



Conference Program

2017 Summer Biomechanics, Bioengineering, and
Biotransport Conference

June 21 – 24, 2017 Tucson, AZ

S^B3C

biomechanics.
bioengineering.
biotransport.

Funding for this conference was made possible (in part) by the National Science Foundation's Chemical, Bioengineering, Environmental, and Transport Systems Division (Engineering of Biomedical Systems, Disability & Rehabilitation Engineering, Fluid Dynamics), Civil, Mechanical and Manufacturing Innovation Division (Biomechanics and Mechanobiology), and the Division of Materials Research (Biomaterials).

Funding for this conference was also made possible (in part) by 1R13EB024395-01 from the National Institute of Biomedical Imaging and Bioengineering and the National Institute of Arthritis and Musculoskeletal and Skin Diseases. 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 2017 Summer Biomechanics, Bioengineering, and Biotransport Conference (SB³C) organizers gratefully acknowledge the support of the National Science Foundation, the National Institutes of Health, and American Society of Mechanical Engineers.



NIAMS



National Institute of Biomedical Imaging
and Bioengineering



SETTING THE STANDARD

FOREWORD AND ACKNOWLEDGMENT

On behalf of the 2017 Summer Biomechanics, Bioengineering & Biotransport Conference organizers, welcome to SB³C2017. The unbeatable combination of great biomechanics, amazing colleagues, and a beautiful setting have made this our favorite meeting since we first attended, and we were honored to have the opportunity to lead a team of incredibly hard-working colleagues dedicated to continuing the rich SBC/SB³C tradition in 2017.

The theme of this year's meeting is "Growth, Development, Remodeling, and Repair," a dynamic and exciting area that has risen in prominence in recent years both at this conference and nationally. Highlighting this theme, the conference features a plenary lecture by Dr. Lakshminarayanan Mahadevan, Lola England de Valpine Professor of Applied Mathematics, Organismic and Evolutionary Biology, and Physics at Harvard University, as well as special sessions to celebrate the contributions of Dr. Larry Taber and Dr. Don Giddens.

The Student Paper Competition is a traditional highlight of the meeting. This year, the BS and MS poster competitions will be featured on Thursday evening, and the PhD oral presentations will be Friday afternoon. The American Society of Mechanical Engineers (ASME) is sponsoring the competition, providing funding for the cash prizes, and both ASME and the National Science Foundation helped fund registration fees for Student Paper Competition finalists. Another annual meeting highlight is the plenary lectures by winners of prestigious ASME awards: Kristin Myers from Columbia University (Y.C. Fung Young Investigator Award), Richard Neptune from the University of Texas (Van C. Mow Medal), Arthur Erdman from the University of Minnesota (Savio L-Y. Woo Medal), and Gerard Ateshian of Columbia University (H.R. Lissner Medal).

In addition to our Plenary and Award Lectures and regular technical sessions, there are a number of Workshops featured each day, including 'How-to' Sessions and a whole day focused on industrial interactions. Opportunities for social and networking interactions also abound — please see pages 8 to 16 of this program book for details on these events.

In addition to the features familiar to those of you who have attended prior SBC/SB³C meetings, we are pleased to report that SB³C2017 includes some new and notable features. This is our first desert venue ever, and we hope you enjoy the beauty of the surrounding Saguaro National Park. For the hikers, bikers, and golfers among you we have flipped the traditional meeting schedule to provide free time in the mornings, when temperatures are cooler and the desert is at its most beautiful. We are also proud that this is the biggest year ever for both the B.S. Student Paper Competition and the Diversity Travel Awards, thanks to a concerted effort by the organizing committee and fantastic support from the National Science Foundation.

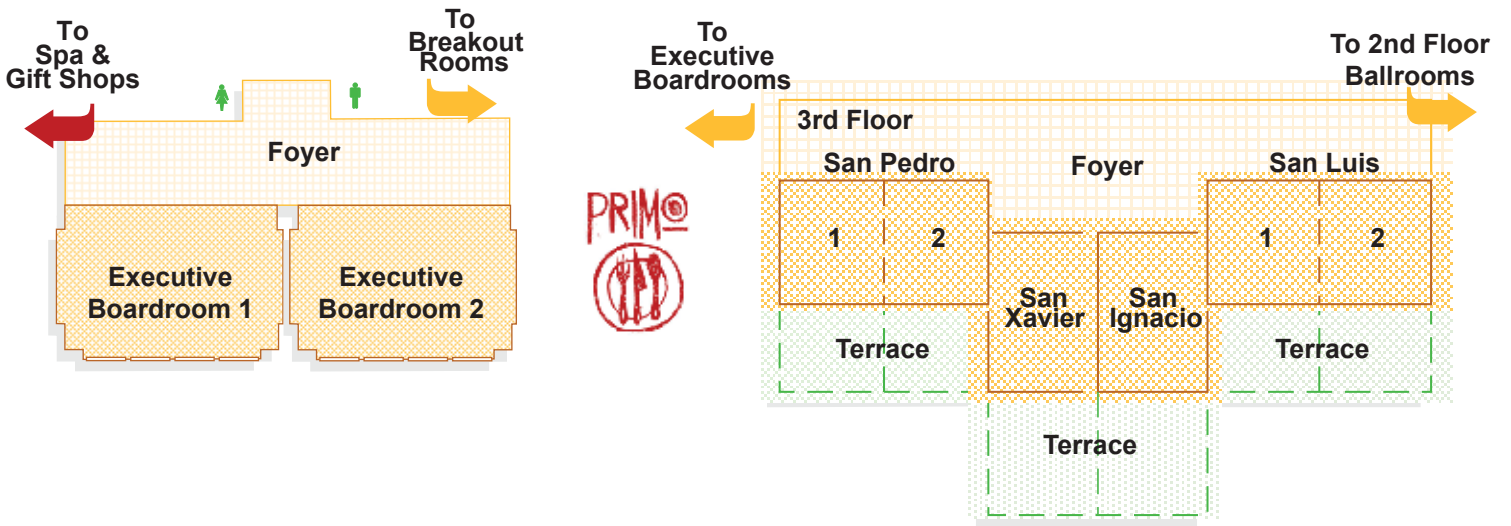
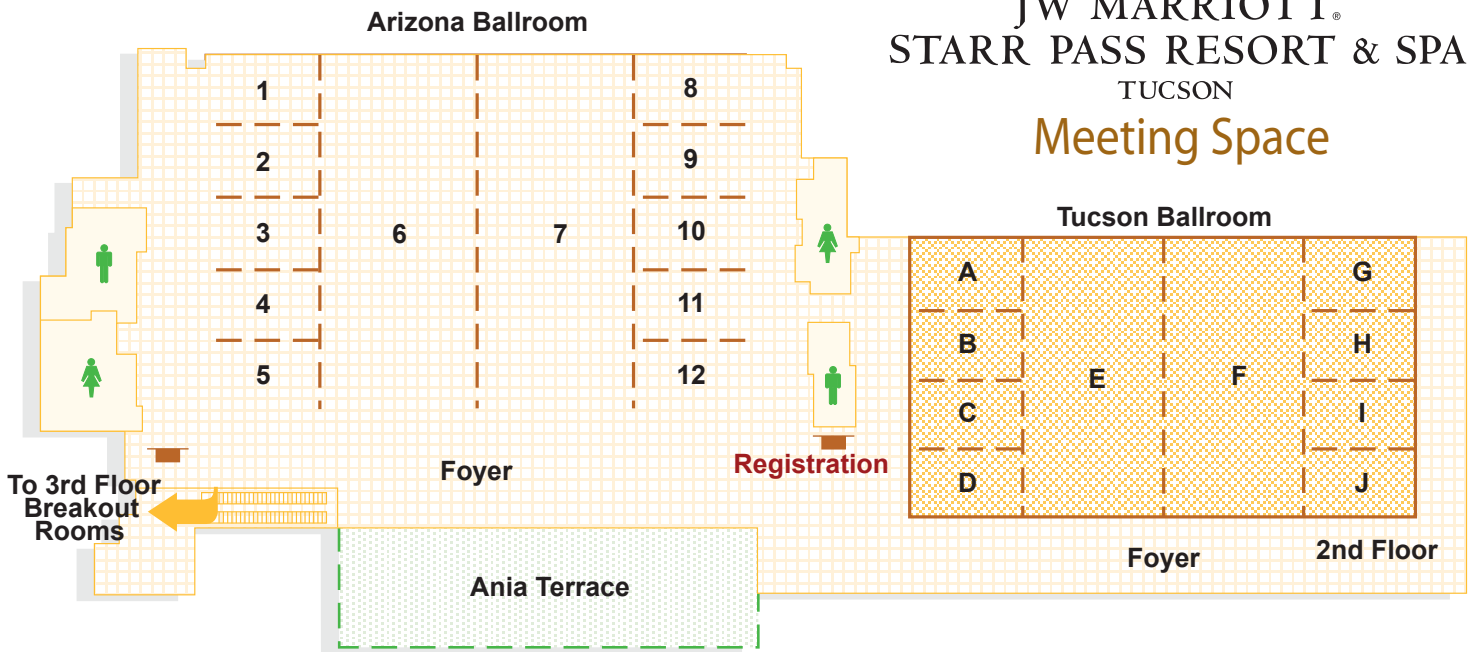
We would like to thank the Sponsors listed in this program, particularly the National Science Foundation, the American Society of Mechanical Engineers, and the National Institutes of Health, for their generous support. Even more importantly, we would like to thank the many of you who played critical roles in organizing SB³C2017. The Conference Organizers, Program Committee, and Student Paper Competition Committee listed in the program devoted an enormous amount of time and energy to this conference, but that was just the beginning: together with abstract reviewers and session chairs, more than 200 people helped make SB³C2017. We hope you enjoy it, and then join the team for SB³C2019. We'll see you at the Tequila Toast,

Jeff Holmes, Conference Chair
University of Virginia

Rob Mauck, Program Chair
University of Pennsylvania

CONFERENCE SITE MAP & ACCESSIBILITY

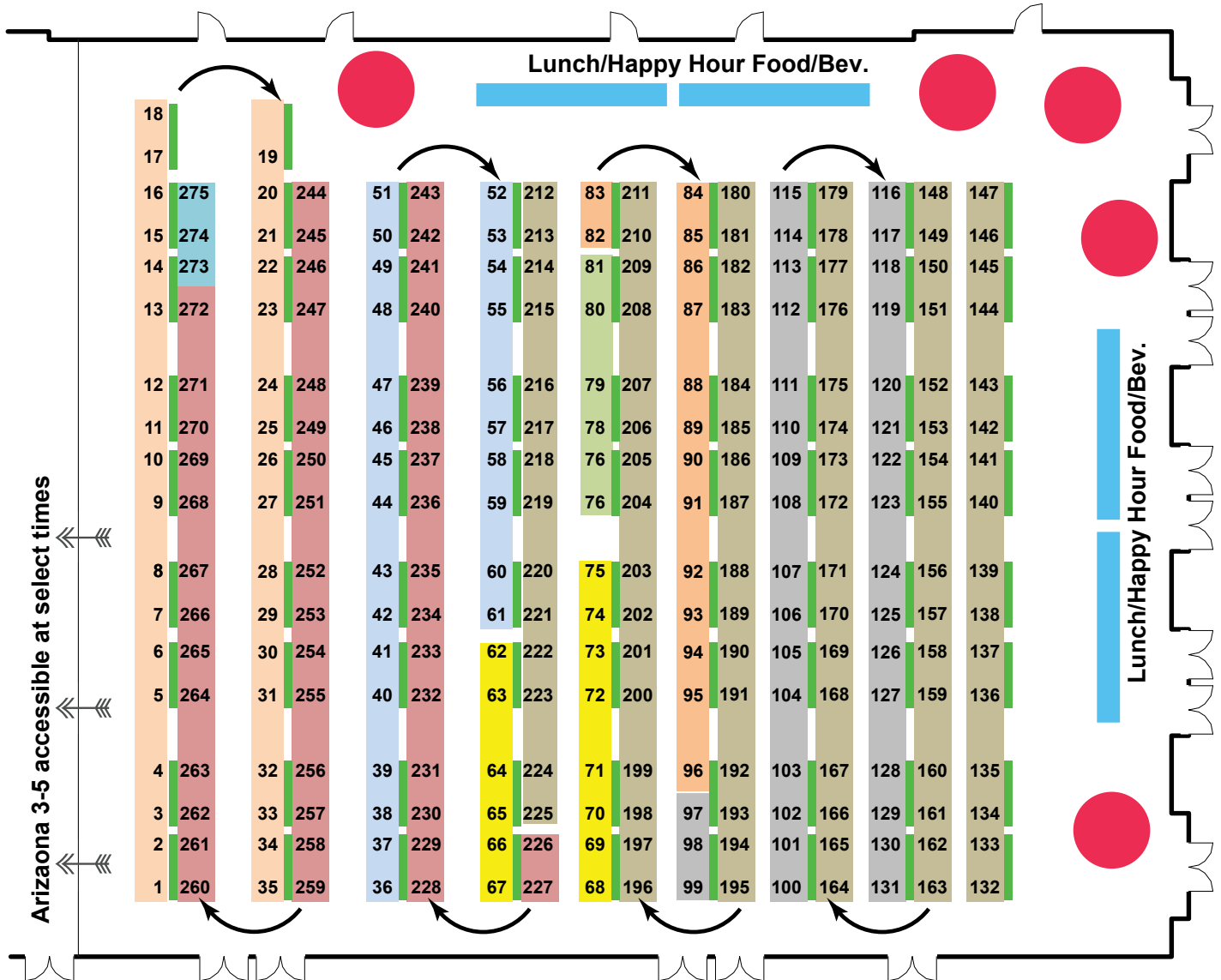

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Meeting Space



ACCESSIBILITY

Both floors (2nd and 3rd) of the meeting spaces are accessible. The following hotel spaces are accessible: main entrance, pathway to registration, registration desk, route to accessible guest rooms (which have 32 inch wide openings), business center entrance, fitness center entrance, pool entrances (with self-operating lifts or sloped entry for all pools), spa entrance, restaurants and lounges. The hotel has on site accessible self-parking, and service animals allowed for persons with disabilities. Additionally, golf carts are available on request to assist with transportation at check-in / check-out and around the resort. Participants with disabilities are encouraged to contact the general manager of the hotel prior to arrival to arrange this service.

Arizona Ballroom 6-12: Poster Sessions



Poster Numbers	1- 35	36 - 61	62 - 75	76 - 81	82 - 96
Theme	BS Level Posters	MS Level Posters	Biotransport Posters	Education Posters	Design, Dynamics, and Rehabilitation Posters
Poster Numbers	97 - 131	132 - 225	226 - 272	273 - 275	
Theme	Cell and Tissue Engineering Posters	Solids Posters	Fluids Posters	Undergraduate Design Competition Posters	

*See page 5 for poster instructions. See page 23 for more details on poster numbering. See page 62 for poster sessions.

COMMITTEE MEETINGS

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

Wednesday, June 21

BED Executive*	Arizona 1	7:00 - 9:30 AM
SB ³ C Organizing & Program* (NOTE: 1)	Arizona 1	9:30 - 10:20 AM
SB ³ C Oversight* (NOTE: 2)	Arizona 1	10:30 - 11:20 AM
New Directions	Arizona 2	10:30 - 11:20 AM
Solid Mechanics	Tucson AB	11:30 - 12:20 PM
Biotransport	San Ignacio	11:30 - 12:20 PM
Education	Arizona 1	11:30 - 12:20 PM
Cell & Tissue Engineering	Tucson AB	12:30 - 1:20 PM
Fluid Mechanics	Tucson CD	12:30 - 1:20 PM
Design, Dynamics & Rehabilitation Biotransport	San Ignacio	12:30 - 1:20 PM

Thursday, June 22

Open Executive Business Meeting	San Ignacio	9:00 - 10:30 PM
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Friday, June 23

JBME Editors (with breakfast)*	Arizona 1	9:00 - 10:15 AM
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Saturday, June 24

Student Leadership Council Meeting	San Ignacio	11:00 - 11:50 AM
Industrial Advisory Board*	offsite (see page 8)	12:15 - 1:45 PM

NOTE 1: SB³C Organizing committee meeting: members for three conference years (2017, 2018, 2019) should attend. SB³C Program committee meeting: Program Chair (2018), Program Chair (2016), and Chairs of Technical Committees. Organizing Committee chaired by Conference Chair 2017; Program Committee chaired by Program Chair 2017.

NOTE 2: Conference Oversight Committee consists of the Conference Chairs from 2016-2019 and the Program Chairs from 2016-2019. Chaired by Conference Chair 2016.

INSTRUCTIONS FOR POSTER PRESENTERS

The poster room will be available to conference attendees from Thursday morning to Saturday early morning. All posters should be hung before 11 AM on Thursday; the room will be open from 6:00 AM on Thursday for this purpose.

There will be two formal poster sessions during which time poster presenters should be available to discuss their work. **Poster Session I** will be held Thursday June 22nd from 5:30-7:30 PM and **Poster Session II** will be held Friday June 23rd from 12:30-2:00 PM. The MS and BS Poster Competition will take place during Poster Session I and all finalists (Posters #1-61, as indicated in the program book) should be present at their poster during this entire period.

All other posters will present in both sessions. In Poster Session I, Posters #62-147 will present from 5:30-6:30 PM, and Posters #148-275 will present from 6:30-7:30 PM. In Poster Session II, posters #62-147 will present from 12:30-1:15 PM, and posters #148-275 will present from 1:15-2:00 PM.

All posters must be removed by 5:30 PM on Friday. Any poster remaining after this time will be removed by the organizers.

SPEAKER READY ROOMS

Session rooms will be available outside of scheduled meeting times. Speakers are encouraged to test their presentations in the appropriate room prior to their presentation.

ORGANIZING COMMITTEE



Jeff Holmes, Conference Chair
University of Virginia



Rob Mauck, Program Chair
University of Pennsylvania

Laurel Kuxhaus, Information Chair, Clarkson University

Anna Grosberg, Local Arrangements Chair, University of California Irvine

Steven Abramowitch, Publications Chair, University of Pittsburgh

Matt Fisher, Exhibits Co-Chair, North Carolina State University and UNC- Chapel Hill

Craig Goergen, Exhibits Co-Chair, Purdue University

Alison Marsden, Diversity Chair, Stanford University

Spencer Lake, Student Paper Competition Chair, Washington University in St. Louis

Bhargavi Krishnan, Student Leadership Chair, University of Kansas

Josh Drost, Student Leadership Co-Chair, Michigan State University

PROGRAM COMMITTEE

Rob Mauck, Chair, Program Committee, University of Pennsylvania

M. Nichole Rylander, Chair, Biotransport Technical Committee, University of Texas at Austin

Xiaoming (Shawn) He, Vice Chair, Biotransport Technical Committee, Ohio State University

Rob Mauck, Chair, Cell & Tissue Engineering Technical Committee, University of Pennsylvania

Ed Guo, Vice Chair, Cell & Tissue Engineering Technical Committee, Columbia University

Tammy Reid Bush, Chair, Design, Dynamics & Rehabilitation Technical Committee, Mich. St. Univ.

Mike Moreno, Vice Chair, Design, Dynamics & Rehabilitation Technical Committee, Texas A&M Univ.

Alisa Clyne, Chair, Education Committee, Drexel University

Ferris Pfeiffer, Vice Chair, Education Committee, University of Missouri

Keefe B. Manning, Chair, Fluid Mechanics Technical Committee, Pennsylvania State University
Alison Marsden, Vice Chair, Fluid Mechanics Technical Committee, Stanford University
Jonathan Vande Geest, Chair, Solid Mechanics Technical Committee, University of Pittsburgh
Vicky Nguyen, Vice Chair, Solid Mechanics Technical Committee, Johns Hopkins
Bhargavi Krishnan, Chair, Student Leadership Committee, University of Kansas
Josh Drost, Vice Chair, Student Leadership Committee, Michigan State University
Spencer Lake, Chair, Student Paper Competition, Washington University in St. Louis

STUDENT PAPER COMPETITION COMMITTEE

Spencer Lake – Chair, Student Paper Competition – Washington University in St. Louis
Rouzbeh Amini – PhD Level – University of Akron
Shannon Stott – MS Level – Mass. General Hospital Cancer Center, Harvard Medical School
Sara Roccabianca – BS Level – Michigan State University

UNDERGRADUATE DESIGN COMPETITION COMMITTEE

Mike Moreno, Undergraduate Design Competition, Texas A&M University

ASME BED STUDENT LEADERSHIP COMMITTEE PLANNED EVENTS

<p>Friday, June 23rd, 2017: Grad School Pro Tips Workshop How do you establish your scientific credibility? Come to this workshop and learn what it takes to conduct science responsibly.</p>	<p>Time: 11 AM - 12:30 PM Location: Tucson IJ</p>
<p>Friday, June 23rd, 2017: Student Networking Mixer Join us in a networking event where you can interact with industry professionals. Learn about their job opportunities and what it takes to be successful in your career. RSVP required.</p>	<p>Time: 6:45 - 7:45 PM Location: Arizona 3-5</p>
<p>Friday, June 23rd, 2017: Hike to the Bowen Stone House Hike and socialize with fellow graduate students to the Bowen Stone House. Don't forget your water bottles!</p>	<p>Time: 6:00 AM Location: Conference site lobby</p>
<p>Saturday, June 24th, 2017 Open Meeting Attend this open meeting to provide feedback on the events hosted at the conference, suggestions for future work, and meet the Student Leadership Committee.</p>	<p>Time: 11:00 – 11:50 AM Location: San Ignacio</p>

For more information on things to do and live updates about events follow us on Facebook (ASME Bioengineering Division) and on Twitter (@asmebedstudents)
 Don't Forget about the BEDRock concert on Friday, June 23, 2017!

INDUSTRY DAY

The Industry Advisory Board (IAB) consists of members from Industry and Academia who are interested in enhancing connections that can be beneficial to both. Industry gains access to important research capabilities and academics benefit from a more customer needs focused approach to problem solving. Combining the resources of both entities can create strong teams for solving critical medical needs. Students also benefit from making important connections in industry that help them obtain jobs and companies have opportunities to meet talented students to fill important positions.

This year the IAB has organized several events specifically designed to meet the needs of conference participants from industry. We scheduled “Industry Day” to begin at the end of the regular workweek, from Friday evening through Saturday afternoon. We also coordinated with other committees for co-sponsored events (see program for details).

IAB/SLC Networking Mixer

Students and industry representatives join together, make connections with potential employers, and network with a wide variety of participants. *(registration required)*

BEDRock Concert

Don't miss this exciting event! The rock concert is one of the highlights of the conference providing opportunities to relax and socialize (unless you are in the band).

Industry Workshop

Learn how to “Establish and Improve Collaborations between Industry and Academia” from experts in the field. Hear from the experts and participate in small group discussions to get your questions answered.

ASME Sponsored Industry Luncheon & IAB Meeting

This year we are combining our IAB meeting with a special luncheon sponsored by ASME. The luncheon will provide good food and opportunities to establish and reinforce connections between industry and academic partners. *(registration required; location provided upon registration)*

Technical Session

Attend a session of your choice based in your area of interest. Consider the **Medical Devices 1**: “Experimental Modeling for Clinical Surgical Applications” session.

Technical Session

Attend a session of your choice based in your area of interest. Consider the **Medical Devices 2**: “Surgical Device Design Applications” session.

Friday - June 23

IAB/SLC Networking Mixer
6:45 - 7:45 PM

BEDRock Concert
8:00 - 10:15 PM

Saturday - June 24

Industry Workshop
10:30 - 12:00 PM

ASME Sponsored Industry Luncheon & IAB Meeting
12:15 - 1:45 PM

Medical Devices 1
2:15 - 3:45 PM

Medical Devices 2
4:00 - 5:30 PM

The mission of the IAB is to establish and improve interconnections between people in academics and industry for mutual benefit. Our goal is to make the conference “industry friendly” and provide value for all participants.

*Martin Tanaka – Chair IAB; Lacey Gorochow – Vice Chair IAB;
M.L. Suresh Raghavan & Ethan Kung – IAB Leadership Team Members*

WEDNESDAY, JUNE 21**1:30-2:30 PM****'How-To' Session: SimVascular Workshop and New User Training****Tucson AB**

Organizers: Alison Marsden (Stanford University), Shawn Shadden (UC Berkeley), and Nathan Wilson (Open Source Medical Software Corporation)

SimVascular is the only available open source software package that provides a complete pipeline from medical image data to cardiovascular blood flow simulation results and analysis (www.simvascular.org). It offers capabilities for image segmentation, unstructured adaptive meshing, physiologic boundary conditions, and an efficient Navier-Stokes finite element solver with fluid structure interaction. 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. This workshop will introduce several exciting new features of SimVascular, including a completely overhauled user interface, and improved solid modeling operations. We will interactively take new users through a step-by-step tutorial, highlighting new software features. We will cover basic steps of model construction, meshing and flow simulations, as well as underlying theory, numerical methodology and best practices for high quality results. Following a series of interactive demonstrations, we will moderate a question and answer session for current and potential users.

WEDNESDAY, JUNE 21**1:30-2:30 PM****'How-To' Session: FEBio Workshop – New features****Tucson CD**

Organizers: Jeff Weiss (University of Utah) and Gerard Ateshian (Columbia University)

The FEBio software suite is a set of free software tools for nonlinear finite element analysis in biomechanics and biophysics (febio.org). It offers modeling scenarios, constitutive models and boundary conditions that are relevant to many research areas in biomechanics. The software is open-source, and pre-compiled executables for Windows, Mac OS X and Linux platforms are available. This workshop covers some of the latest and upcoming features in FEBio, including a fluid solver for computational fluid dynamics, improved shell formulations for large deformations, porous shells to model solvent and solute transport in membranes, expanded parameter optimization capabilities, methods to implement homogenization, and a FEBiochem plugin to solve for solute transport and reactive kinetics in non-deforming media.

