



SB<sup>3</sup>C

biomechanics.  
bioengineering.  
biotransport.

# Conference Program

2019 Summer Biomechanics, Bioengineering,  
and Biotransport Conference

June 25 - 28, Seven Springs, PA

Funding for this conference was made possible (in part) by the National Science Foundation's Civil, Mechanical and Manufacturing Innovation Division (Biomechanics and Mechanobiology) #1856203.

Funding for this conference was also made possible (in part) by 1R13EB028126-01 from the National Institute of Biomedical Imaging and Bioengineering. The views expressed in written conference materials or publications and by speakers and moderators do not necessarily reflect the official policies of the Department of Health and Human Services; nor does mention of trade names, commercial practices, or organizations imply endorsement by the U.S. Government.

Prizes and other support for the Student Paper Competition were provided by the Bioengineering Division of the American Society of Mechanical Engineers.

**The 2019 Summer Biomechanics, Bioengineering, and Biotransport Conference (SB<sup>3</sup>C) organizers gratefully acknowledge the support of the National Science Foundation, the National Institutes of Health, and American Society of Mechanical Engineers.**



National Institute of Biomedical Imaging and Bioengineering  
*Creating Biomedical Technologies to Improve Health*



Congratulations to the inaugural Cover Art Contest Winner:

**Mikhail Golman, Columbia University - (Podium SB<sup>3</sup>C2019-140)**

*Title: Failure Mechanisms In The Tendon Enthesis Under Quasistatic, Cyclical, And Pathological Loading*

Description: Three dimensional visualization of tendon enthesis using contrast-enhanced microCT imaging. An unloaded control sample revealed that, hidden within the well-known larger apparent attachment footprint area, is a smaller, much denser primary insertion site where tendon fibers insert directly into the bone surface.

**ISBN 978-0-578-51219-8**

# 1 Forward and Acknowledgement

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We are excited to welcome you to the fourth annual Summer Bioengineering, Biomechanics and Biotransport Conference (SB<sup>3</sup>C). On behalf of the entire Conference Committee and the SB<sup>3</sup>C Foundation, we welcome you to Seven Springs, PA. We are happy to announce our Platinum Sponsor, The American Society of Mechanical Engineers Bioengineering Division (ASME-BED). ASME-BED is sponsoring the Student Paper Competition (SPC) awards, travel for all 36 PhD SPC finalists and ASME memberships for all students who entered the SPC. Additionally, for the first time, with generous support from the National Institutes of Health (NIH) and the National Science Foundation (NSF), we supported travel for many of the SPC BS and MS finalists, as well as over 30 Diversity Travel Awards.

This year is special as we celebrate the 100th birthday of Y.C. Fung, who is world renowned as a "Founder of Modern Biomechanics." In 1972, Y.C. Fung established the Biomechanics Symposium under ASME. We honor Dr. Fung with two symposia highlighting research from both early career and established investigators whose careers and work exemplify that of Professor Fung. We also remember Dr. Christopher Jacobs, a leader in cellular mechanotransduction and computational biomechanics, through two sessions focused on mechanobiology.

This year's conference theme is Creating Multiscale Connections: The Keystone of Integrative Biomechanics, Bioengineering and Biotransport. A keystone is placed at the top of an arch or vault, locking the stones in place and allowing the structure to bear weight. Since Pennsylvania is the Keystone state, we centered this year's conference on workshops and sessions that integrate research across size scales and organ systems, as this is critical to both discovery and impact in the field. We hope that attendees will be inspired to engage in multiscale research, while renewing old connections and initiating new conversations with the diversity of colleagues who attend SB<sup>3</sup>C.

We continue the tradition of honoring the ASME medal winners, and we are especially proud of the diversity among the award recipients. The H.R. Lissner Medal winner, Dr. Jennifer Wayne, is honored for outstanding achievement in experimental and computational joint biomechanics, in addition to her educational impact and service to ASME-BED. Dr. Rita Patterson, winner of the Savio L-Y. Woo Translational Biomechanics Medal, is honored for biomechanics research on the hand and wrist that translated into surgical interventions that have improved patients' quality of life. Dr. Tony Huang will receive the Van C. Mow Medal for pioneering research in acoustofluidics; Dr. Grace O'Connell will receive the Y.C. Fung Early Career Medal for exceptional intervertebral disc research; and Dr. Kenneth Diller will receive the Robert M. Nerem Education and Mentorship Medal for investing in the personal and professional development of his colleagues. We congratulate all of the awardees and encourage you to attend their talks during the conference.

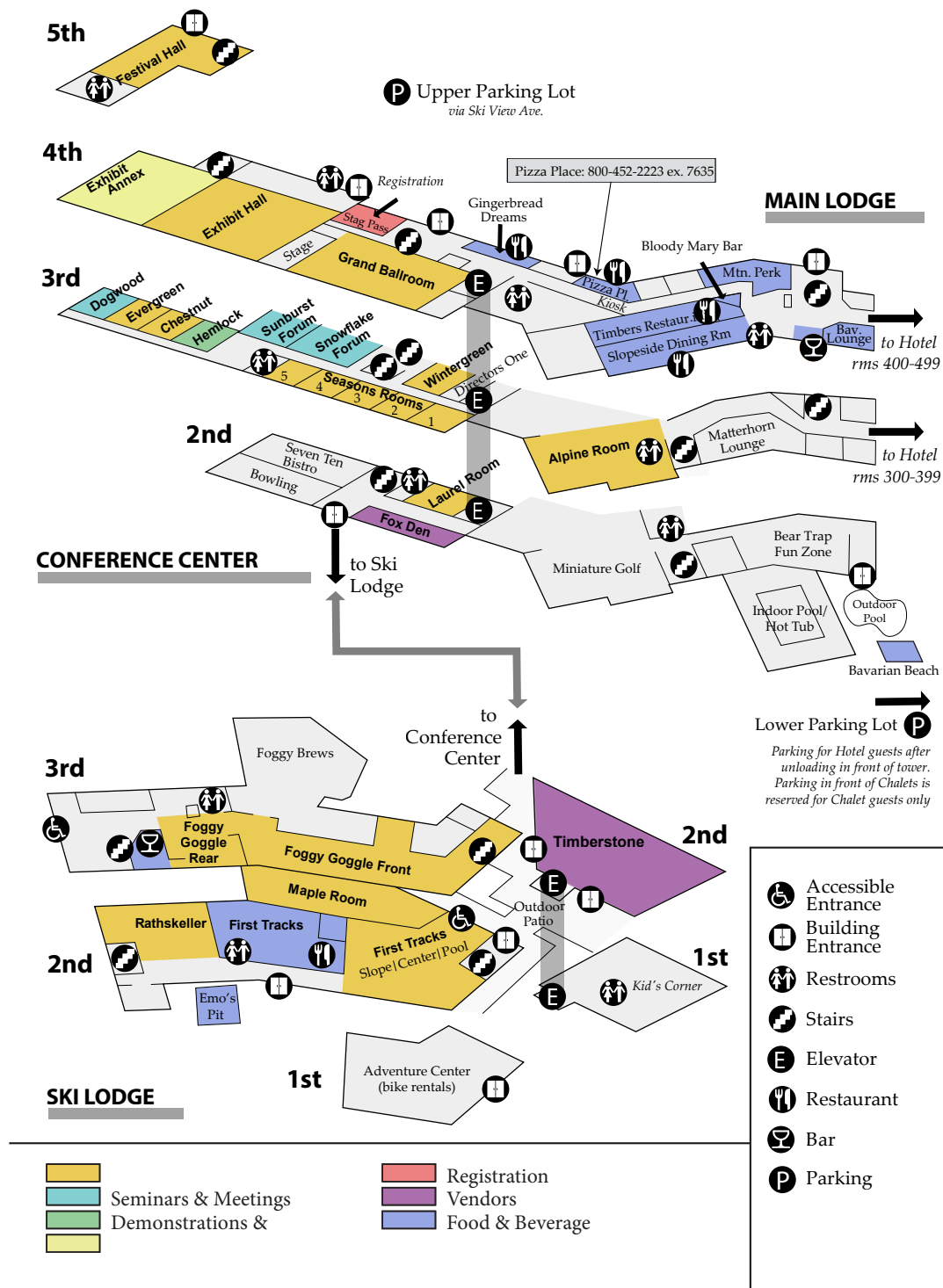
Our student delegates, who make up approximately 50% of our total delegates, are represented by a strong Student Leadership Committee (SLC). The SLC has planned both professional development activities as well as social activities for all students. We are proud to announce that we have a record number of SPC submissions and especially proud of the record number of bachelor level submissions.

We hope you have time to enjoy the beautiful Allegheny Mountains of Seven Springs and take time to hike, golf, mountain bike, ride the zip line, battle at paintball, or take it easy in the spa. Last but certainly not least, we wholeheartedly thank the entire SB<sup>3</sup>C Conference Committee, the ASME-BED Technical Committees, the SLC, Boscov's Travel, the SB<sup>3</sup>C Foundation, and all the abstract reviewers and SPC judges who work so hard to ensure we have an amazing conference. Enjoy the conference, and please join us again in Vail 2020!

**Tammy Haut Donahue, Conference Chair**  
University of Massachusetts Amherst

**Alisa Morss Clyne, Program Chair**  
University of Maryland

## 2 Conference Site Map and Accessibility



### ACCESSIBILITY

All floors being used for the meeting spaces are accessible. The following entrances are accessible: Conference Center entrance ramp, Pizza Place entrance, Hotel Lobby Entrance and Conference Center lower level back entrance. The hotel has on-site accessible self-parking as well as valet service. Service animals are permitted for persons with disabilities. Should you require specific accessibility accommodations, please contact the resort's front desk at 814-352-7777 x3000.

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### 3 General Information

#### 3.1 Social Program

##### Tuesday June 25

Opening Reception	Pavers Circle	6:30 - 8:30 PM
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##### Wednesday June 26

ASME SLC Walk and Talk	Front of Main Lodge	3:00 - 4:30 PM
Diversity/Mentoring Event	Matterhorn Lounge	4:30 - 6:00 PM

##### Thursday June 27

Women's Networking Event	Seven/Ten Bistro	3:45 - 4:45 PM
IAB SLC Career Connections	Exhibit Hall	5:30 - 7:00 PM
BEDRock	Foggy Goggle Stage	8:00 - 11:00 PM

##### Friday June 28

ASME Student Leadership Committee Meeting	Wintergreen	10:30 - 11:30 AM
Lissner Reception	Exhibit Hall Annex	6:30 - 7:30 PM
Conference Banquet & Awards	Exhibit Hall	7:30 - 10:30 PM

#### 3.2 Conference Registration Hours

Tuesday, June 25	9:00AM - 9:00 PM
Wednesday, June 26	6:30AM - 2:00 PM
Thursday, June 27	6:30AM - 2:30 PM
Friday, June 28	11:30PM - 2:00 PM

#### 3.3 Instructions for Poster Presenters

The Exhibit Hall will be available to attendees from Tuesday-Friday. Session I posters should be set up between 11am-3:30pm on Tuesday, June 25 and must be removed between 3-4pm on Wednesday, June 26. Session II posters should be set up between 4-6pm on Wednesday, June 26 and can be removed on Thursday, June 27 after 4pm (Friday morning at the latest). Students with posters in the competition should remain at their posters throughout the designated poster sessions. Any poster remaining after the assigned take down period for a Poster Session will be removed by the organizers.

##### Poster Session I (Wed June 26, 12:45PM - 2:15PM)

Poster #	Theme
1-33	ASME SPC BS Level Competition
34-60	ASME SPC MS Level Competition
61-86	Fluids
87-132	Solids
133-150	Cell & Tissue Eng.

##### Poster Session II (Thurs June 27, 12:45PM - 2:15PM)

Poster #	Theme
151-165	Biotransport
166-177	Design, Dynamics, & Rehab.
178-182	Education
183-203	Fluids
204-282	Solids
283-298	Cell & Tissue Eng.

#### 3.4 Speaker Ready Rooms

For podium speakers, session rooms will be available outside of the scheduled session times. Speakers are encouraged to test their presentations in the appropriate room prior to their presentation.

### 3.5 Committee Meetings

Unless denoted by asterisks (\*), the committee meetings listed below are open to all. Attending these meetings is a terrific way to get more involved with the Bioengineering Division of the ASME! Please consider joining one or more of the meetings listed below.

#### Tuesday, June 25

##### SB<sup>3</sup>C Meetings

SB <sup>3</sup> C Board Meeting*	Seasons 1-3	9:00AM - 10:00 AM
SB <sup>3</sup> C Organizing & Program**	Seasons 1-3	10:10AM - 11:20 AM

##### ASME BED Meetings

Fluid Mechanics	Fox Den	8:30AM - 9:20 AM
Biotransport	Seasons 4-5	11:30AM - 12:20 PM
Education	Wintergreen	11:30AM - 12:20 PM
Cell & Tissue Engineering	Seasons 1-3	11:30AM - 12:20 PM
Design, Dynamics & Rehab	Wintergreen	12:30PM - 1:20 PM
Solid Mechanics	Seasons 1-3	12:30PM - 1:20 PM

#### Wednesday, June 26

BED Executive*	Director's One	2:00PM - 4:30 PM
ASME Bioengineering Division Open Business Meeting	Wintergreen	6:00PM - 7:00 PM

#### Thursday, June 27

JBME Editors (with lunch) ***	Slopeside Restaurant	1:00PM - 2:00 PM
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\* Closed Meeting

\*\* SB<sup>3</sup>C Organizing committee meeting: members for three conference years (2019, 2020, 2021) should attend.  
SB<sup>3</sup>C Program committee meeting: Program Chair (2020), Program Chair (2021), and Chairs of Technical Committees for these years. Organizing Committee chaired by Conference Chair 2019; Program Committee chaired by Program Chair 2019.

\*\*\* JBME editors and co-editors.



## 4 Conference Organizing Committees

### 4.1 Organizing Committee



**Tammy Haut Donahue, Conference Chair**  
University of Massachusetts Amherst



**Alisa Morss Clyne, Program Chair**  
University of Maryland

**Joseph Iaquinto**, Information Chair, CLiMB, VA Puget Sound & University of Washington  
**Matthew Fisher**, Local Arrangements Chair, NC State University & UNC-Chapel Hill  
**Naomi Chesler**, Exhibits Chair, University of Wisconsin  
**Daniela Valdez-Jasso**, Diversity Chair, University of California San Diego  
**Jonathan Vande Geest**, Publications Chair, University of Pittsburgh  
**Shannon Stott**, Student Paper Competition Chair, Mass Gen Hospital, Harvard Med School  
**Carla Winsor**, Student Leadership Chair, University of Wisconsin  
**Justin Scott**, Student Leadership Co-Chair, Michigan State University  
**Megan Killian**, Social Media Chair, University of Delaware

### 4.2 Program Committee

**Alisa Morss Clyne**, Chair, Program Committee, University of Maryland  
**Xiaoming (Shawn) He**, Chair, Biotransport Technical Committee, University of Maryland  
**Rafael Davalos**, Vice Chair, Biotransport Technical Committee, Virginia Tech University  
**Tammy Bush**, Chair, Design, Dynamics, and Rehab Tech Committee, Michigan State University  
**Michael Moreno**, Vice Chair, Design, Dynamics, and Rehab Tech Committee, Texas A&M  
**Alison Marsden**, Chair, Fluids Technical Committee, Stanford University  
**John LaDisa**, Vice Chair, Fluids Technical Committee, Marquette University  
**Alisa Morss Clyne**, Chair, Education Technical Committee, University of Maryland  
**Ferris Pfeiffer**, Vice Chair, Education Technical Committee, University of Missouri  
**Ed Guo**, Chair, Cell & Tissue Engineering Technical Committee, Columbia University  
**Grace O'Connell**, Vice Chair, Cell & Tissue Engineering Technical Committee, UC Berkeley  
**Jonathan Vande Geest**, Chair, Solid Mechanics Technical Committee, University of Pittsburgh  
**Vicky Nguyen**, Vice Chair, Solid Mechanics Technical Committee, Johns Hopkins University  
**Carla Winsor**, Student Leadership Chair, University of Wisconsin  
**Justin Scott**, Student Leadership Vice Chair, Michigan State University  
**Shannon Stott**, ASME BED SLC Advisor, Mass Gen Hospital, Harvard Med School



### 4.3 Student Paper Competition Committee

**Shannon Stott**, Chair, Student Paper Competition, Mass Gen Hospital, Harvard Med School

**Sara Roccabianca**, PhD Level, Michigan State University

**Ian Sigal**, MS Level, University of Pittsburgh

**Joao Soares**, BS Level, Virginia Commonwealth University

### 4.4 Undergraduate Design Competition Committee

**Michael Moreno**, Chair, Undergraduate Student Design Competition, Texas A&M University

**Ted Conway**, Co-Chair, Undergraduate Student Design Competition, Florida Institute of Tech

### 4.5 ASME BED Student Leadership Committee Planned Events

#### **Wednesday, June 26th, 2019: Walk and Talk**

Take a hike with some friends! We will be hiking around the Seven Springs area and might even run into some of the surrounding lakes. We will be taking a break to talk and eat some snacks, but talking and meeting new people along the way is always encouraged! Snacks will be provided.

**Time:** 3:00-4:30 PM

**Location:** In front of the main lodge

#### **Thursday, June 27th, 2019: Career Connections Mixer**

Are you interested in a career in industry or academia? The Career Connections Mixer is an opportunity for undergraduate students, graduate students, and post docs to connect face-to-face with potential employers from industrial and academic backgrounds to discuss career paths in bioengineering.

**Time:** 5:30-7:00 PM

**Location:** Seasons 1, 2, and 3

#### **Friday, June 28th, 2019: Student Leadership Committee Open Meeting**

Come join the student leadership committee as we discuss plans for the next year and ways to better serve the student community. This is a chance to see how events and services for students get planned and potentially get involved in the process yourself.

**Time:** 10:30-11:30 AM

**Location:** Wintergreen

**JUNE  
27**  
5:30 PM

# CAREER CONNECTIONS

AT THE 2019 SB<sup>3</sup>C

APPLY | RECRUIT | NETWORK

**SB<sup>3</sup>C** **biomechanics.  
bioengineering.  
biotransport.**

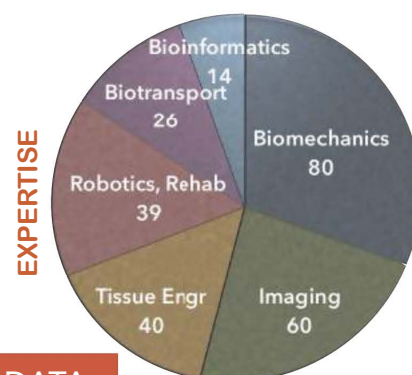
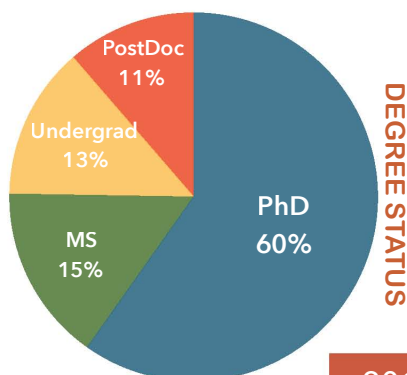
June 25-28, 2019, Seven Springs, PA

Job? Ph.D. position?

Post doc?

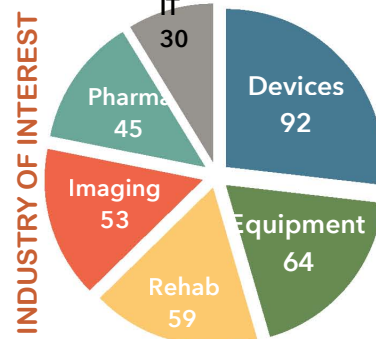
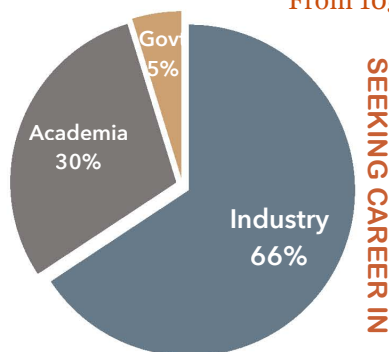
Network with  
Employers and/or  
Professors

Organized by the  
Industry Committee and  
Student Leadership Committee



2017 DATA

From 105 student registrants



Students and employers may register at  
<http://sb3c.org/program/career-connections>

**Thursday, June 27, 2019 5:30 - 7 PM**

**Exhibit Hall, Seven Springs Resort, PA**

The SB<sup>3</sup>C is the annual conference for Bioengineering Division of the American Society of Mechanical Engineers. The Career Connections Event is a forum for networking among the nation's top students, elite bioengineering research laboratories and potential employees.

Enquiries:

Students: Marissa Grobbel (Student Leadership Committee), [grobbe12@msu.edu](mailto:grobbe12@msu.edu)

Employers: Suresh M.L. Raghavan (Industry Committee), [ml-raghavan@uiowa.edu](mailto:ml-raghavan@uiowa.edu)

**SB<sup>3</sup>C.ORG**

## 5 Special Sessions, Plenary Speakers, and Workshops

<b>TUESDAY, JUNE 25</b>	<b>9:30 - 11:30AM</b>
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### **Patient-specific blood flow simulations using CRIMSON**

**Fox Den**

**Organizers:** *Alberto Figueroa, University of Michigan; Chris Arthurs, King's College London*

CRIMSON, the Cardiovascular Modelling and Simulation Environment, is a complete software pipeline for segmenting blood vessels from medical imaging data, generating meshes, designing and specifying boundary conditions and material properties, and performing finite element simulation of blood flow on thousands of CPU cores, using the SUPG-stabilised incompressible Navier-Stokes equations. Upon completing the short course, attendees will have the basic knowledge required for performing image-derived patient-specific simulations of arterial blood flow using CRIMSON in their own research groups. Because of CRIMSON's focus on presenting cutting-edge modelling and simulation features via a modern and intuitive user interface, complete novices can learn to perform their first segmentation and simulation in a short period of time. The second half of the short course will teach some selected advanced features of CRIMSON, such as custom boundary condition design tools, transitional physiology and cardiovascular control scripting, or PC-MRI boundary condition imposition, depending on the interest of the attendees. Attendees will leave the short course with an in-depth understanding of how CRIMSON can accelerate their own research. Attendees will be required to bring their own laptops and a proper mouse, and should have CRIMSON pre-installed from [www.crimson.software](http://www.crimson.software).  
Speakers:

**Alberto Figueroa** (University of Michigan)

**Chris Arthurs** (King's College London)

**Sabrina Lynch** (University of Michigan)

<b>TUESDAY, JUNE 25</b>	<b>Time 11:30AM - 1:30PM</b>
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### **SimVascular Workshop and New User Training**

**Fox Den**

**Organizers:** *Alison Marsden, Stanford University; David Parker, Stanford University; Shawn Shadden, UC Berkeley; Nathan Wilson, Open Source Medical Software Corporation*

SimVascular is the only fully open source software package providing a complete pipeline from medical image data to cardiovascular blood flow simulation results and analysis ([www.simvascular.org](http://www.simvascular.org)). It offers capabilities for image segmentation, unstructured adaptive meshing, physiologic boundary conditions, and two Navier-Stokes finite element solvers with fluid structure interaction capabilities, including large deformation motion with an Arbitrary Lagrangian Eulerian (ALE) formulation. An accompanying vascular model repository provides over 100 clinical data sets with simulation results from different parts of the vasculature to enable research. Extensive online documentation and tutorials with clinical examples are provided online. In this workshop, we will interactively take new users through a step-by-step tutorial, covering basic steps of model construction, meshing, flow simulations, and best practices for high quality results. We will also introduce several new features of SimVascular, including a module for image segmentation with machine learning, a python scripting interface, and a pipeline for reduced-order modeling with a 1D solver. Following a series of interactive demonstrations, we will moderate a question and answer session for current and potential users.

<b>TUESDAY, JUNE 25</b>	<b>Time 2:00 - 3:30 PM</b>
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**Thermal Damage Processes in Tissues - in Celebration of Dr. John Pearce's 70th Birthday**

**Sunburst**

**Organizers:** *Rupak Banarjee, University of Cincinnati*

This special workshop/symposium is dedicated to the valuable contributions of Dr. John Pearce to the topic of thermal damage processes in tissues. Motivated by clinical experience in the Department of Surgery at the Medical University of South Carolina in the early 1970s, Dr. Pearce has worked for over 40 years on this topic, from his dissertation on the "The Thermal Performance of Electrosurgical Dispersive Electrodes" to, his 1986 book on Electrosurgery, to the development of the Ligasure vessel sealing system, and more recent work on accurate modeling of intrinsic cell death processes at low temperatures. After 35 years on the faculty of the Electrical and Computer Engineering Department at the University of Texas at Austin he retired as Temple Foundation Professor Emeritus. He is a Fellow of the ASME, and the International Microwave Power Institute.

Speakers:

**John Bischof** (University of Minnesota)

**Kenneth Diller** (University of Texas at Austin)

<b>TUESDAY, JUNE 25</b>	<b>Time 2:00 - 3:30 PM</b>
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**Bridging the scales: Emerging tools in multi-scale mechanical imaging of biological tissues**

**Snowflake**

**Organizers:** *Mehmet Kurt, Stevens Institute of Technology; Brittany Coats, University of Utah*

Since the onset of medicine, the simplest, most immediate hands-on diagnostic tool has been the test of palpation: variations in the local mechanical properties of tissue can in fact be indicative of a variety of pathologies. Even within modern medicine, this remains a precious way to assess the need of more sophisticated clinical investigations. However, there remain two critical roadblocks in translating imaging methods into clinical practice: 1) How can we palpate and image tissues that are relatively inaccessible and deep within the human body, such as the brain and the liver? 2) How can we bridge the understanding between tissue-level mechanical properties and the underlying cellular mechanics and physiology? In this workshop, we will hear from researchers who have developed successful mechanical imaging methods that are making an immediate impact in clinical diagnosis and treatment within the context of these main research challenges. Attendees will learn about various multi-scale mechanical imaging techniques that have already made substantial clinical impact and gain insights into where some of the challenges in multi-scale mechanical imaging lie.

Speakers:

**Claire Acevedo** (University of Utah)

**Philip Bayley** (Washington University - St Louis)

**Deva Chan** (Rensselaer Polytechnic Institute)

**Daniel Cortes** (Penn State University)

**Darryl Overby** (Imperial College London)

<b>TUESDAY, JUNE 25</b>	<b>Time 2:00 - 3:30 PM</b>
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**Medical Device Design, Development, and Approval**

**Wintergreen**

**Organizers:** *Michael Moreno, Texas A&M; Nandini Duraiswamy, FDA*

A workshop on how to design your new medical device and get it approved for sale. Brief presentations on product design and development process used in the development of medical devices,

getting FDA approval for your device, and where to get help. Bring your idea and we will help you put together an action plan to take our idea to the next level.

**TUESDAY, JUNE 25**

**Time 2:00 - 3:30 PM**

**Best Practices in Promoting Academic Code of Honor and Ethics**

**Seasons 1-3**

**Organizers:** Sara Wilson, University of Kansas; Michele Grimm, National Science Foundation; Victor Lai, University of Minnesota Duluth; Rouzbeh Amini, University of Akron

Many SB<sup>3</sup>C attendees are graduate students, post-doctoral trainees, and faculty members who are or will soon be teaching their first classes. Promoting ethical behavior among students and handling disciplinary issues when academic misconduct takes place can be some of the most challenging tasks to be undertaken by a first-time instructor. The purpose of this workshop is to provide an overview of best practices for promoting an honor system among the students, preventing the underlying issues that can lead to academic misconduct, and handling difficult conversations/decisions that result from the violation of such ethical standards. The workshop includes three 20-minute seminars presented by three of our more seasoned colleagues, who will share their experiences and best practices. Time at the end of the workshop will be provided for an open Q & A session and potential input from the audience. The topics of discussion include encouraging students to focus on mastering the material rather than only trying to do well on tests and assignments, adopting methods to increase students' self-efficacy, developing a reputation for being a "fair professor", clearly defining academic misconduct, using resources to check for plagiarism, etc. The organizers and presenters expect to prepare a manuscript for submission to the ASME Journal of Biomechanical Engineering Annual Educational issue to further disseminate the information provided in this workshop.

**TUESDAY, JUNE 25**

**Time 5:30 - 6:30 PM**

**Plenary Lecture**

**Grand Ballroom**

**Multi-scale Approaches to Identify Brain Injury Thresholds in Children**

**Susan Margulies**, Wallace H. Coulter Department of Biomedical Engineering, Georgia Institute of Technology and Emory University

In traumatic brain injury (TBI), we integrate animal experiments, tissue and surrogate tests, clinical studies, and computational models to define biomechanical and molecular cascades, assess acute and longer-term outcomes. Integrating across scale and species, and across computational and experimental approaches in our novel interdisciplinary platform, we identify thresholds for predicting traumatic brain injuries in the developing brain. By increasing our understanding of how head injuries occur in children, this crucial information enables engineers to design safer protective equipment (e.g. car seats, helmets) for children and provides physicians with tools to assist them in the prevention, diagnosis and treatment of head injuries in children.



<b>WEDNESDAY, JUNE 26</b>	<b>Time 8:15 - 8:45 AM</b>
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**YC Fung Early Career Medal Award Lecture: Computational and Experimental Analyses of the Intervertebral Disc and Implications for Failure**

**Grand Ballroom**

**Grace D. O'Connell, PhD** (University of California Berkeley)

The intervertebral disc is a complex avascular fibrocartilaginous organ with limited healing capacity. Tissue failure within the disc leads to mechanical dysfunction and herniation. Age and degeneration results in large compositional changes that greatly effects the disc's ability to imbibe water and nutrients, altering tissue- and joint-level mechanical behavior. This talk will discuss how experimental and modeling techniques are being used to gain insight into the biomechanics of the intervertebral disc and its subcomponents, such as the annulus fibrosus. Specifically, we will look at how sub-tissue components contribute to failure and intradiscal stress distributions and implications for developing biological repair strategies for the disc.

<b>WEDNESDAY, JUNE 26</b>	<b>Time 8:45 - 9:15 AM</b>
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**Van C. Mow Medal Award Lecture: Acoustofluidics - merging acoustics and microfluidics for biomedical applications**

**Grand Ballroom**

**Tony Jun Huang, PhD** (Duke University)

The past two decades have witnessed an explosion in lab-on-a-chip research with applications in biology, chemistry, and medicine. The continuous fusion of novel properties of physics into microfluidic environments has enabled the rapid development of this field. Recently, a new lab-on-a-chip frontier has emerged, joining acoustics with microfluidics, termed acoustofluidics. Here we summarize our recent progress in this exciting field and show the depth and breadth of acoustofluidic tools for biomedical applications through many unique examples, from exosome separation to cell-cell communications to 3D bioprinting, from circulating tumor cell isolation and detection to ultra-high-throughput blood cell separation for therapeutics, from high-precision micro-flow cytometry to portable yet powerful fluid manipulation systems. These acoustofluidic technologies are capable of delivering high-precision, high-throughput, and high-efficiency cell/particle/fluid manipulation in a simple, inexpensive, cell-phone-sized device. More importantly, the acoustic power intensity and frequency used in these acoustofluidic devices are in a similar range as those used in ultrasonic imaging, which has proven to be extremely safe for health monitoring during various stages of pregnancy. As a result, these methods are extremely biocompatible; i.e., cells and other biospecimen can maintain their natural states without any adverse effects from the acoustic manipulation process. With these unique advantages, acoustofluidic technologies meet a crucial need for highly accurate and amenable disease diagnosis (e.g., early cancer detection and monitoring of prenatal health) as well as effective therapy (e.g., transfusion and immunotherapy).

<b>WEDNESDAY, JUNE 26</b>	<b>Time 4:30 - 6:00 PM</b>
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**Diversity Mentor-Mentee Event**

**Matterhorn Lounge**

**Organizers:** Daniela Valdez-Jasso

Being a junior scientist can be intimidating so why not meet others and exchange experiences? The Diversity Mentor-Mentee Event this year will have a networking component, where you will meet junior & senior students, postdoctorates, and junior & senior faculty members from the field. This will be followed by round-table discussions on "how to deal with ... situations." At the end of the event, we

will hear how one of our leaders in the field have "shaped the environment of their scientific career." As part of attending this event, you will be matched with a mentor with whom you hold a teleconference within a year of SB<sup>3</sup>C.

**Registration is not required** but encouraged to have enough ice-cream and supplies of pastries!

**Who should attend:** anyone interested in making the scientific environment more welcoming to all!

**Note:** if there is a specific topic you would like to include for discussion, please send it by June 1st to [dvaldezjasso@ucsd.edu](mailto:dvaldezjasso@ucsd.edu). Additional questions can also be directed to: [dvaldezjasso@ucsd.edu](mailto:dvaldezjasso@ucsd.edu)

<b>THURSDAY, JUNE 27</b>	<b>Time 8:15 - 8:45 AM</b>
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**Savio L-Y. Woo Medal Award Lecture: Form = Function: Translating Biomechanics to improve Hand Surgery and Rehabilitation** **Grand Ballroom**

**Rita M. Patterson, PhD** (University of North Texas Health Science Center)

This talk will focus on how working in a medical school environment, we formed collaborative inclusive teams to translate engineering principles to answer clinical questions. Specifically, how we combined knowledge of anatomy and biomechanics to understand wrist injury and determine better surgical procedures and rehabilitation protocols to facilitate wrist function. Throughout this process, we were able to combine experimental data collected with medical imaging to create real time videos of motion to provide visualization to surgeons and therapists to help them understand the complex motions in the wrist. This work has allowed us to evaluate and recommend surgical procedures to help patients with a variety of wrist injuries.

<b>THURSDAY, JUNE 27</b>	<b>Time 8:45 - 9:15 AM</b>
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**Robert M. Nerem Education and Mentorship Medal Award Lecture: Teaching and Mentoring for 46 Years at the University of Texas** **Grand Ballroom**

**Kenneth R. Diller, ScD** (University of Texas at Austin)

As a faculty member one of the most rewarding activities occurs with the opportunity to invest in the personal and professional development of (mostly younger) colleagues. Teaching and mentoring provide common platforms for this type of interaction. Teaching is often thought of as being more formal within the structure of a curriculum with courses in which defined elements of knowledge are shared and hopefully imparted for future practical application. Mentoring is conducted in a more informal context involving one-on-one or small group contacts. Over many years as an educator, my practices of teaching and mentoring have grown more similar in exercise, stimulated in no small part by the adoption of inquiry-based instructional methodologies. I find the educational philosophy widely attributed to Albert Einstein to be very inspiring: "Education is not the learning of facts but the training of the mind to think." Life as a professor has provided a rich environment to experience the rewards and satisfaction of being a teacher and mentor. Bob Nerem was for me an outstanding model of what it means to be a teacher and mentor.

<b>THURSDAY, JUNE 27</b>	<b>Time 2:15 - 3:45 PM</b>
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**Multiscale Musculoskeletal Mechanics Across Interfaces** **Sunburst**

**Organizers:** David Pierce, Mariana Kersh, Matthew Fisher

Understanding of the mechanics of both soft and hard tissues has greatly improved over the last few decades. In parallel, recent advances have pushed this understanding to the cellular and subcellular levels. However, the community developed the bulk of this understanding using isolated tissues and



cells ex vivo. Meanwhile, the interfaces and gradients inherent to many soft tissues often prove crucial to their function, e.g. muscle-tendon-bone and cartilage-bone. Moreover, these tissues interact over multiple length scales. This session will focus on such, often understudied, multiscale interfaces. The goal of this workshop (a series of talks followed by a curated discussion) is to promote cross-fertilization of ideas and collaborative experimental and computational efforts towards more rapid progress in advancing understanding of the multiscale mechanics across interfaces and is therefore a joint workshop between the Solid Mechanics and the Cell & Tissue Engineering groups. Important themes include: Solid Mechanics (Growth, Remodeling and Repair; Injury; Musculoskeletal Soft Tissue Mechanics; Bone Mechanics; Joint and Spine Mechanics), Cell & Tissue Engineering (Nano, Micro and Multiscale; Tissue Engineered Disease Models; Musculoskeletal Tissue Engineering; The Cellular Microenvironment; Mechanotransduction and Sub-cellular Biophysics; Cellular and Molecular Biomechanics).

Speakers:

**Dawn Elliott** (University of Delaware)

**Virginia Ferguson** (University of Colorado at Boulder)

**Mariana Kersh** (University of Illinois at Urbana-Champaign)

<b>THURSDAY, JUNE 27</b>	<b>Time 2:15 - 3:45 PM</b>
<b>BME Education Summit Readout</b>	<b>Snowflake</b>

**Organizers:** *Kristen Billiar, Worcester Polytechnic Institute*

Track Chairs from the BME Education Summit (May 2019, Cleveland, OH) will provide a summary of the discussion from the sessions at the Summit, and they will solicit additional comments.

Speakers:

**Kristen Billiar** (Worcester Polytechnic Institute)

**Susan Margulies** (Georgia Tech)

**Bob Tranquillo** (University of Minnesota)

<b>THURSDAY, JUNE 27</b>	<b>Time 2:15 - 3:45 PM</b>
<b>From Mouse to Human: Challenges of Using Rodent Models to Understand Human Diseases</b>	<b>Wintergreen</b>

**Organizers:** *Chiara Bellini and Jessica Oakes (Department of Bioengineering, Northeastern University, Boston, MA)*

Rodent models are often leveraged to gain a better understanding of disease processes, with the ultimate goal of identifying key features for the benefit of human health. This has become even more true as genetically-modified mice have become widely available and technology advancements have made it possible to quantify physiological processes at a small scale. The aim of this workshop is to discuss the pros/cons of working with rodent models and emerging methods on how to link data collected in rodents, or pre-clinical models, to humans. Specifically, we will bring together experts in imaging, mechanics, and predictive modeling to address these challenges and facilitate a discussion over a broad range of disciplines. Each speaker will focus on a different system and/or disease.

Speakers:

**Naomi Chesler** (University of Wisconsin)

**Craig Goergen** (Purdue University)

<b>THURSDAY, JUNE 27</b>	<b>Time 2:15 - 3:45 PM</b>
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**Community Based Learning in Biomedical Engineering Education****Seasons 1-3****Organizers:** Anita Singh, Widener University

Community-based learning (CBL) holds many benefits for students by: a) enhancing learning within the core content area, b) broadening of professional skills that are needed in today's global economy, and c) deepening our learning about the communities we live in. Bridging the gap between Science, Technology, Engineering and Mathematics (STEM) disciplines and human and environmental needs embedded within our communities has also proven to increase interest in the STEM topics and careers, especially with populations traditionally underrepresented in these fields. Community-based learning has been widely adopted in higher education but less so in the STEM, especially engineering disciplines. This workshop will explore ways to integrate community-based learning into biomedical engineering education using successful examples as a framework and active discussions with participants to explore issues and constraints within their own classrooms. The workshop will actively engage participants in developing plans and ideas for their own students within their local community.

<b>THURSDAY, JUNE 27</b>	<b>Time 2:15 - 3:45 PM</b>
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**FEBio Workshop and Discussion****Seasons 4-5****Organizers:** Jeffrey A. Weiss, University of Utah (point of contact); Gerard Ateshian, Columbia University; Steve Maas, University of Utah

FEBio is a nonlinear finite element software suite that is specifically designed for applications in biomechanics and biophysics ([www.febio.org](http://www.febio.org)). FEBio uses the finite element method to discretize the equations for conservation of mass, linear momentum, and charge. The resulting equations allow fully coupled simulation of solid mechanics, solid-fluid mixtures, fluid mechanics, fluid-solid interactions, transport, reaction and diffusion of neutral and charged species, contact, prestrain, growth and remodeling. The governing equations are formulated based on mixture theory. It offers modeling scenarios, constitutive models and boundary conditions that are relevant to many research areas in biomechanics. All features can be used together seamlessly, giving the user a powerful tool for solving 3D problems in computational biomechanics. The software is open-source, and pre-compiled executables for Windows, Mac OS X and Linux platforms are available. There are over 8,000 registered users of the FEBio software suite. This workshop will provide a brief overview of the FEBio project, followed by presentation and demonstration of new capabilities in the software that have been added over the last two years. This will include computational fluid dynamics analysis, fluid-solid interactions, parameter optimization, and applications of the plugin framework. Following the presentations and demonstrations, we will moderate an open question-and-answer period for users and potential users.

Speakers:

**Jeff Weiss** (University of Utah)**Gerard Ateshian** (Columbia University)

<b>THURSDAY, JUNE 27</b>	<b>Time 3:45 - 4:45 PM</b>
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**SB<sup>3</sup>C Women's Networking Event****Seven/Ten Bistro****Organizers:** Rita M. Patterson (University of North Texas Health Science Center)

Our purpose is to provide mentoring, networking, and communication for women involved in biomedical engineering to help further their careers and facilitate award nominations.

<b>THURSDAY, JUNE 27</b>	<b>Time 5:30 - 7:00 PM</b>
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**Career Connections Mixer****Sessions 1 - 3****Organizers:** *Industry Committee and Student Leadership Committee*

The **Career Connections Mixer** is an opportunity for undergraduate students, graduate students and post docs to connect face-to-face with potential employers from the industry and academia to discuss career paths in bioengineering. Students are encouraged to attend, bring their resumes, and speak with professionals hiring in their field. Registration is required; those who register early (by May 15, 2019) may have the option of having their resume included in an employer handbook. The Career Connections Mixer is organized by the ASME BED Industry Committee and Student Leadership Committee. Students and employers can register at: <http://sb3c.org/program/career-connections/>.

<b>FRIDAY, JUNE 28</b>	<b>Time 5:30 - 6:30 PM</b>
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**H.R. Lissner Medal Award Lecture: 3D Computational Modeling of the Three Legged Stool****Grand Ballroom****Jennifer S. Wayne, PhD** (Virginia Commonwealth University)

Biomedical Engineering advances rely heavily on experimental evidence informing theoretical and computational analyses. The impact of these successful relationships extends in multiple directions - engineering itself, clinical practice, education, etc. This presentation will focus on the computational work begun in my early years in the field for articular cartilage mechanics to our current 3D joint analyses, and how such efforts dovetail with the training of students and curricula.

**2019 RICHARD SKALAK AWARD  
ASME JOURNAL OF BIOMECHANICAL ENGINEERING**

Each year the Editors-in-Chief and the editorial board members of the ASME Journal of Biomechanical Engineering select a paper that they believe is the most meritorious of all the papers published in the Journal in the previous calendar year. The authors of this paper are the recipients of the Richard Skalak Award, named after an early leader within the ASME Bioengineering community. The 2019 award winners will be announced at the conference banquet.

## 6 Awards



1977 Robert W. Mann  
 1978 Y.C. Fung  
 1979 Robert F. Rushmer  
 1980 F. Gaynor Evans  
 1981 Max Anliker  
 1982 R.M. Kenedi  
 1983 Henning E. von Gierke  
 1984 Perry L. Blackshear  
 1985 Richard Skalak  
 1986 Albert H. Burstein  
 1987 Van C. Mow  
 1988 Alf Louis Nachemson  
 1989 Robert M. Nerem  
 1990 Albert B. Schultz  
 1991 Savio Lau-Yuen Woo  
 1992 John C. Chato  
 1993 Don P. Giddens  
 1994 Sheldon Weinbaum  
 1995 Robert E. Mates  
 1996 Albert I. King  
 1997 Ajit P. Yoganathan  
 1998 Malcolm H. Pope  
 1999 Stephen C. Cowin  
 2000 Morton H. Friedman  
 2001 W. Michael Lai  
 2002 Kenneth R. Diller  
 2003 Vijay K. Goel  
 2004 John M. Tarbell  
 2005 Steven A. Goldstein  
 2006 Peter A. Torzilli  
 2007 Maury L. Hull  
 2008 Noshir A. Langrana  
 2009 Thomas P. Andriacchi  
 2010 Roger D. Kamm  
 2011 Jay D. Humphrey  
 2012 David Butler  
 2013 Mehmet Toner  
 2014 Kyriacos A. Athanasiou  
 2015 James A. Ashton-Miller  
 2016 Roger C. Haut  
 2017 Gerard A. Ateshian  
 2018 Louis J. Soslowsky  
 2019 Jennifer S. Wayne

### H.R. Lissner Medal

The H.R. Lissner Medal recognizes outstanding achievements in the field of bioengineering. These achievements may be in the form of (1) significant research contributions in bioengineering; (2) development of new methods of measuring in bioengineering; (3) design of new equipment and instrumentation in bioengineering; (4) educational impact in the training of bioengineers; and/or (5) service to the bioengineering community, in general, and to the Bioengineering Division of ASME, in particular. The Bioengineering Division of ASME established the H. R. Lissner Award as a divisional award in 1977. It was upgraded to a society award in 1987, made possible by a donation from Wayne State University and is named in honor of Professor H. R. Lissner of Wayne State University for his pioneering work in biomechanics that began in 1939.

### 2019 Jennifer S. Wayne, PhD

Dr. Jennifer S. Wayne is Professor of Biomedical Engineering at Virginia Commonwealth University. She received her BS degree in Engineering Mechanics (summa cum laude) from Virginia Tech, MS degree in Biomedical Engineering from Tulane University, and PhD degree in Bioengineering from the University of California at San Diego. She began her faculty career in 1991 at Virginia Commonwealth University in a joint appointment with Biomedical Engineering and Orthopaedic Surgery. She directs the VCU Orthopaedic Research Laboratory and is currently Associate Chair of Biomedical Engineering. She has mentored over 125 residents, fellows, and medical students in basic research as well as over 30 senior engineering capstone projects and 30 graduate theses.

Dr. Wayne's research efforts explore joint biomechanics from both experimental and computational approaches to characterize healthy function and for assessing effectiveness of reparative strategies. This began with articular cartilage function and expanded to 3D patient specific computational simulations. Dr. Wayne has served ASME in multiple capacities including the first female chair of the Bioengineering Division. She was elected Fellow of ASME in 2007. She is also a Fellow of AIMBE, a Program Evaluator for ABET, the international accrediting body for engineering and technology, and begins as BMES representative to the Engineering Accreditation Commission (EAC) of ABET in July 2019. In addition, Dr. Wayne has served on the Board of Directors of the Orthopaedic Research Society (ORS) and currently serves on the ORS Ethics Committee.



## Savio L-Y. Woo Medal



2016 Baruch Barry Lieber  
2017 Arthur Erdman  
2018 Kyriacos A. Athanasiou  
2019 Rita M. Patterson

The Savio L-Y. Woo Translational Biomechanics Medal was established in June 2015 as a society-level award and recognizes a sustained level of meritorious contributions in translating bioengineering research to clinical application, to improve the quality of life. This award is named in honor of Savio Lau-Yuen Woo, Ph.D., Distinguished University Professor of Bioengineering and the Founder and Director of the Musculoskeletal Research Center (MSRC), a diverse multidisciplinary research and educational center in the Department of Bioengineering at the University of Pittsburgh. Beyond pioneering and world-renowned scholarly contributions, Professor Woo has made an enormous impact in 40 years of translational research that has significantly contributed to the delivery of healthcare. Any member of ASME who has demonstrated a sustained level of outstanding achievement in translating bioengineering findings to the clinical community may be eligible for this medal.

## 2019 Rita M. Patterson, PhD

Rita M. Patterson, PhD., Professor, University of North Texas Health Science Center (UNTHSC) Fort Worth Texas, for biomechanics research on the hand and wrist that has led to changes in surgical interventions and has significantly impacted the treatment of patients with hand/wrist disorders; for well-cited and high-quality publications; and for influencing medical practice through the dedicated mentoring of students.

Her research revolves around applying engineering principles to solve medical problems in applied research in Orthopaedics, human performance, and rehabilitation ([hmplab@unthsc.edu](mailto:hmplab@unthsc.edu)). The lab is a collaboration between several departments and schools in Fort Worth that are interested in human performance. Our team of engineers, physical therapists, physicians and basic scientists work together to understand biomechanics and kinematics in the neuro-musculo-skeletal system. Through video motion capture, virtual reality environments, custom instrumentation and computational modeling we analyze abnormal motions due to disease processes and evaluate rehabilitation treatments. Other aspects of my research include collaborations to develop soft robotic devices to measure joint function that can aid in the diagnosis of hand problems and help provide objective measures to track patient progress during rehabilitation. Ultimately this diverse team works together to understand biomechanics and kinematics to answer clinically meaningful questions that can help make people's lives better.

Patterson mentors students at all levels from high school to the post-doctoral level. She is an Associate Editor of the Journal of Hand Surgery and the ASME Journal of Medical Devices.

Patterson is an ASME fellow. She was an ASME minority leadership program intern and later member in the Center for Research and Technology. She has also been very active in the Bioengineering Division serving as member and chair for the student paper competition (1999-2002), chair of the Design, Dynamics, & Rehabilitation committee (2001-2003), chair of the Summer bioengineering meeting in Naples, FL (2010), and chair of the division (BED) in 2010. She is a founding organizer of the Women's Networking Event held annually at the summer meeting.

