



The International  
Society for Fracture  
Repair

# THE INTERNATIONAL SOCIETY FOR FRACTURE REPAIR NEWSLETTER March 2009



Osteoporotic  
Fracture Campaign

## From the President,



The Bone and Joint Decade will be coming to a close next year, and the ISFR would like to take the opportunity to summarize the achievements of our Osteoporotic Fracture campaign.

Over the last 5 years the campaign has successfully raised the issue of the important role of fracture treatment and secondary prevention in patients with osteoporotic fractures. Scientists, politicians and the public have been informed of the significance of these issues and awareness of the problem has now greatly increased. Although many countries are initiating varied approaches to improve the healthcare situation for elderly patients with osteoporotic fractures, programs for effective treatment have yet to be established in hospitals and healthcare systems around the globe. Most importantly, it has been recognized that fracture treatment in a geriatric population requires a holistic approach with interdisciplinary action.

The ISFR plans to continue the activities of the OFC in the future. Most recently, a workshop with experts from around the

world met in March in London, UK, to discuss the challenges of osteoporotic fractures in the spine. The next OFC activity will be a combined symposium and workshop called "Osteoporosis: From Evidence to Action". Please stay tuned for this event by checking our website [www.fractures.com](http://www.fractures.com).

Furthermore, the ISFR intends to continue their mission to foster research activities in the field of fracture repair. Toward this end, the member's area of our website [www.fractures.com](http://www.fractures.com) now includes a link called "RESEARCH EXCHANGE" where exchange opportunities for researchers, clinicians, or students can be posted. Please check the link if you are interested in an exchange or if you are able to host people interested in an exchange program.

Finally, I would like to draw your attention to the research program of the Osteosynthesis and Trauma Care Foundation (OTC). The OTC research program is offering research grants in the field of orthopaedic trauma surgery, particularly in the area of fracture repair research. Information can be obtained on their website at [www.otcfoundation.org](http://www.otcfoundation.org). Please use this funding opportunity to start new research projects and advance the science of fracture repair for the betterment of patient care.

Peter Augat

**ISFR Symposium in Kyoto  
Symposium on Biophysical  
Stimulation on Bone and Fracture  
Healing**

Takashi Matsushita

This symposium was held in Kyoto, Japan from November 26 through November 28, 2008. The purpose of the symposium was to discuss the effects of biophysical stimulation on bone remodeling and fracture healing. Fifteen invited speakers and moderators from the United States, Europe, and Japan presented twenty-four papers (30 minutes each) and discussed topics for more than six hours during the three days. Specialties of the speakers and moderators were grossly divided into three categories: cell biology, biomechanics, and clinicians (orthopaedic surgeons and dentists). The first part of this workshop was reported in the January 2009 ISFR newsletter. We now report part II.

**November, 27 Topics: Mechanical  
Stimulation on Fracture Healing**

Goodship (UK) summarized the biomechanics in the early and the intermediate stages of fracture healing. He reported that the strains imposed at callus are strain rate dependent and will be heterogeneous across the maturing callus, and, that high strain rate deformations are highly osteogenic in bone tissue. He also emphasized that the combination of timing of application and nature of mechanical stimulus was critical in controlling and optimizing the progression of bone repair. Inoue (USA) presented on the effect of early axial dynamization on tibial bone healing in dogs. From the results of a gap healing model, he stated that early axial dynamization appeared to accelerate

callus formation and remodeling and to provide higher mechanical stiffness during the early stages of bone healing. Claes (Germany) examined the effect of mechanical stability on local vascularization and tissue differentiation in callus healing and concluded that a good reduction of a fracture with small interfragmentary gaps and stability is important for its revascularization and healing. Matsushita (Japan) reported the effect of three kinds of loading (cyclic compression, cyclic distraction and rigid fixation) on fracture healing in rabbits. He stated that fracture healing was similarly enhanced in the cyclic compression and cyclic distraction groups compared to the rigid fixation group, and therefore concluded that adequate axial cyclic movements (adequate strain on newly formed tissue at the fracture site) seemed to stimulate fracture healing regardless of the direction of applied force. He also stated that adequate strain might decrease together with the process of fracture healing. Duda (Germany) et al. reported the relationship between 3D fixation stability and fracture healing in the tibia of sheep. They concluded that a moderate level of axial stability was necessary to optimize healing, but excessive shear may be detrimental to fracture healing. Healing did not appear to be stimulated at a particular level of shear stability. Augat (Germany) reviewed the effect of shear stress on fracture healing. The results from animal studies are inconclusive and suggest that in addition to the presence of shear, timing and sequence of loading events also have a large influence on the healing response. Most of the studies suggest that healing is more sensitive to mechanical conditions – in particular to the presence of shear loading – in the early healing phase. Part III will be featured in the next newsletter, stay tuned.

