11th Regional Osteoporosis Conference

ISCD Bone Densitometry Courses and Certification Examinations 2010 &
1st ISCD Vertebral Fracture Assessment Course in Hong Kong

13-14 May 2010 Novotel Century Hong Kong Hotel

15-16 May 2010 Hong Kong Convention & Exhibition Centre

PROGRAMME BOOK

Organised by:

OSHK
香港骨質疏鬆學會

Osteoporosis Society of Hong Kong

Co-organised by:

Hong Kong Geriatrics Society

ISCD Course Endorsed by:

ISCD

International Society for Clinical Densitometry

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Welcome Message

On behalf of the Organising Committee, we have great pleasure in inviting you to attend the 11th Regional Osteoporosis Conference, held on 15-16 May 2010 at the Hong Kong Convention and Exhibition Centre. The Conference is organised by the Osteoporosis Society of Hong Kong and co-hosted with the Hong Kong Geriatrics Society.

Advancing age is clearly a major risk factor for osteoporosis and fractures. Hence the joint symposium with the Hong Kong Geriatrics Society will focus on fall prevention, use of vitamin D and calcium as well as safety of bisphosphonates in the elderly population. This year, we are honoured to have several leading clinicians and vision researchers from Australia, Canada, Germany, UK and USA to address the state-of-the-art developments in osteoporosis. Together with our local experts, we hope this conference can stimulate and promote knowledge exchange between our renowned speakers and our participants. The topics to be covered include pathophysiology of osteoporosis in men and women, role of imagings in fracture risk prediction, steroid induced osteoporosis, atypical fracture and other new developments. This is also the first time that we offer a complementary Hands-on Interactive Workshop on Bone Mineral Density (BMD) Measurement and Scan Interpretation during the conference.

A poster session will be organised to provide a forum for continued and expansive coverage of topics related to osteoporosis and a Young Investigator Award will be presented to the best poster presentation from our young investigators.

An exciting addition to the conference is our ISCD Bone Densitometry Courses and Certification Examinations as well as the 1st ISCD Vertebral Fracture Assessment (VFA) Course in Hong Kong. As most vertebral fractures are silent, the addition of VFA to BMD measurement will improve our clinical acumen in fracture diagnosis.

We look forward to seeing you at the ISCD courses and the 11th Regional Osteoporosis Conference in Hong Kong.

Dr Sue LO
President
Osteoporosis Society of Hong Kong

Dr Bernard KONG
President
Hong Kong Geriatrics Society

Congratulatory Message

Congratulatory Message from the Under Secretary for Food and Health, the Government of the Hong Kong Special Administrative Region

With the demographic and epidemiologic transitions, osteoporosis has become an increasingly common chronic condition in Hong Kong, as elsewhere. Along with other chronic illnesses, the Department of Health has formulated a Strategic Framework that will guide the work of Government as we develop new or revisit existing policies and services.

Allow me to highlight a few specific initiatives that the public sector has put in place recently in addressing this burgeoning illness burden. On pharmaceutical solutions, the Hospital Authority is now providing bisphosphonates as a standard drug to the 4,000 or so post-operative patients with hip fractures every year. Doctors' advice on non-pharmacologic options on lifestyle and behavioral modification, such as physical activity prescription, smoking cessation services and dietary therapy is also standard across our facilities. Rehabilitation programmes for pain control and general enhancement of quality of life are another important component in our osteoporosis management strategy. Of particular note, both public executive agencies namely the Department of Health and the Hospital Authority have reinforced their team-based initiatives in fall prevention, especially amongst senior citizens, to good effect.

Of course, there remains much work to be done in better understanding osteoporosis and developing novel interventions that would prevent and retard the development of this condition, and manage its consequences. Your dedicated efforts in this regard are indispensable therefore.

On this note of knowledge synthesis and the translation of science into clinical care, I extend my warmest welcome to all delegates to this important Conference and wish you a most productive meeting. On behalf of the patients who will benefit much from your collective wisdom and impact, I thank you for contributing to this event and hope that you will continue to exchange ideas and generate new insights.

Prof Gabriel M LEUNG, JP
Under Secretary for Food and Health
The Government of the HKSAR

Congratulatory Message

Congratulatory Message from the President of the Hong Kong Academy of Medicine

On behalf of the Hong Kong Academy of Medicine, I extend my sincerest congratulations to the Osteoporosis Society of Hong Kong on the great success in organizing this key Conference in Hong Kong.

Osteoporosis is a disease affecting many millions of people around the world. According World Health Organization, osteoporosis causes more than 8.9 million fractures annually worldwide. Osteoporosis fractures are a major cause of morbidity and disability in older people, imposing a considerable economic burden on health services worldwide. It is estimated that approximately 1.66 million hip fractures occur each year worldwide, and that the incidence would increase four-fold by 2050 because of the increasing population of elders.

In Hong Kong, the ageing population increases rapidly. The proportion of elder people in our population will double from one in eight in 2007 to one in four by 2033. We should therefore pay more attention to age-related diseases in order to prepare for its impact on our community.

I applaud the hard work and effort of the Society in bringing all experts together to share their knowledge and expertise in treatment of the disease in this Conference; and to advise on building up ancillary strategies to prevent osteoporotic fractures in our elderly population.

I wish the Conference a great success.

Prof Raymond LIANG
President
Hong Kong Academy of Medicine

Programme

ISCD Course Programme

13-14 May 2010 (Thursday - Friday)
Venue: Plaza 3-4, Lower Lobby, Novotel Century Hong Kong Hotel

ISCD Full Faculty

Prof David KENDLER (Canada), Prof Annie Wai-chee KUNG (Hong Kong), Dr Ekaterina ZIVANOVIC (Australia)

Guest Faculty

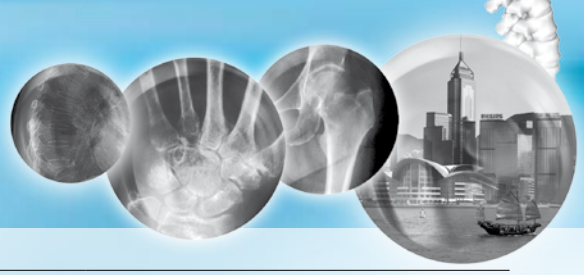
Dr Frankie Pak-tat CHOI, Dr Andrew Yiu-yan HO, Dr Tai-pang IP, Dr Jenny Yin-yan LEUNG, Dr Catherine Yuet-hung WONG

ISCD Bone Densitometry Courses & Certification Examinations 2010

Day One: 13 May 2010 (Thursday)

08:30	**Registration**	
	General Combined Session	
08:45	**ISCD Introduction and Objectives** *(Prof Annie Wai-chee KUNG)*	
09:00	**Overview of Osteoporosis** *Definitions, pathophysiology, and epidemiology* *(Prof David KENDLER)*	
10:00	**Basic Science of Bone Densitometry & Device Operating Principles** *Introduction to diagnosis, fracture risk, monitoring, and clinical indications* *(Dr Frankie Pak-tat CHOI)*	
10:45	**Tea Break**	
11:00	**X-Ray Science, Radiation Safety & Quality Assurance** *Available techniques and technical principles of central skeletal DXA and peripheral densitometry* *(Dr Frankie Pak-tat CHOI)*	
	Divided Sessions	
	Clinician Course	**Technologist Course**
12:00	**Clinical Evaluation of Bone Health** *Value of bone densitometry in diagnosis and monitoring of osteoporosis* *(Dr Andrew Yiu-yan HO)*	**Clinical Management of the Osteoporotic Patient** *(Dr Tai-pang IP)*
13:00	**Buffet Lunch**	12:45 **Buffet Lunch**
13:30		**Quality Control** *(Dr Ekaterina ZIVANOVIC)*
14:00	**Use of Bone Densitometry for the Diagnosis of Osteoporosis** *Strengths and limitations of WHO criteria, diagnosis in different patient groups, central vs. peripheral sites* *(Dr Tai-pang IP)*	
14:15		**Role of the Technologist** *(Dr Ekaterina ZIVANOVIC)*
14:45	**Assessment of Fracture Risk**	
15:00	*Expressing risk, integration of clinical risk factors, assessment of risk by central skeletal and peripheral methods* *(Prof David KENDLER)*	**Anatomy in Bone Densitometry** *(Dr Catherine Yuet-hung WONG)*
15:30	**Tea Break**	

Programme



15:45	**Monitoring with Bone Densitometry** *Precision and serial monitoring, determining significance of change and appropriate follow-up interval* *(Dr Jenny Yin-yan LEUNG)*	**Patient Positioning & Scan Acquisition** *(Dr Ekaterina ZIVANOVIC)*
16:30	**Clinical Management of Osteoporosis** *Laboratory evaluation and overview of pharmacologic management* *(Dr Jenny Yin-yan LEUNG)*	**Scan Analysis** *(Dr Ekaterina ZIVANOVIC)*
17:15	**Faculty Panel Discussion**	**Scan Results and Interpretation** *(Dr Catherine Yuet-hung WONG)*
17:30	**Clinician Course ends**	
17:45		**Faculty Panel Discussion**
18:00		**Technologist Course ends**

Day Two: 14 May 2010 (Friday Morning)

	General Combined Session	
08:30	**Principles of DXA Scan Interpretation** *Patient positioning, proper scan analysis, artifacts, recommendations for interpretation and reporting* *(Dr Ekaterina ZIVANOVIC & Dr Andrew Yiu-yan HO)*	
	Divided Sessions	
	Clinician Course	**Technologist Course**
09:15	**Principles of Reporting DXA Scan** *Standard nomenclature, ISCD recommendations for reporting* *(Dr Tai-pang IP)*	**Vertebral Fracture Assessment** *(Dr Ekaterina ZIVANOVIC)*
10:00	**Tea Break**	
10:15	**Clinician Certification Examination**	**Technologist Certification Examination**
12:15	End of Examination	End of Examination

1st ISCD Vertebral Fracture Assessment Course in Hong Kong

Day Two: 14 May 2010 (Friday Afternoon)

11:45-12:45	**Registration & Buffet Lunch**
12:45	Introduction to Vertebral Fracture Assessment *(Prof David KENDLER)*
13:45	Technical Aspects of VFA Imaging *(Prof Annie Wai-chee KUNG)*
14:45	**Tea Break**
15:00	VFA Indications and Interpretations *(Prof David KENDLER)*
16:00	Principles of Reporting VFA *(Prof Annie Wai-chee KUNG)*
17:00	VFA Cases Study Review and Workshop *(Prof David KENDLER)*
18:00	VFA Course ends

