



MINNESOTA
MEDICAL
ASSOCIATION

PROGRAM
AIMM/ASBMR JOHN HADDAD
YOUNG INVESTIGATORS MEETING

March 27-31, 2016

SNOWMASS, COLORADO

The purpose of this conference is to bring scientists and clinicians together in a format of open verbal communication that permits the translation of basic science advances into clinical concepts. Physicians and scientists working in the field of bone and mineral metabolism are encouraged to participate.

This activity has been planned and implemented in accordance with the Essential Areas and Policies of the Accreditation Council for Continuing Medical Education through the joint providership of the Minnesota Medical Association and the Advances in Mineral Metabolism. The Minnesota Medical Association (MMA) is accredited by the Accreditation Council for Continuing Medical Education to provide continuing medical education for physicians.

The Minnesota Medical Association designates this live activity for a maximum of *20.75 AMA PRA Category 1 Credit(s)*[™]. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

OBJECTIVES

- Learn about different experimental models for simulating the effects of unloading and spaceflight
- Increase their knowledge of the effects of unloading on skeletal homeostasis
- Learn about the effects of Spaceflight on the musculoskeletal system of mice and humans.
- Understand and describe the basic mechanisms responsible for the development of hypoparathyroidism
- Appreciate the complexities of the disorder and recognize the symptoms and the factors driving diagnosis of the disorder
- Have an increased understanding of the available treatments, their efficacy and potential complications
- Origin, specification and behavior of joint tissue progenitor cells
- Molecular regulation of articular cartilage genesis and endurance
- Gain insight into the coordinate regulation of cell fate decisions during development and maintenance of the skeleton.
- Identify and describe the functions of bone-derived factors in energy metabolism.
- Describe interactions between bone and other tissues in the systemic control of energy metabolism.
- Understand relationships between marrow mesenchymal progenitor cells, osteoblast, osteocytes, and adipocytes during bone development and recognize possibly unique functions of marrow adipocytes in metabolism.
- Attendees of these talks will gain knowledge in a broad array of clinical topics relevant to metabolic bone disease.
- Attendees will participate in discussion of clinical management of several skeletal diseases.
- These talks will facilitate the development of collaborative ideas and research.
- Gain understanding of the canonical and recently discovered mechanisms of G protein-coupled receptor activation pertinent to the PTH receptor
- Learn the developments regarding the use of the novel PTH(1-34) analog abaloparatide in the clinical treatment of osteoporosis.

- Attendees of these talks will gain knowledge in a broad array of topics relevant to bone biology and disease.
 - These talks will facilitate the development of collaborative ideas and research.
 - Understand vascular biology as applied to bone
 - Understand the stem cell supporting function of the vasculature in bone marrow
 - Understand osteogenesis-angionogenesis coupling in bone and its regulation by the hypoxia signaling pathway
 - Review potential side-effects of osteoporosis therapy
 - Address the impact of perceptions of side-effects on patient compliance with medication
 - Assess the impact of reduced drug development on osteoporosis management
 - Advance understanding of topics important to the science of mineral metabolism and the study of human disease.
 - Recognize myriad approaches exist for pursuing an academic career path.
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AIMM Founders Lecture Fund

**NIH: National Institute of Arthritis and Musculoskeletal and
Skin Diseases**

AIMM/ASBMR John Haddad Young Investigators

Alessandra Carriero, PhD	Florida Institute of Technology
Yi Fan, DDS	Harvard School of Dental Medicine
Kyu Sang Joeng, PhD	Baylor College of Medicine
Lamya Karim, PhD	Beth Israel Deaconess Medical Center
Allison Kuipers, PhD	University of Pittsburgh
Jonathan Mitchell, PhD	Children's Hospital of Philadelphia
Micheala Reagan, PhD	Maine Medical Center Research Institute
Katherine Staines, PhD*	The University of Edinburgh
Joy Tsai, MD	Harvard School of Dental Medicine
Laura Wright, PhD	Indiana University

** also received Bone Research Society (UK) Travel Award*

**AIMM/ASBMR JOHN HADDAD YOUNG INVESTIGATORS MEETING
PROGRAM
MARCH 27 – 31, 2016**

SUNDAY MARCH 27

3:00 – 7:00pm **REGISTRATION**

3:55 – 4:00pm **Introduction and Welcome**
Christopher Kovacs, MD, AIMM President

Session 1 **The effects of weightlessness and microgravity on bone in humans and animal models.**

Session Chairs: Melissa Kacena, PhD and Jo Price, PhD

4:00 – 4:45pm Ted Gross, PhD (University of Washington)
“Skeletal unloading, neuromuscular function, and bone homeostasis”

4:45 – 5:30pm Ted Bateman, PhD (University of North Carolina – Chapel Hill)
“Results from STS-135 Mission, and On to Longer-Duration Microgravity Exposure on ISS”