Patterson is a member of the American Institute for Medical and Biological Engineering. She and her students have received numerous awards for best scientific content at clinical and engineering meetings and in 2017 she received UNTHSC's first Medical School faculty achievement award for excellence in research, teaching and service.





### Robert M. Nerem Education and Mentorship Medal

The Robert M. Nerem Education and Mentorship Medal is given to an individual who has demonstrated a sustained level of outstanding achievement in education and mentoring of trainees. Examples of meritorious activities include leadership within the nominee's institution, mentoring activities that are above and beyond those expected from others employed in similar positions, mentoring activities tailored to meet the needs of the trainees, and innovative mentoring activities.

#### 2019 Kenneth R. Diller, ScD

Ken Diller is the 2019 Nerem Medal Awardee for his leadership in establishing three Biomedical Engineering Departments within the University of Texas System, authoring a prominent Biotransport text, and mentoring more than 50 grad students, thousands of undergrads, and countless faculty at UT and across the United States. Ken was born and raised in Orrville, Ohio. He earned a Bachelor of Mechanical Engineering degree from Ohio State in 1966 (with honors) and a M.Sc. in 1967. Subsequently, he was awarded an Sc.D. in M.E. in 1972 from M.I.T. where he was one of the early grad students to focus on biomedical applications of engineering. He was an NIH Postdoc and became an Asst. Prof. in Mechanical Engineering at the University of Texas at Austin in 1973, with promotions to Assoc. Prof. in 1979 and Full Prof. in 1984. He served as department chair of Mechanical Engineering and then Biomedical Engineering covering a span of 19 years. Dr. Diller has held many leadership positions in within the ASME and other professional organizations. He has chaired the Bioengineering Division (98-99), the BED Honors Committee (91-94), the Lissner Medal Committee (91-94), and the Biotransport Technical Committee (87-88).



2018 Roger D. Kamm  
2019 Kenneth R. Diller

In addition, he was Editor of the Journal of Biomechanical Engineering (97-02). Dr. Diller has won numerous teaching and research awards internal to UT and internationally. He has been honored by ASME as: Fellow (90), Heat Transfer Division Memorial Award (94) and 75th Anniversary Medal (13), ASME Distinguished Lecturer (98-01), Lissner Medal (02), and Max Jakob Award (14). In addition, he received the UT Dad's Association University Teaching



Award (92), Alexander von Humboldt Fellow (83-84), NIH Fogarty Senior International Fellow (89-90), Ohio State Outstanding ME grad (92) and Thomas French Achievement Award (17), Cryobiology Luyet Medal (13), and Fellow membership of AAAS, AIMBE, BMES, Society for Cryobiology, and Clare Hall College at the Univ. of Cambridge.

## Van C. Mow Medal

The Van C. Mow Medal is bestowed upon an individual who has made significant contributions to the field of bioengineering through research, education, professional development, leadership in the development of the profession, as a mentor to young bioengineers, and with service to the bioengineering community. The individual must have earned a PhD or equivalent degree between ten and twenty years prior to June 1 of the year of the award. The award was established by the Bioengineering Division in 2004.

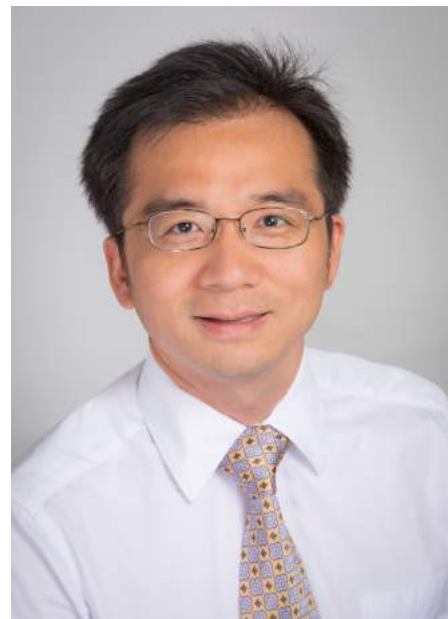
### 2019 Tony Jun Huang, PhD

Tony Jun Huang is the William Bevan Professor of Mechanical Engineering and Materials Science at Duke University. Previously he was a professor and the Huck Distinguished Chair in Bioengineering Science and Mechanics at The Pennsylvania State University. He received his Ph.D. degree in Mechanical and Aerospace Engineering from the University of California, Los Angeles (UCLA) in 2005. His research interests are in the fields of acoustofluidics, optofluidics, and micro/nano systems for biomedical diagnostics and therapeutics. He has authored/co-authored over 200 peer-reviewed journal publications in these fields. His journal articles have been cited more than 14,000 times, as documented at Google Scholar (h-index: 64). He also has 20 patents and invention disclosures.



2005 Kyriacos A. Athanasiou  
 2006 Robert Lie-Yuan Sah  
 2007 Lori A. Setton  
 2008 Scott L. Delp  
 2009 Michael Sacks  
 2010 Tony M. Keaveny  
 2011 David A. Vorp  
 2012 John Bischof  
 2013 Jeffrey Weiss  
 2014 Christopher R. Jacobs  
 2015 Dawn M. Elliott  
 2016 Beth A. Winkelstein  
 2017 Richard R. Neptune  
 2018 Jeffrey W. Holmes  
 2019 Tony Jun Huang

He was elected a fellow of the following five professional societies: the American Institute for Medical and Biological Engineering (AIMBE), the American Society of Mechanical Engineers (ASME), the Institute of Electrical and Electronics Engineers (IEEE), the Institute of Physics (IOP), and the Royal Society of Chemistry (RSC). Huang's research has gained international recognition through numerous prestigious awards and honors including a 2010 National Institutes of Health (NIH) Director's New Innovator Award, a 2012 Outstanding Young Manufacturing Engineer Award from the Society for Manufacturing Engineering, a 2013 American Asthma Foundation (AAF) Scholar Award, JALA



Top Ten Breakthroughs of the Year Award in 2011, 2013, and 2016, the 2014 IEEE Sensors Council Technical Achievement Award from the Institute of Electrical and Electronics Engineers (IEEE), the 2017 Analytical Chemistry Young Innovator Award from the American Chemical Society (ACS), and the 2019 Van Mow Medal from the American Society of Mechanical Engineers (ASME).



## Y.C. Fung Early Career Medal

The Y.C. Fung Early Career Award is given to young investigators who are committed to pursuing research in the field of Bioengineering and have demonstrated significant potential to make substantial contributions to the field of Bioengineering. Such accomplishments may take the form of, but are not limited to, design or development of new methods, equipment or instrumentation in bioengineering; and research publications in peer-reviewed journals. The award was established by the Bioengineering Division in 1985 and operated as a division award until 1998 when it was elevated to a Society award.



- 1986 Mark H. Holmes
- 1987 Steven A. Goldstein
- 1989 David N. Ku
- 1990 Jay D. Humphrey
- 1991 Michael Kwan
- 1992 Cheng Zhu
- 1993 John A. Frangos
- 1994 Mehmet Toner
- 1995 Cheng Dong
- 1996 Antony Keaveny
- 1997 Gerard A. Ateshian
- 1998 Louis J. Soslowsky
- 1999 Rebecca Richards-Kortum
- 2000 Farshid Guilak
- 2001 David F. Meaney
- 2002 Jeffrey A. Weiss
- 2003 Sangeeta N. Bhatia
- 2004 Richard E. Debski
- 2005 Jeffrey W. Holmes
- 2006 Beth A. Winkelstein
- 2007 Stavros Thomopoulos
- 2008 Gabriel A. Silva
- 2009 Robert Mauck
- 2010 Matthew J. Gounis
- 2011 Ali Khademhosseini
- 2012 Marissa Nichole Rylander
- 2013 Jonathan Vande Geest
- 2014 W. David Merryman
- 2015 Adam J. Engler
- 2016 Triantafyllos Stylianopoulos
- 2017 Kristin Myers
- 2018 Spencer P. Lake
- 2019 Grace D. O'Connell

## 2019 Grace D. O'Connell, PhD

Grace D. O'Connell is an Assistant Professor of Mechanical Engineering at UC Berkeley, where she has been on the faculty since 2013. She is also an affiliated assistant professor in the Department of Orthopaedic Surgery at UC San Francisco. After receiving her BS in Aerospace Engineering from the University of Maryland, Dr. O'Connell trained with Dr. Dawn Elliott at the University of Pennsylvania in the Department of Bioengineering. Her PhD research focused on understanding the effect of injury and degeneration on disc joint and tissue-level mechanics, using noninvasive imaging, computational modeling, and mechanical testing techniques. She also did a post doc with Dr. Clark Hung at Columbia University, where her research focused on cartilage tissue engineering. Her current research focuses on mechanobiology of fiber-reinforced soft tissues, such as the annulus fibrosus of the intervertebral discs. Combining skills from her PhD and postdoc training, her research group employs multi-scale computational modeling and mechanical testing to study tissue failure and mechanics with degeneration. Ongoing work is focused on understanding failure propagation through fiber-reinforced composites and how tissue remodeling due to disease alters stress distributions. Dr. O'Connell has been an active member of the ASME Bioengineering division since 2010, and is currently the Vice Chair of the Cell and Tissue Engineering Committee. Dr. O'Connell is the recipient of the NSF CAREER award, the ACS Young Investigator Award, and is the inaugural chair of the Don M. Cunningham Professorship in Mechanical Engineering at UC Berkeley. She lives in Berkeley, California with her husband, Nathan Bartley, and is an avid rock climber.



## 7 Reviewers

**The SB<sup>3</sup>C Conference and Program Committees thank all of our abstract reviewers!**

Aggarwal, Ankush	Ahmadzadeh, Hossein	Akyildiz, Ali	Alford, Patrick
Amini, Rouzbeh	Anderson, Andrew	Andrews, Dennis	Arumugam, Jayavel
Arzani, Amirhossein	Avaz, Reza	Ayyalasomayajula, Avinash	Baek, Seungik
Baker, Brendon	Ban, Ehsan	Banks, Darren	Barocas, Victor
Bayly, Philip	Bell, Rebecca	Berman, Alycia	Bersi, Matthew
Bey, Michael	Bhattacharya, Shamik	Blokpoel, Lia	Brazile, Bryn
Brieu, Mathias	Calve, Sarah	Camarillo, David	Campbell, Ian
Canchi, Tejas	Chakraborty, Nilay	Chan, Deva	Chao, P. Grace
Chassagne, Fanette	Chivukula, Venkat Keshav	Choi, Joseph	Chueh, Juyu
Coats, Brittany	Cone, Stephanie	Connizzo, Brianne	Corr, David
Dabagh, Mahsa	Dahl, Joanna	Dasi, Lakshmi	Davalos, Rafael
De Vita, Raffaella	Deymier, Alix	Dholakia, Ronak	Dixon, Brandon
Doddasomayajula, Ravi	Doyle, Matthew	Dymont, Nathaniel	Eberhardt, Alan
Elmasry, Shady	Eskandari, Mona	Ethier, Ross	Feng, Yuan
Feola, Andrew	Ferruzzi, Jacopo	Figuerola, C. Alberto	Fischenich, Kristine
Fischer, Ken	Fisher, Matthew	Florio, Catherine	Furlong, Laura-Anne
Gallant, Nathan	Gallo, Diego	Gambaruto, Alberto	Gao, Cai
Gao, Xin	Garcia, Kara	Genin, Guy	George, Stephanie
George, Uduak	Gharraee, Nazli	Ghosh, Soham	Girard, Michael
Goergen, Craig	Goktas, Selda	Good, Bryan	Gouveia, Pedro
Grosberg, Anna	Gu, Qimei	Gullbrand, Sarah	Gurkan, Umut
Gustafson, Jonathan	Hang, Tianqi	Haskett, Darren	Hatoum, Hoda
He, Xiaoming "Shawn"	Heise, Rebecca	Henak, Corinne	Henderson, Jonathan
Henderson, Kyvory	Henninger, Heath	Heys, Jeff	Higginson, Jill
Hood, Lyle	Hosseini, Seyedhadi	Hua, Yi	Huang, Charles
Huang, Zhongping	Hyun, Sinjae	Iaquinto, Joseph	Jackson, Alicia
Jacot, Jeffrey	Jain, Kartik	Jamison, David	Jimnez, Juan
Joyce, Michael	Kadlowec, Jennifer	Kapnis, Konstantinos	Keller, Brandis
Kemper, Andrew	Kennedy, Eric	Kersh, Mariana	Khandha, Ashutosh
Khoshgoftar, Mehdi	Kia, Danial Sharifi	Kishore, Vipul	Knutsen, Andrew
Kolli, Kranthi	Korin, Netanel	Kraft, Reuben	Kuo, Calvin
Kurt, Mehmet	LaDisa, John	Lai, Victor	Lake, Spencer
Laksari, Kaveh	Leask, Richard	Lee, Chung-Hao	Lei, Ying
Leitkam, Sam	Lessner, Susan	Levene, Howard	Li, Kewei
Li, Ying	Liao, Jun	Lindsey, Stephanie	Lu, Jia
Lu, Yuan-Chiao	Lundberg, Hannah	Lv, Mengxi	Maher, Suzanne
Maiti, Spandan	Mao, Haojie	Marsden, Alison	Martin, Bryn
Martin, John	Merrill, Thomas	Meyer, Eric G.	Michalek, Arthur
Midha, Prem	Miller, Kristin	Moghaddam, Hesam	Mohanraj, Bhavana
Molony, David	Monson, Ken	Moore, Emily	Moraes, Christopher
Morbiducci, Umberto	Mukherjee, Debanjan	Murfee, Walter	Muthusamy, Jayaveera
Myers, Kristin	Nagatomi, Jiro	Nedrelow, David	Nerurkar, Nandan
Neu, Corey	Nguyen, Thao	Nicholas, Kurniawan	Nicolella, Daniel
Nikou, Amir	O'Connell, Grace	O'Leary, Cian	Oganesyan, Ruben
Ohashi, Toshiro	Oomen, Pim	Ozkan, Alican	Paliwal, Nikhil
Papaharilaou, Yannis	Patnaik, Sourav	Pedrigi, Ryan	Peloquin, John
Penkova, Anita	Pfeiffer, Ferris	Pierce, David M	Piskin, Senol
Ploeg, Heidi	Provenzano, Paolo	Puttlitz, Christian	Qin, Yixian
Qin, Zhenpeng	Quindlen-Hotek, Julia	Raghav, Vrishank	Raghavan, Raghu
Ramaswamy, Sharan	Rausch, Manuel	Raut, Samarth	Richardson, Will

Roccabianca, Sara	Roth, Joshua	Rowson, Steve	Rutledge, Bradley
Ryu, Jae Joong	Sacks, Michael	Sadegh, Ali	Saha, Amit
Samourides, Andreas	Sanches, Augusto	Sastry, Sudeep	Saw, Shier Nee
Schiele, Nathan	Segers, Patrick	Sewell-Loftin, M.K.	Shavik, Sheikh Mohammad
Shearn, Jason	Sheriff, Jawaad	Shetye, Snehal	Shiwerski, Daniel
Siefert, Andrew	Sigal, Ian A.	Singh, Anita	Singh, Sagar
Smith, Joshua	Soares, Joao	Solistro, Giovanni	Spratley, Meade
Steineman, Brett	Steinman, David	Stern, Amber	Stitzel, Joel
Stoker, Aaron	Stott, Shannon	Stylianou, Antonis	Sun, Wei
Szczesny, Spencer	Tang, Dalin	Tepole, Adrian Buganza	Thirugnanasambandam, Mirunalini
Thomopoulos, Stavros	Tian, Lian	Timmins, Lucas	Unal, Mustafa
Urban, Jillian	Vahdati, Ali	Valen-Sendstad, Kristian	Vande Geest, Jonathan
Vanderby, Ray	Voo, Liming	Wallace, Joseph	Wang, Hai
Wang, Liang	Wang, Sihong	Wang, Vincent	Wang, Yiru
Wang, Zhijie	Wayne, Jennifer	Weaver, Ashley	Wei, Feng
Weickenmeier, Johannes	Weiss, Dar	Weiss, Jeffrey	Wenk, Jonathan
Wheatley, Benjamin	Wilson, Sara	Win, Zaw	Winkelstein, Beth
Witzenburg, Colleen	Wojcik, Laura	Wood, Scott	Wu, Lyndia C.
Wu, Wei	Xu, Gang	Xu, Jun	Yang, Bin
Yang, Weiguang	Yap, Choon Hwai	Yoshida, Kyoko	Yousefi, Atieh
Yu, Guanglin	Zagorski, Wu Pan	Zakerzadeh, Rana	Zhan, Li
Zhang, Jiangyue	Zhang, Liying	Zhang, Mingzi	Zhang, Yanhang (Katherine)
Zhao, Wei	Zhou, Yilu		

## **SCIENTIFIC SESSIONS**

## 8 Podium Sessions

<b>Tuesday, June 25</b>	<b>3:45PM - 5:15PM</b>
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### Thermal Damage Processes in Tissues

Sunburst

**Session Chair: Rupak Banerjee** *University of Cincinnati*

**Session Co-Chair: Liang Zhu** *University of Maryland Baltimore County*

- 3:45PM Adventures In Thermal Therapy: From Surgery To Cancer Treatment** SB<sup>3</sup>C2019-001  
John Pearce<sup>1</sup>, <sup>1</sup>*The University of Texas at Austin, United States*
- 4:00PM Microwave Thermal Therapy of Benign Adrenal Adenomas For Treatment of Primary Aldosteronism** SB<sup>3</sup>C2019-002  
Punit Prakash<sup>1</sup>, Martin O'Halloran<sup>2</sup>, Michael Dennedy<sup>2</sup>, <sup>1</sup>*Kansas State University, United States*, <sup>2</sup>*National University of Ireland - Galway, Ireland*
- 4:15PM Metabolize Or Die: John Pearce'S Fascination With Bioenergetics In Cancer, and What We Know (and do Not Know) Now** SB<sup>3</sup>C2019-003  
Michael Graner<sup>1</sup>, Petr Paucke<sup>2</sup>, Natalie Serkova<sup>3</sup>, Anthony Fringuello<sup>1</sup>, Steven Ojemann<sup>1</sup>, Aviva Abosch<sup>1</sup>, Julia Craft<sup>1</sup>, Xiaoli Yu<sup>1</sup>, <sup>1</sup>*University of Colorado Denver, Anschutz Medical Campus, Department of Neurosurgery, United States*, <sup>2</sup>*University of Colorado Denver, Anschutz Medical Campus, Department of Neurology, United States*, <sup>3</sup>*University of Colorado Denver, Anschutz Medical Campus, Department of Anesthesiology, United States*
- 4:30PM Examining Arrhenius Kinetics Over A Large Temperature Range** SB<sup>3</sup>C2019-004  
Daipayan Sarkar<sup>1</sup>, Peiyuan Kang<sup>1</sup>, Zhenpeng Qin<sup>1</sup>, <sup>1</sup>*University of Texas at Dallas, United States*
- 4:45PM Heating Protocol Design Affected By Thermal Damage Model In Magnetic Nanoparticle Hyperthermia For Cancer Treatment** SB<sup>3</sup>C2019-005  
Manpreet Singh<sup>1</sup>, Qimei Gu<sup>1</sup>, Ronghui Ma<sup>1</sup>, Liang Zhu<sup>1</sup>, <sup>1</sup>*University of Maryland Baltimore County, United States*

<b>Tuesday, June 25</b>	<b>3:45PM - 5:15PM</b>
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### Heart Valve Mechanics and Cardiovascular Devices

Snowflake

**Session Chair: Ankush Aggarwal** *University of Glasgow*

**Session Co-Chair: Ali Akyildiz** *Erasmus Medical Center*

- 3:45PM A Physiologically-Driven Biaxial Bioreactor System To Investigate Valve Interstitial Cell Phenotypic State After Surgical Repair** SB<sup>3</sup>C2019-006  
Salma Ayoub<sup>1</sup>, Jordan Graves<sup>1</sup>, Chung-Hao Lee<sup>2</sup>, Michael Sacks<sup>1</sup>, <sup>1</sup>*The University of Texas at Austin, United States*, <sup>2</sup>*The University of Oklahoma, United States*
- 4:00PM Restriction of Annulus Movement Alters The Dynamic Deformation and Strain Distribution of The Tricuspid Valve Leaflets: A Simulation Study** SB<sup>3</sup>C2019-007  
Keyvan Amini Khoiy<sup>1</sup>, Rouzbeh Amini<sup>1</sup>, <sup>1</sup>*The University of Akron, United States*
- 4:15PM Tricuspid Valve Leaflet Strains In The Beating Ovine Heart** SB<sup>3</sup>C2019-008  
Manuel Rausch<sup>1</sup>, Mrudang Mathur<sup>1</sup>, William Meador<sup>1</sup>, Marcin Malinowski<sup>2</sup>, Tomasz Jazwiec<sup>2</sup>, Tomasz Timek<sup>2</sup>, <sup>1</sup>*University of Texas at Austin, United States*, <sup>2</sup>*Spectrum Health, United States*
- 4:30PM Materially Heterogeneous Annuloplasty Ring Reduces Loading On Posterior Annular Sutures** SB<sup>3</sup>C2019-009  
Beatrice Ncho<sup>1</sup>, Eric Pierce<sup>1</sup>, Ajit Yoganathan<sup>1</sup>, <sup>1</sup>*Georgia Institute Of Technology, United States*

**4:45PM 3d Reconstructions of Deployed Coronary Stents In The Clinical Setting: Investigation of Distortion Effects From Curvature On The Circumferential Orientation of Oct Images SB<sup>3</sup>C2019-010**

Mark Elliott<sup>1</sup>, David Molony<sup>2</sup>, Brigham Smith<sup>3</sup>, Sarang Joshi<sup>1</sup>, Habib Samady<sup>2</sup>, Lucas Timmins<sup>1</sup>, <sup>1</sup>University of Utah, United States, <sup>2</sup>Emory University School of Medicine, United States, <sup>3</sup>University of Utah School of Medicine, United States

**5:00PM Effects of Right Ventricular Assist Device On Treating Pulmonary Arterial Hypertension: An In-Silico Study Using Image Based Biventricular Modeling Framework SB<sup>3</sup>C2019-011**

Sheikh Mohammad Shavik<sup>1</sup>, Lik Chuan Lee<sup>1</sup>, <sup>1</sup>Michigan State University, United States

**Tuesday, June 25**

**3:45PM - 5:15PM**

**Cardiovascular Biomechanics and Tissue Engineering**

**Wintergreen**

**Session Chair: Joao Soares** *Virginia Commonwealth University*

**Session Co-Chair: Zhijie Wang** *Colorado State University*

**3:45PM Controlling Compliance of Polycaprolactone/gelatin Tissue Engineered Vascular Graft In A Rat Model SB<sup>3</sup>C2019-012**

Kenneth Furdella<sup>1</sup>, Shinichi Higuchi<sup>1</sup>, Kang Kim<sup>1</sup>, William Wagner<sup>1</sup>, Jonathan Vande Geest<sup>1</sup>, <sup>1</sup>University of Pittsburgh, United States

**4:00PM A Bio-Chemo-Mechanical Computational Model of Tissue Engineered Vascular Graft Development In Vivo SB<sup>3</sup>C2019-013**

Ramak Khosravi<sup>1</sup>, Abhay Ramachandra<sup>1</sup>, Jason Szafron<sup>1</sup>, Christopher Breuer<sup>2</sup>, Jay Humphrey<sup>1</sup>, <sup>1</sup>Yale University, United States, <sup>2</sup>Nationwide Children's Hospital, United States

**4:15PM Role of Hyaluronic Acid In Regulation of Contractile Forces In Heart Valve Tissue Constructs SB<sup>3</sup>C2019-014**

Ying Lei<sup>1</sup>, Luciano Bortolin<sup>1</sup>, Frank Benesch-Lee<sup>1</sup>, Teniola Oguntolu<sup>1</sup>, Kristen Billiar<sup>1</sup>, <sup>1</sup>Worcester Polytechnic Institute, United States

**4:30PM Adipose Stromal Cell Secreted Factors Induce The Elastogenesis Cascade Within Aortic Smooth Muscle Cells SB<sup>3</sup>C2019-015**

Aneesh Ramaswamy<sup>1</sup>, Rachel Sides<sup>1</sup>, Eoghan Cunnane<sup>2</sup>, David Vorp<sup>1</sup>, Justin Weinbaum<sup>1</sup>, <sup>1</sup>University of Pittsburgh, United States, <sup>2</sup>University of Pittsburgh; Royal College of Surgeons in Ireland, United States

**4:45PM Quantifying and Modeling Spatial Heterogeneity In Valve Interstitial Cells SB<sup>3</sup>C2019-016**

Emma Lejeune<sup>1</sup>, Alex Khang<sup>1</sup>, Michael Sacks<sup>1</sup>, <sup>1</sup>University of Texas at Austin, United States

**5:00PM Cyclic Stretch Causes Liberation of Caveolin-1 In Extracellular Vesicles From Vascular Smooth Muscle Cells SB<sup>3</sup>C2019-017**

Mohammad Shaver<sup>1</sup>, Jessica Molina<sup>1</sup>, Joshua Daniel Hutcheson<sup>1</sup>, <sup>1</sup>Biomedical Engineering Department of Florida International University, United States

**Tuesday, June 25**

**3:45PM - 5:15PM**

**Mechanics of Cartilage in Health and Disease**

**Seasons 1-3**

**Session Chair: Corinne Henak** *University of Wisconsin-Madison*

**Session Co-Chair: Corey Neu** *University of Colorado Boulder*

**3:45PM Focal Chondral Defects In The Dysplastic Hip Cause Activity- and Size-Dependent Increases In Stress and Strain SB<sup>3</sup>C2019-018**

Jocelyn Todd<sup>1</sup>, Travis Maak<sup>1</sup>, Jeffrey Weiss<sup>1</sup>, <sup>1</sup>University of Utah, United States

**4:00PM Mechanical Property Changes In The Tibial Plateau Cartilage Following Traumatic Injury and Repair Procedures To The Lapine Knee SB<sup>3</sup>C2019-019**

Patrick Vaughan<sup>1</sup>, Feng Wei<sup>1</sup>, Albane Fauron<sup>1</sup>, Loic DeJardin<sup>1</sup>, Tammy Haut Donahue<sup>2</sup>, Roger Haut<sup>1</sup>, <sup>1</sup>Michigan State University, United States, <sup>2</sup>University of Massachusetts - Amherst, United States

**4:15PM Collagen-Derived Residual Stress Enhances The Biphasic Lubrication Property In Articular Cartilage SB<sup>3</sup>C2019-020**

Hiromichi Fujie<sup>1</sup>, Soh Morishita<sup>1</sup>, Seido Yarimitsu<sup>1</sup>, <sup>1</sup>Tokyo Metropolitan University, Japan

**4:30PM Shorter More Regular Activity Improves Cartilage Function Compared To Longer Less Regular Activity SB<sup>3</sup>C2019-021**

Brian Graham<sup>1</sup>, Axel Moore<sup>2</sup>, David Burris<sup>1</sup>, Christopher Price<sup>1</sup>, <sup>1</sup>University of Delaware, United States, <sup>2</sup>Imperial College London, United Kingdom

**4:45PM Impact of Decorin On Cartilage Pericellular Matrix Micromechanics and Chondrocyte Mechanotransduction SB<sup>3</sup>C2019-022**

Daphney R. Chery<sup>1</sup>, Prashant Chandrasekaran<sup>1</sup>, Qing Li<sup>1</sup>, Biao Han<sup>1</sup>, Su Chin J. Heo<sup>2</sup>, Renato V. Iozzo<sup>3</sup>, Motomi Enomoto-Iwamoto<sup>4</sup>, Robert L. Mauck<sup>2</sup>, Lin Han<sup>1</sup>, <sup>1</sup>School of Biomedical Engineering, Science and Health Systems, Drexel University, United States, <sup>2</sup>Department of Orthopaedic Surgery, University of Pennsylvania, United States, <sup>3</sup>Department of Pathology, Anatomy and Cell Biology, Thomas Jefferson University, United States, <sup>4</sup>Department of Orthopedics, University of Maryland, United States

**5:00PM Through-Thickness Patterns of Shear Strain Change With Early-Stage Progression of Osteoarthritis SB<sup>3</sup>C2019-023**

Franz Maier<sup>1</sup>, Courtland G. Lewis<sup>2</sup>, David M. Pierce<sup>1</sup>, <sup>1</sup>University of Connecticut, United States, <sup>2</sup>Hartford Healthcare, United States

**Tuesday, June 25**

**3:45PM - 5:15PM**

**Reproductive and Abdominal Biomechanics**

**Seasons 4-5**

**Session Chair: Raffaella De Vita** *Virginia Tech*

**Session Co-Chair: Kristin Miller** *Tulane University*

**3:45PM Material Property Characterization of Human Cervical Tissue Based On Biphasical Viscoelastic Model SB<sup>3</sup>C2019-024**

Lei Shi<sup>1</sup>, Joy Vink<sup>2</sup>, Ronald Wapner<sup>2</sup>, Kristin Myers<sup>1</sup>, <sup>1</sup>Department of Mechanical Engineering, Columbia University, United States, <sup>2</sup>Department of Obstetrics and Gynecology, Columbia University, United States

**4:00PM Effects of Pelvic Organ Prolapse On The Biaxial Biomechanical Behavior of Post-Menopausal Uterosacral Ligament SB<sup>3</sup>C2019-025**

Elvis Danso<sup>1</sup>, Jason Schuster<sup>1</sup>, Isabella Johnson<sup>1</sup>, Emily Harville<sup>1</sup>, Laurephile Desrosiers<sup>2</sup>, Leise Knoepp<sup>2</sup>, Kristin Miller<sup>1</sup>, <sup>1</sup>Tulane University, United States, <sup>2</sup>Ochsner Clinical School, United States

**4:15PM Rupture Mechanisms of The Vagina Under Inflation SB<sup>3</sup>C2019-026**

Jeffrey McGuire<sup>1</sup>, Woowon Lee<sup>2</sup>, Kimani Toussaint<sup>2</sup>, Caleb Stine<sup>1</sup>, Jennifer Munson<sup>1</sup>, Raffaella De Vita<sup>3</sup>, <sup>1</sup>Virginia Tech, United States, <sup>2</sup>University of Illinois at Urbana Champaign, United States, <sup>3</sup>Virginia tech, United States

**4:30PM Remodeling of The Diabetic Urinary Bladder: A Comparison of An Obese and A Lean Animal Model of Type II Diabetes SB<sup>3</sup>C2019-027**

Marissa Grobbel<sup>1</sup>, Matthew Lewis<sup>1</sup>, Anne Tonson<sup>1</sup>, Robert Wiseman<sup>1</sup>, Sara Roccabianca<sup>1</sup>, <sup>1</sup>Michigan State University, United States



- 4:45PM Lactating Human Breast Response To Infant Oral Movements** SB<sup>3</sup>C2019-028  
Diana Alatalo<sup>1</sup>, Lin Jiang<sup>1</sup>, Fatemeh Hassanipour<sup>1</sup>, <sup>1</sup>*The University of Texas at Dallas, United States*
- 5:00PM Contribution To The Understanding of The Genese of The Ligamental System of The Pelvic System** SB<sup>3</sup>C2019-029  
Olivier Mayeur<sup>1</sup>, Mathias Brieu<sup>2</sup>, Michel Cosson<sup>3</sup>, <sup>1</sup>*Centrale Lille, France*, <sup>2</sup>*California State University, United States*, <sup>3</sup>*CHR Lille - Jeanne de Flandres, France*

**Tuesday, June 25****3:45PM - 5:15PM****Biomedical Engineering Education****Hemlock****Session Chair:** Sara Wilson *University of Kansas***Session Co-Chair:** Choon Hwai Yap *National University of Singapore*

- 3:45PM Broadening Research Exposure and Research Participation In Mechanical Engineering: Findings From The Umbric Me S-Stem Scholarship Program** SB<sup>3</sup>C2019-030  
Liang Zhu<sup>1</sup>, Ronghui Ma<sup>1</sup>, Deepa Madan<sup>1</sup>, Charles Eggleton<sup>1</sup>, L. D. Timmie Topoleski<sup>1</sup>, Shuyan Sun<sup>1</sup>, <sup>1</sup>*University of Maryland Baltimore County, United States*
- 4:00PM Lessons Learned: Five Years of The Biomedical Engineering In Simulations, Imaging, and Modeling (bme-Sim) Reu Site** SB<sup>3</sup>C2019-031  
Stephanie George<sup>1</sup>, <sup>1</sup>*East Carolina University, United States*
- 4:15PM Incorporating Clinical Rotations, Online Lectures, and Business Concepts In Bme Senior Capstone Design: Are We There Yet?** SB<sup>3</sup>C2019-032  
Alan Eberhardt<sup>1</sup>, Joel Dobbs<sup>1</sup>, <sup>1</sup>*University of Alabama at Birmingham, United States*
- 4:30PM Outcomes of Incorporating Clinical Simulation Laboratories In Biomedical Engineering Education** SB<sup>3</sup>C2019-033  
Anita Singh<sup>1</sup>, Dawn Ferry<sup>1</sup>, <sup>1</sup>*Widener University, United States*
- 4:45PM Industrial Ergonomics Risk Assessment Meets Research In The Biomechanics Classroom** SB<sup>3</sup>C2019-034  
Johannes Brombach<sup>1</sup>, Megan DeRidder<sup>2</sup>, Laurel Kuxhaus<sup>2</sup>, <sup>1</sup>*University of Applied Sciences, Germany*, <sup>2</sup>*Clarkson University, United States*
- 5:00PM On The Role of Project-Based Active Learning Techniques On Computer Programming Self-Efficacy of Undergraduate Biomedical Engineering Students and The Interactive Effects of Gender** SB<sup>3</sup>C2019-035  
S. Cyrus Rezvanifar<sup>1</sup>, Rouzbeh Amini<sup>1</sup>, <sup>1</sup>*The University of Akron, United States*

**Tuesday, June 25****3:45PM - 5:15PM****Respiratory, Lymphatic, Ocular and Other Organ System  
Fluid Mechanics****Fox Den****Session Chair:** Jessica Oakes *Northeastern University*

- 3:45PM Numerical Modeling of Lamina Cribrosa Hemodynamics** SB<sup>3</sup>C2019-036  
Yi Hua<sup>1</sup>, Bryn L. Brazile<sup>1</sup>, Ian A. Sigal<sup>1</sup>, <sup>1</sup>*University of Pittsburgh, United States*
- 4:00PM Particle Deposition Correlates With Wall Shear Stress Divergence In Human Airways** SB<sup>3</sup>C2019-037  
Ali Farghadan<sup>1</sup>, Kamran Poorbahrani<sup>2</sup>, Sahar Jalal<sup>3</sup>, Jessica Oakes<sup>2</sup>, Filippo Coletti<sup>3</sup>, Amirhossein Arzani<sup>1</sup>, <sup>1</sup>*Northern Arizona University, United States*, <sup>2</sup>*Northeastern University, United States*, <sup>3</sup>*University of Minnesota, United States*

- 4:15PM Computational Modeling of Pathogen Leakage Through N95 Respirators** SB<sup>3</sup>C2019-038  
Prasanna Hariharan<sup>1</sup>, Neha Sharma<sup>2</sup>, Gavin D'Souza<sup>2</sup>, Suvajyoti Guha<sup>1</sup>, Rupak Banerjee<sup>2</sup>, Matthew Myers<sup>1</sup>, <sup>1</sup>US Food and Drug Administration, United States, <sup>2</sup>University of Cincinnati, United States
- 4:30PM Regional Targeting of Therapeutic Particles In Healthy and Asthmatic Lungs** SB<sup>3</sup>C2019-039  
Kamran Poorbahrami<sup>1</sup>, Sean Fain<sup>2</sup>, David Mummy<sup>2</sup>, Jessica Oakes<sup>1</sup>, <sup>1</sup>Northeastern University, United States, <sup>2</sup>University of Wisconsin-Madison, United States
- 4:45PM Differential Effects of Bladder Outlet Obstruction Associated Pressure Cycling On Urothelial Cell Inflammation and Fibrosis In Vitro** SB<sup>3</sup>C2019-040  
Cody Dunton<sup>1</sup>, Todd Purves<sup>2</sup>, Francis Hughes<sup>2</sup>, Jiro Nagatomi<sup>1</sup>, <sup>1</sup>Clemson University, United States, <sup>2</sup>Duke University Medical Center, United States
- 5:00PM Effect of Airway Cilia Properties On Its Physiological Functioning** SB<sup>3</sup>C2019-041  
Uduak George<sup>1</sup>, <sup>1</sup>San Diego State University, United States

<b>Wednesday, June 26</b>	<b>9:30AM -11:00AM</b>
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### Drug Delivery in Cancer, Ocular, and Central Nervous Systems

**Sunburst**

**Session Chair: Ying Li** *University of Connecticut*

**Session Co-Chair: Bryn Martin** *University of Idaho*

- 9:30AM In Vivo Measurement of Bevacizumab Diffusion Coefficient In The Rabbit Vitreous Humor Using Fluorescein Labeling** SB<sup>3</sup>C2019-042  
Anita Penkova<sup>1</sup>, Shuqi Zhang<sup>1</sup>, Komsan Rattanakijisuntorn<sup>2</sup>, Mark Humayun<sup>1</sup>, Juan Carlos Martinez<sup>1</sup>, Alejandra Gonzalez Calle<sup>1</sup>, Ana Galesic<sup>1</sup>, Abigail Tadde<sup>1</sup>, Matthew Pratt<sup>1</sup>, Mark Thompson<sup>1</sup>, Satwindar Sadhal<sup>1</sup>, <sup>1</sup>University of Southern California, United States, <sup>2</sup>Ubon Ratchathani University, Thailand
- 9:45AM Precise Targeting of Polr2a As A Therapeutic Strategy For Human Triple Negative Breast Cancer** SB<sup>3</sup>C2019-043  
Jiangsheng Xu<sup>1</sup>, Xiaoming He<sup>1</sup>, <sup>1</sup>University of Maryland, United States
- 10:00AM Characterization of Injection-Induced Tissue Swelling During Subcutaneous Injection of Biologics** SB<sup>3</sup>C2019-044  
Yingnan Shen<sup>1</sup>, Bumsoo Han<sup>1</sup>, <sup>1</sup>Purdue University, United States
- 10:15AM Analysis of Convective and Diffusive Transport In The Brain Interstitium** SB<sup>3</sup>C2019-045  
Lori Ray<sup>1</sup>, Jeff Iliff<sup>2</sup>, Jeff Heys<sup>1</sup>, <sup>1</sup>Montana State University, Chemical & Biological Engineering, United States, <sup>2</sup>Ohsu, United States
- 10:30AM Three-Dimensional Nonlinear Biphase Finite Element Model of Backflow During Flow-Controlled Infusions Into The Brain** SB<sup>3</sup>C2019-046  
Gustavo Orozco<sup>1</sup>, Joshua Smith<sup>2</sup>, Jos Garca<sup>3</sup>, <sup>1</sup>University of Eastern Finland, Finland, <sup>2</sup>Lafayette College, United States, <sup>3</sup>Universidad del Valle, Colombia
- 10:45AM Relating Chemical and Physical Properties of Oligonucleotide Polyelectrolyte Complex Micelles** SB<sup>3</sup>C2019-047  
Alexander Marras<sup>1</sup>, Jeffrey Viereggs<sup>1</sup>, Jeffrey Ting<sup>1</sup>, Matthew Tirrell<sup>1</sup>, <sup>1</sup>University of Chicago, United States

<b>Wednesday, June 26</b>	<b>9:30AM -11:00AM</b>
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**Growth Remodeling and Repair I****Snowflake****Session Chair: Colleen Witzenburg** *University of Wisconsin***Session Co-Chair: Sara Roccabianca** *Michigan State University*

- 9:30AM Structural Remodeling and Volumetric Growth In The Right Ventricle Under Pulmonary Arterial Hypertension** SB<sup>3</sup>C2019-048  
Reza Avaz<sup>1</sup>, Emilio Mendiola<sup>1</sup>, Michael Sacks<sup>2</sup>, <sup>1</sup>*UT Austin, United States*, <sup>2</sup>*University of Texas at Austin, United States*
- 9:45AM Mathematical Modeling of Regional Hypertensive Aortic Remodeling Reveals A Critical Role For Inflammation** SB<sup>3</sup>C2019-049  
Marcos Latorre<sup>1</sup>, Matthew Bersi<sup>2</sup>, Jay Humphrey<sup>1</sup>, <sup>1</sup>*Yale University, United States*, <sup>2</sup>*Vanderbilt University, United States*
- 10:00AM Effect of Glucose On The Interlamellar Bonding of Arterial Elastin** SB<sup>3</sup>C2019-050  
Ruizhi Wang<sup>1</sup>, Xunjie Yu<sup>1</sup>, Yanhang Zhang<sup>1</sup>, <sup>1</sup>*Boston University, United States*
- 10:15AM Cortical Thickness Differences Emerge From Passive Physical Forces Generated By Growth** SB<sup>3</sup>C2019-051  
Maria Holland<sup>1</sup>, Ellen Kuhl<sup>2</sup>, Alain Goriely<sup>3</sup>, <sup>1</sup>*University of Notre Dame, United States*, <sup>2</sup>*Stanford University, United States*, <sup>3</sup>*University of Oxford, United Kingdom*
- 10:30AM Targeting Cadherin-11 For Renal Fibrosis** SB<sup>3</sup>C2019-052  
Tessa Huffstater<sup>1</sup>, Leslie Gewin<sup>1</sup>, W. David Merryman<sup>1</sup>, <sup>1</sup>*Vanderbilt University, United States*
- 10:45AM Plastic Remodeling of Collagen Upon Tumor Growth Alters Fluid Transport Properties of The Extracellular Matrix** SB<sup>3</sup>C2019-053  
Jacopo Ferruzzi<sup>1</sup>, Meng Sun<sup>1</sup>, Anastasia Gkousioudi<sup>1</sup>, Anahita Pilvar<sup>1</sup>, Darren Roblyer<sup>1</sup>, Yanhang Zhang<sup>1</sup>, Muhammad Zaman<sup>1</sup>, <sup>1</sup>*Boston University, United States*

<b>Wednesday, June 26</b>	<b>9:30AM -11:00AM</b>
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**Celebration of YC Fung's 100th birthday****Wintergreen****Session Chair: Grace O'Connell** *UC Berkeley*

- 9:30AM Yc Fung Symposium Introduction** SB<sup>3</sup>C2019-054  
Robert Nerem
- 9:45AM Pulmonary Arterial Mechanics: Something Old, Something New, Something Borrowed, Something Blue** SB<sup>3</sup>C2019-055  
Naomi Chesler<sup>1</sup>, <sup>1</sup>*University of Wisconsin - Madison, United States*
- 10:00AM Coronary Calcifications: From Vesicles To Plaque Rupture** SB<sup>3</sup>C2019-056  
Natalia Maldonado<sup>1</sup>, Luis Cardoso<sup>2</sup>, Sheldon Weinbaum<sup>2</sup>, <sup>1</sup>*New York City College of Technology, United States*, <sup>2</sup>*The City College of New York, United States*
- 10:15AM The Impact of Hemodynamic Reflex Compensation Following Myocardial Infarction On Subsequent Ventricular Growth** SB<sup>3</sup>C2019-057  
Colleen Witzenburg<sup>1</sup>, Jeffrey Holmes<sup>2</sup>, <sup>1</sup>*University of Wisconsin, United States*, <sup>2</sup>*University of Virginia, United States*

- 10:30AM Effect of Ltbp-3 On The Circumferential and Axial Mechanics of The Aorta In A Mouse Model of Marfan Syndrome** SB<sup>3</sup>C2019-058  
Arina Korneva<sup>1</sup>, Arunika Makam<sup>2</sup>, Jay Humphrey<sup>1</sup>, Chiara Bellini<sup>2</sup>, <sup>1</sup>*Yale University, United States*, <sup>2</sup>*Northeastern University, United States*
- 10:45AM Contribution of Matrix Remodeling To Biaxial Mechanics of Right-Ventricular Myocardium In Pulmonary Arterial Hypertension** SB<sup>3</sup>C2019-059  
Daniela Velez-Rendon<sup>1</sup>, Justin Shieh<sup>2</sup>, Daniela Valdez-Jasso<sup>2</sup>, <sup>1</sup>*University of Illinois at Chicago, United States*, <sup>2</sup>*University of California San Diego, United States*

**Wednesday, June 26****9:30AM -11:00AM****Biomechanics of Lower and Upper Extremities****Seasons 1-3****Session Chair: Mariana Kersh** *University of Illinois at Urbana-Champaign***Session Co-Chair: Jennifer Wayne** *Virginia Commonwealth University*

- 9:30AM Flexion Angle Dependent Differences In Joint Kinematics and Acl Force In Response To Applied Loads Are Conserved Throughout Skeletal Growth In The Porcine Stifle Joint** SB<sup>3</sup>C2019-060  
Stephanie Cone<sup>1</sup>, Danielle Howe<sup>1</sup>, Emily Lambeth<sup>1</sup>, Jorge Piedrahita<sup>2</sup>, Jeffrey Spang<sup>3</sup>, Matthew Fisher<sup>1</sup>, <sup>1</sup>*North Carolina State University and the University of North Carolina – Chapel Hill, United States*, <sup>2</sup>*North Carolina State University, United States*, <sup>3</sup>*University of North Carolina – Chapel Hill, United States*
- 9:45AM A Novel Geometric Ratio To Predict The Flexion Gap In Total Knee Arthroplasty** SB<sup>3</sup>C2019-061  
Shady Elmasry<sup>1</sup>, Peter Sculco<sup>1</sup>, Timothy Wright<sup>1</sup>, Andrew Pealre<sup>1</sup>, Michael Cross<sup>1</sup>, David Mayman<sup>1</sup>, Cynthia Kahlenberg<sup>1</sup>, Geoffrey Westrich<sup>1</sup>, Carl Imhauser<sup>1</sup>, <sup>1</sup>*Hospital for Special Surgery, United States*
- 10:00AM Micromotion In Tibial Components Recovered Post Mortem: A Pilot Study** SB<sup>3</sup>C2019-062  
Heath Baskin<sup>1</sup>, Elie Ghanem<sup>1</sup>, Jack Lemons<sup>1</sup>, Alan Eberhardt<sup>1</sup>, <sup>1</sup>*University of Alabama at Birmingham, United States*
- 10:15AM Computational Mechanics Demonstrate How A Transcondylar Screw Enhances Healing of Subchondral Bone Cysts** SB<sup>3</sup>C2019-063  
Lance Frazer<sup>1</sup>, Elizabeth Santschi<sup>2</sup>, Kenneth Fischer<sup>1</sup>, <sup>1</sup>*University of Kansas, United States*, <sup>2</sup>*Kansas State University, United States*
- 10:30AM A Generalized Framework For Objective Determination of Functional Musculoskeletal Joint Coordinate Systems** SB<sup>3</sup>C2019-064  
Tara Nagle<sup>1</sup>, Ahmet Erdemir<sup>1</sup>, Robb Colbrunn<sup>1</sup>, <sup>1</sup>*Cleveland Clinic, United States*
- 10:45AM Cartilage Contact Stiffness Effects On Contact Pressure and Area At The Elbow Joint** SB<sup>3</sup>C2019-065  
Jonathan Parman<sup>1</sup>, Cuneyd Gunay<sup>2</sup>, Akin Cil<sup>1</sup>, Antonis Stylianou<sup>1</sup>, <sup>1</sup>*University of Missouri - Kansas City, United States*, <sup>2</sup>*Eskisehir Osmangazi University, Turkey*

<b>Wednesday, June 26</b>	<b>9:30AM -11:00AM</b>
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**Ocular Biomechanics****Seasons 4-5****Session Chair: Rouzbeh Amini** *The University of Akron***Session Co-Chair: Andrew Feola** *Atlanta VA and Georgia Institute of Technology*