## Osteoporotic Fracture Campaign report

**Antonio Moroni**

**Rizzoli Orthopaedic Institute**

**I**t should be the goal of every health care system to reduce fractures via prevention programmes, early diagnosis along with acute treatment using OP drugs. However, it is evident that major gaps exist in providing access to BMD testing according to the 2008 National Report Card on Osteoporosis Care. Osteoporosis Canada, who issued the report, also recommends a comprehensive approach.

➤ The federal and provincial-territorial governments work collaboratively to create a national strategy, supported by parallel provincial/territorial strategies that provide coordinated osteoporosis care

➤ The strategies ensure that current and future initiatives in risk reduction, diagnosis and treatment are coordinated, evidence-based, comprehensive, and appropriately resourced within the publicly-funded system; and that they achieve the ultimate goal of reducing debilitating fractures and their impact on individual lives and the health care system

Every year there is an estimated 1-4 million vertebral compression fractures that cause a reduction in the overall quality of life in the patient which deserves global attention. We currently held an **ISFR Spine Workshop** on this important issue. Different specialties were represented such as a geriatrician, rheumatologist, pain specialist, neurosurgeons, spine and general orthopaedic surgeons, engineer, and scientists were invited to London, St. Marys Hospital, Imperial college at the Cockburn Lecture Theatre on March 13-14, 2009. The chairs were Dr. Stefan Goemaere (Ghent University, Belgium), Dr. Mo Akmal (NHS Trust, UK) and myself.

Four sessions were held on: surgical perspectives and non-surgical management & future advances, cost-effectiveness studies and design as well as a session dedicated to our five supporting industries: Medi Germany, Medtronic, Lilly, Synthes and Vexim. The workshop held its merit of high scientific discussion amongst all 22 participants.

**“It is not possible to see all the levels in about 10-15% of patients with vertebral compression fractures, this can depend on various factors which include patient age and the likelihood of having a fracture.”**

Dr. Harry Genant, Professor Emeritus, UCSF

Consensus was reached by the spine workshop participants and advocated by the group that since lateral VFA can be found in all DXAs sold, performing a lateral VFA can help detect many levels in those 10-15% of the patients with vertebral compression fractures which normally have some levels that go undetected. In the future, advanced imaging modalities may permit proper diagnosis of this fracture type; however, they do not work reliably as of yet. The ISFR is dedicated to this topic as well as distributing surveys about common practice patterns in surgeons and non surgeons, as well as producing a consensus paper. This topic will also be featured in the upcoming ISFR symposium which I am pleased to announce that will take place in Monte Carlo, Monaco.

**Osteoporosis: From Evidence to Action, ISFR symposium  
December 4-5, 2009  
Monte Carlo, Monaco**

Chairs: M Bhandari, P Ballerio, A Hoang-Kim, A Moroni, & E Schemitsch

**“Osteoporosis: From Evidence to**

**Action** will be open to all researchers, young investigators, fellows and trainees in the field of orthopaedics. In addition, registration for specific courses organized by M. Bhandari (Canada) & E. Schemitsch (Canada) on **"Evidence-Based Orthopaedics"** and **"Current Issues in the design of orthopaedic research"** will be also available in different time periods on both days.

This highly educational event on hip, wrist and spine fractures and EBM courses will be delivered by international faculty and leading experts in the field. Over the past seven years, the growth of the osteoporotic fracture campaign has overwhelmed us and the past achievements of hip, wrist and spine workshops will be combined in output that will be presented at the symposium, specifically titled: **Do we have an answer?** This is an opportunity for the OFC to look forward to its future of Action. Faculty members will be involved in running parallel workgroups on **"Improving outcomes"** in all three fracture types concerning osteoporosis.