Programme

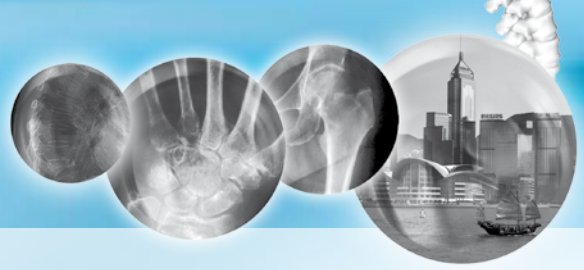
11th Regional Osteoporosis Conference Programme

15-16 May 2010 (Saturday - Sunday)
Room S421, 4/F, Hong Kong Convention & Exhibition Centre (Old Wing)

15 May 2010 (Saturday)

12:00-16:30	Registration
12:30-14:00	**Session 1: Eli Lilly Lunch Symposium** Chairperson: *Prof Annie Wai-chee KUNG*
	Impact of Treatment Adherence on Fracture Rates *Prof David KENDLER, University of British Columbia, Canada*
14:00-14:30	**Opening Ceremony** Guest of Honour: *Prof Raymond LIANG, President, Hong Kong Academy of Medicine* *Presentation of the Young Investigator Award*
	Session 2: Osteoporosis Society of Hong Kong Symposium Chairpersons: *Dr Chi-fai KO & Dr James Ka-hay LUK*
14:30-15:05	**Pathophysiology of Osteoporosis in Men and Women: Similarities and Differences** *Prof David KENDLER, University of British Columbia, Canada*
15:05-15:40	**Fracture Risk Prediction: Central DXA and Other Modalities of Measurement of Bone Strength** *Dr Ekaterina ZIVANOVIC, East-West DXA Consultancy, Australia*
15:40-16:00	Tea Break
	Chairpersons: *Dr Andrew Yiu-yan HO & Dr Tai-pang IP*
16:00-16:35	**Osteoporotic Fracture Healing and Atypical Fracture** *Dr Tak-wing LAU, Queen Mary Hospital, Hong Kong*
16:35-17:10	**Osteoporosis Associated with Haematological Diseases** *Dr Wing-yan AU, Queen Mary Hospital, Hong Kong*
17:10-18:10	**Session 3: Novartis Symposium** Chairperson: *Prof Chak-sing LAU*
	Advanced Therapy across the Spectrum of Patients with Osteoporosis *Prof David M. REID, University of Aberdeen, United Kingdom*
18:30-20:30	Faculty Dinner *(By Invitation Only)* Golden Bauhinia, Hong Kong Convention & Exhibition Centre (New Wing)

Programme



16 May 2010 (Sunday)

09:00-12:00	Registration
09:30-10:00	Morning Refreshment
	Session 4: Joint Symposium with the Hong Kong Geriatrics Society Chairpersons: *Dr Sue Seen-tsing LO & Dr Bernard Ming-hei KONG*
10:00-10:35	**Safety Issues of Bisphosphonates** *Prof Timothy Chi-yui KWOK, The Chinese University of Hong Kong, Hong Kong*
10:35-11:10	**Fall Prevention in Elderly - the Strategy in a Regional Hospital** *Dr Chung-tai SY, Pamela Youde Nethersole Eastern Hospital, Hong Kong*
11:10-11:45	**Use of Vitamin D and Calcium in Elderly** *Dr Jenny Yin-yan LEUNG, Ruttonjee Hospital, Hong Kong*
11:45-12:00	Q & A
12:00-13:30	**Session 5: Servier Luncheon Symposium** Chairperson: *Dr Jenny Yin-yan LEUNG*
	Strontium Ranelate: Next Step in the Treatment of Osteoporosis *Prof Dieter FELSENBERG, Charité - University Medicine Berlin, Germany*
13:30-14:30	**Session 6: GSK Symposium** Chairperson: *Prof Annie Wai-chee KUNG*
	Exploring New Frontiers in Osteoporosis Therapy: Denosumab *Dr Lorraine A. FITZPATRICK, GlaxoSmithKline, USA*
14:30-15:30	**Session 7: sanofi-aventis Symposium** Chairperson: *Dr Tai-pang IP*
	Glucocorticoid-induced Osteoporosis: Focus on Bisphosphonates *Dr Chi-chiu MOK, Tuen Mun Hospital, Hong Kong*
15:30-16:30	**Session 8: MSD Symposium** Chairperson: *Dr Andrew Yiu-yan HO*
	Relevance of Vitamin D in Osteoporosis Patients: Key Clinical Considerations *Prof John Allan Eisman AO, Medicine (Conjoint) of the University of New South Wales, Australia*
16:30-16:40	**Closing Remarks**

Hands-on Interactive Workshop on BMD Scans

15-16 May 2010 (Saturday – Sunday)
Room S425, 4/F, Hong Kong Convention & Exhibition Centre (Old Wing)

There are 9 time slots with the same workshop content and each lasts for 55 minutes. The seat capacity for each time slot is 8 delegates (Total: 72 pax). Seat for each time slot is available on first-come-first-served basis. Prior registration is required. Delegates can register at the entrance of Room S425 15 minutes before each time slot or pre-register with the staff there starting from 14:20 on 15 May for later time slots.

15 May 2010 (Saturday)					
Time Slot 1	14:40-15:35	Time Slot 2	16:00-16:55	Time Slot 3	17:00-17:55
16 May 2010 (Sunday)					
Time Slot 4	10:00-10:55	Time Slot 5	11:00-11:55	Time Slot 6	12:30-13:25
Time Slot 7	13:30-14:25	Time Slot 8	14:30-15:25	Time Slot 9	15:30-16:25

*Prior registration is required.

Organising Committee & Accreditations

Organising Committee

Chairman: Dr Andrew Yiu-yan HO

Members:

Dr William Shing-kee CHEUNG
Dr Eddie Siu-lun CHOW
Dr Tai-pang IP
Dr Anita Sik-yau KAN
Prof Annie Wai-chee KUNG
Dr Jenny Yin-yan LEUNG
Dr Sue Seen-tsing LO
Ms Connie Hong-nin LOONG
Dr Wai-ming WONG

Accreditations

CME, CPE, CDE and CNE accreditations have been sought from following colleges/programmes. Registered participants can be accredited CME, CPE, CDE and CNE as follows:

	Max for Whole Function	Clinician Course (13-14 May)	Tech. Course (13-14 May)	VFA Course (14 May)	Whole Conference (15-16 May)	ROC Conference (15 May)	ROC Conference (16 May)	Category and Remarks
CME								
Hong Kong College of Community Medicine	10	7	7	5	10	5	6	
Hong Kong College of Family Physicians	10	7	7	5	10	5	5	Cat. 5.2
Hong Kong College of Emergency Medicine	Pending							
Hong Kong College of Orthopaedic Surgeons	-	8	8	3	6	3	3	Cat. B
Hong Kong College of Physicians	-	9	9	5	11	4.5	6.5	
Hong Kong College of Radiologists	25	9	9	5	11	4.5	6.5	Cat. B
MCHK CME Programme *(The Medical Council of Hong Kong CME Programme)*	10	7	7	5	10	5	5	Accredited by HKAM
CPE								
Hong Kong Physiotherapy Association	-	9	9	5	10	5	5	
Hong Kong Occupational Therapists Board	9	5	5	2.5	5	2.5	2.5	Code: BP10059
Hong Kong Radiographers Board	15	8.5	8.5	5	9.5	4.5	5	CPD points
CDE								
Hong Kong Dietitians Association	-	8	8	4	8	5	5	Non core points
CNE								
Queen Mary Hospital, Central Nursing Department	Pending							

Faculty

Prof John Allan Eisman AO	Australia
Dr Wing-yan AU	Hong Kong
Dr William Shing-kee CHEUNG	Hong Kong
Dr Frankie Pak-tat CHOI	Hong Kong
Dr Eddie Siu-lun CHOW	Hong Kong
Prof Dieter FELSENBERG	Germany
Dr Lorraine A. FITZPATRICK	USA
Dr Andrew Yiu-yan HO	Hong Kong
Dr Tai-pang IP	Hong Kong
Dr Anita Sik-yau KAN	Hong Kong
Prof David KENDLER	Canada
Dr Chi-fai KO	Hong Kong
Dr Bernard Ming-hei KONG	Hong Kong
Prof Annie Wai-chee KUNG	Hong Kong
Prof Timothy Chi-yui KWOK	Hong Kong
Prof Chak-sing LAU	Hong Kong
Dr Tak-wing LAU	Hong Kong
Dr Jenny Yin-yan LEUNG	Hong Kong
Dr Sue Seen-tsing LO	Hong Kong
Ms Connie Hong-nin LOONG	Hong Kong
Dr James Ka-hay LUK	Hong Kong
Dr Chi-chiu MOK	Hong Kong
Prof David M. REID	United Kingdom
Dr Chung-tai SY	Hong Kong
Dr Catherine Yuet-hung WONG	Hong Kong
Dr Wai-ming WONG	Hong Kong
Dr Ekaterina ZIVANOVIC	Australia

Exhibition

Date: 15 May 2010 (12:00-18:00)
16 May 2010 (09:30-16:30)

Venue: Room S423-424, Hong Kong Convention and Exhibition Centre (Old Wing)

