

*The Society for Physical Regulation
in Biology and Medicine*

**27th Scientific Conference
Program**



**Turtle Bay Resort
North Shore
Oahu, Hawaii**

January 6-9, 2009

The Society for Physical Regulation in Biology and Medicine gratefully acknowledges support from the following 2009 Conference sponsors:



Introducing the FX-5000!

- Increased Frequency Range
- Tutorials & Wizards
- Data Analysis
- Pump Control
- Custom waveforms



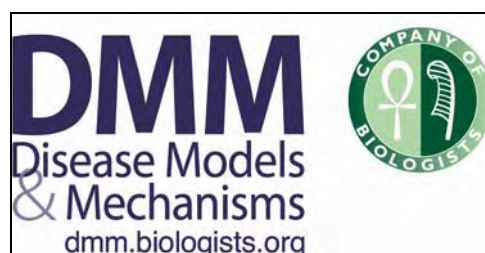
Flexcell® International Corp.

437 Dimmock's Mill Rd., Suite 28, Hillsborough, NC 27278
(919) 732-1591 or (800) 728-3714
www.flexcellint.com

The Company of Biologists

www.biologists.com

The Company of Biologists finances a range of awards and charitable grants through the publication of its three internationally renowned journals: *The Journal of Experimental Biology*; *Journal of Cell Science and Development*; and *Disease Models and Mechanisms*.



SCHEDULE AT A GLANCE

MONDAY, JANUARY 5, 2009

7:00-9:00 P.M. Council Meeting

TUESDAY, JANUARY 6, 2009

7:30 A.M. Continental Breakfast

7:50- 8:05 A.M Welcome/Introduction
Fred Pavalko, Program Chair, James Wang, President

8:05 -9:45 A.M. SESSION I: MECHANOSENSING AND SIGNALING IN OSTEOCYTES

KEYNOTE SPEAKER: Lynda Bonewald, PhD (University of Missouri Kansas City) **Mechanosensing in osteocytes**

9:45- 10:00 A.M. Coffee Break

10:00- 12:55 P.M. SESSION II: CELL RESPONSES TO MECHANICAL LOADING

KEYNOTE SPEAKER: Randall L. Duncan, PhD (University of Delaware) **Mechanical habituation: potential mechanisms for the desensitization of bone**

KEYNOTE SPEAKER: Bradley K. Yoder, PhD (University of Alabama Birmingham) **Ciliary Function and Dysfunction in Tissue homeostasis and Disease**

5:00 -7:00 P.M. Welcome Reception and Poster Session (posters will be displayed for the duration of the conference)

WEDNESDAY, JANUARY 7, 2009

7:30 A.M. Continental Breakfast

8:00 – 10:20 A.M. SESSION III: REPAIR AND REGENERATION

KEYNOTE SPEAKER: Roman J. Skoracki, PhD (The University of Texas M. D. Anderson Cancer Center) **A Clinicians Perspective of Current Repair Strategies for Bony Defects**

WEDNESDAY, JANUARY 7, 2009 (continued)

10:20 - 10:35 A.M. Coffee Break

10:35 – 12:35 P.M. SESSION IV: EXTRA-CELLULAR MATRIX AND ELECTRICAL SIGNALING

KEYNOTE SPEAKER: Yu-Li Wang, PhD (Carnegie Mellon University) **Mechanical forces as regulatory signals for adherent cells**

7:00 – 9:00 P.M. *Gala Dinner*

THURSDAY, JANUARY 8, 2009

7:30 A.M. Continental Breakfast

8:00 – 10:00 A.M. SESSION V: IN VIVO TISSUE RESPONSES TO MECHANICAL LOADING

KEYNOTE SPEAKER: Alexander G. Robling, PhD (Indiana University School of Medicine) **Mechanical signaling in bone tissue: spatiotemporal integration of cell and tissue-level responses**