- 9:30AM A Multiscale Finite Element Modeling Approach To Characterize Iris Deformation** SB<sup>3</sup>C2019-066  
Vineet Thomas<sup>1</sup>, Sam Salinas<sup>1</sup>, Anup Pant<sup>1</sup>, Syril Dorairaj<sup>2</sup>, Rouzbeh Amini<sup>1</sup>, <sup>1</sup>*The University of Akron, United States*, <sup>2</sup>*Mayo Clinic, United States*
- 9:45AM Correlation of Human Lamina Cribrosa Strain Response To Axon Counts In The Optic Nerve Across Racioethnic Donor Eyes** SB<sup>3</sup>C2019-067  
Hirut Kollech<sup>1</sup>, Reza Behkam<sup>1</sup>, Katelyn Axman<sup>1</sup>, Jr-Jiun Liou<sup>1</sup>, Jonathan Vande Geest<sup>1</sup>, <sup>1</sup>*University of Pittsburgh, United States*
- 10:00AM Tensile Behavior of Anterior and Posterior Corneal Flaps Subjected To CxI Treatment Procedure** SB<sup>3</sup>C2019-068  
Hamed Hatami-Marbini<sup>1</sup>, <sup>1</sup>*University of Illinois at Chicago, United States*
- 10:15AM Genomic Loci Modulating Ocular Compliance In Mice** SB<sup>3</sup>C2019-069  
Elizabeth Boazak<sup>1</sup>, Cassandra Chu<sup>1</sup>, Rebecca King<sup>2</sup>, Joseph Sherwood<sup>3</sup>, Darryl Overby<sup>3</sup>, Eldon Geisert<sup>2</sup>, C. Ross Ethier<sup>1</sup>, <sup>1</sup>*The Georgia Institute of Technology, United States*, <sup>2</sup>*Emory University, United States*, <sup>3</sup>*Imperial College London, United Kingdom*
- 10:30AM Characterizing The Actin and Gfap Network Structure of The Astrocytic Lamina In Mouse Eyes** SB<sup>3</sup>C2019-070  
Yik Tung Tracy Ling<sup>1</sup>, Mary Pease<sup>2</sup>, Harry Quigley<sup>2</sup>, Thao (Vicky) Nguyen<sup>1</sup>, <sup>1</sup>*Department of Mechanical Engineering, Johns Hopkins University, United States*, <sup>2</sup>*Wilmer Eye Institute, Johns Hopkins University, United States*
- 10:45AM Snapshot Polarized Light Microscopy To Visualize and Quantify Collagenous Soft Tissue Microstructure At 156 Frames/second** SB<sup>3</sup>C2019-071  
Bin Yang<sup>1</sup>, Po-Yi Lee<sup>1</sup>, Bryn Brazile<sup>1</sup>, Ian Sigal<sup>1</sup>, <sup>1</sup>*University of Pittsburgh, United States*

<b>Wednesday, June 26</b>	<b>9:30AM -11:00AM</b>
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**Human Movement and Gait****Hemlock****Session Chair: Wu Pan Zagorski** *Lear Corporation***Session Co-Chair: Antonis Stylianou** *University of Missouri Kansas City*

- 9:30AM A Human Cadaveric Model For Quantifying Knee Joint Mechanics During Simulated Gait: Effect of Astm and Iso Derived Input Profiles** SB<sup>3</sup>C2019-072  
Amanda Wach<sup>1</sup>, Olufunmilayo Adebayo<sup>1</sup>, Caroline Brial<sup>1</sup>, Tony Chen<sup>1</sup>, Russell Warren<sup>1</sup>, Peter Torzilli<sup>1</sup>, Suzanne Maher<sup>1</sup>, <sup>1</sup>*Hospital for Special Surgery, United States*
- 9:45AM Predicted Gait Alterations Due To A Unilateral Reduction In Muscle Synergies** SB<sup>3</sup>C2019-073  
Marleny Arones<sup>1</sup>, Carolyn Patten<sup>2</sup>, Benjamin J. Fregly<sup>1</sup>, <sup>1</sup>*Rice University, United States*, <sup>2</sup>*University of California, United States*
- 10:00AM System Identification of Pressure-Measuring Insoles For Determining Ground Reaction Force During Walking** SB<sup>3</sup>C2019-074  
Jessica DeBerardinis<sup>1</sup>, Janet S. Dufek<sup>1</sup>, Mohamed B. Trabia<sup>1</sup>, Yann Le Gall<sup>2</sup>, Nicolas Da Silva Sacoto<sup>2</sup>, <sup>1</sup>*University of Nevada Las Vegas, United States*, <sup>2</sup>*Ecole Supérieure d'Electronique de l'Ouest, France*

- 10:15AM Utilizing Cross-Correlation To Determine Phase Shift In Gait Data For A Neural Prosthesis** SB<sup>3</sup>C2019-075  
Martin L. Tanaka<sup>1</sup>, David Hudson<sup>1</sup>, <sup>1</sup>*Western Carolina University, United States*
- 10:30AM Movement Patterns In Dancers** SB<sup>3</sup>C2019-076  
Rita Patterson<sup>1</sup>, Nathan Hersberger<sup>1</sup>, Elizabeth Balyakina<sup>1</sup>, Sajid Surve<sup>1</sup>, <sup>1</sup>*University of North Texas Health Science Center, United States*
- 10:45AM Can Superhydrophobic Slip Flow Improve Centrifugal Blood Pump Performance and Reduce Blood Damage?** SB<sup>3</sup>C2019-077  
Wei Xuan Chan<sup>1</sup>, Vivek Vasudevan<sup>1</sup>, Jia Jun Low Adriel<sup>1</sup>, Janani Venkatesan<sup>1</sup>, Choon-Hwai Yap<sup>1</sup>, <sup>1</sup>*National University of Singapore, Singapore*

<b>Wednesday, June 26</b>	<b>9:30AM -11:00AM</b>
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## Data Driven Fluid Mechanics Modeling and Visualization

## Fox Den

**Session Chair: Alejandro Roldan-Alzate** *University of Wisconsin-Madison*

- 9:30AM Non-Invasive Diagnostics of Coronary Artery Disease Using Machine Learning and Computational Fluid Dynamics** SB<sup>3</sup>C2019-078  
Kritika Iyer<sup>1</sup>, Christopher J. Arthurs<sup>2</sup>, Cyrus P. Najarian<sup>1</sup>, S.M. Reza Soroushmehr<sup>1</sup>, Brahmajee K. Nallamothu<sup>1</sup>, C. Alberto Figueroa<sup>1</sup>, <sup>1</sup>*University of Michigan, United States*, <sup>2</sup>*King's College London, United Kingdom*
- 9:45AM Statistical Modeling For Assessment of Aneurysm Rupture Status - Implications For Japanese and Finnish Populations** SB<sup>3</sup>C2019-079  
Felicita Detmer<sup>1</sup>, Sara Hadad<sup>1</sup>, Sven Hirsch<sup>2</sup>, Philippe Bijlenga<sup>3</sup>, Yuya Uchiyama<sup>4</sup>, Juhana Frsen<sup>5</sup>, Juan Cebra<sup>1</sup>, <sup>1</sup>*George Mason University, United States*, <sup>2</sup>*ZHAW University of Applied Sciences, Switzerland*, <sup>3</sup>*University of Geneva, Switzerland*, <sup>4</sup>*Tokyo University of Science, Japan*, <sup>5</sup>*Kuopio University Hospital, Finland*
- 10:00AM Accelerating Cardiovascular Model Building With Convolutional Neural Networks** SB<sup>3</sup>C2019-080  
Gabriel Maher<sup>1</sup>, Nathan Wilson<sup>2</sup>, Alison Marsden<sup>1</sup>, <sup>1</sup>*Stanford University, United States*, <sup>2</sup>*Open Source Medical Software Corporation, United States*
- 10:15AM Cardiac Motion Tracking From Noisy Ultrasound Images - Exploiting Cyclic Constraint Fitted To Non-Rigid Image Registration** SB<sup>3</sup>C2019-081  
Hadi Wiputra<sup>1</sup>, Wei Xuan Chan<sup>1</sup>, Yoke Yin Foo<sup>1</sup>, Yu Zheng<sup>1</sup>, Sheldon Ho<sup>1</sup>, Choon Hwai Yap<sup>1</sup>, <sup>1</sup>*National University Of Singapore, Singapore*
- 10:30AM Deep Neural Networks For Hemodynamic Analysis of Human Thoracic Aorta** SB<sup>3</sup>C2019-082  
Liang Liang<sup>1</sup>, Wenbin Mao<sup>2</sup>, Wei Sun<sup>2</sup>, <sup>1</sup>*Department of Computer Science at University of Miami, United States*, <sup>2</sup>*Georgia Institute of Technology and Emory University, United States*
- 10:45AM Effect of Nonlinear Elastic Properties of Arterial Walls On Pulse Wave Propagation** SB<sup>3</sup>C2019-083  
Alberto Coccarelli<sup>1</sup>, Sanjay Pant<sup>1</sup>, Ankush Aggarwal<sup>2</sup>, <sup>1</sup>*Swansea University, United Kingdom*, <sup>2</sup>*University of Glasgow, United Kingdom*

<b>Wednesday, June 26</b>	<b>11:15AM -12:45PM</b>
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**Biotransport in a Tumor Microenvironment****Sunburst**

**Session Chair: Sihong Wang** *The City College of New York*

**Session Co-Chair: Rana Zakerzadeh** *University of Texas at Austin*

- 11:15AM Fast Tumor Spheroid Growth In Microfluidic Device** SB<sup>3</sup>C2019-084  
Yaling Liu<sup>1</sup>, Chris Uhl<sup>1</sup>, Yuyuan Zhou<sup>1</sup>, <sup>1</sup>*Lehigh University, United States*
- 11:30AM A Microfluidic Tissue Array For Mid-Throughput Drug Screening Using Tumor Tissues For Personalized Medicine** SB<sup>3</sup>C2019-085  
AH Rezwanuddin Ahmed<sup>1</sup>, Xuejun Jiang<sup>2</sup>, Sarat Chandarlapaty<sup>2</sup>, Sihong Wang<sup>1</sup>, <sup>1</sup>*The City College of New York, United States*, <sup>2</sup>*Memorial Sloan Kettering Cancer Center, United States*
- 11:45AM Circulating Tumor Cell Transport and Adhesion In Microfluidic Devices** SB<sup>3</sup>C2019-086  
Jifu Tan<sup>1</sup>, Zhenya Ding<sup>2</sup>, Wei Li<sup>2</sup>, <sup>1</sup>*Northern Illinois University, United States*, <sup>2</sup>*Texas Tech University, United States*
- 12:00PM An In Vitro Tumor Platform For Modeling Breast Tumor Stromal Interactions and Characterizing The Subsequent Response** SB<sup>3</sup>C2019-087  
Manasa Gadde<sup>1</sup>, Marissa Rylander<sup>1</sup>, <sup>1</sup>*University of Texas at Austin, United States*
- 12:15PM Computational Fluid Dynamics Model of Pressurized Intraperitoneal Aerosol Chemotherapy: Gravity Matters!** SB<sup>3</sup>C2019-088  
Mohammad Rahimi-Gorji<sup>1</sup>, Leen Van de Sande<sup>1</sup>, Charlotte Debbaut<sup>1</sup>, Patrick Segers<sup>1</sup>, Wouter Willaert<sup>1</sup>, Wim Ceelen<sup>1</sup>, <sup>1</sup>*Ghent University, Belgium*
- 12:30PM Microtissues For Biomechanical Investigations of Angiogenesis** SB<sup>3</sup>C2019-089  
M.K. Sewell-Loftin<sup>1</sup>, Priscilla Hwang<sup>1</sup>, Joshua Katz<sup>1</sup>, Steve George<sup>2</sup>, Gregory Longmore<sup>1</sup>, <sup>1</sup>*Washington University School of Medicine in St. Louis, United States*, <sup>2</sup>*University of California, Davis, United States*

<b>Wednesday, June 26</b>	<b>11:15AM -12:45PM</b>
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**Cardiac Mechanics****Snowflake**

**Session Chair: Manuel Rausch** *University of Texas at Austin*

**Session Co-Chair: Colleen Witzenburg** *University of Wisconsin*

- 11:15AM A Robust 3d Constitutive Model For The Passive Properties of Left Ventricular Myocardium** SB<sup>3</sup>C2019-090  
David Li<sup>1</sup>, Reza Avazmohammadi<sup>1</sup>, Samer Merchant<sup>2</sup>, Tomonori Kawamura<sup>3</sup>, Edward Hsu<sup>2</sup>, Joseph Gorman<sup>3</sup>, Robert Gorman<sup>3</sup>, Michael Sacks<sup>1</sup>, <sup>1</sup>*The University of Texas at Austin, United States*, <sup>2</sup>*University of Utah, United States*, <sup>3</sup>*University of Pennsylvania, United States*
- 11:30AM Fast Predictions of Cardiac Growth During Ventricular Dyssynchrony** SB<sup>3</sup>C2019-091  
Pim Oomen<sup>1</sup>, Colleen Witzenburg<sup>2</sup>, Thien-Khoi Phung<sup>1</sup>, Kenneth Bilchick<sup>1</sup>, Jeffrey Holmes<sup>1</sup>, <sup>1</sup>*University of Virginia, United States*, <sup>2</sup>*University of Wisconsin, United States*
- 11:45AM Role of Talin1 In Cardiac Fibroblasts On Cardiac Hypertrophy** SB<sup>3</sup>C2019-092  
Natalie Noll<sup>1</sup>, Qinkun Zhang<sup>1</sup>, Hind Lal<sup>1</sup>, W. David Merryman<sup>1</sup>, <sup>1</sup>*Vanderbilt University, United States*

- 12:00PM Modeling of Anisotropic Reverse Cardiac Growth In Response To Local Alteration of Electromechanics** SB<sup>3</sup>C2019-093  
Jayavel Arumugam<sup>1</sup>, Ghassan Kassab<sup>2</sup>, Lik Chuan Lee<sup>1</sup>, <sup>1</sup>*Michigan State University, United States*, <sup>2</sup>*California Medical Innovations Institute, United States*
- 12:15PM The Effect of Collagen Heterogeneity On Rat Myocardial Infarct Mechanics In A Multiscale Fiber Network Model** SB<sup>3</sup>C2019-094  
Christopher Korenczuk<sup>1</sup>, William Richardson<sup>2</sup>, Victor Barocas<sup>1</sup>, <sup>1</sup>*University of Minnesota - Twin Cities, United States*, <sup>2</sup>*Clemson University, United States*
- 12:30PM Analyzing The Biomechanical Response of Failing Right Ventricular Tissue To Sacubitril/valsartan Treatment** SB<sup>3</sup>C2019-095  
Danial Sharifikia<sup>1</sup>, Claire Tushak<sup>1</sup>, Evan Benza<sup>2</sup>, Kang Kim<sup>3</sup>, Marc Simon<sup>3</sup>, <sup>1</sup>*Department of Bioengineering, University of Pittsburgh, United States*, <sup>2</sup>*Heart and Vascular Institute, University of Pittsburgh Medical Center (UPMC), United States*, <sup>3</sup>*Department of Bioengineering, University of Pittsburgh; Division of Cardiology, School of Medicine, University of Pittsburgh; Heart and Vascular Institute, University of Pittsburgh Medical Center (UPMC); McGowan Institute for Regenerative Medicine, Univer, United States*

**Wednesday, June 26****11:15AM -12:45PM****Celebration of YC Fung's 100th birthday****Wintergreen****Session Chair: Spencer Lake** *Washington University in St. Louis*

- 11:15AM Osmotic Swelling Behavior of The Pregnant Mouse Cervix and The Contribution of Hyaluronic Acid** SB<sup>3</sup>C2019-096  
Charles Jayyosi<sup>1</sup>, Shanmugasundaram Nallasamy<sup>2</sup>, Priya Madhukaran<sup>2</sup>, Mala Mahendroo<sup>2</sup>, Kristin Myers<sup>1</sup>, <sup>1</sup>*Columbia University, United States*, <sup>2</sup>*University of Texas Southwestern Medical Center, United States*
- 11:30AM From Biomechanics To T Cell Affinity To Systems Immunology My Path In Biomedical Engineering That Is Inspired By Dr. Yc Fung** SB<sup>3</sup>C2019-097  
Ning Jiang<sup>1</sup>, <sup>1</sup>*University of Texas at Austin, United States*
- 11:45AM A Mathematical Model For The Post-Implant Collagen Maturation Behavior of Engineered Tissues** SB<sup>3</sup>C2019-098  
Michael Sacks<sup>1</sup>, <sup>1</sup>*University of Texas at Austin, United States*
- 12:00PM Non-Invasive Brillouin Moduli and Membrane Fluctuation Measurements of Live Tumor Cell Nuclei** SB<sup>3</sup>C2019-099  
Anya Roberts<sup>1</sup>, Vijay Singh<sup>1</sup>, Peter So<sup>1</sup>, Roger Kamm<sup>1</sup>, <sup>1</sup>*Mit, United States*
- 12:15PM A Micromechanical Model For Collagenous Tissues and Applications To Study Growth and Remodeling** SB<sup>3</sup>C2019-100  
Thao Vicky<sup>1</sup>, <sup>1</sup>*Johns Hopkins University, United States*
- 12:30PM Yc Fung Symposium Conclusion** SB<sup>3</sup>C2019-101  
Savio Woo

**Wednesday, June 26****11:15AM -12:45PM****Mechanics of Cartilage and Meniscus****Seasons 1-3****Session Chair: Deva Chan** *Rensselaer Polytechnic Institute***Session Co-Chair: David M Pierce** *University of Connecticut*

- 11:15AM Mechanical Property Changes In The Meniscus In A Novel Closed Joint Animal Impact and Surgical Model** SB<sup>3</sup>C2019-102



Gerardo Narez<sup>1</sup>, Albane Fauron<sup>2</sup>, Loic Dejardin<sup>2</sup>, Feng Wei<sup>2</sup>, Roger C. Haut<sup>2</sup>, Tammy L. Haut Donahue<sup>1</sup>,  
<sup>1</sup>University of Massachusetts, Amherst, United States, <sup>2</sup>Michigan State University, United States

**11:30AM Non-Invasive Mri Assessment of Meniscus and Cartilage Changes In A Large Animal Model of Meniscus Injury** SB<sup>3</sup>C2019-103

Kyle Meadows<sup>1</sup>, Sonia Bansal<sup>2</sup>, John Peloquin<sup>1</sup>, Liane Miller<sup>2</sup>, Jay Patel<sup>2</sup>, Kamel Saleh<sup>2</sup>, Michael Hast<sup>2</sup>, Miltiadis Zgonis<sup>2</sup>, Robert Mauck<sup>2</sup>, Dawn Elliott<sup>1</sup>, <sup>1</sup>University of Delaware, United States, <sup>2</sup>University of Pennsylvania, United States

**11:45AM Maintaining Cartilage Hydration During Sliding Part 2: Modes and Competitive Recovery Rates** SB<sup>3</sup>C2019-104

David Burris<sup>1</sup>, Axel Moore<sup>2</sup>, Brian Graham<sup>1</sup>, Jamie Benson<sup>1</sup>, Caroline Kook<sup>1</sup>, Steven Voinier<sup>1</sup>, Christopher Price<sup>1</sup>,  
<sup>1</sup>University of Delaware, United States, <sup>2</sup>Imperial College London, United Kingdom

**12:00PM Collagen Fiber Orientation and Mechanical Properties Correlate Across Human Articular Cartilage Zones** SB<sup>3</sup>C2019-105

Kristine Fischenich<sup>1</sup>, Joseph Wahlquist<sup>1</sup>, Virginia Ferguson<sup>1</sup>, <sup>1</sup>University of Colorado at Boulder, United States

**12:15PM Toward Quantifying Changes In The Collagen Network of Human Articular Cartilage During Early-Stage Osteoarthritis** SB<sup>3</sup>C2019-106

Szarek E. Phoebe<sup>1</sup>, Magnus B. Lilledahl<sup>2</sup>, Courtland G. Lewis<sup>3</sup>, David M. Pierce<sup>1</sup>, <sup>1</sup>University of Connecticut, United States, <sup>2</sup>Norwegian University of Science and Technology, Norway, <sup>3</sup>Hartford Healthcare, United States

**12:30PM Type III Collagen Is A Key Regulator of Collagen Fibrillar Structure In Cartilage Pericellular Matrix** SB<sup>3</sup>C2019-107

Chao Wang<sup>1</sup>, Becky Brisson<sup>2</sup>, Qing Li<sup>1</sup>, Masahiko Terajima<sup>3</sup>, Motomi Enomoto-Iwamoto<sup>4</sup>, Mitsuo Yamauchi<sup>3</sup>, Susan Volk<sup>2</sup>, Lin Han<sup>1</sup>, <sup>1</sup>Drexel University, United States, <sup>2</sup>University of Pennsylvania, United States, <sup>3</sup>University of North Carolina, United States, <sup>4</sup>University of Maryland, United States

**Wednesday, June 26**

**11:15AM -12:45PM**

**Injury: imaging**

**Seasons 4-5**

**Session Chair: Steve Rowson** *Virginia Tech*

**Session Co-Chair: Liming Voo** *Johns Hopkins University Applied Physics Laboratory*

**11:15AM A Comparison of The Deformation Response of The Brain To Mild Acceleration In The Axial and Sagittal Planes In A Healthy Volunteer** SB<sup>3</sup>C2019-108

Andrew Knutsen<sup>1</sup>, Arnold Gomez<sup>2</sup>, Jerry Prince<sup>2</sup>, Philip Bayly<sup>3</sup>, John Butman<sup>4</sup>, Dzung Pham<sup>1</sup>, <sup>1</sup>The Henry M Jackson Foundation, United States, <sup>2</sup>Johns Hopkins University, United States, <sup>3</sup>Washington University in St. Louis, United States, <sup>4</sup>National Institutes of Health, United States

**11:30AM Longitudinal Head Impact Exposure and White Matter Integrity Analysis Among Returning Youth Football Players** SB<sup>3</sup>C2019-109

Mireille Kelley<sup>1</sup>, Jillian Urban<sup>2</sup>, Derek Jones<sup>2</sup>, Elizabeth Davenport<sup>3</sup>, Logan Miller<sup>2</sup>, Beverly Snively<sup>4</sup>, Alexander Powers<sup>5</sup>, Christopher Whitlow<sup>6</sup>, Joseph Maldjian<sup>3</sup>, Joel Stitzel<sup>2</sup>, <sup>1</sup>Virginia Tech-Wake Forest School of Biomedical Engineering and Sciences, United States, <sup>2</sup>Virginia Tech-Wake Forest University School of Biomedical Engineering and Sciences, United States, <sup>3</sup>Department of Radiology, University of Texas Southwestern, United States, <sup>4</sup>Department of Biostatistical Sciences, Wake Forest School of Medicine, United States, <sup>5</sup>Department of Neurosurgery, Wake Forest School of Medicine, United States, <sup>6</sup>Department of Radiology (Neuroradiology), Wake Forest School of Medicine, United States

**11:45AM Imaging and Mechanical Characterization of The Pia-Arachnoid Complex** SB<sup>3</sup>C2019-110

Nikolaus Benko<sup>1</sup>, Emma Luke<sup>2</sup>, Yousef Alsanea<sup>1</sup>, Brittany Coats<sup>1</sup>, <sup>1</sup>University of Utah Mechanical Engineering, United States, <sup>2</sup>University of Rochester Biomedical Engineering, United States

- 12:00PM Mechanical and Interfacial Characterization of Meningioma Through Mr Imaging** SB<sup>3</sup>C2019-111  
Efe Ozkaya<sup>1</sup>, Dominic Nistal<sup>2</sup>, Zeynep Suar<sup>1</sup>, Alexander Chartrain<sup>2</sup>, Cassandra Gologorsky<sup>3</sup>, Priti Balchandani<sup>2</sup>, Raj Shrivastava<sup>2</sup>, Mehmet Kurt<sup>1</sup>, <sup>1</sup>*Stevens Institute of Technology, United States*, <sup>2</sup>*Icahn School of Medicine at Mount Sinai, United States*, <sup>3</sup>*Cornell University, United States*
- 12:15PM A Network-Based Brain Injury Metric For Concussion Prediction** SB<sup>3</sup>C2019-112  
Shaoju Wu<sup>1</sup>, Wei Zhao<sup>1</sup>, Bethany Rowson<sup>2</sup>, Steve Rowson<sup>2</sup>, Songbai Ji<sup>1</sup>, <sup>1</sup>*Worcester Polytechnic Institute, United States*, <sup>2</sup>*Virginia Tech, United States*
- 12:30PM Changes In Brain Tissue In Vivo Deformation Following Decompression Surgery In Chiari Patients** SB<sup>3</sup>C2019-113  
Maggie Eppelheimer<sup>1</sup>, Blaise Simplicie Talla Nwotchouang<sup>1</sup>, Soroush Heidari Pahlavian<sup>2</sup>, John Oshinski<sup>3</sup>, Daniel Barrow<sup>3</sup>, Rouzbeh Amini<sup>1</sup>, Francis Loth<sup>1</sup>, <sup>1</sup>*The University of Akron, United States*, <sup>2</sup>*USC Stevens Neuroimaging and Informatics Institute University of Southern California, United States*, <sup>3</sup>*Emory University, United States*

**Wednesday, June 26****11:15AM -12:45PM****UG Design Competition****Hemlock**

**Session Chair: Michael Moreno** *Texas A&M University*  
**Session Co-Chair: Ted Conway** *Florida Institute of Technology*

- 11:15AM Design and Optimization of A Finger-By-Finger Vibrational Therapy** SB<sup>3</sup>C2019-114  
Joshua Posen<sup>1</sup>, George Durrant<sup>1</sup>, Samuel Langlois<sup>1</sup>, Chirsteen Abdalla<sup>1</sup>, Gary Drzewiecki<sup>1</sup>, <sup>1</sup>*Rutgers University, United States*
- 11:30AM Jogging Stroller Attachment Device For Natural Arm Motion** SB<sup>3</sup>C2019-115  
Tamara Chambers<sup>1</sup>, Amy Ramos<sup>1</sup>, Meghan Blanks<sup>1</sup>, <sup>1</sup>*Embry-Riddle Aeronautical University, United States*
- 11:45AM Assistive Device For Stretching Exercise In Patients With Frozen Shoulder Syndrome** SB<sup>3</sup>C2019-116  
Maria Owsiak<sup>1</sup>, Monsour Al Awami<sup>1</sup>, Ryan Daher<sup>1</sup>, Scott Goeltz<sup>1</sup>, Rebecca Gomezrueda<sup>1</sup>, Russel Maurer<sup>1</sup>, Andrew Saylor<sup>1</sup>, Ria Mazumder<sup>1</sup>, <sup>1</sup>*Widener University, United States*
- 12:00PM Wearable Robotic Wrist Orthosis For Stroke Rehabilitation** SB<sup>3</sup>C2019-117  
Neshat Baset<sup>1</sup>, Dona Antony<sup>1</sup>, Mahdi Haghsheenas-Jaryani<sup>1</sup>, Muthu Wijesundara<sup>1</sup>, <sup>1</sup>*University of Texas at Arlington Research Institute, United States*
- 12:15PM Design of 3d Printed Robotic Glove Augmenting Manual Manipulation of Humans** SB<sup>3</sup>C2019-118  
Mason Araujo<sup>1</sup>, Immanuel Ponminissery<sup>1</sup>, Seok Chang Ryu<sup>1</sup>, <sup>1</sup>*Texas A&M University, United States*
- 12:30PM Assistive Device For Muscular Degeneration In The Upper Arm** SB<sup>3</sup>C2019-119  
Alexandria Barber<sup>1</sup>, Emily Eaton<sup>1</sup>, Jillian Farmer<sup>1</sup>, Samantha Gladd<sup>1</sup>, Natalie Jagelski<sup>1</sup>, Jenny Lin<sup>1</sup>, <sup>1</sup>*Clarkson University, United States*

**Wednesday, June 26****11:15AM -12:45PM****Translational Cardiovascular Diagnosis and Treatment****Fox Den**

**Session Chair: John LaDisa** *Marquette University*

- 11:15AM Analyses of Hemodialysis Arteriovenous Fistula Geometry Obtained By Serial Magnetic Resonance Imaging** SB<sup>3</sup>C2019-120  
Yong He<sup>1</sup>, Daniel Pike<sup>2</sup>, Yan-Ting Shiu<sup>2</sup>, Prabir Roy-Chaudhury<sup>3</sup>, Alfred Cheung<sup>2</sup>, Scott Berceli<sup>1</sup>, <sup>1</sup>*University of Florida, United States*, <sup>2</sup>*University of Utah, United States*, <sup>3</sup>*University of Arizona, United States*

- 11:30AM Effect of Gravity On Hemodynamics In Cerebral Aneurysms - An In Vitro Study** SB<sup>3</sup>C2019-121  
Melissa Brindise<sup>1</sup>, Sean Rothenberger<sup>1</sup>, Susanne Schnell<sup>2</sup>, Michael Markl<sup>2</sup>, David Saloner<sup>3</sup>, Vitaliy Rayz<sup>1</sup>, Pavlos Vlachos<sup>1</sup>, <sup>1</sup>Purdue University, United States, <sup>2</sup>Northwestern University, United States, <sup>3</sup>University of California San Francisco, United States
- 11:45AM A Nonlinear Mechanics-Based Virtual Coiling Method For Intracranial Aneurysm** SB<sup>3</sup>C2019-122  
Seyyed Mostafa Mousavi Janbeh Sarayi<sup>1</sup>, Robert J. Damiano<sup>1</sup>, Palak Patel<sup>1</sup>, Gary Dargush<sup>1</sup>, Adnan H. Siddiqui<sup>1</sup>, Hui Meng<sup>1</sup>, <sup>1</sup>University at Buffalo, The State University of New York, United States
- 12:00PM Computational Assessment of Left-Ventricular Outflow Tract Hemodynamic Alterations In Discrete Subaortic Stenosis** SB<sup>3</sup>C2019-123  
Jason Shar<sup>1</sup>, Sundeep Keswani<sup>2</sup>, Jane Grande-Allen<sup>3</sup>, Philippe Sucosky<sup>1</sup>, <sup>1</sup>Wright State University, United States, <sup>2</sup>Texas Children's Hospital, United States, <sup>3</sup>Rice University, United States
- 12:15PM Blood Flow Modeling of Cerebral Aneurysm Treated With Intrasaccular Flow Diverting Devices** SB<sup>3</sup>C2019-124  
Fernando Mut<sup>1</sup>, Bong Jae Chung<sup>2</sup>, Juan Cebral<sup>1</sup>, <sup>1</sup>George Mason University, United States, <sup>2</sup>Montclair State University, United States
- 12:30PM Impact of Post-Tavr Patient-Specific Geometry On Neo-Sinus Flow: A Computational Fluid Dynamics Study** SB<sup>3</sup>C2019-125  
Shelly Singh-Gryzbon<sup>1</sup>, Sanchita Bhat<sup>1</sup>, Vahid Sadri<sup>1</sup>, Joseph Choi<sup>1</sup>, Mandy Salmon<sup>1</sup>, Zhenglun (Alan) Wei<sup>1</sup>, Philipp Ruile<sup>2</sup>, Franz-Joseph Neumann<sup>2</sup>, Philipp Blanke<sup>3</sup>, Ajit Yoganathan<sup>1</sup>, <sup>1</sup>Georgia Institute of Technology, United States, <sup>2</sup>University Heart Center Freiburg-Bad Krozingen, Germany, <sup>3</sup>St Paul's Hospital and University of British Columbia, Canada

Thursday, June 27

9:30AM -11:00AM

**PhD Paper Competition: Cell & Tissue engineering****Sunburst****Session Chair: Tamara Bush** Michigan State University**Session Co-Chair: Zhenpeng Qin** The University Of Texas At Dallas

- 9:30AM Igf-1 Suppresses Trpv4 Osmosensation Through The Map7 Binding Domain In Chondrocytes** SB<sup>3</sup>C2019-126  
Nicholas Trompeter<sup>1</sup>, Lauren Hurd<sup>1</sup>, Joseph Gardinier<sup>2</sup>, Victor DeBarros II<sup>1</sup>, Mary Boggs<sup>1</sup>, Randall Duncan<sup>1</sup>, <sup>1</sup>University of Delaware, United States, <sup>2</sup>Henry Ford Health System, United States
- 9:45AM High-Velocity Stretching Causes Mechanically-Induced Tau Pathology In Neurons** SB<sup>3</sup>C2019-127  
Nicholas Braun<sup>1</sup>, Dezhi Liao<sup>1</sup>, Patrick Alford<sup>1</sup>, <sup>1</sup>University of Minnesota - Twin Cities, United States
- 10:00AM Introduction of Heterogeneous Cell Properties For Modeling Emergent Stress Fields In Multicellular Systems** SB<sup>3</sup>C2019-128  
Zachary Goldblatt<sup>1</sup>, Heather Cirka<sup>1</sup>, Habibeh Ashouri Choshali<sup>1</sup>, Nima Rahbar<sup>1</sup>, Dannel McCollum<sup>2</sup>, Kristen Billiar<sup>1</sup>, <sup>1</sup>Worcester Polytechnic Institute, United States, <sup>2</sup>UMASS Medical School, United States
- 10:15AM Concentration Dependent Tgf-Beta Internalization Rate In Engineered Musculoskeletal Tissues** SB<sup>3</sup>C2019-129  
Sedat Dogru<sup>1</sup>, Danial Sharifikia<sup>1</sup>, Samuel Sze<sup>1</sup>, Michael Albro<sup>1</sup>, <sup>1</sup>Boston University, United States
- 10:30AM A Micropatterning Approach To Study Cellular Communication Via Mechanical Forces In Fibrous Microenvironments** SB<sup>3</sup>C2019-130  
Christopher Davidson<sup>1</sup>, Brendon Baker<sup>1</sup>, <sup>1</sup>University of Michigan, United States
- 10:45AM Endothelial Nitric Oxide Synthase Glycosylation Is A Potential Target For Reducing Endothelial Dysfunction** SB<sup>3</sup>C2019-131  
Sarah Basehore<sup>1</sup>, Alisa Morss Clyne<sup>1</sup>, <sup>1</sup>Drexel University, United States

<b>Thursday, June 27</b>	<b>9:30AM -11:00AM</b>
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### PhD Paper Competition: Imaging, Injury, and Biomedical Engineering Education

**Snowflake**

**Session Chair: Corinne Henak** *University of Wisconsin-Madison*

**Session Co-Chair: Victor Barocas** *University of Minnesota*

**9:30AM Developing A Stem+m Identity In Underrepresented Minority Groups Through Sports and Biomechanics SB<sup>3</sup>C2019-132**

Brittany Marshall<sup>1</sup>, Amy Loya<sup>2</sup>, John Drazan<sup>3</sup>, Anthony Prato<sup>4</sup>, Nicole Conley<sup>5</sup>, Stavros Thomopoulos<sup>1</sup>, Katherine Reuther<sup>1</sup>, <sup>1</sup>*Columbia University, United States*, <sup>2</sup>*Rensselaer Polytechnic Institute, United States*, <sup>3</sup>*University of Pennsylvania, United States*, <sup>4</sup>*SUNY Geneseo, United States*, <sup>5</sup>*Union College, United States*

**9:45AM 3d Strain Gradients Correlate With Murine Myocardial Infarct Severity SB<sup>3</sup>C2019-133**

Arvin Soepriatna<sup>1</sup>, John Boyle<sup>2</sup>, Abigail Clifford<sup>1</sup>, Alex Yeh<sup>1</sup>, Semih Bezci<sup>3</sup>, Grace O'Connell<sup>3</sup>, Craig Goergen<sup>1</sup>, <sup>1</sup>*Purdue University, United States*, <sup>2</sup>*Washington University in Saint Louis, United States*, <sup>3</sup>*University of California Berkeley, United States*

**10:00AM Development of A Dual-Venc 4d Flow Mri Framework For The Generation of Patient Specific Aortic Finite Element Models SB<sup>3</sup>C2019-134**

Jamie Concannon<sup>1</sup>, Kevin Moerman<sup>1</sup>, Peter Dockery<sup>1</sup>, Peter McHugh<sup>1</sup>, Christof Karmonik<sup>2</sup>, Patrick McGarry<sup>1</sup>, <sup>1</sup>*National University of Ireland Galway, Ireland*, <sup>2</sup>*MRI Core, Debaquey Heart and Vascular Center, Houston Methodist, TX, USA, United States*

**10:15AM 5-Ht2b Antagonism Controls Border Zone Mechanics To Improve Outcomes Following Myocardial Infarction SB<sup>3</sup>C2019-135**

J. Caleb Snider<sup>1</sup>, Qinkun Zhang<sup>1</sup>, Hind Lal<sup>1</sup>, W. David Merryman<sup>1</sup>, <sup>1</sup>*Vanderbilt University, United States*

**10:30AM An Integrated Machine Learning-Inverse Finite Element Approach For Identification of Patient-Specific Material Properties of The Aortic Wall From Clinical Ct Images SB<sup>3</sup>C2019-136**

Minliang Liu<sup>1</sup>, Liang Liang<sup>2</sup>, Fatiesa Sulejmani<sup>1</sup>, Xiaoying Lou<sup>3</sup>, Glen Iannucci<sup>3</sup>, Edward Chen<sup>3</sup>, Bradley Leshnowar<sup>3</sup>, Wei Sun<sup>1</sup>, <sup>1</sup>*Georgia Institute of Technology, United States*, <sup>2</sup>*University of Miami, United States*, <sup>3</sup>*Emory University, United States*

**10:45AM Comparative Analysis of Head Impact Kinematics In High School and Collegiate Football Using Mig2.0 Instrumented Mouthguard SB<sup>3</sup>C2019-137**

Ileana Pirozzi<sup>1</sup>, Michael Fanton<sup>1</sup>, Chiara Giordano<sup>1</sup>, Sohrab Sami<sup>1</sup>, India Rangel<sup>1</sup>, William Mehning<sup>1</sup>, Pritha Roy<sup>1</sup>, Brett Avery<sup>1</sup>, Michael Zeineh<sup>1</sup>, Gerald Grant<sup>1</sup>, David Camarillo<sup>1</sup>, <sup>1</sup>*Stanford University, United States*

<b>Thursday, June 27</b>	<b>9:30AM -11:00AM</b>
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### PhD Paper Competition: Extracellular Matrix Biomechanics

**Wintergreen**

**Session Chair: Alejandro Roldan-Alzate** *University of Wisconsin-Madison*

**Session Co-Chair: Bahareh Behkam** *Virginia Tech*

**9:30AM Plasticity and Elasto-Plastic Damage Mechanics Using Reactive Constrained Solid Mixtures: A Modeling Approach For Biomedical Materials SB<sup>3</sup>C2019-138**

Brandon Zimmerman<sup>1</sup>, Gerard Ateshian<sup>1</sup>, <sup>1</sup>*Columbia University, United States*

**9:45AM Inflammatory and Non-Inflammatory Synovial Fluids Exhibit Distinct Tribological Phenotypes SB<sup>3</sup>C2019-139**

Elizabeth Feeney<sup>1</sup>, Devis Galesso<sup>2</sup>, Cynthia Secchieri<sup>2</sup>, Roberta Ramonda<sup>3</sup>, Lawrence Bonassar<sup>1</sup>, <sup>1</sup>*Cornell University, United States*, <sup>2</sup>*Fidia Farmaceutici S.p.A., Italy*, <sup>3</sup>*University of Padua, Italy*

- 10:00AM Failure Mechanisms In The Tendon Enthesis Under Quasistatic, Cyclical, and Pathological Loading** SB<sup>3</sup>C2019-140  
Mikhail Golman<sup>1</sup>, Adam Abraham<sup>2</sup>, Iden Kurtaliaj<sup>2</sup>, Brittany Marshall<sup>2</sup>, Guy Genin<sup>3</sup>, Victor Birman<sup>4</sup>, Stavros Thomopoulos<sup>2</sup>, <sup>1</sup>*Columbia University, United States*, <sup>2</sup>*Columbia University, United States*, <sup>3</sup>*Washington University in St. Louis, United States*, <sup>4</sup>*Missouri Science & Technology, United States*
- 10:15AM Real-Time Measurement of Collagen Architecture and Deformations At Sub-Micron Resolution** SB<sup>3</sup>C2019-141  
Po-Yi Lee<sup>1</sup>, Bin Yang<sup>1</sup>, Ian A Sigal<sup>1</sup>, <sup>1</sup>*University of Pittsburgh, United States*
- 10:30AM Collagen Fatigue Damage Evolves With Creep Strain and Is Strain Rate Dependent** SB<sup>3</sup>C2019-142  
Jared Zitnay<sup>1</sup>, Gang Seob Jung<sup>2</sup>, Allen Lin<sup>1</sup>, Zhao Qin<sup>2</sup>, Yang Li<sup>1</sup>, Markus Buehler<sup>2</sup>, S. Michael Yu<sup>1</sup>, Jeffrey Weiss<sup>1</sup>, <sup>1</sup>*University of Utah, United States*, <sup>2</sup>*Massachusetts Institute of Technology, United States*
- 10:45AM Collagen Denaturation Occurs Upon Tissue Failure In Energy Storing Tendons** SB<sup>3</sup>C2019-143  
Allen Lin<sup>1</sup>, Jared Zitnay<sup>1</sup>, Alexandra Allan<sup>1</sup>, Jeffrey Weiss<sup>1</sup>, <sup>1</sup>*University of Utah, United States*

Thursday, June 27

9:30AM -11:00AM

**Bone Mechanics****Seasons 1-3****Session Chair: Daniel Nicoletta** *Southwest Research Institute*

- 9:30AM Metabolic Acidosis Causes Physio-Chemically Induced Mechanical and Compositional Changes To Murine Bones** SB<sup>3</sup>C2019-144  
Kathryn Morozov<sup>1</sup>, Brian Wingender<sup>1</sup>, Anna Peterson<sup>1</sup>, Alix Deymier<sup>1</sup>, <sup>1</sup>*UConn Health, United States*
- 9:45AM Effect of Hydration On Mechanical Properties of Individual Collagen Fibrils and Extrafibrillar Matrix** SB<sup>3</sup>C2019-145  
Heber Martinez Barron<sup>1</sup>, Wei Gao<sup>1</sup>, Xiaodu Wang<sup>1</sup>, <sup>1</sup>*University of Texas at San Antonio, United States*
- 10:00AM Effects of Exercise and Posture On Subchondral Bone Density and Thickness of Sheep** SB<sup>3</sup>C2019-146  
Hyunggwai Song<sup>1</sup>, John Polk<sup>1</sup>, Mariana Kersh<sup>1</sup>, <sup>1</sup>*University of Illinois at Urbana-Champaign, United States*
- 10:15AM Statistical Shape Analysis For The Assessment of Proximal Femur Shape Features Meaningful To Osteoporotic Risk of Fracture** SB<sup>3</sup>C2019-147  
Alessandra Aldieri<sup>1</sup>, Mara Terzini<sup>1</sup>, Cristina Bignardi<sup>1</sup>, Alberto L. Audenino<sup>1</sup>, Umberto Morbiducci<sup>1</sup>, <sup>1</sup>*Politecnico di Torino, Italy*
- 10:30AM Nondestructive Mapping of 3d Bone-Implant Contact and 3d Peri-Implant Strain** SB<sup>3</sup>C2019-148  
Yuxiao Zhou<sup>1</sup>, Chujie Gong<sup>1</sup>, Mehran Hossaini-Zadeh<sup>2</sup>, Jing Du<sup>1</sup>, <sup>1</sup>*The Pennsylvania State University, United States*, <sup>2</sup>*Temple University, United States*

Thursday, June 27

9:30AM -11:00AM

**Frontiers in Experiments, Imaging, and Modeling in Tissue  
Solid Mechanics****Seasons 4-5****Session Chair: Adrian Buganza Tepole** *Purdue University***Session Co-Chair: Mathias Brieu** *California State University - Los Angeles*

- 9:30AM Choroidal Swelling Is Predicted To Cause Significant Optic Nerve Head Deformation: Potential Relevance To Sans** SB<sup>3</sup>C2019-149

Andrew Feola<sup>1</sup>, Brian Samuels<sup>2</sup>, Brandon Macias<sup>3</sup>, Michael Stenger<sup>4</sup>, Nimesh Patel<sup>5</sup>, C. Ross Ethier<sup>6</sup>, <sup>1</sup>Atlanta VA and Georgia Institute of Technology, United States, <sup>2</sup>University of Alabama at Birmingham, United States, <sup>3</sup>KBRwyle, United States, <sup>4</sup>Nasa-jsc, United States, <sup>5</sup>University of Houston, United States, <sup>6</sup>Georgia Tech, United States

**9:45AM Biomechanical Characterization of Active and Passive Properties of Murine Branch Pulmonary Arteries** SB<sup>3</sup>C2019-150

Abhay B. Ramachandra<sup>1</sup>, Jay Humphrey<sup>1</sup>, <sup>1</sup>Yale University, United States

**10:00AM Effects of Long Term Spinal Cord Injury On The Mechanical Behavior of The Urinary Bladder Extracellular Matrix** SB<sup>3</sup>C2019-151

Tyler Tuttle<sup>1</sup>, Heidi Lujan<sup>1</sup>, Stephen DiCarlo<sup>1</sup>, Sara Roccabianca<sup>1</sup>, <sup>1</sup>Michigan State University, United States

**10:15AM Multi-Scale Model of Pressure-Driven Hypoxia In The Skin Resulting From Microvascular Collapse** SB<sup>3</sup>C2019-152

Vivek Sree<sup>1</sup>, Manuel Rausch<sup>2</sup>, Adrian Buganza Tepole<sup>1</sup>, <sup>1</sup>Purdue University, United States, <sup>2</sup>The University of Texas at Austin, United States

**10:30AM A Comparative Classification Analysis of Abdominal Aortic Aneurysm By Machine Learning Algorithms** SB<sup>3</sup>C2019-153

Balaji Rengarajan<sup>1</sup>, Wei Wu<sup>1</sup>, Crystal Weidner<sup>2</sup>, Satish Mukul<sup>3</sup>, Mark Eskandari<sup>4</sup>, Ender Finol<sup>1</sup>, <sup>1</sup>Department of Mechanical Engineering University of Texas at San Antonio San Antonio, TX, U.S.A., United States, <sup>2</sup>Department of Management Science and Statistics University of Texas at San Antonio San Antonio, TX, U.S.A., United States, <sup>3</sup>Department of Thoracic & Cardiovascular Surgery, Allegheny General Hospital Allegheny Health Network Pittsburgh, PA, U.S.A., United States, <sup>4</sup>Division of Vascular Surgery, Feinberg School of Medicine Northwestern University Chicago, IL, U.S.A., United States

**10:45AM Design, Calibration, and Preliminary Testing of A System To Measure The Viscoelastic Properties of A Pacinian Corpuscle** SB<sup>3</sup>C2019-154

Tiffany Senkow<sup>1</sup>, Emily Chandler<sup>1</sup>, Amy Moeller<sup>2</sup>, Victor Barocas<sup>1</sup>, <sup>1</sup>University Of Minnesota, United States, <sup>2</sup>Twin Cities Orthopedics, United States

**Thursday, June 27**

**9:30AM -11:00AM**

**Rehabilitation and Assistive Technologies**

**Hemlock**

**Session Chair:** Sara Wilson *University of Kansas*

**Session Co-Chair:** Carrie Peterson *Virginia Commonwealth University*

**9:30AM The Effect of Intermittent Theta Burst Stimulation On Biceps Corticomotor Excitability In Nonimpaired Individuals and Individuals With Tetraplegia** SB<sup>3</sup>C2019-155

Neil Mittal<sup>1</sup>, Blaize Majdic<sup>1</sup>, Carrie Peterson<sup>1</sup>, <sup>1</sup>Virginia Commonwealth University, United States

**9:45AM Inertial Measurement Units Used To Quantify Arm Elevation Angles of Manual Wheelchair Users and Able-Bodied Controls Throughout A Typical Day** SB<sup>3</sup>C2019-156

Brianna Goodwin<sup>1</sup>, Stephen Cain<sup>2</sup>, Meegan Van Straaten<sup>1</sup>, Emma Fortune<sup>1</sup>, Melissa Morrow<sup>1</sup>, <sup>1</sup>Mayo Clinic, United States, <sup>2</sup>University of Michigan, United States

**10:00AM Exercise Therapy Affects Glenohumeral Kinematics In Patients With Isolated Supraspinatus Tears** SB<sup>3</sup>C2019-157

Luke Mattar<sup>1</sup>, Camille Johnson<sup>1</sup>, Tom Gale<sup>1</sup>, Adam Popchak<sup>1</sup>, James Irrgang<sup>1</sup>, William Anderst<sup>1</sup>, Volker Musahl<sup>1</sup>, Richard Debski<sup>1</sup>, <sup>1</sup>University of Pittsburgh, United States

**10:15AM Changes In Hand Function Due To Basal Joint Suspensionplasty** SB<sup>3</sup>C2019-158

Joshua Drost<sup>1</sup>, James Clarkson<sup>1</sup>, Tamara Bush<sup>1</sup>, <sup>1</sup>Michigan State University, United States

**10:30AM Macroscopic Surface Deformation of Retrieved Glenoid Components For Total Shoulder Arthroplasty SB<sup>3</sup>C2019-159**

Giuliana Davis<sup>1</sup>, Noah Bonnheim<sup>1</sup>, Louis Malito<sup>1</sup>, Stephan Gunther<sup>2</sup>, Tom Norris<sup>3</sup>, Lisa Pruitt<sup>1</sup>, <sup>1</sup>*Department of Mechanical Engineering, University of California, Berkeley, United States*, <sup>2</sup>*Martha Jefferson Hospital, United States*, <sup>3</sup>*San Francisco Shoulder, Elbow & Hand Clinic, United States*

