

# **Summer Biomechanics, Bioengineering and Biotransport Conference 2015**

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17-20 June 2015

Volume 1 of 2

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WEDNESDAY, JUNE 17

3:45pm - 5:15pm

### Ocular Biomechanics I

Primrose A

Session Chair: Rouzbeh Amini, *The University of Akron, Akron, OH, United States*

Session Co-Chair: Jun Liu, *Ohio State, Columbus, OH, United States*

- 3:45PM Development Of A Platform For Studying Astrocyte Mechanobiology: Compression Of Astrocytes In 3D Alginate Gels** SB<sup>3</sup>C2015-655 pg. 977  
John J. Mulvihill<sup>1,2</sup>, Lisa A. Schildmeyer<sup>1</sup>, Baptiste Coudrillier<sup>1</sup>, Danny J. Kelly<sup>2</sup>, C. Ross Ethier<sup>1,3</sup>, <sup>1</sup>*Georgia Tech, Atlanta, GA, United States*, <sup>2</sup>*Trinity College Dublin, Dublin, Ireland*, <sup>3</sup>*Atlanta VA Medical Center, Atlanta, GA, United States*
- 4:00PM Cellular Young's Modulus as a Novel Stemness Marker in the Corneal Limbus** SB<sup>3</sup>C2015-216 pg. 212  
Tom Bongiorno<sup>1</sup>, Jena Chojnowski<sup>2</sup>, James D. Lauderdale<sup>2</sup>, Todd Sulchek<sup>1,3</sup>, <sup>1</sup>*Georgia Institute of Technology, Atlanta, GA, United States*, <sup>2</sup>*University of Georgia, Athens, GA, United States*, <sup>3</sup>*The Parker H. Petit Institute for Bioengineering and Bioscience, Atlanta, GA, United States*
- 4:15PM Experimental Measurement Of Collagen Fiber Uncrimping And Recruitment With Increases In Intraocular Pressure** SB<sup>3</sup>C2015-417 pg. 543  
Ian A. Sigal, Ning-Jiun Jan, Jonathan Grimm, Huong Tran, Hiroshi Ishikawa, Katherine A. Davoli, Larry Kagemann, Joel S. Schuman, Gadi Wollstein, Kira Lathrop, *University of Pittsburgh, Pittsburgh, PA, United States*
- 4:30PM Phase-contrast Micro-tomography Measurements Of Intraocular Pressure-induced Deformation Of The Porcine Lamina Cribrosa** SB<sup>3</sup>C2015-147 pg.86  
Baptiste Coudrillier<sup>1</sup>, Diogo M. Gerales<sup>2</sup>, Nghia Vo<sup>3</sup>, Ian C. Campbell<sup>1</sup>, Julie Albon<sup>4</sup>, Richard L. Abel<sup>2</sup>, C. Ross Ethier<sup>1</sup>, <sup>1</sup>*Georgia Institute of Technology, Atlanta, GA, United States*, <sup>2</sup>*Imperial College, London, United Kingdom*, <sup>3</sup>*Diamond Light Source, Didcot, United Kingdom*, <sup>4</sup>*Cardiff University, Cardiff, United Kingdom*
- 4:45PM Ocular Compliance in Mice** SB<sup>3</sup>C2015-111 pg.34  
Stephen A. S. Schwaner<sup>1</sup>, Joseph M. Sherwood<sup>2</sup>, Eric J. Snider<sup>1</sup>, Eldon E. Geisert<sup>3</sup>, Darryl R. Overby<sup>4</sup>, C. Ross Ethier<sup>1,3</sup>, <sup>1</sup>*Georgia Institute of Technology, Atlanta, GA, United States*, <sup>2</sup>*Imperial College London, London, United Kingdom*, <sup>3</sup>*Emory University, Atlanta, GA, United States*, <sup>4</sup>*Imperial College of London, London, United Kingdom*
- 5:00PM Time And Pressure-Dependent Hydraulic Resistance Across Schlemm's Canal Endothelial Cell Layers** SB<sup>3</sup>C2015-1045 pg.1064  
Alice Spenlehauer, Joseph M. Sherwood, Darryl R. Overby, *Imperial College London, London, United Kingdom*

WEDNESDAY, JUNE 17

3:45pm - 5:15pm

### Design and Devices I - Vascular Disease and Therapeutic Intervention

Superior

Session Chair: James Moore, *Imperial College London, London, United Kingdom*

Session Co-Chair: Joao S. Soares, *University of Texas at Austin, Austin, TX, United States*

- 3:45PM Corrosion Behavior of a Novel Biodegradable Metallic Stent** SB<sup>3</sup>C2015-240 pg.251  
Jennifer Frattolillo<sup>1,2</sup>, Luca Gottellini<sup>1,3</sup>, Olivier F. Bertrand<sup>1,4</sup>, Rosaire Mongrain<sup>1,2</sup>, <sup>1</sup>*McGill University, Montreal, QC, Canada*, <sup>2</sup>*Montreal Heart Institute, Montreal, QC, Canada*, <sup>3</sup>*Politecnico di Milano, Milan, Italy*, <sup>4</sup>*Quebec Heart and Lung Institute, Laval University, Quebec City, QC, Canada*
- 4:00PM Geometric Analysis of Iliac Artery Tortuosity: Comparison to Current Clinical Practice** SB<sup>3</sup>C2015-248 pg.267  
Matthew G. Doyle<sup>1,2</sup>, Elrasheed Osman<sup>2</sup>, Naomi Eisenberg<sup>2</sup>, Cristina H. Amon<sup>1</sup>, Leonard W. Tse<sup>2</sup>, <sup>1</sup>*University of Toronto, Toronto, ON, Canada*, <sup>2</sup>*Toronto General Hospital, Toronto, ON, Canada*
- 4:15PM In Vitro Coronary Artery Model for the Study of Atherosclerosis** SB<sup>3</sup>C2015-368 pg.453  
Elizabeth E. Antoine, Abdul I. Barakat, *Ecole Polytechnique, Palaiseau, France*

# SCIENTIFIC SESSIONS

## Wednesday

- 4:30PM Quantification of Plaque Shift after Coronary Bifurcation Stenting** SB<sup>3</sup>C2015-465 pg.632  
 Francesco Iannaccone<sup>1,2</sup>, **Claudio Chiastra**<sup>1,3</sup>, Francesco Migliavacca<sup>3</sup>, Frank J. H. Gijssen<sup>1</sup>, Patrick Segers<sup>2</sup>, Evelyn Regar<sup>4</sup>, Matthieu De Beule<sup>2,5</sup>, Jolanda J. Wentzel<sup>1</sup>, <sup>1</sup>Thoraxcenter, Erasmus University Medical Center, Rotterdam, Netherlands, <sup>2</sup>Ghent University, Ghent, Belgium, <sup>3</sup>Politecnico di Milano, Milan, Italy, <sup>4</sup>Erasmus MC, Rotterdam, Netherlands, <sup>5</sup>FEops bvba, Ghent, Belgium
- 4:45PM Management of Distal Embolization during Interventional Treatment of Acute Ischemic Stroke in a Simulated Vascular Phantom** SB<sup>3</sup>C2015-589 pg.857  
**Juyu Chueh**, Olivia W. Brooks, Ajit S. Puri, Ajay K. Wakhloo, Matthew J. Gounis, *University of Massachusetts Medical School, Worcester, MA, United States*
- 5:00PM Temperature Comparison Of Catheter Ablation Between Open Irrigation And Vibration** SB<sup>3</sup>C2015-159 pg.108  
**Kaihong Yu**<sup>1</sup>, Tetsui Yamashita<sup>2</sup>, Shigeaki Shingyochi<sup>3</sup>, Kazuo Matsumoto<sup>4</sup>, Makoto Ohta<sup>5</sup>, <sup>1</sup>Tohoku University, Sendai, Japan, <sup>2</sup>Cardiovascular Internal Medicine System Sec., JMS Co., Ltd., Tokyo, Japan, <sup>3</sup>Nidec Copal Electronics Corp., Tochigi, Japan, <sup>4</sup>Saitama Medical University, Hidaka, Japan, <sup>5</sup>Tohoku University, Sendai, Japan

WEDNESDAY, JUNE 17

3:45pm - 5:15pm

### Atherosclerosis

### Wasatch

**Session Chair: Michael Walsh**, *University of Limerick, Ireland*  
**Session Co-Chair: Francis Loth**, *University of Akron, OH, United States*

- 3:45PM Human Coronary Plaque Morphological and Stress Vulnerability Indices Using IVUS-Based Fluid-Structure Interaction Models: A Multi-Patient Study** SB<sup>3</sup>C2015-33 pg.18  
 Liang Wang<sup>1</sup>, Jie Zheng<sup>2</sup>, Akiko Maehara<sup>3</sup>, Chun Yang<sup>4</sup>, Richard Bach<sup>2</sup>, David Muccigrosso<sup>2</sup>, Gary Mintz<sup>5</sup>, **Dalin Tang**<sup>1,6</sup>, <sup>1</sup>WPI, Worcester, MA, United States, <sup>2</sup>Washington University, St. Louis, St. Louis, MO, United States, <sup>3</sup>Columbia University, New York, NY, United States, <sup>4</sup>China United Network Communications Co., Ltd., Beijing, China, <sup>5</sup>Columbia University, The Cardiovascular Research Foundation, New York, NY, United States, <sup>6</sup>Southeast University, Nanjing, China
- 4:00PM The Effect of Head Rotation to the Geometry and Hemodynamics of Healthy Vertebral Arteries** SB<sup>3</sup>C2015-495 pg.678  
**Nicolas Aristokleous**<sup>1</sup>, Ioannis Seimenis<sup>2</sup>, Georgios C. Georgiou<sup>3</sup>, Andreas S. Anayiotos<sup>1</sup>, <sup>1</sup>Cyprus University of Technology, Lemesos, Cyprus, <sup>2</sup>Democritus University of Thrace, Alexandroupoli, Greece, <sup>3</sup>University of Cyprus, Nicosia, Cyprus
- 4:15PM Development Of A Framework To Characterize The Role Of Wall Shear Stress In Atherosclerotic Plaque Transformation Through The Combined Use Of OCT And Vh-IVUS** SB<sup>3</sup>C2015-1064 pg.1098  
**David Molony**<sup>1</sup>, Lucas Timmins<sup>1</sup>, Emad Rasoul-Arzrumly<sup>2</sup>, Olivia Hung<sup>2</sup>, Bill Gogas<sup>2</sup>, Habib Samady<sup>2</sup>, Don Giddens<sup>1</sup>, <sup>1</sup>Georgia Institute of Technology, Atlanta, GA, United States, <sup>2</sup>Emory University, Atlanta, GA, United States
- 4:30PM Phenotypic Differences in Coronary Artery Disease Progression in the Clinical Setting and Dependence on a Focal Oscillatory Hemodynamic Environment.** SB<sup>3</sup>C2015-426 pg.561  
**Lucas H. Timmins**<sup>1,2</sup>, David S. Molony<sup>1,2</sup>, Parham Eshtehardi<sup>3</sup>, Michael C. McDaniel<sup>2</sup>, John N. Oshinski<sup>1,2</sup>, Habib Samady<sup>2</sup>, Don P. Giddens<sup>1,2</sup>, <sup>1</sup>Georgia Institute of Technology, Atlanta, GA, United States, <sup>2</sup>Emory University School of Medicine, Atlanta, GA, United States, <sup>3</sup>Albert Einstein College of Medicine, Bronx, NY, United States
- 4:45PM Relationship among Disturbed Shear Descriptors, the Extent of Flow Recirculation and Helicity in Carotid Bifurcation** SB<sup>3</sup>C2015-547 pg.778  
**Diego Gallo**<sup>1</sup>, David A. Steinman<sup>2</sup>, Umberto Morbiducci<sup>1</sup>, <sup>1</sup>Politecnico di Torino, Turin, Italy, <sup>2</sup>University of Toronto, Toronto, ON, Canada
- 5:00PM Application of Gold Particle Enhanced CT for Vulnerable Plaque Detection and Quantification in Atherosclerotic Mouse Models** SB<sup>3</sup>C2015-366 pg.451  
**David De Wilde**<sup>1</sup>, Bram Trachet<sup>1,2</sup>, Carole Van der Donckt<sup>3</sup>, Bert Vandeghinste<sup>1</sup>, Benedicte Descamps<sup>1</sup>, Christian Vanhove<sup>1</sup>, Guido R. Y. De Meyer<sup>3</sup>, Patrick Segers<sup>1</sup>, <sup>1</sup>Ghent University, Gent, Belgium, <sup>2</sup>Institute for Bioengineering Ecole Polytechnique Fédérale de Lausanne, Lausanne, Switzerland, <sup>3</sup>University of Antwerp, Wilrijk, Belgium

WEDNESDAY, JUNE 17

3:45pm - 5:15pm

### Nano, Micro and Multiscale Mechanics

Magpie

Session Chair: Raffaella De Vita, *Virginia Tech, Blacksburg, VA, United States*

Session Co-Chair: Steven Abramowitch, *University of Pittsburgh, Pittsburgh, PA, United States*

- 3:45PM Direct Measurement of Energy Landscape of Biological Interactions** SB<sup>3</sup>C2015-1181 pg.1307  
Ahmad Haider, Daniel Potter, Todd Sulchek, *Georgia Institute of Technology, Atlanta, GA, United States*
- 4:00PM Constructing Rudimentary Limit Curves For Neuronal Phospholipid Bilayer Failure And Theoretical Calcium Penetration** SB<sup>3</sup>C2015-1025 pg.1028  
M. A. Murphy<sup>1</sup>, Sungkwang Mun<sup>1</sup>, M. F. Horstemeyer<sup>1</sup>, Steven R. Gwaltney<sup>1</sup>, Tonya W. Stone<sup>1</sup>, Michelle C. LaPlaca<sup>2</sup>, Jun Liao<sup>1</sup>, Lakiesha N. Williams<sup>1</sup>, **R. Prabhu<sup>1</sup>**, <sup>1</sup>Mississippi State, MS, United States,<sup>2</sup>Georgia Institute of Technology, GA, United States
- 4:15PM Deterioration Of Trabecular And Cortical Microarchitecture And Reduced Bone Stiffness At Distal Radius And Tibia In Postmenopausal Women With Vertebral Fractures** SB<sup>3</sup>C2015-231 pg.236  
Ji Wang<sup>1</sup>, Emily Stein<sup>2</sup>, Bin Zhou<sup>1</sup>, Kyle Nishiyama<sup>2</sup>, Elizabeth Shane<sup>2</sup>, X. Edward Guo<sup>1</sup>, <sup>1</sup>Columbia University, New York, NY, United States,<sup>2</sup>College of Physicians and Surgeons, Columbia University, New York, NY, United States
- 4:30PM Correlating Molecular Structure With The Mechanical Response Of Aquatic Caddisworm Silk** SB<sup>3</sup>C2015-325 pg.389  
Nicholas N. Ashton, Russell J. Stewart, *The University of Utah, Salt Lake City, UT, United States*
- 4:45PM Numerical Modeling of Human Fibrous Cap Delamination** SB<sup>3</sup>C2015-181 pg.148  
Xiaochang Leng, Xiaomin Deng, Michael A. Sutton, Susan M. Lessner, *University of South Carolina, Columbia, SC, United States*
- 5:00PM Nonlinear Viscoelastic Response of the Spinal Cord In Vivo** SB<sup>3</sup>C2015-150 pg.90  
Snehal S. Shetye<sup>1</sup>, Femke Streijger<sup>2</sup>, Christopher Strickland<sup>1</sup>, Jae H. T. Lee<sup>2</sup>, Brian K. Kwon<sup>2</sup>, Peter Crompton<sup>2</sup>, Patrick D. Shipman<sup>1</sup>, Christian M. Puttlitz<sup>1</sup>, <sup>1</sup>Colorado State University, Fort Collins, CO, United States,<sup>2</sup>University of British Columbia, Vancouver, BC, Canada

WEDNESDAY, JUNE 17

3:45pm - 5:15pm

### Organs, Morphogenesis, and Collective Cell Behavior

Maybird

Session Chair: Nandan L. Nerurkar, *Harvard Medical School, Boston, MA, United States*

Session Co-Chair: Celeste Nelson, *Princeton University, Princeton, NJ, United States*

- 3:45PM Fgf8 Establishes A Contractile Gradient To Drive Directed Cell Movements In The Developing Avian Gut** SB<sup>3</sup>C2015-143 pg.80  
Nandan L. Nerurkar, Cliff Tabin, *Harvard Medical School, Boston, MA, United States*
- 4:00PM Mechanics of Early Eye Development: Interactions Between the Retina and Lens** SB<sup>3</sup>C2015-193 pg.170  
Alina Oltean<sup>1</sup>, Jie Huang<sup>2</sup>, David C. Beebe<sup>2</sup>, Larry A. Taber<sup>1</sup>, <sup>1</sup>Washington University in St. Louis, St. Louis, MO, United States,<sup>2</sup>Washington University School of Medicine, St. Louis, MO, United States
- 4:15PM Magnetic Micropillar Array To Study Epithelial Microtissue Morphogenesis And Local Mechanics** SB<sup>3</sup>C2015-341 pg.413  
Mohammadnabi Asmani, Yan Li, Christopher Kotei, David Olsen, Zhaowei Chen, Fanjie Meng, **Ruogang Zhao**, *State University of New York at Buffalo, Buffalo, NY, United States*
- 4:30PM Viscoelastic Folding Instability Controls Airway Branching Morphogenesis** SB<sup>3</sup>C2015-386 pg.481  
Victor D. Varner, Jason P. Gleghorn, Celeste M. Nelson, *Princeton University, Princeton, NJ, United States*
- 4:45PM In Silico Predictions Of Angiogenic Growth Coupled To Matrix Mechanics Within Heterogeneous Extracellular Environments** SB<sup>3</sup>C2015-546 pg.776  
Lowell T. Edgar<sup>1</sup>, James B. Hoying<sup>2</sup>, Jeffrey A. Weiss<sup>1</sup>, <sup>1</sup>University of Utah, Salt Lake City, UT, United States,<sup>2</sup>University of Louisville, Louisville, KY, United States



## SCIENTIFIC SESSIONS

Wednesday

- 5:00PM Biohybrid Swimming at Low Reynolds Number** SB<sup>3</sup>C2015-1183 pg.1311  
**Brian Williams<sup>1</sup>**, Sandeep Anand<sup>1</sup>, Jagannathan Rajagopalan<sup>2</sup>, M. Taher A. Saif<sup>1</sup>, <sup>1</sup>*University of Illinois at Urbana-Champaign, Urbana, IL, United States*, <sup>2</sup>*Arizona State University, Tempe, AZ, United States*

WEDNESDAY, JUNE 17

3:45pm - 5:15pm

### Multiscale Modeling in Biotransport (Special Session)

Golden Cliff / Eagle's Nest

Session Chair: Bumsoo Han, *Purdue University, West Lafayette, IN, United States*Session Co-Chair: Ronghui Ma, *University of Maryland Baltimore County, Baltimore, MD, United States*

- 3:45PM Energetics of Water Permeation across Stretched Phospholipid/Cholesterol Bilayer: Molecular Dynamics Simulation** SB<sup>3</sup>C2015-200 pg.184  
**Taiki Shigematsu**, Kenichiro Koshiyama, Ryotaro Kurumatani, Shigeo Wada, *Osaka University, Toyonaka, Osaka, Japan*
- 4:00PM Numerical Modeling of Scalp Cooling Devices for the Prevention of Chemotherapy-Induced Alopecia** SB<sup>3</sup>C2015-635  
**Bradley Pliskow**, Mehmet Kaya, Kunal Mitra, *Florida Institute of Technology, Indialantic, FL, United States* pg.939
- 4:15PM Cross Capillary Mesangial Transport** SB<sup>3</sup>C2015-1066 pg.1100  
**Sarah E. Hunt**, Yoav Segal, Kevin D. Dorfman, Victor H. Barocas, *University of Minnesota, Minneapolis, MN, United States*
- 4:30PM Multiscale Simulation of Shear-Induced Platelet Activation: Correlating Numerical with Experimental Results** SB<sup>3</sup>C2015-302 pg.351  
**Peng Zhang<sup>1</sup>**, Chao Gao<sup>1</sup>, Na Zhang<sup>1</sup>, Seetha Pothapragada<sup>1</sup>, Marvin J. Slepian<sup>1,2</sup>, Yuefan Deng<sup>1</sup>, Danny Bluestein<sup>1</sup>, <sup>1</sup>*Stony Brook University, Stony Brook, NY, United States*, <sup>2</sup>*University of Arizona, Tucson, AZ, United States*
- 4:45PM Numerical Study Of A New Thermalplasty Treatment System For Atherosclerosis** SB<sup>3</sup>C2015-1110 pg.1183  
**Shiqing Zhao**, **Aili Zhang**, Lisa X. Xu, *Shanghai Jiao Tong University, Shanghai, China*
- 5:00PM An Approach to Include Pre-Stress in a Finite Element Model of Convection-Enhanced Delivery With Backflow** SB<sup>3</sup>C2015-383 pg.475  
**Gustavo A. Orozco<sup>1</sup>**, **Fabian A. Urrea<sup>1</sup>**, **Fernando Casanova<sup>1</sup>**, Joshua H. Smith<sup>2</sup>, Jose J. Garcia<sup>1</sup>, <sup>1</sup>*Universidad del Valle, Cali, Colombia*, <sup>2</sup>*Lafayette College, Easton, PA, United States*

WEDNESDAY, JUNE 17

3:45pm - 5:15pm

### Muscle and Joint Loading

Primrose B

Session Chair: Jun Liao, *Mississippi State, Mississippi State, MS, United States*Session Co-Chair: Andrew Anderson, *University of Utah, Salt Lake City, UT, United States*

- 3:45PM Medial and Lateral Contact Pressure Distribution Following the Implantation of a Novel Medial Meniscus Implant** SB<sup>3</sup>C2015-185 pg.156  
**Maoz Shemesh<sup>1</sup>**, **Noa Cohen<sup>1</sup>**, **Eyal Zylberberg<sup>1</sup>**, **Adaya Shefy-Peleg<sup>1</sup>**, **Ron Arbel<sup>2</sup>**, **Vincenzo Condello<sup>3</sup>**, **Nogah Shabshin<sup>4</sup>**, **Eran Linder-Ganz<sup>1</sup>**, **Jonathan J. Elsner<sup>5</sup>**, <sup>1</sup>*Active Implants, Netanya, Israel*, <sup>2</sup>*Ichilov Medical Center, Tel Aviv, Israel*, <sup>3</sup>*Sacro Cuore Hospital, Verona, Italy*, <sup>4</sup>*Carmel Medical Center, Haifa, Israel*, <sup>5</sup>*Active Implants, Cambridge, MA, United States*
- 4:00PM Effect of Meniscal Properties and Patient Variables on Knee Joint Contact Mechanics** SB<sup>3</sup>C2015-213 pg.206  
**Hongqiang Guo<sup>1</sup>**, Thomas J. Santner<sup>2</sup>, Po-Hsu Chen<sup>2</sup>, Amy L. Lerner<sup>3</sup>, Suzanne A. Maher<sup>1</sup>, <sup>1</sup>*Hospital for Special Surgery, New York, NY, United States*, <sup>2</sup>*The Ohio State University, Columbus, OH, United States*, <sup>3</sup>*University of Rochester, Rochester, NY, United States*
- 4:15PM Non-Invasive Method for Investigating the Relationship between Muscle Strain and Post-Exercise Blood Perfusion Using MRI** SB<sup>3</sup>C2015-1175 pg.1299  
**Amanda K. W. Buck**, Christopher P. Elder, Bruce M. Damon, *Vanderbilt University, Nashville, TN, United States*

- 4:30PM Numerical Modeling of Skeletal Muscle Under High Strain and Stress Relaxation Compression Conditions** SB<sup>3</sup>C2015-247 pg.265  
Benjamin B. Wheatley<sup>1</sup>, Renee Pietsch<sup>2</sup>, Tammy L. Haut Donahue<sup>1</sup>, Lakiesha N. Williams<sup>2</sup>, <sup>1</sup>Colorado State University, Fort Collins, CO, United States, <sup>2</sup>Mississippi State University, Starkville, MS, United States
- 4:45PM Biomechanical Characterization of Porcine Skeletal Muscle Extracellular Matrix** SB<sup>3</sup>C2015-512 pg.710  
Bryn Brazile, Sourav S. Patnaik, Sallie Lin, Xiaodan Shi, Shengfa Liao, Raj Prabhu, Hongjoo Rhee, Lakiesha N. Williams, Jun Liao, Mississippi State University, Mississippi State, MS, United States
- 5:00PM Predicting the Stress and Intramuscular Pressure Response of Whole Skeletal Muscle Through Optimized Finite Element Analysis** SB<sup>3</sup>C2015-249 pg.269  
Benjamin B. Wheatley<sup>1</sup>, Duane A. Morrow<sup>2</sup>, Gregory M. Odegard<sup>3</sup>, Kenton R. Kaufman<sup>2</sup>, Tammy L. Haut Donahue<sup>1</sup>, <sup>1</sup>Colorado State University, Fort Collins, CO, United States, <sup>2</sup>Mayo Clinic, Rochester, MN, United States, <sup>3</sup>Michigan Tech University, Houghton, MI, United States

WEDNESDAY, JUNE 17

5:30pm - 7:00pm

## Ocular Biomechanics II

Primrose A

Session Chair: Jun Liu, Ohio State, Columbus, OH, United States  
Session Co-Chair: Ian A. Sigal, University of Pittsburgh, Pittsburgh, PA, United States

- 5:30PM Equilibrium Shape of the Aqueous Humor-Vitreous Substitue Interface** SB<sup>3</sup>C2015-445 pg.598  
Krystyna Isakova, Rodolfo Repetto, Jan Oscar Pralits, University of Genova, Genova, Italy
- 5:45PM A Computational Model To Explore The Role Of Experimentally Determined Scleral Microstructure On Lamina Cribrosa Deformation** SB<sup>3</sup>C2015-1087 pg.1140  
Avinash Ayyalasomayajula, Forest L. Danford, Jonathan P. Vande Geest, University of Arizona, Tucson, AZ, United States
- 6:00PM Effects Of Hydration And Riboflavin/uva Collagen Crosslinking On Bovine Corneal Tensile Properties** SB<sup>3</sup>C2015-1074 pg.1114  
Hamed Hatami-Marbini, Oklahoma State University, Stillwater, OK, United States
- 6:15PM Intraocular Pressure Increases In Patients With Intraocular Gas Bubbles Following A Descent And Subsequent Ascent** SB<sup>3</sup>C2015-394 pg.497  
Lucas A. Gsellman, Rouzbeh Amini, The University of Akron, Akron, OH, United States
- 6:30PM The Effect Of Elevated Intraocular Pressure On Convective Flow In The Vitreous** SB<sup>3</sup>C2015-323 pg.385  
Julie E. Whitcomb<sup>1</sup>, Mohammad R. Kazemi<sup>2</sup>, Michael R. Robinson<sup>1</sup>, Mayssa Attar<sup>1</sup>, Anita Penkova<sup>3</sup>, Sati Sadhal<sup>3</sup>, Susan S. Lee<sup>1</sup>, <sup>1</sup>Allergan, Irvine, CA, United States, <sup>2</sup>Consultant, San Jose, CA, United States, <sup>3</sup>University of Southern California, Los Angeles, CA, United States
- 6:45PM A Parametrized Model Of The Lamina Cribrosa For Studying Oxygen Transport** SB<sup>3</sup>C2015-312 pg.367  
Fabian A. Bräu<sup>1,2</sup>, Ian C. Campbell<sup>1,3</sup>, Baptiste Coudrillier<sup>1</sup>, C. Ross Ethier<sup>1,3</sup>, <sup>1</sup>Georgia Institute of Technology, Atlanta, GA, United States, <sup>2</sup>Technical University Munich, Munich, Germany, <sup>3</sup>Atlanta VA Medical Center, Decatur, GA, United States

WEDNESDAY, JUNE 17

5:30pm - 7:00pm

## Design and Devices II - Modeling and Simulation of Cardiovascular Therapies

Superior

Session Chair: Michael Moreno, Texas A&M University, College Station, TX, United States  
Session Co-Chair: Lucas H. Timmins, Georgia Institute of Technology, Atlanta, GA, United States

- 5:30PM Hemocompatibility Assessment Of Hyaluronan Enhanced Linear Low Density Polyethylene For Use In Aortic Heart Valve Leaflets** SB<sup>3</sup>C2015-1041 pg.1056  
Rachael Simon-Walker, John Cavicchia, David Bark, Susan James, Lakshmi Prasad Dasi, Popat Ketul, Colorado State University, Fort Collins, CO, United States

SCIENTIFIC SESSIONS

Wednesday

- 5:45PM Virtual Transplantation To Establish Donor Selection Criteria For Undersized And Complex Heart Recipients**  
SB<sup>3</sup>C2015-335 pg.401  
**Justin Ryan**<sup>1</sup>, Randy Richardson<sup>2</sup>, Erik Ellsworth<sup>3</sup>, John J. Nigro<sup>3</sup>, David Frakes<sup>1</sup>, Stephen Pophal<sup>3</sup>, <sup>1</sup>Arizona State University, Tempe, AZ, United States, <sup>2</sup>St. Joseph's Hospital and Medical Center, Phoenix, AZ, United States, <sup>3</sup>Phoenix Children's Hospital, Phoenix, AZ, United States
- 6:00PM Physical Patient Specific Simulation For Ascending Aortic Aneurysms Surgery Pre-procedural Training**  
SB<sup>3</sup>C2015-338 pg.407  
**Justine Garcia**<sup>1</sup>, ZhiLin Yang<sup>1</sup>, Kevin Lachapelle<sup>2</sup>, Rosaire Mongrain<sup>1</sup>, Richard Leask<sup>1</sup>, <sup>1</sup>McGill University, Montreal, QC, Canada, <sup>2</sup>McGill University Health Network, Montreal, QC, Canada
- 6:15PM Computer Simulator of the Coil Insertion into Aneurysm: The Effect of Mechanical Property and Reference Configuration of the Coil** SB<sup>3</sup>C2015-343 pg.417  
**Tomohiro Otani**<sup>1</sup>, Satoshi Ii<sup>1</sup>, Tomoyoshi Shigematsu<sup>2</sup>, Toshiyuki Fujinaka<sup>2</sup>, Masayuki Hirata<sup>2</sup>, Tomohiko Ozaki<sup>2</sup>, Shigeo Wada<sup>1</sup>, <sup>1</sup>Graduate School of Engineering Science, Osaka University, Toyonaka, Japan, <sup>2</sup>Graduate School of Medicine, Osaka University, Suita, Japan
- 6:30PM Computational Hemodynamic Assessment of a Novel Modular Anastomotic Valve Device for Hemodialysis Vascular Access** SB<sup>3</sup>C2015-1069 pg.1106  
**Andrew McNally**<sup>1</sup>, Philippe Sucosky<sup>1</sup>, A. George Akingba<sup>2</sup>, <sup>1</sup>University of Notre Dame, South Bend, IN, United States, <sup>2</sup>Indiana University School of Medicine, Indianapolis, IN, United States
- 6:45PM Computational Modeling Of A Percutaneous Transvenous Mitral Annuloplasty Device Deployment Into The Coronary Sinus Vessel For Treatment Of Mitral Regurgitation: Analysis Of Anchor Sizes** SB<sup>3</sup>C2015-1068 pg.1104  
**Thuy Pham**<sup>1</sup>, Fanwei Kong<sup>1</sup>, Milton Deherrera<sup>2</sup>, Wei Sun<sup>1</sup>, <sup>1</sup>Georgia Institute of Technology, Atlanta, GA, United States, <sup>2</sup>Edwards Lifesciences, Irvine, CA, United States

WEDNESDAY, JUNE 17

5:30pm - 7:00pm

**Cardiovascular Diagnostics and Imaging**

**Wasatch**

**Session Chair:** David Steinman, University of Toronto, Toronto, ON, Canada

**Session Co-Chair:** Matt Gounis, University of Massachusetts, Worcester, MA, United States

- 5:30PM Invasive Measurement of Pulse Wave Velocity in Anesthetized Mice: a Computational-Experimental Study**  
SB<sup>3</sup>C2015-600 pg.875  
**Federica Cuomo**<sup>1</sup>, Jacopo Ferruzzi<sup>2</sup>, Jay D. Humphrey<sup>2</sup>, Carlos A. Figueroa<sup>1</sup>, <sup>1</sup>University of Michigan, Ann Arbor, MI, United States, <sup>2</sup>Yale University, New Haven, CT, United States
- 5:45PM Modeling Hemodynamic Effects Of Cerebral Vasospasm** SB<sup>3</sup>C2015-1049 pg.1072  
**Jaiyoung Ryu**<sup>1</sup>, Xiao Hu<sup>2</sup>, Shawn C. Shadden<sup>1</sup>, <sup>1</sup>University of California, Berkeley, Berkeley, CA, United States, <sup>2</sup>University of California, San Francisco, San Francisco, CA, United States
- 6:00PM A Novel Approach to Calculating Isovolumic Pressure for Single-Beat Estimation of Right Ventricular End-Systolic Elastance** SB<sup>3</sup>C2015-544 pg.772  
**Alessandro Bellofiore**<sup>1</sup>, Eric Dinges<sup>2</sup>, Sanjiv J. Shah<sup>3</sup>, Michael J. Cuttica<sup>3</sup>, Ranya Sweis<sup>3</sup>, Hamorabi Mkrdichian<sup>3</sup>, Lauren Beussink-Nelson<sup>3</sup>, Melissa Bailey<sup>2</sup>, James R. Runo<sup>2</sup>, Jon G. Keevil<sup>2</sup>, Christopher J. Francois<sup>2</sup>, Naomi C. Chesler<sup>2</sup>, <sup>1</sup>San Jose State University, San Jose, CA, United States, <sup>2</sup>University of Wisconsin-Madison, Madison, WI, United States, <sup>3</sup>Northwestern University, Chicago, IL, United States
- 6:15PM A Method for Rapid, Accurate Calculation of Wall Shear Stress from 2D Phase Contrast Magnetic Resonance Image Data** SB<sup>3</sup>C2015-562 pg.805  
**Elizabeth Iffrig**<sup>1,2</sup>, William R. Taylor<sup>1,2</sup>, John N. Oshinski<sup>1,2</sup>, <sup>1</sup>Emory University, Atlanta, GA, United States, <sup>2</sup>Georgia Institute of Technology, Atlanta, GA, United States
- 6:30PM Tracking Mass Transport Of A Drug Surrogate In Porcine Coronary Tissue Using Photoacoustic Imaging And Spectroscopy** SB<sup>3</sup>C2015-1083 pg.1132  
**Kenneth J. Furdella**, Jonathan P. Vande Geest, Russell S. Witte, University of Arizona, Tucson, AZ, United States



- 6:45PM Wave Intensity Analysis from Magnetic Resonance Imaging: Experimental Validation and New Insights into Single Ventricle Physiology** SB<sup>3</sup>C2015-459 pg. 622  
Nikesh Arya<sup>1</sup>, Silvia Schievano<sup>1</sup>, Catriona Baker<sup>1</sup>, Tain-Yen Hsia<sup>2</sup>, Alessandro Giardini<sup>2</sup>, Sachin Khambadkone<sup>2</sup>, Andrew M. Taylor<sup>1</sup>, **Giovanni Biglino**<sup>1</sup>, <sup>1</sup>University College London, London, United Kingdom, <sup>2</sup>Great Ormond Street Hospital for Children, London, United Kingdom

WEDNESDAY, JUNE 17

5:30pm - 7:00pm

**Multiscale Biomechanics - Coupling Musculoskeletal, Joint, and Tissue Level Models (Special Session)**

**Magpie**

**Session Chair:** Mariana Kersh, *University of Illinois, Urbana, IL, United States*

**Session Co-Chair:** Darryl Thelen, *University of Wisconsin-Madison, Madison, WI, United States*

- 5:30PM Gait Simulation Using a Contact Force Feedback Controller** SB<sup>3</sup>C2015-416 pg.541  
**Jonathan P. Walter**, Marcus G. Pandy, *University of Melbourne, Parkville, Australia*
- 5:45PM A Multi-scale Finite Element Framework for Modeling Natural Knee Mechanics** SB<sup>3</sup>C2015-314 pg.371  
**Michael D. Harris**, Ali Azhar, Alessandro Navacchia, Adam J. Cyr, Donald Hume, Clare K. Fitzpatrick, Paul J. Rullkoetter, Kevin B. Shelburne, *University of Denver, Denver, CO, United States*
- 6:00PM Prediction Of Elbow Joint Contact Pressures In The Multibody Framework** SB<sup>3</sup>C2015-389 pg.487  
**Munsur Rahman**<sup>1</sup>, Akin Cil<sup>1,2</sup>, Antonis P. Stylianou<sup>1</sup>, <sup>1</sup>University of Missouri-Kansas City, Kansas City, MO, United States, <sup>2</sup>Truman Medical Centers, Kansas City, MO, United States
- 6:15PM Multi-scale Models of Skeletal Muscle Reveal the Complex Effects of Muscular Dystrophy on Tissue Mechanics and Damage Susceptibility.** SB<sup>3</sup>C2015-478 pg.656  
**Kelley M. Virgilio**, Kyle M. Martin, Shayn M. Peirce, Silvia S. Blemker, *University of Virginia, Charlottesville, VA, United States*
- 6:30PM Multiscale Syntheses Of Articular Cartilage Stress In Post Aclr Model Under Physiological Loading** SB<sup>3</sup>C2015-605  
**Malek Adouni**, Yasin Dhaher, *Rehabilitation Institute of Chicago/Biomedical Engineering, Northwestern University, Chicago, IL, United States* pg.885
- 6:45PM Towards The Validation of a Multiscale Chemo-Electro-Mechanical Finite Element Model Using Electromyography** SB<sup>3</sup>C2015-475 pg.650  
Thomas Heidlauf, Mylena Mordhorst, **Sook-Yee Chong**, Oliver Röhrle, *University of Stuttgart, Stuttgart, Germany*

WEDNESDAY, JUNE 17

5:30pm - 7:00pm

**Musculoskeletal Tissue Engineering - Molecular, Soluble, and Mechanical Regulation of Tissue Development**

**Maybird**

**Session Chair:** Danny Kelly, *Trinity College, Dublin, Ireland*

**Session Co-Chair:** Pen-hsiu Grace Chao, *National Taiwan University, Taipei, Taiwan*

- 5:30PM Osteocyte Sclerostin Expression Is Directed By Substrate Composition And Dimensionality In Addition To Fluid Flow** SB<sup>3</sup>C2015-241 pg.253  
**Robert Thomas Brady**<sup>1</sup>, Andrew R. Cameron<sup>1</sup>, David A. Hoey<sup>2</sup>, Fergal J. O'Brien<sup>1</sup>, <sup>1</sup>Royal College of Surgeons in Ireland, Dublin, Ireland, <sup>2</sup>University of Limerick, Limerick, Ireland
- 5:45PM Investigating CRISPRi Cell-Engineering Methods For Treatment Of Intervertebral Disc Degeneration** SB<sup>3</sup>C2015-395  
**Niloofer Farhang**<sup>1</sup>, Jonathan M. Brunger<sup>2</sup>, Joshua D. Stover<sup>1</sup>, Pratishka I. Thakore<sup>2</sup>, Brandon Lawrence<sup>1</sup>, Farshid Guilak<sup>2</sup>, Charles A. Gersbach<sup>2</sup>, Lori A. Setton<sup>2</sup>, Robby D. Bowles<sup>1</sup>, <sup>1</sup>University of Utah, Salt Lake City, UT, United States, <sup>2</sup>Duke University, Durham, NC, United States pg.499

# SCIENTIFIC SESSIONS

Wednesday

- 6:00PM Label-Free Protein Profiling for Functional Characterization of Engineered Cartilage Following Inflammatory Cytokine Exposure** SB<sup>3</sup>C2015-450 pg.608  
**Andrea R. Tan**<sup>1</sup>, Shujuan Tao<sup>2</sup>, David Chen<sup>2</sup>, Lewis Brown<sup>2</sup>, Clark T. Hung<sup>1</sup>, <sup>1</sup>*Columbia University, New York, NY, United States*, <sup>2</sup>*Comparative Proteomics Center, Columbia University, New York, NY, United States*
- 6:15PM Bisphosphonate Gives Trauma Damaged Chondrocytes a New Life via Inhibition of Mevalonate Pathway** SB<sup>3</sup>C2015-570 pg.819  
**Yilu Zhou**, Miri Park, Liyun Wang, Enoch Cheung, X. Lucas Lu, *University of Delaware, Newark, DE, United States*
- 6:30PM The Impact of Physical and Enzymatic Treatment on the Development of Tissue-Engineered Articular Cartilage Generated from Adult Human Chondrocytes** SB<sup>3</sup>C2015-1099 pg.1161  
**Brendan L. Roach**<sup>1</sup>, Terri-Ann N. Kelly<sup>1</sup>, Michael K. Dermksian<sup>1</sup>, Sonia Bansal<sup>1</sup>, Paola A. Lopez<sup>2</sup>, Aaron M. Stoker<sup>3</sup>, James L. Cook<sup>3</sup>, Gerard A. Ateshian<sup>1</sup>, Clark T. Hung<sup>1</sup>, <sup>1</sup>*Columbia University, New York, NY, United States*, <sup>2</sup>*University of Arizona, Tucson, AZ, United States*, <sup>3</sup>*University of Missouri at Columbia, Columbia, MO, United States*
- 6:45PM Effects Of Structural Vs. Non-structural Scaffolds On Bmp-2- And Mechanical Load-mediated Bone Regeneration** SB<sup>3</sup>C2015-1180 pg.1305  
**Anna McDermott**<sup>1</sup>, Angela Lin<sup>2</sup>, Robert Guldberg<sup>2</sup>, **Joel D. Boerckel**<sup>1</sup>, <sup>1</sup>*University of Notre Dame, Notre Dame, IN, United States*, <sup>2</sup>*Georgia Institute of Technology, Atlanta, GA, United States*