WEDNESDAY, JUNE 21**4:30 PM - 6:00 PM**

Special Tribute Session: Tucson CD
Celebration for Larry Taber: Growth and Remodeling in Development and Disease

The purpose of this session is to honor Larry Taber, who is retiring following 39 years of pioneering work in the fields of developmental biomechanics, and tissue growth and remodeling. Larry Taber is currently the Dennis and Barbara Kessler Professor of Biomedical Engineering and Professor of Mechanical Engineering and Materials Science at Washington University in St. Louis. He moved to WU in 1997, after spending four years at the General Motors Research Laboratories and 15 years at the University of Rochester. He has published more than 100 journal articles on a wide range of topics including cochlear mechanics, nonlinear shell



SPECIAL SESSIONS, PLENARY SESSIONS & WORKSHOPS

theory, cardiovascular mechanics, and the mechanics of growth and development. Larry is a Fellow of the American Society of Mechanical Engineers and the American Institute for Medical and Biological Engineering. From 2011-2016, he served as co-editor-in-chief of the journal Biomechanics and Modeling in Mechanobiology. Larry is the only three-time winner of the Richard Skalak Award for the best paper published in the Journal of Biomechanical Engineering 2004, 2007, 2015.

THURSDAY, JUNE 22	11:00 AM - 12:00 PM
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Mixer: Diversity / Mentoring Event

Arizona 3-5

Organizers: Alison Marsden (Stanford University) and Naomi Chesler (University of Wisconsin-Madison)

A “chilly” climate at the peer, departmental and institutional levels is often responsible for poor retention of women graduate students and in academic positions pre- and post-tenure. Isolation and accumulated effects of unconscious bias are also key factors in the loss of persons from underrepresented minorities (URM) groups from academic positions. Professional societies and associated conferences such as SB³C can provide a venue for reducing isolation and increasing mentoring opportunities that help refresh and promote women and members of URM groups at all stages of the academic career path.

The diversity and inclusion committee is therefore happy to announce a mentor-mentee match mixer at SB³C, designed to develop mentoring relationships between junior and senior colleagues in biomechanics, bioengineering, and biotransport. The mixer will include some initial remarks on the mentoring process and best practices in mentoring and in being mentored, after which the majority of the time will be devoted to one-on-one or one-on-two conversations between mentors and mentees, promoting discussion on specific matters of importance to the individual participants to complement the broader guidelines.

Pre-registration is required. Questions may be directed to Alison Marsden at amarsden@stanford.edu

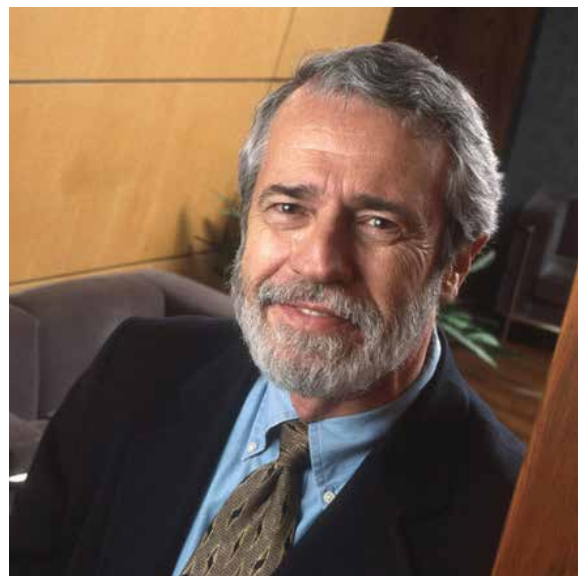
THURSDAY, JUNE 22	2:15 PM - 3:45 PM
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Special Tribute Session:

Tucson GH

Don Giddens' Impact on Cardiovascular Fluid Dynamics and Atherosclerosis

The purpose of this session is to honor and celebrate Don Giddens' 45+ year academic career, highlighting his seminal research contributions, committed role to engineering education and mentorship, dedicated service to the ASME-BED, and visionary leadership in Bioengineering. Don is considered one of the pioneers in the biofluid mechanics research community, making seminal contributions in the area of fluid dynamics and arterial disease. He has mentored countless graduate students and post-docs, many of whom have gone on to successful careers in academia and industry. Don's academic career includes serving as Chair of the Department of Aerospace Engineering at Georgia Tech (1988-92), Dean of the Whiting School of Engineering at Johns Hopkins (1992-97), founding Chair of the Coulter Department of Biomedical Engineering at Georgia Tech/Emory (1998-2002), and Dean of the College of Engineering at Georgia Tech (2002-2011). He is the past President of the ASEE (2012). At the ASME society level, Don received the H.R. Lissner Medal (1993) and R.H. Thurston Lecture Award (1996). Don is a member of the National Academy of Engineering and is a Fellow of the ASME, the AHA, and AIMBE (founding fellow).



THURSDAY, JUNE 22**4:00 - 4:30 PM****Y.C. Fung Young Investigator Award Lecture:****Tucson EF****The Mechanical Environment of Pregnancy****Kristin M. Myers, PhD** (Columbia University)

Description: The reproductive soft tissues supporting the fetus undergo some of the most dramatic and unique growth and remodeling events in the human body. During pregnancy, the uterus and fetal membrane must grow and stretch to accommodate the fetus. Simultaneously, the cervix must remodel and be a mechanical barrier to keep the fetus within the uterus. All three tissues must withstand mechanical forces to protect, support, and maintain an optimal growth environment for the developing baby. Then, in a reversal of roles, ideally nearing term, the uterus begins to contract and the cervix deforms to allow for a safe delivery. The magnitude of stress and stretch of these soft tissues supporting the fetus are thought to control physiologic processes that regulate tissue growth, remodeling, contractility, and rupture. It is generally hypothesized that these mechanical signals are clinical cues for normal labor and preterm birth, a major long-lasting public health problem with heavy emotional and financial consequences. In this talk I will reveal what we know about the soft tissue mechanics of pregnancy. I will present finite element models of pregnancy based on ultrasonic anatomical data, and I will examine the mechanical function of the soft tissues supporting the fetus. I will also characterize cervical material properties using a hyperelastic constitutive model that accounts for the cervical collagen fiber architecture. Through this experimental and modeling effort I aim to identify which factor or combination of factors is responsible for clinically-observed mechanical dysfunction in pregnancy.

THURSDAY, JUNE 22**4:30 - 5:00 PM****Van C. Mow Medal Award Lecture:****Tucson EF****Biomechanical Analyses of Human Movement and the Implications for Clinical Interventions****Richard R. Neptune, PhD** (University of Texas at Austin)

Description: The human neuromusculoskeletal system is exceedingly complex. As a result, gaining insight into normal and pathological movement remains a challenge due to the extremely difficult task of measuring the principle elements of muscle coordination and the effects of individual muscle forces on the resulting movement. This talk will discuss how experimental and modeling and simulation techniques are being used to gain insight into the biomechanics and neuromotor control of human movement with the goal to improve rehabilitation outcomes for those with movement impairments. Specifically, we will look at how individual muscles contribute to specific biomechanical task demands of human movement and the implications for prescribing clinical interventions.

THURSDAY, JUNE 22**5:00 - 5:30 PM****Savio L-Y. Woo Medal Award Lecture:****Tucson EF****Lessons Learned from Kinematics Research Applied to Medical Device Design****Arthur G. Erdman, PhD** (University of Minnesota)

Description: Current medical device development is often limited to incremental changes to known products or suboptimal solutions for which more insight is desired about the true impact of design decisions upon device interactions with tissue and organs. Major advances in medical device design and manufacture currently require extensive/expensive product cycles that usually include animal and clinical trials. New computational design methodologies are needed to provide designers with more meaningful, accurate feedback earlier in the design process; to enable designers to more broadly

SPECIAL SESSIONS, PLENARY SESSIONS & WORKSHOPS

explore the space of potential design alternatives; and to expand the boundaries of complex designs that are possible given today's computer-assisted design tools. The proposed methodology includes human-in-the-loop optimization techniques that were first applied for designing linkage mechanisms. New tools for the medical device industry will allow accelerated and less costly development cycles including more robust modeling environments.

FRIDAY, JUNE 23

11:00 AM - 12:30 PM

Workshop: Additive Manufacturing and Biofabrication in Mechanobiology

Tucson AB

Organizers: Jessica Sparks (Miami University), Grace O'Connell (University of California, Berkeley), and Matthew Fisher (North Carolina State University / University of North Carolina)

This session will focus on research that harnesses the unique capabilities of additive manufacturing and biofabrication technologies to drive the design, development, and manufacturing of biological systems or biomedical devices. Biofabrication is understood to include approaches for bioprinting, bioassembly, or tissue maturation processes, among other strategies. Other topics of interest include use of additive manufacturing for non-biological products with biomedical relevance, such as flexible/wearable electronics or surgical guides. The goal of the session is to promote and highlight important synergies between fundamental biomechanics and mechanobiology research and more applied, technology-driven investigations on additive manufacturing or biofabrication methods. This workshop is a joint workshop between the Solid Mechanics and the Cell & Tissue Engineering technical committees. Important themes include:

- (Mechanics) Bioprinting for functional tissue/organ development (e.g., with or without a bioreactor)
- (Cell and Tissue) Printable complexity of materials and cells used to create a single scaffold
- Challenges and limitations in current printing technology (e.g., resolution, printing integrity)

Speakers:

Jay B. Hoying, PhD (Advanced Solutions Life Sciences) -- "Biofabrication of the Vasculature"

Adam W. Feinberg, PhD (Carnegie Mellon University) -- "Rebuilding the Heart by 3D Bioprinting of the Extracellular Matrix"

Wei Gao, PhD (University of California, Berkeley) -- "Wearable Sweat Biosensors"

FRIDAY, JUNE 23

11:00 AM - 12:30 PM

Workshop: Ocular Biomechanics: What's Our Vision?

Tucson CD

Organizers: Ian Sigal (University of Pittsburgh, Ophthalmology) and Jonathan Vande Geest (University of Pittsburgh, Bioengineering)

The eye must seamlessly integrate several complex systems in order to achieve its proper function – effective capture and transmission of a visual signal to the brain. These subsystems rely on finely tuned biomechanics, so that mechanical properties and microstructure of ocular tissues play a critical role in providing the appropriate environment to promote proper integration and function of these complex subsystems and the eye itself. The complexity of this organ requires the use of experiments and modeling to understand the role of ocular biomechanics on visual function. This knowledge is also necessary to improve the available tools for diagnosis and treatment of eye disease, as well as to develop novel methods to enhance vision.

This symposium will bring experts in ocular biomechanics together to disseminate state of the art tools experimental, theoretical and computational modeling of the eye. A particular focus of this symposium will be discussions related to the future of this field and how ocular biomechanics might play a role in restoring vision in a variety of ocular pathologies and injuries.

Speakers:

Ross Ethier, PhD (Georgia Institute of Technology)

Rouzbeh Amini, PhD (University of Akron)

Vicky Nguyen, PhD (Johns Hopkins University)

Ian Sigal, PhD (University of Pittsburgh)

Jonathan Vande Geest, PhD (University of Pittsburgh)

Bradley Greger, PhD (Arizona State University)

FRIDAY, JUNE 23	11:00 AM - 12:30 PM
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Workshop: Grad School Pro Tips – Responsible Conduct in Science

Tucson IJ

Organizers: Mitra Shabani (Clemson University), Aslak Wigdahl Bergersen (Simula Research Laboratory), Katrina J Hansen (Worcester Polytechnic Institute), and Bhargavi Krishnan (University of Kansas)

During university studies, students are trained in the subject they study, such as biomechanics, numerical methods etc., however they are not taught the study of science, or more practical tasks such as how to peer review. The goal of this workshop is therefore to discuss on how to conduct science responsibly. The workshop will cover a variety of topics including responsible conduct in computational modeling, responsible conduct working with data: acquisition, management, sharing, and ownership of data and responsible conduct in collaborations, peer review, publication practices, and authorship. The workshop will be organized as a panel comprised of fellow presenters at the SB³C followed by questions from the audience.

Speakers:

Sara Wilson, PhD (University of Kansas)

Robert Nerem, PhD (Georgia Institute of Technology)

Michele Grimm, PhD (National Science Foundation and Wayne State University)

Jeffrey Holmes, PhD (University of Virginia)

Moderator:

Kristian Valen-Sendstad, Ph.D. (Simula Research Laboratory, Norway)

FRIDAY, JUNE 23	11:00 AM - 12:30 PM
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Workshop: Advanced Medical Imaging for Assessing Physiological Flows

San Luis

Organizer: Alejandro Roldán-Alzate (University of Wisconsin – Madison)

Recent advances in medical imaging technologies have improved our ability to non-invasively assess fluid dynamics phenomena in physiological and pathological conditions. The combination of these techniques with experimental set ups as well as numerical simulations have the potential to serve as predictive tools for surgical and treatment planning. The purpose of this workshop is to review the available medical imaging techniques and how those could help the fluid biomechanics research.

Speakers:

Craig J. Goergen, PhD (Weldon School of Biomedical Engineering, Purdue University) --

Doppler Ultrasound Imaging for Blood Flow Assessment

Kevin M. Johnson, PhD (University of Wisconsin – Madison) -- MRI techniques for imaging fluid flow and motion.

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Alex Barker, PhD (Feinberg School of Medicine, Northwestern University) -- MRI Derived Biomarkers of Hemodynamic Performance

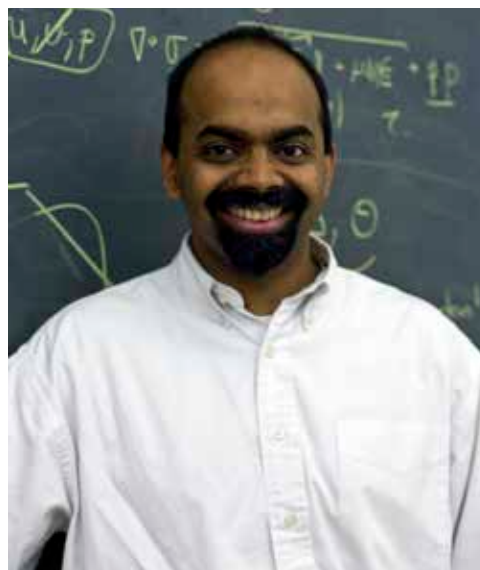
Charles Strother, MD (University of Wisconsin – Madison) -- Time Resolved 3D DSA (4D DSA) and Angiographic Flat Detector Derived Dynamic Brain Perfusion Maps; Anatomy and Physiology in the Angiographic Suite

FRIDAY, JUNE 23	5:45 - 6:45 PM
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Plenary Lecture: On Growth and Form – Geometry, Physics and Biology **Tucson EF**

L. Mahadevan, PhD (School of Engineering and Applied Sciences, and Departments of Physics, and Organismic and Evolutionary Biology, Harvard University)

A century ago, the publication of D’Arcy Thompson’s classic “On growth and form” laid out his vision to look at form from a mathematical and physical perspective, a view that has finally begun to permeate into the fabric of modern biology. Motivated by qualitative and quantitative biological observations, I will show that there is a “method in the madness” - using examples of growth and form in cells, tissues and organs such as a freely growing pollen tube, undulating fringes on a leaf or petal, the growth of floral spurs, the looping of the gut and the coiling of tendrils. In each case, we will see how a combination of biological and physical experiments, mathematical models and computations allow us to unravel the quantitative basis for the diversity and complexity of biological form, with tantalizing links to evolutionary canalization, biomimetic technologies, and new aspects of geometry and analysis.



FRIDAY, JUNE 23	6:45 - 7:45 PM
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Mixer: IAB/SLC Networking Mixer **Arizona 3-5**

Organizers: Industrial Advisory Board and Student Leadership Council

This year the IAB has organized several events specifically designed to meet the needs of conference participants from industry (see page 8 for additional details and events). At this networking mixer, students and industry representatives join together, make connections with potential employers, and network with a wide variety of participants. *(registration required)*

FRIDAY, JUNE 23	6:45 - 7:45 PM
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SB³C Women’s Networking Event **Arizona 2**

Organizer: Rita M. Patterson (University of North Texas Health Science Center)

We welcome all University Faculty, Post doctorate, Government, and Industry women to attend.

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

SATURDAY, JUNE 24**10:30 AM - 12:00 PM****Workshop:****Tucson AB****Establishing and Improving Collaboration Between Industry and Academics**

Organizers: Martin L. Tanaka (Western Carolina University) and Alan Eberhardt (University of Alabama at Birmingham)

Establishing collaborations between industry and academics can be beneficial to both. Industry gains access to important research capabilities and academics benefit from a more customer needs focused approach to problem solving. Combining the resources of both entities can create a strong team that can focus on solving critical medical needs. However, the pathway towards joining forces comes with challenges. We have invited two experts to discuss how they initiate and manage these collaborations. Dr. Art Erdman is the Director of the Medical Devices Center at the University of Minnesota, a Fellow of ASME and AIMBE, and former editor of the ASME Journal of Medical Devices. Our second expert, Dr. Ahmed Al-Jumaily, is the Founder & Director of the Institute of Biomedical Technologies at Auckland University of Technology, a Fellow of ASME, and the Track Organizer for Biomedical & Biotechnology Engineering at ASME's IMECE. The workshop will begin with brief presentations by the organizers and key speakers. Following this will be small group discussions where workshop participants can ask the organizers/speakers specific questions. This workshop is sponsored by the Industry Advisory Board; Design, Dynamics, and Rehabilitation Technical Committee; and the Education Committee.

Speakers:

Art Erdman, PhD (University of Minnesota)

Ahmed Al-Jumaily, PhD (Auckland University of Technology – New Zealand)

SATURDAY, JUNE 24**12:30 PM - 2:00 PM****Workshop:****Tucson AB****From Bench to Bedside: Mechanics, Materials, and Metrics for Tendon Repair and Regeneration**

Organizers: Nelly Andarawis-Puri (Cornell University), Alice Huang (Mount Sinai School of Medicine), and Spencer Lake (Washington University)

Tendon and ligament damage is one of the major causes of musculoskeletal dysfunction, yet few new therapies to treat these disorders have emerged, despite considerable clinical interest. Potential strategies to treat damage must integrate numerous considerations, including structure, mechanics, materials, and cell biology. To address these considerations, this workshop will provide an overview of the state of the field, current perspectives, and new insights on tendon biomechanics and tissue engineering/regeneration. Presentations by leading experts will be followed by a breakout discussion with guided talking points to identify new directions for the field and foster collaboration across groups.

Speakers:

Ray Vanderby, PhD (University of Wisconsin, Madison)

Ellen Arruda, PhD (University of Michigan)

SATURDAY, JUNE 24	12:30 PM - 2:00 PM
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Workshop:**Tucson CD****Using MATLAB in Biomedical Engineering Education and Research**

Organizers: Rouzbeh Amini (University of Akron), Alisa Morss Clyne (Drexel University), Corinne Henak (University of Wisconsin-Madison), Joseph Iaquinto (VA/University of Washington), Ferris Pfeiffer (University of Missouri), Ye Cheng (Mathworks), Anita Singh (Widener University), Sara Wilson (University of Kansas)

MATLAB is a programming language with numerous built-in functions and examples useful in biomedical engineering education and research. This workshop is designed for a broad audience of SB3C attendees, including graduate students, post-doctoral trainees, and faculty members. During the first 30 minutes of the workshop, Dr. Richard Hart will share his experiences teaching a sophomore biomedical engineering course on “Numerical Simulations in Biomedical Engineering,” which extensively uses MATLAB. During the remaining 60 minutes, Dr. Balaji Sharma from MathWorks will demonstrate how to use MATLAB in education and research, covering topics such as Hardware for project-based learning (such as Arduino/Raspberry Pi), Live editor for interactive teaching, Autograder for instant feedback, App Designer to create MATLAB apps, or Internet of things and data analytics. Through this workshop, attendees will learn about recent features in MATLAB that are relevant to bioengineering teaching and research.

Speakers:**Richard Hart, PhD** (The Ohio State University)**Balaji Sharma, PhD** (Mathworks)

SATURDAY, JUNE 24	5:45 - 6:45 PM
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H.R. Lissner Medal Award Lecture:**Tucson EF****A Perspective on the Role of Modeling in Biomechanics****Gerard Ateshian, PhD** (Columbia University)

Bioengineering is an interdisciplinary field where engineers often interact with physicians, biologists, biochemists, and other practitioners in the biomedical sciences. Engineers are trained to include modeling as part of their scientific approach for addressing societal needs, but sometimes find themselves at odds trying to justify this fundamental strategy to members of scientific communities that have traditionally relied primarily on experimental observations for uncovering and deducing mechanisms in living systems. This presentation provides my perspective on the challenges, and occasional successes, encountered with the modeling of biological tissues and associated processes in living systems, with illustrations from our research in cartilage mechanics and tissue engineering. I also present my perspective for a road plan to advance biomechanics theories to meet these challenges in the long term.

2017 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 2017 award winners will be announced at the conference banquet.

H.R. Lissner Medal



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

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.

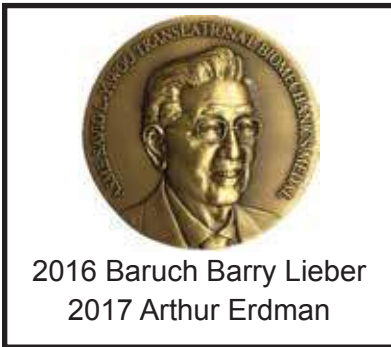
2017 Gerard A. Ateshian, PhD

Dr. Gerard A. Ateshian received his B.S. (1986), M.S. (1987) and Ph.D. (1991) degrees in Mechanical Engineering at Columbia, pursuing his doctoral research in the Department of Orthopaedic Surgery. He stayed on as a faculty member at Columbia where he is currently the Andrew Walz Professor of Mechanical Engineering. Dr. Ateshian has been a longstanding member of the Bioengineering Division of ASME (BED), having served on multiple committees and rising to the position of Division Chair in 2006. He has mentored 25 Ph.D. students,



42 M.S. students and 61 B.S. students to date. He has received the Great Teacher Award from the Society of Columbia Graduates in 2002 and the Columbia Engineering Alumni Association Distinguished Faculty Teaching Award in 2012. Dr. Ateshian's research has addressed many different facets of osteoarthritis research with an experimental focus on cartilage mechanics and tissue engineering, while also making significant theoretical and computational advances in the field of continuum mechanics. He was awarded the Y.C. Fung Young Investigator Award from the BED in 1997 and the OARSI Basic Science Award from the Osteoarthritis Research Society International in 2013. He has published over 200 peer-reviewed full-length manuscripts, with 19,000 citations and an h-index of 71. Dr. Ateshian is also a co-developer of the FEBio finite element open-source software suite, which addresses the specific needs of the biomechanics community. Currently, there are more than 5,100 registered FEBio users; since its initial release in 2007 there have been more than 110,000 software downloads.

Savio L-Y. Woo Medal



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.

2017 Arthur Erdman, PhD

Arthur G. Erdman, P.E., is the Richard C. Jordan Professor and a Morse Alumni Distinguished Teaching Professor of Mechanical Engineering at the University of Minnesota, specializing in mechanical design, bioengineering and product design. In July 2007, he was selected as the Director of the Medical Devices Center at the U of M and is also the Co-Editor of the ASME Journal of Medical Devices.

He received his BS degree at Rutgers University, his MS and Ph.D. at RPI. Dr. Erdman has published over 370 technical papers, 3 books, is co-inventor of over 45 patents and shares with his former students 9 Best Paper Awards at international conferences. Dr. Erdman has had research collaborations with numerous health sciences faculty including those in Ophthalmology, Neuroscience, Epidemiology, Cardiology, Urology, Orthopedics, Surgery, Dentistry, Otolaryngology, Veterinary Medicine and Sports Biomechanics.

He has consulted at over 50 companies in mechanical, biomedical and product design, including Xerox, 3M, Andersen Windows, Proctor and Gamble, HP, Rollerblade, Sulzer Medica, St. Jude Medical and Yamaha. He has received a number of awards including ASME Machine Design Award, the ASME Outstanding Design Educator Award and the U of M Outstanding Service Award. Erdman is a Fellow of ASME and a Founding Fellow of AIMBE. Dr. Erdman has served as chair of the Publications committee, the Design Division and the Bioengineering Divisions of ASME. He has also been the Chair of fifteen Design of Medical Devices Conferences which are held next to the University of Minnesota each April.

In April 2013, he received the Academy of Medical Device Innovators Award from the University of Minnesota and The Institute for Engineering for Medicine. Dr. Erdman was selected as a “Titan of Technology” in the Technology Advocate category October 2014 by the Minneapolis/St. Paul Business Journal. In 2017 he received the ASME Savio L-Y Woo Translational Biomechanics Medal, for “translating meritorious bioengineering science to clinical practice through research, education, professional development, and with service to the bioengineering community.”



Van C. Mow Medal



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

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.

2017 Richard R. Neptune, PhD

Dr. Richard R. Neptune earned his Ph.D. in Mechanical Engineering from the University of California, Davis. He held post-doctoral positions at the University of Calgary and the VA Palo Alto Rehabilitation Research and Development Center. He has served on the Department of Mechanical Engineering faculty at UT



Austin since 2001. His research integrates musculoskeletal modeling, computer simulation and experimental analyses to identify the neuromotor and biomechanical mechanisms that contribute to locomotor impairments in those with movement disabilities including lower-limb amputees, stroke patients and wheelchair users. His research also seeks to improve the performance of orthotic and prosthetic devices using advanced additive manufacturing techniques. His research has been supported primarily by the Department of Veteran's Affairs, National Science Foundation and National Institutes of Health. He has received the American Society of Biomechanics Young Scientist Award and CAREER award from the National Science Foundation. He is also the recipient of the Da Vinci Award from the Engineering Society of Detroit and National Multiple Sclerosis Society and the Outstanding Young Scientist Award from the Houston Society for Engineering in Medicine and Biology. He recently received the Joe and Bettie Branson Ward Endowed Excellence Award from The University of Texas at Austin for his teaching and research that has contributed to changes of positive value to society. He also received the Lockheed Martin Aeronautics Company Award for Excellence in Engineering Teaching and was elected Fellow of the American Society of Biomechanics. He has served ASME in a number of capacities including organizing and chairing conference sessions and as an Associate Editor for the Journal of Biomechanical Engineering. He is currently the Chair of the Department of Mechanical Engineering and a Provost Teaching Fellow, and holds the John T. MacGuire Professorship in Mechanical Engineering.