5:30 – 5:45pm break

5:45 – 6:30pm Jean Sibonga, PhD (NASA)
“Monitoring Skeletal Health in Astronauts”

6:30 – 7:00pm Young Investigator – Alessandra Carriero, PhD
“Multiscale mechanics and mechano-adaptation of bone in growth, aging and disease”

7:45 – 10:00pm Welcome reception for registrants and guests

MONDAY MARCH 28

Session 2 **Understanding Hypoparathyroidism**

Session Chair: Larry Suva, PhD

- 7:00 – 7:45am Bart Clarke, MD (Mayo Clinic)
 “Hypoparathyroidism: A clinician’s view of the disorder”
- 7:45 – 8:30am Harald Jüppner, MD (Massachusetts General Hospital)
 **“Hypoparathyroidism and Pseudohypoparathyroidism:
 the molecular and genetic basis of the disorders”**
- 8:30 – 8:45am break
- 8:45 – 9:15am Young Investigator – Yi Fan, DDS
 “Regulation of mesenchymal cell fate and bone resorption by PTH1R”
- 9:15 – 9:30am Discussion and Overview

GROUP PHOTO

12:00 – 1:30pm Mid-day consultations between Young and Established Investigators

- 3:00 – 4:15pm **Panel Discussion**
 “Crisis in the Future of Osteoporosis Pharmacotherapy”
 Session Chair: Bob Gagel, MD

Panelists: Michael Rosenblatt, MD [Merck]
 Andreas Grauer, MD [Amgen]
 Ann Elderkin, PA [ASBMR]
 Cliff Rosen, MD [Maine Medical Center]

Session 3 **Joints, Cartilage, and Skeletal Development**

Session Chair: Eileen Shore, PhD

- 4:30 – 5:15pm Veronique Lefebvre, PhD (Cleveland Clinic)
 **“Transcriptional regulation of the lineage determination and differentiation
 of skeletal cell types”**
- 5:15 – 6:00pm Maurizio Pacifici, PhD (Children’s Hospital of Philadelphia)
 **“Cell lineage and molecular analyses of synovial joint
 and articular cartilage development”**
- 6:00 – 6:15pm break
- 6:15 – 6:45pm Young Investigator – Katherine Staines, PhD
 “Understanding pathological ossification in osteoarthritis”
- 6:45 – 7:00pm Discussion and Overview

7:45 – 10:00pm Welcome Dinner for registrants and guests

TUESDAY MARCH 29

Session 4 Young Investigator Session

Session Chair: Dana Gaddy, PhD

- 7:00 – 7:30am Young Investigator – Allison Kuipers, PhD
“Arterial Calcification: Is the Wnt Pathway a Link between Bone and the Vasculature?”
- 7:30 – 8:00am Young Investigator – Jonathan Mitchell, PhD
“Pediatric Bone Density and the Role of Common and Rare Genetic Variants”
- 8:00 – 8:15am break
- 8:15 – 8:45am Young Investigator – Laura Wright, PhD
“Bisphosphonates prevent osteolysis and muscle weakness in aromatase inhibitor-treated mice with breast cancer bone metastases”
- 8:45 – 9:15am Young Investigator – Michaela Reagan, PhD
“Integrating Biology and Engineering for Preclinical Solutions to Osteolysis and Bone Disease”
- 9:15 – 9:30am Discussion and Overview

12:00 – 1:30pm Mid-day consultations between Young and Established Investigators

3:00 – 4:15pm **Meet the Professor Session 1**

1A: Bart Clarke and Harald Jüppner – **“Which parathyroid hormone treatment for osteoporosis? PTH 1-34, PTH 1-84 or PTHrP variants?”**

1B: Gerard Karsenty – **“Regulation of glucose homeostasis by bone”**

Session 5 Role of Bone in the Regulation of Energy Metabolism

Session Chairs: Renny Francesci, PhD, and Steve Harris, PhD

- 4:30 – 5:15pm Gerard Karsenty, MD, PhD (Columbia University)
“The impact of bone on whole organism physiology”
- 5:15 – 6:00pm Cliff Rosen, MD (Maine Medical Center)
“What is New Between Bone and Fat? It’s the Fuel!!!!”
- 6:00 – 6:15pm break
- 6:15 – 6:45pm Young Investigator – Lamya Karim, PhD
“Mechanisms of Diabetic Skeletal Fragility”
- 6:45 – 7:00pm Discussion and Overview

WEDNESDAY MARCH 30

Session 6

Late-Breaking Clinical Topics

Session Chair: Joy Wu, MD, PhD

7:00 am **Trabecular (spine) bone density increases significantly in the first six months after weaning (Factors Affecting Bone Formation after Breastfeeding Pilot study [FABB-Pilot])**
Christopher Kovacs