10:00 – 10:15 A.M. Coffee Break

10:15 – 11:55 A.M. SESSION VI: STEM CELLS AND DIFFERENTIATION

FRIDAY, JANUARY 9, 2009

8:00 A.M. Continental Breakfast

8:30 – 11:10 A.M. SESSION VII: BIOMATERIALS AND TISSUE ENGINEERING

KEYNOTE SPEAKER: William R. Wagner, PhD (University of Pittsburgh) **Designing and processing constructs for mechanically active soft tissues**

11:10 – 11:25 A.M. Coffee Break

11:25 A.M. Annual Business Meeting and Awards Ceremony

WELCOME MESSAGE



On behalf of the Society for Physical Regulation in Biology and Medicine (SPRBM), I welcome you to the 27th Annual SPRBM Scientific Conference. We are pleased to have you contribute this conference here at this spectacular setting of Turtle Bay Resort on the north shore of Oahu.

The central theme of this year's conference is Cellular Mechanisms that Regulate Tissue Responses to Mechanical Stimuli. Our goals for this meeting include facilitating interactions among leading scientists and bioengineers in related fields to discuss recent progress in mechanobiology and related fields and to promote new ideas.

SPRBM is pleased to have seven distinguished keynote speakers, Drs. Lynda Bonewald, Randall Duncan, Bradley Yoder, Roman Skoracki, Yu-Li Wang, Alexander Robling, and William Wagner. Together with an excellent program of submitted abstracts for our conference, these invited speakers will address important topics in the areas of cellular mechanisms of mechanotransduction, tissue repair and regeneration, tissue mechanobiology, functional tissue engineering, stem cell and cell biology, biomaterials, molecular and cellular biomechanics, and tissue wound healing.

At this conference, we are dedicated to promoting highly interactive discussions during presentations and around posters that will be displayed during the conference. We also encourage networking and exchange of scientific information in the spectacular and relaxing environment of Oahu's famous north shore. The SPRBM is very grateful for the funding support for this conference.

All the abstracts from this year's conference will be published in the journal: Cellular and Molecular Bioengineering. I am thankful for the kind support from the Editors-in-Chief, Drs. X. Edward Guo and David Odde and technical support from Springer Press. We invite all meeting participants to submit full length manuscripts of the work presented at the conference to Cellular and Molecular Bioengineering.

I offer my gratitude to the society's staff members, Ms. Gloria Parsley and her crew. Their dedication and hard work have made this conference possible. Finally, the SPRBM is grateful to all of you for attending the conference. I look forward to seeing you all at the Turtle Bay Resort