WEDNESDAY, JUNE 17

5:30pm - 7:00pm

## Transport at the Nano- and Micro- scale Golden Cliff / Eagle's Nest

**Session Chair:** Rubén Díaz-Rivera, *University of Puerto Rico at Mayagüez, PR, United States*

**Session Co-Chair:** Chris Rylander, *University of Texas at Austin, Austin, TX, United States*

- 5:30PM Biophysical Fractionation Of Cells With Multiple Microfluidic Outlets** SB<sup>3</sup>C2015-294 pg.335  
**Todd Sulchek**, Gonghao Wang, Cory Turbyfield, Kaci Crawford, Alexander Alexeev, *Georgia Tech, Atlanta, GA, United States*
- 5:45PM Pressure Drop Approach to Estimate the Apparent Slip Length in a PDMS Micro-channel** SB<sup>3</sup>C2015-633 pg.935  
**Stephanie E. González Jiménez**<sup>1</sup>, Carlos R. Romero Peñaloza<sup>1</sup>, Rubén E. Díaz-Rivera<sup>1,2</sup>, <sup>1</sup>*University of Puerto Rico at Mayagüez, Mayagüez, PR, United States*, <sup>2</sup>*Purdue University, West Lafayette, IN, United States*
- 6:00PM Mechano-activatable Microcapsules For Tunable Drug Delivery** SB<sup>3</sup>C2015-597 pg.869  
**Bhavana Mohanraj**, Fuquan Tu, Daeyeon Lee, George R. Dodge, Robert L. Mauck, *University of Pennsylvania, Philadelphia, PA, United States*
- 6:15PM Rate of Transport of Circulating Macromolecules Into The Arterial Wall May Determine Atherosclerotic Plaque Stability** SB<sup>3</sup>C2015-358 pg. 435  
**Peter Weinberg**, **Zahra Mohri**, *Imperial College London, London, United Kingdom*
- 6:30PM Gold Nanoparticle Mediated Enhanced Gene Delivery With High Selectivity For Breast Cancer Treatment** SB<sup>3</sup>C2015-659 pg.985  
**Binita Shrestha**, Liang Tang, *University of Texas at San Antonio, San Antonio, TX, United States*
- 6:45PM The Effect Of Particle Deformability On The Transport Of Soft Colloids Through Porous Media** SB<sup>3</sup>C2015-1148 pg.251  
**Eduard Benet**, Louis Foucard, Franck J. Vernerey, John Pellegrino, *University of Colorado at Boulder, Boulder, CO, United States*

WEDNESDAY, JUNE 17

5:30pm - 7:00pm

## Ligament and Tendon

## Primrose B

**Session Chair:** Spencer Lake, *Washington University, St. Louis, MO, United States*

**Session Co-Chair:** Ozan Akkus, *Case Western Reserve University, Cleveland, OH, United States*

- 5:30PM Two Bundles of the Anterior Cruciate Ligament Exhibit Different Microstructural Properties and Mechanics During Stress-Relaxation** SB<sup>3</sup>C2015-484 pg. 662  
**Ryan Castile**, Nathan Skelley, Robert Brophy, Spencer Lake, *Washington University, St. Louis, MO, United States*



- 5:45PM Composition-dependent Mechanical Properties and Multiscale Strain Transfer in Tendon Subjected to Shear Loading** SB<sup>3</sup>C2015-173 pg.132  
Fei Fang, Spencer P. Lake, *Washington University in St. Louis, St. Louis, MO, United States*
- 6:00PM Evaluation of Tendon Injuries Using Shear Wave Elastography: Preliminary In-vivo Results in Human Achilles and Semitendinosus Tendons** SB<sup>3</sup>C2015-160 pg.110  
Daniel H. Cortes, Stephen M. Suydam, Jennifer A. Zellers, Karin Gravare-Silbernagel, Thomas S. Buchanan, Dawn M. Elliott, *University of Delaware, Newark, DE, United States*
- 6:15PM Modeling Ligament Mechanics Using Microstructural Parameters Measured from Confocal Images of Collagen Networks** SB<sup>3</sup>C2015-223 pg.222  
Christina J. Stender, Evan Rust, Erica E. Morrill, Roshani Lamichhane, Raquel J. Brown, Trevor J. Lujan, *Boise State University, Boise, ID, United States*
- 6:30PM A Transversely Isotropic Constitutive Model Describes And Predicts The Contribution Of Elastin To The Multiaxial Mechanics Of Ligament** SB<sup>3</sup>C2015-441 pg.590  
Heath B. Henninger, Sara A. Scott, Benjamin J. Ellis, Jeffrey A. Weiss, *University of Utah, Salt Lake City, UT, United States*
- 6:45PM Detection, Quantification, and Localization of Subfailure Damage in Tendon Fascicles using Collagen Mimetic Peptides** SB<sup>3</sup>C2015-628 pg.925  
Jared L. Zitnay, Yang Li, Shawn P. Reese, Boi-Hoa San, S. Michael Yu, Jeffrey A. Weiss, *University of Utah, Salt Lake City, UT, United States*

THURSDAY, JUNE 18

8:00am - 9:00am

PLENARY SESSION I – Margaret Gardel

Ballrooms 1-3

THURSDAY, JUNE 18

9:15am - 10:45am

Brain Injury Biomechanics

Primrose A

Session Chair: Brittany Coats, *University of Utah, Salt Lake City, UT, United States*

Session Co-Chair: Francis Gayzik, *Wake Forest University School of Medicine, Winston-Salem, NC, United States*

- 9:15AM The Effect of Facemasks on the Impact Performance of Helmets** SB<sup>3</sup>C2015-1101 pg.1165  
Steven Rowson, Evan Terrell, *Virginia Tech, Blacksburg, VA, United States*
- 9:30AM Estimating Axonal Strain in White Matter Using Paranodal Proteins as Fiduciary Markers** SB<sup>3</sup>C2015-468 pg.638  
Sagar Singh, Assimina A. Pelegri, David I. Shreiber, *Rutgers, The State University of New Jersey, Piscataway, NJ, United States*
- 9:45AM In Vivo Comparison Of Wearable Head Impact Sensors** SB<sup>3</sup>C2015-1152 pg.1259  
Lyndia C. Wu, Vaibhav Nangia, Kevin Bui, Bradley Hammor, Calvin Kuo, Fidel Hernandez, David B. Camarillo, *Stanford University, Stanford, CA, United States*
- 10:00AM Image-Based Dynamic Analysis of Brain Deformation on Porcine Brain Injury Model** SB<sup>3</sup>C2015-1163 pg.1279  
Arnold D. Gomez, Gregory G. Scott, Boston C. Terry, Brittany Coats, *University of Utah, Salt Lake City, UT, United States*
- 10:15AM Preliminary Development and Validation of an Atlas-Based Finite Element Brain Model** SB<sup>3</sup>C2015-1145 pg.1245  
Logan Miller, Jillian Urban, Elizabeth Lillie, Joel Stitzel, *Virginia Tech-Wake Forest University School of Biomedical Engineering and Sciences, Winston-Salem, NC, United States*
- 10:30AM Influence of Recent Head Impact History on Biomechanics of Concussion Sustained in College Football Athletes** SB<sup>3</sup>C2015-289 pg.327  
Daniel J. Sjoquist, Brian D. Stemper, Alok S. Shah, James Murtha, John R. Humm, Ashley LaRoche, Adam Pfaller, Steven Broglio, Kevin Guskiewicz, Michael McCrea, *Medical College of Wisconsin, Milwaukee, WI, United States*

THURSDAY, JUNE 18	9:15am - 10:45am
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### Dynamics and Rehabilitation

### Superior

**Session Chair:** Alan Eberhardt, *University of Alabama at Birmingham, Birmingham, AL, United States*  
**Session Co-Chair:** Tammy Bush, *Michigan State University, East Lansing, MI, United States*

- 9:15AM A Support Vector Machine Based On Vertical Ground Reaction Force To Supplement Observational Gait Evaluation** SB<sup>3</sup>C2015-568 pg.817  
**Craig J. Simons**<sup>1</sup>, Cory L. Christiansen<sup>2</sup>, Jennifer E. Stevens-Lapsley<sup>2</sup>, Kevin B. Shelburne<sup>1</sup>, Bradley S. Davidson<sup>1</sup>,  
<sup>1</sup>University of Denver, Denver, CO, United States,<sup>2</sup>University of Colorado Denver, Denver, CO, United States
- 9:30AM A Bootstrapping Method to Assess the Influence of Age, Obesity, and Gender on Probability of Tripping as a Function of Obstacle Height** SB<sup>3</sup>C2015-506 pg.698  
**Christina M. R. Garman**<sup>1</sup>, Christopher T. Franck<sup>1</sup>, Maury A. Nussbaum<sup>1</sup>, Michael L. Madigan<sup>2</sup>, <sup>1</sup>Virginia Tech, Blacksburg, VA, United States,<sup>2</sup>Texas A & M University, College Station, TX, United States
- 9:45AM Metabolic Consumption Using Different Repetitive Lifting Strategies** SB<sup>3</sup>C2015-1039 pg.1052  
Timothy D. Craig<sup>1</sup>, Alice E. Riley<sup>1</sup>, Sandra A. Billinger<sup>2</sup>, Neena K. Sharma<sup>2</sup>, **Sara E. Wilson**<sup>1</sup>, <sup>1</sup>University of Kansas, Lawrence, KS, United States,<sup>2</sup>University of Kansas, Kansas City, KS, United States
- 10:00AM Design, Calibration, and Validation of a Novel In Vitro Tibial Force Sensor** SB<sup>3</sup>C2015-29 pg.10  
**Joshua D. Roth**, Maury L. Hull, Stephen M. Howell, *University of California, Davis, Davis, CA, United States*
- 10:15AM Oh Deer! Morphological and Biomechanical Evaluation of Cervine Femora** SB<sup>3</sup>C2015-415 539  
**Mark J. Hedgeland**, Morgan A. Libruk, Nicole C. Corbiere, Mario J. Ciani, Laurel Kuxhaus, *Clarkson University, Potsdam, NY, United States*
- 10:30AM The Effects of Low Intensity Vibration on Bone Mineral Density in the Intact Limb of Animals with a Percutaneously Attached Endoprosthesis.** SB<sup>3</sup>C2015-502 pg.692  
**Kyle Bodnyk**<sup>1</sup>, Garrett Noble<sup>1</sup>, Matthew Allen<sup>2</sup>, Noel Fitzpatrick<sup>3</sup>, Gabriel Pagnotti<sup>4</sup>, Richard Hart<sup>1</sup>, <sup>1</sup>The Ohio State University, Columbus, OH, United States,<sup>2</sup>University of Cambridge, Cambridge, United Kingdom,<sup>3</sup>Fitzpatrick Referrals, Surrey, United Kingdom,<sup>4</sup>Stony Brook University, New York, NY, United States

THURSDAY, JUNE 18	9:15am - 10:45am
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### Cerebral and Aortic Aneurysms

### Wasatch

**Session Chair:** Ender A. Finol, *University of Texas at San Antonio, San Antonio, TX, United States*  
**Session Co-Chair:** Naomi Chesler, *University of Wisconsin, Madison, WI, United States*

- 9:15AM Effect of Branched and Fenestrated Stent-Grafts on Renal Blood Flow.** SB<sup>3</sup>C2015-107 pg. 26  
**Harkamaljit S. Kandail**<sup>1</sup>, Mohamad S. Hamady<sup>2</sup>, Xiao Y. Xu<sup>1</sup>, <sup>1</sup>Imperial College London, London, United Kingdom,<sup>2</sup>Imperial College Healthcare NHS Trust, London, United Kingdom
- 9:30AM Hemodynamic Changes in Treated Cerebral Aneurysms and Correlations with Long-Term Outcomes** SB<sup>3</sup>C2015-557  
**Michael C. Barbour**<sup>1</sup>, Patrick M. McGah<sup>1</sup>, Michael R. Levitt<sup>2</sup>, Kurt Sansom<sup>1</sup>, Ryan P. Morton<sup>2</sup>, John D. Nevra<sup>2</sup>, Pierre D. Mourad<sup>2</sup>, Basavaraj V. Ghodke<sup>3</sup>, Danial K. Hallam<sup>3</sup>, Laligam N. Sekhar<sup>2</sup>, Louis J. Kim<sup>2</sup>, Alberto Aliseda<sup>1</sup>, <sup>1</sup>University of Washington, Seattle, WA, United States,<sup>2</sup>University of Washington, Neurological Surgery, Seattle, WA, United States,<sup>3</sup>Dept of Radiology, Harborview Medical Center, Seattle, WA, United States pg.797
- 9:45AM Anuerysm MRI Phantoms For Direct, Ex Vivo Fluid Dynamics** SB<sup>3</sup>C2015-283 pg.319  
**Jeff R. Anderson**<sup>1</sup>, Orlando Diaz<sup>2</sup>, Richard Klucznik<sup>2</sup>, Yi J. Zhang<sup>2</sup>, Gavin W. Britz<sup>2</sup>, Robert G. Grossman<sup>2</sup>, Christof Karmonik<sup>1,2</sup>, <sup>1</sup>Houston Methodist Research Institute, Houston, TX, United States,<sup>2</sup>Houston Methodist Hospital, Houston, TX, United States
- 10:00AM Endovascular Treatment of Intracranial Aneurysms: Finite Element Modeling of Various Intervention Strategies** SB<sup>3</sup>C2015-518 pg.723  
**Robert Damiano**, Ding Ma, Jianping Xiang, Adnan Siddiqui, Kenneth Snyder, Hui Meng, *University at Buffalo, State University of New York, Buffalo, NY, United States*

- 10:15AM Experimental Evaluation of Hemodynamics in Patient-Specific Model of Type B Aortic Dissection** SB<sup>3</sup>C2015-608 pg.889  
Joav Birjiniuk<sup>1</sup>, Jean M. Ruddy<sup>2</sup>, Mark Young<sup>3</sup>, Lucas H. Timmins<sup>1</sup>, Ravi K. Veeraswamy<sup>4</sup>, David N. Ku<sup>5</sup>, <sup>1</sup>Georgia Institute of Technology and Emory University School of Medicine, Atlanta, GA, United States, <sup>2</sup>Medical University of South Carolina, Charleston, SC, United States, <sup>3</sup>Medtronic, Inc., Santa Rosa, CA, United States, <sup>4</sup>Emory University School of Medicine, Atlanta, GA, United States, <sup>5</sup>Georgia Institute of Technology, Atlanta, GA, United States
- 10:30AM Assessment And Quantification Of Transitional Flow In Intracranial Aneurysms - Highly Resolved Simulations Below The Kolmogorov Scales** SB<sup>3</sup>C2015-588 pg. 855  
Kartik Jain<sup>1,2</sup>, Kristian Valen-Sendstad<sup>2</sup>, Sabine Roller<sup>1</sup>, Kent-Andre Mardal<sup>2,3</sup>, <sup>1</sup>University of Siegen, Siegen, Germany, <sup>2</sup>Simula Research Laboratory, Oslo, Norway, <sup>3</sup>University of Oslo, Oslo, Norway

THURSDAY, JUNE 18

9:15am - 10:45am

### Microstructure of Aneurysms

Magpie

Session Chair: Alison Marsden, University of California San Diego, San Diego, CA, United States  
Session Co-Chair: Hai-Chao Han, University of Texas at San Antonio, San Antonio, TX, United States

- 9:15AM Stiffer Arterial Wall Enhances Aortic Aneurysm Formation In A Mouse Model Via Elastase Infusion** SB<sup>3</sup>C2015-537 pg.758  
Zhijie Wang, Stephanie Morgan, Mark Golob, Zhenjie Liu, Bo Liu, Naomi C. Chesler, University of Wisconsin - Madison, Madison, WI, United States
- 9:30AM Bayesian Calibration Of A Growth And Remodeling Computational Model Of Abdominal Aortic Aneurysms** SB<sup>3</sup>C2015-564 pg.809  
Seungik Baek, Liangliang Zhang, Sajjad SeyedSalehi, Jongeun Choi, Chae Young Lim, Tapabrata Maiti, Michigan State University, East Lansing, MI, United States
- 9:45AM Role Of Aneurysm On Failure Properties Of "Radially-oriented" Collagen Fibers In Human Ascending Thoracic Aortic Media** SB<sup>3</sup>C2015-572 pg.823  
Siladitya Pal, Spandan Maiti, Alkiviadis Tsamis, Julie A. Phillippi, Thomas G. Gleason, David A. Vorp, University of Pittsburgh, Pittsburgh, PA, United States
- 10:00AM Elastin Production Slows Aneurysm Enlargement in a Constrained Mixture Models of Aneurysm Growth and Remodelling** SB<sup>3</sup>C2015-404 pg.517  
Kory J. Blose, Justin S. Weinbaum, Anne M. Robertson, David A. Vorp, University of Pittsburgh, Pittsburgh, PA, United States
- 10:15AM Novel Image-based Analysis Of Patient-specific Abdominal Aortic Aneurysm Wall Stress Using A Membrane Mechanics Model** SB<sup>3</sup>C2015-1043 pg.1060  
Mirunalini Thirugnanasambandam<sup>1</sup>, Prahlad G. Menon<sup>1,2</sup>, Stéphane Avril<sup>3</sup>, Ender A. Finol<sup>1</sup>, <sup>1</sup>University of Texas at San Antonio, San Antonio, TX, United States, <sup>2</sup>Sun Yat-sen University - Carnegie Mellon University Joint Institute of Engineering, Pittsburgh, PA, United States, <sup>3</sup>Ecole Nationale Supérieure des Mines, Saint-Etienne, France
- 10:30AM Heterogeneous Elastic Properties Of Ascending Thoracic Aneurysms** SB<sup>3</sup>C2015-122 pg.46  
Jia Lu<sup>1</sup>, Yuanming Luo<sup>1</sup>, Frances M. Davis<sup>2</sup>, Stéphane Avril<sup>2</sup>, <sup>1</sup>The University of Iowa, Iowa City, IA, United States, <sup>2</sup>Ecole Nationale Supérieure des Mines de Saint-Etienne, St. Étienne, France

THURSDAY, JUNE 18

9:15am - 10:45am

### Musculoskeletal Tissue Engineering - Matrices and Interfaces

Maybird

Session Chair: Matt Fisher, North Carolina State University, Raleigh, NC, United States  
Session Co-Chair: Mariana Kersh, University of Illinois, Urbana, IL, United States

- 9:15AM Perfusion Decellularized Skeletal Muscle As A Scaffold For The Repair Of Volumetric Muscle Loss** SB<sup>3</sup>C2015-432 pg.574  
Ben Kasukonis, John Kim, Tyrone Washington, Jeffrey C. Wolchok, University of Arkansas, Fayetteville, AR, United States



## SCIENTIFIC SESSIONS

Thursday

- 9:30AM Fabrication Of Dense Porous Aligned Collagen Scaffolds Using 2D Plastic Compression And Porogens** SB<sup>3</sup>C2015-1034 pg.1042  
Shawn Reese, Jared Zitnay, Jeffrey Weiss, *University of Utah, Salt Lake City, UT, United States*
- 9:45AM Wrinkled, Wavelength-Tunable Graphene-Based Surface Topographies for Directing Cell Alignment and Morphology** SB<sup>3</sup>C2015-295 pg.337  
Daniel F. Tonderys, Susan Leggett, Zhongying Wang, *Brown University, Providence, RI, United States*
- 10:00AM Network Stiffening of Nanofiber Scaffolds by Mineral** SB<sup>3</sup>C2015-402 pg.513  
Justin H. Lipner<sup>1</sup>, John J. Boyle<sup>1</sup>, Victor Birman<sup>2</sup>, Guy M. Genin<sup>1</sup>, Stavros Thomopoulos<sup>1</sup>, <sup>1</sup>*Washington University in St. Louis, Saint Louis, MO, United States*, <sup>2</sup>*Engineering Education Center, Missouri University of Science and Technology, Saint Louis, MO, United States*
- 10:15AM Micrometer-scale Mechanical Properties Of The Tendon-to-bone Attachment** SB<sup>3</sup>C2015-594 pg.865  
Alix C. Deymier-Black<sup>1</sup>, Yiran An<sup>2</sup>, Andrea G. Schwartz<sup>1</sup>, Guy M. Genin<sup>1</sup>, Stavros Thomopoulos<sup>1</sup>, Asa H. Barber<sup>2</sup>, <sup>1</sup>*Washington University in St Louis, St Louis, MO, United States*, <sup>2</sup>*Queen Mary University of London, London, United Kingdom*
- 10:30AM Local Microenvironment Response of Chondrocytes in Gradient Collagen Matrices** SB<sup>3</sup>C2015-639 pg.947  
Tyler Novak, Benjamin Seelbinder, Celina M. Twitchell, Sherry L. Voytik-Harbin, Corey P. Neu, *Purdue University, Lafayette, IN, United States*

THURSDAY, JUNE 18

9:15am - 10:45am

### Transport in Tissue and Tumor Microenvironments

### Golden Cliff / Eagle's Nest

Session Chair: John Pearce, *The University of Texas at Austin, Austin, TX, United States*Session Co-Chair: Aili Zhang, *Shanghai Jiao Tong University, Shanghai, China*

- 9:15AM Temperature Control of Hydrogel Delivered Through Endoscopic Needle as Potential Treatment for Pancreatic Cancer** SB<sup>3</sup>C2015-477 pg.654  
Tom M. Merrill<sup>1</sup>, Jennifer Mitchell<sup>2</sup>, Denise Merrill<sup>2</sup>, Matthew Short<sup>1</sup>, <sup>1</sup>*Rowan University, Glassboro, NJ, United States*, <sup>2</sup>*FocalCool, LLC, Mullica Hill, NJ, United States*
- 9:30AM Shear Activated Nanoparticle Aggregate Delivery of Tissue Plasminogen Activator with Adjunctive Endovascular Bypass for Revascularization in Acute Ischemic Stroke** SB<sup>3</sup>C2015-303 pg.353  
Matthew J. Gounis<sup>1</sup>, Netanel Korin<sup>2</sup>, Miklos G. Marosfoi<sup>1</sup>, Oktay Uzun<sup>2</sup>, Erin T. Langan<sup>1</sup>, Anne-Laure Papa<sup>2</sup>, Olivia W. Brooks<sup>1</sup>, Chris Johnson<sup>2</sup>, Ajit S. Puri<sup>1</sup>, Deen Bhatta<sup>2</sup>, Ajay K. Wakhloo<sup>1</sup>, Donald E. Ingber<sup>2</sup>, <sup>1</sup>*University of Massachusetts Medical School, Worcester, MA, United States*, <sup>2</sup>*Wyss Institute for Biologically Inspired Engineering, Boston, MA, United States*
- 9:45AM Characterization Of Endothelial Cell Permeability On A Biomimetic Blood Vessel Platform** SB<sup>3</sup>C2015-217 pg.214  
Yaling Liu, Antony Thomas, Christopher Uhl, *Lehigh University, Bethlehem, PA, United States*
- 10:00AM Salmon Thrombin Inhibits Endothelial Barrier Disruption Through its Activation of Protein C** SB<sup>3</sup>C2015-273 pg.301  
Jenell Smith, Peter Galie, David Slochower, Paul Janmey, Beth Winkelstein, *University of Pennsylvania, Philadelphia, PA, United States*
- 10:15AM An In Vitro Microfluidic Tumor Model to Mimic Ductal Carcinoma In Situ** SB<sup>3</sup>C2015-673 pg.1011  
Victoria Noe-Kim, Altug Ozelikkale, Bumsoo Han, *Purdue University, West Lafayette, IN, United States*
- 10:30AM Novel 3D Co-culture Assay Reveals Cancer Cell Migration Driven By Matrix-dependent Autonomous Formation Of CXCL12 Gradients** SB<sup>3</sup>C2015-532 pg.750  
Christopher Moraes<sup>1</sup>, Taisuke Kojima<sup>2</sup>, Stephen P. Cavnar<sup>2</sup>, Gary D. Luker<sup>2</sup>, Shuichi Takayama<sup>2</sup>, <sup>1</sup>*McGill University, Montreal, QC, Canada*, <sup>2</sup>*University of Michigan, Ann Arbor, MI, United States*

THURSDAY, JUNE 18

9:15am - 10:45am

**Cartilage and Intervertebral Disc**

**Primrose B**

Session Chair: **Clark Hung**, *Columbia University, New York, NY, United States*

Session Co-Chair: **Corey Neu**, *Purdue University, West Lafayette, IN, United States*

- 9:15AM Quantitative Analysis Of Raman Spectra For Assessment Of Crosslink Concentrations Toward Diagnosing Early Osteoarthritis** SB<sup>3</sup>C2015-452 pg.612  
Chao Wang, **Krista M. Durney**, Jonathan L. Kuo, Jack R. Norton, Gerard A. Ateshian, Sinisa Vukelic, *Columbia University, New York, NY, United States*
- 9:30AM An In-situ Cartilage Characterization Method With Reduced Time And Computation Demands: Comparison Against Linear And Nonlinear Biphasic Theories** SB<sup>3</sup>C2015-226 pg.228  
**David L. Burris**, Axel C. Moore, Xingyu Chen, Brandon K. Zimmerman, X. Lucas Lu, *University of Delaware, Newark, DE, United States*
- 9:45AM Maintenance of F-Spondin (Spon1) Knockout Phenotype in 3D Cultured Murine Chondrocytes** SB<sup>3</sup>C2015-1050 pg.1074  
**Eben G. Estell**<sup>1</sup>, Qing Yang<sup>2</sup>, Andrea R. Tan<sup>1</sup>, Mukundan Attur<sup>2</sup>, Steven B. Abramson<sup>2</sup>, Clark T. Hung<sup>1</sup>, *<sup>1</sup>Columbia University, New York, NY, United States, <sup>2</sup>New York University School of Medicine and Langone Medical Center, New York, NY, United States*
- 10:00AM Impact-induced Fissuring In Articular Cartilage: Bulk And Tissue-scale Mechanics** SB<sup>3</sup>C2015-663 pg. 993  
**Corinne R. Henak**, Lena R. Bartell, Itai Cohen, Lawrence J. Bonassar, *Cornell University, Ithaca, NY, United States*
- 10:15AM Modeling The Intervertebral Discs Repair With Cellular Therapies** SB<sup>3</sup>C2015-563 pg.807  
**Qiaojiao Zhu**, Xin Gao, Weiyong Gu, *University of Miami, Coral Gables, FL, United States*
- 10:30AM The Contribution of Collagen Fibers in Human Cartilage Endplate Mechanics** SB<sup>3</sup>C2015-660 pg.987  
**John DeLucca**<sup>1</sup>, Mary Boggs<sup>1</sup>, Edward Vresilovic<sup>2</sup>, Randall Duncan<sup>1</sup>, Dawn Elliott<sup>1</sup>, *<sup>1</sup>University of Delaware, Newark, DE, United States, <sup>2</sup>Pennsylvania State University, Hershey, PA, United States*

THURSDAY, JUNE 18

11:00am - 12:30pm

**Biomechanics of Microcirculation: From Cells to Networks and Changes During Disease States (joint with JSME)**

**Primrose A**

Session Chair: **Ken-ichi Tsubota**, *Chiba University, Chiba, Japan*

Session Co-Chair: **Walter Lee Murfee**, *Tulane University, New Orleans, LA, United States*

- 11:00AM Molecular Dynamics Simulations of Lipid Bilayer Failure under Mechanical Stresses: Toward Understanding Mechanical Hemolysis** SB<sup>3</sup>C2015-214 pg.208  
**Kenichiro Koshiyama**, *Osaka University, Toyonaka, Japan*
- 11:15AM A Computational Study Of Red Blood Cells In Stokes Flow: From Single Cellular Mechanics To Suspension Rheology** SB<sup>3</sup>C2015-256 pg.277  
**Toshihiro Omori**, Yohsuke Imai, Takami Yamaguchi, Takuji Ishikawa, *Tohoku University, Sendai, Japan*
- 11:30AM Microsystems Engineering for Bridging Angiogenesis with Mechanopathology** SB<sup>3</sup>C2015-28 pg.8  
**Jonathan W. Song**, *The Ohio State University, Columbus, OH, United States*
- 11:45AM Autodigestion And Its Manifestations In The Microcirculation.** SB<sup>3</sup>C2015-292 pg.331  
**Geert W. Schmid-Schoenbein**, Frank De Iano, Angelina Altshuler, Erik Kistler, Michael Richter, *University of California, San Diego, La Jolla, CA, United States*
- 12:00PM Quantifying Hemodynamics And Wall Mechanics In Patient-specific Coronary Artery Bypass Grafts** SB<sup>3</sup>C2015-1119  
**Abhay B. Ramachandra**, Andrew Kahn, Alison L. Marsden, *University of California San Diego, La Jolla, CA, United States* pg.1201

SCIENTIFIC SESSIONS

Thursday

- 12:15PM The Effects of Aging on Microvascular Network Resistance and Flow Heterogeneity in the Rat Mesentery**  
 SB<sup>3</sup>C2015-644 pg.957  
**David C. Sloas**, Scott A. Stewart, Richard S. Sweat, Walter L. Murfee, *Tulane University, New Orleans, LA, United States*

THURSDAY, JUNE 18

11:00am - 12:30pm

**Human Dynamics**

**Superior**

**Session Chair:** Rita M. Patterson, *University of North Texas Health Science Center, Fort Worth, TX, United States*  
**Session Co-Chair:** Tom Gardner, *Columbia University, New York, NY, United States*

- 11:00AM Lumbar-pelvic Coordination Differences Between Novice And Experienced Lifters In Repetitive Lifting**  
 SB<sup>3</sup>C2015-1029 pg.1034  
 Timothy D. Craig<sup>1</sup>, Alice E. Riley<sup>1</sup>, Sandra A. Billinger<sup>2</sup>, Neena K. Sharma<sup>2</sup>, **Sara E. Wilson<sup>1</sup>**, *<sup>1</sup>University of Kansas, Lawrence, KS, United States, <sup>2</sup>University of Kansas, Kansas City, KS, United States*
- 11:15AM Design and Simulation of an Ankle Foot Simulator** SB<sup>3</sup>C2015-1171 pg.1291  
**Jonathan J. Miller**, *University of Utah, Salt Lake City, UT, United States*
- 11:30AM Improved Detection Of Dynamic Balance Using Normalized COM-COP Inclination Angular Jerk During A Golf Swing**  
 SB<sup>3</sup>C2015-23 pg.3  
**Ahnryul Choi<sup>1</sup>**, Joung Hwan Mun<sup>2</sup>, *<sup>1</sup>The University of Texas Health Science Center at Houston, Houston, TX, United States, <sup>2</sup>Sungkyunkwan University, Suwon, Korea*
- 11:45AM Investigating the Effect of Ball Impact Location** SB<sup>3</sup>C2015-117 pg.42  
 Ainhoa Iglesias-Díaz, **Martin L. Tanaka**, Paul M. Yanik, Aaron K. Ball, *Western Carolina University, Cullowhee, NC, United States*
- 12:00PM Designing Biomechanical Models of the Ankle: How Many Degrees of Freedom are Necessary to Reflect In Vivo Joint Kinematics?** SB<sup>3</sup>C2015-237 pg.246  
**Jennifer A. Nichols**, Koren E. Roach, Charles L. Saltzman, Andrew E. Anderson, *University of Utah, Salt Lake City, UT, United States*
- 12:15PM Obesity and Age Affect Trip Outcome and Severity Following a Laboratory-Induced Trip** SB<sup>3</sup>C2015-510 pg.706  
**Christina M. R. Garman<sup>1</sup>**, Maury A. Nussbaum<sup>1</sup>, Michael L. Madigan<sup>2</sup>, *<sup>1</sup>Virginia Tech, Blacksburg, VA, United States, <sup>2</sup>Texas A & M University, College Station, TX, United States*

THURSDAY, JUNE 18

11:00am - 12:30pm

**Thrombus Prediction**

**Wasatch**

**Session Co-Chair:** Shawn Shadden, *UC Berkeley, Berkeley, CA, United States*  
**Session Co-Chair:** Dalin Tang, *WPI, Worcester, MA, United States*

- 11:00AM Activated Expression And Shedding Of Platelet Glycoprotein IIb/IIIa Under Non-physiological Shear Stress: A Paradoxical Effect** SB<sup>3</sup>C2015-280 pg.313  
**Zengsheng Chen**, Jun Ding, Zhongjun J Wu, *University of Louisville School of Medicine, Louisville, KY, United States*
- 11:15AM Development of A Predictive Computational Model For Device-Induced Thrombosis** SB<sup>3</sup>C2015-243 pg.257  
 Joshua O. Taylor<sup>1,2</sup>, Richard S. Meyer<sup>2</sup>, Steven Deutsch<sup>2</sup>, **Keefe Manning<sup>1,3</sup>**, *<sup>1</sup>The Pennsylvania State University, University Park, PA, United States, <sup>2</sup>Applied Research Laboratory, State College, PA, United States, <sup>3</sup>Penn State Hershey Medical Center, Hershey, PA, United States*
- 11:30AM Thrombotic Risk Assessment Using Transluminal Attenuation Gradient and Computational Modelling in Kawasaki Disease Patients with Coronary Artery Aneurysms** SB<sup>3</sup>C2015-1082 pg.1130  
**Noelia Grande Gutierrez<sup>1</sup>**, Andrew M. Kahn<sup>2</sup>, Olga Shirinsky<sup>3</sup>, Nina V. Gagarina<sup>3</sup>, Galina A. Lyskina<sup>3</sup>, Ryuji Fukazawa<sup>4</sup>, Shunichi Ogawa<sup>4</sup>, Jane C. Burns<sup>2</sup>, Alison L. Marsden<sup>1</sup>, *<sup>1</sup>University of California San Diego, La Jolla, CA, United States, <sup>2</sup>School of Medicine, University of California San Diego, La Jolla, CA, United States, <sup>3</sup>Sechenov First Moscow State University, Moscow, Russian Federation, <sup>4</sup>Nippon Medical School Hospital, Tokyo, Japan*



- 11:45AM Hemodynamic Prediction of Thrombus Prone Regions in Abdominal Aortic Aneurysms** SB<sup>3</sup>C2015-455 pg.618  
Konstantinos Tzirakis<sup>1</sup>, **Eleni Metaxa**<sup>1</sup>, Nikolaos Kontopodis<sup>2</sup>, Christos V. Ioannou<sup>2</sup>, Yannis Papaharilaou<sup>1</sup>, <sup>1</sup>*Foundation of Research and Technology - Hellas, Heraklion, Greece,* <sup>2</sup>*University of Crete, Heraklion, Greece*
- 12:00PM Thrombogenic Properties Of A Superhydrophobic Surface For Use As A Prosthetic Heart Valve Material**  
SB<sup>3</sup>C2015-652 pg.971  
**David L. Bark, Jr.**, Sanli Movafaghi, Brandon L. Moore, Arun K. Kota, Ketul C. Popat, Lakshmi P. Dasi, *Colorado State University, Fort Collins, CO, United States*
- 12:15PM The Impact of VAD Surgical Implantation Configurations on its Thrombogenic Potential** SB<sup>3</sup>C2015-548 pg.780  
**Wei C. Chiu**<sup>1</sup>, Allison J. McLarty<sup>1</sup>, Shmuel Einav<sup>1</sup>, Marvin J. Slepian<sup>2</sup>, Danny Bluestein<sup>1</sup>, <sup>1</sup>*Stony Brook University, Stony Brook, NY, United States,* <sup>2</sup>*Sarver Heart Center, Tucson, AZ, United States*

<b>THURSDAY, JUNE 18</b>	<b>11:00am - 12:30pm</b>
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### Heart Valve Structure and Function

Magpie

**Session Chair:** Michael Sacks, *University of Texas, Austin, TX, United States*

**Session Co-Chair:** Shamik Bhattacharya, *St.Mary's University, San Antonio, TX, United States*

- 11:00AM Age-dependent Changes In Stress And Strain In The Human Native Heart Valve And Their Relation With Collagen Remodeling** SB<sup>3</sup>C2015-523 pg.731  
**Pim J. A. Oomen**<sup>1</sup>, Sandra Loerakker<sup>1</sup>, Daphne van Geemen<sup>1</sup>, Jan Neggers<sup>1</sup>, Marie-José T. H. Goumans<sup>2</sup>, Antoon J. van den Bogaert<sup>3</sup>, Ad J. J. C. Bogers<sup>3</sup>, Carlijn V. C. Bouten<sup>1</sup>, Frank P. T. Baaijens<sup>1</sup>, <sup>1</sup>*Eindhoven University of Technology, Eindhoven, Netherlands,* <sup>2</sup>*Leiden University Medical Center, Leiden, Netherlands,* <sup>3</sup>*Erasmus Medical Center, Rotterdam, Netherlands*
- 11:15AM Effects Of Leaflet Microstructure And Constitutive Model On The Closing Behavior Of The Mitral Valve**  
SB<sup>3</sup>C2015-339 pg.409  
**Chung-Hao Lee**<sup>1</sup>, Jean-Pierre Rabbah<sup>2</sup>, Ajit P. Yoganathan<sup>2</sup>, Robert C. Gorman<sup>3</sup>, Joseph H. Gorman<sup>3</sup>, Michael S. Sacks<sup>1</sup>, <sup>1</sup>*The University of Texas at Austin, Austin, TX, United States,* <sup>2</sup>*Georgia Institute of Technology, Atlanta, GA, United States,* <sup>3</sup>*University of Pennsylvania, Philadelphia, PA, United States*
- 11:30AM Capturing Detailed 3D Mitral Valve Geometry For Computational Valve Modeling** SB<sup>3</sup>C2015-462 pg.626  
**Charles H. Bloodworth**, Eric L. Pierce, Thomas F. Easley, Milan Toma, Morten O. Jensen, Ajit P. Yoganathan, *Wallace H Coulter Department of Biomedical Engineering, Georgia Tech and Emory University, Atlanta, GA, United States*
- 11:45AM True 3D Stresses in Heart Valve Leaflets** SB<sup>3</sup>C2015-1032 pg.1038  
**Bruno V. Rego**, Michael S. Sacks, *The University of Texas at Austin, Austin, TX, United States*
- 12:00PM A Framework For Parameter Estimation Of Heart Valves Using Inverse-Modeling Approach** SB<sup>3</sup>C2015-603 pg.881  
**Ankush Aggarwal**, Michael S. Sacks, *University of Texas at Austin, Austin, TX, United States*
- 12:15PM Immersogeometric Fluid-Structure Interaction Analysis of Bioprosthetic Heart Valves: Realistic Material Modeling and Experimental Validation** SB<sup>3</sup>C2015-1150 pg.1255  
**David Kamensky**<sup>1</sup>, Ming-Chen Hsu<sup>2</sup>, Michael S. Sacks<sup>1</sup>, Thomas J. R. Hughes<sup>1</sup>, <sup>1</sup>*University of Texas at Austin, Austin, TX, United States,* <sup>2</sup>*Iowa State University, Ames, IA, United States*

<b>THURSDAY, JUNE 18</b>	<b>11:00am - 12:30pm</b>
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### Nano-, Micro-, and Multi-Scale Mechanics of Cells and Tissues

Maybird

**Session Chair:** Nadeen Chahine, *Feinstein Institute of Medical Research, Manhasset, NY, United States*

**Session Co-Chair:** Grace D. O'Connell, *University of California, Berkeley, Berkeley, CA, United States*

- 11:00AM Micromechanical Heterogeneity And Anisotropy Of The Meniscus Extracellular Matrix** SB<sup>3</sup>C2015-128 pg.58  
Qing Li<sup>1</sup>, Feini Qu<sup>2,3</sup>, Biao Han<sup>1</sup>, Robert L. Mauck<sup>2,3</sup>, **Lin Han**<sup>1</sup>, <sup>1</sup>*Drexel University, Philadelphia, PA, United States,* <sup>2</sup>*University of Pennsylvania, Philadelphia, PA, United States,* <sup>3</sup>*Philadelphia Veterans Administration Medical Center, Philadelphia, PA, United States*

# SCIENTIFIC SESSIONS

Thursday

- 11:15AM A Micromechanical Viscoelastic Computational Model Incorporating Progressive Detachment Of The Tau Proteins Predicting Microtubule Breaking Following Axonal Injury.** SB<sup>3</sup>C2015-153 pg. 96  
**Hossein Ahmadzadeh**<sup>1</sup>, Douglas H. Smith<sup>2</sup>, Vivek B. Shenoy<sup>1</sup>, <sup>1</sup>*Department of Materials Science and Engineering, University of Pennsylvania, Philadelphia, PA, United States,* <sup>2</sup>*Penn Center for Brain Injury and Repair and Department of Neurosurgery, University of Pennsylvania, Philadelphia, PA, United States*
- 11:30AM Layer-specific Mitral Valve Interstitial Cell Deformations Under Physiological Loading** SB<sup>3</sup>C2015-340 pg. 411  
**Chung-Hao Lee**<sup>1</sup>, Christopher A. Carruthers<sup>2</sup>, Ayoub Salma<sup>1</sup>, Robert C. Gorman<sup>3</sup>, Joseph H. Gorman<sup>3</sup>, Michael S. Sacks<sup>1</sup>, <sup>1</sup>*The University of Texas at Austin, Austin, TX, United States,* <sup>2</sup>*Medtronic, Minneapolis, MN, United States,* <sup>3</sup>*University of Pennsylvania, Philadelphia, PA, United States*
- 11:45AM Relaxation of Simulated Viscoelastic Fiber Networks** SB<sup>3</sup>C2015-377 pg.467  
**Rohit Y. Dhume**, Victor H. Barocas, *University of Minnesota, Minneapolis, MN, United States*
- 12:00PM A Multi-Scale Approach in Analyzing Fluid/Solute Flow in Mechanically Loaded Bone** SB<sup>3</sup>C2015-499 pg.686  
Lixia Fan<sup>1</sup>, Shaopeng Pei<sup>2</sup>, Xiaohan Lai<sup>2</sup>, Xin Lu<sup>2</sup>, **Liyun Wang**<sup>2</sup>, <sup>1</sup>*Nanjing University of Science and Technology, Nanjing, China,* <sup>2</sup>*University of Delaware, Newark, DE, United States*
- 12:15PM Blocking Inflammation Protects Against Alterations In Cell Biomechanics, Morphology And Cytoskeleton** SB<sup>3</sup>C2015-1155 pg.1265  
**Timothy Jacobsen**, Paula Hernandez, Victoria Wei, Nadeen O. Chahine, *Feinstein Institute for Medical Research, Manhasset, NY, United States*

