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Poster Presentations

Clinical abstracts

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P21

Vitamin D Deficiency and Low Bone Mineral Density in Native Chinese Rheumatoid Arthritis Patients

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Background: We aimed to examine the risk factors related to the development of osteoporosis in rheumatoid arthritis (RA) patients and whether there is an association among the changes in bone mineral density (BMD), disease activities (modified DAS28), serum 25-hydroxyvitamin D (25OHD) levels, and disease duration.
Methods: There were 110 patients with RA and 110 age- and sex-matched healthy controls who were concurrently studied. All of the patients underwent the following measurements: erythrocyte sedimentation rate, C-reactive protein, rheumatoid factor, and serum 25OHD. Dual-energy x-ray absorptiometry (DEXA) was also used to measure the BMD of the left femur at the time of recruitment. Patients taking vitamin D supplement or corticosteroids were excluded.
Results: The incidences of osteopenia (45.6% vs 36.4%, *P*=0.170) and osteoporosis (33.6% vs 5.45%, *P*=0.000) were higher in the RA patients than in the healthy controls. There was a significant negative correlation between vitamin D levels and DAS28 (r=–0.325, *P*=0.001) and a significant positive correlation between vitamin D levels and BMD (r=0.422, *P*=0.000). The multiple regression analysis revealed that the 25OHD levels were significantly correlated with the disease activity and the BMD (F=11.087, *P* = 0.000). Stepwise multiple regression analysis showed that the serum 25OHD level was the significant predictor for a low BMD and high disease activity (DAS28) in RA patients. In healthy control group, no significant correlations were found between vitamin D and BMD, and between age and vitamin D (*P*>0.05). However, there was a significant negative correlation between gender and vitamin D (r=0.048, *P*=0.672). The vitamin D levels in female were significantly lower than male.
Conclusion: The incidences of osteoporosis and osteopenia were higher in RA patients compared to the age- and gender-matched healthy controls. Low serum 25OHD levels correlate with low BMD and high disease activity in RA patients.

P22

Relationship of Circulating Matrix Metalloproteinase-2 and Bone Sialoprotein Levels with Postmenopausal Osteoporosis

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Background: It was unknown that the serum matrix metalloproteinase-2 (MMP2) and bone sialoprotein (BSP) levels would be the key to osteoporosis. We would to study the serum matrix metalloproteinase-2 (MMP2) and bone sialoprotein (BSP) levels and the correlations of MMP2 and BSP with bone metabolic markers and bone mineral density (BMD) in aged postmenopausal Chinese women.
Methods: The serum MMP2, BSP, osteoprotegrin (OPG) osteoprotegrin ligand (OPGL) of 120 postmenopausal Chinese female volunteers were measured using ELISA. And the ratios of BSP to MMP2 was calculated. BMD were measured using dual energy X-ray absorptiometry. According to the criteria of WHO, the aged women were divided to 3 groups, such as the normal, the low bone density and the osteoporosis group.
Results: (1) Serum BSP concentrations were significantly higher in postmenopausal women with osteoporosis (56±20) ng/ml in age-matched normal controls (26±11) ng/ml (*P*<0.05). But Serum MMP2 concentrations were higher in postmenopausal women with osteoporosis (153±121) ng/ml than in age-matched normal controls (125±101) ng/ml. (2) Notable negative relations were found between BSP, MMP2, ratio of BSP/MMP2 and BMD of lumber and Ward's triangle, sOPGL (*P*<0.05) as well as positive relations were found between BSP, ratio of BSP/MMP2 and sBSP (*P*<0.05). (3) In osteoporosis women, notable negative correlations between BSP, ratio of BSP/MMP2 and BMD of lumber, femoral neck and Ward's triangle, sOPGL were found (*P*<0.05) as well as positive relations were found between OPN, ratio of BSP/MMP2 and sOPG (*P*<0.05), and the positive relations of MMP2 and the BMD

of Ward's triangle was existed (P<0.05), in low bone density group the negative relations of MMP2 and BMD of lumber and Ward's triangle, as well as ratio of BSP/MMP2 were detected (P<0.05).

Conclusion: There are significant correlations between serum BSP, ratios of BSP and MMP2 and bone metabolism of sOPG, sOPGL and BMD, and BSP and BSP/MMP2 may increase with increases in bone-metabolism. The increases of BSP and ratio of BSP/MMP2 appear possibly as a concomitant event in high bone loss, such as postmenopausal osteoporosis.

P23

The association between SOST gene polymorphisms and bone response to alendronate in Chinese postmenopausal women with osteoporosis

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Background: Sclerostin (SOST) is an important antagonist for Wnt pathway of osteoclast. We investigate the association between SOST gene polymorphisms and bone response to alendronate (ALN) treatment in Chinese postmenopausal women with osteoporosis.

Methods: In this prospective, multicenter study, 632 postmenopausal osteoporotic or osteopenia women (average aged 62.40±6.83 years) were randomly received low-dose (70mg/2w) or standard-dose (70mg/w) of ALN for one year. Six tag single nucleotide polymorphisms (SNP) of SOST and one reported loci of SOST associated with BMD were determined by TaqMan allelic discrimination assay. Bone mineral density (BMD) at lumbar spine 2-4 (L2-4), femoral neck (FN) and total hip (TH) was measured by dual-energy x-ray absorptiometry. Serum β-isomerized carboxy-telopeptide of type I collagen (β-CTX) and total alkaline phosphatase (ALP) levels were assessed by chemiluminescence immunoassay and automatic analyser, respectively. The association was analyzed between polymorphisms and changes in BMD and bone turnover markers levels after ALN treatment.

Results: Serum bone turnover markers levels were significantly decreased (P<0.01) and BMD at all sites was obviously increased (P<0.05) after 12 months of ALN treatment. A total of 545 DNA samples were suitable for genetic analysis. rs1234612 polymorphism was associated with baseline L2-4 BMD and percentage change of L2-4 BMD after 12 months of treatment (P = 0.044 and 0.015, respectively). rs851054 polymorphism was associated with baseline serum ALP levels and L2-4 BMD (P = 0.003 and 0.020, respectively). rs865429 polymorphism was associated with percentage change of FN BMD after 12 months of treatment (P = 0.030). rs1513670 polymorphism was associated with percentage change of serum ALP levels after 3 months of treatment (P = 0.005).

Conclusion: SOST may be an important candidate gene for predicting the effect of ALN on bone turnover biochemical markers levels and BMD, which may provide preliminary evidence for individualized treatment according to genotypes of the patients in future. Further studies in larger sample and other ethnical population is needed to explore the detail molecular mechanism, of which SOST polymorphisms affect the efficacy of bisphosphonates.

P24

A Child-Bone Pain-Physical Inactivity-Repeated Fracture

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Background: Osteoporosis in children is rare and usually secondary to an underlying disease which is difficult to detect. We analyze the diagnosis, differential diagnosis and treatment of severe osteoporosis in a boy, in order to improve the understanding of secondary osteoporosis in children.

Methods: An 8-year-old boy presented with severe bone pain, physical inactivity and repeated fracture at femur. Blood routine test, erythrocyte sedimentation rate (ESR), serum parathyroid hormone, 25OHD and bone turnover biomarkers, IFE were measured. Syphilis antibody was measured. Bone mineral density was detected by dual energy x-ray absorptiometry. Skeletal X ray films and CT scanning were examined. Bone marrow biopsy was completed.

Results: ESR was increased and serum parathyroid hormone level was decreased. The other routine test and serum biochemical examination were all within normal range. X-ray films showed apparent osteoporosis and bone destruction at the long bone and vertebra, as well as multiple vertebral compression fractures. DXA indicated osteoporosis: Neck 0.404g/cm2, Troch 0.250g/cm2, Total 0.389g/cm2. No endocine diseases, genetic bone diseases and autoimmune diseases were found. Bone marrow aspiration indicated that bone marrow hyperplasia was active, lymphocytes system had large number of immature cells, the original and immature lymphocyte accounted for 86.5%. Based on the bone marrow aspiration, a diagnosis of acute lymphoblastic leukemia (ALL) was confirmed.

Conclusion: Severe osteoporosis could be induced by ALL in children, so we should pay more attention on differential diagnosis of osteoporosis, especially in children.

P25

Trabecular Bone Score in Clinical Practice

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Background: Trabecular bone score (TBS) is a parameter of bone microarchitecture that is determined by the level analysis of DXA images. TBS is associated with fractures in the preliminary case-control and prospective studies. The aim of this study was to assess the TBS role in clinical practice.
Methods: We've examined 176 healthy women aged 40-79 years (mean age – 53.4±0.6 yrs) and 117 men aged 40-79 years (mean age – 59.8±0.9 yrs). Bone mineral density (BMD) of whole body, PA lumbar spine and proximal femur were measured by DXA method (Prodigy, GEHC Lunar, Madison, WI, USA) and PA spine TBS were assessed by TBS iNsight® software package installed on the available DXA machine (MedImaps, Pessac, France).
Results: We have observed a significant decrease of TBS as a function of age (F=6.56; *P*=0.0003) whereas PA spine BMD was significantly increasing with age (F=4.04; *P*=0.008) in the examined women. This contradiction can be traced to the spinal osteoarthritis and degenerative diseases progressing with age in the elderly patients. TBS was significantly lower in women with duration of PMP over 4 yrs (*P*=0.003) in comparison with women without menopause; BMD of spine significantly decreased in women with duration of PMP over 7–9 yrs (*P*=0.02). So, the TBS can detect changes in the state of bone tissue at the earlier stage than BMD. We have observed a significant decrease of TBS in men with ageing (F=2.44; *P*=0.05). Overall TBS values in men are lower than the age matched TBS values in women.
Conclusion: TBS is an independent parameter which has a potential diagnostic value of its own, without taking into account the BMD results. The study concerning patients with osteoporosis and fractures is underway.

P26

30 Cases of Secondary Hypophosphatemic Osteomalacia Induced by Adefovir Dipivoxil and The Analysis of The Risk Genotypes of SLC22A6 and ABCC2

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Background: To raise the awareness of secondary hypophosphatemic osteomalacia induced by adefovir dipivoxil through analyzing the clinical characteristics of 30 patients and to explore the risk genotypes concerned with this disease through analyzing SNPs of *SLC22A6* and *ABCC2* genes.
Methods: The clinical data and treatment of 30 patients with secondary hypophosphatemic osteomalacia induced by adefovir dipivoxil were reviewed and summarized. PCR and direct DNA sequencing were performed for *SLC22A6* and *ABCC2* genes to detect the mutations and SNPs.
Results: All patients were infected with chronic hepatitis B, taking adefovir dipivoxil for 2–9(5.6±2.0) years, taking "bone pain and difficulty in activities "as the main clinical manifestations. Laboratory tests showed normal serum calcium, 27 cases of hypophosphatemia (0.21–0.78mmol/L), 19 cases of hypouricemia (59-194umol/L), 13 cases of glycosuria (+ – ++++), 16 cases of proteinuria (+ – ++++), 8 cases of metabolic acidosis (PH: 7.27–7.34, $HCO3^-$: 19.5–20.3 mmol/L, BE: 5.7–2.7 mmol/L), 29 cases of higher ALP (125–567 U/L), 17 cases of lower 25-(0H)D (<4.0–19.06ng/ml), ect. Imaging examinations mainly showed pseudofracture, fracture and osteoporosis. All patients had neither renal diseases history nor family inherited diseases history. According to the long-term oral administration of adefovir dipivoxil, they were diagnosed as secondary hypophosphatemic osteomalacia induced by adefovir dipivoxil. Treatment: withdraw adefovir dipivoxil and to use other antivirals instead, adjust acid-base, calcitriol and calcium. The follow-up showed that their clinical symptoms ameliorated significantly, the bone pain relieved and the biochemical indicators gradually returned to normal. The detection of gene coding region mutations and SNPs of *SLC22A6* and *ABCC2* genes found 5 SNP sites and no mutation sites for *SLC22A6* gene of 14 samples; 19 SNP sites, 10 new-found or extremely low frequency SNP sites and 2 mutation sites for *ABCC2* gene of 21 samples.
Conclusion: Treatment dose of adefovir dipivoxil (10mg/d) could cause secondary hypophosphatemic osteomalacia, mostly appear after long-term oral administration. But clinical manifestations and signs of these patients are not specific which usually result in missed diagnosis and misdiagnosis. Once correctly diagnosed and treated, its prognosis is usually good. The SNPs found by detecting *SLC22A6* and *ABCC2* genes are helpful for analyzing the risk genotypes related to the nephrotoxicity induced by adefovir dipivoxil and have provide evidences for individualized medication.

P27

The Correlation between Serum Osteocalcin and Testosterone in Men Under The Condition of High Bone Turnover in Patients with Hyperthyroidism

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Background: Animal studies suggested that osteocalcin, independent of the hypothalamic-pituitary-gonadal axis, could regulate the synthesis of testosterone in Leydig cells, indicating the presence of bone-gonadal axis. Clinical evidence is limited. This study aims to explore the relationship between serum osteocalcin and sexual hormones in male patients with hyperthyroidism.
Methods: Inclusion criteria: Males with new diagnosed Graves disease with age between 18-60; Exclusion criteria: a. other types of hyperthyroidism such as Hashimotos thyroiditis, thyroid adenoma independent high function and the like; b. patients taking drugs affecting bone metabolism such as bisphosphonates, PTH; c. patients with primary hypogonadism;

d. patients with diseases affecting bone metabolism, such as recent fracture, chronic renal insufficiency, hyperparathyroidism, tumor with bone metastasis, et al. 30 cases were included for data collection, sex hormone, osteocalcin and type I collagen fragments (CTX) were examined by electrochemical luminescence method by Rochecobase601 immune analyzer. SPSS20.0 was used for multiple linear regression analysis.
Results: In male hyperthyroidism before therapy, total testosterone (Introducing covariates albumin 40.93 ± 3.92g/l, no statistically significant effect on total testosterone), osteocalcin, CTX (C-terminal telopeptide of type I collagen degradation products), LH, FSH, age, BMI and duration of disease were (36.99±10.28 nmol/l), (52.08±29.71 ng/ml), (1.54±0.82 ng/ml), (9.43±4.57 IU/L), (8.92±7.27 IU/L), (48.13±16.37 years), (21.81±3.30 kg/m2), (7.15±10.05 years). Testosterone was positively correlated with osteocalcin (r=0.543, *P*=0.02), while age, course of disease, hyperthyroidism, BMI, LH, FSH, CTX had no statistical significance (*P*>0.05).
Conclusion: In male hyperthyroidism patients, testosterone was positively correlated with serum osteocalcin, which supports the idea that serum osteocalcin takes part in the regulation of sex hormone.

