful. The purpose of this study was to consider the plasma SOD activities in osteoporotic Iranian women comparing to the control, in side glance to smoking and menopause effects.

Methods: SOD activity was measured spectrophotometrically at 540 nm. Participants were selected by inclusion and exclusion criteria among those who referred to Jamie Clinic in Tehran for BMD evaluation, and classified as Patient group (n=76) against control group (n=76). Standard questionnaire (including smoking habit and menopause condition, etc.) and sophistical statistic methods were used in this study.

Results: In total osteoporotic group (−1.0>T-score) SOD activity value is 2.05±0.87 μg protein. In control group (Femoral and Lumber T-score≥−1) SOD activity value is 1.72±0.76 μg protein. In **s**moker (n=20) and non-smoker (n=172) participants, SOD activity values are 2.32±1.11 and 1.82±0.87 μg protein, respectively. In pre- menopausal (n=109) and post- menopausal (n=83) participants, SOD activity values are 1.82±0.85 and 1.95±0.99 μg Protein, respectively. Femur mineral density in smoker and non-smoker are −1.22±1.07 and −0.62±1.32, and in premenopausal and postmenopausal are −0.44±1.12 and −0.98±1.45, respectively.

Conclusions: Control group SOD values are significantly less than patient group (p<0.01). SOD activity values have reverse relationship with T-score in total participants (r=−0.216; p<0.001). No difference in menopause and smoking habit was found between groups, but it is worth saying that in all participants (no attention to control or patient group), there is more plasma SOD activity in the smokers than non- smokers (P<0.05). SOD values is more in postmenopausal compared to the premenopausal, though it is not significant. Femur mineral density is lower in smokers than nonsmokers (P<0.05),also in postmenopausal than premenopausal women (p<0.01). It seems SOD activities are increased as compensatory respond to osteoporotic severity. According to the different studies, it seems that oxidative stress can cause osteoporosis and a physiologic increase in the amount of antioxidants; even though this amount may be not sufficient for the human body desires.

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Disclosure of Interest: None Declared

P139

BONE MINERAL DENSITY DIFFERENCE BETWEEN RIGHT AND LEFT HIP

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Aims: Controversy exists regarding the use of bilateral hip scanning. The reason for scanning unilaterally might be the reporting of good correlation between BMD of left and right hip at all regions of interest. As the diagnostic classification in most cases is solely based on the lowest T-score at the spine or hip, the interpretation could be

affected by significant left-right difference in hip BMD especially in the old. The purpose of our study was to ascertain the difference in BMD measurement of the two hips in a population of Caucasian community dwelling women older than 65 years who presented to routine DXA for evaluation, invited for screening.

Methods: BMD measurement of the two hips in a population of Caucasian community dwelling women older than 65 years who presented to routine DXA for evaluation, invited for screening.

Results: We found that bilateral BMD measurements were only moderately correlated at the femoral neck and total hip in elderly women. In a significant number of the screened elderly women, we found that the DXA differences were changing the diagnosis of each woman from either normal BMD to osteopenia or visa versa, or from osteopenia to osteoporosis or visa versa. We found an increasing disagreement between the hips with increasing age and this disagreement was up to 9.1% in the women older than 70 years when evaluating femoral neck, meaning that the diagnosis of osteoporosis in a subset of patients would depend on whether the left or right hip was scanned. When evaluating total hip, the disagreement was somewhat lower (6.0%) in women aged >70 years. Our study is the first to prove this age dependency.

Conclusions: In conclusion, due to increasing BMD difference between hips with increasing age, bilateral hip measurements should be performed in elderly women aged >65 years.

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P140

COMPARISON OF BONE MINERAL DENSITY OF ATHLETES AND NON-ATHLETES IN SPINAL CORD INJURED PATIENTS AND VETERAN

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Aims: The aim of this study was to assess the effect of various exercises on BMDs of femoral neck (FN) and lumbar spine, L2-L4 (LS) and the correlations of FN and LS BMDs with blood contents of athletes and non-athletes in spinal cord injured (SCI) patients and veterans.

Methods: 34 male veterans, 10 basketball players, 8 weight lifters, 5 swimmers and 11 nonathletes participated in the research. The mean±SD for the basketball players, weight lifters, swimmers and nonathletes for the age, weight and height were: 46.30±5.47 y, 66.60±9.85 kg, 168.90±5.47 cm; 43.37±2.13 y, 70.25±5.47 kg, 163.62±6.52 cm; 49.40± 11.73 kg, 167.09±7.82 cm, respectively. The BMDs of these athletes were compared with the nonathletes for the FN and LS. The measurements were performed using a DXA system (Norland XR46, Atkinson, USA). Fast Calcium, Phosphor, Creatinine, serum Albumin, Phosphate Alkaline Enzyme and TSH hormone were also measured. The data were analyzed at α=0.05 significant level, using SPSS 16 software.

Results: The results showed that there were no significant difference among the BMDs of the LS and FN of the various groups. There was no significant correlation between the blood contents and the BMDs of the measured sites, except for the Creatinine. The Pearson's analysis showed that there were negative significant correlations between the injury period, the FN (r=−0.53, p<0.001) and LS BMDs (r=−0.35, p<0.02). Therefore, this study showed that there were no significant difference in BMDs of SCI athletes and non-athletes.

Conclusions: Weight bearing exercise prevents the normal population from osteoporosis and increases the BMD. However, in this study, this was not found for the SCI patients, which were consistent with Giangregorio et al study (1), but inconsistent with Alekna et al study (2). These researchers reported that exercise has no effect on BMD after the SCI. Present study showed no significant relation between the blood contents and BMD. However, there was a significant relationship between Creatinine and LS BMD.

References: 1. Giangregorio LM et al., Spinal Cord 2005;43:649; 2. Alekna V et al. Spinal Cord 2008;46: 727

Disclosure of Interest: None Declared

P141

MANAGEMENT OF OSTEOPOROSIS IN POSTMENOPAUSAL WOMEN IN SHIRAZ, SOUTHERN IRAN

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Aims: Osteoporosis is a common problem in health systems on the other way it is a hidden epidemic disease

which prevalence of it increases with age increasing and the most important risk factor of it is menopause. Early detection of this disease by bone densitometry and treatment of it, can prevent many complication of the disease, specially fracture. To determine how many diagnostic tests and taking medication for prevention and treatment of osteoporosis in postmenopausal women in public health centers in Shiraz have been used.

Methods: This survey is a descriptive cross-sectional study. 405 post menopausal women 55 years old entered in randomly from public health center which had been selected by cluster sampling from the city of Shiraz. All data were gathered by a standard questioner which were completed through interview and exam.

Results: Statistic analysis showed the most women had been menopause in 45–50 years old and 96/3% were high risk for osteoporosis and the most common risk factor was life style. In study sample 67/9% had not done any diagnostic test for osteoporosis. And 31/9% had done at least one of the two tests Radiography or BMD who among them 77/3% osteoporosis had been diagnosed. In relation with taking medication for prevention 20/5% of overall study sample use Ca supplement and vit D continuously during the last year. About treatment medication 6.7% Bisphosphonates, 2.5% Calcitonin 4.9% ERT-HRT, have been used.

Conclusions: Evaluation and screening of osteoporosis in menopause women and high risk menopause women by diagnostic BMD are so far from NOF (National Osteoporosis Foundation) recommendation and similarly about medication of prevention & treatment osteoporosis.

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Disclosure of Interest: None Declared

P142
RISK FACTOR OF OSTEOPOROSIS IN POST MENOPAUSAL WOMEN IN SOUTH OF IRAN, SHIRAZ

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Aims: osteoporosis a serious and debilitating disease resulting in an increased risk of fracture, causing morbidity and mortality.

Objective: to determine the risk of osteoporosis, in postmenopausal women in Shiraz, southern Iran.

Methods: This is a descriptive cross-sectional study of 405 menopause women more than 55 years old who applied to health center were entered the study from June to October 2005.The health centers had been chosen by random cluster sampling from different geographic areas of Shiraz. For gathering data a modified questionnaire according from postmenopausal osteoporosis evaluation form belong to NAMS (North American Menopausal Society) was used. through interview and examination data was gathered.

Results: Mean age of menopause was 49 year. Disease affected and medication intake which are considered as osteoporosis risk factor each there were in 12/6% of study subjects. Positive family history; there was in 8/4% of subjects. 78% of subjects were high risk due to lifestyle that 33/3% inactivity and lack of sport and 5/9% sunlight unexposure, respectively, were the minimum and maximum lifestyle risk factors. Smoking there was in 15/3% of subjects.

From 75 individuals who had done BMD test 58 individuals had osteoporosis and 17 individuals had no evidence of osteoporosis. There was no significant difference about risk Factors between osteoporosis and nonosteoporotic individuals by chi-square test ($p>0/05$).

Conclusions: In general, lifestyle is the most common risk factor in this sample. The lack of physical activity and smoking as life style risk factors needs to be considered to be the most common problem in menopause women to prevent future fracture.

References: 1. Kais JA, Lancet 2002;359:1929; 2. Cooper C, Am J Med 1997;103:12S; 3. National Osteoporosis Foundation. Physician's Guide: Pharmacologic Options. Available at: http://www.nof.org/physguide/pharmacologic.htm. Accessed February 23, 2006; 4. International Osteoporosis Foundation (2003) The facts about osteoporosis and its impact (ref type: report) 1–3.

Disclosure of Interest: None Declared

P143
OSTEOPROTECTIVE ACTION OF A SYNTHETIC PTEROCARPAN: EVIDENCE FOR NON-ESTROGENIC OSTEOGENIC EFFECT

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Aims: To evaluate the mode of action and efficacy of a synthetic pterocarpan, CDR-Med, synthesized using medicarpin scaffold which has non-estrogenic bone conserving effect in ovariectomized mice.
Methods: Neonatal rat calvarial osteoblasts were used for all in vitro experiments. Kinase assays were performed following standard protocols. Female Sprague Dawley (weaning) rats (10/group) were administered CDR-Med at 1.0 and 10.0 $mg^{-1}.kg^{-1}$ body weight doses by gavage for 30 days along with vehicle control. For studies with adult OVX groups, animals were OVX and treatment was started after 3 months for a period of 90 days at 10.0 $mg^{-1}.kg^{-1}$ body weight dose. BMD, osteoid formation (mineral apposition rate and bone formation rate), bone microarchitecture, and bone turnover/resorption markers were studied.
Results: CDR-Med at as low as 10^{-8} M concentration stimulated osteoblast differentiation and mineralization. CDR-Med stimulated osteoblast differentiation by increased secretion of BMP-2 from osteoblasts. CDR-Med stimulated phosphorylation of smad 1/5/8 in osteoblasts which required activation of p38 MAPK. CDR-Med required functional estrogen receptor (ER) as ICI-182780, an ER antagonist, inhibited CDR-Med stimulated osteoblast differentiation and p38MAPK activation. Reporter assay performed in calvarial osteoblast cells revealed that CDR-Med transactivates ER. However, CDR-Med had no estrogen agonistic effect in rat uterus. In vivo, compared with vehicle treatment, CDR-Med treatment in developing rats resulted in dose-dependent increase in BMD of both cortical and cancellous bones and bone formation rate. OVX rats treated with CDR-Med exhibited improved trabecular microarchitecture and increased bone formation rate compared with the ovariectomized vehicle group. Serum osteocalcin and urinary type I collagen levels in OVX rats treated with CDR-Med were significantly lower than those of the ovariectomized group.
Conclusions: CDR-Med, a novel synthetic pterocarpan, promotes peak bone mass by ER-p38MAPK-BMP-2 pathway and is devoid of any estrogenic effect at the uterine level. CDR-Med is effective in stimulating new-bone formation in OVX -induced bone loss model.
References: Tyagi AM et al., Mol Cell Endocrinol 2010;325:101
Acknowledgements: AMT, AK and JK acknowledge CSIR, Government of India for fellowships
Disclosure of Interest: None Declared

P144
COMPARISON OF BONE MINERAL DENSITIES OF VERTEBRAL BODIES (L2–L4) OF PLUS 50 YEARS POSTMENOPAUSAL WOMEN

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Aims: Osteoporosis is the most disabling metabolic bone diseases which is known as a burden on the public health. Its impact on the health system will be more appreciated as the mean age of the society gets higher. It is more common in the postmenopausal women. The world health organization (WHO) declared the osteoporosis as one of the four main enemies of the human being in 1991. The main diagnostic procedure for osteoporosis detection is to measure BMD of L2–L4. The aim of this work was to investigate if the measurement of a single vertebra could replace the total L2–L4 measurement.
Methods: BMDs of 97 osteoporotic postmenopausal women with a mean age of 61.78±8.48 (50–86) and a mean BMI of 24.75±2.66 (18–30) who had no known diseases or no any medication that affects bone density were measured at Osteoporosis Section of Seyed Al-Shohada Hospital of Isfahan University of Medical Sciences. The vertebral bodies (L2–L4) of the subjects were measured, using a DXA System, a Norland XR46 total body system. To investigate if the BMD measurement of a single vertebra could replace the total L2–L4 measurement the mean BMDs and the correlations of the L2–L4 were compared.
Results: According to our findings there was a very strong correlation between L2/L3 (r=0.88, p=0). This correlation was higher than the correlation between L3/L4 or L2/L4. Moreover, the mean BMDs of L2 and L3 were not significantly different (p>0.05). The mean BMDs of L2 and L3 were significantly lower than L4.
Conclusions: Since the mean BMDs of L2 and L3 are not significantly different and due to a very high correlation

between L2 and L3, we recommend the measurement of L2 rather than L2–L4, to save time, cost and the patient x-ray exposure as well as ease of the selection of region of interest.

Disclosure of Interest: M. B. Tavakoli Hosseinabadi Board member of: Medical Physics, M. R. Salamat: None Declared

P145
BMD-DXA IN INDONESIA

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Aims: Indonesian Osteoporosis Association would like to collect data of BMD-DXA machines used in Indonesia and to standardize the way the clinicians and technologists operate them.

Methods: We collected data from the distributors for BMD-DXA machines sold since 1995. With cooperation from IOF and ISCD, we implemented the international standard for the operators.

Results: There are 49 BMD-DXA used in 14 big cities with almost half located in Jakarta (the capital). The operators who passed the ISCD examination and IOF Course are 50% Clinicians and 32.3% Technologist.

Conclusions: Uneven distribution of the BMD-DXA machines and not all capital cities of the 33 provinces of Indonesia has BMD-DXA. Implementation of the international standard used by all operators is on-going with more than 40% completed.

Disclosure of Interest: None Declared

P146
BONE MINERAL DENSITY IN PATIENTS WITH SLEEP APNEA

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Aims: This study was carried out to determine lumbar and femoral BMD in patients with sleep apnea.

Methods: 21 sleep apnea patients and 26 control subjects participated in our study. In the patients with sleep apnea and control subjects, serum Ca, P, ALP levels and urinary desoxypiridinoline (Dpd) levels were measured. BMD was determined at the lumbar spine (L1-4) and the femoral regions (neck and total) using DXA.

Results: The demographic variables such as age, sex and BMI were similar between patients and controls. There was no statistically significant difference in lumbar, femoral neck and total femur BMD values between patients and controls ($p>0.05$).

Conclusions: Our study indicates that lumbar spine and femoral BMD values in patients with sleep apnea may not differ from those of healthy controls.

Disclosure of Interest: None Declared

P147
STANDARDIZATION OF QUS FOR DIAGNOSING OSTEOPOROSIS

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Aims: An ultrasound bone density measurement (QUS : Quantitative Ultrasound) is widely used in Japan. The QUS is well used also as screening of osteoporosis for medical check up in public health or diagnosis of osteoporosis in general physician because of its simple and non-invasive method. About 7000 QUS equipments are working in whole Japan, but all of those QUS parameters have not standardized yet. The aim of this study is to make conversion formula for standardized QUS parameters and using them to make reference curve and to set fracture threshold.

Methods: As opposed to 6 QUS machines (AOS100, CM200, A1000express, UBIS5000, Benus, Minelyzer) for which we are mainly used in Japan now, measurement accuracy in vitro and correlation between each equipment in vivo were investigated. We measured simultaneously with all equipments for 281-person (142 men, 139 women) and the standardization was investigated.

Results: In every equipment, %CV were 0.3% or less, and since measured value had a fixed tendency by the algorithm of an instrument, we decided that it was able to calculate standardized SOS (second-SOS) with most suitable correlation from each measurement. A conversion formula are shown.

AOS100	$s-SOS = 1.18 \times SOS - 307.95$
	$s-BUA = 0.667 \times BUA + 34.698$
CM200	$s-SOS = 0.86 \times SOS + 220.24$
A1000	$s-SOS = 0.79 \times SOS + 298.00$
	$s-BUA = 0.893 \times BUA - 19.727$
UBIS5000	$s-SOS = 1.03 \times SOS + 3.64$
	$s-BUA = 2.278 \times BUA - 63.637$
new Benus	$s-SOS = 1.40 \times SOS + 636.67$
Minelizer	$s-SOS = 2.00 \times SOS - 1504.70$
	$s-BUA = 0.747 \times BUA + 24.246$

Using those s-SOS conversion formula, we have re-analyzed the conventional reference data and fracture threshold data. Since 20 years-old cost fell [man and woman] gradually at a peak, we used the data of the man and woman of 20–29 years old as YAM. The female YAM value in s-SOS was 1550.3±27.9 m/s, and the male was 1548.0±30.2 m/s. The fracture threshold was 1496.8 m/s (male-1.61, female-1.93 in *T*-score).

Conclusions: The s-SOS and s-BUA as standardized QUS becomes easy to compare with internationally from now on. In Asia, the fracture with osteoporosis will be the biggest social problem. Cheaper and safer bone density measurement is expected and QUS becomes one choice. Especially standardized QUS is most needed when evaluating and comparing the osteoporosis in Asia.

Disclosure of Interest: None Declared

P148

CORRELATION BETWEEN VITAMIN D STATUS AND INSULIN RESISTANCE IN POSTMENOPAUSAL INDIAN WOMEN

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Aims: To study the correlation between vitamin D status and insulin resistance in postmenopausal Indian women.

Methods: Cross-sectional study which was conducted at Indraprastha Apollo Hospitals, New Delhi. 71 postmenopausal women (mean age 56 years) were enrolled. All underwent detailed history and physical examination including BMI calculation. Subjects who were known diabetics or who were found to have fasting blood glucose in the diabetic range were excluded. Subjects with chronic renal failure, chronic liver disease, chronic smokers and chronic alcoholics or any other chronic inflammatory condition were also excluded as they could potentially alter the insulin resistance. Serum calcium (and albumin for calculating corrected serum calcium), phosphorus, alkaline phosphatase, parathormone (PTH) and 25-hydroxyvitaminD (25(OH)D) were measured as parameters of calcium homeostasis. Fasting blood glucose (FBG) and fasting serum insulin were measured at induction. Glucose Insulin Ratio (GIR) and Insulin resistance (HOMA-IR) were calculated. FBG, Systolic and diastolic blood pressures, BMI, fasting serum insulin, calculated GIR and HOMA-IR were studied as parameters of insulin resistance.

Data was then analysed for statistical significance.

Results: The mean corrected serum calcium was 8.72± 0.59 mg/dl, phosphorus 3.76±0.51 mg/dl, PTH was 12.71±9.05 pg/ml and 25(OH)D was 12.73±7.63 ng/ml. The mean BMI was 27.78±5.37 kg/cm^2. Mean FBG was 92.46±10.91 mg/dl, fasting insulin was 10.19± 8.38. The mean calculated GIR was 13.14±9.39 and HOMA IR was 2.31±1.70. 25(OH)D was found to have significant negative linear correlation with BMI (correlation coefficient −0.234 and *P*-value 0.050 and HOMA-IR (correlation coefficient −0.237 and *P*-value 0.047). 25(OH)D was not found to significantly correlate with any of the other parameters of insulin resistance studied. BMI showed significant linear correlation with PTH (correlation coefficient 0.276 and *P*-value 0.020). PTH was not found to significantly correlate with any of the other parameters.

Conclusions: Serum 25(OH) vitamin D level has significant negative linear correlation with BMI and insulin resistance as measured by HOMA-IR in healthy postmenopausal Indian women.

Disclosure of Interest: None Declared

P149

VITAMIN D DEFICIENCY AMONG SAUDI CHILDREN AND ADULTS: RESULTS OF THE RIYADH COHORT

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Aims: This study aims to determine whether vitamin D influences cardiometabolic risk factors in Saudi children and adults.

Methods: In this cross-sectional, observational study, we recruited 186 boys (mean age 12.4±3.7 years), 114 girls (11.6±3.7) and 341 (177 nondiabetic and 164 DMT2) adults for a combined total of 527 Saudi subjects. Anthropometrics were obtained and morning fasting blood samples were collected. Serum glucose and lipid profile were determined using routine methods. Serum 25-hydroxyvitamin D was quantified using an enzyme-linked immunosorbent assay.

Results: 10% of Saudi children had severe 25-hydroxyvitamin D deficiency (<12.5 nmol/L), while 50% of the boys and 40% of the girls had mild vitamin D deficiency (12.5–24.9 nmol/L). Circulating 25-hydroxyvitamin D concentrations were inversely correlated to age, BMI, blood pressure, waist and hip circumferences and serum triglyceride concentrations, and positively associated to HDL-cholesterol. Age and systolic blood pressure were significant predictors of 25-hydroxyvitamin D, explaining about 30% of the variance ($p=0.0005$). In adults, severe vitamin D deficiency

was more evident in the nondiabetic group. Age was the most significant predictor of 25-hydroxyvitamin D in both groups, explaining 25% and 16% of variances (p-values 0.0005 and 0.0005), respectively. Waist-hip ratio, systolic blood pressure and BMI were significant predictors of 25-hydroxyvitamin D in the nondiabetics, explaining 21% of variance (p-value 0.039). Serum intact PTH levels were higher in nondiabetic men and women.

Conclusions: Significant associations of serum 25-hydroxyvitamin D to cardiometabolic parameters support promising cardioprotective benefits from vitamin D sufficiency at an early age. The study further underscores the need for vitamin D fortification of the Saudi diet and the promotion of vitamin D supplementation in both children and adults.

Disclosure of Interest: None Declared

P150
KNOWLEDGE, ATTITUDE AND PRACTICE OF OSTEOPROSIS AMONG IRANIAN FEMALE ADOLESCENT MALE

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Aims: Osteoporosis "a multifactorial disease is a major cause of fractures especially femoral fractures" characterized by reduction of bone mass. Although there is no known cure. Osteoporosis and related fractures are largely preventable. The purpose of this investigation was to determine the level of knowledge Attitude and practice (KAP) of osteoporosis among Iranian Adolescent Females. Also KAP correlations with age education, parents' education, parents' occupation and family number were studied.

Methods: 626 school students from ten provinces with age ranging from 10 to 19 (13.9±1.4) years participated in this descriptive-analytic study. Questionnaire was used in this study with four parts that consists of:

1- Demographic Information
2- 14 yes - No and don't know questions related to knowledge (this third option allowed the respondent a choice without guessing).
3- 11 yes- No and don't know questions about attitude.
4- 9 just yes or No questions related to practice. We descript +2 for correct responses +1 for incorrect responses and zero (0) for don't know answers. Before beginning the project reliability of the questionnaire was assessed by use of Cronbach test and the result was 0.81. After data collection Spss/win 13 and spearman Pearson and t-test were used for data analysis.

Results: The total score of KAP was 4–65 (43.3±13.8) In details a range between 14 and 30 (23±2.9) 10–22 (19.2±2.4) and 2–18 (101±2.8) were seen in knowledge attitude and practice respectively There was a direct correlation between total score of KAP and parents education (r= 0.163, P=0.00001). Subjects Knowledge and attitude and also attitude and practice had a positive correlation between parents' occupation family number and total score of KAP. According to this research Iranian adolescent females would have acceptable knowledge about osteoporosis but the attitude and practice of them were less than knowledge This result is same as the results of other countries investigations It seems there is necessity to present and perform programs to increase practice of Iranian young women about osteoporosis.

Conclusions: According to this research Iranian female adolescents would have acceptable knowledge about osteoporosis but the attitude and practice of them were less than knowledge This result is same as the results of other countries investigations It seems there is necessity to present and perform programs to increase practice of Iranian young women about osteoporosis.

Disclosure of Interest: None Declared

P151
BONE HEALTH STATUS OF HEALTHY COMMUNITY DWELLING HUNGARIAN MEN OVER 50 YEARS OF AGE.

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Aims: Unlike women, the skeletal health status of men is underinvestigated and has as yet not received ample attention, despite the fact that emerging data suggest a considerable public health implication in elderly men. In a pilot attempt in our part of Europe, we examined the bone health status of healthy community dwelling Hungarian men over 50 years of age living in the city of Debrecen.

Methods: We determined serum levels of 25-hydroxyvitamin D3 (25-OH-D3), PTH, osteocalcin (OC), degradation products of C-terminal telopeptides of type-I collagen, sex hormone (17β-estradiol (E2), testosterone, luteinising hormone, folliclular stimulating hormone, sex hormone binding globulin (SHBG)) levels, COL1A1 (G1245T) gene polymorphism, 10-year probability of hip fracture and a major osteoporotic fracture using the country specific FRAX® algorithm, daily dietary calcium intake and BMD at L_1–L_4 lumbar spine (LS) and femur neck (FN).

Results: Voluntary recruitment was done from September 2009 to September 2010. During this period a total of 229

randomly selected volunteers agreed to participate. Upon receiving written informed consent study procedures were carried out, volunteers not confirming to the inclusion/exclusion criteria (n=20) were excluded from the study. The mean age was 61 (51–81) years. The percentage of subjects having normal, osteopenic and osteoporotic T-scores at the LS was 64.6%, 27.8% and 7.7%, respectively, and at the FN was 55%, 42.1% and 2.9%, respectively. The prevalence of hypovitaminosis D (serum 25-OH-D3 <75 nmol/L) during spring, summer, autumn and winter was 64.4%, 39.6%, 61.9% and 66.7%, respectively. The mean (range) 10-year probability of hip fracture and the 10-year probability of a major osteoporotic fracture was 0.76 (0–9.4)% and 3.77 (2–16)%. On comparing subjects with normal and low 25-OH-D3 vitamin levels there was no statistically significant difference in the FN (0.969±0.147 g/cm^2 vs. 0.973±0.125 g/cm^2) and LS (1.189±0.202 g/cm^2 vs. 1.160±0.158 g/cm^2) BMD. The mean (range) daily dietary calcium intake was 674 (122–1,624) gm/day. The distribution of COL1A1 genotypes (n=199) was consistent with the Hardy-Weinberg equilibrium law: GG (67.4%), GT (28.6%), and TT (4%). On comparing the different genotypes there was no difference in FN and LS BMD. FN BMD showed statistically significant correlation with age (r=−0.157), BMI (r=0.361), OC (r=−0.207), E2 (r=0.158) and SHBG (r=−0.260).

Conclusions: Our study is the first such survey of its' kind in Central Europe, and hopefully the 10-year probability of fracture and other risk factor findings shall help formalize future public health directives.

References: http://www.sheffield.ac.uk/FRAX/tool.jsp?country=27

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P152
THE IMPACT OF DIFFERENT DIAGNOSIS METHODS ON THE PREVALENCE OF OSTEOPOROSIS

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Aims: The aim of the study is to realize the influence of different diagnostic methods on the prevalence of osteoporosis and the related risk factors among elderly women in rural community in southern Taiwan.

Methods: Subjects were randomly sampled among women over 65 years old from a rural community (Tianliao Township, Kaohsiung County) in July 2009. Each subject received a face-to-face interview by a well-trained staff with structurized questionnaires, and physical examination including body height, body weight, and arm span. Lumbar and hip BMD were measured by mobile DXA (Hologic Explorer QDR). Thoraco-lumbar X-ray were measured by mobile X-ray (Daeyoung DC-325R). The diagnosis of osteoporosis was confirmed by either (a) the 1994 WHO criteria (T-score≤−2.5 based on DXA), (b) nontraumatic compression fractures or (c) history of nontraumatic fractures. The prevalence of osteoporosis were compared among three group based on different methods (method a+c vs. b+c vs. a+b+c). A total of 368 subjects were enrolled for final analysis, and the response rate was 75.9%. The SPSS statistical software version 17.0 was used for data analyses. A p-$value$ < 0.05 was constructed for statistical significance.

Results: Among 368 women over 65 years old, the mean age was 74.3±6.0 year-old. The overall prevalence of

osteoporosis (method a+b+c) was 78.3% (age-standardized 78.1%). Besides, the prevalence of osteoporosis based on method a+c and b+c was 60.9% and 55.7%, respectively. Using the multiple logistic regression analyses with adjustment for age, educational status, BMI, and difference between arm span and body height, osteoporosis was positively associated with older age (≥75 years, OR, 1.90 [95% CI=1.09–3.31], but negatively associated with BMI (23–25 kg/m^2, OR, 0.35 [95% CI=0.16–0.75]; <23 kg/m^2, OR, 0.42 [95% CI=0.21–0.82]).

Conclusions: The prevalence of osteoporosis among women over 65 years old in rural community of Taiwan was 78.3% (age-standardized 78.1%). Older age and lower BMI were the independently risk factors for osteoporosis. The thoraco-lumbar X-ray might be necessary to reflect the final diagnosis of osteoporosis.

Disclosure of Interest: None Declared

P153
EVALUATION OF METHODS TO ASSESS DIETARY CALCIUM AND MAGNESIUM INTAKE BY SINGAPORE CHINESE RESIDENTS

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Aims: To evaluate and apply methods for assessment of dietary calcium (Ca) and magnesium (Mg) intake by Singaporeans of Chinese descent.

Methods: A comprehensive database for Ca and Mg with more than 2,500 entries for food items and 200 for beverages was developed. Data were obtained from five food composition tables, food labels, in-house chemical analysis and other relevant sources. Duplicate diet studies were conducted in parallel to 3-day (3-d) and 24-hour (24-h) food records (FRs) to cross-validate the different approaches. The 3-d and 24-h FRs were evaluated in 24 and 20 test subjects, respectively. Goodness of fit (R^2, linear regression analysis) was used to assess accuracy of estimates in the individual and slope to assess accuracy in population assessment. A pilot study using 24-h FRs was conducted to assess dietary Ca and Mg intake in Chinese females residing in Singapore below the age of 55 years (n=31) and 55 years and above (n=24).

Results: Both types of record were found to be suitable to estimate Ca and Mg intakes in the target population (Table 1, Fig. 1). Assessment of individual Mg intake requires 3 day food records. Mean Ca intake was 359±45 mg/day in Singaporean Chinese women <55 years and 684±97 mg/day in subjects >55 years. Mean Mg intake was 153±18 mg/day and 205±15 mg/day in the same age groups. Differences in mineral intake between age groups was statistically significant for Ca (p=0.002) but not for Mg (p=0.08).

Table 1 Assessment of acuracy of FRs for estimation of Ca and Mg intakes.

	Slope		R^2	
FR Type	3-d	24-h	3-d	24-d
Ca	1.00	0.94	0.9019	0.7419
Mg	0.96	1.00	0.7432	0.4795

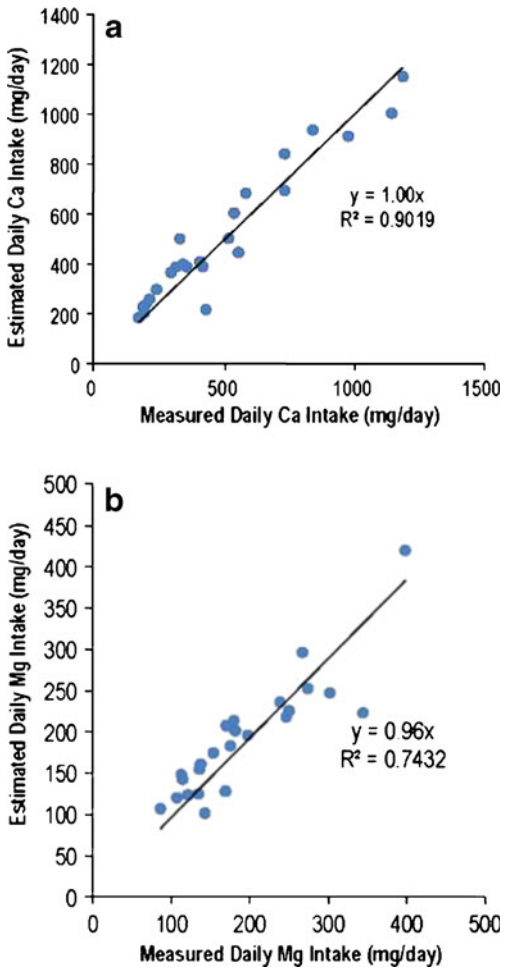

Fig. 1. Measured vs. estimated Ca (A) and Mg (B) intakes base on 3-day FRs. Goodness of fit (R_2) is indicative of bias for assessments in the individual and slope for bias in populations (linear regression lines, forced through origin).

Conclusions: WHO recommended nutrient intakes (RNI) of Ca are 1000 mg/day for adults 19-50 years and 1300 mg/day for adults >51 years. RNI for Mg is 220 mg/day in both age groups. Finding from our pilot study indicate that Ca intake of Singaporean Chinese is well below current WHO recommendations while Mg intakes were found to be suboptimal. Low Ca intakes in younger females could be related to differences in dietary habits between age groups and/or a greater awareness of the role of Ca in bone health in the elderly.

Disclosure of Interest: None Declared

P154
BONE MINERAL DENSITY IN INDIAN PATIENTS WITH HIP FRACTURE

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Aims: Limited data are available regarding risk factors for hip fracture in India especially BMD. Therefore, this preliminary study was done to evaluate osteoporosis as a risk factor for hip fracture in Indian patients with hip fracture.

Methods: 25 consecutive patients with a fresh hip fracture admitted to our hospital, were enrolled in the study. The levels of serum 25-hydroxyvitamin D (25-OH-D), intact parathyroid hormone (intact PTH), alkaline phosphatase (ALP), albumin, serum calcium and serum phosphorus were examined in these patients. Hypovitaminosis D was defined as serum 25(OH)-D <20 ng/dl. The upper normal limit for serum intact PTH was taken as 54 pg/dl. BMD of the nonfractured hip and lumbar spine was measured using a DXA scan. DXA scan also done in similar number of age and sex matched healthy controls for comparison of BMD at hip joint and lumbar spine.

Results: The mean (SD) levels of serum calcium, phosphate and alkaline phosphate were 8.6 (0.7) mg/dl, 3.7 (0.9) mg/dl and 289 (126) IU/L, respectively, in the hip fracture group. The similar the mean (SD) values of serum 25 (OH)D, and PTH were 12.83 (7.27) ng/ml and 106 (98) pg/ml, respectively. Among the hip fracture group vitamin D deficiency occurred in 21 patients (84%), and secondary hyperparathyroidism was observed in 18 patients (72%). The BMD (BMD) and the *T*-score at hip and lumbar spine were significantly lower in the hip fracture group compared to controls (0.538 g/cm^2 vs. 0.824 g/cm^2; p*value < 0.001 and 0.703 g/cm^2 vs. 0.893 g/cm^2; p-value=0.001, respectively). Similarly BMD - *T*-score at hip and lumbar spine were significantly lower in the hip fracture group compared to controls (−3.1 vs. −1.2; p-value < 0.001 −2.6 vs. −1.7; p-value < 0.005, respectively). Osteoporosis defined as *T*-score<−2.5 was observed in 92% of patients in hip fracture group and in 24% of control group.

Conclusions: Majority of patients with hip fracture in India have osteoporosis, vitamin D deficiency with secondary hyperparathyroidism. Further studies involving larger number of patients are required to confirm these findings.

Disclosure of Interest: None Declared

P155
SERUM LEVEL OF UNDER-CARBOXYLATED OSTEOCALCIN AND BONE MINERAL DENSITY IN EARLY MENOPAUSAL WOMEN

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Aims: Serum level of under carboxylated osteocalcin (ucOC) is considered a sensitive measure of vitamin K status and ucOC levels are associated with BMD and fracture risk in elderly persons. The aim of this study was to assess the relationship between ucOC and BMD in early menopausal Norwegian women.

Methods: The data reported come from the baseline measurements in a double-blinded placebo-controlled randomised trial comprising 334 healthy women between 50 and 60 years, 1–5 years after menopause, not using warfarin or medication known to affect bone metabolism. Total hip, femoral neck, lumbar spine and total body BMD and serum level of ucOC were measured and information of lifestyle was collected through questionnaires. The association between ucOC and BMD at all measurement sites was assessed by multiple regression analyses with log transformed ucOC as independent variable adjusting for possible confounding variables.

Results: In multiple regression models including years since menopause, smoking status and weight or BMI, serum level of ucOC was a significant and negative predictor of BMD at the femoral neck (p=0.01), the total hip (p=0.02) and total body (p=0.026), but not at the lumbar spine (p=0.14). The multiple regression model explained 14% of the variation of the femoral neck BMD.

Conclusions: Despite the low explanatory power, the conclusion is that women in the menopausal period should ensure adequate vitamin K nutritional intake.

Disclosure of Interest: None Declared

P156
HIGH PREVALENCE OF SUBCLINICAL OSTEOMALACIA IN YOUNG NORTH INDIAN HEALTHY ADULTS

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Aims: Hypovitaminosis D is highly prevalent in Indian subcontinent. We aimed to study the clinical impact of hypovitaminosis D in North Indian young healthy adults.

Methods: Randomly selected 151 healthy adult subjects (females 100, males 51, mean age=26±5 years) underwent a proforma based clinical evaluation with emphasis on bone and mineral metabolism. Assessment of calcium by food frequency questionnaire was made. BMD was measured at total hip, ultradistal forearm and lumbar spine (L1–L4) by DXA (Hologic-4500/W). Serum total calcium, inorganic phosphorus, alkaline phosphatase, creatinine, albumin, $25(OH)D_3$, iPTH (IRMA), were measured. Bone turnover was assessed by estimations of serum Cross laps, mid-osteocalcin and bone specific alkaline phosphatase

Results: Median (IQ) daily dietary calcium intake was 390 (303–518) mg and 350 (258–435) mg in males and females respectively. Serum calcium, phosphorus, albumin and creatinine were normal in all subjects. Biochemical osteomalacia (S. alkaline phosphatase >150 IU/L) was seen in 27% of subjects. The prevalence of hypovitaminosis D (serum level <20 ng/ml) was 83%. Only 11% of subjects with hypovitaminosis D had elevated PTH. Low BMD (*Z*-score at the hip or spine ≥−2.0) was present in 17%. Median (IQ) levels of serum BAP was 24 (20–28) U/L; serum N mid osteocalcin level was 11 (8–15) ng/ml and serum cross laps was 0.4 (0.3–0.6) ng/ml. Elevated serum levels of BAP, N mid osteocalcin and cross laps were seen in 21%, 0.7% and 19% respectively. There was no significant correlation between bone markers and BMD. BMD was predicted by anthropometric variables like height, weight and BMI.

Conclusions: Young Indian healthy adults have high prevalence of hypovitaminosis D and subclinical osteomalacia despite abundant sunshine. Vitamin D food fortification as a public health measure needs to be undertaken

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Disclosure of Interest: None Declared

P157
SERUM VITAMIN D AND THE PHALANGEAL BONE MINERAL DENSITY AMONG HEALTHY PRE-MENOPAUSAL WOMEN IN SRI LANKA

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Aims: The present study assessed the prevalence of vitamin D deficiency among healthy pre-menopausal women aged 20–40 years and the effect of hypovitaminosis D on phalangeal BMD measured by AccuDXA. AccuDXA measured bone mineral content (BMC) and BMD in the middle phalanx of the middle finger, a site rich in cortical bone in the appendicular skeleton.

Methods: We measured serum vitamin D (25-vitD) and parathyroid hormone (PTH) concentrations and assessed their associations with phalangeal BMD and anthropometry among healthy middle aged women (n=434), selected randomly from the Galle district in southern Sri Lanka.