THURSDAY, JUNE 18

11:00am - 12:30pm

## Cryotherapy and Hyperthermia: 70+ Birthday Golden Cliff / Eagle's Nest Celebration for Prof. Avraham Shitzer

**Session Chair:** John Bischof, *University of Minnesota at Minneapolis, Minneapolis, MN, United States*

**Session Co-Chair:** Liang Z. Zhu, *University of Maryland Baltimore County, Baltimore, MD, United States*

- 11:00AM A Novel Method For Positioning And Operating Cryo-surgical Probes In 2-D Convex Target Areas Based On Super-positioning Of Unit Circles** SB<sup>3</sup>C2015-25 pg. 7  
**Avraham Shitzer**, *Technion, Isreal Inst. Tech., Haifa, Israel*
- 11:15AM Meeting The Need For Improved Monitoring Of Cryotherapy In Thin Cardiovascular Tissues With A New Micro-thermal Sensor** SB<sup>3</sup>C2015-1137 pg.1233  
**Harishankar Natesan**<sup>1</sup>, Jeunghwan Choi<sup>1</sup>, Wyatt Hodges<sup>2</sup>, Sean Lubner<sup>2</sup>, Chris Dames<sup>2</sup>, John Bischof<sup>1</sup>, <sup>1</sup>*University of Minnesota, Minneapolis, MN, United States,* <sup>2</sup>*University of California, Berkeley, CA, United States*
- 11:45AM Determination of the Convective Heat Transfer Coefficients on the Outer Surfaces of the Cryovials Plunged in Liquid Nitrogen and 37°C Water Bath** SB<sup>3</sup>C2015-433 pg. 576  
**Tao Wang**, Gang Zhao, *University of Science and Technology of China, Hefei, China*
- 11:45AM Correcting Arrhenius Models for Application to Cell Death Processes Involving Intrinsic Protein Cascades** SB<sup>3</sup>C2015-142 pg.78  
**John Pearce**, *The University of Texas at Austin, Austin, TX, United States*
- 12:00AM Tumor Engineering to Elucidate the Effect of Mild Hyperthermia on the Transport of Single Walled Carbon Nanohorns in the Tumor Microenvironment** SB<sup>3</sup>C2015-586 pg.851  
**Matthew R. DeWitt**<sup>1</sup>, M. Nichole Rylander<sup>2</sup>, <sup>1</sup>*Virginia Tech, Blacksburg, VA, United States,* <sup>2</sup>*The University of Texas at Austin, Austin, TX, United States*
- 12:15AM Strategies Of Injecting Ferrofluid Into Tumors To Achieve Repeatable Nanoparticle Deposition And Thermal Dosage In Magnetic Nanoparticle Hyperthermia** SB<sup>3</sup>C2015-286 pg.323  
**Alexander LeBrun**, Charles Bieberich, Ronghui Ma, Liang Zhu, *University of Maryland Baltimore County, Baltimore, MD, United States*



THURSDAY, JUNE 18	11:00am - 12:30pm
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### Cartilage Mechanics and Repair (joint with JSME)

Primrose B

Session Chair: Hiromichi Fujie, *Tokyo Metropolitan University, Tokyo, Japan*

Session Co-Chair: Jennifer Wayne, *Virginia Commonwealth University, Richmond, VA, United States*

- 11:00AM Anisotropic Hydraulic Permeability In Articular Cartilage And Menisci: A Direct Measurement Using Biopsy**  
Punches SB<sup>3</sup>C2015-420 pg.549  
Hiromichi Fujie, Ryosuke Nakamura, *Tokyo Metropolitan University, Tokyo, Japan*
- 11:15AM The Influence of Cartilage Morphology and Elasticity on Tibiofemoral Contact Pressures During Walking**  
SB<sup>3</sup>C2015-667 pg.1001  
Colin R. Smith, Rachel L. Lenhart, Mike F. Vignos, Jarred Kaiser, Darryl G. Thelen, *University of Wisconsin-Madison, Madison, WI, United States*
- 11:30AM The Effect of Impact and Genipin Crosslinking on the Friction and Wear of Articular Cartilage** SB<sup>3</sup>C2015-24 pg.5  
Craig M. Bonitsky<sup>1</sup>, Michael Selepe<sup>1</sup>, Megan E. McGann<sup>1</sup>, Timothy C. Ovaert<sup>1</sup>, Stephen B. Trippel<sup>2</sup>, Diane R. Wagner<sup>1</sup>,  
<sup>1</sup>University of Notre Dame, Notre Dame, IN, United States,<sup>2</sup>Indiana University, Indianapolis, IN, United States
- 11:45AM Development Of Artificial Cartilage Using Two Phase Collagen/Scaffold With Mesenchymal Stem Cells**  
SB<sup>3</sup>C2015-268 pg.297  
Mitsugu Todo<sup>1</sup>, Yusuke Nakamura<sup>1</sup>, Takaaki Arahira<sup>2</sup>, <sup>1</sup>Kyushu University, Kasuga, Japan,<sup>2</sup>Fukuoka Dental College, Fukuoka, Japan
- 12:00PM Evaluation Of Friction And Wear Properties Of Poly(vinyl Alcohol) Hydrogels As Artificial Articular Cartilage**  
SB<sup>3</sup>C2015-1078 pg.1122  
Seido Yarithsu<sup>1</sup>, Ayumi Yoshida<sup>1</sup>, Kazuhiro Nakashima<sup>1</sup>, Teruo Murakami<sup>1</sup>, Saori Sasaki<sup>2</sup>, Atsushi Suzuki<sup>2</sup>, <sup>1</sup>Kyushu University, Fukuoka, Japan,<sup>2</sup>Yokohama National University, Yokohama, Japan
- 12:15PM Relationship Of Wear Particles Of Poly(vinyl Alcohol) Hydrogel And Immune Response Of Macrophage**  
SB<sup>3</sup>C2015-1079 pg.1124  
Seiji Omata, Yoshinori Sawae, Teruo Murakami, *Kyushu University, Fukuoka, Japan*

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### Poster Session I

### BS Competition - Biofluid Mechanics

Event Center Tent

- 1 Predicting Regions Of Low Wall Shear Stress In The Carotid Artery Bifurcation** SB<sup>3</sup>C2015-419 pg.547  
Haley M. King, Emma J. Lichtenfels, Christian R. Fahrenbruck, Brandon Moore, Lakshmi P. Dasi, *Colorado State University, Fort Collins, CO, United States*

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### Poster Session I

### BS Competition - Biotransport

Event Center Tent

- 2 Generating Tumor Models From MicroCT Scan Images For Simulating Temperature Elevation During Magnetic Nanoparticle Hyperthermia** SB<sup>3</sup>C2015-300 pg.347  
Andrew S. Lee, Alexander LeBrun, Ronghui Ma, Liang Zhu, *University of Maryland Baltimore County, Baltimore, MD, United States*
- 3 Evaluating Accuracy Of The Algorithm/formula Used In Store Brand Digital Thermometers To Predict Body Temperature Based On The First Few Seconds of The Temperature Measurements** SB<sup>3</sup>C2015-507 pg.700  
Amirreza Saharkhiz<sup>1</sup>, Oleg Vesnovsky<sup>2</sup>, Jon P. Casamento<sup>2</sup>, Laurence W. Grossman<sup>2</sup>, L. D. Timmie Topoleski<sup>1</sup>, Liang Zhu<sup>1</sup>, <sup>1</sup>University of Maryland Baltimore County, Baltimore, MD, United States,<sup>2</sup>U.S. Food and Drug Administration, Silver Spring, MD, United States

SCIENTIFIC SESSIONS

Thursday

- 4      **Development Of A Tissue Phantom To Mimic The Thermal Environment Of A Human Arm To Test Digital Thermometers** SB<sup>3</sup>C2015-501    pg.690  
**Peter Dillon**<sup>1</sup>, Oleg Vesnovsky<sup>2</sup>, L. D. Timmie Topoleski<sup>1</sup>, Jon P. Casamento<sup>2</sup>, Laurence W. Grossman<sup>2</sup>, Liang Zhu<sup>1</sup>,  
<sup>1</sup>University of Maryland Baltimore County, Baltimore, MD, United States,<sup>2</sup>U.S. Food and Drug Administration, Silver Spring, MD, United States
- 5      **Quantitative Visualization of Drug Response of Breast Cancer Cells Within a Three-Dimensional Extracellular Matrix** SB<sup>3</sup>C2015-234    pg.240  
**Brett S. Klosterhoff**<sup>1</sup>, Kyeonggon Shin<sup>1</sup>, J. Craig Dutton<sup>2</sup>, Bumsoo Han<sup>1</sup>, <sup>1</sup>Purdue University, West Lafayette, IN, United States,<sup>2</sup>University of Illinois at Urbana-Champaign, Urbana, IL, United States

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Poster Session I      BS Competition - Cellular and Tissue Engineering      Event Center Tent

- 6      **Fabrication and Evaluation of Biodegradable Tissue Scaffolds for Osteochondral Defect Repair** SB<sup>3</sup>C2015-1154    pg.1263  
**Carly R. Garrow**, Andrew J. Polk, Ferris M. Pfeiffer, *University of Missouri - Columbia, Columbia, MO, United States*

THURSDAY, JUNE 18

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Poster Session I      BS Competition - Design and Devices      Event Center Tent

- 7      **Wear Simulator for Canine Total Hip Replacements** SB<sup>3</sup>C2015-1174    pg.1297  
**Kevin J. Warburton**<sup>1</sup>, Evan Rust<sup>1</sup>, Jeff Brouman<sup>2</sup>, Trevor J. Lujan<sup>1</sup>, <sup>1</sup>Boise State University, Boise, ID, United States,<sup>2</sup>Veterinary Surgeon WestVet Animal Emergency & Specialty Center, Garden City, ID, United States
- 8      **Material Property Testing of Carboxymethylated Hyaluronic Acid Hydrogel Polymer** SB<sup>3</sup>C2015-1186    pg.1315  
**McKenna Drysdale**<sup>1</sup>, Hee-Kyoung Lee<sup>1,2</sup>, Barbara Wirosko<sup>2</sup>, Brittany Coats<sup>1</sup>, <sup>1</sup>University of Utah, Salt Lake City, UT, United States,<sup>2</sup>Jade Therapeutics, Salt Lake City, UT, United States
- 9      **Design of a 3-D Bioreactor for Simulation of Cerebrospinal Fluid Flow in the Third Ventricle and Aqueduct of Sylvius** SB<sup>3</sup>C2015-1164    pg.1281  
**Michael J. Majcher**, Matthew R. Dailey, David P. Lemmer, Joseph T. Havrilak, Nic Leipzig, Bryn A. Martin, *University of Akron, Akron, OH, United States*
- 11      **A New Method For Determining Cross-sectional Shape And Area Of Soft Tissues Using 3d Laser Scanning** SB<sup>3</sup>C2015-176    pg.138  
**Yaniv Michaeli**<sup>1,2</sup>, Richard E. Debski<sup>2</sup>, <sup>1</sup>ORT Braude College, Nahariya, Israel,<sup>2</sup>University of Pittsburgh, Pittsburgh, PA, United States
- 12      **Rapid Quantification Of Femoral Head Geometry From Magnetic Resonance Imaging Of Femoroacetabular Impingement** SB<sup>3</sup>C2015-643    pg. 955  
**Haley Ehlers**<sup>1</sup>, Michael Roberts<sup>1</sup>, Garry Gold<sup>2</sup>, Saikat Pal<sup>1</sup>, <sup>1</sup>California Polytechnic State University, San Luis Obispo, CA, United States,<sup>2</sup>Stanford University, Stanford, CA, United States
- 13      **Design and Implementation of an Instrumented Pedal for Cycling Biomechanics Research** SB<sup>3</sup>C2015-1033    pg.1040  
**Luke I. Kraemer**, Juan D. Gutierrez-Franco, Jake E. Deschamps, Karim C. Dudum, Eshan M. Dandekar, Scott J. Hazelwood, Hemanth V. Porumamilla, Stephen M. Klisch, *California Polytechnic State University, San Luis Obispo, CA, United States*

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**Poster Session I                      BS Competition - Human Dynamics                      Event Center Tent**

- 14      **Can Measured Muscle Synergies Reconstruct Unmeasured Muscle Excitations?** SB<sup>3</sup>C2015-573    pg.825  
          **Nicholas A. Bianco**,Carolynn Patten, Benjamin J. Fregly, *University of Florida, Gainesville, FL, United States*
- 15      **Using OpenSim to Predict Knee Joint Moments During Cycling** SB<sup>3</sup>C2015-1023    pg.1024  
          **Karim C. Dudum**, Jake E. Deschamps, Juan D. Gutierrez-Franco, Luke I. Kraemer, Alejandro M. Gonzalez-Smith, Eshan M. Dandekar, Scott J. Hazelwood, Stephen M. Klisch, *California Polytechnic State University, San Luis Obispo, CA, United States*

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**Poster Session I                      BS Competition - Injury                      Event Center Tent**

- 16      **The Temporal Change in Protein Biomarkers of Vitreous Humor following Blast Trauma of the Visual System**  
          SB<sup>3</sup>C2015-1098    pg.1159  
          **Justin A. Jones**, Daniel F. Shedd, Brittany Coats, *University of Utah, Salt Lake City, UT, United States*
- 17      **Effect of Sclerostin Antibody on Tendon-to-Bone Healing in a Rotator Cuff Animal Model** SB<sup>3</sup>C2015-1051    pg.1076  
          **Shivam A. Shah**<sup>1</sup>, Ioannis Korpakakis<sup>1</sup>, Necat Havlioglu<sup>2</sup>, Michael S. Ominsky<sup>3</sup>, Leesa M. Galatz<sup>1</sup>, Stavros Thomopoulos<sup>1</sup>, <sup>1</sup>*Washington University of St. Louis, Saint Louis, MO, United States*,<sup>2</sup>*John Cochran VA Medical Center, Saint Louis, MO, United States*,<sup>3</sup>*Amgen Inc., Thousand Oaks, CA, United States*

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**Poster Session I                      BS Competition - Tissue Mechanics                      Event Center Tent**

- 18      **Comparison of Pulmonary Artery Material Properties between a Congenital Heart Disease Patient and a Normal Subject using Cardiac Magnetic Resonance: A Feasibility Study** SB<sup>3</sup>C2015-606    pg.887  
          **Rajit Banerjee**<sup>1</sup>, Gavin A. D'Souza<sup>2</sup>, Namheon Lee<sup>3</sup>, Michael D. Taylor<sup>3</sup>, <sup>1</sup>*University of Toledo, Toledo, OH, United States*,<sup>2</sup>*University of Cincinnati, Cincinnati, OH, United States*,<sup>3</sup>*Cincinnati Children's Hospital Medical Center, Cincinnati, OH, United States*
- 19      **Finite Element Analysis of the Biomechanical Consequences of Schmorl's Nodes** SB<sup>3</sup>C2015-1018    pg.1014  
          **Boston B. Barham**, Anton E. Bowden, *Brigham Young University, Provo, UT, United States*
- 20      **A Mechanical Model For Cortical Folding During Brain Development** SB<sup>3</sup>C2015-575    pg.829  
          **Nithya Vijayakumar**, Maria Holland, Ellen Kuhl, *Stanford University, Stanford, CA, United States*

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**Poster Session I                      Multi-scale Modeling in Biotransport                      Event Center Tent**

- 21      **Comparison Of MRI-measured Tracer Transport In The Rat Brain With Computational Model Prediction**  
          SB<sup>3</sup>C2015-1149    pg.1253  
          **Wei Dai**, Garrett W. Astary, Aditya K. Kasinadhuni, Paul R. Carney, Thomas H. Mareci, Malisa Sarntinoranont, *University of Florida, Gainesville, FL, United States*
- 22      **A Reduced-Dimensional Transport Model for Thrombogenic Species in Large Arteries** SB<sup>3</sup>C2015-195    pg.174  
          **Kirk B. Hansen**, Shawn C. Shadden, *University of California, Berkeley, Berkeley, CA, United States*



SCIENTIFIC SESSIONS

Thursday

- 23 **Low-Concentration Salmonella Detection Using Orbiting Magnetic Microbeads in a Continuous-Flow Microfluidic Device** SB<sup>3</sup>C2015-593 pg.863  
Matthew S. Ballard, Drew L. Owen, Zachary G. Mills, Srinivas K. G. Hanasoge, Peter J. Hesketh, Alexander Alexeev, Georgia Institute of Technology, Atlanta, GA, United States
- 24 **Computational Multiphysics Model of Clot Lysis in a Completely Occluded Stenotic Artery** SB<sup>3</sup>C2015-139 pg.74  
Andris Piebalgs, Xiao Y. Xu, Imperial College London, London, United Kingdom
- 25 **Effect of Intervertebral Disc Size on Nutrient Distributions: A Finite Element Analysis with Implications for In Vivo Models** SB<sup>3</sup>C2015-1077 pg.1120  
Alicia R. Jackson, University of Miami, Coral Gables, FL, United States
- 26 **Reaction/Diffusion Modelling of AtzA Biocatalyst Encapsulated in a Silica Gel Matrix** SB<sup>3</sup>C2015-175 pg.136  
Baris Ragip Mutlu, University of Minnesota, Minneapolis, MN, United States
- 27 **Finite Element Model of Mixed Porohyperelastic Transport in an Axisymmetric Porcine Coronary Artery** SB<sup>3</sup>C2015-184 pg.154  
Michelle A. H. Armstrong, Bruce R. Simon, Jonathan P. Vande Geest, University of Arizona, Tucson, AZ, United States

THURSDAY, JUNE 18

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Poster Session I

Design, Dynamics and Rehab

Event Center Tent

- 28 **Mechanical Design of a Customizable Self-Expanding Endovascular Stent** SB<sup>3</sup>C2015-1189 pg.1321  
Joel C. R. Scott, Clifton R. Johnston, Darrel A. Doman, Dalhousie University, Halifax, NS, Canada
- 29 **Which Of Four Commercially-Available Laser Scanner Systems Generates The Most Accurate Bone Model?** SB<sup>3</sup>C2015-152 pg.94  
Valentina Campanelli<sup>1,2</sup>, Stephen M. Howell<sup>1</sup>, Maury Hull<sup>1</sup>, <sup>1</sup>UC Davis, Davis, CA, United States,<sup>2</sup>University of Verona, Verona, Italy
- 30 **Deformation and Flow of Arterial Stenosis Model Regarding the Change in Curvature of Coronary Artery for Percutaneous Transluminal Coronary Angioplasty** SB<sup>3</sup>C2015-1142 pg.1239  
Shunichi Kobayashi, Shinshu University, Ueda, Japan
- 31 **Computational Modeling Of Mechanical Stresses In Stents: Implications For The Optimization Of Drug-eluting Stents** SB<sup>3</sup>C2015-458 pg.620  
Francois P. M. Cornat, Franz Bozsak, Abdul I. Barakat, Ecole Polytechnique, Palaiseau cedex, France
- 32 **Damage Analysis of Retrieved Oxidized Zirconium Femoral Components for TKA: Can Wear Breach the Oxide Layer?** SB<sup>3</sup>C2015-1135 pg.1229  
Noah Bonnheim<sup>1</sup>, Michael Ries<sup>2</sup>, Sanjai Shukla<sup>2</sup>, Lisa Pruitt<sup>1</sup>, <sup>1</sup>University of California, Berkeley, Berkeley, CA, United States,<sup>2</sup>Tahoe Fracture and Orthopaedic Clinic, Carson City, NV, United States
- 33 **Design and Optimization of an In-Vitro Emboli Detector for Flow-Induced Thrombogenicity Evaluation** SB<sup>3</sup>C2015-344 pg.419  
Ram Shtoltz, Tel Aviv University, Tel Aviv, Israel
- 34 **Development of Micro-scale Ultrasound Imaging for Tissue Characterization.** SB<sup>3</sup>C2015-1165 pg.1283  
Jeremy Stromer, Leila Ladani, University of Connecticut, Storrs, CT, United States
- 35 **Bearing Surface Damage Analysis Of Total Shoulder Replacement Retrievals Across Fixation Designs And UHMWPE Composition** SB<sup>3</sup>C2015-531 pg.748  
Louis G. Malito<sup>1</sup>, Farzana Ansari<sup>1</sup>, Lulu Li<sup>1</sup>, Taylor Lee<sup>1</sup>, Helen Park<sup>1</sup>, Steve Gunther<sup>2</sup>, Tom Norris<sup>3</sup>, Mike Ries<sup>4</sup>, Lisa Pruitt<sup>1</sup>, <sup>1</sup>University of California, Berkeley, Berkeley, CA, United States,<sup>2</sup>Martha Jefferson Hospital, Charlottesville, VA, United States,<sup>3</sup>San Francisco Shoulder, Elbow & Hand Clinic, San Francisco, CA, United States,<sup>4</sup>Tahoe Fracture and Orthopaedic Clinic, Carson City, NV, United States
- 36 **Stress Angle Device: A Novel System For Reproducing The Mechanical Conditions Associated With Regions Most Susceptible To Vascular Disease** SB<sup>3</sup>C2015-406 pg.521  
Steve Zambrano, Michael J. Draper, Brendan L. Swain, Caleb A. Davis, Michael R. Moreno, Texas A&M University, Bryan, TX, United States

- 37 **On The Characterization Of Mitral Valve Geometry And Development Of A Population-averaged Model**  
SB<sup>3</sup>C2015-1022 pg.1022  
**Amir Khalighi**<sup>1</sup>, Andrew Drach<sup>1</sup>, Fleur ter Huurne<sup>2</sup>, Chung-Hao Lee<sup>1</sup>, Charles Bloodworth<sup>3</sup>, Eric Pierce<sup>3</sup>, Morten Jensen<sup>3</sup>, Ajit Yoganathan<sup>3</sup>, Michael Sacks<sup>1</sup>, <sup>1</sup>*University of Texas at Austin, Austin, TX, United States*, <sup>2</sup>*Eindhoven University, Eindhoven, Netherlands*, <sup>3</sup>*Georgia Institute of Technology, Atlanta, GA, United States*
- 38 **Modeling the Mechanical Behavior of Polymeric Bioresorbable Stents: a Finite Element Approach** SB<sup>3</sup>C2015-658 pg.983  
**Nic Debusschere**, Patrick Segers, Peter Dubruel, Benedict Verheghe, Matthieu De Beule, *Ghent University, Ghent, Belgium*

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**Poster Session I      Neuromuscular Control and Motion Analysis      Event Center Tent**

- 39 **Artificial Neural Networks for the Optimization of Ligament Stiffnesses in a Computational Foot/Ankle Model**  
SB<sup>3</sup>C2015-438 pg.584  
**Ruchi Chande**, Norma Ortiz-Robinson, Jennifer Wayne, *Virginia Commonwealth University, Richmond, VA, United States*
- 40 **Movement Analysis Based on the Separation of Angular Momentum: Gait Progression and Segment Rotation in Patients with TKA** SB<sup>3</sup>C2015-382 pg.473  
**Brecca M. Gaffney**<sup>1</sup>, Will M. Johnston<sup>1</sup>, Cory L. Christiansen<sup>2</sup>, Jennifer E. Stevens-Lapsley<sup>2</sup>, Kevin B. Shelburne<sup>1</sup>, Bradley S. Davidson<sup>1</sup>, <sup>1</sup>*University of Denver, Denver, CO, United States*, <sup>2</sup>*University of Colorado Denver, Aurora, CO, United States*
- 41 **A Description of Segmental Angular Momentum Synergies using Independent Component Analysis During Gait**  
SB<sup>3</sup>C2015-543 pg.770  
**Brecca M. Gaffney**<sup>1</sup>, Cory L. Christiansen<sup>2</sup>, Kevin B. Shelburne<sup>1</sup>, Bradley S. Davidson<sup>1</sup>, <sup>1</sup>*University of Denver, Denver, CO, United States*, <sup>2</sup>*University of Colorado Denver, Aurora, CO, United States*
- 42 **Joint Angle and Muscle Activity during Hippotherapy: A Case Study Using Motion Capture Analysis and EMG**  
SB<sup>3</sup>C2015-632 pg.933  
**Mary C. Baker**, Stephen Wester, Timothy Monday, *Texas Tech University, Lubbock, TX, United States*
- 43 **Changes In The Range Of Motion Envelope Of The Lumbar Spine With Repetitive Lifting** SB<sup>3</sup>C2015-618 pg.907  
Muhammad I. Gul<sup>1</sup>, Timothy D. Craig<sup>1</sup>, Neena K. Sharma<sup>2</sup>, **Sara E. Wilson**<sup>1</sup>, <sup>1</sup>*University of Kansas, Lawrence, KS, United States*, <sup>2</sup>*University of Kansas, Kansas City, KS, United States*

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**Poster Session I      Best Practices in Biomechanics, Bioengineering, and Biotransport Education      Event Center Tent**

- 44 **Best Practices in Teaching Biomechanics: Integrating Reflective Learning Activities** SB<sup>3</sup>C2015-138 pg.72  
**Laurel Kuxhaus**, *Clarkson University, Potsdam, NY, United States*
- 45 **Assessment of a Bioengineering Innovation Program for Middle School Girls** SB<sup>3</sup>C2015-577 pg.833  
**Kristen Billiar**<sup>1</sup>, Amanda Reidinger<sup>1</sup>, Jeanne Hubelbank<sup>2</sup>, Helen Vassallo<sup>1</sup>, <sup>1</sup>*Worcester Polytechnic Institute, Worcester, MA, United States*, <sup>2</sup>*Independent Program Evaluation Consultant, Sudbury, MA, United States*
- 46 **Teaching Undergraduate Design: An Approach Based on Industrial Experience** SB<sup>3</sup>C2015-118 pg.44  
**Martin L. Tanaka**, *Western Carolina University, Cullowhee, NC, United States*
- 47 **A Progress Report From a Multi-disciplinary Capstone Experience Involving Engineering and Business Students**  
SB<sup>3</sup>C2015-110 pg.32  
**Alan Eberhardt**, Joel Dobbs, *University of Alabama at Birmingham, Birmingham, AL, United States*

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## Poster Session I

## Cardiovascular Devices and Imaging in Fluid Mechanics

## Event Center Tent

- 48 **Retrospective Analysis of Echocardiography in Those Suspected of Pulmonary Hypertension with Comparison to Right Heart Catheterization** SB<sup>3</sup>C2015-439 pg.586  
Travis B. Eason<sup>1</sup>, Melinda V. Pyle<sup>1</sup>, Lavanya Alapati<sup>1</sup>, Sanjay Mehra<sup>2</sup>, John M. Cahill<sup>1</sup>, Stephanie M. George<sup>1</sup>, <sup>1</sup>East Carolina University, Greenville, NC, United States, <sup>2</sup>Vidant Medical Center, Greenville, NC, United States
- 49 **The Influence Of Sub-Optimal Acquisition Delay In A C-arm Cone-Beam CT Perfusion Study** SB<sup>3</sup>C2015-1067 pg.1102  
Antonius M. de Korte, Kajo van der Marel, Juyu Chueh, Olivia W. Brooks, Ajit S. Puri, Ajay K. Wakhloo, Matthew J. Gounis, <sup>1</sup>New England Center for Stroke Research, University of Massachusetts Medical School, Worcester, MA, United States
- 50 **The Relationship Of Wall Shear Stress With Clinically Relevant Metrics In Pulmonary Arterial Hypertension** SB<sup>3</sup>C2015-648 pg.963  
Alifer D. Bordonas<sup>1,2</sup>, Vitaly O. Kheyfets<sup>3</sup>, Ender A. Finol<sup>1</sup>, <sup>1</sup>University of Texas at San Antonio, San Antonio, TX, United States, <sup>2</sup>University of Texas Health Science Center at San Antonio, San Antonio, TX, United States, <sup>3</sup>University of Colorado, Denver, CO, United States
- 51 **Quantitative Coronary Angiography Based Reconstructions for Wall Shear Stress Calculations in Bifurcations** SB<sup>3</sup>C2015-545 pg. 774  
Jelle T. C. Schrauwen<sup>1</sup>, Antonios Karanasos<sup>1</sup>, Nienke S. Ditzhuijzen<sup>1</sup>, Jean-Paul Aben<sup>2</sup>, Jolanda J. Wentzel<sup>1</sup>, Antonius F. W. van der Steen<sup>1,3</sup>, Frank J. H. Gijsen<sup>1</sup>, <sup>1</sup>Thoraxcenter, Erasmus Medical Center, Rotterdam, Netherlands, <sup>2</sup>Pie Medical Imaging, Maastricht, Netherlands, <sup>3</sup>Delft University of Technology, Netherlands
- 52 **Swirling Flows in Arterial Hemodynamics** SB<sup>3</sup>C2015-1072 pg. 1112  
Kartik Bulusu<sup>1</sup>, Christopher Elkins<sup>2</sup>, John Eaton<sup>2</sup>, Michael Plesniak<sup>1</sup>, <sup>1</sup>George Washington University, Washington, DC, United States, <sup>2</sup>Stanford University, Stanford, CA, United States
- 53 **Integrating an Open Source Meshing Alternative into SimVascular 2.0** SB<sup>3</sup>C2015-1062 pg.1094  
Adam R. Updegrove<sup>1</sup>, Nathan M. Wilson<sup>2</sup>, Shawn C. Shadden<sup>1</sup>, <sup>1</sup>University of California, Berkeley, Berkeley, CA, United States, <sup>2</sup>Open Source Medical Software Corporation, Santa Monica, CA, United States
- 54 **Microbubble Void Imaging - A Novel Technique For Flow Visualisation and Quantitative Assessment of Intravascular Mixing in Larger Vessels Using Ultrasound** SB<sup>3</sup>C2015-388 pg.485  
Chee Hau Leow, Francesco Iori, Richard W. Corbett, Neill Duncan, Colin G. Caro, Peter E. Vincent, Mengxing Tang, Imperial College London, London, United Kingdom
- 55 **In-vivo Validation Of The In Silico Predicted Pressure Drop Across An Arteriovenous Fistula** SB<sup>3</sup>C2015-536 pg.756  
Leonard Browne<sup>1</sup>, Khalid Bashir<sup>2</sup>, Philip Griffin<sup>1</sup>, Eamon Kavanagh<sup>2</sup>, Michael Walsh<sup>1</sup>, <sup>1</sup>University of Limerick, Limerick, Ireland, <sup>2</sup>Univeristy Hospital Limerick, Limerick, Ireland
- 56 **Triangulated Surface Boolean Operations for Combining 2-D and 3-D Image Segmentation for Patient-Specific Blood Flow Analysis** SB<sup>3</sup>C2015-1052 pg.1078  
Adam R. Updegrove<sup>1</sup>, Nathan M. Wilson<sup>2</sup>, Shawn C. Shadden<sup>1</sup>, <sup>1</sup>University of California, Berkeley, Berkeley, CA, United States, <sup>2</sup>Open Source Medical Software Corporation, Santa Monica, CA, United States
- 57 **Role of Wall Thickness and Tethering in the Assessment of Arterial Stiffness** SB<sup>3</sup>C2015-156 pg.102  
Simona Hodis<sup>1</sup>, Mair Zamir<sup>2</sup>, <sup>1</sup>Texas A&M University - Kingsville, Kingsville, TX, United States, <sup>2</sup>University of Western Ontario, London, ON, Canada
- 58 **SimVascular 2.0: an Open Source Pipeline for Cardiovascular Modeling and Simulation** SB<sup>3</sup>C2015-656 pg.979  
Hongzhi Lan<sup>1</sup>, Nathan M. Wilson<sup>2</sup>, Daniele Schiavazzi<sup>1</sup>, Jameson Merkow<sup>1</sup>, Adam Updegrove<sup>3</sup>, Shawn C. Shadden<sup>3</sup>, Alison L. Marsden<sup>1</sup>, <sup>1</sup>University of California - San Diego, La Jolla, CA, United States, <sup>2</sup>Open Source Medical Software Corporation, Los Angeles, CA, United States, <sup>3</sup>University of California - Berkeley, Berkeley, CA, United States
- 59 **Nt-proBNP Expression Originating From The RV Myocardium In Pediatric Pulmonary Hypertension Patients Is Correlated With Both The Reactive And Resistive Components Of Vascular Impedance** SB<sup>3</sup>C2015-1130 pg.1219  
Vitaly O. Kheyfets<sup>1</sup>, Jamie Dunning<sup>1</sup>, Uyen Truong<sup>2</sup>, Kendall Hunter<sup>1</sup>, Dunbar Ivy<sup>2</sup>, Robin Shandas<sup>1</sup>, <sup>1</sup>University of Colorado, Aurora, CO, United States, <sup>2</sup>Children's Hospital Colorado, Aurora, CO, United States



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**Poster Session I      Embryonic, Pediatric Cardiology, and Other Fluid Mechanics      Event Center Tent**

- 60      **Valveless Flow in a Thick Elastic Tube** SB<sup>3</sup>C2015-582    pg. 843  
Pavel Kozlovsky<sup>1</sup>, Moshe Rosenfeld<sup>1</sup>, Ariel Jaffa<sup>2</sup>, **David Elad<sup>1</sup>**, <sup>1</sup>Tel Aviv University, Tel Aviv, Israel, <sup>2</sup>Tel Aviv Medical Center, Tel Aviv, Israel
- 61      **Prediction of Downstream Velocity Waveforms for In Vitro Aortic Flow Experiments** SB<sup>3</sup>C2015-229    pg.234  
**Rafeed A. Chaudhury**, Justin R. Ryan, David H. Frakes, Ronald J. Adrian, *Arizona State University, Tempe, AZ, United States*
- 62      **In Vitro Optimization Of The Nozzle Used In Assisted Bidirectional Glenn Procedure For Single Ventricle Stage 1 Palliation** SB<sup>3</sup>C2015-626    pg.921  
Jian Zhou<sup>1</sup>, Mahdi Esmaily-Moghadam<sup>2</sup>, Timothy Conover<sup>1</sup>, Tain-Yen Hsia<sup>3</sup>, Alison Marsden<sup>4</sup>, **Richard Figliola<sup>1</sup>**, <sup>1</sup>Clemson University, Clemson, SC, United States, <sup>2</sup>Stanford University, Palo Alto, CA, United States, <sup>3</sup>Great Ormond Street Hospital, London, United Kingdom, <sup>4</sup>University of California, San Diego, La Jolla, CA, United States
- 63      **Mean Flow Umbilical Doppler Indices Perform Better Than Pulsatility Indices In Determining Small For Gestational Age Pregnancies** SB<sup>3</sup>C2015-201    pg.186  
Shier Nee Saw<sup>1</sup>, Citra Nurfarah Zaini Mattar<sup>2</sup>, Seow Heong Yeo<sup>3</sup>, Shu-E Soh<sup>4,5</sup>, Yap-Seng Chong<sup>2,6</sup>, Peter David Gluckman<sup>6,7</sup>, Keith Godfrey<sup>8</sup>, Seang Mei Saw<sup>5,9</sup>, Arijit Biswas<sup>2</sup>, **Choon Hwai Yap<sup>1</sup>**, <sup>1</sup>National University of Singapore, Singapore, <sup>2</sup>Yong Loo Lin School of Medicine, NUS & NUHS, Singapore, <sup>3</sup>KK Women's and Children's Hospital, Singapore, <sup>4</sup>Yong Loo Lin School of Medicine, NUS, Singapore, <sup>5</sup>Saw Swee Hock School of Public Health, NUS, Singapore, <sup>6</sup>Singapore Institute for Clinical Sciences, A\*STAR, Singapore, <sup>7</sup>Liggins Institute, University of Auckland, Auckland, New Zealand, <sup>8</sup>University of Southampton & University Hospital Southampton NHS Foundation Trust, Southampton, United Kingdom, <sup>9</sup>Singapore Eye Research Institute, Singapore
- 64      **Accounting For Clinical Data Uncertainty In Multiscale Numerical Simulation Of Single Ventricle Palliation Surgery** SB<sup>3</sup>C2015-309    pg.363  
**Daniele E. Schiavazzi<sup>1</sup>**, Tain-Yen Hsia<sup>2</sup>, Alison L. Marsden<sup>1</sup>, <sup>1</sup>University of California at San Diego, San Diego, CA, United States, <sup>2</sup>Great Ormond Street Hospital for Children and UCL Institute of Cardiovascular Science, London, United Kingdom
- 65      **Automated Tuning for Parameter Identification in Multi-scale Coronary Simulations** SB<sup>3</sup>C2015-541    pg. 766  
**Justin S. Tran**, Daniele Schiavazzi, Abhay Ramachandra, Andrew Kahn, Alison Marsden, *University of California, San Diego, La Jolla, CA, United States*
- 66      **Investigating Environmental Causes of Congenital Heart Diseases: A Subject-Specific Computational Fluid Dynamics Study** SB<sup>3</sup>C2015-204    pg.192  
**Venkat Keshav Chivukula<sup>1</sup>**, Sevan Goenezen<sup>2</sup>, Sandra Rugonyi<sup>1</sup>, <sup>1</sup>Oregon Health and Sciences University, Portland, OR, United States, <sup>2</sup>Texas A&M University, College Station, TX, United States
- 67      **Characterization of Transition to Turbulence for Blood in an S-Shaped Pipe Under Steady Flow Conditions** SB<sup>3</sup>C2015-1053    pg.1080  
**Dipankar Biswas<sup>1</sup>**, David M. Casey<sup>1</sup>, Douglas C. Crowder<sup>1</sup>, Kristian Valen-Sendstad<sup>2</sup>, David A. Steinman<sup>2</sup>, Yang H. Yun<sup>1</sup>, Francis Loth<sup>1</sup>, <sup>1</sup>The University of Akron, Akron, OH, United States, <sup>2</sup>University of Toronto, Toronto, ON, Canada
- 68      **Quantitative Analysis Of Heart Function In Embryonic Zebrafish: Retrograde Flow In The Atrioventricular Junction** SB<sup>3</sup>C2015-661    pg.989  
Alexander T. Bulk, David L. Bark Jr., Brennan Johnson, Deborah Gogarty, **Lakshmi P. D. Dasi**, *Colorado State University, Fort Collins, CO, United States*
- 69      **The Impact of Parameter Variation, Experimental Data and Uncertainty Quantification for Complex Biomechanical Problems Exemplified for AAA** SB<sup>3</sup>C2015-364    pg. 447  
**Wolfgang A. Wall**, Jonas Biehler, Michael W. Gee, *Technische Universität München, Garching b. München, Germany*
- 70      **Novel Method For 3D Reconstruction Of The Chick Embryo Cardiovascular Anatomy From Non-invasive Ultrasound Scans For Longitudinal Studies** SB<sup>3</sup>C2015-109    pg.30  
Germaine X. Y. Tan<sup>1</sup>, Muhammad Jamil<sup>1</sup>, Nicole G. Z. Tee<sup>2</sup>, Liang Zhong<sup>1,2</sup>, **Choon Hwai Yap<sup>1</sup>**, <sup>1</sup>National University of Singapore, Singapore, <sup>2</sup>National Heart Centre Singapore, Singapore

## SCIENTIFIC SESSIONS

## Thursday

- 71 **Investigating The Two-phase Nature Of Blood Flow** SB<sup>3</sup>C2015-1102 pg.1167  
Joseph M. Sherwood<sup>1</sup>, Xuejin Li<sup>2</sup>, George Karniadakis<sup>2</sup>, Stavroula Balabani<sup>3</sup>, <sup>1</sup>Imperial College London, London, United Kingdom, <sup>2</sup>Brown University, Providence, RI, United States, <sup>3</sup>University College London, London, United Kingdom
- 72 **Tissue Hypoxia and Murray's Law of Minimum Work Control Neovascular Growth and Remodeling** SB<sup>3</sup>C2015-1176  
Sean Moore, David Hoelzle, Joel D. Boerckel, University of Notre Dame, Notre Dame, IN, United States pg.1301

THURSDAY, JUNE 18

12:30pm - 2:30pm

## Poster Session I

## MS Competition - Biofluid Mechanics

## Event Center Tent

- 73 **Elevated Wall Shear Stress Predicts Branch Graft Failure Following Chimney Endovascular Aortic Aneurysm Repair** SB<sup>3</sup>C2015-443 pg.594  
Rosamaria Tricarico<sup>1</sup>, He Yong<sup>1,2</sup>, Adam Beck<sup>1</sup>, Salvatore Scali<sup>1,2</sup>, Roger Tran-Son-Tay<sup>1</sup>, Scott Berceci<sup>1,2</sup>, <sup>1</sup>University of Florida, Gainesville, FL, United States, <sup>2</sup>North Florida/South Georgia Veterans Health System, Gainesville, FL, United States
- 74 **Better Assessment Of Arteriovenous Fistula Patency Using Functional Diagnostic Endpoints** SB<sup>3</sup>C2015-442 pg.592  
Krishna Subramony Anantha, Ehsan Rajabi-Jaghargh, Rupak Banerjee, University of Cincinnati, Cincinnati, OH, United States
- 75 **Establishing In Vivo Hemodynamic Baseline In A Normotensive Rat Model** SB<sup>3</sup>C2015-1059 pg.1090  
Daniela Velez-Rendon, Erica R. Pursell, Daniela Valdez-Jasso, University of Illinois at Chicago, Chicago, IL, United States

THURSDAY, JUNE 18

12:30pm - 2:30pm

## Poster Session I

## MS Competition - Biotransport

## Event Center Tent

- 76 **Imaging Processing Algorithms For Detecting Subtle Morphological Changes In Mole Images Over Time** SB<sup>3</sup>C2015-235 pg. 242  
Alireza Chamani<sup>1</sup>, Neera Nathan<sup>2</sup>, Thomas Hornyak<sup>3</sup>, Liang Zhu<sup>1</sup>, <sup>1</sup>University of Maryland Baltimore County, Baltimore, MD, United States, <sup>2</sup>National Cancer Institute / NIH, Bethesda, MD, United States, <sup>3</sup>University of Maryland at Baltimore, Baltimore, MD, United States
- 77 **Evaluating the Influence of Tissue Properties on the Core Temperature Using a 3D Whole Body Model** SB<sup>3</sup>C2015-1037 pg.1048  
Robins T. Kalathil<sup>1</sup>, Swarup Zachariah<sup>1</sup>, Amit Bhattacharya<sup>2</sup>, Rupak Banerjee<sup>1</sup>, <sup>1</sup>University of Cincinnati, Cincinnati, OH, United States, <sup>2</sup>University of Cincinnati College of Medicine, Cincinnati, OH, United States