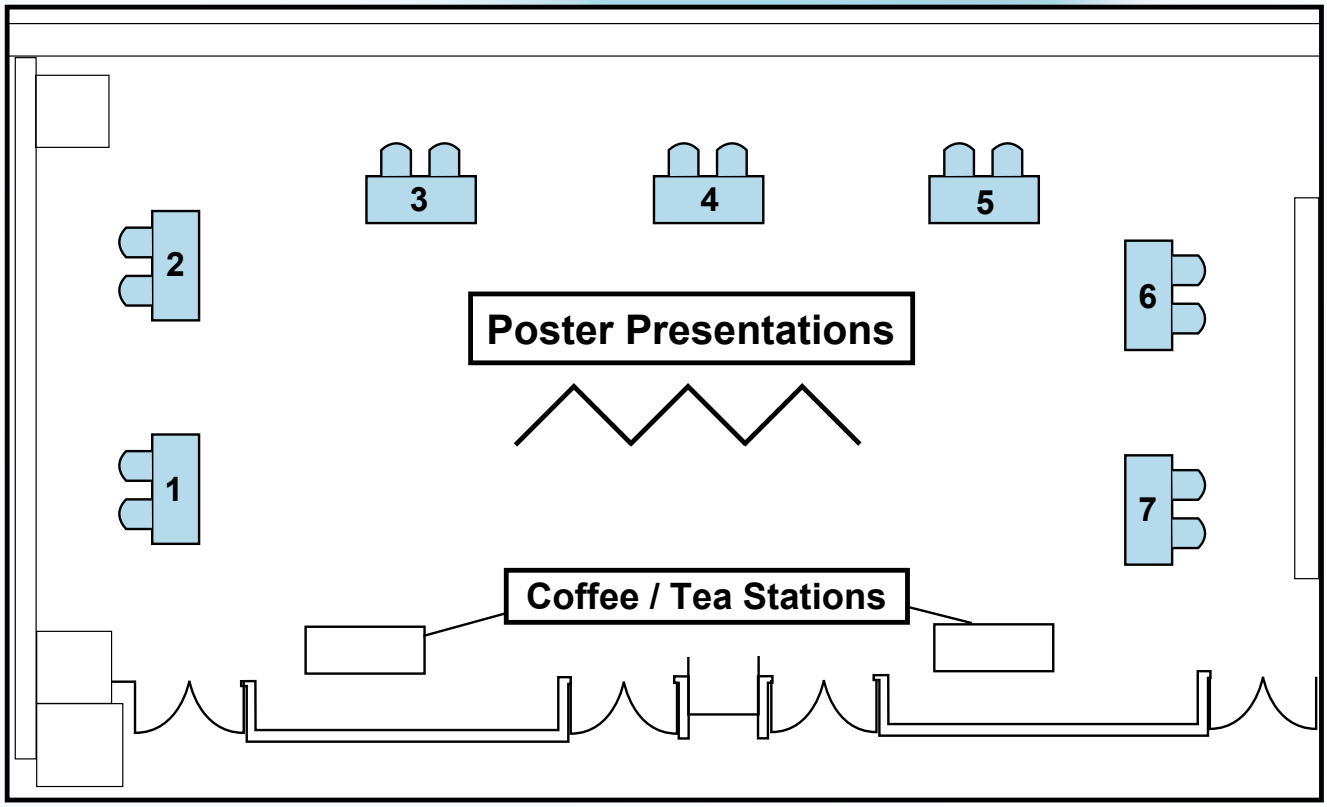
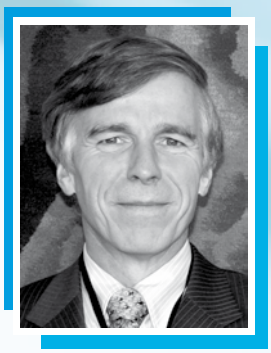


Table No.	Company
1	Servier Hong Kong Ltd
2	Novartis Pharmaceuticals (HK) Ltd
3	Roche Hong Kong Ltd
4	sanofi-aventis Hong Kong Ltd
5	Merck Sharp & Dohme (Asia) Ltd
6	GlaxoSmithKline Ltd
7	Eli Lilly Asia, Inc

Impact of Treatment Adherence on Fracture Rates



Prof David KENDLER
Director, Osteoporosis Research Centre (ProHealth)
Associate Professor of Medicine, Endocrinology
University of British Columbia, Canada

Numerous osteoporosis therapies have been proven in clinical trials to provide significant anti-fracture benefits to individuals with low bone mineral density (BMD). In clinical trials, participants are carefully selected through restrictive inclusion and exclusion criteria and those eligible to participate are closely monitored by professional healthcare staff for the duration of the trial. These carefully screened individuals are not representative of all patients in the community and the healthcare and monitoring they receive during a clinical trial is rarely (if ever) attained in "real-world" medical practice. While the rates of medication adherence even in closely-monitored clinical trials are not optimal, they are markedly better than in the real-world setting. Therefore, the efficacy ascribed to therapies from clinical trials can only be assumed with patients similar to those from the trial and with similar levels of adherence.

Poor adherence to therapy generally limits therapeutic effectiveness in any drug class. Lower adherence to anti-fracture medication translates into a greater number of fractures than suggested from clinical trial data. Effective strategies to increase anti-fracture medication adherence are needed to reduce the burden of fragility fracture.

Adherence is a general term that encompasses both persistence and compliance, and refers to taking medications as instructed over a given time period. Compliance to medication is the extent to which a patient acts in accordance with the prescribed interval and dosing regimen. Persistence to medication is the duration of time from initiation to discontinuation of therapy.

In chronic diseases, where the benefit of therapy is often not overt, adherence is usually very low, typically dropping markedly within the initial six months of therapy, with slower declines thereafter.

It is difficult to predict and to detect non-adherence in patients. In research and some clinical settings, direct and indirect methods provide estimates of patient adherence to therapy. Direct methods, such as patient observation or measurement of biochemical markers or medicine metabolites, are typically expensive and/or require significant resources. Indirect methods, including patient questionnaires, pill counts, prescription refill rates, and electronic medication monitors, while less expensive, can over-estimate adherence; questionnaires can be susceptible to misrepresentation and pill counts, prescription refill rates and electronic refill monitors do not ensure the pills were taken as prescribed or taken at all, but are recorded as such.

Compliance is most-commonly assessed as the medication possession ratio (MPR), a ratio of the amount of medication dispensed over a given time period as compared to the prescribed amount (an MPR of ≥80% is most-commonly considered compliant in osteoporosis studies). Compliance with the prescription is assumed when the medication is dispensed. MPR, however, does not reflect whether the patient is actually taking the medicine and, if so, appropriately.

Poor adherence is one of the primary reasons for suboptimal clinical benefit and should be considered as a potential factor when a patient's condition is not responding to therapy.

Compliance within a year of initiating osteoporosis therapy is rarely over 60% and decreases significantly thereafter. The use of MPR likely overestimates true compliance as the effects of improper dosing of medications cannot be determined.
Persistence is typically very low within the first year of osteoporosis therapy. Persistence to osteoporosis therapy a year after initiation is rarely over 50%, regardless of medication, and decreases thereafter. This is particularly important since the anti-fracture effects of many of the therapies require a longer time for beneficial effects to be realized and need to be taken for many years to maximize fracture risk reduction.

Lower adherence to osteoporosis therapy leads to an increase in fracture risk. An analysis of a large US claims database (n=38,120) concluded that low compliance (<80% MPR) was associated with a 17% increase in the fracture rate, even after adjustment for other known risk factors. In a large investigation from the US (n=58,109) compliance with bisphosphonates at one year was associated with a 60% lower risk of hip fracture and a 40% decreased risk of vertebral fracture.

Numerous investigations have explored the relationship between adherence and fracture risk over a gradient of adherence levels. What is clear is that the relationship between these variables is not linear and that this relationship may change based on the particular osteoporosis drug investigated (ie. a bisphosphonate with long residency in the skeleton vs raloxifene which is short acting and does not reside in the bone). Analyses of a large (35,537 women; ≥45 y of age) US claims database with follow-up over a five-year time span concluded that total, vertebral, nonvertebral, and hip fractures were significantly lower in refill-compliant and persistent patients, with relative risk reductions of 20% to 45%. Similarly, analyses of the UK General Practice Research Database concluded that there was an inverse relationship between bisphosphonate persistence and osteoporotic and hip fracture risk, with no effect of therapy on fracture risk until after six months, as is demonstrated in some clinical trials.

Factors that impact adherence can be generally categorized into one of five areas: belief in the importance of taking medication for osteoporosis, medication-specific factors, beliefs regarding medications and health, relationships with health care providers and information exchange.

Abstracts

Adherence to different osteoporosis medications has been found to vary with the frequency of administration and/or the method of administration. Adherence to medications is often inversely proportional to the frequency of dose. It is likely, however, that there is more importance of patient support, follow-up, and knowledge of the reason for taking the medication. One year adherence to teriparatide therapy was reported to be almost 90% in conjunction with a strong patient support program.

Interventions to improve adherence have resulted in mixed results with those proven to be most effective in increasing adherence being typically very complex and/or costly. Even with multifaceted approaches there has been limited success in enhancing adherence, so there must be more research performed in this important area in the future. Certainly, approaches designed to enhance adherence need to be individualized as much as possible as no single approach has been shown to work in all individuals.

Often, simply informing the patient that they are responding to therapy, as reported by BMD, is enough to lead to substantial increases in adherence. However, discussion of a response to treatment can increase adherence, but only if the results are positive.

A greater understanding of factors which contribute to adherence to therapy will help to determine interventions to improve adherence and therefore ultimately reduce the osteoporosis burden of illness.

References

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Abstracts

Pathophysiology of Osteoporosis in Men and Women: Similarities and Differences

Prof David KENDLER
Director of Osteoporosis Research Centre (ProHealth)
Associate Professor of Medicine, Endocrinology
University of British Columbia, Canada

We have come a great way over the past 3 decades in understanding the pathophysiology of osteoporosis in women and through these insights have developed highly effective therapies. The greater understanding of bone biology has permitted the development of more specific interventions as well as diagnostic and risk assessment technologies. The understanding of male osteoporosis has, however, somewhat lagged behind.

Epidemiologically, fracture rates in men are similar to those in women. The exponential increase in the rate of hip and vertebral fractures occurs in men about a decade after the rise in women. In addition, men do not have an increase in the rate of distal radius fractures with age such as is observed inn women after menopause. Vertebral fracture prevalence in men between 50 and 60 years may exceed that of women in this age range, perhaps due to trauma in younger years.

There are several key differences in the pathophysiology of osteoporosis between men and women. Clinically, men have a higher peak bone mass and a larger bone size than women. With ageing, men (but not women) can experience periosteal bone formation leading to compensatory increases in the diameter of long bones and hence greater mechanical strength. In addition, men have a greater muscle mass, are more active and experience fewer falls. Men do not experience the menopausal decline in bone density seen after midlife in women. Finally, men have a shorter lifespan and hence age-related osteoporotic fractures will be fewer than in women. The mortality after hip fracture in men is double that of women.

With recent developments in bone imaging technologies, it is apparent that men have less endocortical resorption (resulting in less intracortical porosity) than women. Men more often have reduced bone formation (anabolic defect) than women who may have osteoporosis resulting from increased bone resorption.

BMD by DXA is our most useful clinical tool in evaluating bone health in both men and women. Interpretation of BMD results in men remains controversial. Because of the bone size artifact in areal bone density, the apparent BMD of larger bones in men is higher than women. This size artifact may be useful in the estimation of fracture risk as it integrates factors related to larger sized bones (less prone to fracture) with BMD. Indeed, most of the higher bone density in men, as measured by DXA, is related to the greater size of men's bones as compared to women's bones. Some authors (and ISCD's position) is to compare a man's BMD to a young-normal male database. Others (and IOF's position) is to compare a man's BMD to a young-normal female database.

Clinical risk factors have been evaluated in male osteoporosis. Over 50% of cases are deemed idiopathic with fewer attributed to glucocorticoid, hypogonadism, alcohol, and anticonvulsant use. The FRAX risk assessment software tool includes risk factors collected from epidemiologic databases including men and has specific weighting of the risk factors according to the observed fracture risks in men.