7:15am **A 57 year-old female with osteoporosis and hypophosphatasia**
Lynn Kohlmeier

7:30am **A clinical quandary: unusual presentation or rare disease?**
Larry Suva

7:45am **Association between bone density and blood counts in humans**
Joy Wu

8:00am **Spaceflight Mouse Investigations: Bone Regeneration**
Melissa A. Kacena

Bone defect recover in mice exposed to microgravity +/- thrombopoietin and/or BMP2
Articular cartilage repair after post-traumatic osteoarthritis in mice

8:15am

8:30 – 8:45am break

8:45am

9:00am

9:15am

10:30 – 12:00pm **Ski race**

12:00 – 1:30: Mid-day consultations between Young and Established Investigators

3:00 – 4:00pm **Meet the Professor Session 2**

2A: Matthew Drake / Richard Bockman – “How should abaloparatide fit in to the treatment of osteoporosis”

2B: Dana Gaddy / Larry Suva – “Paths to achieving an academic career”

4:00 – 4:45pm Business Meeting

Session 7 **Novel PTHR activation mechanisms and relevant clinical applications for osteoporosis treatment**

Session Chair: Murat Bastepe, MD, PhD

4:45 – 5:30pm Jean-Pierre Vilardaga, PhD (University of Pittsburgh)
 “GPCR activation mechanisms specific for the PTH Receptor”

5:30 – 5:45pm break

5:45 – 6:30pm Matthew Drake, MD, PhD (Mayo Clinic)
 ”Studies using abaloparatide in the treatment of osteoporosis.”

6:30 – 7:00pm Young Investigator – Joy Tsai, MD
 “Effects of 2 Years of Denosumab and Teriparatide Transitions on Bone Microarchitecture and Estimated Strength: the DATA-Switch HR-pQCT study”

7:45 – 10:00pm Awards Dinner for registrants and guests

THURSDAY MARCH 31

Session 8 Late breaking basic/translational topics

Session Chair: Nan Hatch, DMD, PhD

7:00am **Enhancer RNA Regulation and Possible Functions during Mesenchymal Stem Cell to Osteoblast and Osteocytes Differentiation: Comparison to In vivo Embryonic Limb and IDGSW3 Early Osteoblast and Late Osteocyte In Vitro Enhancer Regions**
SE Harris

MSC osteoblast/osteocyte differentiation +/- BMP2 in vitro: time course computational gene network/regulated enhancer RNAs

7:15am **Epigenetic Control of Skeletal Development and Bone Formation**

Andre J van Wijnen

Bone anabolic treatments/micronutrients induce epigenetic pathways that converge to suppress osteogenic differentiation by modulating global chromatin organization in mice

7:30am **Bone-Targeted Parathyroid Hormone Antagonist for Treatment of Breast Cancer Metastasis to Bone**

Robert Gensure

Prevention of breast cancer metastasis to bone by novel fusion protein, PTH(7-33)-CBD in mice

7:45am **Superficial cells disappear during early stages of osteoarthritis via accelerated differentiation into chondrocytes.**

Andrei S Chagin

Articular cartilage repair after post-traumatic osteoarthritis in mice

8:00am **Discoidin Receptor 2 Deficiency Induces Spontaneous and Selective Degeneration of the Temporomandibular Joint**

Renny T. Franceschi

Mouse model of Temporomandibular joint disease, osteoarthritis-like degenerative changes, Discoidin Receptor 2 (DDR2)

8:15am **Enpp1 and Opn decrease risk of renal calcifications caused by hyperphosphaturia in Npt2a null mice**

Clemens Bergwitz

Npt2a^{-/-} mouse model, nephrocalcinosis as influenced by diet and modifiers, Enpp1/OPN

8:30 – 8:45am break

8:45 – 9:30am

12:00 – 1:30pm Mid-day consultations between Young and Established Investigators

3:00 – 4:15pm **Meet the Professor Session 3**

3A: Ernestina Schipani – “Defining hypoxic versus normoxic models in skeletal research”

3B: Maurizio Pacifici – “Chondrocytes and Skeletal Growth”

Session 9 **Blood Vessels in Bone**

Session Chair: Kurt Hankenson, DVM, PhD

4:30 – 5:15pm Ernestina Schipani, MD, PhD (University of Michigan)
“Role of the osteoblastic HIFs in the regulation of the osteogenesis-angiogenesis coupling”

5:15 – 6:00pm Paul Frenette, MD (Albert Einstein College of Medicine)
“Blood vessel types and function in bone marrow niches”

6:00 – 6:15pm break

6:15 – 6:45pm Young Investigator – Kyu Sang Joeng, PhD
“The function of Wnt1 in bone homeostasis and therapeutic potential of anti-sclerostin antibody for WNT1-related Osteogenesis Imperfecta”

6:45 – 7:00pm Discussion and Close

SEE YOU NEXT YEAR!!!