THURSDAY, JUNE 18

12:30pm - 2:30pm

## Poster Session I

## MS Competition - Cellular and Tissue Engineering

## Event Center Tent

- 78 **Individual Cell-Based Morphological Analysis to Determine Chirality of Epithelial Morphogenesis** SB<sup>3</sup>C2015-371 pg.459  
Michael J. Raymond, Poulomi Ray, Leo Wan, Rensselaer Polytechnic Institute, Troy, NY, United States



THURSDAY, JUNE 18

12:30pm - 2:30pm

## Poster Session I

## MS Competition - Design and Devices

## Event Center Tent

- 79 **Fetal Monitoring with Silicone Nanocomposite Strain Gauges** SB<sup>3</sup>C2015-334 pg.339  
Daniel Baradoy, Anton Bowden, David Fullwood, *Brigham Young University, Provo, UT, United States*
- 80 **Development of 3D Printed Patient Specific Ascending Aortic Training Models for Cardiac Surgery** SB<sup>3</sup>C2015-446 pg. 600  
ZhiLin Yang<sup>1</sup>, Justine Garcia<sup>1</sup>, Kevin Lachapelle<sup>2</sup>, Rosaire Mongrain<sup>1</sup>, Richard L. Leask<sup>1</sup>, <sup>1</sup>*McGill University, Montreal, QC, Canada*, <sup>2</sup>*Royal Victoria Hospital, Montreal, QC, Canada*
- 81 **Image-based 3D Morphometric Analysis of the Clavicle Intramedullary Canal in Male Population** SB<sup>3</sup>C2015-494 pg.676  
Jazmine Aira<sup>1,2</sup>, Sergio Gutierrez<sup>2</sup>, Brandon G. Santoni<sup>1,2</sup>, Mark A. Frankle<sup>1,3</sup>, Peter Simon<sup>1,2</sup>, <sup>1</sup>*University of South Florida, Tampa, FL, United States*, <sup>2</sup>*Foundation for Orthopaedic Research and Education, Tampa, FL, United States*, <sup>3</sup>*Florida Orthopaedic Institute, Tampa, FL, United States*

THURSDAY, JUNE 18

12:30pm - 2:30pm

## Poster Session I

## MS Competition - Human Dynamics

## Event Center Tent

- 82 **Pseudo-Rigid Body Method for Reducing Soft Tissue Artifact: Validation and Application to Gait** SB<sup>3</sup>C2015-1147 pg.1249  
Jake Deschamps, Karim Dudum, Eshan Dandekar, Scott Hazelwood, Stephen Klisch, *California Polytechnic State University, San Luis Obispo, CA, United States*

THURSDAY, JUNE 18

12:30pm - 2:30pm

## Poster Session I

## MS Competition - Injury

## Event Center Tent

- 83 **Assessing Head Impact Sensor Validity in the Laboratory** SB<sup>3</sup>C2015-631 pg.931  
Abigail M. Zadnik, Steven Rowson, Stefan M. Duma, *Virginia Tech, Blacksburg, VA, United States*
- 84 **Acute Failure Modes in Small Diameter Spinal Segments** SB<sup>3</sup>C2015-282 pg.317  
Aubrie L. Taylor, Cassandra Bell, Anton E. Bowden, *Brigham Young University, Provo, UT, United States*
- 85 **Human Knee Joint Finite Element Model Using a Two Bundle Anterior Cruciate Ligament: Validation and Gait Analysis** SB<sup>3</sup>C2015-610 pg.893  
Nicholas A. Czapla<sup>1</sup>, Meghan K. Sylvia<sup>1</sup>, Zachary F. Lerner<sup>2</sup>, David J. Tuttle<sup>3</sup>, Otto S. Schueckler<sup>4</sup>, Scott J. Hazelwood<sup>1</sup>, Stephen M. Klisch<sup>1</sup>, <sup>1</sup>*California Polytechnic State University at San Luis Obispo, San Luis Obispo, CA, United States*, <sup>2</sup>*Colorado State University at Fort Collins, Fort Collins, CO, United States*, <sup>3</sup>*Radiology Associates, Inc., San Luis Obispo, CA, United States*, <sup>4</sup>*Central Coast Orthopedic Medical Group, San Luis Obispo, CA, United States*
- 86 **Quantifying Head Impact Exposure in Collegiate Women's Soccer** SB<sup>3</sup>C2015-555 pg. 793  
Jaclyn Press, Steven Rowson, *Virginia Tech, Blacksburg, VA, United States*

THURSDAY, JUNE 18

12:30pm - 2:30pm

## Poster Session I

## MS Competition - Tissue Mechanics

## Event Center Tent

- 87 **Development of a Human Knee Joint Finite Element Model to Investigate Cartilage Stress During Walking in Obese and Normal Weight Adults** SB<sup>3</sup>C2015-611 pg. 895  
**Meghan Sylvia<sup>1</sup>**, Nicholas Czapla<sup>1</sup>, Zachary Lerner<sup>2</sup>, David Tuttle<sup>3</sup>, Otto Schueckler<sup>4</sup>, Scott Hazelwood<sup>1</sup>, Stephen Klisch<sup>1</sup>, <sup>1</sup>*California Polytechnic State University, San Luis Obispo, San Luis Obispo, CA, United States*, <sup>2</sup>*Colorado State University, Fort Collins, Fort Collins, CO, United States*, <sup>3</sup>*Radiology Associates, Inc., San Luis Obispo, CA, United States*, <sup>4</sup>*Central Coast Orthopedic Medical Group, San Luis Obispo, CA, United States*
- 88 **Accurate Prediction of Collagen Fiber Distribution using FFT: A Validation Study** SB<sup>3</sup>C2015-431 pg. 572  
**Erica E. Morrill**, Christina Stender, Roshani Lamichhane, Raquel Brown, Trevor Lujan, *Boise State University, Boise, ID, United States*

THURSDAY, JUNE 18

12:30pm - 2:30pm

## Poster Session I

## Joint and Spine Mechanics

## Event Center Tent

- 89 **Influence of Bone Density and Insertion Angle on Fixation Strength of Pedicle Screws** SB<sup>3</sup>C2015-186 pg.158  
 Giovanni Solitro, **Farid Amirouche**, Brenden Magnan, *University of Illinois at Chicago, Chicago, IL, United States*
- 90 **An Open-source Toolbox for Surrogate Modeling of Joint Contact Mechanics** SB<sup>3</sup>C2015-578 pg.835  
**Ilan Eskinazi**, Benjamin J. Fregly, *University of Florida, Gainesville, FL, United States*
- 91 **Effect Of Axial Compression Preload On Intervertebral Disc Torsional Mechanics** SB<sup>3</sup>C2015-127 pg.56  
 Semih E. Bezci, **Grace D. O'Connell**, *University of California, Berkeley, Berkeley, CA, United States*
- 92 **Using Dynamic Community Detection to Map Collagen Fiber Network Reorganization During Tensile Loading of the Human Facet Capsular Ligament** SB<sup>3</sup>C2015-115 pg.40  
**Sijia Zhang**, Danielle Bassett, Beth Winkelstein, *University of Pennsylvania, Philadelphia, PA, United States*
- 93 **Application of a Novel Robotically Simulated Pivot Shift for Anterior Cruciate Ligament Reconstruction: Comparison of the All-Epiphyseal and Over-The-Top Techniques** SB<sup>3</sup>C2015-500 pg.688  
**Robb Colbrunn**, Tara Bonner, Joel Kolmodin, Paul Saluan, *Cleveland Clinic, Cleveland, OH, United States*
- 94 **Effect Of Sacroiliac Joint Fixation On Segmental Kinematics Of Lumbar Spine: A Finite Element Analysis** SB<sup>3</sup>C2015-1146 pg.1247  
**Ali Kiapour<sup>1</sup>**, Derek Lindsey<sup>2</sup>, Scott Yerby<sup>2</sup>, Vijay Goel<sup>1</sup>, <sup>1</sup>*ECORE, Toledo, OH, United States*, <sup>2</sup>*Si-Bone Inc, San Jose, CA, United States*
- 95 **Effect of Variability in Anatomical Landmarks on Ankle Kinematic Descriptions** SB<sup>3</sup>C2015-513 pg. 712  
**Ednah G. Louie**, Fallon G. Fitzwater, Matthew H. Dickinson, William M. Eboch, Bardiya Akhbari, Lorin P. Maletsky, *University of Kansas, Lawrence, KS, United States*
- 96 **Biomechanical Evaluation of Proximal Junctional Failure and Kyphosis in Lumbar Spinal Fusion Surgery** SB<sup>3</sup>C2015-155 pg.100  
 Won Man Park<sup>1</sup>, Kyungsoo Kim<sup>1</sup>, Yongjung J. Kim<sup>2</sup>, **Yoon Hyuk Kim<sup>1</sup>**, <sup>1</sup>*Kyung Hee University, Yongin, Korea, Republic of*, <sup>2</sup>*Columbia University College of Physicians and Surgeons, New York, NY, United States*
- 97 **Biomechanical Comparison Between Facet Sparing Laminectomy and Laminectomy with Facetectomy in Lumbar Spine: A Finite Element Analysis** SB<sup>3</sup>C2015-653 pg.973  
 Shady Elmasry<sup>1</sup>, Shihab Asfour<sup>1</sup>, Joseph Gjola<sup>2</sup>, Loren Latta<sup>2</sup>, Frank Eismont<sup>2</sup>, **Francesco Travascio<sup>1</sup>**, <sup>1</sup>*University of Miami, Coral Gables, FL, United States*, <sup>2</sup>*University of Miami, Miami, FL, United States*
- 98 **Open Knee(s): Comprehensive Tibiofemoral Joint Testing For Specimen-specific Next Generation Knee Models** SB<sup>3</sup>C2015-530 pg.746  
**Tara F. Bonner**, Robb W. Colbrunn, Snehal Chokhandre, Craig Bennetts, Ahmet Erdemir, *Cleveland Clinic, Cleveland, OH, United States*

- 99 **Applying Mean Soft Tissue Properties To A Subpopulation Of Knee Models Reveals Inability To Capture Variations In Knee Stability** SB<sup>3</sup>C2015-613 pg.899  
Kevin Schafer, Mohammad Kia, Daniel Green, Andrew Pearle, Thomas Wickiewicz, Timothy Wright, **Carl Imhauser**, *Hospital for Special Surgery, New York, NY, United States*
- 100 **2D/3D Registration To Find Host Bone Coverage Of Rsa Implants** SB<sup>3</sup>C2015-1156 pg.1267  
Jonathan W. Keimel<sup>1</sup>, Kristi L. Krebs<sup>1</sup>, **Andres F. Cabezas<sup>1</sup>**, Adam Lorenzetti<sup>2</sup>, Brandon G. Santoni<sup>3</sup>, Mark A. Frankle<sup>2</sup>, Peter Simon<sup>4</sup>, <sup>1</sup>*University of South Florida, Clearwater, FL, United States*, <sup>2</sup>*Florida Orthopaedic Institute, Tampa, FL, United States*, <sup>3</sup>*Foundation for Orthopaedic Research and Education, Clearwater, FL, United States*, <sup>4</sup>*Foundation for Orthopaedic Research and Education, Tampa, FL, United States*
- 101 **Do External Load Measures Predict Knee Contact Force Changes Due To Weight Loss?** SB<sup>3</sup>C2015-1158 pg.1269  
**Nathan R. Sauder<sup>1</sup>**, James C. Coburn<sup>2</sup>, Melinda K. Harman<sup>3</sup>, Heather K. Vincent<sup>4</sup>, Darryl D. D'Lima<sup>5</sup>, Benjamin J. Fregly<sup>1</sup>, <sup>1</sup>*University of Florida, Gainesville, FL, United States*, <sup>2</sup>*Center for Devices and Radiological Health, Food and Drug Administration, Silver Spring, MD, United States*, <sup>3</sup>*Clemson University, Clemson, SC, United States*, <sup>4</sup>*University of Florida, Gainesville, FL, United States*, <sup>5</sup>*Shiley Center for Orthopaedic Research & Education, Scripps Clinic, La Jolla, CA, United States*
- 102 **Mechanical Characterization and a Computational Wear Model for Polycarbonate Urethane as a Bearing Material** SB<sup>3</sup>C2015-396 pg.501  
**Hannah Gramling**, Amrita Srinivasan, Lisa Pruitt, *University of California, Berkeley, Berkeley, CA, United States*
- 103 **Does the Cylindrical or Spherical Axis More Accurately Locate the Flexion-Extension Axis of the Tibia of the Natural Knee?** SB<sup>3</sup>C2015-349 pg.425  
**Abheetinder S. Brar<sup>1</sup>**, Stephen M. Howell<sup>1</sup>, Maury L. Hull<sup>1</sup>, Mohamed R. Mahfouz<sup>2</sup>, <sup>1</sup>*University of California, Davis, Davis, CA, United States*, <sup>2</sup>*University of Tennessee, Knoxville, TN, United States*
- 104 **Development Of A Finite Element Model Of The Pediatric Occipito-atlantoaxial Complex For Studying Osodontoideum And Atlanto-occipital Dislocation** SB<sup>3</sup>C2015-1070 pg.1108  
**Rinchen Phuntsok<sup>1,2</sup>**, Marcus D. Mazur<sup>1,3</sup>, Vijay M. Ravindra<sup>1,3</sup>, Douglas L. Brockmeyer<sup>1,3</sup>, Benjamin J. Ellis<sup>2,3</sup>, <sup>1</sup>*University of Utah, Salt Lake City, UT, United States*, <sup>2</sup>*Scientific Computing and Imaging, Salt Lake City, UT, United States*, <sup>3</sup>*Salt Lake City, UT, United States*
- 105 **A Hybrid Risk Model for Hip Fracture Prediction using Clinical and Stochastic Finite Element Data** SB<sup>3</sup>C2015-293  
**Peng Jiang**, Samy Missoum, Zhao Chen, *University of Arizona, Tucson, AZ, United States* pg.333
- 106 **The Effect of Muscle Loading on Ankle Joint Complex Kinematics and Achilles Load: A Cadaveric Study** SB<sup>3</sup>C2015-525 pg.735  
**Bardiya Akhbari**, Matthew H. Dickinson, Ednah G. Louie, Sami Shalhoub, Lorin P. Maletsky, *University of Kansas, Lawrence, KS, United States*
- 107 **The Hip Joint Estimates from Skin-Marker-Based Methods Do Not Correspond with Measurements using Dual Fluoroscopy** SB<sup>3</sup>C2015-1094 pg.1151  
**Niccolo M. Fiorentino**, Penny R. Atkins, Michael J. Kutschke, Ashley L. Kapron, K. Bo Foreman, Andrew E. Anderson, *University of Utah, Salt Lake City, UT, United States*
- 109 **Effect Of Interspinous Device On Lumbar Spine: A Finite Element Study** SB<sup>3</sup>C2015-1035 pg.1044  
**Deniz U. Erbulut**, Iman Zafarparandeh, Chaudhry R. Hassan, Ismail Lazolu, Ali F. Ozer, *Koc University, Istanbul, Turkey*
- 110 **The Effects Of Axial Compressive Loading On The Intersegmental Rotation Of A Virtual Cervical Spine** SB<sup>3</sup>C2015-308 pg.361  
**Ryan J. Moss**, Kevin M. Bell, *Orthopaedic Robotics Laboratory, Pittsburgh, PA, United States*
- 111 **A Computational Method for Visualizing Femoral Range of Motion for Patients with Slipped Capital Femoral Epiphysis** SB<sup>3</sup>C2015-384 pg.477  
**Ferris Pfeiffer**, David Tager, Sumit Gupta, *University of Missouri, Columbia, MO, United States*



THURSDAY, JUNE 18

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## Poster Session I

## Tissue Mechanics - General

## Event Center Tent

- 112 **Extracting Mechanical Properties Of The Corneoscleral Shell From Whole Eye Perfusion** SB<sup>3</sup>C2015-629 pg.927  
Joseph M. Sherwood<sup>1</sup>, Ester Reina-Torres<sup>1</sup>, Jacques Bertrand<sup>1</sup>, C. Ross Ethier<sup>2</sup>, Darryl Overby<sup>1</sup>, <sup>1</sup>Imperial College London, London, United Kingdom, <sup>2</sup>Georgia Institute of Technology/Emory, Atlanta, GA, United States
- 113 **Strain Rate Dependency Of The Intracellular Calcium Ion Concentration During Neuronal Membrane Mechanoporation** SB<sup>3</sup>C2015-621 pg.911  
Amirhamed Bakhtiarydavijani<sup>1</sup>, Anna E. Florence<sup>1</sup>, Michael A. Murphy<sup>1</sup>, Sungkwang Mun<sup>1</sup>, Jun Liao<sup>1</sup>, Lakiesha N. Williams<sup>1</sup>, M. F. Horstemeyer<sup>1</sup>, Michelle C. LaPlaca<sup>2</sup>, Raj Prabhu<sup>1</sup>, <sup>1</sup>Mississippi State University, Starkville, MS, United States, <sup>2</sup>Georgia Institute of Technology, Atlanta, GA, United States
- 114 **Quasilinear and Non-Quasilinear Viscoelastic Behavior of Collagen Gels During Stress Relaxation** SB<sup>3</sup>C2015-551 pg.784  
Christopher E. Korenczuk<sup>1</sup>, Victor K. Lai<sup>2</sup>, Victor H. Barocas<sup>1</sup>, <sup>1</sup>University of Minnesota, Minneapolis, MN, United States, <sup>2</sup>University of Minnesota Duluth, Duluth, MN, United States
- 115 **Direct Estimation of Three-dimensional Deformation Gradient Tensors from Volumetric Ultrasound Data** SB<sup>3</sup>C2015-671 pg.1007  
John J. Boyle<sup>1</sup>, Roger Rowe<sup>1</sup>, Frederick Damen<sup>2</sup>, Arvin Soepriatna<sup>2</sup>, Robert B. Pless<sup>1</sup>, Craig Goergen<sup>2</sup>, Stavros Thomopoulos<sup>1</sup>, Guy M. Genin<sup>1</sup>, <sup>1</sup>Washington University in St Louis, Saint Louis, MO, United States, <sup>2</sup>Purdue University, West Lafayette, IN, United States
- 116 **A Structural Constitutive Model for the Active and Passive Behavior of Biological Tissues** SB<sup>3</sup>C2015-330 pg.397  
Ting Tan, Raffaella De Vita, Virginia Tech, Blacksburg, VA, United States
- 117 **Computational Modeling Of Synthetic Mesh Materials: Simulation And Experimental Assessment Of Model Predictions** SB<sup>3</sup>C2015-511 pg.708  
William R. Barone<sup>1</sup>, Katrina M. Knight<sup>1</sup>, Pamela A. Moalli<sup>2</sup>, Steven D. Abramowitch<sup>1</sup>, <sup>1</sup>University of Pittsburgh, Pittsburgh, PA, United States, <sup>2</sup>Magee-Womens Research Institute, University of Pittsburgh, Pittsburgh, PA, United States
- 118 **Tough, Self-recovering Hydrogels Inspired By Caddisfly Silk** SB<sup>3</sup>C2015-337 pg.405  
Dwight D. Lane, G. Mahika Weerasekare, Sarbjit Kaur, Russell J. Stewart, University of Utah, Salt Lake City, UT, United States
- 119 **Determining The Compressive Modulus Of Mouse Trabecular Meshwork With Atomic Force Microscopy** SB<sup>3</sup>C2015-1047 pg.1068  
Ke Wang, Todd Sulchek, C. Ross Ethier, Georgia Institute of Technology, Atlanta, GA, United States
- 120 **Development of Shoe Sole Design Using Material Natural Frequencies** SB<sup>3</sup>C2015-251 pg.271  
Brett D. Steineman<sup>1</sup>, Ted Barber<sup>2</sup>, Tammy L. Haut Donahue<sup>1</sup>, <sup>1</sup>Colorado State University, Fort Collins, CO, United States, <sup>2</sup>Pearl Izumi, Inc., Louisville, CO, United States
- 121 **The Need for Validation in Soft Tissue Constitutive Models** SB<sup>3</sup>C2015-1058 pg.1088  
Sandeep Madireddy, Kumar Vemaganti, University of Cincinnati, Cincinnati, OH, United States
- 122 **A Computational Study of A Simple, Transversely Isotropic Model of Soft Tissue, with Shear and Tensile Anisotropy, in Large Strain** SB<sup>3</sup>C2015-202 pg.188  
Yuan Feng<sup>1</sup>, Ruth J. Okamoto<sup>2</sup>, Guy M. Genin<sup>2</sup>, Larry A. Taber<sup>2</sup>, Philip V. Bayly<sup>2</sup>, <sup>1</sup>Soochow University, Suzhou, China, <sup>2</sup>Washington University in St. Louis, St. Louis, MO, United States
- 123 **Development Of A Clinical Ultrasound Technique for Analysis of Protein Content Within Hydrogel** SB<sup>3</sup>C2015-1109  
Jessica Stukel<sup>1</sup>, Monika Goss<sup>2</sup>, Agata Exner<sup>2</sup>, Rebecca Willits<sup>1</sup>, <sup>1</sup>The University of Akron, Akron, OH, United States, <sup>2</sup>Case Western Reserve University, Cleveland, OH, United States pg.1181
- 124 **Validation Of High Rate Strip Biaxial Tension Deformations Of The Neuronal Phospholipid Bilayer Using Empirical Data** SB<sup>3</sup>C2015-1120 pg.1203  
M. A. Murphy<sup>1</sup>, M. F. Horstemeyer<sup>1</sup>, Steven R. Gwaltney<sup>1</sup>, Tonya W. Stone<sup>1</sup>, Michelle C. LaPlaca<sup>2</sup>, Jun Liao<sup>1</sup>, Lakiesha N. Williams<sup>1</sup>, R. Prabhu<sup>1</sup>, <sup>1</sup>Mississippi State, MS, United States, <sup>2</sup>Georgia Institute of Technology, Atlanta, GA, United States

- 125 **Collective Chiral Rotation of Epithelial Microtissues Within a Three-Dimensional Matrigel System** SB<sup>3</sup>C2015-232  
Amanda S. Chin, Kathryn E. Worley, Leo Q. Wan, Rensselaer Polytechnic Institute, Troy, NY, United States pg.238
- 126 **Finite Element Model of Cervical Pessary in Use: Evaluating Mechanical Interventions for Preterm Birth**  
SB<sup>3</sup>C2015-490 pg.668  
Michael J. Fernandez<sup>1</sup>, Michael D. House<sup>2</sup>, Noelia M. Zork<sup>3</sup>, Joy S. Vink<sup>3</sup>, Ronald J. Wapner<sup>3</sup>, Sachin R. Jambawalikar<sup>3</sup>, Kristin M. Myers<sup>1</sup>, <sup>1</sup>Columbia University, New York, NY, United States, <sup>2</sup>Tufts Medical Center, Boston, MA, United States, <sup>3</sup>Columbia University Medical Center, New York, NY, United States
- 127 **Impact of Urinary Bladder Matrix on Vaginal Smooth Muscle Function and Structure in the Nonhuman Primate Model** SB<sup>3</sup>C2015-164 pg.116  
Katrina Knight<sup>1</sup>, Zegbeh Jallah<sup>1</sup>, Rui Liang<sup>2</sup>, Stacy Palcsey<sup>2</sup>, Pamela Moalli<sup>1,2</sup>, Steven Abramowitch<sup>1,2</sup>, <sup>1</sup>Musculoskeletal Research Center, University of Pittsburgh, Pittsburgh, PA, United States, <sup>2</sup>Magee-Womens Research Institute, Magee-Womens Hospital, Pittsburgh, PA, United States
- 128 **Biaxial Creep of Swine Cardinal and Uterosacral Ligaments** SB<sup>3</sup>C2015-299 pg. 345  
Ting Tan, Nathan M. Cholewa, Scott W. Case, Raffaella De Vita, Virginia Tech, Blacksburg, VA, United States
- 129 **Characterization of Soft Tissue Microstructure via Transmural SALS** SB<sup>3</sup>C2015-1044 pg.1062  
John G. Lesicko, Kristen R. Feaver, Michael S. Sacks, University of Texas at Austin, Austin, TX, United States
- 130 **Finite Element Modeling of the Posterior Eye in Microgravity** SB<sup>3</sup>C2015-348 pg.423  
Andrew Feola<sup>1</sup>, Julia Raykin<sup>1</sup>, Lealem Mulugeta<sup>2</sup>, Rudolph Gleason<sup>1</sup>, Jerry G. Myers<sup>3</sup>, Emily S. Nelson<sup>3</sup>, Brian Samuels<sup>4</sup>, Ross Ethier<sup>1</sup>, <sup>1</sup>Georgia Institute of Technology, Atlanta, GA, United States, <sup>2</sup>Universities Space Research Association, Houston, TX, United States, <sup>3</sup>NASA Glenn Research Center, Cleveland, OH, United States, <sup>4</sup>University of Alabama at Birmingham, Birmingham, AL, United States
- 131 **Posterior Scleral Stiffening: How is Scleral Canal Expansion Affected by the Size of Stiffening Region?**  
SB<sup>3</sup>C2015-1048 pg.1070  
Ian C. Campbell<sup>1,2</sup>, Baptiste Coudrillier<sup>1</sup>, C. Ross Ethier<sup>1,2</sup>, <sup>1</sup>Georgia Institute of Technology/Emory University, Atlanta, GA, United States, <sup>2</sup>Atlanta VA Medical Center, Decatur, GA, United States
- 132 **Biomechanical Behavior Of Cornea When Subjected To Tension And Compression Loads** SB<sup>3</sup>C2015-1076 pg.1118  
Hamed Hatami-Marbini, Oklahoma State University, Stillwater, OK, United States
- 133 **Correlating Urethral Rupture with Distension of the Urethra during the Inflation of a Misplaced Transurethral Catheter Balloon** SB<sup>3</sup>C2015-370 pg. 457  
Connor V. Cunnane, University of Limerick, Limerick, Ireland
- 134 **Tuning Silk Fibroin Hydrogels: Genipin Crosslinking Pre-gelation Decreases Time-dependent Properties**  
SB<sup>3</sup>C2015-1125 pg.1211  
Winston H. Elliott<sup>1</sup>, Walter Bonani<sup>2,3</sup>, Devid Maniglio<sup>2,3</sup>, Antonella Motta<sup>2,3</sup>, Wei Tan<sup>1</sup>, Claudio Migliaresi<sup>2,3</sup>, <sup>1</sup>University of Colorado- Boulder, Boulder, CO, United States, <sup>2</sup>University of Trento, Trento, Italy, <sup>3</sup>European Institute of Excellence on Tissue Engineering and Regenerative Medicine, and INSTM Trento Research Unit, Trento, Italy
- 135 **Spherical Shell Mechanical Model of the Pacinian Corpuscle** SB<sup>3</sup>C2015-411 pg.531  
Julia C. Quindlen, Henryk K. Stolarski, Victor H. Barocas, University of Minnesota, Minneapolis, MN, United States
- 136 **Measuring Tortuosity Changes due to Central Retinal Vein Occlusion** SB<sup>3</sup>C2015-1182 pg.1309  
Kendall McMillan<sup>1</sup>, Shaun Evans<sup>1</sup>, Gil Binenbaum<sup>2</sup>, Brittany Coats<sup>1</sup>, <sup>1</sup>University of Utah, Salt Lake City, UT, United States, <sup>2</sup>The Children's Hospital of Philadelphia, Philadelphia, PA, United States
- 138 **Mechanical Properties Of Human Placenta In Normal Pregnancies And During Intrauterine Growth Restriction**  
SB<sup>3</sup>C2015-206 pg.196  
Jeanette Shifen Lau, Shier Nee Saw, Martin Lindsay Buist, Choon Hwai Yap, National University of Singapore, Singapore
- 139 **Determination of the Mechanical Properties of the Iris Using Inverse Finite Element Modeling** SB<sup>3</sup>C2015-424 pg.557  
Anup D. Pant, Rouzbeh Amini, The University of Akron, Akron, OH, United States
- 140 **A Poroeleastic High Fidelity Finite Element Model Of The Osteochondral Unit To Evaluate Changes In Permeability With Osteoarthritis** SB<sup>3</sup>C2015-144 pg.82  
Michael E. Stender, Richard A. Regueiro, Virginia L. Ferguson, University of Colorado, Boulder, Boulder, CO, United States

SCIENTIFIC SESSIONS

Thursday

- 141 **The Effects Of Stress State On The Mechanical Response And Failure Of The Neuronal Phospholipid Bilayer: A Molecular Dynamics Study** SB<sup>3</sup>C2015-1132 pg.1223  
M. A. Murphy<sup>1</sup>, M. F. Horstemeyer<sup>1</sup>, Steven R. Gwaltney<sup>1</sup>, Tonya W. Stone<sup>1</sup>, Michelle C. LaPlaca<sup>2</sup>, Jun Liao<sup>1</sup>, Lakiesha N. Williams<sup>1</sup>, **R. Prabhu**<sup>1</sup>, <sup>1</sup>Mississippi State, MS, United States,<sup>2</sup>Georgia Institute of Technology, Atlanta, GA, United States
- 142 **Racial Differences In The Load-dependent Area Of The Lamina Cribrosa** SB<sup>3</sup>C2015-1172 pg.1293  
**Stephen J. Howerton**, Forest L. Danford, Jonathan P. Vande Geest, Avinash Ayyalasomayajula, *The University of Arizona, Tucson, AZ, United States*
- 143 **Optic Nerve Sheath Mechanics in VIIP Syndrome** SB<sup>3</sup>C2015-488 pg.666  
**Julia Raykin**<sup>1</sup>, Andrew Feola<sup>1</sup>, Rudy Gleason<sup>1</sup>, Lealem Mulugeta<sup>2</sup>, Jerry Myers<sup>3</sup>, Emily Nelson<sup>3</sup>, Brian Samuels<sup>4</sup>, C. Ross Ethier<sup>1</sup>, <sup>1</sup>Georgia Institute of Technology, Atlanta, GA, United States,<sup>2</sup>Universities Space Research Association, Houston, TX, United States,<sup>3</sup>NASA Glenn Research Center, Cleveland, OH, United States,<sup>4</sup>University of Alabama at Birmingham, Birmingham, AL, United States
- 144 **Modeling the Biaxial Mechanics of Brain White Matter** SB<sup>3</sup>C2015-177 pg.140  
**Kevin M. Labus**<sup>1</sup>, José J. García<sup>2</sup>, Christian M. Puttlitz<sup>1</sup>, <sup>1</sup>Colorado State University, Fort Collins, CO, United States,<sup>2</sup>Universidad del Valle, Cali, Colombia
- 145 **An In Silico Biomechanical Analysis of the Stent-Esophagus Interaction.** SB<sup>3</sup>C2015-365 pg. 449  
**Mathias Peirlinck**<sup>1</sup>, Benedict Verheghe<sup>1,2</sup>, Patrick Segers<sup>1</sup>, Matthieu De Beule<sup>1,2</sup>, <sup>1</sup>Ghent University, Ghent, Belgium,<sup>2</sup>FEops bvba, Ghent, Belgium

THURSDAY, JUNE 18

12:30pm - 2:30pm

Poster Session I

Bone Biomechanics

Event Center Tent

- 146 **Fabrication And Characterization Of Artificial Bone-cartilage Tissue Construction Using Mesenchymal Stem Cells** SB<sup>3</sup>C2015-207 pg.198  
**Takaaki Arahira**, *Fukuoka Dental College, Fukuoka, Japan*
- 147 **Mechanical Analysis of Bone Tissue as Mineral and Organic Composite by Raman Spectroscopy** SB<sup>3</sup>C2015-447 pg.602  
**Masahiro Todoh**, Shigeru Tadano, *Hokkaido University, Sapporo, Japan*
- 148 **The Effect of Pore Size on Bone Strain in the Proximal Femur** SB<sup>3</sup>C2015-1167 pg.1287  
**Mariana Kersh**<sup>1</sup>, Afrodite Zendelli<sup>2</sup>, Yohann Bala<sup>2</sup>, Ali Ghasem-Zadeh<sup>2</sup>, Ego Seeman<sup>2</sup>, Roger Zebaze<sup>2</sup>, <sup>1</sup>University of Illinois, Urbana, IL, United States,<sup>2</sup>Austin Health, Heidelberg, Australia
- 149 **Multimodal Assessment of Bone Quality of the Human Rib** SB<sup>3</sup>C2015-38 pg.20  
**Lauren M. Mangano**<sup>1</sup>, Jean-Paul Roux<sup>2</sup>, François Duboeuf<sup>2</sup>, Delphine Farlay<sup>2</sup>, David Mitton<sup>3</sup>, Hélène Follet<sup>2</sup>, <sup>1</sup>Boston University, Brookline, MA, United States,<sup>2</sup>INSERM, Université Lyon 1, Lyon, France,<sup>3</sup>IFSTTAR, Université Lyon 1, Bron, France
- 150 **The Characterization Of The Bone Marrow Mechanical Environment Using Poroelastic Finite Element Models** SB<sup>3</sup>C2015-1116 pg.1195  
**Joshua Gargac**, Thomas Metzger, Tyler Kreipke, Hansel Weihs, Glen Niebur, *University of Notre Dame, South Bend, IN, United States*
- 151 **Spring Mediated Cranioplasty: a Patient Specific Numerical Model** SB<sup>3</sup>C2015-210 pg.202  
**Alessandro Borghi**<sup>1</sup>, Silvia Schievano<sup>1</sup>, William Rodgers<sup>1</sup>, Freida Angullia<sup>2</sup>, Allan Ponniah<sup>2</sup>, David Dunaway<sup>2</sup>, Owase Jeelani<sup>2</sup>, <sup>1</sup>University College London, London, United Kingdom,<sup>2</sup>Great Ormond Street Hospital, London, United Kingdom
- 152 **Preliminary Finite Element Analysis of Subchondral Bone Cysts in the Stifle of the Horse** SB<sup>3</sup>C2015-393 pg.495  
**Lance F. Frazer**<sup>1</sup>, Kenneth Fischer<sup>1</sup>, Garrett Noble<sup>2</sup>, Elizabeth Santschi<sup>3</sup>, <sup>1</sup>University of Kansas, Lawrence, KS, United States,<sup>2</sup>Ohio State University, Columbus, OH, United States,<sup>3</sup>Kansas State University, Manhattan, KS, United States



THURSDAY, JUNE 18	12:30pm - 2:30pm
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**Poster Session I      Fabrication and Manipulation of the Cellular Microenvironment      Event Center Tent**

- 153      **Mechanics of Interstitial Growth in Enzymatically Degradable Hydrogels: Characterization of Degradation Front**  
SB<sup>3</sup>C2015-1124   pg.1209  
Umut Akalp, Stephanie J. Bryant, Stacey C. Skaalure, Franck J. Vernerey, *University of Colorado at Boulder, Boulder, CO, United States*
- 154      **Microgeometry and Microenvironment of Mitral Valve Interstitial Cells Under Physiological Loads** SB<sup>3</sup>C2015-287   pg.325  
Salma Ayoub, Chung-Hao Lee, Michael S. Sacks, *The University of Texas at Austin, Austin, TX, United States*
- 155      **Understanding and Optimizing Electrical Stimulation of Neurons for Improving Regeneration: A Finite Element Simulation with Experimental Verification** SB<sup>3</sup>C2015-520   pg.727  
Robert D. Adams<sup>1</sup>, Rebecca K. Willits<sup>2</sup>, Amy B. Harkins<sup>1</sup>, <sup>1</sup>*Saint Louis University, Saint Louis, MO, United States*,<sup>2</sup>*University of Akron, Akron, OH, United States*
- 156      **Schwann Cell Proliferation in Scaffolds with Decoupled Mechanical and Biochemical Properties** SB<sup>3</sup>C2015-428   pg.565  
Jessica Stukel, Wenda Zhou, Rebecca Willits, *The University of Akron, Akron, OH, United States*
- 157      **Wrinkled, Wavelength-Tunable Graphene-Based Surface Topographies for Directing Cell Alignment and Morphology**  
SB<sup>3</sup>C2015-297   pg.341  
Daniel F. Tonderys, *Brown University, Providence, RI, United States*
- 158      **Biomimetic Ex Vivo Model for Tracking Stem Cells During Microvascular Network Growth** SB<sup>3</sup>C2015-1100   pg.1163  
Mohammad S. Azimi, Amy L. Strong, Theresa B. Phamduy, Douglas B. Chrisey, Bruce A. Bunnell, Walter L. Murfee, *Tulane University, New Orleans, LA, United States*

THURSDAY, JUNE 18	12:30pm - 2:30pm
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**Poster Session I      Multi-Scale Mechanics in Cell and Tissue Engineering      Event Center Tent**

- 159      **Optimization of Test Methods and Burst Property Characterization of Alginate Hydrogel Lung Sealants**  
SB<sup>3</sup>C2015-630   pg.929  
Patrick N. Charron, Spencer L. Fenn, Rachael A. Oldinski, *University of Vermont, Burlington, VT, United States*
- 160      **Numerical Simulations of Fibrous Biomaterial with Randomly Distributed Fiber Network** SB<sup>3</sup>C2015-130   pg.62  
Tao Jin, Ilinca Stanciulescu, *Rice University, Houston, TX, United States*
- 161      **Using Simulations with Realistic Fibrous Network Geometry to Find the Achievable Range of Mechanical Behaviors of Elastomeric Scaffolds** SB<sup>3</sup>C2015-535   pg.754  
James B. Carleton, Gregory J. Rodin, Michael S. Sacks, *University of Texas at Austin, Austin, TX, United States*
- 162      **A Strain Based Approach To Quantify Non-affine Behavior Of Three Dimensional Random Network** SB<sup>3</sup>C2015-1080  
Hamed Hatami-Marbini, *Oklahoma State University, Stillwater, OK, United States*   pg.1126
- 163      **Empirically Determined Vascular Smooth Muscle Mechano-adaptation Laws** SB<sup>3</sup>C2015-275   pg.305  
Kerianne E. Steucke, Patrick W. Alford, *University of Minnesota, Minneapolis, MN, United States*
- 164      **Microstructure And Dynamics Of Crosslinked Collagen Gel** SB<sup>3</sup>C2015-397   pg.503  
Shengmao Lin<sup>1</sup>, Linxia Gu<sup>1,2</sup>, <sup>1</sup>*University of Nebraska-Lincoln, Lincoln, NE, United States*,<sup>2</sup>*Nebraska Center for Materials and Nanoscience, Lincoln, NE, United States*
- 165      **Probing Of A Complex Multi-layer Embryonic Tissue Through Novel 3D Bio-etching** SB<sup>3</sup>C2015-352   pg.431  
Melis Hazar<sup>1</sup>, YongTae Kim<sup>2</sup>, Philip R. LeDuc<sup>1</sup>, William C. Messner<sup>3</sup>, Lance A. Davidson<sup>4</sup>, <sup>1</sup>*Carnegie Mellon University, Pittsburgh, PA, United States*,<sup>2</sup>*Georgia Institute of Technology, Atlanta, GA, United States*,<sup>3</sup>*Tufts University, Medford, MA, United States*,<sup>4</sup>*University of Pittsburgh, Pittsburgh, PA, United States*

SCIENTIFIC SESSIONS

**Thursday/Friday**

- 166      **Numerical Simulation Of Effects Of Membrane Surface Viscosity On Tank-treading Motion Of Red Blood Cell**  
 SB<sup>3</sup>C2015-203 pg.190  
 Ken-ichi Tsubota, *Chiba University, Chiba, Japan*
- 167      **Wnt/beta-catenin Signaling Pathways Contributes To Dynamic Fluid Flow Loading Induced In Situ Osteocytic Calcium Oscillations In An Intact Mouse Femur** SB<sup>3</sup>C2015-1084 pg.1134  
 Minyi Hu, Guowei Tian, Yi-Xian Qin, *Stony Brook University, Stony Brook, NY, United States*
- 168      **Nonlinear Anisotropic Mechanical Properties of Vascular Smooth Muscle Cells** SB<sup>3</sup>C2015-650 pg.967  
 Zaw Win, Patrick W. Alford, *University of Minnesota, Minneapolis, MN, United States*
- 169      **Dynamic Fluid Flow Loading Induced In Situ Osteocytic Calcium Oscillations In An Intact Mouse Femur**  
 SB<sup>3</sup>C2015-1081 pg.1128  
 Minyi Hu, Guowei Tian, Yi-Xian Qin, *Stony Brook University, Stony Brook, NY, United States*

**FRIDAY, JUNE 19**

**8:00am - 9:30am**

**Workshop: Mow and Fung Lectures - Dawn M. Elliott, Adam J. Engler**

**Primrose A/B**

Session Chair: Louis Soslowsky, *University of Pennsylvania, Philadelphia, PA, United States*  
 Session Co-Chair: Guy Genin, *Washington University, St. Louis, MO, United States*

**FRIDAY, JUNE 19**

**8:00am - 9:30am**

**Workshop: Problem-based Learning in Biomechanics**

**Superior**

Session Chair: Alisa Morss Clyne, *Drexel University, Philadelphia, PA, United States*  
 Session Co-Chair: Kristen Billiar, *Worcester Polytechnic Institute, Worcester, MA, United States*

**FRIDAY, JUNE 19**

**8:00am - 9:30am**

**Workshop: CFD Challenge 2015**

**Wasatch**

Session Chair: Kenichi Kono, *Wakayama Rosai Hospital, Japan*  
 Session Co-Chair: Kristian Valen-Sendstad, *University of Toronto, Toronto, ON, Canada*