Sex steroids are required for optimal bone health in both men and women. The progressive age-related decline in testosterone in men contributes to both increases in bone resorption (primarily estradiol effect) and anabolic defect (testosterone effect). The effects of testosterone in male bone health may include contributions to higher peak bone mass, periosteal bone formation (leading to larger bones with age), and ongoing bone anabolic effects. Estradiol accounts for about 70% of the antiresorptive activity of sex steroid in men. Rare genetic absence of aromatase enzyme can result in severe male osteoporosis with delayed epiphyseal closure. This has been successfully treated in men with estrogen therapy resulting in epiphyseal closure and very rapid increases in bone density.

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The treatment of osteoporosis in men has lagged behind that of osteoporosis in women. Although nitrogen bisphosphonates are equally potent in me at increasing bone density and suppressing bone turnover, there are no fracture endpoint trials in men with osteoporosis. Teriparatide is also indicated for the treatment of osteoporosis in men based on equivalent BMD and bone turnover markers data to that seen in women. Hypogonadism in men does not appear to affect the action of these therapies on the male skeleton.

Though there are many similarities between bone biology in men and women, the differences are also many. A better understanding of bone biology over a man's lifetime will provide new insights into diagnosis and terapy of male osteoporosis.

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Fracture Risk Prediction: Central DXA and Other Modalities of Measurement of Bone Strength

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Osteoporotic fractures represent a growing public health problem. The burden of fractures relates to the morbidity and associated mortality as well as to the cost. There were an estimated 9 million osteoporotic fractures worldwide in 2000 (1), and the predictions are showing a rapid increase in numbers worldwide.

Osteoporosis is defined as a skeletal disorder, characterised by compromised bone strength, predisposing it to an increased risk of fracture (2). Aspects of bone strength we can measure today are: BMD, micro-architecture, size, bone turnover and VFA.

A number of technologies are used to assess bone mineral density (BMD), and prospective studies have established that there is an exponential relationship between decreasing bone mass and increasing incidence of fracture (3, 4, 5). The bone mass is directly dependent on both volume and the density of the mineralized tissue. Measurement of bone mass by densitometry has become central to the diagnosis of osteoporosis, decisions about treatment, predictions of fracture risk and to monitoring treatment (6).

The diagnostic techniques used for bone mass measurement should meet following criteria: non invasive, rapid, accurate and reproducible.

Researchers have established a fracture threshold level for all bone density methods. Fracture risk can be expressed as current, site-specific, absolute, relative, global, and lifetime risk.

Available modalities are arbitrarily classified into two groups: central and peripheral.

Central devices in use are QCT, MRI, DPA and DXA.

QCT is described as the most accurate tool; provides bone geometry and spatial distribution of bone mineral. The results are expressed as volumetric BMD and as standard deviations from the mean of appropriate age, ethnic and sex matched reference data.

Advantages of QCT: The BMD measured by QCT is true volumetric density (mg/cm3); measurement separates cortical and trabecular BMD and it is not size dependent. Degenerative diseases are not effecting the measurement and it is useful in overweight patients.

Limitations of QCT are higher radiation dose than DXA; less precise than PA spine done by DXA, higher cost; great demand for other diagnostic purpose. There have been relatively few published studies regarding the use of QCT measurements for predicting fracture.

MRI scan provides information on bone density, as well as information on bone structure.

Two major approaches are: standard MR imaging based on the estimation of bone marrow T2* relaxation time, used as an index of osteoporosis (10, 11), and high spatial resolution MR producing 2D and 3D trabecular bone structure images (12, 13).
Advantages of MRI: provides bone mineral content of vertebrae, trabecular structure and bone quality. Additionally provides early detection of trabecular lesions, fractures and deformities at the spine. Application is central and peripheral as well.
Limitations: availability, high cost and greater demand for other diagnostic purpose.

DPA uses a radioactive source, measures hip and spine BMD.

Advantage is a low radiation.

Limitations are slow scanning time and very poor image resolution.

DXA evolved from DPA and is probably most used device.
Advantages: very low radiation, image resolution closer to x-ray image, relatively short scanning time, well defined reference data base, used in most epidemiological and pharmaceutical studies.

Limitations: it is a two-dimensional modality, it is size dependent, degenerative changes and calcifications of surrounding tissue are affecting the result, bone detection algorithms and projections artefacts.
Peripheral devices in use are:

pQCT - measuring sites are: forearm, tibia and the femur. The method uses CT technology and only a single slice can be obtained. pQCT offers the same advantages as QCT – volumetric BMD, it is size independent and separates measures of trabecular and cortical bone. Further advantages are low cost and lower radiation exposure.

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pDXA utilizes DXA technology to evaluate BMD at peripheral skeletal sites. pDXA has a high discriminatory power as a screening tool and fracture risk assessment (14).

QUS provides information about quality of the bone. Two major methods of assessing bone strength using ultrasound are: Speed of Sound (SOS) and Broadband Ultrasound Attenuation (BUA). Combined with clinical risk factors can identify fracture risk. QUS shows a limited application in monitoring changes.

DXR calculates peripheral BMD from hand radiographs and has been shown to be a good predictor of fractures (15), and is a technique with excellent precision (16).

SPA uses an isotopic source as the radiation source and requires either water bath or water bag around the measured bone, usually radius or heel.

SXA The only difference between SPA and SXA is source of radiation; SXA uses X-ray tube instead of an isotopic source. SXA are being replaced by DXA systems.

Common advantages for peripheral devices are: portability, accessibility, less radiation if any, shorter scan time, easier to operate, less expensive and can predict fracture risk. The devices are useful as a screening and research tool, especially in paediatric patients.

Common disadvantages for peripheral devices are: only applicable to the peripheral skeleton, bone loss begins in axial skeleton so early bone loss may be missed, measure predominantly cortical bone with slow turnover, reference data base is generally smaller; poor reproducibility and poor ability to monitor the treatment; there is no agreement on a diagnostic threshold.

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Osteoporotic Fracture Healing and Atypical Fracture

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Osteoporosis is an epidemic. In the last 5 years, there was a steady increase in the number of geriatric hip fractures in Hong Kong. The total number of hip fractures operated in 2006 is about 4000 in public hospitals. This figure raised by 10% in 2009. Besides the obvious increase of burden on our care, these osteoporotic fractures are difficult to fix as well. These surgeries carry a much higher risk in terms of pre-operative and perioperative care. The surgical complication rate is also much higher. The reason is that the osteoporotic bone is not rigid enough for ordinary implant fixation, and the healing is much slower than normal bone. Many studies have demonstrated the negative effect of aging and osteoporosis on fracture healing. These studies include ovariectomized animal models as well as clinical outcome study. However, this is not universally true as some studies were not able to show the negative effect of osteoporosis on fracture healing. Therefore, in the mean time, it is still controversial. Nevertheless, it is generally believe that fracture fixation and fracture healing tends to be much more difficult in osteoporotic bone as observed by clinical outcome studies and experience.

It is not uncommon to see patients with sequential osteoporotic fractures. These patients' bones are just too soft to withstand low energy trauma. It leads to lots of problems in patient well being as well as a significant burden on our health care system. The prevention of another fracture following the first one has become one of the major goals in osteoporotic fracture management. In order to fight against this tsunami of osteoporosis, various drugs had come into the market during the last decade. Nowadays, the most popular and widely used one is probably bisphosphonates group. Its use in osteoporosis has been shown to decrease the future fracture risk of vertebra and hip, and its use can even lower the mortality rate. Therefore, this group of drugs are widely used in post fragility fracture patients as well as patients that have been diagnosed to have osteoporosis. Now in many countries, its use is included in the standard management protocol. However, in recent years, there was an increase in a special kind of femur fracture, i.e. a subtrochanteric fracture or a mid-shaft diaphyseal fracture, with relation to the prolong use of bisphosphonates. These fractures are called atypical femur fractures because the fracture pattern, the mode of injury and the healing are atypical when compared with usual femur fractures. These atypical fractures usually result from a very trivial twist or fall and sometimes even without any preceding event. The patient may have a period of prodromal pain days or weeks before the fracture. X-ray examination usually revealed typical radiological features like generalized cortical thickening, presence of stress fractures or cortical beaking. The use of double tetracycline labelling in these patients can reveal the over suppressed bone turnover in cortical bone, which was also referred as adynamic bone disease. The postulated theory behind these fractures is that the bisphosphonates oversuppressed the osteoclast activities with an unbalanced osteoblastic activies. Therefore, the normal remodelling power is suppressed. The minor stress fractures over the tension side of the femur is not repaired effectively, leading to stress riser. When the stress riser occurs in a critical area in the femur, the femur may break upon a minor stress. These fractures, in general, are rare but it is getting more attention. The principle treatment method is still intramedullary nailing and the result is generally good.

Although the theory of oversuppressed osteoclast seems logical, there is no hard evidence yet. Nevertheless, the increasing incidence of atypical fractures has led us to monitor the patients taking long term bisphospohonates more carefully. During follow-up of these patients, the symptom of weather there is any thigh pain was specifically asked together with a standard femur anteroposterior x-ray may be helpful, especially when the patient is taking the drug more than a year. On the other hand, the use of "drug holiday" may help to decrease the incidence but it still need more data to prove its efficacy. Nevertheless, the benefit of using bisphosphonates to fight osteoporosis seems to outweight the risk of getting this rare atypical fractures. However, we should not ignore this condition as this rare fracture can be diagnosed early and prophylactic measures can be advised.

Abstracts

Osteoporosis Associated with Haematological Diseases

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Osteoporosis and osteopenia is often overlooked as a problem in patients with benign and malignant hematological disorders. This may be due to pathophysiology of the bone marrow based disorder, steroid treatment side effects, immobilization and premature endocrine failure. Low bone mass is highly prevalent in patients with thalassemia major, even with optimal transfusion, chelation and hormonal replacement. The local incidence amongst hemophilia patients awaits surveillance studies. In patients with hematological malignancies, bone erosion is an innate feature of plasma cell myeloma. High dose steroid usage is also part of treatment protocol of almost all lymphomas and lymphoid leukemias, while patients with autoimmune cytopenia are often exposed to prolonged steroids. Finally, survivors of allogeneic stem cell transplantation often suffer from substantial loss of bone mass, especially in patients with chronic graft versus host disease. The survival of patients with both benign and malignant hematological diseases is on an ever-improving trend. With proper awareness, screening and treatment, the late untoward consequences of osteoporosis may be avoided.