P28

Age Effects on The Associations between PTH and Bone Metabolism in Chinese Men and Women

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Background: This study was an attempt to examine the relationship of parathyroid hormone (PTH) concentrations with serum vitamin D level and bone turnover markers level in adults living in Shanghai.
Methods: A total of 17895 healthy adults aged 21y to 96y were recruited as the study population including male 5751 and female 12144 from 2009 to 2013. Concomitant tests of PTH, 25OHD and bone turnover markers (osteocalcin, PINP and βCTX) were identified by direct competitive electroluminescent immunoassay.
Results: Serum PTH concentrations showed a positively skewed distribution in both male and female. PTH levels didn't vary by seasons. All the subjects were divided into three groups by age: young (21–50y), middle-old (50–80y), and older (>80y). In all the subjects whose PTH concentrations were under the quarter level of its distribution in population, young group had the highest 25OHD level (male: 32.2 ng/ml and female: 33.2 ng/ml) in three groups while older group had the lowest 25OHD level (male: 28.2 ng/ml and female: 28.6 ngml) in both men andwomen. PTH showed weak positive correlations with both PINP (male: r=0.020 and female: r=0.042) and βCTX (male: r=0.055 and female: r=0.056). However, the positive correlations became stronger gradually in middle-old (PINP male: r=0.062 and female: r=0.056, βCTX male: r=0.082 and female: r=0.077) and older groups (PINP male: r=0.065 and female: r=0.010, βCTX male: r=0.174 and female: r=0.179).
Conclusion: The elderly with low PTH levels had lower vitamin D status than the youngster. Theassociations between PTH and bone turnover marker (PINP and βCTX) changed with aging.

P29

Relationship between Lipid Metabolism and Bone Mineral Density in Middle and Senior Men

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Background: To explore the relationship between lipid metabolism and bone mineral density (BMD) in middle and senior men.
Methods: 529 middle and senior men were divided into three groups: age stage of 50~59, 60~69, 70~79. BMD of the lumbar (L2-4) and proximal femur (Neck, Troch, Ward's) were measured by dual-energy X-ray. Serum lipid profiles of TG, TC, LDL-ch, HDL-ch, LP (a) were examined. The results were compared among three groups. The relationship between BMD and lipid levels was analyzed with simple linear correlation.
Results: BMD of L2-4, Neck, Troch and Ward's were significantly lower in 60~69 years old group and 70~79 years old group than in 50~59 years old group (*P*<0.05). BMD of L2-4 and Neck were significantly lower in 70~79 years old group than in 60~69 years old group (*P*<0.05). The levels of LDL and LP (a) were higher in 60~69 years old group and 70~79 years old group than in 50~59 years old group (*P*<0.05). The levels of HDL were lower in 60~69 years old group and 70~79 years old group than in 50~59 years old group (*P*<0.05). The levels of LP (a) were higher in 70~79 years old group than in 60~69 years old group (*P*<0.05). BMD were related negatively to LDL and LP (a) in three groups (*P*<0.05).
Conclusion: In middle and senior men, BMD were decreased with growth of age. BMD were related negatively to LDL and LP (a). Regulation of lipid levels is beneficial to prevent osteoporosis.

P30

Serum Bone Turnover Makers In Type 2 Diabetic Osteoporosis Patients

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Background: To measure the bone turnover markers, including serum conversion of procollagen type 1 N-terminal propeptide (PINP), bone formation marker, type I collagen cross-linked carboxy-terminal peptide (ICTP), bone resorption marker, in type 2 diabetic patients.
Methods: 84 type 2 diabetes patients were selected from the Second Division of Endocrinology of the Third Hospital of Hebei Medical University, from June 2013 to December 2013. Bone mineral density (BMD) of all subjects were measured by the dual energy x-ray absorptiometry (DEXA) scan. According to the WHO diagnostic criteria for osteoporosis, 84 T2DM patients were divided into normal bone mass group (DMNB group, N=23), low bone mass group (DMLB group, N=39) and osteoporosis group (DMOP group, N=22). All subjects were fasted overnight for ≥8 h, venous blood samples were

collected. The levels of Serum PINP and ICTP were measured by radioimmunoassay.Statistical analyses were done by SPSS Software (V13.0, SPSS Inc, USA) $P<0.05$ were considered statistically significant.
Results: The average level of PINP was 38.294±18.269 μg/l in 84 type 2 diabetes patients. Among them, the level of PINP in DMNB, DMLB and DMOP groups was 41.325±18.069 μg/l, 39.273±19.397 μg/l and 33.389±16.100 μg/l respectively. There is no significant difference of the concentrations of PINP between the three groups ($P>0.05$). The average level of was 6.838±2.464 μg/l in 84 type 2 diabetes patients. Among them, the level of ICTP in DMNB, DMLB and DMOP groups was 6.344±2.416 μg/l, 6.854±2.694 μg/l, 7.328±2.879 μg/l respectively. There is no significant difference of the concentrations of PINP between the three groups ($P>0.05$).
Conclusion: Type 2 diabetes patients with abnormal bone metabolism, decreased bone formation, increased bone resorption. Bone mineral density in patients with diabetes does not reflect the dynamic changes in bone metabolism *in vivo*.

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Effects of Advanced Glycation End Products and Its Receptor in Type 2 Diabetes Mellitus Related Osteoporosis

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Background: In recent years, many studies have found that the interaction of advanced glycation end products (AGEs) and receptor for advanced glycation end products (RAGE) play an important role in the development of diabetic osteoporosis. Pentosidine is one kind of AGEs, its content is positively correlated related with the number of fluorescence AGEs, and a linear correlation between the plasma pentosidine concentrations and cortical bone pentosidine has been found. Thus, we predict that plasma pentosidine can be marked as the total formation of AGEs. However, the effect of pentosidine and RAGE on type 2 diabetes mellitus related osteoporosis still exist many controversies. The aim of this study is to provide clinical evidence for pentosidine and endogenously secretory receptor of advanced glycation end products (esRAGE) in the evaluation of bone metabolism in type 2 diabetes mellitus related osteoporosis.
Methods: A total of 84 type 2 diabetic inpatients were included in the second department of endocrine of the Third Hospital of Hebei Medical University from Jun. 2013 to Dec. 2013, including 42 male and 42 female. According to the diagnostic standard of osteoporosis recommended by WHO, the subjects were divided into normal bone density group (DMN), diabetic osteopenia group (DMOPN) and diabetic osteoporosis group (DMOP). Clinical parameters, HbA1c, type I precollagen N terminal propeptide (PINP), type I collagen carboxyl peptide (ICTP), pentosidine, esRAGE, bone mineral density (BMD) were detected.
Results: Among the three groups, the results showed that: 1. Pentosidine of each group was positively correlated with esRAGE, Body mass index (BMI) and ICTP ($P<0.05$); esRAGE/pentosidine of each group was negatively correlated with ICTP ($P<0.001$); 2. No significant correlation was found between esRAGE and ICTP; PINP and HbA1c had no obvious correlation with pentosidine, esRAGE and esRAGE/pentosidine; 3. Pentosidine, esRAGE and esRAGE/pentosidine had no obvious correlation with each site of BMD.
Conclusion: AGEs may interfer the process of bone remodeling by enhancing bone absorption, while not shown in the reduction of BMD.Plasma pentosidine levels and esRAGE/pentosidine together with BMD and bone turnovermarkers may be a new choice of bone metabolism evaluation in diabetic related osteoporosis.

P32

Effects of Pentosidine and Endogenously Secretory Receptor of Advanced Glycation End Products in Type 2 Diabetes Mellitus Related Osteoporosis

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Background: Previous studies have found that diabetes induced osteopenia relates to many factors such as osmotic diuresis caused by the high blood sugar and calcium regulating hormone abnormalities. In recent years, many studies found that the interaction of advanced glycation end products (AGEs) and receptor for advanced glycation end products (RAGE) play an important role in the development of diabetic osteoporosis. Pentosidine is the most important kind of AGEs. However, the effect of pentosidine and RAGE on type 2 diabetes mellitus related osteoporosis still exist many controversies. The aim of this study is to provide theory basis for pentosidine and endogenously secretory receptor of advanced glycation end products (esRAGE) in the evaluation of bone metabolism in type 2 diabetes mellitus related osteoporosis.
Methods: A total of 84 type 2 diabetic inpatients were included in the second department of endocrine of the Third Hospital of Hebei Medical University from Jun. 2013 to Dec. 2013, including 42 male and 42 female. According to the diagnostic standard of osteoporosis recommended by WHO, the subjects were divided into normal bone density group (DMN), diabetic osteopenia group (DMOPN) and diabetic osteoporosis group (DMOP). Clinical parameters, HbA1c, type I precollagen N terminal propeptide (PINP), type I collagen carboxyl peptide (ICTP), pentosidine, esRAGE, bone mineral density(BMD) were recorded.
Results: 1. The course of disease in DMOP group was significantly longer than that of DMN and DMOPN groups ($P<0.01$), and the height of DMOP group was significantly lower than that of DMN and DMOPN group ($P<0.01$); 2. There was a significant difference in pentosidine between DMN and DMOPN groups ($P<0.05$), there was no significant differences found in esRAGE and esRAGE/pentosidine ratio among the three

groups; 3. There was no significant difference of ICTP and PINP in DMN, DMOPN and DMOP groups.
Conclusion: AGEs may interfer the process of bone remodeling, which is not shown in the reduction of BMD. Plasma pentosidine levels and esRAGE/pentosidine together with BMD and bone turnover markers may be a new choice of bone metabolism evaluation in diabetic related osteoporosis.

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The Relationship between Serum DKK1 Level and Bone Mineral Density in T2DM Patients

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Background: To evaluate serum Dkk1 level in T2DM patients and to analyze its relationship with BMD and related clinical factors.
Methods: A total of 105 T2DM inpatients was included in the department of endocrinology of the Third Hospital of Hebei Medical University from June 2013 to December 2013. All subjects were measured BMD at L2-L4 lumbar vertebrae, both femurs (neck, great trochanter, intertrochanter) by DEXA. According to the diagnostic criteria (DEXA) of the WHO, all subjects were divided into normal group, osteopenia group and osteoporosis group. The gender, age, height, weight, duration, body mass index and other related information of patients were recorded, and fasting blood glucose (FBG), glycosylated hemoglobin (HbAlc) and other biochemical indicators, including serum Dkk1 levels were measured by ELISA. All data were analyzed using SPSS 13.0.
Results: Dkk1 levels were statistically significant between three groups ($p<0.05$). DKK1 levels were correlatied with age, gender, course, glycosylated hemoglobin, BMD in three groups. In normal BMD group: DKK1 level was positively correlated with course, glycosylated hemoglobin. In osteopenia group: DKK1 level was positively related with age, HbAlc. In osteoporosis group: DKK1 level was correlated with age, course, and HbAlc.
Conclusion: The BMD of T2DM patients was influenced by age and sex, had no significant correlation with BMI, course and HbAlc. In T2DM patients, DKK1 level was influenced by age, course, HbAlc and BMD.

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The Relationship between Serum Sclerostin Level and Bone Mineral Density in T2DM Patients

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Background: To evaluate serum Sclerostin level in T2DM patients and to analyze its relationship with BMD and related clinical factors.
Methods: A total of 105 T2DM inpatients were included in the department of endocrinology of the Third Hospital of Hebei Medical University from June 2013 to December 2013. All subjects were measured BMD at L2-L4 lumbar vertebrae, both femurs (neck, great trochanter, intertrochanter) by DEXA. According to the diagnostic criteria (DEXA) of the WHO, all subjects were divided into normal group, osteopenia group and osteoporosis group. The gender, age, height, weight, duration, body mass index and other related information of patients were recorded, and fasting blood glucose (FBG), glycosylated hemoglobin (HbAlc) and other biochemical indicators, including serum Sclerostin levels were measured by ELISA. All data were analyzed using SPSS 13.0.
Results: Sclerostin levels were statistically significant between three groups ($p<0.05$). Sclerostin level was correlated with age, gender, course, HbAlc and BMD in three groups. Sclerostin level was positively correlated with course, HbAlc in normal BMD and osteopenia group, while in osteoporosis group,Sclerostin level was only positively related with HbAlc.
Conclusion: Sclerostin level was influenced by age, course and HbAlc in T2DM patients.

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Correlation of Esrage with Bone Strength, Bone Mineral Density and Bone Metabolism in Postmenopausal Women with Type 2 Diabetes

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Background: To investigate whether the serum endogenous secretory receptor for advanced glycation end products (esRAGE) was correlated with bone strength, bone mineral density and bone metabolism in postmenopausal women with type 2 diabetes (T2DM).
Methods: Thirty-four postmenopausal women with T2DM were enrolled in this study. The serum esRAGE was measure with enzyme linked immunosorbent assay (ELISA). Bone strength was determined by the parameters including cross-sectional area (CSA), cross-sectional moment of inertia (CSMI), cort thick (CT) of femoral neck(FN), inter-tuberosity(IT), femoral shaftwere(FS) with HOLOGIC Discovery dual-energy X-ray absorptiometry (DXA). Bone mineral density (BMD) were mesasured by HOLOGIC Discovery dual-energy X-ray absorptiometry (DXA). Bone metabolism parameters including serum parathyroid hormone (PTH), 25 hydroxy-vitamin D_3 (VD), bone gla protein (BGP), type I N-terminal propeptide (PINP) and beta-isomerized C-telopeptide (b-CTx) were measured with chemiluminescence. Blood calcium (Ca), blood phosphorus (P), serum alkaline phosphatase (ALP), fasting blood glucose (FBG), lipid file, and the parameters of hepatic and kidney function were elevated. Glycosylated hemoglobin (HbA1c) was detected with high performance liquid chromatography spectrum.

Results: The serum esRAGE levels were negatively correlated with the parameters of bone strength as following, CSA-FN: r=–0.369, *P*=0.032; CSMI-FN: r=–0.198, *P*=0.261; CT-FN: r=–0.342, *P*=0.048; CSA-IT: r=–0.374, *P*=0.029; CSMI-IT: r=–0.341, *P*=0.048; CT-IT: r=–0.375, *P*=0.029; CSA-FS: r=–0.330, *P*=0.057; CSMI-FS: r=–0.188, *P*=0.287; CT-FS: r=–0.272, *P*=0.120. However, the serum esRAGE levels showed no significant difference among the different BMD groups. And also the serum esRAGE levels were not correlated with VD_3, BGP, PINP and b-CTx.
Conclusion: The serum esRAGE in postmenopausal women with T2DM was negatively correlated with bone strength, while not correlated with bone metabolism and bone mineral density.