**10:45AM Development of An Annular Flow Mechanism For Maintaining Intraocular Pressure With A Glaucoma Drainage Device SB<sup>3</sup>C2019-160**

Sara Wilson<sup>1</sup>, Anna Donovan<sup>1</sup>, Hussain Alantari<sup>2</sup>, Paul Munden<sup>3</sup>, Ronald Dougherty<sup>1</sup>, <sup>1</sup>*University of Kansas, United States*, <sup>2</sup>*University of Missouri - Kansas City, United States*, <sup>3</sup>*Oklahoma City VA Health Care System, United States*

**Thursday, June 27****9:30AM -11:00AM****Ventricular and Valvular Flow****Fox Den****Session Chair: Lakshmi Prasad Dasi** *Ohio State University***9:30AM Aortic Sinus Vortex Spatio-Temporal Variations With Leaflet Calcification SB<sup>3</sup>C2019-161**

Hoda Hatoum<sup>1</sup>, Lakshmi Prasad Dasi<sup>1</sup>, <sup>1</sup>*The Ohio State University, United States*

**9:45AM An Initial Fluid Mechanics Study of Bioprosthetic Heart Valves In An Accelerated Dynamic Environment SB<sup>3</sup>C2019-162**

Sailahari Ponnaluri<sup>1</sup>, Ming-Chen Hsu<sup>2</sup>, Michael Sacks<sup>3</sup>, Keefe Manning<sup>1</sup>, <sup>1</sup>*The Pennsylvania State University, United States*, <sup>2</sup>*Iowa State University, United States*, <sup>3</sup>*University of Texas, United States*

**10:00AM Experimental Testing of Polymeric Tavr Valve Performance In Patient-Specific Models SB<sup>3</sup>C2019-163**

Brandon Kovarovic<sup>1</sup>, Oren Rotman<sup>1</sup>, Marvin Slepian<sup>2</sup>, Danny Bluestein<sup>1</sup>, <sup>1</sup>*Department of Biomedical Engineering, Stony Brook University, Stony Brook, NY, United States*, <sup>2</sup>*Sarver Heart Center, University of Arizona, Tucson, AZ, United States*

**10:15AM Comparative Quantification of Mitral Regurgitation By Computer Modeling and Simulated Echocardiography SB<sup>3</sup>C2019-164**

Wenbin Mao<sup>1</sup>, Andrs Caballero<sup>1</sup>, Rebecca Hahn<sup>2</sup>, Susheel Kodali<sup>2</sup>, Wei Sun<sup>1</sup>, <sup>1</sup>*Georgia Institute of Technology, United States*, <sup>2</sup>*Columbia University Medical Center, United States*

**10:30AM The Effects of Anterior Mitral Leaflet Laceration On Left Ventricular Flow With Transcatheter Mitral Valves: An In Vitro Study SB<sup>3</sup>C2019-165**

Thomas Easley<sup>1</sup>, Vahid Sadri<sup>1</sup>, Pranav Dorbala<sup>1</sup>, Norihiko Kamioka<sup>2</sup>, Vasilis Babaliaros<sup>2</sup>, Ajit Yoganathan<sup>1</sup>, <sup>1</sup>*Georgia Institute of Technology, United States*, <sup>2</sup>*Emory University, United States*

**10:45AM Patient-Specific Modeling of The Left Ventricular Hemodynamics Using The Chimera Overset Mesh Technique SB<sup>3</sup>C2019-166**

Federico Can<sup>1</sup>, Matteo Selmi<sup>2</sup>, Gianluca De Santis<sup>3</sup>, Alberto Redaelli<sup>4</sup>, Patrick Segers<sup>1</sup>, Joris Degroote<sup>5</sup>, <sup>1</sup>*IBiTech bioMMeda, Department of Electronics and Information Systems, Ghent University, Belgium*, <sup>2</sup>*Division of Cardiac Surgery, Department of Surgery, Universit di Verona, Italy*, <sup>3</sup>*FEops NV, Belgium*, <sup>4</sup>*Department of Electronics, Informatics and Bioengineering, Politecnico di Milano, Italy*, <sup>5</sup>*Department of Flow, Heat and Combustion Mechanics, Ghent University, Belgium*



<b>Thursday, June 27</b>	<b>11:15AM -12:45PM</b>
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### PhD Paper Competition: Computational Biomechanics and Diagnostic Models

**Sunburst**

**Session Chair:** Chiara Bellini *Northeastern University*

**Session Co-Chair:** Craig Goergen *Purdue University*

- 11:15AM Designing Tissue Engineered Vascular Grafts For Young and Aged Hosts: In Vivo, Ex Vivo and In Silico Study** SB<sup>3</sup>C2019-167  
Piyusha Gade<sup>1</sup>, Keewon Lee<sup>1</sup>, Yadong Wang<sup>2</sup>, Anne Robertson<sup>1</sup>, <sup>1</sup>*University of Pittsburgh, United States*, <sup>2</sup>*Cornell University, United States*
- 11:30AM Computational Fluid Dynamics Modeling of Myocardial Bridging Using Coronary Angiography** SB<sup>3</sup>C2019-168  
Mohammadali Sharzehee<sup>1</sup>, Ran Gao<sup>2</sup>, Yuan Chang<sup>2</sup>, Jiangping Song<sup>2</sup>, Hai-Chao Han<sup>3</sup>, <sup>1</sup>*University Of Texas At San Antonio, United States*, <sup>2</sup>*Fuwai Hospital, China*, <sup>3</sup>*Professor, United States*
- 11:45AM Axial Stretch Modulates Lymphatic Contractility: An Experimental-Computational Approach In A Novel Rat Tail Model** SB<sup>3</sup>C2019-169  
Mohammad S. Razavi<sup>1</sup>, Julie Leonard-Duke<sup>1</sup>, Rebecca Hardie<sup>1</sup>, Brandon Dixon<sup>1</sup>, Rudolph Gleason<sup>1</sup>, <sup>1</sup>*Georgia Institute of Technology, United States*
- 12:00PM Simulation of Cardiac Flow: Analysis of Geometry Simplification** SB<sup>3</sup>C2019-170  
Fanwei Kong<sup>1</sup>, Christoph Augustin<sup>2</sup>, Kevin Sack<sup>3</sup>, Shawn Shadden<sup>1</sup>, <sup>1</sup>*Department of Mechanical Engineering, University of California, Berkeley, United States*, <sup>2</sup>*Institute of Biophysics, Medical University of Graz, Austria*, <sup>3</sup>*Division of Biomedical Engineering Department of Human Biology, University of Cape Town, South Africa*
- 12:15PM A Combined Mri Arterial Spin Labeling and Computational Modeling Strategy To Quantify Patient-Specific Blood Flow and Perfusion In Cerebrovascular Occlusive Disease** SB<sup>3</sup>C2019-171  
Jonas Schollenberger<sup>1</sup>, Luis Hernandez-Garcia<sup>2</sup>, C. Alberto Figueroa<sup>3</sup>, <sup>1</sup>*Department of Biomedical Engineering, University of Michigan, United States*, <sup>2</sup>*fMRI Laboratory and Department of Biomedical Engineering, University of Michigan, United States*, <sup>3</sup>*Departments of Surgery and Biomedical Engineering, University of Michigan, United States*
- 12:30PM Evaluation of Artificial Neural Networks As A Potential Rupture Discrimination Model** SB<sup>3</sup>C2019-172  
Sricharan S Veeturi<sup>1</sup>, Hamidreza Rajabzadeh-Oghaz<sup>1</sup>, Jason M Davies<sup>1</sup>, Hui Meng<sup>1</sup>, <sup>1</sup>*University at Buffalo, United States*

<b>Thursday, June 27</b>	<b>11:15AM -12:45PM</b>
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### PhD Paper Competition: Morphogenesis, Development, Growth, and Remodeling

**Snowflake**

**Session Chair:** Kristin Miller *Tulane University*

**Session Co-Chair:** Jeffrey Weiss *University of Utah*

- 11:15AM Systematic Modulation of Cell-Cell Adhesion In Vivo Modulates Epithelial Tissue Mechanics and Remodeling** SB<sup>3</sup>C2019-173  
Xun Wang<sup>1</sup>, Karen Kasza<sup>1</sup>, <sup>1</sup>*Columbia University, United States*
- 11:30AM Relating Bone Strain To Local Changes In Radius Microstructure Following 12 Months of Axial Forearm Loading In Women** SB<sup>3</sup>C2019-174  
Megan Mancuso<sup>1</sup>, Karen Troy<sup>1</sup>, <sup>1</sup>*Department of Biomedical Engineering, Worcester Polytechnic Institute, United States*

- 11:45AM Effects of Reproduction and Lactation History On Rat Maternal Bone Mechano-Responsiveness and Osteocyte Microenvironment** SB<sup>3</sup>C2019-175  
Yihan Li<sup>1</sup>, Ashutosh Parajuli<sup>2</sup>, Chantal de Bakker<sup>1</sup>, Hongbo Zhao<sup>1</sup>, Wei-Ju Tseng<sup>1</sup>, Rebecca Chung<sup>1</sup>, Liyun Wang<sup>2</sup>, X. Sherry Liu<sup>1</sup>, <sup>1</sup>*University of Pennsylvania, United States*, <sup>2</sup>*University of Delaware, United States*
- 12:00PM Biphasic Network Model of Collagen and Elastin Remodelling Recapitulates Compositional and Organizational Changes During Aortic Growth and Development** SB<sup>3</sup>C2019-176  
Ryan Mahutga<sup>1</sup>, Victor Barocas<sup>1</sup>, <sup>1</sup>*University of Minnesota, United States*
- 12:15PM Pregnancy and Lactation Impair Subchondral Bone Leading To Reduced Rat Supraspinatus Tendon Failure Properties** SB<sup>3</sup>C2019-177  
Ashley Fung<sup>1</sup>, Snehal Shetye<sup>1</sup>, Yihan Li<sup>1</sup>, X. Sherry Liu<sup>1</sup>, Louis Soslowsky<sup>1</sup>, <sup>1</sup>*University of Pennsylvania, United States*
- 12:30PM Modeling Adaptive Remodeling of The Bladder Wall During Aging** SB<sup>3</sup>C2019-178  
Fangzhou Cheng<sup>1</sup>, Lori Birder<sup>1</sup>, Paul Watton<sup>2</sup>, Anne Robertson<sup>1</sup>, <sup>1</sup>*University of Pittsburgh, United States*, <sup>2</sup>*University of Sheffield, United States*

Thursday, June 27

11:15AM -12:45PM

### PhD Paper Competition: Cellular Mechanics, Drug Delivery, and Therapeutics

Wintergreen

Session Chair: Sarah Bentil *Iowa State University*Session Co-Chair: Brendon Baker *University of Michigan*

- 11:15AM Membrane Wrapping Efficiency of Elastic Nanoparticles During Endocytosis: Size and Shape Matter** SB<sup>3</sup>C2019-179  
Zhiqiang Shen<sup>1</sup>, Huilin Ye<sup>1</sup>, Xin Yi<sup>2</sup>, Ying Li<sup>1</sup>, <sup>1</sup>*University of Connecticut, United States*, <sup>2</sup>*Peking University, China*
- 11:30AM Neck Skin Thermal Features As A Measure of Stenosis In The Carotid Artery: Computational and In-Vivo Study** SB<sup>3</sup>C2019-180  
Ashish Saxena<sup>1</sup>, Eddie Yin Kwee Ng<sup>1</sup>, Vignesh Raman<sup>1</sup>, Soo Teik Lim<sup>2</sup>, <sup>1</sup>*Nanyang Technological University, Singapore*, <sup>2</sup>*National Heart Center Singapore, Singapore*
- 11:45AM A Cold-Responsive Nanoparticle Enables Intracellular Delivery and Rapid Release of Trehalose For Fast Freezing of Stem Cells** SB<sup>3</sup>C2019-181  
Samantha Stewart<sup>1</sup>, Xiaoming He<sup>2</sup>, <sup>1</sup>*University of Maryland, College Park, United States*, <sup>2</sup>*University of Maryland, College Park, United States*
- 12:00PM Engineering and Characterization of Collagenase-Expressing Salmonella Typhimurium For Enhanced Interstitial Transport In Tissue** SB<sup>3</sup>C2019-182  
Eric Leaman<sup>1</sup>, Bahareh Behkam<sup>1</sup>, <sup>1</sup>*Virginia Tech, United States*
- 12:15PM A Systematic Approach To The Thermal Mitigation of Irreversible Electroporation Therapy** SB<sup>3</sup>C2019-183  
Timothy O'Brien<sup>1</sup>, Melvin Lorenzo<sup>1</sup>, Yajun Zhao<sup>1</sup>, Robert Neal, II<sup>2</sup>, John Robertson<sup>1</sup>, S. Nahum Goldberg<sup>3</sup>, Rafael Davalos<sup>1</sup>, <sup>1</sup>*Department of Biomedical Engineering and Mechanics, Virginia Tech, United States*, <sup>2</sup>*AngioDynamics, United States*, <sup>3</sup>*Department of Radiology, Hadassah Hebrew University Hospital, Israel*
- 12:30PM Optical Opening of Blood-Brain Barrier For Macromolecules Penetration By Laser Excitation of Vasculature-Targeted Plasmonic Nanoparticles** SB<sup>3</sup>C2019-184  
Xiaoqing Li<sup>1</sup>, Hejian Xiong<sup>1</sup>, Vamsidhara Vemireddy<sup>2</sup>, Xiuying Li<sup>1</sup>, Monica Giannotta<sup>3</sup>, Heather Hayenga<sup>1</sup>, Edward Pan<sup>2</sup>, Shashank Sirsi<sup>1</sup>, Elisabetta Dejana<sup>3</sup>, Robert Bachoo<sup>2</sup>, Zhenpeng Qin<sup>1</sup>, <sup>1</sup>*University of Texas at Dallas, United States*, <sup>2</sup>*University of Texas Southwestern Medical Center, United States*, <sup>3</sup>*FIRC Institute of Molecular Oncology Foundation, Italy*

<b>Thursday, June 27</b>	<b>11:15AM -12:45PM</b>
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**Musculoskeletal Tissue Engineering****Seasons 1-3****Session Chair: Alix Deymier** *UConn Health***Session Co-Chair: Spencer Szczesny** *Pennsylvania State University*

**11:15AM Recapitulating The Complex Biomechanical Properties of Intervertebral Disc Using Tunable 3d Printing** SB<sup>3</sup>C2019-185

Samantha Marshall<sup>1</sup>, Timothy Jacobsen<sup>1</sup>, Kevin Anton<sup>1</sup>, Archana Murali<sup>1</sup>, Nadeen Chahine<sup>1</sup>, <sup>1</sup>*Columbia University, United States*

**11:30AM Orientation and Size of The Porcine Anterior Cruciate Ligament Vary Between Yorkshire and Yucatan Breeds At Early Adolescence** SB<sup>3</sup>C2019-186

Stephanie Cone<sup>1</sup>, Danielle Howe<sup>1</sup>, Emily Lambeth<sup>1</sup>, Jorge Piedrahita<sup>2</sup>, Lynn Fordham<sup>3</sup>, Jeffrey Spang<sup>3</sup>, Matthew Fisher<sup>1</sup>, <sup>1</sup>*North Carolina State University and the University of North Carolina – Chapel Hill, United States*, <sup>2</sup>*North Carolina State University, United States*, <sup>3</sup>*University of North Carolina – Chapel Hill, United States*

**11:45AM For Ligaments, Material Stiffness Is Not What It Appears To Be: How To Build More Accurate Material Models and Implications On Acl Graft Selection** SB<sup>3</sup>C2019-187

Callan Luetkemeyer<sup>1</sup>, Ellen Arruda<sup>1</sup>, <sup>1</sup>*University of Michigan, United States*

**12:00PM An Engineered Biomaterial Microenvironment To Direct The Formation of A Living Barrier To Seal Cartilage Defects** SB<sup>3</sup>C2019-188

Jay Patel<sup>1</sup>, Claudia Loebel<sup>1</sup>, Brian Wise<sup>1</sup>, Kamiel Saleh<sup>1</sup>, James Carey<sup>1</sup>, Jason Burdick<sup>1</sup>, Robert Mauck<sup>1</sup>, <sup>1</sup>*University of Pennsylvania, United States*

**12:15PM Sustained Release of Tgf-3 From Heparinized Collagen Biofabric Induces Chondrogenic Differentiation of Human Mesenchymal Stem Cell Macromass** SB<sup>3</sup>C2019-189

Hyungjin Jung<sup>1</sup>, Phillip McClellan<sup>1</sup>, Ozan Akkus<sup>1</sup>, <sup>1</sup>*Case Western Reserve University, United States*

<b>Thursday, June 27</b>	<b>11:15AM -12:45PM</b>
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**Nano to Micro Multiscale Mechanics****Seasons 4-5****Session Chair: Kristin Myers** *Columbia University***Session Co-Chair: Vicky Nguyen** *Johns Hopkins University*

**11:15AM A Computational and Experimental Study of Short Bowel Syndrome Biomechanics** SB<sup>3</sup>C2019-190

Hadi S. Hosseini<sup>1</sup>, Jordan S. Taylor<sup>1</sup>, James C. Y. Dunn<sup>1</sup>, <sup>1</sup>*Stanford University, United States*

**11:30AM A Discrete Fiber Network Model of Arterial Elastin Considering Inter-Fiber Crosslink** SB<sup>3</sup>C2019-191

Xunjie Yu<sup>1</sup>, Yanhang Zhang<sup>1</sup>, <sup>1</sup>*Boston University, United States*

**11:45AM In Vivo Lamin A/c Deficiency Maintains Bulk Nuclear Shape and Stiffness, But Leads To Abrogated Intranuclear Mechanics and Chromatin Organization** SB<sup>3</sup>C2019-192

Soham Ghosh<sup>1</sup>, Adrienne Scott<sup>1</sup>, Jessica Kelly<sup>1</sup>, Benjamin Seelbinder<sup>1</sup>, Xin Xu<sup>1</sup>, Stephanie Schneider<sup>1</sup>, Corey Neu<sup>1</sup>, <sup>1</sup>*University of Colorado Boulder, United States*

**12:00PM Tunable Dna Nanocalipers Capable of Applying Forces To Biomolecules** SB<sup>3</sup>C2019-193

Jenny Le<sup>1</sup>, Kyle Crocker<sup>1</sup>, Michael Darcy<sup>1</sup>, Michael Poirier<sup>1</sup>, Ralf Bundschuh<sup>1</sup>, Carlos Castro<sup>1</sup>, <sup>1</sup>*The Ohio State University, United States*

**12:15PM Microstructure of Tendon Reveals Helically Wrapped Fibrils With The Potential To Mediate Mechanical Load Transfer By Friction SB<sup>3</sup>C2019-194**

Babak N. Safa<sup>1</sup>, John Peloquin<sup>1</sup>, Jessica Natriello<sup>1</sup>, Jeffrey Caplan<sup>1</sup>, Dawn Elliott<sup>1</sup>, <sup>1</sup>*University of Delaware, United States*

**12:30PM Deformation Characteristics of The Rat Pia-Arachnoid Complex Through Multimodal Imaging SB<sup>3</sup>C2019-195**

Zeynep M. Suar<sup>1</sup>, Gloria Fabris<sup>1</sup>, Luke Langner<sup>1</sup>, Mehmet Kurt<sup>1</sup>, <sup>1</sup>*Stevens Institute of Technology, United States*

**Thursday, June 27**

**11:15AM -12:45PM**

**Vascular Biomechanics**

**Hemlock**

**Session Chair: Patrick Alford** *University of Minnesota*

**Session Co-Chair: Seungik Baek** *Michigan State University*

**11:15AM Uncertainty Analysis of Vascular Surrogate Models SB<sup>3</sup>C2019-196**

Zhenxiang Jiang<sup>1</sup>, Jongeun Choi<sup>2</sup>, Seungik Baek<sup>1</sup>, <sup>1</sup>*Michigan State University, United States*, <sup>2</sup>*Yonsei University, South Korea*

**11:30AM Effect of Calcification & Fibrous Tissue Features On Rupture Risk In Atherosclerotic Plaques SB<sup>3</sup>C2019-197**

Bas Vis<sup>1</sup>, Hilary Barrett<sup>1</sup>, Astrid Moerman<sup>1</sup>, Frank Gijzen<sup>1</sup>, Ali Akyildiz<sup>1</sup>, <sup>1</sup>*Erasmus Medical Center, Netherlands*

**11:45AM Initiation of Dissection In The Aortic Arch SB<sup>3</sup>C2019-198**

Brian FitzGibbon<sup>1</sup>, Kevin Moerman<sup>1</sup>, Peter McHugh<sup>1</sup>, Patrick McGarry<sup>1</sup>, <sup>1</sup>*National University of Ireland Galway, Ireland*

**12:00PM Comparative Biomechanical Phenotyping of The Murine Central Vasculature SB<sup>3</sup>C2019-199**

Jay Humphrey<sup>1</sup>, <sup>1</sup>*Yale University, United States*

**12:15PM Regional Anisotropic Mechanical Characterization of Porcine Pulmonary Arteries SB<sup>3</sup>C2019-200**

Narasimha Rao Pillalamarri<sup>1</sup>, Sourav Patnaik<sup>1</sup>, Senol Piskin<sup>1</sup>, Ender Finol<sup>1</sup>, <sup>1</sup>*University of Texas at San Antonio, United States*

**12:30PM Investigating The Effects of Extracellular Stiffness On Vascular Smooth Muscle Cell Stress and Mechanical Properties SB<sup>3</sup>C2019-201**

Elizabeth Shih<sup>1</sup>, Patrick Alford<sup>1</sup>, <sup>1</sup>*Department of Biomedical Engineering at University of Minnesota Twin Cities, United States*

**Thursday, June 27**

**11:15AM -12:45PM**

**Patient-Specific Flow and Physiology**

**Fox Den**

**Session Chair: Amirhossein Arzani** *Northern Arizona University*

**11:15AM Cardiac Flow Dynamics of Healthy Volunteers : Sex Differences SB<sup>3</sup>C2019-202**

David Rutkowski<sup>1</sup>, Gregory Barton<sup>1</sup>, Christopher Francois<sup>1</sup>, Alejandro Roldan-Alzate<sup>1</sup>, <sup>1</sup>*University of Wisconsin-Madison, United States*

**11:30AM Wall Shear Stress Topological Skeleton Identification In Cardiovascular Flows: A Practical Approach SB<sup>3</sup>C2019-203**

Valentina Mazzi<sup>1</sup>, Diego Gallo<sup>1</sup>, Karol Cal<sup>1</sup>, Muhammad O. Khan<sup>2</sup>, David A. Steinman<sup>3</sup>, Umberto Morbiducci<sup>1</sup>,  
<sup>1</sup>Polito BIOMed Lab, Department of Mechanical and Aerospace Engineering, Politecnico di Torino, Turin, Italy,  
<sup>2</sup>Cardiovascular Biomechanics Computation Lab, Department of Pediatrics Stanford University, Stanford, United States,  
<sup>3</sup>Biomedical Simulation Laboratory, Department of Mechanical & Industrial Engineering University of Toronto, Toronto, Canada

- 11:45AM Patient-Specific Fluid-Structure Interaction Analysis of A Bicuspid Aortic Valve** SB<sup>3</sup>C2019-204  
 Monica Emendi<sup>1</sup>, Ram Ghosh<sup>2</sup>, Matteo Bianchi<sup>2</sup>, Francesco Sturla<sup>3</sup>, Filippo Piatti<sup>3</sup>, Alberto Redaelli<sup>1</sup>, Danny Bluestein<sup>2</sup>, <sup>1</sup>Politecnico di Milano, Italy, <sup>2</sup>Stony Brook University, United States, <sup>3</sup>IRCCS Policlinico San Donato, Italy
- 12:00PM Introduction of A Simple 2d Computational Model To Predict Risk of Coronary Obstruction During Transcatheter Aortic Valve Replacement** SB<sup>3</sup>C2019-205  
 Megan Heitkemper<sup>1</sup>, Hoda Hatoum<sup>1</sup>, Amirsepher Azimian<sup>1</sup>, Breandan Yeats<sup>1</sup>, Jennifer Dollery<sup>1</sup>, Bryan Whitson<sup>1</sup>, Gregory Rushing<sup>1</sup>, Juan Crestanello<sup>1</sup>, Scott Lilly<sup>1</sup>, Lakshmi Prasad Dasi<sup>1</sup>, <sup>1</sup>The Ohio State University, United States
- 12:15PM Machine Learning For Discrimination of Posterior Communicating Artery Aneurysm Rupture Status** SB<sup>3</sup>C2019-206  
 Felicitas Detmer<sup>1</sup>, Daniel Lckehe<sup>2</sup>, Fernando Mut<sup>1</sup>, Martin Slawski<sup>1</sup>, Sven Hirsch<sup>3</sup>, Philippe Bijlenga<sup>4</sup>, Gabriele von Voigt<sup>2</sup>, Juan Cebal<sup>1</sup>, <sup>1</sup>George Mason University, United States, <sup>2</sup>Leibniz University Hannover, Germany, <sup>3</sup>ZHAW University of Applied Sciences, Switzerland, <sup>4</sup>University of Geneva, Switzerland
- 12:30PM A Reduced Order Modeling Method For Cardiovascular Flow** SB<sup>3</sup>C2019-207  
 Mehran Mirramezani<sup>1</sup>, Shawn Shadden<sup>1</sup>, <sup>1</sup>University of California, Berkeley, United States

Friday, June 28

12:00PM - 1:30PM

## Biotransport in Thermal Therapy and Cryopreservation

Sunburst

**Session Chair: R. Lyle Hood** University of Texas at San Antonio

**Session Co-Chair: Nilay Chakraborty** University of Michigan Dearborn

- 12:00PM Whole Body Hyperthermia Induced Interstitial Fluid Pressure Reduction and Enhanced Nanoparticle Delivery To Pc3 Tumors** SB<sup>3</sup>C2019-208  
 Qimei Gu<sup>1</sup>, Shuaishuai Liu<sup>1</sup>, Arunendra Saha Ray<sup>1</sup>, Lance Dockery<sup>1</sup>, Marie-Christine Daniel<sup>1</sup>, Charles Bieberich<sup>1</sup>, Ronghui Ma<sup>1</sup>, Liang Zhu<sup>1</sup>, <sup>1</sup>University of Maryland Baltimore County, United States
- 12:15PM Quantification of Tissue Electrical and Thermal Response Due To High Frequency Irreversible Electroporation: A Pilot Study In Ex Vivo Perfused Livers** SB<sup>3</sup>C2019-209  
 Melvin Lorenzo<sup>1</sup>, Tim O'Brien<sup>2</sup>, Kenneth Aycok<sup>1</sup>, Navid Manuchehrabadi<sup>3</sup>, Rafael Davalos<sup>1</sup>, <sup>1</sup>Department of Biomedical Engineering and Mechanics Virginia Polytechnic and State University, United States, <sup>2</sup>Virginia Department of Biomedical Engineering and Mechanics Virginia Polytechnic and State University, United States, <sup>3</sup>AngioDynamics, United States
- 12:30PM Magnetic Nanoparticle Hyperthermia For Pancreatic Cancer: A Computational Study** SB<sup>3</sup>C2019-210  
 Anilchandra Attaluri<sup>1</sup>, Sri Kamal Kandala<sup>2</sup>, Robert Ivkov<sup>3</sup>, <sup>1</sup>The Pennsylvania State University - Harrisburg, United States, <sup>2</sup>University of Texas MD Anderson Cancer Center, United States, <sup>3</sup>Johns Hopkins University School of Medicine, United States
- 12:45PM In Situ Photo-Inactivation of Proteins By Molecular Hyperthermia** SB<sup>3</sup>C2019-211  
 Peiyuan Kang<sup>1</sup>, Xiaoqing Li<sup>1</sup>, Stephanie Shiers<sup>1</sup>, Hejian Xiong<sup>1</sup>, Theodore Price<sup>1</sup>, Zhenpeng Qin<sup>1</sup>, <sup>1</sup>The university of texas at dallas, United States

- 1:00PM Diffusion Limited Cryopreservation of Arterial Tissue To 1.5 Mm With Radiofre-Quency Heated Metal Forms** SB<sup>3</sup>C2019-212  
Zonghu Han<sup>1</sup>, Zhe Gao<sup>1</sup>, Anirudh Sharma<sup>2</sup>, John Bischof<sup>2</sup>, <sup>1</sup>University Of Minnesota, United States, <sup>2</sup>University of Minnesota, United States
- 1:15PM Counterintuitive Scaling Effects In The Developing Thermomechanical Stress During Cryogenic Cooling of The Kidney With Implications To Electromagnetic Rewarming For Organ Banking** SB<sup>3</sup>C2019-213  
Prem Solanki<sup>1</sup>, Yoed Rabin<sup>1</sup>, <sup>1</sup>Carnegie Mellon University, United States

**Friday, June 28****12:00PM - 1:30PM****Aneurysm Mechanics****Snowflake****Session Chair: Spandan Maiti** *University of Pittsburgh***Session Co-Chair: Yanhang (Katherine) Zhang** *Boston University*

- 12:00PM Patient-Specific Estimation of Ascending Thoracic Aortic Aneurysm Growth and Remodeling: Fem Based Constrained Mixture Model** SB<sup>3</sup>C2019-214  
S. Jamaledin Mousavi Mousavi<sup>1</sup>, Stephane Avril<sup>1</sup>, <sup>1</sup>Mines Saint-Etienne, Univ Lyon, Univ Jean Monnet, INSERM, U 1059 Sainbiose, Centre CIS, F - 42023 Saint-Etienne France, France
- 12:15PM Machine Learning Prediction of Rupture Strength of Ascending Aortic Aneurysm Tissue** SB<sup>3</sup>C2019-215  
Xuehuan He<sup>1</sup>, Anna Ferrara<sup>2</sup>, Yuanming Luo<sup>1</sup>, Ferdinando Auricchio<sup>2</sup>, Jia Lu<sup>1</sup>, <sup>1</sup>University Of Iowa, United States, <sup>2</sup>Universit degli Studi di Pavia, Italy
- 12:30PM Wall Stress and Geometric Measures In Electively Repaired Abdominal Aortic Aneurysms** SB<sup>3</sup>C2019-216  
Balaji Rengarajan<sup>1</sup>, Wei Wu<sup>1</sup>, Mirunalini Thirugnanasambandam<sup>2</sup>, Shalin Parikh<sup>2</sup>, Raymond Gomez<sup>1</sup>, Ender Finol<sup>1</sup>, <sup>1</sup>Department of Mechanical Engineering University of Texas at San Antonio San Antonio, TX, U.S.A., United States, <sup>2</sup>UTHSA/UTHSA Joint Graduate Program in Biomedical Engineering University of Texas at San Antonio San Antonio, TX, U.S.A., United States
- 12:45PM A Particle-Based Model Reveals An Insidious Feed-Back Loop Between Aortic Lamellar Disruption and Cell Apoptosis** SB<sup>3</sup>C2019-217  
Hossein Ahmadzadeh<sup>1</sup>, Jay Humphrey<sup>1</sup>, <sup>1</sup>Yale University, United States
- 1:00PM Alterations In Biomechanical Properties of Aortic Wall In A Mouse Model of Marfan Syndrome** SB<sup>3</sup>C2019-218  
Nazli Gharraee<sup>1</sup>, Rahul Raghavan<sup>1</sup>, Yujian Sun<sup>1</sup>, Susan Lessner<sup>1</sup>, <sup>1</sup>University of South Carolina, United States
- 1:15PM Can The Elastase Induced Aneurysm Model Be Used To Study Remodeling In Saccular Aneurysms** SB<sup>3</sup>C2019-219  
Chao Sang<sup>1</sup>, David Kallmes<sup>2</sup>, Watkins Simon<sup>1</sup>, Anne Robertson<sup>1</sup>, <sup>1</sup>University of Pittsburgh, United States, <sup>2</sup>Mayo Clinic, United States

**Friday, June 28****12:00PM - 1:30PM****Mechanobiology - a Symposium in Memory of Christopher R. Jacobs****Wintergreen****Session Chair: Eno Ebong** *Northeastern University***Session Co-Chair: Ed Guo** *Columbia University*

- 12:00PM Adhesion Models For Cell Migration Simulator On Continuous Substrate** SB<sup>3</sup>C2019-220  
Jay Hou<sup>1</sup>, Liam Tyler<sup>1</sup>, Daniel Keefe<sup>1</sup>, David Odde<sup>1</sup>, Victor Barocas<sup>1</sup>, <sup>1</sup>University of Minnesota, United States

- 12:15PM Red Blood Cell Biomechanics In Chronic Fatigue Syndrome** SB<sup>3</sup>C2019-221  
Amit Saha<sup>1</sup>, Brendan Schmidt<sup>2</sup>, Arun Kumar<sup>2</sup>, Amir Saadat<sup>1</sup>, Vineeth Suja<sup>1</sup>, Vy Nguyen<sup>2</sup>, Justin Do<sup>2</sup>, Wendy Ho<sup>2</sup>, Mohsen Nemat-Gorgani<sup>1</sup>, Eric Shafqeh<sup>1</sup>, Anand Ramasubramanian<sup>2</sup>, Ronald Davis<sup>1</sup>, <sup>1</sup>*Stanford University, United States*, <sup>2</sup>*San Jose State University, United States*
- 12:30PM Development of Recombinant Inner-Ear Motor Protein Prestin Equipped With Affinity Tag** SB<sup>3</sup>C2019-222  
Michio Murakoshi<sup>1</sup>, Hiroshi Wada<sup>2</sup>, <sup>1</sup>*Kanazawa University, Japan*, <sup>2</sup>*Tohoku Bunka Gakuen University, Japan*
- 12:45PM Inhibition of Gsk-3 By Licl Does Not Affect Msc Differentiation In Vitro Or Bone Formation In Situ** SB<sup>3</sup>C2019-223  
Alyssa Oberman<sup>1</sup>, Angela Patel<sup>1</sup>, Glen Niebur<sup>1</sup>, <sup>1</sup>*University of Notre Dame, United States*
- 1:00PM Mechanical Feedback and Cooperativity In A Theoretical Model of Airway Smooth Muscle Cell-Matrix Adhesion** SB<sup>3</sup>C2019-224  
Linda Irons<sup>1</sup>, Markus Owen<sup>2</sup>, Reuben O'Dea<sup>2</sup>, Bindi Brook<sup>2</sup>, <sup>1</sup>*Yale University, United States*, <sup>2</sup>*University of Nottingham, United Kingdom*
- 1:15PM Extracellular Matrix Stiffness Regulates Calcium Oscillations In Multicellular Ensembles, But Not In Isolated Cells** SB<sup>3</sup>C2019-225  
Suzanne Stasiak<sup>1</sup>, Ryan Jamieson<sup>1</sup>, Hari Krishnan Parameswaran<sup>1</sup>, <sup>1</sup>*Northeastern University, United States*

Friday, June 28

12:00PM - 1:30PM

**Imaging and Mechanics of Ligament and Tendon****Seasons 1-3****Session Chair: Mona Eskandari** *University of California Riverside***Session Co-Chair: Mariana Kersh** *University of Illinois at Urbana-Champaign*

- 12:00PM Elastography Evaluation of The Elbow Ulnar Collateral Ligament In Overhead Throwing Athletes** SB<sup>3</sup>C2019-226  
Seyedali Sadeghi<sup>1</sup>, Dov Bader<sup>1</sup>, Daniel Cortes<sup>1</sup>, <sup>1</sup>*Penn State University, United States*
- 12:15PM Assessment of Tendon Hydraulic Permeability Using Osmotic Loading and Biphasic Finite Element Modeling** SB<sup>3</sup>C2019-227  
Babak N. Safa<sup>1</sup>, Ellen Bloom<sup>1</sup>, Andrea Lee<sup>1</sup>, Michael Santare<sup>1</sup>, Dawn Elliott<sup>1</sup>, <sup>1</sup>*University of Delaware, United States*
- 12:30PM Three Dimensional Morphological Changes In Carpal Tunnel Ligament Arch In Response To Wrist Compressive Forces** SB<sup>3</sup>C2019-228  
Rakshit Shah<sup>1</sup>, Zong-Ming Li<sup>1</sup>, <sup>1</sup>*Hand Research Laboratory, Department of Biomedical Engineering, United States*
- 12:45PM Fibroblast-Like Synoviocytes Alter Matrix Mechanics & Neuronal Mmp-1 Expression Under Tensile Failure To Different Degrees Depending On Concentration** SB<sup>3</sup>C2019-229  
Meagan Ita<sup>1</sup>, Nicholas Stiansen<sup>1</sup>, Sarah St Pierre<sup>2</sup>, Beth Winkelstein<sup>1</sup>, <sup>1</sup>*University of Pennsylvania, United States*, <sup>2</sup>*Worcester Polytechnic Inst, United States*
- 1:00PM Aging Adversely Affects Different Rat Rotator Cuff Tendons Similarly** SB<sup>3</sup>C2019-230  
Joseph Newton<sup>1</sup>, George Fryhofer<sup>1</sup>, Snehal Shetye<sup>1</sup>, Ashley Rodriguez<sup>1</sup>, Andrew Kuntz<sup>1</sup>, Lou Soslowsky<sup>1</sup>, <sup>1</sup>*University of Pennsylvania, United States*
- 1:15PM Comparison of The Deformation Behavior of The Anterior Cruciate Ligament In Response To Various External Knee Loadings** SB<sup>3</sup>C2019-231  
Satoshi Yamakawa<sup>1</sup>, Richard Debski<sup>1</sup>, Hiromichi Fujie<sup>2</sup>, <sup>1</sup>*University of Pittsburgh, United States*, <sup>2</sup>*Tokyo Metropolitan University, Japan*



<b>Friday, June 28</b>	<b>12:00PM - 1:30PM</b>
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**Injury: Models****Seasons 4-5**

**Session Chair: Brittany Coats** *University of Utah*

**Session Co-Chair: Mehmet Kurt** *Stevens Institute of Technology*

- 12:00PM Development of Finite Element Model of Subhuman Primate Brain and Investigation of Diffuse Axonal Injury Thresholds Induced By Head Rotation** SB<sup>3</sup>C2019-232  
Tushar Arora<sup>1</sup>, Priya Prasad<sup>2</sup>, Liying Zhang<sup>1</sup>, <sup>1</sup>Wayne State University, United States, <sup>2</sup>Prasad Engineering, LLC, United States
- 12:15PM Development of A Computational Biomechanics Mouse Model For Traumatic Axonal Injury** SB<sup>3</sup>C2019-233  
Connor Bradfield<sup>1</sup>, Liming Voo<sup>1</sup>, KT Ramesh<sup>2</sup>, <sup>1</sup>Johns Hopkins Applied Physics Lab, United States, <sup>2</sup>Johns Hopkins Department of Mechanical Engineering, United States
- 12:30PM A Study of The Brain-Skull Interface Conditions of The Worcester Rat Head Injury Model (wrhim)** SB<sup>3</sup>C2019-234  
Wei Zhao<sup>1</sup>, Brian Stemper<sup>2</sup>, Songbai Ji<sup>1</sup>, <sup>1</sup>Worcester Polytechnic Institute, United States, <sup>2</sup>Marquette University & Medical College of Wisconsin, United States
- 12:45PM Probabilistic Analysis of Injury Risk Using Human Body Finite Element Models** SB<sup>3</sup>C2019-235  
Travis Eliason<sup>1</sup>, Matthew Davis<sup>2</sup>, Derek Jones<sup>2</sup>, Daniel Nicoletta<sup>1</sup>, <sup>1</sup>Southwest Research Institute, United States, <sup>2</sup>Elemance, United States
- 1:00PM Characterization of Injured Brain Tissue After Controlled Cortical Impact** SB<sup>3</sup>C2019-236  
Suhao Qiu<sup>1</sup>, Wenheng Jiang<sup>2</sup>, Changxin Lai<sup>1</sup>, Tianyao Wang<sup>3</sup>, Wei Chen<sup>2</sup>, Luyang Tao<sup>2</sup>, Mingyuan Gao<sup>2</sup>, Jun Liu<sup>3</sup>, Jianfeng Zeng<sup>2</sup>, Yuan Feng<sup>1</sup>, <sup>1</sup>Shanghai Jiao Tong University, China, <sup>2</sup>Soochow University, China, <sup>3</sup>Fudan University, China
- 1:15PM A Model of Tension-Induced Organization of Subcortical Axons During Cortical Folding of The Brain** SB<sup>3</sup>C2019-237  
Kara Garcia<sup>1</sup>, Christopher Kroenke<sup>2</sup>, Philip Bayly<sup>3</sup>, <sup>1</sup>Indiana University School of Medicine, United States, <sup>2</sup>Oregon Health and Science University, United States, <sup>3</sup>Washington University in St. Louis, United States

<b>Friday, June 28</b>	<b>12:00PM - 1:30PM</b>
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**Cardiovascular and Musculoskeletal Device Design****Hemlock**

**Session Chair: Amy Throckmorton** *Drexel University*

**Session Co-Chair: Lucas Timmins** *University of Utah*

- 12:00PM Synthesis and Characterization of Porous Shape Memory Polymer Materials For Use In The Design of Implantable Medical Devices** SB<sup>3</sup>C2019-238  
Robert Kunkel<sup>1</sup>, Jingyu Wang<sup>1</sup>, Jishan Luo<sup>1</sup>, Bradley Bohnstedt<sup>2</sup>, Yingtao Liu<sup>1</sup>, Chung-Hao Lee<sup>1</sup>, <sup>1</sup>University of Oklahoma, United States, <sup>2</sup>University of Oklahoma Health Sciences Center, United States
- 12:15PM Dual-Support Mechanical Assistive Technology For Pediatric and Young Adult Patients** SB<sup>3</sup>C2019-239  
Carson Fox<sup>1</sup>, Randy Stevens<sup>2</sup>, Joseph Rossano<sup>3</sup>, Francisco Arabia<sup>4</sup>, Amy Throckmorton<sup>1</sup>, <sup>1</sup>Biomedical Engineering, Drexel University, United States, <sup>2</sup>St. Christopher's Hospital for Children, United States, <sup>3</sup>Cardiology, The Children's Hospital of Philadelphia, United States, <sup>4</sup>Cardiothoracic Surgery, University of Arizona, United States
- 12:30PM Durable and Flexible Superhydrophobic and Blood-Repelling Surface With Shape-Customizable Features For Biomedical Applications** SB<sup>3</sup>C2019-240

Zhe Li<sup>1</sup>, Ba Loc Nguyen<sup>2</sup>, Junmin Xue<sup>3</sup>, Graeme MacLaren<sup>4</sup>, Choon Hwai Yap<sup>1</sup>, <sup>1</sup>*Department of Biomedical Engineering, National University of Singapore, Singapore, Singapore*, <sup>2</sup>*National University of Singapore Department of Biomedical Engineering, National University of Singapore, Singapore, Singapore*, <sup>3</sup>*Department of Material Science and Engineering, National University of Singapore, Singapore, Singapore*, <sup>4</sup>*Department of Surgery, Yong Loo Lin School of Medicine, National University of Singapore, Singapore, Singapore*

- 12:45PM Quantifying The Capacitance and Resistance of A Double-Walled Aortic Stent-Graft Prototype** SB<sup>3</sup>C2019-241  
Shannen B Kizilski<sup>1</sup>, Omid Amili<sup>1</sup>, Filippo Coletti<sup>1</sup>, Rumi Faizer<sup>1</sup>, Victor H Barocas<sup>1</sup>, <sup>1</sup>*University of Minnesota, United States*
- 1:00PM Development and Evaluation of An Intratracheal Aerosol Delivery Device For Avian Wildlife Conservation Efforts** SB<sup>3</sup>C2019-242  
Carlos Ruvalcaba<sup>1</sup>, Susana Ramirez-Perez<sup>1</sup>, Stephanie Ortega<sup>1</sup>, Lisa Tell<sup>1</sup>, Jean-Pierre Delplanque<sup>1</sup>, <sup>1</sup>*University of California Davis, United States*

<b>Friday, June 28</b>	<b>12:00PM - 1:30PM</b>
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## Thrombosis Hemolysis and Mechanical Circulatory Support

## Fox Den

**Session Chair: Keefe Manning** *The Pennsylvania State University*

- 12:00PM Superhydrophobicity and Vortex Generators Potential To Reduce Thrombogenicity After Prosthetic Valve Implantation** SB<sup>3</sup>C2019-243  
Hoda Hatoum<sup>1</sup>, David Bark<sup>2</sup>, Hamed Vahabi<sup>2</sup>, Sanli Movafaghi<sup>2</sup>, Brandon Moore<sup>2</sup>, Marcio Forleo<sup>2</sup>, Arun Kota<sup>2</sup>, Ketul Popat<sup>2</sup>, Lakshmi Prasad Dasi<sup>1</sup>, <sup>1</sup>*The Ohio State University, United States*, <sup>2</sup>*Colorado State University, United States*
- 12:15PM A Multiscale Model For Simulating Platelet Aggregation: Correlating With In Vitro Results** SB<sup>3</sup>C2019-244  
Peng Zhang<sup>1</sup>, Prachi Gupta<sup>1</sup>, Jawaad Sherif<sup>1</sup>, Changnian Han<sup>1</sup>, Marvin J. Slepian<sup>2</sup>, Yuefan Deng<sup>1</sup>, Danny Bluestein<sup>1</sup>, <sup>1</sup>*Stony Brook University, United States*, <sup>2</sup>*University of Arizona, United States*
- 12:30PM 3d Flexible Non-Newtonian Computational Framework To Study Thrombosis Initiation** SB<sup>3</sup>C2019-245  
Sabrina R. Lynch<sup>1</sup>, Christopher J. Arthurs<sup>2</sup>, Zelu Xu<sup>3</sup>, Onkar Sahni<sup>3</sup>, Jose A. Diaz<sup>1</sup>, C. Alberto Figueroa<sup>1</sup>, <sup>1</sup>*University of Michigan, United States*, <sup>2</sup>*King's College London, United Kingdom*, <sup>3</sup>*Rensselaer Polytechnic Institute, United States*
- 12:45PM Refining A Numerical Model For Device-Induced Thrombosis** SB<sup>3</sup>C2019-246  
Ling Yang<sup>1</sup>, Steven Deutsch<sup>1</sup>, Keefe Manning<sup>1</sup>, <sup>1</sup>*Department of Biomedical Engineering, The Pennsylvania State University, United States*
- 1:00PM Investigation of The Interplay Between Blood and Thrombus Mechanical Properties: A 3d Fluid-Solid Interaction Model** SB<sup>3</sup>C2019-247  
Fatama T. Huda<sup>1</sup>, Tarek Abdel-Salam<sup>1</sup>, Nathan E. Hudson<sup>1</sup>, Ali Vahdati<sup>1</sup>, <sup>1</sup>*East Carolina University, United States*
- 1:15PM Numerical Models of Valve-In-Valve Deployment To Evaluate The Risk of Leaflets Thrombosis** SB<sup>3</sup>C2019-248  
Halit Yaakobovich<sup>1</sup>, Dar Weiss<sup>1</sup>, Uri Zaretsky<sup>1</sup>, Shmuel Einav<sup>1</sup>, Gil Marom<sup>1</sup>, <sup>1</sup>*Tel Aviv University, Israel*

<b>Friday, June 28</b>	<b>1:45PM - 3:15PM</b>
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## Biotransport in Disease Detection and Therapy

**Sunburst**

**Session Chair:** Zhongping Huang *West Chester University*

**Session Co-Chair:** Rebecca Heise *Virginia Commonwealth University*

- 1:45PM Accurate Detection of Differential Interaction Strengths In Energy Landscapes Using Machine Learning** SB<sup>3</sup>C2019-249  
Ahmad Haider<sup>1</sup>, Alan Liu<sup>1</sup>, Todd Sulchek<sup>1</sup>, <sup>1</sup>*Georgia Institute of Technology, Atlanta, United States*
- 2:00PM Aerosolized Surfactant Replacement Therapy In An In Vivo Rodent Lung Injury Model** SB<sup>3</sup>C2019-250  
Franck J Kamga Gninzeko<sup>1</sup>, Michael Valentine<sup>1</sup>, Sahil Chindal<sup>1</sup>, Susan Boc<sup>2</sup>, Sneha Dhapare<sup>1</sup>, Michael Hindle<sup>1</sup>, Dale Farkas<sup>1</sup>, P. Worth Longest<sup>1</sup>, Rebecca Heise<sup>1</sup>, <sup>1</sup>*Virginia Commonwealth University, United States*, <sup>2</sup>*Virginia Commonwealth University, United States*
- 2:15PM Numerical Analysis of Dense Suspension Rheology of Red Blood Cells In A Shear Flow** SB<sup>3</sup>C2019-251  
Naoki Takeishi<sup>1</sup>, Marco Rosti<sup>2</sup>, Yohsuke Imai<sup>3</sup>, Shigeo Wada<sup>1</sup>, Luca Brandt<sup>2</sup>, <sup>1</sup>*Osaka University, Japan*, <sup>2</sup>*Royal Institute of Technology (KTH), Sweden*, <sup>3</sup>*Kobe University, Japan*
- 2:30PM Deep Learning Assisted Label-Free On-Chip Selective Extraction of Single-Cell-Laden Droplets From Oil Into Aqueous Solution With Dielectrophoresis** SB<sup>3</sup>C2019-252  
Alisa White<sup>1</sup>, Yuntian Zhang<sup>2</sup>, Gang Zhao<sup>2</sup>, Xiaoming He<sup>1</sup>, <sup>1</sup>*University of Maryland College Park, United States*, <sup>2</sup>*University of Science and Technology of China, China*
- 2:45PM Biotransport In The Glymphatic System: Measuring and Modeling Flow Through Perivascular Spaces** SB<sup>3</sup>C2019-253  
Humberto Mestre<sup>1</sup>, Jeffrey Tithof<sup>2</sup>, Ting Du<sup>1</sup>, Wei Song<sup>1</sup>, Weiguo Peng<sup>1</sup>, Amanda Sweeney<sup>1</sup>, Genaro Olveda<sup>1</sup>, John Thomas<sup>2</sup>, Maiken Nedergaard<sup>1</sup>, Douglas Kelley<sup>2</sup>, <sup>1</sup>*University of Rochester Medical Center, United States*, <sup>2</sup>*University of Rochester, United States*

