During mean 4.7 years, 1872 sustained one or more MOF. For each standard deviation reduction in TBS, there was a 36% increase in MOF risk (HR 1.36, 95% CI 1.30–1.42, p < 0.001). When adjusted for significant clinical risk factors and femoral neck BMD, lumbar spine TBS was still a significant predictor of MOF (HR 1.18, 95% CI 1.12–1.23). Models for estimating MOF probability, accounting for competing mortality, showed that low TBS (10th percentile) increased risk 1.5–1.6 fold compared with high TBS (90th percentile) across a broad range of ages and femoral neck T-scores. They concluded that lumbar spine TBS is able to predict incident MOF and hip fractures independent of FRAX clinical risk factors and femoral neck BMD even after accounting for the increased death hazard. Such results would have to be cross-validated in other cohorts. As such, I will share preliminary results from an ongoing worldwide individual level meta-analysis study validating results from the Manitoba cohort. (1) WD Leslie, H Johansson, JA Kanis, A Odén, E Mccloskey, D Hans. Lumbar Spine Texture Enhances Ten-Year Fracture Probability Assessment. Osteoporos Int. 2014 Jun 21. [Epub ahead of print]

Brief CV
Research Area(s): Pr. Hans has over 25 years of experience working in the musculoskeletal field, with particular emphasis on DXA, microarchitecutre, ultrasound imaging techniques and body composition.
Technical Expertise: Pr. Hans earned a Ph.D. in Medical Physics with honors from Claude Bernard University in Lyon, France. He also earned his Masters of Science degree with honors in the area of Acoustic, Signal and Image Pro- cessing and Ultrasound from Claude Bernard University. He completed recently his expertise with a Master Business Administration in Entrepreneur- ship from HEC in Geneva Switzerland.
Prior his current position, Pr. Hans was during 10 years the Head of R&D in the Radiology Department, Bone and Body Composition Laboratory at University of Geneva, Switzerland. Previously, he was the Director of the Quality Assurance Center for Clinical Research and the Associate Director of R&D for the ultrasound unit at the Osteoporosis and Arthritis Research Group (OARG) at UCSF, San Francisco, USA (directed by Prof Harry K. Genant). At earlier stage, he was the Director of both Bone Densitometry and New Technologies Department and Quality Assurance Center at the Centre d’Épidémiologie des Osteoporoses in Lyon, France (directed by Prof Pierre J. Meunier and Pierre D. Delmas).
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RECONSIDERATION FOR MILD WEDGE OR SHORT VERTEBRAE WITH AGE DISTRIBUTION FROM LATERAL SPINAL RADIOGRAPHS
Wei Yu
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Introduction: Radiographic assessment of vertebral fractures is limited by the inability to distinguish mild fractures from congenital mild wedge deformities or vertebral of short vertebral height. We attempted to quantify the expected background prevalence of these deformities by measuring vertebral fracture prevalence across all age groups in a large hospital-based retrospective Chinese cohort.

Methods: We reviewed eligible lateral chest radiographs from patients admitted to Peking Union Medical College Hospital during 2011 using the Genant semiquantitative method for vertebral fracture assessment (14- L2). We evaluated fracture prevalence among subjects by sex, 10-year age group, and fracture severity grades subjectively. We further analyzed characteris- tics of subjects with mild (grade I) fractures to estimate the relative contribution of congenital mild wedge deformities.

Results: A total of 10,720 subjects (5396 men and 5324 women) with lateral chest radiographs were evaluated. Subjects ranged in age from 0.5 to 97 years with a mean of 51.8 ± 17.4 years (Men: 52.8 ± 17.6 years; Women: 50.8 ± 17.2 years). When stratified by 10-year age groups, the prevalence of vertebral fractures was relatively low until about 40 years of age, after which prevalence increased for both genders. Fractures (13 fractures for 9 males and 6 fractures for 5 females) seen in subjects younger than 40 years of age were almost exclusively mild grade fractures. No fractures were iden- tified in subjects younger than 20 years of age.

Conclusions: Mild or wedge-shaped vertebral body changes on lateral radiographs are rare among young subjects, indicating that when mild vertebral deformities are found among adults, they are likely to be the product of ag- ing and not congenital variation. Clinically therefore, mild vertebral body changes should be managed as osteoporosis or at least considered as a risk factor for osteoporotic fracture.

Brief CV
Wei Yu, M.D. was promoted to be a professor at the department of radiology, Peking Union Medical College Hospital Beijing China in 1999. He has published about 80 articles related to both musculoskeletal diseases and osteoporosis, including bone densitometry for diagnosis and quality control. Dr. Wei Yu received his Bachelor Degree from China Medical University in 1984, and MD from Peking Union Medical College 1991. He has studied at Radiology department, University of California San Francisco (UCSF) and had his post-doctor certification between 1993–1955. He was appointed as visiting associated professor from 1997 to1998 at Radiology department, University of California San Francisco. He was a member of WHO scientific group on prevention and management of osteoporosis between 1997 to 1999, and has been a standing committee member and secretary-general of Chinese society of osteoporosis and bone mineral research of CMA (Chinese Medical Associ- ation) since 2001. Now, he has been appointed to be vice president of Chinese society of osteoporosis and bone mineral research of CMA since 2012.