Advanced Therapy across the Spectrum of Patients with Osteoporosis

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Therapeutic approaches for the management of post-menopausal, drug-induced and male osteoporosis are increasing in number and complexity making choice of treatment for individual patients ever more difficult. Trials of therapies for the management of post-menopausal osteoporosis have as their primary end-point fracture reduction, primarily at the vertebral site but increasingly at non-vertebral and hip sites . Anti-resorptive therapies, primarily the bisphosphonates have the best evidence base for anti-fracture efficacy across all 3 skeletal sites (Figure 1)

Figure 1
Evidence for anti-fracture effect of therapies for PMO

	Spine	Non-vert	Hip
Daily Alendronate	A	A	A
Daily Risedronate	A	A	A
Daily Ibandronate	A	A-	No evidence
Annual iv Zoledronic acid	A	A	A
Daily HRT/ERT	A	A	A
Daily Raloxifene	A	No effect	No evidence
Daily Lasofoxifene	A	A	No evidence
Daily nasal Calcitonin	A	B	No evidence
Daily sc Teriparatide	A	A	No evidence
Daily Strontium Ranelate	A	A	A-

Anti-resorptive Anabolic Uncertain

Adapted & updated from Royal College of Physicians Osteoporosis Guidelines – Clinical Update, July 2009

Of the bisphosphonates alendronate, risedronate and zoledronic acid have roughly equivalent anti-fracture efficacy at the lumbar spine although treatment with annual infusions of zoledronic acid has arguably the clearest evidence of non –vertebral and hip fracture benefits in PMO (1). However the choice of therapy in PMO will depend on patient choice, convenience, side effect profile and in some instances, cost.

Annual infusions of zoledronic acid (ZOL) have the advantage of convenience and avoidance of the troublesome gastro-intestinal adverse effects induced in some patients by oral bisphosphonates. In addition ZOL has been shown to be beneficial after a hip fracture where secondary vertebral and non-vertebral fracture rates were significantly reduced with an added benefit of a reduction in overall mortality by 28% in the zol group compared with placebo(2). On the less positive side use of ZOL is associated with excess flu-like reactions primarily after the first dose almost certainly due to the release of the cytokines TNFα and IL-6 (3). The reaction can be diminished by the concomitant use of acetaminophen or paracetamol. Anxieties about the relationship with ZOL infusions in the doses used in PMO and serious atrial fibrillation, osteonecrosis of the jaw(4) and atypical femoral fractures(5) have so far been unsubstantiated.

Anti-fracture efficacy in other osteoporosis associated disorders including glucocorticoid induced osteoporosis (GIO) is fairly scanty. However in GIO both alendronate after 2 years (6) and risedronate after 1 year in women(7) and men(8) post- hoc analyses have shown a reduction in vertebral fracture rates compared to placebo. The primary efficacy of treatment in both prevention and reversal of GIO has been shown by changes in bone mineral density (BMD) at the spine and hip. A recent study with an annual infusion of ZOL has shown superiority to daily oral risedronate in preventing or reversing bone loss at both the lumbar spine and hip sites in GIO (9). There was no significant difference in vertebral fracture rates in the study but it was only of 1-year duration and the fracture rates were extremely low.

As yet there is no RCT published examining the efficacy of ZOL annual infusions in the management of idiopathic low bone mass in men with fracture as an end-point. However males were included in the HORIZON RFT and appeared to benefit in a similar fashion to post-menopausal women in the study (2). In the GIO trial approximately one third of the 833 participants wer male and ZOL had similar effects on BMD in the men as in the women (9).
In summary zoledronic acid has a considerable body of evidence to demonstrate that it can be safely and effectively used in the management of both women and men with low bone mass and osteoporosis. It is thus a very useful addition to the therapeutic options available to prescribers.

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Abstracts

Safety Issues of Bisphosphonates

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Biphosphonates are the most commonly used drugs for osteoporosis. The commonest side effect is oesophagitis. But this can be avoided by proper administration of the drug and infrequent dosing. Nevertheless, oral preparations should be avoided in those with significant reflux oesophagitis or dysphagia. The most concerning side effect is osteonecrosis of jaw. Although it is a rare condition, it can be severely debilitating, causing pain, sinus formation and malnutrition. Large scale prospective cohort studies of cancer patients receiving intravenous biphosphonates have found incidence of biphosphonate related osteonecrosis of jaw (BRONJ) as high as 2-10%. Dental extraction and steroid use were strong associated factors. The epidemiology of BRONJ in oral biphosphonate for osteoporosis is less clear. Small case series have been described. Based on these, ASBMR task force suggested that the incidence of BRONJ among osteoporosis patients was one in 10,000 and one in 100,000. But some cross sectional studies or retrospective studies have suggested that the incidence may be much higher. Cases of BRONJ with oral biphosphonates have been reported in Hong Kong. Based on very limited data, the common associated factors are biphosphonate use for more than one year, diabetes mellitus, oral steroid, heavy smoking and comorbid conditions. Further studies in this area are clearly warranted. Dental hygiene is generally poor in older people in Hong Kong. It is strongly advisable for older patients to have a dental check before starting biphosphonates. One should warn the patients on biphosphonates about this potential side effect and they should be stopped when ONJ is diagnosed. One should be more cautious about using biphosphonate in frail older people as they are at higher risk of BRONJ, and have limited access to dental care at the same time.

There have been case series of low energy subtrochanteric fractures associated with cortical thickening of the femoral shaft in long term alendronate users. Although it is scientific plausible that biphosphonate may have a causative role in atypical fractures, epidemiological studies have so far not found that the risk of atypical fractures is significantly increased in biphosphonate users.

The possibility that biphosphonate may cause atrial fibrillation was raised when the incidence of serious atrial fibrillation was found to be significantly higher with zoledronic acid in a large scale clinical trial. Several observational studies subsequently, however, failed to show any association between biphosphonate use and atrial fibrillation.

As for all medications, clinicians should be vigilant of side effects, especially in the frail older people. But with existing data, the proven benefits of biphosphonates still outweigh the potential risks.

Abstracts

Fall Prevention in Elderly - the Strategy in a Regional Hospital

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Fall prevention is an important subject in geriatrics. It is because falls are prevalent among elderly people and closely linked with other major areas in geriatric medicine including incontinence, immobility, intellectual impairment and iatrogenesis. Elderly is susceptible to falls and osteoporotic fractures with increasing age. In Hong Kong, 20% of elderly aged 60 or above have accidental falls annually.

In order to prevent falls in elderly, multi-disciplinary targeting fall intervention program is a gold standard for at risk elderly. However, the availability of relevant fall prevention and intervention services is unable to match the huge demand. A rational strategy for fall prevention shall be adopted to deal with different scenarios.

The patient safety team in the Hong Kong East Cluster of the Hospital Authority was established to enhance patient safety in hospital and after discharge. Fall prevention is one of the most important missions to deal with. Drafting of related practice guideline and working protocol, quality assurance program and staff training activities are areas of concern.

The group tackles this problem at various levels:

1) Community level:

   Education talks on fall prevention are conducted in elderly centres to enhance the knowledge and awareness of the public to this issue; fall prevention clinic (Allied health and Nurses lead) had established in 2009 to provide fall assessment (on referral or walk in basis) to at risk individual in the government general out- patient clinic.

2) Accident and Emergency Department (AED):

   Patients present to AED for falls are at risk of recurrent fall, fractures and hospitalization. Fallers discharged from AED were referred to trained community nurses for environmental modification and home strengthening exercise with promising results.

3) In-patient level:

   Every admitted patient has to be assessed by standardized tool for fall risk assessment and then to prescribe individualize prevention measures. Nurses are allowed to initiate in-patient fall consultation to fall team doctor for high risk patients and those sustained falls during hospitalization. Relevant training programs and continuous quality improvement activities are carried out regularly.

4) Day hospital fall intervention program:

   For selected patients with complicated fall risk profiles, multi-disciplinary fall assessment and targeting intervention program can be provided in geriatrics day hospital. Tailored made intervention program will be given to individual patient with falls. Screening for osteoporosis is also an important element of the program.

5) Nursing home level:

   The group works closely with community geriatrics services to enhance the safety of residents in institutions.

The working group believes that it is important to allow all the programs mentioned above to refer suitable subjects to each other, such that individual not eligible to one program can be looked after by another program and thus patient specific intervention can be carried out.

Abstracts

Use of Vitamin D and Calcium in Elderly

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It has been well documented that an adequate amount of Vitamin D is essential for optimal calcium absorption and bone health. The recommended daily allowance of Vitamin D is 800-1000 IU/ day. However, Vitamin D is rare in food. Major source of Vitamin D is by synthesis of cholecalciferal (Vitamin D3) form its precursors in skin under the effect of ultraviolet light. Vitamin D insufficiency is more prevalent in older aged subjects due to less efficient conversion to Vitamin D3 from its precursors at skin. In the United States, the mean population serum 25OHD levels have plummeted in the last decade. From the National Health and Nutrition Examination Survey (NHANES), it showed that the number of subjects with 25OHD levels less than 30ng/ml nearly double when comparing the population in 2004 with 1994[1]. Local study in Hong Kong also showed that Vitamin D insufficiency is as high as > 60% for community dwelling adults > 50 years old[2]. Reasons for the decrease in Vitamin D levels include decrease in sunlight exposure, use of sunscreen, decrease in intake of milk product and possible association with obesity and metabolic syndrome[3]. Vitamin D supplementation is advisable for those having Vitamin D insufficiency, e.g. institutionalized elderly residing in old aged homes. Vitamin D supplementation alone without calcium has not been shown to be able to prevent hip fracture, non vertebral or vertebral fractures[4]. In addition, supplementation with vitamin D alone versus placebo did not show a statistically significant difference in rate of falls with RR of 0.95 (95% CI 0.80, 1.14) or risk of falling with RR of 0.96 (95% CI 0.92, 1.01)[5].

Traditional Chinese diet consists of around 400 mg calcium/ day. Meta-analysis involving adults aged 50 or above showed that calcium supplementation with or without vitamin D was associated with a reduced rate of bone loss of 0.54% at hip region and 1.19% at spine region when compared to control. However, calcium supplementation alone has also not been shown to reduce hip fractures, non vertebral fractures or vertebral fractures.

Regarding combined use of Calcium and Vitamin D as preventive agent for osteoporosis, meta-analyses showed that combined use (as compared with placebo) result in significant reduction in incidence of hip fractures, especially among the institutionalized elderly, with risk ratio of 0.84 (95% CI 0.73, 0.96,) [4]. Meta-analyses also showed that to prevent one hip fracture, NNT is about 276 (95%CI 165, 843) over 2 years - 7 years[6]. On the other hand, meta-analyses showed that combined use (as compared with placebo) did not result in significant reduction in incidence of non vertebral fractures. In subgroup analysis, 2 studies performed among institutionalized elderly showed that supplementation could result in significant reduction in new non vertebral fractures[7,8]. Furthermore, meta- analyses showed that combined use did not result in significant reduction in vertebral fractures. Overall, the effectiveness of calcium and Vitamin D in prevention of fractures among community dwelling people is not conclusive [9-11]. There were evidences that compliance with treatment could affect the outcome. Finally, there are evidences that calcium and vitamin D status may act together in the pathogenesis of cancer[12].

