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The 35th International Sun Valley Workshop on Skeletal Tissue Biology

Foreword

The 35th International Sun Valley Workshop on Skeletal Tissue Biology was held July 31-August 3, 2005. There were 109 Workshop attendees representing a wide range of clinical, basic science and social science disciplines. The program consisted of a mixture of clinical and basic science topics, with attempts to vertically and horizontally integrate these topics.

The W.S.S. Jee Remodeling in Bone (RIB) Award was given to Dr. John Currey for his pioneering studies relating bone mechanical properties with morphology. Dr. Currey's plenary lecture "Structural Heterogeneity in Bone: Good or Bad" was followed by a poster session that highlighted posters from students who received the Alice L. Jee Travel Award. The Workshop program was also highlighted by podium talks on Monday evening from six young investigators who were selected winners of the ASBMR/Harold M. Frost Young Investigator Awards, which came with a $1,500 prize and certificate.

As usual, the clinical focus of the Workshop concentrated on osteoporosis. Because of the many new approaches currently in development for osteoporosis therapy, a session on "Novel Therapies for Osteoporosis" examined recent data from studies using osteoprotegerin (OPG), selective androgen receptor modulators (SARMS), PTH[1-84] and Cathepsin K inhibitors. Cell-based orthopaedic therapies (Cell Therapies for Orthopaedic Applications) were addressed in a subsequent session.

The effects of pharmaceutical therapies on bone quality has become a high profile, much discussed issue, but the means to measure these abstract qualitative properties is less certain. Therefore, one session (Measuring "Bone Quality") described various techniques that could be used to measure various facets of "bone quality," including the role of matrix constituents, the mechanics of the interaction among the matrix constituents, microcrack initiation and growth, and changes to collagen that have mechanical influence. Because signaling is so important to bone remodeling, and because the osteocyte network is the putative neuronal network of bone, the role of osteocyte function in homeostasis and skeletal response were examined in a session titled "Mechanotransduction and the Osteocyte Network."

One strictly educational session was presented, which was a tutorial about how to use "Genetically Modified Animal Models to Study Bone and Cartilage". This session examined the strengths and limitations of transgenic animal models, knock-outs and knock-ins and the manner in which they are made; methods used to phenotype these constructs; and then examples of how they can be used.

The Workshop was supported by grants from the National Institutes of Health (NIAMS) and the Orthopaedic Research and Education Foundation (OREF). In addition, contributions from industry came from pharmaceutical concerns (Alliance for Better Bone Health; Amgen; Eli Lilly and Co.; Merck and Co., Inc.; Mission Pharmacal; NPS Pharmaceuticals; Pfizer), orthopaedic appliance manufacturers (DePuy Biologics; DePuy Spine; OrthoLogic; Zimmer), contract research companies (ClinTrials Bioresearch; SkeleTech) and manufacturers of imaging equipment (Scanco USA, Inc).

35th International Sun Valley Workshop On Skeletal Tissue Biology

July 31-August 3, 2005 Sun Valley, Idaho, USA

Sunday Morning (8 am-Noon):

Tutorial: Measuring "Bone Quality"
(Chair: **D. Fyhrie**)

(1) Bone quality: Summary of NIH/ASBMR meeting – **G. Lester** (NIAMS)
(2) Raman microscopy as probe of bone biomechanics – **M. Morris** (U. Michigan)
(3) Longitudinal micro-CT scans to evaluate bone architecture – **H. Weinans** (Erasmus Univ., Rotterdam)
(4) Sacrificial bonds in bone (The glue in our bones) – **P. Hansma** (U. Calif., Santa Barbara)
(5) Collagen glycation and its role in fracture properties of bone – **D. Vashishth** (RPI)
(6) Micromechanisms in bone failure – **J. Kinney** (Lawrence Livermore)

Sunday Evening (7:30 pm-10 pm):

RIB Award/Plenary Session (J. Currey, Univ. of York)

The Plenary Lecture was followed by a Poster Session with a wine and cheese reception.

Monday Morning (8 am-Noon):

Osteocytes and Mechanotransduction
(Chair: **L. Bonewald**)

(1) Generation and function of osteocyte dendritic processes – **L. Bonewald** (UMKC)
(2) DMP1 is essential for osteocyte formation and function – **J. Feng** (UMKC)
(3) Primary cilia as osteocyte strain sensors – **D. Quarles** (KUMC)
(4) PTH and osteocytes – **P. Divieti** (Mass General)
(5) New observations on bone fragility with glucocorticoid treatment. Results from an *in vivo* animal model **N. Lane** (UCSF)

Monday Evening (7:30 pm-10 pm):

Presentations by ASBMR/Harold M. Frost Award Recipients

(1) NFATc1 directly induces the human β_3 integrin gene in osteoclast differentiation – **T. Crotti** (BIDMC)
(2) Wdr5, a novel WD repeat protein, regulates osteoblast and chondrocyte differentiation *in vivo* – **F. Gori** (Mass General)
(3) Transcriptional mechanism of COMP gene expression and chondrogenesis – **C. Liu** (NYU)
(4) Bone tissue material properties are altered during osteoporosis – **L. McNamara** (Mt. Sinai, NY)
(5) Does exercise during growth influence osteoporotic fracture risk later in life – **S. Warden** (IUSM)
(6) Inhibition of NFAT increases osteoblast differentiation by increasing Fra-2 expression – **M. Zayzafoon** (UAB)

Tuesday Morning (8 am-Noon):

Tutorial: Genetically Modified Animal Models to Study Bone and Cartilage
(Chair: **T. Clemens**)

(1) Genetically altered mice for bone research – **H. Kronenberg** (Harvard, MGH)
(2) Viewing problems in bone biology from the perspective of lineage identification – **D. Rowe** (U Connecticut)
(3) Issues related to phenotyping – **R. Turner** (Oregon State University)

This tutorial included several components:
a. Methodologies for KO's, KI's, transgenics (overexpression, underexpression), Cre-lox, etc.
b. How does one phenotype them?
c. What animals are available?
d. What can be studied using these specific models?

Wednesday Morning (8 am-Noon):

Novel Therapies for Osteoporosis
(Chair: **R. Recker**)

(1) Overview of current therapies – **R. Recker** (Creighton Univ.)
(2) RANKL – **M. Ominsky** (Amgen)
(3) Selective androgen receptor modulators – Prospects for emerging therapy in osteoporosis? – **D. Thompson** (Pfizer)
(4) Treatment of postmenopausal osteoporotic women with parathyroid hormone 1-84 for 18 months increases cancellous bone formation and improves cancellous architecture: A study of iliac crest biopsies using histomorphometry and micro computed tomography – **J. Fox** (NPS)
(5) Cathepsin K inhibitors – **D. Kimmel** (Merck)

Wednesday Evening (7:30 pm-10 pm):

Cell Therapies for Orthopaedic Applications
(Chair: **R. O'Keefe**)

(1) Periosteal stem cells are essential for bone revitalization and repair – **R. O'Keefe** (Rochester)
(2) Distinct osteogenic activity of BMPs and their orthopaedic applications – **T-C. He** (Univ. Of Chicago)
(3) Cell -based therapeutics – **G. Matthews** (Genzyme)
(4) Intra-operative devices for use with marrow-derived progenitor cells for bone grafting – **G. Muschler** (Cleveland Clinic)

Summaries of most of these talks are included in this issue of the JMNI, together with a synthesis of the main points, including those made in the discussion, provided by the session chair.

David B. Burr, Ph.D.

Organizer and Chairman
35th International Sun Valley Workshop
on Skeletal Tissue Biology
Associate Editor of JMNI

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