**FRIDAY, JUNE 19**

**8:00am - 9:30am**

**Workshop: Mentee-mentor Matching Mixer and Best Practices in Mentoring**

**Magpie**

Session Chair: Naomi Chesler, *University of Wisconsin, Madison, WI, United States*  
 Session Co-Chair: Lakiesha Williams, *Mississippi State University, Mississippi State, MS, United States*  
 Session Co-Chair: Victor Barocas, *University of Minnesota, Minneapolis, MN, United States*

**FRIDAY, JUNE 19**

**8:00am - 9:30am**

**Workshop: Strategies for a Successful Postdoctoral Experience**

**Maybird**

**Organizers:** ASME Bioengineering Division Student Leadership Committee (special thanks to Kathryn Drzewiecki, Samira Jamalian, Paola Jaramillo, and Samantha Schoell)



FRIDAY, JUNE 19

9:45am - 10:45am

## PLENARY SESSION II – Andrew McCulloch

Ballrooms 1-3

FRIDAY, JUNE 19

11:00am - 12:30pm

## PhD Competition - Biofluid Mechanics

Primrose A

Session Chair: Stephanie George, East Carolina University, Greenville, NC, United States

Session Co-Chair: Brandon Dixon, Georgia Institute of Technology, Atlanta, GA, United States

- 11:00AM Increased Red Blood Cell Stiffness Increases Pulmonary Vascular Resistance And Pulmonary Arterial Pressure**  
SB<sup>3</sup>C2015-587 pg.853  
David A. Schreier, Omid Forouzan, Timothy Hacker, John Sheehan, Naomi C. Chesler, University of Wisconsin-Madison, Madison, WI, United States
- 11:15AM Effect of Bicuspid Aortic Valve Morphotype on Ascending Aorta Hemodynamics: a Computational Study**  
SB<sup>3</sup>C2015-304 pg.355  
Kai Cao, Philippe Sucosky, University of Notre Dame, Notre Dame, IN, United States
- 11:30AM Hemodynamic Characterization of Different Basilar Tip Aneurysm Templates Using Computational Fluid Dynamics**  
SB<sup>3</sup>C2015-1114 pg.1191  
Priya Nair<sup>1</sup>, Brian W. Chong<sup>2</sup>, David Frakes<sup>1</sup>, <sup>1</sup>Arizona State University, Tempe, AZ, United States, <sup>2</sup>Mayo Clinic Hospital, Phoenix, AZ, United States
- 11:45AM Modulation of Lymph Node Resistance during Inflammation: Experimental Measurement and Computational Modeling** SB<sup>3</sup>C2015-566 pg.813  
Mohammad Jafarnejad<sup>1</sup>, Joshua P. Scallan<sup>2</sup>, Joseph M. Sherwood<sup>1</sup>, Darryl R. Overby<sup>1</sup>, David C. Zawieja<sup>3</sup>, Michael J. Davis<sup>2</sup>, James E. Moore<sup>1</sup>, <sup>1</sup>Imperial College London, London, United Kingdom, <sup>2</sup>University of Missouri, Columbia, MO, United States, <sup>3</sup>Texas A&M Health Science Center, Temple, TX, United States
- 12:00PM Inlet Flow Rate Variation and Onset of Flow Instabilities in the Carotid Siphon** SB<sup>3</sup>C2015-276 pg.307  
Resmi KrishnankuttyRema<sup>1</sup>, Kristian Valen-Sendstad<sup>1,2</sup>, David Steinman<sup>1</sup>, <sup>1</sup>University of Toronto, Toronto, ON, Canada, <sup>2</sup>Simula Research Laboratory, Lysaker, Norway
- 12:15PM Suction Effect Produced by Active Contraction of Collecting Lymphatic Vessels Facilitates Lymphatic Filling**  
SB<sup>3</sup>C2015-539 pg.762  
Samira Jamalian<sup>1</sup>, Mohammad Jafarnejad<sup>1</sup>, Christopher D. Bertram<sup>2</sup>, David C. Zawieja<sup>3</sup>, J. Davis<sup>4</sup>, James E. Moore<sup>1</sup>, <sup>1</sup>Imperial College London, London, United Kingdom, <sup>2</sup>University of Sydney, New South Wales, Australia, <sup>3</sup>Texas A&M Health Science Center, Temple, TX, United States, <sup>4</sup>University of Missouri School of Medicine, Columbia, MO, United States

FRIDAY, JUNE 19

11:00am - 12:30pm

## PhD Competition - Biotransport and Simulation

Superior

Session Chair: Victor Varner, Princeton University, Princeton, NJ, United States

Session Co-Chair: Alisa Morss, Drexel University, Philadelphia, PA, United States

- 11:00AM Lymphatic Disease Phenotyping With Near-Infrared Imaging** SB<sup>3</sup>C2015-1104 pg.1171  
Tyler S. Nelson<sup>1</sup>, Michael J. Weiler<sup>1</sup>, Ira L. Savetsky<sup>2</sup>, Xiaolei Liu<sup>3</sup>, Babak J. Mehrara<sup>2</sup>, Hong Chen<sup>4</sup>, J. Brandon Dixon<sup>1</sup>, <sup>1</sup>Georgia Institute of Technology, Atlanta, GA, United States, <sup>2</sup>Memorial Sloan Kettering Cancer Center, New York, NY, United States, <sup>3</sup>St. Jude Children's Research Hospital, Memphis, TN, United States, <sup>4</sup>Oklahoma Medical Research Foundation, Oklahoma City, OK, United States

SCIENTIFIC SESSIONS

Friday

- 11:15AM Red Blood Cell Dynamic Deformability and Adhesion in Microscale Flow Determine Cellular Heterogeneity in Sickle Cell Disease** SB<sup>3</sup>C2015-504 pg.696  
**Yunus Alapan<sup>1</sup>**, Yumi Matsuyama<sup>1</sup>, Jane Little<sup>1,2</sup>, Umut A. Gurkan<sup>1,3</sup>, <sup>1</sup>Case Western Reserve University, Cleveland, OH, United States, <sup>2</sup>University Hospitals, Cleveland, OH, United States, <sup>3</sup>Louis Stokes Cleveland Veterans Affairs Medical Center, Cleveland, OH, United States
- 11:30AM Reduced Lymphatic Function Correlates With Disease Progression In a Novel Single Vessel Ligation Model of Lymphedema** SB<sup>3</sup>C2015-410 pg.529  
**Michael J. Weiler**, Tyler S. Nelson, J. Brandon Dixon, *Georgia Tech, Atlanta, GA, United States*
- 11:45AM Finite Element Modeling Of Active Transmembrane Cell Transport** SB<sup>3</sup>C2015-356 pg.433  
**Chieh Hou**, Kelly Terlizzi, Gerard A. Ateshian, *Columbia University, New York, NY, United States*
- 12:00PM Combined Experimental and Finite Element Analysis to Determine the Diffusion Coefficient Within and Between Human Skin Layers** SB<sup>3</sup>C2015-274 pg.303  
**Anne M. Römgens<sup>1</sup>**, Dan L. Bader<sup>1,2</sup>, Frank P. T. Baaijens<sup>1</sup>, Cees W. J. Oomens<sup>1</sup>, <sup>1</sup>Eindhoven University of Technology, Eindhoven, Netherlands, <sup>2</sup>University of Southampton, Southampton, United Kingdom
- 12:15PM CFD Simulation of Transition to Turbulence for Newtonian vs. Non-Newtonian Flow Through a Stenosis** SB<sup>3</sup>C2015-363 pg.445  
**M. Owais Khan<sup>1</sup>**, Kristian Valen-Sendstad<sup>1,2</sup>, Dipankar Biswas<sup>3</sup>, David M. Casey<sup>3</sup>, Francis Loth<sup>3</sup>, David Steinman<sup>1</sup>, <sup>1</sup>University of Toronto, Toronto, ON, Canada, <sup>2</sup>Simula Research Laboratory, Lysaker, Norway, <sup>3</sup>University of Akron, Akron, OH, United States

FRIDAY, JUNE 19

11:00am - 12:30pm

**PhD Competition - Cellular and Tissue Engineering**

**Wasatch**

**Session Chair:** Victor Lai, *University of Minnesota, Duluth, MN, United States*

**Session Co-Chair:** Colleen Witzenburg, *University of Virginia, Charlottesville, VA, United States*

- 11:00AM Interstitial Cell Migration in Dense Connective Tissues is Modulated by Matrix Microstructure and Micromechanics** SB<sup>3</sup>C2015-129 pg. 60  
**Feini Qu<sup>1,2</sup>**, Miltiadis H. Zgonis<sup>1,2</sup>, Robert L. Mauck<sup>1,2</sup>, <sup>1</sup>University of Pennsylvania, Philadelphia, PA, United States, <sup>2</sup>Philadelphia VA Medical Center, Philadelphia, PA, United States
- 11:15AM Cells Alter Traction Force and Orientation in Response to Long-term Cyclic Stretch** SB<sup>3</sup>C2015-461 pg.624  
**Heather A. Cirka**, Qi Wen, Kristen L. Billiar, *Worcester Polytechnic Institute, Worcester, MA, United States*
- 11:30AM Dedifferentiation of Chondrocytes Influences Strain Transfer Measured by Deformable Image Registration** SB<sup>3</sup>C2015-561 pg.803  
**Jonathan T. Henderson<sup>1</sup>**, Benjamin Seelbinder<sup>1</sup>, Alexander Veress<sup>2</sup>, Corey Neu<sup>1</sup>, <sup>1</sup>Purdue University, West Lafayette, IN, United States, <sup>2</sup>University of Washington, Seattle, WA, United States
- 11:45AM An Active Contraction Model Of Valvular Interstitial Cells** SB<sup>3</sup>C2015-614 pg.901  
**Yusuke Sakamoto**, Michael Sacks, *The University of Texas at Austin, Austin, TX, United States*
- 12:00PM A Predictive 3D High-Content/High Throughput Screening Platform to Elucidate and Enhance Multilineage Stem Cell Differentiation** SB<sup>3</sup>C2015-601 pg.877  
**Amit Paul**, Bo Chen, Elise DeBruyn, Michael Cho, *University of Illinois at Chicago, Chicago, IL, United States*
- 12:15PM In Vitro Growth Trajectory And In Vivo Implantation Of Cell-seeded Disc-like Angle Ply Structures For Total Disc Replacement** SB<sup>3</sup>C2015-131 pg.64  
**John T. Martin<sup>1,2</sup>**, Dong Hwa Kim<sup>1,2</sup>, Kensuke Ikuta<sup>1,2</sup>, Christian G. Pfeifer<sup>1,2</sup>, Lachlan J. Smith<sup>1,2</sup>, Dawn M. Elliott<sup>3</sup>, Harvey E. Smith<sup>1,2</sup>, Robert L. Mauck<sup>1,2</sup>, <sup>1</sup>University of Pennsylvania, Philadelphia, PA, United States, <sup>2</sup>Philadelphia VA Medical Center, Philadelphia, PA, United States, <sup>3</sup>University of Delaware, Newark, DE, United States

FRIDAY, JUNE 19

11:00am - 12:30pm

**PhD Competition - Mechanics and Rehabilitation****Magpie****Session Chair:** Bradley Davidson, *University of Denver, Denver, CO, United States***Session Co-Chair:** Darryl Thelen, *University of Wisconsin-Madison, Madison, WI, United States*

- 11:00AM Blocking Blood-Spinal Cord Barrier Breakdown Prevents the Development of Pain Following Nerve Root Compression Injury** SB<sup>3</sup>C2015-319 pg.379  
Jenell Smith, Paul Janmey, Beth Winkelstein, *University of Pennsylvania, Philadelphia, PA, United States*
- 11:15AM Defining Collagen Fiber Mechanics in Neuron-Collagen Constructs Under Stretch Using Integrated Experimental & Modeling Approaches** SB<sup>3</sup>C2015-281 pg.315  
Sijia Zhang, Xuan Cao, Vivek Shenoy, Beth Winkelstein, *University of Pennsylvania, Philadelphia, PA, United States*
- 11:30AM Redistribution of Knee Loads Using Auditory Feedback from Pressure Detecting Shoe Insoles** SB<sup>3</sup>C2015-245 pg.261  
Christopher F. Ferrigno, Ina S. Stoller, Laura E. Thorp, Najia Shakoor, Markus M. Wimmer, *Rush University, Chicago, IL, United States*
- 11:45AM Pre-Clinical Assessment of a Percutaneous Leaflet Resection Device for Treatment of Degenerative Mitral Valve Disease** SB<sup>3</sup>C2015-559 pg.799  
Steven Boronyak, Brett Byram, Joseph Fredi, Michael Young, W. David Merryman, *Vanderbilt University, Nashville, TN, United States*
- 12:00PM Subject-specific Calibration Of Geometric Neuromusculoskeletal Models** SB<sup>3</sup>C2015-585 pg.849  
Andrew J. Meyer, Carolyn Patten, Benjamin J. Fregly, *University of Florida, Gainesville, FL, United States*
- 12:15PM In-Vivo Dynamic Measurement of Tibiotalar and Subtalar Joint Kinematics Using Dual Fluoroscopy: A Framework for Studying OA.** SB<sup>3</sup>C2015-527 pg.739  
Koren E. Roach, Bibo Wang, Ashley L. Kapron, Niccolo M. Fiorentino, Charles L. Saltzman, Madeline Singer, Andrew E. Anderson, *University of Utah, Salt Lake City, UT, United States*

FRIDAY, JUNE 19

11:00am - 12:30pm

**PhD Competition - Characterization of Tissue Mechanics****Maybird****Session Chair:** Sarah Kieweg, *University of Kansas, Lawrence, KS, United States***Session Co-Chair:** Ian A. Sigal, *University of Pittsburgh, Pittsburgh, PA, United States*

- 11:00AM Regional Contraction Shapes the Three-Dimensional Morphogenesis of the Embryonic Forebrain** SB<sup>3</sup>C2015-1030 pg.1036  
Kara E. Garcia, Philip V. Bayly, Larry A. Taber, *Washington University in St. Louis, St. Louis, MO, United States*
- 11:15AM The Dynamic Mechanical Response is Severely Altered in Collagen V Deficient Mouse Supraspinatus Tendons** SB<sup>3</sup>C2015-104 pg.24  
Brienne K. Connizzo<sup>1</sup>, Mei Sun<sup>2</sup>, David E. Birk<sup>2</sup>, Louis J. Soslowsky<sup>1</sup>, <sup>1</sup>*University of Pennsylvania, Philadelphia, PA, United States*, <sup>2</sup>*University of South Florida, Tampa, FL, United States*
- 11:30AM Evidence that Interfibrillar Load Transfer in Tendon is Supported by a Network of Small Diameter Collagen Fibrils** SB<sup>3</sup>C2015-132 pg.66  
Spencer E. Szczesny<sup>1</sup>, Kristen L. Fetchko<sup>2</sup>, Jeffrey L. Caplan<sup>3</sup>, Pal Pedersen<sup>4</sup>, Dawn M. Elliott<sup>2</sup>, <sup>1</sup>*University of Pennsylvania, Philadelphia, PA, United States*, <sup>2</sup>*University of Delaware, Newark, DE, United States*, <sup>3</sup>*Delaware Biotechnology Institute, Newark, DE, United States*, <sup>4</sup>*Carl Zeiss Microscopy, Thornwood, NY, United States*
- 11:45AM 3D Strains in Posterior Sclera Using Ultrasound Speckle Tracking** SB<sup>3</sup>C2015-515 pg.716  
Elias R. Pavlatos, Benjamin Cruz-Perez, Hugh J. Morris, Hong Chen, Richard T. Hart, Jun Liu, *The Ohio State University, Columbus, OH, United States*
- 12:00PM The Collagen Directionality and Dispersion and Mechanical Indentation Response in Nonpregnant Human Cervical Tissue** SB<sup>3</sup>C2015-1090 pg.1144  
Wang Yao<sup>1</sup>, Yu Gan<sup>1</sup>, Christine Hendon<sup>1</sup>, Joy Vink<sup>2</sup>, Ronald Wapner<sup>2</sup>, Kristin Myers<sup>1</sup>, <sup>1</sup>*Columbia University, New York, NY, United States*, <sup>2</sup>*Columbia University Medical Center, New York, NY, United States*



## SCIENTIFIC SESSIONS

Friday

- 12:15PM Tribological Rehydration: Maintaining and Rebuilding Interstitial Fluid Pressure in Cartilage** SB<sup>3</sup>C2015-133 pg.68  
Axel C. Moore, David L. Burris, *University of Delaware, Newark, DE, United States*

FRIDAY, JUNE 19

11:00am - 12:30pm

## Undergraduate Design Competition

## Golden Cliff / Eagle's Nest

**Session Co-Chair: Martin L. Tanaka**, *Western Carolina University, Cullowhee, NC, United States*  
**Session Co-Chair: Sara Roccabianca**, *Michigan State University, East Lansing, MI, United States*

- 11:00AM BioView: A Wearable Sensor Array For Rehabilitation Biofeedback** SB<sup>3</sup>C2015-1420 pg.1329  
Tyler Maydew, Brett Donnermeyer, Kathryn Thompson, Alwyn Johnson, Bradley Davidson, *University of Denver, Denver, CO, United States*
- 11:15AM The Tension Assisted Device: An Orthotic Alternative to High Tone Plantar Flexion** SB<sup>3</sup>C2015-298 pg. 343  
Ron V. Perrone, Elizabeth Duncan, Cory Jeanes, Mike Martorano, Gary Bowlin, John Williams, Susan Anderson, *University of Memphis, Memphis, TN, United States*
- 11:30AM DermaShift: Diagnostic Device For Pressure Ulcer Formation** SB<sup>3</sup>C2015-1421 pg.1331  
Francisca Acosta<sup>1</sup>, Hope Atina<sup>1</sup>, Kim Le<sup>1</sup>, Andrea Pinto<sup>1</sup>, William Wilson<sup>1</sup>, Erice Richardson<sup>1</sup>, Catherine Ambrose<sup>2</sup>, Lex Frieden<sup>2</sup>, *<sup>1</sup>Rice University, Houston, TX, United States, <sup>2</sup>Texas Health Science Center, Houston, TX, United States*
- 11:45AM Smartboot: An Instrumented Clinical Walking Boot for Partial Weight Bearing Training** SB<sup>3</sup>C2015-328 pg.395  
Dustyn Roberts, Tim West, Michael Schenk, David Schnall, Margaret O'Brien, Melissa Groome, Brian Knarr, Jill Higginson, Anita Singh, *University of Delaware, Newark, DE, United States*
- 12:00PM Soft Ankle-foot Orthotic** SB<sup>3</sup>C2015-187 pg.160  
Adam Podolec, Megan Erhart, Noah Schadt, Geni Giannotti, Jared Green, Tyler Leichenberger, *Rochester Institute of Technology, Rochester, NY, United States*
- 12:15PM Design of a Low-cost Haptic Assistive Handwriting Device** SB<sup>3</sup>C2015-225 pg.226  
Eamon Campolettano, Alexander Croft, Kevin Fasano, Stephen Hodge, Kevin Myers, Brian Pinkard, Jessica Ross, Allison Scoular, Thomas S. Todd, Alexander A. Brown, *Lafayette College, Easton, PA, United States*

FRIDAY, JUNE 19

11:00am - 12:30pm

## PhD Competition - Mechanics of Injury and Repair

## Primrose B

**Session Chair: Ramesh Ragupathy**, *Drexel University, Philadelphia, PA, United States*  
**Session Co-Chair: Corey Neu**, *Purdue University, West Lafayette, IN, United States*

- 11:00AM Thermoresponsive, Redox-crosslinked Cellulosic Hydrogels Undergo In Situ Gelation And Restore Nucleus Pulposus Biomechanical Properties Post Nucleotomy** SB<sup>3</sup>C2015-263 pg.287  
Devika M. Varma<sup>1</sup>, Huizi A. Lin<sup>1</sup>, Rose G. Long<sup>2</sup>, Carine Rognon<sup>3</sup>, Andrew C. Hecht<sup>2</sup>, James C. Iatridis<sup>2</sup>, Steven B. Nicoll<sup>1</sup>, *<sup>1</sup>The City College of New York, CUNY, New York, NY, United States, <sup>2</sup>Icahn School of Medicine at Mount Sinai, New York, NY, United States, <sup>3</sup>Swiss Federal Institute of Technology of Zurich (ETHZ), Zurich, Switzerland*
- 11:15AM A Multigenerational Collagen Damage Model Explains Engineered Cartilage Growth and Remodeling Phenomena** SB<sup>3</sup>C2015-642 pg.953  
Robert J. Nims, Alexander D. Cigan, Brian K. Jones, Krista M. Durney, Clark T. Hung, Gerard A. Ateshian, *Columbia University, New York, NY, United States*
- 11:30AM Influence of Intracortical Porosity on the Fracture Susceptibility of Human Cortical Bone** SB<sup>3</sup>C2015-672 pg.1009  
Andrew P. Baumann, Travis L. Turnbull, Glen L. Niebur, Ryan K. Roeder, *University of Notre Dame, Notre Dame, IN, United States*
- 11:45AM Effective Remodeling in Cerebral Aneurysm: a Case Study** SB<sup>3</sup>C2015-1159 pg.1271  
Xinjie Duan<sup>1</sup>, Bong Jae Chung<sup>2</sup>, Juan R. Cebal<sup>2</sup>, Khaled Aziz<sup>3</sup>, Anne M. Robertson<sup>1</sup>, *<sup>1</sup>University of Pittsburgh, Pittsburgh, PA, United States, <sup>2</sup>George Mason University, Fairfax, VA, United States, <sup>3</sup>Allegheny General Hospital, Pittsburgh, PA, United States*

- 12:00PM Cartilage Wear Initiated by Fatigue Damage Under Physiologic Loading when Fluid Load Support and Boundary Lubrication are Compromised** SB<sup>3</sup>C2015-1160 pg.1273  
**Krista M. Durney**, Sevan R. Oungouljian, Brian K. Jones, Jason T. Suh, Clark T. Hung, Gerard A. Ateshian, *Columbia University, New York, NY, United States*
- 12:15PM Cornea Damage Progression following Blast Exposure** SB<sup>3</sup>C2015-1169 pg.1289  
**Dan F. Shedd**<sup>1</sup>, Justin A. Jones<sup>1</sup>, Brian Zaugg<sup>2</sup>, Brittany Coats<sup>1</sup>, <sup>1</sup>*University of Utah, Salt Lake City, UT, United States*, <sup>2</sup>*John A. Moran Eye Center, Salt Lake City, UT, United States*

FRIDAY, JUNE 19

12:30pm - 3:00pm

## Poster Session II

## Thermal Effects and Nanoparticles

## Event Center Tent

- 170 **Determination of the Biophysical Parameters of HUVECs and Their Application in Optimization of the Addition and Removal of Cryoprotective Agents** SB<sup>3</sup>C2015-434 pg.578  
**Yuntian Zhang**, Dan Niu, Gang Zhao, *University of Science and Technology of China, Hefei, China*
- 171 **Nonlinear Derating of High-Intensity Focused Ultrasound using Hydrophone Measurements in Water** SB<sup>3</sup>C2015-542  
**Seyed Ahmad Reza Dibaji**<sup>1</sup>, Yunbo Liu<sup>2</sup>, Joshua E. Soneson<sup>2</sup>, Rupak K. Banerjee<sup>1</sup>, Matthew R. Myers<sup>2</sup>, <sup>1</sup>*University of Cincinnati, Cincinnati, OH, United States*, <sup>2</sup>*US Food and Drug Administration, Silver Spring, MD, United States* pg.768
- 172 **Effect of Hydroxyapatite Nanoparticles on Cryopreservation of HUVECs** SB<sup>3</sup>C2015-427 pg.563  
 Yuanyuan Zheng, Jianye Wang, **Gang Zhao**, Tao Wang, *University of Science and Technology of China, Hefei, China*
- 173 **Feasibility of Utilizing Thermal Images for Melanoma Screening** SB<sup>3</sup>C2015-126 pg.54  
 Alexander LeBrun, **Liang Zhu**, *University of Maryland Baltimore County, Baltimore, MD, United States*
- 174 **Application Of Mesoporous Silica Nanoparticle At Drug Delivery System** SB<sup>3</sup>C2015-1372 pg.1327  
**M. Titirili**, Sevil Yücel, B. Karakuzu, Y. Basarab, *Yildiz Technical University, Istanbul, Turkey*

FRIDAY, JUNE 19

12:30pm - 3:00pm

## Poster Session II

## Transport at the Cell and Tissue Level

## Event Center Tent

- 176 **Cancer-Associated Fibroblasts Promote Vascularization in Collagen and Fibrin Matrices** SB<sup>3</sup>C2015-199 pg.182  
**M.K. Sewell-Loftin**, Samantha van Hove, Gregory Longmore, Steven George, *Washington University in St. Louis, St. Louis, MO, United States*
- 177 **Insights Into the Hemodynamic Factors Affecting Embolus Transport for Stroke** SB<sup>3</sup>C2015-584 pg.847  
**Debanjan Mukherjee**, Shawn C. Shadden, *U.C. Berkeley, Berkeley, CA, United States*
- 178 **A Peristaltic Mechanism For Clearance Of Solutes In Periarterial Basement Membranes** SB<sup>3</sup>C2015-391 pg. 491  
**M Keith Sharp**<sup>1</sup>, Alexandra Keith Diem<sup>2</sup>, Roy O. Weller<sup>2</sup>, Roxana O. Carare<sup>3</sup>, <sup>1</sup>*University of Louisville, Louisville, KY, United States*, <sup>2</sup>*University of Southampton, Southampton, United Kingdom*, <sup>3</sup>*University of Southampton, Southampton, United Kingdom*
- 179 **Trapping of Tumor Cells Using Rapid Electrokinetic Patterning (REP)** SB<sup>3</sup>C2015-163 pg.114  
**Katherine N. Clayton**, Seungman Park, Steven Wereley, Bumsoo Han, *Purdue University, West Lafayette, IN, United States*
- 180 **Visco-Hyperelastic and Biphasic Properties of a Brain Phantom Agarose Gel** SB<sup>3</sup>C2015-114 pg.38  
 Gerson Cordoba<sup>1</sup>, Gustavo Orozco<sup>1</sup>, **Fernando Casanova**<sup>1</sup>, Joshua H. Smith<sup>2</sup>, Jose J. Garcia<sup>1</sup>, <sup>1</sup>*Universidad del Valle, Cali, Colombia*, <sup>2</sup>*Lafayette College, Easton, PA, United States*

FRIDAY, JUNE 19

12:30pm - 3:00pm

## Poster Session II

## Design, Dynamics and Rehab

## Event Center Tent

- 181 **The Effect Of Bone Defect Size And Position On Cementless Acetabular Cup Stability : A Finite Element Analysis** SB<sup>3</sup>C2015-1091 pg.1146  
Mark H. Gonzalez, Farid Amirouche, Gianfranco Solitro, *University of Illinois at Chicago, Chicago, IL, United States*
- 182 **Simulation-Based Design of a Hip Actuator for Running a Mile Sprint** SB<sup>3</sup>C2015-641 pg. 951  
John R. Rogers, Julie E. Dillon, Cameron I. McDonald, Gabriela C. Barrera-Gutierrez, *United States Military Academy, West Point, NY, United States*
- 183 **Comparison of Human Walking Backward and Forward Using Optimization Method** SB<sup>3</sup>C2015-351 pg.429  
Yujang Xiang<sup>1</sup>, Hyun-Jung Kwon<sup>2</sup>, <sup>1</sup>*University of Alaska Fairbanks, Fairbanks, AK, United States*, <sup>2</sup>*The Ohio State University, Columbus, OH, United States*
- 184 **Beginning Braille Learning Device** SB<sup>3</sup>C2015-252 pg.273  
Kelton Gubler, Jason Castillo, Adam Daly, Austin Eastman, Kay B. Freckleton, Andrew Silotti, *University of Utah, Salt Lake City, UT, United States*
- 185 **Ocular Bobbing Compensation System** SB<sup>3</sup>C2015-3803 pg.1335  
Yucong Gu, Yuchen Yan, You Chen, Tai Kim, Ken Fischer, *University of Kansas, Lawrence, KS, United States*
- 186 **A Bioengineering Solution To Cure Spinal Cord Injury** SB<sup>3</sup>C2015-1161 pg.1275  
Anita Singh<sup>1</sup>, Jacklyn Witko<sup>1</sup>, Brittany King<sup>1</sup>, Alexander Herman<sup>1</sup>, Andrea Vernengo<sup>1</sup>, Babitha Tom<sup>2</sup>, <sup>1</sup>*Rowan University, Glassboro, NJ, United States*, <sup>2</sup>*Widener University, Chester, PA, United States*
- 187 **High Performance Luxury 4WD (or All Terrain) Wheel Chair** SB<sup>3</sup>C2015-3731 pg.1333  
Jason McCurry, Philip Stykes, Alex Wilfong, Martin Tanaka, *Western Carolina University, Cullowhee, NC, United States*
- 188 **Dynamic Balance Using The COM And COP Inclination Angle During A Golf Swing** SB<sup>3</sup>C2015-22 pg.1  
Ahnryul Choi<sup>1</sup>, Joung Hwan Mun<sup>2</sup>, <sup>1</sup>*The University of Texas Health Science Center at Houston, Houston, TX, United States*, <sup>2</sup>*Sungkyunkwan University, Suwon, Korea, Republic of*

FRIDAY, JUNE 19

12:30pm - 3:00pm

## Poster Session II

## Fluid Mechanics of Atherosclerosis and Aneurysms

## Event Center Tent

- 189 **FSI Simulations for the Hemodynamic Assessment of the Carotid Bifurcation in an Atherosclerotic Mouse Model** SB<sup>3</sup>C2015-528 pg.741  
David De Wilde<sup>1</sup>, Bram Trachet<sup>1,2</sup>, Nic Debusschere<sup>1</sup>, Francesco Iannaccone<sup>1</sup>, Abigail Swillens<sup>1</sup>, Joris Degroote<sup>1</sup>, Jan Vierendeels<sup>1</sup>, Guido R. Y. De Meyer<sup>3</sup>, Patrick Segers<sup>1</sup>, <sup>1</sup>*Ghent University, Gent, Belgium*, <sup>2</sup>*Ecole Polytechnique Fédérale de Lausanne, Lausanne, Switzerland*, <sup>3</sup>*University of Antwerp, Wilrijk, Belgium*
- 190 **Integrating Morphologic, Biomechanic, Biological And Clinical Risk Factors To Improve Decision Making In The Management Of Abdominal Aortic Aneurysm Disease** SB<sup>3</sup>C2015-454 pg.616  
Eleni Metaxa<sup>1</sup>, Nikolaos Kontopodis<sup>2</sup>, Christos V. Ioannou<sup>2</sup>, Yannis Papaharilaou<sup>1</sup>, <sup>1</sup>*FORTH, Heraklion, Greece*, <sup>2</sup>*University of Crete, Heraklion, Greece*
- 191 **Biomechanical Response And Fiber Microstructure Coupled With Localized Protease Activity And Inhibition In The Angiotensin II Infused ApoE<sup>-/-</sup> Mouse Model Of Aneurysm** SB<sup>3</sup>C2015-188 pg.162  
Darren G. Haskett<sup>1</sup>, Tyler S. Smith<sup>1</sup>, D. Catalina Ardilia<sup>1</sup>, Tom C. Doetschman<sup>1</sup>, Oliver J. McIntyre<sup>2</sup>, Dominic V. McGrath<sup>1</sup>, Urs Utzinger<sup>1</sup>, Jonathan P. Vande Geest<sup>1</sup>, <sup>1</sup>*University of Arizona, Tucson, AZ, United States*, <sup>2</sup>*Vanderbilt University, Nashville, TN, United States*
- 192 **Geometric and Hemodynamics Implications of Moyamoya Disease on Carotid Siphon** SB<sup>3</sup>C2015-264 pg.289  
Muhammad Jamil<sup>1</sup>, Mehnaz Haq<sup>1</sup>, Heidi Kang<sup>2</sup>, Zhi Rui Lee<sup>2</sup>, Phua Hwee Tang<sup>3</sup>, Choon Hwai Yap<sup>1</sup>, <sup>1</sup>*National University of Singapore, Singapore*, <sup>2</sup>*Hwa Chong Institution, Singapore*, <sup>3</sup>*KKH Women's and Children's Hospital, Singapore*



- 193 **Coherent Wall Shear Stress Structures Determine the Near Wall Transport in Aneurysms.** SB<sup>3</sup>C2015-423 pg.555  
Amirhossein Arzani<sup>1</sup>, Guoning Chen<sup>2</sup>, Alberto M. Gambaruto<sup>3</sup>, Shawn C. Shadden<sup>1</sup>, <sup>1</sup>University of California, Berkeley, Berkeley, CA, United States, <sup>2</sup>University of Houston, Houston, TX, United States, <sup>3</sup>Barcelona Supercomputing Center, Barcelona, Spain
- 194 **RhoA Mediated Effects of Statin Therapy on Endothelial Cells: A Comparison to Fasudil and Latrunculin A**  
SB<sup>3</sup>C2015-538 pg.760  
Melissa L. Dick<sup>1,2</sup>, Katherine N. MacDonald<sup>1</sup>, Jean-Claude Tardif<sup>2</sup>, Richard L. Leask<sup>1,2</sup>, <sup>1</sup>McGill University, Montreal, QC, Canada, <sup>2</sup>Montreal Heart Institute, Montreal, QC, Canada
- 195 **In Vitro And Computational Fluid Dynamics Comparison Of The Flow Diversion Efficacy Of Five Commercial Stents**  
SB<sup>3</sup>C2015-636 pg.941  
Ronak J. Dholakia<sup>1</sup>, Andrew Pagano<sup>1</sup>, Fotis Drakopoulos<sup>2</sup>, Ari Kappel<sup>1</sup>, Chander Sadasivan<sup>1</sup>, Xiangmin Jiao<sup>1</sup>, David J. Fiorella<sup>1</sup>, Nikos Chrisochoides<sup>2</sup>, Henry H. Woo<sup>1</sup>, Baruch B. Lieber<sup>1</sup>, <sup>1</sup>Stony Brook University, Stony Brook, NY, United States, <sup>2</sup>Old Dominion University, Norfolk, VA, United States
- 196 **Effect of Red Blood Cells on Endothelial Cell Shear Stress Studied Using Discrete-Nature Blood Flow Simulations**  
SB<sup>3</sup>C2015-1024 pg.1026  
Brenna E. Hogan<sup>1</sup>, Zaiyi Shen<sup>2</sup>, Chaouqi Misbah<sup>2</sup>, Abdul Barakat<sup>1</sup>, <sup>1</sup>Ecole Polytechnique, Palaiseau Cedex, France, <sup>2</sup>Universite Joseph Fourier, Grenoble, France
- 197 **FRED versus Pipeline: An In-vitro Comparison of Cerebral Aneurysm Hemodynamics Using Particle Image Velocimetry** SB<sup>3</sup>C2015-1108 pg.1179  
Priya Nair<sup>1</sup>, Brian W. Chong<sup>2</sup>, Haithem Babiker<sup>1</sup>, Justin Ryan<sup>1</sup>, L. Fernando Gonzalez<sup>3</sup>, David Frakes<sup>1</sup>, <sup>1</sup>Arizona State University, Tempe, AZ, United States, <sup>2</sup>Mayo Clinic Hospital, Phoenix, AZ, United States, <sup>3</sup>Duke University School of Medicine, Durham, NC, United States
- 198 **In Vitro Validation of Endovascular Doppler-derived Flow Rates in Cerebral Vessels** SB<sup>3</sup>C2015-526 pg.737  
Patrick McGah, John Nerva, Ryan Morton, Michael Barbour, Pierre Mourad, Michael Levitt, Louis Kim, Alberto Aliseda, University of Washington, Seattle, WA, United States
- 199 **The Role of the Glycocalyx in Leukocyte Adhesion to the Endothelium** SB<sup>3</sup>C2015-612 pg. 897  
Karli K. McDonald, Scott E. Cooper, Richard L. Leask, McGill University, Montreal, QC, Canada
- 200 **Validation Of CFD Solver Of A Clinical Tool Using PIV On A Patient-Specific Intracranial Aneurysm.** SB<sup>3</sup>C2015-623  
Nikhil Paliwal, Christopher Martensen, Nicole Varble, Robert Damiano, Adnan Siddiqui, Elad Levy, Jianping Xiang, Hui Meng, University at Buffalo, State University of New York, Buffalo, NY, United States pg.915
- 201 **The Quantification of Blood Flow Patterns Induced by Endovascular Stent Grafts Using a Non-Newtonian Blood Analog** SB<sup>3</sup>C2015-637 pg.943  
Amanda Colella Centazzo, Clifton R. Johnston, Dalhousie University, Halifax, NS, Canada

FRIDAY, JUNE 19

12:30pm - 3:00pm

Poster Session II

Heart Valves, Mechanical Circulatory Support,  
Thrombosis, and Hemolysis

Event Center Tent

- 202 **Modulation of Platelet Microtubule Function Alters Platelet Stiffness and Mechanotransductive Responsiveness to Shear Stress** SB<sup>3</sup>C2015-1036 pg.1046  
Siu Ling Leung<sup>1</sup>, Yi Lu<sup>1</sup>, Danny Bluestein<sup>2</sup>, Marvin J. Slepian<sup>1,2</sup>, <sup>1</sup>the University of Arizona, Tucson, AZ, United States, <sup>2</sup>Stony Brook University, Stony Brook, NY, United States
- 203 **Convective Leakage Makes Heparin Locking of Central Venous Catheters Ineffective within Seconds: Experimental Measurements in an In Vitro Model of the Pediatric Superior Vena Cava** SB<sup>3</sup>C2015-1042 pg.1058  
Alberto Aliseda<sup>1</sup>, Michael Barbour<sup>1</sup>, Patrick M. McGah<sup>1</sup>, Kurt R. Sansom<sup>1</sup>, Kenneth Gow<sup>2</sup>, <sup>1</sup>University of Washington, Seattle, WA, United States, <sup>2</sup>Seattle Children's Hospital, Seattle, WA, United States
- 204 **Aortic Flow Waveform Shape Regulates Valvular Hemodynamics And Energy Losses** SB<sup>3</sup>C2015-1063 pg.1096  
Brandon L. Moore, Lakshmi P. Dasi, Colorado State University, Fort Collins, CO, United States

SCIENTIFIC SESSIONS

Friday

- 205 **Analyzing The Effect Of Stent Geometry For Polymeric Aortic Valves** SB<sup>3</sup>C2015-1071 pg.1110  
Atieh Yousefi Koupaei, Brandon L. Moore, David L. Bark Jr., David Prawel, Lakshmi P. Dasi, Colorado State University, Fort Collins, CO, United States
- 206 **Mathematical Modeling of Thrombus Formation in Idealized Models of Aortic Dissection** SB<sup>3</sup>C2015-170 pg.126  
Claudia Menichini, Xiao Y. Xu, Imperial College London, London, United Kingdom
- 207 **Characterizing The Inflammatory And Coagulation Response To Trauma And Resuscitation** SB<sup>3</sup>C2015-579 pg.837  
Elaheh Rahbar<sup>1</sup>, Jessica C. Cardenas<sup>2</sup>, Nena Matijevic<sup>2</sup>, Deborah J. del Junco<sup>2</sup>, Jeanette M. Podbielski<sup>2</sup>, Mitchell J. Cohen<sup>3</sup>, Bryan A. Cotton<sup>2</sup>, John B. Holcomb<sup>2</sup>, Charles E. Wade<sup>2</sup>, <sup>1</sup>Wake Forest University, Winston-Salem, NC, United States, <sup>2</sup>University of Texas Health Science Center, Houston, TX, United States, <sup>3</sup>University of California San Francisco, San Francisco, CA, United States
- 208 **Valve Interstitial Cell Shape Regulates Cell Function And Phenotype.** SB<sup>3</sup>C2015-619 pg.909  
Atefeh Razavi, Rachel Reynolds, Kartik Balachandran, University of Arkansas, Fayetteville, AR, United States
- 209 **Aortic Valve Calcification: Geometric And Biomechanical Analysis** SB<sup>3</sup>C2015-1055 pg.1084  
Banafsheh Zebhi<sup>1</sup>, Brandon L. Moore<sup>1</sup>, Gary Luckasen<sup>2</sup>, Lakshmi P. Dasi<sup>1</sup>, <sup>1</sup>Colorado State University, Fort Collins, CO, United States, <sup>2</sup>Medical Center of Rockies, Loveland, CO, United States
- 211 **Effect Of Assymetric Deployment On The Function And Leaflet Mechanics Of Bioprosthetic TAVI Valves** SB<sup>3</sup>C2015-524 pg.733  
Michael B. Gogarty<sup>1</sup>, Pablo Maureira<sup>2</sup>, Lakshmi P. Dasi<sup>1</sup>, <sup>1</sup>Colorado State University, Fort Collins, CO, United States, <sup>2</sup>Lorraine University Hospital of Nancy, Nancy, France
- 212 **Vascular Compliance Effect On Endothelial-to-mesenchymal Transdifferentiation Under Highly Pulsatile Fluid Shear** SB<sup>3</sup>C2015-1111 pg.1185  
Winston H. Elliott<sup>1</sup>, Yan Tan<sup>2</sup>, Nancy Tseng<sup>2</sup>, Wei Tan<sup>1,2</sup>, <sup>1</sup>University of Colorado- Boulder, Boulder, CO, United States, <sup>2</sup>University of Colorado- Denver, Denver, CO, United States
- 213 **Intimal Hyperplasia and its Implications in the Cephalic Arch: A Numerical Study of Non-Physiological Hemodynamics in Patients with Brachiocephalic Fistulae** SB<sup>3</sup>C2015-315 pg. 373  
Seyed Mohammad Javid Mahmoudzadeh Akherat<sup>1</sup>, Michael E. Boghosian<sup>1</sup>, Kevin W. Cassel<sup>1</sup>, Mary S. Hammes<sup>2</sup>, <sup>1</sup>Illinois Institute of Technology, Chicago, IL, United States, <sup>2</sup>University of Chicago, Chicago, IL, United States
- 214 **In Vitro Pulsatile Flow Loop Using Human Blood To Mimic Physiological Flow Conditions** SB<sup>3</sup>C2015-664 pg.995  
Ryan W. Oba, David Bark, Ketul Popat, Lakshmi P. D. Dasi, Colorado State University, Fort Collins, CO, United States