<b>Friday, June 28</b>	<b>1:45PM - 3:15PM</b>
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## Vascular Pathology and Disease Progression

**Snowflake**

**Session Chair:** Umberto Morbiducci *Politecnico di Torino*

- 1:45PM Prediction of Carotid Restenosis Risk After Endarterectomy By Hemodynamic and Geometric Analysis: A 5-Years Follow-Up** SB<sup>3</sup>C2019-254  
Diego Gallo<sup>1</sup>, Maurizio Domanin<sup>2</sup>, Christian Vergara<sup>3</sup>, Umberto Morbiducci<sup>1</sup>, <sup>1</sup>*Politecnico di Torino, Italy*, <sup>2</sup>*Universit di Milano, Italy*, <sup>3</sup>*Politecnico di Milano, Italy*
- 2:00PM Comparison of Healthy and Pulmonary Hypertension Hemodynamics** SB<sup>3</sup>C2019-255  
Senol Piskin<sup>1</sup>, Ender A. Finol<sup>1</sup>, <sup>1</sup>*University Of Texas At San Antonio, United States*
- 2:15PM Functional Characterization of Arteriovenous Fistula On Swine Models Using Mri** SB<sup>3</sup>C2019-256  
Eleonora Tubaldi<sup>1</sup>, Jose A. Rosado-Toro<sup>1</sup>, Diego Celdran-Bonafonte<sup>1</sup>, Prabir Roy-Chaudhury<sup>1</sup>, <sup>1</sup>*University of Arizona, United States*
- 2:30PM Impact of Hemodynamics and Endothelial Glycocalyx On Cancer Cell Adhesion To Vascular Wall Endothelium** SB<sup>3</sup>C2019-257  
Solomon Mensah<sup>1</sup>, Alina Nersesyan<sup>1</sup>, Ian Harding<sup>1</sup>, Mark Niedre<sup>1</sup>, Vladimir Torchilin<sup>1</sup>, Eno Ebong<sup>1</sup>, <sup>1</sup>*Northeastern University, United States*

- 2:45PM Pulmonary Artery Hemodynamic Changes In Pediatric Patients With Ventricular Septal Defects** SB<sup>3</sup>C2019-258  
Melody Dong<sup>1</sup>, Weiguang Yang<sup>1</sup>, Marlene Rabinovitch<sup>1</sup>, Jeffrey Feinstein<sup>1</sup>, Alison Marsden<sup>1</sup>, <sup>1</sup>*Stanford University, United States*
- 3:00PM Fluid-Solid Growth Modeling of Pulmonary Vascular Tree: Establishing A Homeostatic Baseline State** SB<sup>3</sup>C2019-259  
Hamidreza Gharahi<sup>1</sup>, Seungik Baek<sup>1</sup>, Vasilina Filonova<sup>2</sup>, C. Alberto Figueroa<sup>2</sup>, <sup>1</sup>*Michigan State University, United States*, <sup>2</sup>*University of Michigan, United States*

**Friday, June 28****1:45PM - 3:15PM**

### Mechanobiology - a Symposium in Memory of Christopher R. Jacobs

**Wintergreen****Session Chair: Kara Garcia** *Indiana University School of Medicine***Session Co-Chair: Tammy Haut Donahue** *University of Massachusetts Amherst*

- 1:45PM An Active Chemo-Mechanical Model Predicts Adhesion and Microenvironmental Regulation of 3d Cell Shapes** SB<sup>3</sup>C2019-260  
Xingyu Chen<sup>1</sup>, Veronika te Boekhorst<sup>2</sup>, Peter Friedl<sup>2</sup>, Vivek Shenoy<sup>1</sup>, <sup>1</sup>*University of Pennsylvania, United States*, <sup>2</sup>*University of Texas MD Anderson Cancer Center, United States*
- 2:00PM Myosin-Independent Regulation of Cell and Nuclear Structures In Wavy Patterns** SB<sup>3</sup>C2019-261  
Bor-Lin Huang<sup>1</sup>, Chin-Hsun Huang<sup>1</sup>, Richard Assoian<sup>2</sup>, Pen-hsiu Grace Chao<sup>1</sup>, <sup>1</sup>*National Taiwan University, Taiwan*, <sup>2</sup>*University of Pennsylvania, United States*
- 2:15PM Mapping 3d Mechanical Strains During Tissue Formation With A Novel Fibronectin-Based Nanomechanical Biosensor** SB<sup>3</sup>C2019-262  
Daniel Shiwarski<sup>1</sup>, Joshua Tashman<sup>1</sup>, Alkis Tsamis<sup>1</sup>, Quintin Jallerat<sup>1</sup>, Malichi Blundon<sup>1</sup>, John Szymanski<sup>1</sup>, Brooke McCartney<sup>1</sup>, Lance Davidson<sup>2</sup>, Adam Feinberg<sup>1</sup>, <sup>1</sup>*Carnegie Mellon University, United States*, <sup>2</sup>*University of Pittsburgh, United States*
- 2:30PM Tendon Enthesis Cilium Assembly Is Driven By Mechanical Loading and Hedgehog Signaling** SB<sup>3</sup>C2019-263  
Fei Fang<sup>1</sup>, Andrea Schwartz<sup>2</sup>, Stavros Thomopoulos<sup>1</sup>, <sup>1</sup>*Columbia University, United States*, <sup>2</sup>*Washington University in St. Louis, United States*
- 2:45PM Sensing The Curvature: Protrusive Sensitivity of Invasive Breast Cancer Cells** SB<sup>3</sup>C2019-264  
Apratim Mukherjee<sup>1</sup>, Bahareh Behkam<sup>1</sup>, Amrinder Nain<sup>1</sup>, <sup>1</sup>*Virginia Tech, United States*
- 3:00PM Towards Fiber-Level Traction Force Microscopy In Collagen Gels** SB<sup>3</sup>C2019-265  
Lauren Bersie-Larson<sup>1</sup>, Jay Hou<sup>1</sup>, Victor Barocas<sup>1</sup>, Paolo Provenzano<sup>1</sup>, <sup>1</sup>*University Of Minnesota, United States*

**Friday, June 28****1:45PM - 3:15PM**

### Spine Biomechanics

**Seasons 1-3****Session Chair: Alicia Jackson** *University of Miami***Session Co-Chair: Daniel Cortes** *Penn State University*

- 1:45PM Inhibition of The Integrin Beta-1 Subunit Increases Strain Thresholds For Peripheral Neuron Dysfunction and Injury** SB<sup>3</sup>C2019-266  
Sagar Singh<sup>1</sup>, Beth Winkelstein<sup>1</sup>, <sup>1</sup>*University of Pennsylvania, United States*

- 2:00PM Vertebral Endplate Remodeling Reduces Small Molecule Diffusion Into Degenerative Intervertebral Discs** SB<sup>3</sup>C2019-267  
Beth Ashinsky<sup>1</sup>, Edward Bonnevie<sup>1</sup>, Sai Mandalapu<sup>1</sup>, Stephen Pickup<sup>1</sup>, Chao Wang<sup>2</sup>, Lin Han<sup>2</sup>, Robert Mauck<sup>1</sup>, Harvey Smith<sup>1</sup>, Sarah Gullbrand<sup>1</sup>, <sup>1</sup>University of Pennsylvania, United States, <sup>2</sup>Drexel University, United States
- 2:15PM In-Plane Shear Mechanical Characterization of The Lumbar Facet Capsular Ligament** SB<sup>3</sup>C2019-268  
Emily Bermel<sup>1</sup>, Arin Ellingson<sup>1</sup>, Victor Barocas<sup>1</sup>, <sup>1</sup>University of Minnesota - Twin Cities, United States
- 2:30PM Direct Quantification of Intervertebral Disc Water Content Using Magnetic Resonance Imaging** SB<sup>3</sup>C2019-269  
Bo Yang<sup>1</sup>, Michael Wendland<sup>1</sup>, Yu Ma<sup>1</sup>, Grace O'Connell<sup>1</sup>, <sup>1</sup>University Of California Berkeley, United States
- 2:45PM Location-Wise Fatigue Damage Prediction For The Intervertebral Disc Annulus of The Cervical Spine** SB<sup>3</sup>C2019-270  
Adhitya Vikraman Subramani<sup>1</sup>, Phillip Whitley<sup>2</sup>, Harsha Teja Garimella<sup>2</sup>, Reuben Kraft<sup>1</sup>, <sup>1</sup>Pennsylvania State University, United States, <sup>2</sup>CFD Research, United States
- 3:00PM Bone Volume Fraction Vs. Bone Mass Density As A Predictor For Mechanical Properties of The Cancellous Bone of Human Lumbar Vertebral Bodies** SB<sup>3</sup>C2019-271  
Francesco Travascio<sup>1</sup>, Abeer Al-Barghouthi<sup>2</sup>, Loren Latta<sup>1</sup>, <sup>1</sup>University of Miami, United States, <sup>2</sup>Max Biedermann Institute for Biomechanics, Mount Sinai Medical Center, United States

Friday, June 28

1:45PM - 3:15PM

## Growth Remodeling and Repair II: Musculoskeletal System Seasons 4-5

**Session Chair: Reuben Kraft** *Penn State University*

**Session Co-Chair: Johannes Weickenmeier** *Stevens Institute of Technology*

- 1:45PM Murine Rotor Cuff Tendinopathy Models: The Role of Muscle Loading** SB<sup>3</sup>C2019-272  
Adam Abraham<sup>1</sup>, Fei Fang<sup>1</sup>, Mikhail Golman<sup>1</sup>, Panagiotis Oikonomou<sup>1</sup>, Stavros Thomopoulos<sup>1</sup>, <sup>1</sup>Columbia University, United States
- 2:00PM The Effect of Fatigue On The Impact Response of Rat Ulna** SB<sup>3</sup>C2019-273  
Chenxi Yan<sup>1</sup>, Mariana Kersh<sup>1</sup>, <sup>1</sup>University of Illinois Urbana Champaign, United States
- 2:15PM Microindentation Maps Two Gradients In Mechanical Properties Across The Zones of The Growth Plate** SB<sup>3</sup>C2019-274  
Kevin Eckstein<sup>1</sup>, Karin Payne<sup>2</sup>, Virginia Ferguson<sup>1</sup>, <sup>1</sup>University of Colorado at Boulder, United States, <sup>2</sup>University of Colorado at Anschutz, United States
- 2:30PM Fibrous Network Topography Regulates Fibrotic Phenotypes In Annulus Fibrosus Cells** SB<sup>3</sup>C2019-275  
Edward Bonnevie<sup>1</sup>, Sarah Gullbrand<sup>1</sup>, Beth Ashinsky<sup>2</sup>, Tonia Tsinman<sup>1</sup>, Dawn Elliott<sup>3</sup>, Harvey Smith<sup>1</sup>, Robert Mauck<sup>1</sup>, <sup>1</sup>University of Pennsylvania and CMC VA Medical Center, United States, <sup>2</sup>University of Pennsylvania, CMC VA Medical Center, and Drexel University, United States, <sup>3</sup>University of Delaware, United States
- 2:45PM Mitochondria Function, Structural, and Mechanical Outcomes After Exposure To Near-Infrared Light During Tendon Maturation and Adult Healing** SB<sup>3</sup>C2019-276  
Ryan Locke<sup>1</sup>, Elisabeth Lemmon<sup>1</sup>, Ellen Dudzinski<sup>1</sup>, Sarah Kopa<sup>1</sup>, Harrah Newman<sup>1</sup>, Elahe Ganji<sup>1</sup>, Megan Killian<sup>1</sup>, <sup>1</sup>University of Delaware, United States
- 3:00PM Primary Synovial Fibroblast-Collagen Gels Exhibit Unique Tensile Failure Properties & Microstructure From 3T3-Collagen Gels** SB<sup>3</sup>C2019-277  
Meagan Ita<sup>1</sup>, Harrison Troche<sup>1</sup>, Beth Winkelstein<sup>1</sup>, <sup>1</sup>University of Pennsylvania, United States

<b>Friday, June 28</b>	<b>1:45PM - 3:15PM</b>
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**Soft Tissue Mechanics****Hemlock****Session Chair: Kristin Myers** *Columbia University***Session Co-Chair: Joao Soares** *Virginia Commonwealth University*

- 1:45PM Contact Experiments Reveal Pressure Evolution In Soft Hydrated Interfaces** SB<sup>3</sup>C2019-278  
Christopher Johnson<sup>1</sup>, Jiho Kim<sup>1</sup>, Alison Dunn<sup>1</sup>, <sup>1</sup>*University of Illinois at Urbana-Champaign, United States*
- 2:00PM Harmonic Shear Wave Imaging: A New Elastography Method To Evaluate Mechanical Properties of Soft Tissues** SB<sup>3</sup>C2019-279  
Seyedali Sadeghi<sup>1</sup>, Daniel Cortes<sup>1</sup>, <sup>1</sup>*Penn State University, United States*
- 2:15PM Strong Triaxial Coupling and Anomalous Poisson Effect In Collagen Networks** SB<sup>3</sup>C2019-280  
Ehsan Ban<sup>1</sup>, Hailong Wang<sup>2</sup>, J Matthew Franklin<sup>3</sup>, Jan Liphardt<sup>3</sup>, Paul Janmey<sup>1</sup>, Vivek Shenoy<sup>1</sup>, <sup>1</sup>*University of Pennsylvania, United States*, <sup>2</sup>*University of Science and Technology of China, China*, <sup>3</sup>*Stanford University, United States*
- 2:30PM Fiber Orientation and Structure Characterization of Pregnant and Nonpregnant Human Uterus** SB<sup>3</sup>C2019-281  
Shuyang Fang<sup>1</sup>, James McLean<sup>2</sup>, Christine Hendon<sup>2</sup>, Joy Vink<sup>3</sup>, Kristin Myers<sup>1</sup>, <sup>1</sup>*Department of Mechanical Engineering Columbia University, United States*, <sup>2</sup>*Department of Electrical Engineering Columbia University, United States*, <sup>3</sup>*Department of Obstetrics and Gynecology Columbia University Medical Center, United States*
- 2:45PM Cadherin-11 Regulates Aortic Valve Interstitial Cell Force Generation and Mechanical Properties** SB<sup>3</sup>C2019-282  
Matthew Bersi<sup>1</sup>, Meghan Bowler<sup>1</sup>, W. David Merryman<sup>1</sup>, <sup>1</sup>*Vanderbilt University, United States*
- 3:00PM A Volumetric Growth Model For Healing Post-Infarction Scar** SB<sup>3</sup>C2019-283  
Derek Bivona<sup>1</sup>, Ana Estrada<sup>1</sup>, Jeffrey Holmes<sup>1</sup>, <sup>1</sup>*University of Virginia, United States*

<b>Friday, June 28</b>	<b>1:45PM - 3:15PM</b>
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**Emerging Computational and Experimental Methods in Fluid Mechanics****Fox Den****Session Chair: C. Alberto Figueroa** *University of Michigan*

- 1:45PM A Multiscale Flow-Mediated Platelet Adhesion Model and Its Experimental Validation** SB<sup>3</sup>C2019-284  
Peng Zhang<sup>1</sup>, Jawaad Sherif<sup>1</sup>, Peineng Wang<sup>1</sup>, Marvin J. Slepian<sup>2</sup>, Yuefan Deng<sup>1</sup>, Danny Bluestein<sup>1</sup>, <sup>1</sup>*Stony Brook University, United States*, <sup>2</sup>*University of Arizona, United States*
- 2:00PM Deep-Learning Based Region-of-Interest Selection In 3d Cerebrovascular Images** SB<sup>3</sup>C2019-285  
Tatsat Rajendra Patel<sup>1</sup>, Prakhar Jaiswal<sup>1</sup>, Nikhil Paliwal<sup>1</sup>, Adnan H Siddiqui<sup>1</sup>, Rahul Rai<sup>1</sup>, Hui Meng<sup>1</sup>, <sup>1</sup>*University at Buffalo, United States*
- 2:15PM A Forward Incremental Prestressing Approach For Nonlinear Fluid-Structure Interaction Hemodynamics** SB<sup>3</sup>C2019-286  
Nitesh Nama<sup>1</sup>, Miquel Aguirre<sup>2</sup>, Jay D. Humphrey<sup>3</sup>, C. Alberto Figueroa<sup>1</sup>, <sup>1</sup>*University of Michigan, United States*, <sup>2</sup>*Mines Saint-tienne, France*, <sup>3</sup>*Yale University, United States*
- 2:30PM Fsi Modeling of Cyclic Aspiration For Acute Ischemic Stroke Patients** SB<sup>3</sup>C2019-287  
Bryan Good<sup>1</sup>, Francesco Costanzo<sup>1</sup>, Scott Simon<sup>2</sup>, Keefe Manning<sup>1</sup>, <sup>1</sup>*The Pennsylvania State University, United States*, <sup>2</sup>*Penn State Hershey Medical Center, United States*

- 2:45PM A Systematic Methodology For Correcting Pc-Mri and Cfd Incompatibilities** SB<sup>3</sup>C2019-288  
Thomas Puiseux<sup>1</sup>, Anou Sewonu<sup>2</sup>, Franck Nicoud<sup>1</sup>, Simon Mendez<sup>1</sup>, Ramiro Moreno<sup>2</sup>, <sup>1</sup>IMAG, Univ. Montpellier, CNRS, France, <sup>2</sup>ALARA Expertise, France
- 3:00PM Reduced-Order Leaflet Models For Numerical Experiments On Transcatheter Aortic Valves** SB<sup>3</sup>C2019-289  
Shantanu Bailoor<sup>1</sup>, Jung-Hee Seo<sup>1</sup>, Hoda Hatoum<sup>2</sup>, Lakshmi Prasad Dasi<sup>2</sup>, Rajat Mittal<sup>1</sup>, <sup>1</sup>Johns Hopkins University, United States, <sup>2</sup>Ohio State University, United States

Friday, June 28

3:30PM - 5:00PM

**Multiscale Biotransport in Hemodynamics and Lymphatics****Sunburst****Session Chair: Brandon Dixon** *Georgia Institute of Technology***Session Co-Chair: Mona Eskandari** *University of California Riverside*

- 3:30PM Biotransport In The Glymphatic System: Pulsation, Peristalsis, and High Blood Pressure** SB<sup>3</sup>C2019-290  
Humberto Mestre<sup>1</sup>, Jeffrey Tithof<sup>1</sup>, Ting Du<sup>1</sup>, Wei Song<sup>1</sup>, Weiguo Peng<sup>1</sup>, Amanda M. Sweeney<sup>1</sup>, Genaro Olveda<sup>1</sup>, John H. Thomas<sup>1</sup>, Maiken Nedergaard<sup>1</sup>, Douglas H. Kelley<sup>1</sup>, <sup>1</sup>University of Rochester, United States
- 3:45PM Micro Particle Image Velocimetry For In Vitro Assessment of Patient Specific Whole Blood Rheology** SB<sup>3</sup>C2019-291  
Erdem Kucukal<sup>1</sup>, Yuncheng Man<sup>1</sup>, Ailis Hill<sup>1</sup>, Shichen Liu<sup>1</sup>, Jane Little<sup>1</sup>, Umut Gurkan<sup>1</sup>, <sup>1</sup>Case Western Reserve University, United States
- 4:00PM Patient-Specific Metrics From Quantitative Rheology of Whole Sickle Blood Using Microfluidics** SB<sup>3</sup>C2019-292  
Jose Valdez<sup>1</sup>, Yvonne Datta<sup>2</sup>, John Higgins<sup>3</sup>, David Wood<sup>1</sup>, <sup>1</sup>University of Minnesota-Department of Biomedical Engineering, United States, <sup>2</sup>University of Minnesota-Department of Medicine, United States, <sup>3</sup>Harvard University-Department of Systems Biology, United States
- 4:15PM Instability of Phospholipid Bilayer Under Shear Flow: Molecular Dynamics Simulation** SB<sup>3</sup>C2019-293  
Taiki Shigematsu<sup>1</sup>, Kenichiro Koshiyama<sup>2</sup>, Shigeo Wada<sup>3</sup>, <sup>1</sup>Global Center for Medical Engineering and Informatics, Osaka University, Japan, <sup>2</sup>Graduate School of Technology, Industrial and Social Sciences, Tokushima University, Japan, <sup>3</sup>Graduate School of Engineering Science, Osaka University, Japan
- 4:30PM Computational Simulations of Thrombolytic Therapy In Acute Ischaemic Stroke** SB<sup>3</sup>C2019-294  
Boram Gu<sup>1</sup>, Andris Piebalgs<sup>1</sup>, Yu Huang<sup>1</sup>, Dylan Roi<sup>2</sup>, Kyriakos Lobotesis<sup>2</sup>, Rongjun Chen<sup>1</sup>, Simon A. Thom<sup>3</sup>, Xiao Yun Xu<sup>1</sup>, <sup>1</sup>Department of Chemical Engineering, Imperial College London, United Kingdom, <sup>2</sup>Imaging Department, Charing Cross Hospital, Imperial College Healthcare NHS Trust, United Kingdom, <sup>3</sup>National Heart & Lung Institute, Imperial College London, United Kingdom
- 4:45PM Combined Microfluidic-Computational Approach To Quantify The Effect of Sickle-Cell Disease On Blood Rheology** SB<sup>3</sup>C2019-295  
Marisa Bazzi<sup>1</sup>, Jose Valdez<sup>2</sup>, David Wood<sup>2</sup>, Victor Barocas<sup>2</sup>, <sup>1</sup>Department of Chemical Engineering and Material Science University of Minnesota, United States, <sup>2</sup>Department of Biomedical Engineering University of Minnesota, United States

<b>Friday, June 28</b>	<b>3:30PM - 5:00PM</b>
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**Cardiovascular Mechanics: Other****Snowflake**

**Session Chair: Seungik Baek** *Michigan State University*

**Session Co-Chair: Sourav Patnaik** *University of Texas at San Antonio*

- 3:30PM Mechanical Characterization of Atherosclerotic Coronary Arteries By Ex-Vivo Inflation Testing and Inverse Finite Element Modeling** SB<sup>3</sup>C2019-296  
 Su Guvenir<sup>1</sup>, Giulia Gandini<sup>1</sup>, Irene Berselli<sup>2</sup>, Veronica Codazzi<sup>2</sup>, Francesco Migliavacca<sup>2</sup>, Claudio Chiastra<sup>2</sup>, Frank J.H. Gijssen<sup>1</sup>, Ali C. Akyildiz<sup>1</sup>, <sup>1</sup>*Erasmus Medical Center, Netherlands*, <sup>2</sup>*Politecnico Di Milano, Italy*
- 3:45PM Histomechanical Analysis of Decellularized Porcine Internal Thoracic Arteries** SB<sup>3</sup>C2019-297  
 Colton Kostelnik<sup>1</sup>, Wayne Carver<sup>2</sup>, John Eberth<sup>2</sup>, <sup>1</sup>*University of South Carolina - Department of Biomedical Engineering, United States*, <sup>2</sup>*University of South Carolina School of Medicine - Department of Cell Biology and Anatomy, United States*
- 4:00PM Understanding The Transmural Variation In Extracellular Matrix Fiber Orientation Using Multi-Photon Microscopy** SB<sup>3</sup>C2019-298  
 Anastasia Gkousioudi<sup>1</sup>, Jacopo Ferruzzi<sup>1</sup>, Yanhang Zhang<sup>1</sup>, <sup>1</sup>*Boston University, United States*
- 4:15PM Kinematic Analysis of Murine Cardiac Hypertrophy Using High-Frequency Four-Dimensional Ultrasound** SB<sup>3</sup>C2019-299  
 Frederick Damen<sup>1</sup>, Mauro Costa<sup>2</sup>, Craig Goergen<sup>1</sup>, <sup>1</sup>*Purdue University, United States*, <sup>2</sup>*The Jackson Laboratory, United States*
- 4:30PM Selective Stiffening of A Myocardial Infarct Improves Predicted Systolic Function Without Impairing Filling** SB<sup>3</sup>C2019-300  
 Kyoko Yoshida<sup>1</sup>, Ana Estrada<sup>1</sup>, Jeffrey Holmes<sup>1</sup>, William Richardson<sup>2</sup>, <sup>1</sup>*University of Virginia, United States*, <sup>2</sup>*Clemson University, United States*
- 4:45PM Hypertension-Induced Changes In The Mechanical Behavior of The Left Ventricular Wall** SB<sup>3</sup>C2019-301  
 Marissa Grobbel<sup>1</sup>, Ari Hollander<sup>1</sup>, Analeeza Dubay<sup>1</sup>, Emma Darios Flood<sup>1</sup>, Kibrom Alula<sup>1</sup>, Gregory Fink<sup>1</sup>, Stephanie Watts<sup>1</sup>, Lik Chuan Lee<sup>1</sup>, Sara Roccabianca<sup>1</sup>, <sup>1</sup>*Michigan State University, United States*

<b>Friday, June 28</b>	<b>3:30PM - 5:00PM</b>
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**Biofabrication and 3D in Vitro Systems****Wintergreen**

**Session Chair: Matthew Fisher** *NC State University*

**Session Co-Chair: Anna Grosberg** *University of California, Irvine*

- 3:30PM Bioprinting 3d Breast Epithelial Spheroids To Study Vascular Interactions In Human Cancer** SB<sup>3</sup>C2019-302  
 Swathi Swaminathan<sup>1</sup>, Alisa Morss Clyne<sup>1</sup>, <sup>1</sup>*Drexel University, United States*
- 3:45PM Fabricating 3d Cellular Aggregates Via Laser Direct-Write Bioprinting: Size- and Shape-Controlled Embryoid Bodies and Tumor Spheroids** SB<sup>3</sup>C2019-303  
 David Kingsley<sup>1</sup>, Cassandra Roberge<sup>1</sup>, David Corr<sup>1</sup>, <sup>1</sup>*Rensselaer Polytechnic Institute, United States*
- 4:00PM Fluid-Structure Interaction At Drop-Drop Interface During Drop-On-Demand Printing of Hydrogel-Based Soft Materials** SB<sup>3</sup>C2019-304  
 Cih Cheng<sup>1</sup>, George T. C. Chiu<sup>1</sup>, Bumsoo Han<sup>1</sup>, <sup>1</sup>*Purdue University, United States*



- 4:15PM Directed Self-Assembly of 3d In Vitro Tissue Models Using Droplet Microfluidics** SB<sup>3</sup>C2019-305  
Jasmine Shirazi<sup>1</sup>, Michael Donzanti<sup>1</sup>, Jason Gleghorn<sup>1</sup>, <sup>1</sup>*University of Delaware, United States*
- 4:30PM Engineering A 3d Model of Ductal Carcinoma In Situ Using Multimaterial Fresh 3d Bioprinting** SB<sup>3</sup>C2019-306  
Joshua Tashman<sup>1</sup>, Thomas Hinton<sup>1</sup>, Daniel Brown<sup>2</sup>, Daniel Shiowski<sup>3</sup>, Andrew Lee<sup>1</sup>, Andrew Hudson<sup>1</sup>, Adrian Lee<sup>2</sup>, Adam Feinberg<sup>1</sup>, <sup>1</sup>*Carnegie Mellon University, United States*, <sup>2</sup>*University of Pittsburgh, United States*, <sup>3</sup>*Carnegie Mellon University, United States*
- 4:45PM Integrating In Vitro and In Silico Technologies: Development of A Perfusion Bioreactor and Its Digital Twin** SB<sup>3</sup>C2019-307  
Liesbet Geris<sup>1</sup>, Mohammad Mehrian<sup>1</sup>, Sebastien de Bournonville<sup>2</sup>, Toon Lambrechts<sup>2</sup>, Jean-Marie Aerts<sup>2</sup>, Frank Luyten<sup>2</sup>, Ioannis Papantoniou<sup>2</sup>, <sup>1</sup>*University of Lige, Belgium*, <sup>2</sup>*KU Leuven, Belgium*

Friday, June 28

3:30PM - 5:00PM

**Mechanics and Modeling of Musculoskeletal Soft Tissues****Seasons 1-3****Session Chair:** Sara Roccabianca *Michigan State University***Session Co-Chair:** Adrian Buganza Tepole *Purdue University*

- 3:30PM Sex-Dependent Orientation and Size of The Anterior Cruciate Ligament Throughout Skeletal Growth In The Porcine Stifle Joint** SB<sup>3</sup>C2019-308  
Danielle Howe<sup>1</sup>, Stephanie Cone<sup>1</sup>, Jorge Piedrahita<sup>2</sup>, Lynn Fordham<sup>3</sup>, Jeffrey Spang<sup>3</sup>, Matthew Fisher<sup>1</sup>, <sup>1</sup>*North Carolina State University and the University of North Carolina- Chapel Hill, United States*, <sup>2</sup>*North Carolina State University, United States*, <sup>3</sup>*University of North Carolina- Chapel Hill, United States*
- 3:45PM Decorin, Alone and In Tandem With Biglycan, Alters Viscoelasticity In Aged Tendons** SB<sup>3</sup>C2019-309  
Ryan Leiphart<sup>1</sup>, Snehal Shetye<sup>1</sup>, Stephanie Weiss<sup>1</sup>, Louis Soslowsky<sup>1</sup>, <sup>1</sup>*University of Pennsylvania, United States*
- 4:00PM Bath Osmolarity Alters Multiscale Mechanics and Damage In Tendon** SB<sup>3</sup>C2019-310  
Ellen Bloom<sup>1</sup>, Andrea Lee<sup>1</sup>, Dawn Elliott<sup>1</sup>, <sup>1</sup>*University of Delaware, United States*
- 4:15PM Quantifying Differences In The Mechanical Properties of The Flexor and Extensor Muscles In The Human Forearm Using Mr Elastography** SB<sup>3</sup>C2019-311  
Daniel Smith<sup>1</sup>, Andrea Zonnino<sup>1</sup>, Peyton Delgorio<sup>1</sup>, Raymond Duda<sup>1</sup>, Fabrizio Sergi<sup>1</sup>, Curtis Johnson<sup>1</sup>, <sup>1</sup>*University of Delaware, United States*
- 4:30PM Sex-Related Differences In Carpal Arch Morphology** SB<sup>3</sup>C2019-312  
Kishor Lakshminarayanan<sup>1</sup>, Rakshit Shah<sup>1</sup>, Zong-Ming Li<sup>1</sup>, <sup>1</sup>*Hand Research Laboratory, Department of Biomedical Engineering, United States*
- 4:45PM Utilizing Arfi Imaging To Predict Linear Region Modulus of Tendons From Toe Region Data** SB<sup>3</sup>C2019-313  
Gerald A Ferrer<sup>1</sup>, Waqas Khalid<sup>1</sup>, Volker Musahl<sup>1</sup>, Kang Kim<sup>1</sup>, Richard E Debski<sup>1</sup>, <sup>1</sup>*University of Pittsburgh, United States*

<b>Friday, June 28</b>	<b>3:30PM - 5:00PM</b>
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**Injury: Biomechanics****Seasons 4-5****Session Chair: Songbai Ji** *WPI***Session Co-Chair: Yuan Feng** *Shanghai Jiao Tong University*

- 3:30PM Shear Wave Propagation and Estimation of Material Parameters In A Nonlinear, Fibrous Material** SB<sup>3</sup>C2019-314  
Zuoxian Hou<sup>1</sup>, Ruth Okamoto<sup>1</sup>, Philip Bayly<sup>1</sup>, <sup>1</sup>*Washington University in St.Louis, United States*
- 3:45PM Shock Wave Propagation In Brain Tissue** SB<sup>3</sup>C2019-315  
Donghoon Keum<sup>1</sup>, Soroush Assari<sup>1</sup>, Kurosh Darvish<sup>1</sup>, <sup>1</sup>*Temple University, United States*
- 4:00PM Effect of Corpus Callosum Demyelination On Murine Brain Injury Mechanism** SB<sup>3</sup>C2019-316  
Javid Abderezaei<sup>1</sup>, Gloria Fabris<sup>1</sup>, Zachary Lopez<sup>1</sup>, Cassandra Gologorsky<sup>2</sup>, Johannes Weickenmeier<sup>1</sup>, Mehmet Kurt<sup>1</sup>, <sup>1</sup>*Stevens Institute of Technology, United States*, <sup>2</sup>*Cornell University, United States*
- 4:15PM High-Rate Anisotropic and Region-Dependent Properties In Human Infant Cranial Bone** SB<sup>3</sup>C2019-317  
Robert Metcalf<sup>1</sup>, Jessica Comstock<sup>2</sup>, Brittany Coats<sup>1</sup>, <sup>1</sup>*University of Utah, Mechanical Engineering, United States*, <sup>2</sup>*University of Utah, Pediatric Pathology, United States*
- 4:30PM Bilateral Skull Fractures Due To Controlled Head Drops In Infant Porcine Specimens** SB<sup>3</sup>C2019-318  
Patrick Vaughan<sup>1</sup>, Alexis Goots<sup>1</sup>, Todd Fenton<sup>1</sup>, Roger Haut<sup>1</sup>, Feng Wei<sup>1</sup>, <sup>1</sup>*Michigan State University, United States*
- 4:45PM Estimates of High-Risk Single and Cumulative Head Impact Doses In American Football** SB<sup>3</sup>C2019-319  
Adam Bartsch PhD<sup>1</sup>, <sup>1</sup>*Prevent Biometrics, United States*

<b>Friday, June 28</b>	<b>3:30PM - 5:00PM</b>
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**Government Perspectives on Multiscale Biomechanics, Bioengineering, and Biotransport****Hemlock****Session Chair: Alisa Morss Clyne**, *University of Maryland***Grace Peng**, *NIH Program Director, Division of Discovery Science & Technology and Mathematical Modeling, Simulation, and Analysis***Michele Grimm**, *NSF Program Director, Biomedical Engineering***Laurel Kuxhaus**, *ASME Federal Fellow*

<b>Friday, June 28</b>	<b>3:30PM - 5:00PM</b>
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**Pediatric and Congenital Fluid Mechanics****Fox Den****Session Chair: Amy Throckmorton** *Drexel University*

- 3:30PM Stent Intervention Improves Flow Distribution and Vascular Growth In Porcine Pulmonary Artery Stenosis** SB<sup>3</sup>C2019-320  
Ryan Pewowaruk<sup>1</sup>, Klarka Mendrisova<sup>1</sup>, Carolina Larrain<sup>1</sup>, Christopher Francois<sup>1</sup>, Luke Lamers<sup>1</sup>, Alejandro Roldan-Alzate<sup>1</sup>, <sup>1</sup>*University of Wisconsin - Madison, United States*

- 3:45PM Shear Stress Modulates Cardiomyocyte Proliferation Via Endothelial Cell-Cardiomyocyte Signaling** SB<sup>3</sup>C2019-321  
 Matthew Watson<sup>1</sup>, Lauren Black<sup>2</sup>, Erica Kemmerling<sup>3</sup>, <sup>1</sup>*Tufts University, Department of Mechanical Engineering and Department of Biomedical Engineering, United States*, <sup>2</sup>*Tufts University, Department of Biomedical Engineering, United States*, <sup>3</sup>*Tufts University, Department of Mechanical Engineering, United States*
- 4:00PM Computational Surgical Planning For Peripheral Pulmonary Artery Stenosis In Children With Alagille and Williams Syndromes** SB<sup>3</sup>C2019-322  
 Ingrid Lan<sup>1</sup>, Weiguang Yang<sup>2</sup>, Jeffrey Feinstein<sup>3</sup>, Alison Marsden<sup>3</sup>, <sup>1</sup>*Bioengineering, Stanford University, United States*, <sup>2</sup>*Pediatric Cardiology, Stanford University, United States*, <sup>3</sup>*Bioengineering and Pediatric Cardiology, Stanford University, United States*
- 4:15PM Fluid-Structure Analysis of A Collapsible Axial Impeller and Protective Cage For Dysfunctional Fontan Physiology** SB<sup>3</sup>C2019-323  
 Matthew Hirschhorn<sup>1</sup>, Evan Bisirri<sup>1</sup>, Randy Stevens<sup>2</sup>, Joseph Rossano<sup>3</sup>, Amy Throckmorton<sup>1</sup>, <sup>1</sup>*Drexel University, United States*, <sup>2</sup>*St. Christopher's Hospital for Children, United States*, <sup>3</sup>*Children's Hospital of Philadelphia, United States*
- 4:30PM Mechanics and Efficiency of The Zebrafish Embryonic Heart Tube** SB<sup>3</sup>C2019-324  
 Alireza Sharifi<sup>1</sup>, Alex Gendernalik<sup>1</sup>, Deborah Garrity<sup>1</sup>, David Bark Jr.<sup>1</sup>, <sup>1</sup>*Colorado State University, United States*
- 4:45PM Whole Embryonic Heart Ultrasound Imaging, Motion Tracking and Flow Simulations Reveal Hemodynamic Role of Embryonic Atria** SB<sup>3</sup>C2019-325  
 Sheldon Ho<sup>1</sup>, Wei Xuan Chan<sup>2</sup>, Nhan Phan-Thien<sup>2</sup>, Choon Hwai Yap<sup>2</sup>, <sup>1</sup>*Biomedical Engineering, National University of Singapore, Singapore*, <sup>2</sup>*National University of Singapore, Singapore*

## 9 Poster Sessions

### 9.1 Poster Session I

Wednesday, June 26 12:45PM - 2:15PM

#### Posters - BS Level Competition: Cardiovascular System

##### **Assessment of Pulmonary Arterial Structure and Its Association With Right Ventricular Function** SB<sup>3</sup>C2019-P001

Frankangel Servin<sup>1</sup>, Rebecca R Vanderpool<sup>2</sup>, Rajesh Janardhanan<sup>3</sup>, Jose Rosado<sup>4</sup>, Franz P Rischard<sup>5</sup>, Jason X.J Yuan<sup>6</sup>,  
<sup>1</sup>University of Arizona, Department of Biomedical Engineering, United States, <sup>2</sup>University of Arizona, Department of  
 Biomedical Engineering, Division of Translational and Regenerative Medicine, United States, <sup>3</sup>University of Arizona,  
 Department of Medical Imaging, United States, <sup>4</sup>University of Arizona, Department of Medical Imaging, United States,  
<sup>5</sup>University of Arizona, Division of Pulmonary, Allergy, Critical Care and Sleep Medicine, United States, <sup>6</sup>University of  
 Arizona, Division of Translational and Regenerative Medicine, United States

##### **Quantitative Analysis of Flow Distribution Within The Fetal Heart Using In-Vitro 4d Flow Mri** SB<sup>3</sup>C2019-P002

Lucille Anzia<sup>1</sup>, Katrina Ruedinger<sup>1</sup>, Shardha Srinivasan<sup>2</sup>, Barbara Trampe<sup>1</sup>, Timothy Heiser<sup>1</sup>, J. Igor Iruretagoyena<sup>2</sup>, Ale-  
 jandro Roldan-Alzate<sup>1</sup>, <sup>1</sup>University of Wisconsin Madison, United States, <sup>2</sup>University of Wisconsin School of Medicine and  
 Public Health, United States

##### **On The Use of Pentagalloyl Glucose For Mechanistic Suppression of Abdominal Aortic Aneurysm** SB<sup>3</sup>C2019-P003

Vangelina Osteguín<sup>1</sup>, Sourav Patnaik<sup>1</sup>, Alycia Berman<sup>2</sup>, Craig Goergen<sup>2</sup>, Ender Finol<sup>1</sup>, <sup>1</sup>University of Texas at San Anto-  
 nio, United States, <sup>2</sup>Purdue University, United States

##### **Novel Method of Detecting The Effect From Inhaled Anesthetics On Peripheral Venous Pressure Waveforms** SB<sup>3</sup>C2019-P004

Kaylee Henry<sup>1</sup>, Ali Al-Alawi<sup>1</sup>, Md Abul Hayat<sup>1</sup>, Patrick Bonasso<sup>2</sup>, Hanna Jensen<sup>1</sup>, Jingxian Wu<sup>1</sup>, Kevin Sexton<sup>2</sup>, Morten  
 Jensen<sup>1</sup>, <sup>1</sup>University of Arkansas, United States, <sup>2</sup>University of Arkansas for Medical Sciences, United States

##### **Fluvastatin Decreases Endothelial Nitric Oxide Synthase O-GlcNacylation** SB<sup>3</sup>C2019-P005

Danika Meldrum<sup>1</sup>, Sarah Basehore<sup>1</sup>, Alisa Morss Clyne<sup>1</sup>, <sup>1</sup>Drexel University, United States

##### **Investigations of The Chordae Tendineae'S Mechanical Properties of Porcine Atrioventricular Heart Valves** SB<sup>3</sup>C2019-P006

Colton Ross<sup>1</sup>, Devin Laurence<sup>1</sup>, Yan Zhao<sup>2</sup>, Ming-Chen Hsu<sup>3</sup>, Ryan Baumwart<sup>4</sup>, Yi Wu<sup>1</sup>, Chung-Hao Lee<sup>1</sup>, <sup>1</sup>The University  
 of Oklahoma, United States, <sup>2</sup>The University of Oklahoma Health Sciences Center, United States, <sup>3</sup>Iowa State University,  
 United States, <sup>4</sup>Oklahoma State University, United States

##### **Relationship of Platelet Adhesion With Surface Topography In The Penn State Pvad** SB<sup>3</sup>C2019-P007

Cecilia Richardsen<sup>1</sup>, Ashlyn Mueser<sup>1</sup>, Branka Lukic<sup>2</sup>, Christopher Siedlecki<sup>2</sup>, William Weiss<sup>2</sup>, Keefe Manning<sup>1</sup>,  
<sup>1</sup>Pennsylvania State University, United States, <sup>2</sup>Penn State Hershey Medical Center, United States

##### **Mouse Aortic Mechanical Properties From Finite Element Model Optimized To Match Ring-Pull Experiments** SB<sup>3</sup>C2019-P008

Carl Schoepfoerster<sup>1</sup>, Ryan Mahutga<sup>1</sup>, Victor Barocas<sup>1</sup>, <sup>1</sup>Department of Biomedical Engineering, University of Minnesota-  
 Twin Cities, United States

##### **A Computational Study of The Role of The Pericardium On Cardiac Function In Normal and Hypertensive Hearts** SB<sup>3</sup>C2019-P009

Emilio A. Mendiola<sup>1</sup>, Huan Nguyen<sup>1</sup>, Reza Avaz<sup>1</sup>, Michael S. Sacks<sup>1</sup>, <sup>1</sup>The University of Texas at Austin, United States

##### **Estimating The Contribution of The Endovascular Catheter On Cerebral Hypoperfusion During Mechanical Thrombectomy** SB<sup>3</sup>C2019-P010

Christina Ngo<sup>1</sup>, Jeffrey Pyne<sup>2</sup>, Jaiyoung Ryu<sup>3</sup>, Shawn Shadden<sup>2</sup>, <sup>1</sup>*Department of Bioengineering, UC Berkeley, United States*, <sup>2</sup>*Department of Mechanical Engineering, UC Berkeley, United States*, <sup>3</sup>*Department of Mechanical Engineering, Chung-Ang University, South Korea*

**Alteration of The Mechanical Response of Porcine Tricuspid Valve Anterior Leaflets Following Exposure To De-ionized Water** SB<sup>3</sup>C2019-P011

Margaret Clark<sup>1</sup>, Samuel Salinas<sup>1</sup>, Rouzbeh Amini<sup>1</sup>, <sup>1</sup>*The University of Akron, United States*

**On The Distribution of Aortic Valve Cusp Calcification** SB<sup>3</sup>C2019-P012

Varshini Guhan<sup>1</sup>, Megan Heitkemper<sup>1</sup>, Lakshmi Prasad Dasi<sup>1</sup>, <sup>1</sup>*The Ohio State University, United States*

**An Investigation of Layer-Specific Tissue Biomechanics of Porcine Atrioventricular Valve Anterior Leaflets** SB<sup>3</sup>C2019-P013

Cortland Johns<sup>1</sup>, Katherine Kramer<sup>1</sup>, Anju Babu<sup>1</sup>, Chung-Hao Lee<sup>1</sup>, <sup>1</sup>*Biomechanics and Biomaterials Design Lab, School of Aerospace and Mechanical Engineering, The University of Oklahoma Norman, OK, USA, United States*

**A Study of Pressure Dynamics Across A Stenotic Orifice** SB<sup>3</sup>C2019-P014

Tori Burton<sup>1</sup>, Hoda Hatoum<sup>1</sup>, Lakshmi Prasad Dasi<sup>1</sup>, <sup>1</sup>*Department of Biomedical Engineering at The Ohio State University, United States*

**A Study of The Effects of An Increased Beat Rate On The Penn State Pediatric Ventricular Assist Device** SB<sup>3</sup>C2019-P015

Brady Houtz<sup>1</sup>, Sailahari Ponnaluri<sup>1</sup>, Maureen Gallagher<sup>1</sup>, Charlee Dawson<sup>1</sup>, Bryan Good<sup>1</sup>, Steven Deutsch<sup>1</sup>, Keefe Manning<sup>1</sup>, <sup>1</sup>*Pennsylvania State University, United States*

**Hemodynamics of Coronary Artery Aneurysms In Kawasaki Disease An Idealized Aneurysm Model** SB<sup>3</sup>C2019-P016

Alex Lu<sup>1</sup>, Noelia Grande Gutierrez<sup>1</sup>, Alison Marsden<sup>1</sup>, <sup>1</sup>*Stanford University, United States*

**Fluid Dynamics Study of An Implantable Blood Pump For Patients With A Failed Fontan Circulation** SB<sup>3</sup>C2019-P017

Cody Kubicki<sup>1</sup>, Bryan Good<sup>1</sup>, William Weiss<sup>2</sup>, Keefe Manning<sup>1</sup>, <sup>1</sup>*The Pennsylvania State University, United States*, <sup>2</sup>*Penn State Hershey Medical Center, United States*

**Posters - BS Level Competition: Musculoskeletal, Respiratory, Ocular and Other Systems**

**Heterogeneity and Anisotropy In The Microscale Energy Dissipating Properties of The Knee Meniscus** SB<sup>3</sup>C2019-P018

Kev'ther Hoxha<sup>1</sup>, Chao Wang<sup>1</sup>, Biao Han<sup>1</sup>, Robert Mauck<sup>2</sup>, Lin Han<sup>1</sup>, <sup>1</sup>*Drexel University, United States*, <sup>2</sup>*University of Pennsylvania, United States*

**2d Or Not 2d; Comparing 2d and 3d Measurements of Collagen Microstructure** SB<sup>3</sup>C2019-P019

Gosia Fryc<sup>1</sup>, Bin Yang<sup>1</sup>, Alexandra Gogola<sup>1</sup>, Bryn Brazile<sup>1</sup>, Yi Hua<sup>1</sup>, Tian Yong Foong<sup>1</sup>, Ian A. Sigal<sup>1</sup>, <sup>1</sup>*University of Pittsburgh, United States*

**The Effect of A Cannabinoid Receptor 2 Agonist On Motor Function After Blast-Induced Neurotrauma** SB<sup>3</sup>C2019-P020

Bayan Alturkestani<sup>1</sup>, Soroush Assari<sup>1</sup>, Ola M Sharaf<sup>1</sup>, Ian Hendricks<sup>1</sup>, Sara J. Ward<sup>1</sup>, Ronald F. Tuma<sup>1</sup>, Kurosh Darvish<sup>1</sup>, <sup>1</sup>*Temple University, United States*

**Drone Blade Induced Skin Laceration and Eye Injury Risk; An Investigation of Skin and Eye Surrogate Models** SB<sup>3</sup>C2019-P021