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Association of LRP5 Gene Polymorphism with Type 2 Diabetes Mellitus and Osteoporosis in Postmenopausal Women

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Background: This study was to explore the association of low-density lipoprotein receptor related protein 5 (LRP5) gene polymorphism with bone mineral density (BMD), bone turnover markers and glycometabolism in postmenopausal women with type 2 diabetes mellitus (T2DM) and/or osteoporosis (OP) in Shanghai.
Methods: 354 unrelated Han Chinese post-menopausal women were recruited from Shanghai and divided into 4 groups: OP group (n=90), T2DM group (n=96), T2DM + OP group (n=90) and control group (n=78). The LRP5 genotypes were determined by DNA se-quencing. The BMD was measured by dual-energy X-ray absorptiometry. The bone transformation indicators and glycometabolism index (HbA1c and Fasting insulin) were also detected. The association of LRP5 polymorphism with BMD, bone turnover markers and glycometabolism was evaluated.
Results: In OP group, the BMD of L2-4 was higher in patients with rs3736228 CC genotype than those with CT/TT genotypes (*P*<0.05). After adjustment for age, body mass index (BMI) and years of menopause, rs3736228 polymorphism was still associated with BMD of L2-4 (*P*<0.01). In the control group, HbA1c was significantly higher in patients with rs3736228 CC genotype than those with CT/TT genotypes (*P*<0.05), but no significant difference was found after adjustment for BMI, age and years of menopause (*P*>0.05).
Conclusion: LRP5 gene is an impressionable gene in postmenopausal women with OP in Shanghai. T2DM patients have a high BMD when compared with controls, which may be related to BMI and fasting insulin (FINS). LRP5 genotype is not an impressionable gene in postmenopausal women with T2DM in Shanghai.

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Correlated Risk Factors Analysis of Osteoporosis in 125 Male Patients with Type 2 Diabetes Mellitus

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Background: To investigate the correlated risk factors of osteoporosis and osteopenia in 125 male patients with type 2 diabetes mellitus.
Methods: The 125 male patiants with T2DM was devided to osteoporosis group and non-osteoporosis group accorrding to BMD values. Compare the following risk factors of two groups: diabetes mellitus, age, body mass index (BMI), liver and renal function and analyze the correlation between the above risk factors with BMD in T2DM complicated by osteoporosis.
Results: The preverlence in male patients with type 2 diabetes mellitus is 57.6%, duration of diabetes, age, BMI, TBIL, ALT and BUN are significantly diffrent between the two groups. T2DM with BMD and age, disease duration and BUN was negatively correlated with BMI was positively correlated.
Conclusion: Patients with type 2 diabetes mellitus should keep approriate BMI to reduce the onset of osteoporosis.

P38

The Efficacy and Safety of Risedronate 35 mg Once a Week to Treat Chinese Postmenopausal Osteoporosis or Osteopenia: 1-Year Data

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Background: Oral risedronate is effective in the treatment of postmenopausal osteoporosis when administered daily, weekly, or monthly. This 1-year, randomized, double-blind, multicenter study assessed the efficacy and safety of a single, 35-mg weekly risedronate oral dose compared with the 5-mg daily regimen in Chinese postmenopausal women with osteoporosis or osteopenia.
Methods: Postmenopausal women with primary osteoporosis were randomly assigned to receive either 35 mg risedronate once a week (n=145) or 5 mg daily (n=145) for 1 year. The patients' bone mineral densities (BMDs), bone turnover

markers, new vertebral fractures, and adverse events (AEs) were evaluated. The primary efficacy endpoint was the mean percent change from baseline in the lumbar spine BMD after 1 year.
Results: In total, 145 subjects in the weekly group and 144 subjects in the daily group completed the study. After 12 months, the mean percent changes in the lumbar spine BMD at 12 months (95% CI) were 4.87% (3.92 to 5.81%) for the 35-mg weekly group and 4.35% (3.31 to 5.39%) for the 5-mg daily group. This study demonstrates that the effects of the weekly 35-mg and the daily 5-mg risedronate dosing regimens similarly improved the BMDs and the biochemical markers of bone turnover during 1 year of follow-up. Moreover, safety and tolerability were similar for the two dosing regimens.
Conclusion: Based on prespecified statistical criteria, weekly 35-mg dosing demonstrated efficacy and tolerability levels that were similar to those of daily dosing, providing an alternative for Chinese postmenopausal women with osteoporosis who prefer once-a-week oral dosing.

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Impacts of Supplementation with Omega-3 Fish Oil on Bone Mineral Density: A Two-Year Randomized Controlled Trail (RCT)

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Background: To determine the effects of treatment with an anti-inflammatory dose of fish oil on bone mineral density (BMD).
Methods: In a multicenter, double-blind RCT (ACTRN 12607000415404), 202 Australian participants with knee osteoarthritis aged ≥40 years (median age (range), 61 (41-87) years; 49% female) received either low-dose fish oil (providing eicosapentaenoic acid (EPA)+docosahexaenoic acid (DHA) 0.45g/day) or high-dose fish oil, providing EPA+DHA 4.5g/day) for two years. BMD was assessed using Hologic/Lunar DXA. The results (g/cm^2) were converted to the standardized BMD (mg/cm^2) using the published equations. Both the intention-to-treat analysis by multiple imputation technique and complete case analysis were carried out using linear regression models.
Results: at baseline (mean±SD) for low- or high- dose group was 1198±198 and 1157±169 mg/cm^2 respectively for lumbar spine and 1035±165 and 1017±174 mg/cm^2 respectively for femoral neck. There were no differences in BMD at two years between the two groups in the complete case regression analyses adjusting for BMD at baseline (mean (95% CI): lumbar spine 3.7 (–7.9, 15.3) mg/cm^2; femoral neck –5.5 (–14.9, 3.9) mg/cm^2). The findings did not change with additional adjustments of age, gender, study centre and uses of bone-related drugs during the study period as well as using the intention-to-treat analysis or limiting to older participants (≥55 years at the baseline) (all $P \geq 0.25$). Among all participants, a small decrease was observed at two years in BMD of femoral neck [mean (95% CI): –0.8% (–0.3%, –1.2%)] but not lumbar spine [0.3% (–0.2%, 0.8%)]. Mild adverse events such as headache and gastrointestinal intolerance were common but did not occur more frequently in either group. There were no serious adverse events related to either intervention.
Conclusion: A two-year supplementation with high-dose omega-3 fish oil compared with low-dose did not provide extra benefits to BMD among adult men and women.

P40

The Effectiveness of Two Different Combined Osteoporosis Drug Therapy Against Bone Mineral Density Loss around Femoral Implants after Total Hip Arthroplasty

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Background: To investigate the effectiveness of combined therapy using calcitonin and alfacalcidol or using alendronate and alfacalcidol for the bone mineral density (BMD) preservation around femoral implants after primary THA.
Methods: 120 patients were classified into A (Calcitonin and alfacalcidol, n = 40), B (alendronate and alfacalcidol, n = 40) or C(non-medication, n =40) groups. The periprosthetic BMD and profile of the biochemical markers such as bone-specific alkaline phosphatase and serum N-terminal telopeptides of type-1 collagen (NTX) were measured at 1, 12, 24 and 48 weeks after surgery. All subjects were fasted overnight for ≥8 h. The bone-specific alkaline phosphatase and the NTX were measured by radioimmunoassay. All data was done by SPSS Software (V13.0, SPSS Inc).
Results: The BMD values in the region of the calcar of A and B patients were maintained and were significantly higher than those of C patients at each measurement period. The plasma levels of NTX in the groups A and B were found to be significantly lower than those in the group C, Meanwhile, the groups B had a better results at each measurement period.
Conclusion: The two combined-therapy regimens significantly prevent periprosthetic BMD loss around femoral implants, most notably in the calcar, compared to no medication. The combined therapy using alendronate and alfacalcidol could get a better Curative effect.

P41

Combination of Denosumab, Teriparatide and Zoledronic Acid to Reduce Pain in Postmenopausal Osteoporosis Fractures Failing Previously Successful Therapy with 18 Months Teriparatide Injection

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Background: Osteoporosis and its consequences have become a major health problem in elderly, especially women that have undergone menopause. The dramatic impact of

declining estrogen level leads to complex mechanism resulting in diminishing of bone microarchitecture. Estimated to affect 200 million women worldwide, osteoporosis and its risk of fractures contribute to a huge economic burden. Though numerous pharmacological treatment are available, such as antiresorptive agents (bisphosphonates, selective estrogen receptor modulator, hormone therapy, calcitonin, receptor activator for nuclear factor-kB [RANK] ligand inhibitor) and a bone-forming agent (teriparatide), choosing regimen of therapy remains challenging as we need to consider patients' clinical condition, history of illness and patients' preference.
Methods: we report our personal experience using combination of agents to alleviate osteoporotic spinal pain in an 83 year-old woman with multiple vertebral compression fractures.
Results: With long history of rheumatoid arthritis and chronic use of glucocorticoid, her severe osteoporotic lumbar pain was worsened by severe juvenile scoliosis. We gave her 18 months teriparatide injections to diminish her spinal pain, that could not be obtained by weekly risedronate 35 mg and intravenous ibandronate 3 mg. Apparently, increase in her bone density did not correlate with spinal pain improvement. The second time she had strikingly painful spinal pain, cyclic teriparatide injection alone failed to counter her pain, so we administered combination of 5 mg zoledronic acid infusion, 20 mcg daily teriparatide injections and 60 mg denosumab injection.
Conclusion: This combination succeeded in reducing pain to its minimal scale. It has been a year since her last injection and she felt minimal pain, experienced no adverse events and had overall good BMD T-score.

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A Controlled Clinical Trial on Three Methods for The Treatment of Patellar Osteoporotic Fracture of Asian Old and Middle Aged Woman

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Background: To investigate therapeutic effects and indications of three different methods for the treatment of patella fractures secondary to Osteoporosis in Asian old and middle aged woman, in order to provide evidences for the standard treatment of this type of fractures.
Methods: A total of 38 female patients (ranging in age from 55 to 75 years) patients admitted from March, 2007 to April, 2013 with indications that patella fracture accompanied with a low bone mass which showed by BMD (bone mineral density) test through Dual-energy X-ray absorptiometry (DXA) and T-score before the operation were randomly divided into modified tension band group(A group), titanium cable group (B group), patella claw device (C group) with 10 cases in each group and the average age is 59.5.
Results: All the patients were followed-up, there were no significant differences in age and classification of fractures. The duration of follow-up ranged from 8 months to 6 years, with an average of 30 months. According to WOMAC index (the western Ontario and Macmaster) which measured from following aspects: pain, stiffness, function of joint, in Group A, 9 patients got excellent results, 1 good, 1 fair good rate was 99.99%; in Group B, above data were 8, 2, 4 and 71.42%; while in Group C, the data were 6, 3, 4 and 69.23% respectively. The statistical analysis demonstrated that the difference of therapeutic effects between Group A and Group B was significant (P<0.05) and that the difference between Group A and Group C w as also significant (P<0.05), but the difference between Group B and Group C was not significant (P>0.05).
Conclusion: Comparing with other groups, the modified tension band group has a significant advantage in treatment of patella fractures secondary to Osteoporosis in Asians, especially the older and middle aged women in southern China, which may provide a reference for orthopaedist to cure this type of fracture.

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Association between BMP 7 Gene Polymorphism and Osteoporotic Fracture in Postmenopausal Chinese Women

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Background: To identify the associations of 8 single-nucleotide polymorphisms (SNPs) in *bone morphogenetic protein 7* (BMP 7) with bone mineral density (BMD) and osteoporotic fracture in postmenopausal Chinese women.
Methods: 3828 unrelated postmenopausal Han Chinese women in Shanghai area including 1251 with osteoporotic fractures (at least once identified nontraumatic fracture history or the presence of fracture in X-ray at hip, spine or wrist) and 2577 without were included in the present study. BMD of lumbar spine (L1-4), femoral neck and total hip were detected by Dual-energy X-ray absorptiometry (DXA) and the occurrence sites of osteoporotic fractures were identified by X-ray imaging. 8 SNPs of *BMP 7* were genotyped and their associations with BMD and osteoporotic fracture were analyzed.
Results: The patients with osteoporotic fractures showed much lower BMD than that of those without fractures [(0.914±0.17) versus (0.845±0.17) g/cm^2 at L1-4, [(0.738±0.12) versus (0.668±0.11) g/cm^2 at femoral neck and [(0.800±0.14) versus (0.710±0.13) g/cm^2 at total hip, all P<0.01]. However, there was no significant correlation found between *BMP 7* gene polymorphism and BMD of L1-4, femoral neck or total hip. The C/T genotype of rs6025447 [OR, 0.72; 95% CI, (0.54–0.96); P=0.025] and G/A genotype of rs230205 [OR, 0.74; 95% CI, (0.56–0.99); P=0.0143] were found to be associated with distal radius fracture. The haplotype AC of rs128168–rs6025447 [OR, 2.17; 95%CI, (1.23–3.82); P=0.007] was associated with osteoporotic fracture in hip and GT haplotype of rs128168–rs6025447 [OR, 0.54; 95%CI, (0.34–0.86); p = 0.009] was associated with thoracic vertebra fracture.
Conclusion: Our study provides the negative results of the associations between 8 SNPs of *BMP 7* with lumbar spine, femoral neck and total hip BMD in a large sample of postmenopausal Han Chinese women. The findings of this study showed the significant associations between osteoporotic fracture and SNPs in *BMP 7*. Our results suggest that the C/T

genotype of rs6025447, G/A genotype of rs230205 and GT haplotype of rs128168-rs6025447 were protective variants of *BMP 7* for distal radius and thoracic vertebra fractures, and haplotype AC of rs128168-rs6025447 was risk factor for hip fracture.

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Gender Differences in Cortical Thickness of The Femoral Neck in Elderly Chinese Population with Hip Fractures

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Background: Bone mineral density and structure analysis by quantitative computed tomography (QCT) have been utilized in clinical research studies to evaluate hip fracture risk. However, there is relatively little information about the distribution of cortical bone of the proximal femoral which is the key to resist fracture, especially about the Chinese elderly people. So, we used bone investigational tookit (BIT) of QCT to investigate the femoral neck structure of elderly population with atraumatic hip fractures.
Methods: QCT scans were performed in the hip for one hundred and thirty-nine females over 55 years old and sixty males over 60 years old with atraumatic hip fractures, and we used BIT software which directed automatic the lowest area the mid-femoral neck cross-section perpendicular to the femoral neck axis to measure cortical thickness (C.Th) in anatomic quadrants of the femoral neck.
Results: For elder females, the estimated C.Th in superoanterior (SA) quadrants, inferoanterior (IA) quadrants, inferoposterior (IP) quadrants and superoposterior (SP) quadrants were (0.90±0.61) mm, (2.20±0.83) mm, (3.70±0.96) mm and (0.85±0.54) mm respectively, for elder males the corresponding parameters being (1.33±0.71) mm, (2.22±0.90) mm, (3.72±0.79) mm and (1.20±0.79) mm. The females had significantly thinner mean CTh in SP and SA quadrants than the parameters of the males; however, there was no difference in IA and IP quadrants between genders. Comparing age-related decrease changes of CTh in anatomic quadrants for females, there were no age-related changes for males.
Conclusion: When comparing men and women in our study, there is no difference in C.Th in infero quadrants. Women have thinner CTh in supero quadrants. Thinner cortical thickness in the superior region of the femoral neck may be a stronger predictor for hip fracture, implying the mechanism causing a higher fracture incidence in women.