COMPARISON OF QCT WITH DXA IN THE MANAGEMENT OF OSTEOPOROSIS
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Bone mineral density assessment plays an important role in the management of osteoporosis. DXA is widely used and well recognized in the medical professionals. However, due to the projection nature of DXA technique, its limitation and drawback are not well recognized. QCT is a true volumetric BMD measurement, but its potential advantage and application in the management of osteoporosis are not fully explored. In this presentation, we will compare the performance of QCT with DXA in the diagnosis, monitoring and pre-op evaluation of osteoporosis. In a comparison of QCT with DXA in measuring the lumbar vertebral BMD of over 500 healthy young adults (20–40 years old) in Beijing, Shanghai and Guangzhou, the taller and heavier subjects from Beijing and Shanghai have higher aBMD by DXA, but lower vBMD by QCT than the Guangzhou subjects. The performance of QCT and DXA in diagnosing osteoporosis in Chinese population was evaluated. 367 elder subjects with mean age of 69 yrs old underwent QCT (Mindways, USA) of the spine, DXA (GE iDXA, USA) of the hip and spine in the same day. Then -2.5 SD DXA criteria and below 80 mg/ ml QCT criteria for diagnosis of osteoporosis were applied for this population. The DXA classification of 69.4% subjects agreed with the QCT results, while 31.6% of the subjects had discordant classification, i.e., QCT diagnosed as osteoporosis but not with DXA. This may indicated that with DXA measurement a substantial portion of elders was misclassified and not treated.
QCT BMD measurement can be achieved with the routine CT scans, it is particular important for the hip and spine fractures, the vBMD results can be used to diagnose osteoporosis and useful in the pre-op planning.

Brief CV
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Research Area(s): Radiology, bone density measurement
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TRABECULAR BONE SCORE PREDICTS FRACTURE INCIDENCE IN NON-OSTEOPOROTIC OLDER CHINESE MEN
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Department of Medicine & Therapeutics, The Chinese University of Hong Kong
Jockey Club Centre for osteoporosis care and control, The Chinese University of Hong Kong, Hong Kong

Background: Trabecular bone score (TBS) based on secondary analysis of pixel gray-level variations in DXA images of the lumbar spine is an indirect novel surrogate marker of global bone microarchitecture. There are cross sectional and prospective data to suggest that TBS is independently associated with fracture. There is however a lack of prospective data to confirm its role in fracture prediction in Chinese population and whether such role remains in non-osteoporotic subjects.

Subject and method: 2000 men and 2000 women aged 65 years or more were recruited in 2001—3 for predictors of osteoporotic fractures. At baseline, comprehensive health assessment was performed. Bone mineral density (BMD) of hip and spine was measured by Hologic dual energy X-ray absorptiometry. All subjects were followed up for an average of ten years for incidence of fractures primarily by electronic medical record system of the public hospitals in Hong Kong. Cox regression was performed to examine the association between baseline TBS scores (as assessed by TBS InNight, Medimaps SA) and the incidence of major osteoporotic fractures over ten years. Femoral neck BMD was used as covariate. The subjects with osteoporosis as defined by T-score ≤ −2.5 at either hip or spine were excluded from analysis.

Result: 1665 men and 1071 women had BMD within the normal and osteopenia range at baseline. Out of these, 91 men and 91 women had major osteoporotic fractures over ten years. Out of these 41 men and 19 women had hip fractures. Cox regression after adjustment for hip BMD and age showed that TBS score was significantly associated with major osteoporotic fracture in older men, but not in women (p = 0.025 and 0.112 in men and women respectively). In contrast, TBS predicted hip fracture in older women but not in older men (p = 0.048 and 0.393 respectively). Similar results were obtained when FRAX score was used as covariate.

Conclusion: TBS of lumbar spine was predictive of major osteoporotic fracture in older Chinese men without osteoporosis independently of clinical risk factors and hip BMD. The role of TBS in predicting osteoporotic fractures in non-osteoporotic older women requires a larger study.

Brief CV
Appointments
1.8.06 — Professor II in Medicine/Geriatric Medicine Prince of Wales/Shatin Hospitals, Shatin, Hong Kong
1.7.04 Director of Jockey Club Centre of Positive Ageing 2010 Director of CUHK Jockey Club Centre for osteoporosis care and control

Representative publications (total number of publications: 168)

HIGH-THROUGHPUT CELL IMAGING IN BONE SYSTEMS BIOLOGY
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Cyclic mechanical loading is perhaps the most important physiological factor regulating bone mass and shape in a way which balances optimal strength with minimal weight. This bone adaptation process spans multiple length and time scales. Forces resulting from physiological exercise at the organ scale are sensed at the cellular scale by osteocytes, which reside inside the bone matrix. Via biochemical pathways, osteocytes orchestrate the local remodeling action of osteoblasts (bone formation) and osteoclasts (bone resorption). Together these local adaptive remodeling activities sum up to strengthen bone globally at the organ scale. To resolve the underlying mechanisms it is required to identify and quantify both cause and effect across the different scales. Progress has been made at the different scales experimentally. Computational models of bone adaptation have been developed to piece together various experimental observations at the different scales into coherent and plausible mechanisms. However additional quantitative experimental validation is still required, especially on the cellular level, to build upon the insights which have already been achieved. A systems biology approach to understanding biological systems demands the development of high-throughput imaging methods which are capable of yielding spatiotemporal information at single cell resolution. Given the diverse micro-mechanical environment which exists in loaded trabecular bone, the availability of such data for osteocytes would undoubtedly enhance our understanding of their role in bone remodelling. As part of this presentation, emerging as well as state-of-the-art techniques of high-throughput imaging will be discussed and how these techniques might be used in a systems biology approach to further our understanding of the mechanisms governing load induced bone adaptation, i.e. ways will be outlined in which imaging and computational approaches could be coupled, in a quantitative manner to create more reliable multiscale models of bone.