Fred M. Pavalko, Program Chair
December 12, 2008

SCIENTIFIC CONFERENCE PROGRAM

TUESDAY, JANUARY 6, 2009

- 7:30 A.M. Continental Breakfast
- 7:50 – 8:05 A.M. Welcome/Introduction – Fred Pavalko, Indiana University School of Medicine
- 8:05 – 9:45 A.M. SESSION I: MECHANOSENSING AND SIGNALING IN OSTEOCYTES**
(Moderator: Fred Pavalko, Indiana University School of Medicine)
- 8:05 – 8:45 A.M. **KEYNOTE SPEAKER: Lynda Bonewald, PhD** (University of Missouri Kansas City)
Mechanosensing in osteocytes
- 8:45 – 9:05 A.M. **Calcium oscillations in osteocyte networks induced by fluid flow**
Xin L. Lu, B. Huo, A.D. Baik, X.Ed Guo. Columbia University
- 9:05 – 9:25 A.M. **Osteocytic network is more responsive in calcium signaling than osteoblastic network under fluid flow**
Xin L. Lu, B. Huo, A.D. Baik, X.Ed Guo. Columbia University
- 9:25 – 9:45 A.M. **Deletion of Beta1 integrins from cortical osteocytes reduces loading-induced bone formation**
Julie B. Litzberger, W.J. Tang, Christopher R Jacobs. Stanford University
- 9:45 – 10:00 A.M. Coffee Break
- 10:00 – 12:55 P.M. SESSION II: CELL RESPONSES TO MECHANICAL LOADING**
(Moderator: Fred Pavalko, Indiana University School of Medicine)
- 10:00 – 10:40 A.M. **KEYNOTE SPEAKER: Randall L. Duncan, PhD** (University of Delaware)
Mechanical habituation: potential mechanisms for the desensitization of bone
- 10:40 – 11:00 A.M. **Mechanotransduction in mesenchymal stem cells: effects of fluid shear stress**
Rokhaya Diop, S. Hsu, S. Li. University of California Berkley
- 11:00 – 11:20 A.M. **Focal adhesion kinase is important for fluid shear stress induced mechanotransduction in osteoblasts**
Suzanne R.L. Young, Rita Gerard, O'Riley, Jae-Boem Kim, Fred M. Pavalko. Indiana University School of Medicine
- 11:20 – 11:40 A.M. **Mechanical loading functions as a niche factor that regulates proliferation and differentiation of tendon stem cells**
Jianying Zhang, James H.-C. Wang. University of Pittsburg
- 11:55 – 12:35 P.M. **KEYNOTE SPEAKER: Bradley K. Yoder, PhD** (University of Alabama Birmingham)
Ciliary Function and Dysfunction in Tissue homeostasis and Disease
- 12:35 – 12:55 P.M. **Adenylyl cyclase 6 and cAMP mediate primary cilia dependent mechanosensing in bone cells**
Sara Temiyasathit, R.Y. Kwon, P. Tummala, C.C. Quah, Christopher R. Jacobs. Department of Veterans Affairs, Palo Alto, and Stanford University,
- 12:55 P.M. Adjourn (*lunch on your own, free afternoon*)
- 5:00 – 7:00 P.M. Welcome Reception and Poster Session

WEDNESDAY, JANUARY 7, 2009

- 7:30 A.M. Continental Breakfast
- 8:00 – 10:30 A.M. SESSION III: REPAIR AND REGENERATION**
(Moderator: Anshu Mathur, University of Texas M.D. Anderson Cancer Center)
- 8:00 – 8:40 A.M. **KEYNOTE SPEAKER: Roman J. Skoracki, PhD** (The University of Texas M. D. Anderson Cancer Center)
A Clinicians Perspective of Current Repair Strategies for Bony Defects
- 8:40 – 9:00 A.M. **Fabrication and characterization of surfaces displaying interwoven micropatterns of GRGDS and fibronectin creased using laser scanning lithography**
John H. Slater, J.S. Miller and J.L. West. Rice University
- 9:00 – 9:20 A.M. **Effect of bFGF and PDGF-BB on repair of rat dermal fibroblasts in vitro**
Brandon G. Henry, S. Bhansali and E. Muffly. University of South Florida
- 9:20 – 9:40 A.M. **A new strategy for osteochondral tissue engineering with human umbilical cord mesenchymal stromal cells**
Limin Wang, L. Zhao and Michael S. Detamore. University of Kansas
- 9:40 – 10:00 A.M. **Development of novel aliphatic biodegradable fluorescent polymers for tissue engineering**
Jian Yang, S. Gautam, L. Liu, Y. Zhang, J. Dey, W. Chen, R.P. Mason, L.P. Tang, C. Zhang, J. Zheng, K.J. Guleserian. University of Texas
- 10:00 – 10:20 A.M. **Effect of *In Vivo* Cellular Microenvironment on Regeneration of Tissues**
Anshu B. Mathur. University of Texas M.D. Anderson Cancer Center
- 10:20 – 10:35 A.M. Coffee Break
- 10:35 – 12:35 P.M. SESSION IV: EXTRACELLULAR MATRIX AND ELECTRICAL SIGNALING**
(Moderator: Julie Litzenberger, Stanford University)
- 10:35 – 11:15 A.M. **KEYNOTE SPEAKER: Yu-Li Wang, PhD** (Carnegie Mellon University)
Mechanical forces as regulatory signals for adherent cells
- 11:15 – 11:35 A.M. Title: TBA, *Al Banes*, University of North Carolina at Chapel Hill
- 11:35 – 11:55 A.M. **Signaling through focal adhesions in osteoblast echanotransduction**
Fred M. Pavalko. Indiana University School of Medicine
- 11:55 – 12:15 P.M. **Novel, real-time imaging of cell morphology, motility and directional migration in response to physical, chemical and electrical guidance in 3-D ECMs**
Christine E. Pullar. University of Leicester
- 12:15 – 12:35 P.M. **Millimeter waves modulate intracellular calcium dynamics in stem cell derived neurons**
Igor Titushkin, E. Moros, W. Pickard, M. Cho. University of Illinois
- 12:35 – 12:55 P.M. **The role of growth factors on the hypercellular and matrix deposition phases of keratocytes during wound healing**
Latia Etheredge, B. Kane, John R. Hassell. University of South Florida
- 7:00 – 9:00P.M. GALA DINNER