Y.C. Fung Young Investigator 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

The Y.C. Fung Young Investigator 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.

2017 Kristin Myers, PhD

Kristin Myers is an Associate Professor in the Department of Mechanical Engineering at Columbia University in the City of New York. She received her Mechanical Engineering doctorate (2008) and masters (2005) degrees from MIT under the mentorship of Dr. Simona Socrate and her bachelors (2002) degree from the University of Michigan under the guidance of Dr. Alan Wine- man. In 2010 she completed post-doctoral research in the field of ocular biomechanics mentored by Dr. Thao (Vicky)



Nguyen at Johns Hopkins. In 2010 she founded the Myers Soft Tissue Lab at Columbia, which uses experimental, theoretical, and computational mechanics to solve problems in Women's Health and Reproductive Biomechanics. With clinical translation in mind, her lab is uncovering the structural antecedents of preterm birth. Through the experimental interrogation of nonpregnant and pregnant cervical tissue and multi-organ finite element models of pregnancy, her work has: 1) quantified the nonlinear and time-dependent material behavior of the cervix, 2) measured the evolution of cervical collagen crosslinking throughout a murine pregnancy, identifying the key gestational time points of collagen network remodeling, 3) established an anisotropic material model for human cervix informed by collagen directionality data 4) quantified and visualized the loading environment of human pregnancy to uncover the load-sharing capability

of the uterus, fetal membranes, and cervix, and 5) demonstrated the structural role of the cervical collagen fiber architecture and collagen fiber strength in preventing early cervical deformation. Dr. Myers' work is funded by the NIH, NSF, and the March of Dimes, including the NSF CAREER award to develop the framework to model hormone-mediated tissue growth and remodeling of the uterine cervix during pregnancy.

The SB³C Program Committee thanks all of our abstract reviewers!

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HOW TO NAVIGATE THIS BOOK

This year the organizing committee made a few changes to the program book related to the assigned abstract number, (e.g. SB³C2017-1 or SB³C2017-P1). Below are examples of a technical session presentation and a poster presentation as they are presented in the program book with a box around the abstract number.

Technical Session (Podium) Presentation Example

2:45PM **Alterations in Mechanical Properties and In Vivo Geometry of the Mitral Valve Following Myocardial Infarction**

SB³C2017-1

Bruno V. Rego¹, Salma Ayoub¹, Amir H. Khalighi¹, Andrew Drach¹, Joseph H. Gorman², Robert C. Gorman², Michael S. Sacks¹, ¹*Institute for Computational Engineering and Sciences, The University of Texas at Austin, Austin, TX, United States*, ²*Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA, United States*

Here the “1” at the end indicates the number of the presentation as it is listed in the program book. It also indicates the order of the abstract in the conference proceedings.

Here “P1” at the end indicates that this is a poster presentation and it is the first listed in the program book. This is also the number to use when hanging your poster. It also indicates the order of the abstract in the conference proceedings following the technical session presentations.

Poster Presentation Example

The Effect of Floor Stiffness on Standing Posture and Sway SB³C2017-P1

Daiane Aizen Grill¹, Sara E. Wilson¹, ¹*Department of Mechanical Engineering, The University of Kansas, Lawrence, KS, United States*

Additionally, there are 2 author indices (as highlighted below). The first organizes the authors according to the **presentation number** as described above. It starts on page 85. The second organizes authors according to the **page number** in the program book. It starts on page 98. There is also a session chair/co-chair index organized by page number on page 109.

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SCIENTIFIC SESSIONS

Wednesday, June 21**2:45pm - 4:15pm****Heart Valve Mechanics (Solids)****Tucson AB****Session Chair: Wei Sun**, *Georgia Institute of Technology, GA, United States***Session Co-Chair: Robert L. Hood**, *Houston Methodist, TX, United States*

- 2:45PM Alterations in Mechanical Properties and In Vivo Geometry of the Mitral Valve Following Myocardial Infarction** SB³C2017-1
Bruno V. Rego¹, Salma Ayoub¹, Amir H. Khalighi¹, Andrew Drach¹, Joseph H. Gorman², Robert C. Gorman², Michael S. Sacks¹, ¹*Institute for Computational Engineering and Sciences, The University of Texas at Austin, Austin, TX, United States*, ²*Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA, United States*
- 3:00PM Blocking Cadherin-11 Prevents Calcific Aortic Valve Disease In Notch1^{+/-} Mice** SB³C2017-2
W. David Merryman, Cyndi Clark, *Vanderbilt University, Nashville, TN, United States*
- 3:15PM Coaptation Zone in Tricuspid Annulus Cinching: A Pilot Study Using an Ex-Vivo Porcine Model** SB³C2017-3
Ashley Thomas¹, Paola Diaz-Portela², Edward Y. Sako³, Shamik Bhattacharya², ¹*Physics, St. Mary's University, San Antonio, TX, United States*, ²*Engineering, St. Mary's University, San Antonio, TX, United States*, ³*Cardiothoracic Surgery, The University of Texas Health Science Center at San Antonio, San Antonio, TX, United States*
- 3:30PM Effect Of Restricting Mitral Valve Annular Contraction On Anterior Leaflet Strain: An In Vitro Study** SB³C2017-4
Thomas F. Easley¹, Vinay Bhal², Charles H. Bloodworth¹, Ajit P. Yoganathan², ¹*Parker H. Petit Institute for Bioengineering and Bioscience, Georgia Institute of Technology, Atlanta, GA, United States*, ²*Wallace H. Coulter Department of Biomedical Engineering, Georgia Institute of Technology, Atlanta, GA, United States*
- 3:45PM In Vitro Left Heart System with 7T MRI Provides High Resolution Mitral Valve 3D Imaging Datasets for Computational Modeling** SB³C2017-5
Sam E. Stephens¹, Mariana R. Maissonette², Serguei Liachenko³, Jonathan F. Wenk⁴, **Morten O. Jensen**², ¹*Department of Mechanical Engineering, University of Arkansas, Fayetteville, AR, United States*, ²*Department of Biomedical Engineering, University of Arkansas, Fayetteville, AR, United States*, ³*Bioimaging Laboratory, Division of Neurotoxicology, FDA National Center for Toxicology Research, Jefferson, AR, United States*, ⁴*Department of Mechanical Engineering, University of Kentucky, Lexington, KY, United States*
- 4:00PM Long-term Growth Of Calcific Aortic Valve Disease: A Mechanobiology Model** SB³C2017-6
Amirhossein Arzani¹, Kristyn S. Masters², Mohammad R. K. Mofrad¹, ¹*University of California Berkeley, Berkeley, CA, United States*, ²*University of Wisconsin Madison, Madison, WI, United States*

Wednesday, June 21**2:45pm - 4:15pm****Spine Mechanics (Solids)****Tucson CD****Session Chair: Beth Winkelstein**, *University of Pennsylvania, PA, United States***Session Co-Chair: John Peloquin**, *University of Delaware, DE, United States*

- 2:45PM Biomechanical Differences Between Male And Female Sacroiliac Joints Implanted With Three Different Sacroiliac Implant Systems: Stress Analyses** SB³C2017-7
Amin Joukar, Anoli Shah, Ali Kiapour, Ardalan Seyed Vosoughi, Anand K. Agarwal, Hossein Elgafy, Nabil Ebraheim, Vijay K. Goel, *University of Toledo, Toledo, OH, United States*
- 3:00PM The Occipitoatlantal Capsular Ligaments Are The Primary Stabilizers of The Adult Craniocervical Junction** SB³C2017-8
Rinchen Phuntsok^{1,2}, Douglas L. Brockmeyer³, Andrew T. Dailey³, Michael R. Herron^{1,2}, Kenneth L. Smith^{1,2}, Benjamin J. Ellis^{1,2}, ¹*Department of Bioengineering, University of Utah, Salt Lake City, UT, United States*, ²*Scientific Computing and Imaging Institute, University of Utah, Salt Lake City, UT, United States*, ³*Department of Neurosurgery, University of Utah, Salt Lake City, UT, United States*
- 3:15PM Towards Enhancing the Consistency of Vertebral Kinematics in a Rat Dislocation Spinal Cord Injury Model** SB³C2017-9
Stephen Mattucci¹, Jie Liu², Paul Fijal¹, Wolfram Tetzlaff², Thomas Oxlund¹, ¹*Orthopaedics, University of British Columbia, Vancouver, BC, Canada*, ²*International Collaboration on Repair Discoveries (ICORD), Vancouver, BC, Canada*

SCIENTIFIC SESSIONS

- 3:30PM Electro-Mechanical Actuator for High Frequency Magnetic Resonance Elastography In-Vivo of the Spine** SB³C2017-10
Sean M. Rothenberger¹, Thomas U. Neuberger², Corina S. Drapaca³, Daniel H. Cortes¹, ¹*Department of Mechanical and Nuclear Engineering, Pennsylvania State University, University Park, PA, United States*, ²*Department of Biomedical Engineering, Pennsylvania State University, University Park, PA, United States*, ³*Department of Engineering Science and Mechanics, Pennsylvania State University, University Park, PA, United States*
- 3:45PM MRI Quantification of In Vivo Human Disc Diurnal Compression and Induced Flexion** SB³C2017-11
Kyle D. Meadows¹, John M. Peloquin¹, Edward J. Vresilovic², Dawn M. Elliott¹, ¹*Biomedical Engineering, University of Delaware, Newark, DE, United States*, ²*Department of Orthopaedics and Rehabilitation, Pennsylvania State University, Newark, DE, United States*
- 4:00PM Effect of Spinal Fusion on Biomechanics of Adjacent Segment Discs: An In-Vivo Patient Study** SB³C2017-12
Kamran Z. Khan¹, Thomas D. Cha¹, Louis G. Jenis¹, James D. Kang², Kirkham B. Wood³, Guoan Li¹, ¹*Orthopaedic Surgery, Harvard Medical School & Massachusetts General Hospital, Boston, MA, United States*, ²*Orthopaedic Surgery, Harvard Medical School & Brigham and Women's Hospital, Boston, MA, United States*, ³*Orthopaedic Surgery, Stanford University Medical Center, Redwood City, CA, United States*

Wednesday, June 21	2:45pm - 4:15pm
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Cardiovascular Growth, Remodeling, & Repair (Solids)

Tucson IJ

Session Chair: Seungik Baek, *Michigan State University, MI, United States*
Session Co-Chair: Chiara Bellini, *Yale University, CT, United States*

- 2:45PM Computational Modeling Of Remodeling Following Relief Of Hemodynamic Overload In A Biventricular Canine Heart Model** SB³C2017-13
Amir Nikou¹, Kyoko Yoshida², Colleen M. Witzenburg², Andrew D. McCulloch¹, Jeffrey H. Omens¹, Jeffrey W. Holmes², ¹*University of California San Diego, La Jolla, CA, United States*, ²*University of Virginia, Charlottesville, VA, United States*
- 3:00PM Targeting Serotonin 2B Receptor To Improve Cardiac Function Following Myocardial Infarction** SB³C2017-14
J. Caleb Snider¹, Qinkun Zhang², Hind Lal², W. David Merryman¹, ¹*Biomedical Engineering, Vanderbilt University, Nashville, TN, United States*, ²*Department of Cardiovascular Medicine, Vanderbilt University, Nashville, TN, United States*
- 3:15PM The Interplay of Growth and Remodeling in Human Heart Valves During Somatic Growth** SB³C2017-15
Pim J. A. Oomen^{1,2}, Carlijn V. C. Bouten¹, Ellen Kuhl², **Sandra Loerakker**^{1,2}, ¹*Biomedical Engineering, Eindhoven University of Technology, Eindhoven, Netherlands*, ²*Mechanical Engineering, Stanford University, Stanford, CA, United States*
- 3:30PM Regional Variations in Cell-Matrix Mechano-Adaptation Drive Hypertensive Vascular Remodeling** SB³C2017-16
Matthew R. Bersi^{1,2}, Ramak Khosravi², Anna Wujciak², Alexander W. Caulk², David G. Harrison³, Jay D. Humphrey^{2,4}, ¹*Biomedical Engineering, Vanderbilt University, Nashville, TN, United States*, ²*Biomedical Engineering, Yale University, New Haven, CT, United States*, ³*Medicine and Pharmacology, Vanderbilt University, Nashville, TN, United States*, ⁴*Vascular Biology & Therapeutics Program, Yale University, New Haven, CT, United States*
- 3:45PM Strain Mediated Enzyme Degradation of Arterial Tissue; Implications in Disease and Medical Device Design** SB³C2017-17
Robert Gaul, Caitríona Lally, *Trinity College Dublin, Dublin, Ireland*
- 4:00PM Modelling the Dissection of Arterial Tissue** SB³C2017-18
Brian FitzGibbon^{1,2}, Niamh Hynes², Sherif Sultan², Peter McHugh¹, Patrick McGarry¹, ¹*Biomedical Engineering, National University of Ireland, Galway, Co. Galway, Ireland*, ²*Western Vascular Institute, Vascular & Endovascular Surgery, Galway University Hospitals, Co. Galway, Ireland*

Wednesday, June 21**2:45pm - 4:15pm****Bone Biomechanics (Solids)****San Ignacio****Session Chair: Elise Morgan, Boston University, MA, United States****Session Co-Chair: Dan Nicoletta, Southwest Research Institute, TX, United States**

- 2:45PM Effects of Daily and Cyclic Parathyroid Hormone (PTH) Treatment Regimens on Bone in Ovariectomized Rats** SB³C2017-19
Hongbo Zhao, Wei-Ju Tseng, Wonsae Lee, Yang Liu, Yihan Li, Chantal de Bakker, X.Sherry Liu, *Department of Orthopaedic Surgery, University of Pennsylvania, Philadelphia, PA, United States*
- 3:00PM TART Cherry Prevents Bone Loss Through Inhibition of RANKL in TNF-Overexpressing Mice** SB³C2017-20
Linda A. Effiong¹, Nicolas Moon², Saquib Nizami¹, Thomas R. Gardner¹, Do Y. Soung¹, *Department of Orthopaedic Surgery, Columbia University, New York, NY, United States*, ²*Department of Medicine, Case Western Reserve University, Cleveland, OH, United States*
- 3:15PM In Vivo Bone Strain and Cortical Bone Response to Mechanical Load in the Mouse Tibia** SB³C2017-21
Kari Verner¹, Haisheng Yang², Russell Main², ¹*Weldon School of Biomedical Engineering, Purdue University, West Lafayette, IN, United States*, ²*Basic Medical Sciences, Purdue University, West Lafayette, IN, United States*
- 3:30PM The Relationship Between Pore Morphology and Cortical Bone Mechanics** SB³C2017-22
Lydia P. Bakalova¹, Jesper S. Thomsen², Christina M. Andreasen³, Annemarie Br uel², Ellen M. Hauge², Birgitte Jul Kill², Thomas Levin Andersen³, **Mariana E. Kersh**¹, *Department of Mechanical Science and Engineering, University of Illinois at Urbana-Champaign, Urbana, IL, United States*, ²*Department of Biomedicine, Aarhus University, Aarhus, Denmark*, ³*Dept. of Clinical Cell Biology (KCB), Vejle Hospital - Lilleb elt Hospital, Institute of Regional Health Research, University of Southern Denmark, Vejle, Denmark*
- 3:45PM Experimental Measurement of Multiaxial Strain States and Multiaxial Yielding of Trabecular Bone During Vertebral Failure** SB³C2017-23
Johnfredy Loaiza, Amira I. Hussein, Elise F. Morgan, *Mechanical Engineering, Boston University, Boston, MA, United States*
- 4:00PM Development and Validation of Subject-Specific Proximal Femur and Lumbar Spine Finite Element Models of Obese, Older Adults to Evaluate the Effects of Weight Loss on Bone Strength** SB³C2017-24
Ashley A. Weaver¹, Samantha L. Schoell¹, Daniel P. Beavers², Leon Lenchik³, W. Jack Rejeski⁴, Joel D. Stitzel¹, Kristen M. Beavers⁴, ¹*Biomedical Engineering, Wake Forest University, Winston-Salem, NC, United States*, ²*Biostatistical Sciences, Wake Forest University, Winston-Salem, NC, United States*, ³*Radiology, Wake Forest University, Winston-Salem, NC, United States*, ⁴*Health and Exercise Science, Wake Forest University, Winston-Salem, NC, United States*

Wednesday, June 21**2:45pm - 4:15pm****Thrombosis (Fluids)****Tucson GH****Session Chair: Keefe Manning, Pennsylvania State University, PA, United States****Session Co-Chair: Shawn Shadden, UC Berkeley, CA, United States**

- 2:45PM Limitations of the Scalar Stress for Predicting Hemolysis in Complex Flows** SB³C2017-25
Mohammad M. Faghih, M. Keith Sharp, *Mechanical Engineering, University of Louisville, Louisville, KY, United States*
- 3:00PM 3D Reconstruction Of The Hemostatic Plug Transport Microenvironment** SB³C2017-26
Mehran Mirramezani¹, Maurizio Tomaiuolo², Timothy J. Stalker², Shawn C. Shadden¹, ¹*Mechanical Engineering, University of California, Berkeley, Berkeley, CA, United States*, ²*Department of Medicine, University of Pennsylvania, Philadelphia, PA, United States*
- 3:15PM An Investigation of the Relationship between Platelet Adhesion and Surface Topography in the Penn State Pediatric VAD** SB³C2017-27
Ashlyn Mueser¹, Chris A. Siedlecki^{1,2}, William J. Weiss^{1,2}, **Keefe B. Manning**^{1,2}, ¹*Biomedical Engineering, The Pennsylvania State University, University Park, PA, United States*, ²*Surgery, Penn State Hershey Medical Center, Hershey, PA, United States*

- 3:30PM A Predictive Multiscale Mode For Simulating Flow-induced Platelet Activation And Aggregation: Correlating With In-vitro Results** SB³C2017-28
Peng Zhang¹, Jawaad Sheriff¹, Prachi Gupta², Marvin J. Slepian³, Yuefan Deng², Danny Bluestein¹, ¹*Biomedical Engineering Department, Stony Brook University, Stony Brook, NY, United States*, ²*Applied Mathematics Department, Stony Brook University, Stony Brook, NY, United States*, ³*Departments of Medicine and Biomedical Engineering, University of Arizona, Tucson, AZ, United States*
- 3:45PM Clot Formation in a Model Intracranial Aneurysm is Modulated by Endovascular Coil Shape and Arrangement** SB³C2017-29
Brittany Earnest¹, Avery J. Evans², Brian P. Helmke¹, ¹*Biomedical Engineering, University of Virginia, Charlottesville, VA, United States*, ²*Radiology, University of Virginia, Charlottesville, VA, United States*
- 4:00PM Evaluation of a Near-Wall Residence Time Model for Thrombogenic Potential** SB³C2017-30
Kirk B. Hansen, Shawn C. Shadden, *Mechanical Engineering, University of California, Berkeley, Berkeley, CA, United States*

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Biotransport and Microfluidics (BTR)

San Luis

Session Chair: Bumsoo Han, *Purdue University, IN, United States*

Session Co-Chair: Jiangzhou Zhou, *Yale University, CT, United States*

- 2:45PM Efficient Capture Of Circulating Tumor Cells In A Microfluidic Device** SB³C2017-31
Yaling Liu^{1,2}, Shunqiang Wang¹, Wentao Shi², ¹*Department of Mechanical Engineering and Mechanics, Lehigh University, Bethlehem, PA, United States*, ²*Bioengineering Program, Lehigh University, Bethlehem, PA, United States*
- 3:00PM Microfluidic Sorting Of Cell Viability Based On Stiffness For Applications In Regenerative Medicine** SB³C2017-32
 Muhymin Islam¹, Hannah Brink², Syndey Blanche², Caleb DiPrete², Tom Bongiorno¹, Nicholas Stone¹, Anna Liu², Anisha Philip³, Gonghao Wang¹, Wilbur Lam^{2,3}, Alexander Alexeev¹, Edmund K. Waller³ **Todd Sulchek**^{1,2}, ¹*George W. Woodruff School of Mechanical Engineering, Georgia Institute of Technology, Atlanta, GA, United States*, ²*Wallace H. Coulter Department of Biomedical Engineering, Georgia Institute of Technology, Atlanta, GA, United States*, ³*Winship Cancer Institute, Emory School of Medicine, Atlanta, GA, United States*
- 3:15PM PTEN Deletion in Pancreatic Cancer Associated Fibroblasts Decreases Hydraulic Permeability in a 3D Microfluidic Model of the Tumor Stroma** SB³C2017-33
Alex Avendano¹, Jonathan Chang², Christina Ennis³, Amanda Stratton⁴, Jason R. Pitarresi⁵, Michael C. Ostrowski⁶, Jonathan W. Song^{1,6}, ¹*Department of Mechanical Engineering, The Ohio State University, Columbus, OH, United States*, ²*Department of Biomedical Engineering, The Ohio State University, Columbus, OH, United States*, ³*Neuroscience, Kenyon College, Gambier, OH, United States*, ⁴*Bioengineering, Lehigh University, Bethlehem, PA, United States*, ⁵*Division of Gastroenterology, University of Pennsylvania, Philadelphia, PA, United States*, ⁶*The Comprehensive Cancer Center, The Ohio State University, Columbus, OH, United States*
- 3:30PM Development Of A Vascularized 3D Microfluidic Tumor Platform To Study Particle Transport** SB³C2017-34
Manasa Gadde¹, Rhys Michna², Marissa N. Rylander³, ¹*Biomedical Engineering, University of Texas at Austin, Austin, TX, United States*, ²*Mechanical Engineering, University of Texas at Austin, Austin, TX, United States*, ³*Mechanical Engineering, University of Texas at Austin, Austin, TX, United States*
- 3:45PM Relation Between Accuracy and Persistence of Cancer Cell Migration Under Chemical Gradient** SB³C2017-35
Hye-ran Moon¹, Julien Varennes², Andrew J. Mugler², Bumsoo Han^{1,3}, ¹*School of Mechanical Engineering, Purdue University, West Lafayette, IN, United States*, ²*Department of Physics and Astronomy, Purdue University, West Lafayette, IN, United States*, ³*Purdue Center for Cancer Research, Purdue University, West Lafayette, IN, United States*
- 4:00PM Impact of CXCL-12 Isoforms on Breast Cancer Invasion** SB³C2017-36
Sarah Bushman, *Ohio State University, Columbus, OH, United States*

Wednesday, June 21

2:45pm - 4:15pm

Intrinsic and Extrinsic Regulation of Cellular Mechanotransduction (CTE)

San Pedro

Session Chair: Joel Boerckel, *University of Notre Dame, IN, United States*

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

- 2:45PM Nuclear Envelope Wrinkling and Connectivity Regulates MSC Mechano-Adaptation and YAP/TAZ Translocation** SB³C2017-37
Brian D. Cosgrove, Tristan P. Driscoll, Eric N. Dai, Su-Jin Heo, Jason A. Burdick, Robert L. Mauck, *Bioengineering, University of Pennsylvania, Philadelphia, PA, United States*
- 3:00PM Modulating Substrate Stiffness, Cell Morphology and Oxygen Availability in 3D Hydrogels Direct the Chondrogenic and Myogenic Differentiation of Mesenchymal Stem Cells** SB³C2017-38
Paola Aprile, Binulal N. Sathy, Daniel J. Kelly, *Trinity College Dublin, Dublin, Ireland*
- 3:15PM The Role Of Cadherin-11 In Mediating Mechanical Cues In Fibroblasts** SB³C2017-39
Meghan A. Bowler¹, Matthew R. Bersi¹, Rachel J. Jerrell², Aron Parekh², W. David Merryman¹, *¹Biomedical Engineering Vanderbilt University, Nashville, TN, United States, ²Otolaryngology, Vanderbilt University, Nashville, TN, United States*
- 3:30PM Modelling The Influence Of Cell Shape And Other Mechanical Cues On Differentiation** SB³C2017-40
Hamsini Suresh, Siamak Soleymani Shishvan, Vikram Sudhir Deshpande, *Engineering, University of Cambridge, Cambridge, United Kingdom*
- 3:45PM Anisotropic YAP Mechanotransduction** SB³C2017-41
Wen-Cih Wen, Pen-Hsiu Grace Chao, *Institute of Biomedical Engineering, National Taiwan University, Taipei, Taiwan*
- 4:00PM Cell Cycle Synchronization Modulates Chondrogenesis and Mechanotransduction of Mesenchymal Stem Cells** SB³C2017-42
Andrea R. Tan¹, Eben G. Estell¹, Alfonso Martin-Peña², J. Chloe Bulinski³, Clark T. Hung¹, *¹Biomedical Engineering, Columbia University, New York, NY, United States, ²Orthopaedics and Rehabilitation, University of Florida, Gainesville, FL, United States, ³Biological Sciences, Columbia University, New York, NY, United States*

Wednesday, June 21

4:30pm - 6:00pm

Soft Tissue Characterization and Modeling (Solids)

