Program at a Glance

TUESDAY, JANUARY 3, 2012

7:00 PM SPRBM Council Meeting

WEDNESDAY, JANUARY 4, 2012

7:00 AM Continental Breakfast

7:45 AM **Welcome/Introduction**
Yi-Xian Qin
Dan Hammer

8:00-10:00 AM
SESSION I - MOLECULAR BASE OF EXTRACELLULAR MATRIX
(Moderator: Chris Jacobs, Cheng Dong)

8:00-8:40 Keynote Lynda Bonewald
8:40-9:00 Michael Detamore
9:00-9:20 Catherine Kuo
9:20-9:40 Roland Kaunas
9:40-10:00 Carlos Rinaldi

10:00-10:20 AM Coffee Break

10:20-12:20 PM
SESSION II – ION CHANNEL AND MECHANOTRANSDUCTION
(Moderator: Paul Janmey, Jianping Jin)

10:20-11:00 Keynote Farshid Guilak
11:00-11:20 X. Edward Guo
11:20-11:40 Paul A. Janmey
11:40-12:00 Robert Mauck
12:00-12:20 Deborah Leckband

12:20-2:30 PM Afternoon Break

2:30-4:15 PM Workshop 1 NIH/NSF
(Panel Chair: Robert Guldberg)

2:30-2:50 Dennis Carter, BMMB Program Director, NSF
2:50-3:10 Joan McGowan, Division Director of Musculoskeletal Diseases, NIAMS, NIH
3:10-3:30 Farshid Guilak, Professor, Duke University
3:30-3:50 Jean Sipe, CSR, NIH Center for Scientific Review
3:50-4:15 Panel Discussion

4:15-4:30PM Coffee Break

4:30-5:30 PM Afternoon Break or Workshop 2

6:30 PM WELCOME RECEPTION
Anshu Mather, President of SPRBM

THURSDAY, JANUARY 5, 2012

8:00-10:20 AM
SESSION III – CELL MOTILITY, PROPERTY AND MODELING
(Moderator: Dan Hammer, Edward Guo)

8:00-8:40 Keynote Roger Kamm
8:40-9:00 Cheng Zhu
9:00-9:20 Chris Jacobs
9:20-9:40 Phil LeDuc
9:40-10:00 Jianping Jin
10:00-10:20 Yingxiao Peter Wang

10:20-10:40 AM Coffee Break

10:40-12:50 PM
SESSION IV – MOTILITY, CELLUAR AND MOLECULAR MECHANICS
(Moderator: Roger Kamm, Phil LeDuc)

10:40-11:20 Keynote Dan Hammer
11:20-11:40 Shinji Deguchi
11:40-12:00 Cheng Dong
12:00-12:20 Elizabeth Loboa
12:20-12:35 Christopher Waters
12:35-12:50 Susan Thomas

1:00-5:00 PM Afternoon Break

6:00-9:30 PM GALA DINNER
SPECIAL INVITED SPEAKER
Clinton Rubin

FRIDAY, JANUARY 6, 2012

8:00-10:00 AM
SESSION V – CHALLENGE IN INTEGRATED RESEARCH AND MECHANOTRANSDUCTION
(Moderator: Deborah Leckband, Catherine Kuo)

8:00-8:40 Keynote Joan McGowan
8:40-9:00 Christopher Chen
9:00-9:15 Alesha Castillo
9:15-9:30 Rita Issa
9:30-9:45 Jaime Ramirez-Vick
9:45-10:00 Alisa Clyne

10:00-10:20 AM Coffee Break

10:20-12:40 PM
SESSION VI – STEM CELL MECHANICAL MODULATION AND TISSUE REGENERATION
(Moderator: Cheng Zhu, Chris Chen)

10:20-11:00 Keynote Robert Guldberg
11:00-11:20 Yi-Xian Qin
11:20-11:40 Michael Sacks
11:40-12:00 Anshu Mathur
12:00-12:20 Peter Murray
12:20-12:40 James Wang

12:40-2:30 PM Afternoon Break

2:30-4:00 PM
SESSION VII – SHORT TALKS FROM STUDENTS/FELLOWS
(Moderator: Robert Mauck, James Wang, Y. Peter Wang)