Please contact Amy Hoang-Kim (isfr.fractures@gmail.com) and Emilie Cavernese for early registration and more information. Monte Carlo, Monaco is easily reached via Nice from all major cities and affordable prices will be enforced to ensure that this event be enjoyable and attended by all. We look forward to seeing you in December!

Online registration will be available in May through our website [www.fractures.com](http://www.fractures.com). Special rates are offered to ISFR members.



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### **A Focus on Spine Research**

Orthopaedic Research Society, Las Vegas

Report from **Amy Hoang-Kim**  
ISFR coordinator

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At the 55th Annual Meeting of the Orthopaedic Research Society, several research topics focused on vertebral fractures. Currently there are various operative techniques for preparing the endplate of vertebral bodies for implant attachment and spinal fusion. In some studies, the endplate is completely removed to achieve the bleeding bone effect but penetration depth has not been quantified. Bell S et al (Utah, US) showed that while the

deeper region of penetration may provide a faster and more active remodeling site, the structural stability of the vertebral body may be compromised at such an extensive penetration depth. Therefore, when designing intervertebral implants, it may be necessary to increase stability of the implant to accommodate the slower remodeling rate beyond the layer of calcified fibrocartilage, which is a non-remodeling tissue on the

endplates of vertebral bodies in sheep and human cadaveric vertebrae.

In a study presented by Bessho M et al (Tokyo, Japan), on "Predicting strengths of the femur and vertebra in patients with postmenopausal osteoporosis by a CT based finite element method—The predicted fracture load of the proximal femur is correlated with that of the lumbar vertebra". The right femur and the second lumbar vertebra (L2) in 40 female patients with postmenopausal osteoporosis (age:52-89, average 70.1) were evaluated. Axial CT scans of the proximal femura and L2 were obtained (slice thickness:3mm femur, 2mm L2, Aquilon Super 4, Toshiba Medical Systems Co, Tokyo, Japan) as well as scans of a calibration phantom were taken. The element size was set to allow for bone heterogeneity and the mechanical properties of each element were computed from the Hounsfield unit value and its equivalent ash density was derived with a linear regression model. Data was collected to evaluate the correlation between femoral and vertebral predicted fracture loads (PFLs). The average PFL of the proximal femur in stance configuration was 3910 N range: 2830 - 5800 N, SD:719N). The investigators found that femoral PFL in stance configuration could be utilized to estimate vertebral PFL and femoral PFL in fall configuration.

The degradation in quality of life following the onset of a vertebral compression fracture is well known. Mortality risk has been shown to increase by 23% following the onset of VCFs. Edidin, AA et al (Sunnyvale, CA) established the mortality risk associated with vertebral fractures for elderly patients of all ages, ethnicities, and gender in the healthcare system. The risk of mortality at short-term follow-up is significantly higher for patients that do not undergo operative

treatment following VCF diagnosis. The risk of mortality for kyphoplasty patients was also significantly lower than that for vertebroplasty patients. In the future, it is to be determined whether these trends would continue with a long-term follow-up.

According to Raley TJ et al., the typical treatment for a vertebral compression fracture (VCF) involves the injection of bone cement into the vertebral body to fixate the fracture. This involves either injection of a low viscosity cement directly into the vertebral body (vertebroplasty) or the use of a balloon to create a void in the cancellous bone and injection of the bone cement into this created void (balloon kyphoplasty). The study investigated the potential height restoration ability of the two VCF treatment methods as well as an innovative vertebral augmentation system. Four female cadaver spines with a mean age at time of death of  $72.8 \pm 7.9$  years (66-84 years old) maintained at  $-20^{\circ}\text{C}$  until approximately 24 hours prior to testing were used. A student t-test found no significant difference between the specimen groups for age or BMD. There was a significant difference in height between the pre-fracture and post-fracture specimens for all three groups. The mean anterior height restoration for the balloon kyphoplasty, vertebral augmentation and vertebroplasty systems were  $74.8 \pm 9.4\%$ ,  $83.7 \pm 17.5\%$  and  $32.8 \pm 8.1\%$  respectively. There was no significant difference between the balloon kyphoplasty and vertebral augmentation system groups ( $p=0.40$ ). The balloon kyphoplasty and vertebral augmentation system procedures both restored significantly more height compared to the vertebroplasty procedure ( $p \leq 0.001$  and  $p \leq 0.002$ ). Extravasation was noted for 1 balloon kyphoplasty, 0 for the vertebral augmentation and 2 vertebroplasty specimens post-