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Strontium Ranelate: Next Step in the Treatment of Osteoporosis

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The objectives of a sufficient treatment of osteoporosis are to reduce the fracture risk by increasing bone strength and reducing the risks of falls. Bone strength increases by decreasing the bone loss and increasing bone formation. Strontium ranelate is a divalent strontium salt of ranelic acid that is capable to increase bone formation and reducing bone resorption. The drug is effective in reducing the risk of fractures, including both vertebral and non-vertebral fractures, in women with postmenopausal osteoporosis. The efficacy is documented by two large, double-blinded, placebo-controlled, multicentre trials of 5 years duration with extensions up to nearly 10 years. Hip fractures are reduced as well in a high risk population in a post hoc analysis of one trial. Moreover, data from patients who continued to receive the drug during 3-year extension phases of these trials indicate that strontium ranelate continues to provide protection against new vertebral fractures and non-vertebral fractures up to 8 years of therapy. It also improves bone mineral density at numerous sites and both increases markers of bone formation and decreases markers of bone resorption.

The efficacy of strontium ranelate in treatment of Asian patients with postmenopausal osteoporosis has been evaluated in two randomized, double-blind, placebo-controlled, multicentre trials of 1 year duration. The primary endpoint in both studies was the change from baseline in lumbar spine BMD. Mean DXA-BMD change from baseline was +4.6% in the strontium ranelate group in spine compared to placebo and 2.85% in the femoral neck and 3.22% in the total hip region ($p<0.001$).

Strontium ranelate is administered orally as a suspension and is generally well tolerated. The nature of the adverse events was generally similar regardless of treatment duration in clinical trials, with the most commonly reported being nausea and diarrhoea over 5 years of treatment, and memory loss and diarrhoea during longer-term treatment. Although an increase risk of venous thrombo-embolism was associated with strontium ranelate relative to placebo over 5 years of treatment in a pooled analysis of clinical trials. Post-marketing data have not confirmed this finding. Overall, the clinical data available suggest that strontium ranelate is an effective and generally well tolerated option for the first-line treatment of postmenopausal osteoporosis.

Abstracts

Exploring New Frontiers in Osteoporosis Therapy: Denosumab

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The balance between bone formation and resorption is important for maintenance of bone integrity. An imbalance between the activities of the osteoblast and osteoclast results in bone loss. The RANK-RANK ligand (RANKL) system has been identified as an essential mediator of osteoclast formation, function, and survival. RANKL binds RANK on osteoclasts or osteoclast precursors to stimulate or promote differentiation into osteoclasts and activate mature osteoclasts to resorb bone. Therefore, RANKL is a therapeutic target for diseases associated with increased bone resorption. Denosumab is a fully human monoclonal IgG2 antibody to RANKL that binds with high affinity and specificity to human RANKL. Denosumab binding prevents the activation of RANK and inhibits the formation, activation, and survival of osteoclasts. As a consequence, bone resorption and cancer-induced bone destruction are reduced.

Denosumab has been evaluated in women with postmenopausal osteoporosis or low BMD. A large, pivotal phase III study demonstrated the effectiveness of denosumab at decreasing fracture risk at the spine, hip and nonvertebral sites. Across all studies, denosumab has been shown to be effective at increasing BMD and decreasing bone turnover markers (serum CTX1 and procollagen type 1 N-terminal propeptide [P1NP]). The effects of denosumab were rapid in onset, consistent in magnitude across all subpopulations, and sustained for treatment periods up to 6 years. Furthermore, denosumab-treated subjects had greater increases in BMD at all anatomical sites when compared to alendronate-treated subjects and additional efficacy in terms of increases in BMD was observed in subjects who switched from alendronate to denosumab Bone microarchitecture and bone quality are maintained during denosumab treatment.

Abstracts

Glucocorticoid-induced Osteoporosis: Focus on Bisphosphonates

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Glucocorticoid is the commonest and the most important cause of secondary osteoporosis. Glucocorticoid-induced osteoporosis (GIO) is associated with an increased risk of fracture in the hip and the spine at a much higher threshold of bone mineral density (BMD) than postmenopausal osteoporosis, indicating a substantial deleterious effect of glucocorticoid on the microarchitecture of bone. GIO affects trabecular bone in a greater extent than cortical bone, with more pronounced loss in BMD during the first year of glucocorticoid therapy. The reduction in BMD at the hip and lumbar spine correlates with the cumulative glucocorticoid dose. Improvement of BMD has been demonstrated with discontinuation of glucocorticoid treatment. An alternate day regimen of glucocorticoid administration does not appear to protect the skeleton. More than one-third of postmenopausal patients who are receiving long-term glucocorticoid therapy developed asymptomatic vertebral fractures and the prevalence increases with age. Meta-analysis has confirmed an increased risk of vertebral and non-vertebral fractures in chronic glucocorticoid users, with a relative risk of hip fracture of 2.01 and vertebral fracture of 2.86. The fracture risk appears to be related to dose and duration of glucocorticoid therapy, age, body mass index (BMI) and the female sex. There is no safe dose of glucocorticoid for osteoporotic fracture. A daily prednisolone dose as low as 7.5mg is already associated with a 60% increase in the risk of vertebral fracture. Fracture risk increases with the cumulative dose of glucocortiocoid used.

The mechanisms of GIO are complex and multiple. Glucocorticoids reduce intestinal absorption of calcium, increase urinary excretion of phosphate and calcium, as well as suppress the production of sex steroid. Glucocorticoids downregulate the expression of osteoprotegerin (OPG) in osteoblasts, which leads to increased RANKL expression and hence enhanced activity and survival of the osteoclasts. Glucocorticoids also exhibit direct inhibitory effects on osteoblast activity and promote apoptosis of osteoblasts and osteocytes through a reduction of the Wnt signaling, increase in PPARγ2 expression and activation of caspase 3. High-dose glucocorticoid therapy leads to an early and transient phase of increased bone resorption, followed by decreased bone formation on long-term administration.

Guidelines for the prevention and treatment of GIO are available but inconsistent in different localities. The threshold of BMD for intervention of GIO is lower than that of postmenopausal osteoporosis. Life style modification with weight bearing exercise, good nutrition, maintenance of a normal body mass index and avoidance of smoking and alcohol abuse should be advised. Assessment of fall risk and advice on fall prevention should be performed where appropriate. Patients who are receiving glucocorticoids should be given calcium and vitamin D supplementation. Primary prevention for BMD loss should be considered when a daily prednisone dose of 5mg or more is going to be administered for more than 3 months, especially in postmenopausal women and subjects older than 65 years, those with a history of fragility fractures or a BMD T score of less than -1. Although the recommendation covers all ages, the evidence regarding primary prevention of GIO in men, premenopausal women and children is much less strong and efficacy is only based on assumption. The assessment of fracture probability by the FRAX has included the use of glucocorticoids as a categorical risk factor. As the dose and duration of glucocorticoid use is not considered, the fracture risk in current glucocorticoid users may be underestimated by the FRAX.

Bisphosphonates have been best studied in the primary and secondary prevention of GIO. Bisphosphonates inhibit bone resorption and reduce its rate of remodeling in the early stage of glucocorticoid therapy. They may also alleviate the effect of glucocorticoids on induction of apoptosis of osteoblasts and osteocytes. However, the evidence of bisphosphonates in GIO is less strong that that of postmenopausal osteoporosis because of the smaller sample size and shorter period of treatment in clinical trials. Moreover, reduction in fracture is not the primary end point in GIO studies and interpretation is confounded by the heterogeneity of the study population in terms of age, sex, underlying disease, comorbidities and the use of concurrent medications at the time of study entry. Alendronate, risedronate and zoledronate have been approved for the management of GIO. All these agents have been shown to prevent loss in BMD at the hip and lumbar spine and some have also been shown to reduce vertebral fractures. Zoledronate has to be administered intravenously and is indicated in patients who have intestinal malabsorption or cannot tolerate oral bisphosphonates. Teriparatide, a human recombinant parathyroid hormone amino acids 1-34, is a second-line agent for the treatment of GIO when bisphosphonates fail or cannot be tolerated.

Poster Presentations

Poster	Presentation Title	First Author
1	A Secondary Fracture Prevention Programme to Reduce Fractures, Hospital Admissions, and Mortality Rates at One and Five Years	Connie HN LOONG
2	BMD Enhances Clinical Risk Factors in Predicting Ten-Year Risk of Osteoporotic Fractures in Chinese Men: The Hong Kong Osteoporosis Study	Cora HY BOW
3	Bone Mineral Density and Serum Osteoprotegerin Levels in Pre- and Postmenopausal Women	Cora HY BOW
4	Evaluation of the Osteoporosis Secondary Fracture Prevention Program at Queen Mary Hospital: Successful Recruitment is associated with Lower Re-fracture and Mortality Rates at One and Five years	Connie HN LOONG
5	Exercise Performance and Adherence for Osteoporosis Patients in Half Year Follow-up	MYAB SUEN
6	Factors Associated with Osteoporosis Treatment Adherence in Hong Kong	Cissy SS SOONG
7	Meta-analysis on the Efficacy of Bisphosphonate in the Prevention of Vertebral Fracture	CH SZETO
8	Preditive Factors for Re-fracture in Chinese Population with Previous Osteoporotic Fractures	Connie HN LOONG
9	Rate of Bone Loss and Its Predictive Factors in Asian Women during Menopausal Transition	Elaine CHEUNG

Poster Presentations

Poster 1 A Secondary Fracture Prevention Programme to Reduce Fractures, Hospital Admissions, and Mortality Rates at One and Five Years

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Introduction: Osteoporosis patients with a prior fracture have a much higher risk of re-fracture. Anti-osteoporosis medications reduce fractures only with prolonged treatment. In 2000, a Secondary Fracture Prevention Programme was piloted in Queen Mary Hospital to evaluate and treat patients with osteoporotic fractures.

Objectives: (1) To triage and identify post-fracture patients with good survival and quality of life to minimize unnecessary osteoporosis drug treatment; (2) To reduce re-fractures, (3) To reduce mortality with osteoporosis drug treatment, and (4) To lower cost for hospitals to treat preventable re-fractures.

Methodology: Patients with low-traumatic fractures underwent a structured evaluation and triage system for treatment and systematic follow-up programme. The triage was done by a registered nurse in-charged of the programme. Outcome measures included (1) re-fracture rate; (2) re-admission rate; and (3) mortality rate at 1-, and 5-years using survival analysis.