Results: Mean (SD) age of women was 32.8 (5.3) years while mean (SD) phalangeal BMD was 0.493 (0.060) g/cm^2 (range; 0.230–0.660 g/cm^2) and mean BMC was 1.49 (0.28) g (range; 0.85–2.36 g). Median (interquartile range) of serum vitamin D and PTH concentrations were 30.86 (15.61–52.37) nmol/l and 52.00 (30.80–70.00) pg/ml, respectively. Among study subjects the prevalence of severe (<12.5 nmol/l), moderate (12.5–25.0 nmol/l) and mild (25.0–35.0 nmol/l) vitamin D deficiency were 21.4%, 19.1% and 15.7%, respectively. Serum vitamin D showed significant positive correlations with BMD (r=0.13, p=0.008) and BMC (r=0.12, p=0.01) while serum PTH showed significant negative correlations with BMD (r=−0.16, p=0.001) and BMC (r=−0.15, p=0.002). Furthermore, a significant negative correlation was seen between PTH and vitamin D (r=−0.62, p=0.001) concentrations. In contrast to women in the lower tertile of vitamin D, women in the upper tertile were shorter, having higher BMD and lower PTH level. BMC, weight and BMI showed no difference in the tertiles of vitamin D. Women with lower vitamin D had higher PTH level and women with higher vitamin D had lower PTH level. Furthermore, PTH showed a trend across the tertiles of vitamin D. Regression model was fitted with PTH as the dependent variable and vitamin D as the independent variable to assess the relationship of these two variables. Using the regression equation (intercept = 73.08 and gradient=−0.62), rising of PTH above 65.0 pg/ml was seen at the vitamin D level of 13.02 nmol/l. Ninety six subjects (22.1%) of our sample had vitamin D

levels <13.02 nmol/l. Among them, 76% of subjects (n=73) had elevated PTH (>65 pg/ml). Other 24% (n=23) had mean PTH concentration of 51.64 pg/ml (median of 58.00 pg/ml).

Conclusions: Vitamin D deficiency is prevalent among healthy premenopausal women in Sri Lanka similar to other South Asian countries. The corresponding rise in serum PTH among them indicated that the low levels of vitamin D observed is not a mere biochemical finding but has definite metabolic consequences. This was further strengthened by finding lower phalangeal BMD/BMC among vitamin D deficient subjects. The positive correlation of vitamin D levels with their BMD and BMC levels merits further investigations to examine the clinical relevance of asymptomatic vitamin D deficiency.

Disclosure of Interest: None Declared

P158
THE RELATIONSHIP BETWEEN OSTEOPOROSIS AND BREAST ARTERIAL CALCIFICATION IN JAPANESE POSTMENOPAUSAL WOMEN

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Aims: Breast arterial calcification (BAC) is common but unreported findings on routine screening mammography. BAC is reported to be associated with an increased prevalence of both cardiovascular risk factors and cardiovascular morbidity. Moreover, increased osteoprotegerin (OPG) levels have been consistently associated with the incidence and prevalence of coronary artery disease. However, little is known about plasma OPG levels in postmenopausal women with breast arterial calcification. The aim of this study is to clarify the relationship between plasma osteoprotegerin levels and breast arterial calcification in osteoporotic postmenopausal women.

Methods: This study was carried out in 51 postmenopausal women aged 46–82 years who underwent screening mammography. Each mammogram was reviewed for the presence of arterial calcifications. Participants were divided into four groups of the number of calcified vessels including, 0BAC: no calcification, 1BAC: one calcified vessel, 2BAC: two calcified vessels and >3BAC: more than three calcified vessels. BMD was measured in accordance with established osteoporosis screening guidelines and assessed in the lumber spine (L2–L4) and total hip using DXA on a Hologic QDR4500 (Hologic, Waltham, MA). Serum OPG, alkaline phosphatase (Alp), low density lipoprotein-cholesterol (LDL-C), high density lipoprotein-cholesterol (HDL-C) and urinary type I collagen cross-linked-N-telopeptide (uNTX) were measured.

Results: The mean age of these 51 women was 64.5+1.1 years-old, 0BAC; n=25, 1BAC; n=11, 2BAC; n=8 and >3BAC; n=7. Thus, of the 51 women, 26 (51.0%) had BAC. The prevalence of low bone density (osteopenia) and osteoporosis was 33.3% and 56.9%, respectively. The prevalence of BAC was 58.6% in osteoporosis and 47.1% in osteopenia higher than 20.0% in women without osteopenia and osteoporosis. In the subgroups of BAC, BMD in >3BAC group was clearly decreased, and serum OPG levels were significantly higher in >3BAC group compared with those in 0BAC group. In addition, the prevalence for vertebral fractures was 61.5% in women with BAC higher than those in without BAC (37.5%). In contrast, serum Alp, the ratio of LDL-C/HDL-C and uNTX were not significantly changed, increasing the number of BAC in postmenopausal women.

Conclusions: In conclusion, the prevalence of BAC in Japanese postmenopausal women was remarkably high in osteopenia and osteoporosis. Especially, the result in the subgroups of BAC showed that OPG was increased in severe calcification of breast artery, suggesting that BAC may be associated with surrogate markers of reduced BMD and subclinical cardiovascular disease including coronary artery calcification.

Disclosure of Interest: None Declared

P159
ASSOCIATION BETWEEN SLEEP DURATION AND BONE MINERAL DENSITY IN CHINESE WOMEN

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Aims: Short sleep duration has been found closely related to several endocrine and metabolic dysfunctions. However, evidence on the association of insufficient sleep with bone health was limited. The present study aims to examine the relationships of sleep duration with total and regional BMD in Chinese women.

Methods: 602 women aged 18–80 years were analyzed. Sleep duration was collapsed to form categories of 5 h or less, 6, 7, 8 and 9 h or more. Total and regional BMD were measured using DXA. Multiple regression analysis was performed to examine the relationships of sleep duration categories with total and regional BMD after controlling for covariates. 8 h of sleep was set as reference in the models.

Results: Women with short sleeping duration were more likely to have lower total and all body regional BMD. The

trend unchanged even after adjusting potential covariates in three regression models. Compared to 8 h sleeping, individuals who slept 5 h or less and 6 h had significant lower total and regional BMD. When further divided women into 18–44 years old group and 45 years or older group, and rerun the regression model, the results were almost identical in 45 years or older group.
Conclusions: Significant variations in total and regional BMD with sleep duration were observed in women. Decreased sleep duration had a negative association with BMD, especially in middle-age and elderly women. These findings may lead to the development of better preventive approaches to osteoporosis in women through identification of potential modifiable risk factor.
Disclosure of Interest: None Declared

P160
RISK FACTORS FOR SPINAL OSTEOPOROSIS IN URBAN IRANIAN WOMEN

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Aims: In this study we aimed to define and compare the risk factors of spinal and femoral osteoporosis in postmenopausal Iranian women.
Methods: The sample was selected from all postmenopausal women whose BMD was measured in selected centers during the study period (2002–2005). In this study all the spinal (L1–L4) osteoporotic women were recalled and interviewed upon their consent to participate as case groups (140 women). Controls included women with normal spinal BMD as definition of WHO created from the centers' databases during the study period (167 women). BMD was measured by axial DXA using a Lunar DPX machine and *T* value was computed using the WHO classification. Data collected for this study included filling questionnaires through personal interviews, Estimation association of risk factors with spinal osteoporosis has been calculated by Odds Ratio, and Multiple Logistic Regression Analysis has been used in the different risk factors for adjustment the most relevant factors: age, weight, height.
Results: The significant ($p<0.05$) risk factors for spinal osteoporosis in present study population with their Odds ratios (in parenthesis) were as follow respectively:), History of fracture in relatives:(4.6), education <12 schooling years (2.3), duration of menopause >5 years: (2.1), History of fracture (2.5), weight <60 kg (2.7) (2.4), BMI<25 (3.2) (3) high consumption of salt (2.5). Regular consumption of milk (0.4) (0.3), chicken (0.5) tea >7 cup/d (0.3) and also regular exercises (0.4) sunlight exposure (0.4) and HRT (0.4) appeared to be significant protective factors in spinal region. Parity >3 (2) and lactation duration >2 yrs (1.9) also appeared to be significant risk factors for spinal osteoporosis.
Conclusions: Spinal osteoporosis, in this study appears to be associated with several similar known risk factors. This study indicates the direction for public health strategies for osteoporosis prevention in countries like Iran.
Disclosure of Interest: None Declared

P161
REPRODUCTIVE FACTORS AND OSTEOPOROSIS IN INDIAN AND IRANIAN POSTMENOPAUSAL WOMEN

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Aims: In this study we aimed to assess the association between reproductive factors and osteoporosis in postmenopausal women from selected BMD centers of two developing Asian countries (Iran and India).
Methods: In this study we have used from the data of a multicenter interview-based study conducted in selected hospitals and health centers from urban areas in Iran and India. The case group included postmenopausal osteoporotic women who were identified as) by using DXA method. The controls were chosen from postmenopausal women with normal bone density matched in age group with cases. The sample sizes included from Iran a total of 363 subjects (178 osteoporotic and 185 normal) and from India a total of 354 subjects (203 osteoporotic and 151 normal).
Results: The significant ($p<0.05$) reproductive risk factors in present study population with their Odds Ratios (in parenthesis, respectively in Iran and India) were as follow: duration of menopause >5 years: (2.76) (1.92), Menarche age (after 14 years): (1.92) (4.50), Menopause age (<45 years): (1.86) (2.49), Parity >3: (1.80) (1.88), HRT (0.43) was shown as protective factor and duration of lactation >4 years (1.7) was found as a risk factor in Iran. There were no significant differences in association of risk factors and osteoporosis between Iranian and Indian subjects
Conclusions: There were no significant differences in association of risk factors and osteoporosis between Iranian and Indian subjects. Grand multiparity and long lactation duration are associated with osteoporosis
Disclosure of Interest: None Declared

P162
THE INCIDENCE OF OSTEOPOROTIC HIP FRACTURE IN IRAN, A REVIEW

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Aims: Despite having valid bone density values for different groups of the Iranian population, comprehensive information regarding the osteoporotic hip fracture rate does not exist. This review, therefore, aimed to combine the incidence of osteoporotic hip fracture in different areas of Iran.
Methods: Iranian scientific databases (SID: www.sid.ir and IRAN MEDEX: www.iranmedex.com) along with MEDLINE and EMBASE were searched for articles published between 1 January 1990 and 31 December 2009 using terms including "hip", "osteoporosis" and "fracture". Retrospective, cross-sectional and cohort studies which were conducted as population-based researches were included. Studies which have reported information solely regarding traumatic (injury) hip fracture, on the other hand, were excluded. The number of the fracture cases, their sex and age, the location and type of the study were extracted. The incidence of osteoporotic hip fracture was thereafter calculated in 100,000 individuals aged over 50 years. The total elderly population aged >50 years old data were obtained from Statistical Center of Iran in the study period.
Results: A cohort study on Tehran population as well as four retrospective cross-sectional studies conducted in Golestan province, Zanjan, Tabriz and Kashan were included in the review protocol. All of them were reported to be retrospective studies carried out based on hospital records. The annual incidence of osteoporotic hip fracture ranged 15.3/100,000 to 769.2/100,000. The female to male ratio varied from 0.89 to 2.1.
Conclusions: Unfortunately, there is no operating system to collect osteoporotic hip fracture data in Iran. The present review revealed that the incidence of osteoporotic hip fracture in Iran is lower than that in Western countries (American and European). Further studies are needed to discover the main causes contributing to the low incidence rate reported in our study.
Disclosure of Interest: None Declared

P163
EFFECT OF EXERCISE ON BONE DENSITY AND RISK OF FRACTURES IN ELDERLY HIGH-RISK WOMEN—FOLLOW-UP OF A POPULATION-BASED RANDOMISED CONTROLLED TRIAL

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Aims: Previously, we conducted a population-based, randomized, controlled 30-month exercise trial that was aimed at reducing the risk factors for factures in high-risk elderly women. The exercise regimen consisted of impact, balance and lower extremity training. The aim of the present extended follow-up of the trial was to assess the long-term effect of the chosen exercise regimen on bone density and its impact on the risk of fragility fractures in elderly women with low bone density.
Methods: A birth cohort of 1689 women aged 70 to 73 were invited to the radius and hip BMD measurements; 96 women were excluded due to medical reasons; 160 women with the radius and hip BMD value of more than two SD below the reference value were included in the original trial. The women were randomly assigned to an exercise group (EG) and a control group (CG). Both groups were followed-up approximately 3 years after the final measurements, and the mean total follow-up was 7.1 years. Areal BMD and bone mineral content (BMC) measurements were performed annually. Seven-year incident fragility fracture data on hospital treated fractures was collected from Hospital Discharge Registers. Information on the date and cause of death was taken from the Cause of Death Register located at Statistics Finland.
Results: Hip and radius BMD and BMC decreased similarly over time in both groups. There were 17 hospital treated fragility fractures during the total follow-up period from baseline to the final visit in the EG, while there were 23 fractures in the CG (Poisson IRR 0.68; 95% CI 0.34–1.32, $p=0.02$). Fractures were located more proximally in the CG than in the EG. 47% of all fractures were proximal among the control women and 18% in the exercise group, respectively ($p=0.02$). There were no hip fractures in the EG while there were five hip fractures in the CG (incidence rate difference, $p=0.02$). One woman in the EG and eight women in the CG died during the follow-up period ($p=0.01$).
Conclusions: Mainly home-based supervised exercises followed by voluntary home training seem to have little effect on BMD, but it may protect high-risk elderly women from hip fractures. Regular daily physical activity should be recommended in elderly women.
Disclosure of Interest: None Declared

P164
USE OF AN ULTRASOUND SCREENING PROGRAMME TO UNDERSTAND THE RISK OF POOR BONE HEALTH IN INDONESIAN MEN AND WOMEN

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Aims: Bone density measurements by DXA are not feasible for large population studies, whereas portable ultrasound heel scanners can provide a practical way of collecting information on bone health status. We now have heel scan data from a large self-selected Indonesian population which provides a snapshot of their bone health status, and have taken the opportunity to compare this ultrasound data with DXA results from a previous study in Indonesia (1).

Methods: The Lunar Achilles (GE Healthcare) heel scanner was made available in several public centres in Indonesia and men and women were invited to have their heel scanned: 81,457 women and 35,712 men aged ≥21 years old had *T*-scores recorded against the Asian database provided with the heel scanner. A subset of this data (matched for gender and age) was compared to results obtained from baseline DXA results of 76 postmenopausal women in an intervention study in Jakarta (1).

Results: On average, the *T*-score for 20 year old men and women was already below 0. The mean *T*-score showed a slow decline between 0 and −1.0 up to the age of 50 for both women and men. The women showed a rapid decline from age 51 onwards, reaching a mean *T*-score of ≤−2.5 at about 66–70 years of age. The *T*-score for men continued the slow decline after 50 and reached a mean of ≤−2.5 at about 76–80 years, 10 years later than the women. Heel scans for women of similar ages to the intervention study (49–68 yo) showed that a significant proportion (40.6%) had osteopenia, and 23% were classified as osteoporotic according to ultrasound. The results from DXA in Indonesian women of similar age are reported for comparison in Table 1.

Table 1: Comparison of heel scan and DXA classifications for 49 to 68 year old Indonesian women.

	Subjects	Age	Normal	Osteopenia	Osteoporosis
FN BMD	76	49 to 68	38.2%	59.2% [a]	2.6% [c]
LS BMD	76	49 to 68	31.6%	50.0% [ab]	18.4% [d]
Heel scan	20945	49 to 68	36.4%	40.6% [b]	23.0% [d]

[a,b,c,d] Results within a column with the same letter are not significantly different ($P<0.05$)

Conclusions: The Indonesian heel scan data shows a high degree of poor bone health in both men and women, probably as a result of only reaching low peak bone mass during early adulthood. For older women, classifications of osteopenia and osteoporosis were similar from heel ultrasound and lumbar spine BMD by DXA. The high incidence of poor bone health raises concern about the possible increase in fractures with ageing and the expected burden on the public health system.

References: 1 Kruger MC et al. Bone 2010;46:759

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Disclosure of Interest: None Declared

P165
THE CORRELATION OF BMD AND LIPID LEVELS IN KOREAN POSTMENOPAUSAL WOMEN

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Aims: Epidemiological studies suggest a positive relationship between cardiovascular diseases (CVD) and osteoporosis, where lipid has been indicated to be a possible link, but only a few studies have investigated the relation between lipids and BMD, but the association remains unclear.

Methods: We studied the relationship between serum lipids and BMD of lumbar spine (L-spine) and femoral neck in Korean postmenopausal women. We included 60–65 aged, postmenopausal women visited Pusanpaik hospital for heath checkup and took informed consent in 2009. People having other underlying medical disease were excluded, and 200 women were analysed. Lipid levels such as total cholesterol (TC), triglyceride (TG), high-density lipoprotein cholesterol (HDL-c) and low density lipoprotein cholesterol (LDL-c) were checked using fasting serum sample. BMD was measured by DXA (Prodigy Advance TM, GE-lunar, Madison, WI, USA).

Results: Mean of L-spine BMD was lower than that of femoral neck (L-spine vs. femoral neck;−1.55±1.413 vs. −1.04±0.861, $P=0.00$). No association was found between lipid levels (TC, TG, HDL-c, and LDL-c) and value of L-spine and femoral neck BMD by regression analysis. When BMD was ranked as osteoporosis, osteopenia and within normal range (WNR) of BMD by ISCD guideline, only ranked L-spine BMD had the significant relationship with LDL-cby ANOVA ($P=0.48$). Women in osteopenia had a significantly higher LDL-c levels compared with women in osteoporosis and WNR (LDL-c; 116.75±37.780 in osteo-

porosis, 130.38±39.832 in osteopenia, and 116.73±34.189 in WNR, osteoporosis vs. osteopenia; P=0.042, osteopenia vs. WNR; P=0.038).

Conclusions: Our analysis showed that LDL-c in lipid profile was related with ranked BMD, but it in even osteoporotic women was lower than in osteopenic women. These results indicate that lipid levels do not explain the association between osteoporosis and CVD. The larger and well designed study adjusted for confounding factors such as nutrition is needed for the confirmation of this result.

Disclosure of Interest: None Declared

P166
BODY FAT MASS IS A PREDICTOR OF RISK OF OSTEOPOROTIC FRACTURES IN WOMEN BUT NOT IN MEN: RESULTS FROM THE EPIC-NORFOLK STUDY

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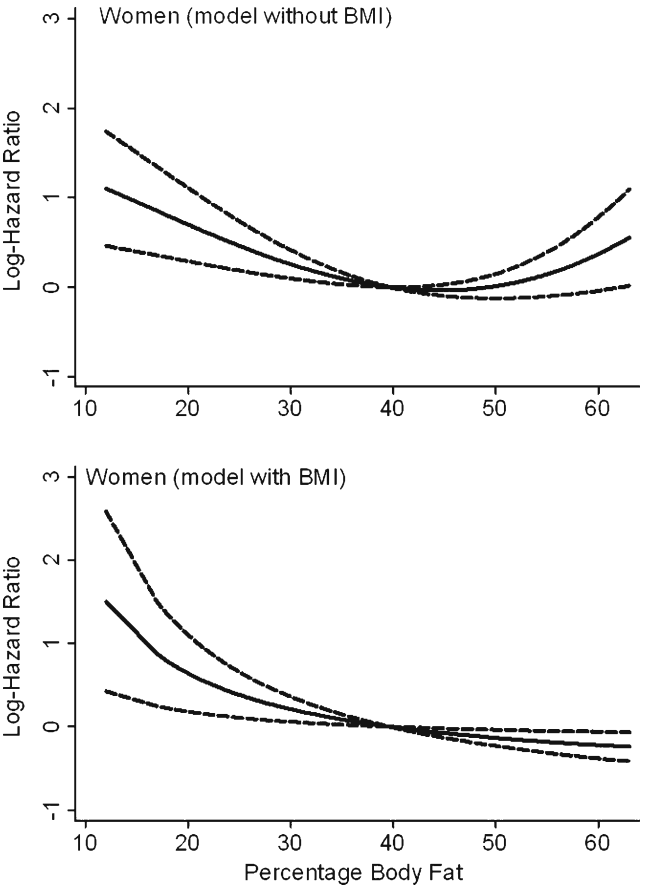
Aims: Body fat mass, an important index of obesity, has been linked to osteoporosis and fracture risk in different directions. This inconsistency between studies can be a result of ignoring potential non-linear nature of association between fat mass and bone health as well as use of surrogate outcomes (e.g., BMD) for fractures. We aimed to examine the association between percentage body fat (% BF) and prospective risk of fracture in the European Prospective Investigation into Cancer (EPIC)-Norfolk study.

Methods: %BF was measured using a validated bio-impedance technique in 1997–2000 and participants were followed for any incident fracture up to 2008. From 14,789 participants (6470 men) aged 42–82 years at baseline, 556 suffered a fracture (184 hip fractures) during 122,330 person-years of follow-up (mean 8.7±0.8 years). Fractional polynomial modelling was used to determine the shape of association between %BF and fracture risk with adjustment for known risk factors of fracture (age, height, history of fracture, smoking status, alcohol intake and broadband ultrasound attenuation of the heel) with and without adjustment for BMI.

Results: The prospective risk of hip fracture decreased linearly (in logarithmic scale) with rising %BF values among women. Effects of 10% decrease in %BF on risk of hip fracture was almost equal to 5 years increase in age and one SD (16 dB/MHz) lower BUA. In model without adjustment for BMI among women, the association between %BF and risk of 'any type of fracture' was a second-degree fractional polynomial curve with the lowest hazard seen around mean %BF of 40%. After adjustment for BMI, the association turned to a first-degree fractional polynomial with continuous but altering decrease in fracture risk with higher %BF (Figure). There was no significant association among men.

Figure: Association between %BF and risk of 'any type of fracture' among female participants of EPIC-Norfolk study (n=8319)



Conclusions: This study shows that increased body fat mass is associated with lower risk of fracture among women but not in men. The association is linear for hip fractures but of a nonlinear nature for other types of fracture. While low values of %BF are accompanied with substantially high risk of any fracture, high values of %BF are associated with moderately lower risk of fracture among women. Understanding differences in relationships between different indices of obesity (such as %BF and BMI) as well as sex interaction may help elucidate the metabolic and other underlying mechanisms involved in bone health and fracture risk.

Disclosure of Interest: None Declared

P167
C-REACTIVE PROTEIN PREDICTS INCIDENT FRACTURE IN COMMUNITY-DWELLING ELDERLY JAPANESE WOMEN: THE MURAMATSU STUDY

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Aims: While C-reactive protein (CRP), a systemic inflammation marker, is thought to be associated with osteoporosis, evidence supporting this claim has been limited. In this study, we aim to assess the association between CRP levels and incident osteoporotic fracture in elderly women.
Methods: We conducted a cohort study with a follow-up period of 6 years. The study included 751 Japanese women aged 69 years or older. We measured serum high-sensitivity CRP (hs-CRP) levels as a major predictor of osteoporosis. Covariates included age, BMI, forearm BMD, postural sway, calcium intake, serum 25-hydroxyvitamin D, postural sway velocity, osteoporosis medication, and physical activity. The primary outcome was incident limb and vertebral fractures. The Cox proportional hazards model was used to calculate the hazard ratio (HR) of fracture in relation to tertiles of CRP levels.
Results: Median hs-CRP-values in study participants were 0.16 mg/L in the lowest tertile, 0.36 mg/L in the medium tertile, and 1.14 mg/L in the highest tertile. The hs-CRP-values in these women were substantially lower than in their Caucasian counterparts. Limb or vertebral fractures occurred in 50 subjects during 4,250 person-years. Low CRP levels were associated with low incidence of limb or vertebral fractures (P for trend=0.0352). The adjusted HRs of fracture for the medium and highest quartiles of hs-CRP levels, compared to the lowest quartile, were 2.22 (95% CI: 1.02–4.84) and 2.40 (95% CI: 1.10–5.24), respectively.
Conclusions: CRP is a significant predictor of osteoporotic fracture in elderly Asian women, who have substantially lower CRP levels than Caucasians. Mechanisms explaining such an association should be further studied.
Disclosure of Interest: None Declared

P168
FRACTURE OCCURRENCE AMONG POSTMENOPAUSAL WOMEN WITH OSTEOPOROSIS

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Aims: To determine the occurrence of fractures among cohort of postmenopausal women with osteoporosis.
Methods: Data file of a cohort of postmenopausal women with osteoporosis in a tertiary osteoporosis referral center was retrieved from January 1999 to December 2008. Attempt to establish occurrence of fractures and its risk factors was done through telephone interview. Stata version 10 was used to generate descriptive statistics.
Results: A total of 1499 postmenopausal osteoporosis patients were retrieved from the database with only 322 available for interview. Among these, 234 readily agreed for the phone interview, 47 has died, while 41 declined the invitation. Majority of the patients were lost because of the following reasons: a) contact numbers not in service; b) patients have moved to other places of residence; c) no answer on the phone; d) no available contact numbers from the charts.
The mean age of participants pre-diagnosis was 67.08± 8.85 years mostly between 61 and 70 year age group. Filipino ethnicity comprised 88.46% of the subjects while the rest were Chinese and Caucasian. Other demographic data included normal BMI in 63.68%, natural menopause occurred in 75.21%, family history of osteoporosis in 10.26%, family history of fracture in 1.28%, diabetes mellitus 10.26%, and significant smoking history in 3.84%. Using the Osteoporosis Screening Tools for Asians (OSTA), 61.54% and 23.5% were in the medium and high risk categories respectively. More than half of them were on at least 500 mg calcium supplement daily. Among those interviewed, 28 (11.97%) sustained fracture with the mean age of 73.67±8.33 (range 59–89) years. Recurrent falls accounts for 25%. The most common site of fracture was femur in 21.43%, followed by lumbar spine 17.86%, forearm in 14.29% while 46.43% were classified as others. Only 7.14% underwent surgery. Other forms of treatment included placement of cast in 32.14%, pharmacologic intervention in 39.28%, body brace in 14.28%, and rehabilitation therapy in 7.14%. Pharmacologic therapies included antiresorptive agents like bisphosphonates in 67.85%, selective estrogen receptor modulator in 7.14%, strontium ranelate in 3.57%. Supplementation included calcium carbonate with vitamin D (39.28%), combination of calcium plus milk (25%), calcium alone (14.28%), milk alone (7.14%) while the rest 14.28% had none. Majority of them have been on exercise (57.14%) while (42.85%) are classified as having inactivity.
Conclusions: We have described the prevalence of fractures among a cohort of high risk postmenopausal women. Fractures do still occur despite intake of anti-osteoporosis medications. More studies need to be undertaken in order to better understand the complexities of the pathomechanisms of osteoporotic fractures.
Acknowledgements: This study is supported through unrestricted educational grant from the Rheumatology Educational Trust Foundation, Inc. (RETFI)
Disclosure of Interest: None Declared

P169
HYPOVITAMINOSIS D AMONG FEMALES OF MINIA GOVERNORATE, EGYPT

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Aims: In this study we aimed to examine the prevalence and determinants of hypovitaminosis D among females of Minia governorate, Egypt.
Methods: This is a cross-sectional study in which two hundred females aged from 17 to 76 years with a mean-SD of (38.96–13.7) from Makousa; a suburban village, Minia, Egypt; were randomly selected, screened and interviewed. Data was recorded concerning with vitamin D deficiency, clinical examination reporting nonspecific musculoskeletal pains as well as biochemical assay for serum 25-hydroxyvitamin D, alkaline phosphatase (ALP), and Parathormone (PTH). Hypovitaminosis D was defined by serum 25-hydroxyvitamin D concentrations <40 ng/mL. Multiple stepwise linear regression models were used to assess which determinants are dependant for hypovitaminosis D.
Results: Among the 200 females, 123 female (61.5%) had hypovitaminosis D (defined as 25-OHvit.D<40 ng/mL), while 77 female (38.5%) had desirable vitamin D levels (25-OHvit.D>40 ng/mL). Both PTH ($P<0.001$) levels and ALP ($P<0.001$) were significantly higher in females with hypovitaminosis D than those with desirable levels. Sun exposure duration, areas of skin exposed, and gravidity are the main determinants of vit D levels.
Conclusions: Hypovitaminosis D is prevalent in the Egyptian females, despite being in a sunny environment and rich available dietary resources. Community education and awareness must take place regarding dietary requirement of vitamin D, food rich with, specifically according to age group, even food fortification is recommended. Sun exposure duration, timing of the day and minimal area to be exposed, effect of repeated pregnancies as determinants of vitamin D level, should be also considered.
Disclosure of Interest: None Declared

P170
POOR KNOWLEDGE ABOUT OSTEOPOROSIS IN BRUNEIAN WOMEN ATTENDING AN ORTHOPAEDIC CLINIC

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Aims: To assess the level of knowledge about osteoporosis in Bruneian women attending an Orthopaedic clinic, study its association with menopausal status, family history of osteoporosis and history of fragility fracture and to identify the sources of knowledge.
Methods: 100 Bruneian women over 40 years of age attending an Orthopaedic clinic were recruited after obtaining informed consent. Knowledge of osteoporosis was assessed using the Osteoporosis Questionnaire (OPQ) [1]. Additional information was obtained on a separate proforma to study the association of knowledge level with menopausal status, family history of osteoporosis and history of fragility fracture.
Results: The mean±SD of age of the sample was 53.9± 7.4 years (range 40–77). The mean±SD total score with the OPQ was 0.92±3.91 (minimum −8 and maximum 10; minimum and maximum possible score on OPQ is −20 and 20, respectively). The scores in individual areas expressed as mean/SD/minimum/maximum/maximum possible were; General knowledge −0.03/1.8/-4/5/5; risk factors 0.37/2.2/-5/5/7; consequences 0.8/1.5/-3/4/4; and treatment −0.22/1.5/-4/3/4. In response to open questions, 43% provided a correct definition of osteoporosis, 24% and 41% were aware of the consequences and treatment options respectively. There was no impact of menopausal status, family history of osteoporosis or history of fragility fracture on the total score. The most common source of knowledge was TV/radio (37%) followed by magazines and newspapers (33%).
Conclusions: This study reveals lack of knowledge about osteoporosis in Bruneian women. This is evident in all the areas of knowledge tested. Information obtained through common media has been found to be inadequate and dangerous in some cases. There is need for education of Bruneian women about various aspects of osteoporosis. Medical personnel should be more involved in patient education. The OPQ can be used to identify subjects at risk of osteoporosis, who will benefit most from educational intervention.
References: 1. Pande KC et al., Maturitas 2000;37:75
Disclosure of Interest: None Declared

P171
KNOWLEGDE ABOUT OSTEOPOROSIS: REVIEW OF STUDIES REPORTING USE OF OSTEOPOROSIS QUESTIONNAIRE (OPQ)

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Aims: To review results of studies which have used Osteoporosis Questionnaire (OPQ) [1] to assess patients knowledge about Osteoporosis.

Methods: A literature search was conducted on Pubmed and Medline using search words 'Osteoporosis knowledge' 'patient education' and 'Osteoporosis Questionnaire' to identify relevant studies. The studies were reviewed for the site where study was conducted, sample size, variables studied and results. The OPQ is a 20 item, reliable and validated questionnaire to assess patient's knowledge in four areas comprising general knowledge, risk factors, treatment and consequences of osteoporosis. The minimum and maximum possible score is −20 and +20, respectively.
Results: A total of six studies were identified. The purpose of these has been to assess knowledge about osteoporosis, assess effect of educational intervention and study association with compliance with treatment. Deficiencies in knowledge have been recognized in all the studies in sample from UK, India, Czech Republic and Brunei Darussalam. No association of knowledge was seen with menopausal status, family history of osteoporosis, history of fragility fracture or compliance related outcomes. Level of knowledge was seen to correlate with education level as well as faculty and use of hormone replacement therapy. A significant improvement in score was reported after educational intervention in elderly rehabilitation in-patients with low-trauma fractures.
Conclusions: Generally poor knowledge about Osteoporosis has been noted in 'at risk' population from four different geographical areas using OPQ. OPQ can be used to identify subjects who will benefit from educational intervention and also to assess patient's knowledge of Osteoporosis after educational intervention.
References: 1. Pande KC et al., Maturitas 2000;37:75
Disclosure of Interest: None Declared

P172
LONG-TERM EFFECT OF EXERCISE ON EXTRASKELETAL RISK FACTORS FOR FRACTURES IN ELDERLY HIGH-RISK WOMEN—FOLLOW-UP OF A POPULATION-BASED RANDOMISED CONTROLLED TRIAL

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Aims: Previously, we conducted a population-based, randomized, controlled 30-month exercise trial that was aimed at reducing the risk factors for factures in high risk elderly women. The exercise regimen consisted of impact, balance and lower extremity training. The aim of the present extended follow-up of the trial was to assess the long-term effect of the chosen exercise regimen on balance, muscle strength, gait and functional ability in elderly women with low bone density.
Methods: A birth cohort of 1689 women aged 70–73 were invited to the clinical examination; 96 women were excluded due to medical reasons; All 160 women with the radius and hip BMD value of more than two SD below the reference value were included in the original trial. The mean total follow-up was 7.1 years. Body sway, grip and leg strength, mobility with Timed Up and go -test, gait speed, gait endurance and functional ability were measured annually. Symptoms of depression were ascertained with the Geriatric Depression Scale and cognitive functions were assessed with the Mini-Mental State Examination.
Results: Postural sway increased in both groups during the six-year follow-up, the increment being more pronounced in the control group (CG) (time-group interaction, $p=0.005$). The exercisers maintained their walking speed at the baseline level, while the women in the CG had a significant decrement in walking speed (group-time interaction, $p<0.001$). The difference between the groups in TUG -test was practically the same at baseline and at the final visit. Time-group interaction was significant both during the total follow-up ($p<0.001$) and post-intervention follow-up ($p=0.042$), mainly due to improvement within the exercisers during the intervention. During the trial, activities in daily living assessed with the Frenchay Activities Index showed a significant and similar decrease within the exercise group (EG) and CG, but during the total follow-up there was a group-time interaction in favour for the EG ($p=0.001$).
Conclusions: Mainly home-based supervised exercises followed by voluntary home training seem to have a long-term effect on many important extraskeletal risk factors of hip fractures. Regular daily physical activity should be recommended in elderly women.
Disclosure of Interest: None Declared

P173
BONE MINERAL DENSITY IN POSTMENOPAUSAL WOMEN WITH OSTEOPOROTIC FRACTURES

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Aims: This research was aimed at studying the bone tissue state among postmenopausal women with osteoporotic fractures.
Methods: The total of 160 postmenopausal women 45–79 years old (average age—63,4±0,7 years; average duration of menopause—14,4±0,7 years). The patients were divided into two groups: group A—women ($n=100$, average age—63,2±0,9 years) without osteoporotic fractures, group B—women ($n=60$, average age—65,5±1,2 years) with osteoporotic fractures in their anamnesis.

The questionnaire; measurement of anthropometrical characteristics (height, mass, BMI); BMD, *T*- and *Z*-scores of the spine (L1–L4), proximal femur (neck, trochanter and total femur regions), and radial shaft (ultradistal and 33% regions) were defined with Dual-energy X-ray absorptiometer "Prodigy" (GE Medical systems, 2005).

Results: All indexes on different regions of skeleton using X-ray absorptiometry in postmenopausal women with osteoporotic fractures were significant lower ($p<0,001$) compared the data of women without osteoporotic fractures: total body—BMD: 0,999±0,015 g/cm^2 and 1,097±0,010 g/cm^2, *T*-score: −1,59±0,18 and −0,34±0,12, *Z*-score: −0,81±0,15 and −0,06±0,09; spine (L1–L4)—BMD: 0,909±0,023 g/cm^2 and 1,094±0,017 g/cm^2, *T*-score: −2,26±0,20 and −0,78±0,14, *Z*-score: −1,18±0,18 and −0,02±0,13; femoral neck—BMD: 0,780±0,016 g/cm^2 and 0,886±0,014 g/cm^2, *T*-score: −1,88±0,11 and −1,09±0,01, *Z*-score: −0,59±0,10 and −0,05±0,09; trochanter region of femur—BMD: 0,696±0,017 g/cm^2 and 0,819±0,016 g/cm^2, *T*-score: −1,35±0,15 and −0,36±0,12, *Z*-score: −0,42±0,14 and 0,33±0,11; total femur region—BMD: 0,839±0,019 g/cm^2 and 0,968±0,016 g/cm^2, *T*-score: −1,29±0,16 and −0,27±0,12, *Z*-score: −0,33±0,13 and 0,45±0,11; ultradistal region of radial shaft—BMD: 0,299±0,008 g/cm^2 and 0,352±0,08 g/cm^2, *T*-score: −2,12±0,20 and −0,77±0,19, *Z*-score: −0,74±0,21 and 0,39±0,18; 33% region of radial shaft—BMD: 0,562±0,013 g/cm^2 and 0,648±0,010 g/cm^2, *T*-score: −2,13±0,18 and −0,96±0,12, *Z*-score: −0,69±0,16 and 0,18±0,12, accordingly.

Conclusions: Low BMD on different regions of skeleton is significant predictor of osteoporotic fractures in postmenopausal women.

Disclosure of Interest: None Declared

P174

1842 HIP FRACTURES TREATED IN MALMÖ, SWEDEN DURING THREE DECADES

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Aims: This is another report from the hospital in Malmö on hip fractures focusing on describing secular changes in patient back-ground data as well as the demographic changes from the city of Malmö during three decades.

Methods: All the patients were consecutively analyzed during 12 months periods and interviewed during the time in hospital by one and the same investigator. The material consists of 615 hip fractures from 1983 to 85, 596 from 1994 to 631 from 2003 to 4. The mean age was 77-78-78 years among the men and 80-82-82,5 years among the women. The patients characteristics preoperatively as well as their mortality are described and compared between the three time-periods.

Results: The incidence today and in the 80's are 36/76 fractures among 10.000 men/women over 50 years. The proportion of cervical hip fracture in the 80's was 53%, 45% in the 1990's and 50% in the 2000's. patients coming from own homes increased from 66% to 71%. The percentage of patients without home-aid was 46% in the 90's, today it is 38% and resembles that of the 1980's (35%). 71% today need walking-aid, it was about 50% in the previous decades. The proportion that stays indoors was 38% in the 80's compared to 21% in the 90's and 36% today. Diabetes increased—from 6% to 8% to 11%. This is age-dependent as well as the increase in stroke as a concomitant disease which is present in 16% today. The percentage of dementia and stroke is today 16% each, Mb Parkinson 4% and epilepsy 3%. Heart-lung disease has gone from 43%, 51% to 49% of the cohorts. In the 1980's and the following decades the percentage of moderate trauma were 91%, 89% and 92%. A previous hip fracture had 11% in the 1980's, 15% in the 90's and 10% today. The mean number of days in hospital was 27 days in the 1980's, 15 in the 90's and today 10 days. The mortality rate within one year lies steady around 24%.

Conclusions: The population in the city of Malmö, Sweden as well as the hip fracture patients seems to have been even more dependent and unhealthy during the 90's both compared with the 80's and today. Maybe increased poverty, malnutrition and morbidity among the population in Malmö born during and after WW1 contributed to the increased number of hip fracture and the status of the patients in the 90's. In such case our healthier aged population and prophylactic measures of today regarding lifestyle and falling can even more reduce the number of hip fracture in the future.

Disclosure of Interest: None Declared

P175

BONE DENSITY TEST RESULTS IN SOUTH INDIAN ADULT POPULATION : AN ANALYSIS OF HOSPITAL DATA

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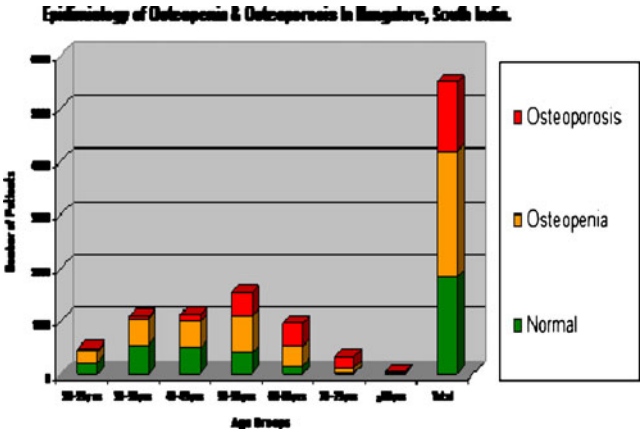
Aims: To understand the epidemiology of osteopenia and osteoporosis among adult patient (>18 years) population of a mid sized hospital in a metropolitan city Bangalore, South India.

Methods: Retrospective BMD results, using DXA, estimated at different sites (AP spine, Dual Femur and Forearm). *T*-score & *Z*-score derived. Derived *T*-score was classified into Normal (+1 to −1), Osteopenic (less than −1

to −2.5) and Osteoporotic ranges (less than −2.5). *Z*-scores were also derived and correlated with the Caucasian reference database.

Results: Of 5490 case-patients who underwent routine or referral testing, the median age was 50 years (range: 20–90 yrs), 2926 (53%) were females and the median lowest BMD *T*-score (LBMDT) was −1.5 (range: −9.1 to 3.4). Of the 3691 (67.2%) diagnosed with abnormal BMD *T*-score, 43.4% were osteopenic and 23.8% osteoporotic. Of the 2382 case-patients with osteopenia, 48.7% were females. 967 patients (40.6%) were in the 45–64 age range and 949 patients (39.8%) were in the 20–44 age range when compared to the 466 patients who were ≥65 yrs age range (19.6%) [$P<0.001$]. Among the 1309 case-patients with osteoporosis, 77.6% were females, and 662 patients (50.7%) were above the ≥65 years range. The median lowest BMD *Z*-score (LBMDZ) was −1.2 (range: −8.2 to 4.6). Out of the total number of cases, 410 patients 7.5% had an abnormal Z score of below—3.0.