Lauren Duma<sup>1</sup>, Mark Begonia<sup>2</sup>, Barry Miller<sup>1</sup>, Stefan Duma<sup>1</sup>, <sup>1</sup>*Virginia Tech, United States*, <sup>2</sup>*Virginia Tech, United States*

**Direct Measurement of Collagen Fiber Orientation Along The Surface of Ligaments and Tendons of The Knee In A Porcine Model** SB<sup>3</sup>C2019-P022

Emily Lambeth<sup>1</sup>, Stephanie Cone<sup>1</sup>, Matthew Fisher<sup>1</sup>, <sup>1</sup>North Carolina State University and the University of North Carolina - Chapel Hill, United States

**Elastase Treatment Increases and Accelerates Stress Relaxation In Tendon.** SB<sup>3</sup>C2019-P023

James Abraham<sup>1</sup>, Jeremy Eekhoff<sup>2</sup>, Spencer Lake<sup>3</sup>, <sup>1</sup>Department of Mechanical Engineering and Materials Science at Washington University in St. Louis, United States, <sup>2</sup>Department of Biomedical Engineering at Washington University in St. Louis, United States, <sup>3</sup>Department of Mechanical Engineering and Materials Science at Washington University in St. Louis, Department of Biomedical Engineering at Washington University in St. Louis, Department of Orthopaedic Surgery at Washington University in St. Louis, United States

**Ultrasound Shear Wave Elastography of The Anterior Cruciate Ligament** SB<sup>3</sup>C2019-P024

Gabi Schwartz<sup>1</sup>, Rachel Heller<sup>1</sup>, Seyedali Sadeghi<sup>1</sup>, Daniel Cortes<sup>1</sup>, <sup>1</sup>Penn State, United States

**Extracellular Matrix Stiffness Alters Chondrocyte Phenotype Through Trpv4 Regulation** SB<sup>3</sup>C2019-P025

Ryan Skinner<sup>1</sup>, Mallory Griffin<sup>1</sup>, Nicholas Trompeter<sup>1</sup>, Cindy Farino<sup>1</sup>, Omar Banda<sup>1</sup>, John Slater<sup>1</sup>, Randall Duncan<sup>1</sup>, <sup>1</sup>University of Delaware, United States

**Asthmatic and Healthy Airway Morphology Measured From Ct-Based Geometries** SB<sup>3</sup>C2019-P026

Irina Pyataeva<sup>1</sup>, Kamran Poorbahrami<sup>1</sup>, Ellesse Cooper<sup>1</sup>, Ben Piperno<sup>1</sup>, David Mummy<sup>2</sup>, Sean Fain<sup>2</sup>, Jessica Oakes<sup>1</sup>, <sup>1</sup>Northeastern University, United States, <sup>2</sup>University of Wisconsin-Madison, United States

**Contributions of Collagen Ii, Laminin, and Fibronectin To Vitreoretinal Adhesion In Human Eyes** SB<sup>3</sup>C2019-P027

Joseph Phillips<sup>1</sup>, Christopher Creveling<sup>1</sup>, Brittany Coats<sup>1</sup>, <sup>1</sup>University of Utah, United States

**Rapid Quantitative Assessment of Postural Control Function For Mild Traumatic Brain Injury: Evaluation of A Portable Force Plate Device** SB<sup>3</sup>C2019-P028

Jonathan VanPaepeghem<sup>1</sup>, Kunal Dave<sup>1</sup>, Liying Zhang<sup>1</sup>, <sup>1</sup>Wayne State University, United States

**Mechanical Influence of Graphitic Carbon Nitride Filler On Poly(vinyl Alcohol) Thin Film Hydrogels For Wound Healing** SB<sup>3</sup>C2019-P029

Bradley Henderson<sup>1</sup>, Katelyn Cudworth<sup>1</sup>, Andrew Clifford<sup>2</sup>, Dylan Quintana<sup>2</sup>, John Thurston<sup>2</sup>, Trevor Lujan<sup>1</sup>, <sup>1</sup>Boise State University, United States, <sup>2</sup>College of Idaho, United States

**A Novel Workflow For Generation of Patient-Specific Asthmatic Airway Models From Ct Data** SB<sup>3</sup>C2019-P030

Ellesse Cooper<sup>1</sup>, Kamran Poorbahrami<sup>1</sup>, Ben Piperno<sup>1</sup>, David Mummy<sup>2</sup>, Sean Fain<sup>2</sup>, Jessica Oakes<sup>1</sup>, <sup>1</sup>Northeastern University, United States, <sup>2</sup>University of Wisconsin, United States

**Water Sport Head Injuries; Ability of Helmets To Reduce Head Impact Accelerations** SB<sup>3</sup>C2019-P031

Brock Duma<sup>1</sup>, Mark Begonia<sup>1</sup>, Casey Charron<sup>1</sup>, Stefan Duma<sup>1</sup>, <sup>1</sup>Virginia Tech, United States

**The Influence of Radiographic Projection Angle On Visualization of The Subtalar Joint** SB<sup>3</sup>C2019-P032

Kalebb Howell<sup>1</sup>, Nicola Krahenbuhl<sup>2</sup>, Rich Lisonbee<sup>1</sup>, Beat Hintermann<sup>2</sup>, Charles Saltzman<sup>1</sup>, Andrew Anderson<sup>1</sup>, Alexej Barg<sup>1</sup>, Amy Lenz<sup>1</sup>, <sup>1</sup>University of Utah, United States, <sup>2</sup>Kantonsspital Baselland, Switzerland

**Effects of Volumetric Boundary Conditions On The Compressive Mechanics and Modeling of Passive Skeletal Muscle** SB<sup>3</sup>C2019-P033

Anurag Vaidya<sup>1</sup>, Benjamin Wheatley<sup>1</sup>, <sup>1</sup>Bucknell University, United States

**Posters - MS Level Competition: Solid Mechanics**

**The Effect of In Vivo Ionizing Radiation On The Micromechanics of Mouse Vertebrae** SB<sup>3</sup>C2019-P034

Tongge Wu<sup>1</sup>, Megan Pendleton<sup>1</sup>, Noah Bonenheim<sup>1</sup>, Joshua Alwood<sup>2</sup>, Tony Keaveny<sup>1</sup>, <sup>1</sup>University of California, Berkeley, United States, <sup>2</sup>NASA Ames Research Center, United States

**Investigating Sex-Specific Accuracy of Proximal Femur Coordinate Systems Derived From Statistical Shape Models** SB<sup>3</sup>C2019-P035

Carla Winsor<sup>1</sup>, Xinshan Li<sup>2</sup>, Ju Zhang<sup>3</sup>, Corinne Henak<sup>1</sup>, Heidi-Lynn Ploeg<sup>4</sup>, <sup>1</sup>University of Wisconsin - Madison, United States, <sup>2</sup>University of Sheffield, United Kingdom, <sup>3</sup>Auckland Bioengineering Institute, New Zealand, <sup>4</sup>Queen's University, Canada

**Effects of Collagenase and Elastase On The Mechanical Properties of Porcine Abdominal Aorta SB<sup>3</sup>C2019-P036**

Celeste Blum<sup>1</sup>, Chris Korenczuk<sup>2</sup>, Victor Barocas<sup>2</sup>, <sup>1</sup>University of Minnesota - Twin Cities, United States, <sup>2</sup>University of Minnesota- Twin Cities, United States

**Finite Element Simulation Framework For Investigating Pathological Effects On Organ-Level Tricuspid Valve Biomechanical Function SB<sup>3</sup>C2019-P037**

Devin Laurence<sup>1</sup>, Emily Johnson<sup>2</sup>, Ming-Chen Hsu<sup>2</sup>, Arshid Mir<sup>3</sup>, Harold Burkhart<sup>3</sup>, Yi Wu<sup>1</sup>, Chung-Hao Lee<sup>1</sup>, <sup>1</sup>University of Oklahoma, United States, <sup>2</sup>Iowa State University, United States, <sup>3</sup>University of Oklahoma Health Sciences Center, United States

**An Integrated Opto-Mechanical System For Quantification of Dynamic Microstructure and Mechanics of Heart Valve Tissues SB<sup>3</sup>C2019-P038**

Samuel Jett<sup>1</sup>, Zachary Schuermann<sup>1</sup>, Arshid Mir<sup>2</sup>, Harold Burkhart<sup>3</sup>, Chung-Hao Lee<sup>1</sup>, <sup>1</sup>Biomechanics and Biomaterials Design Laboratory, School of Aerospace and Mechanical Engineering, The University of Oklahoma Norman, OK, USA, United States, <sup>2</sup>Division of Pediatric Cardiology, Department of Pediatrics, University of Oklahoma Health Sciences Center, Oklahoma City, OK, USA, United States, <sup>3</sup>Division of Cardiothoracic Surgery, Department of Surgery, University of Oklahoma Health Sciences Center, Oklahoma City, OK, USA, United States

**Computational Analysis of Unhelmeted Bicycle Accidents Through Multi-Body and Finite Element Simulations SB<sup>3</sup>C2019-P039**

Lise Gheysen<sup>1</sup>, Michel Woering<sup>2</sup>, Markos Kapeliotis<sup>2</sup>, Jos Vander Sloten<sup>2</sup>, <sup>1</sup>UGent, Belgium, <sup>2</sup>KU Leuven, Belgium

**Repeated Non-Injurious Loading Induces Changes In Local Mechanics & Collagen Fiber Organization That May Be Injurious SB<sup>3</sup>C2019-P040**

Travis Kotzur<sup>1</sup>, Beth Winkelstein<sup>1</sup>, <sup>1</sup>University of Pennsylvania, United States

**Investigation of Scaling Techniques Used For Developing Brain Injury Criterion By Finite Element Models of The Primate and Human Head Simulating Head Rotation SB<sup>3</sup>C2019-P041**

Tushar Arora<sup>1</sup>, Priya Prasad<sup>2</sup>, Liying Zhang<sup>1</sup>, <sup>1</sup>Wayne State University, United States, <sup>2</sup>Prasad Engineering, LLC, United States

**Determination of Tissue Level Injury Threshold For Ocular Trauma By Finite Element Analysis SB<sup>3</sup>C2019-P042**

Kunal Dave<sup>1</sup>, Liying Zhang<sup>1</sup>, <sup>1</sup>Wayne State University, United States

**Computational Analysis of Lisfranc Surgical Repairs SB<sup>3</sup>C2019-P043**

M. Tyler Perez<sup>1</sup>, John Owen<sup>1</sup>, Robert Adelaar<sup>2</sup>, Jennifer Wayne<sup>1</sup>, <sup>1</sup>Virginia Commonwealth University, United States, <sup>2</sup>McGuire VA Medical Center, United States

**McDespot Quantitative Mri Correlates With Articular Cartilage Material Properties SB<sup>3</sup>C2019-P044**

Matthew Grondin<sup>1</sup>, Fang Liu<sup>1</sup>, Michael Vignos<sup>1</sup>, Richard Kijowski<sup>1</sup>, Corinne Henak<sup>1</sup>, <sup>1</sup>University of Wisconsin-Madison, United States

**Characterization of Shear Wave Speed-Stress Relationship In Collateral Ligaments SB<sup>3</sup>C2019-P045**

Jonathon Blank<sup>1</sup>, Joshua Roth<sup>1</sup>, Darryl Thelen<sup>1</sup>, <sup>1</sup>Department of Mechanical Engineering, University of Wisconsin-Madison, United States

**Tribocorrosion Behavior of Metallic Implants: A Comparative Study of CoCrMo and Ti6Al4v SB<sup>3</sup>C2019-P046**

Mihir Patel<sup>1</sup>, Edward Cudjoe<sup>1</sup>, Jae Joong Ryu<sup>1</sup>, <sup>1</sup>Youngstown State University, United States

**An Age-Aware Constitutive Model For Human Sclera Incorporating Experimentally-Measured Collagen Fiber Tortuosity SB<sup>3</sup>C2019-P047**

Tian Yong Foong<sup>1</sup>, Yi Hua<sup>1</sup>, Alexandra Gogola<sup>1</sup>, Rouzbeh Amini<sup>2</sup>, Ian A. Sigal<sup>1</sup>, <sup>1</sup>*University of Pittsburgh, United States*,  
<sup>2</sup>*University of Akron, United States*

## Posters - MS Level Competition: Biotransport, Fluids, Tissue Engineering and Dynamics

### **Stochastic Model For Platelet Spreading Under Flow** SB<sup>3</sup>C2019-P048

Iain Briongos<sup>1</sup>, Peter Hammes<sup>1</sup>, David Bark<sup>1</sup>, <sup>1</sup>*Colorado State University, United States*

### **Evaluating Single Muscle Contraction Using Electrical Stimulation and Shear Wave Elastography** SB<sup>3</sup>C2019-P049

Heer Patel<sup>1</sup>, Seyedali Sadeghi<sup>1</sup>, Daniel Cortes<sup>1</sup>, <sup>1</sup>*The Pennsylvania State University, United States*

### **Implementing Real-Time Extrinsic Muscle Control In A Robotic Gait Simulator For Investigating Lower Extremity Function** SB<sup>3</sup>C2019-P050

Watson Spivey<sup>1</sup>, Cody O'Cain<sup>1</sup>, Bronislaw Gepner<sup>1</sup>, Edward Sprately<sup>1</sup>, Jason Kerrigan<sup>1</sup>, <sup>1</sup>*University of Virginia, Center for Applied Biomechanics, United States*

### **Evaluation of Accuracy of Four Muscle Models Using Intramuscular Pressure A Surrogate For Muscle Force** SB<sup>3</sup>C2019-P051

Grant Boggess<sup>1</sup>, Mohammad Shorijeh<sup>1</sup>, Filiz Ates<sup>2</sup>, William Litchy<sup>2</sup>, Krista Coleman-Wood<sup>2</sup>, Kenton Kaufman<sup>2</sup>, BJ Fregly<sup>1</sup>,  
<sup>1</sup>*Rice University, United States*, <sup>2</sup>*Mayo Clinic, United States*

### **The Effects of Ankyloglossia On The Tongue Motility of Infants During Breastfeeding** SB<sup>3</sup>C2019-P052

Yiela Saperstein<sup>1</sup>, David Elad<sup>2</sup>, Andrew Laine<sup>1</sup>, Scott Siegel<sup>3</sup>, Catherine Watson Genna<sup>4</sup>, <sup>1</sup>*Columbia University, United States*, <sup>2</sup>*Tel Aviv University, Israel*, <sup>3</sup>*Stony Brook University, United States*, <sup>4</sup>*Private Practice, United States*

### **Development of A Computational Model of Braided Stent For Cerebral Aneurysm Treatment** SB<sup>3</sup>C2019-P053

Shunya Shiozaki<sup>1</sup>, Tomohiro Otani<sup>1</sup>, Shigeo Wada<sup>1</sup>, <sup>1</sup>*Department of Mechanical Science and Bioengineering, Graduate School of Engineering Science, Osaka University, Japan*

### **Accelerometers Used To Measure Magnitude and Frequency of Hand Movement For Children With Cerebral Palsy During Constraint Induced Movement Therapy** SB<sup>3</sup>C2019-P054

Brianna Goodwin<sup>1</sup>, Emily Sabelhaus<sup>2</sup>, Ying-Chun Pan<sup>1</sup>, Kristie Bjornson<sup>1</sup>, Kelly Pham<sup>1</sup>, William Walker<sup>1</sup>, Katherine Steele<sup>1</sup>, <sup>1</sup>*University of Washington, United States*, <sup>2</sup>*Seattle Children's Hospital, United States*

### **Reduction of Wall Shear Strain Rates In Arteriovenous Graft Venous Anastomoses** SB<sup>3</sup>C2019-P055

Dillon Williams<sup>1</sup>, Guy Genin<sup>1</sup>, Mohamed Zayed<sup>1</sup>, <sup>1</sup>*Washington University, United States*

### **Flow Through Soft Tissue Equivalents: Measuring The Hydraulic Permeability of Collagen Gels** SB<sup>3</sup>C2019-P056

Christopher Vidmar<sup>1</sup>, Brittany Fisher<sup>1</sup>, Victor Lai<sup>1</sup>, <sup>1</sup>*Department of Chemical Engineering at the University of Minnesota-Duluth, United States*

### **Effect of Different Inlet Velocity Profiles On Patient-Specific Cfd Simulations of Healthy Trachea** SB<sup>3</sup>C2019-P057

Bipin Tiwari<sup>1</sup>, Tarun Kore<sup>1</sup>, Sandeep Bodduluri<sup>2</sup>, Surya Bhatt<sup>2</sup>, Vrishank Raghav<sup>1</sup>, <sup>1</sup>*Auburn University, United States*,  
<sup>2</sup>*University of Alabama at Birmingham, United States*

### **Quantifying Distortion Energy In Collagen Matrices Subjected To Complex Loads Using A Biaxial Bioreactor** SB<sup>3</sup>C2019-P058

Katherine Hollar<sup>1</sup>, Danielle Siegel<sup>1</sup>, John Everingham<sup>1</sup>, Abdullah Ahmad<sup>1</sup>, Alvaro Morfin<sup>1</sup>, Gunes Uzer<sup>1</sup>, Trevor Lujan<sup>1</sup>,  
<sup>1</sup>*Boise State University, United States*

### **An Intercalating Crosslinkable and Biocompatible Hydrogel System For Resurfacing Damaged Cartilage** SB<sup>3</sup>C2019-P059

Brian Wise<sup>1</sup>, Jay Patel<sup>1</sup>, Claudia Loebel<sup>1</sup>, Jason Burdick<sup>1</sup>, Robert Mauck<sup>1</sup>, <sup>1</sup>*University of Pennsylvania, United States*

### **Engineering Spatial Gradients of Diamagnetic Particles and Cells In Hydrogels Using Negative Magnetophoresis** SB<sup>3</sup>C2019-P060



Hannah Zlotnick<sup>1</sup>, Andy Clark<sup>2</sup>, Xuemei Cheng<sup>2</sup>, Robert Mauck<sup>1</sup>, <sup>1</sup>*University of Pennsylvania, United States*, <sup>2</sup>*Bryn Mawr, United States*

## Posters - Fluids: Cardiovascular Fluid Mechanics

### Computational Hemodynamics & Complex Networks Integrated Platform To Study Intravascular Flow In The Carotid Bifurcation SB<sup>3</sup>C2019-P061

Karol Cal<sup>1</sup>, Diego Gallo<sup>1</sup>, Valentina Mazzi<sup>1</sup>, Stefania Scarsoglio<sup>1</sup>, Muhammad O. Khan<sup>2</sup>, David A. Steinman<sup>3</sup>, Luca Ridolfi<sup>1</sup>, Umberto Morbiducci<sup>1</sup>, <sup>1</sup>*Polito BIOMed Lab, Department of Mechanical and Aerospace Engineering, Politecnico di Torino, Turin, Italy*, <sup>2</sup>*Cardiovascular Biomechanics Computation Lab, Department of Pediatrics, Cardiology, Stanford University, Stanford, United States*, <sup>3</sup>*Biomedical Simulation Lab, Department of Mechanical & Industrial Engineering, University of Toronto, Toronto, Canada*

### Automatic Techniques For Determining Boundary Condition Parameters In Computational Haemodynamics SB<sup>3</sup>C2019-P062

Christopher J. Arthurs<sup>1</sup>, C. Alberto Figueroa<sup>2</sup>, <sup>1</sup>*King's College London, United Kingdom*, <sup>2</sup>*University of Michigan, United States*

### Developing A Scalable Open-Source Solver To Simulate Hemodynamics In The Human Pulmonary Vasculature SB<sup>3</sup>C2019-P063

Narasimha Rao Pillalamarri<sup>1</sup>, Senol Piskin<sup>1</sup>, Ender Finol<sup>1</sup>, <sup>1</sup>*University of Texas at San Antonio, United States*

### Solution Adaptive Refinement of Cut-Cell Cartesian Meshes Improves Mechanical Heart Valve Simulation Performance SB<sup>3</sup>C2019-P064

Ryan Pewowaruk<sup>1</sup>, Tim Ruesink<sup>1</sup>, Yanheng Li<sup>2</sup>, David Rowinski<sup>2</sup>, Alejandro Roldan-Alzate<sup>1</sup>, <sup>1</sup>*University of Wisconsin - Madison, United States*, <sup>2</sup>*Convergent Science, United States*

### Uncertainty Quantification of Outflow Boundary Conditions On Non-Invasive Pressure Quantification In Aortorenal Artery System SB<sup>3</sup>C2019-P065

Huidan (whitney) Yu<sup>1</sup>, Monsurul Khan<sup>1</sup>, Hao Wu<sup>1</sup>, Xiaoping Du<sup>1</sup>, Alan Sawchuk<sup>1</sup>, <sup>1</sup>*Indiana University-Purdue University Indianapolis, United States*

### Modeling Pulse Wave Propagation For Idealized and Physiological Arteries With Fluid-Structure Interactions In Febio SB<sup>3</sup>C2019-P066

Jay Shim<sup>1</sup>, Vittorio Gatti<sup>1</sup>, Pierre Nauleau<sup>1</sup>, Grigorios Karageorgos<sup>1</sup>, Elisa Konofagou<sup>1</sup>, Gerard Ateshian<sup>1</sup>, <sup>1</sup>*Columbia University, United States*

### In Vitro Volumetric Lagrangian Particle Tracking and 4d Pressure Field In A Left Ventricle Model SB<sup>3</sup>C2019-P067

Hicham Saaid<sup>1</sup>, Matteo Novara<sup>2</sup>, Jason Voorneveld<sup>3</sup>, Christiaan Schinkel<sup>4</sup>, Jos Westenberg<sup>5</sup>, Frank Gijzen<sup>6</sup>, Patrick Segers<sup>1</sup>, Pascal Verdonck<sup>1</sup>, Johan Bosch<sup>6</sup>, Sasa Kenjeres<sup>4</sup>, Daniel Schanz<sup>2</sup>, Sebastian Gesemann<sup>2</sup>, Andreas Schröder<sup>2</sup>, Tom Claessens<sup>7</sup>, <sup>1</sup>*BioMMeda, Institute Biomedical Technology Ghent University, Belgium*, <sup>2</sup>*Institute of Aerodynamics and Flow Technology, German Aerospace Center (DLR), Germany*, <sup>3</sup>*Thoraxcenter Biomedical Engineering, Erasmus Medical Center, Netherlands*, <sup>4</sup>*Department of Chemical Engineering Delft University of Technology, Netherlands*, <sup>5</sup>*Department of Radiology Leiden University Medical Center, Netherlands*, <sup>6</sup>*Thoraxcenter Biomedical Engineering Erasmus Medical Center, Netherlands*, <sup>7</sup>*Department of Materials, Textiles And Chemical Engineering, Ghent University, Belgium*

### Impact of Different Bifurcation Stenting Techniques On The Endothelial Shear Stress Within A Peripheral Bifurcation SB<sup>3</sup>C2019-P068

Azadeh Lotfi<sup>1</sup>, Tracie Barber<sup>1</sup>, <sup>1</sup>*UNSW Australia, Australia*

### Improvement and In Vitro Validation of A Finite Element Based Virtual Coiling Method For Intracranial Aneurysm SB<sup>3</sup>C2019-P069

Robert Damiano<sup>1</sup>, Saeb Ragani<sup>1</sup>, Adnan Siddiqui<sup>1</sup>, Jason Davies<sup>1</sup>, Hui Meng<sup>1</sup>, <sup>1</sup>*University at Buffalo, United States*

**Automated Segmentation of Cerebral Arteries From Patient-Specific 3d Cerebrovascular Images Using Deep-Learning and Group Morphology** SB<sup>3</sup>C2019-P070

Tatsat Rajendra Patel<sup>1</sup>, Nikhil Paliwal<sup>1</sup>, Prakhar Jaiswal<sup>1</sup>, Adnan H Siddiqui<sup>1</sup>, Rahul Rai<sup>1</sup>, Hui Meng<sup>1</sup>, <sup>1</sup>University at Buffalo, United States

**Fabrication of A Flexible Idealized 3d Printed Aortic Dissection For In Vitro Analysis** SB<sup>3</sup>C2019-P071

Sylvana Garca-Rodriguez<sup>1</sup>, Alexander B. Holtz<sup>1</sup>, Huairan Zhou<sup>1</sup>, Rafael Medero<sup>1</sup>, Alejandro Roldan-Alzate<sup>1</sup>, <sup>1</sup>University of Wisconsin-Madison, United States

**Experimental Evaluation of Two Fast Virtual Stenting Algorithms For Modeling Flow Diverters In Patient-Specific Intracranial Aneurysms** SB<sup>3</sup>C2019-P072

Saeb Ragani Lamooki<sup>1</sup>, Vincent Tutino<sup>1</sup>, Nikhil Paliwal<sup>1</sup>, Setlur Nagesh<sup>1</sup>, Robert Damiano<sup>1</sup>, Adnan Siddiqui<sup>1</sup>, Hui Meng<sup>1</sup>, <sup>1</sup>University at Buffalo, United States

**Adhesion Effect On Localization of Deformable Micro-Particles In Blood Flow** SB<sup>3</sup>C2019-P073

Huilin Ye<sup>1</sup>, Zhiqiang Shen<sup>1</sup>, Ying Li<sup>1</sup>, <sup>1</sup>University of Connecticut, United States

**4d Flow Mri Determination of Windkessel Parameters For Patient Specific Cardiovascular Simulation** SB<sup>3</sup>C2019-P074

Ryan Pewowaruk<sup>1</sup>, Alejandro Roldan-Alzate<sup>1</sup>, <sup>1</sup>University of Wisconsin - Madison, United States

**Differences In Parent Artery Geometry Between Acom and Mca Aneurysms** SB<sup>3</sup>C2019-P075

Fernando Mut<sup>1</sup>, Megan Lawson<sup>1</sup>, Juan Cebal<sup>1</sup>, <sup>1</sup>George Mason University, United States

**Predicting Aneurysmal Degeneration In The Dissected Thoracic Aorta: A Computational Fluid Dynamic Approach** SB<sup>3</sup>C2019-P076

Arianna Forneris<sup>1</sup>, Alina Ismaguilova<sup>1</sup>, Giampaolo Martufi<sup>1</sup>, Jehangir Appoo<sup>1</sup>, Elena Di Martino<sup>1</sup>, <sup>1</sup>University of Calgary, Canada

**Patient-Specific Evaluation of Post-Tevar Hemodynamic Performance In Aortic Dissection** SB<sup>3</sup>C2019-P077

Selene Pirola<sup>1</sup>, Claudia Menichini<sup>1</sup>, Baolei Guo<sup>2</sup>, Simone Saitta<sup>1</sup>, Weiguo Fu<sup>2</sup>, Zhihui Dong<sup>2</sup>, Xiao Yun Xu<sup>1</sup>, <sup>1</sup>Imperial College London, United Kingdom, <sup>2</sup>Fudan University, China

**Image-Based Assessment of The Hemodynamic Performance of Surgical and Transcatheter Aortic Valve Replacements** SB<sup>3</sup>C2019-P078

Selene Pirola<sup>1</sup>, Omar A. Jarra<sup>1</sup>, Mohammad Y. Salmasi<sup>1</sup>, Declan P. O'Regan<sup>1</sup>, John R. Pepper<sup>2</sup>, Thanos Athanasiou<sup>1</sup>, Xiao Yun Xu<sup>1</sup>, <sup>1</sup>Imperial College London, United Kingdom, <sup>2</sup>Royal Brompton and Harefield NHS Foundation Trust, United Kingdom

**Hemodynamic Characteristics Associated With Cerebral Aneurysms Evolution** SB<sup>3</sup>C2019-P079

Seyedeh Fatemeh Salimi Ashkezari<sup>1</sup>, Fernando Mut<sup>1</sup>, Juan Raul Cebal<sup>1</sup>, <sup>1</sup>George Mason University, United States

**Intensity of Stenosis-Induced Flow Instabilities of The Internal Carotid Artery: A Computational Approach** SB<sup>3</sup>C2019-P080

Viviana Mancini<sup>1</sup>, Aslak W. Bergersen<sup>2</sup>, Kristian Valen-Sendstad<sup>2</sup>, Patrick Segers<sup>1</sup>, <sup>1</sup>IBiTech bioMMeda, Ghent University, Belgium, <sup>2</sup>Department of Computational Physiology, Simula Research Laboratory, Norway

**Predicting Thrombosis Risk In The Left Atrial Appendage of Human Heart** SB<sup>3</sup>C2019-P081

Breandan Yeats<sup>1</sup>, Hoda Hatoum<sup>1</sup>, Thura Harfi<sup>1</sup>, Lakshmi Prasad Dasi<sup>1</sup>, <sup>1</sup>The Ohio State University, United States

**Effects of Subject-Specific, Spatially Reduces, and Idealized Boundary Conditions On The Predicted Hemodynamic Environment In The Murine Aorta** SB<sup>3</sup>C2019-P082

Kelly Smith<sup>1</sup>, Samer Merchant<sup>1</sup>, Edward Hsu<sup>1</sup>, Lucas Timmins<sup>1</sup>, <sup>1</sup>University of Utah, United States

**Pre-Procedural Patient-Specific In-Silico Deployment of Sapien and Evolut Transcatheter Aortic Valves SB<sup>3</sup>C2019-P083**

Sri Krishna Sivakumar<sup>1</sup>, Hoda Hatoum<sup>1</sup>, Jennifer Dollery<sup>1</sup>, Scott Lilly<sup>1</sup>, Lakshmi Prasad Dasi<sup>1</sup>, <sup>1</sup>*The Ohio State University, United States*

**Effects of Resolution and Dynamic Range of Dual-Venc 4d Flow Mri On Flow Measurements In Cerebral Aneurysms: In Vitro 4d Flow Study In A Scaled Model SB<sup>3</sup>C2019-P084**

Sean Rothenberger<sup>1</sup>, Melissa Brindise<sup>1</sup>, Joseph Muskat<sup>1</sup>, Susanne Schnell<sup>2</sup>, Pavlos Vlachos<sup>1</sup>, Vitaliy Rayz<sup>1</sup>, <sup>1</sup>*Purdue University, United States*, <sup>2</sup>*Northwestern University, United States*

**In-Silico Characterization of Patient-Specific Pulmonary Hypertension Hemodynamics SB<sup>3</sup>C2019-P085**

Narasimha Rao Pillalamarri<sup>1</sup>, Senol Piskin<sup>1</sup>, Sourav Patnaik<sup>1</sup>, Alifer Bordonas<sup>1</sup>, Vitaly Kheyfets<sup>2</sup>, Ender Finol<sup>1</sup>, <sup>1</sup>*University of Texas at San Antonio, United States*, <sup>2</sup>*University of Colorado, Denver, United States*

**Development of An Experimental System Exploring The Efficacy of Cyclic Aspiration On Clot Displacement In A Cerebral Thrombectomy Model SB<sup>3</sup>C2019-P086**

Joshua Kugel<sup>1</sup>, Connor Foust<sup>1</sup>, Bryan Good<sup>1</sup>, Keefe Manning<sup>1</sup>, <sup>1</sup>*The Pennsylvania State University, United States*

**Posters - Solid Mechanics: Bone Mechanics**

**Assessing Femoral Implant Failure Risk By Applying Controllable Torque With Robot Manipulator and 6 Dof Sensor SB<sup>3</sup>C2019-P087**

Marius Gudauskis<sup>1</sup>, Abel Pietros<sup>2</sup>, Brian L. Davis<sup>2</sup>, Brandon Jonard<sup>3</sup>, <sup>1</sup>*Institute of Mechatronics, Kaunas University of Technology, Lithuania*, <sup>2</sup>*Department of Biomedical Engineering, The University of Akron, United States*, <sup>3</sup>*Department of Orthopaedics, Summa Healthcare System, United States*

**Drill Plunge In Orthopedic Surgery Defined SB<sup>3</sup>C2019-P088**

Scott Baskerville<sup>1</sup>, Ted Conway<sup>1</sup>, Samantha Schultz<sup>1</sup>, <sup>1</sup>*Florida Institute of Technology, United States*

**A Preliminary Study On Correlations Between Microarchitectural Parameters of Human Trabecular Bone SB<sup>3</sup>C2019-P089**

Pengwei Xiao<sup>1</sup>, Joel Gomez<sup>1</sup>, Matthew Kirby<sup>1</sup>, Ed Guo<sup>2</sup>, Xiaodu Wang<sup>1</sup>, <sup>1</sup>*The University of Texas at San Antonio, United States*, <sup>2</sup>*Columbia University, United States*

**Posters - Solid Mechanics: Cardiovascular Tissue Mechanics**

**Three-Dimensional Anisotropic Residual Stresses In The Abdominal Aorta SB<sup>3</sup>C2019-P090**

Taisiya Sigaeva<sup>1</sup>, Gerhard Sommer<sup>2</sup>, Gerhard A. Holzapfel<sup>3</sup>, Elena Di Martino<sup>1</sup>, <sup>1</sup>*University of Calgary, Canada*, <sup>2</sup>*Graz University of Technology, Austria*, <sup>3</sup>*Graz University of Technology, Norwegian University of Science and Technology, Austria*

**A Biomechanics-Based Risk Prediction Metric For Thoracic Aortic Dissection SB<sup>3</sup>C2019-P091**

Spandan Maiti<sup>1</sup>, James Thunes<sup>1</sup>, Leonid Emerel<sup>1</sup>, Thomas Gleason<sup>1</sup>, David Vorp<sup>1</sup>, <sup>1</sup>*University of Pittsburgh, United States*

**Physiologic Strength of Ascending Thoracic Aortic Tissue Depends On Stress Biaxiality SB<sup>3</sup>C2019-P092**

James Thunes<sup>1</sup>, Ronald Fortunato<sup>1</sup>, Thomas Gleason<sup>1</sup>, David Vorp<sup>1</sup>, Spandan Maiti<sup>1</sup>, <sup>1</sup>*University of Pittsburgh, United States*

**Inverse Mixed Strain Method For Aneurysm Stress Analysis SB<sup>3</sup>C2019-P093**

Yuanming Luo<sup>1</sup>, Jia Lu<sup>1</sup>, <sup>1</sup>*the University of Iowa, United States*

**Microstructural Characterization of Intraluminal Thrombus In Abdominal Aortic Aneurysms SB<sup>3</sup>C2019-P094**

Pete Gueldner<sup>1</sup>, Sourav Patnaik<sup>1</sup>, Senol Piskin<sup>1</sup>, Mirunalini Thirugnanasambandam<sup>1</sup>, Satish Muluk<sup>2</sup>, Ender Finol<sup>1</sup>, <sup>1</sup>*University of Texas at San Antonio, United States*, <sup>2</sup>*Allegheny General Hospital, United States*

**Material Characterization of Atherosclerotic Plaques With Virtual Fields Method** SB<sup>3</sup>C2019-P095

Ronald van den Berg<sup>1</sup>, Stephane Avril<sup>2</sup>, Frank Gijsen<sup>1</sup>, Ali Akyildiz<sup>1</sup>, <sup>1</sup>*Erasmus Medical Center, Netherlands*, <sup>2</sup>*Mines Saint-Etienne, France*

**Microstructure-Based Finite Element Modeling Framework For Simulating Passive Inflation of The Left Ventricle** SB<sup>3</sup>C2019-P096

Ce Xi<sup>1</sup>, Ghassan Kassab<sup>2</sup>, Lik Chuan Lee<sup>1</sup>, <sup>1</sup>*Michigan State University, United States*, <sup>2</sup>*California Medical Innovations Institute, United States*

**A Thermodynamically Motivated Cross-Bridge Cycling Framework To Predict Myofibril Remodeling Under Conditions Associated With Lv Hypertrophy** SB<sup>3</sup>C2019-P097

Eoin McEvoy<sup>1</sup>, Patrick McGarry<sup>1</sup>, <sup>1</sup>*National University of Ireland Galway, Ireland*

**Contractility Modelling Towards Predicting Eccentric Hypertrophy In A Patient-Specific Heart Model** SB<sup>3</sup>C2019-P098

Ryan Coleman<sup>1</sup>, Eoin McEvoy<sup>1</sup>, Patrick McGarry<sup>1</sup>, <sup>1</sup>*NUI Galway, Ireland*

**Cardiac Growth and Remodeling: Using Machine Learning To Correlate Cell and Organ Scales** SB<sup>3</sup>C2019-P099

Mathias Peirlinck<sup>1</sup>, Francisco Sahli Costabal<sup>2</sup>, Kevin Sack<sup>3</sup>, Jenny Choy<sup>4</sup>, Ghassan Kassab<sup>4</sup>, Julius Guccione<sup>5</sup>, Matthieu De Beule<sup>1</sup>, Patrick Segers<sup>1</sup>, Ellen Kuhl<sup>2</sup>, <sup>1</sup>*Ghent University, Belgium*, <sup>2</sup>*Stanford University, United States*, <sup>3</sup>*University of Cape Town, South Africa*, <sup>4</sup>*California Medical Innovations Institute, Inc., United States*, <sup>5</sup>*University of California at San Francisco, United States*

**Changes In The Anisotropic and Viscoelastic Properties of The Ovine Right Ventricle Under Chronic Pressure Overload** SB<sup>3</sup>C2019-P100

Wenqiang Liu<sup>1</sup>, Michael Nguyen-Truong<sup>1</sup>, Elisabeth Gray<sup>1</sup>, Jeremiah Easley<sup>1</sup>, Eric Monnet<sup>1</sup>, Christian Puttlitz<sup>1</sup>, Zhijie Wang<sup>1</sup>, <sup>1</sup>*Colorado State University, United States*

**Mechanical Characterization of Bovine Embolus Analogs For Investigating Acute Ischemic Stroke Recanalization** SB<sup>3</sup>C2019-P101

Gretchen Hiller<sup>1</sup>, Bryan Good<sup>1</sup>, Keefe Manning<sup>1</sup>, <sup>1</sup>*Department of Biomedical Engineering The Pennsylvania State University University Park, PA, United States*

**Assessment of Ascending Aortic Wall Stresses For Nondissected Patients With Bicuspid Aortic Valve and Dissected Patients With Tricuspid Aortic Valve** SB<sup>3</sup>C2019-P102

Sreyas Ravi<sup>1</sup>, David Vorp<sup>1</sup>, Spandan Maiti<sup>1</sup>, <sup>1</sup>*University of Pittsburgh, United States*

**Application of Digital Image Correlation To The Local Strain Analysis of Mouse Aortas: Novel Method To Create Speckle Pattern** SB<sup>3</sup>C2019-P103

Liya Du<sup>1</sup>, Brooks Lane<sup>1</sup>, John Eberth<sup>1</sup>, Susan Lessner<sup>1</sup>, <sup>1</sup>*University of South Carolina, United States*

**Towards An Ultrasound Imaging Framework For Transmural Evaluation of Right Ventricular Myocardial Fiber Orientation Under Loading** SB<sup>3</sup>C2019-P104

Danial Sharifkia<sup>1</sup>, Marc Simon<sup>2</sup>, Kang Kim<sup>2</sup>, <sup>1</sup>*Department of Bioengineering, University of Pittsburgh, United States*, <sup>2</sup>*Department of Bioengineering, University of Pittsburgh; Division of Cardiology, School of Medicine, University of Pittsburgh; Heart and Vascular Institute, University of Pittsburgh Medical Center (UPMC); McGowan Institute for Regenerative Medicine, Univer, United States*

**Improved Strain Analysis of Left Ventricular Function Post Myocardial Infarction In Mice** SB<sup>3</sup>C2019-P105

Danielle Wilson<sup>1</sup>, Zhen Zhu<sup>1</sup>, Stephanie George<sup>1</sup>, Jitka Virag<sup>1</sup>, <sup>1</sup>*East Carolina University, United States*

**Structural Changes In The Progression of Pulmonary Arterial Hypertension** SB<sup>3</sup>C2019-P106

Erica Pursell<sup>1</sup>, Daniela Valdez-Jasso<sup>1</sup>, <sup>1</sup>*Ucsd, United States*

**Dynamic Mechanics of Cyclically Stretched Vascular Smooth Muscle Cells** SB<sup>3</sup>C2019-P107

Taylor Rothermel<sup>1</sup>, Patrick Alford<sup>1</sup>, <sup>1</sup>University of Minnesota - Twin Cities, United States

**Mechanics of The Bulbus Arteriosus In Zebrafish: Why The Shape of The P-D Loop Is Crucial** SB<sup>3</sup>C2019-P108

Matthias Van Impe<sup>1</sup>, Patrick Sips<sup>2</sup>, Julie De Backer<sup>2</sup>, Patrick Segers<sup>1</sup>, <sup>1</sup>Ghent University, Belgium, <sup>2</sup>Ghent University Hospital, Belgium

**The Effect of Leaflet Residual Strains On Aortic Valve Dynamics** SB<sup>3</sup>C2019-P109

Rana Zakerzadeh<sup>1</sup>, Ming-Chen Hsu<sup>2</sup>, Michael Sacks<sup>1</sup>, <sup>1</sup>University of Texas at Austin, United States, <sup>2</sup>Iowa State University, United States

**Effects of -80c Freezing On the Biomechanical Response of Tricuspid Valve Leaflets** SB<sup>3</sup>C2019-P110

Samuel Salinas<sup>1</sup>, Margaret Clark<sup>1</sup>, Rouzbeh Amini<sup>1</sup>, <sup>1</sup>The University of Akron, United States

**Role of Glycosaminoglycans In Biaxial Mechanical Behaviors of Porcine Atrioventricular Heart Valve Leaflets** SB<sup>3</sup>C2019-P111

Chung-Hao Lee<sup>1</sup>, Colton Ross<sup>1</sup>, Devin Laurence<sup>1</sup>, Lauren Evans<sup>1</sup>, Jacob Richardson<sup>1</sup>, Anju Babu<sup>1</sup>, Ean Beyer<sup>1</sup>, Yi Wu<sup>1</sup>, Gerhard Holzapfel<sup>2</sup>, Arshid Mir<sup>3</sup>, Harold Burkhart<sup>3</sup>, <sup>1</sup>The University of Oklahoma, United States, <sup>2</sup>Graz University of Technology, Austria, <sup>3</sup>The University of Oklahoma Health Sciences Center, United States

**State of The Art Simulation of The Early Stages of Bioprosthetic Heart Valve Fatigue** SB<sup>3</sup>C2019-P112

Will Zhang<sup>1</sup>, Rana Zakerzadeh<sup>2</sup>, Michael Sacks<sup>2</sup>, <sup>1</sup>University of Michigan, United States, <sup>2</sup>The University of Texas at Austin, United States

**Image-Based Simulation of The Mitral Valve Repair Surgery In Ischemic Mitral Regurgitation Patients** SB<sup>3</sup>C2019-P113

Amir Khalighi<sup>1</sup>, Bruno Rego<sup>1</sup>, Robert Gorman<sup>2</sup>, Joseph Gorman<sup>2</sup>, Michael Sacks<sup>1</sup>, <sup>1</sup>The University of Texas at Austin, United States, <sup>2</sup>University of Pennsylvania, United States

**A Non-Invasive Method To Quantify Aortic Valve Leaflet Deformation** SB<sup>3</sup>C2019-P114

Bruno Rego<sup>1</sup>, Samuel Potter<sup>2</sup>, Alison Pouch<sup>3</sup>, Robert Gorman<sup>3</sup>, Michael Sacks<sup>2</sup>, <sup>1</sup>University of Texas at Austin, United States, <sup>2</sup>University of Texas at Austin, United States, <sup>3</sup>University of Pennsylvania, United States

**Collagen Architecture, Cellularity, and Biaxial Mechanics of Ovine Tricuspid Valve Leaflets** SB<sup>3</sup>C2019-P115

William Meador<sup>1</sup>, Mrudang Mathur<sup>1</sup>, Marcin Malinowski<sup>2</sup>, Tomasz Jazwiec<sup>2</sup>, Tomasz Timek<sup>2</sup>, Manuel Rausch<sup>1</sup>, <sup>1</sup>The University of Texas at Austin, United States, <sup>2</sup>Spectrum Health, United States

**Quantification of Simultaneous Structure, Strain, and Stress Behaviors In Layered Soft Tissues** SB<sup>3</sup>C2019-P116

Samuel Potter<sup>1</sup>, Will Goth<sup>1</sup>, James Tunnell<sup>1</sup>, Michael Sacks<sup>1</sup>, <sup>1</sup>The University of Texas at Austin, United States

**The Role of Sclerostin In Calcific Aortic Valve Disease** SB<sup>3</sup>C2019-P117

J. Ethan Joll<sup>1</sup>, W. David Merryman<sup>1</sup>, <sup>1</sup>Vanderbilt University, United States

**A Spatial Mean Curvature Map of The Aortic Valve-Relevance To Calcification** SB<sup>3</sup>C2019-P118

Amanda Barreto<sup>1</sup>, Asad Mirza<sup>1</sup>, Sharan Ramaswamy<sup>1</sup>, <sup>1</sup>FIU-Biomedical Engineering Department, United States

## Posters - Solid Mechanics: Growth Remodeling and Repair

**Matching Material and Cellular Timescales Maximizes Cell Spreading On Viscoelastic Substrates** SB<sup>3</sup>C2019-P119

Ze Gong<sup>1</sup>, Spencer Szczesny<sup>2</sup>, Steven Caliri<sup>3</sup>, Elisabeth Charrier<sup>1</sup>, Ovijit Chaudhuri<sup>4</sup>, Xuan Cao<sup>1</sup>, Yuan Lin<sup>5</sup>, Robert Mauck<sup>1</sup>, Paul Janmey<sup>1</sup>, Jason Burdick<sup>1</sup>, Vivek Shenoy<sup>1</sup>, <sup>1</sup>University of Pennsylvania, United States, <sup>2</sup>The Pennsylvania State University, United States, <sup>3</sup>University of Virginia, United States, <sup>4</sup>Stanford University, United States, <sup>5</sup>University of Hong Kong, Hong Kong

**Extracellular Matrix Microstructure Modulates Myofibroblast Differentiation Within 3d Fibrous Microenvironments**  
In Vitro SB<sup>3</sup>C2019-P120

Daniel Matera<sup>1</sup>, Brendon Baker<sup>1</sup>, <sup>1</sup>University of Michigan, United States

**Architecture and Function of Chick Embryonic Heart Cells Are Mediated By Geometric Ecm Patterning Cues**  
SB<sup>3</sup>C2019-P121

Bernard Cook<sup>1</sup>, Patrick Alford<sup>1</sup>, <sup>1</sup>University of Minnesota, United States

**Three-Dimensional Ct Morphometric Image Analysis of The Clivus and Sphenoid Sinus In Chiari Malformation Type I** SB<sup>3</sup>C2019-P122

Blaise Simplicie Talla Nwotchouang<sup>1</sup>, Maggie Eppelheimer<sup>1</sup>, Paul Bishop<sup>2</sup>, Dipankar Biswas<sup>1</sup>, Janna Andronowski<sup>1</sup>, Jayapalli Bapuraj<sup>3</sup>, David Frim<sup>4</sup>, Rick Labuda<sup>5</sup>, Rouzbeh Amini<sup>1</sup>, Francis Loth<sup>1</sup>, <sup>1</sup>University of Akron, United States, <sup>2</sup>Cleveland Clinic, United States, <sup>3</sup>University of Michigan Health System, United States, <sup>4</sup>University of Chicago, United States, <sup>5</sup>Conquer Chiari, United States

**Controlled Release From Mechanically-Activated Microcapsules In Developing Tissue Microenvironments**  
SB<sup>3</sup>C2019-P123

Ana Peredo<sup>1</sup>, Yun Kee Jo<sup>1</sup>, Daeyeon Lee<sup>1</sup>, George Dodge<sup>1</sup>, Robert Mauck<sup>1</sup>, <sup>1</sup>University of Pennsylvania, United States

**Finite Element Modeling To Study Musculoskeletal Growth: A Comparison of Node and Element-Based Approaches** SB<sup>3</sup>C2019-P124

Danielle Howe<sup>1</sup>, Nikhil Dixit<sup>2</sup>, Katherine Saul<sup>2</sup>, Matthew Fisher<sup>1</sup>, <sup>1</sup>North Carolina State University and the University of North Carolina- Chapel Hill, United States, <sup>2</sup>North Carolina State University, United States

**Mitral Valve Leaflet Remodeling Following Myocardial Infarction** SB<sup>3</sup>C2019-P125

Bruno Rego<sup>1</sup>, Amir Khalighi<sup>1</sup>, Eric Lai<sup>2</sup>, Robert Gorman<sup>2</sup>, Joseph Gorman<sup>2</sup>, Michael Sacks<sup>1</sup>, <sup>1</sup>The University of Texas at Austin, United States, <sup>2</sup>University of Pennsylvania, United States

**A Machine Learning Material Model For Soft Tissue Remodeling** SB<sup>3</sup>C2019-P126

Wenbo Zhang<sup>1</sup>, Tan Bui-Thanh<sup>1</sup>, Michael Sacks<sup>1</sup>, <sup>1</sup>The University of Texas at Austin, United States