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Poster Session II

Respiratory and Cerebrospinal Fluid Motion

Event Center Tent

- 215 **Effects of Inhalation Transience on Flow Structures During Numerical Simulation of Airflow Through a CT-based Airway Geometry** SB<sup>3</sup>C2015-649 pg.965  
Richard R. Gruetzmacher, The University of Tennessee at Chattanooga, Chattanooga, TN, United States
- 216 **Bariatric Surgery Improvements For OSA Patients** SB<sup>3</sup>C2015-151 pg.92  
Ahmed M. Al-Jumaily, Auckland University of Technology, Auckland, New Zealand
- 217 **Acoustic Detection of Respiratory Sounds in Silicone Lung Airway Model Using Microphone Array System** SB<sup>3</sup>C2015-360 pg.439  
Gabriel Pramudita Saputra<sup>1</sup>, Kazunori Nozaki<sup>2</sup>, Satoshi Ii<sup>1</sup>, Chizu Habukawa<sup>1,3</sup>, Shigeo Wada<sup>1</sup>, <sup>1</sup>Osaka University, Toyonaka, Osaka, Japan, <sup>2</sup>Osaka University Dental Hospital, Suita, Osaka, Japan, <sup>3</sup>Minami Wakayama Medical Center, Tanabe, Wakayama, Japan
- 218 **Pressure Modulation Improves OSA Patient Therapy** SB<sup>3</sup>C2015-246 pg.263  
Ahmed M. Al-Jumaily, Auckland University of Technology, Auckland, New Zealand

- 219 **Multicenter Comparison Of 4D Phase Contrast MRI Measurement Of Cerebrospinal Fluid Dynamics In The Cervical Spine** SB<sup>3</sup>C2015-583 pg.845  
**Suraj Thyagaraj**<sup>1</sup>, Daniel Giese<sup>2</sup>, Francesco Santini<sup>3</sup>, Eleonora Fornari<sup>4</sup>, Alexander C. Bunck<sup>2</sup>, Francis Loth<sup>1</sup>, Bryn A. Martin<sup>1</sup>, <sup>1</sup>University of Akron, Akron, OH, United States, <sup>2</sup>University of Cologne, Cologne, Germany, <sup>3</sup>University of Basel, Basel, Switzerland, <sup>4</sup>Lausanne University Hospital, Lausanne, Switzerland
- 220 **Integration Of A Spontaneous Respiratory Driver With Blood Gas Feedback Into Biogears, An Open-source, Whole-body Physiology Model** SB<sup>3</sup>C2015-327 pg.393  
**Yeshitila Gebremichael**, Rachel Clipp, Jeffrey Webb, Aaron Bray, Cameron Thames, Zack Swarm, Jennifer Carter, Jeremiah Heneghan, *Applied Research Associates, Inc., Raleigh, NC, United States*
- 221 **A Patient-Specific Computational Model to Characterize The Impact of Neural Tissue Motion on Cerebrospinal Fluid Dynamics at the Cervical-Medullary Junction** SB<sup>3</sup>C2015-166 pg.120  
**Soroush Heidari Pahlavian**<sup>1,2</sup>, Francis Loth<sup>1,2</sup>, Mark Luciano<sup>3</sup>, Bryn Martin<sup>1,2</sup>, <sup>1</sup>The University of Akron, Akron, OH, United States, <sup>2</sup>Conquer Chiari Research Center, Akron, OH, United States, <sup>3</sup>Cleveland Clinic Foundation, Cleveland, OH, United States
- 222 **Complexity Of The Cerebrospinal Fluid Flow In Patients Suffering From Chiari Malformation Type I - A Computational Study** SB<sup>3</sup>C2015-209 pg.200  
**Kartik Jain**<sup>1,2</sup>, Kent-Andre Mardal<sup>2,3</sup>, <sup>1</sup>University of Siegen, Siegen, Germany, <sup>2</sup>Simula Research Laboratory, Oslo, Norway, <sup>3</sup>University of Oslo, Oslo, Norway
- 223 **Peclet Number Of Ciliary Transport On The Surface Of The Tracheal Lumen** SB<sup>3</sup>C2015-157 pg.104  
Kouki Kiyota<sup>1</sup>, Hironori Ueno<sup>2</sup>, Keiko Numayama-Tsuruta<sup>1</sup>, Yohsuke Imai<sup>1</sup>, Takami Yamaguchi<sup>1</sup>, **Takuji Ishikawa**<sup>1</sup>, <sup>1</sup>Tohoku University, Sendai, Japan, <sup>2</sup>Aichi University of Education, Aichi, Japan

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Poster Session II

Musculoskeletal Soft Tissue Mechanics

Event Center Tent

- 224 **A Phenomenological Model to Describe The Viscoelastic Behavior in Multiple Loading** SB<sup>3</sup>C2015-440 pg.588  
**Behzad R. Babaei**, *Washington University in St. Louis, St. Louis, MO, United States*
- 225 **Effect of Osteoarthritis on the Mechanical Properties of Human Articular Cartilage** SB<sup>3</sup>C2015-509 pg.704  
**Blair E. Larson**, Kristine M. Fischenich, Kirk A. Kindsfater, Tammy L. Haut Donahue, *Colorado State University, Fort Collins, CO, United States*
- 226 **Conditioned Media from Degenerative Vertebral Discs Sensitizes Dorsal Root Ganglion Neurons to Heat Stimuli** SB<sup>3</sup>C2015-1040 pg.1054  
**Joshua D. Stover**<sup>1</sup>, Ibrahima Bah<sup>2</sup>, Alexander Kotelsky<sup>2</sup>, Mark R. Buckley<sup>2</sup>, Brandon Lawrence<sup>1</sup>, Robert Bowles<sup>1</sup>, <sup>1</sup>University of Utah, Salt Lake City, UT, United States, <sup>2</sup>University of Rochester, Rochester, NY, United States
- 227 **Inter and Intra Variation in the Tensile Properties of the Porcine Temporomandibular Joint Disc** SB<sup>3</sup>C2015-498 pg.684  
**Jesse Lowe**<sup>1</sup>, Alejandro Almarza<sup>1,2</sup>, <sup>1</sup>University of Pittsburgh, Pittsburgh, PA, United States, <sup>2</sup>McGowan Institute of Regenerative Medicine, Pittsburgh, PA, United States, <sup>3</sup>
- 228 **A Quantitative Evaluation of the Role of Cell Senescence in Intervertebral Disc Degeneration** SB<sup>3</sup>C2015-640 pg.949  
Shady Elmasry, Shihab Asfour, Juan Pablo de Rivero Vaccari, **Francesco Travascio**, *University of Miami, Coral Gables, FL, United States*
- 229 **Characterizing the Change in Ankle Constraint Following Grade II and III Sprains** SB<sup>3</sup>C2015-392 pg.493  
**Matthew H. Dickinson**, Ednah G. Louie, Bardiya Akhbari, William M. Eboch, Sami Shalhoub, Lorin P. Maletsky, *University of Kansas, Lawrence, KS, United States*
- 230 **Three-dimensional Strain Distribution In The Anterior Cruciate Ligament During Anterior Translation Of The Knee** SB<sup>3</sup>C2015-444 pg.596  
**Satoshi Yamakawa**<sup>1</sup>, Richard Debski<sup>2</sup>, Hiromichi Fujie<sup>1</sup>, <sup>1</sup>Tokyo Metropolitan University, Hino, Japan, <sup>2</sup>University of Pittsburgh, Pittsburgh, PA, United States



SCIENTIFIC SESSIONS

Friday

- 231 **A Finite Element Model to Evaluate the Role of the Medial Meniscotibial Attachment in Knee Biomechanics** SB<sup>3</sup>C2015-1153 pg.1261  
**Andrew J. Polk**, Ferris M. Pfeiffer, James L. Cook, James P. Stannard, Patrick A. Smith, *University of Missouri, Columbia, MO, United States*
- 232 **Characterization of Fatigue Failure in Bovine Meniscus.** SB<sup>3</sup>C2015-1187 pg.1317  
**Jeremy J. Creechley**<sup>1</sup>, Trevor J. Lujan<sup>2</sup>, <sup>1</sup>*Materials Science and Engineering, Boise State University, Boise, ID, United States*, <sup>2</sup>*Boise State University, Boise, ID, United States*
- 233 **Quantifying Skeletal Muscle Deformation in Three Dimensions** SB<sup>3</sup>C2015-666 pg.999  
**Elisabeth Jensen**, Kenton Kaufman, Duane Morrow, Joel Felmlee, *Mayo Clinic, Rochester, MN, United States*
- 234 **Treatment of Focal Cartilage Defects Using a Metal Implant: New Biomechanical Insights Using Finite Element Modeling** SB<sup>3</sup>C2015-361 pg.441  
**Ashley Heuijers**, Wouter Wilson, Keita Ito, Corinus C. van Donkelaar, *Eindhoven University of Technology, Eindhoven, Netherlands*
- 235 **Progressive Changes In Cervical Spine Intervertebral Disc Properties During Cyclic Compressive Fatigue Loading** SB<sup>3</sup>C2015-665 pg.997  
**Sagar Umale**<sup>1</sup>, Brian Stemper<sup>1,2</sup>, Mingxin Zheng<sup>3</sup>, Aidin Masoudi<sup>3</sup>, Daniel Fama<sup>1,2</sup>, Narayan Yoganandan<sup>1,2</sup>, Brian Snyder<sup>3,4,5</sup>, <sup>1</sup>*Medical College of Wisconsin, Milwaukee, WI, United States*, <sup>2</sup>*Clement J. Zablocki VA Medical Center, Milwaukee, WI, United States*, <sup>3</sup>*Beth Israel Deaconess Medical Centre, Boston, MA, United States*, <sup>4</sup>*Harvard Medical School, Boston, MA, United States*, <sup>5</sup>*Cerebral Palsy Clinic Children's Hospital, Boston, MA, United States*
- 236 **Structural Inhomogeneity Enhances Interstitial Fluid Pressurization in TMJ Condylar Cartilage** SB<sup>3</sup>C2015-1107 pg.1177  
**Brandon Zimmerman**<sup>1</sup>, Leonardo Ruggiero<sup>1,2</sup>, Miri Park<sup>1</sup>, Lin Han<sup>3</sup>, Liyun Wang<sup>1</sup>, David L. Burris<sup>1</sup>, Xin L. Lu<sup>1</sup>, <sup>1</sup>*University of Delaware, Newark, DE, United States*, <sup>2</sup>*Vrije Universiteit Brussel, Brussels, Belgium*, <sup>3</sup>*Drexel University, Philadelphia, PA, United States*
- 237 **A Model To Study Articular Cartilage Mechanical And Biological Responses To Rolling And Sliding Loads** SB<sup>3</sup>C2015-162 pg.112  
**Oliver R. Schätti**<sup>1,2,3</sup>, Luigi M. Gallo<sup>2</sup>, Peter A. Torzilli<sup>1</sup>, <sup>1</sup>*Laboratory for Soft Tissue Research, Hospital for Special Surgery, New York City, NY, United States*, <sup>2</sup>*Center for Dental Medicine, University of Zürich, Zürich, Switzerland*, <sup>3</sup>*Institute for Biomechanics, Swiss Federal Institute of Technology, ETH, Zürich, Switzerland*
- 238 **Ibuprofen Does Not Adversely Affect Supraspinatus Tendon Mechanical Adaptations in a Rat Model of Exercise** SB<sup>3</sup>C2015-269 pg.299  
**Sarah I. Rooney**, Rachel Baskin, Andrew F. Kuntz, Louis J. Soslowsky, *University of Pennsylvania, Philadelphia, PA, United States*
- 239 **Toward Understanding the Mechanisms by Which Microparticles Induce Synovial Inflammation in Osteoarthritis** SB<sup>3</sup>C2015-374 pg.463  
**Amy M. Silverstein**<sup>1</sup>, Robert M. Stefani<sup>1</sup>, Sevan R. Oungoulain<sup>1</sup>, Eric L. Tong<sup>1</sup>, Mukundan G. Attur<sup>2</sup>, Steven B. Abramson<sup>2</sup>, Christopher S. Ahmad<sup>1</sup>, James L. Cook<sup>3</sup>, Gerard A. Ateshian<sup>1</sup>, J. Chloe Bulinski<sup>1</sup>, Clark T. Hung<sup>1</sup>, <sup>1</sup>*Columbia University, New York, NY, United States*, <sup>2</sup>*New York University, New York, NY, United States*, <sup>3</sup>*University of Missouri, Columbia, MO, United States*
- 240 **Regional Mechanical Properties of the Long Head of the Biceps Tendon** SB<sup>3</sup>C2015-148 pg.88  
**Christopher W. Kolz**<sup>1</sup>, Thomas Suter<sup>1,2</sup>, Heath B. Henninger<sup>1</sup>, <sup>1</sup>*University of Utah, Salt Lake City, UT, United States*, <sup>2</sup>*Clinic of Orthopaedic Surgery, Kantonsspital Baselland, Liestal, Switzerland*
- 241 **Biomechanical Effects of Menisco-Tibial Repair** SB<sup>3</sup>C2015-399 pg.507  
**Ferris Pfeiffer**<sup>1</sup>, James Stannard<sup>1</sup>, James Cook<sup>1</sup>, Matthew Bollier<sup>2</sup>, Patrick Smith<sup>3</sup>, <sup>1</sup>*University of Missouri, Columbia, MO, United States*, <sup>2</sup>*University of Iowa, Iowa City, IA, United States*, <sup>3</sup>*Columbia Orthopaedic Group, Columbia, MO, United States*
- 242 **Mechanical And Adhesive Properties Of Hydrogels In Tension And Shear** SB<sup>3</sup>C2015-1097 pg.1157  
**Jennifer Kadlowec**, Daniel Collins, Patrick Myers, Thomas Christiani, Jennifer Vernengo, *Rowan University, Glassboro, NJ, United States*

- 243 **Dynamic Viscoelastic Properties of Porcine Patellar Tendon Tissue: A Study of Regional Variation and Frequency Dependent Behaviour** SB<sup>3</sup>C2015-449 pg.606  
Sourav S. Patnaik<sup>1,2</sup>, Taylor Szasz<sup>1,2</sup>, **Raj Prabhu**<sup>1,2</sup>, Hongjoo Rhee<sup>2</sup>, Mark F. Horstemeyer<sup>2</sup>, Jun Liao<sup>1,2</sup>, Lakiesha Williams<sup>1,2</sup>, <sup>1</sup>Mississippi State University, Mississippi State, MS, United States, <sup>2</sup>Center for Advanced Vehicular Systems, Mississippi State, MS, United States
- 244 **Targeting Collagen Strands by Triple Helix Hybridization** SB<sup>3</sup>C2015-194 pg.172  
Michael Yu, **Yang Li**, University of Utah, Salt Lake City, UT, United States
- 245 **Functional Tensile Properties of a Split Quadriceps Graft for Double-Bundle ACL Reconstruction** SB<sup>3</sup>C2015-180 pg.146  
**Robert Matthew Miller**, Amir Ata Rahnama-Azar, Todd Jasinski, Fabio V. Arilla, Levent Surer, Freddie H. Fu, Richard E. Debski, Volker Musahl, University of Pittsburgh, Pittsburgh, PA, United States
- 246 **A New Method for Measuring Stress Concentrations in Finite Element Analysis of Fibrocartilage Predicts Greater Fracture Risk for Angled Center Cracks** SB<sup>3</sup>C2015-326 pg.391  
**John M. Peloquin**<sup>1</sup>, Dawn M. Elliott<sup>2</sup>, <sup>1</sup>University of Pennsylvania, Philadelphia, PA, United States, <sup>2</sup>University of Delaware, Newark, DE, United States
- 247 **The Effect of Anatomical Variability on Temporomandibular Joint Mechanics.** SB<sup>3</sup>C2015-403 pg.515  
Jessica Coogan<sup>1</sup>, Travis Eliason<sup>1</sup>, Mark Wong<sup>2</sup>, **Daniel Nicolella**<sup>1</sup>, <sup>1</sup>Southwest Research Institute, San Antonio, TX, United States, <sup>2</sup>The University of Texas School of Dentistry at Houston, Houston, TX, United States

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Poster Session II

Injury Mechanics

Event Center Tent

- 248 **Sensitivity Study of Head Impact Parameters on Intracranial Dynamics** SB<sup>3</sup>C2015-413 pg.535  
**Yi Hua**<sup>1</sup>, Praveen Akula<sup>1</sup>, Matthew Kelso<sup>2</sup>, Linxia Gu<sup>1,3</sup>, <sup>1</sup>University of Nebraska-Lincoln, Lincoln, NE, United States, <sup>2</sup>University of Nebraska Medical Center, Omaha, NE, United States, <sup>3</sup>Nebraska Center for Materials and Nanoscience, Lincoln, NE, United States
- 249 **Improving Brain-Skull Interface Through Application of Mesh Smoothing Algorithm** SB<sup>3</sup>C2015-1093 pg.1149  
**Mireille Kelley**<sup>1,2</sup>, Logan Miller<sup>1,2</sup>, Jillian Urban<sup>1,2</sup>, Joel Stitzel<sup>1,2</sup>, <sup>1</sup>Wake Forest University School of Medicine, Winston-Salem, NC, United States, <sup>2</sup>Virginia Tech - Wake Forest University, Winston-Salem, NC, United States
- 250 **Mouse Model Of Blast Traumatic Brain Injury: An Imaging, Behavior And Pathological Assessment Study** SB<sup>3</sup>C2015-380 pg.471  
**Sujith Sajja**<sup>1</sup>, Jiangyang Zhang<sup>1</sup>, Jeff Bulte<sup>1</sup>, Joseph Long<sup>2</sup>, Robert Stevens<sup>1</sup>, Piotr Walczak<sup>1</sup>, Miroslaw Janowski<sup>1,3</sup>, <sup>1</sup>Johns Hopkins School of Medicine, Baltimore, MD, United States, <sup>2</sup>Walter Reed Army Institute of Research, Silver Spring, MD, United States, <sup>3</sup>NeuroRepair Department, MMRC, PAS, Warsaw, Poland
- 251 **The Effects of the Impact of a Soccer Ball on a Human Head** SB<sup>3</sup>C2015-517 pg.720  
**Kimberly A. Brown**, Aalaap Desai, Yuxiong Mao, Mark Horstemeyer, Jun Liao, Lakiesha Williams, Hongjoo Rhee, Raj Prabhu, Mississippi State University, Mississippi State, MS, United States
- 252 **Biomechanics of Human Tibia and Fibula Fracture Caused by a Mixed Martial Arts Kick** SB<sup>3</sup>C2015-436 pg. 582  
**Andrew Lamont**<sup>1,2</sup>, Robbin Bertucci<sup>1,3</sup>, Youssef Hammi<sup>2</sup>, Mark Horstemeyer<sup>2</sup>, Jun Liao<sup>1,2</sup>, Hongjoo Rhee<sup>3</sup>, Lakiesha Williams<sup>1,2</sup>, Rajkumar Prabhu<sup>1,2</sup>, <sup>1</sup>Agricultural and Biological Engineering, Mississippi State University, Starkville, MS, United States, <sup>2</sup>Center for Advanced Vehicular Systems, Starkville, MS, United States, <sup>3</sup>Center for Advanced Vehicular Systems, Mississippi State, MS, United States
- 253 **Influence Of Sulci On Mechanical Response Of The Brain And Injury Prediction Under High-rate Impact** SB<sup>3</sup>C2015-473 pg.646  
Alan Leung<sup>1</sup>, Nithyanand Kota<sup>2</sup>, Amit Bagchi<sup>3</sup>, **Siddiq Qidwai**<sup>3</sup>, <sup>1</sup>Advanced Technology & Research Corporation, Columbia, MD, United States, <sup>2</sup>Leidos Corporation, Arlington, VA, United States, <sup>3</sup>US Naval Research Laboratory, Washington, DC, United States
- 254 **Finite Element Analysis of Lower Extremity Military Boot Protection at Blast Conditions** SB<sup>3</sup>C2015-1143 pg.1241  
Robbin Bertucci, **R. Prabhu**, M. F. Horstemeyer, Jun Liao, Lakiesha N. Williams, Mississippi State University, Starkville, MS, United States

SCIENTIFIC SESSIONS

Friday

- 255 **Development of a Computationally Efficient Full Human Body Finite Element Model** SB<sup>3</sup>C2015-638 pg.945  
Doron Schwartz<sup>1,2</sup>, Berkan Guleyupoglu<sup>1,2</sup>, Bharath Koya<sup>1,2</sup>, Joel D. Stitzel<sup>1,2</sup>, F. Scott Gayzik<sup>1,2</sup>, <sup>1</sup>Wake Forest School of Medicine, Winston Salem, NC, United States, <sup>2</sup>Virginia Tech – Wake Forest University Center for Injury Biomechanics, Winston Salem, NC, United States
- 256 **An Efficient and Reliable Biomechanical Testing Device to Perform Torsion Testing in Long Bones with Locking Compression Plates** SB<sup>3</sup>C2015-574 pg.827  
Joseph P. Loftus<sup>1</sup>, Anita Singh<sup>1</sup>, Lindsay Stoy<sup>1</sup>, Douglas J. Patterson<sup>2</sup>, <sup>1</sup>Widener University, Chester, PA, United States, <sup>2</sup>Christiana Care, Newark, DE, United States
- 257 **A Computational Model Of Blast Loading To The Eye: A Comparison With Field Tests** SB<sup>3</sup>C2015-481 pg. 660  
Thao D. Nguyen<sup>1</sup>, Rajneesh Bhardwaj<sup>2</sup>, Shantanu Bailoor<sup>2</sup>, <sup>1</sup>Johns Hopkins University, Baltimore, MD, United States, <sup>2</sup>Indian Institute of Technology Bombay, Mumbai, India
- 258 **Supine to Prone Thoraco-abdominal Deformation and Organ Migration in a Set of Healthy Young Adults** SB<sup>3</sup>C2015-1027 pg.1030  
Berkan Guleyupoglu, Josh C. Tan, Craig A. Hamilton, F. Scott Gayzik, Wake Forest University School of Medicine, Winston Salem, NC, United States
- 259 **Design of a Novel Shock Tube System for Blast Induced Traumatic Brain Injury** SB<sup>3</sup>C2015-598 pg.871  
Andrew B. Robbins<sup>1</sup>, Raoul Van Loon<sup>2</sup>, Ashok K. Shetty<sup>3</sup>, Michael R. Moreno<sup>1</sup>, <sup>1</sup>Texas A&M University, College Station, TX, United States, <sup>2</sup>Swansea University, Swansea, United Kingdom, <sup>3</sup>Texas A&M Health Science Center, Temple, TX, United States
- 261 **A Computational Head Model Validated Against Pressure Responses Only May Not Be Used To Estimate Brain Strain Responses** SB<sup>3</sup>C2015-662 pg.991  
Wei Zhao, Songbai Ji, Dartmouth College, Hanover, NH, United States
- 262 **Head Impact Response Resulting from Forceful Impact with Toy Swords by Pediatric Males** SB<sup>3</sup>C2015-604 pg.883  
Stephanie M. Beeman, Steven Rowson, Stefan M. Duma, Virginia Tech, Blacksburg, VA, United States
- 263 **Behavioral And Inflammatory Consequences Of Cerebrovascular Dysfunction In Primary Blast Injury** SB<sup>3</sup>C2015 pg.1319  
Stewart Yeoh, Kenneth L. Monson, University of Utah, Salt Lake City, UT, United States
- 264 **Pelvic Response of a Total Human Body Finite Element (FE) Model During Simulated Under Body Blast (UBB) Impacts** SB<sup>3</sup>C2015-1028 pg.1032  
Caitlin M. Weaver<sup>1,2</sup>, Randolph S. Coates<sup>2</sup>, Andrew S. Merkle<sup>3</sup>, Joel D. Stitzel<sup>1</sup>, <sup>1</sup>Wake Forest University, Winston-Salem, NC, United States, <sup>2</sup>US Army Research Laboratory, Aberdeen Proving Ground, MD, United States, <sup>3</sup>Johns Hopkins Applied Physics Lab, Laurel, MD, United States
- 265 **The Effect of Pre-Crash Velocity Reduction on Occupant Response Using a Finite Element Model** SB<sup>3</sup>C2015-301 pg.349  
Nicholas A. Vavalle<sup>1,2</sup>, Berkan Guleyupoglu<sup>1,2</sup>, Jeremy M. Schap<sup>1,2</sup>, Kristofer D. Kusano<sup>3,4</sup>, F. Scott Gayzik<sup>1,2</sup>, <sup>1</sup>Virginia Tech – Wake Forest Center for Injury Biomechanics, Winston-Salem, NC, United States, <sup>2</sup>Wake Forest School of Medicine, Winston-Salem, NC, United States, <sup>3</sup>Virginia Tech – Wake Forest Center for Injury Biomechanics, Blacksburg, VA, United States, <sup>4</sup>Virginia Tech, Blacksburg, VA, United States
- 266 **Alteration And Failure Of Cerebral Artery Internal Elastic Lamina Following Axial Overstretch** SB<sup>3</sup>C2015-1140 pg.1235  
Matthew I. Converse, Tessa Sommer, Kenneth L. Monson, University of Utah, Salt Lake City, UT, United States
- 268 **Prediction Of Extra-axial Injury Location From Real World Motor Vehicle Crash And Occupant Data** SB<sup>3</sup>C2015-1086  
Jillian E. Urban<sup>1</sup>, Sarah Lynch<sup>1</sup>, Ervin Lowther<sup>1,2</sup>, Christopher Whitlow<sup>1,2,3</sup>, Joel Stitzel<sup>1</sup>, <sup>1</sup>Wake Forest University, Winston-Salem, NC, United States, <sup>2</sup>Wake Forest School of Medicine, Winston-Salem, NC, United States, <sup>3</sup>Translational Science Institute, Winston-Salem, NC, United States pg.1138
- 269 **Effect of Neck Cable Tension During Helmeted Head Impact** SB<sup>3</sup>C2015-1113 pg.1189  
Bethany Rowson, Steven Rowson, Stefan M. Duma, Virginia Tech, Blacksburg, VA, United States
- 270 **Traumatic Brain Injury Resulted in Increased Aquaporin-4 Expression - Relevance to Post Injury Edema** SB<sup>3</sup>C2015-647 pg. 961  
Nasya Sturdivant, Jeffrey Wolchok, Kartik Balachandran, University of Arkansas, Fayetteville, AR, United States



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Poster Session II

Mechanics of Growth, Remodeling and Repair

Event Center Tent

- 271 **Damage Accumulation Modeling and Rate Dependency of Spinal Dura Mater** SB<sup>3</sup>C2015-178 pg. 142  
Nicole Ramo, Snehal S. Shetye, Christian M. Puttlitz, *Colorado State University, Fort Collins, CO, United States*
- 272 **Analytical Approximation for Predicting Stress Fiber Remodeling Due to Dynamic Mechanical Stimuli** SB<sup>3</sup>C2015-215  
Tommaso Ristori<sup>1,2</sup>, <sup>1</sup>Eindhoven University of Technology, Eindhoven, Netherlands, <sup>2</sup>Institute for Complex Molecular Systems, Eindhoven, Netherlands pg.210
- 273 **Multiscale Model of Strain-Dependent Glomerular Basement Membrane Remodeling** SB<sup>3</sup>C2015-624 pg.917  
Lazarina Gyoneva<sup>1</sup>, Yoav Segal<sup>1,2</sup>, Kevin D. Dorfman<sup>1</sup>, Victor H. Barocas<sup>1</sup>, <sup>1</sup>University of Minnesota, Minneapolis, MN, United States, <sup>2</sup>VA Medical Center, Minneapolis, MN, United States
- 274 **Quantification Of Transient Temperature And Thermal Damage In An Established Burn Model** SB<sup>3</sup>C2015-1166 pg.1285  
Stephanie Lindow, F. Scott Gayzik, *Wake Forest University School of Medicine, Winston-Salem, NC, United States*
- 275 **Simulated Collagen Network Remodeling in Response to Stress.** SB<sup>3</sup>C2015-591 pg.859  
Carley B. Hovell, *University of Minnesota, Twin Cities, Minneapolis, MN, United States*
- 276 **Isolation of Subarachnoid Hemorrhage Factors on a Single Chip for Understanding Cerebral Vasospasm Progression** SB<sup>3</sup>C2015-514 pg.714  
Eric S. Hald, Kerianne E. Steucke, Connor Timm, Patrick W. Alford, *University of Minnesota, Minneapolis, MN, United States*
- 277 **A Finite Element Investigation of Fracture Healing Under Simulated Microgravity Loading Conditions** SB<sup>3</sup>C2015-422  
Benjamin C. Gadowski, Zachary F. Lerner, Raymond C. Browning, Christian M. Puttlitz, *Colorado State University, Fort Collins, CO, United States* pg.553

FRIDAY, JUNE 19

12:30pm - 3:00pm

Poster Session II

Cardiovascular Tissue Mechanics

Event Center Tent

- 278 **Novel Technique for Assessment of Mechanical Properties of Carotid Arteries** SB<sup>3</sup>C2015-476 pg.652  
Stefan Sanders, Frans van de Vosse, Marcel Rutten, *Eindhoven University of Technology, Eindhoven, Netherlands*
- 279 **Morphological Characterization Of Collagen Fibers At The Crack Initiation Sites In Biaxially Stretched Porcine Thoracic Aortas Toward Clarification Of Aneurysm Rupture Mechanism** SB<sup>3</sup>C2015-425 pg.559  
Shukei Sugita, Takeo Matsumoto, *Nagoya Institute of Technology, Nagoya, Japan*
- 280 **Biaxial Mechanical Characterization of Non-Uniform Thermal Shrinkage Deformations to Guide Ablative Therapy** SB<sup>3</sup>C2015-565 pg.811  
Steven Boronyak, W. David Merryman, *Vanderbilt University, Nashville, TN, United States*
- 281 **Characterization of the Fatigue Life, Dynamic Creep and Modes of Damage Accumulation within Mitral Valve Chordae Tendineae** SB<sup>3</sup>C2015-533 pg.752  
Gillian M. Gunning, Bruce P. Murphy, *Trinity College Dublin, Dublin, Ireland*
- 282 **Finite Element Modeling Of Cardiac Muscle Contraction** SB<sup>3</sup>C2015-408 pg. 525  
Xiaoyan Zhang, Kenneth S. Campbell, Jonathan F. Wenk, *University of Kentucky, Lexington, KY, United States*
- 283 **Novel Micro-Computed Tomography Technique for Soft Tissue Deformation Tracking - Application to the Mitral Valve** SB<sup>3</sup>C2015-182 pg.150  
Eric L. Pierce<sup>1</sup>, Charles H. Bloodworth<sup>2</sup>, Ajay Naran<sup>2</sup>, Thomas F. Easley<sup>2</sup>, Morten O. Jensen<sup>1</sup>, Ajit P. Yoganathan<sup>1</sup>, <sup>1</sup>Georgia Institute of Technology and Emory University, Atlanta, GA, United States, <sup>2</sup>Georgia Institute of Technology, Atlanta, GA, United States

- 284 **Identification and Quantification of Extracellular Matrix Proteins at the Plaque - Internal Elastic Lamina Interface in a Mouse Model of Atherosclerosis** SB<sup>3</sup>C2015-291 pg.329  
Lindsey Davis, Susan Lessner, *University of South Carolina, Columbia, SC, United States*
- 285 **The Number of Lesions Does Not Govern the Functionality of Coronary Bifurcation Lesions: A Study of the Effect of Relative Stenosis Severity** SB<sup>3</sup>C2015-224 pg.224  
Catherine Pagiatakis<sup>1,2</sup>, Jean-Claude Tardif<sup>2,3</sup>, Philippe L. L'Allier<sup>2,3</sup>, Jennifer Frattolin<sup>1</sup>, Rosaire Mongrain<sup>1,2</sup>, <sup>1</sup>McGill University, Montreal, QC, Canada, <sup>2</sup>Montreal Heart Institute, Montreal, QC, Canada, <sup>3</sup>University of Montreal, Montreal, QC, Canada
- 286 **Force Required to Cinch the Tricuspid Annulus: An Ex Vivo Study** SB<sup>3</sup>C2015-137 pg.70  
Amy N. Adkins<sup>1</sup>, Jesus Aleman<sup>1</sup>, Edward Sako<sup>2</sup>, Lori Boies<sup>1</sup>, Shamik Bhattacharya<sup>1</sup>, <sup>1</sup>St.Mary's University, San Antonio, TX, United States, <sup>2</sup>University of Texas Health Science Center San Antonio, San Antonio, TX, United States
- 287 **Infarcted Left Ventricles Have Stiffer Material Properties and Lower Stiffness Variation: 3D Echo-Based Modeling to Quantify In Vivo Ventricle Material Properties** SB<sup>3</sup>C2015-32 pg.16  
Longling Fan<sup>1</sup>, Jing Yao<sup>2</sup>, Chun Yang<sup>3</sup>, Di Xu<sup>2</sup>, Dalin Tang<sup>1,4</sup>, <sup>1</sup>Southeast University, Nanjing, China, <sup>2</sup>Nanjing Medical University, Nanjing, China, <sup>3</sup>China United Network Communications Co., Ltd., Beijing, China, <sup>4</sup>Worcester Polytechnic Institute, Worcester, MA, United States
- 288 **Development Of An Estimation Method Of Blood Vessel Configuration At No Load State For FE Patient-specific Simulation** SB<sup>3</sup>C2015-1133 pg.1225  
Ming Yu<sup>1</sup>, Sota Yamamoto<sup>1</sup>, Mrie Oshima<sup>2</sup>, <sup>1</sup>Shibaura Institute of technology, Tokyo, Japan, <sup>2</sup>The University of Tokyo, Tokyo, Japan
- 289 **Post Endovascular Stent Repair Of Descending Aorta: Side Effects And Development Of Aneurysm In The Ascending Aorta** SB<sup>3</sup>C2015-1095 pg.1153  
Giampaolo Martufi, Manal Altamimi, Raied Aburashed, Cyrus Fiori, Jehangir J. Appoo, Elena S. Di Martino, *University of Calgary, Calgary, AB, Canada*
- 290 **Bicuspid Aortic Valve Hemodynamics Induce Acute Asymmetric Remodeling Of Porcine Ascending Aortas: An Ex Vivo Study** SB<sup>3</sup>C2015-1112 pg.1187  
Samantha K. Atkins, Philippe Sucosky, *University of Notre Dame, Notre Dame, IN, United States*
- 291 **The Effect of Vascular Curvature on Blood Flow and Oxygen Transport in Arterio-Venous Fistulae** SB<sup>3</sup>C2015-807  
Francesco Iori, Lorenza Grechy, Richard W. Corbett, Wladyslaw Gedroyc, Neill Duncan, Colin G. Caro, Peter E. Vincent, *Imperial College London, London, United Kingdom* pg. 1013
- 292 **Measuring Vessel Wall Displacement and Circumferential Strain Using Displacement Encoded with Stimulated Echo (DENSE) MRI Sequence** SB<sup>3</sup>C2015-592 pg.861  
Elizabeth Iffrig<sup>1,2</sup>, Xiaodong Zhong<sup>1,3</sup>, William R. Taylor<sup>1,2</sup>, John N. Oshinski<sup>1,2</sup>, <sup>1</sup>Emory University, Atlanta, GA, United States, <sup>2</sup>Georgia Institute of Technology, Atlanta, GA, United States, <sup>3</sup>Siemens Medical Solutions, Malvern, PA, United States
- 293 **Computational Analysis Of The Effect Of Sequential Coiling On The Wall Stress Of Cerebral Aneurysms** SB<sup>3</sup>C2015-1190 pg.1323  
Joseph E. Pichamuthu, Brian T. Jankowitz, David A. Vorp, *University of Pittsburgh, Philadelphia, PA, United States*
- 294 **Smooth Muscle Cell Elastin Generation Stimulated by Adipose-Derived Mesenchymal Stem Cells** SB<sup>3</sup>C2015-496  
Aneesh Ramaswamy, Kory Blose, Justin Weinbaum, David Vorp, *University of Pittsburgh, Pittsburgh, PA, United States* pg.680
- 295 **Computational Modeling Of Passive Myocardium:A Comparison Between Two Constitutive Models** SB<sup>3</sup>C2015-347  
Amir Nikou<sup>1</sup>, Shauna M. Dorsey<sup>2</sup>, Jeremy R. McGarvey<sup>3</sup>, Joseph H. Gorman III<sup>2</sup>, Jason A. Burdick<sup>2</sup>, James J. Pilla<sup>2</sup>, Robert C. Gorman<sup>2</sup>, Jonathan F. Wenk<sup>1</sup>, <sup>1</sup>University of Kentucky, Lexington, KY, United States, <sup>2</sup>University of Pennsylvania, Philadelphia, PA, United States, <sup>3</sup>Gorman Cardiovascular Research Group, University of Pennsylvania, Philadelphia, PA, United States pg.421
- 296 **Toward an Experimentally Validated Immersed Boundary Model of Left Ventricular Fluid Dynamics Using In Vitro Experiments** SB<sup>3</sup>C2015-1123 pg.1207  
Boyce E. Griffith<sup>1</sup>, Jae Ho Lee<sup>1</sup>, Pritam Mekala<sup>2</sup>, Arvind Santhanakrishnan<sup>2</sup>, <sup>1</sup>University of North Carolina at Chapel Hill, Chapel Hill, NC, United States, <sup>2</sup>Oklahoma State University, Stillwater, OK, United States
- 297 **Role Of Cyclic Strain On Calcific Nodule Formation Among Aortic Heart Valve Cusps** SB<sup>3</sup>C2015-1085 pg.1136  
Ying Lei, Zannatul Ferdous, *The University of Tennessee, Knoxville, TN, United States*

- 298 **Impact of Partial Intraluminal Thrombus Attachment on Peak Stresses on Abdominal Aortic Aneurysm Wall** SB<sup>3</sup>C2015-277 pg.309  
Juan S. Stockle, David A. Romero, Cristina H. Amon, *University of Toronto, Toronto, ON, Canada*
- 299 **Stability Analysis of the Continuum Constrained Mixture Model for Vascular Growth and Remodeling** SB<sup>3</sup>C2015-1096 pg.1155  
Jiacheng Wu, Shawn C. Shadden, *University of California, Berkeley, Berkeley, CA, United States*
- 300 **Ultrasound Monitoring of Abdominal Aortic Aneurysm Progression in a Murine Model** SB<sup>3</sup>C2015-1046 pg.1066  
Arvin H. Soepriatna<sup>1</sup>, Gurmeet S. Sangha<sup>1</sup>, Amelia R. Adelsperger<sup>1</sup>, Evan H. Phillips<sup>1</sup>, Clifford M. Babbey<sup>2</sup>, Michael P. Murphy<sup>2</sup>, Pavlos P. Vlachos<sup>1</sup>, Craig J. Goergen<sup>1</sup>, <sup>1</sup>*Purdue University, West Lafayette, IN, United States*, <sup>2</sup>*Indiana University - Purdue University Indianapolis, Indianapolis, IN, United States*
- 301 **Aortic Peak Stress Induced By Antihypertensive Medications In Aortic Dissection Patients** SB<sup>3</sup>C2015-552 pg.786  
Vittoria Flamini, *New York University, Brooklyn, NY, United States*
- 302 **Mechanical Parameters Characterization of Embryonic Mouse Hearts for Studying Human Congenital Heart Disease** SB<sup>3</sup>C2015-492 pg.672  
Andres Rubiano, Kyle G. Rowe, W. Gregory Sawyer, Chelsey S. Simmons, *University of Florida, Gainesville, FL, United States*
- 303 **Machine Learning Based Structured Edge Detection for Cardiovascular Modeling** SB<sup>3</sup>C2015-1021 pg.1020  
Jameson T. Merkow<sup>1</sup>, Zhouwen Tu<sup>1</sup>, David Kriegman<sup>1</sup>, Nathan Wilson<sup>2</sup>, Alison L. Marsden<sup>1</sup>, <sup>1</sup>*University of California San Diego, San Diego, CA, United States*, <sup>2</sup>*Open Source Medical Software Corporation, San Diego, CA, United States*
- 304 **A Study On The Interplay Of Sex And Cyclic Stretch In Aortic Valve Calcification** SB<sup>3</sup>C2015-466 pg.634  
Shirin Masjedi, Ying Lei, Zannatul Ferdous, *University of Tennessee, Knoxville, TN, United States*

FRIDAY, JUNE 19

12:30pm - 3:00pm

**Poster Session II      Tissue Engineering and Regenerative Medicine:      Event Center Tent**  
**Materials and Interfaces**

- 306 **Genipin Cross-linking Silk Fibroin Post-gelation Increases Gel Mechanical Stiffness** SB<sup>3</sup>C2015-1134 pg.1227  
Winston H. Elliott<sup>1</sup>, Walter Bonani<sup>2,3</sup>, Devid Maniglio<sup>2,3</sup>, Antonella Motta<sup>2,3</sup>, Wei Tan<sup>1</sup>, Claudio Migliaresi<sup>2,3</sup>, <sup>1</sup>*University of Colorado- Boulder, Boulder, CO, United States*, <sup>2</sup>*University of Trento, Trento, Italy*, <sup>3</sup>*European Institute of Excellence on Tissue Engineering and Regenerative Medicine, and INSTM Trento Research Unit, Trento, Italy*
- 307 **Silica-Collagen Hydrogel for Corneal Replacement** SB<sup>3</sup>C2015-259 pg.281  
Michael DiVito, *University of Minnesota, Minneapolis, MN, United States*
- 308 **In Situ Polymerization Of Thiol-acrylate Nanocomposite Foam For Bone Defects** SB<sup>3</sup>C2015-253 pg.275  
Anoosha Forghani, *Louisiana State University, Baton Rouge, LA, United States*
- 309 **Fabrication Of Scaffolds From Different Silica Based Bioactive Glass And Investigation Of Bioactivity And Biodegradation Behaviors** SB<sup>3</sup>C2015-1371 pg.1325  
Sevil Yücel<sup>1</sup>, A. C. Ozarslan<sup>1</sup>, B. S. Oduncu<sup>1</sup>, P. Terzioglu<sup>2</sup>, <sup>1</sup>*Yildiz Technical University, Istanbul, Turkey*, <sup>2</sup>*Muğla Sıtkı Koçman University, Muğla, Turkey*
- 310 **Evaluation Of Two Formulations Of Polycaprolactone For Use In Tissue Scaffold Applications** SB<sup>3</sup>C2015-390 pg.489  
Jacob D. Harris, A. Sharif El-Gizawy, Ferris M. Pfeiffer, *University of Missouri, Columbia, MO, United States*
- 311 **Aqueous Biphasic Micro-printing Of Tumor Spheroids** SB<sup>3</sup>C2015-654 pg.975  
Stephanie Lemmo Ham, Ehsan Atefi, Hossein Tavana, *University of Akron, Akron, OH, United States*
- 312 **Using Finite Element Analysis to Study the Mechanical Advantages of a Turtle's Shell** SB<sup>3</sup>C2015-1105 pg.1173  
John W. Wood, Rajkumar Prabhu, *Mississippi State University, Starkville, MS, United States*