P45

Percutaneous Kyphoplasty for Severely Osteoporotic Vertebral Compression Fractures

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Background: Percutaneous vertebroplasty (PVP) or Kyphoplasty (PKP) has been progressively developed and adopted to treat osteoporotic vertebral compression fractures using conventional PMMA bone cements have been effectively with good short- and medium-term results. However, greater than 80 percent collapse of the vertebral body were contraindications or relative ontraindications for PVP or PKP, and the efficacy of conservative management is lower. To study the feasibility and efficacy of PKP in treating greater than 80 percent collapse of the osteoporotic vertebral body compression fractures in older patients with more than two weeks in spine causing moderate to severe pain and unresponsive to conservative therapy.
Methods: Forty-three cases who suffered from the fracture that induces maximum compression of vertebral column by more than 2/3 to 4/5 of its original height were retrospectively reviewed. Fifty-one percutancous kyphoplasty were performed under “C” armed fluroscopy image guiding. The clinical effects were evaluated by observing the charges of visual analog scale, locomotor activity scale,height of vertebral bodies and the Cobb’s angle.
Results: All cases were treated successfully. Visual analog scale was decreased from 6.515±0.87 preoperatively to 2.364±0.0.74 postoperatively (P<0.05). Locomotor activity scale was improved from 3.30±0.59 preoperatively to 1.030±0.17 postoperatively (P<0.05). The height of veterbral body was increased from 0.642±0.24 cmpreoperatively to 1.676±0.49 cm (P<0.05). The Cobb’s angle was improved from 32.382±11.67 preoperatively to 22.794±9.73 postoperatively (P<0.05). Pain relief and activity improvement were remarkable.
Conclusion: Percutaneous kyphoplasty for severely osteoporotic vertebral compression fractures which are usually considered as contraindications, it is safe and effective for severe osteoporotic vertebral body compression fractures.

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***In Vitro* Study on Prevention of Bone Cement Leakage with Gelatin Sponge Pre-Injection during Percutaneous Vertebroplasty Operation**

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Background: In percutaneous vertebroplasty, bone cement leakage is the overriding complication. There are many reasons influence bone cement leakage. Such as bone cement viscosity, bone cement injection speed and the size of vertebral crevice. To evaluate the bone cement leakage with gelatin sponge pre-injection during percutaneous vertebroplasty (PVP) operation, with exsomatize vertebral bodyies as experimental subjects.
Methods: Experimental design using old cadaver vertebral leakage model. We selected thoracolumbar samples from elderly female corpse to make compression fractures model, randomized low viscosity born cement group (Group A) and gelatin sponge pre-injection+ low viscosity group (Group B), then measured the born cement dynamic viscosity at 19℃, imitated PVP operation method on the isolated specimens at four time points of 3, 6, 9, 12 min after the bone cement reconciliation, separately injected 5ml born cement at a slow constant speed, respectively measured the born cement leakage rate and leakage quantity of each group.

Results: low viscosity born cement's viscosity will increase with the time, while adding gelatin sponge have a great impact on the viscosity, at the same time point after 5 minutes, the viscosity of born cement viscosity in group B is higher than group A, with statistical significance different (P<0.05). The time point of 9min after cement mixing is appropriate, the leakage quantity of group B is significantly less than group A (P<0.05).
Conclusion: the traditional method of combining low viscosity of born cement with gelatin sponge pre-injection can obviously decrease percolation rate and percolation quantity of the bone cement, it is more economical, easy to operate, having a good prospect of clinical promotion.

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A Comparative Research on The Differences of T-Scores Between Hip and Lumbar in 1150 Perimenopausal Period and Senile Women

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Background: To analyse the difference and change rule in T-scores of hip's and lumbar's bone mineral density with ageing in 1150 perimenopausal period and senile women in south of Jiangsu Province, and provide help for clinical application.
Methods: Using dual energy X-ray absorptiometry, the hip (neck of femur) and lumbar (L1-L4) bone mineral were measured in 1150 perimenopausal period and senilewomen aged from 45-75 years. With each year-old grouping statistics, the average of T-scores between hip and lumbarare standardized by statistics to analyze the correlation and the differentiation.
Results: (1) The T-scores of the neck of femur and lumbar bone mineral density are basically the same as normal before 53 years old. (2) Significant differences appear between 54 and 72 years old women in neck of femur and lumbar bone T-scores, that is the lumbar's T-scores are lower than the neck of femur's. In some of these groups, T-scores of lumbar can be diagnosed as decreased bone mass while the neck of femur's T-scores can be diagnosed as normal.Howeverin other groups, lumbar can be diagnosed as osteoporosis but the neck of femur just can be diagnosed as decreased bone mass by T-scores. (3) After 72 years old (like 73 to 74 years old), the curves of the change and the T-scores value of neck of femur and lumbar bonedensity are basically the same which already exist osteoporosis.
Conclusion: In the actual diagnosis of osteoporosis in perimenopausal period and senile women in south of Jiangsu Province, the lumbar's T-scoresare in fact lower than the neck of femur's T-scores. Not only the neck of femur is normal while Lumbar may already become thedecreased bone mass, but also the neck of femur become decreased bone mass but Lumbar may already exist osteoporosis.

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The Analysis of Chosen Testing Skeletal Site of DEXA and Comparison of Differences between Hip and Lumbar Bone T-Score in 3662 Local People

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Background: To explore the inconsistency of tested parts being chosen in clinic diagnosis, and the changes and regulations in T-scores of hip and lumbar tested by DXA in different aged people by retrospective analyses of the local physical examined people in Suzhou.
Methods: Using dual energy X-ray absorptiometry, the neck of femur and lumbar (L1-L4) bone mineral density was measured in 3662 men and women over 45 years old. There were 9 female and 9 male groups based upon the stratifications of gender and 5-year age intervals. The T-score averages were calculated and their differences analyzed by t-test.
Results: 1. 35.8% women and 39.5% men chose only single part to test by DXA, and in different gender according to age group, the maximum single part testing rate appeared at age of 66~70 years old. 2. In female, T-scores of the neck of femur and lumbar bone mineral density were basically the same before 50 years old; There were significant differences between 51 and 75 years old women; the lumbar's T-scores were lower than the neck of femur's. In some of these age groups, T-scores of lumbar could be diagnosed as decreased bone mass while the neck of femur was normal; In other groups,T-scores of lumbar could be diagnosed as osteoporosis but the neck of femur just was diagnosed as decreased bone mass; After 75 years there were not obvious differences between hip and lumbar bone's T-Scores. 3. In male, the neck of femur's T-scores were lower than the lumbar's in every age group; Sometimes, T-scores of neck of femur showed decreased bone mass while the lumbar was normal. 4. Osteoporosis incidences were increasing with age in both men and women. 5. In each group, women's osteoporosis incidences were much higher than men with the same age group.
Conclusion: The situation of chosen testing part of DXA is serious in suzhou region; There are different trend and change between hip's and lumbar's Tscores with age and gender in those joint test group. Thus some normal T-scores of one skeletal site may be abnormal at another site. While evaluating one particular site, one should consider these differences to avoid an incorrect diagnosis.

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Subclinical Hypovitaminosis D And Osteoporosis In Breast Cancer Patients

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Background: This study was designed to detect the incidence of osteoporosis and circulating concentration of 25-hydroxy

vitamin D level in breast cancer patients as well as their relation to the treatment received and to stage of breast cancer.
Methods: Seventy-four female patients with breast cancer were included in the study; their mean age was 47.89±9.59 years. Another fifty-two age and sex matched subjects were included as control. All patients were receiving chemotherapy, 40 received hormonal therapy, 50 radiotherapy and 10 surgically removed. Vitamin D level and dual energy x-ray absorptiometry (DXA) were performed for patients and control.
Results: Vitamin D level was significantly higher in the control (23.66±5.2 IU/L) than in patients (18.37±6.25 IU/L) (P<0.0001). There was a tendency to a normal DXA score in the forearm of the patients while the score of the hip and spine was significantly different from that of the control (P=0.001 and P=0.034 respectively). In patients, there were significant correlations between 25(OH)D3 and hip DXA (r= 0.25, P=0.03), and significant negative correlations between tumor grades and DXA of hip, forearm and spine (r=–0.42, r=–0.39, r=–0.45 respectively; P<0.0001).
Conclusion: Our finding support low serum vitamin D concentration in breast cancer patients. In addition, their BMD of the hip is obviously reduced. The sub-clinically detected hypovitaminosis D and osteoporosis throw light on the importance of offering calcium and vitamin D supplements to breast cancer patients. It is further recommended that breast cancer patients have a DXA scan performed at baseline and repeatedly on a yearly basis.

P50

Elevated MAP Is Associated with Increased Subchondral Bone Microstructural Damage in Patients with Knee Osteoarthritis

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Background: To determine the association between mean arterial pressure (MAP), reflection of hypertension, and subchondral bone microstructural damage in patients with knee osteoarthritis.
Methods: Ninety-seven consecutive osteoarthritic patients undergoing total knee arthroplasty (TKA) were divided into two groups according to MAP level: normal (n=46) and elevated (n=51). Tibial plateaus removed during TKA were evaluated using micro-computed tomography, histology and immunohistochemistry. Patients' clinical data were analyzed.
Results: Patients showed 17.8% lower bone volume fraction (BV/TV), 17.5% lower trabecular number (Tb.N) and 34.8% higher structure model index in medial subchondral bone in normal vs. elevated MAP groups (P<0.05). Opposite results were found for lateral side. The association between MAP and BV/TV and Tb.N persisted after adjusting by potential confounders. Histology showed higher OARSI scores on medial (P=0.081) and lateral (P<0.05) sides in elevated MAP group. Moreover, 18.3% lower ratio of bone area/total area on medial side and 23.7% higher of the ratio on lateral side were detected in elevated MAP groups (P<0.05). Larger numbers of TRAP$^+$ cells were detected in medial subchondral bone in elevated MAP group (P<0.05). Immunohistochemistry revealed higher numbers of pSmad2/3$^+$ cells in elevated MAP group (P<0.05). Lower numbers of anti-Osterix$^+$ osteoprogenitors and anti-Osteocalcin$^+$ osteoblasts were detected in medial subchondral bone in elevated vs. normal MAP groups (P<0.05).
Conclusion: Elevated MAP was associated with more severe subchondral bone microstructural damage in patients with knee osteoarthritis. Moreover, transforming growth factor beta signaling may be involved in this process. These findings provide a mechanism by which hypertension may affect osteoarthritis progression.

P51

The Value of Routine Biopsy during Percutaneous Kyphoplasty for Vertebral Compression Fractures

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Background: To evaluate the feasibility of routine bone biopsy during percutaneous kyphoplasty (PKP) for vertebral compression fractures (VCF).
Methods: A retrospectively maintained database of 93 patients undergoing PKP without biopsy (September 2007–November 2010) was interrogated to determine the baseline incidence of adverse events (control group). Following the introduction of routine biopsy (biopsy group, 103 patients, November 2010–September 2013), clinical and radiologic outcomes were prospectively evaluated. The rate of unsuspected lesions was reported, and the surgical duration, cement leakage rate and pain control were compared between the two groups.
Results: No statistically significant differences were found between the two groups, regarding the surgical duration, cement leakage rate and pain control. Four unsuspected lesions were found in the biopsy group, three of which were malignancies with a 2.9% (3/103) unsuspected malignancy rate. The economic analysis showed that routine biopsy was cost-effective in finding new malignancies comparing with a routine cancer screening campaign.
Conclusion: Routine biopsy during PKP was safe and cost-effective in finding unsuspected malignancies. We advocate routine biopsy in every operated vertebral level during PKP for VCF patients.

P52

Neurological Recovery in Teriparatide Treatment for Preventing Sencondary Fracture of Osteoporotic Fracture Patients with Neurological Deficits but Contraindicated for Surgical Intervention

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Background: Osteoporotic vertebral fracture (OVF) is a significant risk of secondary fracture, among which 5.3% were combined with neurological deficits. Surgical intervention is

highly recommended for OVCF with neurological deficits, but when patients have severe bone fragility or comorbid medical problem, they are not suitable for surgical intervention. This study aimed at evaluating the effect of neurological recovery related with teriparatide in preventing secondary fracture of OVCF patients with neurological deficits.
Methods: A total of 59 patients with OVF (T1-L1) and neurological deficits but contraindicated for surgical intervention were included in the study. Among them, 32 patients received teriparatide 20μg/day, and 27 patients received alendronate 10 mg/day, more than 6 months. Visits were scheduled for assessment of efficacy variables at 2 weeks, 1, 2, 3, 6, 12 months after administration, including serum markers of bone resorption (ß-C-telopeptide of type I collagen [ß-CTX]) and bone formation (N-terminal propeptide of type I collagen [PINP]), kyphosis angle of fractured vertebra, any incident vertebral fracture, and fracture line status through X-ray plain; spine bone mineral density (BMD) by Dual energy X-ray absorptiometry (DEXA); neurological function status by JOA score; pain perception by VAS. Computed tomography (CT) scans were repeated until radiographic evidence of cortical bridging at the fracture site was confirmed.
Results: Both treatments had positive effect on pain relief, fracture healing, bone turner and secondary fracture risk reduction, but teriparatide was more pronounced than alendronate. JOA scores increased markedly from baseline to 2 months in teriparatide group, followed by a gradual increase after 2 months. Little subsequent change of JOA scores was observed in the alendronate group throughout follow up.
Conclusion: Through teriparatide treatment for preventing secondary fracture of OVF patients with neurological deficits, patients achieved neurological recovery besides secondary fracture risk reduction and pain relief.

