Summer 2014

Musculoskeletal Messenger

University of Pennsylvania Penn Center for Musculoskeletal Disorders

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Looking Forward to the 2014 PCMD Annual Scientific Symposium — November 12, 2014

Preparations are underway for the 11th Annual Penn Center for Musculoskeletal Disorders Scientific Symposium in the BRB Auditorium/Lobby to be held on November 12, 2014.

The keynote speaker will be Henry M. Kronenberg, M.D., from Harvard Medical School, Professor of Medicine and Chief of the Endocrine Unit at the Massachusetts General Hospital. His lecture is titled "*How PTHrP regulates chondrocyte differentiation.*"

The day will begin at 10:45 am with registration and poster set-up followed by scientific presentations from new Center Full and Affiliate members and PCMD Pilot Grant recipients.

The symposium will also include lunch and a judged poster session with prizes awarded in four categories.

The day will conclude with a reception from 4:00-5:30pm in the BRB lobby.

Please register (no charge, but registration is required) by going to: http://www.med.upenn.edu/pcmd/PCMD-scientific-symposium-registration-form.shtml .

Please check the PCMD website in the upcoming months for more information.

PCMD Pilot and Feasibility Grant Recipients Announced

The Penn Center for Musculoskeletal Disorders Pilot and Feasibility Grant Program has awarded four investigators with one year of funding for their pilot grant projects with a start date of July 1, 2014.

Joshua F. Baker, MD, MSCE, will receive funding for his grant titled "Assessment of Intramyocellular Fat Accumulation in Rheumatoid Arthritis Using MR Spectroscopy." Dr. Baker's project aims to determine correlations between IMCL and 1) measures of RA disease activity and severity, and 2) promotors/inhibitors of skeletal muscle health hypothesized to be altered in RA including Insulin-like Growth Factor-1 (IGF-1) and myostatin.

Russ P. Carstens, M.D., will receive funding for his pilot grant titled "Roles of Epithelial Splicing Regulatory Proteins in Craniofacial Development." Dr. Carstens's study will further characterize the phenotypes associated with CL/P defects in Esrp KO mice and begin to define targets and mechanisms through which they func-

PCMD Pilot and Feasibility Grant Recipients Announced (cont'd)

tion.

Foteini Mourkioti, Ph.D., will receive a pilot grant (*co-sponsored by the Institute for Regenerative Medicine's Program in Musculoskeletal Regeneration*) titled "A Novel Molecular Mechanism in Chronic Skeletal Muscle Injury." Dr. Mourkioti's experiments will test the hypothesis that during the progression of the dystrophic phenotype, the increased MuSC-specific NF-κB activity contributes significantly to the subsequent rapid functional defects.

Chamith S. Rajapakse, Ph.D., will receive a pilot grant titled "Biomechanics of Hip Fracture Assessed by MRI." Dr. Rajapakse's study intends to advance the hypothesis that hip strength can be reliably assessed in a clinically feasible manner using direct high-resolution MRI guided micro-level finite element analysis.

Congratulations to all four pilot grant recipients!

2014 Orthopaedic Surgery New PhD Faculty Recruited

Please welcome Foteini (Faye) Mourkioti, Ph.D. who has joined Penn as Assistant Professor of Orthopaedic Surgery in July 2014. Dr. Mourkioti obtained her Ph.D. from Max-Planck Institute in Germany and completed her postdoctoral fellowship at Stanford University. Her research interests are muscle disorders, stem cells, muscle regeneration, telomeres, cardiomyopathy, mitochondria, oxidative stress, muscle atrophy, and muscle wasting.

If you would like to contact Dr. Mourkioti, please send her an email at fmour@mail.med.upenn.edu.

Orthopaedic Research Club (ORC)

The Orthopaedic Research Club is co-directed by Drs. Ling Qin, Motomi Enomoto-Iwamoto, and X. Sherry Liu and is sponsored by the PCMD. The goals of the club are to:

- Exchange the most recent research data and ideas and seek potential collaborations among musculoskeletal researchers from Penn and neighboring institutions
- Provide seminar opportunities for postdoctoral fellows and graduate students from musculoskeletal research groups at Penn to advocate their research, to obtain feedback from their peers, and to promote their interactions with other investigators outside of their groups
- Invite regional speakers with common orthopaedic research interests to seek collaborative opportunities

The seminars are usually held at CHOP Abramson Research Center (ARC), room 124 on the last Wednesday of the month from 4-5 pm. There are approximately 10 seminars per year. If you have any questions, please contact Dr. Qin at qinling@mail.med.upenn.edu.

What's New in the PCMD Biomechanics Core?

The mission of the Biomechanics Core (http://www.med.upenn.edu/pcmd/biomechanics.shtml) of the Penn Center for Musculoskeletal Disorders (PCMD) is assist all PCMD members in performing the highest quality research via the provision of unique tools to assess the mechanical properties of musculoskeletal tissues. In this pursuit, we have developed a range of both basic and advanced mechanical testing methods (see: http://www.med.upenn.edu/pcmd/BCTestingMethods.shtml) that provide investigators with important information, across length scales, regarding the structure/function relationships of their tissue of interest. There are currently 29 active users of the Biomechanics Core, from the Perelman School of Medicine, Children's Hospital of Philadelphia, the School of Engineering and Applied Science, the School of Dentistry, and the School of Veterinary Medicine. These investigators regularly utilize the existing assays and resources of the Biomechanics Core to test such features as bone mechanical strength, tendon material properties, and the mechanical quality of cartilage repair. We are also continually working to innovate in the area of mechanical measurement and to increase the sophistication of our biomechanical testing tools and devices.