2:30-2:40 Jihye Seong
2:40-2:50 Kristen Lee
2:50-3:00 Lina Wang
3:00-3:10 Asanka Wijekoon
3:10-3:20 Daniela Fuentes
3:20-3:30 Manu Platt
3:30-3:40 Minyi Hu
3:40-3:50 Neethu Mohan
3:50-4:00 Julia Chen

4:00-6:00 PM POSTER SESSION (Wine/Cheese)

7:00 PM BMES/CMBE Editorial Board Meeting

SATURDAY, JANUARY 7, 2012

8:00-10:20 AM
SESSION VIII – RISING STARS
(Moderator: Michael Detamore, Yi-Xian Qin)

8:00-8:20 Nathan Gallant
8:20-8:40 Sihong Wang
8:40-9:00 Cindy Reinhart-King
9:00-9:20 Shelly Peyton
9:20-9:40 Jiro Nagatomi
9:40-10:00 Eric Darling
10:00-10:20 Charles Gersbach

10:20 AM **Annual SPRBM Business Meeting and SPRBM/BMES Awards Ceremony**
(Moderator: Anshu Mather, Robert Mauck)

Scientific Program

2nd BMES-SPRBM Conference on
Cellular and Molecular Bioengineering
30th SPRBM Scientific Conference

Cell Motility, Matrix, Mechanobiology, and Regeneration

Hilton Caribe Hotel Resort, San Juan, Puerto Rico

JANUARY 3-7, 2012

TUESDAY, JANUARY 3, 2012

7:00 PM SPRBM Council Meeting

WEDNESDAY, JANUARY 4, 2012

7:00 AM Continental Breakfast
7:45 AM Welcome/Introduction (Yi-Xian Qin, Daniel Hammer)

8:00 AM – 10:00 AM
SESSION I – MOLECULAR BASE OF EXTRACELLULAR MATRIX
Moderator: Chris Jacobs, Cheng Dong (Las Olas Ballroom)

8:00-8:40 Keynote Lynda Bonewald
The Role of the Osteocyte Perilacunar Matrix in Mechanosensation
8:40-9:00 Michael Detamore
Interpenetrating Networks and Colloidal Gels
9:00-9:20 Catherine Kuo
Structure-property relationships of embryonic tendon during development
9:20-9:40 Roland Kaunas
The Direction of Stretch-Induced Stress Fiber Orientation Depends on Collagen Matrix Stress
9:40-10:00 Carlos Rinaldi
Magnetic Nanoparticles as Nanoscale Probes and Actuators in Complex Fluids and Biological Systems

10:00-10:20 AM Coffee Break

10:20 AM – 12:20 PM
SESSION II – ION CHANNEL AND MECHANOTRANSDUCTION
Moderator: Paul Janmey, Jianping Jin (Las Olas Ballroom)

10:20-11:00 Keynote Farshid Guilak
The Molecular Basis of Mechanical Signal Transduction in Cartilage
11:00-11:20 X. Edward Guo
Intracellular Calcium $[Ca^{2+}]_i$ *Spikes in Osteocyte Network*

11:20-11:40	Paul A. Janmey *Mechanosensing Through Multiple Types of Transmembrane Receptors*
11:40-12:00	Robert Mauck *Variations in Nuclear Mechanics and Contractility Alter Mesenchymal Stem Cell Mechanotransduction*
12:00-12:20	Deborah Leckband *Rigidity Sensing and Mechanotransduction at Intercellular Junctions*

12:20-2:30 PM Afternoon Break

2:30 PM – 4:15 PM
NIH/NSF GRANT WRITING WORKSHOP

Panel Chair: Robert Guldberg (Las Olas Ballroom)

2:30-2:50	Dennis Carter, BMMB Program Director, NSF *Mechanobiology funding opportunities in NSF*
2:50-3:10	Joan McGowan, Division Director of Musculoskeletal Diseases, NIAMS, NIH *Challenges and Opportunities of Musculoskeletal Research in NIH*
3:10-3:30	Farshid Guilak, Professor, Duke University *How to Write a Good Proposal - from Reviewers' Point of View*
3:30-3:50	Jean Sipe, CSR, NIH Center for Scientific Review *Grant writing and NIH review*
3:50-4:15	Panel Discussion