Tucson AB

Session Chair: Jun Liao, *Mississippi State University, MS, United States*

Session Co-Chair: Spandan Maiti, *University of Pittsburgh, PA, United States*

- 4:30PM Experimental Characterization of Airway Tissue Exhibits Pronounced Directional and Regional Mechanical Property Variations** SB³C2017-43
Mona Eskandari, Alberto L. Arvayo, Ellen Kuhl, Marc E. Levenston, *Mechanical Engineering, Stanford University, Stanford, CA, United States*
- 4:45PM Fatigue Failure of Simulated Networks: Effect of Network Architecture on its Fatigue Behavior** SB³C2017-44
Rohit Y. Dhume, Victor H. Barocas, *Department of Mechanical Engineering, University of Minnesota, Minneapolis, MN, United States*
- 5:00PM Biaxial Mechanical Properties of Venous Valve Leaflet Tissues** SB³C2017-45
Jiaqi Lu, Adam Benson, **Hsiao-Ying Shadow Huang**, *North Carolina State University, Raleigh, NC, United States*
- 5:15PM In Vivo Comparison of Myelin and Stiffness Maps in the Human Brain** SB³C2017-46
Efe Ozkaya¹, Max Wintermark², Mehmet Kurt¹, *¹Stevens Institute of Technology, Hoboken, NJ, United States, ²Department of Radiology, Stanford University, Stanford, CA, United States*

- 5:30PM Influence Of Size And Shape On The Biomechanical Environment Of The Human Lamina Cribrosa: A Study On Racioethnic Disparity** SB³C2017-47
Hirut G. Kolley¹, Reza Behkam², Jonathan P. Vande Geest^{1,2,3,4}, *Computation Modeling and Simulation, University of Pittsburgh, Pittsburgh, PA, United States, ²Department of Bioengineering, University of Pittsburgh, Pittsburgh, PA, United States, ³Louis J. Fox Center for Vision Restoration, University of Pittsburgh, Pittsburgh, PA, United States, ⁴McGowan Institute for Regenerative Medicine, University of Pittsburgh, Pittsburgh, PA, United States*
- 5:45PM The Impact of Cerebrospinal Fluid Pressure on Optic Nerve Head Deformation** SB³C2017-48
Andrew Feola¹, Baptiste Coudrillier^{1,2}, John Mulvihill^{1,3}, Diogo M. Geraldles⁴, Nghia T. Vo⁵, Julie Albon^{6,7}, Richard L. Abel⁸, Brian Samuels⁹, Ross Ethier¹, *Biomedical Engineering, Georgia Institute of Technology and Emory University, Atlanta, GA, United States, ²Exponent Inc., Menlo, CA, United States, ³University of Limerick, Limerick, Ireland, ⁴Mechanical Engineering, Imperial College London, London, United Kingdom, ⁵Diamond Light Source, Didcot, United Kingdom, ⁶School of Optometry and Vision Sciences, Cardiff University, Cardiff, United Kingdom, ⁷Cardiff Institute of Tissue Engineering and Repair, Cardiff University, Cardiff, United Kingdom, ⁸Surgery and Cancer, Imperial College London, London, United Kingdom, ⁹Ophthalmology, University of Alabama at Birmingham, Birmingham, AL, United States*

Wednesday, June 21	4:30pm - 6:00pm
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Celebration for Larry Taber: Growth and Remodeling in Development and Disease (Solids/CTE)

Tucson CD

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

Session Co-Chair: Victor Varner, *The University of Texas at Dallas, TX, United States*

- 4:30PM Vascular Smooth Muscle Cell Mechano-Adaptation Depends on Extracellular Mechanical Properties** SB³C2017-49
 Kerianne E. Steucke, Kamilah Y. Amen, **Patrick W. Alford**, *Biomedical Engineering, University of Minnesota, Minneapolis, MN, United States*
- 4:45PM Beyond the Force: Mechanics of Early Development in the Frog Illustrate Fundamental Design Principles of Growth and Development** SB³C2017-50
Lance A. Davidson^{1,2}, *Bioengineering, University of Pittsburgh, Pittsburgh, PA, United States, ²Developmental Biology, University of Pittsburgh, Pittsburgh, PA, United States*
- 5:00PM FGF-Mediated Tensional Gradients Drive Morphogenesis of the Avian Hindgut.** SB³C2017-51
Nandan L. Nerurkar¹, L. Mahadevan², Cliff Tabin¹, *Genetics, Harvard Medical School, Boston, MA, United States, ²Harvard University, Cambridge, MA, United States*
- 5:15PM Buckling Morphogenesis of the Embryonic Airway Epithelium** SB³C2017-52
Victor D. Varner, *The University of Texas at Dallas, Richardson, TX, United States*
- 5:30PM Modeling Mechanical Regulation of Gene Expression in Ventricular Myocytes** SB³C2017-53
Andrew D. McCulloch¹, Kyle S. Buchholz¹, Philip M. Tan², Jeffrey H. Omens³, Jeffrey J. Saucerman², *Bioengineering, UC San Diego, La Jolla, CA, United States, ²Biomedical Engineering, University of Virginia, Charlottesville, VA, United States, ³Medicine, UC San Diego, La Jolla, CA, United States*
- 5:45PM What Drives Cortical Folding in the Brain?** SB³C2017-54
Philip V. Bayly¹, Gang Xu², *Mechanical Engineering and Materials Science, Washington University in Saint Louis, Saint Louis, MO, United States, ²Engineering and Physics, University of Central Oklahoma, Edmond, OK, United States*

Wednesday, June 21

4:30pm - 6:00pm

Atherosclerosis (Fluids)

Tucson GH

Session Chair: Alison Marsden, *Stanford University, CA, United States*Session Co-Chair: Frank Gijzen, *Erasmus MC, Netherlands*

- 4:30PM Prediction of Post Stenotic Flow Instabilities in a Patient Specific Common Carotid Artery Model** SB³C2017-55
Viviana Mancini¹, Aslak Bergersen², Patrick Segers¹, Kristian Valen-Sendstad², ¹*IBiTech-bioMMeda, Ghent University, Ghent, Belgium*, ²*Scientific Computing, Simula Research Laboratory, Lysaker, Norway*
- 4:45PM Comprehensive Characterization of Rabbit Aortic Arch Hemodynamics from 4D PC-MRI Derived CFD** SB³C2017-56
David S. Molony¹, Lei Zhou¹, Jaekeun Park¹, Candace Fleischer¹, John N. Oshinski^{1,2}, Xiaoping Hu³, Habib Samady¹, Amir Rezvani¹, Don P. Giddens², ¹*Department of Medicine, Emory University, Atlanta, GA, United States*, ²*Wallace H Coulter Department of Biomedical Engineering, Georgia Institute of Technology, Atlanta, GA, United States*, ³*Department of Bioengineering, University of California, Riverside, Riverside, CA, United States*
- 5:00PM Hemodynamic Risk in Coronary Bifurcations: A Computational Exploration** SB³C2017-57
Diego Gallo¹, Claudio Chiastra², Paola Tasso¹, Francesco Iannaccone³, Francesco Migliavacca², Jolanda J. Wentzel⁴, Umberto Morbiducci¹, ¹*Department of Mechanical and Aerospace Engineering, Politecnico di Torino, Turin, Italy*, ²*Department of Chemistry, Materials and Chemical Engineering "Giulio Natta", Politecnico di Milano, Milan, Italy*, ³*FEops NV, Ghent, Belgium*, ⁴*Department of Cardiology, Biomedical Engineering, Erasmus MC, Rotterdam, Netherlands*
- 5:15PM Blocking Cadherin-11 Decreases Atherosclerotic Plaque Development** SB³C2017-58
Camryn L. Johnson¹, MacRae F. Linton², W. David Merryman¹, ¹*Biomedical Engineering, Vanderbilt University, Nashville, TN, United States*, ²*Department of Pharmacology, Vanderbilt University, Nashville, TN, United States*
- 5:30PM Temporal And Spatial Correlation Of Wall Shear Stress To Plaque Composition In Atherosclerotic Mice During Plaque Progression** SB³C2017-59
Ruoyu Xing, Astrid Moerman, Yanto Ridwan, Kim van der Heiden, Frank Gijzen, *Erasmus Medical Center, Rotterdam, Netherlands*
- 5:45PM Baseline Right Ventricular Function Does Not Predict Sudden Death in Sick Cell Mice** SB³C2017-60
David A. Schreier¹, Diana Tabima¹, Tim A. Hacker², Naomi C. Chesler¹, ¹*Biomedical Engineering, University of Wisconsin-Madison, Madison, WI, United States*, ²*Medicine, University of Wisconsin-Madison, Madison, WI, United States*

Wednesday, June 21

4:30pm - 6:00pm

Biofluids (Fluids)

Tucson IJ

Session Chair: Jessica M. Oakes, *Northeastern University, MA, United States*Session Co-Chair: Bryn A. Martin, *University of Idaho, ID, United States*

- 4:30PM Inter-Subject Variability to Inhaled Aerosols** SB³C2017-61
Jessica M. Oakes, *Bioengineering, Northeastern University, Boston, MA, United States*
- 4:45PM Multiphase Flow Dynamics of Penetrant Behavior in Cough** SB³C2017-62
Don Nadun S. Kuruppumullage¹, Bari Hoffman Ruddy², Olusegun J. Ilegbusi¹, ¹*Mechanical and Aerospace Engineering, University of Central Florida, Orlando, FL, United States*, ²*Communication Sciences and Disorders, University of Central Florida, Orlando, FL, United States*
- 5:00PM Measurement of the Diffusion Coefficient of Oxygen in the Vitreous Humor** SB³C2017-63
Anita N. Penkova¹, Komsan Rattanakijuntorn², Anahid Khoobyar¹, Karthik Murali³, Mark S. Humayun⁴, Satwindar S. Sadhal¹, ¹*Aerospace & Mechanical Engineering, University of Southern California, Los Angeles, CA, United States*, ²*Mechanical Engineering, Ubon Ratchathani University, Ubonratchathani, Thailand*, ³*D-Health Lab, University of Southern California, Los Angeles, CA, United States*, ⁴*Ophthalmology, Biomedical Engineering, University of Southern California, Los Angeles, CA, United States*
- 5:15PM A Simulation Framework Of Multiscale Flow In Lymphatic Vessel Networks** SB³C2017-64
Lowell T. Edgar, Christopher J. Morris, James E. Moore, *Imperial College London, London, United Kingdom*

- 5:30PM Contraction of Collecting Lymphatics: Organization of Pressure-Dependent Rate for Multiple Lymphangions** SB³C2017-65
Christopher D. Bertram¹, Charlie Macaskill¹, Michael J. Davis², ¹*School of Mathematics and Statistics, University of Sydney, New South Wales, Australia*, ²*Dept. of Medical Pharmacology and Physiology, University of Missouri School of Medicine, Columbia, MO, United States*
- 5:45PM Pulsatility Dictates Lymph Flow In Vivo** SB³C2017-66
 Akshay Pujari¹, Daniel T. Sweet², Mark L. Kahn², **Juan M. Jimenez**¹, ¹*Mechanical and Industrial Engineering, University of Massachusetts, Amherst, MA, United States*, ²*Medicine and Division of Cardiology, University of Pennsylvania, Philadelphia, PA, United States*

Wednesday, June 21	4:30pm - 6:00pm
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**Strategies to Improve Rehabilitation Treatments
(DDR/IAB)**

San Luis

Session Chair: Anita Singh, *Rowan University, NJ, United States*
Session Co-Chair: Paola Jaramillo, *Virginia Tech, VA, United States*

- 4:30PM Repetitive Small-Angle Flexion May Increase Injury Risk: An Ex-Vivo Study** SB³C2017-67
 Nicole Corbiere-Gale, Stacey L. Zeigler, Christopher Towler, Kathleen A. Issen, Arthur J. Michalek, **Laurel Kuxhaus**, *Clarkson University, Potsdam, NY, United States*
- 4:45PM Walking Speed Changes in Response to User-Driven Treadmill Control** SB³C2017-68
Nicole Ray¹, Brian Knarr², Jill Higginson¹, ¹*Mechanical Engineering, University of Delaware, Newark, DE, United States*, ²*Biomechanics, University of Nebraska at Omaha, Omaha, NE, United States*
- 5:00PM Improvements In Gait After Combinational Treatment Strategy In Contused Rats** SB³C2017-69
 Alexander Herman¹, Rebecca Gomezrueda², Jennifer Kadlowec¹, Andrea J. Vernengo³, **Anita Singh**^{1,2}, ¹*Mechanical Engineering, Rowan University, Glassboro, NJ, United States*, ²*Biomedical Engineering, Widener University, Chester, PA, United States*, ³*Chemical Engineering, Rowan University, Glassboro, NJ, United States*
- 5:15PM Soft Robotic Devices for Hand Rehabilitation: A Narrative Review** SB³C2017-70
Rita M. Patterson¹, Chia-Ye Chu², ¹*Family Medicine, University of North Texas Health Science Center, Fort Worth, TX, United States*, ²*Texas College of Osteopathic Medicine, University of North Texas Health Science Center, Fort Worth, TX, United States*
- 5:30PM Loading Patterns Associated With Postural Change** SB³C2017-71
Justin Scott, Kelly Patterson, Lindsay Hoard, Michael Drost, Tamara Reid Bush, *Department of Mechanical Engineering, Michigan State University, East Lansing, MI, United States*
- 5:45PM The Psychophysical Effects of Haptic Feedback in the Perceptual Awareness of a Powered Transfemoral Limb** SB³C2017-72
J. Miles Canino, Kevin B. Fite, *Mechanical and Aeronautical Engineering, Clarkson University, Potsdam, NY, United States*

Wednesday, June 21	4:30pm - 6:00pm
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Micro-Engineered Physiologic Systems (CTE)

San Ignacio

Session Chair: Sharan Ramaswamy, *Florida International University, FL, United States*
Session Co-Chair: David Corr, *Rensselaer Polytechnic Institute, NY, United States*

- 4:30PM Skin-on-a-Chip: A Microengineered Platform for Studies in Skin Mechanobiology** SB³C2017-73
Megan J. Farrell¹, Thomas F. Seykora¹, Susan W. Volk², George Cotsarelis³, Dongeun (Dan) Huh¹, ¹*Department of Bioengineering, University of Pennsylvania, Philadelphia, PA, United States*, ²*Department of Clinical Studies, School of Veterinary Medicine, University of Pennsylvania, Philadelphia, PA, United States*, ³*Department of Dermatology, University of Pennsylvania, Philadelphia, PA, United States*

- 4:45PM Valve Interstitial Cell Mechanics Within a 3-D Poly(ethylene glycol) Hydrogel Environment** SB³C2017-74
Alex C. Khang¹, Andrea G. Rodriguez², Megan Schroeder³, Kristi Anseth^{2,3,4}, Michael S. Sacks¹, ¹Center for Cardiovascular Simulation, Department of Biomedical Engineering, University of Texas at Austin, Austin, TX, United States, ²Department of Chemical and Biological Engineering, University of Colorado at Boulder, Boulder, CO, United States, ³Department of Materials Science and Engineering, University of Colorado at Boulder, Boulder, CO, United States, ⁴Howard Hughes Medical Institute and the Biofrontiers Institute, University of Colorado at Boulder, Boulder, CO, United States
- 5:00PM Interplay of Multi-typed Hepatic Cells under Shear Flow** SB³C2017-75
 Yu Du, Hao Yang, Ning Li, **Mian Long**, *Institute of Mechanics, Chinese Academy of Sciences, Beijing, China*
- 5:15PM A Chemogenetic Tool to Control Chondrocyte Activity in vitro** SB³C2017-76
Ryan C. McDonough¹, Janty Shoga², Christopher Price^{1,2}, ¹Biomedical Engineering, University of Delaware, Newark, DE, United States, ²Biomechanics and Movement Science, University of Delaware, Newark, DE, United States
- 5:30PM Develop A High Throughput Flow Platform For Controlled Stem Cell Growth Activity** SB³C2017-77
Ansha Zhao^{1,2}, Yonghui Ding¹, Michael Floren¹, Cameron Morley¹, Wei Tan¹, ¹Department of Mechanical Engineering, University of Colorado at Boulder, Boulder, CO, United States, ²Department of Material Science and Engineering, Southwest Jiaotong University, Chengdu, Sichuan, China
- 5:45PM Sprouting Lymphangiogenesis Regulated By Combined Biochemical And Mechanical Stimulation In A 3-D Microfluidic Device** SB³C2017-78
Chia-Wen Chang¹, Pawan Kumar², Jonathan W. Song^{2,3}, ¹Chemical and Biomolecular Engineering, The Ohio State University, Columbus, OH, United States, ²The Comprehensive Cancer Center, The Ohio State University, Columbus, OH, United States, ³Mechanical and Aerospace Engineering, The Ohio State University, Columbus, OH, United States

Wednesday, June 21	4:30pm - 6:00pm
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**Microenvironmental Control of Tissue Formation
and Cell Function (CTE)**

San Pedro

Session Chair: Brendon Baker, *University of Michigan, MI, United States*

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

- 4:30PM Interfacial Mechanics Determine Tissue Architecture of Normal and Diseased Breast** SB³C2017-79
Vasudha Srivastava¹, James C. Garbe^{1,2}, Mark A. LaBarge³, Zev J. Gartner¹, ¹Pharmaceutical Chemistry, University of California San Francisco, San Francisco, CA, United States, ²Life Sciences Division, Lawrence Berkeley National Lab, Berkeley, CA, United States, ³Population Sciences, City of Hope National Medical Center, Duarte, CA, United States
- 4:45PM A Computational Microstructural Network Model to Test Dunn's Hypotheses of Contact Guidance** SB³C2017-80
Victor K. Lai¹, Rohit Y. Dhume², Lauren M. Bersie³, Victor H. Barocas³, Robert T. Tranquillo³, ¹Chemical Engineering, University of Minnesota - Duluth, Duluth, MN, United States, ²Mechanical Engineering, University of Minnesota - Twin Cities, Minneapolis, MN, United States, ³Biomedical Engineering, University of Minnesota - Twin Cities, Minneapolis, MN, United States
- 5:00PM A Coupled Chemo-mechanical Cell-matrix Model to Predict Mechanical Feedback Between Cells and Extracellular Matrices** SB³C2017-81
Farid Alisafaei¹, Matthew Hall², Mingming Wu², Vivek Shenoy¹, ¹Department of Materials Science and Engineering, University of Pennsylvania, Philadelphia, PA, United States, ²Department of Biological and Environmental Engineering, Cornell University, Ithaca, NY, United States
- 5:15PM Identification Of TRPV4 as a Pressure Mechanosensor In The Developing Lung** SB³C2017-82
 Joshua T. Morgan, Wade G. Stewart, **Jason P. Gleghorn**, *Biomedical Engineering, University of Delaware, Newark, DE, United States*
- 5:30PM The Influence of Matrix Stiffness on Directed Cell Migration in Aligned Fibrous Microenvironments** SB³C2017-83
William Y. Wang, Brendon M. Baker, *Biomedical Engineering, University of Michigan, Ann Arbor, MI, United States*
- 5:45PM Stretch Cannot Account for Enhanced Branching of Occluded Embryonic Lungs** SB³C2017-84
 Uduak George¹, Kishore Bokka¹, David Warburton², **Sharon Lubkin**¹, ¹North Carolina State University, Raleigh, NC, United States, ²Childrens Hospital Los Angeles, Los Angeles, CA, United States

Thursday, June 22	12:30pm - 2:00pm
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Multiscale Analysis of Cartilage and Intervertebral Disc (Solids)

Tucson AB

Session Chair: Daniel H. Cortes, *Penn State University, PA, United States*

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

- 12:30PM Development of Three-Dimensional Soft Materials Elastography Based on Magnetic Resonance Imaging and Topology Optimization** SB³C2017-85
Luyao Cai¹, Claus B. W. Pedersen², Corey P. Neu³, ¹*Biomedical Engineering, Purdue University, West Lafayette, IN, United States*, ²*Dassault Systèmes Deutschland GmbH, Hamburg, Germany*, ³*Mechanical Engineering, University of Colorado Boulder, Boulder, CO, United States*
- 12:45PM Role of Pricellular Matrix In Modulating Chondrocyte Strains in Healthy and Osteoarthritic Cartilage** SB³C2017-86
Mehdi Khoshgofar, Peter A. Torzilli, Suzanne A. Maher, *Orthopaedic Soft Tissue Research Program, Hospital for Special Surgery, New York, NY, United States*
- 1:00PM Effect of Biphasic Parameters and Fibril Orientation on Transient Cartilage Mechanics in the Hip** SB³C2017-87
Jocelyn Todd¹, Huashan Zou¹, Travis G. Maak², Jeffrey A. Weiss¹, ¹*Department of Bioengineering, University of Utah, Salt Lake City, UT, United States*, ²*Department of Orthopaedics, University of Utah, Salt Lake City, UT, United States*
- 1:15PM Fully Automated, Hexahedral Meshing of Patient-Specific Cartilage Structures: Data From the OAI** SB³C2017-88
 Borja Rodriguez-Vila¹, **David M. Pierce**², ¹*Bioengineering and Telemedicine Centre, Universidad Politécnica de Madrid, Madrid, Spain*, ²*Departments of Mechanical Engineering/Biomedical Engineering, University of Connecticut, Storrs, CT, United States*
- 1:30PM Does Regular Physical Activity Help Mitigate Cartilage Strains?** SB³C2017-89
Axel C. Moore¹, Brian T. Graham², Christopher Price¹, David L. Burris², ¹*Biomedical Engineering, University of Delaware, Newark, DE, United States*, ²*Mechanical Engineering, University of Delaware, Newark, DE, United States*
- 1:45PM Human Disc Nucleotomy: Annulus Fibrosus Internal Deformations are Only Altered at Low Loads** SB³C2017-90
Amy A. Claeson¹, Brent L. Showalter², Edward J. Vresilovic³, Alexander C. Wright⁴, James C. Gee⁴, Neil R. Malhotra⁴, Dawn M. Elliott¹, ¹*Department of Biomedical Engineering, University of Delaware, Newark, DE, United States*, ²*Department of Bioengineering, University of Pennsylvania, Philadelphia, PA, United States*, ³*Department of Orthopaedics and Rehabilitation, University of Pennsylvania, Hershey, PA, United States*, ⁴*Department of Radiology, University of Pennsylvania, Philadelphia, PA, United States*

Thursday, June 22	12:30pm - 2:00pm
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Soft Tissue Mechanobiology (Solids)

Tucson CD

Session Chair: Jessica Wagenseil, *Washington University in St. Louis, MO, United States*

Session Co-Chair: Lik Chuan Lee, *Michigan State University, MI, United States*

- 12:30PM The Role of Mechanical Forces on Hemisphere Division in the Embryonic Forebrain** SB³C2017-91
Kara E. Garcia, Larry A. Taber, *Biomedical Engineering, Washington University in St. Louis, St. Louis, MO, United States*
- 12:45PM Prestrain Regulates Cell Sensing Of Topo-mechanical Cues To Direct Annulus Fibrosus Mechanobiology** SB³C2017-92
Edward D. Bonnevie¹, Dawn Elliott², Rob Mauck¹, ¹*University of Pennsylvania, Philadelphia, PA, United States*, ²*University of Delaware, Newark, DE, United States*
- 1:00PM Local Mechanical Properties of 3D Collagen Hydrogels Assessed via Optical Magnetic Twisting Cytometry** SB³C2017-93
Jacopo Ferruzzi¹, Haiyue Li², Atena Irani Shemirani¹, Yanhang Zhang², Muhammad Hamid Zaman¹, ¹*Biomedical Engineering, Boston University, Boston, MA, United States*, ²*Mechanical Engineering, Boston University, Boston, MA, United States*

- 1:15PM Mechanobiology of Healing: Modeling the Coordination Between Collagen Deposition and Wound Contraction** SB³C2017-94
Adrian Buganza Tepole, *Mechanical Engineering, Purdue University, West Lafayette, IN, United States*
- 1:30PM Evaluation of Strain Energy Functions for the Development of a Growth and Remodeling Model of Age-Specific Murine Patellar Tendon Healing** SB³C2017-95
Akinjide R. Akintunde, Kristin S. Miller, *Biomedical Engineering, Tulane University, New Orleans, LA, United States*
- 1:45PM Biomechanical Comparison of Anatomical Osteochondral Allograft vs. "Snowman" Configuration** SB³C2017-96
Ferris M. Pfeiffer, Aaron Stoker, James P. Stannard, James L. Cook, *University of Missouri, Columbia, MO, United States*

Thursday, June 22	12:30pm - 2:00pm
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Heart Valve Flow and Function (Fluids/Solids)

Tucson GH

Session Chair: Amanda Buck, *Vanderbilt University, TN, United States*
Session Co-Chair: Sharp Michael Keith, *University of Louisville, KY, United States*

- 12:30PM Pressure-Induced Changes in the Regional Structural Architecture of the Porcine Tricuspid Valve Leaflets** SB³C2017-97
Vineet S. Thomas, Anup D. Pant, Anthony Black, Taylor Verba, Rouzbeh Amini, *Biomedical Engineering, The University of Akron, Akron, OH, United States*
- 12:45PM Effect of Geometric Remodeling on Mitral Valve Leaflet Mechanics: An Ex Vivo Investigation** SB³C2017-98
Charles H. Bloodworth¹, Eric L. Pierce¹, Nancy J. Deaton¹, Michael S. Sacks², Ajit P. Yoganathan¹, *Wallace H Coulter Department of Biomedical Engineering, Georgia Institute of Technology and Emory University, Atlanta, GA, United States*, ²*Institute for Computational Engineering and Sciences, University of Texas at Austin, Austin, TX, United States*
- 1:00PM Hemodynamic Performance Of Valve-In-Valve In Calcified Bioprosthetic Valves Is Significantly Different Than In Non-calcified Valves** SB³C2017-99
Hoda Hatoum¹, Jennifer Dollery², Pablo Maureira³, Juan A. Crestanello², Lakshmi P. Dasi¹, *Department of Biomedical Engineering, The Ohio State University, Columbus, OH, United States*, ²*Division of Cardiac Surgery, The Ohio State University, Columbus, OH, United States*, ³*Department of Cardiovascular Surgery, Lorraine University Hospital of Nancy, Nancy, France*
- 1:15PM Experimental Investigation of 3D Left Ventricular Flow Using a Novel Multiplane Scanning Stereo PIV Setup** SB³C2017-100
Hicham Saaid¹, **Patrick Segers**¹, Tom Claessens², Pascal Verdonck¹, *Institute Biomedical Technology, Ghent University, Ghent, Belgium*, ²*Department of Materials Science and Engineering, Ghent University, Ghent, Belgium*
- 1:30PM MRI-based Fluid Structure Interaction of the Aortic Valve: Alteration of Nonlinear Valve Properties to Simulate Calcification and Bicuspid Aortic Valve** SB³C2017-101
Anvar Gilmanov¹, **Alex J. Barker**², Henryk Stolarski¹, Fotis Sotiropoulos³, *University of Minnesota Minneapolis, Minneapolis, MN, United States*, ²*Department of Radiology, Northwestern University, Chicago, IL, United States*, ³*Stony Brook University, Stony Brook, NY, United States*
- 1:45PM Assessment of Thrombosis Potential of a Transcatheter Heart Valve Using a Novel Single-camera Volumetric PIV Technique** SB³C2017-102
Christopher Clifford¹, **Vrishank Raghav**^{1,2}, Prem Midha³, Ikechukwu Okafor^{4,5}, Camille Johnson², Brian Thurow¹, Ajit Yoganathan², *Aerospace Engineering, Auburn University, Auburn, AL, United States*, ²*Biomedical Engineering, Georgia Institute of Technology, Atlanta, GA, United States*, ³*Mechanical Engineering, Georgia Institute of Technology, Atlanta, GA, United States*, ⁴*Chemical Engineering, Georgia Institute of Technology, Atlanta, GA, United States*, ⁵*Exponent Inc, Philadelphia, PA, United States*