Conclusions: Though incidence and prevalence of osteoporosis is not yet available in the Indian population, this is the first study that has evaluated such an extensive sized adult population. Our study shows that osteoporosis is very common in Bangalore (South India). The total number of patients with normal bone density decreases as age increases. Among those with osteopenia, males and females seemed to be almost equally affected, while among those with osteoporosis, females were predominantly affected. Osteopenia seemed to be more common among the younger age range (+30 +40, +50). However osteoporosis seemed common in the older age range (50+ & 60+) age group. This correlates with the natural progression of disease as age advances. Therefore osteopenia cases should be easily recognized early on in age and recommended stronger measures to prevent progression into osteoporosis, particularly in the female population. When these results were compared to the available ICMR data (Indian Council of Medical Research), good correlation can be derived in terms of prevalence of osteopenia & osteoporosis in the Indian population.

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Disclosure of Interest: None Declared

P176
PREVALENCE OF 25-HYDROXYVITAMIN D DEFICIENCY IN PATIENTS OF NEWLY DIAGNOSED MULTIPLE MYELOMA IN A TERTIARY CARE SETTING

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Aims: To assess the prevalence of 25-hydroxyvitamin D (25OHD) deficiency in patients of newly diagnosed Multiple Myeloma (MM) and its correlation to severity of the disease at presentation.

Methods: 29 newly diagnosed patients of MM (21 males, 8 females) were included in the study. All patients underwent measurements of markers of clinical disease activity (haemoglobin, leucocyte & platelet counts, lactate dehydrogenase [LDH], β_2 microglobulin, highly sensitive C-reactive protein [hsCRP], serum and urinary protein electrophoresis) and serum markers of skeletal parameters (25OHD, creatinine, calcium, albumin, phosphate and alkaline phosphatase). Skeletal survey was done to assess the presence of any fractures or lytic lesions. Staging of MM was based on International Staging System (ISS). 25OHD status was defined as: >30 ng/ml—sufficient, 21–30 ng/ml—insufficient & <20 ng/ml—deficient.

Results: Higher mean levels of hsCRP (3.09 mg/L vs. 0.72 mg/L, $P=0.03$) and creatinine (1.89 mg/dL vs. 1.16 mg/dL, $P=0.04$) and lower serum albumin values (3.74 g/dL vs. 4.56 g/dL, $P=0.003$) were present in patients with 25OHD deficiency and insufficiency compared to subjects without 25OHD deficiency. The prevalence of 25OHD deficiency showed an upward trend with increasing stages of ISS: 17% of patients in Stage I, 24% in Stage II, and 39% in Stage III ($P=0.02$) were vitamin D deficient.

Conclusions: Deficiency of 25OHD in patients with newly diagnosed MM may be an important predictor of prognosis of the disease in association with ISS staging.

References: 1. Badros A et al., Br J Haematol. 2008;142:492; 2. Drake MT, Ng AC, European Journal of Clinical & Medical Oncology 2010;2:163
Disclosure of Interest: None Declared

P177
A STUDY TO EVALUATE THE ACCURACY OF MARKERS ON ORTHOPANTOGRAMS IN DETECTING OSTEOPOROSIS IN AN INDIAN DENTAL HOSPITAL VISITING POPULATION

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Aims: The aim of this study was to investigate the value of two common and simple to use morphometric markers on Orthopantograms (OPGs) in detecting osteoporosis, in an Indian population visiting a dental hospital for prosthodontic rehabilitation. Unfortunately, such research is totally lacking in India till date.
Methods: Patients above the age of 45 years visiting the Prosthodontics Department of the institution for rehabilitation between August 2008 and March 2010 and satisfying the inclusion criteria, were eligible to be part of the study. After recording their consent, 78 subject were recruited and their age, sex and religion recorded. These subjects underwent standardized DXA and digital OPGs. The BMD *T*-score values were used to divide subjects into osteoporotic, osteopenic and normal groups, while the OPGs were analysed for Mandibular Cortical Index (MCI) and Panoramic Mandibular Index (PMI). MCI and PMI values were correlated with BMD values for the sample as a whole, and for groups made on the demographic data, using statistical tests such as mean, standard deviation, chi square, ANOVA, *p*-values (P=0.05) and ROC curves.
Results: While 24.3% of the sample was osteoporotic, 38.5% was osteopenic. Surprisingly, 31.8% of the males were osteoporotic compared to 14.7% females. Though no significant difference was found in the osteoporosis incidence of Hindus and Muslims, percentage of Muslim females having osteoporosis was almost double that of Hindu females. *T*-score values of the sample significantly correlated with MCI and PMI. MCI showed better diagnostic predictability (sensitivity and specificity) compared to PMI. Its accuracy however was low, when detecting osteopenia.
Conclusions: Since MCI showed good diagnostic value in detecting osteoporosis, it may be used as a screening tool before rendering routine prosthodontic treatment. In developing countries like India, whose large middle and low income population may find a "gold standard" BMD test such as DXA difficult to afford for such a purpose, this more economical test is advisable for two reasons if the patient is found osteoporotic −1. the prosthodontist may modify his treatment plan accordingly to prevent further damage to the underlying tissues and 2. the patient could be referred for prompt medical intervention. Another advantage of an OPG for screening is its routine requirement for most dental investigations and interventions.
Disclosure of Interest: S. Singh Grant/Research Support from: Council of Science and Technology (UP)

P178
PATIENT'S COMPLIANCE, PERZISTENCE AND ADHERENCE IN OSTEOPOROSIS MANAGEMENT

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Aims: Osteoporosis is still unrecognized disorder among general population. The goal of this paper was to investigate the patient knowledge about general facts regarding osteoporosis, disease that they suffer and being treated respectively.
Methods: The questionnaires were designed with multiple answer questions where questions about osteoporosis itself, risk factors, use of vitamin and mineral supplement, therapy and disease consequences were outlined. Total of 120 patients completed the questionnaires, including patient satisfaction forms. There were total 120 patients, 114 females and 6 males. Average age for female group was 62,95 years and for male group was 54. There were 102 postmenopausal women and 12 premenopausal females with early osteoporosis following gynecological operations. All six males had glucocorticoid induced osteoporosis due to rheumatoid arthritis disease and corticosteroid therapy. BMI was 23,5 in total. Average length of osteoporosis was 4,5 years in duration. BMD test in average among all patients was −3,1.
Results: The results obtained from this survey showed the following:

1. 98 patients (86%) answered correctly questions about regarding diagnosis of osteoporosis.
2. Majority of patients know the importance of diet and vitamin and mineral supplements, but not aware about the value of exercise.
3. Vitamin D is insufficient in their diet.
4. Dosage of calcium is mainly 500 mg as supplement to diet.
5. 90 patients (75%) were on bisphosphonates therapy, while 30 patients (25%) received other antiresorptive agents.

6. The most important value for patients regarding therapy was the drug efficacy in general, and rest is the frequency of drug administration.
7. Consequences of disease were significantly underestimated among majority of examined subjects.

Conclusions: This survey showed that there is a lack of information among patients concerning diet, physical activity, morbidity and mortality, vitamin and mineral supplements, especially about the importance of vitamin D in prevention and treatment. Decreased adherence to therapy was notified in majority individuals mainly due do higher cost of medications, lack of satisfaction and also related to drug administration and frequency.

Disclosure of Interest: None Declared

P179
PREVALENCE AND ASSOCIATED FACTORS OF VITAMIN D INADEQUACY IN COMMUNITY WOMEN IN SOUTHERN TAIWAN

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Aims: Vitamin D plays an important role in calcium absorption and bone development. Vitamin D inadequacy is detrimental on health, especially in osteoporotic women. Understanding Vitamin D status is helpful in prevention and treatment of female osteoporosis. The aim of this study was to examine the prevalence and associated factors of vitamin D inadequacy in community women in southern Taiwan.

Methods: From September 2009 to February 2010, a total of 371 women (40–88 years) were surveyed by stratified sampling method from Douliou City (urban area) and Gukeng Township (rural area) in Yunlin County in southern Taiwan. All subjects received complete basic information and anthropometric measurements, including detailed medical history, dietary habits and lifestyle characteristics. An 8-h overnight fasting venous blood samples were collected for serum 25-hydroxyvitamin D (25(OH)D, electrochemiluminescent immunoassay method, Roche Diagnostics, Indianapolis, USA) analysis. Vitamin D inadequacy is defined as a serum 25(OH)D level less than 30 ng/mL. SPSS statistical software version 15.0 was used for data analyses. A p-value < 0.05 will be adapted for statistical significance.

Results: The mean age and BMI of participants was 56.9± 11.2 years old and 24.10±3.47 kg/m^2, respectively. The mean serum 25(OH)D level was 25.1±6.3 ng/mL with a range from 7 to 49 ng/mL. The prevalence of vitamin D inadequacy in total population and three age groups (40–49, 50–64 and ≥65 years old) was 82.2%, 90.8%, 81.9% and 72.2%, accordingly (p for trend=0.002). Using the multiple logistic regression analyses with adjustment for age, living area, marital status, socioeconomic status, obesity, abdominal obesity, hypertension, smoking and alcohol habit, tea consumption habit, vegetarians, physical activity and sun exposure (<10 min/day), vitamin D inadequacy was positively associated with age younger than 50 years (odds ratio [OR], 0.337; 95% CI, 0.157–0.721) and urban dwelling (OR, 2.047; 95% CI, 1.119–3.743), but negatively associated with habitual tea consumption (OR, 0.536; 95% CI, 0.291–0.987).

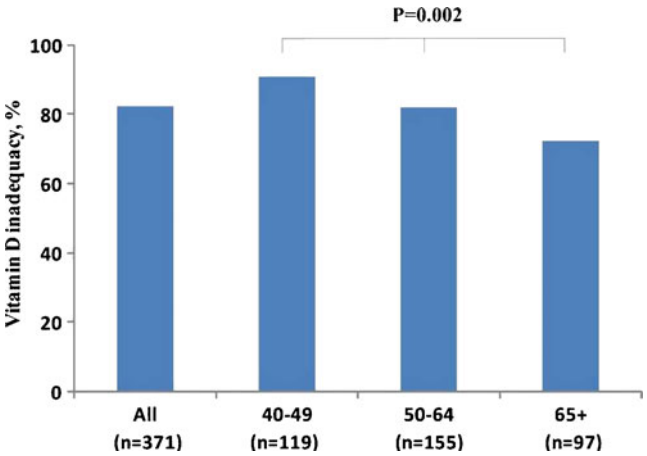

Figure 1. Prevalence of vitamin D inadequacy by age group.

Conclusions: The prevalence of Vitamin D inadequacy was 82.2% in women aged 40 and over in southern Taiwan. The younger age and urban dwelling were significant risk factors for Vitamin D inadequacy, but habitual tea consumption was inversely associated with vitamin D inadequacy.

Acknowledgements: The study was supported by the Grants of NCKUH20100025 and BHP-A9802-6 (from Bureau of Health Promotion, Department of Health, ROC, Taiwan).

Disclosure of Interest: None Declared

P180
ESTABLISHMENT OF AGE SPECIFIED BMD REFERENCE RANGE IN HEALTHY, PHYSICALLY ACTIVE, AND MIDDLE TO UPPER SOCIOECONOMIC STATUS INDIAN FEMALES USING DXA

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Aims: Establishment of age specified BMD reference range in healthy, physically active, and middle to upper socio-economic status females using DXA.
Methods: BMD at multiple skeletal sites was measured by DXA (Prodigy, Lunar) in 1928 healthy women aged 18–85 years. The effect of anthropometry and biochemical parameters on BMD was determined.
Results: Peak BMD was observed between 25 and 30 years of age at the hip, lumbar spine, and radius (data will be presented). Significant positive correlation was observed between height and BMD at 33% radius, femur neck and lumbar spine whereas significant negative correlation was seen between serum alkaline phosphatase (ALP) and serum PTH levels with BMD at above mentioned sites. On multivariate regression analysis, age, serum ALP and serum PTH were the most consistent contributors to variance in the BMD. Compared to age-matched US females, BMD of lumbar spine was significantly lower for our subjects in all age groups.
Conclusions: Peak BMD in healthy Indian females was achieved by 30 years of age at lumbar spine, hip and radius, with age, serum ALP and serum PTH levels being the most consistent contributors to variance in BMD. In all age groups, BMD was lower than age matched US females. Our data establish a useful reference range for the Indian females for correct interpretation of densitometric results.
Disclosure of Interest: None Declared

P181
SEX SPECIFIC REFERENCE DATA FOR BONE DENSITY PARAMETERS MEASURED WITH DUAL-ENERGY X-RAY ABSORPTIOMETRY IN A LARGE COHORT OF HEALTHY INDIAN CHILDREN AND ADOLESCENTS

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Aims: To provide sex-specific reference centile curves of bone densitometric parameters measured by DXA, for Indian children, by using the LMS technique and to evaluate the determinants of BMC in this population.
Methods: The study population consisted of 1905 healthy children (835 males, 1050 females) aged 5–17 years. Anthropometric, biochemical and hormonal parameters were measured in all study subjects. Bone mineral content and BMD was measured using a LUNAR Prodigy Oracle DXA machine. Bone mineral apparent density (BMAD) was calculated for the lumbar spine and femoral neck using the methods described by Carter et al. and Lu et al., respectively. Sex-specific centile curves for BMAD (spine and femoral neck) and BMC (total body and spine) were generated using LMS method. For further interpretation of results, sex specific centile curves were derived for bone area for height, and BMC for bone area at spine and total body, using the approach suggested by Mølgaard.
Results: Height of the study population was comparable to the reference population from Delhi. Biochemical evidence of vitamin D deficiency was highly prevalent in the study group. 95% of boys and 98% of girls had 25(OH)D levels less than 50 nmol/L. On multivariate regression, age, weight and height were the most consistent contributors to the variance in BMC at different sites. Anthropometric parameters were able to explain 50–70% of BMC variance in boys at different sites, whereas in females they could explain only 5–10% of BMC variance. Centiles for each year of age will be presented. Data are provided for clinical interpretation of the spine and femoral neck scans based on BMAD (g/cm^3), which reduces the size dependence of DXA areal BMD (g/cm^2). The spine and total-body data are also presented for interpretation of results using the three step approach suggested by Mølgaard et al.
Conclusions: This study provides the first sex-specific and ethnicity-specific reference databases for Indian children, thereby allowing clinicians to assess and interpret BMD in pediatric patients.
References: 1. Carter DR et al., J Bone Miner Res 1992;7:137; 2. Lu PW et al., J Clin Endocrinol Metab 1996;81:1586; 3. Mølgaard C et al., Arch Dis Child 1997;76:9
Disclosure of Interest: None Declared

P182
VITAMIN D INSUFFICIENCY AND ITS ASSOCIATION WITH OBESITY AMONG PRIMARY SCHOOL CHILDREN IN KUALA LUMPUR, MALAYSIA

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Aims: To present findings on low blood vitamin D status and its association with obesity among primary school children in Kuala Lumpur.
Methods: A cross-sectional study of primary aged school children was undertaken in 2008. Six primary schools were randomly selected from a zone in Kuala Lumpur with a multi-ethnic population from middle income levels. Fasting blood samples were taken to assess micronutrients including vitamin D [as 25(OH)D]. A total of 402 boys and girls aged 7–12 years participated in the study. Informed consent was obtained from both parents and the subjects.
Results: Anthropometric results indicated that more than half of the children (58.0%) were of normal BMI-for-age; however, 17.9% were overweight and 16.4% obese. Biochemical assessment indicated that most children had adequate concentrations of ferritin, haemoglobin, zinc, folate and vitamin B_{12}. In contrast, 35.3% of children had serum 25(OH)D concentrations indicative of vitamin D deficiency (≤37.5 nmol/L) and a further 37.1% had insufficiency concentrations (>37.5–≤50 nmol/L). Significant correlations were found between vitamin D concentrations and BMI-for-age of the children.
Conclusions: This study highlights the existence of a high prevalence of vitamin D deficiency and insufficiency among urban primary school children in a tropical country. In light of the growing problem of obesity in Malaysian children, these findings emphasize the important need for appropriate interventions to address both problems of obesity and poor vitamin D status in children.
Acknowledgements: GSK Nutritional Healthcare, United Kingdom funded the study.
Disclosure of Interest: G. L. Khor Grant/Research Support from: GlaxoSmithKline, W. Chee Grant/Research Support from: GlaxoSmithKline, M. S. Zalilah Grant/Research Support from: GlaxoSmithKline, B. K. Poh Grant/Research Support from: GlaxoSmithKline, M. Arumugam: None Declared, J. Ab Rahman: None Declared, H. Theobald Employee of: GlaxoSmithKline

P183
VITAMIN D AND AUSTRALIAN ABORIGINALS

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Aims:

(a) to establish a normal range for 25D levels in this population;
(b) To test for a relationship between 25D and fasting blood glucose levels;
(c) To establish the 25D level at which bone turnover increases and parathyroid hormone level rises;
(d) To test for relationships between 25D and a range of factors which may influence vitamin D synthesis, storage and metabolism.

Methods: 58 Aboriginal participants were recruited via Nunkuwarrin Yunti (Adelaide) and Tullawon Health Service (Yalata). Participant demographics, smoking status, alcohol consumption, average time spent outdoors each day, BMI, skin colour and medication use were recorded. Blood was collected after an overnight fast for 25-hydroxyvitamin D (25D), glucose, parathyroid hormone (PTH) and c-terminal telopeptide (CTX).
Results: Serum 25D values showed a normal distribution with a mean of 56.8 nmol/L. A seasonal variation was found, peaking in late summer/autumn and reaching a trough in late winter/spring. A statistically significant association was found between serum 25D and CTX, but not 25D and PTH. 25D levels were significantly associated with time spent outdoors, but not with level of pigmentation, BMI, smoking status or level of alcohol consumption. No significant association was found between fasting glucose level and serum 25D.
Conclusions: Aboriginal participants in this study had lower 25D levels than those found in comparable published studies, especially in winter. Small sample size limited study power. The relationships outlined above and their implications for clinical practice and further research will be discussed and elaborated upon.
Disclosure of Interest: None Declared

P184
INCREASING INCIDENCE OF HIP FRACTURE IN CHIANG MAI, THAILAND

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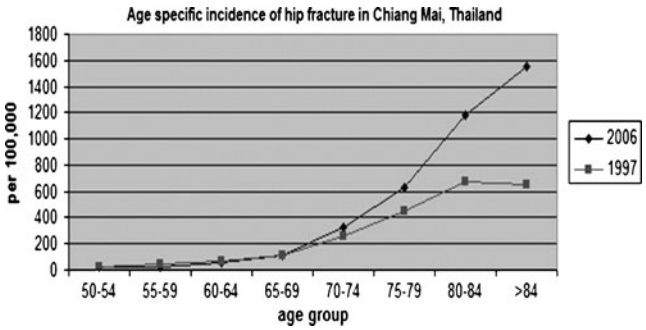
Aims: To examine the incidence of hip fracture and other epidemiological data in Chiang Mai, Thailand and to compare to the data collected 9 years before.
Methods: Hospital based data were collected from all public and private hospital in Chiang Mai. All patients aged 50 years or over who lived in Chiang Mai province and got low-energy-trauma hip fractures (femoral neck or intertrochanteric region) during 1 August 2006 to 31 July 2007 were studied.
Results: 690 hip fractures were reported during the 1-year study period including of 203 males and 487 females (male to female=1:2.4). Mean age was 76.37 years (male=76.35,

female=76.71) with a range of 50–99 years. The estimated cumulative incidence was 180.3 per 100,000 (95% CI 154.68–208.27). The cumulative incidence of hip fractures in male and female were 112.61 and 239.48 per 100,000 respectively. In female the number of events peaked in the 75–79 age group which was lower than that found in male (>80). Fall from standing height was the most common mechanism of fracture (79.04%). According to type of fracture, femoral neck fracture was reported in 215 (31.16%), intertrochanteric fracture was reported in 475 (68.84%). Most cases (91.74%) were able to walk before fracture. After treatment, the percentages of the patients who need walking aids for ambulation were 93.70 at 3-months and 70.85 at 6-months.



Conclusions: As compared to the previous study done in 1997by our colleagues, the incidence of hip fracture in Chiang Mai province increased significantly especially after the age of 70 years. It increased for two times after the age of 80 years. The average age also increased (76.37 vs. 74.70 years). After treatment most of the patients needed walking aids for ambulation. Hip fracture incidence in Chiang Mai, Thailand was increasing rapidly.

Disclosure of Interest: None Declared

P185
EPIDEMIOLOGICAL SURVEY OF THE OSTEOPOROSIS AND ASSOCIATED FACTORS IN MALES AND FEMALES IN SOUTHERN TAIWAN

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Aims: Osteoporosis increases the susceptibility to fracture, which leads to considerable mortality and morbidity with huge financial implications in worldwide. Understanding the associated risk factors is helpful for the prevention and treatment of osteoporosis. The aim of this study was to evaluate the prevalence and associated factors of osteoporosis in community-dwelling people in southern Taiwan.

Methods: From July 2009 to February 2010, a total of 1200 community-dwelling people (M/F=524/676, 40–95 years, 59.3±11.4 years old) were epidemiologically surveyed by systemic stratified sampling method from Douliou City (urban area) and Gukeng Township (rural area) in Yunlin County in southern Taiwan. All subjects received complete basic information and anthropometric measurements, including detailed medical history, dietary habits and lifestyle characteristics. BMD was measured at lumbar spine, total hip and neck region by DXA (Prodigy, GE Lunar, USA) method. Based on World Health Organization criteria, osteoporosis was defined as a *T*-score (Caucasian) of −2.5 or lower according to the lowest *T*-score of the three measured regions. The SPSS statistical software version 15.0 was used for data analyses. A p-value < 0.05 was constructed for statistical significance.

Results: The overall prevalence of osteoporosis in total population, men and women was 27%, 22.1% and 30.8%, respectively. In total population, the prevalence of three age groups (40–49, 50–64 and ≥65 years old) was 6.6%, 20.4% and 48.7% (p for trend <0.001); while 11%, 18.7% and 30.3% in men (p for trend <0.001) and 4.3%, 21.6% and 69.2% in women (p for trend <0.001), accordingly. Using the multiple logistic regression analyses with adjustment for age, gender, living area, marital status, socioeconomic status, obesity, hypertension, diabetes, smoking and alcohol habit, tea consumption habit, vegetarians, physical activity and sun exposure (<10 min/day), osteoporosis was positively associated with older age (50–64 years, OR, 4.215 [95% CI=2.482–7.159]; ≥65 years, OR, 16.959 [95% CI=9.765–29.451]), female gender (OR 1.744 [95% CI=1.230–2.471]), low socioeconomic status (OR, 1.88 [95% CI=1.309–2.701]), but negatively associated with obesity (OR, 0.521 [95% CI=0.353–0.771]), diabetes (OR, 0.505 [95% CI=0.304–0.839]) and habitual tea consumption (OR, 0.634 [95% CI=0.463–0.868]).

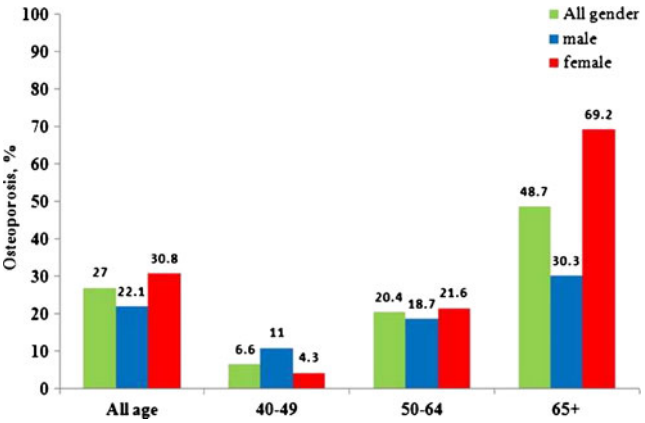

Figure 1. Prevalence of osteoprosis by age group

Conclusions: The prevalence of osteoporosis was 27% in community-dwelling males and females people aged 40 and over in southern Taiwan. The older age, female gender and low socioeconomic status were significant risk factors for osteoporosis, but obesity, diabetes and habitual tea consumption were inversely associated with osteoporosis.

Acknowledgements: The study was supported by the Grants of NCKUH9801002 and BHP-A9802-6 (from Bureau of Health Promotion, Department of Health, ROC, Taiwan).

Disclosure of Interest: None Declared

P186

MORTALITY FOLLOW-UP OF OLDER ADULTS WITH OR WITHOUT HIP FRACTURE IN TAIWAN

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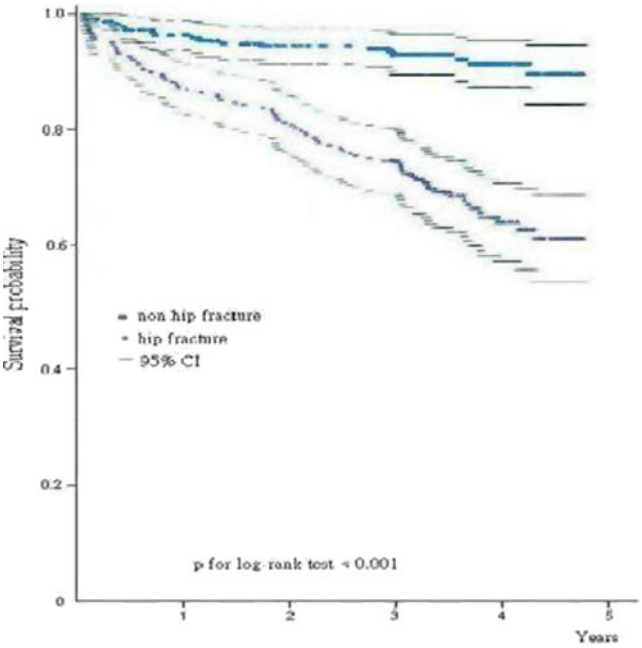
Aims: The purposes of this study were to compare mortality rate of hip fracture patients with those without hip fracture, and to identify risk factors of death in hip fracture patients.

Methods: This study is a 5-year cohort study in older adults with or without hip fracture in Taiwan. Data used for this study were from a case-control study of hip fracture in Taipei, conducted from 2004 to 2006. Hip fracture group included 228 patients with fist low-trauma hip fracture. A total of 497 individuals (215 from hospital; 282 from community) who were matched with hip fracture patients on age and sex were used as a comparison group. The vital status of all participants was verified through linking the mortality data provided by the Department of Health in Taiwan. During the follow-up, 144 deaths occurred. The average time of follow-up was 3.28 (SD=1.08) years. Baseline information collected for all 725 study participants from the case-control study include sociodemography, chronic diseases, lifestyle behaviors, geriatric syndromes, and functional measures. The Kaplan-Meier method was adopted to compare the survival curves of study participants with or without hip fracture. Cox proportional hazards regression models were used to estimate the hazard ratio of selected factors potentially associated with death.

Results: The survival rates for each follow-up year were 87.3%, 81.1%, 74.1%, 66.7%, 65.8% in hip fracture group and 95.8%, 90.9%, 88.3%, 87.1%, 86.7% in non fracture group, respectively. The difference of overall survival between two groups by Kaplan-Meier analysis was statistically significant (Fig. 1). In the univariate analysis, six (age, gender, education level, BMI, cancer, physical function, handgrip strength, and peak flow rate) out of 23 factors were associated with death. Only BMI (lean vs. normal; HR=2.16, 95% CI:1.22–3.82) and peak flow rate (low vs. high; HR=5.01, 95% CI:1.44–17.48) were further identified to have independent effect on death in the multivariate analysis.



Conclusions: Hip fracture patients have relatively higher mortality risk compared with older adults without fracture. The risk factors of death identified in our study may be further adopted to evaluate the mortality risk for hip fracture patients in both community and clinical setting.

Disclosure of Interest: None Declared

P187

OSTEOPOROSIS PREVALENCE AMONG ADULTS IN KOREA: NATIONAL HEALTH INSURANCE DATABASE STUDY

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Aims: Osteoporosis is one of the important socioeconomic problems in the most countries. Estimation of prevalence of osteoporosis is important to establish the strategy for

preventing osteoporosis and related complications. We evaluated nationwide data regarding prevalence of osteoporosis in South Korea with using data from the Health Insurance Review Agency (HIRA), which includes nationwide information.
Methods: Reimbursement records from HIRA database between January 1, 2004 and December 31, 2008 were investigated. Patients aged ≥30 years old with osteoporosis were identified based on a study-defined algorithm using prescription data and diagnostic codes.
Results: During the study periods, the number of patients receiving medical treatment related to osteoporosis increased from 1,034,399 to 1,392,189 for women and from 120,496 to 171,902 for men. The calculated prevalence of osteoporosis among people over 50 years of age was 6.1% for men and 33.3% for women, and among people over 30 years of age was 2.7% for men and 16.6% for woman. More than 40% of patients (59.1% for women; 41.2% for men) were treated with medication indicated only for osteoporosis. About 4–7% of osteoporosis patients had a past medical history suggesting secondary cause of osteoporosis. More than 80% of all osteoporosis patients were women older than 50 years, reflecting the pronounced burden of osteoporosis among postmenopausal women.
Conclusions: This study demonstrated substantial increasing trend in medical claims related to osteoporosis during 2005–2008 among adults in Korea, and the pronounced burden of osteoporosis among postmenopausal women.
Disclosure of Interest: None Declared

P188
HIGHER DIASTOLIC BLOOD PRESSURE AND LOWER HEMOGLOBIN LEVEL INCREASE RISK FOR HIP FRACTURES IN OLDER ADULTS

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Aims: To investigate if a relationship exists between health examination parameters and hip fracture.
Methods: The Cases consisted of 91 hip fracture patients (41 men and 50 women) who were consecutively admitted for a first hip fracture, who were caused by a fall from a standing height or less, who were 60 years of age or older. During the same period we studied 91 healthy controls, sex-, age-, BMI matched by age group, who lived in the nursing home. Parameters in health examination were measured including blood pressure, blood glucose, hemoglobin, triglyceride, total cholesterol.
Results: The mean age of subjects was 78.8 years (±6.0 SD). The Patients had lower hemoglobin levels [(132.5± 11.9) g/L) vs. (119.9±22.7) g/L, t=4.327, P=0.0001] than controls. Anemia increased the risk of hip fracture by 9.81 times (95% CI 2.84, 33.99) compared with no anemia. There were no differences in higher hypertension rates (52% vs. 40%, x^2=3.459, P>0.05), systolic blood pressure, blood glucose, triglyceride, total cholesterol between two groups. But, the patients had higher diastolic blood pressure [(84.5±13.6) mm Hg vs. (75.9±8.5) mm Hg, t=5.034, P= 0.0001] than controls. In logistic regression model the risk parameters for hip fractures, which were still significant in the final model, were hemoglobin (β=−0.04, P=0.001), diastolic blood pressure (β=0.051, P=0.007).
Conclusions: These findings suggest that higher diastolic blood pressure and lower hemoglobin level increase risk for hip fractures in older adults.
Disclosure of Interest: None Declared

P189
KNOWLEDGE AND LEARNING NEEDS OF NURSING PROFESSIONALS ABOUT OSTEOPOROSIS AND ITS RELATED LIFESTYLE RISK FACTORS IN SINGAPORE

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Aims: To evaluate nurses' knowledge and their training needs in osteoporosis in Singapore; and also to assess the relative importance of previous experience in nursing patient with osteoporosis, having family member being diagnosed of osteoporosis, and field of practice in relation to knowledge of osteoporosis.
Methods: A cross-sectional survey employing a self administered structured questionnaire was conducted among registered nurses working in a large tertiary hospital in Singapore to assess their training needs. Facts On Osteoporosis Quiz (FOOQ) was used to ascertain their knowledge of osteoporosis. General linear regression and multinomial logistic regression was employed to determine the relative importance of previous experience in nursing patient with osteoporosis, family member diagnosed of osteoporosis, and field of practice in relation to total FOOQ score.
Results: The mean FOOQ score was 13.46 out of 20 which was relatively low. Knowledge about osteoporosis was acquired mainly through the internet (56.8%), magazines/ newspapers (50.4%), and pamphlets on osteoporosis (42.1%). 93.2% of the respondents expressed interest in acquiring more knowledge and the preferred learning modality were conferences/symposiums (51.3%), in-services (36.8%), and structured training programs (33.8%). Previous experience in nursing patient with fragility

fracture, having family member being diagnosed of osteoporosis and field of practice were not so important in relation to total FOOQ score. The most preferred learning topics were "risk factors of osteoporosis" (24.5%), and "diagnosis of osteoporosis" (22.5%). The least interested topics were "rehabilitation in post fragility fracture" (1.4%), "bone loss in solid organ transplant" (1.6%) and "cancer and bone" (3.1%).

Conclusions: Given the fact that majority of the nurses' surveyed expressed interest in learning more, and currently the knowledge level of osteoporosis amongst nurses in Singapore is relatively poor, future training programs are needed to enhance their understanding and awareness about osteoporosis in this group of health care professionals.

Disclosure of Interest: None Declared

P190
FAMILY HISTORY OF OSTEOPOROSIS DOES NOT ADVERSELY INFLUENCE BMC OR BMD OF CHINESE ADOLESCENTS

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Aims: Familial studies of osteoporosis suggest a significant effect of genetic factors on peak bone mass. However, studies of the role of hereditary osteoporosis on bone mass of Asian adolescents are nonexistent. The purpose of this study was to examine the influence of positive family history (FH) of osteoporosis on forearm and os calcis bone mineral content (BMC) and density (BMD) in healthy Asian adolescents with Chinese ancestors.

Methods: The parents of 466 adolescents (age 13–15 years) were surveyed about the presence of osteoporosis in their family. FH was defined by presence of osteoporosis or crush fractures in a parent or grandparent. The self-reported prevalence of positive FH in this population was 3% (8 boys, 6 girls). Each adolescent with a positive FH was matched with four adolescents with no FH. Boys were matched for geographical location (same school), age, weight, BMI, fat mass, lean body mass (LBM), and grip strength. Girls were matched for the same variables and menarche. Fourteen adolescents with a positive FH were compared with 56 adolescents with no FH. BMC and BMD of the forearm and the os calcis were measured using DXA; fat mass and LBM were measured using bioelectrical impedance analysis (BIA); grip strength was measured by isometric dynamometry.

Results: One-way analysis of variance (ANOVA) revealed that there were no significant differences in body size or composition indices or in BMC and BMD of the forearm or the os calcis between adolescent boys with a FH vs. boys without a FH of osteoporosis. There were also no significant differences in body size or composition indices or in age at menarche or time since menarche between the two groups of girls. However, girls with a FH of osteoporosis had significantly greater forearm BMC (3.49 ±0.47 g vs. 2.86±0.49 g) and BMD (0.41±0.05 g/cm^2 vs. 0.34±0.04 g/cm^2) and os calcis BMC (1.99±0.45 g vs. 1.65±0.25 g) than girls without a FH of osteoporosis.

Conclusions: A positive family history for osteoporosis does not seem to be associated with BMC or BMD of regional sites in Asian boys. However, despite controlling for the important covariates such as age, puberty, body size and composition, results in girls suggest that adolescents with a family history of osteoporosis seem to have better BMC and BMD than those without a family history of osteoporosis.

Disclosure of Interest: None Declared

P191
ASSOCIATION BETWEEN COPY NUMBER VARIATIONS OF ESTROGEN MATABOLISM-RELATED GENE AND BONE MINERAL DENSITY IN POSTMENOPAUSAL WOMEN OF JANANESE

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Aims: Premature menopause which consequently reduces exposure time to estrogen is an unremovable risk factor for bone mass, and so are bilateral oophorectomy due to malignant tumor operation. This issues related to decreased bone mass due to bilateral oophorectomy as cancer treatment, however, were less emphasized until recently compared to the importance of malignant tumor treatment itself. The aim of our research is to find out how copy number variation (CNV) is responsible for the change in bone mass by studying cases of bilateral oophorectomy, and ultimately to realize early intervention to groups who have high risks of having osteoporosis. Furthermore, a speedy clarification was attempted by studying the cases of oophorectomy before menopause, which experience events in short periods of time instead of normal periods of time like a few to a few decades of years.