P53

Rash - Bone Pain - Multiple Vertebral Compression Fractures

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Background: Osteoporosis is the common and severe side effects of glucocorticoid hormone. We analyzed a rare patient with serious osteoporosis who was misdiagnosed as autoimmune polyendocrine syndrome and treated by long term of glucocorticoid hormone and L-thyroxine, in order to clarify the diagnosis of APS and improve the understanding of glucocorticoid-induced osteoporosis (GIOP).
Methods: A 17 years old boy was admitted because of rash for 10 years, bone pain for 3 years and fever for 2 years. We performed the examinations of function of hypothalamic-adrenal-axis, pituitary-thyroid-axis and pituitary-sexual gland-axis. Blood routine test, erythrocyte sedimentation rate (ESR), serum parathyroid hormone, 25OHD and bone turnover biomarkers, IFE were measured. Bone mineral density was detected by dual energy X-ray absorptiometry. Skeletal X-ray films and adrenal gland CT were examined. Skin biopsies were completed.
Results: Psoriasis was diagnosed according to finding in skin biopsy. Function of hypothalamic was normal and hyperthyroidism was found. Bilateral adrenal glands were thin in CT scanning. Scoliosis and multiple vertebral compression fractures were found in X-ray films of bone. No autoimmune antibody was positive. We think APS was misdiagnosed. Severe GIOP and hyperthyroidism were induced by long term mistreating. We stop treatment of L-thyroxine, reduce the dosage of glucocorticoid hormone gradually and give the patient zoledronic acid intravenously. The condition of the patient has been improved significantly.
Conclusion: Osteoporosis is the common and severe side effects of glucocorticoid hormone. Bisphosphonates are also effective in treatment of GIOP in children.

P54

Study on the Threshold Of BMD of Vertebral Fracture in Osteoporosis

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Background: Vertebral fracture is one of the commonest pathological changes in osteoporotic fracture. Bone mineral density (BMD) of the spine and dual hips is measured by DEXA. The instant vertebral assessment (IVA) and the vertebral fracture assessment (VFA) are used to analyse types of vertebral fractures and predict the risk of fracture.
Methods: 74 patients with osteoporosis were enrolled including 62 females and 12 males also with new vertebral fracture. The BMD of spine and dual hips was measured during 2 weeks after that they were hospitalised. We identified three types of vertebral fractures by the software in DEXA: wedge, biconcave, and compression. The fractures were classified according to three degrees of severity, ranging from mild through moderate to severe.
Results: The BMD are negatively correlated with severity of spinal fractures($R = -0.428$, $P<0.05$). T threshold of BMD of vetebral fracture is -2.830±0.319. The 95% confidence of interval (-3.65, -2.40).
Conclusion: The BMD and Genant classification can be used to predict the risk of osteoporotic fracture and the threshold of vertebral fracture in osteoporosis.

P55

The Polymorphisms of Wnt Signaling Pathway Genes Are Associated with Obesity Phenotypes in Chinese Nuclear Families

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Background: Wnt signaling is essential in both skeletal and muscle development and homeostasis. Bone and muscle, from

early embryonic development through aging and involution, are closely coupled in both form and function. 6 Wnt signaling pathway genes (including WNT4, WNT5B, WNT10B, WNT16, CTNNB1 and CTNNBL1) were osteoporosis candidates. The purpose of this study was to investigate the relationship between single nucleotide polymorphisms (SNPs) in these 6 candidate genes and obesity phenotypes in Chinese nuclear families.

Methods: Two cohorts of nuclear families, including 2137 Chinese Han subjects (consisting of 1214 subjects from 399 male-offspring nuclear families and 923 from 278 female-offspring nuclear families) were recruited. 51 SNPs located in the 6 genes were screened. Total fat mass (TFM) and total lean mass (TLM) were measured using DEXA. Associations between the individual SNP markers with TFM, TLM, percentage fat mass (PFM), percentage lean mass (PLM) and body mass index (BMI) were analyzed using quantitative transmission disequilibrium tests (QTDTs).

Results: QTDT family-based genetic association, 1000 permutations test guaranteed reliability. In male-nuclear family, five SNPs in *CTNNBL1* gene (rs6091103, rs238303, rs6067647, rs8126174 and rs4811144) were significantly associated with TFM, four of the five SNPs in *CTNNBL1* gene (rs238303, rs6067647, rs8126174 and rs4811144) were also significantly associated with PFM and PLM, rs3809269 in *WNT5B* gene and two SNPs (rs11564459 and rs2293303) in *CTNNB1* gene were significantly associated with TLM, but no significant associations were detected of BMI in the males. Furthermore, in female-nuclear family, two SNPs in *WNT5B* gene (rs11830202 and rs12811969) and two SNPs in *WNT10B* gene (rs833840 and rs4760662) were significantly associated with BMI, rs12811969 in *WNT5B* gene and the two SNPs in *WNT10B* (rs833840 and rs4760662) were also significantly associated with TFM and PFM.

Conclusion: Genetic polymorphisms in *WNT5B* and *CTNNBL1* genes may be a major contributor to variability in obesity phenotypes in young Chinese men and women. Genetic polymorphisms in *CTNNB1* gene contribute to the variation of obesity phenotypes in young Chinese men. Genetic polymorphisms in *WNT4* and *WNT10B* genes may be a major contributor to variability in obesity phenotypes in young Chinese women.

P56

The Skeletal Manifestations of Bethlem Myopathy

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Background: Bone consists of various proteins, including collagen 1, the major protein and some other matrix proteins. Collagen 6 is one of the bone matrix proteins which is made up of three distinct subunits, a1(VI), a2(VI) and a3(VI). The genes of COL6A1, COL6A2 and COL6A3 encode the three chains respectively. It is known that mutations in the three collagen 6 genes COL6A1, COL6A2 and COL6A3 mainly cause Ullrich congenital muscular dystrophy (UCMD) and Bethlem myopathy (BM), while the skeletal manifestations have not been well described. One Chinese patient with severe skeletal manifestations of Bethlem myopathy will be reported in this study.

Methods: A 12 years old boy from a consanguineous family who presents muscle weakness, difficulty in walking, jaw swelling, pectus carinatum and forearm flexion was recruited. His myopathy symptoms presented as typical, characteristic of Bethlem myopathy. We investigated the biochemical change, radiographic features and gene mutations in COL6A.

Results: This patient had disorganized teeth, slender limbs, forearms flexion abnormalility and hip dysplasia. His serum calcium was 2.51 mmol/L, phosphate 1.71 mmol/L, ALP 206U/L and PTH 43.3 pg/ml. On X-ray examination, he has osteopenia on skull, hip, and femur, vertebrae combined with mild spine flexion. The appearances of some vertebras are like sandwich. The patient proved to be a novel heterozygous missense mutation of COL6A2 gene (c.1492C>T). This mutation was predicted to cause structure change of a2 chain of collagen 6 protein and lead to a peculiar pattern of collagen 6 defects.

Conclusion: In our study, we described a patient presented severe skeletal abnormal with Bethlem myopathy. A novel heterozygous missense mutation of COL6A2 was found in this Chinese family. To our best knowledge, this is the first report talking about Bethlem myopathy patient with special skeletal disorders.

P57

Early Regional Adaptation of Bone Mineral Density after Anterior Cruciate Ligament Reconstruction

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Background: The aim of the study was to analyze the adaptation of bone mineral destiny (BMD) and its influence on cartilage damage after anterior cruciate ligament (ACL) reconstruction in a combined rabbit model.

Methods: Forty rabbits underwent ACL reconstruction by use of allogenic tendon graft prepared beforehand at the age of 1year. Ten animals were killed at 0, 3, 12, and 24 weeks postoperatively. Each ACL-reconstructed knee was examined by quantitative computed tomography (qCT) to analyze BMD. In addition, the histopathological Mankin score was hired to estimate cartilage damage. Group t-test and Spearman statistical tests were performed as appropriate. Significant difference was established at $P<0.05$.

Results: BMD decreased significantly within the first 3 weeks after surgery and in the femur, especially in the posterior-medial region, osteoporosis (OP) was pronounced (–0.063 ± 0.020 g/cm^3). The data decreased to –0.112±0.025 g/cm^3 in 12-week group. The regions of pronounced OP adaptation corresponded to observe focal cartilage defects.

Conclusion: The posterior-medial region in the femur is the most affected area after ACL reconstruction. Early decreases in BMD in the injured knee may be related to load altering and should be a significant pathogenesis of posttraumatic osteoarthritis.

P58

Bone Mineral Density, Spinal Micro-Architecture (Tbs Data) and Body Composition in the Older Ukrainian Women with Vertebral Fragility Fractures

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Background: Osteoporosis and sarcopenia are the most frequent musculoskeletal disorders affecting older people. Fracture incidence increases due to ageing. A low skeletal muscle mass is associated with poor structural bone parameters and impaired balance of the elderly. The aim of this study is to evaluate the bone mineral density (BMD), trabecular bone score (TBS) and body composition in women taking into account the presence of vertebral fragility fractures (VFF).
Methods: We've examined 171 women aged 65–89 years (mean age – 73.12±0.39 yrs; mean height – 1.58±0.004 m; mean weight – 72.54±0.99 kg). The patients were divided into the groups depending on the VFF presence: A – no VFF (n=105; mean age – 72.70±0.54 yrs; mean height – 1.58±0.006 m; mean weight – 74.43±1.33 kg), B – present VFF (n=66; mean age – 73.79±0.55 yrs; mean height – 1.58±0.008 m; mean weight – 69.53±1.37 kg). Total body, lumbar spine, femoral neck, forearm BMD, lateral vertebral assessment, trabecular bone score (L1-L4), lean and masses were measured by DXA densitometer (Prodigy, GE). Appendicular skeletal mass (ASM) was measured at all the four limbs with DXA. We've also calculated the appendicular skeletal mass index (ASMI) according to the formula ASM/height^2 (kg/m^2).
Results: We have found the following parameters to be significantly lower in women with the VFF compared to women having no VFF:BMD of total body (A – 0.859±0.01 g/cm^2, B – 0.764±0.02 g/cm^2; P<0.05), spine (A – 1.038±0.02 g/cm^2, B – 0.927±0.03 g/cm^2; P<0.05), femoral neck (A – 0.787± 0.01 g/cm^2, B – 0.711±0.01 g/cm^2; P<0.05), 33% forearm (A – 0.690±0.01 g/cm^2, B – 0.600±0.01 g/cm^2; P<0.05), TBS (A – 1.171±0.01, B – 1.116±0.02; P<0.05), whole-body fat mass (A – 30736.87±939.92 g, B – 25877.45±966.90 g; P<0.05), whole-body lean mass (A – 41202.44±498.18 g, B – 39440.77±594.78 g; P<0.05), ASM (A – 16.47±0.22 kg, B – 15.81±0.22 kg; P<0.05) and ASMI (A – 6.59±0.07 kg/m^2, B – 6.34±0.09 kg/m^2; P<0.05). The frequency of sarcopenia was 2% in women with no VFF and 14%—in women with the VFF.
Conclusion: Women with the VFF have the BMD, TBS, lean and fat masses data significantly lower in comparison to women with no VFF.

P59

Regional Features of Bone Mineral Density in Women Kuzbass (Western Siberia, Russia)

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Background: In the diagnosis of osteoporosis is important dual-energy X-ray absorptiometry (DXA). During DXA bone mineral density of the patient compared with the reference database that was originally put in densitometric system, which often differ from that particular region. According to the recommendations of The International Society for Clinical Densitometry (ISCD) Z-score is recommended to calculate the reference to the database for a specific population. The purpose of this research - the creation of population base indicators of bone mineral density of the lumbar vertebrae for women Kuzbass.
Methods: The study included 1504 healthy Caucasian women living in Kuzbass. All performed DXA densitometric system Lunar.
Results: The following results were obtained. Mineral density of the lumbar vertebrae L_1–L_4 was in the age group 16–19 years – 1.126 g/cm^2, for 20–29 years – 1.177 g/cm^2, for 30–39 years – 1.174 g/cm^2, for 40–49 years – 1,144 g/cm^2 for 50–59 years – 1.083 g/cm^2, for 60–69 years – 1.040 g/cm^2, for 70–79 years – 0.989 g/cm^2 and 80 years and older – 0,980 g/cm^2. For comparative evaluation of population indices women Kuzbass with indicators database NHANES III was conducted standardization values BMD. Were no differences in terms of L_1–L_4 BMD in the age groups 16–19 years, 20–29 years. Significant difference was observed with BMD values of 30-39 years of age and older.
Conclusion: Developed database BMD has regional characteristics and should be used to calculate the Z-score for the female population of the Kuzbass.

P60

The BMD both in Cortical and Trabecular Lumbar Vertebrae Decreased Significantly in Chinese Patients with AS by QCT

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Background: To assess the changes of bone mineral density (BMD) in patients with ankylosing spondylitis (AS) by QCT and guide the clinical treatment.
Methods: The BMD of lumbar vertebra 1–5 were measured in 60 male patients with AS and 20 healthy male controls by quantitative computed tomography (QCT). Erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) were determined. Means of continuous variables were compared independent students t-test. Linear regression was employed to determine the variables associated with BMD. The correlations between the BMD and body mass index (BMI), disease duration, Bath AS functional index (BASFI) was analyzed. Bone loss for each patient with AS was calculated as: bone loss = (average BMD of control – BMD of patient) / average BMD of controls) × 100%. According to Chinese guideline, patients with a bone loss of 13-24% were defined as osteopenia; and of equal or larger than 25% as osteoporosis.
Results: Patients with AS had significantly lower BMD both in trabecula and bertebrae lumbar vertebra than control subjects (113.4±21.4 vs 189.1±16.7 mg/ml, 248.1±31.3 vs 303.0±47.0 mg/ml, P<0.01, respectively). The percentage of BMD decreased was 40.0%. Osteoporosis and osteopenia of lumbar vertebra were found in 44.2% and 39.4% of patients. There were significant correlation between the BMD and BMI, disease duration, BASFI.
Conclusion: There was significant decrease of lumbar BMD and high rate of osteoporosis in patients with AS. The BMD

should be measured in patients and early intervention to prevent osteoporosis were required to the patients with AS.

P61

Epidemiological Characteristics of 5563 Patients Aged over 50 with Hip Fractures

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Background: To describe the epidemiological characteristics of the hip fractures of the inpatients, providing a scientific basis for prevention and treatment of the hip fractures.
Methods: The study involved 5563 patients aged over 50 with hip fractures admitted to the Tianjin Hospital from January 2005 to December 2010. There were 2144 males and 3419 females. The demographic data, the time and causes of injury, fracture types, treatment and inpatient expenditures were collected and reviewed retrospectively. SPSS 11.0 software was used for statistical analysis.
Results: About 83.74% of the overall fractures observed during the study period occurred in persons aged 60 years or above, especially in female. In the period of 2005–2010, the proportions of hip fracture cases in each year varied from 12.06% to 21.12%. The incidence peak was situated in 2009. Fall was leading cause of hip fracture (77.98%). The number of patients with femoral neck fracture was higher than that of intertrochanteric fractures in patients aged 50 to 79 years old. But in patients aged over 90, fewer femoral neck fractures was seen. The highest incidence of low-trauma hip fracture occurred in winter with the lowest incidence in spring. Meanwhile, October was the epidemic peak period. Surgery was the predominant management for hip fracture, accounting for 56.97%. The direct cost of acute treatment of fragile hip fracture increased year by year.
Conclusion: Hip fractures are more common among patients aged over 60 years and inpatient expenditures of hip fractures have grown markedly.