Thursday, June 22	12:30pm - 2:00pm
Cardiovascular Devices (Fluids/Solids) Tucson IJ	
Session Chair: Danny Bluestein, Stony Brook University, NY, United States	
Session Co-Chair: Ender A. Finol, University of Texas at San Antonio, TX, United States	
12:30PM	Influence of Inlet Boundary Conditions on the Evaluation of Aortic Wall Shear Stress for Patients With Abnormal Aortic Valves SB ³ C2017-103 Selene Pirola ¹ , Omar A. Jarral ² , Declan P. O'Regan ³ , Thanos Athanasiou ² , Xiao Y. Xu ¹ , ¹ <i>Chemical Engineering, Imperial College London, London, United Kingdom</i> , ² <i>Department of Surgery and Cancer, St. Mary's Hospital, Imperial College London, London, United Kingdom</i> , ³ <i>Institute of Clinical Sciences, Hammersmith Hospital, Imperial College London, London, United Kingdom</i>
12:45PM	Evaluation of Novel Polymeric Transcatheter and Surgical Aortic Valves with Fluid-structure Interaction Models and Experimental Analysis SB ³ C2017-104 Ram P. Ghosh ¹ , Gil Marom ¹ , Oren M. Rotman ¹ , Matteo Bianchi ¹ , Saurabh Prabhakar ² , Marc Horner ³ , Marvin J. Slepian ^{1,4} , Danny Bluestein ¹ , ¹ <i>Biomedical Engineering, Stony Brook University, Stony Brook, NY, United States</i> , ² <i>ANSYS Fluent India Pvt. Ltd, Pune, India</i> , ³ <i>ANSYS Inc., Evanston, IL, United States</i> , ⁴ <i>Sarver Heart Center, University of Arizona, Tucson, AZ, United States</i>
1:00PM	Patient-specific Mitral Valve Annuloplasty Repair: The Optimal Ring Design for Treating Ischemic Mitral Regurgitation SB ³ C2017-105 Amir H. Khalighi ¹ , Andrew Drach ² , Michael S. Sacks ² , ¹ <i>Mechanical Engineering, University of Texas at Austin, Austin, TX, United States</i> , ² <i>University of Texas at Austin, Austin, TX, United States</i>
1:15PM	Positioning Of A Dedicated Stent For Coronary Bifurcations: An In Silico Study SB ³ C2017-106 Claudio Chiastra ¹ , Maik J. Grundeken ² , Francesco Migliavacca ¹ , Gabriele Dubini ¹ , Patrick W. Serruys ³ , Robbert J. de Winter ² , Joanna J. Wykrzykowska ² , Ender A. Finol ⁴ , Wei Wu ⁴ , ¹ <i>Department of Chemistry, Materials, and Chemical Engineering "Giulio Natta", Politecnico di Milano, Milan, Italy</i> , ² <i>The Heart Center, Academic Medical Center, University of Amsterdam, Amsterdam, Netherlands</i> , ³ <i>International Centre for Circulatory Health, Imperial College London, London, United Kingdom</i> , ⁴ <i>Department of Mechanical Engineering, University of Texas at San Antonio, San Antonio, TX, United States</i>
1:30PM	Very Short Peripheral Catheter For Reduction Of Catheter-related Thrombophlebitis SB ³ C2017-107 Dar Weiss ¹ , Oren M. Rotman ² , Uri Zaretsky ¹ , Shmuel Einav ^{1,2} , ¹ <i>Tel Aviv University, Tel Aviv, Israel</i> , ² <i>Stony Brook University, Stony Brook, NY, United States</i>
1:45PM	Fluid-Structure Interaction Modeling of the Penn State Pediatric Ventricular Assist Device: Preliminary Computational Studies SB ³ C2017-108 Bryan Good , Phil Crompton, Keefe Manning, <i>Bioengineering, The Pennsylvania State University, University Park, PA, United States</i>

Thursday, June 22	12:30pm - 2:00pm
Active Learning in Biomechanical Engineering Education (EDU) San Ignacio	
Session Chair: Ferris Pfeiffer, University of Missouri, MO, United States	
Session Co-Chair: Anita Singh, Rowan University, NJ, United States	
12:30PM	Real-world Problem Solving and Value Creation in the Biomechanics Classroom SB ³ C2017-109 Laurel Kuxhaus ¹ , Karen L. Troy ² , ¹ <i>Clarkson University, Potsdam, NY, United States</i> , ² <i>Worcester Polytechnic Institute, Worcester, MA, United States</i>
12:45PM	Using Project-based Physical Computing to Teach Programming Concepts to Biomedical Engineers SB ³ C2017-110 Trevor R. Ham, Rouzbeh Amini , <i>Biomedical Engineering, The University of Akron, Akron, OH, United States</i>
1:00PM	Course Based Undergraduate Research Experiences in Biomechanical Engineering SB ³ C2017-111 Alisa Morss Clyne , <i>Drexel University, Philadelphia, PA, United States</i>

- 1:15PM A New Approach to Teaching Biomechanics by Bridging the Gap Between Classroom and Clinic** SB³C2017-112
Anita Singh, Dawn Ferry, Widener, Chester, PA, United States
- 1:30PM Encouraging an Entrepreneurial Mindset in Biomechanics** SB³C2017-113
Kristen Billiar, Biomedical Engineering, Worcester Polytechnic Institute, Worcester, MA, United States
- 1:45PM UAB Solution Studios™ - A Collaboration Between Nursing, Biomedical Engineering, And Honors** SB³C2017-114
Joel Berry¹, Nancy Wingo², Kristen Noles³, Alan Eberhardt¹, ¹Biomedical Engineering, The University of Alabama at Birmingham, Birmingham, AL, United States, ²School of Nursing, The University of Alabama at Birmingham, Birmingham, AL, United States, ³UAB Hospital, The University of Alabama at Birmingham, Birmingham, AL, United States

Thursday, June 22	12:30pm - 2:00pm
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Hyperthermia, Cryotherapy, and Cryopreservation (BTR)

San Luis

Session Chair: Chris Rylander, Virginia Tech, VA, United States
Session Co-Chair: Aili Zhang, Shanghai Jiaotong University, Shanghai, China

- 12:30PM Study Of Freezing Induced Radiofrequency Ablation Heating Pattern Change** SB³C2017-115
Kangwei Zhang, Jincheng Zou, Aili Zhang, Lisa Xu, School of Biomedical Engineering, Shanghai Jiaotong University, Shanghai, China
- 12:45PM Behavior Of Interstitial Fluid Pressure In Tumors With Enhanced Blood Perfusion** SB³C2017-116
Timothy Munuhe, Myo Min Zaw, Liang Zhu, Ronghui Ma, Mechanical Engineering, University of Maryland Baltimore County, Baltimore, MD, United States
- 1:00PM Temperature Field Measurement of Optical Thermocavitation for Enhanced Skin Surface Cooling** SB³C2017-117
Vicente Robles, Darren Banks, Mahdi Akbarimoosavi, Luis Felipe Devia-Cruz, Santiago Camacho-López, Guillermo Aguilar, Mechanical Engineering, University of California Riverside, Riverside, CA, United States
- 1:15PM Medium-Term Stability of Cancer Biomarkers in Human Sera Stored by Isothermal Vitrification** SB³C2017-118
Morwena J. Solivio, Alptekin Aksan, Mechanical Engineering, University of Minnesota, Minneapolis, MN, United States
- 1:30PM Heat Shock Protein Expression During Short Pulse Laser Therapy** SB³C2017-119
Neda Parchami¹, Amanda Oliveira², Kenia Nunes², Eric Guisbert², Kunal Mitra¹, ¹Biomedical Engineering, Florida Institute of Technology, Melbourne, FL, United States, ²Biological Sciences, Florida Institute of Technology, Melbourne, FL, United States
- 1:45PM Initial Studies: A Novel Approach to Treating Acute Pancreatitis with Therapeutic Hypothermia** SB³C2017-120
Daniel P. Meckes¹, Matthew J. Skinner², Keith T. Wilkins¹, Gregory M. Donatelli¹, Christopher C. Thompson², Jennifer E. Mitchell¹, Thomas L. Merrill^{1,3}, ¹FocalCool, LLC., Mullica Hill, NJ, United States, ²Harvard Medical School, Boston, MA, United States, ³Mechanical Engineering, Rowan University, Glassboro, NJ, United States

Thursday, June 22	12:30pm - 2:00pm
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Disease Models and Engineered Therapies (CTE)

San Pedro

Session Chair: Jason Gleghorn, University of Delaware, DE, United States
Session Co-Chair: Pat Alford, University of Minnesota, MN, United States

- 12:30PM Glial Cell Analysis in the Brain Tumor Microenvironment Elucidates Contributions to Glioblastoma Patient Progression** SB³C2017-121
Robert C. Cornelison¹, Jessica X. Yuan¹, Bethany J. Horton², Jennifer M. Munson¹, ¹Biomedical Engineering, University of Virginia, Charlottesville, VA, United States, ²Public Health Sciences, University of Virginia, Charlottesville, VA, United States

- 12:45PM Feasibility of a “Same-Day” Autologous Tissue-Engineered Vascular Graft Remodeling in a Seeded Elastomeric Scaffold** SB³C2017-122
Darren G. Haskett¹, Kamiel A. Saleh², Jeffery T. Krawiec², Justin S. Weinbaum², Antonio D’Amore¹, William R. Wagner¹, Lauren E. Kokaj³, Kacey G. Marra³, J. Peter Rubin³, David A. Vorp², ¹*Department of Surgery, University of Pittsburgh, Pittsburgh, PA, United States*, ²*Department of Bioengineering, University of Pittsburgh, Pittsburgh, PA, United States*, ³*Department of Plastic Surgery, University of Pittsburgh, Pittsburgh, PA, United States*
- 1:00PM In Vivo Maturation and Integration of Engineered Endplate-Modified Disc-Like Angle Ply Structures (EDAPS)** SB³C2017-123
Sarah E. Gullbrand^{1,2}, Dong Hwa Kim^{1,2}, Beth G. Ashinsky^{1,2}, John T. Martin^{1,2}, Lachlan J. Smith^{1,2}, Dawn M. Elliott³, Harvey E. Smith^{1,2}, Robert L. Mauck^{1,2}, ¹*University of Pennsylvania, Philadelphia, PA, United States*, ²*Philadelphia VA Medical Center, Philadelphia, PA, United States*, ³*University of Delaware, Newark, DE, United States*
- 1:15PM Densification of Type I Collagen Matrices as a Model for Cardiac Fibrosis** SB³C2017-124
Benjamin Seelbinder¹, Logan J. Worke², Jeanne E. Barthold¹, Tyler Novak², Russell P. Main^{2,3}, Corey P. Neu^{1,2}, ¹*Mechanical Engineering, University of Colorado Boulder, Boulder, CO, United States*, ²*Biomedical Engineering, Purdue University, West Lafayette, IN, United States*, ³*Department of Basic Medical Sciences, Purdue University, West Lafayette, IN, United States*
- 1:30PM Absence of Decorin Accelerates Cartilage Fibrillation and Aggrecan Depletion in Post-traumatic Osteoarthritis** SB³C2017-125
Qing Li¹, Liu Ouyang¹, Basak Doyran¹, Li Fan¹, Wei Tong², Wei-Ju Tseng², X. Sherry Liu², Renato V. Iozzo³, Ling Qin², David E. Birk⁴, Lin Han¹, ¹*Drexel University, Philadelphia, PA, United States*, ²*Department of Orthopaedic Surgery, University of Pennsylvania, Philadelphia, PA, United States*, ³*Department of pathology, Anatomy and Cell biology, Thomas Jefferson University, Philadelphia, PA, United States*, ⁴*Department of Molecular Pharmacology and physiology, University of South Florida, Tampa, FL, United States*
- 1:45PM Controlling And Measuring The Spatial Extent Of Chondrocyte Death In A Non-invasive Murine Post-traumatic Osteoarthritis Model** SB³C2017-126
Alexander Kotelsky, Edward F. Ruppel, Mark R. Buckley, *Biomedical Engineering, University of Rochester, Rochester, NY, United States*

Thursday, June 22

2:15pm - 3:45pm

Mechanics and Modeling of Musculoskeletal Soft Tissues (Solids)

Tucson AB

Session Chair: David M. Pierce, *University of Connecticut, CT, United States*

Session Co-Chair: Deva Chan, *Henry M Jackson Foundation, MD, United States*

- 2:15PM Dynamic Compression of Human and Ovine Meniscal Tissue Compared to a Block Copolymer Material for Potential Meniscal Replacement** SB³C2017-127
Kristine M. Fischenich¹, Katie Boncell², Travis S. Bailey^{1,3}, Tammy L. Haut Donahue^{1,4}, ¹*School of Biomedical Engineering, Colorado State University, Fort Collins, CO, United States*, ²*Health and Exercise Science, Colorado State University, Fort Collins, CO, United States*, ³*Chemical and Biological Engineering, Colorado State University, Fort Collins, CO, United States*, ⁴*Mechanical Engineering, Colorado State University, Fort Collins, CO, United States*
- 2:30PM Roles Of Type V Collagen In The Structure And Mechanical Properties Of Mandibular Condyle Cartilage** SB³C2017-128
Prashant Chandrasekaran¹, Qing Li¹, Mei Sun², Louis J. Soslowsky³, David E. Birk², Lin Han¹, ¹*School of Biomedical Engineering, Science and Health Systems, Drexel University, Philadelphia, PA, United States*, ²*Department of Molecular Pharmacology and Physiology, University of South Florida, Tampa, FL, United States*, ³*McKay Orthopaedic Research Laboratory, University of Pennsylvania, Philadelphia, PA, United States*
- 2:45PM Micromechanical Heterogeneity Of The Temporomandibular Joint Disc And Condyle Cartilage Surfaces** SB³C2017-129
Liu Ouyang¹, Chao Wang¹, Qing Li¹, Xin L. Lu², Lin Han¹, ¹*School of Biomedical Engineering, Science and Health Systems, Drexel University, Philadelphia, PA, United States*, ²*University of Delaware, Newark, DE, United States*
- 3:00PM Meniscal Entesis Collagen Fiber Orientation is Altered with Osteoarthritis** SB³C2017-130
Hannah Pauly¹, Tammy Haut Donahue^{1,2}, ¹*School of Biomedical Engineering, Colorado State University, Fort Collins, CO, United States*, ²*Mechanical Engineering, Colorado State University, Fort Collins, CO, United States*

- 3:15PM Rule-Based Approach for Assignment of Myofiber Distribution to Human Tongue Models** SB³C2017-131
Arnold D. Gomez¹, Nahla Elsaid², Jiachen Zhuo², Maureen L. Stone³, Jerry L. Prince¹, ¹*Electrical and Computer Engineering, Johns Hopkins University, Baltimore, MD, United States*, ²*Dept. of Diagnostic Radiology and Nuclear Medicine, University of Maryland School of Medicine, Baltimore, MD, United States*, ³*Department of Neural and Pain Sciences, University of Maryland School of Dentistry, Baltimore, MD, United States*
- 3:30PM Machine Learning for Estimation of Activation Patterns in Computational Models of the Tongue** SB³C2017-132
Arnold D. Gomez¹, Amod Jog¹, Maureen L. Stone², Jerry L. Prince¹, ¹*Electrical and Computer Engineering, Johns Hopkins University, Baltimore, MD, United States*, ²*Department of Neural and Pain Sciences, University of Maryland School of Dentistry, Baltimore, MD, United States*

Thursday, June 22	2:15pm - 3:45pm
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Ocular Biomechanics (Solids)

Tucson CD

Session Chair: Ian A. Sigal, *University of Pittsburgh, PA, United States*

Session Co-Chair: Andrew Feola, *Georgia Institute of Technology, GA, United States*

- 2:15PM Biomechanical Characterizations of the Porcine Optic Nerve** SB³C2017-133
 Sammira Rais-Rohani², Sarah Fitzgerald², Bryn Brazile², Richard L. Summers³, Robert L. Hester³, Raj Prabhu², Lakiesha N. Williams², **Jun Liao**^{1,2}, ¹*Department of Bioengineering, University of Texas at Arlington, Arlington, TX, United States*, ²*Department of Biological Engineering, Mississippi State University, Mississippi State, MS, United States*, ³*Department of Physiology and Biophysics, University of Mississippi Medical Center, Jackson, MS, United States*
- 2:30PM A New Geodesics Model of Collagen Fibers in the Globe; Better Than a Reinforced Sphere** SB³C2017-134
Ian A. Sigal, Yi Hua, Ning-Jiun Jan, Andrew P. Voorhees, *Laboratory of Ocular Biomechanics, University of Pittsburgh, Pittsburgh, PA, United States*
- 2:45PM Anisotropic And Heterogeneous Finite Element Models Of The Human Lamina Cribrosa Using Nonlinear Optical Microscopy** SB³C2017-135
Reza Behkam, Jonathan Vande Geest, *University of Pittsburgh, Pittsburgh, PA, United States*
- 3:00PM In-Vivo Iris Stiffness in Patients with Occludable Anterior Chamber Angle Following Laser Peripheral Iridotomy** SB³C2017-136
Anup D. Pant¹, Priyanka Gogte², Cyril K. Dorairaj³, Vanita Pathak-Ray², Rouzbeh Amini¹, ¹*Biomedical Engineering, The University of Akron, Akron, OH, United States*, ²*LV Prasad Eye Institute, Hyderabad, India*, ³*Department of Ophthalmology, Mayo Clinic, Jacksonville, FL, United States*
- 3:15PM Evaluating The Efficacy Of Crosslinking The Posterior Rat Sclera** SB³C2017-137
Bailey G. Hannon¹, Ian C. Campbell^{2,3}, A. Thomas Read², C. Ross Ethier^{1,2}, ¹*George W. Woodruff School of Mechanical Engineering, Georgia Institute of Technology, Atlanta, GA, United States*, ²*Coulter Department of Biomedical Engineering, Georgia Institute of Technology/Emory University, Atlanta, GA, United States*, ³*Atlanta VA Medical Center, Atlanta, GA, United States*
- 3:30PM The Effect of the Removal of Glycosaminoglycans on the Deformation Response of the Human Lamina Cribrosa to Pressure** SB³C2017-138
Dan Midgett¹, Harry Quigley², Thao Nguyen¹, ¹*Mechanical Engineering, Johns Hopkins University, Baltimore, MD, United States*, ²*Wilmer Eye Institute, Johns Hopkins University, Baltimore, MD, United States*

Thursday, June 22	2:15pm - 3:45pm
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Cardiac Mechanics (Solids)

Tucson IJ

Session Chair: Yuan Feng, *Soochow University, Suzhou, China*

Session Co-Chair: Lik Chuan Lee, *Michigan State University, MI, United States*

- 2:15PM Longitudinal Reinforcement Improves Post-Infarction Function by Redistributing Transmural Fiber Stress in the Border Zone** SB³C2017-139
Ana C. Estrada¹, Samantha A. Clarke¹, Jeffrey W. Holmes^{1,2,3}, ¹*Biomedical Engineering, University of Virginia, Charlottesville, VA, United States*, ²*Department of Medicine, University of Virginia, Charlottesville, VA, United States*, ³*Berne Cardiovascular Research Center, University of Virginia, Charlottesville, VA, United States*

SCIENTIFIC SESSIONS

- 2:30PM Characterization Of Biomechanical Properties Of Human Trabeculae Carneae** SB³C2017-140
Fatemeh Fatemifar¹, Marc D. Feldman², Hai-Chao Han¹, ¹*Mechanical Engineering, University of Texas at San Antonio, San Antonio, TX, United States*, ²*Medicine, The University of Texas Health Science Center at San Antonio, San Antonio, TX, United States*
- 2:45PM Characterizing the Three-Dimensional Mechanical Properties of Passive Myocardium Injected with Hydrogels Using a Novel Numerical-Experimental Inverse Modeling Approach** SB³C2017-141
David S. Li¹, Reza Avazmohammadi¹, João S. Soares¹, Jason A. Burdick², Joseph H. Gorman³, Robert C. Gorman³, Michael S. Sacks¹, ¹*Center for Cardiovascular Simulation, Institute for Computational Engineering and Sciences, The University of Texas at Austin, Austin, TX, United States*, ²*Polymeric Biomaterials Laboratory, Department of Bioengineering, University of Pennsylvania, Philadelphia, PA, United States*, ³*Gorman Cardiovascular Research Group, Department of Surgery, University of Pennsylvania, Philadelphia, PA, United States*
- 3:00PM Mesenchymal Stem Cell Delivery Via a Novel Cardiac Patch Improves Right Ventricular Function in Pulmonary Arterial Hypertensive Rats** SB³C2017-142
Zhijie Wang¹, Eric G. Schmuck², David A. Schreier³, Timothy A. Hacker², Naomi C. Chesler³, ¹*Mechanical Engineering, Colorado State University, Fort Collins, CO, United States*, ²*Medicine, University of Wisconsin - Madison, Madison, WI, United States*, ³*Biomedical Engineering, University of Wisconsin - Madison, Madison, WI, United States*
- 3:15PM Patient-specific Modeling of the Electro-mechano-fluidic Function of the Left Ventricle and the Aorta** SB³C2017-143
Christoph M. Augustin¹, Gernot Plank², Shawn C. Shadden¹, ¹*Department of Mechanical Engineering, University of California, Berkeley, Berkeley, CA, United States*, ²*Institute of Biophysics, Medical University of Graz, Graz, Austria*
- 3:30PM Establishing Creditability of the Living Heart Porcine Model** SB³C2017-144
Brian P. Baillargeon¹, Kevin L. Sack², Julius Guccione³, ¹*Dassault Systemes SIMULIA Corp, Oakley, CA, United States*, ²*University of Cape Town, Cape Town, South Africa*, ³*University of California San Francisco, San Francisco, CA, United States*

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Don Giddens' Impact on Cardiovascular Fluid Dynamics and Atherosclerosis (Fluids)

Tucson GH

Session Chair: Lucas H. Timmins, *Georgia Institute of Technology, GA, United States*
Session Co-Chair: Ajit Yoganathan, *Georgia Institute of Technology, GA, United States*

- 2:15PM Building a Biomedical Imaging Clinical Applications Program: Fluid Dynamics And Disease - A Tribute To Don Giddens** SB³C2017-145
Diego R. Martin, *Medical Imaging, University of Arizona, Tucson, AZ, United States*
- 2:30PM Don Giddens and Resolution of the Shear Stress Conundrum in Atherosclerosis** SB³C2017-146
Christopher K. Zarins, *Surgery, Stanford University, Stanford, CA, United States*
- 2:45PM Micropatterning Drives Endothelial Cell Alignment and Function on Vascular Grafts** SB³C2017-147
 Matthew W. Hagen, Deirdre E. Anderson, **Monica Hinds**, *Biomedical Engineering, Oregon Health & Science University, Portland, OR, United States*
- 3:00PM Paravalvular Leak in Transcatheter Aortic Valve Replacement** SB³C2017-148
Ajit P. Yoganathan¹, Ikay Okafor¹, Prem Midha¹, Vrishank Raghav², Vasilis Babaliaros³, Gautam Kumar³, ¹*Georgia Tech, Atlanta, GA, United States*, ²*Auburn University, Auburn, AL, United States*, ³*Emory University, Atlanta, GA, United States*
- 3:15PM Tribomechanics of Bare and a-C:H Coated Metallic Biomaterials** SB³C2017-149
 Konstantinos Kapnisis, Marios Constantinou, Maria Kyrkou, Petros Nikolaou, **Andreas S. Anayiotos**, Georgios Constantinides, *Mechanical Engineering and Materials Science and Engineering, Cyprus University of Technology, Limassol, Cyprus*

3:30PM A Multipronged Approach Predicts Low Wall Shear Stress Regions that Correlate with Thrombosis Formation In Vivo SB³C2017-150

Amanda K. W. Buck¹, Joseph J. Groszek¹, Daniel C. Colvin¹, Sara B. Keller², Clark D. Kensinger¹, Rachel Forbes¹, Seth Karp¹, Phillip Williams¹, Shuvo Roy³, William H. Fissell¹, ¹*Vanderbilt University Medical Center, Nashville, TN, United States*, ²*University of Washington, Seattle, WA, United States*, ³*University of California San Francisco, San Francisco, CA, United States*

Thursday, June 22	2:15pm - 3:45pm
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Measurement in Movement and Trauma (DDR/IAB)

San Luis

Session Chair: Joseph Iaquinto, *VA Puget Sound Health Care System, VA, United States*