## SCIENTIFIC SESSIONS

Friday

- 313 **Characterization of a Thermoreversible Collagen for Free-Form Fabrication of Scaffolds** SB<sup>3</sup>C2015-474 pg.648  
Kathryn E. Drzewiecki, David I. Shreiber, *Rutgers University, Piscataway, NJ, United States*
- 314 **3D Printing Of B. Mori Silk Proteins For Implantable Devices** SB<sup>3</sup>C2015-320 pg.381  
Tom M. Merrill, Maria Torculas, Jethro Medina, Brenton Boszczuk, Kyle Meehan, Ian Miller, Xiao Hu, Wei Xue, *Rowan University, Glassboro, NJ, United States*
- 315 **Influence of Nano- and Micro-Scale Structure of Aligned Electrospun Scaffolds on Mechanical Properties and Cell Response** SB<sup>3</sup>C2015-141 pg.76  
Hannah M. Pauly<sup>1</sup>, Ketul C. Popat<sup>1</sup>, Daniel J. Kelly<sup>2</sup>, Tammy L. Haut Donahue<sup>1</sup>, <sup>1</sup>Colorado State University, Fort Collins, CO, United States, <sup>2</sup>Trinity College Dublin, Dublin, Ireland
- 316 **An Assessment of the Native Species in Articular Cartilage and Synovial Fluid as Potential Absorptive Barriers to UV-Initiated Scaffold Polymerization** SB<sup>3</sup>C2015-429 pg.567  
Anthony Finch, Patrick Donnelly, Peter Torzilli, *Hospital for Special Surgery, New York, NY, United States*

FRIDAY, JUNE 19

12:30pm - 3:00pm

**Poster Session II      Tissue Engineering and Regenerative Medicine:      Event Center Tent**  
**Cells, Constructs, Culture Systems, and Regeneration**

- 317 **Effects of Mechanical Constraints on Cell-Generated Stress and Collagen Remodeling in Statically Cultured Microtissues** SB<sup>3</sup>C2015-369 pg.455  
Mathieu A. J. van Kelle, Sandra Loerakker, Inge A. E. W. van Loosdregt, Carlijn V. C. Bouten, Frank P. T. Baaijens, *Eindhoven University of Technology, Eindhoven, Netherlands*
- 318 **Optimization of Parameters For Long-Term Storage of Tissue Engineered Articular Cartilage** SB<sup>3</sup>C2015-385 pg.479  
Adam B. Nover<sup>1</sup>, Robert M. Stefani<sup>1</sup>, Stephanie L. Lee<sup>1</sup>, Rebecca A. Peyser<sup>1</sup>, Daniel R. Howard<sup>2</sup>, Gerard A. Ateshian<sup>1</sup>, Aaron M. Stoker<sup>3</sup>, James L. Cook<sup>3</sup>, Clark T. Hung<sup>1</sup>, <sup>1</sup>Columbia University, New York, NY, United States, <sup>2</sup>Mount Sinai St. Luke's, New York, NY, United States, <sup>3</sup>University of Missouri, Columbia, MO, United States
- 319 **Maturation Of Human Stem Cell-derived Cardiomyocytes In 3D Tissues Through Increasing Collagen Concentrations** SB<sup>3</sup>C2015-1131 pg.1221  
Aric Q. Pahnke, *University of Toronto, Toronto, ON, Canada*
- 320 **Use Of Kartogenin To Augment The Tendon-bone Tunnel Healing** SB<sup>3</sup>C2015-310 pg.365  
Yiqin Zhou, Jianying Zhang, Guangyi Zhao, James H-C. Wang, *University of Pittsburgh, Pittsburgh, PA, United States*
- 321 **Modular Tissue Engineered Cartilage Surfaces** SB<sup>3</sup>C2015-324 pg.387  
Audrey C. Ford, Kayla Wolf, Aditya Nandy, Anne Y. Zeng, Grace D. O'Connell, *University of California Berkeley, Berkeley, CA, United States*
- 322 **Tensile Properties of Stem Cell-Based Self-Assembled Tissue (scSAT) Biosynthesized on Nanoperiodic Structured Substrate** SB<sup>3</sup>C2015-448 pg.604  
Kei Oya<sup>1</sup>, Yuki Tani<sup>2</sup>, Kota Koizumi<sup>3</sup>, Norihiko Sugita<sup>3</sup>, Kenji Suzuki<sup>4</sup>, Norimasa Nakamura<sup>3</sup>, Hiromichi Fujie<sup>2</sup>, <sup>1</sup>Tokai University, Hiratsuka, Kanagawa, Japan, <sup>2</sup>Tokyo Metropolitan University, Hino, Tokyo, Japan, <sup>3</sup>Osaka University, Suita, Osaka, Japan, <sup>4</sup>Kogakuin University, Hachioji, Tokyo, Japan
- 323 **Ultrasound Assisted Human Mesenchymal Stem Cell Chondrogenesis: Engineering Large-scale Cartilage Grafts** SB<sup>3</sup>C2015-669 pg.1003  
Anu Subramanian, Sanjukta Guha Thakurta, Neety Sahu, Abdul Qadir Chama, Hendrik J. Viljoen, *University of Nebraska, Lincoln, NE, United States*
- 324 **Osteogenic Induction Of Human Adipose Derived Stem Cells Cultured On Poly (l-lactic Acid) Scaffolds Prepared By Thermally Induced Phase Separation Method** SB<sup>3</sup>C2015-172 pg.130  
Harish Chinnasami, Ram Devireddy, Dan Hayes, *Louisiana State University, Baton Rouge, LA, United States*
- 325 **Investigating the Role of Osteoactivin in Muscle Regeneration** SB<sup>3</sup>C2015-625 pg. 919  
Jinjin Ma<sup>1</sup>, Bing Yu<sup>2</sup>, Andrew Baker<sup>1</sup>, Min-Ho Kim<sup>2</sup>, Anthony Calabro<sup>1</sup>, Faye Safadi<sup>3</sup>, Christopher Malcuit<sup>2</sup>, Kathleen Derwin<sup>1</sup>, <sup>1</sup>Cleveland Clinic, Cleveland, OH, United States, <sup>2</sup>Kent State University, Kent, OH, United States, <sup>3</sup>Northeast Ohio Medical University, Rootstown, OH, United States

- 326 **Effect Of Heat Shock On Cryopreservation Of Adipose Tissue Derived Stem Cells** SB<sup>3</sup>C2015-165 pg.118  
Mulla S. Shaik<sup>1</sup>, Jeffrey M. Gimble<sup>2</sup>, Ram Devireddy<sup>1</sup>, <sup>1</sup>Louisiana State University, Baton Rouge, LA, United States, <sup>2</sup>LaCell Incorporation, New Orleans, LA, United States
- 327 **Evaluating the Consistency of Cardiomyocyte Self-assembly** SB<sup>3</sup>C2015-316 pg.375  
Nancy K. Drew, Danny B. Baldo, Jason Q. Core, Anna Grosberg, University of California, Irvine, Irvine, CA, United States

FRIDAY, JUNE 19

12:30pm - 3:00pm

## Poster Session II      Mechanotransduction and Sub-Cellular Biophysics      Event Center Tent

- 328 **Comparison Between Nonlinear Material Models And Fiber Network Models Reveals Importance Of Fiber Interactions In Cell Mechanosensing On Fibrous Substrates** SB<sup>3</sup>C2015-609 pg. 891  
Maziar Aghvami<sup>1</sup>, Kristen L. Billiar<sup>2</sup>, Edward A. Sander<sup>1</sup>, <sup>1</sup>University of Iowa, Iowa City, IA, United States, <sup>2</sup>Worcester Polytechnic Institute, Worcester, MA, United States
- 329 **Role of SRC in Electric Field-Induced Directed Cell Migration** SB<sup>3</sup>C2015-469 pg.640  
Shun-Hao Tsao, Pen-Hsiu Grace Chao, National Taiwan University, Taipei, Taiwan
- 330 **Exploring the Response of Astrocytes to Traumatic Brain Injuries Using a Novel Bench Top Crash Tester** SB<sup>3</sup>C2015-435 pg. 580  
Joe Wyatt, Addison Walker, Kartik Balachandran, Jeff Wolchok, University of Arkansas, Fayetteville, AR, United States
- 331 **Endoplasmic Reticulum Calcium Dynamics in Osteocyte Mechanobiology** SB<sup>3</sup>C2015-179 pg.144  
Genevieve N. Brown, Prajesh Desai, X. Edward Guo, Columbia University, New York, NY, United States
- 333 **Movement In Engineered Valvular Tissues In Relation To Regional Flow Physics And Nutrient Transport** SB<sup>3</sup>C2015-279 pg.311  
Manuel Salinas, Florida International University, Davie, FL, United States
- 334 **Cellular Cholesterol Content Modulates Monocyte Interaction With E-selectin** SB<sup>3</sup>C2015-412 pg.533  
Amit K. Saha, Anand K. Ramasubramanian, University of Texas at San Antonio, San Antonio, TX, United States
- 335 **Time Evolution of Contractility in Fibroblasts as a Measure of Cell Photodamage** SB<sup>3</sup>C2015-1177 pg.1303  
Samantha G. Knoll<sup>1</sup>, Wylie W. Ahmed<sup>2</sup>, Taher A. Saif<sup>1</sup>, <sup>1</sup>University of Illinois at Urbana-Champaign, Urbana, IL, United States, <sup>2</sup>Institut Curie, Paris, France
- 336 **Topology of Prestin Expressed in the CHO Cell Membrane -Atomic Force Microscopy Study-** SB<sup>3</sup>C2015-221 pg.218  
Michio Murakoshi<sup>1,2</sup>, Hiroshi Wada<sup>3</sup>, <sup>1</sup>Kagoshima University, Kagoshima, Japan, <sup>2</sup>JST, Kawaguchi, Japan, <sup>3</sup>Tohoku Bunka Gaku University, Sendai, Japan
- 337 **Role of Cell-Cell Interaction in Tensional Homeostasis** SB<sup>3</sup>C2015-1118 pg.1199  
Alicia Zollinger<sup>1</sup>, Elizabeth Canovic<sup>2</sup>, Michael Smith<sup>1</sup>, Dimitrije Stamenovic<sup>1</sup>, <sup>1</sup>Boston University, Boston, MA, United States, <sup>2</sup>Massachusetts Institute of Technology, Cambridge, MA, United States
- 338 **Computational And Experimental Analysis Of Intracellular Motion, Forces, And Structure** SB<sup>3</sup>C2015-1184 pg.1313  
Michael Mak<sup>1</sup>, Taeyoon Kim<sup>2</sup>, Muhammad H. Zaman<sup>3</sup>, Roger D. Kamm<sup>1</sup>, <sup>1</sup>Massachusetts Institute of Technology, Cambridge, MA, United States, <sup>2</sup>Purdue University, West Lafayette, IN, United States, <sup>3</sup>Boston University, Boston, MA, United States
- 339 **Epithelial to Mesenchymal Transition Alters Cellular Chiral Behavior** SB<sup>3</sup>C2015-238 pg.249  
Kathryn E. Worley, Andrew K. Watrobski, David Shieh, Leo Q. Wan, Rensselaer Polytechnic Institute, Troy, NY, United States
- 340 **Modeling Cellular Contraction on Biohybrid Devices Using Thermal Contraction Capabilities of Finite Element Analysis Tools** SB<sup>3</sup>C2015-400 pg.509  
Victoria A. Webster, Ozan Akkus, Hillel J. Chiel, Roger D. Quinn, Case Western Reserve University, Cleveland, OH, United States

FRIDAY, JUNE 19

3:00pm - 4:30pm

**Bone Structure, Mechanics, and Function****Primrose A****Session Chair:** Amy Wagoner Johnson, *University of Illinois at Urbana-Champaign, Urbana, IL, United States***Session Co-Chair:** Shigeo Tanaka, *Kanazawa University, Kanazawa, Japan*

- 3:00PM Collagen Bound Water Is A Strong Correlate Of Bone's Toughness** SB<sup>3</sup>C2015-262 *pg.285*  
Mustafa Unal, Ozan Akkus, *Case Western Reserve University, Cleveland, OH, United States*
- 3:15PM Sequential Bisphosphonate and Parathyroid Hormone Treatment Decouples Bone Remodeling in Favor of Bone Formation** SB<sup>3</sup>C2015-521 *pg.729*  
Allison R. Altman, Carina Lott, Chantal M. de Bakker, Wei-Ju Tseng, Ling Qin, X. Sherry Liu, *University of Pennsylvania, Philadelphia, PA, United States*
- 3:30PM Tissue Mineral Density Dependent Mechanical Properties of Individual Trabecula Plates and Rods Do Not Differ in Anatomic Directions but Individual Trabecular Directions** SB<sup>3</sup>C2015-242 *pg.255*  
Y. Eric Yu, Ji Wang, Bin Zhou, X. Edward Guo, *Columbia University, new york, NY, United States*
- 3:45PM Post-yield Damage Denatures Bone's Collagen As Determined By A Novel Molecular Spectroscopic Biomarker** SB<sup>3</sup>C2015-261 *pg. 283*  
Mustafa Unal, Hyungjin Jung, Ozan Akkus, *Case Western Reserve University, Cleveland, OH, United States*
- 4:00PM Measurement of Bone Mineral Density in Motor Vehicle Crash Occupants and Correlation with Age and Fracture Incidence** SB<sup>3</sup>C2015-236 *pg.244*  
Ashley A. Weaver, Richarlette C. Hightower, Sarah K. Lynch, Kristen M. Beavers, Anna N. Miller, Joel D. Stitzel, *Wake Forest University, Winston-Salem, NC, United States*
- 4:15PM Proximal Femoral Cortical Bone Thickness in Patients with Femoroacetabular Impingement and Normal Hips Analyzed using Statistical Shape Modeling** SB<sup>3</sup>C2015-1115 *pg.1193*  
Penny R. Atkins, Prateep Mukherjee, Shireen Y. Elhabian, Sumedha Singla, Michael D. Harris, Jeffrey A. Weiss, Ross T. Whitaker, Andrew E. Anderson, *University of Utah, Salt Lake City, UT, United States*

FRIDAY, JUNE 19

3:00pm - 4:30pm

**Joint Motion and Rehabilitation****Superior****Session Chair:** Laurel Kuxhaus, *Clarkson University, Potsdam, NY, United States***Session Co-Chair:** Bradley Davidson, *University of Denver, Denver, CO, United States*

- 3:00PM A Long-Term Simulated Degradation Study of a Synthetic Meniscus Implant: Material and Functional Properties** SB<sup>3</sup>C2015-191 *pg.166*  
Maoz Shemesh<sup>1</sup>, Adaya Shefy-Peleg<sup>1</sup>, Eyal Zylberberg<sup>1</sup>, Eran Linder-Ganz<sup>1</sup>, Jonathan J. Elsner<sup>2</sup>, *Active Implants, Netanya, Israel, Active Implants, Cambridge, MA, United States*
- 3:15PM A Robotic Knee Orthosis for Locomotive Assistance** SB<sup>3</sup>C2015-409 *pg.527*  
Saroj Thapa<sup>1</sup>, Hao Zheng<sup>1</sup>, Geza Kogler<sup>2</sup>, Xiangrong Shen<sup>1</sup>, *University of Alabama, Tuscaloosa, AL, United States, Georgia Institute of Georgia, Atlanta, GA, United States*
- 3:30PM Towards Vertebral Compression Fracture Prevention: Simulating Physiologic Fracture During Small Movement ADLs.** SB<sup>3</sup>C2015-414 *pg.537*  
Nicole C. Corbiere, Stacey L. Zeigler, Kathleen A. Issen, Arthur J. Michalek, Laurel Kuxhaus, *Clarkson University, Potsdam, NY, United States*
- 3:45PM Effect of Arm Posture on Voluntary Activation and Moments Generated by Individuals with Tendon Transfer and Quadriplegia** SB<sup>3</sup>C2015-1151 *pg.1257*  
Carrie L. Peterson<sup>1,2,3</sup>, Michael S. Bednar<sup>4</sup>, Anne M. Bryden<sup>5,6</sup>, Michael W. Keith<sup>5,6</sup>, Eric J. Perreault<sup>1,2</sup>, Wendy M. Murray<sup>1,2,3</sup>, *Rehabilitation Institute of Chicago, Chicago, IL, United States, Northwestern University, Chicago, IL, United States, Edward Hines Jr., VA Hospital, Hines, IL, United States, Loyola University, Maywood, IL, United States, MetroHealth Medical Center, Cleveland, OH, United States, Case Western Reserve University, Cleveland, OH, United States*



- 4:00PM Use of a Torque Range of Motion Device to Teach Evaluation of Joint Dysfunction** SB<sup>3</sup>C2015-296 pg.339  
**Rita Patterson<sup>1</sup>**, Jeongsik Shin<sup>2</sup>, Aditya Das<sup>2</sup>, Vanneise Collins<sup>1</sup>, Carol Kominski<sup>1</sup>, Katelyn Rockenbach<sup>1</sup>, Robert Longnecker<sup>1</sup>, David Mason<sup>1</sup>, <sup>1</sup>*University of North Texas Health Science Center, Fort Worth, TX, United States*, <sup>2</sup>*University of Texas at Arlington Research Institute, Fort Worth, TX, United States*
- 4:15PM Development of Virtual Environment Navigation Options for Individuals Post-stroke or With Cerebral Palsy Using Kinect** SB<sup>3</sup>C2015-124 pg.50  
**Alan Eberhardt<sup>1</sup>**, Sean Pool<sup>1</sup>, Scott Bickel<sup>1</sup>, Gerald McGwin<sup>1</sup>, James Rimmer<sup>1</sup>, Laurie Malone<sup>2</sup>, <sup>1</sup>*University of Alabama Birmingham, Birmingham, AL, United States*, <sup>2</sup>*Lakeshore Foundation, Birmingham, AL, United States*

FRIDAY, JUNE 19

3:00pm - 4:30pm

**Cardiovascular Imaging****Wasatch**Session Chair: Frank Gijzen, *University of Rotterdam, Netherlands*Session Co-Chair: Christof Karmonik, *Houston Methodist Research Institute, Houston, TX, United States*

- 3:00PM Differential Hemodynamic Changes And Lumen Remodeling In The Artery And Vein Of Porcine Arteriovenous Graft And Fistula** SB<sup>3</sup>C2015-123 pg.48  
**Daniel B. Pike<sup>1</sup>**, Yong He<sup>2</sup>, Christi M. Terry<sup>1</sup>, Alfred K. Cheung<sup>1,3</sup>, Yan-Ting Shiu<sup>1</sup>, <sup>1</sup>*University of Utah, Salt Lake City, UT, United States*, <sup>2</sup>*University of Florida, Gainesville, FL, United States*, <sup>3</sup>*VA SLC Health Care System, Salt Lake City, UT, United States*
- 3:15PM Does Aortic Open Distal and Hemi-arch Procedure Remove All Tissue Suspected for Progression of Bicuspid Valve Aortopathy?** SB<sup>3</sup>C2015-322 pg. 383  
**Alex J. Barker<sup>1</sup>**, Pim van Ooij<sup>1</sup>, David Guzzardi<sup>2</sup>, Emilie Bollache<sup>1</sup>, S. Chris Malaisrie<sup>1</sup>, Patrick M. McCarthy<sup>1</sup>, James Carr<sup>1</sup>, Jeremy Collins<sup>1</sup>, Michael Markl<sup>1</sup>, Paul W. M. Fedak<sup>1,2</sup>, <sup>1</sup>*Northwestern University, Chicago, IL, United States*, <sup>2</sup>*University of Calgary, Calgary, AB, Canada*
- 3:30PM Quantification of Helical Flow Patterns in Left Ventricles of Healthy Subjects and Patients with Dilated Cardiomyopathy** SB<sup>3</sup>C2015-471 pg.642  
**Jonas Lantz**, Carljohan Carlh  ll, Tino Ebbers, *Link  ping University, Link  ping, Sweden*
- 3:45PM Preparation of a Hydrogel Phantom of Human Atherosclerotic Plaque for Medical Simulation and Imaging** SB<sup>3</sup>C2015-622 pg.913  
**Juyu Chueh<sup>1</sup>**, Tanya N. Turan<sup>2</sup>, Truman R. Brown<sup>2</sup>, Todd LeMatty<sup>2</sup>, Hui Mao<sup>3</sup>, Olivia W. Brooks<sup>1</sup>, Matthew J. Gounis<sup>1</sup>, <sup>1</sup>*University of Massachusetts Medical School, Worcester, MA, United States*, <sup>2</sup>*Medical University of South Carolina, Charleston, SC, United States*, <sup>3</sup>*Emory University School of Medicine, Atlanta, GA, United States*
- 4:00PM Microcirculation-Induced MRI Signal Anisotropy in Organized Tissues: Finite Element Modeling and Validation on Perfused Hearts** SB<sup>3</sup>C2015-1162 pg.1277  
**Osama Abdullah<sup>1</sup>**, Arnold David Gomez<sup>1</sup>, Adam Schmidt<sup>1</sup>, Edward Hsu<sup>2</sup>, <sup>1</sup>*University of Utah, Salt Lake City, UT, United States*, <sup>2</sup>*University of Utah, Salt Lake City, UT, United States*
- 4:15PM Functional and Anatomical Measures for Outflow Boundary Conditions in Atherosclerotic Coronary Bifurcations** SB<sup>3</sup>C2015-549 pg.782  
**Jelle Schrauwen<sup>1</sup>**, Adriaan Coenen<sup>1</sup>, Akira Kurata<sup>1</sup>, Jolanda J. Wentzel<sup>1</sup>, Antonius F. W. van der Steen<sup>1,2</sup>, Koen Nieman<sup>1</sup>, Frank J. H. Gijzen<sup>1</sup>, <sup>1</sup>*Thoraxcenter, Erasmus Medical Center, Rotterdam, Netherlands*, <sup>2</sup>*Delft University of Technology, Delft, Netherlands*

FRIDAY, JUNE 19

3:00pm - 4:30pm

**Vascular Remodeling and Stented Flow****Magpie**Session Chair: Lucas H. Timmins, *Georgia Institute of Technology, Atlanta, GA, United States*Session Co-Chair: Zhijie Wang, *University of Wisconsin - Madison, Madison, WI, United States*

- 3:00PM Effects Of Estrogen On Pulmonary Wave Reflection And Energy Transmission In Pulmonary Arterial Hypertension** SB<sup>3</sup>C2015-627 pg.923  
**Aiping Liu**, Naomi Chesler, *University of Wisconsin-Madison, Madison, WI, United States*

# SCIENTIFIC SESSIONS

Friday

- 3:15PM Biomechanical Comparison of Glutaraldehyde-crosslinked Gelatin/Fibrinogen Electrospun Cylindrical Scaffolds to Porcine Native Vascular Tissue** SB<sup>3</sup>C2015-1128 pg.1217  
**Ehab Tamimi**, Catalina D. Ardila, Darren G. Haskett, Thomas Doetschman, Jonathan P. Vande Geest, *University of Arizona, Tucson, AZ, United States*
- 3:30PM Hemodynamics of Healthy Vs. Pathological Venous Valve - Fluid-Structure Interaction Computational Model** SB<sup>3</sup>C2015-212 pg.204  
**Elina Soifer**<sup>1</sup>, Dar Weiss<sup>1</sup>, Oren Rotman<sup>1</sup>, Uri Zaretsky<sup>1</sup>, Shmuel Einav<sup>1,2</sup>, <sup>1</sup>*Tel Aviv University, Tel Aviv, Israel*,<sup>2</sup>*Stony Brook University, Stony Brook, NY, United States*
- 3:45PM Patient-specific Treatment Of Intracranial Aneurysms: An Automatic CFD-based Flow-diverter Optimization Principle** SB<sup>3</sup>C2015-265 pg.291  
**Philipp Berg**<sup>1</sup>, László Daróczy<sup>1</sup>, Oliver Beuing<sup>2</sup>, Gábor Janiga<sup>1</sup>, <sup>1</sup>*University of Magdeburg, Magdeburg, Germany*,<sup>2</sup>*University Hospital Magdeburg, Magdeburg, Germany*
- 4:00PM Vaso-CT for Quantitative Mapping of Vessel Wall Apposition in a Flow-Diverter Implant** SB<sup>3</sup>C2015-493 pg.674  
**Kajo van der Marel**, Ajay K. Wakhloo, Matthew J. Gounis, Ajit S. Puri, *University of Massachusetts Medical School, Worcester, MA, United States*
- 4:15PM Biomechanical Testing to Improve Constitutive Models of the Two-Layered Carotid Artery Media** SB<sup>3</sup>C2015-453 pg.614  
**Caleb Davis**<sup>1,2</sup>, Ashish Pandya<sup>2</sup>, Stephen E. Greenwald<sup>2</sup>, <sup>1</sup>*Texas A&M University, College Station, TX, United States*,<sup>2</sup>*Queen Mary University of London, London, United Kingdom*

FRIDAY, JUNE 19

3:00pm - 4:30pm

## Cardiovascular Tissue Engineering

Maybird

**Session Chair:** Alisa Morss, *Drexel University, Philadelphia, PA, United States*

**Session Co-Chair:** Pat Alford, *University of Minnesota, Minneapolis, MN, United States*

- 3:00PM Spatiotemporal Cell-matrix Interactions During En Masse Migration of Fibroblasts on Collagen Matrices** SB<sup>3</sup>C2015-491 pg.670  
**Altug Ozelikkale**<sup>1</sup>, Frederick Grinnell<sup>2</sup>, Bumsoo Han<sup>1</sup>, <sup>1</sup>*Purdue University, West Lafayette, IN, United States*,<sup>2</sup>*University of Texas Southwestern Medical Center, Dallas, TX, United States*
- 3:15PM Modeling the Enhancement of Extracellular Matrix Quantity and Quality in Large-Deformation Mechanically-Conditioned Heart Valve Tissue Engineering** SB<sup>3</sup>C2015-169 pg.124  
**Joao S. Soares**<sup>1</sup>, John A. Stella<sup>2</sup>, Antonio D'Amore<sup>2</sup>, Will Zhang<sup>1</sup>, William R. Wagner<sup>2</sup>, John E. Mayer<sup>3</sup>, Michael S. Sacks<sup>1</sup>, <sup>1</sup>*University of Texas at Austin, Austin, TX, United States*,<sup>2</sup>*University of Pittsburgh, Pittsburgh, PA, United States*,<sup>3</sup>*Harvard Medical School, Boston, MA, United States*
- 3:30PM Tubular Pediatric Pulmonary Valves By Suturing Decellularized Engineered Tissue Tubes** SB<sup>3</sup>C2015-183 pg.152  
 Jay Reimer, Zeeshan Syedain, Bee Haynie, **Robert Tranquillo**, *University of Minnesota, Minneapolis, MN, United States*
- 3:45PM Adipose-Derived Stem Cells From Diabetic Donors Cause Thrombotic Failure of Autologous Tissue Engineered Blood Vessels** SB<sup>3</sup>C2015-407 pg.523  
**Jeffrey T. Krawiec**<sup>1</sup>, Han T. Liao<sup>1,2</sup>, Justin S. Weinbaum<sup>1</sup>, Dominic J. Pezzone<sup>1</sup>, Antonio D'Amore<sup>1</sup>, J. P. Rubin<sup>1</sup>, William R. Wagner<sup>1</sup>, David A. Vorp<sup>1</sup>, <sup>1</sup>*University of Pittsburgh, Pittsburgh, PA, United States*,<sup>2</sup>*Chang Gung University, Guishan District, Taiwan*
- 4:00PM Biomechanical Characterizations of Scar ECM During the Acute to Chronic Stages of Myocardial Infarction** SB<sup>3</sup>C2015-503 pg.694  
**Bryn Brazile**<sup>1</sup>, Ryan Butler<sup>1</sup>, Sourav S. Patnaik<sup>1</sup>, Yanyi Xu<sup>2</sup>, Andrew Claude<sup>1</sup>, Raj Prabhu<sup>1</sup>, Lakiesha N. Williams<sup>1</sup>, Jianjun Guan<sup>2</sup>, Jun Liao<sup>1</sup>, <sup>1</sup>*Mississippi State University, Mississippi State, MS, United States*,<sup>2</sup>*Ohio State University, Columbus, OH, United States*
- 4:15PM Development of a Induced Pluripotent Stem Cell Derived Cardiomyocyte Seeded Fibrin Suture for Cardiac Regeneration** SB<sup>3</sup>C2015-599 pg.873  
**Katrina J. Hansen**<sup>1</sup>, Michael A. Laflamme<sup>2</sup>, Glenn R. Gaudette<sup>1</sup>, <sup>1</sup>*Worcester Polytechnic Institute, Worcester, MA, United States*,<sup>2</sup>*University of Washington, Seattle, WA, United States*

FRIDAY, JUNE 19

3:00pm - 4:30pm

**The Cellular Microenvironment  
(joint with JSME)**

**Golden Cliff / Eagle's Nest**

**Session Chair:** Wei Tan, *University of Colorado, Boulder, CO, United States*  
**Session Co-Chair:** Brendon Baker, *Boston University, Boston, MA, United States*

- 3:00PM MicroRNAs and Related Tissue Remodeling Genes in Rotator Cuff With Delayed Repair in A Rat Model**  
SB<sup>3</sup>C2015-1089 pg.1142  
**Christopher T. Chen**, Fuxin Wei, Erik Contreras, Lucas M. Chen, Zachary Shirley, William Shelton, Michael Khazzam, *UT Southwestern Medical Center, Dallas, TX, United States*
- 3:15PM Soft 3-Dimensional Neotissue Microarrays as High-throughput Platforms for Interrogating Stem Cell Instructional Microenvironments** SB<sup>3</sup>C2015-1173 pg.1295  
**Michael Floren**, Wei Tan, *University of Colorado, Boulder, CO, United States*
- 3:30PM Long-range Communication Between Cells in Fibrous Matrices Enabled by Tension-driven Alignment of Fibers**  
SB<sup>3</sup>C2015-113 pg.36  
**Hailong Wang**<sup>1</sup>, Abhilash Nair<sup>1</sup>, Brendon M. Baker<sup>2</sup>, Britta Trappmann<sup>2</sup>, Christopher S. Chen<sup>2</sup>, Rebecca G. Wells<sup>1</sup>, Vivek B. Shenoy<sup>1</sup>, <sup>1</sup>*University of Pennsylvania, Philadelphia, PA, United States*, <sup>2</sup>*Boston University, Boston, MA, United States*
- 3:45PM Engineered Cardiac Model System Reveals Fibroblast Threshold for Synchronized Beating** SB<sup>3</sup>C2015-158 pg.106  
**Ariane C. C. van Spreeuwel**<sup>1</sup>, Noortje A. M. Bax<sup>1</sup>, Christopher S. Chen<sup>2</sup>, Carljin V. C. Bouten<sup>1</sup>, <sup>1</sup>*Eindhoven University of Technology, Eindhoven, Netherlands*, <sup>2</sup>*Boston University, Boston, MA, United States*
- 4:00PM Cadherin-Specific Extracellular Interactions Alter Stem Cell Sensation and Interpretation of Soft Tissue Microenvironments** SB<sup>3</sup>C2015-190 pg.164  
**Brian D. Cosgrove**<sup>1,2</sup>, Kush D. Mehta<sup>1</sup>, Tristan P. Driscoll<sup>1,2</sup>, Jason A. Burdick<sup>1,2</sup>, Robert L. Mauck<sup>1,2</sup>, <sup>1</sup>*University of Pennsylvania, Philadelphia, PA, United States*, <sup>2</sup>*Philadelphia VA Medical Center, Philadelphia, PA, United States*
- 4:15PM Microscopic Heterogeneity in the Aortic Wall: Correlation between Mechanical Environment and Protein Expression**  
SB<sup>3</sup>C2015-567 pg.815  
**Takeo Matsumoto**<sup>1</sup>, Yohei Uno<sup>1</sup>, Shintaro Iijima<sup>1</sup>, Yoshitaka Moriyama<sup>1</sup>, Shukei Sugita<sup>1</sup>, Kazuaki Nagayama<sup>1,2</sup>, Akio Matsumoto<sup>3</sup>, <sup>1</sup>*Nagoya Institute of Technology, Nagoya, Japan*, <sup>2</sup>*Ibaraki University (present), Hitachi, Japan*, <sup>3</sup>*Chiba University, Chiba, Japan*

FRIDAY, JUNE 19

3:00pm - 4:30pm

**Soft Tissue Mechanics**

**Primrose B**

**Session Chair:** Heath Henninger, *University of Utah, Salt Lake City, UT, United States*  
**Session Co-Chair:** Trevor Lujan, *Boise State University, Boise, ID, United States*

- 3:00PM Computational Framework For Application Of Residual Stress When The Stress-free Configuration Is Unknown.**  
SB<sup>3</sup>C2015-1075 pg.1116  
**Steve Maas**<sup>1</sup>, Ahmet Erdemir<sup>2</sup>, Jason P. Halloran<sup>3</sup>, Jeffrey A. Weiss<sup>1</sup>, <sup>1</sup>*University of Utah, Salt Lake City, UT, United States*, <sup>2</sup>*Cleveland Clinic, Cleveland, OH, United States*, <sup>3</sup>*Cleveland State University, Cleveland, OH, United States*
- 3:15PM Using Slow and Fast Shear Waves to Estimate Shear and Tensile Moduli: Results from Simulations of Anisotropic Tissue.** SB<sup>3</sup>C2015-317 pg.377  
**Dennis J. Tweten**, John L. Schmidt, Ruth J. Okamoto, Philip V. Bayly, *Washington University, St. Louis, MO, United States*
- 3:30PM Experimental Measurement of Shear and Tensile Moduli In Anisotropic Tissue Using Magnetic Resonance Elastography** SB<sup>3</sup>C2015-244 pg.259  
**John L. Schmidt**<sup>1</sup>, Dennis J. Tweten<sup>1</sup>, Maisie M. Mahoney<sup>1</sup>, Tally Portnoi<sup>2</sup>, Ruth J. Okamoto<sup>1</sup>, Joel R. Garbow<sup>1</sup>, Philip V. Bayly<sup>1</sup>, <sup>1</sup>*Washington University, St. Louis, MO, United States*, <sup>2</sup>*Massachusetts Institute of Technology, Cambridge, MA, United States*



SCIENTIFIC SESSIONS

Friday/Saturday

- 3:45PM A Nonlinear Anisotropic Inverse Mechanics Method for Computational Dissection of Inhomogeneous Planar Soft Tissues** SB<sup>3</sup>C2015-171 pg.128  
**Colleen M. Witzenburg**<sup>1</sup>, Victor H. Barocas<sup>2</sup>, <sup>1</sup>University of Virginia, Charlottesville, VA, United States, <sup>2</sup>University of Minnesota, Minneapolis, MN, United States
- 4:00PM Structural Properties of the Anterolateral Structures of the Knee** SB<sup>3</sup>C2015-284 pg.321  
 Amir Ata Rahnama-Azar, **R Matthew Miller**, Daniel Guenther, Freddie H. Fu, Bryson P. Lesniak, Volker Musahl, Richard E. Debski, *University of Pittsburgh, Pittsburgh, PA, United States*
- 4:15PM Stiffness Characterization in Biological Materials Based on Deformation Imaging and Topology Optimization** SB<sup>3</sup>C2015-556 pg.795  
**Luyao Cai**<sup>1</sup>, Claus Pedersen<sup>2</sup>, Ross Mclendon<sup>2</sup>, Manuel Biedermann<sup>2</sup>, Gergana Dimitrova<sup>2</sup>, Jiang Yao<sup>2</sup>, Corey P. Neu<sup>1</sup>, <sup>1</sup>Purdue University, West Lafayette, IN, United States, <sup>2</sup>Dassault Systèmes, Johnston, RI, United States

**SATURDAY, JUNE 20**

**11:30am - 1:00pm**

**Workshop: Critical Steps in Composing a Successful Mentorship Plan**

**Primrose A**

Session Chair: **Sara E. Wilson**, *University of Kansas, Lawrence, KS, United States*  
 Session Co-Chair: **Rouzbeh Amini**, *The University of Akron, Akron, OH, United States*

**SATURDAY, JUNE 20**

**11:30am - 1:00pm**

**Workshop: Teaching Undergraduate Design**

**Superior**

Session Chair: **Martin Tanaka**, *Western Carolina University, Cullowee, NC, United States*  
 Session Co-Chair: **Ken Fischer**, *University of Kansas, Lawrence, KS, United States*

**SATURDAY, JUNE 20**

**11:30am - 1:00pm**

**Workshop: SimVascular Workshop and New User Training**

**Wasatch**

Session Chair: **Alison Marsden**, *University of California, San Diego, CA, United States*  
 Session Co-Chair: **Shawn Shadden**, *UC Berkeley, Berkeley, CA, United States*  
 Session Co-Chair: **Nathan Wilson**, *Open Source Medical Software Corporation, CA, United States*

**SATURDAY, JUNE 20**

**11:30am - 1:00pm**

**Workshop: FEBio Workshop and Discussion**

**Magpie**

Session Chair: **Jeffrey A. Weiss**, *University of Utah, Salt Lake City, UT, United States*  
 Session Co-Chair: **Gerard A. Ateshian**, *Columbia University, New York, NY, United States*  
 Session Co-Chair: **Steve Maas**, *University of Utah, Salt Lake City, UT, United States*

**SATURDAY, JUNE 20**

**11:30am - 1:00pm**

**Workshop: Experimental and Computational Frameworks for Biotransport in Tumors**

**Maybird**

Session Chair: **M. Nichole Rylander**, *University of Texas at Austin, Austin, TX, United States*  
 Session Co-Chair: **Malisa Sarntinoranont**, *University of Florida, Gainesville, FL, United States*

SATURDAY, JUNE 20

11:30am - 1:00pm

**Workshop: Taking the Guesswork out of the Interview Process**      **Golden Cliff / Eagle's Nest**

**Organizers:** ASME Bioengineering Division Student Leadership Committee (special thanks to Justine Garcia, Elizabeth Iffrig, and Corinne Riggan)

SATURDAY, JUNE 20

11:30am - 1:00pm

**Workshop: Robotic Testing Systems to Study Joint and Tissue Function**      **Primrose B**

**Session Chair:** Hiromichi Fujie, *Tokyo Metropolitan University, Tokyo, Japan*  
**Session Chair:** Richard Debski, *University of Pittsburgh, Pittsburgh, PA, United States*

SATURDAY, JUNE 20

1:30pm - 3:00pm

**Heart Valves and Cardiovascular Devices**      **Primrose A**

**Session Chair:** Sarah Vigmostad, *University of Iowa, Iowa City, IA, United States*  
**Session Co-Chair:** Keefe Manning, *Pennsylvania State University, State College, PA, United States*

- 1:30PM Fluid-Structure Interaction Analysis of Mitral Valve Forces using a Comprehensive Model with 3D Chordal Structure: Synergy of Modeling and Experiments** SB<sup>3</sup>C2015-387 pg.483  
Milan Toma<sup>1</sup>, **Morten O. Jensen**<sup>1</sup>, Daniel R. Einstein<sup>2</sup>, Ajit P. Yoganathan<sup>1</sup>, Richard P. Cochran<sup>3</sup>, Karyn S. Kunzelman<sup>3</sup>,  
<sup>1</sup>*Georgia Institute of Technology, Atlanta, GA, United States*,<sup>2</sup>*Pacific Northwest National Laboratory, Richland, WA, United States*,<sup>3</sup>*University of Maine, Orono, ME, United States*
- 1:45PM Transcatheter Aortic Valve Replacement Model: Crimping And Deploying In Patient-pathology Specific Roots** SB<sup>3</sup>C2015-418 pg.545  
**Matteo Bianchi**<sup>1</sup>, Ram P. Ghosh<sup>1</sup>, Debapria Das<sup>1</sup>, Gil Marom<sup>1</sup>, Thomas Claiborne<sup>1</sup>, Marvin Slepian<sup>2</sup>, Danny Bluestein<sup>1</sup>,  
<sup>1</sup>*Stony Brook University, Stony Brook, NY, United States*,<sup>2</sup>*Sarver Heart Center, University of Arizona, Tucson, AZ, United States*
- 2:00PM Computational Assessment of Hemodynamics in Tricuspid and Bicuspid Aortic Valves** SB<sup>3</sup>C2015-305 pg.357  
**Kai Cao**, Philippe Sucosky, *University of Notre Dame, Notre Dame, IN, United States*
- 2:15PM Effects Of Coronary Flow On Sinus Hemodynamics In The Presence Of A Transcatheter Aortic Valve Implantation** SB<sup>3</sup>C2015-1060 pg.1092  
Brandon Moore<sup>1</sup>, Pablo Maureira<sup>2</sup>, **Lakshmi P. Dasi**<sup>1</sup>, <sup>1</sup>*Colorado State University, Fort Collins, CO, United States*,<sup>2</sup>*Lorraine University Hospital of Nancy, Nancy, France*
- 2:30PM Left Ventricle Assist Device Anastomosis Hemodynamic Analysis Using Direct Numerical Simulations (DNS) And Large Eddy Simulations (LES)** SB<sup>3</sup>C2015-463 pg.628  
**Ricardo J. Bonilla-Alicea**, *Georgia Institute of Technology, Atlanta, GA, United States*
- 2:45PM Microfluidic Facsimile Of Ventricular Assist Device Shear Stress Patterns: Towards Point-of-care Devices To Monitor Patient Thrombotic Risk** SB<sup>3</sup>C2015-1126 pg.1213  
**Annalisa Dimasi**<sup>1</sup>, Filippo Consolo<sup>1</sup>, Lorenzo Valerio<sup>1</sup>, Marco Rasponi<sup>1</sup>, Danny Bluestein<sup>2</sup>, Gianfranco B. Fiore<sup>1</sup>, Alberto Redaelli<sup>1</sup>, Marvin Slepian<sup>3</sup>, <sup>1</sup>*Politecnico di Milano, Milano, Italy*,<sup>2</sup>*Stony Brook University, Stony Brook, NY, United States*,<sup>3</sup>*University of Arizona, Tucson, AZ, United States*