Results: 2,364 fracture patients (1,606 female and 758 male) admitted to Queen Mary Hospital between April 2000 and April 2009 were screened. 1,078 (45.6%) had hip fractures, 565 (23.9%) spine fractures, 311 (13.2%) distal radius fractures and 410 (17.3%) fractures at other sites. 80.2% of patients fulfilled the inclusion criteria and were included into the program.

About 80% of these patients were started on anti-osteoporotic medications. The re-fracture rate at 1 and 5 years of patients who received anti-osteoporosis medications were significantly lower than those did not receive medications (both $p<0.05$). Patients who satisfied the inclusion criteria but did not receive anti-osteoporosis medications had significantly higher re-admission and mortality rates at 1- and 5-years (all $p<0.05$).

Patients who were excluded from the program have significantly lower re-fracture rate but higher mortality rates due to other causes at all time-points (all $p<0.05$). Anti-osteoporosis medications reduced risk of hip fractures by 88.8%, spine fractures by 88.3%, and other fractures by 82.8% at 12 months.

The average cost of bisphosphonates, an effective anti-osteoporosis medication, is $1,400/patient-year. The Hospital Authority Statistical Report for 2007 recorded a total of 25,713 fractures. Based on these data, the secondary fracture prevention programme is estimated to provide a cost-saving of $100,260,300 per year.

Conclusion: A structured triage and management programme for secondary fracture prevention was effective in identifying patients with better quality of life who are more likely to benefit from anti-osteoporosis medication, therefore reducing unnecessary drug prescription. Judicial use of anti-osteoporosis agents was effective in reducing re-fractures, and mortality and achieving cost-savings.

Poster 2 BMD Enhances Clinical Risk Factors in Predicting Ten-Year Risk of Osteoporotic Fractures in Chinese Men: The Hong Kong Osteoporosis Study

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Introduction: Clinical risk factors with or without bone mineral density (BMD) measurements are increasingly recognized as reliable predictors of absolute fracture risk. Clinical risk factors may be population specific. The purpose of this prospective study was to determine the risk factors for osteoporotic fractures and to predict the 10-year risk of fractures in Southern Chinese male population.

Materials and Methods: This is a part of the Hong Kong Osteoporosis Study. 1,525 community-dwelling, treatment-naive Southern Chinese men aged 50 or above were recruited. Baseline demographic characteristics and clinical risk factors were obtained, and BMD at the spine and hip were measured. Subjects were prospectively followed for incident low trauma fracture. Ten-year risk of major osteoporotic fracture and hip fracture was calculated using Cox proportional hazards models.

Results: The mean age of subjects was 68 ± 10 years. After 3.5 ± 3 (1–14) years of follow-up, 36 non-traumatic incident fractures were reported. The incident rates for osteoporotic fractures and hip fracture were 676/100,000 and 132/100,000 person-years respectively. The most significant predictors of osteoporotic fracture were history of fall (odds ratio 14.5) and fragility fracture (odds ratio 4.4). Other predictive factors included outdoor activity <60 minutes/day, BMI < 20 kg/cm2, difficulty bending forward, use of walking aid, and age ≥ 65 years. Each SD reduction in BMD at spine or hip was associated with 1.7 to 2.6-fold increase in fracture risk. Subjects with 5 or more clinical risk factors had an absolute 10-year risk of osteoporotic fracture of 6.2%, which increased to 18.2% if they also had total hip BMD T-score ≤ -2.5. Addition of BMD information (total hip T-score score ≤ -2.5) significantly enhanced fracture risk prediction when compared to clinical risk factors only (omnibus test $p=0.001$). Men with multiple risk factors and low BMD T-scores have a higher absolute fracture risk while men with no risk factors and normal BMD have a lower fracture risk than that predicted by FRAX.

Conclusions: Clinical risk factors are population specific and the addition of BMD measurement to risk factor assessment improves fracture risk prediction in Southern Chinese men.

Poster Presentations

Poster 3 Bone Mineral Density and Serum Osteoprotegerin Levels in Pre- and Postmenopausal Women

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Introduction: Osteoprotegerin (OPG) is an essential regulator of bone turnover through its suppression on osteoclastogenesis. Findings from previous studies of serum OPG and bone mineral density (BMD) in humans have been conflicting. The objective of this study was to identity factors associated with serum OPG levels and to determine its effect on BMD in pre- and post- menopausal women.

Methods: This is a part of the Hong Kong Osteoporosis Study. 2,343 community-dwelling, treatment and hormonal therapy naive female subjects aged 18 or above were recruited (679 premenopausal women, mean age 36.7±8.8 years; 1,664 postmenopausal women, mean age 62.6±8.5 years). Baseline demographic characteristics, serum biochemistry, hormonal profile and fasting serum OPG levels were obtained. Baseline BMD at the spine and hip were measured.

Results: Serum OPG levels was correlated with age in both pre- and post-menopausal women (premenopause r=0.208, postmenopause r=0.258, both p<0.0001). After adjusting for age, OPG levels were positively correlated with serum estradiol (r=0.100, p<0.05) and negatively with follicular stimulating hormone (FSH, r=-0.114, p<0.01) in premenopausal but not postmenopausal women. In premenopausal women, higher serum OPG levels were associated with higher age- and BMI-adjusted BMD (spine r=0.147, p<0.05; femoral neck r=0.138, p<0.05; total hip r=0.148, p<0.05). In postmenopausal women, age-adjusted OPG showed no correlation with BMD in the linear regression model. However, a negative correlation was observed between OPG in quartiles and hip BMD (p-tread <0.01), but not spine BMD.

Conclusions: Serum OPG level is an independent factor associated with higher BMD in pre-menopausal women. However it's protective effect on BMD is not significant in post-menopausal women with low bone mass.

Poster 4 Evaluation of the Osteoporosis Secondary Fracture Prevention Program at Queen Mary Hospital: Successful Recruitment is associated with Lower Re-fracture and Mortality Rates at One and Five years

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Introduction: Osteoporosis is a silent metabolic bone disease and it only manifests itself with the complication of fracture. Anti-osteoporosis medications reduce fractures with prolonged treatment. With rapid aging of the population, the number of fractures and its cost of treatment will be expected to increase exponentially. A structured triage protocol is necessary to identify patients who will benefit most from osteoporosis drug treatment.

Objectives: To develop a triage protocol for an osteoporosis secondary fracture prevention program.

Methodology: Patients admitted to Queen Mary Hospital with fractures underwent a multidisciplinary, structured triage protocol to identify patients for evaluation and treatment. The triage was done by a registered nurse in-charged of the program. Recruited subjects underwent investigation were offered education and medical consultation, lifestyle modification and drug treatment for osteoporosis. The outcome of the program was assessed at one year by the following criteria: (1) recruitment rate; (2) drug treatment rate; (3) re-fracture rate, and (4) mortality rate.

Results: 2,169 fracture patients admitted to Queen Mary Hospital between 1999 and 2009 were assessed. 1,844 (85.0%) patients were recruited and 325 (15.0%) patients were excluded from the program. Among those recruited into the program, 1355 (73.5%) patients underwent investigations: 169 (12.5%) patients were diagnosed with secondary osteoporosis; 967 (71.4%) patients were diagnosed primary osteoporosis initiated anti-osteoporosis medications. 489 (26.5%) patients recruited into the program but refused further investigations and medications. 246 (11.3%) patients were excluded from the program due to poor quality of life (bed/chair-bound, inability to swallow), and 79 (3.7%) were excluded due to unstable medical conditions within 3 months post-fracture.

Patient recruited into the program and put on anti-osteoporosis medication had lower mortality rate and re-fracture rates at one and five years (mortality rates: 2.7% at 1-year and 8.5% at 5-years; and re-fracture rates: 2.1% at 1-year and 9.1% at 5-years) compared with patient recruited into the program but refused further investigation and/ or medication (mortality rates: 6.6% at 1-year and 22.3% at 5-years, and re-fracture rate: 2.3% at 1-year and 12.9% at 5-years). Patients being excluded from the program due to (1) poor quality of life had 3.8% mortality rate at 1-year and 41.7% at 5-years, and 2.6% re-fracture rate at 1-year and 24.4% at 5-years; (2) unstable medical condition within three months post-fracture had a 2.6% mortality rate at 1-year and 42.6% at 5-years, and 2.5% re-fracture rate at 1-year, and 18.9% at 5-years.

Conclusion: The triage protocol for secondary fracture prevention was successful in identifying subjects with good quality of life and more likely to benefit from treatment. The program was associated with a reduction in re-fracture rate and mortality rate at 1- and 5-years. There was a higher incident of mortality and re-fracture rates for patients excluded from the program. Further investigations are necessary to explore the relationship. Unfortunately, despite active recruitment, elderly patients with osteoporotic fractures had low acceptance of this program. Education and promotion of the secondary fracture prevention program is urgently needed.

Poster 5 Exercise Performance and Adherence for Osteoporosis Patients in Half Year Follow-up

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Study Objectives: To evaluate on the adherence to exercise program and explore on factors that could help to maintain a high quality exercise performance of a home-based physiotherapy exercise program for patients with osteoporosis.

Material & Methods: Physiotherapist-led educational talk and exercise class were conducted for ambulatory patients attending the osteoporosis clinic in Ruttonjee Hospital. Weight bearing exercises, resistance exercises, balance training and posture correction exercises were taught in form of group class (around 8 patients/ group) in one session lasting for 60 minutes. Two groups of patients were undergoing the study, osteoporosis home exercise DVD prescribed and no DVD prescribed. Patients were then follow up in two weeks and half year later, during which their knowledge, confidence of performing exercise and usefulness of exercises were rated using the visual analogue scale from 0 to 10. The weekly exercise time was also documented. The quality of exercise performance was evaluated by physiotherapists.

Results: 113 patients attended the half-year follow up from December 2007 to January 2010. The results showed a high rating of patients on the overall exercise knowledge (mean= 7.881±1.95) and high confidence in performing exercise (mean=7.819±1.96). Upon evaluation by physiotherapist, the percentage of patients adopting accurate performance while performing exercise was high (mean=91.88%). The reported average exercise time was 73.08 minutes per week, comparing with the advice of 90 minutes per week, in 3 divided sessions. The osteoporosis DVD is useful in maintenance of home exercise (mean=7.817±2.70). A statistically significant correlation was found between exercise knowledge and accurate performance during exercise. (r=0.507, p=0.000).

Conclusions: Patients could be motivated for good exercise compliance and having high quality exercise performance in form of small group class for one session. Subjective rating on the knowledge of exercise is a useful factor to ensure a high quality performance for patients with osteoporosis.