Session Co-Chair: Steven Rowson, *Virginia Tech, VA, United States*

2:15PM Development of Low Cost Human Surrogates Using Additive Manufacturing SB³C2017-151

Travis Eliason, Art Nicholls, Daniel Nicolella, *Southwest Research Institute, San Antonio, TX, United States*

2:30PM Longitudinal Posture and Activity Tacking in the Home Enabled by Machine Learning and a Conformal, Wearable Sensor System SB³C2017-152

Ryan S. McGinnis¹, Steve DiCristofaro², Nikhil Mahadevan², Ellora Sen-Gupta², Ikaro Silva², Elise Jortberg², Nirav Sheth², John Wright², Brian Murphy², Bryan McGrane², Milan Raj², Melissa Ceruolo², Jesus Pindado², Roozbeh Ghaffari², AJ Aranyosi², Shyamal Patel², ¹*University of Vermont, Burlington, VT, United States*, ²*MC10, Inc., Lexington, MA, United States*

2:45PM In-Vivo Tibiotalar and Subtalar Kinematics in Chronic Ankle Instability Patients and Asymptomatic Controls: A High-speed Dual Fluoroscopy Study SB³C2017-153

Koren E. Roach¹, K. Bo Foreman², Alexej Barg³, Andrew E. Anderson³, ¹*Bioengineering, University of Utah, Salt Lake City, UT, United States*, ²*Physical Therapy, University of Utah, Salt Lake City, UT, United States*, ³*Orthopaedics, University of Utah, Salt Lake City, UT, United States*

3:00PM Impact Performance of Bicycle Helmets During Real-World Oblique Impacts SB³C2017-154

Megan L. Bland¹, Craig McNally¹, David S. Zuby², Becky C. Mueller², Steven Rowson¹, ¹*Biomedical Engineering and Mechanics, Virginia Tech, Blacksburg, VA, United States*, ²*Insurance Institute for Highway Safety, Ruckersville, VA, United States*

3:15PM Improving Head Impact Kinematics Measurement Accuracy Using Sensor Fusion of Multiple Sensors SB³C2017-155

Calvin Kuo¹, Jake A. Sganga², Michael G. Fanton¹, David B. Camarillo², ¹*Mechanical Engineering, Stanford University, Stanford, CA, United States*, ²*Bioengineering, Stanford University, Stanford, CA, United States*

3:30PM Exploring Novel Objective Functions for Simulating Muscle Coactivation in the Neck SB³C2017-156

Jonathan D. Mortensen, Andrew S. Merryweather, *Mechanical Engineering, University of Utah, Salt Lake City, UT, United States*

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Mechanical Regulation of Remodeling and Repair (CTE)

San Ignacio

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

Session Co-Chair: Nelly Andarawis-Puri, *Cornell University, NY, United States*

2:15PM The Timing of Mechanical Loading Modulates Endochondral Ossification of Chondrogenically Primed MSCs SB³C2017-157

Anna M. McDermott¹, Joel D. Boerckel¹, Daniel J. Kelly², ¹*University of Notre Dame, Notre Dame, IN, United States*, ²*Trinity College Dublin, Dublin, Ireland*

2:30PM Inhibition of Rho Kinase that Attenuates Pain Also Reduces Early Spinal Glial Activation & Neurotransmitter Expression After Mechanical Facet Capsule Injury In Vivo SB³C2017-158

Sijia Zhang, Christine Weisshaar, Beth Winkelstein, *University of Pennsylvania, Philadelphia, PA, United States*

SCIENTIFIC SESSIONS

- 2:45PM Interdependence Driven Aging in Synthetic Tissues** SB³C2017-159
 Aylin Acun, Dervis Vural, Pinar Zorlutuna, *University of Notre Dame, Notre Dame, IN, United States*
- 3:00PM A Novel Bioreactor to Study the Driving Mechanical Stimuli of Tissue Growth and Remodeling** SB³C2017-160
 Mathieu A. J. van Kelle, Pim J. A. Oomen, Jurgen A. Bultink, Marloes W. J. T. Janssen-van den Broek, Richard G. P. Lopata, Marcel C. M. Rutten, Sandra Loerakker, Carlijn V. C. Bouten, *Biomedical Engineering, Eindhoven University of Technology, Eindhoven, Netherlands*
- 3:15PM Biological Intervention to Reduce Post-Traumatic Joint Contracture: Preliminary Evidence Supporting the Use of Simvastatin or Losartan** SB³C2017-161
 Alex Reiter¹, Chelsey Dunham¹, Ryan Castile¹, Aaron Chamberlain¹, Leesa Galatz², Spencer Lake¹, ¹*Washington University in St. Louis, St. Louis, MO, United States*, ²*Mt. Sinai Hospital, New York, NY, United States*
- 3:30PM Proteolytic Beacon for Matrix Metalloproteinases Implicated in Extracellular Matrix Remodelling** SB³C2017-162
 Dominic Muli¹, Oliver McIntyre², Jonathan Vande Geest¹, ¹*Department of Bioengineering, University of Pittsburgh, Pittsburgh, PA, United States*, ²*Vanderbilt University Medical Center, Vanderbilt University, Nashville, TN, United States*

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**Therapeutic Materials for Repair and Regeneration
(CTE)**

San Pedro

Session Chair: Matt Fisher, *North Carolina State University, NC, United States*
Session Co-Chair: Jessica Sparks, *Miami University, OH, United States*

- 2:15PM A Novel Antioxidant Porous Vesicle Treatment Prevents the Pain & Axonal Damage that Develop with Neuropathic Injury** SB³C2017-163
 Sonia Kartha, Christine Weisshaar, Andrew Tsourkas, Zhiliang Cheng, Beth Winkelstein, *University of Pennsylvania, Philadelphia, PA, United States*
- 2:30PM Mechanical Function of a Composite Nanofibrous Biomaterial Analogue of the Knee Meniscus Inclusive of Radial Tie Fiber-Like Elements** SB³C2017-164
 Sonia Bansal, Breanna N. Seiber, Niobra M. Keah, Robert L. Mauck, Miltiadis H. Zgonis, *McKay Orthopaedic Research Laboratory, University of Pennsylvania, Philadelphia, PA, United States*
- 2:45PM The Role of Carbonate on Protein-free Formation of Bone-like Apatite** SB³C2017-165
 Alix C. Deymier¹, Arun Nair², Baptiste Depalle³, Zhao Qin⁴, Kashyap Arcot⁵, Christophe Drouet⁶, Claude H. Yoder⁷, Markus J. Buehler⁴, Stavros Thomopoulos¹, Guy M. Genin⁵, Jill D. Pasteris⁸, ¹*Orthopedic Surgery, Columbia University, New York, NY, United States*, ²*Dept. of Mechanical Engineering, University of Arkansas, Fayetteville, AR, United States*, ³*Dept. of Materials, Imperial College, London, United Kingdom*, ⁴*Dept. of Civil and Envir Engr, MIT, Boston, MA, United States*, ⁵*Dept. of Mech Engr and MatSci, Washington University, St Louis, MO, United States*, ⁶*CIRIMAT, Universite de Toulouse, Toulouse, France*, ⁷*Dept. of Chemistry, Franklin and Marshall College, Lancaster, PA, United States*, ⁸*Dept. of Earth and Planetary Sci, Washington University, St Louis, MO, United States*
- 3:00PM A Tunable Flexible-PLA Scaffold Suitable for Complex 3D Printed Tissues** SB³C2017-166
 Timothy Jacobsen, Andrew Wong, Jacob Rigos, Nadeen Chahine, *The Feinstein Institute for Medical Research, Manhasset, NY, United States*
- 3:15PM Development and Testing of a Long Bone Segment Regenerating Scaffold for Patients** SB³C2017-167
 John A. Szivek, Jacqueline Buchak, Andrew M. Wojtanowski, David A. Gonzales, Adriana Barreda, Jordan L. Smith, David S. Margolis, *Orthopaedic Surgery, University of Arizona, Tucson, AZ, United States*
- 3:30PM Determination of the Mechanical Properties of De Novo Engineered Tissue in Needled-Nonwoven Scaffolds** SB³C2017-168
 Joao S. Soares, Will Zhang, Michael S. Sacks, *Institute for Computational Engineering and Sciences, University of Texas at Austin, Austin, TX, United States*

Friday, June 23

2:15pm - 3:45pm

**PhD Paper Competition: Imaging, Biofluid
Mechanics, and Biotransport**

Tucson AB

Session Chair: Sarah Vigmostad, *University of Iowa, IA, United States*

Session Co-Chair: Philippe Sucusky, *Wright State, OH, United States*

- 2:15PM The Predictive Value of Transverse Shear Stress on Plaque Progression in Human Coronary Arteries** SB³C2017-169
Annette M. Kok¹, David S. Molony², Lucas H. Timmins³, Yi-An Ko⁴, Parham Eshtehardi², Jolanda J. Wentzel¹, Habib Samady², ¹*Biomedical Engineering, Erasmus MC, Rotterdam, Netherlands*, ²*Medicine, Emory University School of Medicine, Atlanta, GA, United States*, ³*Bioengineering, University of Utah, Salt Lake City, UT, United States*, ⁴*Biostatistics and Bioinformatics, Emory University Rollins School of Public Health, Atlanta, GA, United States*
- 2:30PM Uncertainty Quantification in Multi-scale Coronary Simulations Using Multi-resolution Expansion** SB³C2017-170
Justin S. Tran¹, Daniele E. Schiavazzi², Abhay B. Ramachandra³, Andrew M. Kahn⁴, Alison L. Marsden³, ¹*Mechanical Engineering, Stanford University, Stanford, CA, United States*, ²*ACMS, University of Notre Dame, Notre Dame, IN, United States*, ³*Bioengineering and Pediatrics, Stanford University, Stanford, CA, United States*, ⁴*Medicine, University of California, San Diego, La Jolla, CA, United States*
- 2:45PM An Improved Micro-thermal Sensor For Planning And Guidance Of Pulmonary Vein Cryotherapy** SB³C2017-171
Harishankar Natesan¹, Limei Tian², Wyatt Hodges⁴, Chris Dames⁴, John Rogers^{2,3}, John Bischof¹, ¹*Department of Mechanical Engineering, University of Minnesota, Minneapolis, MN, United States*, ²*Department of Material Science and Engineering, University of Illinois, Urbana- Champaign, IL, United States*, ³*Department of Material Science and Engineering, Northwestern University, Evanston, IL, United States*, ⁴*Department of Mechanical Engineering, University of California, Berkeley, CA, United States*
- 3:00PM Enhanced Hyperthermia due to Gold Nano-particles During MR-guided High Intensity Focused Ultrasound (HIFU) Ablation Procedures** SB³C2017-172
S. Devarakonda¹, M. Myers², C. Dumoulin³, M. Lanier³, R. Banerjee¹, ¹*Department of Mechanical Engineering, University of Cincinnati, Cincinnati, OH, United States*, ²*Division of Applied Mechanics, CDRH, US FDA, Silver Spring, MD, United States*, ³*Department of Radiology, Cincinnati Children's Hospital Medical Center, Cincinnati, OH, United States*
- 3:15PM In Vivo Quantification of Brain Tissue Displacement and Strain Using Cine-Dense MRI In a Healthy Subject and a Chiari Malformation Patient** SB³C2017-173
Soroush Heidari Pahlavian¹, Rouzbeh Amini², Xiaodong Zhong³, John Oshinski⁴, Francis Loth¹, ¹*Mechanical Engineering, The University of Akron, Akron, OH, United States*, ²*Biomedical Engineering, The University of Akron, Akron, OH, United States*, ³*MR R&D Collaborations, Siemens Healthcare, Atlanta, GA, United States*, ⁴*Radiology & Imaging Sciences and Biomedical Engineering, Emory University, School of Medicine, Atlanta, GA, United States*
- 3:30PM CFD Model < MRI Measurement Of Intrathecal Cerebrospinal Fluid Dynamics In A Cynomolgus Monkey** SB³C2017-174
Mohammadreza Khani¹, Tao Xing², Christina Gibbs¹, John Oshinski³, Gregory Stewart⁴, Jillynne Zeller⁵, Bryn A. Martin⁶, ¹*agricultural and biological engineering, University of Idaho, Moscow, ID, United States*, ²*University of Idaho, Moscow, ID, United States*, ³*Department of Radiology, Emory University, atlanta, GA, United States*, ⁴*Alchemy Neuroscience, hanover, Germany*, ⁵*Northern Biomedical Research, Spring Lake, MI, United States*, ⁶*Agricultural and biological engineering, University of Idaho, Moscow, ID, United States*

Friday, June 23	2:15pm - 3:45pm
PhD Paper Competition: Tissue Mechanics and Characterization	
Tucson CD	
Session Chair: Jeff Wolchok, University of Arkansas, AR, United States	
Session Co-Chair: Daniela Valdez-Jasso, University of Illinois at Chicago, IL, United States	
2:15PM	Shear Wave Elastography for Assessing Myocardial Material Properties: An In Vitro, Ex Vivo and In Silico Study SB ³ C2017-175 Annette Caenen ¹ , Mathieu Pernot ² , Darya Shcherbakova ¹ , Abdullah Thabit ¹ , Luc Mertens ³ , Abigail Swillens ¹ , Patrick Segers ¹ , ¹ <i>IBiTech-bioMMeda, Ghent University, Ghent, Belgium</i> , ² <i>Langevin Institut, Ecole Supérieure de Physique et de Chimie Industrielles, Paris, France</i> , ³ <i>Hospital for Sick Children, University of Toronto, Toronto, ON, Canada</i>
2:30PM	Quantification Of The Effect Of Calcification On The Tissue - Stent Interaction In A Stenosed Aortic Root SB ³ C2017-176 Orla M. McGee ¹ , Paul S. Gunning ¹ , Wei Sun ² , Laoise M. McNamara ¹ , ¹ <i>Biomedical Engineering, NUI Galway, Galway, Ireland</i> , ² <i>Wallace H Coulter Department of Biomedical Engineering, Georgia Institute of Technology, Atlanta, GA, United States</i>
2:45PM	Influence of Optic Nerve Head Material Properties on Rat Optic Nerve Strains Due to Elevated Intraocular Pressure SB ³ C2017-177 Stephen A. Schwaner ¹ , Marta Pazos ^{2,3} , Hongli Yang ³ , Elaine C. Johnson ⁴ , John C. Morrison ⁴ , Claude F. Burgoyne ³ , C. Ross Ethier ¹ , ¹ <i>Georgia Institute of Technology, Atlanta, GA, United States</i> , ² <i>Hospital de l'Esperanca-Parc de Salut Mar., Barcelona, Spain</i> , ³ <i>Devers Eye Institute, Portland, OR, United States</i> , ⁴ <i>Oregon Health and Science University, Portland, OR, United States</i>
3:00PM	Finite Element Modeling of Active Skeletal Muscle: Muscle Force and Intramuscular Pressure SB ³ C2017-178 Benjamin Wheatley ¹ , Gregory Odegard ² , Kenton Kaufman ³ , Tammy Haut Donahue ¹ , ¹ <i>Colorado State University, Fort Collins, CO, United States</i> , ² <i>Michigan Technological University, Houghton, MI, United States</i> , ³ <i>Mayo Clinic, Rochester, MN, United States</i>
3:15PM	A Finite Element Algorithm for Large Deformation Frictional Contact of Biphase Materials with Application to Contact of Articular Cartilage in Diarthrodial Joints SB ³ C2017-179 Brandon K. Zimmerman ¹ , Krista M. Durney ² , Gerard A. Ateshian ¹ , ¹ <i>Mechanical Engineering, Columbia University, New York, NY, United States</i> , ² <i>Biomedical Engineering, Columbia University, New York, NY, United States</i>
3:30PM	Relationships Between Peak Bone Microstructure and Rate of Estrogen-Deficiency-Induced Bone Loss SB ³ C2017-180 Yihan Li , Wei-Ju Tseng, Chantal M. J. de Bakker, Hongbo Zhao, X. Sherry Liu, <i>Upenn, Philadelphia, PA, United States</i>

Friday, June 23	2:15pm - 3:45pm
PhD Paper Competition: Cellular Mechanics and Mechanobiology	
Tucson GH	
Session Chair: Jeffery Ruberti, Northeastern University, MA, United States	
Session Co-Chair: Ryan Pedrigi, University of Nebraska, NE, United States	
2:15PM	Anisotropic Hysteresis in Vascular Smooth Muscle Cells SB ³ C2017-181 Zaw Win , Justin Buksa, Patrick Alford, <i>University of Minnesota, Minneapolis, MN, United States</i>
2:30PM	Osteochondroprogenitor Primary Cilia Are Required For Juvenile Skeletal Development And Adult Bone Formation SB ³ C2017-182 Emily R. Moore , Yuchen Yang, Ya Xing Zhu, Christopher R. Jacobs, <i>Columbia University, New York, NY, United States</i>
2:45PM	Targeting Primary Cilia-Mediated Mechanotransduction To Enhance Whole Bone Adaptation SB ³ C2017-183 Milos Spasic , Michael P. Duffy, Christopher R. Jacobs, <i>Columbia University, New York, NY, United States</i>

- 3:00PM YAP/TAZ Feedback Control of Cytoskeletal Tension and Adhesion Remodeling is Required for ECFC Motility** SB³C2017-184
Devon E. Mason¹, James H. Dawahare¹, Sherry L. Voytik-Harbin², Mervin C. Yoder³, Joel D. Boerckel¹, ¹*Aerospace and Mechanical Engineering, University of Notre Dame, Notre Dame, IN, United States*, ²*Weldon School of Biomedical Engineering and Dept. of Basic Medical Sciences, Purdue University, West Lafayette, IN, United States*, ³*Herman B Wells Center for Pediatric Research, Indiana University School of Medicine, Indianapolis, IN, United States*
- 3:15PM TGFB Induces Primary Cilia Disassembly in Response to Cyclic Loading of Tenocytes** SB³C2017-185
Daniel T. Rowson, Hazel R. C. Screen, Martin M. M. Knight, *School of Engineering and Materials Science, Institute of Bioengineering, Queen Mary University of London, London, United Kingdom*
- 3:30PM Insights into Tribological Rehydration of Articular Cartilage Via Analysis of Solute Transport In Situ** SB³C2017-186
Brian T. Graham¹, Axel C. Moore², David L. Burris¹, Christopher Price², ¹*Mechanical Engineering, University of Delaware, Newark, DE, United States*, ²*Biomedical Engineering, University of Delaware, Newark, DE, United States*

Friday, June 23

2:15pm - 3:45pm

PhD Paper Competition: Diseases, Injury, and Remodeling

Tucson IJ

Session Chair: Jonathan Wenk, *University of Kentucky, KY, United States*

Session Co-Chair: Joshua Gargac, *University of Mount Union, OH, United States*

- 2:15PM Repeated Sub-Threshold Joint Loading Produces Pain and Alters Biomechanical & Spinal Glial Responses** SB³C2017-187
Sonia Kartha, Ben Bulka, Nicholas Stiansen, Harrison Troche, Beth Winkelstein, *University of Pennsylvania, Philadelphia, PA, United States*
- 2:30PM Anterior Capsule is a Larger Contributor to Contracture Than Muscle in a Rat Elbow Model of Post-Traumatic Joint Contracture** SB³C2017-188
Chelsey Dunham¹, Ryan Castile², Aaron Chamberlain³, Spencer Lake⁴, ¹*Biomedical Engineering, Washington University in St. Louis, St. Louis, MO, United States*, ²*Mechanical Engineering & Materials Science, Washington University in St. Louis, St. Louis, MO, United States*, ³*Orthopaedic Surgery, Washington University in St. Louis, St. Louis, MO, United States*, ⁴*Mechanical Engineering & Materials Science, Biomedical Engineering, Orthopaedic Surgery, Washington University in St. Louis, St. Louis, MO, United States*
- 2:45PM Modeling Tendon Viscoelasticity, Plasticity, and Damage Using Reactive Inelasticity** SB³C2017-189
Babak N. Safa^{1,2}, Michael H. Santare^{1,2}, Dawn M. Elliott^{1,2}, ¹*Mechanical Engineering, University of Delaware, Newark, DE, United States*, ²*Biomedical Engineering, University of Delaware, Newark, DE, United States*
- 3:00PM Arterial Damage Model Based On Empirical Stretch Thresholds Of Collagen Unfolding And Tissue Yielding** SB³C2017-190
Matthew I. Converse¹, Michele Marino², Kenneth L. Monson³, ¹*Mechanical Engineering, University of Utah, Salt Lake City, UT, United States*, ²*Institut für Kontinuumsmechanik, Leibniz Universität Hannover, Hannover, Germany*, ³*Mechanical Engineering; Bioengineering, University of Utah, Salt Lake City, UT, United States*
- 3:15PM Statin Attenuates the Inflammatory Damage on Cartilage by Inhibiting Rho Activity in Chondrocytes** SB³C2017-191
Mengxi Lv, Yilu Zhou, Shongshan Fan, Olivia Smith, X. Lucas Lu, *University of Delaware, Newark, DE, United States*
- 3:30PM Quantifying the Relative Importance of Maximum Myofilament Force and Metabolite Concentration in Right Ventricular Failure: A Multiscale Computational Approach** SB³C2017-192
Ryan J. Pewowaruk¹, Shivendra G. Tewari², Guanying Wang³, Diana M. Tabima¹, Anthony J. Baker³, Daniel A. Beard², Naomi C. Chesler¹, ¹*Biomedical Engineering, University of Wisconsin-Madison, Madison, WI, United States*, ²*Molecular & Integrative Physiology, University of Michigan-Ann Arbor, Ann Arbor, MI, United States*, ³*Medicine, University of California-San Francisco, San Francisco, CA, United States*

Friday, June 23	2:15pm - 3:45pm
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**PhD Paper Competition: Extracellular Matrix
Biomechanics**

San Luis

Session Chair: Trevor Lujan, *Boise State University, ID, United States*

Session Co-Chair: Hamed Hatami-Marbini, *University of Illinois at Chicago, IL, United States*

- 2:15PM Micromechanics of Elastic Lamellae in Mouse Carotid Artery SB³C2017-193**
Xunjie Yu¹, Raphael Turcotte², Francesca Seta³, Yanhang Zhang^{1,4}, ¹*Department of Mechanical Engineering, Boston University, Boston, MA, United States*, ²*Wellman Center for Photomedicine, Massachusetts General Hospital, Harvard Medical School, Boston, MA, United States*, ³*Vascular Biology Section, Boston University School of Medicine, Boston, MA, United States*, ⁴*Department of Biomedical Engineering, Boston University, Boston, MA, United States*
- 2:30PM Biomechanical and Biological Evaluation of Elastin Stabilization in Rat Abdominal Aortic Aneurysms Using Pentagalloyl Glucose SB³C2017-194**
Mirunalini Thirugnanasambandam¹, Dan T. Simionescu², Eugene Sprague³, Beth Goins⁴, Geoffrey D. Clarke⁴, Hai-Chao Han⁵, Krysta H. Amezcua¹, Oluwaseun R. Adeyinka¹, Ender Finol⁵, ¹*Department of Biomedical Engineering, University of Texas at San Antonio, San Antonio, TX, United States*, ²*Department of Bioengineering, Clemson University, Clemson, SC, United States*, ³*Department of Medicine, University of Texas Health Science Center at San Antonio, San Antonio, TX, United States*, ⁴*Department of Radiology, University of Texas Health Science Center at San Antonio, San Antonio, TX, United States*, ⁵*Department of Mechanical Engineering, University of Texas at San Antonio, San Antonio, TX, United States*
- 2:45PM Woven Collagen Biotextiles for Rotator Cuff Tendon Repair SB³C2017-195**
Greg D. Learn¹, Phillip E. McClellan², Derrick M. Knapik³, Jameson L. Cumsky⁴, Robert J. Gillespie³, Ozan Akkus², ¹*Biomedical Engineering, Case Western Reserve University, Cleveland, OH, United States*, ²*Mechanical & Aerospace Engineering, Case Western Reserve University, Cleveland, OH, United States*, ³*Orthopaedic Surgery, Case Western Reserve University, Cleveland, OH, United States*, ⁴*School of Medicine, Case Western Reserve University, Cleveland, OH, United States*
- 3:00PM Effect of Osmotic Swelling in Soft Tissues is Dependent on Collagen Fiber Orientation SB³C2017-196**
Bo Yang, Grace D. O'Connell, *Mechanical Engineering, University of California, Berkeley, Berkeley, CA, United States*
- 3:15PM Modeling the Effect of Spatially-Dependent ECM Fiber Deposition on Cell Tensional Homeostasis SB³C2017-197**
Shannen B. Kizilski¹, Rohit Y. Dhume¹, Patrick W. Alford², Victor H. Barocas², ¹*Mechanical Engineering, University of Minnesota, Minneapolis, MN, United States*, ²*Biomedical Engineering, University of Minnesota, Minneapolis, MN, United States*
- 3:30PM Planar Shear Characterization of the Facet Capsular Ligament SB³C2017-198**
Emily A. Bermel¹, Amy A. Claeson², Alexander Safonov¹, Victor H. Barocas¹, ¹*Biomedical Engineering, University of Minnesota - Twin Cities, Minneapolis, MN, United States*, ²*Biomedical Engineering, University of Delaware, Newark, DE, United States*

Friday, June 23	2:15pm - 3:45pm
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**PhD Paper Competition: Biomaterials and
Material-Cellular Interaction**

San Pedro

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

Session Co-Chair: Ian A. Sigal, *University of Pittsburgh, PA, United States*

- 2:15PM Substrate Stiffness Dictates Macrophage Polarization And Their Cross-talk With Mesenchymal Stem Cells : Implications For Biomaterial Design SB³C2017-199**
Rukmani Sridharan, Andrew R. Cameron, Daniel J. Kelly, Fergal J. O'Brien, *Anatomy, Royal College of Surgeons, dublin, Ireland*