4:15-4:30 PM Coffee Break

4:15-4:30 PM Afternoon Break or Workshop 2

6:30 PM – 9:00 PM
WELCOME RECEPTION

Anshu Mathur, President of SPRBM (Oasis Garden)
Rising of Cellular and Molecular Bioengineering

THURSDAY, JANUARY 5, 2012

8:00 AM – 10:20 AM
SESSION III – CELL MOTILITY, PROPERTY AND MODELING

Moderator: Dan Hammer, Edward Guo (Las Olas Ballroom)

8:00-8:40	Keynote Roger Kamm *Biomechanical Properties of The Cell: Insights from Computational Modeling*
8:40-9:00	Cheng Zhu *Kinetic Analysis of Cross-Junctional Molecular Interactions Between T Cell and Antigen Presenting Cell*
9:00-9:20	Chris Jacobs *Primary Cilia as Cellular Mechanosensors*
9:20-9:40	Phil LeDuc *Planes, Trains, Automobiles....and Cells?*
9:40-10:00	Jianping Jin *Mechanoregulation and function of calponin*
10:00-10:20	Yingxiao Peter Wang *A Circuit Algorithm of Tunable Intramolecular Interactions Embedded within Shp2*

10:20-10:40 AM Coffee Break

10:40 AM – 12:50 PM
SESSION IV – MOTILITY, CELLULAR AND MOLECULAR MECHANICS

Moderator: Roger Kamm, Phil LeDuc (Las Olas Ballroom)

10:40-11:20	Keynote Dan Hammer *Biomechanics of Directed Immune Cell Motility*
11:20-11:40	Shinji Deguchi *Role of Stress Fibers in Cellular Tensional Homeostasis*
11:40-12:00	Cheng Dong *Melanoma Cell Induced Endothelial Gap Formation Depends on VE-Cadherin Disassembly and Contractile Forces*
12:00-12:20	Elizabeth Loboa *Functional Bone Tissue Engineering using Human Adipose Derived Stem Cells and Biomimetic Physical Stimuli*
12:20-12:35	Christopher Water *Spatial and Temporal Changes in Elastic Modulus During Cell Migration*
12:35-12:50	Susan Thomas *The Role of Peripherial Lymphatic Drainage in Immunity*

1:00-5:00 PM Afternoon Break

6:00 PM – 9:30 PM
GALA DINNER

SPECIAL INVITED SPEAKER Clinton T. Rubin (Salon Tropical)
My Transition from Bone-Head to Fat-Head

FRIDAY, JANUARY 6, 2012

8:00 AM – 10:00 AM
SESSION V – CHALLENGE IN INTEGRATED RESEARCH AND MECHANOTRANSDUCTION

Moderator: Deborah Leckband, Catherine Kuo (Las Olas Ballroom)

8:00-8:40	Keynote Joan McGowan *Managing Science and Innovating in Challenging Times*
8:40-9:00	Christopher Chen *A Material Approach to Studying Mechanotransduction*
9:00-9:15	Alesha Castillo *Role of SDF-1/CXCR4 Signaling in Load-Induced Bone Formation*
9:15-9:30	Rita Issa *Cyclic Loading Preconditions Carilage Against Oxidative and Inflammatory Stress*
9:30-9:45	Jaime Ramirez-Vick *Effect of Fibronectin and Vitronectin on Osteoblast Attachment and Proliferation on Nanostructured Titanium Surfaces*
9:45-10:00	Alisa Clyne *Ultra-Low and High Glucose Inhibit Endothelial Cell Shear Stress Response*

10:00-10:20 AM Coffee Break

10:20 AM – 12:40 PM
SESSION VI – STEM CELL MECHANICAL MODULATION AND TISSUE REGENERATION

Moderator: Cheng Zhu, Chris Chen (Las Olas Ballroom)

10:20-11:00	Keynote Robert Guldberg *Mechanical Regulation of Vascular Growth and Bone Regeneration*
11:00-11:20	Yi-Xian Qin *Mechanobiologic Acoustics on Bone Cellular and In-Vivo Adaptation*
11:20-11:40	Michael Sacks *Effects of Large Deformation Mechanical Stimuli on the Development of Engineered Heart Valve Leaflet Tissues*
11:40-12:00	Anshu Mathur *Tissue Regeneration with Biomaterials*
12:00-12:20	Peter Murray *Stem Cells and Tooth Regeneration*
12:20-12:40	James Wang *Defining Cellular Mechanical Forces and Mechano-Regulation of Stem Cell Functions*