Methods: 144 cases which were diagnosed as uterine corpus cancer at our hospital, the standard therapy together with bilateral oophorectomy was undertaken. The results of L2-4 BMD measured by DXA method were diagnosed by following the diagnostic standard specified by The Japanese Society for Bone an Mineral Research, which were then categorized into two groups; a group of osteoporosis and decreased bone mass (58 cases, A group) and a group

of normal bone mass (86 cases, B group). CNV of *ESR1* and *UGT2B17* were detected by using the lymphocyte-derived genomic DNA of the subject cases. The detection of CNV was performed by real-time quantitative PCR.
Results: All cases from both groups, *ESR1* had two copy numbers. On the other hands, the number of *UGT2B17* copy was 0 copy in 49 cases of the group A and 2 copies in 9 cases, while it was 0 copy in 63 cases of the group B, 2 c copies in 21 cases and 4 copies in 2 cases.
Conclusions: The relation between the copy number variation of sex hormone metabolism related enzyme identified by the genome wide association analysis and bone mass was examined. Reports on genome-wide association analysis in recent years have reveled various bone metabolism and osteoporosis related gene polymorphism. Because ESR1 is the nuclear receptor gene of estrogen, the relation between its gene polymorphism and bone mass has been suggested since before, but the relation between CNV of *ESR1* and bone mass has not been clarified, and in addition, no examination about allele frequency of many cases or no information about the Japanese is found in kinds of database or reports.
Disclosure of Interest: None Declared

P192
ASSOCIATION OF RANK GENE POLYMORPHISMS WITH BONE MINERAL DENSITY IN POSTMENOPAUSAL TURKISH WOMEN

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Aims: To investigate the effects of two genetic polymorphisms, C421T and C575T, of RANK gene, which regulate osteoclastogenesis, on BMD at the femoral and lumbar region in early postmenopausal Turkish women.
Methods: In this cross-sectional study 78 normal and 100 osteopenic/osteoporotic postmenopausal Turkish women aged between 45 and 65 years old were included. Exclusion criteria were; menopause before 40 years of age; surgical menopause; past or current history of any neurologic, endocrinologic, metabolic, rheumatologic, malignant diseases or malabsorption; hormone replacement treatment within the previous 4 months; any prior osteoporosis treatment; kidney/liver diseases; glucocorticoid or oral anticoagulant medication history, chronic alcoholism or immobilisation history for >3 months. Following information were recorded to a standardized questionnaire; age, weight, height, densitometric BMD and *T*-score values at the lumbar spine (L1–L4), femoral neck and total regions measured with Hologic QDR Delphi, fracture history, family history for fracture, cigarette and alcohol consumptions, daily calcium intake from 3-day dietary self-record, physical activity, reproductive history (menarche and menopause age, number of pregnancies and their durations, total month of lactations). The polymorphisms were determined by sequencing method for RANK C421T and by enzymatic digestion with Ssil enzyme for RANK C575T. Genotype, combined genotype and allele frequencies were assessed by chi-square test. The generalized linear model was used to compare arithmetic mean BMD values, adjusted for age, weight, height and years since menopause, at various sites by different genotype and combined genotype classifications in the normal and osteopenic/osteoporotic groups separately.
Results: The distributions of genotypes of C421T vs. C575T polymorphisms in the RANK gene were as follows: CC%71,8, CT%25,6, TT%2,6 for the controls and CC%67, CT%30, TT%3 for the patients; CC%37,2, CT%38,5, TT% 24,3 for the controls and CC%32, CT%35, TT%33 for the patients. The frequency of the RANK 421C allele was% 84,6 and 575C allele was%56,4 for the control group. The frequency of the RANK 421C allele was%82,0 and 575C allele was%49,5 for the patient group. There were no differences significant between two groups for genotype and allelic frequencies. There were no significant differences for combined genotype and haplotype frequencies between two groups. There were no associations between the adjusted BMD and genotypes at the lumbar spine and femoral region for each polymorphism both in the normal and patient groups. We also found no association between combined genotypes and adjusted BMD at the femoral and lumbar regions in both of the study groups.
Conclusions: The RANK gene C421T and C575T polymorphisms were not found to affect BMD at the femoral and lumbar regions in early postmenopausal Turkish women.
Acknowledgements: This study was supported by Turkish Osteoporosis Foundation.
Disclosure of Interest: None Declared

P193
THE INFLUENCES OF AIR POLLUTION AND GENETIC SUSCEPTIBILITY ON BONE MINERAL DENSITY

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Aims: The aim of the study was to explore genetic and environmental risk factors that contribute to osteoporosis by quantifying several factors related to BMD.
Methods: Osteoporosis is a systemic skeletal disease characterized by reduced BMD, disrupted bone micro-architecture and alterations in the amount and variety of proteins in bones. Bone turnover is a very complex process, depending on genetic and non genetic factors, such as diet, lifestyle or air pollution. We assessed family history, vitamin D status, BMD in subjects seeking advice on osteoporosis. Air pollution data were also obtained. Average concentrations of NO2 and particulate matter PM10 were calculated. Due to their synergistic effect on the organism the maximum permissible concentration calculated for all air pollutants was exceeded.
Results: In our study total body BMD was inversely associated with indicators of air pollution. The prevalence of vitamin D depletion was 64.76%. Genetic contribution to the etiology of osteoporosis was revealed by the positive family history for 36% affected subjects.
Conclusions: Air pollution and vitamin D deficiency have a negative impact on bone mineral homeostasis.
Disclosure of Interest: None Declared

P194
POSSIBILITY EFFICACY OF COX-2 GENOTYPES ON VERTEBRAL FRACTURE PREVENTION IN OSTEOPOROTIC PATIENTS UNDER ALENDRONATE THERAPY

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Aims: We evaluated whether the reportedly functional PTGS2 (prostaglandin-endoperoxide synthase 2/cyclooxygenase [COX] 2) genotypes influence the efficacy of alendronate on vertebral fracture prevention.
Methods: 60 postmenopausal osteoporotic women participated in this interventional study. The quantity of vertebral fracture evaluated in all participants before and after intervention by X-ray. Alendronate, 10 mg/day, calcium, 1 g/day and vitamin D, 400 mg/day were given to participants for 2 years. Laboratory measurements included circulating crosslaps, osteocalcin, PTH, osteoprotegerin, RANKL, vitamin D, TNF-α, IL-6, IL-1 levels. Hip and spine BMD were measured using DXA. Genotyping for cox-2 gene SNP (-765G/C) was performed by using the PCR- RFLP method.
Results: Genotype frequency of homozygous major allele (GG), heterozygous (GC) and homozygous minor allele (CC) were 61.7%, 33.3% and 5%, respectively. Evaluation of vertebral fracture before alendronate therapy in participants demonstrated no significant differences between G and C alleles, although the difference appears near to significant after alendronate therapy at the end of 2 years. Serum PTH level and L2–L4 BMD were significantly different between different alleles. As well IL-1 had significant superior concentration in C allele carries. There was a significant different in sum of vertebral fracture between two allelic groups after 2 years treatments.
Conclusions: Since bone remodeling process has been affected by inflammatory factors, it appears that variation in COX-2 genotypes may influence the alendronate efficacy in fracture prevention among postmenopausal osteoporotic women.
Disclosure of Interest: None Declared

P195
THE VISFATIN PHARMACOGENETIC ASPECTS ON GLYCEMIC AND BONE TURNOVER IMPROVEMENT BY GREEN TEA EXTRACT INTERVENTION IN TYPE 2 DIABETIC PATIENTS

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Aims: Green tea and its components had many pharmacological activities such as antiobesity and antidiabetic properties. The aim of current study is to assess the effect of green tea extract (GTE) on type2 diabetes mellitus (T2DM) management according to visfatin gene variation (SNP rs2110385) and bone turnover among diabetic patients.
Methods: Totally 105 T2DM patients with stratified randomize method were split into interventional and control groups in double blind placebo-controlled clinical trial. GTE, 500 mg, and placebo were given for 8 weeks. Laboratory and anthropometric measurements included FBG, G2h, HbA1C and lipid profile, fasting serum Visfatin, adiponectin, insulin, osteocalcin, crosslaps, BMI and WHR were measured. Genotyping for SNP was performed by using the RFLP-PCR method.
Results: Triglyceride, LDL and total cholesterol levels were decreased significantly in GTE treated group with TT

genotypes. Also regarding to GG genotype, only total cholesterol had significant reduction after treatment episode in GTE group. We showed significant decrease in HbA1C and increase in visfatin levels in GTE group after intervention too. Our findings showed no significant differ in variation in control group after intervention time. Assess of bone markers levels revealed that osteocalcin changes was near significant but log osteocalcin had significant alteration in GTE group. Representational evidences demonstrated that decrease in crosslaps level was 10 times in green tea groups opposed to in placebo one. We found that improved bone turn over patients had significantly lower FBG and HbA1c levels ratio to non-improved patients as well as results showed higher fasting insulin concentration in GTE group.

Conclusions: Visfatin genotypes may modify the effect of Green tea extract on lipid profile through various expressions and secretion of visfatin. As well our results suggest that GTE may reduce bone resorption marker more than placebo and probably modify the bone turn over in T2DM patients.

Disclosure of Interest: None Declared

P196
RELATION BETWEEN LEPTIN RECEPTOR GENE GLN223ARG POLYMORPHISM, BODY COMPOSITION AND BONE MINERAL DENSITY IN CHINESE PR GIRLSROOFE

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Aims: To investigate the relation between leptin receptor (LEPR) gene Gln223Arg polymorphism, body composition, and BMD in Chinese professional dance girls.

Methods: Two groups of girls were randomly selected from two senior high schools in Beijing with a significant difference in BMI. Information on daily energy and nutrient intake was collected using 7-day 24-h food records. Physical activity was assessed with specific questionnaires. Serum leptin and estrogen levels, bone mass, BMD, and body composition were measured. The LEPR gene Gln223Arg polymorphism was analyzed by PCR-RFLP according to the standard protocol.

Results: No significant relation was found between the Gln223Arg polymorphism and body composition. However, individuals carrying the Gln223 allele had a significantly lower forearm BMD ($P<0.05$), and showed a nonsignificant trend toward a lower BMD at the whole body, left arm, and left leg than those carrying the Arg223 homozygote.

Conclusions: Leptin receptor gene Gln223Arg polymorphism is related with the peak bone mass in adolescent girls, which can be used as a genetic marker in predicting the risk of suffering "female athlete triad" and developing osteoporosis in Chinese adolescent dancers.

Acknowledgements: The authors thank all the investigators, supporting staff, children and their parents who participated in the study.

Disclosure of Interest: L. Yang Grant / Research Support from: Danone Institute, China Diet Nutrition & Communication Grant, J. Hu: None Declared, J. Piao: None Declared, Y. Lan: None Declared, Y. Yang: None Declared, Q. Zhang: None Declared

P197
EFFECT OF OXIDATIVE STRES FROM COAL DUST EXPOSURE ON OSTEOBLAST AND OSTEOCLAST NUMBER: PRELIMINARY STUDY

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Aims: Aim of this study was to know an effect of oxidative stress from coal dust exposure on osteoblast and osteoclast number.

Methods: In this experimental study, four groups were evaluated: P1: control; P2: coal dust exposure at dose 6.25 mg/m^3/1 h a day for 28 days; P2: coal dust exposure at dose 12.5 mg/m^3/1 h a day for 28 days; P4: coal dust exposure at dose 25 mg/m^3/1 h a day for 28 days. Oxidative stress in circulation was measured by malondialdehid level. Osteoblast and osteoclast number was count by light microscope at 1000 magnification from distal femur stained by Hematoxylin Eosin. Coal dust exposure (pm10) was done by equipment model 2010 in Pharmacology Laboratory, Faculty of Medicine, Brawijaya University, Malang.

Results: There is increase oxidative stress between control groups and coal dust exposure groups ($p<0.05$). There is decrease osteoblast number between control groups and coal dust exposure groups ($p<0.05$). There is increase osteoclast number between control groups and coal dust exposure groups ($p<0.05$). No correlation between oxidative stress and osteoblast and osteoclast number in coal dust exposure groups ($p>0.05$).

Conclusions: No effect from oxidative stress caused by coal dust exposure on osteoblast and osteoclast number.

Disclosure of Interest: None Declared

P198
SERUM 25-HYDROXY-VITAMIN D IS ASSOCIATED WITH INSULIN RESISTANCE AND ADIPONECTIN LEVELS IN DIABETIC SAUDI ADULTS

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Aims: Hypovitaminosis D is associated with an increased prevalence of diabetes mellitus type 2 (DMT2) and the metabolic syndrome. The purpose of this study was to examine the association between 25-hydroxy-vitamin D (25-OH-VitD) levels with adipocytokines and other indices of insulin resistance in the Saudi population with DMT2.
Methods: A total of 155 male and female Saudi adults, aged 26–80, were randomly selected from the existing Biomarkers Screening in Riyadh Program (RIYADH Cohort). Subjects were clinically assessed, anthropometry was obtained and serum 25-OH-VitD, leptin, adiponectin, resistin, insulin, CRP, TNF-α, glucose, triglycerides, total cholesterol, LDL, and HDL concentrations were measured.
Results: Our results showed a negative correlation between 25-OH-VitD and BMI, LDL and glucose and a positive correlation between 25-OH-VitD and adiponectin, which remained significant after controlling for BMI. Taken together, these findings demonstrate a negative association between 25-OH-VitD and measures of adiposity and insulin resistance in patients with DMT2.
Conclusions: For the first time in DM patients we found positive association between circulating adiponectin and 25-OH-VitD independently of adiposity in the same cohort suggests a role of this hormone as a link between 25-OH-VitD and insulin resistance.
Disclosure of Interest: None Declared

P199
OSTEOGENIC CELLS IN THE PERIPHERAL BLOOD AFTER BONY INJURY

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Aims: We've tried to investigate whether bony injury (such as fracture or bony surgery like total joint arthroplasty) might affect the amount of the circulating osteogenic cells in the peripheral blood, and to identify if there were contributing factors.
Methods: Peripheral blood samples of 54 cases were obtained pre-operatively and 4 days after Total joint arthroplasty in same patients. Mononuclear cells were obtained from the buffy coat of the peripheral blood. After tagging antibodies of osteocalcin and alkaline phosphatase, the existence and proportion of osteogenic cells were analyzed by the flow cytometry. We compared preop and postop data and also analyzed several patients' laboratory parameters, and statistical analysis was done.
Results: Both postop Alkaline Phosphatase and Osteocalcin were increases in 15 cases and one of them was increased in 19 cases and both were decreased in 20 cases. Low platelet number was statistically related with decrease in osteogenic cell population. Other parameters, such as BMI, number of associated disease, albumin, hemoglobin, total WBC count, lymphocyte count did not contribute to osteogenic cell population.
Conclusions: Platelets which include many kinds of growth factors and cytokines were needed to maintain or increase the osteogenic cell population in the peripheral blood.
Disclosure of Interest: None Declared

P200
HEPCIDIN ACTIVATED OSTEOBLASTING IN MC3T3-E1 CELL

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Aims: Recent studies show that osteoporosis is correlated with iron overload. Experiments in cultured cells have demonstrated that iron is capable of inhibiting animal bone crystal growth with significant changes in crystallinity and carbonate substitution. Both clinical observation and in vivo animal studies have well documented that iron overload decreases bone formation and promote resorption. Hepcidin is a newly identified endogenous iron regulator with strong activity in downregulation of iron homeostasis. In the present study, we addressed whether hepcidin can upgrade osteoblastic activities in cultured cells.
Methods: The expression of osteoprotegerin (OPG) mRNA and bone gla protein (BGP) mRNA using RT-PCR was evaluated in cultured human osteoblast cells following incubation with different concentrations of Hepcidin.
Results: Hepcidin increased the expression of BGP and OPG mRNA in a dose responsive manner ($P<0.05$)

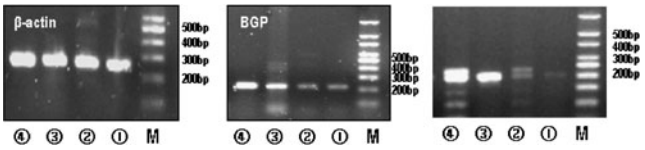

Fig. 1: β-actin, BGP, OPG expression after intervention of hepcidin with different concentration ① Control group; ② hepcidin 100 nmol/L; ③ hepcidin 200 nmol/L; ④ hepcidin 300 nmol/L

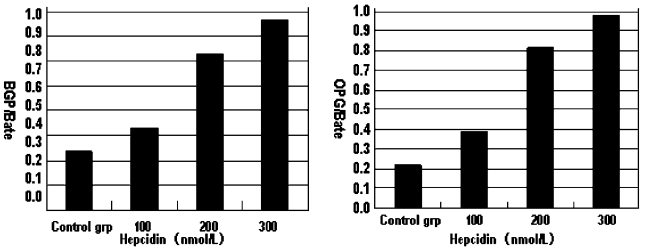

Fig. 2: BGP/Bate and OPG/Bate expression with the influence of hepcidin

Conclusions: Hepcidin promoted the osteoblastic activities documented by the increased expression of both OPG and BPG mRNAs while cellular ferric iron was down regulated. These data indicate that hepcidin has a promoting effect for bone formation, which may have a therapeutic potential in the treatment of osteoporosis.

Disclosure of Interest: None Declared

P201

CARTILAGE-SPECIFIC PPARGAMMA DEFICIENT MICE EXHIBIT SERIOUS ENDOCHONDRAL BONE GROWTH DEFECTS: IDENTIFYING UNDERLYING PATHOLOGICAL MECHANISMS ASSOCIATED WITH OSTEOPOROSIS

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Aims: Rationale: The majority of long bones develop through a process called endochondral ossification. Recent studies suggest that abnormalities in endochondral ossification process could be one of the underlying mechanisms associated with the pathology of osteoporosis. PPARγ, a transcription factor, plays a key role in lipid homeostasis and studies suggest that PPARγ is involved in the maintenance of bone homeostasis. However, the specific in vivo function of PPARγ in chondrogenesis, and endochondral bone growth and development is largely unknown. Therefore, (1) This study for the first time examined the specific in vivo contribution of PPARγ to cartilage and endochondral bone development processes using cartilage-specific PPARγ knockout (KO) mice and (2) to understand the key relationship between endochondral bone growth and skeletal deformities such as osteoporosis. *Overall hypothesis: Cartilage-specific ablation of PPARγ will result in endochondral bone growth defects resulting in serious skeletal deformities*.

Methods: To test this, we first generated cartilage specific-specific PPARγ-deficient mice using the Lox P/Cre system. We then performed series of histomorphometric techniques to determine endochondral bone growth, skeletal changes, ossification patterns, chondrocyte cell shape, chondrocyte hypertrophy, bone mineralization, bone vascularity and organization of growth plates. RT-PCR and western blotting was performed to determine the expression of extracellular matrix (ECM) markers.

Results: Cartilage-specific PPARγ KO mice were viable but showed reduced length, weight, skeletal growth and length of long bones at birth. Newborn heterozygous (het) and homozygous (hom) cartilage-specific PPARγ KO mice showed serious endochondral bone growth abnormalities including delayed primary/secondary ossification, abnormal growth plate organization and cell shape, reduced cellularity, loss of columnar organization and shorter hypertrophic zones. Immunohistochemistry for p57 and SOX 9 (markers for hypertrophic differentiation), showed reduced chondrocyte differentiation in het and hom mice. Immunohistochemistry for PECAM and Collagen X in long bones of E16.5 mice revealed reduced vascularity and delayed osseous center formation in PPARγ KO mice. Von Kossa staining revealed significantly decreased bone mineralization and weaker bones in PPARγ KO mice. Studies using PPARγ-deficient chondrocytes showed increased expression of ECM degradation products including matrix metalloproteinase (MMP)-13 and ADAMTS-5 (aggrecanase), and decreased expression of ECM building products including aggrecan and type II collagen.

Conclusions: This is the first report to demonstrate that PPARγ-deficiency in cartilage results in serious endochondral bone growth defects which may ultimately result in serious skeletal deformities including osteoporosis. We are currently investigating the bone density and osteoporotic markers in adult PPARγ mice and we strongly foresee that these mice may exhibit osteoporosis.

Disclosure of Interest: None Declared

P202

SERUM 25 VITAMIN D LEVELS ARE INVERSELY CORRELATED WITH FAT MASS INDEX BUT NOT WITH INSULIN RESISTANCE IN ASIAN INDIAN CHILDREN WITH OBESITY IN THE AGE GROUP OF 6–17 YEARS

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Aims: To study the correlation of vitamin D with insulin resistance and total body fat in Asian-Indian children with obesity in the age group of 6–17 years.
Methods: In a cross-sectional observational study, 82 Asian Indian children in the age group of 6–17 years with obesity (as per criteria of International Obesity Task Force) were studied. Oral glucose tolerance test (OGTT) was done (1.75 g/kg body weight of oral glucose with maximum of 75 g) with sample collection at 0, 60 and 120 min for blood glucose and serum insulin. Total body fat was measured with DXA. Serum 25 Vitamin D (S25OHVitD) and serum insulin was measured with Chemmileuscent immuno assay (CLIA) while blood glucose was with GOD-POD method.
Results: Total 82 obese children (45 boys; 35 girls, mean±SD 12.8±3.0 years with range of 6–17 years) were evaluated. The mean S25OHVitD was 8.57±4.2 ng/ml (range—3.9–19.2). S25OHVitD was negatively correlated with Fat Mass Index (FMI; r −0.33, p 0.01) and total body fat (r −0.31; p 0.01). S25OHVitD was did not show statistically significant correlation with any of the parameter of glucose and insulin metabolism (Fasting insulin, HOMA-IR, Matsuda Insulin sensitivity index, Area under curve of glucose & insulin). FMI was positively correlated with diastolic BP (r 0.25; p 0.02), Waist circumference (r 0.52 $p<0.0001$), Hip circumference (r 0.50; $p<0.0001$), HOMA-IR (r 0.33; p 0.001), area under curve of insulin (r 0.35; p 0.001), fasting insulin levels (r 0.34; p 0.002) while inversely correlated with Matsuda ISI (r −0.25; p 0.02).
Conclusions: There is very high prevalence of vitamin D deficiency in Asian-Indian children with obesity. FMI and total body fat are negatively correlated with S25OHVitD. However, we could not found any significant association between S25OHVitD and parameters of glucose and insulin metabolism.
Disclosure of Interest: None Declared

P203
A STUDY ON THE ESTRADIOL DEPENDENT CHANGES IN THE MECHANICAL AND STRUCTURAL PROPERTIES OF HUMAN FETAL OSTEOBLASTS CELL LINE IN VITRO

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Aims: Osteoporosis is a skeletal disorder characterized by decreased bone mass and quality, often leading to fragility fractures. The most common form of osteoporosis is the postmenopausal osteoporosis caused, by estrogen deficiency. The pathogenesis of osteoporosis has been extensively studied on the basis of cellular and molecular effects of estrogen on osteoblasts. However, the mechanical basis of the pathogenesis is still not understood clearly. This study aims to study the mechanical basis of the pathogenesis of osteoporosis by assessing the direct effect of estradiol on the elastic modulus and corresponding structural changes of human fetal osteoblasts cell line (hFOB 1.19).
Methods: The hFOB 1.19 cells were cultured in 1:1 mixture of Ham's F12 and Dulbecco's Modified Eagle's Medium without phenol red supplemented with 0.3 mg/ml G418 and 10% fetal bovine serum. The cells were seeded on sterile 13 mm glass cover slips. After 3 days of culture in either medium alone or medium supplemented with 10 nM β-Estradiol, the cells were subjected to Atomic Force Microscopy (Digital Instruments) force indentation. Hertz contact law was used to determine the apparent elastic modulus of the cell. The underlying changes in cytoskeleton were studied to comprehend the reason behind the changes in elastic modulus of hFOB. After treatment with estradiol the cells were stained with 0.1 μg/ml TRITC-Phalloidin for F-Actin and 5 μg/ml DAPI for nuclei and images were taken using fluorescent microscopy. Following estradiol treatment the cells were also tested for proliferation and Alkaline phosphatase activity
Results: The cells treated with estradiol showed significantly lower apparent elastic modulus (0.28±0.02) compared to the normal cells (0.37±0.04) as shown in Fig. 1. The apparent elastic modulus of estradiol treated cells decreased by 24% ($p<0.05$). The fluorescent images showed that the altered mechanical properties were also associated with changes in the cell morphology, in terms of area of spreading out of the cell with estradiol treated cells showing more wide-spread morphology (Fig. 2). The proliferation rate and alkaline phosphatase activity of estradiol treated cells were also significantly increased.

Figure 1

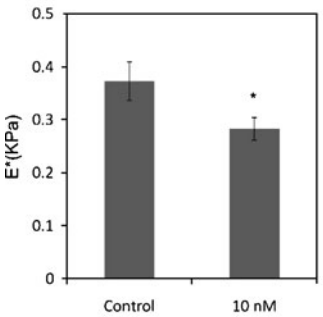
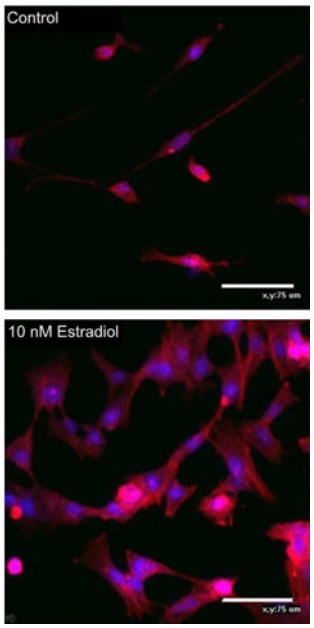


Figure 2



Conclusions: The results suggest that during the pathogenesis of osteoporosis the estrogen deficiency not only results in the changes in the physiological functions of osteoblasts but also is associated with alteration in the mechanical properties of the cells. The changes in mechanical properties are possibly due to the rearrangement of cytoskeletal structures of the cell. Thus, this study shows that the pathogenesis of osteoporosis affects the mechanical properties of osteoblasts and that the mechanical property of the cells possibly influences the physiological functions of the cell.

Acknowledgements: The experiments were carried out at the Nanobiomechanics laboratory of National University of Singapore.

Disclosure of Interest: None Declared

P204

RELATIONSHIP OF ADIPOSITY TO VOLUMETRIC BMD AND MICROSTRUCTURAL PARAMETERS IN MEN AND WOMEN ACROSS THE ADULT LIFESPAN

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Aims: Recent studies suggest that obesity might be detrimental to bone health (1,2). In this population-based, cross-sectional study, we examined the relationship between adiposity and bone, focusing on differences between various adipose depots, independent of weight, and bone mass and structure at different skeletal sites in adult men and women.

Methods: In an age-stratified population sample of 218 women (140 postmenopausal) and 291 men (age 20–97 years), we assessed their visceral adipose tissue (VAT) and subcutaneous adipose tissue (SAT) areas at the L2–L3 interspace level by single slice CT and correlated these findings to volumetric BMD (vBMD) at the lumbar spine and femoral neck by central QCT, as well as vBMD and microstructural parameters at the ultradistal radius by high resolution peripheral QCT (HRpQCT). All analyses were stratified by gender, as well as by menopausal status in women and by age (< and ≥50 years) in men. We also adjusted for weight, and bioavailable testosterone and estradiol levels (measured using liquid chromatography-tandem mass spectrometry).

Results: In men below 50 years but not in men 50 years and above, VAT was negatively correlated with total and trabecular vBMD at the lumbar spine, cortical vBMD at the femoral neck and cortical vBMD, cortical thickness and cortical area of the ultradistal radius, whereas VAT was negatively correlated with femoral neck cortical vBMD in premenopausal but not postmenopausal women. SATwas negatively correlated with trabecular femoral neck vBMD in men 50 years and older but not in men under 50 years, and negatively correlated with cortical vBMD at the femoral neck and trabecular vBMD, trabecular number, trabecular thickness and bone volume/tissue volume at the ultradistal radius in premenopausal women but not in postmenopausal women.

Conclusions: The relationship between adipose tissue and bone is complex and is confounded, as well as modified, by many factors. Our data suggest that adipose tissue has a negative relationship with bone which is age-, gender-, adipose depot- and bone compartment-specific. VAT seems to be more associated with a poorer bone phenotype.

References: 1. Zhao LJ et al., J Clin Endocrinol Metab 2007;92:1640; 2. Hsu YH et al., Am J Clin Nutr 2006;83:146

Disclosure of Interest: None Declared

P205

HOW CORRELATION BETWEEN MICRO/NANO-STRUCTURE AND WITH ATOMIC CONFIGURATION IN INDONESIAN OSTEOPOROSIS PHENOMENON

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Aims: Aim of this study was to know micro/nanostructure and atomic configuration from Indonesian osteoporosis women.

Methods: In this multicenter study, two groups were distinguished by BMD measurement, normal groups and osteoporosis groups. Bone was obtained from patient with fracture in Surgery room. Bone micro/nanostructure was analyzed by Scanning Electron Microscope. Bone atomic configuration was measured by X-ray fluorescence. All measurement was done in Physics Laboratory, Malang District University, Malang-Indonesia.

Results: Under SEM, there is difference in micro/nano-structure between normal groups and osteoporosis groups, such as trabecular thinning, tapering, breaking and perforating. Resorption lacunae of various shapes were seen on the surface of the trabeculum. There is difference in atomic configuration between normal groups and osteoporosis groups. Atomic configuration tend to increase in osteoporosis are S, Cr, Fe, Ni, Cu, Ti, Hf, Mo, Si, Re, and Ti.

Atomic configuration tend to decrease in osteoporosis are P, Ca, Al and Zn.
Conclusions: Atomic configuration correlates with micro/nanostructure in Indonesian osteoporosis women.
Disclosure of Interest: None Declared

P206
PROLACTIN REGULATES OSTEOBLAST AND OSTEOCLAST INTERACTION IN BONE REMODELING

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Aims: Hyperprolactinemia is one of the risk factor of decrease in bone mass which has been believed to be mediated by hypogonadism. However, the presence of prolactin receptor in human osteosarcoma cell line and primary bone cell culture from mouse calvariae supported the hypothesis of a direct prolactin (PRL) action on bone cells. Recently, it was demonstrated that PRL regulates bone formation and osteoblast differentiation in vivo and in vitro. Therefore, the aim of this study was to investigate the role of PRL in the regulation of bone metabolism via osteoblast-osteoclast interaction by coculture technique.
Methods: Murine premature osteoclast (RAW 264.7) was used for coculturing at various stages of human pre-osteoblasts (SV-HFO) that differentiate in proliferating pre-osteoblasts (days 2–7) to extracellular matrix producing cells (days 7–14) which is eventually mineralized (days 14–21). Concentration of PRL mimicked a lactating period (100 ng/ml) was used to incubate in osteogenic medium.
Results: Prolactin receptor mRNA and protein was highly expressed in SV-HFO, but was absent in osteoclast (RAW 264.7). PRL significantly decreased total DNA in the osteoblast-osteoclast co-culture, which was due to a decrease in osteoblast number. Calcium measurement in PRL-treated group suggested a decrease in mineralization by PRL while having no effect on alkaline phosphatase activity. Furthermore, PRL decreased markers of osteoblast differentiation, ALP and osteocalcin, and osteoclast differentiation, CLC7 and TRAP, in the co-culture at there early stage of osteoblast differentiation (at day 10) suggesting inhibition of PRL on bone remodeling at early stage.
Conclusions: The present study shows inhibitory effects of PRL on osteoblasts and osteoclasts and provides evidence of an action of PRL on osteoclast differentiation via osteoblast.
Acknowledgements: Royal Golden Jubilee Ph.D. programme.
Disclosure of Interest: None Declared

P207
ASSESSMENT OF BONE LOSS IN ANKYLOSING SPONDYLITIS PATIENTS BY SERUM C-TELOPEPTIDE MEASUREMENT

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Aims: Determine the level of serum C-Telopeptide (CTX), a bone resorption marker, in AS patients and the relationship between CTX and the disease activity.
Methods: The study consisted of 36 male patients (mean age of 24.9±8.3), who fulfilled the modified New York criteria for the AS, and 15 age-matched healthy male controls. The assessments included age, disease duration, and clinical, radiology and laboratory data. Inflammatory activity of the disease was assessed using ESR, CRP and Bath Ankylosing Spondylitis Disease Activity Index (BASDAI). BMD at the lumbar spine and femoral neck was measured by DXA. Serum CTX was measured by Beta-Crosslaps method.
Results: The results showed that serum CTX level was significantly higher in the AS group (1098.8±432.5 pg/ml) compared with that of the control group ((370.5± 106.7 pg/ml, $P<0.01$). There was a positive relationship between CTX level and indicators of inflammatory status, including ESR ($r=0.855$), CRP ($r=0.836$), and BASDAI ($p<0.01$).
Conclusions: Although this was a small study, our data suggest that persistent inflammation may be an etiologic factor of bone loss in AS, and thus CTX and other biochemical markers should be used to monitor disease status, beside clinical assessment, in order to have proper treatment.
Disclosure of Interest: None Declared

P208
VISCOELASTIC AND MECHANICAL PROPERTIES CHANGES IN OVARIECTOMIZED RAT FEMUR: PRELIMINARY RESULTS BY USING NANOINDENTATION CSM MODE

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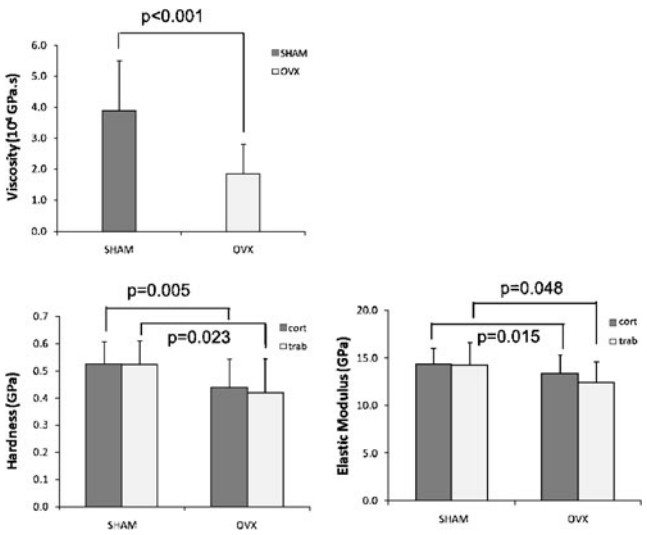
Aims: While conventional diagnosis of osteoporosis is based on BMD from DXA, the micro-level bone quality deterioration in viscoelastic and mechanical aspects have not been thoroughly understood. The aim of this study is to evaluate the bone micro-level changes of viscoelastic and mechanical properties in ovariectomized (OVX) animal model.

Methods: 35 female Sprague Dawley rats of age 8–10 weeks were divided into two groups, OVX and SHAM. At the end of the 12th weeks, rats were euthanized and femurs were harvested after removing soft tissues. The femur specimens were embedded in epoxy and metallographically polished to produce the smooth surface which was 1 mm above the distal growth plate. After 16 h rehydration, nanoindentation (G200 nanoindenter, Agilent) was conducted using continuous stiffness measurement (CSM) method to determine elastic modulus (E) and hardness (H). Twenty indentations were made on cortical bone and trabecular bone respectively, each at least 60 μm away from the adjacent indentation. Basic XP creep test was also conducted on cortical bone with 10 indents per femur sample. Creep displacement-time curve was fitted using the following equation: $h^2(t) = (\pi/2) P_o \cot\alpha[(1 - \exp(-tE_2/\eta))/E_2]$. E_2 is the elastic element of the Voigt model and η is the indentation viscosity, which is computed based on the curve fitting of creep displacement by non-linear regression.

Results: For the purpose of eliminating surface roughness interference, all the results were taken at a displacement range of 800–1000 nm. Early micro-level deterioration due to osteoporosis was observed in both cortical and trabecular structures of OVX rats. Mechanical Properties of E and H were decreased in OVX rat femurs as hypothesized. Significant differences in elastic modulus (E) are observed between OVX and SHAM groups. For cortical bone, $Ec - ovx = 13.4 \pm 1.88$GPa vs. $Ec - sham = 14.4 \pm 1.60$ GPa ($P = 0.015$); for trabecular bone, $Et - ovx = 12.48 \pm 2.16$ GPa vs. $Et - sham = 14.28 \pm 2.41$ GPa($P = 0.048$). Significance in H shows the same trend as M: for cortical bone, $Hc - ovx = 0.43 \pm 0.10$ GPa vs. $Hc - sham = 0.52 \pm 0.08$ GPa ($P = 0.005$); for trabecular bone, $Ht - ovx = 0.42 \pm 0.12$ GPa vs. $Ht - sham = 0.52 \pm 0.08$ GPa($P = 0.023$). Furthermore, $\eta c - ovx = 1.86*10^{13} \pm 0.95*10^{13}$ GPaS vs. $\eta c - sham = 3.89*10^{13} \pm 1.63*10^{13}$ GPa($P < 0.001$).



Conclusions: Osteoporosis induced decline in microlevel bone quality is embodied as reduced modulus, hardness and viscosity in this study. By using the CSM mode, we observed the decrease in viscosity of OVX rat femur which may indicate the reduced damping property of the bone. Considering femur as fracture-resistant element, decrease in viscoelastic and mechanical properties may contribute to the increased fracture risk. Current results would shed light on the evaluation of the drug response in the treatment of osteoporosis, and prediction of osteoporotic fractures based on bone intrinsic qualities.

Disclosure of Interest: None Declared

P209
OSTEOCYTE CELL FATE FROM GLUCOCORTICOID TREATMENT IS DOSE DEPENDENT

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Aims: Glucocorticoids induce osteocyte autophagy in vitro. We determined if there was a dose dependent response of glucocorticoids for osteocyte autophagy and apoptosis in a male glucocorticoid-induced osteoporosis mouse model as well as in an osteocytic cell line.

Methods: Three month old male Swiss-Webster mice were implanted with prednisolone slow release pellets [2.5 mg, (1.4 mg/kg/d), or 5 mg, (2.8 mg/kg/d), 60-day slow release pellets], or Placebo. The mice were sacrificed at day 28. Minerals and calcitrophic hormones were measured in serum by ELISA or RIA. Autophagy and apoptosis were accessed from the tibiae or in the osteocytes (MLO-Y4 cells) by RT-PCR and western blot. The percentages of osteocytes undergoing apoptosis or autophagy were measured by immunohistochemistry in both the cancellous and cortical bone regions of the distal femurs.

Results: Twenty-eight days of GC exposure dose-dependently decreased serum phosphorus by about (10% and 25%), $1,25(OH)_2D$ (65% and 90%) and increased FGF23 (78% and 107%), respectively There was a significant increase in the activation of autophagic RT-PCR gene pathway by an average of 50-fold at the 1.4 mg/kg/d dose level and activation of the apoptosis RT-PCR gene pathway by an average of 30-fold at the 2.8 mg/kg/d dose level. The presence of osteocyte autophagy at the distal femur was not different at trabecular bone region however it was increased by about 50% at the cortical bone site at both dose levels. Osteocyte apoptosis was not different from placebo-treated group at the trabecular bone region and increased at the cortical bone region by approximately 40% at 2.8 mg/kg/d

dose level. Osteocyte autophagy was correlated to cathepsin K expression in vivo and in vitro.

Conclusions: We found a dose dependent effect of GCs on osteocyte cell fate, with lower doses favoring autophagy and higher doses favoring apoptosis. Osteocyte's initial reaction to GCs may be to undergo autophagy and some cells may survive while others go on to apoptosis.

Disclosure of Interest: W. Yao Grant / Research Support from: NIH, J. Jia: None Declared, M. Guan: None Declared, L. Bonewald: None Declared, N. Lane Grant / Research Support from: NIH

P210
MICRORNAS REGULATE BONE METASTASIS IN LUNG CANCER

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Aims: It has been reported that 20–40% of patients with advanced lung cancer develop osteolytic bone metastasis. MicroRNAs (miRNAs) critically regulate tumor metastasis. However, the pathological roles of miRNAs in bone metastasis in lung cancer are unknown. Our aim was to determine the miRNA profiles relevant to bone metastasis in lung cancer and its molecular mechanisms.

Methods: (1) miRNA microarray and Taqman miRNA assay based real-time qRT-PCR were used to investigate miRNA profiles in lung cancer cell lines/tumor tissue with/without bone metastasis. (2). Loss and gain of function techniques based on a lentiviral system were used to permanently restore miRNAs relevant to bone metastasis in SBC5, a human small cell lung cancer cell line that can metastasize to multiple organs including bone. The miRNA modified SBC5 cells were cocultured with osteoblasts/osteoclasts. The phenotypes as well as communications between SBC5 cells and bone cells were investigated. The miRNA modified SBC5 cells were further implanted into NSG immunodeficient mice to determine the changes in bone metastases.

Results: The expression levels of miR-335 and miR-29a were significantly lower in SBC5 cells and human lung cancer tissue with bone metastasis. Restoring miR-335 in SBC5 significantly decreased proliferation and tumorigenesis (invasion and migration), but did not affect cellular functions of osteoblasts and osteoclasts cocultured with SBC5. Restoring miR-29a in SBC5 did not affect proliferation and tumorigenesis, but significantly impaired cellular functions of osteoblasts and osteoclasts cocultured with SBC5. Restoring miR-335 and miR-29a together in SBC5 significantly decreased proliferation and tumorigenesis, as well as impaired the cellular functions of osteoblasts and osteoclasts cocultured with SBC5. Restoring either miR-335 or miR-29a could reduce bone metastasis in NSG mice, the group with miR-335 and miR-29a together showed the maximum reduction. Bioinformatics study showed miR-335 could target insulin-like growth factor one receptor (IGF1R), and miR-29a could target parathyroid hormone related peptide (PTHrP). Intriguingly, significantly high levels of IGF1R and PTHrP were found in SBC5. Furthermore, restoring miR-335 or miR-29a could significantly reduce the expression of IGF1R or PTHrP respectively in SBC5.

Conclusions: Deregulating PTHrP by miR-29a in lung cancer directly or indirectly enhances osteoclastic bone resorption, which releases some growth factors such as IGF1 from bone. Low level of miR-335 in these lung cancer cells results out higher level of IGF1R, which enhances IGF1 signaling released from bone resorption. The hyperactivated IGF1 signaling facilitates the development of bone metastasis. Restoring miR-335 and miR-29a can block the vicious cycle between tumor cells and bone cells, thus reduce bone metastasis in lung cancer. Targeting miRNAs may represent the novel therapies for bone metastasis in lung cancer.

Disclosure of Interest: None Declared

P211
A STUDY ON USING LOW DRUG RATIO OF BISPHOSPHONATE TO PARATHYROID HORMONE IN THE OVARIECTOMIZED RAT

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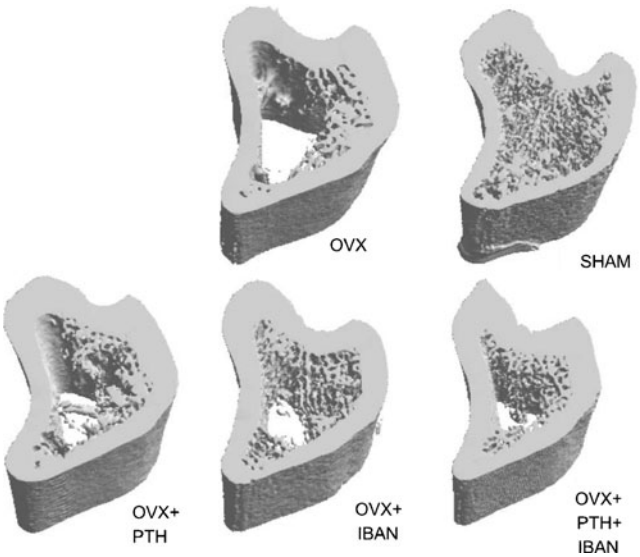
Aims: We aim to evaluate the combination from a relatively low ratio of the commonly used anti-resorptive [1,2] bisphosphonate (ibandronate) to anabolic [3,4] parathyroid hormone (hPTH) in the ovariectomized rat model for osteoporosis in terms of densitometric, microarchitectural, and mechanical analyses, to determine any synergistic effects [5,6] similar to the drug ratio used clinically.

Methods: 60 female Sprague Dawley rats between the ages of 8–10 weeks were randomly divided into five groups: SHAM, OVX + VEH, OVX + PTH, OVX + IBAN and OVX + PTH + IBAN. The rats were ovariectomized following 1 week of acclimatization. Meanwhile, SHAM group were subjected to sham surgery. SHAM and OVX + VEH rats were administered the vehicle whereas corresponding drugs (hPTH, Ibandronate) were administered to the other groups starting from the 4th-week post surgery. Three rats from each group were euthanized after

6, 8, 10 and 12 weeks. The excised tibia samples were subjected to 3-point bending, pQCT and μCT analysis. Serum biomarkers (P1NP and CTX) for both bone formation and resorption were also studied using ELISA.