**Biomechanical Restoration Potential of Pentagalloyl Glucose After Arterial Extracellular Matrix Damage**  
SB<sup>3</sup>C2019-P127

Sourav Patnaik<sup>1</sup>, Narasimha Rao Pillalamarri<sup>1</sup>, Senol Piskin<sup>1</sup>, Mirunalini Thirugnanasambandam<sup>1</sup>, Vangelina Osteguin<sup>1</sup>, Gladys P. Escobar<sup>2</sup>, Eugene Sprague<sup>2</sup>, Ender A. Finol<sup>1</sup>, <sup>1</sup>University of Texas at San Antonio, United States, <sup>2</sup>University of Texas Health San Antonio, United States

**Low-Energy Mechanical Impacts To Articular Cartilage Increase At Least One Anabolic Protein In Chondrocytes**  
SB<sup>3</sup>C2019-P128

Stephany Santos<sup>1</sup>, Kelsey Richard<sup>1</sup>, Melanie C. Fisher<sup>2</sup>, Caroline N. Dealy<sup>2</sup>, David M. Pierce<sup>1</sup>, <sup>1</sup>University of Connecticut, United States, <sup>2</sup>University of Connecticut Health Center, United States

**Alpha Smooth Muscle Actin-Expressing Bone Marrow Progenitor Cells Contribute To Tunnel Integration Following Acl Reconstruction** SB<sup>3</sup>C2019-P129

Timur Kamalidinov<sup>1</sup>, Keitaro Fujino<sup>1</sup>, Yaping Ye<sup>1</sup>, Xi Jiang<sup>1</sup>, Snehal Shetye<sup>1</sup>, Ashley Rodriguez<sup>1</sup>, Miltiadis Zgonis<sup>1</sup>, Andrew Kuntz<sup>1</sup>, Nathaniel Dymant<sup>1</sup>, <sup>1</sup>University of Pennsylvania, United States

**In Silico Modeling of Soft Tissue Failure From Subfailure Damage To Complete Rupture** SB<sup>3</sup>C2019-P130

Ronald Fortunato<sup>1</sup>, Anne Robertson<sup>1</sup>, Chao Sang<sup>1</sup>, Spandan Maiti<sup>1</sup>, <sup>1</sup>University of Pittsburgh, United States

**Myofibroblast Activation In Synthetic Fibrous Matrices Composed of Dextran Vinyl Sulfone** SB<sup>3</sup>C2019-P131

Christopher Davidson<sup>1</sup>, Danica Jayco<sup>1</sup>, Daniel Matera<sup>1</sup>, William Wang<sup>1</sup>, Brendon Baker<sup>1</sup>, <sup>1</sup>University of Michigan, United States

**Interaction of Pentagalloyl Glucose With The Microenvironment of Macrophages SB<sup>3</sup>C2019-P132**

Sourav Patnaik<sup>1</sup>, Vangelina Osteguín<sup>1</sup>, Tina Rodgers<sup>1</sup>, Rohini Vishwanath<sup>1</sup>, Craig Goergen<sup>2</sup>, Dan Simionescu<sup>3</sup>, Gabriela Uribe<sup>1</sup>, Ender Finol<sup>1</sup>, <sup>1</sup>University of Texas at San Antonio, United States, <sup>2</sup>Purdue University, United States, <sup>3</sup>Clemson University, United States

**Posters - Cell & Tissue Engineering: Quantitative Micro/Nanodevices**

**Rapid Actuation and Tunable Control of Dna Machines SB<sup>3</sup>C2019-P133**

Alexander Marras<sup>1</sup>, Stephanie Lauback<sup>2</sup>, Ze Shi<sup>3</sup>, Gaurav Arya<sup>4</sup>, Ratnasingham Sooryakumar<sup>5</sup>, Carlos Castro<sup>5</sup>, <sup>1</sup>University of Chicago, United States, <sup>2</sup>Juniata College, United States, <sup>3</sup>University of California San Diego, United States, <sup>4</sup>Duke University, United States, <sup>5</sup>Ohio State University, United States

**High-Throughput Cell Mechanical Property Measurements From Creep Experiments In An Extensional Flow Microfluidic Device SB<sup>3</sup>C2019-P134**

Huda Irshad<sup>1</sup>, Safwa Ali<sup>1</sup>, Gwendolyn Cramer<sup>1</sup>, Jonathan Celli<sup>1</sup>, Joanna Dahl<sup>1</sup>, <sup>1</sup>University of Massachusetts Boston, United States

**Posters - Cell & Tissue Engineering: Cardiovascular**

**A Computational Approach For Optimal Design of Tissue Engineered Vascular Grafts SB<sup>3</sup>C2019-P135**

Jason Szafron<sup>1</sup>, Abhay Ramachandra<sup>1</sup>, Christopher Breuer<sup>2</sup>, Alison Marsden<sup>3</sup>, Jay Humphrey<sup>1</sup>, <sup>1</sup>Yale University, United States, <sup>2</sup>Nationwide Children's Hospital, United States, <sup>3</sup>Stanford University, United States

**Curling Angle Measurement of Lv Bi-Layered Surface Strip Reveals Residual Stress In The Epicardium SB<sup>3</sup>C2019-P136**

Xiaodan Shi<sup>1</sup>, Yue Liu<sup>2</sup>, Katherine Copeland<sup>1</sup>, Sara McMahan<sup>1</sup>, Song Zhang<sup>3</sup>, Ryan Butler<sup>3</sup>, Yi Hong<sup>1</sup>, Michael Cho<sup>4</sup>, Pietro Bajona<sup>5</sup>, Huajian Gao<sup>2</sup>, Jun Liao<sup>1</sup>, <sup>1</sup>University of Texas at Arlington, United States, <sup>2</sup>Brown University, United States, <sup>3</sup>Mississippi State University, United States, <sup>4</sup>University of Texas Arlington, United States, <sup>5</sup>University of Texas Southwestern Medical Center, United States

**Effects of Microgravity On 3d Bioprinted Constructs To Assess Cardiovascular Disorders SB<sup>3</sup>C2019-P137**

Likitha Somasekhar<sup>1</sup>, Prabhuti Kharel<sup>1</sup>, Kenia Nunes<sup>1</sup>, Paul Gatenholm<sup>2</sup>, Kunal Mitra<sup>1</sup>, <sup>1</sup>Florida Institute of Technology, United States, <sup>2</sup>Chalmers university of Technology, Sweden

**Patient Specific, In Vitro Studies of Pathologies Caused By Heart Disease Associated Lamin A/c Mutations SB<sup>3</sup>C2019-P138**

Mehrsa Mehrabi<sup>1</sup>, Richard Tran<sup>1</sup>, Halida Widyastuti<sup>1</sup>, Cecilia Nguyen<sup>1</sup>, Michael V. Zaragoza<sup>1</sup>, Anna Grosberg<sup>1</sup>, <sup>1</sup>University of California, Irvine, United States

**Adipose Stromal Cell Derived Extracellular Vesicles Induce Elastin and Collagen Deposition By Aortic Smooth Muscle Cells SB<sup>3</sup>C2019-P139**

Eoghan Cunnane<sup>1</sup>, Aneesh Ramaswamy<sup>1</sup>, David Vorp<sup>1</sup>, Justin Weinbaum<sup>1</sup>, <sup>1</sup>University of Pittsburgh, United States

**Posters - Cell & Tissue Engineering: Mechanobiology - a symposium in memory of Christopher R. Jacobs**

**Tissue-Engineered Intra-Arterial Barrier For Mechanobiology Studies SB<sup>3</sup>C2019-P140**

Sara Ben Saadon<sup>1</sup>, David Elad<sup>1</sup>, <sup>1</sup>Tel Aviv University, Israel

**The Role of Prestress In Calcification of Human Coronary Artery Smooth Muscle Cells In Vitro SB<sup>3</sup>C2019-P141**

Amirala Bakhshian Nik<sup>1</sup>, Daniela Medina<sup>1</sup>, Manuel Garcia Russo<sup>1</sup>, Walter Heatherly<sup>1</sup>, Joshua Daniel Hutcheson<sup>1</sup>, <sup>1</sup>Florida International University, United States

**Regulation of Nuclear Architecture, Mechanics and Nucleo-Cytoplasmic Shuttling of Epigenetic Factors By Cell Geometric Constraints** SB<sup>3</sup>C2019-P142

Farid Alisafaei<sup>1</sup>, Doorgesh Sharma Jokhun<sup>2</sup>, GV Shivashankar<sup>2</sup>, Vivek Shenoy<sup>1</sup>, <sup>1</sup>*University of Pennsylvania, United States*, <sup>2</sup>*National University of Singapore, Singapore*

**Computational Models of Endothelial Cell Biochemical Responses To Shear Stress** SB<sup>3</sup>C2019-P143

Jonathan Garcia<sup>1</sup>, Alisa Morss Clyne<sup>1</sup>, <sup>1</sup>*Drexel University, United States*

**Perlecan Deficiency Impairs The Intracellular Calcium Signaling In Mechanically Loaded Bone and Osteocytes** SB<sup>3</sup>C2019-P144

Shaopeng Pei<sup>1</sup>, Sucharitha Parthasarathy<sup>1</sup>, Ashutosh Parajuli<sup>1</sup>, Jerahme Martinez<sup>1</sup>, Mengxi Lv<sup>1</sup>, Sida Jiang<sup>1</sup>, Danielle Wu<sup>2</sup>, Shuo Wei<sup>1</sup>, X. Lucas Lu<sup>1</sup>, Mary C. Farach-Carson<sup>2</sup>, Catherine B. Kirn-Safran<sup>1</sup>, Liyun Wang<sup>1</sup>, <sup>1</sup>*University of Delaware, United States*, <sup>2</sup>*University of Texas Health Center, United States*

**A Modified Bioreactor Configuration To Study Effects of Low Intensity Pulsed Ultrasound Treatment** SB<sup>3</sup>C2019-P145

Abdolrasol Rahimi<sup>1</sup>, Zach Pittz<sup>1</sup>, Nicholas Weaver<sup>1</sup>, Natasha Case<sup>1</sup>, <sup>1</sup>*Saint Louis University, United States*

**Design and Computational Modeling of An Ultrasound Bioreactor For Stimulation of Cell-Seeded Scaffolds** SB<sup>3</sup>C2019-P146

Jacob Crapps<sup>1</sup>, Abdolrasol Rahimi<sup>1</sup>, Natasha Case<sup>1</sup>, <sup>1</sup>*Saint Louis University, United States*

**Pulsatile Electromagnetic Fields Regulate Bone Integrity Through Activation of Voltage Sensitive Calcium Channels** SB<sup>3</sup>C2019-P147

Abigail Dela Paz<sup>1</sup>, Case Gregory<sup>1</sup>, Randall Duncan<sup>1</sup>, Mark Mirotznik<sup>1</sup>, <sup>1</sup>*University of Delaware, United States*

**Posters - Cell & Tissue Engineering: Other**

**Creating The Storkel: A Water Occluding Device For Accidental Submersion With A Tracheostoma** SB<sup>3</sup>C2019-P148

Claire M. Chaisson<sup>1</sup>, Samantha K. Denning<sup>1</sup>, Kelli E. Grimes<sup>1</sup>, William J. Pelowski<sup>1</sup>, Michael A. Valteau<sup>1</sup>, Byron D. Erath<sup>1</sup>, <sup>1</sup>*Clarkson University, United States*

**Dynamic Tracking of Fluorescently Labeled Type I Collagen Molecules; Direct Quantification of Molecular Association With Native Fibrils** SB<sup>3</sup>C2019-P149

Seyed Mohammad Siadat<sup>1</sup>, Jeffrey Ruberti<sup>1</sup>, <sup>1</sup>*Northeastern University, United States*

**Mechanical Advances In Cardiopulmonary Resuscitation** SB<sup>3</sup>C2019-P150

Jeffrey Stransky<sup>1</sup>, Morgan Dean<sup>1</sup>, Thomas Merrill<sup>1</sup>, Jennifer Kadowec<sup>1</sup>, <sup>1</sup>*Rowan University, United States*



## 9.2 Poster Session II

Thursday, June 27 12:45PM - 2:15PM

## Posters - Biotransport

**Thermal Analysis of Partial Vitrification With Application To Large-Size Cryopreservation** SB<sup>3</sup>C2019-P151Purva Joshi<sup>1</sup>, Yoed Rabin<sup>1</sup>, <sup>1</sup>*Carnegie Mellon University, United States***Point-of-Care Diagnosis of Respiratory Syncytial Virus By Digital Nanobubble Detection** SB<sup>3</sup>C2019-P152Yanling Liu<sup>1</sup>, Varsha Godakhindi<sup>1</sup>, Ruth Levitz<sup>2</sup>, Jeffrey Kahn<sup>2</sup>, Zhenpeng Qin<sup>1</sup>, <sup>1</sup>*University of Texas at Dallas, United States*, <sup>2</sup>*University of Texas Southwestern Medical Center, United States***Safe Duration of A Person Soaking Inside A Hot Tub: Theoretical Prediction of Temperature Elevations In Human Bodies Using A Whole Body Heat Transfer Model** SB<sup>3</sup>C2019-P153Myo Min Zaw<sup>1</sup>, Manpreet Singh<sup>1</sup>, Ronghui Ma<sup>1</sup>, Liang Zhu<sup>1</sup>, <sup>1</sup>*University of Maryland Baltimore County, United States***Creating A Distinct Capture Zone In Microfluidic Flow Greatly Enhances The Throughput and Efficiency of Cancer Detection** SB<sup>3</sup>C2019-P154Jiangsheng Xu<sup>1</sup>, Xiaoming He<sup>1</sup>, <sup>1</sup>*University of Maryland, United States***Fundamental Aspects of Paper-Based Microchip Electrophoresis Ph Gradient** SB<sup>3</sup>C2019-P155Muhammad Noman Hasan<sup>1</sup>, Ran An<sup>1</sup>, Asya Akkus<sup>1</sup>, Derya Akkaynak<sup>2</sup>, Adrienne Minerick<sup>3</sup>, Umut Gurkan<sup>1</sup>, <sup>1</sup>*Case Western Reserve University, United States*, <sup>2</sup>*Princeton University, United States*, <sup>3</sup>*Michigan Technological University, United States***Robustness of Convolutional Neural Networks For Malaria Parasite Identification In Thin Blood Smear Images With Adversarial Image Noise** SB<sup>3</sup>C2019-P156Bill Sun<sup>1</sup>, Liang Liang<sup>2</sup>, <sup>1</sup>*Walton High School, United States*, <sup>2</sup>*Department of Computer Science at University of Miami, United States***Towards Patient Specific Vascular Navigation of Therapeutics** SB<sup>3</sup>C2019-P157Luke Puller<sup>1</sup>, Matthew Charles<sup>1</sup>, Darien Perez<sup>1</sup>, Scott Anderson<sup>1</sup>, Anilchandra Attaluri<sup>1</sup>, <sup>1</sup>*The Pennsylvania State University - Harrisburg, United States***Theoretical Evaluation of Temperature Elevation, Thermal Damage, Tumor Porosity Enhancement, and Magnetic Nanoparticle Migration In Tumors During Local Heating** SB<sup>3</sup>C2019-P158Manpreet Singh<sup>1</sup>, Ronghui Ma<sup>1</sup>, Liang Zhu<sup>1</sup>, <sup>1</sup>*University of Maryland Baltimore County, United States***Aloe Alginate Hydrogels For Cervical Cancer Treatment: Antioxidant and Drug Release Activity** SB<sup>3</sup>C2019-P159Sierra McConnell<sup>1</sup>, Patrick Charron<sup>1</sup>, Rachael Oldinski<sup>1</sup>, <sup>1</sup>*University of Vermont, United States***Modelling Lymph Propulsion In A Series of Pumping Lymphangions** SB<sup>3</sup>C2019-P160Ghazal Adeli Koudehi<sup>1</sup>, Matthias Van Impe<sup>1</sup>, Carlos Alejandro Silvera Delgado<sup>1</sup>, Charlotte Debbaut<sup>1</sup>, Christophe Casteleyn<sup>1</sup>, Pieter Cornillie<sup>1</sup>, Patrick Segers<sup>1</sup>, <sup>1</sup>*Ghent University, Belgium***A 2d Axisymmetric Computational Model For The Study of Mass Transport Into Lymphatic Capillaries and Pre-Collector Vessels** SB<sup>3</sup>C2019-P161Carlos Alejandro Silvera Delgado<sup>1</sup>, Ghazal Adeli Koudehi<sup>1</sup>, Matthias Van Impe<sup>1</sup>, Charlotte Debbaut<sup>1</sup>, Patrick Segers<sup>1</sup>, <sup>1</sup>*Ghent University, Belgium***Microfluidic Assessment of Red Blood Cell Deformability and Microvascular Occlusion Risk In Malaria and Sickle Cell Disease** SB<sup>3</sup>C2019-P162Yuncheng Man<sup>1</sup>, Erdem Kucukal<sup>1</sup>, Quentin Watson<sup>1</sup>, Jurgen Bosch<sup>1</sup>, Jane Little<sup>1</sup>, Peter Zimmerman<sup>1</sup>, Umut Gurkan<sup>1</sup>, <sup>1</sup>*Case Western Reserve University, United States*

**Microfluidic Assessment of Red Blood Cell Detachment In Simulated Microvascular Flow** SB<sup>3</sup>C2019-P163

Utku Goreke<sup>1</sup>, Shamreen Iram<sup>1</sup>, Gundeep Singh<sup>1</sup>, Jane A Little<sup>1</sup>, Michael Hinczewski<sup>1</sup>, Umut A Gurkan<sup>1</sup>, <sup>1</sup>*Case Western Reserve University, United States*

**Effects of Leaky Tumor Vasculature On Tissue Stress and Porosity In A Biphasic Model of Brain Glioma** SB<sup>3</sup>C2019-P164

Julian Rey<sup>1</sup>, Malisa Sarntinoranont<sup>1</sup>, James Ewing<sup>2</sup>, <sup>1</sup>*Mechanical and Aerospace Engineering, University of Florida, Gainesville, FL, United States*, <sup>2</sup>*Henry Ford Health System, Detroit, Michigan, United States*

**Modelling Advection-Based Nanoparticle Drug Delivery To The Left Ventricle Using A Splitting Method For Advection-Diffusion Kinetics** SB<sup>3</sup>C2019-P165

Alexandra Diem<sup>1</sup>, Kristian Valen-Sendstad<sup>1</sup>, <sup>1</sup>*Simula Research Laboratory, Norway*

**Posters - Design Dynamics & Rehabilitation**

**Comparison of Principal Component Analysis and Non-Negative Matrix Factorization In Prediction of Unmeasured Muscle Excitations** SB<sup>3</sup>C2019-P166

Di Ao<sup>1</sup>, Mohammad Shourijeh<sup>1</sup>, Carolyn Patten<sup>2</sup>, Benjamin Fregly<sup>1</sup>, <sup>1</sup>*Rice University, United States*, <sup>2</sup>*UC Davis, United States*

**Variance In Swimmer Symmetry Due To Effort and Fatigue** SB<sup>3</sup>C2019-P167

Casey Main<sup>1</sup>, Craig Goehler<sup>1</sup>, <sup>1</sup>*Valparaiso University, United States*

**Joint Stiffness Modulation of Gait Variability In A Stroke** SB<sup>3</sup>C2019-P168

Geng Li<sup>1</sup>, Di Ao<sup>1</sup>, Mohammad Shourijeh<sup>1</sup>, Marleny Arones<sup>1</sup>, Carolyn Patten<sup>2</sup>, Benjamin Fregly<sup>1</sup>, <sup>1</sup>*Rice University, United States*, <sup>2</sup>*UC Davis, United States*

**Analytical Calculation of Musculoskeletal Joint Stiffness** SB<sup>3</sup>C2019-P169

Mohammad S. Shourijeh<sup>1</sup>, Di Ao<sup>1</sup>, Carolyn Patten<sup>2</sup>, Benjamin J. Fregly<sup>1</sup>, <sup>1</sup>*Rice University, United States*, <sup>2</sup>*UC Davis, United States*

**Identifying Postural Instability Using Topological Data Analysis** SB<sup>3</sup>C2019-P170

Kyle Siegrist<sup>1</sup>, James Chagdes<sup>1</sup>, Amit Shukla<sup>1</sup>, Ryan Kramer<sup>2</sup>, Michael Cinelli<sup>3</sup>, <sup>1</sup>*Miami University, United States*, <sup>2</sup>*Air Force Research Laboratory, United States*, <sup>3</sup>*Wilfrid Laurier University, Canada*

**A Novel Strategy For Concurrent Reduction of Fluid Drag and Protein Adsorption For Cardio-vascular Medical Devices.** SB<sup>3</sup>C2019-P171

Cheng Yi-Chih<sup>1</sup>, Yap Choon Hwai<sup>1</sup>, <sup>1</sup>*National University of Singapore, Taiwan*

**Integrated Switchable Ventricular Assist Device For Pediatric Patients** SB<sup>3</sup>C2019-P172

Harut Sarkisyan<sup>1</sup>, Randy Stevens<sup>2</sup>, Amy Throckmorton<sup>1</sup>, <sup>1</sup>*Biomedical Engineering, Drexel University, United States*, <sup>2</sup>*St. Christopher's Hospital for Children, United States*

**Experimental Modeling of Coronary Intervention: Towards Computational Simulation** SB<sup>3</sup>C2019-P173

Maxwell Bean<sup>1</sup>, David Jiang<sup>2</sup>, Sam Stephens<sup>1</sup>, Megan Laughlin<sup>1</sup>, Hanna Jensen<sup>1</sup>, Barry Uretsky<sup>3</sup>, Lucas Timmins<sup>2</sup>, Morten Jensen<sup>1</sup>, <sup>1</sup>*University of Arkansas, United States*, <sup>2</sup>*University of Utah, United States*, <sup>3</sup>*University of Arkansas for Medical Sciences, United States*

**Agonist / Antagonist Control Combining Mixed Sensitivity Design and Iterative Learning** SB<sup>3</sup>C2019-P174

Patrick Schimoler<sup>1</sup>, Jeffrey Viperman<sup>2</sup>, Mark Carl Miller<sup>1</sup>, <sup>1</sup>*Allegheny General Hospital, United States*, <sup>2</sup>*University of Pittsburgh, United States*

**Analysis of A Poly(ethylene Glycol) Diacrylate (PEGDA) Optical Sensor-Based Whispering Gallery Mode Shift Subjected To Shock Wave Impact SB<sup>3</sup>C2019-P175**

Ling Zhang<sup>1</sup>, Maurizio Manzo<sup>2</sup>, Sarah Bentil<sup>1</sup>, <sup>1</sup>*Iowa State University, United States*, <sup>2</sup>*University of North Texas, United States*

**Exercise Therapy Affects Glenohumeral Joint Stability In Patients With Isolated Supraspinatus Tears SB<sup>3</sup>C2019-P176**

Luke Mattar<sup>1</sup>, Camille Johnson<sup>1</sup>, Tom Gale<sup>1</sup>, Adam Popchak<sup>1</sup>, James Irrgang<sup>1</sup>, William Anderst<sup>1</sup>, Volker Musahl<sup>1</sup>, Richard Debski<sup>1</sup>, <sup>1</sup>*University of Pittsburgh, United States*

**Biceps Voluntary Activation: Method To Calculate Pre-Stimulus Moment Affects Magnitude But Not Reproducibility SB<sup>3</sup>C2019-P177**

Thibault Roumengous<sup>1</sup>, Paul Howell<sup>1</sup>, Carrie Peterson<sup>1</sup>, <sup>1</sup>*Virginia Commonwealth University, United States*

## Posters - Education

**Effectiveness of An Extensively Active and Authentic Learning Environment In An Undergraduate Biomedical Engineering Module A Case Study In A South-East Asian Cohort SB<sup>3</sup>C2019-P178**

Vivek Vasudevan<sup>1</sup>, Alberto Corrias<sup>1</sup>, Martin Buist<sup>1</sup>, Hwa-Liang Leo<sup>1</sup>, Choon-Hwai Yap<sup>1</sup>, <sup>1</sup>*National University of Singapore, Singapore*

**Injury Prevention Via Computer Modeling of Stud Traction SB<sup>3</sup>C2019-P179**

Justin Rittenhouse<sup>1</sup>, Peter Gustafson<sup>1</sup>, <sup>1</sup>*Western Michigan University, United States*

**An Ecg Analysis Determining The Impact of Mother'S Metabolic Equivalent Value In Pregnancy On Infant Heart Rate Variability SB<sup>3</sup>C2019-P180**

Alexandra Williams<sup>1</sup>, Colby Jolly<sup>1</sup>, Christy Isler<sup>1</sup>, Kelley Haven<sup>1</sup>, Edward Newton<sup>1</sup>, Linda May<sup>1</sup>, Stephanie George<sup>1</sup>, <sup>1</sup>*Ecu, United States*

**For Your Information: Student Evaluations of Teaching Are Biased Against Women and Faculty of Color SB<sup>3</sup>C2019-P181**

Naomi Chesler<sup>1</sup>, Dante Fratta<sup>2</sup>, Elizabeth Harris<sup>1</sup>, Wayne Pferdehirt<sup>1</sup>, Heidi Ploeg<sup>3</sup>, Barry Vanveen<sup>1</sup>, <sup>1</sup>*University of Wisconsin - Madison, United States*, <sup>2</sup>*University of Wisconsin-Madison, United States*, <sup>3</sup>*Queens University, Canada*

**Incorporating National Biomechanics Day Into Biomechanical Engineering Courses SB<sup>3</sup>C2019-P182**

Sara Wilson<sup>1</sup>, <sup>1</sup>*University of Kansas, United States*

## Posters - Fluids: Cardiovascular Fluid Mechanics

**Developing The Components of A Multiscale Computational Platform In The Design of A Geometrically Tunable Blood Shunt For Norwood Recipients SB<sup>3</sup>C2019-P183**

Ellen Garven<sup>1</sup>, Kara Spiller<sup>1</sup>, Randy Stevens<sup>2</sup>, Amy Throckmorton<sup>1</sup>, <sup>1</sup>*Drexel University, United States*, <sup>2</sup>*St. Christopher's Hospital for Children, United States*

**Quantifying Hemodynamics In Hypoplastic Left Heart Syndrome SB<sup>3</sup>C2019-P184**

Banafsheh Zebhi<sup>1</sup>, Hadi Wiputra<sup>2</sup>, Lisa Howley<sup>3</sup>, Bettina Cuneo<sup>3</sup>, Dawn Park<sup>3</sup>, Hilary Hoffman<sup>3</sup>, Lisa Gilbert<sup>3</sup>, Choon Hwai Yap<sup>2</sup>, David Bark Jr<sup>1</sup>, <sup>1</sup>*Colorado State University, United States*, <sup>2</sup>*National University of Singapore, Singapore*, <sup>3</sup>*Children's Hospital Colorado, United States*

**On The Quantification of Hemodynamics In The Ascending Aorta To Predict Pathogenesis In Bicuspid Aortic Valve Disease SB<sup>3</sup>C2019-P185**

Tejas Canchi<sup>1</sup>, Sargon A Gabriel<sup>1</sup>, Mustafa Gok<sup>1</sup>, David F Fletcher<sup>2</sup>, Stuart Michael Grieve<sup>1</sup>, <sup>1</sup>*The Heart Research Institute, Australia*, <sup>2</sup>*The University of Sydney, Australia*

**Multiple Mitraclips: The Balancing Act Between Pressure Gradient and Regurgitation** SB<sup>3</sup>C2019-P186

Shelley Gooden<sup>1</sup>, Hoda Hatoum<sup>1</sup>, Konstantinos Boudoulas<sup>1</sup>, Lakshmi Prasad Dasi<sup>1</sup>, <sup>1</sup>*The Ohio State University, United States*

**Basilica-Type Leaflet Laceration To Reduce Risk of Thrombosis In Transcatheter Aortic Valve Replacement** SB<sup>3</sup>C2019-P187

Hoda Hatoum<sup>1</sup>, Pablo Maureira<sup>2</sup>, Scott Lilly<sup>1</sup>, Lakshmi Prasad Dasi<sup>1</sup>, <sup>1</sup>*The Ohio State University, United States*, <sup>2</sup>*Centre Hospitalier Universitaire de Nancy, France*

**Early Diagnosis of Reduced Leaflet Mobility After Transcatheter Aortic Valve Replacement** SB<sup>3</sup>C2019-P188

Hoda Hatoum<sup>1</sup>, Jung-Hee Seo<sup>2</sup>, Shantanu Bailoor<sup>2</sup>, Scott Lilly<sup>1</sup>, Rajat Mittal<sup>2</sup>, Lakshmi Prasad Dasi<sup>1</sup>, <sup>1</sup>*The Ohio State University, United States*, <sup>2</sup>*Johns Hopkins University, United States*

**Hemodynamics, In Addition To Morphology, Predicts Long-Term Outcome of Intracranial Aneurysms Treated With Flow Diverters** SB<sup>3</sup>C2019-P189

Nikhil Paliwal<sup>1</sup>, Jason Davies<sup>1</sup>, Adnan Siddiqui<sup>1</sup>, Hui Meng<sup>1</sup>, <sup>1</sup>*University at Buffalo, United States*

**Correlation of Computational Instantaneous Wave-Free Ratio With Fractional Flow Reserve In The Case of Multiple Intermediate Coronary Artery Stenosis In A Left Main Bifurcation** SB<sup>3</sup>C2019-P190

Arash GhorbanniaHassankiadeh<sup>1</sup>, David S. Marks<sup>2</sup>, John F. LaDisa, Jr.<sup>1</sup>, <sup>1</sup>*Marquette University and Medical College of Wisconsin, United States*, <sup>2</sup>*Medical College of Wisconsin, United States*

**The Effects of Oscillatory Shear Regulation On Paracrine Signaling Between Vascular Endothelial Cells and Vascular Smooth Muscle Cells** SB<sup>3</sup>C2019-P191

Chia-Pei Hsu<sup>1</sup>, Alexandra Tchir<sup>1</sup>, Joshua Hutcheson<sup>1</sup>, Sharan Ramaswamy<sup>1</sup>, <sup>1</sup>*Florida International University, United States*

**Non-Linear Cd31 Expression In Vascular Endothelial Cells In Response To Increasing Oscillatory Flow Conditions** SB<sup>3</sup>C2019-P192

Alexandra Tchir<sup>1</sup>, Chia-Pei Hsu<sup>1</sup>, Sharan Ramaswamy<sup>1</sup>, <sup>1</sup>*Florida International University, United States*

**Intra-Valvular Pressure Dynamics and Valve Specific Pressure Recovery In Transcatheter Aortic Valve Replacement: Implication On Validity of Echo Derived Gradient** SB<sup>3</sup>C2019-P193

Hoda Hatoum<sup>1</sup>, Maurice Alston<sup>1</sup>, David Orsinelli<sup>1</sup>, Gregory Rushing<sup>1</sup>, Susan O'Neil<sup>1</sup>, Nancy Matre<sup>1</sup>, Konstantinos Boudoulas<sup>1</sup>, Scott Lilly<sup>1</sup>, Lakshmi Prasad Dasi<sup>1</sup>, <sup>1</sup>*The Ohio State University, United States*

**Design of A Cost-Effective Cardiac Flow Loop For Testing Tavr Placement In Patient-Specific Anatomy** SB<sup>3</sup>C2019-P194

Christine Buffinton<sup>1</sup>, Benjamin Conser<sup>1</sup>, M. Laura Beninati<sup>1</sup>, Shikhar Agarwal<sup>2</sup>, <sup>1</sup>*Bucknell University, United States*, <sup>2</sup>*Geisinger Medical Center, United States*

**Effect of Leaflet Opening Geometry On Turbulent Characteristics For Prosthetic Aortic Valve Applications** SB<sup>3</sup>C2019-P195

Megan Heitkemper<sup>1</sup>, Hoda Hatoum<sup>1</sup>, Jun Kim<sup>1</sup>, Lakshmi Prasad Dasi<sup>1</sup>, <sup>1</sup>*The Ohio State University, United States*

**In Vitro Forward Flow Performance of The Konect Resilia Aortic Valved Conduit** SB<sup>3</sup>C2019-P196

Vahid Sadri<sup>1</sup>, Immanuel David Madukauwa-David<sup>1</sup>, Ajit Yoganathan<sup>1</sup>, <sup>1</sup>*Georgia Institute of Technology, United States*

## Posters - Fluids: Respiratory and Other Fluid Mechanics

**Autonomous Pumping In A Physical Model of A Multi-Lymphangion System** SB<sup>3</sup>C2019-P197

John Montani<sup>1</sup>, Luke Riexinger<sup>1</sup>, Lance Munn<sup>2</sup>, James Baish<sup>1</sup>, <sup>1</sup>*Bucknell University, United States*, <sup>2</sup>*Harvard Medical School, United States*

**Culture of Lymphatic Endothelial Cells In A Custom Bioreactor For Studies Combining Stretching and Fluid Shear Stress** SB<sup>3</sup>C2019-P198

Caleb Davis<sup>1</sup>, Walter Cromer<sup>2</sup>, David Zawieja<sup>2</sup>, Michael Moreno<sup>1</sup>, <sup>1</sup>Texas A&M University, United States, <sup>2</sup>Texas A&M Health Science Center, United States

**In Vitro Anthropomorphic Model of The Cerebrospinal Fluid System: Application To Subarachnoid Hemorrhage Filtration** SB<sup>3</sup>C2019-P199

Lucas Sass<sup>1</sup>, Mohammadreza Khani<sup>1</sup>, Gabryel Conley Natividad<sup>1</sup>, Elliott Marsden<sup>1</sup>, Shavaine Byass<sup>1</sup>, Omolola Bangudu<sup>1</sup>, Aaron McCabe<sup>2</sup>, Laura Zitella Verbick<sup>2</sup>, Shivanand Lad<sup>3</sup>, Bryn Martin<sup>1</sup>, <sup>1</sup>University of Idaho, United States, <sup>2</sup>Minnetronix Neuro, Inc., United States, <sup>3</sup>Duke University, United States

**Impact of Cerebrospinal Fluid Filtration On Subarachnoid Hemorrhage Clearance: A Computational Fluid Dynamics Study** SB<sup>3</sup>C2019-P200

Mohammadreza Khani<sup>1</sup>, Lucas Sass<sup>1</sup>, M. Keith Sharp<sup>2</sup>, Aaron McCabe<sup>3</sup>, Laura Zitella Verbick<sup>3</sup>, Shivanand Lad<sup>4</sup>, Bryn Martin<sup>1</sup>, <sup>1</sup>University of Idaho, United States, <sup>2</sup>University of Louisville, United States, <sup>3</sup>Minnetronix Neuro, Inc., United States, <sup>4</sup>Duke University School of Medicine, United States

**Towards Physiologically-Relevant Vocal Fold Models For Voiced-Speech Investigations** SB<sup>3</sup>C2019-P201

Mohsen Motie-Shirazi<sup>1</sup>, Natalie Jagelski<sup>2</sup>, Byron Erath<sup>1</sup>, <sup>1</sup>Clarkson University, United States, <sup>2</sup>Clarkson University, United States

**Computational Methodology To Estimate Resistance To Cerebrospinal Fluid Motion In The Spinal Canal For Chiari Patients With Specific and Nonspecific Symptoms** SB<sup>3</sup>C2019-P202

Alaaddin Ibrahimy<sup>1</sup>, Rafeeqe Bhadelia<sup>2</sup>, Abraham Bezuidenhout<sup>2</sup>, Francis Loth<sup>1</sup>, <sup>1</sup>The University of Akron, United States, <sup>2</sup>Beth Israel Deaconess Medical Center, United States

**Multiphase Fluid Dynamics of Shear-Thinning Droplets In A Microfluidic Flow-Focusing Device** SB<sup>3</sup>C2019-P203

Ali Bozorgnezhad<sup>1</sup>, Jason Gleghorn<sup>1</sup>, <sup>1</sup>University of Delaware, United States

## Posters - Solid Mechanics: Injury

**Fracture Patterns In Concentrated 4-Point Bending of The Ovine Femora: The Effects of Age and Rate of Loading** SB<sup>3</sup>C2019-P204

Patrick Vaughan<sup>1</sup>, Feng Wei<sup>1</sup>, Roger Haut<sup>1</sup>, <sup>1</sup>Michigan State University, United States

**The Importance of Skull Morphology In Remote Blunt Impact Induced Fracture Initiation** SB<sup>3</sup>C2019-P205

Paul Snyder<sup>1</sup>, Steven Rundell<sup>2</sup>, Todd Fenton<sup>1</sup>, Roger Haut<sup>1</sup>, Feng Wei<sup>1</sup>, <sup>1</sup>Michigan State University, United States, <sup>2</sup>Explico Engineering Company, United States

**Subject-Specific Madymo Analysis of A Low Speed Rear-End Collision** SB<sup>3</sup>C2019-P206

David Sproule<sup>1</sup>, Stephanie Rossman<sup>1</sup>, Paul Snyder<sup>1</sup>, Keith Button<sup>1</sup>, Brian Weaver<sup>1</sup>, Steve Rundell<sup>1</sup>, <sup>1</sup>Explico Engineering, United States

**Development of A Portable Suction Device For Combat Medics** SB<sup>3</sup>C2019-P207

Forhad Akhter<sup>1</sup>, Austin Schoppe<sup>1</sup>, Omar Navarro<sup>1</sup>, Christopher Carroll<sup>1</sup>, Priya Jain<sup>1</sup>, Ricardo Pescador<sup>1</sup>, Robert De Lorenzo<sup>2</sup>, Bruce D. Adams<sup>2</sup>, Yusheng Feng<sup>1</sup>, R. Lyle Hood<sup>1</sup>, <sup>1</sup>University of Texas at San Antonio, United States, <sup>2</sup>University of Texas Health Science Center at San Antonio, United States

**Finite Element Model of Neonatal Brachial Plexus and Spinal Cord** SB<sup>3</sup>C2019-P208

Anita Singh<sup>1</sup>, Christian D'Andrea<sup>2</sup>, Sriram Balasubramanian<sup>2</sup>, <sup>1</sup>Widener Univ, United States, <sup>2</sup>Drexel Univ, United States

**Development of Visual Analysis Tracking Method For Use In Conjunction With Novel Animal Model of Mtb** SB<sup>3</sup>C2019-P209

Allison Gleason<sup>1</sup>, Lisa Pruitt<sup>1</sup>, Daniela Kaufer<sup>1</sup>, Ellen Parker<sup>2</sup>, <sup>1</sup>University of California - Berkeley, United States, <sup>2</sup>Dalhousie University, Canada

**Biomechanical Response of The Mandible To Blunt Impact and Corresponding Biofidelity of The Focus Headform**  
SB<sup>3</sup>C2019-P210

Charles Weisenbach<sup>1</sup>, Jodie Gomez<sup>1</sup>, Andrea Dargie<sup>1</sup>, Ray Daniel<sup>1</sup>, Valeta Chancey<sup>2</sup>, Frederick Brozoski<sup>1</sup>, <sup>1</sup>*U.S. Army Aeromedical Research Laboratory, United States*, <sup>2</sup>*U.S. Army Aeromedical Research Laboratory, United States*

**Converting The Worcester Head Injury Model From Abaqus To Ls-Dyna** SB<sup>3</sup>C2019-P211

Kianoosh Ghazi<sup>1</sup>, Wei Zhao<sup>1</sup>, Songbai Ji<sup>1</sup>, <sup>1</sup>*Worcester Polytechnic Institute, United States*

**Quasi-Linear Viscoelastic Fitting of Thoracic Tissues and Ballistics Gel For Modeling Behind Armor Blunt Trauma**  
SB<sup>3</sup>C2019-P212

Madelyn Eaton<sup>1</sup>, Robert Salzar<sup>1</sup>, <sup>1</sup>*University of Virginia, United States*

**Inhibiting Spinal Phospholipase A2 Prevents Pain and Modifies Spinal Neuron Activity & Glutamate Signaling Early After Nerve Root Compression** SB<sup>3</sup>C2019-P213

Julia Quindlen-Hotek<sup>1</sup>, Sonia Kartha<sup>1</sup>, Prabesh Ghimire<sup>1</sup>, Beth Winkelstein<sup>1</sup>, <sup>1</sup>*University of Pennsylvania, United States*

**Viscoelastic Response of Shock Wave Impacted Brain Tissue** SB<sup>3</sup>C2019-P214

Anastacia McCarty<sup>1</sup>, Ling Zhang<sup>1</sup>, Sarah Hansen<sup>1</sup>, William Jackson<sup>1</sup>, Sarah Bentil<sup>1</sup>, <sup>1</sup>*Iowa State University, United States*

**Effects of Excessive Impact On Bone Conduction In Contact Sports** SB<sup>3</sup>C2019-P215

Shinji Hamanishi<sup>1</sup>, Namkeun Kim<sup>2</sup>, Seongho Mo<sup>2</sup>, Takashi Watanabe<sup>1</sup>, Yoshihiro Aoki<sup>1</sup>, <sup>1</sup>*Sendai National College of Technology, Japan*, <sup>2</sup>*Incheon National University, South Korea*

**Properties of The Six Layers of The Gray Matter** SB<sup>3</sup>C2019-P216

Arpad Bakonyi<sup>1</sup>, Alan Fajtelewicz<sup>2</sup>, Siavash Hashemi<sup>2</sup>, Ali Sadegh<sup>2</sup>, <sup>1</sup>*University of Applied Sciences Technikum Vienna, Austria*, <sup>2</sup>*The City College of the City Univ. of New York, United States*

**Helmeted Head-Neck Kinematics With Localized Impacts and Implications For Brain Injury Metrics** SB<sup>3</sup>C2019-P217

Narayan Yoganandan<sup>1</sup>, John Humm<sup>1</sup>, Mark Meyer<sup>1</sup>, Frank Pintar<sup>1</sup>, Tyler Rooks<sup>2</sup>, Frederick Brozoski<sup>2</sup>, Joseph McEntire<sup>2</sup>, Valeta Chancey<sup>2</sup>, <sup>1</sup>*Medical College of Wisconsin, United States*, <sup>2</sup>*Usaarl, United States*

**Investigate The Variations of The Head Impact Response In A Rodent Head Impact Acceleration Model By Finite Element Modeling** SB<sup>3</sup>C2019-P218

Runzhou Zhou<sup>1</sup>, Liying Zhang<sup>1</sup>, <sup>1</sup>*Wayne State University, United States*

**Injury Risk Curves Using A Novel (bayesian) Techinque To Describe Human Tolerance In Impact Biomechanics**  
SB<sup>3</sup>C2019-P219

Nicholas DeVogel<sup>1</sup>, Anjishnu Banerjee<sup>1</sup>, Narayan Yoganandan<sup>1</sup>, <sup>1</sup>*Medical College of Wisconsin, United States*

**Designing An Impact Pendulum To Test Different Concussion Prevention Helmet Aecessories** SB<sup>3</sup>C2019-P220

Farryl Groder<sup>1</sup>, Efe Ozkaya<sup>1</sup>, Luca Conetta<sup>2</sup>, Mehmet Kurt<sup>1</sup>, <sup>1</sup>*Stevens Institute of Technology, United States*, <sup>2</sup>*The Packer Collegiate Institute, United States*

**Head Impact Characterization In Men'S and Women'S Collegiate Rugby** SB<sup>3</sup>C2019-P221

Emily Kieffer<sup>1</sup>, Grace Pierce<sup>1</sup>, Chase Vaillancourt<sup>1</sup>, Steven Rowson<sup>1</sup>, <sup>1</sup>*Virginia Tech, United States*

**History Dependent Damage Modelling For Axonal Fiber Tracts of The Brain** SB<sup>3</sup>C2019-P222

Ritika Menghani<sup>1</sup>, Ouniol Aklilu<sup>1</sup>, Reuben Kraft<sup>1</sup>, <sup>1</sup>*The Pennsylvania State University, United States*

**Chestband-Based Injury Metrics In Far-Side Impacts** SB<sup>3</sup>C2019-P223

Yuvaraj Purushothaman<sup>1</sup>, John Humm<sup>2</sup>, Hans Hauschild<sup>2</sup>, Klaus Driesslein<sup>2</sup>, Frank Pintar<sup>2</sup>, Narayan Yoganandan<sup>2</sup>, <sup>1</sup>*Medical College Of Wisconsin, United States*, <sup>2</sup>*Medical College of Wisconsin, United States*

**Application of Six-Year-Old Child Human Body Finite Element Models With Accurate Anatomical Characteristics For Understanding The Injury Mechanisms** SB<sup>3</sup>C2019-P224

Haiyan Li<sup>1</sup>, Yongqiang Huang<sup>1</sup>, Wenle Lv<sup>1</sup>, Shihai Cui<sup>1</sup>, Lijuan He<sup>1</sup>, Shijie Ruan<sup>1</sup>, Chunxiang Wang<sup>2</sup>, <sup>1</sup>*International Joint Research Centre of modern automobile safety technology, Tianjin University of Science and Technology, China*, <sup>2</sup>*Tianjin Children Hospital, China*

**Effect of Microstructural Variation In The Biomechanics of Oligodendrocyte-Neuron Co-Cultures** SB<sup>3</sup>C2019-P225

Zeynep M. Suar<sup>1</sup>, Mateusz Urbanski<sup>2</sup>, Gloria Fabris<sup>1</sup>, Carmen V. Melendez-Vasquez<sup>2</sup>, Mehmet Kurt<sup>1</sup>, <sup>1</sup>*Stevens Institute of Technology, United States*, <sup>2</sup>*Hunter College, United States*

**An Atlas-Based Finite Element Model of Mouse Brain For Controlled Cortical Impact** SB<sup>3</sup>C2019-P226

Changxin Lai<sup>1</sup>, Suhao Qiu<sup>1</sup>, Yuan Feng<sup>1</sup>, <sup>1</sup>*Shanghai Jiao Tong University, China*

**Biomechanical Characterization of Ovine Pia Arachnoid Complex** SB<sup>3</sup>C2019-P227

Gabryel Conley Natividad<sup>1</sup>, Sophia Theodossiou<sup>1</sup>, Nathan Schiele<sup>1</sup>, Gordon Murdoch<sup>2</sup>, Goutham Burla<sup>1</sup>, Gabriel Potirniche<sup>3</sup>, Bryn Martin<sup>1</sup>, <sup>1</sup>*University of Idaho, Department of Biological Engineering, United States*, <sup>2</sup>*University of Idaho, Department of Animal and Veterinary Science, United States*, <sup>3</sup>*University of Idaho, Department of Mechanical Engineering, United States*

## Posters - Solid Mechanics: Joint and Spine Mechanics

**Template Models For Surface Manipulation of Musculoskeletal Extremity Regions** SB<sup>3</sup>C2019-P228

Sean Doherty<sup>1</sup>, Ben Landis<sup>1</sup>, Tammy Owings<sup>1</sup>, Ahmet Erdemir<sup>1</sup>, <sup>1</sup>*Cleveland Clinic, United States*

**A Parametric Study of Transcondylar Screw Effectiveness To Enhance Healing of Subchondral Bone Cysts of Varied Sizes** SB<sup>3</sup>C2019-P229

Lance Frazer<sup>1</sup>, Elizabeth Santschi<sup>2</sup>, Kenneth Fischer<sup>1</sup>, <sup>1</sup>*University of Kansas, United States*, <sup>2</sup>*Kansas State University, United States*

**Reducing Kinematic Data Uncertainty During Mechanical Testing of Orthopaedic Implants: The Benefits and Pitfalls of Auxiliary Motion Capture Systems** SB<sup>3</sup>C2019-P230

Callan Gillespie<sup>1</sup>, Quinn Saluan<sup>1</sup>, Tara Nagle<sup>1</sup>, Joe Little<sup>2</sup>, Willy Theodore<sup>2</sup>, Robb Colbrunn<sup>1</sup>, <sup>1</sup>*Cleveland Clinic, United States*, <sup>2</sup>*360 Knee Systems, United States*

**Effect of Pelvis and Limb Position On Radiographic Leg Length Discrepancy Measurement: A Sawbones Model** SB<sup>3</sup>C2019-P231

Isaac Livshetz<sup>1</sup>, Awais Hussain<sup>1</sup>, Matthew Robinson<sup>1</sup>, Farid Amirouche<sup>1</sup>, Mark Gonzalez<sup>1</sup>, <sup>1</sup>*University of Illinois College of Medicine at Chicago, United States*

**Clinical Representation of Joint Coordinate System Forces** SB<sup>3</sup>C2019-P232

Callan Gillespie<sup>1</sup>, Tara Nagle<sup>1</sup>, Robb Colbrunn<sup>1</sup>, <sup>1</sup>*Cleveland Clinic, United States*

**Biomechanics of Three-Level Cervical Fusion Comparing A Stand-Alone Cage Construct To Anterior Plate and Cages Construct - A Cadaveric Study** SB<sup>3</sup>C2019-P233