12:40-2:30 PM Afternoon Break

2:30 PM – 4:00 PM
SESSION VII – SHORT TALKS FROM STUDENTS/FELLOWS POSTERS

Moderator: Robert Mauck, James Wang, Yingxiao Peter Wang (Las Olas Ballroom)

2:30-2:40	Jihye Seong *Intracellular Tension-Induced FAK Activations Visualized by FRET*
2:40-2:50	Kristen Lee *Involvement of Adenylyl Cyclase 6 in Mediating Loading-Induced Bone Formation*
2:50-3:00	Lina Wang *Fabrication and Characterization of Dielectrophorosis Aligned Fibrous Silk Fibroin-Chitosan Scaffolds for Tissue Engineering*
3:00-3:10	Asanka Wijekoon *Oxygen Rich Hydrogel Scaffolds For Tissue Regeneration and Deep Wound Healing*
3:10-3:20	Daniela Fuentes *Dynamic Response of Membrane Rafts to Single Focal Adhesion Deformation*
3:20-3:30	Manu Platt *Computational and Experimental Validation of a Novel Proteolytic Method to Prevent Disease-Induced Degradation of Type I Collagen*
3:30-3:40	Minyi Hu *Dynamic Fluid Flow Stimulation on In Vivo Bone Marrow Mesenchymal Stem Cell Proliferation*
3:40-3:50	Neethu Mohan *Raw Materials and Growth Factor Encapsulated 3D Microsphere Based Gradient Scaffolds for Osteochondral Tissue Engineering*
3:50-4:00	Julia Chen *The Role of Bone Marrow Stromal Cells in Mechanically Induced Osteogenesis*

POSTER SESSION (Wine & Cheese Reception)

4:00-6:00 PM (Salon del Mar, Las Olas Terrace)

7:00 PM BMES/CMBE Editorial Board Meeting

SATURDAY, JANUARY 7, 2012

8:00 AM – 10:20 AM
SESSION VIII – RISING STARS

Moderator: Michael Detamore, Yi-Xian Qin (Salon Flamingo)

8:00-8:20	Nathan Gallant *Regulation of Adhesion Strength by Cell Shape and Focal Adhesion Position*
8:20-8:40	Sihong Wang *Thermal Effects on Osteogenesis of Human Mesenchymal Stem Cells*
8:40-9:00	Cindy Reinhart-King *Age-Related Matrix Stiffening Enhances Vascular Permeability by Altering Endothelial Cell Contractility*
9:00 -9:20	Shelly Peyton *Breast Cancer Metastasis and Tissue Tropism in Engineered Materials*
9:20-9:40	Jiro Nagatomi *A Novel Mechanism For Cellular Mechanotransduction of Hydrostatic Pressure*
9:40-10:00	Eric Darling *Novel Biomarkers for the Identification of Lineage-Preference in Mesenchymal Stem Cells*
10:00-10:20	Charles Gersbach *Photoregulated Gene Expression in Human Cells with Engineered Transcription Factors*

10:20 AM **Annual SPRBM Business Meeting and SPRBM/BMES Awards Ceremony**
(Moderator: Anshu Mathur, Robert Mauck)

Friday, January 6, 2012
4:00 p.m. – 6:00 p.m.

P1. INTRACELLULR TENSION-INDUCED FAK ACTIVATIONS VISUALIZED BY FRET
J Seong and Y Wang
University of Illinois, Urbana-Champaign

P2. INVOVLEMENT OF ADENYLYL CYCLASE 6 IN MEDIATING LOADING-INDUCED BONE FORMATION
K. L. Lee, D. A. Hoey, M. Spasic, T. Tang, H. K. Hammond, C.R. Jacobs
Columbia University; Royal College of Surgeons in Ireland; University of California San Diego