P62

A Study of Bone Mineral Density and Prevalence of Osteoporosis in Chinese People of Han Nationality from Changchun

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Background: The reference data on bone mineral density (BMD) and osteoporosis (OP) among Chinese people is lacking. We, therefore, investigated the BMD and analyzed the changes in peak bone mass and BMD in Han population.
Methods: BMD at the one-third of distal radius and ulna of non-dominant forearm was measured by DTX-200 BMD detector in 16019 Han individuals in Changchun divided into different groups based on age and gender. The mean BMD, T-score and bone loss rate were analyzed using SPSS13.0 statistical software.
Results: The peak BMD in males and females was 0.625±0.109 and 0.506±0.058, respectively which was observed in the age group of 30-34 years. BMD decreased gradually after 40 years. The prevalence of osteoporosis was as follows: 7.7% in males and 6.97% in females in the age group of 50–59 years; 18.13% in males and 35.97 % in females aged 60–69 years; 36.41% in males and 59.55% in females aged 70–79 years; and 57.53% in males and 75.56 % in females aged over 80 years.
Conclusion: There was significant difference (P<0.01) in BMD in different age groups; and between genders within the same age group. In different age groups, the prevalence of osteoporosis was significantly higher in females than in males (P<0.01). The peak BMD in this region was higher than that reported in Japan and Denmark, and was comparable to that in Beijing. Furthermore, differences were significant (P<0.01) as Han population of Changchun was compared with Dai population of Xishuangbanna, Tibet and Dongxiang population of Gansu province.

P63

Association of the g.27563G>A Osteoprotegerin Genetic Polymorphism with Bone Mineral Density in Chinese Women

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Background: Osteoporosis is a common multifactorial disease in postmenopausal women.
Methods: This study aimed to investigate the association of the g.27563G>A osteoprotegerin (OPG) genetic polymorphism with bone mineral density (BMD) and osteoporosis. A case-control study was carried out with 435 osteoporosis postmenopausal women cases and 442 age-matched healthy controls. The BMD at the femoral neck hip, lumbar spine (L2-4), and total hip were assessed by Norland XR-46 dual-energy X-ray absorptiometry. The genotypes of the g.27563G>A genetic polymorphism were detected by created restriction site polymerase chain reaction-and verified by DNA sequencing methods.
Results: We detected that the g.27563G>A genetic polymorphism was a non-synonymous mutation that resulted in an arginine (Arg) to glutamine (Gln) amino acid replacement (p.Arg333Gln). Significant differences were found in the BMD of the femoral neck hip, lumbar spine (L2-), and total hip among different genotypes of the g.27563G>A genetic polymorphism. Subjects with the genotype GG had significantly higher BMD values than those with genotypes GA and AA (P<0.05).
Conclusion: Our data indicated that the A allele of the g.27563G>A genetic polymorphism in OPG could be associated with lower BMD values in the Chinese postmenopausal women evaluated, and that it might be an increased risk factor for osteoporosis.

P64

The Status of Vitamin D in Chinese Young Male and Female and The Effects of Season on Vitamin D Levels

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Background: Vitamin D deficiency becomes very common and has been associated with a various type of disorders. So far

little is known about vitamin D status in Chinese. The aim of this study was to investigate vitamin D status in young (22-37 years) men and women and to analyze the effects of season on the levels of plasma 25-hydroxyvitamin D (25(OH)D).
Methods: Total 416 healthy subjects were selected in winter to spring or summer to autumn and 25-hydroxyvitamin D was assessed by an enzyme-linked immunosorbent assay.
Results: Means of plasma 25(OH)D concentrations were lower in all groups regardless of season and gender. The over all prevalence of 25(OH)D <75 nmol/L was about 90%. Majority of subjects (80%) were mild or moderate vitamin D deficiency in winter to spring. However, most of subjects (over 70%) were mild vitamin D deficiency or insufficiency in summer to autumn. 25(OH)D level was lower in winter to spring than that in summer to autumn. The rate ofmoderate and severe vitamin D deficiency was much higher and 25(OH)D level was lower in women than that men regardless of seasons.
Conclusion: The prevalence of vitamin D deficiency is very high inpeople living in northern part of China. Especially young women are high-risk group of vitamin D deficiency. Effective measures should be taken to prevent vitamin D deficiency and reduce the effects of vitamin D deficiency on human's healthy.

P65

The Research on the Relevance between the Index of BMD, BMI, WHR and Female Breast Cancer

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Background: To study the relevance between the index of BMD, BMI, WHR by DXA and the predisposition to breast cancer.
Methods: We examined by DXA 84 female volunteers who were diagnosed as breast cancer (range in age from 34 to 78, the median age is 53), measuring the BMD of spine and hips. 84 females, checked by DXA served as control group. They range in age from 32 to 77, and the median age is 54.5. The data of each two group were recorded, including height, weight, BMI and WHR. Subjects could be divided into four groups: Underweight (BMI<18.5), Normal (18.5≤BMI<25), Overweight (25≤BMI<30) and Obese (30≤BMI35).
Results: The average height, weight and BMI are 158.54±4.67m, 63.76±9.35kg and 25.33±3.19, WHR are 35.27±9.14, 27.16±4.56, the weight is divided into 4 groups, which are underweight: 3.57% (3/84), normal: 39.29 (33/84), overweight: 50% (42/84) and obese: 7.14 (6/84). The result of BMD: osteoporosis: 15, decreasing: 32 and normal: 37. The Control Group average height, weight and BMI are 158.98±4.55m, 61.61±11.72kg 24.29±4.13, WHR are 30.79±8.32, 25.81±5.40, weight is divided into 4 groups, which are underweight: 5 (5.95%0), normal: 59.53 (50/84), overweight: 26.19% (22/84) and obesity: 8.33 (7/84). BMD: osteoporosis: 19, decreasing: 33 and normal: 32. Height, BMI, age and BMD between groups were not statistically different (P<0.05), but the comparative difference of weight, WHR, whole body fat and body composition was statistical significance (P<0.05).
Conclusion: The breast cancer has no distinct relevance with the female's height, BMI and BMD, however, the obesity and high fat content are risk factor of female breast cancer.

P66

High Prevalence of Vitamin D Insufficiency and Deficiency among Postmenopausal Women in China

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Background: Previous small studies exploring the prevalence of low serum 25-hydroxyvitamin D [25(OH) D] levels among postmenopausal women in China reported inconsistent findings. The aim of the present study was to determine the prevalence of low 25(OH) D levels in a large cohort of postmenopausal women in China.
Methods: This cross-sectional study recruited 1688 women with mean age of 65.4 years (55-93) from urban (N=848) and rural (N=840) areas of 7 geographically distinct regions during the summer (N=963) and winter (N=717) in China. Each woman was evaluated for total serum 25(OH) D levels, fracture risk using Osteoporosis Self-Assessment Tool for Asians (OSTA), and BMD using DXA. Serum PTH was evaluated. Serum cross-linked C-telopeptide of type I collagen (β-CTx) and aminoterminal propeptide of type I collagen (P1NP) were measured in a subgroup of women (N=360). In the present study, the prevalence is reported using 25(OH) D cut-off points of < 15 ng/ml, < 20 ng/ml and < 30 ng/ml.
Results: Overall, 61.4 % of these postmenopausal women had a serum 25(OH) D < 20 ng/ml. The overall prevalence was 91.2% for 25(OH)D < 30 ng/ml and 37.6% for 25(OH)D < 15 ng/ml. Using a cut-off point of 25(OH)D < 20 ng/ml, the prevalence was significantly higher among urban than rural dwellers (64.6% vs. 57.3%, respectively, P=0.0019), and among subjects recruited in winter than in summer (84.2% vs. 43.6%, respectively, P<0.0001). The prevalence of low vitamin D levels varied by region, but not necessarily by latitude, with lower prevalence (around 50%) found in the Middle and South regions, and higher prevalence (around 70%) in North and Southwest regions. PTH inversely correlated with 25(OH) D.

Conclusion: Our results suggest that prevalence of vitamin D deficiency and insufficiency are common among postmenopausal women in China. Increased awareness of vitamin D deficiency and insufficiency among postmenopausal women in China is necessary.
Disclosure: This study was supported by Merck Sharp & Dohme, Corp.

P67

Prevalence of Vitamin D Deficiency in Women Who Live with Lowest Sunshine: An Epidemiological Study in Sichuan, China

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Background: Vitamin D insufficiency and deficiency is pandemic in the world, while its threshold of optimal range was controversial. The lack of sunshine exposure is a common cause of vitamin D deficiency. Sichuan Basin experiences a subtropical monsoon climate with Chinas lowest sunshine totals (900–1400 h per year, less than London) and solar radiation (370–420 KJ/cm^2). Inferably, the prevalence of vitamin D deficiency in Sichuan basin is high, and possibly the highest in China. This study was aimed to research the prevalence of vitamin D deficiency in Sichuan at different cut-points.
Methods: This is a cross-sectional study. Subjects were recruited from communities of four cities of Sichuan province, China, including Chengdu, Guangyuan and Luzhou, which have low sunshine totals, as well as Xichang where sunshine is abundant. Totally 1508 women aged from 30 to 90 yrs (775 live in urban and 733 live in rural area) were included. The measurements were performed in winter of 2013. Lumbar spine and femur's bone density were measured by DXA. 25OHD and PTH were measured centrally in West China Hospital.
Results: Overall, 72.5% of women had a serum 25 (OH) D < 20 ng/ml. The overall prevalence was 95.0% for 25(OH) D < 30 ng/ml, 41.3% for <15 ng/ml and 6.8% for<10 ng/ml. The negative relationship between PTH and 25(OH)D disappeared when 25OHD level is over 15 ng/ml, while BMD was not positively related to 25(OH)D when people achieved 20 ng/ml and higher. The prevalence was not significantly different among urban or rural dwellers. People who live in Xichang with abundant sunshine have higher 25OHD level than those live in other three cities with low sunshine (Mean 21.2±8.4 vs. 16.4±7.6 ng/ml, P<0.001).
Conclusion: Prevalence of vitamin D in people dewelling in Sichuan basin, where the sunshine is the lowest in China, is impressively high, no matter what threshold of optimal range of 25(OH)D is used. Considering be good for bone health, the optimal range of 25(OH)D should be equal and more than 20ng/ml in Chinese.

P68

Vitamin D Status and Seasonal Variation in Beijing Residents

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Background: Vitamin D deficiency is documented as a common health problem in the world. Limited data has been found on the prevalence of vitamin D deficiency in Beijing area.
Objective: To investigate the prevalence characteristic of vitamin D deficiency in Beijing residents and to test the seasonal and monthly serum 25OHD concentration in this population.
Methods: This is an urban hospital based cross-sectional study lasting whole 2 years. 5531 (5–101 years old) Beijing residents are recruited from December 8, 2011 to December 9, 2013. Subjects completed a questionnaire designed to quantify intake of vitamin D through food, vitamin D supplements, hours of sun exposure, sunscreen use over the past month. Venous blood samples are collected for the measurement of serum alkaline phosphatase (AP), calcium, albumin, and phosphorus, 25OHD and PTH. Serum 25OHD is statistically analyzed in accordance with gender, age, and timelines.
Results: As high as 87.1% of this population have vitamin D deficiency (serum 25OHD level ≤20 ng/mL). 44.7% of subjects have severe vitamin D deficiency (25OHD level ≤10 ng/mL). Female subjects show higher prevalence of vitamin D deficiency (89.0%) and severe deficiency (59.3%) than male (84.9% and 42.7%, respectively). The serum 25OHD level varies among seasons (P<0.01). The highest level is in autumn, followed by summer. Spring has the lowest serum 25OHD levels in this population compare to widely recognized winter does. Statistical analysis indicates that the peak of serum 25OHD levels in both male and female are in October and troughs in April. The result does not parallel with the pattern appearing in other areas of same latitude of temperate northern hemisphere.
Conclusion: Vitamin D deficiency and insufficiency is found highly prevalent among residents of Beijing spanning the age spectrum, especially among females and in winter and spring seasons. Targeted prevention on vitamin D deficiency is urgent for this population. Serum 25OHD level was found peak in October and troughs in April in both male and female. The reason remains unclear.

P69

Replication Study of Osteoporosis Related Candidate Loci from Previously Genome-Wide Screening in Chinese Population

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Background: Osteoporosis is a major public health problem and genetic factors play important roles in determining population variation of BMD. We previously validated SNPs reported by previous GWAS with osteoporosis (FHS100K, Icelandic deCODE and UK-NL) in 1,000 unrelated US whites. This study aims to explore the potential associations in Chinese population.
Methods: 17 SNPs, including 10 SNPs achieved significant combined p values even after strict correction for multiple-testing from our previous validation study in a 1,000 unrelated white sample, and seven promising SNPs (at the genome-wide significant level after Bonferroni correction) in the three original GWASs reports while not validated in our independent white sample were selected to explore the potential associations in Chinese. We tested associations with BMD in a population of 1,625 unrelated Chinese adults, including 823 females and 802 males.
Results: We identified four BMD-loci that were significantly associated with SPNBMD in this Chinese population, including 11q13.2 (LRP5, $P=2.24\times10^{-4}$ for rs2306862), 11q13.2 (LRP5, $P=2.99\times10^{-3}$ for rs3736228), 1p36.12 ($P=0.021$ for rs6696981), and 6q25.1 (ESR1, $P=0.028$ for rs851982). Two BMD-loci, 6q25.1 (ESR1, $P=0.013$ for rs4870044); 1p36.12 ($P=0.015$ for rs6696981), were replicated for FNBMD. These two BMD-loci were also detected significant association with HIPBMD, 6q25.1 (ESR1, $P=0.014$ for rs4870044) and 1p36.12 ($P=0.013$ for rs6696981). The SNP rs2306862 at 11q13.2 remained significantly associated with SPNBMD in this Chinese population, even after conservative Bonferroni's correction.
Conclusion: Osteoporosis susceptibility of 5 SNPs was replicated in 1,625 unrelated Chinese adults. Our results further highlight the importance of these loci in the pathogenesis of osteoporosis, to enhance our understanding of the genetic architecture of osteoporosis.