Results: All the structural, mechanical tests showed a significant difference between SHAM and OVX group. The μCT and pQCT indices showed that OVX + IBAN, OVX + PTH and OVX + PTH + IBAN groups had significantly higher BMD than OVX + VEH group, OVX + IBAN and OVX + PTH + IBAN groups having significantly higher BMD than the OVX + PTH group. Although the synergistic administration of ibandronate and PTH does not show any significant difference from the individual treatment groups, BMD, cortical density and mechanical properties of OVX + PTH + IBAN group is higher than the other groups.



Conclusions: Ibandronate administration has showed to restore the trabecular bone density faster than the PTH. Although combined administration of weekly administrated low dosage IBAN and PTH did not perform significantly better than the individual treatments, the results are still distinguishable from prevailing studies [4] which claimed that bisphosphonates may reduce the effect of PTH. Synergistic effect may exist in low dosage weekly regimen with proper ratio of anabolic and antiresorptive drugs. However, large-scale and longer duration studies are required to prove the effect of this synergistic effect and to discover the correlation between the mechanical and structural properties of the bone.

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Acknowledgements: This work was supported by AcRF #R397-000-083-112 from the Ministry of Education, Singapore.

Disclosure of Interest: None Declared

P212
SITE SPECIFICITY OF CALCIUM AND STRONTIUM DEPOSITION IN BONE: A COMPARATIVE ISOTOPIC TRACER STUDY IN THE SHEEP MODEL

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Aims: ^{41}Ca is a promising radiotracer for labeling calcium (Ca) in the human skeleton. Once the skeleton is labeled, changes in urinary tracer excretion can be used for assessment of Ca bone balance and turnover. Stable strontium isotopes (^{84}Sr and ^{86}Sr) may serve as complementary markers for skeleton labeling due to similarities in Ca and Sr metabolism. They are non-radioactive and more easily to detect than ^{41}Ca. Studies were conducted in an adult sheep to assess similarities and dissimilarities between Ca and Sr in terms of urinary excretion, bone deposition and homogenous labeling of the bone matrix.

Methods: A 2 years old sheep received a single intravenous dose of ^{41}Ca (50 nCi) and ^{86}Sr (45 mg). Over a period of 180 days, spot urine samples were collected to follow clearance of both tracers from the animal and to assess when skeleton labeling is complete. Samples were analyzed for ^{41}Ca by Accelerator Mass Spectrometry at ETH Zurich and for ^{86}Sr and element content at NUS by Thermal Ionization Mass Spectrometry and Atomic Absorption Spectrophotometry, respectively. After sacrifice, relevant bones were obtained (tibia, radius, femur, metatarsus, metacarpus, vertebrae). Bones were cut into slices and samples of ca. 2×2×2 mm taken to assess spatial differences in tracer deposition using the same techniques.

Results: Urinary ^{41}Ca excretion followed closely systematics observed in humans and dropped from an initial ratio of ^{41}Ca to natural Ca of 2×10^{-7} on day 1 to 2×10^{-10} on day 180. Tracer excretion stabilized around day 50 post dose as compared to day 200 in human subjects which is in

agreement with a higher bone turnover and faster deposition of the tracer in sheep. At the time of writing, preliminary analysis of the metacarpus indicates ^{86}Sr incorporation across the bone with a preferential tracer deposition in metabolically more active areas (epiphysis).

Conclusions: Isotope doses were sufficient to follow tracer excretion in urine and to assess deposition in bone matrix at the time of sacrifice. Full data sets for tracer deposition in bone tissues and comparative kinetics for calcium and strontium clearance from the sheep will be presented at the conference in order to assess the potential of 86Sr as a surrogate marker for assessment of Ca balance and turnover in humans.

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Disclosure of Interest: None Declared

P213
PHOSPHATIDYLSERINE-CONTAINING LIPOSOMES SUPPRESS INFLAMMATORY BONE LOSS BY AMELIORATING THE CYTOKINE IMBALANCE IN THE ANKLE JOINTS OF ADJUVANT ARTHRITIC RATS

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Aims: Phosphatidylserine-containing liposomes (PSLs) strongly inhibit inflammatory bone loss in adjuvant arthritic (AA) rats. This effect was attributed to the inhibition of osteoclastogenesis through the secretion of prostaglandin E_2 and transforming growth factor-β1 by osteoclast precursors after the phagocytosis of PSLs. However, infiltrated macrophages are considered to secrete anti-inflammatory mediators after phagocytosis of PSLs, which also contributes to inhibiting osteoclastogenesis. In the present study, we have attempted to elucidate the effects of PSLs on the phenotype of infiltrated macrophages during inflammatory bone loss.

Methods: Adjuvant arthritis was induced by a complete Freund's adjuvant (CFA) injection in Lewis rat. Cell infiltration, mRNA expression of inflammatory cytokines in the ankle joint tissue were detected in vivo. Also the effects of PSLs on lipopolysaccharide (LPS)-stimulated macrophages were investigated in vitro.

Results: In AA rats, the ankle joints swelled with the infiltration of both macrophages and helper T cells into the synovia after a CFA injection. In the ankle joints of AA rats, approximately half of the infiltrated macrophages underwent a phenotypic change from interleukin (IL)-1β-producing to IL-10-producing cells after the phagocytosis of PSLs. In LPS-stimulated macrophages, PSLs also significantly decreased IL-1β production, but increased IL-10 production. Moreover, PSLs inhibited the rapid activation of p38 mitogen-activated protein kinases (MAPK) and nuclear factor (NF)-κB, but enhanced the delayed activation of extracellular signal-regulated kinase (ERK) in LPS-stimulated macrophages. PSL-induced differential influences on the activities of p38 MAPK and ERK is a likely underlying mechanism for phenotypic changes of infiltrated macrophages after the phagocytosis of PSLs. This phenotypic change may be responsible for a significant decrease in the mean mRNA level of the receptor activator of NF-κB (RANK) and the RANK ligand (RANKL) in the ankle joint of PSL-treated AA rats, resulting in the inhibition of inflammatory bone loss.

Conclusions: Systemic treatment with PSLs inhibited AA-induced trabecular bone loss by provoking the phenotypic change of macrophages, from IL-1β-producing to IL-10-producing cells, in the ankle joint of AA rats. This phenotypic change of infiltrated macrophages is caused by the PSL-induced inhibition of p38 MAPK activity and the subsequent enhancement of ERK activity.

Disclosure of Interest: None Declared

P214
ISOTOPIC LABELING OF THE HUMAN SKELETON USING 41CA FOR SENSITIVE IDENTIFICATION OF CHANGES IN BONE CALCIUM BALANCE IN HUMANS

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Aims: Identification of effective strategies for osteoporosis prevention remains challenging due to methodological limitations. Response of bone to interventions targeting nutrition or lifestyle is commonly moderate. Long-term interventions and/or large subject groups are required to identify changes by conventional techniques such as BMD

or biomarkers of bone resorption and excretion. Isotopic labeling of bone calcium may overcome current limitations. Once bone calcium is labeled, changes in urinary tracer excretion should directly reflect changes in bone calcium balance. Isotopic labeling of bone became possible using ^{41}Ca, a very long living radioisotope, which is rather inexpensive and can be administered at negligible health risk by using ultra-sensitive mass spectrometric techniques (AMS, RIMS).

Methods: 24 postmenopausal women received an oral dose of ^{41}Ca (100 nCi) for isotopic labeling of bone calcium. Labeled subjects participated in a bisphosphonate intervention (risedronate, 6 months) to evaluate induced changes in ^{41}Ca excretion against changes in BMD (n=6). Remaining subjects (n=16) participated in a randomized cross-over, placebo controlled calcium supplementation trial (750 mg Ca/d, 3 months) to evaluate the sensitivity of the technique.

Results: Isotopic labeling was found to be complete ca. 200 days *post dose*. Both interventions were effective. Bisphosphonate treatment increased BMD significantly for spine (+3.0%, P=0.01). Calcium supplementation resulted, in a significant lowering in D-Pyr (bone resorption marker; −19.4%, P=0.04) and BAP (bone formation marker; −7.2%, P=0.04). Changes in urinary ^{41}Ca excretion paralleled findings made by conventional techniques. Bisphosphonate treatment resulted in a change in calcium transfer rate from the slow into the fast exchanging pool by −56% (P<0.0005) indicating a lowering of bone resorption. Calcium supplementation had no significant effect on calcium transfer rates between the slow and the fast exchanging pool but altered calcium transfer rate from the fast exchanging pool to plasma by −31% (P<0.0005).

Conclusions: Using41Ca, response of bone to controlled interventions can be assessed at much higher sensitivity than with established methods. For both interventions, changes in ^{41}Ca excretion could be identified unambiguously in each individual in less than a month.

Disclosure of Interest: None Declared

P215
A SECONDARY FRACTURE PREVENTION THAT REALLY WORKS

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Aims: To evaluate the effectiveness of a secondary fracture prevention program run by care managers and nurse practitioners using reports generated from an electronic medical record to identify patients who require a DXA scan and/or anti-osteoporosis treatment in a Just-In-Time clinic setting.

Methods: All patients aged 65 years or older who sustained a fragility fracture (any low energy fracture excluding face, skull, fingers, and toes) in 2008 were identified from the inpatient and ambulatory care records of a large health maintenance organization in Southern California. Electronic medical records were used to ascertain additional information on patient demographics and clinical characteristics, fracture type, DXA scan reports, anti-osteoporosis treatment, and eligibility. Proportions of patients screened and/or treated for osteoporosis were described by sex and age group, as were proportions of patients for whom screening or treatment was ordered, but not implemented.

Results: In 2008, 3,037 men and 7,351 women aged 65 years or more sustained a new fragility fracture. DXA scans and/or pharmacologic treatment had been administered to 2,439 men (80.3%) and 6,796 women (92.5%). DXA scans and/or treatment had been ordered, but not carried out for an additional 237 men and 238 women. The combined rate of DXA scan and/or treatment and intended to treat was 88.1% in men and 95.7% in women. Only 186 patients who did not receive a DXA scan and/or treatment or had a DXA scan and/or treatment ordered remain active members of the SCAL HMO. Of the 10,388 initial fragility fracture patients, that leaves 1.8% of these patients that still have a care gap on secondary fracture prevention.

Conclusions: Our goal was to get to as close to 100% of DXA scanning and/or treatment in patients over 65 years old with a fragility fracture as possible. We came close to achieving that goal by utilizing care managers/nurse practitioners and an electronic medical record to target all patients with a fragility fracture who had not received a DXA scanning and/or treatment and then acting the behalf of the patient's primary care physician to order a DXA scan and/or treatment.

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Disclosure of Interest: None Declared

P216
BONE MINERAL DENSITY STATUS IN HYPERTHYROIDISM

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Aims: The objective of this study is to determine the BMD in patients with hyperthyroidism.

Methods: A total 30 consecutive patients (21 females and 9 men) with hyperthyroidism were enrolled in the study from Lok Nayak Hospital, MAMC, New Delhi. Thirty apparently healthy age and sex matched subjects were also studied. In both the groups serum calcium, alkaline phosphatase

(ALP) and phosphate (PO_4^{3-}) was measured by autoanalyser. Quantitative estimation of PTH was done by IRMA and of Vitamin D was done by radioimmunoassay method (DiaSorin, USA). BMD was assessed at the lumbar spine (LS) and hip by DXA technique using Hologic^R QDR 4500A, Waltham, Mass.

Results: The mean±SD age of patients was 37±9.68 years. Mean±SD calcium, ALP, PO_4^{3-} was 9.40±0.59 mg/dl, 260.43±142.84 IU and 3.35±0.38 mg/dl,respectively. It was comparable to the control group. Mean±SD PTH was significantly higher in the patient group as compare to control group (71.25±55.85 vs. 18.62±11.92 pg/ml: $p<0.005$) and Mean±SD vitamin D in two groups was 18.29±9.58 and 27.54±7.70, respectively. The Mean±SD BMD (g/cm^2) at LS and hip was comparable in two groups. Vitamin D deficiency (<20 ng/ml) was seen more in patient group (19:3) while insufficiency (20–30 ng/ml) was comparable (11:17). Number of subjects having BMD *T*-score in osteoporotic range at LS and hip was significantly higher in patient group (12:1; $p<0.005$).

Conclusions: In conclusion vitamin D deficiency and osteoporosis are more common in hyperthyroid patients compare to control.

Disclosure of Interest: None Declared

P217

VITAMIN D DEFICIENCY IN HYPERTHYROIDISM

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Aims: Aim of the study is to evaluate vitamin D levels in patients of hyperthyroidism.

Methods: In all 53 patients (18 men and 35 women) of hyperthyroidism attending the Endocrine clinic of Maulna Azad Medical College were enrolled according to the inclusion criteria. These patients were diagnosed as cases of thyrotoxicosis according to Wayne's clinical score for thyrotoxicosis. Patients with thyroid function test in hyperthyroid range with or without clinically apparent diffuse thyromegaly underwent 2-h and 24-h radioactive iodine uptake thyroid scan (RAIU) and ultrasound thyroid gland. Serum calcium, phosphorous, alkaline phosphatase was done for every case. S. PTH was also measured by immunoradiometeric assay. Quantitative estimation of serum 25(OH) D was done by radioimmunoassay using Diasorin kit. 24 h dietary calcium intake was calculated according to food frequency questionnaire. Based on Vit. D levels patients were categorized as Vitamin D deficient (<20 ng/ml), insufficient (20–30 ng/ml) and sufficient group (>30 ng/ml).

Results: The mean age ±SD of patients was 39.8±10.1 years. The mean±SD 24 h dietary calcium intake was 647.7±253.9 mg/d. Out of 53 patients with hyperthyroidism 26 patients (49.05%) were diagnosed as vitamin D deficient, 19 patients (35.84%) were vitamin D insufficient and only 8 patients (16.%) have sufficient vitamin D levels. The mean±SD calcium values were 9.3±0.6 mg/dl, 9.56±0.5 mg/dl and 9.6±0.7 mg/dl in deficient, insufficient and sufficient groups respectively. None of the patient had serum calcium values in the hypocalcemic range. Similarly the mean±SD values of serum phosphate and serum alkaline phosphatase was comparable in all the three groups. The mean PTH value in the three respective groups were 79.3±42.47 pg/ml, 65.69±27.95 pg/ml and 61.03±23.95 pg/ml.

Conclusions: Vitamin D deficiency/insufficiency is widely prevalent in Indian patient with hyperthyroidism. Further studies are required to evaluate the effect of Vit. D supplementation in hyperthyroidism on bone mineral metabolism.

Disclosure of Interest: None Declared

P218

THE CORRELATION BETWEEN HUBBLE BUBBLE SMOKING AND BONE MINERAL DENSITY OF POSTMENOPAUSAL WOMEN REFERRED TO BMD CLINIC OF NAMAZI HOSPITAL SHIRAZ, IRAN, 2004

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Aims: The determination of correlation between Hubble bubble smoking and BMD of postmenopausal women referred to BMD clinic of Namazi hospital Shiraz.

Methods: We conducted a retrospective cohort study in which the correlation between Hubble bubble smoking and BMD of femur neck and lumbar spine of postmenopausal women was investigated. The interviews were done by phone. 180 women were assigned in two groups of 60 smokers and 120 nonsmokers.

Results: Finding revealed that despite the existence of difference between BMD of femur neck bone density in smokers and nonsmokers ($t=-1.988$, $p=0.048$),variables of parity and level of education played important roles in the

results. We also found that lumbar spine density was lower in smokers (t=−2.016, p=00.045) and after control of confounding variables, the difference was related to Hubble bubble smoking (p=00.045).

Conclusions: In this research it was concluded that education and parity had greater correlation ship with BMD of femur neck, it can be due to paying more attention to sanitation among educated women. Also, in this research, there was significant correlation between Hubble bubble smoking and BMD of lumbar spine. Therefore Hubble bubble smoking can be taken as one of the risk factors of low BMD among postmenopausal women.

Disclosure of Interest: None Declared

P219
AUDIT ON COMMUNICATION ISSUES BETWEEN SECONDARY AND PRIMARY CARE REGARDING SECONDARY PREVENTION OF OSTEOPOROTIC FRACTURES

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Aims: To audit, within the acute trauma ward at Watford General Hospital appropriate prescription of new medication, to assess the implementation of additional letters on discharge aimed at educating the patient and their General Practitioner (GP) on the medication, and to follow-up the receipt additional letters sent to the GP.

Methods: A proforma was designed to collect information regarding appropriate prescription of bone protection medication on discharge from hospital, the issuing of additional letters to the patient and GP, and to follow-up receipt of the letter by the GP. Data from 19 patients was collected over a 1 month period.

Results: 89% were discharged on appropriate bone protection. 47% of patients were issued the additional discharge letter and a copy sent to their GP. 21% of the GPs received the additional letter. All GPs who received the information instituted the changes to the patient's medication list.

Conclusions: Although a majority of the patients were prescribed bone protection medication, a relatively low proportion of patients were discharged with the additional letter. Additional letters that were sent did not always reach GPs. GPs, who received the additional letter made the appropriate changes to ensure continuation of treatment. This study shows that good communication between Secondary and Primary can improve adherence to therapy post discharge. However major changes in the training structure of junior doctors and subsequent lack of continuity in patient care meant this level of communication could not be achieved in all cases. Therefore a more robust reliable system is required for effective delivery of communication to ensure continuation of treatment.

Acknowledgements: Servier Pharmaceutical Company printed the additional letter for us but with no mention of their company on it. They also provided the National osteoporosis society pt leaflets on Alendronate, risedronate and strontium.

Disclosure of Interest: S. Ghosh: None Declared, L. Thangaraj Other: Servier Pharmaceutical Company printed the additional letter for us but with no mention of their company on it. They also provided the National osteoporosis society pt leaflets on Alendronate, risedronate and strontium

P220
VASCULAR ENDOTHELIAL GROWTH FACTOR: ASSOCIATION WITH BONE MINERAL DENSITY IN COPD PATIENTS

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Aims: To assess the relationship between lung function parameters and bone loss with circulation vascular endothelial growth factor (VEGF) in patients with chronic obstructive pulmonary disease (COPD).

Methods: 47 patients with stable COPD (29—with bronchitis type COPD and 18 patients with emphysema) and 23 controls subjects without airflow obstruction were included in the study. BMD was measured by DXA at the lumbar spine (LS), left femur neck (FN) using a Lunar Prodigy Densitometer (USA). We also estimated concentration of VEGF in serum (VEGFser) and pulmonary function.

Results: We identified a decreased BMD (T-score ≤−1 SD) in 43/47 patients, as measured on the FN or LS. T-score was lower in patients with emphysema compared to bronchitis type of COPD (p<0.05). There was a direct correlation with forced expiratory volume in 1 s (FEV1) both bronchitis type of COPD and emphysema (r=0.53, p= 0.003 and r=0.57, p=0.002, respectively). The median concentrations of VEGFser were significantly higher in serum of COPD patients, but significantly lower in patients with emphysema compared to normal control (p<0.05 and p<0.01, respectively). The concentration of VEGFser from patients with COPD correlated inversely with FEV1 (r= −0.73; p=0.00004); in contrast, there was a positive correlation between these two measurements in patients with emphysema (r=0.79; p=0.00002). The VEGFser correlated with BMD (r=0.64, p=0.0002) only in the patients with emphysema.

Conclusions: Thus, our finding suggest that VEGF may affect the pathogenesis of these two disease of emphysema and osteoporosis.
Disclosure of Interest: None Declared

P221
LOW BONE MINERAL DENSITY IS AN INDEPENDENT PREDICTOR OF CARDIOVASCULAR MORTALITY IN HAEMODIALYSIS PATIENTS

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Aims: Various studies suggest a strong association between BMD and clinical outcome in hemodialysis (HD) patients. Secondary hyperparathyroidism, chronic inflammation, vitamin D deficiency, malnutrition in patients with end stage renal disease, may all be responsible for a reduction in BMD. The same factors may contribute to the progression of cardiac disease in haemodialysis patients, which accounts for more than 50% of all deaths among ESRD patients. The purpose of this study was to examine the relationship between BMD and general and cardiovascular mortality in haemodialysis patients of both sexes.
Methods: Lumbar spine, femoral neck, and distal forearm BMD were measured by DXA in 516 haemodialysis patients who were then followed prospectively for a mean of 44 (range 12–120) months. The Kaplan-Meier estimator of survival and the Cox proportional hazards model was used to calculate and determine the relations between mortality and BMD.
Results: In lumbar spine thirty 180 patients (34.8%) had reduced BMD (osteopenia), and in 103 (20%) BMD was below the fracture threshold as defined on DXA measurements by osteoporosis classification of the World Health Organization (WHO). In femoral neck 222 patients (43%) had reduced BMD, and in 49 patients (9.5%) BMD was below the fracture threshold. In distal forearm 170 (33%) had reduced BMD 129 (25%) BMD was below the fracture threshold. The BMD had significant negative associations with serum parathyroid hormone (PTH) levels, bone *alkaline phosphatase and duration of haemodialysis*. Positive associations were found with weight and cumulative dose of active vitamin D metabolites. We did not find any influence of BMD on all-cause mortality of haemodialysis patients. At the same time low BMD was strongly associated with cardiovascular mortality. The Cox proportional hazards model revealed that the best predictor of cardiovascular mortality is low BMD of femoral neck.
Conclusions: Low BMD is associated with cardiovascular mortality, and low BMD of femoral neck is the best predictor of cardiovascular mortality in haemodialysis patients.
Disclosure of Interest: None Declared

P222
BONE MINERAL DENSITY IN PATIENTS WITH LUPUS NEPHRITIS

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Aims: Osteoporosis is defined as a systemic skeletal disease characterized by decreased bone density and disruption of the microstructure, with a consequent increase in bone fragility and susceptibility to fractures. Patients with lupus nephritis (LN) confront an increased risk of developing osteoporosis and fragility fractures. Traditional risk factors, such as smoking, advanced age, physical inactivity, and low weight, are partly responsible, but a number of lupus-specific risk factors may also play an important role. The aim of this study was to determine the prevalence of reduced BMD in a group of LN patients and to identify factors predictive of reduced BMD.
Methods: We studied 84 SLE patients. Demographic and clinical data were collected, radiographs of the thoracic and lumbar spine and BMD measurements by DXA were performed. Osteoporosis was defined as a *T*-score less than −2.5 SD and osteopenia as a *T*-score less than −1.0 SD in at least one region of measurement. Variables evaluated were disease duration, age, SLEDAI, serum creatinine, menses (in woman), daily and cumulative corticosteroid dose, use of immunosuppressive agents and low-molecular-weight heparin, history of fracture due to minor trauma.
Results: Osteopenia was present in 58.33% of the patients and osteoporosis in 21.43%. In multiple regression analysis, low BMD was associated with a low BMI, postmenopausal status, cumulative corticosteroid dose, elevated serum creatinine. A statistical difference ($P<0.01$) was found when comparing BMD in pre- and postmenopausal patients, in patients with serum creatinine < and >350 μmol/l. BMD had a significant correlation with daily and cumulative steroid dose ($P<0.01$ and $P<0.05$, respectively). No significant correlation was found in either subgroup between BMD or other studied parameters.
Conclusions: Osteopenia was present in 58.33% of the patients and osteoporosis in 21.43%. In multiple regression analysis, low BMD was associated with a low BMI, postmenopausal status, cumulative corticosteroid dose, elevated serum creatinine. A statistical difference (*P*<

0.01) was found when comparing BMD in pre- and postmenopausal patients, in patients with serum creatinine < and >350 μmol/l. BMD had a significant correlation with daily and cumulative steroid dose ($P<0.01$ and $P<0.05$, respectively). No significant correlation was found in either subgroup between BMD and other studied parameters.

Disclosure of Interest: None Declared

P223
THE EFFECT OF BISPHOSPHONATES ON OSTEOPROSIS

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Aims: In the 1960s after the recognition of the role of pyrophosphosphate as a natural inhibitor of biomineralization, bisphosphonates were tested for their ability to inhibit calcification because pyrophosphate was hydrolyzable in vivo. During these experiments bisphosphonates were shown to inhibit bone resorption, Bisphosphonates target the underlying pathophysiology of skeletal by inhibiting the activity of osteoclasts reducing bone turnover by effectively reducing skeletal complications and improving patients quality of life, mobility and functioning. Bisphosphonates have become a standard of care in this indication. Clinical trial data demonstrated that ibandronate (third generation bisphosphonates) reduces the risk of skeletal complications, relieve bone pain/improve quality of life and is well tolerated in patients with bone metastases from breast cancer.

Methods: Systematic review articles by internet search

Results: The effect of bisphosphonate alendronate has on bone cancer pain, bone remodeling and tumor growth and necrosis. Alendronate therapy reduced ongoing and movement evoked bone cancer pain, bone destruction and the destruction on sensory nerve fibers. In women or men with a high risk of fractures, these medicines reduce the incidence of fractures and improve the quality of life.

Conclusions: Bisphosphonates are effective in preventing fractures in people with osteoporosis, Bisphosphonates are commonly used to treat osteoporosis (bone thinning). In certain situations bisphosphonates can help protect your bones against some of the effects of secondary bone cancer, such as pain and weakness. Secondary bone cancer occurs when the original cancer (the primary) spreads to form a secondary cancer (metastasis) in the bone.

References: 1- Akcay MN, Breast 2002;11:526; 2- Body JJ et al., Proc Am Clin Oncol 2003;22:46; 3- Body JJ et al., Pain 2004;111:306

Disclosure of Interest: None Declared

P224
EFFECTS OF P-GLYCOPROTEIN ON STEROID-INDUCED OSTEONECROSIS OF THE FEMORAL HEAD

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Aims: P-glycoprotein (P-gp) activity may play an important role in steroid-induced osteonecrosis of the femoral head (ONF); however, the precise mechanism of its pathogenesis remains unknown. Therefore, we investigated the effects of increased P-gp activity on steroid-induced ONF using a rat model.

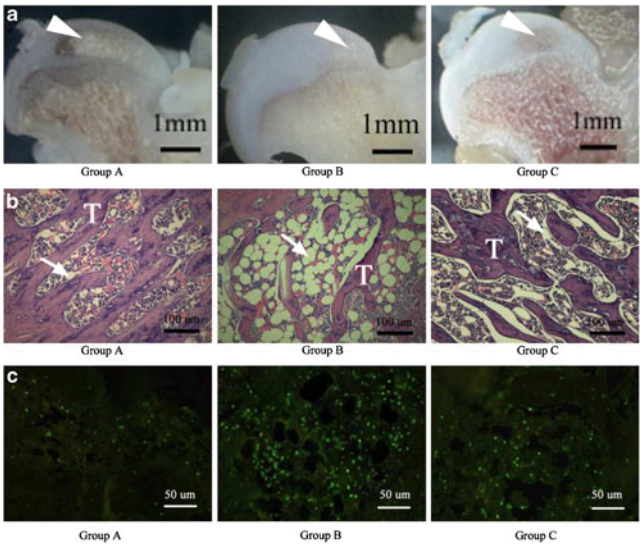
Methods: Rats ($n=60$) were treated with either a pharmacological stimulant of P-gp, rifampicin (Group A), or suppressant, verapamil (Group B), or normal saline (Group C) administered in conjunction with methylprednisolone, an inducer of ONF. In the end, P-gp activity in bone marrow cells and expression in the femoral head were analyzed by flow cytometry, immunohistochemical staining and western blot. All femoral heads underwent histological analysis and the incidence of ONF was calculated.

Results: P-gp activity in bone marrow cells and expression in the femoral head significantly increased in Group A ($P<0.05$) but decreased in Group B ($P<0.05$). Likewise, the serum osteocalcin level, trabecular thickness and number, osteoclast and osteoblast numbers, and mean percentage of the epiphyseal ossification center were significantly increased in Group A ($P<0.01$), but decreased in Group B ($P<0.01$). In contrast, however, adipocytic variables, trabecular separation, and apoptotic cells decreased in Group A ($P<0.01$) but increased in Group B ($P<0.01$). The ONF incidence in Group A (50%) and Group B (100%) were significantly different from that in the control Group C (80%, $P<0.05$).

Table 1. Effects of P-glycoprotein on steroid-induced ONF as assessed by histomorphometry

	Group A	Group B	Group C
EOC (%)	39.02±2.42[a]	11.84±2.65[b]	26.96±9.63
Tb.Th (um)	55.65±7.14[a]	44.06±2.86 [b]	52.63±8.54
Tb.N (N/mm)	9.24±1.72[a]	5.92±1.55 [b]	8.19±2.81
Tb.Sp (um)	111.26±20.65[a]	179.29±44.91[b]	138.35±53.29
Apoptosis	38.87±18.91[a]	123.56±27.86[b]	87.26±19.33
N.Oc/B.Pm (#/mm)	2.74±1.23[a]	1.08±1.04[b]	1.96±1.07
Oc.Pm/B.Pm (%)	0.70±0.31[a]	0.31±0.21[b]	0.49±0.26
N.Ob/B.Pm (#/mm)	33.40±5.07[a]	11.11±2.14[b]	21.66±4.34

EOC: Epiphyseal ossification center.
Quantification of apoptosis was expressed as the number of apoptotic cells in the ×200 field.
Data were expressed as mean±SD.
[a]$P<0.01$ relative to Group B and Group C.
[b]$P<0.01$ relative to Group C.



Conclusions: Enhanced P-gp activity was able to decrease the risk of steroid-induced ONF, possibly by inhibiting adipogenesis and apoptosis in the femoral head.
Disclosure of Interest: None Declared

P225
PREDICTION OF STEROID-INDUCED OSTEONECROSIS OF THE FEMORAL HEAD WITH P-GLYCOPROTEIN ACTIVITY ON PERIPHERAL BLOOD MONONUCLEAR CELLS

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Aims: The same protocol for steroid administration induces osteonecrosis of the femoral head (ONF) in some patients with lower P-glycoprotein (P-gp) activity. Meanwhile, P-gp is expressed on peripheral blood mononuclear cells (PBMC). The aim of the present study is to investigate the relationship between P-gp activity on PBMC and steroid-induced ONF using a rat model.
Methods: Rats (n=60) were treated with either a pharmacological stimulant of P-gp, rifampicin (Group A), or suppressant, verapamil (Group B), or normal saline (Group C) administered in conjunction with methylprednisolone, an inducer of ONF.P-gp activity on peripheral blood mononuclear cells and bone marrow cells were analyzed by flow cytometry preceding steroid treatment. In the end, all the femoral heads received analysis of magnetic resonance image and histology.
Results: P-gp activity on PBMC and bone marrow cells significantly increased in Group A (P<0.05) but decreased in Group B (P<0.05). Likewise, the ONF incidence in Group A (50%) and Group B (100%) were significantly different from that in the control Group C (80%, P<0.05). The area of abnormal signals on magnetic resonance image, adipocytic variables and apoptotic cells decreased in Group A (P<0.01) but increased in Group B (P<0.01). Osteoclast number and perimeter were significantly increased in Group A (P<0.01), but decreased in Group B (P<0.01).
Conclusions: P-gp activity on PBMC was closely related to the risk of steroid-induced ONF.
Acknowledgements: This work was supported by the Shanghai Natural Science Foundation (Grants No. 07ZR14023 and 10411962500).
Disclosure of Interest: None Declared

P226
INSUFFICIENT BILATERAL FEMORAL SUBTROCHANTERIC FRACTURES IN A PATIENT RECEIVING IMATINIB MESYLATE

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Aims: We present a case of insufficient bilateral femoral subtrochanteric fractures in a patient who was treated with imatinib mesylate, an anticancer drug, for 1 year after a diagnosis of chronic myelogenous leukemia.
Methods: A 60-year-old woman presented with bilateral thigh pain for 6 months. A plain radiograph revealed bilateral progressive insufficient fractures on the subtrochanteric areas of the femurs. An MRI of the femurs revealed incomplete stress fractures and no evidence of bone metastasis on either femur. Bone densitometry showed normal T-scores around the hip joint and spine.
Results: The patient had normal serum levels of calcium, vitamin D derivatives, and thyroid hormones. Serum phosphate levels were decreased, and parathyroid hormone levels were increased. Serum osteocalcin and urinary n-telopeptide of collagen cross-links (NTx) were both decreased. A bone biopsy demonstrated normocellular marrow without leukemic cells. A histomorphometric evaluation of her bones revealed reduced bone turnover despite secondary hyperparathroidism. The serum markers for bone metabolism and histomorphometric evaluations in this patient suggest that the drug may have an affect on bone metabolism. These effects could be seen for both bone formation and resorption. This could result in impaired bone mineralization, a severely suppressed bone turnover rate, insufficient fractures, and bone necrosis, which are sometimes seen with long-term use of bisphosphonates.

Conclusions: To our knowledge, this is the first case of an insufficient bilateral femoral shaft fracture that is potentially related to the use of imatinib mesylate in a patient with CML. Careful examination of bone metabolism should be performed in patients with CML because imatinib mesylate treatment is a life-long process.

Disclosure of Interest: None Declared

P227
IMPROVED POSTURE AND TRUNK STRENGTH THROUGH SPINAL ORTHOSES

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Aims: The Orthoses *Spinomed* and *Spinomed active* improve posture, trunk muscle strength and quality of life in postmenopausal women with vertebral fractures: a controlled, randomized, and prospective clinical trial.

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Spinal orthoses may play an important role in the treatment of spinal fractures due to osteoporosis. So far, however, clinical trials addressing efficacy according to evidence-based medicine are rare. In a first pivotal study, an improvement in posture, trunk muscle strength, and quality of life after wearing the orthosis *Spinomed* has been demonstrated (Pfeifer M et al. 2004).

Methods: In this study, 110 patients suffering from vertebral fractures and an angle of kyphosis of 60° and above were recruited in this randomized, prospective clinical trial with the angle of kyphosis being primary endpoint. Secondary endpoints include body height, trunk muscle strength, body sway, pain and limitations of daily living using standardized questionnaires.

Results:

Age (Years)	Spinomed active ("Body"; *N*=48)	Spinomed (*N*=31)	Controls (*N*=31)
68.5±10.6	72.8±7.1	72.3±6.7	
Vertebral fractures (nr)	1.5±2.4	2.0±2.7	2.1±2.8
Angle of kyphosis (Δ°)	−6.2±5.3*	−7.9±4.9*	−1.6±5.5
Body height (Δ in mm)	+4.8±5.7*	+5.3±6.3*	−0.4±4.7
Back ext. strength (Δ in N)	+178±135*	+189±152*	+7±55
Abd. flex. strength (Δ in N)	+131±117*	+94±71*	+23±46
Body sway (Δ in mm)	−16.2±31.2*	−20.4± 40.2*	−1.7± 35.6
Vital capacity (Δ in%)	+5.6±18.9#	+6.1±20.5#	−9.9± 16.1
Pain (Δ Score-Points)	−1.3±1.0*	−1.5±1.2*	+0.1±0.9
ADL (Δ Score-Points)	−1.4±1.5*	−2.1±1.6*	+0.2±0.8

Conclusions: Both orthoses *Spinomed* and *Spinomed active* led to an improvement in posture, trunk muscle strength, and quality of life in patients suffering from osteoporotic vertebral fractures. Especially *Spinomed active*, which is completely invisible below normal clothes is characterized by a very high compliance and acceptance among patients and thus comes very close to an ideal orthosis for the treatment of osteoporosis.

Disclosure of Interest: None Declared

P228
BONE MINERAL DENSITY IN PATIENTS WITH HETEROTOPIC OSSIFICATION AFTER SPINAL CORD INJURY

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Aims: The aim of this research is to define the BMD in patients with spine injury with and without heterotopic ossification.

Methods: Clinical—determining the degree of spinal cord injury scale ASIA, DXA. In the study were included 21 patients with spinal cord injury, which were divided into two groups depending on the availability of heterotopic ossification. In the first group included ten patients with spinal cord injury with the presence of heterotopic ossification (average age 26.6± 4.1 years, duration of traumatic spinal cord disease—7.89± 2.74 months), the second group consisted of 11 patients with traumatic disease spinal cord without heterotopic ossification, the average age of 29.4±3.18 years, duration of traumatic spinal cord disease 8.67±0.95 months.

Results: BMD of the whole group on all locations and was normal total body *Z*-score (−0.56±1,12), lumbar *Z*-score (−0.04±1.03), trochanter *Z*-score (−0.42±3.4), total hip *Z*-score (−0.03±2.8), But, when patients with large ossifications in hip were excluded, the BMD was reduced on the level of the proximal part of the hip, total hip *Z*-score (−1.29±0.96), and especially on the level of trochanter, trochanter *Z*-score (−1.94±0.13). But, comparing two groups, significant difference BMD in different skeletal parts were not observed. Total body (BMD group I −1.14±0.12 g/cm^2, BMD Group II −1.15±0.06 g/cm^2, T=0.02, p=00.97, lumbar BMD group I −1.22±0.12 g/cm^2, BMD Group II −1.15±0.16 g/cm^2, T= 0.85, p=00.42, total hip BMD group I −1.21±0.56 g/cm^2, BMD Group II −0.90±0.09 g/cm^2, T=1.3, p=00.22.

Conclusions: Spinal cord injury leads to the decrease of BMD on the level of the hip, in difference with idiopathic osteoporosis when the minimal BMD is registered on the level of WARDS triangle. But massive ossifications in the hip prevent to obtain corrective results by means of summarization the density of the bone and ossification,

thus, this does not allow to observe the decrease in the real mineral density of the bone in this category of patients.
Disclosure of Interest: None Declared

P229
BONE MINERAL DENSITY IN PATIENTS WITH ACROMEGALY

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Aims: Acromegaly is a state of hypersomatotropism with high bone turnover. While many studies describe increased cortical bone mass in acromegaly, data regarding trabecular bone are conflicting. To elucidate further the effect of acromegaly on bone metabolism, we have evaluated the BMD of acromegaly patients in Mashhad, Iran.
Methods: In a series of 82 acromegalic patients, 38 eugonadal patients with mean age of 40.5±12.4 years were selected. Then bone mineral densitometry measured with DXA and the results interpreted according to WHO guidelines. For control group, we used the results of bone densitometry for the entire normal population of Mashhad.
Results: Osteopenia detected in 7 patients (18.4% of all patients) including in spine or femoral neck. Osteopenia of spine detected in 3 women (25%) and 2 men (7.6%) and osteopenia of femoral neck detected in 2 women (16.6%) and 4 men (15.3%). None of the patients had osteoporosis. Osteoporosis occurred lesser in patients group. Osteopenia also occurred significantly lesser in male patients. In women patients, osteopenia occurred in femoral neck lesser and in spinal area more than control group but these differences were not significant. In 18 men in 5th decade of life only 2 men (11.11%) had osteopenia in both spine and femoral neck area that was significantly lesser than control group with similar age.
Conclusions: Our study demonstrates that eugonadal acromegalic patients have increased BMD compared to general population.
Disclosure of Interest: None Declared

P230
QUANTITATIVE ULTRASOUND OF THE CALCANEUS IS NOT USEFUL FOR ASSESSING THE RISK OF VERTEBRAL FRACTURES IN PATIENTS WITH TYPE 2 DIABETES

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Aims: Patients with type 2 diabetes are known to have increased risks of femoral neck and vertebral fractures, although their BMD is normal or even slightly increased compared to non-diabetic controls. This observation suggests that bone fragility not reflected by BMD, possibly deterioration of bone quality, may participate in their fracture risks. Quantitative ultrasound (QUS), not like BMD, could possibly evaluate bone quality and therefore might be useful for assessing fracture risk in diabetic patients.
Methods: To test this hypothesis, we measured calcaneus QUS as well as BMD at the lumbar spine (L), femoral neck (FN), and 1/3 radius (R) in 99 men (mean age, 64.7 years old) and 96 women (66.6 years old) with type 2 diabetes, and examined their associations with prevalent vertebral fractures (VFs). Calcaneus QUS was performed by CM-200 (ERK Corporation, Osaka, Japan), and sound of speed (SOS) values were obtained. BMD was measured by QDR4500 (Hologic, Waltham, MA, USA).
Results: In diabetic patients, SOS significantly correlated with L-, FN-, and R-BMD in both men (r=0.203–0.300, p=0.026–0.0435) and women (r=0.442–0.449, p<0.0001). VFs were found in 45 and 33 subjects in men and women, respectively. When compared between subjects with and without VFs, there were no significant differences in values of SOS or BMD at any site between the groups in either gender. The distribution of SOS as a function of age showed that those with VFs were scattered widely and there were no associations with age or SOS in either gender. By receiver operating characteristic (ROC) analysis, the sensitivity and specificity of SOS, L-BMD, FN-BMD, and R-BMD for VFs were 42.6%, 46.7%, 40.7%, and 42.2%, respectively, in men and 44.4%, 47.6%, 41.3%, and 47.6%, respectively, in women. Logistic regression analysis adjusted for age and BMI showed that either SOS or BMD was not significantly associated with the presence of VFs in either gender.
Conclusions: These results show that QUS as well as BMD is not sensitive enough to assess the risk of VFs in patients with type 2 diabetes. It seems necessary to seek other modalities or biochemical markers evaluating bone fragility and fracture risk in the population.
Disclosure of Interest: None Declared

P231
ASSOCIATION OF CARDIOVASCULAR HEALTH WITH BONE DENSITY AND GEOMETRY OF THE MID-SHAFT RADIUS IN CHRONIC STROKE SURVIVORS

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Aims: After a stroke, alterations in bone density and geometry in the upper extremity are common, leading to increased risk of fragility fractures. However, little is known about the mechanisms and clinical factors associated with these bone changes. One potentially important factor which has been largely overlooked is cardiovascular health, as stroke survivors tend to suffer from poor cardiovascular function and increasing evidence shows a strong link between cardiovascular disease and compromised bone health in other populations. This study aimed to investigate the association of cardiovascular parameters with bone density and geometry of the radius in chronic stroke survivors.