Robert McGuire<sup>1</sup>, Abeer Al-Barghouthi<sup>2</sup>, Loren Latta<sup>3</sup>, Francesco Travascio<sup>3</sup>, <sup>1</sup>*University of Mississippi, United States*, <sup>2</sup>*Max Biedermann Institute for Biomechanics, Mount Sinai Medical Center, United States*, <sup>3</sup>*University of Miami, United States*

**A Posture Controlling Test Device To Dynamically Load Lumbar Spinal Columns** SB<sup>3</sup>C2019-P234

John Humm<sup>1</sup>, Narayan Yoganandan<sup>2</sup>, <sup>1</sup>*Medical College of Wisconsin and Marquette University, United States*, <sup>2</sup>*Medical College of Wisconsin, United States*

**3d Surface Kinematics of The Lumbar Facet Capsular Ligament During Inflation Testing** SB<sup>3</sup>C2019-P235

Elizabeth Gacek<sup>1</sup>, Emily Bermel<sup>1</sup>, Arin Ellingson<sup>1</sup>, Victor Barocas<sup>1</sup>, <sup>1</sup>*University of Minnesota Twin-Cities, United States*

**Dorsal Subluxation of The First Metacarpal At The Basilar Thumb Joint During Key Pinch: Comparison To Osteoarthritis Grading Systems** SB<sup>3</sup>C2019-P236

Nolan Norton<sup>1</sup>, Brandon Barnds<sup>2</sup>, Terence McIlff<sup>2</sup>, E. Bruce Toby<sup>2</sup>, Kenneth Fischer<sup>1</sup>, <sup>1</sup>University of Kansas, United States, <sup>2</sup>University of Kansas Medical Center, United States

**Wheelchair Seat Position and Footprint Length Effects On Shoulder and Elbow Angles On Graded Surfaces** SB<sup>3</sup>C2019-P237

Amogha Vijayvargiya<sup>1</sup>, Sarah Bass<sup>2</sup>, Hailee Kulich<sup>2</sup>, Alicia Koontz<sup>2</sup>, <sup>1</sup>University of Pittsburgh, United States, <sup>2</sup>Human Engineering Research Laboratories, United States

**Posters - Solid Mechanics: Musculoskeletal Soft Tissue Mechanics**

**An Alternative Method To Characterize Poroelastic Material Properties of Murine Articular Cartilage** SB<sup>3</sup>C2019-P238

Alexander Kotelsky<sup>1</sup>, Joseph Carrier<sup>1</sup>, Mark Buckley<sup>1</sup>, <sup>1</sup>University of Rochester, United States

**Comparison of The Effects of Boundary Lubricants On The Tribological Rehydration of Articular Cartilage** SB<sup>3</sup>C2019-P239

Margot Farnham<sup>1</sup>, David Burris<sup>1</sup>, Christopher Price<sup>1</sup>, <sup>1</sup>University of Delaware, United States

**Effect of Counterface Surface Roughness On Tribological Rehydration of Articular Cartilage** SB<sup>3</sup>C2019-P240

Meghan Kupratis<sup>1</sup>, Margot Farnham<sup>1</sup>, David Burris<sup>1</sup>, Christopher Price<sup>1</sup>, <sup>1</sup>University of Delaware, United States

**Maintaining Cartilage Hydration During Sliding Part 1: The Effect of Migration Length** SB<sup>3</sup>C2019-P241

Jamie Benson<sup>1</sup>, Caroline Kook<sup>1</sup>, Axel Moore<sup>2</sup>, Steven Voinier<sup>1</sup>, Christopher Price<sup>1</sup>, David Burris<sup>1</sup>, <sup>1</sup>University of Delaware, United States, <sup>2</sup>Imperial College London, United Kingdom

**Improved Methods For Mechanically Testing Foot and Ankle Ligaments: Preparation, Length Estimation, Environmental Maintenance, and Semi-Automation** SB<sup>3</sup>C2019-P242

Alexander Berardo-Cates<sup>1</sup>, Christopher Prasanna<sup>2</sup>, Levi Davis<sup>1</sup>, Mathew Kindig<sup>2</sup>, William Ledoux<sup>3</sup>, Joseph Iaquinto<sup>1</sup>, <sup>1</sup>Center for Limb Loss and MoBility, University of Washington, United States, <sup>2</sup>Center for Limb Loss and MoBility, United States, <sup>3</sup>Center for Limb Loss and MoBility, University of Washington, Department of Orthopedics and Sports Medicine, United States

**Testing Medial Ulnar Collateral Ligament Fatigue Failure** SB<sup>3</sup>C2019-P243

David Jordan<sup>1</sup>, Alexander Kharlamov<sup>2</sup>, Patrick Schimoler<sup>3</sup>, Patrick DeMeo<sup>2</sup>, Mark Carl Miller<sup>3</sup>, <sup>1</sup>University of Pittsburgh, United States, <sup>2</sup>Allegheny General Hospital, United States, <sup>3</sup>Allegheny General Hospital and University of Pittsburgh, United States

**Experimental Measurement of Embryonic Tendon Multiscale Mechanics** SB<sup>3</sup>C2019-P244

Benjamin Peterson<sup>1</sup>, Spencer Szczesny<sup>1</sup>, <sup>1</sup>Pennsylvania State University, United States

**Femoral Tunnel Location Affects Acl Excursion During Knee Flexion** SB<sup>3</sup>C2019-P245

Patrick Schimoler<sup>1</sup>, J. Jared Guth<sup>1</sup>, Alexander Kharlamov<sup>1</sup>, J. Daniel Thompson<sup>1</sup>, Sam Akhavan<sup>1</sup>, Mark Carl Miller<sup>1</sup>, <sup>1</sup>Allegheny General Hospital, United States

**Utilization of Multi-Foci Arfi Imaging To Generate Larger Tendon Displacement** SB<sup>3</sup>C2019-P246

Gerald A Ferrer<sup>1</sup>, Waqas Khalid<sup>1</sup>, Volker Musahl<sup>1</sup>, Kang Kim<sup>1</sup>, Richard E Debski<sup>1</sup>, <sup>1</sup>University of Pittsburgh, United States

**Using Optical Tracking To Calculate Non-Recoverable Strain In The Glenohumeral Capsule** SB<sup>3</sup>C2019-P247

Jocelyn Hawk<sup>1</sup>, Calvin Chan<sup>1</sup>, Robert Tisherman<sup>1</sup>, Richard Debski<sup>1</sup>, <sup>1</sup>Orthopaedic Robotics Laboratory, United States

**3d Strain Components and Their Viscoelastic Behavior For Knee Meniscus Tissue In Circumferential Tension Under Stress Relaxation and Creep** SB<sup>3</sup>C2019-P248

John Peloquin<sup>1</sup>, Michael Santare<sup>1</sup>, Dawn Elliott<sup>1</sup>, <sup>1</sup>University of Delaware, United States



**Intramuscular Pressure and Shear Modulus of Lower Leg Muscles Are Correlated** SB<sup>3</sup>C2019-P249

Seyedali Sadeghi<sup>1</sup>, Dov Bader<sup>2</sup>, Daniel Cortes<sup>1</sup>, <sup>1</sup>*Penn State University, United States*, <sup>2</sup>*Penn State College of Medicine, United States*

**Development of Displacement-Controlled Multiaxial Stretching Device For Characterising Viscoelastic Properties of Female Pelvic Floor Tissue** SB<sup>3</sup>C2019-P250

Katie Harte<sup>1</sup>, Gary Menary<sup>1</sup>, Alex Lennon<sup>1</sup>, <sup>1</sup>*Queen's University Belfast, United Kingdom*

**Body Position Effects On Thigh Soft Tissue Properties** SB<sup>3</sup>C2019-P251

Justin Scott<sup>1</sup>, Sheng Chen<sup>1</sup>, Sara Roccabianca<sup>1</sup>, Tamara Reid Bush<sup>1</sup>, <sup>1</sup>*Michigan State University, United States*

**Python-Inspired Grasping Teeth For Tendon To Bone Repair** SB<sup>3</sup>C2019-P252

Iden Kurtaliaj<sup>1</sup>, Ethan Hoppe<sup>2</sup>, Dong Hwan Yoon<sup>2</sup>, Lester Smith<sup>3</sup>, Victor Birman<sup>4</sup>, Guy Genin<sup>2</sup>, Stavros Thomopoulos<sup>1</sup>, <sup>1</sup>*Columbia University, United States*, <sup>2</sup>*Washington University, United States*, <sup>3</sup>*Indiana University, United States*, <sup>4</sup>*Missouri Science & Technology, United States*

**Optimizing Non-Linear Mechanical Behavior of Soft Tissues In Finite Element Model of Human Thigh** SB<sup>3</sup>C2019-P253

Eli Broemer<sup>1</sup>, Sheng Chen<sup>1</sup>, Justin Scott<sup>1</sup>, Tamara Bush<sup>1</sup>, Sara Roccabianca<sup>1</sup>, <sup>1</sup>*Michigan State University, Mechanical Engineering, United States*

**Design of A Novel Biaxial Mechanical Testing System and Protocols For Analysis of Biological Tissues and Tissue-Engineered Constructs** SB<sup>3</sup>C2019-P254

Mingliang Jiang<sup>1</sup>, Michael Moreno<sup>1</sup>, <sup>1</sup>*Texas A&M University, United States*

**Dissimilar Linear Friction Welding (Ifw) Technology For Manufacturing of Functional Materials: Bi-Metallic Ti6Al4V-Cocromo Joint Implants** SB<sup>3</sup>C2019-P255

David Irwin<sup>1</sup>, Christina Seydlorsky<sup>1</sup>, Agraha Gautam<sup>1</sup>, Aspen Glaspell<sup>1</sup>, Kyosung Choo<sup>1</sup>, Jae Joong Ryu<sup>1</sup>, <sup>1</sup>*Youngstown State University, United States*

**Posters - Solid Mechanics: Multiscale Mechanics, Reproductive, Ocular and Others**

**Automated Fiber Orientation Quantification In Three Dimensional Images** SB<sup>3</sup>C2019-P256

Jeremy Eekhoff<sup>1</sup>, Spencer Lake<sup>1</sup>, <sup>1</sup>*Washington University in St. Louis, United States*

**The Effect of Composition and Hydration On The Mechanics of Carbonated Apatite** SB<sup>3</sup>C2019-P257

Brian Wingender<sup>1</sup>, Masashi Azuma<sup>1</sup>, Christina Krywka<sup>2</sup>, Paul Zaslansky<sup>3</sup>, John Boyle<sup>4</sup>, Alix Deymier<sup>1</sup>, <sup>1</sup>*UConn Health, United States*, <sup>2</sup>*Zentrum für Material- und Kstenforschung GmbH, Germany*, <sup>3</sup>*Charit - Universitätsmedizin Berlin, Germany*, <sup>4</sup>*Columbia University, United States*

**Application of Micro-Raman Spectroscopy To Mechanical Characterization of Hydrogels** SB<sup>3</sup>C2019-P258

Hui Zhou<sup>1</sup>, John M. Maloney<sup>1</sup>, Alexander M. Knapp<sup>1</sup>, Malisa Sarntinoranont<sup>1</sup>, Chelsey S. Simmons<sup>1</sup>, Ghatu Subhash<sup>1</sup>, <sup>1</sup>*University of Florida, United States*

**High Fidelity Modeling of 3d Euler Buckling and Stress Transmission Through Mother-Daughter Crosslink Captures Reversible Collapse In Compressing Dendritic Actin Mesh** SB<sup>3</sup>C2019-P259

Jyothirmai Simhadri<sup>1</sup>, Preethi Chandran<sup>1</sup>, <sup>1</sup>*Howard University, United States*

**Ultrashort Laser Fragmentation of Plasmonic Gold Nanoparticles: Coulomb Expulsion Versus Photothermal Evaporation** SB<sup>3</sup>C2019-P260

Peiyuan Kang<sup>1</sup>, Daipayan Sarkar<sup>1</sup>, Zhenpeng Qin<sup>1</sup>, <sup>1</sup>*The University of Texas at Dallas, United States*

**In Vivo Estimation of Optic Nerve Sheath Stiffness Using Noninvasive Mri Measurements and Finite Element Modeling SB<sup>3</sup>C2019-P261**

Chanyoung Lee<sup>1</sup>, Jesse Rohr<sup>2</sup>, Austin Sass<sup>2</sup>, Stuart Sater<sup>2</sup>, Bryn Martin<sup>2</sup>, Arslan Zahid<sup>1</sup>, John Oshinski<sup>1</sup>, C. Ross Ethier<sup>1</sup>,  
<sup>1</sup>Georgia Institute of Technology and Emory University, United States, <sup>2</sup>University of Idaho, United States

**Peripapillary Deformation and Its Relation To Material Properties of The Eye Globe SB<sup>3</sup>C2019-P262**

Jafar A. Mehr<sup>1</sup>, Heather M. Moss<sup>2</sup>, Hamed Hatami-Marbini<sup>1</sup>, <sup>1</sup>University of Illinois at Chicago, United States, <sup>2</sup>Stanford University, United States

**The Effects of Size and Location of Laser Peripheral Iridotomy On The Changes In Pressure Difference Across The Iris Following Dilation SB<sup>3</sup>C2019-P263**

Anup Pant<sup>1</sup>, Rodolfo Repetto<sup>2</sup>, Syril Dorairaj<sup>3</sup>, Rouzbeh Amini<sup>1</sup>, <sup>1</sup>University of Akron, United States, <sup>2</sup>University of Genoa, Italy, <sup>3</sup>Mayo Clinic, United States

**In Vivo Measurements of Trabecular Meshwork Stiffness SB<sup>3</sup>C2019-P264**

Ross Ethier<sup>1</sup>, Guorong Li<sup>2</sup>, Chanyoung Lee<sup>1</sup>, Ke Wang<sup>1</sup>, Iris Navarro<sup>2</sup>, Joseph Sherwood<sup>3</sup>, Karen Crews<sup>4</sup>, Sina Farsiu<sup>2</sup>, Cheng-Wen Lin<sup>4</sup>, Dan Stamer<sup>2</sup>, <sup>1</sup>Georgia Tech/Emory, United States, <sup>2</sup>Duke University, United States, <sup>3</sup>Imperial College London, United Kingdom, <sup>4</sup>Aerie Pharmaceutical, United States

**A Comparison of Two Continuum Modeling Approaches For Corneal Stroma Mechanical Response SB<sup>3</sup>C2019-P265**

Shuolun Wang<sup>1</sup>, Hamed Hatami-Marbini<sup>1</sup>, <sup>1</sup>University of Illinois at Chicago, United States

**Microstructural Changes At The Vitreoretinal Interface With Region and Age In Human Eyes SB<sup>3</sup>C2019-P266**

Christopher Creveling<sup>1</sup>, Yousef Alsanea<sup>1</sup>, Brittany Coats<sup>2</sup>, <sup>1</sup>The University of Utah, United States, <sup>2</sup>University of Utah, United States

**Development of A Finite Element Simulation To Estimate Corneal Elasticity SB<sup>3</sup>C2019-P267**

Usmaan Siddiqui<sup>1</sup>, Nathan Gallant<sup>2</sup>, <sup>1</sup>University of South Florida, United States, <sup>2</sup>Univeristy of South Florida, United States

**Clot Contraction: Investigating The Impact On Clot Mechanical Behavior and Microstructure SB<sup>3</sup>C2019-P268**

Sarah Johnson<sup>1</sup>, Juyu Chueh<sup>2</sup>, Matthew Gounis<sup>2</sup>, Michael Glivarry<sup>3</sup>, Ray McCarthy<sup>3</sup>, Patrick McGarry<sup>1</sup>, Peter McHugh<sup>1</sup>,  
<sup>1</sup>National University Of Ireland Galway, Ireland, <sup>2</sup>University of Massachusetts Medical School, United States, <sup>3</sup>Cerenovus, Johnson & Johnson, Ireland

**Arterial Stiffness Compared Across Scales: From Cells To Extracellular Matrix To Vessels SB<sup>3</sup>C2019-P269**

Bart Spronck<sup>1</sup>, Jay D. Humphrey<sup>1</sup>, <sup>1</sup>Department of Biomedical Engineering, Yale University, United States

**Review of Hyperelastic Modeling of Brain Tissue SB<sup>3</sup>C2019-P270**

Kristen Cirincione<sup>1</sup>, Joshua Smith<sup>1</sup>, <sup>1</sup>Lafayette College, United States

**On The Viscoelasticity of Extra- and Intra-Parenchymal Bronchi SB<sup>3</sup>C2019-P271**

Samaneh Sattari<sup>1</sup>, Mona Eskandari<sup>1</sup>, <sup>1</sup>University of California, Riverside, United States

**Does The Random Generation Algorithm Affect The Results of Numerical Models For Mechanical Response of Filamentous Networks? SB<sup>3</sup>C2019-P272**

Hamed Hatami-Marbini<sup>1</sup>, <sup>1</sup>University of Illinois at Chicago, United States

**Vascular Remodeling and Proteoglycan Accumulation In The Aorta of Progeria Mice Result In Fatal Cardiovascular Effects SB<sup>3</sup>C2019-P273**

Sae-Il Murtada<sup>1</sup>, Yuki Kawamura<sup>1</sup>, Alexander Caulk<sup>1</sup>, Nicole Guerrera<sup>2</sup>, Hossein Ahmadzadeh<sup>1</sup>, Nathan Maulding<sup>2</sup>, Kristin Zimmerman<sup>2</sup>, Dar Weiss<sup>1</sup>, Marcos Latorre<sup>1</sup>, Dillon Kavanagh<sup>2</sup>, Zhenwu Zhuang<sup>2</sup>, Demetrios Braddock<sup>2</sup>, Jay Humphrey<sup>1</sup>,  
<sup>1</sup>Yale University, United States, <sup>2</sup>Yale School of Medicine, United States

**Mechanical Effects of Fiber Interweaving** SB<sup>3</sup>C2019-P274

Bingrui Wang<sup>1</sup>, Yi Hua<sup>2</sup>, Fengting Ji<sup>2</sup>, Ian A. Sigal<sup>2</sup>, <sup>1</sup>*Southwest Jiaotong University, China*, <sup>2</sup>*University of Pittsburgh, United States*

**A Connectome-Based Network Model To Simulate Prion-Like Protein Propagation In Neurodegenerative Diseases** SB<sup>3</sup>C2019-P275

Xuesong Zhang<sup>1</sup>, Johannes Weickenmeier<sup>1</sup>, <sup>1</sup>*Stevens Institute of Technology, United States*

**Determination of The Linear Viscoelastic Behavior of Aponeurosis** SB<sup>3</sup>C2019-P276

Keith Grega<sup>1</sup>, Benjamin Wheatley<sup>1</sup>, <sup>1</sup>*Bucknell University, United States*

**Mri-Based Analysis of 3d Printed Patient Specific Prostate Slicing Molds** SB<sup>3</sup>C2019-P277

David Rutkowski<sup>1</sup>, Shane Wells<sup>1</sup>, Brian Johnson<sup>1</sup>, Wei Huang<sup>1</sup>, David Jarrard<sup>1</sup>, Joshua Lang<sup>1</sup>, Steve Cho<sup>1</sup>, Alejandro Roldan-Alzate<sup>1</sup>, <sup>1</sup>*University of Wisconsin-Madison, United States*

**Murine Vaginal Wall Biaxial Contractile Response Following Elastase Digestion** SB<sup>3</sup>C2019-P278

Gabrielle Clark<sup>1</sup>, Laurephile Desrosiers<sup>2</sup>, Leise Knoepp<sup>2</sup>, Kristin Miller<sup>1</sup>, <sup>1</sup>*Tulane University, United States*, <sup>2</sup>*Ochsner Clinical School, United States*

**Toward Fast and Accurate Automated Female Pelvic Floor 3d Geometric Model Reconstruction Based On Deep Convolutional Neural Networks** SB<sup>3</sup>C2019-P279

Fei Feng<sup>1</sup>, James A. Ashton-Miller<sup>2</sup>, John O.L. DeLancey<sup>3</sup>, Jiajia Luo<sup>1</sup>, <sup>1</sup>*University of Michigan Shanghai Jiao Tong University Joint Institute Shanghai Jiao Tong University, China*, <sup>2</sup>*Department of Mechanical Engineering University of Michigan Ann Arbor, United States*, <sup>3</sup>*Department of Obstetrics and Gynecology University of Michigan Ann Arbor, United States*

**Viscoelastic Mechanical Behavior of Decorin Knockout Mouse Cervical Tissue** SB<sup>3</sup>C2019-P280

Nicole Lee<sup>1</sup>, Charles Jayyosi<sup>1</sup>, Shanmugasundaram Nallasamy<sup>2</sup>, Mala Mahendroo<sup>2</sup>, Kristin Myers<sup>1</sup>, <sup>1</sup>*Columbia University, United States*, <sup>2</sup>*Department of Obstetrics and Gynecology and Green Center for Reproductive Biology Sciences University of Texas Southwestern Medical Center, United States*

**Determination of The Active and Passive Mechanical Properties of The Non-Pregnant Murine Cervix** SB<sup>3</sup>C2019-P281

Cassandra Conway<sup>1</sup>, Gabrielle Clark<sup>1</sup>, Mala Mahendroo<sup>2</sup>, Kristin Miller<sup>1</sup>, <sup>1</sup>*Tulane University, United States*, <sup>2</sup>*University of Texas Southwestern Medical Center, United States*

**Traction Force Microscopy On Human Aortic Smooth Muscle Cells** SB<sup>3</sup>C2019-P282

Claudie Petit<sup>1</sup>, Alain Guignandon<sup>2</sup>, Stephane Avril<sup>1</sup>, <sup>1</sup>*Ecole des Mines de Saint-Etienne, SaInBioSE INSERM U1059, France*, <sup>2</sup>*Universite Jean Monnet, SaInBioSE INSERM U1059, France*

## Posters - Cell & Tissue Engineering: Musculoskeletal

**Effects of Solvent and Gelatin Concentration Near-Field, Direct-Write Electrospinning of Gelatin** SB<sup>3</sup>C2019-P283

Zachary Davis<sup>1</sup>, Paul Warren<sup>1</sup>, Matthew Fisher<sup>1</sup>, <sup>1</sup>*North Carolina State University and University of North Carolina - Chapel Hill, United States*

**Volumetric Intensity Histogram Analysis Method For Quantification of Fatty Infiltration Following Rotator Cuff Repair** SB<sup>3</sup>C2019-P284

Victoria Webster-Wood<sup>1</sup>, Phillip McClellan<sup>2</sup>, Lekha Kesavan<sup>1</sup>, Greg Learn<sup>2</sup>, Ozan Akkus<sup>2</sup>, <sup>1</sup>*Carnegie Mellon University, United States*, <sup>2</sup>*Case Western Reserve University, United States*

**Fiber Morphology and Tensile Modulus of Melt Electrowritten Scaffolds Are Dependent On Process Parameters** SB<sup>3</sup>C2019-P285

Paul Warren<sup>1</sup>, Zachary Davis<sup>1</sup>, Matthew Fisher<sup>1</sup>, <sup>1</sup>*North Carolina State University and University of North Carolina - Chapel Hill, United States*

**Translation of An Engineered Porcine Accessory Carpal Osteochondral Unit As A Model For Treatment of Thumb**  
Oa SB<sup>3</sup>C2019-P286

Brendan Stoeckl<sup>1</sup>, Hannah Zlotnick<sup>1</sup>, Megan Farrell<sup>1</sup>, Liane Miller<sup>1</sup>, Josh Baxter<sup>1</sup>, Thomas Schaer<sup>1</sup>, Michael Hast<sup>1</sup>, David Steinberg<sup>1</sup>, Robert Mauck<sup>1</sup>, <sup>1</sup>*University of Pennsylvania, United States*

**Muscle and Tendon Derived Extracellular Matrix Promotes Expression of Myotendinous Junction Specific Integrins In Myoblast Cell Culture** SB<sup>3</sup>C2019-P287

Lewis Gaffney<sup>1</sup>, Matthew Fisher<sup>1</sup>, Donald Freytes<sup>1</sup>, <sup>1</sup>*North Carolina State University and the University of North Carolina – Chapel Hill, United States*

**Posters - Cell & Tissue Engineering: Organs Morphogenesis and Development**

**Smooth Muscle Differentiation Actively Patterns The Airway Epithelium During Branching Morphogenesis**  
SB<sup>3</sup>C2019-P288

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**The Effects of Oxygen and Air-Liquid-Interface Culture On Human Bronchial Epithelial Cell Differentiation**  
SB<sup>3</sup>C2019-P289

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**Ectopic Sources of Fibroblast Growth Factor 10 Drive Epithelial Buckling and Supernumerary Bud Formation In Cultured Embryonic Lungs.** SB<sup>3</sup>C2019-P290

Kara Peak<sup>1</sup>, Victor Varner<sup>1</sup>, <sup>1</sup>*The University of Texas at Dallas, United States*

**Posters - Cell & Tissue Engineering: Other**

**Bioelectric Gradients Emerge Downstream of Mechanical Forces In Epithelial Tissues** SB<sup>3</sup>C2019-P291

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**Characterization of Collagen/keratin Hydrogels As An Extracellular Matrix For 3d In Vitro Thermal Stress Studies**  
SB<sup>3</sup>C2019-P292

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**Microrna Sequencing of Ascs Undergoing Endothelial-Genesis** SB<sup>3</sup>C2019-P293

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**In Vitro Degradation of Electrospun Polycaprolactone Tissue Engineered Scaffolds Under Cyclical Dynamic Loading** SB<sup>3</sup>C2019-P294

Johane Bracamonte<sup>1</sup>, Sarah Saunders<sup>1</sup>, Sam Cole<sup>2</sup>, Gilbert Annohene<sup>2</sup>, Gary Tepper<sup>2</sup>, Joao Soares<sup>2</sup>, <sup>1</sup>*Virginia Commonwealth University, United States*, <sup>2</sup>*Virginia Commonwealth University, United States*

**Transcorneal Electrical Stimulation Shown To Reduce The Signs of Glaucoma** SB<sup>3</sup>C2019-P295

McKay Cavanaugh<sup>1</sup>, Assraa Jassim<sup>2</sup>, Lucy Coughlin<sup>2</sup>, Jessica Stukel<sup>1</sup>, Denise Inman<sup>2</sup>, Rebecca Willits<sup>1</sup>, <sup>1</sup>*The University of Akron, United States*, <sup>2</sup>*Northeast Ohio Medical University, United States*

**Optimization of Topographical and Mechanical Properties of Peg-Da Based Hydrogels For Promoting Neurodegeneration** SB<sup>3</sup>C2019-P296

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**Maintaining Multipotency of Neural Stem Cells Using Synthetic Fgf Peptide Microenvironments** SB<sup>3</sup>C2019-P297

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**Huvec Tubular Formation On Bio-Inspired Vascularization Substrate** SB<sup>3</sup>C2019-P298

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*VIRGINIA TECH  
CONGRATULATES  
DR. JENNIFER WAYNE*



on receiving the H.R. Lissner Medal  
and welcomes her as our new  
Department Head of Biomedical  
Engineering and Mechanics.



## Biomedical Engineering at UMass Amherst

### Research to Improve Human Health

Faculty are active participants in the Institute for Applied Life Sciences (IALS), launched in 2014 with a \$150 million investment from the Massachusetts Life Science Center and UMass Amherst. The vision for IALS is to translate fundamental research into innovations and services that deliver benefits to human health and well-being. IALS is product-focused, interdisciplinary, collaborative, outward-looking, and entrepreneurial.

### Interdisciplinary focus areas

include: biomaterials; biomechanics; biosensors; tissue engineering; and mechanobiology.

### Department Highlights

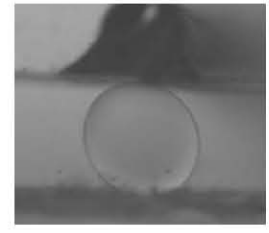
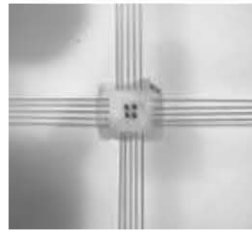
- Launched in Fall 2017
- 148 undergraduate students
- 26% of undergraduates are members of Commonwealth Honors College
- Growing MS and PhD programs
- Highly interdisciplinary and collaborative
- Synergetic lab space in UMass Medical Center and IALS



### University of Massachusetts Amherst

UMass Amherst is one of the nation's top public universities. We currently rank number 26 in a field of more than 700 public, four-year colleges and universities by *U.S. News & World Report*. Distinguished by the excellence and breadth of our academic, research, and community outreach programs — UMass Amherst is making a profound, transformative impact to the common good.

For more information, visit us at [BME.UMASS.EDU](http://BME.UMASS.EDU)



CellScale was founded in 2005 with the goal of making custom mechanical test systems developed at the University of Waterloo available to other researchers. Since then, we have developed a complete line of mechanical testing and cell stimulation products. Our BioTester remains the market leader for biaxial testing of biomaterials while our newly launched MicroTester pushes the boundaries of high resolution micro-scale testing. Come visit CellScale at our booth this week at SB3C!



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At **VCU Engineering**, graduate students and fellows work alongside our diverse faculty on projects that will shape the future of medicine. From cellular mechanobiology to systems-level mechanics and imaging, our research is propelling ideas from the lab to the larger community.

## #EngineersMakeItReal

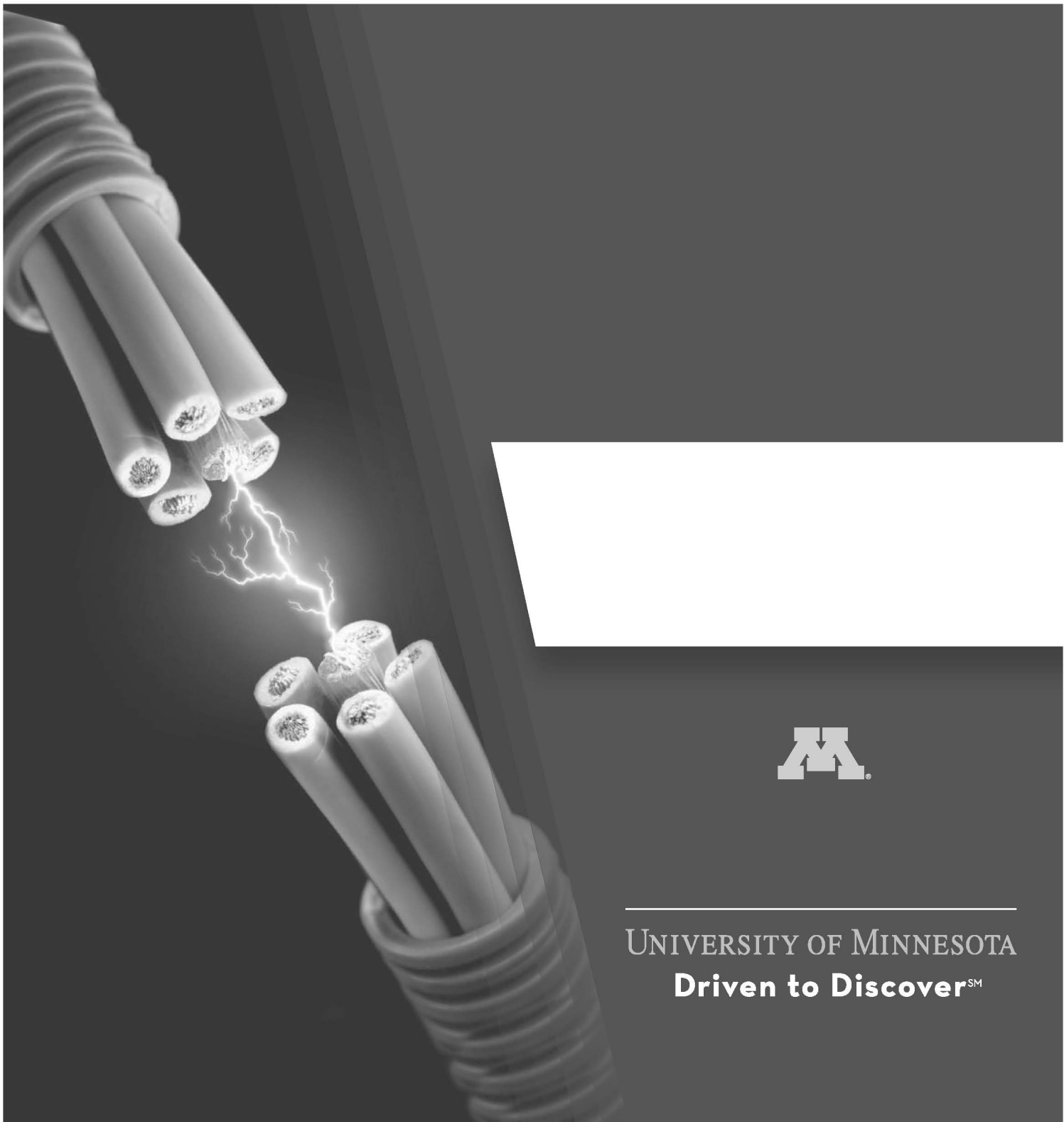
Look for us at our booth at SB3C.

**[egr.vcu.edu](http://egr.vcu.edu)**



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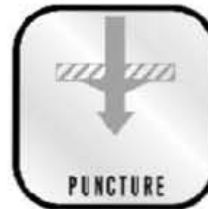
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# SimVascular Workshop SB<sup>3</sup>C 2019

THE OPEN SOURCE PIPELINE FOR CARDIOVASCULAR MODELING

## Learn how to use SimVascular

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- Visualize and analyze simulation data

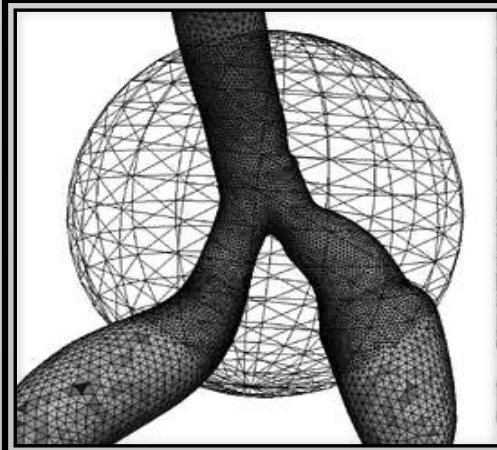
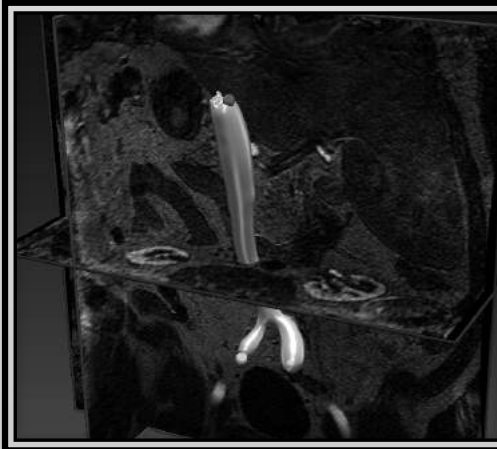
## Join our workshop on June 25<sup>th</sup>

Time: 11:30-1:30

Location: TBD

And come visit our booth at SB<sup>3</sup>C!

Also check out us online: [www.simvascular.org](http://www.simvascular.org)



**Image Analysis:** volume rendering, image denoising, edge detection

**Model Construction:** level set segmentation, model repair tools

**Meshing:** radius-based and boundary layer meshing, adaptive mesh refinement

**Simulation:** deformable walls, variable properties, highly parallelized solver

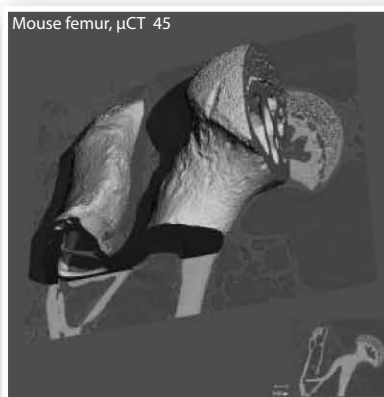
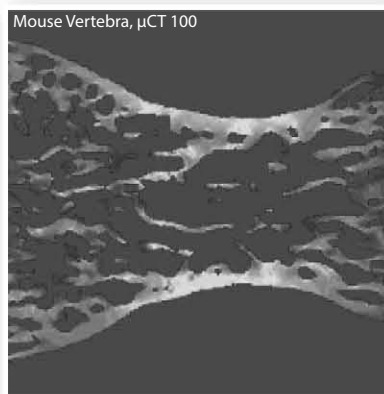
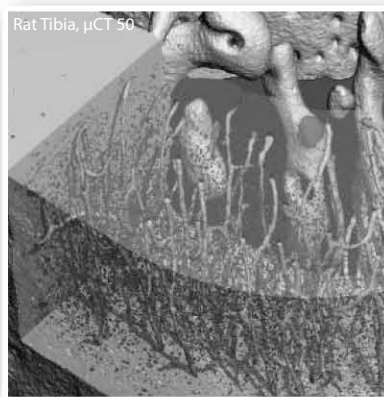
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# DEPARTMENT OF BIOMEDICAL ENGINEERING

## ABOUT THE GRADUATE PROGRAM

The graduate program in the Department of Biomedical Engineering (BME) is designed to be flexible enough to accommodate students with varied backgrounds and to promote an interest in theoretical and applied research while preparing students for a career in industry, government or academia. Departmental assistantships are available to incoming students to allow exploration of research areas prior to selecting an advisor.

Faculty members in the department have strong research programs in a variety of areas and are active participants in the Institute for Biomedical Engineering Research. Research areas include biomaterials, nanotechnology, regenerative medicine & tissue engineering, signal processing, bone biomechanics & mechanobiology, soft tissue mechanics, and device development and bioinstrumentation.

## Degrees Offered

- Doctor of Philosophy (Ph.D.) in Engineering
- Master of Science (M.S.) in Engineering

## University Accolades

Named by the National Science Foundation (NSF) as one of 10 exemplars for technology transfer and commercialization and industrial partnerships.

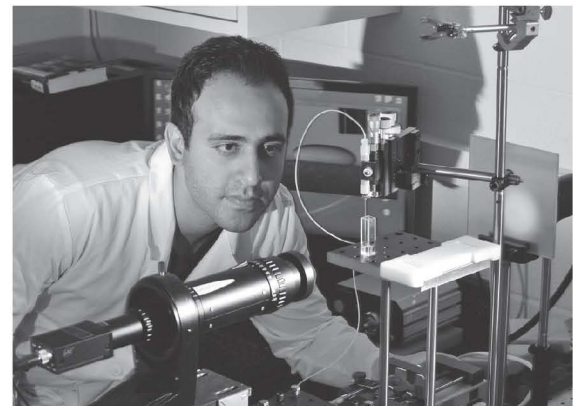
Designated by the state of Ohio as a Center of Excellence in Biomedicine and Health Care and a Center of Excellence in Enabling Technologies: Advanced Materials and Sensors. Programs in these centers attract millions of federal, state and foundation dollars.

## Growth

The department has seen significant growth over the past ten years, with six new hires, three endowed chair positions, and NSF CAREER award winners. Additionally, the laboratory and office space has doubled in size.

## CONTACT

To learn more about graduate research, visit [bme.uakron.edu](http://bme.uakron.edu) or email [bmegrad@uakron.edu](mailto:bmegrad@uakron.edu).









# UNIVERSITY OF MARYLAND







## **Tenure Track Position in Biomedical Engineering (Biomechanics)**

### **Marquette University**

#### **Department of Biomedical Engineering, Opus College of Engineering**

The Department of Biomedical Engineering (BME) at Marquette University invites applications for a tenure-track faculty position in the field of Biomechanics to start August 2019. This position is expected to be at the assistant professor level; however, exceptional candidates for higher rank will also be considered. We seek outstanding candidates who are developing an internationally recognized research program, and whose teaching will advance Marquette's educational mission. This new faculty position will grow our established research and educational programs in Biomechanics.

The ideal candidate will have earned a PhD in Biomedical Engineering, Biomechanical Engineering or a related engineering field. Candidates are expected to develop a strong, externally funded research program and to be effective educators at the undergraduate and graduate levels. Knowledge of Biomechanical Engineering in the broadly defined area of computational biomechanics, robotics, prosthetics/orthotics and/or finite element methods is preferred. While not required, experience in orthopaedics, rehabilitation or trauma is welcome.

The BME department at Marquette has a close, collaborative relationship with the Medical College of Wisconsin and offers BS, MS, ME and PhD degrees. The department currently has over 350 undergraduate students and 50 graduate students with a 5-year projection of over 500 students across all degrees with the greatest growth in Master's and PhD disciplines. Strong collaborative programs are in place with the Departments of Orthopaedic Surgery, Neurosurgery, and Physical Medicine and Rehabilitation which include the Orthopaedic and Rehabilitation Engineering Center (OREC), Stroke Rehabilitation Center of Southeastern Wisconsin, and Neuroscience and Biomechanics Research Laboratories at the nearby Clement J. Zablocki VA Medical Center and Vehicle Crashworthiness Laboratory. These groups have received national recognition and multiple grant awards for a variety of biomechanical studies.

Applications must be submitted online. Applications should include a cover letter with the names and contact information for three references, a current CV, and statements of research and teaching objectives (two-page maximum each). The search is ongoing with a targeted start date of August 2019. Inquiries can be directed to Gerald Harris, Chair of the Biomechanics Faculty Search Committee, [Gerald.Harris@marquette.edu](mailto:Gerald.Harris@marquette.edu), 414-288-1586.

Marquette is a Catholic, Jesuit University that offers educational, professional and cultural advantages of its location in the heart of Milwaukee to all members of its diverse community. *Marquette University is an Equal Opportunity Employer; women and minorities are encouraged to apply.*

# CMBBE2019

16<sup>th</sup> International Symposium **14 – 16 August 2019**  
on Computer Methods in Biomechanics **New York City, United States**  
and Biomedical Engineering and Conference venue: Columbia University  
4<sup>th</sup> Conference on Imaging and Visualization **www.cmbbe2019.com**



Conference Chair  
**Christopher R. Jacobs**  
(in memoriam)

Program Chair  
**Gerard A. Ateshian**

Co-Chair (Imaging & Visualization)  
**João Manuel R.S. Tavares**

Local Arrangements Chair  
**Kristin M. Myers**

## PLENARY SPEAKERS



**Natalia Trayanova**  
*Professor of Biomedical Engineering and Medicine  
at Johns Hopkins University*  
Lecture: Blending Engineering and Medicine



**Liesbet Geris**  
*Professor Faculty of Engineering Science,  
University of Liège & KU Leuven*  
Lecture: Digital twins in tissue engineering:  
from bench to bedside via the computer



**Ravi Iyengar**  
*Department of Pharmacological Sciences and Institute  
for Systems Biomedicine, Systems Biology Center,  
Icahn School of Medicine at Mount Sinai, New York -USA*  
Lecture: Integrated models of cell shape  
and function in tissue organization

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## NOTES

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The 2019 Summer Biomechanics, Bioengineering, and Biotransport Conference (SB<sup>3</sup>C) organizers gratefully acknowledge the support of our Industry and Academic Sponsors.



## SB<sup>3</sup>C 2019 - PROGRAM AT A GLANCE

Room	Sunburst	Snowflake	Wintergreen	Seasons 1-3	Seasons 4-5	Hemlock	Fox Den
<b>TUESDAY, June 25, 2019</b>							
7:00 - 1:30 pm	<b>Committee Meetings</b>						
9:30 - 3:30 pm (see specific times for each)	<b>Workshop:</b> John Pearce 70 <sup>th</sup> birthday celebration (2:00 - 3:30 pm)	<b>Workshop:</b> Bridging the scales (2:00 - 3:30 pm)	<b>Workshop:</b> Medical device design, developmt, and approval (2:00 - 3:30 pm)	<b>Workshop:</b> Promoting academic code of honor and ethics (2:00 - 3:30 pm)			<b>Workshops:</b> CRIMSON (9:30 - 11:30) Simvascular (11:30 - 1:30 pm)
3:45 - 5:15 pm	Thermal damage processes in tissues	Heart valve mechanics and CV devices	CV biomechanics and tissue engineering	Mechanics of cartilage in health and disease	Reproductive and abdominal biomechanics	Biomedical engineering education	Respiratory, ocular, lymphatic, and other organ systems
5:15 - 5:30 pm	<b>Coffee Break (Grand Ballroom)</b>						
5:30 - 6:30 pm	<b>OPENING PLENARY – Susan Margulies (Grand Ballroom)</b>						
6:30 - 8:30 pm	<b>Opening Reception (Pavers Circle)</b>						

<b>WEDNESDAY, June 26, 2019</b>							
7:00 - 8:00 am	<b>Breakfast (Grand Ballroom)</b>						
All Day	<b>Industry Exhibits (Exhibitor Foyer)</b>						
8:15 - 9:15 am	<b>Fung and Mow Award Lectures (Grand Ballroom)</b>						
9:30 - 11:00 am	Drug delivery in cancer, ocular, and nervous systems	Growth remodeling and repair I	YC Fung 100 <sup>th</sup> birthday symposium	Biomechanics of lower and upper extremities	Ocular biomechanics	Human movement and gait	Data driven modeling and visualization
11:00 - 11:15 am	<b>Coffee Break (Grand Ballroom)</b>						
11:15 - 12:45 pm	Biotransport in tumor microenvironment	Cardiac mechanics	YC Fung 100 <sup>th</sup> birthday symposium	Mechanics of cartilage and meniscus	Injury: imaging	UG design competition	Translational CV diagnosis and treatment
12:45 - 2:15 pm	<b>POSTER SESSION I (Exhibit Hall) with Lunch including BS &amp; MS Student Paper Competitions</b>						
4:30 - 6:00 pm	<b>Diversity Mentor-Mentee Event (Matterhorn Lounge)</b>						

<b>THURSDAY, June 27, 2019</b>							
7:00 - 8:00 am	<b>Breakfast (Grand Ballroom)</b>						
All Day	<b>Industry Exhibits (Exhibitor Foyer)</b>						
8:15 - 9:15 am	<b>Nerem and Woo Award Lectures (Grand Ballroom)</b>						
9:30 - 11:00 am	<b>PhD competition:</b> Cell & tissue engineering	<b>PhD competition:</b> Imaging, injury, & BME education	<b>PhD competition:</b> ECM biomechanics	Bone mechanics	Frontiers in tissue solid mechanics	Rehabilitation and assistive technologies	Ventricular and valvular flow
11:00 - 11:15 am	<b>Coffee Break (Grand Ballroom)</b>						
11:15 - 12:45 pm	<b>PhD competition:</b> Comp biomech & diagnostic models	<b>PhD competition:</b> Morpho, develop, growth, & remodel.	<b>PhD competition:</b> Cell mech, drug delivery, & therap.	Musculoskeletal tissue engineering	Nano to micro multiscale mechanics	Vascular biomechanics	Patient-specific flow and physiology
12:45 - 2:15 pm	<b>POSTER SESSION II (Exhibit Hall) with Lunch</b>						
2:15 - 3:45 pm	<b>Workshop:</b> Multiscale musculoskeletal mechanics	<b>Workshop:</b> BME education summit readout	<b>Workshop:</b> From mouse to man	<b>Workshop:</b> Community based learning in BME	<b>Workshop:</b> FEBio		
3:45 - 4:45 pm	<b>Women's Networking Event (Seven/Ten Bistro)</b>						
5:30 - 7:00 pm	<b>Career Connections (Seasons 1, 2, 3)</b>						
8:00 - 11:00 pm	<b>BEDROCK CONCERT (Foggy Goggle Stage)</b>						

<b>FRIDAY, June 28, 2019</b>							
12:00 - 5:00 pm	<b>Industry Exhibits (Exhibitor Foyer)</b>						
12:00 - 1:30 pm	Biotransport in thermal therapy and cryopreserv.	Aneurysm mechanics	Mechanobiology - in memory of Christopher Jacobs	Imaging and mechanics of ligament & tendon	Injury: models	CV and musculoskeletal device design	Thromb., hemolysis and mechanical circulatory support
1:30 - 1:45 pm	<b>Coffee Break (Grand Ballroom)</b>						
1:45 - 3:15 pm	Biotransport in disease detection and therapy	Vascular pathology and disease progression	Mechanobiology - in memory of Christopher Jacobs	Spine biomechanics	Growth remodeling and repair II: musculoskeletal	Soft tissue mechanics	Emerging computation and exp. methods
3:15 - 3:30 pm	<b>Coffee Break (Grand Ballroom)</b>						
3:30 - 5:00 pm	Multiscale biotransport in hemo & lymph	Cardiovascular mechanics: other	Biofabrication and 3D in vitro systems	Musculoskeletal soft tissue mech. and modeling	Injury: biomechanics	<i>Government Initiatives</i>	Pediatric and congenital fluid mechanics
5:30 - 6:30 pm	<b>Lissner Award Lecture – (Grand Ballroom)</b>						
6:30 - 7:30 pm	<b>Lissner Reception (Exhibit Hall Annex)</b>						
7:30 - 10:30 pm	<b>Banquet and Awards Ceremony (Exhibit Hall)</b>						