For example, this past year the core invested in a Makerbot 3D Printer to expedite the design of custom fixtures to meet the testing needs of our user base (Figure 1).

We likewise have continued to innovate and bring advanced methods to bear on common problems. For example, over the past year, we have developed testing methods and theoretical tools to model and extract properties from articular cartilage using micro-indentation testing (Figure 2).

As most of these innovations have been spurred by the needs of our user base, we invite you to reach out to us to identify new areas for development so that we can remain at the leading edge in mechanical testing across the spectrum of MSK tissues and better serve the mechanical testing needs of the community. As a final note, in addition to providing biomechanical testing services, we also provide training for individuals to use the equipment themselves (at a much reduced cost), as well as seed funding for new projects and collaborations utilizing the Core. Please reach out to us for more information. We look forward to hearing from you!

Rob Mauck, Director - lemauck@mail.med.upenn.edu

Mike Hast, Technical Director - hast@mail.med.upenn.edu

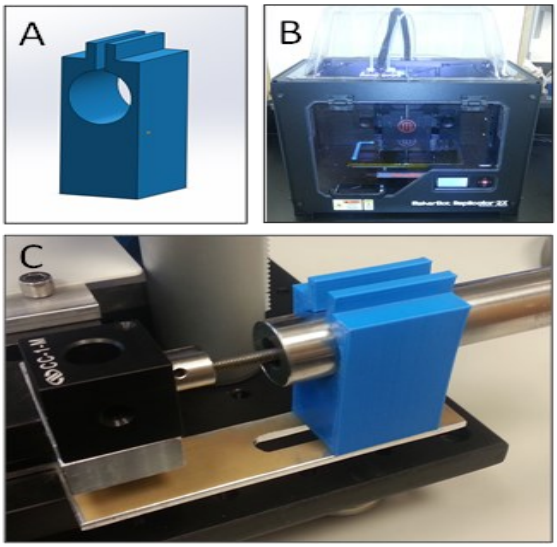

Figure 1: Development in CAD (A), manufacture (B), and use (C) of part that requires precise alignment and tolerancing that was manufactured with the 3-D printer.

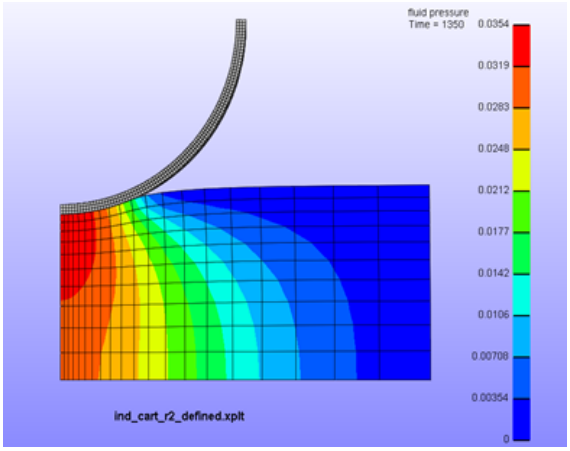

Figure 2: FE Model of biphasic cartilage indentation.

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Upcoming Events

PCMD Visiting Professorship Series 2014-2015

Tuesday, September 16, 2014, 1:30-2:30pm/ 11-146 SCTR
Development of a Gene-based Therapy for Osteoarthritis: Safety and Efficacy in an Equine Model
Steven C. Ghivizzani, PhD
Professor of Orthopaedics & Rehabilitation
University of Florida

Tuesday, October 28, 2014, 1:30-2:30pm/10-146 SCTR
The Strategic Role of Parathyroid Hormone in Resolution of Osseous Healing and Regeneration of Bone
Laurie K. McCauley, DDS, PhD
William K. and Mary Anne Najjar Professor
University of Michigan

Annual Scientific Symposium
Wednesday, November 14, 2014, 10:45-5:30pm/BRB Auditorium
How PTHrP Regulates Chondrocyte Differentiation
Henry M. Kronenberg, M.D.
Professor of Medicine
Harvard Medical School

Tuesday, December 09, 2014, 1:30-2:30pm/10-146 SCTR
Small Leucine Rich Proteoglycans: Fine Tune Regulators of Skeletal Function
Marian F. Young, Ph.D.
Chief of the Molecular Biology of Bones and Teeth Section
National Institutes of Health/NIDCR

Tuesday, January 20, 2015, 1:30-2:30pm/TBD
Synthetic Hydrogel Niches for Musculoskeletal Tissue Engineering
Stephanie J. Bryant, PhD
Associate Professor of Chemical & Biological Engineering
BioFrontiers Institute

Tuesday, February 10, 2015, 1:30-2:30pm/TBD
Pluripotent Stem Cell Repair of Osteochondral Defects
Darryl D'Lima, MD, PhD
Associate Professor
Scripps Translational Science Institute

Tuesday, March 10, 2015, 1:30-2:30pm/TBD
Title: TBD
Mary L. Bouxsein, PhD
Associate Professor of Orthopedic Surgery
Harvard Medical School

Tuesday, April 21, 2015, 1:30-2:30pm/TBD
Orthopedic Tissue Engineering by Epigenetic Landscaping
Andre J. van Wijnen, PhD
Professor of Orthopedic Surgery & Biochemistry and Molecular Biology
Mayo Clinic

Tuesday, May 12, 2015, 1:30-2:30pm/TBD
Cell and Extracellular Matrix Dynamics in Skeletal Tissues
Sarah L. Dallas, PhD
Professor of Oral and Craniofacial Sciences
University of Missouri, Kansas City