Methods: 47 chronic stroke patients and 26 healthy older adults participated in the study. Peripheral quantitative computed tomography (pQCT) was used to measure BMD, geometry and polar stress–strain index (p-SSI, a bone strength index) of the mid-shaft radius (33% site). Each subject was also evaluated for large artery (C1) and small artery (C2) elasticity indices, stroke volume (SV), cardiac output (CO) using pulse wave analysis and impedance cardiography. Pair *t*-tests were used to compare the pQCT parameters between the paretic and non-paretic sides. Pearson's correlation coefficients were used to examine the relationship between the p-SSI and the cardiovascular parameters.

Results: The total area did not demonstrate any significant side-to-side difference in the stroke group. However, significantly lower Cortical BMD, cortical bone area and p-SSI were found on the paretic side than the nonparetic side ($p<0.05$). On the other hand, the control group showed no significant side-to-side difference in all pQCT parameters ($p>0.05$). The radial p-SSI on the paretic side was significantly associated with C1, C2, SV, and CO ($p<0.05$).

Conclusions: The mid-shaft radius has compromised bone density and geometry on the paretic side, which is associated with poor cardiovascular health. The results point to the potential importance of promoting cardiovascular health in enhancing bone strength of the radius in chronic stroke patients.

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P232
A CASE OF BRUGADA SYNDROME WITH PRIMARY HYPERPARATHYROIDISM

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Aims: To report a case of primary hyperparathyroidism with secondary osteoporosis presenting with Brugada syndrome.

Methods: Case report

Results: This is a 51 year old Chinese female who first presented with a history of palpitations associated with loss of consciousness 5 years prior to this presentation. She was diagnosed with recurrent Torsades de pointesthat was refractory to lignocaine infusion or electrical cardioversion at that point of time. However she defaulted her cardiology follow-up. She presented again 5 years later to the casualty department with two episodes of near syncopal attacks which were preceded by palpitations at rest. She denied any chest pain or breathlessness with no obvious aggravating factor identified. Clinical examination was unremarkable with a blood pressure of 151/72 and a regular pulse of 78 beats per minute. Her baseline electrocardiograms as well as telemetry were showing the R on T phenomena triggering ventricular tachycardia were consistent with the diagnosis of Brugada syndrome. On one episode, the ventricular tachycardia degenerated to ventricular fibrillation necessitating electrical cardioversion. She subsequently underwent automated implantable cardio-defibrillator (AICD) implantation. Biochemistry showed that she had an elevated corrected serum calcium of 2.80 mmol/L (2.15–2.58) and a normal serum phosphate of 1.1 mmol/L (0.8–1.6), with an inappropriately elevated intact parathyroid hormone of 12.5 pmol/L (0.8–6.8) suggestive of primary hyperparathyroidism. A Technetium-99 m sestamibi subtraction scan showed a hyperfunctioning right inferior parathyroid lesion. She was osteoporotic with a BMD *T*-score of −3.1 at the lumbar spine; renal function was normal with a calculated glomerular filtration rate of 77 ml/min. She was advised to undergo surgical removal of the parathyroid lesion in view of her low BMD, and more importantly the possibility of hypercalcaemia triggering a ventricular arrhythmia. However, she elected for medical treatment.

Conclusions: This case illustrates the association of Brugada syndrome with primary hyperparathyroidism which has been reported only in one previous case report and highlights the spectrum of clinical presentations of primary hyperparathyroidism beyond the classical 'bone, moans and groans'.

Disclosure of Interest: None Declared

P233

EFFECT OF HIGH DOSE VERSUS CONVENTIONAL VITAMIN D SUPPLEMENT ON SERUM 25(OH)D LEVELS IN WOMEN WITH LOW BONE MASS

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Aims: Vitamin D (vit D) deficiency is very common in Iran. The present study was designed to compare the efficacy of high and conventional doses of vit D required for achieving the optimal level of serum 25(OH)D in elderly women with low bone mass.

Methods: 19 women aged over 50 with *T*-score values lower than −1 on BMD completed the one year randomized clinical trial conducted in Endocrine & Metabolism Research Institute (EMRI) during June 2008 and 2009. They were randomly allocated into two groups: Group P received 50,000 IU vit D_3 weekly for 3 months and thereafter monthly for the next 9 months; Group M received 800 IU vit D_3 daily for the whole year. Both groups received 1000 mg calcium carbonate. Serum 25(OH)D, calcium, phosphor and PTH were checked at baseline along with the 3rd, 6th and 12th month. The 24 h urine analysis was performed to measure calcium secretion levels before and at the end of the trial.

Results: Higher serum levels of 25(OH)D was reported in group P patients on the 3rd month of the study ($p<0.05$); this amount, however, declined gradually over the next months until there was no significant difference between the levels noted between the two groups (Table 1). PTH decreased in both groups over time. Urine calcium to creatinine ratio did not increase in either of the groups.

Table: Biochemical values measured at different stages

	Serum Ca mg/dl		Serum P mg/dl	
	M	P	M	P
Baseline	9.8±0.4	9.6±0.4	3.9±0.4	4.2±0.3
3 months	9.6±0.3	9.4±0.3	3.5±0.4	3.9±0.3
6 months	9.8±0.2	9.6±0.2	3.6±0.3	3.7±0.5
12 months	9.7±0.3	9.4±0.3	3.7±0.3	4.1±0.5

	Serum PTH pmol/L		Serum 25(OH)D nmol/L	
	M	P	M	P
Baseline	2.23±0.9	3.31±1.4	79.5±2.2	75.2±2.5
3 months	2.14±0.7	2.8±1.1	102.3±1.8	*180.6±1.7
6 months	1.8±0.6	2.44±0.7	102.05±1.8	147.8±1.8
12 months	1.7±0.6	2.6±0.8	97.11±1.6	124.9±1.5

*significant differences, inter and intra group

Conclusions: Taking VitD supplements 50,000 IU weekly for 3 months and thereafter monthly for another 9 months is more effective in increasing serum 25(OH)D levels without causing hypercalcemia or hypercalciuria than 800 IU vitD_3 used daily for a whole year.

Disclosure of Interest: None Declared

P234

DIET ALONE IMPROVES CIRCULATING LEVELS OF VITAMIN D AMONG NON-DIABETIC SAUDIS

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Aims: Vitamin D deficiency has recently been linked to a number of chronic non-communicable diseases. Accumulating evidence points to an alarming prevalence of moderate to severe vitamin D deficiency in both children and adult Arabs. We aim to determine whether non-pharmacologic intervention (diet and increased sunlight exposure) alone can significantly improve circulating levels of vitamin D among non-diabetic adult Arabs.

Methods: A total of 30 consenting, non-diabetic, age and BMI-matched adult Saudis were recruited in this interventional study. Subjects taking multivitamins and/or on vitamin D supplements were excluded. Subjects were given dietary advice and proper sunlight exposure which should be followed for 5 months. Anthropometrics and fasting blood samples were taken. Serum fasting glucose, lipid profile, albumin, calcium and phosphorous were quantified at baseline through routine laboratory measurements. Serum 25-hydroxyvitamin D levels were determined by ELISA. All blood measurements were repeated monthly for 5 straight months.

Results: There was a marked improvement in the levels of circulating 25-hydroxyvitamin D among the subjects. Prevalence of vitamin D-deficiency in the cohort fell sharply during the duration of the study. Improved levels of vitamin D also translated to improved metabolic profile of the patients. Detailed results will be given in the full paper.

Conclusions: Non-pharmacologic management of vitamin D deficiency through diet and increased sunlight exposure is enough to improve vitamin D to normal levels. However, whether the correction of this deficiency will translate to decreased risk to known chronic noncommunicable diseases prevalent in the Arab population, remains to be seen. In the mean time, promotion of this treatment option is highly recommended as it is both cheap and practical.

Disclosure of Interest: None Declared

P235
ASSESSING OF HEALTH RELATED QUALITY OF LIFE WITH STRONTIUM RANELATE IN POSTMENOPAUSAL OSTEOPOROSIS

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Aims: to assess the change in health related quality of life (HRQL) with strontium ranelate, a new anti-osteoporotic drugs that acts by dissociating bone formation and bone resorption with beneficial effects on bone mass, bone quality and bone resistance in postmenopausal osteoporosis.
Methods: 72 women diagnosed with postmenopausal osteoporosis as defined by *T*-score ≤−2.5 SD (WHO classification) by L1–L4 lumbar spine and hip DXA (Hologic DXR) were advised to take strontium ranelate 2 g daily plus adjuvant calcium and vitamin D. Clinical risk factors for OP (e.g., early menopause, maternal history of fracture, prior fragility fracture, glucocorticoid exposure, nutritional factors, smoking, excessive alcohol and caffeine, etc.), as well as 10-year probability of major osteoporotic fracture (FRAX® model) risk were assessed at baseline, while HRQL was evaluated at baseline, after 6 and 12 months of therapy, by completing a dedicated questionnaire for vertebral osteoporosis. SPSS-17 was used, "*p*" value being settled under 0.05.
Results: 61 women were returned for follow-up after 12 months. Both DXA at spine and hip and HRQL were performed. Statistically significant annual change (%) in mean BMD was reported. After 12 months of treatment, strontium ranelate had a beneficial effect on HRQL compared to baseline (global score, emotional and physical scores respectively, $p<0.05$). The improvement in the emotional score was related to fewer negative feelings and concerns regarding the disease, whereas the improvement in the physical score was typically associated with reduced vertebral pain and increased mobility.
Conclusions: strontium ranelate is effective for rapid improvement of HRQT in women with postmenopausal osteoporosis.
Disclosure of Interest: None Declared

P236
EFFECT OF LOW-LEVEL LASER THERAPY ON HISTOLOGICAL FEATURES OF IMMOBILIZED TIBIA OF RABBIT

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Aims: The aim of present study was to evaluate effect of Low Level Laser Therapy (LLLT) on light microscopical features of immobilized tibia of rabbits.
Methods: 15 adult male Dutch white rabbits aged 16–20 weeks at the beginning of the experiment were used. All rabbits were randomly assigned into experiment, control, and normal groups. Rabbits of group N were allowed to walk on four limbs without any casting and used for baseline studies. Rabbits of groups E and C were anaesthetized and their right hind limbs were immobilized in 90 hip and knee flexion and full dorsiflexion at ankle joint by plaster of Paris. An open window was left medial side of the right Tibia. Rabbits of group E and C were kept free one week after immobilization. There were not any differences between groups C and E in exception of LLLT.Treatment were not done on the rabbits of control and experimental groups at first week after casting. LLLT with Helium–Neon laser (wavelength:632.8 nm, power:10 mW, timing for each session: 1350 s, spot size of laser beam: 0.0314 cm^2, energy density: 430 J/cm^2) were applied to a fixed point of immobilized tibia of experimental group in second week (5 sessions) and during third to sixth weeks (each week 3 sessions). Rabbits of the normal group lived freely for the same time of the control and experimental group and there were not intervention and casting. All rabbits were killed by chloroform at the end of sixth week. A bone sample was taken from fixed point of experimental group and same place of control and normal groups. The samples were prepared for light microscopical study. Diaphyseal breadth of bones were recorded by a calibrated eyepiece. Data were analyzed by ANOVA method.
Results: ANOVA test revealed there was significant differences in diaphyseal breadths between normal group (184.6± 10.9) and experimental (171±6.4) and control (136.6±18) groups ($P=0.0002$). LSD test showed there were significant differences between control and experimental groups ($P=0.02$) and between normal and control groups ($P=0.02$). In both control group and normal group, haversian systems were observed but there were not blood vessel and cell in the haversian canals and there were not osteocyte in the lacunae. In the experimental group periosteum was thicker than control group and haversian systems were irregular. There were blood cells and osteocytes in the haversian canals and osteocytes in lacunae.
Conclusions: In the present investigation LLLT not only neutralized adverse effects of immobilization but also increased periosteal thickness and remodeling activity.
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Disclosure of Interest: M. Bayat Grant/Research Support from: research project, M. Rakhshan: None Declared, A. Baghestani: None Declared

P237
DIFFERENT MOLECULAR TARGETS OF ICARIIN ON BONE MESENCHYMAL STEM CELLS IN CORT-INTERVENTED AND OVX RATS REVEALED BY STEM CELL MICROARRAY

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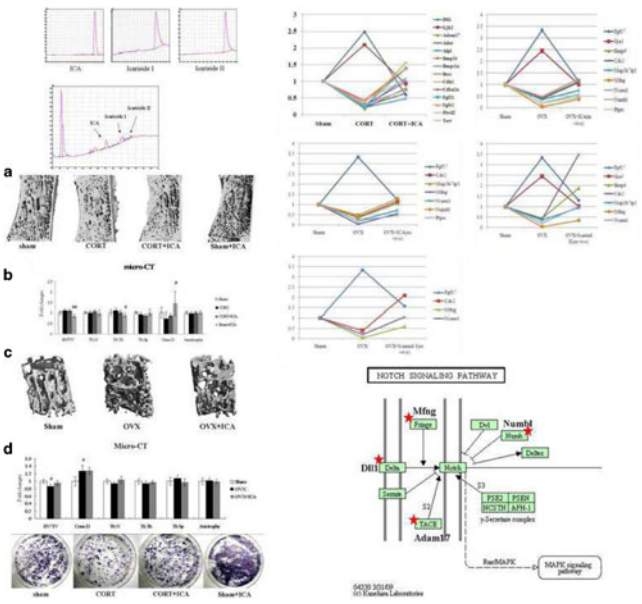
Aims: Icariin (ICA) is an active components of *Herba Epimedium* effective in preventing osteoporosis. However, its molecular targets are widely unknown. The aims of our study is to explore the molecular targets of ICA on osteoporosis treatment.
Methods: In the present study, microarray-based expressions of 256 genes regulated by ICA were analyzed in bone mesenchymal stem cells (BMSCs) of corticosterone-intervented and ovariectomy rats. The drug levels of ICA and its metabolites Icarisid I and II were detected via high performance liquid chromatography-fluorescence (HPLC). Bone mass and BMSCs differentiation were examined by μCT and ALP staining. Pathway analysis was web-based upon KEGG pathways.
Results: In results, intragastric administration of 20 mg/kg ICA produced 10^{-6} M ICA, 10^{-7} M Icarisid I and 10^{-5} M Icarisid II in serum. μCT displayed bone loss tendency though there was no statistical significance. ALP staining showed ICA might raise the differentiation potency of BMSCs both in CORT and Sham conditions. Gene microarray revealed the molecular targets of ICA were various in the treatment for osteoporoses of different pathogenesis. The function of these molecules would be involved in cell communication, cell adhesion, cell cycle and cytokines secretion.



Conclusions: The effect of ICA on promoting osteogenesis might be related to Notch signaling pathway, and Dll1, Adam17, Mfng and Numbl molecules should be paid close attention to for further study.
Disclosure of Interest: Q. Bian Grant/Research Support from: 973 plan (No. 2010CB530400)

P238
THE EFFECT OF LEVOTHYROXINE REPLACEMENT THERAPY ON BONE MINERAL DENSITY IN PATIENTS WITH HYPOTHYROIDISM

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Aims: Many reports show a relation between exogenous thyroxine therapies on BMD but the net effects remain unclear. The aim of this study was to determine the effect of replacement dose of levothyroxine on BMD in premenopausal women with primary hypothyroidism.
Methods: 50 women with primary hypothyroidism were selected. Patients with history of thyroid surgery and iodine ablation or patients with other diseases or drugs that interfere with BMD were excluded from this study. BMD was measured before and after 24 months of replacement dose of levothyroxine and compared with other.
Results: Mean age of patients was 34.4±5.3 years. Mean Lumbar bone mineral percent before treatment was % 78.8 ±15.2 and mean of *T*-score in lumbar area was −1.4±0.86. After 2 years of treatment mean lumbar bone mineral percent and lumbar *T*-score changed to%78.4±13.6 and −1.7±0.57, respectively. Mean bone mineral percent in neck of femur was % 88.47±13.04 and *T*-score was −1.05± 1.07 before treatment that change to % 92.0±8.07 and *T*-score −0.9±0.88 after levothyroxine treatment. These changes were not significant.
Conclusions: Replacement dose of Levothyroxine therapy for at least 2 years in pre-menopausal women does not cause significant change in BMD.
Disclosure of Interest: None Declared

P239
DENOSUMAB REDUCED THE INCIDENCE OF HIP AND NEW VERTEBRAL FRACTURES IN POSTMENOPAUSAL WOMEN WITH HIGHER FRACTURE RISK: A SUBANALYSIS OF THE FREEDOM STUDY

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Aims: In the overall FREEDOM study population, denosumab (DMAb) significantly reduced the risk of hip and new vertebral fractures by 40% (95% CI: 3–63%) and 68% (95% CI: 59–74%), respectively, over 3 years.[1] In this subgroup analysis of the FREEDOM study, we examined hip and new vertebral fracture incidence and risk reduction in women with a higher baseline risk for fracture.

Methods: FREEDOM was a 3-year, randomized, blinded, phase 3 trial in women aged 60–90 years with postmenopausal osteoporosis and a spine or hip BMD *T*-score <−2.5 and not <−4.0 at either site. All women received daily calcium and vitamin D supplements and were randomized to receive twice-yearly DMAb (60 mg) or placebo injections. In *post hoc* analyses, three subgroups at high risk of hip fracture were defined: 1) age ≥75 years; 2) baseline femoral neck (FN) BMD *T*-score ≤−2.5; 3) both factors. In addition, two subgroups at high-risk of new vertebral fracture were defined: 1) age ≥75 years; 2) ≥2 prevalent vertebral fractures of any severity or ≥1 moderate/severe prevalent vertebral fracture (or both).

Results: In all high-risk subgroups analyzed, DMAb significantly reduced the incidence and risk of hip and new vertebral fractures compared with placebo (Table).

Table. Incidence of hip and new vertebral fractures in women with a higher baseline risk for fracture, and relative risk reduction with DMAb, after 3 years

Risk subgroups	Fracture incidence		Relative risk reduction with DMAb	
	Placebo	DMAb	Estimate (95% CI)	*p*-value
Hip				
Age ≥75 years[a]	2.3%	0.9%	62% (22%, 82%)	0.0065
FN BMD *T*-score ≤−2.5[b]	2.8%	1.4%	47% (8%, 70%)	0.0227
Age ≥75 years and BMD *T*-score ≤−2.5[c]	4.1%	1.7%	60% (14%, 82%)	0.0152
New vertebral				
Age ≥75 years[d]	8.6%	3.1%	64% (47%, 75%)	<0.0001
≥2 prevalent vertebral fractures of any severity, or ≥1 moderate or severe vertebral fracture[e]	16.6%	7.5%	55% (31%, 71%)	0.0002

Number of women in each subgroup: [a]placebo=1236; [b]placebo=1406, DMAb=1384; [c]placebo=629, DMAb=602; [d]placebo=1146, DMAb=115; [e]placebo=343, DMAb=359.

Conclusions: DMAb reduced the incidence and risk of hip and new vertebral fractures in subgroups of women from the FREEDOM trial who are at particularly high risk of fracture. The risk reductions in these higher risk subgroups were consistent with that observed in the overall study population.

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P240
DIFFERENT ADHERENCE AMONGST OSTEOPOROTIC REGIMENS—A 2-YEAR ANALYSIS IN A POPULATION TREATED UNDER GUIDELINES

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Aims: To compare the adherence of osteoporosis regimens in patients treated under guidelines.
Methods: This retrospective study used a database with prescriptions of anti-osteoporotic medications, including alendronate, raloxifene, and calcitonin, at Chang Gung Memorial Hospital in Kaohsiung, Taiwan during 2001–2007. We analyzed patients treated following therapeutic recommendations from the National Osteoporosis Foundation (2008) or under the guideline for glucocorticoid-induced osteoporosis by the American College of Rheumatology (2001). Adherence was assessed by compliance and persistence ratio of those patients who had been dispensed an osteoporosis regimen and not switched to other osteoporotic regimens in 2 years after index prescription. Compliance was calculated by the medication possession ratio (MPR, %). The 1-year and 2-year MPR were defined as the ratio of the number of days with available drug supply over a period of 1 year and 2 year, respectively. Persistence ratio was calculated as the percentage of patients that were continued on medication at a given time with no medication refill gap for a period of 30 days or more.
Results: A total of 8,280 charts with predefined diagnosis codes were retrieved. A total of 6,963 charts were reviewed, medical records that were not traceable were excluded from the study. Of the charts reviewed, a total of 2,975 patients' prescriptions (2,683 women, 292 men) met the inclusion criteria for data collection. The mean age was 68.3± 9.5 years. The patients were grouped by treatment regimens, included alendronate (A) (n=1745), raloxifene (R) (n=711), and calcitonin (C) (n=519) (Table 1). At year 1, MPR% (median, Inter-quartile ranges) of group A, R and C was 100, 37.8–100; 100, 23.3–100, and 34.5, 11.5–100 ($p<$ 0.001), and those at year 2 was 72.9, 19.7–100; 53.4, 12.5–100, and 17.3, 5.8–92.1 ($p<0.001$), respectively (Fig. 1). The persistence ratios (%) at year 1 of group A, R and C was 57.1, 50.2 and 32.9 ($p<0.001$) (Fig. 2) and at year 2 was 41.8, 40.1 and 23.5, respectively ($p<0.001$) (Fig. 3).
Conclusions: In terms of adherence in this study cohort, alendronate revealed a better compliance profile (MPR) than raloxifene and calcitonin at either year 1 or 2. Alendronate also demonstrated a better persistence ratio than both raloxifene and calcitonin at year 1, and calcitonin through year 2.
Disclosure of Interest: None Declared

P241
HOW DOES QUALITY OF PATIENT–PHYSICIAN COMMUNICATION AFFECT PERSISTENCE OF TREATMENT

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Aims: To examine the possible relation between the content and style of the doctor–patient communication and patient's persistence with the prescribed antiosteoporotic treatment.
Methods: A questionnaire was distributed to 50–50 patients from two little cities, treated before or currently with osteoporosis by 1–1 local rheumatologist. Questions were related to patients' basic information about osteoporosis, anti-osteoporotic treatment, content of discussions with their doctors, who prescribed their medicine and duration of the treatment taken.
Results: Time, style and content of discussions between patients and physician differed in the two cities. 32% vs. 16% expected relief in their articular pain, 28% vs. 14% in their bone pain, and only 56% vs. 72% chose (inclusive or exclusive) the answer that the medicine they were taken prevents future osteoporosis fractures.
In the community, were knowledge about osteoporosis and expectations from the drug were more realistic, persistence with the treatment was over 1 year, compared with an average of 5 months taking the antiosteoporotic drugs in the community, were people expected articular-pain to be relieved also.
Conclusions: The study demonstrated an inadequate communication between doctors and patients. Patients, confused regarding the consequences of Osteoporosis, with unreal expectations from the drug taken, were abandoning treatment before it could have an outcome. There is a need to improve content and quality of communication and to adapt information to patients' ability to understand it.
Disclosure of Interest: None Declared

P242
ORTHOGERIATRIC INPUT IN SECONDARY PREVENTION OF FRAGILITY FRACTURES

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Aims: There is considerable evidence of benefit of collaborative orthogeriatric care of fragility fracture patients. NICE guidance 2005 in United Kingdom recommend bisphosphonates in women above 75 years without DXA scan. British Orthopedic Association Standard 2008 recommends secondary prevention of osteoporosis with antiresorptive therapy as first standard and integral part of fracture care. The aim was to assess current prescribing of osteoporosis treatments comparing with the guidelines available.
Methods: We reviewed prescribing of secondary osteoporotic treatments amongst patients admitted to Trauma ward of a UK hospital which has weekly orthogeriatric Consultant input.

Results: 100 admissions during 2010 reviewed. Age 50–96 years 75% females. Fracture femur 95%. 75% patients were prescribed Alendronate and remaining had contra-indications or intolerance. Others given Strontium (7%) Risedronate (4%) alfacalcidol (2%) Calcium + vitamin D (96%) DXA scan arranged for 12% with arrangements for follow-up in osteoporosis clinic.
Conclusions: NICE and BOA standard Guidance for prescribing is being implemented within an orthogeriatric hospital service. Nearly 3/4th patients received Alendronate which is the recommended first option bisphosphonate. The role of specialist trauma nurse in identifying fragility fracture patients, educating patients and junior doctors on osteoporosis and bone health is crucial.
Disclosure of Interest: None Declared

P243
A CASE REPORT OF A STRANGE FEMORAL SHAFT TRANSVERSE FRACTURE WITH BISPHOSPHONATE USE

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Aims: Femoral neck fracture or vertebral compression fracture with osteoporosis are increasing as an aging of the population. Bisphosphonate takes a leading part in a prevention of these fracture, there are many reports in the preventive effects. Recently some strange fracture of femoral shaft was reported even using bisphosphonate for preventing further fractures.
Methods: We will report the case which has gotten a femoral shaft transverse fracture, during bisphosphonate treatment for osteoporosis.
Results: A patient is 84 years old female. She has treated by bisphosphonate for osteoporosis from 2 years ago. She had a thigh pain for a few weeks, and fell down suddenly as a collapse in walking without any accident. In radiograph, we found a simple transverse fracture with beak in femoral shaft. In computed tomography, we could not recognize an osteolysis or tumor as a pathological fracture. We have diagnosed it as a strange transverse fracture by SSBT from the clinical history and the X-ray finding. We performed that open reduction and internal fixation by intramedullary nailing. We had good results in postoperative course.
Conclusions: Low-energy fractures of the femoral shaft with a simple, transverse pattern and hypertrophy of the diaphyseal cortex are reported for associating with bisphosphonate treatment. This may result from propagation of a stress fracture whose repair is retarded by diminished osteoclast activity and impaired microdamage repair resulting from its prolonged use.
Disclosure of Interest: None Declared

P244
THE ACUTE SIDE-EFFECT OF ZOLENDRONIC ACID TREATMENT FOR OSTEOPOROTIC PATIENTS

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Aims: To monitor the acute side-effect of zoledronic acid.
Methods: In 2010, twenty patients were treated with zoledronic acid for osteoporosis. Their age range from 52 to 91 with the average of 78 years old. There were 1 man and 22 women. The osteoporotic patients were included by BMD (*T*-score <−2.5), volunteer, or fracture due to low energy trauma and were never treated by zoledronic acid. BMD was measured by DXA on their L2–L4 spine or hip. The recorded side effects include fever, myalgia (including soreness), ostealgia (include arthralgia), dizziness (or headache), and other miscellaneous symptoms.
Results: The following acute side-effect was noted: Fever in seven patients, myalgia in four patients, joint pain in six patients, headache in eight patients. There were two febrile patients in which one went to ER and had antipyretics and antibiotics for 3 days, and the other one went to ER and had acetaminophen only. Among them, five cases have more than three side effects. Other five cases had less than three side-effects. Patients who previously received alendronate treatment have no record of any side effect; however, patients who received raloxifene treatment all had side effects.
Previous Osteoporotic Treatment and Side Effect After Zoledronic acid treatment

	Fever	Myalgia	Arthralgia	Headache
Alendronate	0	0	0	1
Raloxifene	2	1	1	2
None	5	3	5	5

Conclusions: The new zoledronic acid has given patient great convenience and higher compliances because they only need to take one shot per year. However, the acute side-effects are not uncommon. Patients should be advised to increase their water intake for better perspiration and take

antipyretic. Long term follow-up of its side-effect should be recorded.

Disclosure of Interest: None Declared

P245

APPLICATION OF WHOLE BODY VIBRATION THERAPY IN SUBACUTE STROKE PATIENTS: FEASIBILITY, SAFETY, AND EFFECTS ON BONE METABOLISM AND NEUROMOTOR FUNCTION

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Aims: The objectives of this study were to assess the feasibility and safety of whole body vibration therapy (WBV) when applied in subacute stroke patients, and to obtain pilot data on the effects of WBV on bone metabolism and neuromotor function in this patient population.

Methods: 24 subacute stroke patients (age: 67.11± 11.11 years; 16 men and 8 women) were randomized into either the WBV group (n=13) or control exercise group (n=11). In the WBV group, subjects underwent WBV exercise training 5 days a week for 4 weeks, in addition to their conventional physiotherapy. The subjects in the control group underwent the same treatment except that the WBV device was turned off during exercise. All subjects were assessed immediately before and after the training program. The primary outcomes included the serum level of C-telopeptide of collagen crosslinks (a bone resorption marker) and bone specific alkaline phosphatase (a bone formation marker). Other outcomes were Functional Ambulation Category (FAC), six-minute walk test (6MWT), Fugl Meyer Motor Assessment of lower extremity (FMMA) and isometric knee extensor strength. Intent-to-treat analysis was performed to determine the effects of WBV on these outcomes.

Results: 21 subjects completed the programs. Three subjects dropped out (one from control group and two from WBV group). There were no severe adverse effects reported. Only one subject dropped out because of dizziness after vibration treatment. Four subjects complained of dizziness or eye shaking during the first few sessions of WBV training but the symptoms subsided as training progressed. No significant differences in any of the outcome measures were found at baseline. After the training period, there was a significant improvement in 6MWT (p=0.018) and FMMA (p=0.003) in the WBV group, but not in the control group (p>0.025). Both WBV and control groups improved in isometric knee extensor strength (p=0.003 and 0.005) and FAC (p=0.003 and 0.007) after 4 weeks of training. The level of the bone turnover markers did not show significant change in both groups.

Conclusions: The results showed that WBV is a feasible and safe option for individuals with subacute stroke. It may have beneficial effects on neuromotor functions in individuals with subacute stroke. A randomised controlled trial with larger sample size is warranted.

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Disclosure of Interest: None Declared

P246

CLINICAL OBSERVATION OF LOW-FREQUENCY PULSED ELECTROMAGNETIC FIELDS (PEMFS) ON POSTMENOPAUSAL OSTEOPOROSIS

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Aims: Observe the clinical effect of low-intensity pulsed electromagnetic fields (PEMFs) on postmenopausal osteoporosis (PMO), regarding changes in muscular strength & endurance, balance performance and Hemorheology, so as to find out the evidence based on clinical for PEMFs treatment of PMO.

Methods: 60 patients with OP were included and were divided into the experimental group and control group randomly. Both groups received conventional drug therapy. PEMF on the experimental group, the patients lay on the mat for 40 min once a time, once per day for 30 days.

Results: In PEMF group, muscles force and muscle endurance of lumbar-back muscles, abdominal muscles and quadriceps muscle increased significantly after therapy (p<0.05), In control group, only the increase of abdominal muscle had statistical significance (p<0.05).Between the two groups, in PEMF group the increase of lumbar-back muscle and abdominal muscle was higher than in control group (p<0.01). The BBS score was increased and the TUG score was decrease after therapy in PEMF group (p<0.05). In control group, only the variance of BBS score had statistical significance (p<0.05). The serum viscosity of both groups decreased after treatment (P<0.01). The serum viscosity in the PEMFs group had decreased more obviously after treatment than in the control group (P<0.05).

Conclusions: PEMFs can improve postmenopausal patients' muscular strength & endurance of lumbar-back muscles, abdominal muscles and quadriceps muscle, PEMFs treatment has a small positive effect on balance

performance, it also has definite function in improving the blood rheological indexes.

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Disclosure of Interest: None Declared

P247

CONSENSUS GUIDELINES ON OSTEOPOROSIS DIAGNOSIS, PREVENTION, AND MANAGEMENT IN THE PHILIPPINES

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Aims: The key to address Issue of health equity in a developing country whereby healthcare delivery is considered a luxurious commodity by the majority is to optimize existing resources and ensure that healthcare personnel are equally guided and updated as well. The consensus guidelines are developed to assist healthcare practitioners in providing optimal care to postmenopausal individuals at risk for osteoporosis and fragility fractures in the local setting.

Methods: The Technical Review Committee formed by the Osteoporosis Society of the Philippines Foundation Inc. in cooperation with the Philippine Orthopedic Association drafted, retrieved, and appraised important issues on osteoporosis and fragility fractures based on available published evidence. The AGREE instrument was used to appraise published guidelines while the GRADE System, on the other hand, to evaluate validity and quality of other evidence. A multidisciplinary panel of experts and stakeholders convened during an en banc meeting to confer and approve the recommendations.

Results: The final key issues include five on prevention, seven on diagnostics, and three on therapeutic aspects of osteoporosis, with ten others on fragility fractures. The preventive aspects focused on the role of nutrition and forms of exercise that best fit the elderly patients. Utility of screening tools including available technologies were included in the diagnostics concerns. Therapeutic options were stratified to low/medium and high risk groups. Some common concerns on surgical approach to nonvertebral fractures were given emphasis. These were discussed extensively and approved by the panel through a majority vote.

Conclusions: The guidelines will serve the best interest of the specialists including orthopedic surgeons and general care practitioners in their daily care of postmenopausal Filipino women at risk for osteoporosis as well as those with fragility fractures.

Disclosure of Interest: None Declared

P248

EFFECT OF HEPCIDIN ON PROLIFERATION, APOPTOSIS, MINERALIZATION AND GENE EXPRESSION OF OSTEOBLAST (HFOB1.19) IN VITRO

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Aims: To research relationship between iron metabolism and bone metabolism, we investigate effects of hepcidin on proliferation, apoptosis, mineralization and influence on COLI, BGP and OPG gene expression of osteoblast (hFOB1.19), providing research data about iron metabolism related bone metabolism.

Methods: After hFOB1.19 osteoblasts culture in vitro, we treated cells with hepcidin for 24 h and 48 h. MTT assay was used to detect absorb light OD value in enzyme-linked immunosorbent detector at 490 nm. When cells, induced by serum-free hunger, were added with hepcidin for 48 h, we detected influence of hepcidin on osteoblast apoptosis by using Annexin intervention V/PI staining and flow cytometry. We intervened in osteoblasts with hepcidin for lasting 15 days and observed calcium nodular by von Kossa staining assay. We can count the number of calcium nodular to investigate effect of hepcidin on cell mineralization. At the same time, when cells were treated with hepcidin for 72 h, we detect gene expression of COLI, BGP and OPG by RT-PCR.

Results: OD value which indicated cell proliferation viability had no difference in different groups at 24 h and 48 h. Compared to control, apoptosis rate of cells added with hepcidin were lower. Osteoblasts apoptosis rate dropped. The numbers of calcium nodules of cells treated with hepcidin were more than control's and there had significant differences. The number increase of calcium nodules is the most obvious in 200 nmol/L. Intervention of

hepcidin in hFOB1.19 cells culture, compared with control group, the relative content of COL1, OPG, BGP mRNA boost. In this experiment, osteogenesis-related gene expression raise positive with hepcidin concentration increase. There was significant difference in hepcidin (200 nmol/L and 400 nmol/L) compared with control group. Although there was increase, but there was no significant difference in 50 nmol/L and 100 nmol/L concentration.

Conclusions: Hepcidin can decrease rate of apoptosis and enhance the calcium nodules of osteoblast1.19, although hepcidin had no effect on cell proliferation viability. Hepcidin protected osteoblast by reduce rate of apoptosis and promote the formation of mineralization by increase calcium nodules. In this study, hepcidin which was an important hormone in iron metabolism can increase COL1, OPG, BGP gene expression of hFOB1.19, which might promote osteoblast function, participating in bone metabolism process. Based on our research of influences on osteoblasts (hFOB1.19) metabolism, hepcidin regulation might be an important intervention spot on iron metabolism and bone metabolism.

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Disclosure of Interest: None Declared

P249
EFFECT OF HEPCIDIN ON PROLIFERATION AND GENE EXPRESSION IN MICE OSTEOBLAST-LIKE CELLS

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Aims: To investigate effect of hepcidin on proliferation viability and BGP and OPG gene expression of mice osteoblast-like cells (MC3T3-E1) in vitro.

Methods: After MC3T3-E1 cells culture in vitro, different concentrations of hepcidin intervened cells proliferation for 24 h, 48 h, 72 h. We detected OD value, indicating cell proliferation viability, with Enzyme-linked immunosorbent detector assay at 490 nm by MTT assay. Hepcidin was also added into cells culture media for 72 h and BGP and OPG mRNA expressions were detected by RT-PCR.

Results: Compared with control group, there were significant differences at different time in different hepcidin concentration ($P<0.05$) except for 50 nmol ($P>0.05$). There were 47%, 31%, 19% increases at 24 h, 48 h, 72 h, respectively In 100 nmol/L concentration, and there were 55%, 37%, 20% and 40%, 72%, 15% increases in 200 nmol/L and 300 nmol/L concentration, respectively. We found that the most obvious increase of OD value occurred at 24 h. After adding hepcidin, there were higher gene expressions than control group. BGP mRNA relative content increased to 0.39, 1.67, 2.25 times in different concentrations respectively and OPG mRNA relative content increased to 0.79, 2.75, 3.52 times. In our experiment, there was an increase of mRNA expression with hepcidin concentration increase, which indicated a dose-dependent effect. To compare with control group, gene expression increases had a significant difference ($P<0.05$).

Conclusions: Hepcidin stimulates proliferation viability in mice osteoblast-like cells MC3T3-E1 in vitro. Hepcidin could raise BGP expression, which may promote the osteoblast mature differentiation. By increasing OPG expression, hepcidin might inhibit osteoclast function. Hepcidin, as a key regulation of iron metabolism, influences osteoblasts metabolism by promoting MC3T3-E1 osteoblasts proliferation and increasing BGP and OPG gene expression. Hepcidin might affect bone metabolism and further research of hepcidin might be a new ideas on iron metabolism and bone metabolism.

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Disclosure of Interest: None Declared

P250
EFFECT OF IRON METABOLISM INTERVENTION ON GENE EXPRESSION IN OSTEOBLAST (HFOB1.19)

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Aims: To investigated influence of hepcidin and DFO on osteoblast hFOB1.19 osteogenesis-related gene expression.

Methods: After hFOB1.19 osteoblasts cultivating amplification, different concentrations of hepcidin and DFO were added in the media for 72 h. We collected cells respectively and abstracted total RNA for gene expression determination. COL1, OPG and BGP mRNA were detected by semi-quantitative RT-PCR.

Results: Intervention of hepcidin in hFOB1.19 cells culture, compared with control group, the relative content of COL1 mRNA increased in different, respectively. There were also increase in OPG mRNA and BGP mRNA. In this experiment, osteogenesis-related gene expression raise positive with hepcidin concentration increase. There was significant difference, compared with control group, in hepcidin (100 nmol/L, 200 nmol/L, 400 nmol/L) concentration. Although there was increase, but there was no

significant difference in 50 nmol/L concentration. When we added DFO in hFOB1.19 cells medium, COL1, OPG, BGP mRNA content increased respectively. Compared with control group, we found that DFO boost gene expression of COL1, OPG, BGP in 100 nmol/L and 200 nmol/L and there was statistically significant ($P<0.05$), while no statistically significant in 50 nmol/L concentration.

Conclusions: In this study, as an important hormone in iron metabolism, hepcidin might increase gene expression (COL1, OPG, BGP) in hFOB1.19, which might promote osteoblast function and participate in bone metabolism process. By research on hepcidin, there was a novel idea that regulation of hepcidin might supply new method for osteoporosis induced by iron metabolic disorder. As we known that DFO had widely been used in the treatment of iron overload, after DFO administration in hFOB1.19 cell by causing extracellular low iron, DFO raised COL1, OPG, BGP gene expression. In this research, DFO affected bone metabolism by increase osteogenesis-related gene expression, providing a theory basis for DFO to prevention osteoporosis. DFO might be treatment for iron overload osteoporosis. Intervention in osteoblasts iron metabolism by hepcidin and DFO can affect cells gene expressions. For process mechanism research between iron metabolism and bone metabolism, there may be a new research direction to bone metabolism disorders.