P70

Aromatase Inhibitors Associated Musculoskeletal Disorders and Bone Fractures in Postmenopausal Breast Cancer Patients: A Result from Chinese Population

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Background: As the prognosis of early breast cancer patients improves, the long-term safety of aromatase inhibitors (AIs) is increasingly important. In the present study, we retrospectively investigated the incidences of musculoskeletal disorders (MSDs) and bone fractures in a cohort of Chinese postmenopausal patients with breast cancer.
Methods: The age of diagnosis and menopause were compared with one-way ANOVA. The history of bone fracture, family history of bone fracture, history of chemotherapy, bisphosphonates therapy and pathology were compared with Fisher's exact test. The stage data was compared with Kruskal-Wallis test. The incidences of MSDs were analyzed by multiple logistic regression analysis, and the incidences of bone fractures were analyzed by Cox regression.
Results: Data of postmenopausal patients with breast cancer were collected. Among which, 70 patients received AIs therapy (median follow-up of 32.5 months), 52 patients received tamoxifen (TAM), and 89 patients received no endocrine therapy (NE). Baseline characteristics, incidence of MSDs and bone fractures were analyzed and compared. When compared with NE group (40.4%, 36/89), more patients in AIs group developed MSDs (72.9%, 51/70, adjusted odds ratio (AOR) = 3.30, 95% confidence interval (CI) = 1.59–6.88, $P=0.001$). But no difference was found between TAM group (36.5%, 19/52, AOR = 0.70, 95% CI = 0.32–1.52, $P=0.372$) and NE group. About 39.7 months after initial AIs therapy, 9 patients in AI group developed bone fractures in different sites, and the bone fracture rate was significantly increased (12.9%, 9/70, adjusted hazard ratio (AHR) = 20.08, 95% CI = 1.72–234.08, $P=0.017$) in comparison with NE group (1.1%, 1/89). Moreover, the bone fracture rate of TAM group was not different from NE group (1.9%, 1/52, AHR = 2.64, 95% CI = 0.14–48.73, $P=0.513$).
Conclusion: AIs therapy may induce increased rates of MSDs and bone fractures in Chinese population of postmenopausal breast cancer patients, whereas TAM therapy did not help reduce the incidences of MSDs and bone fractures.

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Vitamin D and Its Relationship with Markers of Bone Metabolism in Healthy Chinese Adults

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Background: The aim of this study was to assess the relationship among serum vitamin D level, serum PTH concentrations and bone turnover markers level in healthy adults living in Shanghai.
Methods: 19047 apparently healthy adults aged 21 to 105 were enrolled in the study including male 5560 and female 13487. Serum 25OHD, PTH and bone turnover markers (osteocalcin, PINP, βCTX) were simultaneously detected by direct competitive electrolumineseent immunoassay.
Results: All of subjects were divided into 4 groups based on serum 250HD levels: group 1, <10 ng/mL: (11.9%); group 2, 10~19 ng/mL: (22.3%); group 3, 20~29 ng/mL: (44.3%); group 4, ≥30 ng/mL: (21.5%). According to age group, those who aged <50 years old had higher serum 25OHD compared with other groups. However, PINP and βCTX were higher in subject's age over 80 years old than other age groups. Negarive correlation

was shown between serum PTH levels and 250HD. The plateau of PTH as a suppressed function by vitamin D was located between serum 250HD 16 to 20 ng/mL. BGP and PINP were significantly increased when serum 250HD Was lower than 10 ng/mL respectively. After PTH adjusted, BGP and PINP still showed significant negativecorre-lation with serum 250HD. The plateau of BGP and PINP related to vitamin D was located between selum 250HD 18~25 ng/mL and 20~25 ng/mL. No significant difference was found between serum 250HD and βCTX levels.

Conclusion: The result showed 250HD≤10 ng/mL had influenee on bone turnover markers siginifieantly, especially on bone formation markers. However. 250HD may be one of regulatory factors in bone metabolism with weak power as a simple factor.

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A 'Conditional-on' Mouse Model of Fibrosyplasia Ossificans Progressiva (FOP)

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Background: FOP (MIM 135100) is an autosomal dominant disorder characterized by early onset, episodic and progressive ossification of skeletal muscle and connective tissue. FOP is driven by mutations in the intracellular domain of ACVR1, the most common mutation being Arg206His (R206H).

Methods: To enable mechanistic studies and the development of therapeutic approaches for FOP, we engineered a Cre-regulated 'conditional-ON' allele of ACVR1[R206H] in the mouse – Acvr1[R206H]COIN – using a FlEx-like design. This was necessary because an unregulated Acvr1[R206H] knock-in results in perinatal lethality. Acvr1$^{[R206H]COIN}$ was generated by introducing the R206H mutation into exon 5 (e5) of mmuAcvr1, and placing this engineered mutated exon (e5[R206H]) and flanking intronic sequence in the antisense strand. To retain Acvr1 function in the modified allele, the corresponding wild type region of hsaACVR1 e5 ('WTe5') was inserted into the sense strand of mmuAcvr1, upstream of e5[R206H]. To enable Cre-dependent replacement of WTe5 with e5[R206H], the WTe5 sequence was placed within a lox2372-loxP 'FlEx' array, and a second FlEx array was inserted after the inverted e5[R206H] in a mirror image configuration with respect to the first FlEx array. Cre 'activates' Acvr1[R206H] by bringing e5[R206H] to the sense strand and deletes WTe5.

Results: Body-wide activation of the Acvr1[R206H] in Acvr1$^{[R206H]COIN/+}$;Gt(ROSA)26Sor$^{CreERt2/+}$ adult mice using tamoxifen resulted in progressive heterotopic ossification (HO) resembling FOP. HO was spontaneous, did not require experimentally induced inflammation, and was evident on the axial skeleton and the long bones as early as 2 weeks after induction. Untreated mice were normal, displaying no HO.

Conclusion: The FOP phenotype was obtained in adult mice, hence uncoupling of the FOP observed in these mice from development. Furthermore, HO was prevented by treatment with the ACVR1 inhibitor LDN-212854, demonstrating that this physiologic model of FOP can be used for testing candidate therapeutic regimens.

P73

Novel CLDN19 Mutations in Familial Hypomagnesaemia with Hypercalciuria and Nephrocalcinosis in a Chinese Family

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Background: Familial hypomagnesemia with hypercalciuria and nephrocalcinosis (FHHNC) is an autosomal recessive disorder caused by mutations in the *CLDN16* or *CLDN19* genes, encoding claudin-16 and claudin-19 in the thick ascending limb of Henle's loop. In patients with claudin-19 mutations, severe ocular involvement (macular coloboma, pigmentary retinitis, nystagmus, or visual loss) has been described.

Methods: In this report, we present a 12-year-old girl with rickets, polyuria and polydipsia. Based on the clinical features, laboratoty examinations and DNA analysis, the patient was diagnosed as FHHNC.

Results: She was the daughter of consanguineous parents with a history of recurred hypocalcemic and hypomagnesemic tetany. On physical examination, bilateral horizontal nystagmus and severe myopia were detected. Laboratory examination revealed hypomagnesemia, hypocalcemia, hypercalciuria, nephrocalcinosis and renal stone. A clinical diagnosis of FHHNC caused possibly by claudin-19 mutation was decided with the ocular findings. DNA analysis revealed a novel homozygous missense mutation c.241C>T in the *CLDN19* gene. This is the first case report of FHHNC in Chinese population. Our findings of the novel mutation c.241C>T in exon 2 added to the list of more than 16 mutations of *CLDN19* gene reported.

Conclusion: In conclusion, in a patient with hypomagnesemia, hypercalciuria, nephrocalcinosis, and ocular findings, a diagnosis of FHHNC caused by claudin-19 mutation should be considered.

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Liuwei Dihuang Pills Up-Regulate the Expression of Clcf1 Associated with Kidney Yin Deficiency in Patients with Postmenopausal Osteoporosis

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Background: To clarify the therapeutic mechanism of Liuwei Dihuang Pills (LDP) treatment postmenopausal osteoporosis (PMO) with kidney YIN deficiency.

Methods: Microarray was used to identify the differentially expressed genes in patients with PMO kidney YIN deficiency. These genes were further analyzed through examination of differential gene expression patterns before and after LDP treatment.
Results: In patients with PMO kidney YIN deficiency, GSTM5 and MUC12 were up-regulated and GPR27, C3orf35, ASB1, CLCF1 and PROK2 were down-regulated. After 3 months of LDP treatment, ASB1 (P = 0.000, FC = 3.2591), and CLCF1 (P<0.0000, FC = 2.2918) were significantly up-regulated, while JAK1 (P = 0.0031, FC = 0.0803) and CBP (P = 0.005, FC = 0.3599) were significantly down-regulated.
Conclusion: LDP up-regulated the expression of CLCF1, and the potential mechanism underlying the therapeutic effect of LDP on PMO kidney YIN deficiency may be regulating JAK-STAT signaling pathway.

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Progressive Diaphyseal Dysplasia (PDD): Reports of 6 Cases from 4 Chinese Kindred

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Background: Progressive diaphyseal dysplasia (PDD, OMIM 131300), or Camurati–Engelmann disease, is a rare autosomal dominant type of bone dysplasia, characterized by cortical thickening of the diaphyses of the long bones, and caused by mutations in the transforming growth factor-b1 (TGFb1) gene. To understand PDD in Chinese patients, we describe 6 cases from 4 Chinese families with genetic confirmation.
Methods: Clinical and radiological findings in 4 PDD families were collected, and TGFB1 mutation was detected for the molecular evidence. For the clinical data analysis, medical history, physical examination, biochemical examination, as well as imageological examination were performed on all the involved individuals. Single nucleotide polymorphism was eliminated from all the mutations detected in this study, and mutation detection was performed on health volunteers for normal control.
Results: Diagnosis of PDD was made and confirmed by mutation analysis. This study included 5 typical affected individuals and 1 non-classical case showed clinical manifestation of exophthalmos. Most patients present with limb pain reduced subcutaneous fat muscular weakness, and a waddling gait. Beside, delayed sexual development, exophthalmos due to sclerotic changes at the skull base may be present. Radiological of the patients revealed thickened cortical diaphyses as well as narrowed marrow cavity, one case showed involvement of the skull. Mutation detection presented two different heterozygous mutations in exon 4 of the TGFb1 gene. R218C were detected in 5 individuals out of 3 available families, and mutation R218H was detected in 1 case.
Conclusion: This study performed mutation detection in clinical diagnosed patients in 4 different families and conformed 6 patients. PDD is a rare genetic disease with variable clinical manifestations, Chinese PDD patients showed the similar genotype and hot spots of mutation as other races.

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Efficacy and Safety of Alendronate in Chinese Children with Osteogenesis Imperfecta: A Large Sample Clinical Study

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Background: Osteogenesis imperfecta (OI) is a heritable collagen-related bone dysplasia, characterized by brittle bones with increased fracture risk. Treatments to reduce fracture incidence in Chinese patients with OI are deficient. The aim of this study is to investigate the efficacy and safety of alendronate in children with OI.
Methods: A prospective, self-controlled study was conducted in 99 children or juvenile with OI of type I, III, IV or V. Alendronate of 70 mg/week along with calcium and vitamin D supplements were given for 36 months. The annual new fracture incidence and the liner growth speed were observed. Bone mineral density (BMD) at lumbar spine and proximal femur, serum carboxy-telopeptide cross-links of type I collagen (β-CTX) and alkaline phosphatase (ALP) were measured at 0, 6, 12, 24 and 36 months of treatment. The liver and kidney functions were measured, as well as side effects were recorded.
Results: After 36 month of treatment, significant increase was found in BMD by 131%, 98%, 104% and 72% at lumbar spine, femoral neck, trochanter and total hip (P<0.01 vs baseline), with Z scores increasing from -2.79, -4.37 of baseline to 0.08, –1.28 at lumbar spine, femoral neck (P<0.01). Annual fractures incidence was 0.22 during treatment, which was significantly lower than 1.2 of baseline (P<0.01). Serum ALP level was decreased by 30.2 % after the treatment (P<0.01vs baseline). The Z scores of body height did not present catching growth during treatment. The tolerance to alendronate was very well.
Conclusion: Alendronate is effective in increasing BMD, reducing fracture incidence, inhibiting bone resorption, improving growth with good tolerance in Chinese children with OI.

P77

Novel CAII Mutations and Clinical Manifestations in Two Chinese Patients with Carbonic Anhydrase II Deficiency Syndrome

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Background: Mutations in CAII gene have been found to cause carbonic anhydrase II (CAII) deficiency syndrome, which is a rare autosomal recessive osteopetrosis with renal tubular acidosis (RTA) and cerebral calcifications. This study is to analyze clinical manifestations in two unrelated Chinese

CAII deficiency patients and discuss the potential functional consequences of the novel CAII mutations.
Methods: We extracted genomic DNA from the probands, their parents and wild type controls. Then we used the primers of CAII to screen for CAII mutations in these patients. The identified CAII mutations were subsequently investigated in their relatives.
Results: Clinical heterogeneity has been found in our two CAII deficiency syndrome patients. Patient 1 presented with a classic CAII deficiency syndrome. Compared to patient 1, the patient 2 had much more severe clinical phenotype, except the classic CAII deficiency syndrome, who also exhibited cranial nerve compression and severe mental retardation. Genetic analysis revealed 2 novel mutations in the CAII gene: a nonsense mutation in exon 4 (Y127X) in patient 1 and 2, causing a premature stop at codon 127; a splice mutation at the splice donor site of intron 3 (c.350+2T>C) in patient 2, causing exon 3 skipping, which in turn resulted in frameshift and a novel premature stop codon.
Conclusion: we enlarged the spectrum of mutations in CAII by identifying two novel mutations in two Chinese patients with CAII deficiency syndrome. We analyzed that the truncation mutation or nonsense mutation, which caused shorter truncated products, might be related to the severe clinical phenotypes. We also summarized and compared the differences between the two patients both in genotype and phenotype, which made it available for clinicians to improve their understandings of CAII deficiency syndrome.