treatment. In conclusion, the authors state that mechanical VCF height elevation equivalent to that observed in balloon assisted kyphoplasty was achieved using an innovative ultra-high viscosity cement vertebral augmentation system. In contrast, the conventional vertebroplasty procedure, in which cement simply fills existing VCF voids prior to extravasation via the path of least resistance, was unable to restore comparable height.

**References:**

- 1) Bell S et al. The ideal penetration depth of the vertebral endplate to reach

- actively remodeling bone. Poster 1782, ORS, Las Vegas, Nevada. February 22-25, 2009.
- 2) Bessho M et al. Predicting strengths of the femur and vertebra in patients with postmenopausal osteoporosis by a CT based finite element method- Poster 637, ORS, Las Vegas, Nevada. February 22-25, 2009.
- 3) Edidin AA et al. Mortality risk for operated and non-operated vertebral fracture patients in the medicare population. Poster 1800, ORS, Las Vegas, Nevada. February 22-25, 2009.
- 4) Raley TJ et al. Comparative height restoration of three vertebral augmentation systems for treatment of vertebral compression fractures. Poster 639, ORS, Las Vegas, Nevada, February 22-25, 2009.

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**A Report from AAOS 2009 Annual Meeting held in Las Vegas.  
Media Briefing: "Staying One Step Ahead of Osteoporosis"  
[http://aaos-annualmeeting-presskit.org/Thurs\\_10AM.html](http://aaos-annualmeeting-presskit.org/Thurs_10AM.html)**

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New studies show key steps to preventing bone loss focus on early screening and treatment.

According to information presented today at the 2009 Annual Meeting of the American Academy of Orthopaedic Surgeons (AAOS), new steps to manage bone health and increase communication will significantly help reduce the rate of fractures and increase the quality of life for the aging population.

"Decreasing the rate of hip fractures saves lives, prevents loss of function, and decreases costs," said Tad Funahashi, MD, regional chief of orthopedic surgery and assistant area medical director for Kaiser Permanente Southern California, and clinical professor of orthopaedic surgery at the University of California Irvine's College of Medicine. "If we screen for osteoporosis at the earliest onset of the disease," said Dr. Funahashi, "we can implement treatment and help to decrease the rate of hip fractures by 45 percent."

**Hip Fractures and Osteoporosis Study 474**

Osteoporosis is also a huge problem in other parts of the world. In another study, Leonid Kandel, MD, an orthopaedic surgeon at Hadassah-Hebrew University Medical Center in Jerusalem, Israel, looked at improving the diagnosis rate of osteoporosis in post menopausal women who fracture the distal radius bone, which is located in the lower arm near the wrist. Dr. Kandel says these fractures are often the first clinical symptom of osteoporosis, yet only 15 to 25 percent of these women are referred for a bone density test by a family physician after the fracture. "It is important that patients understand the connection between their current problem, the fracture, and the possibility that the underlying cause is osteoporosis." Dr. Kandel also suggests that there should be a stronger connection and better communication between the hospital

and the community. He feels this will increase the number of patients who are diagnosed and treated for the disease.

### **Osteoporosis in Women after Distal Radius Fracture Study 475**

Francesco Pegreff, MD, orthopaedic surgeon in the Department of Shoulder and Elbow Surgery at Cervesi Hospital, Cattolica, Italy, along with Lorenza Belletti, MD, and Professor Maria Teresa Mascia, in the Department of Rheumatology, University of Modena, Italy, studied a group of patients, 80 percent women and 20 percent men, who were affected by rheumatoid arthritis and taking Vitamin D supplementation.



"We wanted to analyze the correlation between a person's age, sex, how long they had rheumatoid arthritis, whether they were taking Vitamin D supplements, and whether they had fragility fractures due to osteoporosis," said Dr. Pegreff.