P3. FABRICATION AND CHARACTERIZATION OF DIELECTROPHOROSIS ALIGNED FIBROUS SILK FIBROIN-CHITOSAN SCAFFOLDS FOR TISSUE ENGINEERING
L Wang, T Iyyanki, JR Hubenak, GP Reece, AB Mathur
The University of Texas M. D. Anderson Cancer Center

P4. OXYGEN RICH HYDROGEL SCAFFOLDS FOR TISSUE REGENERATION AND DEEP WOUND HEALING
A. Wijekoon, N. D. Leipzig
The University of Akron

P5. DYNAMIC RESPONSE OF MEMBRANE RAFTS TO SINGLE FOCAL ADHESION DEFORMATION
L Wang, T Iyyanki, JR Hubenak, GP Reece, AB Mathur
The Pennsylvania State University

P6. COMPUTATIONAL AND EXPERIMENTAL VALIDATION OF A NOVEL PROTEOLYTIC METHOD TO PREVENT DISEASE-INDUCED DEGRADATION OF TYPE I COLLAGEN
Manu O. Platt
Georgia Institute of Technology and Emory University

P7. DYNAMIC FLUID FLOW STIMULATION ON IN VIVO BONE MARROW MESENCHYMAL STEM CELL PROLIFERATION
M Hu, R Yeh, M Lien, Y-X Qin
Stony Brook University

P8. RAW MATERIALS AND GROWTH FACTOR ENCAPSULATED 3D MICROSPHERE BASED GRADIENT SCAFFOLDS FOR OSTEOCHONDRAL TISSUE ENGINEERING
Neethu Mohan, Michael Detamore
University of Kansas

P9. THE ROLE OF BONE MARROW STROMAL CELLS IN MECHANICALLY INDUCED OSTEOGENESIS
J.C. Chen, D.A. Hoey, C.R. Jacobs
Columbia University, Royal College of Surgeons in Ireland

P10. THE TROPIC GROWTH OF FUNGAL HYPHAE IN RESPONSE TO ENVIRONMENTAL CUES
Alexandra Brand, Darren Thomson, Emma Morrison and Silvia Wehmeier
University of Aberdeen

P11. ROCK-MYOSIN II REGULATION OF EMBRYONIC STEM CELL DIFFERENTIATION
Emma T Pineda & Taby Ahsan
Tulane University

P12. UNDERSTANDING CELLULAR RECEPTOR EXPRESSION CHANGES IN MICROFLUIDIC CHANNELS
Dwayne Vickers and S.K. Murthy
Northeastern University

P13. HIGH-THROUGHPUT DNA SYNTHESIS ENABLED PROTEIN EXPRESSION MODULATION AND OPTIMIZATION
J. Quan, S. Ma, N. Tang, & J. Tian
Duke University

P14. CELL ENCAPSULATION INTO MICRO-BIOREACTORS FOR MONITORING FIBROBLAST DIFFERENTIATION AND CONTRACTION
A.Siani1, D. Berk, N. Tirelli and F. Cellesi
University of Manchester

P15. TENSION MODULATES VESICLE DYNAMICS IN NEURONS
W. W. Ahmed, T. C. Li, S. S. Rubakhin, A. Chiba, J. V. Sweedler, T. A. Saif
University of Illinois, Urbana, Illinois, University of Miami

P16. HYDROGEL COMPOSITES CONTAINING CARBON NANOBRUSHES FOR WOUND HEALING APPLICATIONS
William H. Marks, Sze C. Yang, George W. Dombi, and Sujata K. Bhatia
Harvard University
University of Rhode Island

P17. HYDROGEL COMPOSITES CONTAINING CARBON NANOBRUSHES FOR WOUND HEALING APPLICATIONS
Raven Hardy, Mentewab Ayalew, India Nichols
Spelman College

P18. ERYTHROCYTE MICROMECHANICS AND CYTOADHESION IN SICKLE CELL DISEASE: A MURINE MODEL
Crystal J. Sanders, Jamie L. Maciasezek, George Lykotrafitis (PhD)
University of Connecticut

P19. THE MOLECULAR CHARACTERIZATION OF RECOMBINANT HUMAN NEUROBLASTOMA CELL LINE SKN-SH EXPRESSING THE HUMAN SERINE PALMTOLYTRANSFERASE SUBUNIT 1, SPTLC1
Rashida Mustafa, Yerokun Tokunbo
Spelman College