THURSDAY, JANUARY 8, 2009

- 7:30 A.M. Continental Breakfast
- 8:00 – 10:00 A.M. SESSION V: IN VIVO TISSUE RESPONSES TO MECHANICAL LOADING**
(Moderator: Christopher Jacobs, Columbia University)
- 8:00 – 8:40 A.M. **KEYNOTE SPEAKER: Alexander G. Robling, PhD** (Indiana University School of Medicine)
Mechanical signaling in bone tissue: spatiotemporal integration of cell and tissue-level responses
- 8:40 – 9:00 A.M. **Microfluidic enhancement of skeletal fluid flow inhibits hindlimb unloading-induced bone loss in mice**
Ronald Y. Kwon, D. R. Meays, John A. Frangos. LaJolla Bioengineering Institute
- 9:00 – 9:20 A.M. **Characterizing strains in the tibia of hindlimb unloaded rats during combined isometric and eccentric stimulated muscle contractions**
Matthew W. Lucas, J. M. Swift, Y. Shirazi-Rard, E.S. Greene, B.D. Schepp, S.A. Bloominfield, Harry A. Hogan. Texas A&M University
- 9:20 – 9:40 A.M. **Development of multi-cellular compression device**
SunHee Kim, JaeYoung Yun, Jennifer H. Shin. Korea Advanced Institute of Science and Technology
- 9:40 – 10:00 A.M. **Importance of in vivo mechanical forces in cancer drug discovery**
V. Sanjit Nirmalanandhan, P. Hendricks, G. Vielhauer, G.S. Sittampalam. University of Kansas Medical Center
- 10:00 – 10:15 A.M. Coffee Break
- 10:15 – 11:55 A.M. SESSION VI: STEM CELLS AND DIFFERENTIATION**
(Moderator: Suzanne Young, Indiana University School of Medicine)
- 10:15 – 10:35 A.M. **Multidifferentiation potential of tendon stem cells**
Jianying Zhang and James H.-C. Wang. University of Pittsburgh
- 10:35 – 10:55 A.M. **Tendon Inflammation and the role of tendon stem cells in the development of tendinopathy**
Jianying Zhang and James H.-C. Wang. University of Pittsburgh
- 10:55 – 11:15 A.M. **Comparative analysis of collagenase digestion methods to isolate mesenchymal cells from the human umbilical cord**
Liang Zhao, Michael S. Detamore. University of Kansas
- 11:15 – 11:35 A.M. **Co-culture of human umbilical cord mesenchymal stromal cells with primary chondrocytes and osteoblasts promotes chondrogenic and osteogenic differentiation**
Liang Zhao, Michael S. Detamore. University of Kansas
- 11:35 – 11:55 A.M. **PKC inhibition up-regulates procollagenase synthesis in human dermal fibroblasts**
Raphael Lee. University of Chicago
- 11:55 A.M. Adjourn (*lunch on your own, free afternoon*)