**"We found that women affected by rheumatoid arthritis for more than three years were osteoporotic and had a fracture risk significantly higher than those without the disease. Also, Vitamin D therapy is not enough to prevent further bone loss and fragility fractures in these patients."**

Men in the study fared much better. Those with rheumatoid arthritis did not have a significant risk of fracture.

### **Risk Factors in Osteoporotic Patients Study 477**

Fractures, especially in adults, may be a tip off or early warning sign that osteoporosis could be an issue. Many of these painful fractures of the hip, spine, wrist, arm, and leg often occur as a result of a fall or even a simple household task. One in two women and one in five men over the age of sixty five will sustain bone fractures caused by osteoporosis.

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### **SEFRAOS. Spanish Society of Osteoporotic Fractures Adolfo Diez-Perez, Hospital del Mar**

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The Spanish Society of Osteoporotic Fractures (SEFRAOS) convened their second national congress in Madrid on February 5-7, 2009. Approximately 240 delegates attended the meeting. The main topics analysed were the problems of vertebral fractures, an update in several aspects of metabolic bone diseases, humerus fractures, and new strategies in the treatment of pain and thromboembolic disease. Oral presentations, poster sessions, an open debate, and several invited lecturers completed the programme. A practical workshop utilizing simulated patients was also carried out for in-training residents.

SEFRAOS was founded in October 2007 by a multidisciplinary group of orthopaedic surgeons, osteoporosis experts, anaesthesiologists, primary care physicians, rehabilitation specialists, haematologists, nurses, and other factions involved in the integral care of patients with osteoporosis-related fractures. The main objective of the society is to promote the integration of knowledge and expertise possessed by the diversity of health care providers

who play a role in the treatment of these patients.

Instead of having a classical strategy centred in a single speciality, the goal is to develop a more transversal approach centred in all the complex aspects of patient care. In this respect, the discussions during the congress were extremely lively, with a remarkably rich interchange of ideas, knowledge and approaches emanating from a diversity of disciplines. Openness to the problems and challenges faced by colleagues dealing with a variety of patient issues resulted in better understanding and, undoubtedly, progression toward better care pathways for patients.

SEFRAOS was created to promote this multidisciplinary approach. As well as the national congress, the society has developed a strategy of holding local and regional meetings across the country with a total of 14 half-day sessions. This approach has allowed local physicians and experts dealing with osteoporosis and fractures integration with the goals and scientific messages of the society. Other nation-wide projects are currently in development.

## **MEETINGS OF INTEREST**

### **10th European Federation of Orthopaedic & Trauma (EFORT) Congress**

June 3-6, 2009

Vienna, Austria

[www.efort.org](http://www.efort.org)

### **Canadian Orthopaedic Association 64<sup>th</sup> Annual Meeting**

July 3-6, 2009

Whistler, British Columbia

[www.coaannualmeeting.org](http://www.coaannualmeeting.org)

### **31st Annual Meeting of the American Society for Bone and Mineral Research**

September 11-15, 2009

Colorado, Denver

[www.asbmr.org](http://www.asbmr.org)

## **Osteoporosis: From Evidence to Action**

### **ISFR Symposium**

Hip, Wrist & Spine: Do we have an answer

December 4-5, 2009

Monte Carlo, Monaco

[www.fractures.com](http://www.fractures.com)

### **ISFR EBM Courses**

#### **Session I: Evidence-Based Orthopaedics**

- a. Where are we Now and where are we going?
- b. Making Sense of Health Care Recommendations: GRADE System
- c. Checklists to Grade Quality of RCTs
- d. Outcomes Assessment: Validity and Reliability

#### **Session II: Current Issues in the Design of Orthopaedic Research**

- a. Limiting Bias in clinical research
- b. Multicenter Trials: Current Challenges
- c. Composite Outcomes
- d. It's not about size..it's about the number of events!
- e. Conflicts of Interest and the Current Industry-Surgeon Relationship

December 4-5, 2009

Monte Carlo, Monaco

**ISFR Hip, Wrist & Spine Workgroups**

Improving outcomes

December 4, 2009

Monte Carlo, Monaco

contact Amy Hoang-Kim at [isfr.fractures@gmail.com](mailto:isfr.fractures@gmail.com) for more information

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