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Disclosure of Interest: None Declared

P251

RESEARCH ON RELATIONSHIP BETWEEN FPN1 CONTENT AND EFFECT OF HEPCIDIN ON INTRACELLULAR CALCIUM AND IRON IONS CHANGE IN OSTEOBLASTS

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Aims: To investigate the relationship between FPN1 expression and effect of hepcidin on intracellular calcium and iron ions change and make a preliminary mechanism analysis of hepcidin on osteoblasts.

Methods: hFOB 1.19 cells were treated with different concentration hepcidin. Then, confocal laser scanning microscope (CLSM) was used to observe intracellular calcium and iron fluorescence intensity. We detected FPN1 protein content by western blot.

Results: In test concentration, the fluorescence intensity of intracellular iron gradually weakened with Hepcidin concentration increase suggesting that the intracellular iron concentration increase. Meanwhile, calcium fluorescence intensity gradually increased with extracellular hepcidin concentration increase. Fluorescence intensity of intracellular calcium increase suggested that intracellular calcium increase. FPN1 protein content was depressed in the present of hepcidin. There was a negatively correlation between FP1 content and Hepcidin concentration.

Conclusions: Hepcidin administration made an increase of calcium and iron in osteoblasts, which indicated that hepcidin might prompted calcium and iron influx transport to affect function of osteoblasts. We also found that there is present FPN1 protein in osteoblasts which is the target molecules of hepcidin. FPN1 content had a negatively correlation with hepcidin concentration. We considered that hepcidin might affect osteoblasts through the pathway of FPN1 content regulation. Application of hepcidin might influence iron metabolism related bone metabolism and researches on hepcidin might be a new direction for further bone metabolism study.

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Disclosure of Interest: None Declared

P252

ASSESSMENT OF RISK FACTORS FOR VERTEBRAL AND HIP OSTEOPOROTIC FRACTURES

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Aims: We have established the risk for hip and vertebral fractures using FRAX® algorithm, which takes BMD and nine specific clinical risk factors into account to estimate a patient's 10-year fracture risk.

Methods: We have performed an observational study on a lot of 160 cases, who had potential osteoporosis, treated in the Medical Rehabilitation Clinical Hospital Baile-Felix, Romania. Affected persons were evaluated by DXA technique and vertebral radiographs.

Results: The studied lot had mean age 57.69±4.81, mean value for the risk factors that was 2.16±1.24, a mean of 25.6±4.59 kg/m^2 for the BMI, mean *T*-score for the hip −2.1, and mean *T*-score for lumbar vertebra −2.9±1.1. Correlating these values we have estimated a mean probability of having a vertebral fracture of 9.29±7.18 in

the next 10 years, and a risk of having a hip osteoporotic fracture of 2.91±4.

Conclusions: A parental history of fracture is a well documented risk factor for future fracture. Pain and loss of function due to these fractures have a negative impact on quality of life and increases healthcare costs. Based on the FRAX® results, better decisions can be made regarding treatment options. The strategy of finding the risk factors is important in identification and treatment of osteoporosis.

Disclosure of Interest: None Declared

P253
EFFICACY OF IBANDRONATE ON BONE PAIN IN POSTMENOPAUSAL OSTEOPOROSIS

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Aims: To evaluate the efficacy of 3-monthly 3 mg intravenous Ibandronate on bone pain concomitantly with BMD increase at the lumbar spine, within one year of treatment, in patients with postmenopausal osteoporosis (PMO).

Methods: 205 women with PMO (*T*-score <−2,5), at mean age 64±10,03 were included. Of all patients 123 had (60%) no fractures, 82 (40%) had totally 138 fractures; 101 (73%) —vertebral, 37 (27%)—nonvertebral. BMD at the lumbar spine (LS) on DXA and lateral x-ray of thoracic and lumbar spine, as well as x-ray of the hip and radius were performed before and after one year of treatment. The osteoporotic bone pain was assessed by visual analogue scale (VAS—mm) at baseline, 3rd, 6th and 12th month after initiation of treatment. The patients were treated with Ibandronate 3 mg IV every 3 months, within 1 year. All patients received calcium (1200 mg/d) and Vit.D (1000 I.U./d) supplementation. There was no history of corticosteroid use, rheumatic, endocrine and renal diseases. Statistical analysis was performed by descriptive analysis, *T*-Test and Pearson correlation, using SPSS 11.5 for Windows.

Results: Three-monthly Ibandronate IV injections for one year brought to significant increase in the mean BMD from baseline (0.812±0.144 vs. 0.767±0.133; 0.045 g/cm^2; $P<0.0001$), and to bone growth 5.95%±7.2%. Concordantly, in all patients with and without fractures, mean osteoporotic pain decreased significantly from baseline—68 (±10.8) mm vs. 60 (±10.1) at 3rd month, 68 (±10.8) mm vs. 49 (±8.2) at 6th month, and 68 (±10.8) mm vs. 37 (±5.7) at 12th month ($P<0.0001$). No difference was found in pain reduction between the patients with and without fractures, at 3rd, 6th and 12th month of treatment. The incidence of new fractures at 12th month of treatment is 3.4% (36.6% reduction).

Conclusions: Osteoporotic bone pain is efficaciously reduced in postmenopausal women concordantly with BMD increase, at 1 year of treatment with IV Ibandronate. There is a considerable trend towards low incidence of new fractures over 1 year of treatment. The patients' compliance is excellent and the side effects are insignificant and transient.

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Disclosure of Interest: None Declared

P254
LONG TERM EFFICACY OF EXERCISE IN REDUCING FALLS IN ELDERLY PEOPLE

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Aims: Incidence of falls in older population increases with age, and institutionalized elderly are more exposed to the risk of falls. Osteoporosis generates consequences associated with pain, disability and restricted participation, with social isolation and emotional problems. Reducing fall risk in older people is therefore an important aspect in the holistic approach to fracture prevention. The aim of the study was to assess the effectiveness of a 6 months exercise program in lowering the risk of falls in an institutionalized elderly group.

Methods: 58 subjects with specific fall risk factors selected from 120 old institutionalized people, were randomly assigned to a control group ($n=28$), or to a 6 months group exercise program ($n=30$) based on the following inclusion criteria: age over 65, osteoporosis diagnosis based on DXA assessment, no significant sensorial problems, stable cardiovascular status, appropriate functional independence. Exercise sessions were focused on increasing strength and endurance and improving balance and coordination. Outcome measures included key muscle strength testing, four physical performance measures, and self-reported physical functioning. The assessment was done before and after 6 months, using Tandem standing, Tinetti test for balance and coordination, "up and go" and "chair raising" tests.

Results: Both balance and coordination tests correlated with the risk of fall show significant improvement after the exercise program in exercise group. At the end of the training, "up and go" and "chair rising" tests scores show a statistical significant decreasing, comparing with baseline.

Conclusions: These findings suggest that exercise could be effective in improving balance and coordination and it can

decrease the risk of fall to the older people. Physical activity improves both functional independence and quality of life and should be a part of holistic approach in fracture prevention.

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Disclosure of Interest: None Declared

P255

RECEIVED FOLIC ACID SUPPLEMENTATION DURING THE THIRD TRIMESTER OF PREGNANCY TO IMPROVE MATERNAL AND NEONATAL BONE HEALTH IS RECOMMENDED?

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Aims: The aim of our study was to investigate the relationship between maternal and fetal bone turnover markers and folic acid supplementation during pregnancy.

Methods: In an observational study performed in Tehran University of medical sciences related hospitals, 113 healthy pregnant women with gestational age between 15–42 years were recruited and followed until delivery time. All the participants divided into two groups; women who took 1 mg of folic acid daily supplement from the beginning of the pregnancy until the end of the second trimester entered into group I and women who choose to continue their daily intake of folic acid until the delivery time entered into group II. Two groups were matched based on the maternal anthropometric data, energy, calcium and vitamin D intake. Following the delivery, venous blood samples were collected from mothers and umbilical cord of the neonates.

Results: Maternal and fetal serum concentrations of 25-hydroxy vitamin D3, PTH, osteocalcin (OC), crosslaps and maternal serum level of homocysteine, folate, soluble receptor activator of NF-kappaB ligand (sRANKL), osteoprotegerin (OPG), calcium (Ca), phosphate, alkaline phosphatase were measured in the biochemistry and hormone laboratory of endocrinology and metabolism research center. Measured birth outcome parameters included weight, length, head circumference, appearance, and respiration. Regarding to maternal assessment, it has been shown that the serum levels of OC and OPG and folate were significantly higher in group II compare to group I while the serum levels of RANKL and homocysteine were significantly higher in group I. We did not find significant differences in serum levels of 25-OH vitamin D, PTH, crosslaps, calcium, phosphate and alkaline phosphatase between two groups. There was a positive correlation between consumption of the daily folic acid supplement in whole duration of the pregnancy and serum levels of OC ($p=0.01$, $r=0.41$) and OPG ($p=0.001$, $r=0.53$) and a negative correlation with homocysteine level ($p=0.01$, $r=0.23$).

Concerning fetal assessment our results demonstrated that the serum PTH level was slightly higher in neonates born from mothers in group I. The neonates from mothers recruited in group II had higher but not significant serum level of OC. We observed that the neonates born from mothers in group II had overall better birth outcome parameters and apgar score compare to the neonates born from mothers in group I.

Conclusions: Our results provide the information that daily supplement of folic acid during pregnancy could have a positive impact on the bone turnover markers in mothers and their newborns. This may suggest that both pregnant mothers and their fetus could benefit from positive effects of this when it is taken during the whole period of pregnancy.

Disclosure of Interest: None Declared

P256

PREVENTION AND MANAGEMENT OF OSTEOPOROSIS IN POSTMENOPAUSAL WOMEN

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Aims: Osteoporotic fracture is an important public health problem worldwide. Osteoporosis, whose prevalence is especially high among elderly postmenopausal women, increases the risk of fractures. However, its impact varies considerably between countries, especially due to population differences and different use of public health resources.

Methods: The following sources were searched: Medline, Web of Science, the reference section of relevant articles, and hand searches of relevant journals.

Results: The primary goal of osteoporosis therapy is to prevent fractures, which is accomplished by slowing or stopping bone loss, maintaining bone strength, and minimizing or eliminating factors that may contribute to fractures. The evaluation of postmenopausal women for osteoporosis risk requires a medical history, physical examination, and diagnostic tests. Major risk factors for postmenopausal osteoporosis (as defined by BMD) include advanced age, genetics, lifestyle factors (such

as low calcium and vitamin D intake, smoking), thinness, and menopause status. Management focuses first on nonpharmacologic measures, such as a balanced diet, adequate calcium and vitamin D intake, adequate exercise, smoking cessation, avoidance of excessive alcohol intake, and fall prevention. If pharmacologic therapy is indicated, government-approved options are bisphosphonates, a selective estrogen-receptor modulator, parathyroid hormone, estrogens, and calcitonin. Adequate calcium intake (in the presence of adequate vitamin D status) has been shown to reduce bone loss in peri- and postmenopausal women and reduce fractures in postmenopausal women older than age 60 with low calcium intakes. In premenopausal women, there was a statistically significant difference between users OF oral contraceptive and never-users in osteocalcin (15.5± 7 ng/ml vs. 21.6±9 ng/ml; p=0.003) and CTX (0.30± 0.1 ng/ml vs. 0.41±0.2 ng/ml; p=0.025). This difference persisted after adjustment for age, BMI, age at menarche and number of pregnancies. In contrast, in post menopausal women, there was no difference in bone biochemical markers between OC users and the control. Our studies showed that the bisphosphonates were effective over the range from general recommendation (recently postmenopausal women with normal bone mass) to a reservation for women at particular risk of osteoporosis (elderly women, thin women, or women with osteopenia).
Conclusions: Management strategies for postmenopausal women involve identifying those at risk of low bone density and fracture, followed by instituting measures that focus on reducing modifiable risk factors through lifestyle changes and, if indicated, pharmacologic therapy.
Disclosure of Interest: None Declared

P257
VERTEBROPLASTY—HAPPILY EVER AFTER?

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Aims: Vertebroplasty for vertebral insufficiency fractures is considered as a foolproof method of treating this pathology. Only technique related problems of cement leak and embolism have been highlighted in literature. We bring forward a less described, but common 'side effect' of vertebroplasty that can happen after a well done vertebroplasty.
Methods: We present 5 cases who had a recurrence of back pain and instability after a good initial result of vertebroplasty. All 5 cases (Age 55–78 yrs, M:F=1:4, levels T12-L4) had vertebroplasty for osteoporotic fracture (4 single level, 1 double level vertebroplasty) with good to excellent pain relief immediately post procedure.
Results: All five patients reported recurrence of back pain and instability, similar to the pre procedural symptoms, between 1 month and 6 months post vertebroplasty. The pain was gradual in onset, with no triggering factor, aggravated by loading the spine and relieved by rest. Radiological examination revealed adjacent level fracture in three cases, and collapse of the same vertebral body in two cases. None of the cases had any neurological signs or symptoms. Three cases needed surgical stabilization while two were managed conservatively with upgraded medical therapy and rest.
Conclusions: Surgeons must realize that vertebroplasty merely strengthens the affected vertebra, but does not treat osteoporosis. This strengthened vertebra acts like a hard interface between the soft adjacent vertebrae, which can cave in on constant load transfer and friction with this cemented rigid bone. This can cause the adjacent bones or on some occasions, the same bone in the periphery of the unyielding bone cement, to collapse. Knowledge and potential prevention of this situation (by appropriate medical treatment) is important to surgeons performing vertebroplasty.
Disclosure of Interest: None Declared

P258
EFFECT OF KACANG TUNGGAK (VIGNA UNGULCULUTA) EXTRACT ON OSTEOBLAST AND OSTEOCLAST NUMBER IN OVARIECTOMIZED RA

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Aims: Aim of this study was to know an effect of kacang tunggak (*Vigna ungulculata*) on osteoblast and osteoclast number in ovariectomized rat.
Methods: In this experimental study, six groups were evaluated: P1: control rats; P2: ovariectomized rats then follow up for 1 month; P3: ovariectomized rats then follow up for 2 months; P4: ovariectomized rats then supplemented with Kacang Tunggak extract 0.5 mL/kg BW for 1 month; P5: ovariectomized rats then supplemented with Kacang Tunggak extract 2.5 mL/kg BW for 1 month; P6: ovariectomized rats then supplemented with Kacang Tunggak extract 5 mL/kg BW for 1 month. Femur distal then obtained and stained by Hematoxylin Eosin. Osteoblast and osteoclast number evaluate by light microscope at 1,000 magnification.
Results: Osteoblast number increase in P4 vs. P2 and P5 vs. P2. osteoclast number decrease in P4 vs. P2; P5 vas P2; and P6 vs. P2.

Conclusions: Kacang tunggak (*Vigna ungulculata*) increase osteoblast number and decrease osteoclast number at dose 0.5 and 2.5 mL/kg BW in ovariectomized rats.
Disclosure of Interest: None Declared

P259
PREVENTION OF NEW OSTEOPOROTIC FRACTURES FOR POSTMENOPAUSAL WOMEN TREATED WITH THE COMBINATION THERAPY (ALENDRONATE WITH ALFACALCIDOL): THE JAPANESE OSTEOPOROSIS INTERVENTION TRIAL (JOINT) –02

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Aims: The Japanese Osteoporosis Intervention Trial (JOINT) -02, a multicenter, open-label, randomized controlled trial, was conducted to clarify effectiveness of alendronate with alfacalcidol for postmenopausal women with osteoporosis in a clinical setting.
Methods: The Adequate Treatment of Osteoporosis (A-TOP) research group was established within the Japan Osteoporosis Society to confirm the clinical significance of concurrent use of osteoporotic drugs in 2000s. Eligible patients of JOINT-02 were postmenopausal women with osteoporosis aged at least 70 years who had less than four pre-existing vertebral fractures (including those with no fracture) and at least one A-TOP risk factor for fracture (number of prevalent vertebral fractures ≥1; BMD ≤ young adult mean −3 SD; and urinary deoxypyridinoline (DPD) ≥7.6 nmol/mmol·Cr or type I collagen crosslinked N-telopeptide (NTX) ≥54.3 nmol BCE/mmol·Cr). All patients were randomly assigned to the monotherapy group (alendronate alone) or the combination therapy group (alendronate with alfacalcidol) in the A-TOP data center. They were observed at baseline and at 6-month intervals for 2 years at each site. The primary endpoint was incident vertebral fractures identified radiographically using a semiquantitative morphometry criterion and the secondary endpoints were nonvertebral fracture, BMD, QOL and so on.
Results: A total of 2,164 patients (1,081 in the combination therapy group and 1,083 in the monotherapy group) were enrolled into the trial at 186 sites. As primary analysis, we analyzed 2022 patients (the monotherapy group, 1,027; the combination therapy group, 995). We previously reported that the rate of incident vertebral fractures was not significantly different between the two groups for two years, and however, the combination therapy group significantly reduced the rate of incident vertebral fractures after 6 months and in the subgroups with serious condition (now submitting). Moreover, we analyzed the frequency of nonvertebral fracture. As a result, the combination therapy group reduced the rate of nonvertebral fractures in the subgroup with weight bearing bone compared with the monotherapy group.
Conclusions: In Japan, the use of the combination therapy (alendronate with alfacalcidol) should be considered for postmenopausal women with osteoporosis as an option in the clinical practice.
Disclosure of Interest: None Declared

P260
FOUR-YEAR RESULTS OF A PHASE 2 STUDY OF THE CATHEPSIN K INHIBITOR ODANACATIB IN POSTMENOPAUSAL WOMEN WITH LOW BONE MINERAL DENSITY: EFFECTS ON BONE MINERAL DENSITY AND BONE TURNOVER MARKERS

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Aims: Cathepsin K (CatK) is the primary collagenase in osteoclasts. In a 2-year phase 2 study and its 1-year extension, the selective cathepsin K inhibitor odanacatib (ODN) reduced bone resorption markers and progressively increased bone mineral density (BMD). The study was

extended for 2 additional years to further assess ODN efficacy and long-term safety.

Methods: Postmenopausal women with BMD T-scores between -2.0 and -3.5 at the lumbar spine, femoral neck, trochanter or total hip received placebo or ODN at 3, 10, 25 or 50 mg weekly during the 2-year study. In Year 3, participants were re-randomized to ODN 50 mg weekly or placebo. In Years 4/5, women who received placebo or 3 mg ODN in Years 1/2 and placebo in Year 3 were switched to 50 mg ODN for Years 4/5; all others continued with their Year 3 regimen. 141 women entered the extension, and 133 completed 4 years. Endpoints were BMD at the lumbar spine (primary), total hip and hip subregions, and 1/3 radius; levels of biochemical bone turnover markers; and assessments of safety.

Results: During year 4, 100 women received 50 mg ODN and 41 received placebo. Continuous treatment with 50 mg ODN for 4 years induced significant BMD increases from baseline at the spine (10.7%), total hip (8.3%), femoral neck (8.9%), and trochanter (10.3%) and maintained BMD (−0.1%) at the 1/3 radius; BMD changes from Year 3 were 2.8% (spine), 2.5% (total hip), 3.9% (femoral neck), and 2.9% (trochanter). Serum CTx remained low at Year 4 (−41%), whereas BSAP was relatively unchanged (−2%) from baseline. Women who received active treatment for 2 years and switched to placebo for 2 years experienced bone loss, with BMD near baseline for most sites and decreased by 4.5% at the 1/3 radius at the end of Year 4. Levels of bone turnover markers in women who discontinued active treatment after 2 years rose in the first month off-treatment, but all levels returned to baseline by the end of Year 4. ODN was generally well tolerated.

Conclusions: 4 years of ODN treatment increased lumbar spine and hip BMD and was generally well-tolerated in postmenopausal women with low bone mass. Bone formation markers remained relatively unaffected. Discontinuation of ODN after 2 years of treatment was promptly followed by resolution of effects on bone turnover and density such that BMD and bone biomarker levels at Year 4 were at or near baseline.

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P261
RISK FACTORS AFFECTING FAILURE OF CONSERVATIVE TREATMENT IN PATIENTS WITH OSTEOPOROTIC THORACOLUMBAR COMPRESSION FRACTURES

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Aims: Almost OVCF can be treated conservatively. Recently, Cement augmentation technique has become a common treatment for painful osteoporotic compression fractures. It has shown numerous benefits such as early pain control and height restoration of collapsed vertebral body. In spite of simple procedure, numerous complications related to cement augmentation also have been reported. Moreover, there is limited evidence to support its superiority.

Methods: Prospectively, we assigned 259 patients who had one or two acute painful OVCF confirmed by MRI. All patients were treated conservatively in initial three weeks. After three weeks, cement augmentation procedure was performed in 98 patients (Failure of conservative treatment) who complained sustained back pain and disability in spite of conservative treatment. Participant were stratified according to age, sex, level, number of fractures, BMD, BMI, collapse rates and past history of spine fractures. Pain score using VAS and Oswestry disability index were assessed at 1 week and at 1, 3, 6 and 12 months.

Results: A total of 259 patients were enrolled and 238 (89 of 98 in failure group-cement augmentation, and 149 of 161 in conservative treatment group) completed the 1 year follow up. About 62% of patients were treated successfully with conservative treatment. Risk factors of failure of 3 weeks conservative treatment were older age (over 78.5), severe osteoporosis (less than −2.65 of *T*-score), overweight (over 25.5 of BMI) and initial larger collapse rates (over 23.5%). There were significant reductions in VAS and ODI score in both groups at each follow up assessment. There were not significant differences in outcome measures between two groups at 3, 6, 12 months.

Conclusions: Both treatments of OVCF showed successful clinical results at 1 year follow up period. At the result, in case of the patient with OVCF has no risk factors for failure of conservative treatment, which were older age (over 78.5), severe osteoporosis (less than −2.65 of *T*-score), overweight (over 25.5 of BMI) and initial larger collapse rates (over 25.5%), cement augmentation procedures might not be indicated.

Disclosure of Interest: None Declared

P262
MONITORING INCORPORATION OF STRONTIUM CITRATE IN HUMAN BONE

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Aims: With increasing use of strontium ranelate and strontium supplements to reverse the symptoms of osteoporosis and osteopenia, it became evident that a simple and sensitive diagnostic tool is required. The in-vivo x-ray fluorescence (IVXRF) technique is a promising diagnostic tool to measure bone strontium [1, 2]. The focus of this work was to measure the change in bone strontium using IVXRF, as it is a non-invasive diagnostic tool with a negligible radiation risk.
Methods: After obtaining ethical approvals, individuals, without prior history of strontium based treatments, suffering from osteoporosis and/or osteopenia were recruited. All participants were taking strontium citrate (341 mg/day). Strontium levels were obtained in eight females at two bone sites: (1) the right finger at a point on the dorsal surface of the index finger; and (2) the right ankle joint at the most prominent part of the medial malleolus of the tibia. The natural bone strontium prior to the start of citrate was obtained, followed by weekly and biweekly bone strontium measurements for up to 7 months.
Results: The natural bone strontium levels in these individuals were comparable to those of healthy individuals [2] (being 5.0% and 2.4% lower at finger and ankle, respectively). There was an immediate increase in strontium at both sites, and, the ankle, predominantly being trabecular bone, showed a higher strontium uptake compared to the finger bone, being mostly cortical bone. The average increase of 47.2% and 63.2% in finger and ankle, respectively, was measured after the first dose. This was followed by a slower increase with a plateau for a few weeks. A rapid increase in bone strontium was observed after (83±36) days in the ankle and after (72±32) days in the finger bone. The average bone strontium at the time of rapid increase compared to the natural strontium levels showed a significant increase of 4.3 times in finger and 5.2 times in ankle. Subsequent measurements document slower increase followed by a second plateau, as participants are still regularly monitored.
Conclusions: The results indicate two different mechanisms of strontium uptake by bone. The initial uptake could be associated with ionic exchange at the bone surface, resulting in higher strontium observed at ankle (trabecular bone). The observation of the rapid initial increase at 78 days could be influenced by the bone remodeling cycle that takes approximately 120 days. However, more work is required in order to understand strontium uptake by human bone.

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Disclosure of Interest: None Declared

P263
EFFECT OF ZOLENDRONIC ACID IN TREATMENT OF POSTMENOPAUSAL WOMEN WITH OSTEOPOROSIS

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Aims: Zoledronic acid is a new bisphosphonate used for treatment of postmenopausal osteoporosis. We have based our findings on results of intravenous infusions of zoledronic acid in 162 cases, 25 of which—secondary. Aim. To determine the efficacy and safety of intravenous infusions of zoledronic acid, and effects on vertebral pain, BMD in postmenopausal women with osteoporosis.
Methods: 41 postmenopausal women with osteoporosis aged 49–83 years were examined: average age—65.90±0.76 years, average height—159.23±0.67 cm, mean body mass—67.84±1.25 kg. Methods. Evaluation of pain syndrome and life quality was made with questionnaires. BMD was determined with Dual-energy X-ray absorptiometer "Prodigy" (GE Medical systems). 5 mg of zoledronic acid (Novartis) was administrated by intravenous injection. During the complex treatment patients received one tablet of calcium combined medicine (Calcium—500 mg, Vit. D—400 IU) two times a day during 12 months. Examination was performed before and after 3, 6, 9, and 12 months of treatment course.
Results: A reliable decrease of vertebral pain syndrome by visual analogue scale was observed up to nine months. The pain syndrome increased up to twelve months. However, the given index was lower than before treatment (insignificant changes). According to EuroQol 5D scale, life quality significantly improved. BMD of spine significantly increased in comparison with indexes before treatment after three (t=5.68; p<0.00), six (t=4.88; p<0.00), nine (t=7.59; p<0.00) and twelve (t=5.55; p<0.00) months. The BMD of femur (total) increased significantly after three (t=4.76; p<0.00), six (t=8.06; p<0.00), nine (t=2.36; p=0.03) and twelve (t=2.60; p=0.02) months. Dynamics of BMD were 6.48%, 8.57% on lumbar spine and 2.75%, 3.15% on femur (total) at 6 and 12 months, accordingly. The BMD of forearm increased considerably after 3 (t=4.70; p<0.00) and 12 (t=2.30; p=0.004) months. BMD of total body significantly increased after 3 (t=2.65; p=0.01), 6 (t=3.31; p=0,003), 9 (t=5.53; p<0.00) and 12 (t=2.83; p=0.01) months.

Conclusions: Intravenous infusions of zoledronic acid (5 mg) were shown to be effectively increasing BMD, decreasing pronounced vertebral pain syndrome and improving life quality in postmenopausal women with osteoporosis.
Disclosure of Interest: None Declared

P264
LYCOPENE DECREASED THE LIPID PEROXIDATION PARAMETERS WHICH INTERACTED WITH THE PARAOXONASE (PON1) 172-TA GENOTYPE TO DECREASE THE BONE RESORPTION MARKERS NTX IN POSTMENOPAUSAL WOMEN

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Aims: Lycopene is a potent antioxidant which may decrease the risk of osteoporosis. This effect is attributed to the antioxidative properties of lycopene; however, the exact mechanism by which this occurs has not yet been elucidated. A significant interaction between lycopene and the PON1 genotype has been shown. Aim was to assess whether the paraoxonase (PON1) 172T®A polymorphism affects the response to dietary intervention with lycopene.
Methods: Following a 1-month washout period, 45 postmenopausal women between 50–60 years of age were supplemented for 4 months with either regular tomato juice, lycopene-rich tomato juice, or tomato lycopene capsules, providing 30–70 mg of lycopene per day. Serum samples were analyzed for lycopene; total antioxidant capacity (TAC); the oxidative stress parameters, protein thiols and thiobarbituric acid reactive substances (TBARS); and the bone turnover markers, bone alkaline phosphatase (BAP) to assess bone formation and crosslinked N-telopeptides of type I collagen (NTx) to assess bone resorption. Genotyping of the 172T—A polymorphism was performed and repeated-measures ANOVA was used to determine change over time for each genotype.
Results: Serum lycopene significantly increased as a result of supplementation in the TT genotype and carriers of the A allele (both: $p<0.0001$), as well as significantly decreased protein ($p<0.005$ and $p<0.05$, respectively) and lipid peroxidation ($p<0.005$ and $p<0.0005$, respectively). However, participants with the TT genotype responded more favourably to lycopene, with corresponding increased TAC ($p<0.01$) and significant decreased NTx ($p<0.001$). These effects were not significant in carriers of the A allele.
Conclusions: A significant interaction between PON1 genotype and change in TBARS ($p<0.05$) suggests that supplementation with lycopene resulted in decreased lipid peroxidation, which interacted with the PON1 genotype to decrease bone resorption markers in postmenopausal women. These findings provide mechanistic evidence of how intervention with lycopene may act to decrease lipid peroxidation and thus the risk of osteoporosis in postmenopausal women.
Acknowledgements: Supported by the Canadian Institute of Health Research (CIHR), Kagome Co. (Japan), Lycored Ltd (Israel), H.J. Heinz Co. (Canada), Millenium Biologix (Canada) and Genuine Health (Canada).
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P265
EFFICACY OF A COMBINED ALENDRONATE AND CALCITRIOL AGENT IN KOREAN POSTMENOPAUSAL WOMEN WITH EARLY BREAST CANCER RECEIVING AROMATASE INHIBITOR: A DOUBLE-BLIND, RANDOMIZED, PLACEBO-CONTROLLED STUDY

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Aims: The effectiveness of aromatase inhibitor (AI) on disease free survival in hormone receptor positive breast cancer is well known. However, it also has deleterious effect on spinal BMD in Caucasian postmenopausal women by 2.2% loss in 1 year and 4.0% in 2 years as shown in ATAC [Anastrozole, Tamoxifen, Alone or in Combination] trial [1]. Administration of immediate zoledronic acid in the postmenopausal women with breast cancer starting with AI significantly prevented bone loss [2]. Meanwhile, there was a racial difference as that much lower degree of bone loss occurred associated with AI in Japanese postmenopausal breast cancer patients, 1.3% and 2.8%, respectively in 1 and 2 years [3]. However, it is too early to conclude whether bones in Asian women will differ in the response to AI. We have previously shown that combinative agent, daily 5-mg of alendronate, half of usual dosage and 0.5 μg of calcitriol is quite effective in Korean osteoporotic women [4]. Therefore, we have evaluated how AI affected bone mass in Korean postmenopausal women with breast cancer and performed a randomized, double-blind, prospective,

24-week clinical trial to evaluate the effects of a combinative agent, alendronate on bone in Korean postmenopausal women with early breast cancer treated with AI.
Methods: A total of 98 postmenopausal women with early breast cancer were enrolled; 98 patients were randomly assigned to one of two treatment groups (combinative agent or placebo group, n=49 each). The primary endpoint was % changes in the lumbar spine BMD at week 24. Secondary endpoints included changes in total hip BMD, bone turnover markers (both osteocalcin [OCN] and C-telopeptide [CTX]), and safety profiles.
Results: At week 24, the differences between the groups in the lumbar spine BMD was 3.0% (p<0.005) due to more loss in placebo group as much as −3.5±0.6% vs. −0.5±0.6% in combinative agent group. On the other hand, there was no significant change in any of the femoral BMD. Interestingly, women who recently became menopause in the placebo group lost more spinal BMD as −7.4±1.8% vs. −1.0±1.3% in the combinative agent group (p<0.01). The % changes of OCN and CTX in 24 weeks were lower in the combinative agent group than in the placebo group (28.9±8.1% vs. 57.7±14.2% [p=0.08] and 35.2±17.5% vs. 109.8±28.6% [p<0.05], respectively). There was no report on any fracture or osteonecrosis of jaw during the study period.
Conclusions: Our study demonstrates that there is a significant bone loss as early as 24 weeks in Korean postmenopausal women treated with AI and a combination of 5 mg alendronate and 0.5 μg calcitriol is quite effective in preventing bone loss in patients with breast cancer starting AI.
References: [1] Eastell R et al., Ann Oncol 2002;13:32; [2] Brufsky AM et al., Clin Breast Cancer 2009;9:77; [3] Okishiro M et al., J Cancer Res Clin Oncol 2009;135:823; [4] Rhee Y et al., Osteoporos Int 2006:17:1801
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Disclosure of Interest: None Declared

P266
ROLE OF GLUCOSAMINE IN OSTEOARTHRITIS

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Aims: Osteoarthritis (OA) is a major cause of disability and is among the most frequent forms of musculoskeletal disorders. Several investigated studies have shown that glucosamine sulfate was effective in reducing pain and other OA symptoms compared to placebo. In this review we summarize effect of glucosamine on osteoarthritis
Methods: Literature review of OA and glucosamine through the plumbed, Sciencedirect and Medline from 2000 to 2010.
Results: the literature shows a positive effect of glucosamine on osteoarthritis with relieves pain without evident side effects and decreases the rate of joint space narrowing clinically in OA of knee.
Conclusions: it is possible that long term clinical studies with glucosamine may result in modification to the indications for joint surgery or the time patients can live with OA before developing substantial disability.
Disclosure of Interest: None Declared

P267
PERIPROSTHETIC FRACTURES AFTER TOTAL KNEE ARTHROPLASTY: A REVIEW OF LITERATURE WITH CLINICAL COMMENTRY

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Aims: Periprosthetic fractures associated with total knee arthroplasty are becoming increasingly more common. The nature of the treatment of periprosthetic fractures depends on the localization, stability of the prosthesis and the condition of bone. Several classifications have proved to be of value in determining specific modes of treatment.
Methods: The current review analyses the different therapeutic options resulting in a concept of fracture-specific treatment.
Results: The purpose of this article is to review general concepts about the management of fractures that occur adjacent in TKA, discuss various treatment options for the fractures, and provide some technical pearls about the procedures with a review of the relevant literature.
Conclusions: Numerous sound treatment strategies are available in the surgeon's arsenal with which to address these complex fractures.
Disclosure of Interest: None Declared

P268
PERIPROSTHETIC FRACTURES OF TOTAL HIP ARTHROPLASTY: A REVIEW OF LITERATURE

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Aims: Periprosthetic fractures associated with total hip arthroplasty are becoming increasingly more common. The purpose of study is to review the treatment of periprosthetic fractures of total hip arthroplasty.
Methods: A limited number of cases are proposed. Careful intraoperative technique and tissue handling are crucial to reduce periprosthetic fractures.
Results: Once identified, however, any number of well described treatment options are available for the surgeons.

Conclusions: Carefully approached, and using sound treatment principles, these fractures can be appropriately addressed, thus ensuring adequate patient outcomes.
Disclosure of Interest: None Declared

P269
PROTON PUMP INIBITOR USE AND SUBSEQUENT FRACTURE RISK

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Aims: Previous studies evaluated the association between proton pump inhibitor (PPI) use and subsequent fracture risk, but they showed ambiguous results. Therefore, the objective was to evaluate this association in a different study population. Our findings show that there is probably no causal relationship between PPI use and hip fracture risk. Previous studies evaluated the association between PPI use and subsequent fracture risk, but they showed ambiguous results. To further test these conflicting results, the objective of this study was to evaluate the association between the use of PPIs and the risk of hip/femur fracture in a different study population.
Methods: A case-control study was conducted using data from the Dutch PHARMO record linkage system. The study population included 6763 cases aged 18 years and older with a first hip/femur fracture during enrolment and 26,341 age-, gender- and region-matched controls.
Results: Current users of PPIs had an increased risk of hip/femur fracture yielding an adjusted odds ratio (AOR) of 1.20 (95% CI 1.04–1.40). Fracture risk attenuated with increasing durations of use, resulting in AORs of 1.26 (95% CI 0.94–1.68) in the first 3 months, 1.31 (95% CI 0.97–1.75) between 3 and 12 months, 1.18 (95% CI 0.92–1.52) between 13 and 36 months and 1.09 (95% CI 0.81–1.47) for use longer than 36 months.
Conclusions: Our findings show that there is probably no causal relationship between PPI use and hip fracture risk. The observed association may be the result of unmeasured distortions: although current use of PPIs was associated with a 1.2-fold increased risk of hip/femur fracture, the positive association was attenuated with longer durations of continuous use. Our findings do not support that discontinuation of PPIs decreases risk of hip fracture in elderly patients.
Disclosure of Interest: None Declared

P270
STRONTIUM RANELATE

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Aims: Osteoporosis is listed by the WHO among the ten most frequent and socio-economically important, chronic diseases of mankind. The term osteoporosis however comprises a number of different pathophysiological conditions and clinical situations of weakened bones with increased risk of fragility fractures. A modern anti-osteoporotic drug should provide qualified study results proving therapeutic efficacy over this broad range of daily clinical appearances of osteoporosis. The decision for treatment in the individual patients depends no longer only on BMD.
Methods: Today, the major criterion for decision making is the prospective 10-year risk for fractures
Results: Since this risk is calculated on the basis of age, sex, BMD, prevalent fractures, and a number of other contributing risk factors (Kanis et al., Osteoporos Int 2001;12:989; Kanis et al., Osteoporos Int 2008;19:385), it seems to be of interest to have a look whether the fracture-reducing potency of a drug is influenced by these risk factors.
Conclusions: The purpose of this review is to analyze whether the fracture-reducing efficacy of strontium ranelate in patients with osteoporosis can be achieved independently of sex, etiology of osteoporosis, and the major diagnostically relevant risk factors.
Disclosure of Interest: None Declared

P271
OSTEOPENIA/OSTEOPOROSIS FOLLOW-UP AND THE EFFICACY OF TREATMENT IN POSTMENOPAUSAL WOMEN

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Aims: To assess the adherence and the efficacy of treatment of referred patients to Isfahan Osteoporosis Diagnosis Center.
Methods: This study was a randomized cohort study type which consisted of 350 osteopenic/osteoporotic postmenopausal women over the age of 50 years. The patients were prescribed 70 mg/week Alendronate and 1500 mg/day Calcium plus 800 IU of vitamin D/day. The patient's BMDs of the Femur and Lumbar spine were measured once before the start of the treatment and once after the completion of treatment period, after twelve months (May 2007–March 2009). The measurements were performed with the use of a DXA Norland XR46 system (Atkinson, USA). Of the 350 patients, 100 completed the treatment

successfully, 200 partially completed the treatment and 50 did not take the drugs.
Results: Student *T*-test revealed that for the 100 patients who completed the treatment there were significant ($p<0.01$) gain in BMD of Femoral neck and Lumbar spine. There were also significant BMD gains for both measured sites ($p\leq0.01$) for the 200 patients who partially followed the therapy. For the 50 patients who did not follow the therapy, neither of the sites changed significantly ($p\geq0.15$).
Conclusions: Our findings showed that more than 85% (300/350) of the referred patients who completely or partially adhered to treatment gained an increase in their Femoral neck and Lumbar spine BMDs. The 200 patients who did not completely follow the treatment and gained an increase in BMD may have improved their life style (the diet and physical activities).
Disclosure of Interest: None Declared

P272
IMPROVEMENT OF MUSCLE POWER, MUSCLE FUNCTION AND BACK PAIN IN ELDERLY PATIENTS BY COMBINED THERAPY WITH ALFACALCIDOL AND ALENDRONATE

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Aims: In an open, multi-centered, uncontrolled, prospective study on a cohort of elderly patients, we investigated the efficacy and safety of a combination package containing 4 self explaining one week blisters, each with one tablet of 70 mg alendronate and seven capsules of 1 μg alfacalcidol on muscle power, muscle function and back pain.
Methods: 818 practicing physicians all over Germany recruited 2579 patients for a 3 months observational trial with the above new combination package. 92.4% were women [(89.7% of the women had Postmenopausal Osteoporosis (PMO)], the average age was 74.1 years and the mean BMI 26.4 kg/m^2. 55.4% had a history of falls. Prevalent vertebral and non-vertebral fractures were documented in 62.9% and 61.4% of the patients respectively and a creatinine clearance (CrCl) below 65 ml/min was documented in 65.5%. Main outcome parameters were Chair Rising Test (CRT), Timed Up and Go Test (TUG), back pain and safety at onset and after 3 months. An evaluation of the package design was done at the end of the study.
Results: The percentage of patients able to perform the CRT within 10 s increased from 26.3% to 42.9% after 3 months (increase 63%, $p<0.0001$), while the successful performance within 10 s of TUG increased by 54% ($p<0.0001$) from onset of 30.6% to 47.1% after 3 months. The average overall improvement of CRT was 2.3 s ($p<0.0001$) and of TUG amounted to 2.4 s ($p<0.0001$). It was shown in another recently published study that a mean increase of 2.6 s in the performance of TUG results in a 24% increased risk for nonvertebral fractures. Mean back pain measured by a 0–10 Visual Analogue Scale (VAS) decreased by 41% significantly from 5.9 to 3.5 ($p<0.0001$). Throughout the study 178 Adverse Drug Reactions (ADR) or Adverse Events (AE) were reported in 85 of the 2579 patients (incidence: 3.30%). Three patients experienced serious adverse events, two without causal relationship to the new combination pack.
Conclusions: The new regimen of alfacalcidol plus alendronate achieved significant ameliorations in CRT, TUG and back pain already after 3 months with high safety profile and might improve compliance and reduce dispensing mistakes. This may contribute to the previously shown significant effect on reducing falls and fractures with the same regimen during a controlled long-term trial.
Disclosure of Interest: E. Schacht Consultant/Speaker's bureau/Advisory activities with: Consultant, J. Ringe Grant/Research Support from: Grant/Research Support

P273
ZOLEDRONIC ACID IN OSTEOPOROSIS—PATIENT SATISFACTION, ACCEPTABILITY AND SIDE EFFECTS IN PATIENTS WITH OR WITHOUT PREVIOUS BISPHOSPHONATES

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Aims: Zoledronic acid (ZA) is licensed for the treatment of postmenopausal osteoporosis, osteoporosis in men, and glucocorticoid-induced osteoporosis. As it is given as an annual infusion, it reduces the number of patient visits to medical facility and avoids the gastrointestinal side effects associated with oral bisphosphonates and other oral agents used in osteoporosis. This study was performed to assess the incidence of side effects, level of patient satisfaction, the reasons for initiation of ZA and the information received by patient prior to initiation of ZA.
Methods: A questionnaire based survey was carried out on 100 consecutive patients receiving ZA at the Metabolic Bone Unit. It included questions regarding previous treatment, incidence of side effects, and satisfaction. This was rated on a five point Likert scale, with a score of five representing "very satisfied" and one "poorly satisfied". Patients were asked to return the questionnaire at least 2 weeks after the date of infusion.