FRIDAY, JANUARY 9, 2009

- 8:00 Continental Breakfast
- 8:30 – 11:10 A.M. SESSION VII: BIOMATERIALS AND TISSUE ENGINEERING**
(Moderator: James H.-C. Wang, University of Pittsburgh)
- 8:30 – 9:10 A.M. **KEYNOTE SPEAKER: William R. Wagner, PhD** (University of Pittsburgh)
Designing and processing constructs for mechanically active soft tissues
- 9:10 – 9:30 A.M. **Mechanical properties of PEGDA hydrogels regulate endothelial cell tubulogenesis**
Julia E. Leslie –Barbick, J.L. West. Rice University
- 9:30 – 9:50 A.M. **The multiblock copolymer surfactant P188 induces fusion of transected peripheral neurons**
Raphael Lee. University of Chicago
- 9:50 – 10:10 A.M. **Advanced biocompatibility screening methods for dental materials**
Peter.E. Murray, Franklin Garcia-Godoy. Nova Southeastern University
- 10:10 – 10:30 A.M. **Hydrogels with patterned elasticity reveal differential cell responses to substrate mechanics and ligand density**
Stephanie Nemir, H. Hayenga, J.D. Humphrey, J.L. West. Rice University and Texas A&M University
- 10:30 – 10:50 A.M. **Micro-CT of Corrosion casts for use in the computer aided design of microvasculature**
William L Mondy, D. Cameron, J.P. Timmermans, N. De Clerck, A. Sasov, C. Castenlyn, L.A. Pieg. University of South Florida
- 10:50 – 11:10 A.M. **Osteochondral tissue engineering using macroscopic gradients of bioactive signals**
Nathan Dormer, M. Singh, L. Wang, L. Zhao, C. Berklund and Michael S. Detamore. University of Kansas
- 11:10 – 11:25 A.M. Coffee Break
- 11:25 A.M. **Annual Business Meeting and Awards Ceremony**

ANNUAL BUSINESS MEETING AND AWARDS CEREMONY

PRESIDENT'S REPORT, James Wang

SECRETARY/TREASURER REPORT, Kent Hoffman

IWAO YASUDA AWARD The Society annually seeks to present the Iwao Yasuda Award to an individual who has made an excellent contribution to the field of biomedical research, based upon current research achievements in the area of physical regulation in biology and medicine. The award selection process is based upon an evaluation of abstracts and presentations at the scientific conference.

NEW CLINICAL INVESTIGATOR AWARD The Society annually seeks to present the New Clinical Investigator Award to a clinically trained individual (M.D., D.D.S., D.M.D., D.V.M.) who has made an excellent contribution to the field of biomedical research, based upon current achievements in the area of biological effects of physical interaction and related physiology. The research may be in a clinical or basic science area. The award selection process is based upon an evaluation of abstracts and presentations at the scientific conference.

In order to be considered for the Iwao Yasuda or New Clinical Investigator Awards, abstracts must be of the highest quality, substantially describing completed work of scientific significance. Abstracts must include Introduction, Materials and Methods, Results and Discussion sections with sufficient detail, including statistical analysis, to allow the Program Committee to evaluate the scientific quality of the work. In addition, presentations must be clear, focused, and must adhere to the Program Committee Committee's guidelines for length.

ELECTION ANNOUNCEMENT, Jeremy Mao

WELCOME RECEPTION

SPRBM will host a welcome reception with optional poster presentations on Tuesday, January 6, 2009 from 5:00 – 7:00pm.

GALA DINNER

SPRBM will host the Gala Dinner on Wednesday, January 7, 2009 at 7:00pm.

The Society for Physical Regulation in Biology and Medicine

2008-2009

Officers, Council and Committee Chairs

President:	James Wang (2010)
President-elect:	Franklin Garcia-Godoy (2011)
Immediate Past President:	Jeremy Mao (2009)
Secretary-Treasurer:	Kent C. Hoffman (2009)
Council:	Craig Simmons (2009) Anshu Mathur (2009) Fredrick Pavalko (2010) X. Ed Guo (2010)
Program Chair:	Fredrick Pavalko (2009) Anshu Mathur (2010)
By Laws:	Chris Jacobs
Nominating Committee:	Jeremy Mao
Executive Director:	Gloria L. Parsley
Awards Committee:	James Wang Anshu Mathur Franklin Garcia-Godoy

The Society for Physical Regulation in Biology and Medicine

**2412 Cobblestone Way
Frederick, MD 21702 USA**

301-663-4556

301-694-4948 fax

www.SPRBM.org