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Seven Novel PHEX Gene Mutations in Chinese Subjects with X-Linked Hypophosphatemic Rickets/Osteomalacia

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Background: X-linked hypophosphatemic rickets/osteomalacia (XLH; OMIM307800), is a dominant disorder of phosphate homeostasis resulting in defective bone mineralization. Inactivating mutations in the *PHEX* gene located at Xp22.1 has been unequivocally identified as the main cause of the disease. In this study, we analyzed the *PHEX* gene of 14 unrelated Chinese families with XLH to elucidate the features of *PHEX* gene mutations in Chinese patients.
Methods: We investigated 14 unrelated Chinese families presented with suspected XLH from biochemical or clinical evidence together with 250 healthy donors. For each available individual, genomic DNA was isolated, and all 22 exons with their exon–intron boundaries of the *PHEX* gene were amplified by PCR followed by directly sequenced. Simultaneously, the laboratory and radiological investigations were conducted as well.
Results: Virtually all affected individuals showed in varying degree of growth retardation, dental anomalies and radiological signs of rickets, along with hypophosphatemia and elevated level of serum alkaline phosphatases. The *PHEX* gene mutations were detected in 12 familial and 2 sporadic XLH, and 7 different novel mutations were observed: 3 missense mutations, including c.824T>C in exon7 causing p.Leu275Pro, c.304G>A in exon3 causing p.Gly102Arg, c.229T>C in exon3 causing p.Cys77Arg, respectively; 2 frameshift mutations, c.1234delA in exon11 resulting in p.Ser412ValfsX12, c.1843dupA in exon18 leading to p.Thr615AsnfsX6; 1 putative aberrant splicing mutation, c.1483-1G>C in intron13 at splicing acceptor sites. In addition, the missense mutations were all highly conserved across 12 different biological species. No *PHEX* gene mutations were detected in the 250 healthy donors.
Conclusion: We have identified 7 novel *PHEX* gene mutations in 12 Chinese families and 2 sporadic individuals with XLH, providing new insights to its mutation features in Chinese patients. It also highlights the major role of *PHEX* gene mutations in XLH and expands the knowledge on the molecular basis of the disease.

P79

Association between Vitamin D Gene Receptors Polymorphisms, Secondary Hyperparathyroidism, and Structural-Functional State Of Bone Tissue in Postmenopausal Women

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Background: Aim is to determine the association between vitamin D gene receptors polymorphisms, secondary hyperparathyroidism, and structural-functional state of bone tissue in postmenopausal women.
Methods: The study involved 178 postmenopausal women (the average age – 57.0±1.2 yrs). The VDR Bsm I region genotypes were determined by polymerase chain reaction-restriction fragment length polymorphism. BMD was measured by ultrasound densitometry of calcaneus by SAHARA (Hologic). 25(OH)D and iPTH in plasma were determined by using the Elecsys *electrochemiluminescence* immunoassay system.
Results: According to studies genotype bb was found in 48 % of examined, 37.6 % had Bb, and 14.4 % women – genotype BB. It was found that the genotype Bb was associated with the lowest incidence of osteoporosis (7.4 % vs. 22.1% with genotype bb) and fractures (23.1 % vs. 29.2% with genotype BB). Women with genotype bb recorded a high percentage of osteoporosis (22.1%) and in objects with genotype BB – a high percentage of fractures (29.2%).
Conclusion: The study established that the genotype Bb characterized with high bone mineral density, low incidence of osteoporosis and fractures.

P80

Clinical characterization and genetic analysis of TRPV4-related skeletal dysplasias in 4 Chinese families

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Background: TRPV4-associated skeletal dysplasias are, from mild to severe: Familial digital arthropathy-brachydactyly (FDAB), Autosomal dominant brachyolmia (ADBO), Spondylometaphyseal dysplasia, Kozlowski type (SMDK), Spondyloepiphyseal dysplasia, Maroteaux type (SEDM), Metatropic dysplasia (MD) and Parastremmatic dysplasia. We recruited 3 families (F1, 2 and 3) with congenital scoliosis and 1 family (F4) with localized digital osteopetrosis without accurate diagnosis. This study is aimed to analyze the clinical features and use the next-generation sequencing system to obtain the accurate genetic diagnosis of the 4 families.
Methods: The DNA of the probands was sequenced by target region capture sequencing platform. The detected mutations were confirmed by Sanger sequencing. RT-PCR was performed to analyze the splice-site mutation.
Results: Proband 1, 2, 3 all presented with early-onset kyphoscoliosis and short stature. X-ray of the spine showed platyspondyly, hemivertebra, accompanied by metaphyseal abnormalities in the pelvis and long bone. Some of them also presented with waddling gait, bilateral streblomicrodactyly, bended upper arm, genu valgum, and left femoral head subluxation. Bone turnover parameters were normal. Proband 4 presented with 2nd and 3rd right phalanges thickening after frostbite. She and her mother also presented with shortening of the 4th and 5th toes and teeth loss. X-ray showed cortical bone thickening of right radius, ulna, carpal bone, metacarpal bone and phalanges, with increased BMD.
Conclusion: We reported the first SMDK and FDAB cases in Chinese. The 3 SMDK families carry the same mutation R594H, which implicated that R594H may be a hot-spot mutation in the Chinese population as well. A novel splice-site mutation was found in the FDAB family, which is the first splice-site mutation of TRPV4 gene reported and causes skipping of exon 8. Our findings expanded the phenotypic spectrum and genetic database of TRPV4-associated disorders.

P81

Analysis of Novel Mutations in CYP27B1 and Response to Short-Term Active Vitamin D3 Treatment in Chinese Patients With Pseudo-Vitamin D-Deficiency Rickets (PDDR)

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Background: Pseudovitamin D-deficiency rickets (PDDR) is a rare autosomal recessive disorder resulting from a defect in renal 25-hydroxyvitamin D 1α<-hydroxylase, which is encoded by the *CYP27B1* gene. The aim of this study was to identify the *CYP27B1* mutations and investigate the response to short-term treatment of calcitriol in Chinese patients with PDDR.
Methods: We investigated *CYP27B1* mutations in 7 individuals from 6 separate families. In order to investigate the response to short-term treatment with calcitriol in PDDR patients, we additionally collected clinical data of 8 families from our previous report and analyzed the biochemical parameter changes in the 15 patients.
Results: 9 different mutations were identified: two novel missense mutations (G194R, R259L), three novel and one reported deletion mutations (c1442delA, c1504delA, c311-321del and c. 48-60del), two novel nonsense mutations (c.85G>T, c.580G>T) and an insertion mutation (c1325-1332insCCCACCC), which has been reported previously. The statistical analysis revealed that ALP and PTH significantly decreased after 6-month treatment with calcitriol. The height change of the patients is positively related to the duration of the treatment (r=0.772, *P*=0.009).
Conclusion: We identified 7 novel mutations of *CYP27B1* gene in 7 Chinese PDDR families. Our findings revealed after the treatment of active vitamin D, PTH and ALP decreased to normal within 2 years. The height change of the patients is positively related to the duration of the treatment, which implicated the importance of long-term calcitriol supplementation for the growth development of the children with PDDR.

P82

Dyggve-Melchior-Clausen Syndrome a Case Report

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Background: Dyggve-Melchior-Clausen syndrome (DMC) is a rare autosomal-recessive type of skeletal dysplasia accompanied by variable degrees of intellectual disability (ID). It is characterized by progressive spondyloepimetaphyseal dysplasia leading to disproportionate short stature, microcephaly, and coarse facies. The radiographic appearance of generalized platyspondyly with double-humped end plates and the lace-like appearance of iliac crests are pathognomonic and distinctive in this syndrome. The disorder results from mutations in the *DYM* gene mapped in the 18q12-12.1 chromosomal region.
Objective: To carry out direct sequencing of genomic DNA in a patient with disproportionate short stature, developmental delay, severe ID and negative in urine glycosaminoglycans qualitative test and in his parents.
Results: The proband and his parents were identified as carriers of *DYM* gene mutation. Sequencing of the proband's *DYM* gene showed two heterozygous point mutations c.208C> T(p.Arg70X) and c.1677_1678insGTTT (p.K207VfsX109) to cause compound heterozygous mutations , which were inherited from his father and mother, respectively.
Conclusion: To the best of our knowledge, this is the first report of DMC from China. The proband is a compound heterozygous mutations carrier of DYM c.208C>T and DYM

c.1677_1678insGTTT, in which c.208C>T is a reported DYM mutation, and c.1677_1678insGTTT is a novel DYM gene mutation.

P83

ACVR1-Fc Fusion Protein Inhibits The Function of Constitutively Active Receptor ACVR1, Caused by Gain-Of-Function Mutations in Fibrodysplasia Ossificans Progressiva

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Background: Fibrodysplasia ossificans progressiva (FOP; MIM #135100) is a rare and severely disabling genetic disease characterized by progressive heterotopic ossification, without definitely effective therapies. A recurrent mutation (c.617G>A; R206H) in *ACVR1*, a subtype of bone morphogenetic protein (BMP) type I receptor, contributes to overactive BMP signaling. About 50% of cells in lesions of FOP individuals is of endothelial origin and endothelial cells could transform into multipotent stem-like cells after adenovirus-ACVR1^{R206H} infection and differentiate into osteoblasts and chondrocytes. The aim of this study was to evaluate the efficacy of a novel method for downregulating the overactive ACVR1 receptor on the above cell model.
Methods: In the present study, ACVR1-Fc fusion protein (FP) was generated, expected to be capable of competitively inhibiting the function of overactive ACVR1 receptor. In order to examine the effects of FPs, human umbilical vein endothelial cells (HUVEC), transfected by adenoviruses carrying a constitutively active mutant (c.617G>A) of ACVR1, was used as an *in vitro* model of FOP. After osteogenic or chondrogenetic induction, cells were identified as osteoblasts and chondrocytes. Then the efficacy of FP on overactive ACVR1 receptor was evaluated *in vitro*.
Results: The results from this study indicated that ACVR1-Fc fusion protein inhibited osteogenic and chondrogenetic differentiation and downregulated phosphorylation of both Smad 1/5/8 and p38 MAPK in ACVR1 signaling pathways in the HUVECs model.
Conclusion: Taken together, our results supported the role of ACVR1-Fc fusion protein in suppressing the function of overactive ACVR1, and its potential efficacy may pave the way not only for the treatment of FOP, but also for the heterotopic ossification syndromes associated with excessive BMP signaling pathways.

P84

Associations Between Fat Distribution and Volumetric Bone Mineral Density in Chinese Adults

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Background: To explore the association between fat mass and volumetric bone mineral density (vBMD) in Chinese Adults.
Methods: Using a cross-sectional investigation of 867 participants including 521 women and 346 men from China, vBMD and subcutaneous adipose tissue (SCAT) or visceral adipose tissue (VAT) were measured respectively by quantitative computed tomography (QCT).
Results: The peak vBMD values of the spine was observed at 30 to 39 years in women and at 20 to 29 years in men. In women, the peak values of VAT and SCAT were observed respectively at ≥70 years and 60 to 69 years. In men, the peak values of VAT and SCAT were observed respectively at ≥70 years and 30 to 39 years. Using the correlation tests, there was no correlation between SCAT and vBMD in both genders. Most relationships between VAT and BMD was negative (r = –0.204, P<0.01, in premenopausal women; r = –0.150, P<0.05, in postmenopausal women; and r= –0.181, P<0.05, in middle-aged men). After multiple linear regression analysis, correlations were disappeared.
Conclusion: There appears to be no correlation between fat distribution and vBMD in Chinese adults, further studies are needed to explore between fat distribution and vBMD.

P85

A Recurrent Mutation and a Novel Mutation in The HPGD Gene in Nine Patients with Primary Hypertrophic Osteoarthropathy

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Background: Hypertrophic Osteoarthropathy (HOA) is characterized with digital clubbing, periostosis and hyperdermia. Primary hypertrophic osteoarthropathy (PHO) is a hereditary bone disease which shares the same symptoms with Secondary Hypertrophic Osteoarthropathy. *HPGD* encoding 15-prostaglandin dehydrogenase (15-PGDH) and *SLCO2A1* encoding a kind of PGT were found responsible for PHO. The mutations of either of the two genes would lead to increased level of PGE2, which might be the cause of the constellation of the symptoms. The aim of this study was to analyze the *HPGD* gene and the clinical and radiological findings with 9 patients with the diagnosis of PHO.
Methods: Nine patients, including 2 siblings and the other 6 unrelated patients, were enrolled in the study. Sanger method was used to sequence the candidate *HPGD* gene to detect any mutations. We also analyzed the serum and urinary prostaglandin E2 (PGE2) and prostaglandin metabolite (PGE-M) levels for each of the 9 patients. Only one of these patients are female and her symptoms are less severe than the others, though she shared the same homozygous mutation with her brother and her PGE2 level were at the same level with the others.
Results: We identified a recurrent c.310_311delCT mutation presenting in all of the nine patients, of which 6 patients are homozygous, 2 patients heterozygous as well as 1 patient is compound heterozygous with this mutation and a novel heterozygous missense mutation c.488G>A (p.R163H) in one of these nine patients with PHO. The onset ages are between

1 year old and 16 years old. And the PGE2 is significantly higher than normal with lower PGE-M level.
Conclusion: We identified a recurrent mutation and a novel mutation in *HPGD* gene responsible for PHO. It is likely to be a hot-spot mutation site for PHO patients.

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A Meta-Analysis of Distal Radial Fractures Comparing Closed Reduction and Pinning Fixation with Open Reduction and Internal Fixation
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Background: Distal radial fractures (DRF) are one of the most common fractures in the world, and both Pinning with cast or supplementary external fixation and internal fixation especially plating were widely used. We asked (1) does plating shows superior to pinning in functional recovery, clinical outcomes and complication rate; (2) does supplementary external fixation help improve the outcomes of pinning.
Methods: PubMed, EMBASE, Ovid, Scopus and ISI Web of Science were searched, using the search strategy of "(distal radial fractures OR distal radius fractures OR colles fractures OR smith fractures OR wrist injuries) AND (plate OR plating) AND (pinning OR pins)". All randomized controlled trials (RCTs) comparing functional recovery, clinical outcomes, radiological measurement and complications between pinning and plating for DRF were identified.
Results: Ten of 5287 literatures with 601 patients were included. Plating showed better functional recovery at 3 (P<0.0001), 6 (P<0.0001) and 12 (P=0.0002) months. Cast showed superiority compared with external fixation in DASH score at 12 months (P=0.05). Plating showed lower infection rate (P=0.0001), but higher secondary surgical rate (P=0.0004) and longer operation time (P<0.00001). Pinning showed a better result in ulnar variance (P=0.01). We found significant difference in grip strength at 3 months in favor of plate (P<0.0001), but the opposite result at 12 months (P<0.00001). Plating showed better result in extension, flexion, supination, ulnar deviation at 3 months (P<0.05), but worse result in extension and ulnar deviation at 6 and 12 months and flexion at 12 months (P<0.05).
Conclusion: With better functional recovery and lower infection rate, open reduction and internal fixation with locking plate is preferential to closed reduction and pinning fixation. Cast is preferred as the supplementary fixation for pinning if there is no need for supplementary external fixation. However, more RCTs with high quality are needed to prove our conclusion.