- 2:30PM The Roles Of Decorin In The Structure And Mechanics Of Cartilage Pericellular Matrix During Skeletal Development** SB³C2017-200
Daphney R. Chery¹, Biao Han¹, Samuel Rozan¹, Ling Qin², David E. Birk³, Renato Iozzo⁴, Motomi Enomoto-Iwamoto⁵, Lin Han¹, ¹*School of Biomedical Engineering, Science and Health Systems, Drexel University, Philadelphia, PA, United States*, ²*Department of Orthopaedic Surgery, University of Pennsylvania, Philadelphia, PA, United States*, ³*Department of Molecular Pharmacology and Physiology, University of South Florida, Tampa, FL, United States*, ⁴*Department of Pathology, Anatomy and Cell Biology, Jefferson University, Philadelphia, PA, United States*, ⁵*Department of Orthopaedics, University of Maryland, Baltimore, MD, United States*
- 2:45PM Adhesive Films for Enhanced Tendon-to-Bone Repair** SB³C2017-201
Stephen W. Linderman^{1,2}, Mikhail Golman^{3,4}, Thomas R. Gardner³, Donghwan Yoon⁵, Victor Birman⁶, William N. Levine³, Guy M. Genin⁵, Stavros Thomopoulos^{3,4}, ¹*Biomedical Engineering, Washington University in St. Louis, St. Louis, MO, United States*, ²*Orthopaedic Surgery, Washington University in St. Louis, St. Louis, MO, United States*, ³*Orthopaedic Surgery, Columbia University, New York, NY, United States*, ⁴*Biomedical Engineering, Columbia University, New York, NY, United States*, ⁵*Mechanical Engineering, Washington University in St. Louis, St. Louis, MO, United States*, ⁶*Missouri S&T Global, Missouri University of Science and Technology, St. Louis, MO, United States*
- 3:00PM Self-Assembled Micelle Enables Enhanced Delivery of CRISPR/Cas9 System** SB³C2017-202
Yeh-Hsing Lao¹, Mingqiang Li¹, Madeleine A. Gao¹, Kam W. Leong^{1,2}, ¹*Department of Biomedical Engineering, Columbia University, New York, NY, United States*, ²*Department of Systems Biology, Columbia University Medical Center, New York, NY, United States*
- 3:15PM A Thermodynamic Statistical Mechanics Model to Investigate the Influence of Ligand Density and Substrate Stiffness on Cell Spreading** SB³C2017-203
Eoin McEvoy¹, Siamak S. Shishvan², Patrick McGarry¹, Vikram S. Deshpande², ¹*Discipline of Biomedical Engineering, National University of Ireland Galway, Galway, Ireland*, ²*Department of Engineering, University of Cambridge, Cambridge, United Kingdom*
- 3:30PM Indispensable Roles Of Decorin In Cartilage Poroelasticity At The Nanoscale** SB³C2017-204
Biao Han¹, Qing Li¹, Mei Sun², Hadi T. Nia³, Ramin Oftadeh⁴, Ling Qin⁵, Renato V. Iozzo⁶, David E. Birk², Lin Han¹, ¹*School of Biomedical Engineering, Science and Health Systems, Drexel University, Philadelphia, PA, United States*, ²*Department of Molecular Pharmacology and Physiology, University of South Florida, Tampa, FL, United States*, ³*Massachusetts General Hospital, Harvard Medical School, Boston, MA, United States*, ⁴*Department of Orthopaedic Surgery, Beth Israel Deaconess Medical Center, Boston, MA, United States*, ⁵*Department of Orthopaedic Surgery, University of Pennsylvania, Philadelphia, PA, United States*, ⁶*Sidney Kimmel Cancer Center, Thomas Jefferson University, Philadelphia, PA, United States*

Friday, June 23

4:00pm - 5:30pm

Undergraduate Design Competition**Tucson IJ****Session Chair:** Alan Eberhardt, *University of Alabama Birmingham, AL, United States***Session Co-Chair:** Laurel Kuxhaus, *Clarkson University, NY, United States*

- 4:00PM Prosthetic Bike Attachment for Children With Congenital Amputations** SB³C2017-205
Katherine Mavrommati, Mark R. Oppenheimer, Marco G. Santini, Kurt K. Reed, Caroline E. Skae, Lily H. Laiho, *California Polytechnic State University, San Luis Obispo, CA, United States*
- 4:15PM Coughing for Better Health: A Prosthesis to Aid in Sputum Expectoration in Laryngectomees** SB³C2017-206
Nicole D'Ambrosio, **Matthew Haltermann**, Alden Mitchell, Kota Tamura, Kara Van Herwarde, Byron D. Erath, *Clarkson University, Potsdam, NY, United States*
- 4:30PM Wearable Gesture Recognition System with Applications to American Sign Language** SB³C2017-207
Isioma Kasi-Okonye, Simranjit Ahluwalia, Dinithi Silva, Arturo Acuna, Oguz Yetkin, George Alexandrakis, *The University of Texas at Arlington, Arlington, TX, United States*
- 4:45PM An Adaptable Interim Prosthetic Socket as an Alternative for Below-The-Knee Amputation Rehabilitation** SB³C2017-208
Josh Marchese¹, **Kenneth Muhart**¹, Edward Cudjoe¹, Joshua Gargac², ¹*University of Mount Union, Alliance, OH, United States*, ²*Department of Engineering, University of Mount Union, Alliance, OH, United States*

SCIENTIFIC SESSIONS

- 5:00PM Training Device For Wheelchair Racing** SB³C2017-209
Sarah C. Peden, Marjelle F. Scheffers, Gnanadesikan Somasundaram, Dylan R. Wergelis-Isaacson, Sarah Rooney, *University of Delaware, Newark, DE, United States*
- 5:15PM Design And Analysis Of Soft-robotic Exoskeleton For Restoration Of Hand Function** SB³C2017-210
Vincent Castonguay-Siu, Dalen Mimeault, Pratik Shah, Craig Trischuck, Heather Williams, Michael Lipsett, *University of Alberta, Edmonton, AB, Canada*

Friday, June 23	4:00pm - 5:30pm
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**Upper and Lower Extremity Joint Mechanics
(Solids)**

Tucson AB

Session Chair: Mark Miller, *University of Pittsburgh, PA, United States*
Session Co-Chair: Antonis Stylianou, *University of Missouri-Kansas City, MO, United States*

- 4:00PM Muscle Driven Elbow Joint Simulation in a Multibody Framework** SB³C2017-211
Munsur Rahman¹, Mohsen Sharifi Renani¹, Akin Cil^{1,2,3}, Antonis Stylianou¹, ¹*Civil and Mechanical Engineering, University of Missouri-Kansas City, Kansas City, MO, United States*, ²*Orthopaedic Surgery, University of Missouri-Kansas City, Kansas City, MO, United States*, ³*Orthopaedics, Truman Medical Centers, Kansas City, MO, United States*
- 4:15PM Kinematics of Glenohumeral Joint Following Multiple Anterior Dislocations** SB³C2017-212
Masahito Yoshida¹, Tetsuya Takenaga¹, Calvin A. Chan², Volker Musahl^{1,3}, Albert Lin¹, Richard E. Debski^{2,4}, ¹*Department of Orthopaedic Surgery, University of Pittsburgh, Pittsburgh, PA, United States*, ²*Department of Bioengineering, University of Pittsburgh, Pittsburgh, PA, United States*, ³*Department of Bioengineering, University of Pittsburgh, Pittsburgh, PA, United States*, ⁴*Department of Orthopaedic Surgery, University of Pittsburgh, Pittsburgh, PA, United States*
- 4:30PM Inter-Limb Differences In Knee Gait And Quantitative Magnetic Resonance Imaging Variables 3 Months After Anterior Cruciate Ligament Reconstruction** SB³C2017-213
 Ashutosh Khandha¹, Kurt Manal², Jacob J. Capin³, Kevin McGinnis¹, Lynn Snyder-Mackler³, **Thomas S. Buchanan**⁴, ¹*Delaware Rehabilitation Institute, University of Delaware, Newark, DE, United States*, ²*Department of Mechanical Engineering, University of Delaware, Newark, DE, United States*, ³*Department of Physical Therapy, University of Delaware, Newark, DE, United States*, ⁴*Department of Mechanical Engineering, Department of Biomedical Engineering, University of Delaware, Newark, DE, United States*
- 4:45PM Flexion-Pattern of Bi-Cruciate-Retaining Total Knee Arthroplasty-treated Knees** SB³C2017-214
Tetsuya Takagi¹, Yohei Okada², Satoshi Yamakawa¹, Atsushi Teramoto², Toshihiko Yamashita², Hiromichi Fujie¹, ¹*Faculty of System Design, Tokyo Metropolitan University, Tokyo, Japan*, ²*Department of Orthopaedic Surgery, Sapporo Medical University School of Medicine, Sapporo, Japan*
- 5:00PM Ligament Engagement Patterns in a Human Cadaveric Knee Model: A Basis for Precision Medicine in Orthopaedics** SB³C2017-215
Robert N. Kent, James F. Boorman-Padgett, Ran Thein, Andrew D. Pearle, Thomas L. Wickiewicz, Carl W. Imhauser, *Biomechanics, Hospital for Special Surgery, New York, NY, United States*
- 5:15PM Analysis of Uncertainty in Superposition Testing: Implications for Robotically Controlled Knee Joint Testing:** SB³C2017-216
 Nicholas J. Haas, Tara Bonner, Callan M. Gillespie, **Robb Colbrunn**, *BioRobotics and Mechanical Testing Core, Cleveland Clinic, Cleveland, OH, United States*

Friday, June 23

4:00pm - 5:30pm

Head Injury & Injury Biomechanics 1 (Solids)**Tucson CD****Session Chair: Brittany Coats**, *University of Utah, UT, United States***Session Co-Chair: Jianguye Zhang**, *Johns Hopkins University, MD, United States*

- 4:00PM In Vivo Strains of Brain Deformation with Mild Angular and Posterior Head Acceleration using Tagged MRI** SB³C2017-217
Yuan-Chiao Lu¹, Deva C. Chan², Andrew K. Knutsen¹, Sarah H. Yang¹, Philip V. Bayly³, Wen-Tung Wang¹, John A. Butman⁴, Dzung L. Pham¹, ¹*Center for Neuroscience and Regenerative Medicine, Henry M. Jackson Foundation, Bethesda, MD, United States*, ²*Department of Biomedical Engineering, Rensselaer Polytechnic Institute, Troy, NY, United States*, ³*Mechanical Engineering and Materials Science, Washington University at St. Louis, St. Louis, MO, United States*, ⁴*Radiology and Imaging Sciences, National Institutes of Health Clinical Center, Bethesda, MD, United States*
- 4:15PM Validation Of FE Hybrid III, THOR, And GHBMCM50-OS For Spaceflight Configuration Testing** SB³C2017-218
Derek Jones¹, James Gaewsky¹, Mona Saffarzadeh¹, F. Scott Gayzik¹, Ashley Weaver¹, Jacob Putnam², Jeffrey Somers², Jessica Wells³, N. Newby², Joel Stitzel¹, ¹*Wake Forest University School of Medicine, Winston-Salem, NC, United States*, ²*KBRwyle, Houston, TX, United States*, ³*Leidos, Houston, TX, United States*
- 4:30PM Collagen Alignment Differentially Increases Neuronal Regulation after Stretch of Neuron-Collagen Constructs** SB³C2017-219
Sagar Singh, Sijia Zhang, Beth Winkelstein, *University of Pennsylvania, Philadelphia, PA, United States*
- 4:45PM Disruption of Capillary-Like Structure by Impulsive Pressure Loading** SB³C2017-220
Hironichi Nakadate, Shinichi Nakamura, Shigeru Aomura, *Graduate School of System Design, Tokyo Metropolitan University, Hino, Tokyo, Japan*
- 5:00PM Computational Simulations of Lateral Ankle Sprains in Tennis** SB³C2017-221
Paul D. Heeder¹, **Feng Wei**², Roger C. Haut², ¹*Mechanical Engineering, Michigan State University, East Lansing, MI, United States*, ²*Radiology, Michigan State University, East Lansing, MI, United States*
- 5:15PM Performance Assessment Of A Pre-computed Brain Response Atlas In Dummy Head Impacts** SB³C2017-222
Wei Zhao¹, Calvin Kuo², Lyndia C. Wu³, David B. Camarillo^{2,3}, Songbai Ji^{1,4}, ¹*Department of Biomedical Engineering, Worcester Polytechnic Institute, Worcester, MA, United States*, ²*Department of Mechanical Engineering, Stanford University, Stanford, CA, United States*, ³*Department of Bioengineering, Stanford University, Stanford, CA, United States*, ⁴*Thayer School of Engineering, Dartmouth College, Hanover, NH, United States*

Friday, June 23

4:00pm - 5:30pm

Vascular Mechanics (Solids)**San Ignacio****Session Chair: Lucas H. Timmins**, *Georgia Institute of Technology, GA, United States***Session Co-Chair: Susan Lessner**, *University of South Carolina School of Medicine, SC, United States*

- 4:00PM Patient-Specific Mapping of 2D In Vivo Aortic Wall Strain in the Thoracic and Abdominal Aorta Using DENSE MRI** SB³C2017-223
John S. Wilson¹, Xiaodong Zhong¹, W. Robert Taylor², John Oshinski¹, ¹*Radiology, Emory University, Atlanta, GA, United States*, ²*Cardiology, Emory University, Atlanta, GA, United States*
- 4:15PM Transmural Variation in Fiber Orientation and Its Association with the Anisotropic Behavior of Arterial Elastin** SB³C2017-224
Xunjie Yu¹, Yunjie Wang¹, Yanhang Zhang^{1,2}, ¹*Department of Mechanical Engineering, Boston University, Boston, MA, United States*, ²*Department of Biomedical Engineering, Boston University, Boston, MA, United States*
- 4:30PM Arterial Stiffness, Aging, and Elastin Deficiency** SB³C2017-225
Jie Hawes¹, Robert P. Mecham², Jessica E. Wagenseil¹, ¹*Mechanical Engineering and Materials Science, Washington University, St. Louis, MO, United States*, ²*Cell Biology and Physiology, Washington University, St. Louis, MO, United States*

- 4:45PM Modeling the Pulmonary Arteries With a Four Fiber Family Constitutive Model** SB³C2017-226
Erica R. Pursell, Daniela Velez-Rendon, Daniela Valdez-Jasso, *Bioengineering, University of Illinois at Chicago, Chicago, IL, United States*
- 5:00PM Tortuosity And Curvature Of Cerebral Arteries In Posterior Fossa** SB³C2017-227
D. Nakagawa^{1,2}, A. Schumacher¹, B. Berkowitz¹, D. Hasan², M. Raghavan¹, *¹Department of Biomedical Engineering, University of Iowa, Iowa City, IA, United States, ²Department of Neurosurgery, University of Iowa, Iowa City, IA, United States*
- 5:15PM A Triphasic Fluid Transport Model of the Arterial Wall** SB³C2017-228
Manuel K. Rausch^{1,2}, Jay D. Humphrey³, *¹Department of Aerospace Engineering & Engineering Mechanics, University of Texas at Austin, Austin, TX, United States, ²Department of Biomedical Engineering, Yale University, New Haven, CT, United States, ³Biomedical Engineering, Yale University, New Haven, CT, United States*

Friday, June 23

4:00pm - 5:30pm

Imaging and Diagnostics (Fluids)

Tucson GH

Session Chair: Craig Goergen, *Purdue University, NC, United States*Session Co-Chair: Alejandro Roldán-Alzate, *University of Wisconsin, WI, United States*

- 4:00PM Computational Fluid Dynamics of Aortic Dissection: 4D Flow MRI-Based Inlet Boundary Conditions** SB³C2017-229
Sylvana García-Rodríguez¹, Rafael Medero², Christopher J. François¹, Alejandro Roldán-Alzate^{1,2,3}, *¹Radiology, University of Wisconsin, Madison, WI, United States, ²Mechanical Engineering, University of Wisconsin, Madison, WI, United States, ³Biomedical Engineering, University of Wisconsin, Madison, WI, United States*
- 4:15PM PC-MRI Derived Inlet Boundary Conditions for CFD Models of Human Aorta: Uncertainty Propagation** SB³C2017-230
Silvia Bozzi¹, Giuseppe De Nisco², Diego Gallo², Raffaele Ponzini³, Giovanna Rizzo⁴, Cristina Bignardi², Umberto Morbiducci², Giuseppe Passoni¹, *¹Department of Electronics, Information Science, and Bioengineering, Politecnico di Milano, Milan, Italy, ²Department of Mechanical and Aerospace Engineering, Politecnico di Torino, Turin, Italy, ³HPC and Innovation Unit, CINECA, Milan, Italy, ⁴IBFM, Research National Council, Milan, Italy*
- 4:30PM Noninvasive Estimation of Coronary Fractional Flow Reserve (FFR) Using Magnetic Resonance Imaging: Methodology and Preliminary Results** SB³C2017-231
Jackson B. Hair¹, Lucas H. Timmins², John N. Oshinski^{1,3}, *¹Biomedical Engineering, Georgia Institute of Technology and Emory University, Atlanta, GA, United States, ²Bioengineering, University of Utah, Salt Lake City, UT, United States, ³Department of Radiology & Imaging Sciences, Emory University School of Medicine, Atlanta, GA, United States*
- 4:45PM Fluid-Structure-Interaction Simulations of Hemodynamics in Data Driven Models of Wild Type and Fibulin-5 Deficient Mice** SB³C2017-232
Federica Cuomo¹, Jacopo Ferruzzi², Pradyumn Agarwal¹, Chen Li¹, Jay D. Humphrey², C. Alberto Figueroa^{3,4}, *¹Biomedical Engineering, University of Michigan, Ann Arbor, MI, United States, ²Biomedical Engineering, Yale University, New Haven, CT, United States, ³Biomedical Engineering and Vascular Surgery, University of Michigan, Ann Arbor, MI, United States, ⁴Imaging Sciences and Biomedical Engineering, King's College London, London, United Kingdom*
- 5:00PM Mapping Left Ventricular Blood Stasis Using Conventional Doppler-Echocardiography in Acute Myocardial Infarction** SB³C2017-233
Lorenzo Rossini¹, Pablo Martinez-Legazpi², Candelas Perez del Villar², Yolanda Benito², Carolina Devesa-Cordero², Raquel Yotti², Antonia Delgado-Montero², Ana Gonzalez-Mansilla², Andrew M. Kahn³, Francisco Fernandez-Avilés², Javier Bermejo², Juan Carlos del Alamo¹, *¹Mechanical and Aerospace Engineering, UC San Diego, La Jolla, CA, United States, ²Department of Cardiology, Hospital Universitario Gregorio Marañón, Madrid, Spain, ³Department of Cardiovascular Medicine, UC San Diego, La Jolla, CA, United States*
- 5:15PM Color Doppler Echocardiogram Velocimetry Flow Reconstruction Using Streamfunction-Vorticity Formulation** SB³C2017-234
Brett A. Meyers¹, Craig Goergen², Carlo Scalò¹, Pavlos Vlachos¹, *¹Mechanical Engineering, Purdue University, West Lafayette, IN, United States, ²Weldon School of Biomedical Engineering, Purdue University, West Lafayette, IN, United States*

Friday, June 23	4:00pm - 5:30pm
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Nano and Microtherapeutics (BTR)**San Luis****Session Chair: Shannon Stott**, *Harvard University, MA, United States***Session Co-Chair: Zhenpeng Qin**, *University of Texas at Dallas, TX, United States*

- 4:00PM Enhance Delivery Of Nanoparticles Across The Blood-brain Barrier In Brain Tumors Through Autocatalysis** SB³C2017-235
Gang Deng¹, Liang Han¹, Sasidhar Murikinati², Jaime Grutzendler², Joseph Piepmeier¹, **Jiangbing Zhou**³, ¹*Department of Neurosurgery, Yale University, New Haven, CT, United States*, ²*Department of Neurology, Yale University, New Haven, CT, United States*, ³*Department of Neurosurgery, Department of Biomedical Engineering, Yale University, New Haven, CT, United States*
- 4:15PM Ultrafast Near-infrared Light-triggered Uncaging Technique For Probing Cellular Signaling** SB³C2017-236
Xiuying Li¹, Zifan Che², Khadijah Mazhar³, Theodore Price³, **Zhenpeng Qin**^{1,4,5}, ¹*Departments of Mechanical Engineering, University of Texas at Dallas, Richardson, TX, United States*, ²*Departments of Materials Science and Engineering, University of Texas at Dallas, Richardson, TX, United States*, ³*School of Behavioral and Brain Sciences, University of Texas at Dallas, Richardson, TX, United States*, ⁴*Department of Surgery, University of Texas Southwestern Medical Center, Dallas, TX, United States*, ⁵*Department of Bioengineering, University of Texas at Dallas, Richardson, TX, United States*
- 4:30PM Motion of a Nano-Spheroid in a Cylindrical Vessel Flow: Brownian and Hydrodynamic Interactions; Implications for Targeted Drug Delivery** SB³C2017-237
N. Ramakrishnan¹, Y. Wang², D. M. Eckmann^{1,3}, R. Radhakrishnan^{1,4}, **P. S. Ayyaswamy**², ¹*Department of Bioengineering, University of Pennsylvania, Philadelphia, PA, United States*, ²*Department of Mechanical Engineering and Applied Mechanics, University of Pennsylvania, Philadelphia, PA, United States*, ³*Department of Anesthesiology and Critical Care, University of Pennsylvania, Philadelphia, PA, United States*, ⁴*Department of Chemical and Biomolecular Engineering, University of Pennsylvania, Philadelphia, PA, United States*
- 4:45PM Synthetic Secoisoiricinol Diglucoside Attenuates Mechanical Hyperalgesia & Spinal Inflammation in a Rat Model of Painful Radiculopathy** SB³C2017-238
Christine Weisshaar, Melpo Christofidou-Solomidou, **Beth Winkelstein**, *University of Pennsylvania, Philadelphia, PA, United States*
- 5:00PM The Role of Nanoparticles Design In Determining Analytical Performance of Lateral Flow Assays** SB³C2017-239
Li Zhan¹, Yan Gong², David Boulware³, Feng Xu², Warren Chan⁴, John Bischof¹, ¹*Mechanical Engineering, University of Minnesota, Minneapolis, MN, United States*, ²*Xi'an Jiaotong University, Xi'an, China*, ³*University of Minnesota, Minneapolis, MN, United States*, ⁴*University of Toronto, Toronto, ON, Canada*
- 5:15PM Controlled Ice Nucleation Using Freeze-Dried Pseudomonas Syringe Encapsulated in Hydrogel Beads** SB³C2017-240
Lindong Weng, Shannon N. Tessier, Anisa Swei, Shannon L. Stott, Mehmet Toner, *Massachusetts General Hospital, Boston, MA, United States*

Friday, June 23	4:00pm - 5:30pm
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Mechanical Regulation of Morphogenesis (CTE)**San Pedro****Session Chair: Nandan L. Nerurkar**, *Harvard Medical School, MA, United States***Session Co-Chair: Lance Davidson**, *University of Pittsburgh, PA, United States*

- 4:00PM BMP Signaling Regulates Differential Growth to Drive Buckling During Looping Morphogenesis of the Small Intestine** SB³C2017-241
Nandan L. Nerurkar¹, L. Mahadevan², Cliff Tabin¹, ¹*Genetics, Harvard Medical School, Boston, MA, United States*, ²*Harvard University, Cambridge, MA, United States*
- 4:15PM Cytoskeletal Dynamics Underlie Growth Plate Cartilage Morphogenesis** SB³C2017-242
Alek Erickson¹, Sarah Romereim², Nicholas Conoan³, Andrew Dudley¹, ¹*Genetics, Cell Biology, and Anatomy, University Nebraska Medical Center, Omaha, NE, United States*, ²*Reproductive Endocrinology, University Nebraska Lincoln, Lincoln, NE, United States*, ³*University Nebraska Medical Center, Omaha, NE, United States*

SCIENTIFIC SESSIONS

- 4:30PM Direct In-vivo Quantification of Differential Mechanical Properties in Developing Tissues** SB³C2017-243
Friedhelm Serwane, Alessandro Mongera, Payam Rowghanian, David A. Kealhofer, Adam A. Lucio, Zachary M. Hockenbery, **Otger Campas**, *University of California, Santa Barbara, Santa Barbara, CA, United States*
- 4:45PM Long-Range Patterning by the Vertebrate Tail Organizer via Mechanical Information** SB³C2017-244
Jamie Schwendinger-Schreck¹, Dörthe Jülich¹, Dipjyoti Das¹, Andrew Lawton¹, Nicolas Dray¹, Corey O'Hern^{2,3}, Thierry Emonet^{1,3}, **Scott Holley**¹, *¹Department of Molecular, Cellular and Developmental Biology, Yale University, New Haven, CT, United States, ²Department of Mechanical Engineering and Materials Science, Yale University, New Haven, CT, United States, ³Department of Physics, Yale University, New Haven, CT, United States*
- 5:00PM Buckling During Morphogenesis Of The Lung** SB³C2017-245
Katharine Goodwin, James W. Spurlin, **Celeste M. Nelson**, *Princeton University, Princeton, NJ, United States*
- 5:15PM Mechanical Control Of Cardiogenesis: How Mechanical Cues Guide The Cell Phenotype Of Heart Precursor Cells As They Form A Beating Heart.** SB³C2017-246
Lance Davidson, *University of Pittsburgh, Pittsburgh, PA, United States*

Saturday, June 24	2:15pm - 3:45pm
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Head Injury & Injury Biomechanics 2 (Solids)

Tucson AB

Session Chair: Francis Gayzik, *Wake Forest University School of Medicine, NC, United States*
Session Co-Chair: Mehmet Kurt, *Stevens Institute of Technology, NJ, United States*