Results: Questionnaire response was 100%. 87/100 patients were female, 13 male. The average age was 69 years (range 40–87 years). 33 patients were receiving ZA as primary prevention, 67 as secondary. 16 patients had glucocorticoid-induced osteoporosis. Prior to ZA treatment, 41 patients were on oral BPs, another 41 on IV BPs, 6 on strontium ranelate, 2 on teriparatide and 10 patients were treatment naive. Fifty patients were switched to ZA due to gastrointestinal side-effects with oral medications, 11 patients due to poor compliance (more than one reason may apply). Forty patients were changed from intravenous ibandronate due to change in our treatment protocol. Treatment naive patients were started on ZA because of known contraindications to oral medications. Fifty-two patients experienced one of more side effects, which included—"flu" like symptoms $n=31$, fatigue $n=28$, headache $n=19$, nausea $n=16$ and bone pain $n=29$. There was no difference in the incidence of side effects between patients previously treated with BP or not. Ninety-four patients agreed that they received proper information prior to the ZA infusion about side effects etc, 5 patients disagreed, and 1 patient did not enter a response. The average satisfaction rating was 4.46, 5 patients did not enter a response in this section, and 3 patients stated it was too early to evaluate satisfaction. Sixty-seven patients scored their satisfaction as 5, "very satisfied", 13 patients rated their satisfaction as 4, 5 gave a score of 3, 2 patients gave a score of 2, and 5 patients rated their satisfaction as 1 "poorly satisfied".

Conclusions: IV Zoledronic acid is well tolerated with few mild side effects and good over all patient satisfaction, with or without previous bisphosphonate exposure.

Disclosure of Interest: None Declared

P274

Abstract Withdrawn

P275

COST-EFFECTIVENESS OF BALLOON KYPHOPLASTY COMPARED TO NON-SURGICAL MANAGEMENT IN PATIENTS WITH HOSPITALIZED VERTEBRAL COMPRESSION FRACTURES IN GERMANY

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Aims: To assess the cost-effectiveness (CE) of Balloon Kyphoplasty (BKP) and Non Surgical Management (NSM) in a German setting.

Methods: The cost-effectiveness of BKP compared to NSM in a German setting was evaluated using a recently published Markov Tunnel model (life time horizon, 6 months cycles) assessing BKP and NSM in the treatment of hospitalized vertebral compression fractures (VCFs) in a UK setting [1]. Key data used to populate the model included 2-year Quality of Life (QoL) data from the FREE RCT; mortality odds ratios controlled for comorbidities from the retrospective SAVE study [2]; and one year costs after fracture from a prospective observational study conducted in eight centers in Germany [3]. A Social Health Insurance (healthcare) perspective was adopted and a discount rate of 3% was used. The modeled population consisted of 70 year old women with a baseline *T*-score of −2.5. Cost-effectiveness was assessed with two key base case assumptions: The QoL benefits with BKP compared to NSM observed in the FREE trial approached zero during 1 year; and—based on the SAVE study—it was assumed that BKP decreased mortality compared to NSM by 44% during the first 2 years after the VCF. The impact of the two assumptions was explored in a sensitivity analysis.

Results: The base case ICER (EUR per QALY) was EUR 11,256. Depending on assumptions regarding offset and mortality reductions, the ICER ranged from EUR 8,189 (5 year utility offset and mortality reduction) to EUR 20,497 (no offset or mortality reduction). The results presented in Table 1 below.

Table 1. Cost Effectiveness of BKP compared to NSM in different scenarios

	ICER	Impact on incremental QALY
Base Case	11,256	na
0 year QoL offset	12,626	−0.084
3 years QoL offset	9,391	0.023
5 years QoL offset	8,189	0.085
No mortality reduction	17,174	−0.168
No offset or mortality reduction	20,497	−0.205

Conclusions: BKP appears to be a cost-effective alternative to treat hospitalized VCFs in Germany compared to NSM. As SAVE data includes survival gains for different surgical strategies future analysis may clarify their relative health value. So far published cost effectiveness of BKP has focused on quality of life gains. Preliminary results on the value of increased survival are reported here.

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Disclosure of Interest: A. Svedbom Grant/Research Support from: Medtronic, L. Alvares Employee of: Medtronic, O. Ström Grant/Research Support from: Medtronic

P276

OSTHOLE INHIBITS OSTEOCLASTOGENESIS AND BONE RESORPTION THROUGH ACTIVATION OF B-CATENIN-OPG SIGNALING

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Aims: Osthole, a coumarin-like derivative extracted from Chinese herbs, which have been used as the treatment of bone diseases for thousands of years. There has been no evidence to indicate the effect of Osthole on osteoclast formation and bone resorption. In this study, we try to figure out the effect of Osthole on osteoclastogenesis and underlying mechanism.
Methods: 12-week-old $OPG^{-/-}$ mice were treated with or without Osthole at a dose of 5 mg/kg/day for 8 weeks. Bone mass was detected by micro-CT analysis and osteoclast number was calculated by TRAP staining; Primary calvarial osteoblasts were isolated from 3-day-old C57BL/6 J mice, treated with Osthole at the doses of 10 uM, 50 uM, and 100 uM for 48 h, then total RNA were collected. OPG and RANKL expression were detected using real-time PCR; BMSCs were also isolated from 6-month-old $OPG^{-/-}$ mice and its littermates of $OPG^{+/+}$ mice, cultured with M-CSF and RANKL, and treated with or without Osthole at the dose of 100 uM. After 7 days, TRAP staining was performed and the number of osteoclast was quantitated; Primary calvarial osteoblasts were isolated from 3-day-old β-$Catenin^{loxp/loxp}$ mice, infected with Ad-Cre or Ad-GFP, and treated with or without Osthole at the dose of 100 uM. After 48 h, the expression of β-Catenin and OPG were detected using real-time PCR and western-blot assay.
Results: In-vivo study showed that Osthole increased bone mass in $OPG^{-/-}$ mice by stimulating bone formation, not inhibiting bone resorption. Osteoclast number was not reduced in $OPG^{-/-}$ mice after the treatment of Osthole. This data suggested that OPG may be the target gene of Osthole to affect osteoclastogenesis. To identify this hypothesis, firstly we performed in vitro study. qPCR data showed that Osthole increased the expression of OPG mRNA in osteoblasts dose-dependently. But Osthole has no significant effect on the expression of RANKL mRNA in osteoblasts. These results indicated that Osthole may inhibit osteoclast formation by stimulating the expression of OPG. To test the above hypothesis, we performed TRAP staining and found that Osthole reduced the number of osteoclast dramatically in $OPG^{+/+}$ mice but its effect was blocked totally in $OPG^{-/-}$ mice, which demonstrated that Osthole inhibited osteoclast formation in an OPG-dependent manner. Our previous study showed that the activation of β-catenin signaling promoted the expression of OPG and inhibited osteoclast formation. And Our previous study showed that Osthole activated β-catenin signaling in primary osteoblast. In this study, we found that the deletion of the OPG gene did not affect β-catenin expression and the deletion of the β-catenin gene inhibited OPG expression in osteoblasts, which demonstrated that Osthole stimulated the expression of OPG through activation of β-catenin signaling in osteoblast.
Conclusions: Our findings verified that Osthole inhibited osteoclast formation by activation of β-catenin signaling and could be a potential agent to inhibit bone resorption.
Disclosure of Interest: None Declared

P277

BONE FORMATION IN OVARIECTOMIZED RATS BY AN ORALLY ACTIVE SMALL MOLECULE (CDROSTEOID-C) BY STIMULATION OF TRANSIENT PARATHYROID HORMONE RELEASE

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Aims: Intermittent administration of parathyroid hormone (PTH) is the only FDA-approved therapy for stimulating new bone formation. There is a need of an alternative therapeutic agent that might overcome the cost, hassle of systemic administration and yet achieve similar bone anabolic effect.
Methods: In this study we have used a novel synthetic compound, CDROsteoid-C, which was administered orally (single dose) by gavage to rats in the dose of 3.0 $mg.kg^{-1}$. Further, the effects of CDROsteoid-C were also studied on estrogen deficiency-induced bone loss in aged ovariectomized (OVx) rats (Sprague Dawley) rendered osteopenic. After attaining osteopenic status CDROsteoid-C was administered at 1.0- & 10.0 $mg.kg^{-1}$ doses, twice a week by oral gavage to OVx rats for 3 months, whereas control group received vehicle. As positive control, a group of aged OVx rats were given intraperitoneal injection of PTH (dose) twice a week.
Results: We show that single oral dose of the synthetic compound resulted in the increase in serum levels of PTH and Ca^{2+}. The increase in level of PTH and Ca^{2+} is rapid and transient. CDROsteoid-C (10^{-7}) stimulated production of cAMP levels as well as mRNA levels of various cAMP regulated genes including IL-6, c-fos and leukemia inhibitory factor in primary osteoblasts of the rat. These effects of

CDROsteoid-C on osteoblasts are reminiscent of the effect of PTH on these cells. Dynamic histomorphometry (tetracycline-calcein labeling of femur) and microcomputed tomography assessment revealed that OVx rats treated with CDROsteoid-C exhibited increased mineral apposition rate (MAR) and bone formation rate (BFR) compared to OVx + vehicle group. Surprisingly, BFR levels achieved by CDROsteoid-C treatment were significantly higher than those of PTH treatment to OVx rats. The μCT results also demonstrate that treatment with CDRosteoid resulted in better microarchitectural parameters than the OVx + vehicle control group with 1.0 mg. kg^{-1} dose showing a better response.

Conclusions: Based on these data it appears that intermittent oral administration of CDROsteoid-C directly stimulating osteoblast function, resulting in new bone formation in aged osteopenic rats, probably by rapid and transient rise in serum PTH levels. CDROsteoid-C therefore, has potential therapeutic use as bone anabolic agent.

Disclosure of Interest: None Declared

P278
HOW GOOD ARE WE AT PREVENTING A BREAK AFTER A FALL IN THOSE WHO ARE AT RISK?

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Aims: The likelihood of having a fracture is related to both falling and osteoporosis. Both these factors need to be included in the management of older patients at risk. Osteoporotic fractures cause significant morbidity and mortality. The Australia and New Zealand Bone Mineral Society (ANZBMS) provides guidelines based for the prevention of such fractures. The patients who are admitted to the geriatric ward provide us with an opportunity to implement these guidelines. The Aim of this study was to assess the adherence to guidelines for the management of osteoporosis in the geriatric ward.

Methods: A retrospective audit was carried out on patients admitted over a 3 months period from 04/2008 to 07/2008. The following information was collected from the records of patients deemed eligible for the audit: pre-existing or new diagnosis of osteoporosis or a recent fracture; PTH and Vitamin D level, pre-existing treatments; changes to treatments; treatments on discharge. The data was then used to compare each patient's standard of care with regards to osteoporosis treatment and prophylaxis with the guidelines provided by ANZBMS.

Results: 44 patients were included in this audit. The prevalence of osteoporosis was 41%. Measurement of Vitamin D level and a parathyroid hormone level was carried out in 74%. Prior to the admission 39% of these patients had no osteoporosis treatment. The number of patients who were discharged with treatment of osteoporosis based on the guidelines was low with only 7.4% receiving the appropriate calcium supplementation, 59% receiving cholecalciferol and 45% getting either a bisphosphonate or strontium.

Conclusions: This study highlights the disparity between the presence of guidelines and the implementation. It also shows that we may be missing the importance of preventative management in this patient group, who are at high risk of adverse outcomes in the event of falling.

Acknowledgements: The data for this study was collected by Dr D Subramanium.

Disclosure of Interest: None Declared

P279
IS BONE LOSS THE REVERSAL OF BONE ACCRUAL?-EVIDENCE FROM A CROSS-SECTIONAL STUDY ON DAUGHTER-MOTHER–GRANDMOTHER TRIOS

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Aims: To test if the loss of bone may occur preferentially at sites where more bone was deposited in earlier life, i. e., the bone loss is possibly the directional reversal of accrual.

Methods: We compared the bone mass distribution in weight-bearing bone (tibia) and nonweight-bearing bone (radius) among 18-year-old girls, their premenopausal mothers and postmenopausal maternal grandmothers. Bone and muscle properties were measured by pQCT and polar distribution of bone mass was obtained in 55 girl-mother-maternal grandmother trios. Site-matched difference in bone mass was compared among three generations. The differences between girls and mothers, and between mothers and grandmothers, were used to represent the patterns of bone mass accrual from early adulthood to the middle age and bone loss from the middle to old age, respectively.

Results: Compared to the mothers, 18-year old girls had less bone mass in the anterior and medial-posterior regions

of tibial shaft, while the grandmothers had less bone in the anterior and posterior regions. In contrast, the bone mass difference in radial shaft between girls and mothers, mothers and grandmothers were relatively uniform.

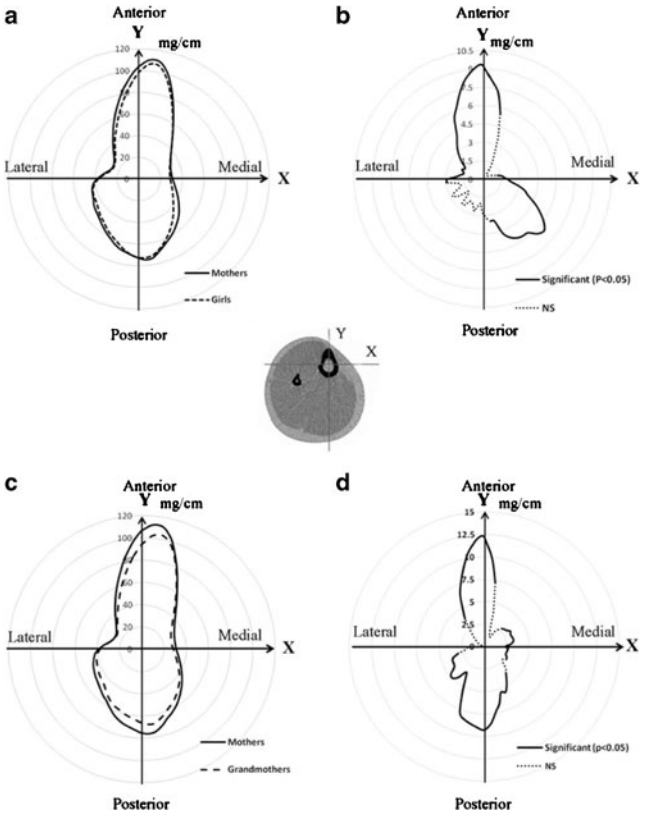

Figure 1: Polar distribution of BMC (bone mineral content) and the difference of mean BMC value followed the anatomic shape in tibial shaft in three generation. The y-axis was defined to coincide with the direction of the widest width of tibial shaft, which goes through the mass center of the cross section. The x-axis was defined as perpendicular to the y-axis through the mass center.

A: Polar distribution of BMC in the tibial shaft of the girls and their mothers.

B: Polar distribution of difference between the mean BMC values in the tibial shaft of the girls and mothers.

C: Polar distribution of BMC in the tibial shaft of the mothers and the grandmothers.

D: Polar distribution of difference between the mean BMC values in the tibial shaft of the mothers and grandmothers.

Conclusions: We concluded that both bone accrual and loss are direction-specific in weight-bearing bones. The bone loss in the old age is largely a directional reversal of the preferential deposition of bone in the most highly loaded regions during early life.

Disclosure of Interest: None Declared

P280
BALLOON KYPHOPLASTY AND VERTEBROPLASTY IN THE MANAGEMENT OF VERTEBRAL COMPRESSION FRACTURE: DOES COMPLICATION RATE DIFFER IN COUNTRIES OR SPECIALTIES OF OPERATORS?

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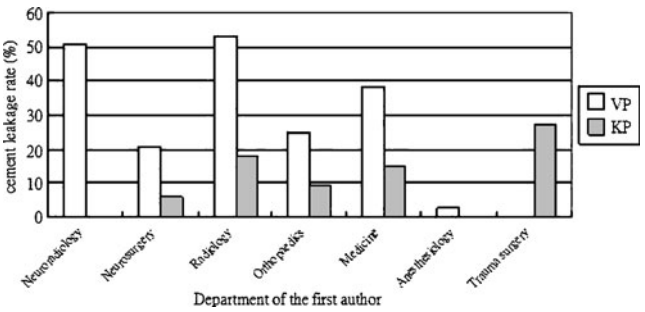
Aims: The goal of this review is to demonstrate the efficacy and safety outcome of vertebroplasty and kyphoplasty and to find out whether complication rates differ in countries or specialties of operators.

Methods: Detailed searches of electronic databases (i.e., Pubmed, Cochrane library) were performed. Outcome measures of efficacy included visual analog scale (VAS) decrease, change in kyphotic angle, restoration of vertebral height and improvement of functional capacity. Outcome measures of safety were cement leakage, new vertebral compression fracture and complications. Countries or specialties of operators were analysed.

Results: No significant difference in VAS decrease was noted between vertebroplasty and kyphoplasty groups (p= 0.374). We found a higher rate of cement leakage, new compression fractures, pulmonary embolism and radiculopathy in vertebroplasty than in kyphoplasty (all $p<0.05$). We also found that reduction in kyphotic angle was larger in kyphoplasty than in vertebroplasty ($p=0.007$). Cement leakage rates were lower in neurosurgery department (20.6%) and orthopedic department (24.7%) than radiology department (52.9%) (figure). No significant difference of complication rate among countries was noted. Complication rates in Europe were higher than that in America.



Conclusions: Kyphoplasty is generally safer than vertebroplasty and can achieve more kyphotic angle reduction. Neurosurgeons and orthopedic surgeons did fewer complications than radiologists, possibly due to familiarity of anatomy

or complication documentation difference. Higher complication rates in Europe than in America might be due to different patient population (neoplastic vs. osteoporotic cause).
Disclosure of Interest: None Declared

P281
EFFECT OF ANTHOCYANIN PIGMENT FROM MAIZE PURPLE PLANT SUPPLEMENTATION ON BONE MINERAL DENSITY OF OSTEOPOROSIS IN OVARIECTOMIZED RATS

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Aims: To evaluate the influence of anthocyanins in Maize purple plant pigment (MPPP) on BMD on ovariectomized rats.
Methods: Forty 3-month-old female Wistar rats were randomized in five groups: sham-operated (Sham), ovariectomised (OVX), and three different doses of OVX + MPPP groups i.e., 2.5%, 5.0%, 10% MPPP ig 1 ml/100 g bw. After 14 weeks the following parameters were determined: serum calcium, phosphorus, alkaline phosphatase (ALP), superoxide dismutase (SOD), malondialdehyde (MDA), liver SOD, liver MDA. BMD in left femur and fourth to sixth lumbar vertebra were assessed via DXA.
Results: There was no difference in serum calcium and phosphorus among groups. Ovariectomy resulted in lower BMD, ALP, SOD activities in both serum and liver SOD, higher MDA contents in both serum and liver. MPPP supplementation resulted in increased SOD activity in both serum and liver, decreased MDA contents in both serum and liver, but no effect on BMD and ALP levels.
Conclusions: These results suggest that anthocyanin pigment from maize purple plant may contribute to an increase of antioxidant capacity, a decrease of oxidative damage, but no effect to prevent the bone loss induced by estrogen deficiency.
Acknowledgements: This study was funded by Liaoning Province Education Science Foundation (2009A695).
Disclosure of Interest: None Declared

P282
BONE MINERAL DENSITY IN YOUNG MALES WITH ANKYLOSING SPONDYLITIS AND THE RELATIONSHIP BETWEEN BMD AND CLINICAL CHARACTERISTIC

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Aims: To determine BMD and the prevalence of osteoporosis (OP) and osteopenia in young males ankylosing spondylitis (AS) patients and to investigate the relationship between BMD and clinical characteristic.
Methods: There were 116 males patients AS (patients were divided into two groups: Group young males patients (17–30 years) and other group (31–55 years) were compared with 116 sex-and age matched controls. BMD was evaluated at the lumbar spine and femoral neck by DXA using a Unigamma-X-ray Plus BMI index. Disease activity variables including erythrocyte sedimentation rate-ESR, Bath Ankylosing Spondylitis Disease Activity Index (BASDAI). Bath ankylosing spondylitis radiology index (BASRI) score and syndesmophytes score, BMI were identified.
Results: In AS patients BMD was significantly reduced in both lumbar spine 1.004±0.178 g/cm^2 and femoral neck 0.740±0.182 g/cm^2 as compared with controls 1.117±0.129 g/cm^2, respectively 0.881±0.152 g/cm^2 (all $p<$ 0.001). According to the WHO definition spine and hip OP was diagnosed in 2.6% and 7.8% AS patients respectively, with an additional 20.7% and 30.2% having osteopenia. In young males patients group (17–30 year) OP and osteopenia was 25.3% in lumbar spine and 34.7% in femoral neck. Other group (31–55 year) OP and osteopenia was 19.5% in lumbar spine and 43.9% in femoral neck. We found a positive correlation between BMD at the lumbar spine and disease duration. Only femoral BMD relationship with disease activity.
Conclusions: These results confirm that in young males AS patients have decreased BMD values at the lumbar spine and femoral neck. OP can be observed in young males patients and with active disease, BASRI-h >2, low BMI are at risk for developing OP.
Disclosure of Interest: None Declared

P283
MARKER OF BONE TURNOVER AS RESPONSE TO NITROGLYCERIN THERAPY IN POSTMENOPAUSAL WOMEN

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Aims: A variety of therapeutic options are studied for osteoporosis. Emerging therapies are effective, but expensive; hence cost-effective therapies are necessary. Effects of estrogen on bone in part mediated via nitric oxide (NO), nitroglycerin (NG) is an alternative to estrogen for postmenopausal women. At appropriate doses, NG, NO donor has favorable effects on osteoblast and osteoclast.

Methods: We analyzed biomarkers, serum C-Telopeptide (CTx) and osteocalcin (OC) in a randomized, double-blind, controlled clinical trial (n=186) that used NG for preventing bone loss. Postmenopausal women were randomized to receive NG or placebo ointment over a 3-year period. To understand the relationship of biomarkers with BMD, we analyzed changes of serum CTx and OC in those who responded vs. non-responders in both active and calcium + vitamin D treated groups. We also analyzed the positive effects on NG on BMD using IGF as a surrogate marker.

Results: Those subjects who had ↑ BMD (responders) following NG-therapy had a significant ↓ of serum CTx (−0.43±0.09 ng/ml, ↓ of 42%; p<0.0002), and ↑ OC levels (1.32±1.43, 7.7%; p=0.27). In NG-group, non-responders had change of CTx of −0.12±0.05; ↓ of 15% p<0.025), and OC −4.99±1.2 ng/ml; ↓ by 22.5%; p< 0.0008. In the NG-treated group, responders vs. non-responders for CTx was p<0.0005; and for OC, p<0.001. We cannot state whether this is due to adherence to therapy, or individuals needed different doses of NG to protect their skeleton.

In comparison, those who had ↑ BMD in the placebo-treated group had no major change in serum CTx (−0.16± 0.06 ng/ml; 18%, p<0.36), or OC levels (−4.11±1.23 ng/ml, 23%; p<0.054). Furthermore, in the NG-treated group, BMD changes observed were correlated with the baseline serum CTx (p<0.001) and change of OC (p<0.001) (levels from the baseline). But no such correlation was seen with the change of BMD with the baseline CTx or OC levels.

Conclusions: Those who had ↑ BMD in response to this novel therapy had a significant ↓ in serum CTx and stable OC levels. Correlations were restricted to NG-treated group only, suggesting that changes of these two biochemical markers are specific to NG-treated group. Hence, these markers could be used to identify responders to NG, adjusting its dose, and/or assess the adherence to therapy.

Disclosure of Interest: None Declared

P284
MECHANISMS OF ACTIONS OF NITRIC OXIDE IN PREVENTION OF BONE LOSS

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Aims: Several therapeutic advances have been made recently in the prevention and treatment of osteoporosis. However, these new therapeutic agents are expensive and some also have significant adverse effects. Hence simple, cost-effective therapeutic options are warranted. Women's Health-Initiative clinical trial demonstrated elevated risks of some cancers with hormone replacement therapy. Hence, many women previously relied on hormone replacement therapy to reduce osteoporosis risk, discontinued this therapy. The beneficial effects of estrogen on bone maintenance is at least in part mediated via nitric oxide (NO)/cGMP pathway, and perhaps also via IGF-1. At appropriate doses, nitroglycerin as a nitric oxide donor was shown to favorably affect both osteoblasts and osteoclasts (i.e., uncoupling these two cell types) (1–3).

Methods: A 3-year randomized, doubled-blind, controlled clinical trial was conducted to assess the efficacy nitroglycerin in preventing bone loss in early postmenopausal women. This study, *N*itroglycerin as an *O*ption: *V*alue in *E*arly Bone *L*oss (NOVEL) study, was funded by NIAMS. Over 200,000 women were contacted, 1,400 were interviewed, 215 were screened, and 186 were recruited. Women were randomized to receive either nitroglycerin ointment or placebo ointment. All women received calcium and vitamin D supplementation. Due to the lack of funds, some of the secondary outcomes including biochemical markers of bone turnover have not been completed. There were no differences in the treatment arms in primary and secondary outcomes with BMD. However, taking compliance (~75%) into consideration, the dose actually used by the study participants was only ~50% of that was originally intend to use in this study; i.e., a subtherapeutic dose that would not have expected to have positive effect on the skeleton.

Results: Nevertheless, a significant increase of serum IGF-1 levels was observed in women who had positive BMD response following nitroglycerin therapy, but not in the placebo-treated group. Nitroglycerin-treated subjects with increased BMD had increase of serum IGF-1 levels, 201±25.6 vs. non-responders, 40.2±16.9 ng/mL (p<0.001), and the BMD changes was significantly correlated with the change of serum IGF-1 levels from the baseline (r=0.5; p<0.01). Whereas, those who were in the placebo group with increased BMD had no change in serum IGF-1 levels (−2.6±24.6 vs. 10.8±13.5 ng/mL, NS; responders vs. non-responders). Previously, we have demonstrated that estrogenic effects on bone can be completely blocked with nitric oxide synthase inhibitors such as L-NAME.

Conclusions: Current data suggest that nitroglycerin, in addition, to be one of the key final common pathways for positive effect of estrogen in bone, it may also be involved in, perhaps enhancing local production of IGF-1 thereby assisting bone formation that is observed with nitric oxide therapies.

Disclosure of Interest: None Declared

P285
PRIOR BISPHOSPHONATE TREATMENT DOUBLES THE LIKELIHOOD OF ATTENUATED TERIPARATIDE RESPONSE AND BLUNTS THE GAIN IN BONE MINERAL DENSITY

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Aims: Teriparatide has been shown to reduce the risk of vertebral fractures by exerting an anabolic bone effect. On the other hand bisphosphonates are potent antiresorptive agents which suppress bone remodeling. The primary aim of this study was to determine whether prior bisphosphonate treatment increased the likelihood of an attenuated Teriparatide response (≤3% Least Significant Change in Spinal BMD). The secondary aim was to determine whether Spinal BMD change differs in the two groups (prior bisphosphonate vs. bisphosphonate naïve) after Teriparatide treatment.
Methods: This is a retrospective study of 110 patients who had completed 18 months of Teriparatide treatment in our Osteoporosis Clinic. Information obtained included patients' DXA at baseline and 18 months, baseline bone markers (P1NP, Osteocalcin, CTX) and exposure to significant bisphosphonate therapy (at least 6 months) before Teriparatide therapy. Patients were divided into Good Responders (>3%LSC BMD Spine) and Attenuated Responders (≤3% LSC BMD Spine).
Results: Of the 110 patients, 103 were female, seven were male. Mean age 71.5±10.2. In total 16 patients (15%) were deemed Attenuated Responders (≤3% LSC BMD Spine). Thirty-eight patients were on prior bisphosphonate treatment, 72 were bisphosphonate naive. Of those on bisphosphonate, 8 (21%) were Attenuated Responders and 30 (79%) were Good Responders. Of those who were bisphosphonate naïve 8 (11%) were Attenuated Responders while 64 (89%) were Good Responders. The mean baseline Spinal BMD of the Good Responders were 0.73±0.14 and Attenuated Responders were 0.79±0.08 (p=0.03). Patients with prior bisphosphonate treatment had a mean gain in lumbar spine BMD of 9.4%±8.0 compared to 14.6%±11.2 (p=0.02) in the bisphosphonate naïve group. Overall the bone markers of those with prior bisphosphonate group compared to bisphosphonate naïve group were lower at baseline (p<0.05)
Conclusions: Compared to bisphosphonate naïve patients, those on bisphosphonate prior to Teriparatide treatment were almost twice as likely (21% vs. 11%) to have an attenuated Teriparatide response (≤3% BMD Spine gain) at 18 months. In addition patients with prior bisphosphonate also had a blunted Spinal BMD gain at 18 months (9.4% vs. 14.6%). Patients who have an attenuated response also have higher Spinal BMD at baseline (0.79 vs. 0.73) with lower bone turnover. Overall 85% of our patients treated with Teriparatide had a good response with 12%±9.6 gain on Spinal BMD.
Disclosure of Interest: None Declared

P286
TERIPARATIDE (PTH 1–34)—LACK OF EARLY BONE FORMATION (P1NP AND OSTEOCALCIN) RESPONSE AT 3 MONTHS PREDICTS POORER BONE MINERAL DENSITY GAIN IN SPINE

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Aims: Teriparatide (PTH 1–34) has emerged as an effective treatment for osteoporosis with its anabolic effect, fracture risk reduction and bone density increment. Although changes in BMD account for only a portion of the fracture risk reduction generated by osteoporosis therapies, BMD measured by DXA offers sufficient precision to therapy response. Unfortunately not all patients response to Teriparatide treatment. We aimed to identify the median bone markers response at 3 months for patients who failed to show at least a 3% gain in lumbar spine BMD (i.e. value equalled or less the least significant change LSC value of 3%) compared to those who did respond.
Methods: There were 98 patients who had completed 18 months of Teriparatide (PTH 1–34) treatment for Osteoporosis from 2004 to 2009. Each patient had DXA measured at baseline and at 18 months. Each patient had bone markers of (P1NP, Osteocalcin, CTX), 25(OH)D3, Serum PTH and calcium level carried out at baseline, 3 months, 12 months and 18 months into therapy. Patients were then divided into responders (>3% LSC BMD Spine) and non responders (≤3% LSC BMD Spine).
Results: Of the 98 patients, 94 were female, four were male. Mean age 67.2±11.3. In total 14 patients (15%) failed to show at least a 3% gain in lumbar spine BMD. The median 3 month P1NP response in the non responder was 16.1 ng/ml which was lower than the P1NP response of 54.9 ng/ml in the responder group. The median 3 months Osteocalcin response in the non responder was 15.6 ng/ml compared to 31.4 ng/ml in the responder group. In the nonresponders group 7 (50%) were on a bisphosphonates while 25 (30%) were on a bisphosphonate in the responders group. There were no statistically significant difference of bone markers at month 12 and 18 months, levels of 25(OH)

D3, corrected calcium, PTH and 24 HR UCA at the other time interval.

Conclusions: This study demonstrated that the 3 months response of both Osteocalcin and P1NP (bone formation markers) were lower in the nonresponder group compared to the responder group. The lower gain might be due to bisphosphonate (although only 50%) were only a bisphosphonate at start of PTH treatment. The lack of early response at 3 months might be an independent risk factor for failure to Teriparatide therapy.

Disclosure of Interest: None Declared

P287
RELATIONSHIP OF DIETARY AND LIFESTYLE FACTORS WITH SERUM VITAMIN D LEVELS AMONG HEALTHY INDIAN GIRLS

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Aims: To assess the impact of dietary and lifestyle variables on bone biochemistry of healthy girls.

Methods: 404 healthy girls aged 6–17 years were randomly selected from Delhi based schools. Subjects underwent detailed lifestyle, dietary and biochemical assessment. Correlation of various dietary and lifestyle components with serum vitamin D [25(OH) D] were conducted.

Results: Mean serum 25(OH)D for the entire cohort was 31.9±15.4 nmol/L. Prevalence of biochemical hypovitaminosis D [serum 25(OH) D <50 nmol/l] was seen in 90·8% of girls whereas only 14·8% had elevated PTH levels (>66 pg/ml). Diets of girls were inadequate in energy, protein, iron and vitamin A as compared to Indian Recommended Dietary Allowance (RDA) matched for their age. Significant negative association of serum 25(OH) D was found with BMI (P=0.001***), dietary protein (P=0.05*) and calcium intake (P=0.003**) whereas lifestyle variables like sun exposure (P=0.001***) and percentage body surface area exposed to sun (P=0.004**) were positively correlated. When subjects were divided into sufficient (>5 μg/d) and insufficient (<5 μg/d) groups depending on dietary vitamin D intakes, the mean intake of sufficient group (5.2±0.48 μg/d) was significantly higher than the insufficient group (2.0±1.37 μg/d, P=0.001). Significant differences in mean serum 25(OH) D and Alkaline phosphatase (ALP) were seen between these two groups (Table 1.)

Table 1: Comparison of Biochemical Parameters of Dietary vitamin D Insufficient and Sufficient group

Serum variables	Insufficient group	Sufficient group	T value
Calcium (mmol/L)	2.27±0.2	2.30±0.1	−1.21
Phosphorous (mmol/L)	1.42±0.2	1.34±0.2	1.78
ALP (IU/l)	408.8±232.5	318.5±140.8**	2.74**
PTH (pg/ml)	33.6±26.2	34.0±16.7	−0.10
25(OH)D (nmol/L)	32.6±17.4	25.3±5.2***	5.06***

Statistically significant difference between means of two groups as tested by Independent sample t-test (two-tailed), P<0.001***, P<0.01**

Conclusions: Dietary vitamin D had no role while greater sun exposure and percentage body surface area exposed had a positive association with serum vitamin D.

Acknowledgements: The study protocol was approved by the institutional ethics committee of the Institute of Nuclear Medicine and Allied Sciences.

Disclosure of Interest: None Declared

P288
GUIDANCE FOR THE ADJUSTMENT OF FRAX® ACCORDING TO THE DOSE OF GLUCOCORTICOIDS

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Aims: The WHO fracture risk assessment (FRAX®) tool estimates 10-year probability of fracture based upon multiple clinical risk factors and an optional femoral neck BMD measurement. Use of glucocorticoids is a dichotomous risk factor (yes/no) and does not therefore take account of the dose of glucocorticoids. The aim was to estimate the adjustment for fracture risk based upon the dose of glucocorticoids.

Methods: Dose responses for fracture risk during exposure to glucocorticoids were taken from the GPRD database and relative risks adjusted to that provided by FRAX®. A dose response for the death hazard was estimated and these variables were used to populate the FRAX® model for the UK.

Results: The exposure to glucocorticoids was found to significantly affect fracture risk. The following rule was formulated. For low dose exposure (<2.5 mg daily of prednisolone or equivalent), hip fracture probabilities computed by FRAX® should be decreased by about 30% depending on age. For the probability of a major fracture, the FRAX® value is decreased by about 20% depending on age. For medium doses (2.5–7.5 mg daily), the unadjusted FRAX® value can be used. For high dose exposure (≥7.5 mg daily of prednisolone or equivalent), hip fracture probabilities computed by FRAX® should be increased by about 20%

depending on age. For the probability of a major fracture, the FRAX® value is increased by about 15% depending on age.

Table: Percentage adjustment of 10-year probabilities of a hip fracture or a major osteoporotic fracture by age according to dose of glucocorticoids.

Dose	Prednisolone equivalent (mg/day)	Age (years)						All ages
		40	50	60	70	80	90	
Hip fracture								
Low	<2.5	−40	−40	−40	−40	−30	−30	−35
Medium[a]	2.5–7.5							
High	≥7.5	+25	+25	+25	+20	+10	+10	+20
Major osteoporotic fracture								
Low	<2.5	−20	−20	−15	−20	−20	−20	−20
Medium[a]	2.5–7.5							
High	≥7.5	+20	+20	+15	+15	+10	+10	+15

[a]No adjustment

Conclusions: A relatively simple adjustment of conventional FRAX® estimates of probabilities of hip fracture and a major osteoporotic fracture can be applied to modulate the risk assessment with knowledge of the dose of glucocorticoids.
Disclosure of Interest: None Declared

P289
LOW VITAMIN D IS RELATED TO INCREASED RISK OF DEATH IN ELDERLY MEN: MROS SWEDEN

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Aims: Conflicting results have been presented regarding the association between serum vitamin D and risk of death. We therefore examined the association between serum 25-OH vitamin D (25-OHD) and the risk of death among elderly community dwelling men recruited to the MrOS Sweden study.

Methods: The study comprised a random, population-based sample of 3,014 men aged 70–80 years. Baseline data included general health and life style questionnaires, femoral neck BMD and 25-OHD. Serum 25-OHD was measured by a competitive RIA (Diasorin, Stillwater, MN). Poisson regression model was used to investigate the association between 25-OHD and the hazard function of death, adjusting for age and time since baseline. A similar approach was used to examine other predictors of mortality and a final multivariate model was constructed to determine independent predictors. A more advanced model Poisson was used to examine the time dependency and non-linearity of 25-OHD.
Results: The mean value of 25-OHD in the cohort was 69.7 nmol/l and 2% had 25-OHD <30 nmol/l. The average follow-up was 6.0 years, during which, 605 men died. The relationship between 25-OHD and the risk of death is dependent on the time since baseline. The prognostic value of 25-OHD for death begins to wane after approximately 3 years since its measurement. The Figure shows the relationship between 25-OHD and mortality at 3 years from baseline derived from the multivariate model. Although the nonlinearity of the model was not significant, there appears to be a threshold value for 25-OHD above which survival is not further improved. If a man at the average value of 25-OHD (60 nmol/l) is compared with a man at 40 nmol/l, the latter man have 40% higher death risk. When comparing the average man with a man at 80 nmol/l, the latter have 6% higher death risk.

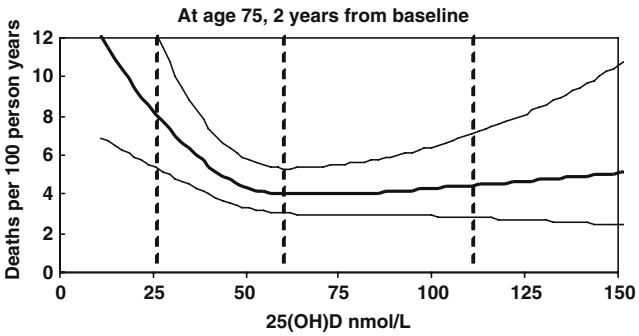

Figure: The hazard function of death (momentary risk) according to 25-OHD for men aged 75 (2 years from baseline), with no history of diabetes and average general health, BMD, outdoor activities and physical activity. The vertical dashed lines in the figure represent the 1st, 50th and the 99th percentiles of 25-OHD.
Conclusions: This study shows that low 25-OHD is associated with excess risk of death when adjusted for comorbidities and when taking the time-effect into consideration. These findings indicate that improved vitamin D nutrition has the potential to improve survival and should be examined in prospective trials.
Disclosure of Interest: None Declared