Poster 6 Factors Associated with Osteoporosis Treatment Adherence in Hong Kong

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Introduction: Effective prevention of osteoporotic fracture requires long term adherence to osteoporosis medication. Longitudinal studies revealed that more than 60% of patients terminated their treatment at one year and the problem increases with time. The problem of non-adherence to osteoporosis medication in Hong Kong is unclear.

Objective: To assess patient adherence to osteoporosis medication in Hong Kong and to identify the associating factors for non-adherence.

Method: 244 patients attended the osteoporosis clinic in Queen Mary Hospital for the first time between January 2007 and December 2008 were invited to participate in a retrospective observational study for their adherence to treatment. Baseline clinical and demographic information, bone mineral density, lifestyle risk factors were assessed by medical charts review. Details in treatment adherence, acceptance, incident fractures, hospital admission and mobility level were collected by telephone interviews. Information were verified from the Hospital Authority Electronic Patient Record System. Medication compliance was measured by proportion of days covered (PDC). A patient is considered as a complier if he/she had missed < 20% of the proportion of days covered (PDC).

Results: A total of 193 patients participated in this study with 79.1 % response rate. The mean rate of medication adherence was 75.3% (PDC) after a mean follow up of 2.3 years. The rate of medication adherence decreased progressively with follow up duration (PDC: 74.5% at first year, 75.6% at second year, 63.7% at third year). The risk factors for non-adherence to treatment were self-perceived having too many medications (OR: 19.77, 95% CI: 2.41-161.99, p<0.001); self-perceived adverse effect from medication (OR: 16.98, 95% CI: 2.04-141.35, p=0.001); self-perceived cannot afford the medication (OR: 14.29, 95% CI: 1.68-121.5, p=0.004); self-perceived not requiring the medication (OR: 9.53, 95% CI: 2.99-30.42, p <0.001); bedbound (OR: 9.19, 95% CI: 1.00-84.08, p=0.035); smoking (OR: 3.97, 95% CI: 1.23-12.76, p=0.025); unsatisfied with medication (OR: 3.17, 95% CI: 1.05-9.59, p=0.04) and medication adverse effect (OR: 1.15, 95% CI: 1.04-1.27, p<0.001).

Conclusion: Although the rate of non-adherence in our study was lower than reported by overseas studies, the problem exacerbated with longer treatment duration. Several self-perceived factors were found associated with patient non-adherence. This study identified the common misconceptions and concerns about osteoporosis medications among patients that required long term treatment. To lower the non-adherence rate, doctors should improve their communications with patients to resolve their concerns with long term medical therapy.

Poster Presentations

Poster 7 Meta-analysis on the Efficacy of Bisphosphonate in the Prevention of Vertebral Fracture

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Introduction: Osteoporosis relies on the quantitative assessment of bone mineral density (BMD) at the femoral neck by central dual energy X-ray absorptiometry. BMD of 2.5 standard deviation or more below the young female adult mean defines the disease. Post-menopausal women and men aged over 50 are at risk.

We should assess the risk of falls, maintain mobility and correct of any nutritional deficiencies of patients. Intakes of at least 1000 mg/day of calcium, 800 IU of vitamin D and of 1g/kg body weight of protein are recommended.

Major pharmacological interventions are the bisphosphonates, strontium ranelate, raloxifene and parathyroid hormone peptides. Bisphosphonates binds to hydroxyapatite crystals in bone matrices and preventing calcification at these binding sites, which also inhibits the breakdown of hydroxyapatite, reducing bone resorption.

Purpose of the Study: To elucidate the risk reduction in the vertebral fracture using bisphosphonate. Meta-analysis allows simplification of picture and easy explanation to patients.

Material & Methods: Various big studies from 1995-2007 are retrieved for analysis. The patients with vertebral osteoporotic fracture are selected. Most are randomized controlled trials. The efficacy of bisphosphonate is particularly investigated. Although there are several members in the group, their mechanism of action is similar. By means of meta-analysis tool, the data were summarized and interpreted in form of graphics.

Results: The relative risk reduction of vertebral fracture varies from 0.39 to 0.91 covering 95% confidence interval for most study. By means of funnel plot, most patients in the biggest analysis have 0.52 relative risk reduction.

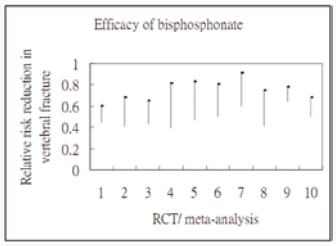

Figure 1: Efficacy of various bisphosphonate in various randomized control trials or meta-analysis.

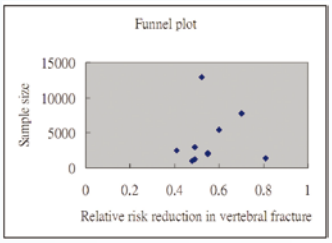

Figure 2: Funnel plot of the sample size and the corresponding relative risk reduction.

Although the absolute risk reduction is relatively small (varies from 1.4% to 10.9%), the number needed to be treated to prevent a vertebral fracture is relatively small (varies from 9 to 72 patients) implying bisphosphonate an effective medication to prevent osteoporotic vertebral fracture.

Study	Relative Risk Reduction	Absolute Risk Reduction	Number Need to be treated	Upper limit for RRR	Lower limit for RRR	Sample size
APIII	48%	3%	33	0.44	0.6	994
FIT	55%	2.70%	36	0.41	0.68	2027
Cranney	52%	1.40%	72	0.43	0.65	12855
VERT/NA	41%	5%	20	0.39	0.81	2458
VERT/AE	49%	10.90%	9	0.47	0.83	1226
HIP	60%	3.40%	29	0.5	0.8	5445
Boonen	81%	8.40%	12	0.6	0.91	1392
Bone	49%	2.50%	40	0.41	0.75	2946
HORIZON/P	70%	7.60%	13	0.64	0.78	7765
HORIZON/R	55%	2.10%	48	0.5	0.68	2127

Table 1: Empirical data in various study in bisphosphonate

Conclusions: Efficacy of bisphosphonate is obvious and beyond doubt but there are gastrointestinal and musculoskeletal side effects like abdominal pain, diarrhea, constipation, musculoskeletal pain, and headache. Osteonecrosis of the jaw and atrial fibrillation occur rarely.

Poster Presentations

Poster 8 Preditive Factors for Re-fracture in Chinese Population with Previous Osteoporotic Fractures

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Introduction: Osteoporotic fracture is a leading cause for hospital admissions. It is known that the re-fracture rate is 3 to 5 folds higher in subjects with previous low-trauma fractures. The re-fracture rate and its predictive factors in Chinese population with previous osteoporotic fractures are unclear. The purpose of this prospective study was to determine the re-fracture rate and to identify its risk factors for Chinese with fractures.

Methodology: A prospective, observational study on Southern Chinese aged 50 and above admitted to Queen Mary Hospital with low-trauma fractures of the hip, spine and distal radius. Subjects were followed yearly by telephone interview for the outcome of re-fracture. Information was verified from the Hospital Authority Electronic Patient Record System. Fracture of the skull, fingers, and toes were excluded. Cox proportional hazards model was used to identify the clinical risk factors for re-fractures.

Results: 2,364 fracture patients (1,606 women and 758 men) admitted to Queen Mary Hospital between 2000 and 2009 were assessed. The mean age at their first fracture was 75.7 ± 10.9 years. At follow-up of 3.8 ± 2.8 years, 268 (11.3%) incident fractures were recorded. The most significant predictors for re-fracture were total hip BMD T-score < -2.5, lumbar spine T-score < -2.5, and quantitative ultrasound T-score < -1. Other predictive factors included smoking, drinking ± 2 glasses per day, oral calcium intake < 800 mg per day, parental hip fracture, outdoor activities with sunshine < 15 minutes per day, body height > 2cm shorter than at age 25, low back pain, difficult in bending forward, walk with aids, history of fall, and serum albumin < 39 g/L. In male subjects, patients with Parkinsonism and serum testosterone < 15 nmol/L were significant associated with re-fracture (Table One).

Conclusions: Early identification of subjects with multiple clinical risk factors may help to reduce the re-fracture and hospital re-admission rates. Public health education on adverse lifestyle risk factors is important to reduce osteoporotic fractures.

Poster 9 Rate of Bone Loss and its Predictive Factors in Asian Women during Menopausal Transition

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Introduction: Bone loss during menopausal transition may range from 5 to 20% but its rate and predictive factors are ill-defined.

Objective: To investigate the rate of bone loss and its predictive factors in Chinese women aged 45-55 years old.

Material and Methods: Healthy treatment-naïve Chinese women aged 45-55 years were recruited. BMD at the spine and hip, clinical risk factors for osteoporosis, serum biochemistry, estradiol (E2), follicular stimulating hormone (FSH) and bone turnover markers were obtained at baseline and yearly for 5 years. Menstrual status at each visit was determined according to the STRAW staging of the Practice Committee of American Society for Reproductive Medicine.

Results: 161 women completed 5 years of study were analysed. The mean age at baseline was 47.7 ± 2.2 yr. At baseline, 80.1%(n=129) of the subjects were premenopausal, 19.3%(n=31) perimenopausal and 0.6%(n=1) postmenopausal. At the end of study, 12.4%(n=20) remained in premenopausal stage (pre-pre group), 31.1%(n=50) changed from premenopausal to perimenopausal (pre-peri group), 34.2%(n=55) from pre- through peri- to post-menopausal (pre-peri-post group) and 21.7%(n=35) from perimenopausal to postmenopausal (peri-post group). Maximum bone loss occurs during the perimenopausal stage. Change in menstrual pattern, menopausal age, baseline FSH, body weight and Straw staging all correlated with the rate of bone loss at both spine and hip. In the linear regression model, only the change in menstrual pattern and menopausal age but not E2 and FSH were identified as independent predictors for rate of bone loss.

Annualized bone loss in percentage (%) +/- S.D.			
group	L1-4	neck of femur	total hip
Pre-pre	-0+/-0.8*	-0.6+/-1.3	-0+/-0.7
Pre-peri	-1+/-1.1*	-0.8+/-1.6	-0.5+/-0.9
Pre-peri-post	-1.6+/-1.1	-1+/-1.6	-0.8+/-1.2+
Peri-post	-1.7+/-1.5	-1.6+/-2#	-1.2+/-1.4#

*p</=0.01(ANOVA) with all other groups, #p<0.05 with pre-pre and pre-peri groups, +p=0.007 with pre-pre group

Conclusion: Strategies to prevent bone loss should best be reinforced at the perimenopausal stage to prevent postmenopausal osteoporosis. FSH only represents the change in menstrual pattern and by itself is not an independent predictor of bone loss during menopausal transition.

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