SATURDAY, JUNE 20

1:30pm - 3:00pm

**Growth, Remodeling and Repair****Superior**Session Chair: Kristin Miller, *Tulane University, New Orleans, LA, United States*Session Co-Chair: C. Alberto Figueroa, *University of Michigan, Ann Arbor, MI, United States*

- 1:30PM Cell-mediated Compaction and Collagen Remodeling in Tissue-engineered Heart Valves due to Dynamic Loading**  
**Conditions** SB<sup>3</sup>C2015-219 pg.216  
 Sandra Loerakker, Tommaso Ristori, Frank P. T. Baaijens, *Eindhoven University of Technology, Eindhoven, Netherlands*
- 1:45PM Non-Linear Optical Characterization of the Extracellular Matrix Changes Following Myocardial Infarction Predicts Alterations in Mechanical Properties** SB<sup>3</sup>C2015-1127 pg.1215  
 Kyle P. Quinn<sup>1</sup>, Kelly E. Sullivan<sup>1</sup>, Carlo A. Alonzo<sup>1</sup>, Zachary Ballard<sup>1</sup>, Irene Georgakoudi<sup>1</sup>, Lauren D. Black<sup>1,2</sup>, *Tufts University, Medford, MA, United States*, <sup>2</sup>Tufts University School of Medicine, Boston, MA, United States
- 2:00PM Tensile Equilibrium Material Response of Pregnant Mouse Cervical Tissue During Normal Remodeling**  
 SB<sup>3</sup>C2015-372 pg.461  
 Kyoko Yoshida<sup>1</sup>, Mala Mahendroo<sup>2</sup>, Joy Vink<sup>3</sup>, Ronald Wapner<sup>3</sup>, Kristin Myers<sup>1</sup>, *<sup>1</sup>Columbia University, New York, NY, United States*, *<sup>2</sup>UT Southwestern Medical Center, Dallas, TX, United States*, *<sup>3</sup>Columbia University Medical Center, New York, NY, United States*
- 2:15PM Strain-dependent Degradation as a Mechanism for the Paradoxical Effects of Mechanical Loading on Collagen Fiber Alignment in Healing Tendon** SB<sup>3</sup>C2015-467 pg.636  
 William J. Richardson<sup>1</sup>, Stavros Thomopoulos<sup>2</sup>, Jeffrey W. Holmes<sup>1</sup>, *<sup>1</sup>University of Virginia, Charlottesville, VA, United States*, *<sup>2</sup>Washington University, St. Louis, MO, United States*
- 2:30PM A Computational Growth and Remodelling Approach to Study Adaptation and Tortuosity in a Buckled Artery**  
 SB<sup>3</sup>C2015-580 pg.839  
 Mehdi Farsad<sup>1</sup>, Qin Liu<sup>2</sup>, Hai-Chao Han<sup>2</sup>, Seungik Baek<sup>1</sup>, *<sup>1</sup>Michigan State University, East Lansing, MI, United States*, *<sup>2</sup>University of Texas at San Antonio, San Antonio, TX, United States*
- 2:45PM Quantification Of Mechanical Properties Of Rat Thoracic Ducts For Long-term Prediction Of Mechanically-mediated Growth And Remodeling** SB<sup>3</sup>C2015-401 pg. 511  
 Alexander W. Caulk, Zhanna Nepiyushchikh, Ryan Shaw, J. Brandon Dixon, Rudolph L. Gleason, *Georgia Institute of Technology, Atlanta, GA, United States*

SATURDAY, JUNE 20

1:30pm - 3:00pm

**Pediatric/Embryonic Hemodynamics****Wasatch**Session Chair: Morbiducci Umberto, *Politecnico di Torino, Turin, Italy*Session Co-Chair: Anayiotos Andreas, *Cyprus University of Technology, Cyprus*

- 1:30PM In Vitro Multi-scale Patient Specific Study of the Effects of Coarctation in the Norwood Circulation** SB<sup>3</sup>C2015-430  
 Tianqi Hang<sup>1</sup>, Alessandro Giardini<sup>2</sup>, Giovanni Biglino<sup>3</sup>, Richard Figliola<sup>1</sup>, *<sup>1</sup>Clemson University, Clemson, SC, United States*, *<sup>2</sup>Great Ormond Street Hospital for Children, London, United Kingdom*, *<sup>3</sup>Great Ormond Street Hospital, London, United Kingdom* pg.569
- 1:45PM Improved Post-operative Flow Modeling For Complex Peripheral Pulmonary Artery Stenosis** SB<sup>3</sup>C2015-1103  
 Weiguang Yang<sup>1</sup>, Jeffrey A. Feinstein<sup>1</sup>, Alison L. Marsden<sup>2</sup>, Frank L. Hanley<sup>1</sup>, Frandics P. Chan<sup>1</sup>, Lisa W. Faberowski<sup>1</sup>, Irene E. Vignon-Clementel<sup>3</sup>, *<sup>1</sup>Stanford University, Palo Alto, CA, United States*, *<sup>2</sup>University of California, San Diego, La Jolla, CA, United States*, *<sup>3</sup>INRIA Paris-Rocquencourt, Paris, France* pg.1169
- 2:00PM The Effect of Resolution on Viscous Dissipation Measured with 4D Flow MRI in Patients with Fontan Circulation: Evaluation Using Computational Fluid Dynamics** SB<sup>3</sup>C2015-421 pg.551  
 Merih Cibis<sup>1</sup>, Kelly Jarvis<sup>2</sup>, Michael Markl<sup>2</sup>, Michael Rose<sup>2</sup>, Cynthia Rigsby<sup>2</sup>, Alex Barker<sup>2</sup>, Jolanda Wentzel<sup>1</sup>, *<sup>1</sup>Erasmus MC, Rotterdam, Netherlands*, *<sup>2</sup>Northwestern University, Chicago, IL, United States*



- 2:15PM Modeling Blood Flow in Embryo-Specific Geometry of the Zebrafish Heart** SB<sup>3</sup>C2015-266 pg.293  
Pavel Kozlovsky<sup>1</sup>, Robert Bryson-Richardson<sup>2</sup>, Moshe Rosenfeld<sup>1</sup>, Ariel Jaffa<sup>3</sup>, **David Elad<sup>1</sup>**, <sup>1</sup>Tel Aviv University, Tel Aviv, Israel,<sup>2</sup>Monash University, Melbourne, Australia,<sup>3</sup>Tel Aviv Medical Center, Tel Aviv, Israel
- 2:30PM Biomechanical Role For Cardiac Jelly In Pumping Mechanics Of Developing Heart During Looping** SB<sup>3</sup>C2015-657  
**David L. Bark, Jr.**, Brennan M. Johnson, Bryce W. Schroder, Deborah M. Garrity, Diego Krapf, Lakshmi P. D. Dasi, Colorado State University, Fort Collins, CO, United States pg.981
- 2:45PM Developmental Hemodynamics in the Embryonic Heart Outflow Tract** SB<sup>3</sup>C2015-205 pg.194  
**Venkat Keshav Chivukula**, Madeline Midgett, Sandra Rugonyi, Oregon Health and Sciences University, Portland, OR, United States

SATURDAY, JUNE 20

1:30pm - 3:00pm

**Biomechanics in Treatment of Heart Disease****Magpie**Session Chair: **Jonathan Wenk**, University of Kentucky, Lexington, KY, United StatesSession Co-Chair: **Lik Chuan Lee**, Michigan State University, East Lansing, MI, United States

- 1:30PM Cardiac Reversible Growth & Remodeling Model: Predicting and Understanding the Chronic Effects of Bioinjection Therapy** SB<sup>3</sup>C2015-31 pg.14  
**Lik Chuan Lee<sup>1</sup>**, Martin Genet<sup>2</sup>, Jonathan Wenk<sup>3</sup>, Joakim Sundnes<sup>4</sup>, Samuel Wall<sup>4</sup>, <sup>1</sup>Michigan State University, East Lansing, MI, United States,<sup>2</sup>ETH Zurich, Zurich, Switzerland,<sup>3</sup>University of Kentucky, Lexington, KY, United States,<sup>4</sup>Simula Research Laboratory, Oslo, Norway
- 1:45PM The Effect Of Trabeculae Carnae On The Passive Compliance Of Left Ventricle** SB<sup>3</sup>C2015-516 pg.718  
**Arnav Sanyal<sup>1</sup>**, David Halaney<sup>2</sup>, Marc D. Feldman<sup>2</sup>, Hai-Chao Han<sup>1</sup>, <sup>1</sup>University of Texas at San Antonio, San Antonio, TX, United States,<sup>2</sup>University of Texas Health Science Center at San Antonio, San Antonio, TX, United States
- 2:00PM Effect of Scar Compaction on Therapeutic Efficacy of Anisotropic Reinforcement Following Myocardial Infarction** SB<sup>3</sup>C2015-615 pg.903  
**Samantha A. Clarke**, Gorav Ailawadi, Jeffrey W. Holmes, University of Virginia, Charlottesville, VA, United States
- 2:15PM Impaired Collagen Degradation Prevents Right Ventricular Hypertrophy And Dysfunction With Development Of Pulmonary Arterial Hypertension** SB<sup>3</sup>C2015-645 pg.959  
**Mark Golob**, Zhijie Wang, Anthony Probst, Timothy Hacker, Gaoussou Diarra, Naomi Chesler, University of Wisconsin-Madison, Madison, WI, United States
- 2:30PM The Degree Of Outflow Tract Banding Predicts Cardiac Remodeling In Chicken Embryos** SB<sup>3</sup>C2015-108 pg.28  
**Madeline Midgett**, Sandra Rugonyi, Oregon Health & Science University, Portland, OR, United States
- 2:45PM Mechanical Decoupling of Nuclei from the Cytoskeleton Indicate Mechanosensitivity in a Myocardocyte Pathology Model** SB<sup>3</sup>C2015-540 pg.764  
**Benjamin Seelbinder**, Sarah Calve, Corey P. Neu, Purdue University, West Lafayette, IN, United States

SATURDAY, JUNE 20

1:30pm - 3:00pm

**Mechanotransduction I - Cellular and Sub-Cellular Biophysics  
(joint with JSME)****Maybird**Session Chair: **Leo Wan**, Rensselaer Polytechnic Institute, Troy, NY, United StatesSession Co-Chair: **James H. Wang**, University of Pittsburgh, Pittsburgh, PA, United States

- 1:30PM TGF-beta and BMP Signaling Pathways Regulate Chromatin Condensation in Mesenchymal Stem Cells in Response to Dynamic Loading** SB<sup>3</sup>C2015-398 pg.505  
**Su-Jin Heo<sup>1</sup>**, Woojin M. Han<sup>1,2</sup>, Tristan P. Driscoll<sup>1</sup>, Dawn M. Elliott<sup>2</sup>, Randall L. Duncan<sup>2</sup>, Robert L. Mauck<sup>1</sup>, <sup>1</sup>University of Pennsylvania, Philadelphia, PA, United States,<sup>2</sup>University of Delaware, Newark, DE, United States

# SCIENTIFIC SESSIONS

## Saturday

- 1:45PM Temperature Rise Causes Upregulation Of Tenocyte Catabolism And Enhances Gap Junctional Intercellular Communications** SB<sup>3</sup>C2015-342 pg.415  
Masataka Tashiro, Eijiro Maeda, **Toshiro Ohashi**, *Hokkaido University, Sapporo, Japan*
- 2:00PM Changes In Mechanosensitivity Of Children Cells: An Approach To Investigate Bone Repair And Bone Developmental Disease** SB<sup>3</sup>C2015-553 pg.789  
**Sara Barreto**<sup>1,2,3</sup>, Andrew R. Cameron<sup>1,2,3</sup>, Dylan Murray<sup>4</sup>, Fergal J. O'Brien<sup>1,2,3</sup>, <sup>1</sup>*Tissue Engineering Research Group, Royal College of Surgeons in Ireland, Dublin, Ireland*, <sup>2</sup>*Trinity Centre for Bioengineering, Trinity College Dublin, Dublin, Ireland*, <sup>3</sup>*Advanced Materials and Bio-Engineering Research (AMBER) Centre, Ireland, Dublin, Ireland*, <sup>4</sup>*National Paediatric Craniofacial Center, Children's University Hospital, Temple Street, Dublin, Ireland*
- 2:15PM Notch1 Mutation Leads to Valvular Calcification Through Enhanced Cadherin-11 Mechanotransduction** SB<sup>3</sup>C2015-651 pg.969  
**Joseph Chen**<sup>1</sup>, Larisa Ryzhova<sup>1</sup>, M.K. Sewell-Loftin<sup>1</sup>, Christopher Brown<sup>1</sup>, Stacey Huppert<sup>2</sup>, H. Scott Baldwin<sup>1</sup>, W. David Merryman<sup>1</sup>, <sup>1</sup>*Vanderbilt University, Nashville, TN, United States*, <sup>2</sup>*Cincinnati Children's Hospital, Cincinnati, OH, United States*
- 2:30PM Vinculin-network Mediated Cytoskeletal Remodeling Regulates Contractile Function In The Aging Heart** SB<sup>3</sup>C2015-1057 pg.1086  
Gaurav Kaushik<sup>1</sup>, Anthony Cammarato<sup>2</sup>, **Adam J. Engler**<sup>1</sup>, <sup>1</sup>*UC San Diego, La Jolla, CA, United States*, <sup>2</sup>*Johns Hopkins University, Baltimore, MD, United States*
- 2:45PM Acto myosin Catch Bonds And Mechano-sensitivity In Non-muscle Cells** SB<sup>3</sup>C2015-1144 pg.1243  
**Franck J. Vernerey**, Umut Akalp, *University of Colorado at Boulder, Boulder, CO, United States*

**SATURDAY, JUNE 20**

**1:30pm - 3:00pm**

## Injury Biomechanics I: Spine, Military, Modeling

## Golden Cliff / Eagle's Nest

**Session Chair:** Liming Voo, *Johns Hopkins University Applied Physics Laboratory, Laurel, MD, United States*

**Session Co-Chair:** Reuben H. Kraft, *The Pennsylvania State University, State College, PA, United States*

- 1:30PM A Point-Wise Normalization Method for Development of Biofidelity Response Corridors** SB<sup>3</sup>C2015-497 pg. 682  
**Ian Marcus**<sup>1</sup>, Scott Gayzik<sup>1</sup>, Kerry Danelson<sup>1</sup>, Jonathan Rupp<sup>2</sup>, Cameron Bass<sup>3</sup>, Narayan Yoganandan<sup>4</sup>, JiangYue Zhang<sup>5</sup>, <sup>1</sup>*Wake Forest University, Winston Salem, NC, United States*, <sup>2</sup>*University of Michigan Transportation Research Institute, Ann Arbor, MI, United States*, <sup>3</sup>*Duke University, Durham, NC, United States*, <sup>4</sup>*Medical College of Wisconsin, Milwaukee, WI, United States*, <sup>5</sup>*Applied Physics Laboratory Johns Hopkins University, Laurel, MD, United States*
- 1:45PM A Comparison Of Brain Injury Predictors Based On Four Benchmark Impact Studies** SB<sup>3</sup>C2015-479 pg.658  
**Siddiq Qidwai**, Nithyanand Kota, Amit Bagchi, *US Naval Research Laboratory, Washington, DC, United States*
- 2:00PM Effect Of Geometric And Material Property Changes In The Thoracic Skeleton For An Older Occupant Finite Element Model** SB<sup>3</sup>C2015-125 pg.52  
**Samantha Schoell**<sup>1,2</sup>, Ashley Weaver<sup>1,2</sup>, Nicholas Vavalle<sup>1,2</sup>, Joel Stitzel<sup>1,2</sup>, <sup>1</sup>*Virginia Tech- Wake Forest University, Winston-Salem, NC, United States*, <sup>2</sup>*Wake Forest School of Medicine, Winston-Salem, NC, United States*
- 2:15PM Collagen Mimetic Peptide as a Marker of Mechanical Damage in Lamb Middle Cerebral Arteries** SB<sup>3</sup>C2015-1020 pg.1018  
**Raymond G. Walther**, Matthew I. Converse, Kenneth L. Monson, *University of Utah, Salt Lake City, UT, United States*
- 2:30PM Injuries And Failure Biomechanical Responses Of Artificial Discs In The Cervical Spine: Potential Applications To Military Environments** SB<sup>3</sup>C2015-519 pg.725  
**Narayan Yoganandan**<sup>1</sup>, Frank A. Pintar<sup>1</sup>, Jamie L. Baisden<sup>1</sup>, Joseph B. McEntire<sup>2</sup>, Valeta Carol Chancey<sup>2</sup>, <sup>1</sup>*Medical College of Wisconsin, Milwaukee, WI, United States*, <sup>2</sup>*U.S. Army Aeromedical Research Laboratory, Fort Rucker, AL, United States*
- 2:45PM Investigation Of Possible Correlation Between Brain Tissue Response And Head Kinematics For Blast-induced Brain Injury** SB<sup>3</sup>C2015-1136 pg.1231  
**Hesam Sarvghad-Moghaddam**, Mariusz Ziejewski, Ghodrath Karami, *North Dakota State University, Fargo, ND, United States*

SATURDAY, JUNE 20

1:30pm - 3:00pm

**Shoulder Mechanics****Primrose B****Session Chair:** Richard Debski, *University of Pittsburgh, Pittsburgh, PA, United States***Session Co-Chair:** Antonis Stylianou, *University of Missouri-Kansas City, Kansas City, MO, United States*

- 1:30PM The Effect Of Size And Location Of Tears In The Supraspinatus Tendon On Potential Tear Propagation** SB<sup>3</sup>C2015-486 pg.664  
**James R. Thunes**, Siladitya Pal, R. M. Miller, Richard E. Debski, Spandan Maiti, *University of Pittsburgh, Pittsburgh, PA, United States*
- 1:45PM 3D Quantification of Osteophyte Distribution on the Humeral Head** SB<sup>3</sup>C2015-576 pg.831  
**Shea K. Taylor**<sup>1,2</sup>, Brandon G. Santoni<sup>1,2</sup>, Mark A. Frankle<sup>1,3</sup>, Peter Simon<sup>1,2</sup>, <sup>1</sup>*University of South Florida, Tampa, FL, United States*,<sup>2</sup>*Foundation for Orthopaedic Research and Education, Tampa, FL, United States*,<sup>3</sup>*Florida Orthopaedic Institute, Tampa, FL, United States*
- 2:00PM Surgical Accuracy of Traditional Humeral Head Osteotomy in Shoulder Arthroplasty** SB<sup>3</sup>C2015-146 pg.84  
Thomas Suter<sup>1,2</sup>, **Christopher W. Kolz**<sup>1</sup>, Sean T. Tagge<sup>1</sup>, Robert Z. Tashjian<sup>1</sup>, Ariane Gerber Popp<sup>2</sup>, Heath B. Henninger<sup>1</sup>, <sup>1</sup>*University of Utah, Salt Lake City, UT, United States*,<sup>2</sup>*Clinic of Orthopaedic Surgery, Kantonsspital Baselland, Liestal, Switzerland*
- 2:15PM Validation of a Subject-Specific Computer Model of Glenohumeral Instability and Capsular Plication** SB<sup>3</sup>C2015-616  
**Charlie Yongpravat**, David Kovacevic, T Sean Lynch, Charles M. Jobin, William N. Levine, Gerard A. Ateshian, Thomas R. Gardner, Christopher S. Ahmad, *Columbia University, New York, NY, United States* pg.905
- 2:30PM Design Considerations for Glenoid Components: A Computational Stress Analysis of Translational Motion in Shoulder Replacements** SB<sup>3</sup>C2015-258 pg.279  
**Christopher Berthelet**<sup>1</sup>, Farzana Ansari<sup>1</sup>, Lisa Pruitt<sup>1</sup>, Tom Norris<sup>2</sup>, Steve Gunther<sup>3</sup>, Michael Ries<sup>4</sup>, <sup>1</sup>*University of California, Berkeley, Berkeley, CA, United States*,<sup>2</sup>*San Francisco Shoulder, Elbow & Hand Clinic, San Francisco, CA, United States*,<sup>3</sup>*Martha Jefferson Hospital, Charlottesville, VA, United States*,<sup>4</sup>*Tahoe Fracture and Orthopedic Clinic, Carson City, NV, United States*
- 2:45PM Damage Analysis Of Metallic And Polymeric Bearings Used In Reverse Total Shoulder Arthroplasty** SB<sup>3</sup>C2015-192  
Suzanne Chou<sup>1</sup>, Isabel Yang<sup>1</sup>, **Noah Bonnheim**<sup>1</sup>, Farzana Ansari<sup>1</sup>, Steve Gunther<sup>2</sup>, Tom Norris<sup>3</sup>, Michael Ries<sup>4</sup>, Lisa Pruitt<sup>1</sup>, <sup>1</sup>*University of California, Berkeley, Berkeley, CA, United States*,<sup>2</sup>*Martha Jefferson Hospital, Charlottesville, VA, United States*,<sup>3</sup>*San Francisco Shoulder, Elbow & Hand Clinic, San Francisco, CA, United States*,<sup>4</sup>*Tahoe Fracture and Orthopaedic Clinic, Carson City, NV, United States* pg.168

SATURDAY, JUNE 20

3:15pm - 4:45pm

**Bone Tissue Engineering (joint with JSME)****Primrose A****Session Chair:** Shigeo Tanaka, *Kanazawa University, Kanazawa, Japan***Session Co-Chair:** Ryan K. Roeder, *University of Notre Dame, Notre Dame, IN, United States*

- 3:15PM Electromagnetic Field Stimulation Enhances Mechanical Properties Of Tissue-engineered Bone Constructed With Calcined Bovine Trabecular Bone Scaffold** SB<sup>3</sup>C2015-336 pg. 403  
**Shigeo Tanaka**, Yuki Yamashita, *Kanazawa University, Kanazawa, Japan*
- 3:30PM Development And Characterization Of Novel Bone Substitutes Using Composite Scaffolds With Mesenchymal Stem Cells** SB<sup>3</sup>C2015-267 pg. 295  
**Mitsugu Todo**<sup>1</sup>, Phanny Yos<sup>2</sup>, <sup>1</sup>*Kyushu University, Kasuga, Japan*,<sup>2</sup>*Institute of Technology of Cambodia, Phnom Penh, Cambodia*
- 3:45PM Hydroxyapatite Reinforced Collagen Scaffolds Designed for Improved Architecture, Mechanical Properties, and Tunable Growth Factor Delivery** SB<sup>3</sup>C2015-174 pg.134  
**Ryan K. Roeder**, Matthew J. Meagher, Holly E. Weiss-Bilka, Diane R. Wagner, Robert J. Kane, *University of Notre Dame, Notre Dame, IN, United States*



## SCIENTIFIC SESSIONS

### Saturday

- 4:00PM Microporosity Dominates Growth for Large and Small Macropores in BCP Scaffolds** SB<sup>3</sup>C2015-670 pg.1005  
**Amy Wagoner Johnson**<sup>1</sup>, Laurie Rustom<sup>1</sup>, David Hoelzle<sup>2</sup>, Mark Markel<sup>3</sup>, Brett Nemke<sup>3</sup>, Yan Lu<sup>3</sup>, <sup>1</sup>*University of Illinois at Urbana-Champaign, Urbana, IL, United States*,<sup>2</sup>*University of Notre Dame, Notre Dame, IN, United States*,<sup>3</sup>*University of Wisconsin, Madison, WI, United States*
- 4:15PM Fabrication Of Collagen Based 3-d Complex Constructs With Electrochemical Compaction Method** SB<sup>3</sup>C2015-154  
Mousa Younesi<sup>1</sup>, Vipul Kishore<sup>2</sup>, **Ozan Akkus**<sup>1</sup>, <sup>1</sup>*Case Western Reserve University, Cleveland, OH, United States*,<sup>2</sup>*Florida institute of technology, Melbourne, FL, United States* pg.98

**SATURDAY, JUNE 20**

**3:15pm - 4:45pm**

### Spine Mechanics

### Superior

**Session Chair:** Brian D. Stemper, *Medical College of Wisconsin, Milwaukee, WI, United States*

**Session Co-Chair:** Farid Amiriouch, *University of Illinois, Chicago, IL, United States*

- 3:15PM SEM-based Multi-scale Mechanical Modeling of Lumbar Spine Facet Capsular Ligament During Biaxial Extension** SB<sup>3</sup>C2015-1054 pg. 1082  
**Vahhab Zarei**, Amy A. Claeson, Victor H. Barocas, *University of Minnesota, Minneapolis, MN, United States*
- 3:30PM Simulation-Directed Design of Planar Biaxial Tests on the Lumbar Facet Capsular Ligament** SB<sup>3</sup>C2015-168 pg.122  
**Amy A. Claeson**, Victor H. Barocas, *University of Minnesota, Minneapolis, MN, United States*
- 3:45PM Effect Of Implant Length And Orientation On Biomechanics Of Sacroiliac Joint Stabilization: A Finite Element Analysis** SB<sup>3</sup>C2015-1141 pg.1237  
**Ali Kiapour**<sup>1</sup>, Derek Lindsey<sup>2</sup>, Scott Yerby<sup>2</sup>, Vijay Goel<sup>1</sup>, <sup>1</sup>*ECORE, Toledo, OH, United States*,<sup>2</sup>*Si-Bone Inc, San Jose, CA, United States*
- 4:00PM Internal Disc Strain Template Highlights Regions of High Local Strain During Compression Loading and Validates a Finite Element Model** SB<sup>3</sup>C2015-1019 pg.1016  
**Brent L. Showalter**<sup>1</sup>, John F. DeLucca<sup>2</sup>, John M. Peloquin<sup>1</sup>, Daniel H. Cortes<sup>2</sup>, Alexander C. Wright<sup>1</sup>, James C. Gee<sup>1</sup>, Edward J. Vresilovic<sup>3</sup>, Dawn M. Elliott<sup>2</sup>, <sup>1</sup>*University of Pennsylvania, Philadelphia, PA, United States*,<sup>2</sup>*University of Delaware, Newark, DE, United States*,<sup>3</sup>*Pennsylvania State University, Hershey, PA, United States*
- 4:15PM Accuracy of QCT-Based Finite Element Predictions of Vertebral Fracture When Boundary Conditions are Based on Intradiscal Pressure Profiles** SB<sup>3</sup>C2015-313 pg.369  
**Timothy Jackman**, Alexander DelMonaco, Elise Morgan, *Boston University, Boston, MA, United States*
- 4:30PM Differences In The Intradiscal Pressure In The L4-L5 And L5-S1 Lumbar Segments** SB<sup>3</sup>C2015-196 pg. 176  
**Hector E. Jaramillo**<sup>1</sup>, Christian M. Puttitz<sup>2</sup>, Jose J. Garcia<sup>3</sup>, Kirk McGilvray<sup>2</sup>, <sup>1</sup>*Universidad Autonoma de Occidente, Cali, Colombia*,<sup>2</sup>*Colorado State University, Fort Collins, CO, United States*,<sup>3</sup>*Universidad del Valle, Cali, Colombia*

**SATURDAY, JUNE 20**

**3:15pm - 4:45pm**

### Biological Flows in the Interstitium and Lymphatics

### Wasatch

**Session Chair:** Brandon Dixon, *Georgia Institute of Technology, Atlanta, GA, United States*

**Session Co-Chair:** Walter Lee Murfee, *Tulane University, New Orleans, LA, United States*

- 3:15PM A Poroelastic Fluid/Structure-Interaction Model of the Spinal Cord and Surrounding Structures with a Cord Syrxin and Associated Stenosis of the Subarachnoid Space** SB<sup>3</sup>C2015-197 pg.178  
**Christopher D. Bertram**<sup>1</sup>, Matthias Heil<sup>2</sup>, <sup>1</sup>*University of Sydney, New South Wales, Australia*,<sup>2</sup>*University of Manchester, Manchester, United Kingdom*
- 3:30PM Neural Tissue Deformation And Cerebrospinal Fluid Flow Impedance Are Positively Correlated At The Craniocervical Junction** SB<sup>3</sup>C2015-634 pg.937  
**Bryn A. Martin**<sup>1</sup>, Nicholas Shaffer<sup>1</sup>, John N. Oshinski<sup>2</sup>, Mark Luciano<sup>3</sup>, Francis Loth<sup>1</sup>, <sup>1</sup>*The University of Akron, Akron, OH, United States*,<sup>2</sup>*Emory University, Atlanta, GA, United States*,<sup>3</sup>*Cleveland Clinic Foundation, Cleveland, OH, United States*

- 3:45PM In Silico and In Vitro Modelling of Flow Behaviour in Lymphatic Vessels.** SB<sup>3</sup>C2015-222 pg.220  
Sinéad T. Morley<sup>1,2,3</sup>, David T. Newport<sup>1,4</sup>, Michael T. Walsh<sup>1,2,3</sup>, <sup>1</sup>University of Limerick, Limerick, Ireland, <sup>2</sup>Centre for Applied Biomedical Engineering Research, Limerick, Ireland, <sup>3</sup>Materials and Surface Science Institute, Limerick, Ireland, <sup>4</sup>Stokes Institute, Limerick, Ireland
- 4:00PM Quantification of Lymphatic Valve Resistance to Forward Flow Using Computational Fluid and Solid Modeling**  
SB<sup>3</sup>C2015-560 pg.801  
John T. Wilson<sup>1</sup>, Raoul van Loon<sup>2</sup>, James E. Moore<sup>1</sup>, <sup>1</sup>Imperial College London, London, United Kingdom, <sup>2</sup>Swansea University, Swansea, United Kingdom
- 4:15PM A New Paradigm for the Contribution of Active Tension to the Constitutive Relation in Small Lymphatic Vessels**  
SB<sup>3</sup>C2015-198 pg.180  
Christopher D. Bertram<sup>1</sup>, Charlie Macaskill<sup>1</sup>, Michael J. Davis<sup>2</sup>, James E. Moore<sup>3</sup>, <sup>1</sup>University of Sydney, New South Wales, Australia, <sup>2</sup>University of Missouri School of Medicine, Columbia, MO, United States, <sup>3</sup>Imperial College, London, United Kingdom
- 4:30PM Spatiotemporal Image Correlation Spectroscopy Techniques for Quantifying Fluid Flow in Microfluidic Channels and Porous Tissues** SB<sup>3</sup>C2015-472 pg.644  
Brian T. Graham, Christopher Price, University of Delaware, Newark, DE, United States

SATURDAY, JUNE 20

3:15pm - 4:45pm

### Micromechanics of Atherosclerosis

Magpie

Session Chair: Dalin Tang, Worcester Polytechnic Institute, Worcester, MA, United States  
Session Co-Chair: Susan Lessner, University of South Carolina, Columbia, SC, United States

- 3:15PM On the Effect of Calcific Content on the Mechanical Behaviour of Carotid Plaque Tissue** SB<sup>3</sup>C2015-359 pg.437  
Hilary E. Barrett, University of Limerick, Limerick, Ireland
- 3:30PM Intima Heterogeneity In Atherosclerotic Plaque Stress Calculations** SB<sup>3</sup>C2015-451 pg. 610  
Lambert Speelman<sup>1</sup>, Bas Van Velzen<sup>2</sup>, Anton F. W. Van der Steen<sup>1,2</sup>, Jolanda J. Wentzel<sup>1</sup>, Frank J. H. Gijssen<sup>1</sup>, <sup>1</sup>Erasmus MC, Rotterdam, Netherlands, <sup>2</sup>Delft University of Technology, Delft, Netherlands
- 3:45PM Diet-induced Vascular Remodeling Produces a Shift in Collagen Fiber Angle Distribution in a Mouse Model of Atherosclerosis** SB<sup>3</sup>C2015-508 pg.702  
Shana R. Watson, Piaomu Liu, Edsel A. Pena, Michael A. Sutton, John F. Eberth, Susan M. Lessner, University of South Carolina, Columbia, SC, United States
- 4:00PM Towards the Development of an Atherosclerotic Plaque Stratification Parameter to Predict Arterial Restenotic Response following Endovascular Treatment** SB<sup>3</sup>C2015-379 pg.469  
Eoghan M. Cunnane<sup>1</sup>, Hilary E. Barrett<sup>1</sup>, Eamon G. Kavanagh<sup>2</sup>, Michael T. Walsh<sup>1</sup>, <sup>1</sup>University of Limerick, Limerick, Ireland, <sup>2</sup>University Hospital Limerick, Limerick, Ireland
- 4:15PM Reconstruction of Incomplete Lipid Pool Geometry for Stress Calculations in Atherosclerotic Arteries** SB<sup>3</sup>C2015-362  
Annette M. Kok, Lambert Speelman, Frank J. H. Gijssen, Jolanda J. Wentzel, Erasmus MC, Rotterdam, Netherlands pg.443
- 4:30PM MMP-2 Expression and the Tissue Mechanics of Human Ascending Thoracic Aortic Aneurysms** SB<sup>3</sup>C2015-405  
Alexander A. Emmott<sup>1,2</sup>, Nastaran Shahmansouri<sup>1,2</sup>, Mohammed Alreshidan<sup>3</sup>, Stefanie Pohlod<sup>1</sup>, Rosaire Mongrain<sup>1</sup>, Raymond Cartier<sup>2</sup>, Kevin Lachapelle<sup>3</sup>, Richard Leask<sup>1,2</sup>, <sup>1</sup>McGill University, Montreal, QC, Canada, <sup>2</sup>Montreal Heart Institute, Montreal, QC, Canada, <sup>3</sup>Royal Victoria Hospital, Montreal, QC, Canada pg.519

SATURDAY, JUNE 20

3:15pm - 4:45pm

### Mechanotransduction II - Interactions between Cells and Their Environment (joint with JSME)

Maybird

Session Chair: Toshiro Ohashi, *Hokkaido University, Sapporo, Japan*Session Co-Chair: Chelsey Simmons, *University of Florida, Gainesville, FL, United States*

- 3:15PM A Microtissue Array Device To Screen The Lung Fibrogenic Potential Of Carbon Nanotubes** SB<sup>3</sup>C2015-350 pg. 427  
Zhaowei Chen, Qixin Wang, Mohammadnabi Asmani, Yan Li, Yun Wu, **Ruogang Zhao**, *State University of New York at Buffalo, Buffalo, NY, United States*
- 3:30PM The Impact of Pre-stretch Induced Surface Anisotropy on Axonal Regeneration** SB<sup>3</sup>C2015-464 pg.630  
Chun Liu, Seungik Baek, **Christina Chan**, *Michigan State University, East Lansing, MI, United States*
- 3:45PM Excessive Mechanical Loading Causes Aberrant Differentiation Of Tendon Stem Cells (TSCs) That Leads To The Development Of Degenerative Tendinopathy** SB<sup>3</sup>C2015-227 pg. 230  
Jianying Zhang, **James H-C. Wang**, *University of Pittsburgh, Pittsburgh, PA, United States*
- 4:00PM Both Nuclear And Extracellular Matrix Rigidity Determine The Stable Size Of Focal Adhesion Plaques** SB<sup>3</sup>C2015-228  
**Xuan Cao**, Tristan P. Driscoll, Robert L. Mauck, Vivek B. Shenoy, *University of Pennsylvania, Philadelphia, PA, United States* pg.232
- 4:15PM Role Of Cell Tension On Anisotropic Mechanosensing** SB<sup>3</sup>C2015-1106 pg.1175  
**Shin Min Wen**, Pen Hsiu Grace Chao, *National Taiwan university, TAIPEI, Taiwan*
- 4:30PM Osteocyte Mechanotransduction During Low Magnitude Mechanical Stimulation** SB<sup>3</sup>C2015-1121 pg.1205  
**Thomas R. Coughlin**, Tyler C. Kreipke, Glen L. Niebur, *University of Notre Dame, Notre Dame, IN, United States*

SATURDAY, JUNE 20

3:15pm - 4:45pm

### Injury Biomechanics II - Head to Foot, Modeling, Risk Golden Cliff / Eagle's Nest

Session Chair: Steven Rowson, *Virginia Tech, Blacksburg, VA, United States*Session Co-Chair: Ken Monson, *University of Utah, Salt Lake City, UT, United States*

- 3:15PM The Effect of Grade II and Grade III Ankle Injury on the Ankle Joint Complex Kinematics and Achilles Load: A Cadaveric Study** SB<sup>3</sup>C2015-529 pg.743  
**Bardiya Akhbari**, Matthew H. Dickinson, Ednah G. Louie, Sami Shalhoub, Lorin P. Maletsky, *University of Kansas, Lawrence, KS, United States*
- 3:30PM Driver Injury Risk Sensitivity in Finite Element Model Reconstructions of Real World Motor Vehicle Crashes** SB<sup>3</sup>C2015-602 pg. 879  
**James P. Gaewsky**, Ashley A. Weaver, Bharath Koya, Joel D. Stitzel, *Wake Forest University, Winston-Salem, NC, United States*
- 3:45PM Head-neck Relative Posture Affects Fracture Outcome of the Basilar Skull and Upper Cervical Spine under Helmeted Head Crown Impact** SB<sup>3</sup>C2015-571 pg.821  
**Liming Voo**, Kyle Ott, Christopher Dooley, Andrew Merkle, *Johns Hopkins University Applied Physics Laboratory, Laurel, MD, United States*
- 4:00PM Investigation of Head Rotational Impulse Characteristics on Brain Strain Responses** SB<sup>3</sup>C2015-39 pg.22  
**Wei Zhao**, Songbai Ji, *Dartmouth College, Hanover, NH, United States*
- 4:15PM Development of a 5th Percentile Female Finite Element Model Using a Multi-Modality Image Dataset** SB<sup>3</sup>C2015-1038  
**Matthew L. Davis**, Bharath Koya, Jeremy M. Schap, F. Scott Gayzik, *Virginia Tech-Wake Forest University, Winston Salem, NC, United States* pg. 1050
- 4:30PM Embedded Finite Elements For Modeling Traumatic Axonal Injury** SB<sup>3</sup>C2015-1117 pg.1197  
**Reuben H. Kraft**, Harsha T. Garimella, *The Pennsylvania State University, University Park, PA, United States*



SATURDAY, JUNE 20	3:15pm - 4:45pm
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### Lower Extremity Mechanics

Primrose B

**Session Chair:** Lorin Maletsky, *University of Kansas, Lawrence, KS, United States*

**Session Co-Chair:** Ferris Pfeiffer, *University of Missouri, Columbia, MO, United States*

- 3:15PM Understanding the Mechanics of Focal Chondral Defects in the Hip: a Framework to Advance Treatment Options**  
SB<sup>3</sup>C2015-596 pg.867  
**Brenden J. Klennert**, Benjamin J. Ellis, Travis G. Maak, Ashley Kapron, Tyler O. Kaiser, Jeffrey A. Weiss, *University of Utah, Salt Lake City, UT, United States*
- 3:30PM Specimen-Specific Evaluation of a Multi-Body Model Predicts Instability and Increased Meniscal Load in the Anterior Cruciate Ligament-Deficient Knee** SB<sup>3</sup>C2015-375 pg.465  
**Mohammad Kia**, Kevin Schafer, Daniel Green, Andrew Pearle, Thomas Wickiewicz, Timothy Wright, Carl Imhauser, *Hospital for Special Surgery, New York, NY, United States*
- 3:45PM In-Vivo Kinematics of the Asymptomatic Hip during Dynamic Pivoting: Foundations for the Evaluation of Femoroacetabular Impingement** SB<sup>3</sup>C2015-306 pg.359  
**Penny R. Atkins**, Niccolo M. Fiorentino, Michael J. Kutschke, Sara J. Fauver, Ashley L. Kapron, Christopher L. Peters, Stephen K. Aoki, Andrew E. Anderson, *University of Utah, Salt Lake City, UT, United States*
- 4:00PM Open Knee(s): Magnetic Resonance Imaging for Specimen-specific Next Generation Knee Models** SB<sup>3</sup>C2015-581  
**Craig Bennetts**<sup>1</sup>, Snehal Chokhandre<sup>1</sup>, Shannon Donnola<sup>2</sup>, Chris Flask<sup>2</sup>, Tara Bonner<sup>1</sup>, Robb Colbrunn<sup>1</sup>, Ahmet Erdemir<sup>1</sup>, <sup>1</sup>*Cleveland Clinic, Cleveland, OH, United States*, <sup>2</sup>*Case Western Reserve University, Cleveland, OH, United States* pg.841
- 4:15PM A New Joint Coordinate System for Robotic Testing of Cadaveric Knee Specimens** SB<sup>3</sup>C2015-554 pg.791  
**Daniel Boguszewski**, Nirav Joshi, Edward Cheung, Paul Yang, Keith Markolf, David McAllister, *UCLA, Los Angeles, CA, United States*
- 4:30PM Do The Laxities Of The Normal Knee At 0° And 90° Of Flexion Support The Goal Of Gap-balancing A Total Knee Arthroplasty?** SB<sup>3</sup>C2015-30 pg.12  
**Joshua D. Roth**, Stephen M. Howell, Maury L. Hull, *University of California, Davis, Davis, CA, United States*

SATURDAY, JUNE 20	5:00pm - 6:00pm
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LISSNER LECTURE – James A. Ashton-Miller

Ballrooms 1-3