- 2:15PM A Deep Learning Approach To Predict Mild Traumatic Brain Injury In Contact Sports** SB³C2017-247
Yunliang Cai¹, Wei Zhao¹, Zhigang Li², Songbai Ji^{1,3}, *¹Biomedical Engineering, Worcester Polytechnic Institute, Worcester, MA, United States, ²Department of Biomedical Data Science, Dartmouth College, Hanover, NH, United States, ³Thayer School of Engineering, Dartmouth College, Hanover, NH, United States*
- 2:30PM Multi-fidelity Modeling Of Traumatic Head Injury In Accident Reconstruction** SB³C2017-248
X. Gary Tan, Amit Bagchi, *Multifunctional Materials Branch, U.S. Naval Research Laboratory, Washington, DC, United States*
- 2:45PM Mechanical Properties of Porcine Brain Tissue In Vivo and Ex Vivo Estimated by MR Elastography** SB³C2017-249
Charlotte A. Guertler¹, Ruth J. Okamoto¹, John L. Schmidt¹, Andrew A. Badachhape², Curtis L. Johnson³, Philip V. Bayly¹, *¹Mechanical Engineering, Washington University in St. Louis, St. Louis, MO, United States, ²Biomedical Engineering, Washington University in St. Louis, St. Louis, MO, United States, ³Biomedical Engineering, University of Delaware, Newark, DE, United States*
- 3:00PM Measurement of Intraocular Pressure During Blast Wave Loading** SB³C2017-250
Nikolaus A. Benko, Daniel F. Shedd, Brittany Coats, *Mechanical Engineering, University of Utah, Salt Lake City, UT, United States*
- 3:15PM Two Phase Thoracic Organ Response Due to Blast Overpressure Loading on Post-Mortem Human Surrogates** SB³C2017-251
Alexander S. Iwaskiw, Constantine K. Demtropolis, Connor O. Pyles, Timothy P. Harrigan, Edwin B. Gienger, Connor A. Bradfield, Eyal Bar-Kochba, Joseph A. Andrist, Mary E. Luongo, Andrew C. Merkle, Robert S. Armiger, *The Johns Hopkins University Applied Physics Laboratory, Laurel, MD, United States*
- 3:30PM Influence of Compressive Strain Rate Dependency on Structure-Property Relations of Fetal Porcine Brain** SB³C2017-252
Courtney White¹, Jun Liao², Michaela Beasley¹, Michael Jones³, Raj Prabhu¹, Lakiesha Williams¹, *¹Mississippi State University, Starkville, MS, United States, ²University of Texas at Arlington, Arlington, TX, United States, ³Cardiff University, Cardiff, United Kingdom*

Saturday, June 24

2:15pm - 3:45pm

Reproductive Biomechanics (Solids)

Tucson CD

Session Chair: Kristin Miller, Tulane University, LA, United States

Session Co-Chair: Raffaella De Vita, Virginia Tech, VA, United States

- 2:15PM Vascular Distensibility And Constitutive Modeling Of Normal And Pathological Placental Chorionic Arteries** SB³C2017-253
Shier Nee Saw¹, Nurfarah Zaini Mattar², Arijit Biswas², Choon Hwai Yap¹, ¹Biomedical Engineering, National University of Singapore, Singapore, Singapore, ²Department of Obstetrics and Gynecology, National University Health Systems, Singapore, Singapore
- 2:30PM A Computational Study of the Contribution of the Commonly Ignored Superficial Perineal Structures During Vaginal Delivery** SB³C2017-254
Megan R. Routhong¹, Spandan Maiti², Raffaella De Vita³, Pamela A. Moalli⁴, Steven D. Abramowitch¹, ¹Musculoskeletal Research Center, Department of Bioengineering, University of Pittsburgh, Pittsburgh, PA, United States, ²Department of Bioengineering, University of Pittsburgh, Pittsburgh, PA, United States, ³Department of Biomedical Engineering and Mechanics, Virginia Tech, Blacksburg, VA, United States, ⁴Magee-Womens Research Institute, Pittsburgh, PA, United States
- 2:45PM Comparing In Vivo Ultrasound Geometry against In Vitro Calculations for Biaxial Testing in the Nonpregnant Murine Cervix** SB³C2017-255
Cassandra K. Conway¹, Hamna J. Qureshi², Leise Knoepp³, Laurephile Desrosiers³, Craig J. Goergen², Kristin S. Miller¹, ¹Biomedical Engineering, Tulane University, New Orleans, LA, United States, ²Biomedical Engineering, Purdue University, West Lafayette, IN, United States, ³Urogynecology, Ochsner Clinical School, New Orleans, LA, United States
- 3:00PM Mechanical Integrity Of The Cervix Is Impaired In A Mouse Model Of Intrauterine Inflammation And Preterm Birth** SB³C2017-256
Carrie E. Barnum¹, Stephanie N. Weiss¹, Guillermo Barila², Amy G. Brown², Snehal S. Shetye¹, Michal A. Elovitz², Louis J. Soslowsky¹, ¹McKay Orthopaedic Research Laboratory, University of Pennsylvania, Philadelphia PA, PA, United States, ²Maternal and Child Health Research Center, Department OBGYN, University of Pennsylvania, Philadelphia PA, PA, United States
- 3:15PM Biomechanical Simulations of Pregnancy: The Influence of Fetal Membrane Mechanics on Uterine and Cervical Tissue Stretch** SB³C2017-257
Andrea R. Westervelt¹, Edoardo Mazza², Alexander E. Ehret², Joy Vink³, Chia-Ling Nhan-Chang³, Ronald J. Wapner³, George Gallos⁴, Michael House⁵, Kristin Myers¹, ¹Mechanical Engineering, Columbia University, New York, NY, United States, ²Mechanical and Process Engineering, ETH Zurich, Zurich, Switzerland, ³Obstetrics and Gynecology, Columbia University Medical Center, New York, NY, United States, ⁴Columbia University Medical Center, New York, NY, United States, ⁵Obstetrics and Gynecology, Tufts Medical Center, Boston, MA, United States
- 3:30PM Mechanical and Histological Characterisation of the Human Male Urethra for the Purposes of Tissue Engineering an Appropriate Regenerative Graft** SB³C2017-258
Eoghan M. Cunnane^{1,2,3}, Niall F. Davis⁴, Alan J. Ryan¹, David A. Vorp^{3,5}, Fergal J. O'Brien¹, Michael T. Walsh², ¹Tissue Engineering Research Group, Royal College of Surgeons Ireland, Dublin 2, Ireland, ²Health Research Institute, School of Engineering, Bernal Institute, University of Limerick, Limerick, Ireland, ³McGowan Institute for Regenerative Medicine and the Department of Bioengineering, University of Pittsburgh, Pittsburgh, PA, United States, ⁴Department of Urology, St. Vincent's University Hospital, Dublin 2, Ireland, ⁵Division of Cardiac Surgery and the Department of Surgery, University of Pittsburgh, Pittsburgh, PA, United States

Saturday, June 24	2:15pm - 3:45pm
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**Tendon Tissue Engineering and Regeneration
(CTE/Solids)**

San Ignacio

Session Chair: Alice Huang, *Mt Sinai School of Medicine, NY, United States*

Session Co-Chair: Ellen Arruda, *University of Michigan, MI, United States*

- 2:15PM Comparison of Human Cell Populations on Tendon Repair** SB³C2017-259
Felix Dyrna¹, Leo Pauzenberger², Phillip Zakko², Mary Beth McCarthy², David Rowe², Augustus Mazzocca², **Nathaniel Dymont**³, ¹*Technical University of Munich, Munich, Germany*, ²*UConn Health, Farmington, CT, United States*, ³*University of Pennsylvania, Philadelphia, PA, United States*
- 2:30PM Leveraging Local Biomaterial Properties and Mechanical Stimulation for Tendon-bone-junction Engineering** SB³C2017-260
William K. Grier, **Raul A. Sun Han Chang**, Brendan A. C. Harley, *Chemical and Biomolecular Engineering, University of Illinois at Urbana, Champaign, Urbana, IL, United States*
- 2:45PM Cyclic Uniaxial Strain Increases Collagen III Deposition in Early Development of Scaffold-Free Engineered Tendon Fibers** SB³C2017-261
Kuwabo Mubyana¹, Connie S. Chamberlain², **David T. Corr**¹, ¹*Biomedical Engineering, Rensselaer Polytechnic Institute, Troy, NY, United States*, ²*Orthopedics and Rehabilitation, University of Wisconsin, Madison, WI, United States*
- 3:00PM Mechanical Stimulation Prevents MMP13-Driven Degradation of Engineered Tendon Tissue** SB³C2017-262
Andreas Herchenhan, Stefano Boccardo, Matteo Centola, Olivier Leupin, *Novartis Pharma AG, Basel, Switzerland*
- 3:15PM Deletion Of Smad4 In Adult Tenocytes Enables Tendon Cell Recruitment And Functional Recovery After Injury** SB³C2017-263
Chun Chien, Kristen Howell, Alice H. Huang, *Orthopaedics, Icahn School of Medicine at Mount Sinai, New York, NY, United States*
- 3:30PM Elastin is Localised to the Interfascicular Matrix of Energy Storing Tendons and Becomes More Disorganised With Ageing** SB³C2017-264
Marta S. Godinho¹, Chavaunne T. Thorpe², Steve E. Greenwald³, Hazel R. Screen¹, ¹*School of Engineering and Materials Science, Queen Mary University of London, London, United Kingdom*, ²*Comparative Biomedical Sciences, The Royal Veterinary College, London, United Kingdom*, ³*Blizard Institute, Barts and The London School of Medicine and Dentistry, London, United Kingdom*

Saturday, June 24	2:15pm - 3:45pm
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Aneurysm (Fluids)

Tucson GH

Session Chair: Kristian Valen-Sendstad, *Simula Research Laboratory, Lysaker, Norway*

Session Co-Chair: C. Alberto Figueroa, *University of Michigan, MI, United States*

- 2:15PM Computer Simulations Of Blood Flow In Aortic Dissections With Fluid Structure Interaction (FSI)** SB³C2017-265
Kathrin Baeumler, Anna M. Sailer, Vijay Vedula, Alison Marsden, Dominik Fleischmann, *Stanford University, Stanford, CA, United States*
- 2:30PM Unsteady Cerebral Blood Flow Simulation Based on Feedback Control-Data Assimilation Method Using 4D PC-MRI Velocity Field** SB³C2017-266
Satoshi Ii, Yoshiyuki Watanabe, Shigeo Wada, *Osaka University, Osaka, Japan*
- 2:45PM Image-based Computational Assessment Of Vascular Wall Mechanics And Hemodynamics In Pulmonary Arterial Hypertension Patients** SB³C2017-267
Byron A. Zambrano¹, Nathan McLean¹, Xiaodan Zhao², Liang Zhong², Lik Chuan Lee¹, Seungik Baek¹, ¹*Mechanical Engineering department, Michigan State University, East Lansing, MI, United States*, ²*National Heart Center, Singapore, Singapore*

- 3:00PM Implications of Singular Intracranial Aneurysm Repair in the Presence of Closely-Spaced Multiple Aneurysms: A CFD Simulation Study** SB³C2017-268
Kevin Sunderland¹, Jingfeng Jiang¹, Qinghai Huang², Gouthami Chintalapani³, Charles Strother⁴, ¹*Biomedical Engineering, Michigan Technological University, Houghton, MI, United States*, ²*Neurosurgery, Changhai Hospital, Shanghai, China*, ³*Siemens Medical Solution (USA) Inc., Hoffman Estate, IL, United States*, ⁴*Radiology, University of Wisconsin, Madison, WI, United States*
- 3:15PM Physiologically-Relevant Measurements of Flow Through Stents: Towards Improved Models of Endovascular Cerebral Aneurysm Treatments** SB³C2017-269
Michael C. Barbour¹, Michael R. Levitt², Luke Johnson¹, Keshav Venkat¹, Christian Geindreau³, Sabine Rolland du Roscoat³, Ryan P. Morton², Louis J. Kim², Alberto Aliseda¹, ¹*Mechanical Engineering, University of Washington, SEATTLE, WA, United States*, ²*Neurological Surgery, University of Washington, SEATTLE, WA, United States*, ³*SR, Universite Grenoble Alps, Grenoble, France*
- 3:30PM Morphometric and Hemodynamic Impact of Post Endovascular AAA Repair: Comparison with Infrarenal Physiological Blood Flow** SB³C2017-270
Paola Tasso¹, Anastasios Raptis², Michalis Xenos³, Diego Gallo¹, Miltiadis Matsagkas⁴, Umberto Morbiducci¹, ¹*Department of Mechanical and Aerospace Engineering, Politecnico di Torino, Turin, Italy*, ²*Laboratory for Vascular Simulations, Institute of Vascular Diseases, Ioannina, Greece*, ³*Department of Mathematics, University of Ioannina, Ioannina, Greece*, ⁴*Department of Vascular Surgery, University of Thessaly, Larissa, Greece*

Saturday, June 24

2:15pm - 3:45pm

Experimental Modeling for Clinical Surgical Applications (DDR/IAB)

San Luis

Session Chair: Sara E. Wilson, *University of Kansas, KS, United States*

Session Co-Chair: Chung-Hao Lee, *University of Oklahoma, OK, United States*

- 2:15PM Spring Assisted Cranioplasty: A Parametric Analysis of Surgical Outcomes Using Statistical Shape Modeling and Finite Element Analysis** SB³C2017-271
Alessandro Borghi¹, Kunhou He¹, Jan Bruse², Naiara Rodriguez Florez¹, David Dunaway³, Owase Jeelani³, Silvia Schievano¹, ¹*UCL Great Ormond Street Institute of Child Health, University College London, London, United Kingdom*, ²*UCL Institute of Cardiovascular Science, University College London, London, United Kingdom*, ³*Craniofacial Unit, Great Ormond Street Hospital, London, United Kingdom*
- 2:30PM New Approach for Worst Case Determination of Hip Stem using FEA and Abaqus GUI** SB³C2017-272
 Mohsen Renani¹, **Jeff Bischoff**², ¹*University of Missouri - Kansas City, Kansas City, MO, United States*, ²*Zimmer Biomet, Inc., Warsaw, IN, United States*
- 2:45PM Finite Element Simulation and Experimental Characterization of Surgical Knot Performance** SB³C2017-273
Arz Y. Qwam Alden¹, Peter A. Gustafson^{1,2}, ¹*Mechanical and Aeronautical Engineering, Western Michigan University, Kalamazoo, MI, United States*, ²*Homer Stryker M.D. School of Medicine, Western Michigan University, Kalamazoo, MI, United States*
- 3:00PM Abstract Withdrawn** SB³C2017-274
- 3:15PM Evaluation of Metaphyseal Reconstructive Knee Revision Implant Impaction with Surgical Cadaveric Operation** SB³C2017-275
Gregg Schmidig, Mayur Thakore, Damon Servidio, *Device Evaluation, Stryker, Mahwah, NJ, United States*

3:30PM Performance Testing of Tissue Containment Bags for Power Morcellation SB³C2017-276

Alexander Herman¹, Nandini Duraiswamy¹, Thomas E. Claiborne², George J. Gibeily³, Veronica A. Price⁴, Prasanna Hariharan¹, ¹*Division of Applied Mechanics, Office of Science and Engineering Laboratories, U.S. Food and Drug Administration, Silver Spring, MD, United States*, ²*General Surgery Devices Branch II, Division of Surgical Devices, Office of Device Evaluation, U.S. Food and Drug Administration, Silver Spring, MD, United States*, ³*Plastic & Reconstructive Surgery Branch I, Division of Surgical Devices, Office of Device Evaluation, U.S. Food and Drug Administration, Silver Spring, MD, United States*, ⁴*Obstetrics & Gynecology Devices Branch, Division of Reproductive, Gastro-Renal and Urology Devices, U.S. Food and Drug Administration, Silver Spring, MD, United States*

Saturday, June 24**2:15pm - 3:45pm****Vascular, Lymphatic, and Ocular Transport (BTR)****Tucson IJ**

Session Chair: Malisa Sarntinoranont, *University of Florida, FL, United States*

Session Co-Chair: M. Nichole Rylander, *University of Texas, TX, United States*

2:15PM Elastic Fiber Network Structure Affects Mass Transport into the Arterial Wall SB³C2017-277

Austin Cocciolone¹, Jessica Wagenseil², ¹*Biomedical Engineering, Washington University, St. Louis, MO, United States*, ²*Mechanical Engineering and Materials Science, Washington University, St. Louis, MO, United States*

2:30PM Effect of Vascular Heterogeneity on Fluid Flow and Transport in Solid Tumors SB³C2017-278

Moath Alamer, Xiao Yun Xu, *Chemical Engineering, Imperial College London, London, United Kingdom*

2:45PM A Parallel Fluid Solid Coupling Tool With Applications In Particle Transport In Blood Cell Suspensions SB³C2017-279

Jifu Tan, Talid Sinno, Scott Diamond, *University of Pennsylvania, Philadelphia, PA, United States*

3:00PM 'Grayscale' Lithography to Create 3-D Channels: Application to High Shear Thrombosis Assays SB³C2017-280

Michael T. Griffin, David N. Ku, *Georgia Institute of Technology, Atlanta, GA, United States*

3:15PM Using CFD to Quantify Changes in Wall Shear Stress Between Common and Innovative Cell Seeding Techniques SB³C2017-281

Jake E. Ravidou¹, Andrew W. Holt², William E. Howard¹, Elizabeth T. Ables³, David A. Tulis², Stephanie M. George¹, ¹*Department of Engineering, East Carolina University, Greenville, NC, United States*, ²*Department of Physiology, Brody School of Medicine, East Carolina University, Greenville, NC, United States*, ³*Department of Biology, East Carolina University, Greenville, NC, United States*

3:30PM Coefficient of Friction Between Carboxymethylated Hyaluronic Acid (CMHA-S) Films and the Ocular Surface SB³C2017-282

Jourdan Colter¹, Hee-Kyoung Lee², Brenda Mann², Barbara Wirostko², Brittany Coats¹, ¹*Mechanical Engineering, University of Utah, Salt Lake City, UT, United States*, ²*EyeGate Pharma, Waltham, MA, United States*

Saturday, June 24**2:15pm - 3:45pm****Measuring and Modeling Cell Mechanics and the Microenvironment (CTE)****Tucson EF**

Session Chair: Nadeen Chahine, *Columbia University, NY, United States*

Session Co-Chair: Patrick McGarry, *National University of Ireland Galway, Galway, Ireland*

2:15PM Finite Element Formulation of Multiphasic Shell Elements for Cell Membrane Analyses in FEBio finite Element Formulation Of Multiphasic Shell Elements For Cell Membrane Analyses In Febio SB³C2017-283

Chieh(Jay) Hou¹, Steve Mass², Jeffrey Weiss², Gerard Ateshian¹, ¹*Columbia University, New York, NY, United States*, ²*University of Utah, Salt Lake City, UT, United States*

- 2:30PM A Multi-scale Model Predicts Increasing Focal Adhesion Size With Decreasing Stiffness In Fibrous Matrices**
SB³C2017-284
Xuan Cao¹, Ehsan Ban¹, Brendon M. Baker², Yuan Lin³, Jason A. Burdick⁴, Christopher S. Chen⁵, Vivek B. Shenoy^{4,6}, ¹Materials Science and Engineering, University of Pennsylvania, Philadelphia, PA, United States, ²Department of Biomedical Engineering, University of Michigan, Ann Arbor, MI, United States, ³Department of Mechanical Engineering, University of Hong Kong, Hong Kong, Hong Kong, ⁴Department of Bioengineering, University of Pennsylvania, Philadelphia, PA, United States, ⁵Department of Biomedical Engineering, Boston University, Boston, MA, United States, ⁶Materials Science and Engineering, University of Pennsylvania, Philadelphia, PA, United States
- 2:45PM Effects of Inflammation on Cellular Deformation of Nucleus Pulposus Cells: A Biphasic Finite Element Model**
SB³C2017-285
Quynhhoa T. Nguyen, Nadeen O. Chahine, *Biomechanics and Bioengineering, Feinstein Institute for Medical Research, Manhasset, NY, United States*
- 3:00PM Cell Force Generation in Biaxially and Uniaxially Loaded Tissues** SB³C2017-286
Noel Reynolds, Eoin McEvoy, Vikram Deshpande, **Patrick McGarry**, *National University of Ireland Galway, Galway, Ireland*
- 3:15PM Modeling the Two-Way Feedback Between Contractility and Matrix Realignment Reveals a Non-Linear Mode of Cancer Cell Invasion** SB³C2017-287
Hossein Ahmadzadeh¹, Marie Webster², Reeti Behera², Ashani Weeraratna², Vivek Shenoy¹, ¹Materials Science and Engineering, University of Pennsylvania, Philadelphia, PA, United States, ²Tumor Microenvironment and Metastasis Program, The Wistar Institute, Philadelphia, PA, United States
- 3:30PM In Situ Characterization of Native Extracellular Matrix Fibril Deformation** SB³C2017-288
Andrea Acuna, Michael A. Drakopoulos, Benjamin J. Sather, Craig J. Goergen, Sarah Calve, *Biomedical Engineering, Purdue University, West Lafayette, IN, United States*

Saturday, June 24

4:00pm - 5:30pm

Head Injury & Injury Biomechanics 3 (Solids)**Tucson AB****Session Chair:** Songbai Ji, *Dartmouth College, NH, United States***Session Co-Chair:** Deva Chan, *Henry M Jackson Foundation, MD, United States*

- 4:00PM Injury Prediction Using Strain And Susceptibility Measures Of The Deep White Matter Via Repeated Random Subsampling** SB³C2017-289
Wei Zhao¹, Yunliang Cai¹, Zhigang Li², Songbai Ji^{1,3}, ¹Department of Biomedical Engineering, Worcester Polytechnic Institute, Worcester, MA, United States, ²Department of Biomedical Data Science, Geisel School of medicine, Dartmouth College, Lebanon, NH, United States, ³Thayer School of Engineering, Dartmouth College, Hanover, NH, United States
- 4:15PM Pros and Cons of Arbitrary Lagrangian Eulerian Method for Flesh Simulation in a Whole Body Finite Element Model for Accelerative Vertical Loading** SB³C2017-290
Jiangyue Zhang, Timothy P. Harrigan, Connor Pyles, Connor Bradfield, Edna Wong, Emily Crane, Drew Seker, Robert Armiger, Andrew Merkle, *Research & Exploratory Development Department, The Johns Hopkins University Applied Physics Laboratory, Laurel, MD, United States*
- 4:30PM Modular Use Of Human Body Models Of Varying Complexity For Thoracic Organs** SB³C2017-291
William Decker^{1,2}, Bharath Koya¹, F. Scott Gayzik¹, ¹Virginia Tech-Wake Forest Center for Injury Biomechanics, Winston Salem, NC, United States, ²Biomedical Engineering, Wake Forest University School of Medicine, Winston Salem, NC, United States
- 4:45PM Brain Morphometrics that Provide a Better Understanding of Chiari Type I Malformation** SB³C2017-292
Maggie Eppelheimer¹, James Houston¹, Soroush Heidari Pahlavian¹, Audrey Braun¹, Dipankar Biswas¹, Dorothy Loth¹, Aintzane Urbizu^{1,2}, Richard Labuda³, Philip Allen¹, Francis Loth¹, ¹The University of Akron, Akron, OH, United States, ²Duke University Medical Center, Durham, NC, United States, ³Conquer Chiari, Wexford, PA, United States
- 5:00PM Mechanical Properties of Injured Mouse Brain Tissue** SB³C2017-293
Yuan Feng¹, Yuan Gao², Tao Wang², Luyang Tao², Suhao Qiu¹, Xuefeng Zhao¹, ¹School of Radiological and Interdisciplinary Sciences (RAD-X), Soochow University, Suzhou, China, ²Department of Forensic Science, Soochow University, Suzhou, China

- 5:15PM Viscoelastic Behavior of Isolated Cervical Spinal Cord and Pia Mater Tissues** SB³C2017-294
Nicole L. Ramo¹, Kevin L. Troyer², Christian M. Puttlitz^{1,3}, ¹*School of Biomedical Engineering, Colorado State University, Fort Collins, CO, United States*, ²*Component Science and Mechanics, Sandia National Laboratories, Albuquerque, NM, United States*, ³*Mechanical Engineering, Colorado State University, Fort Collins, CO, United States*

Saturday, June 24	4:00pm - 5:30pm
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**Reproductive, Ocular, and Gastrointestinal
Biomechanics (Solids)**

Tucson CD

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

- 4:00PM Planar Biaxial Mechanical Properties of Swine Vaginal Tissue** SB³C2017-295
Jeffrey McGuire¹, Raffaella De Vita¹, Steve Abramowitch², Spandan Maiti², ¹*Virginia Tech, Blacksburg, VA, United States*, ²*University of Pittsburgh, Pittsburgh, PA, United States*
- 4:15PM Changes in the Time-Dependent Mechanical Behavior of the Cervix in a Normal Mouse Pregnancy** SB³C2017-296
Kyoko Yoshida¹, Mala Mahendroo², Kristin Myers¹, ¹*Mechanical Engineering, Columbia University, New York, NY, United States*, ²*Obstetrics and Gynecology, UT Southwestern Medical Center, Dallas, TX, United States*
- 4:30PM Finite Element (FE) Modeling Of Monkey Optic Nerve Head (ONH) Biomechanics: Methods And Preliminary Results** SB³C2017-297
Fanwei Kong¹, Andrew Feola¹, Stephen A. Schwaner², Hongli Yang³, Howard Lockwood³, Juan Reynaud³, Claude F. Burgoyne³, Ross Ethier^{1,2}, ¹*Coulter Department of Biomedical Engineering, Georgia Institute of Technology/Emory, Atlanta, GA, United States*, ²*George W. Woodruff School of Mechanical Engineering, Georgia Institute of Technology, Atlanta, GA, United States*, ³*Devers Eye Institute, Portland, OR, United States*
- 4:45PM Posterior Sclera and Optic Nerve Deformation Comparison Between Glaucomatous and Normal Human Eyes** SB³C2017-298
Ehab A. Tamimi¹, Jeffery D. Pyne², Stephen J. Howerton³, Jonathan P. Vande Geest¹, ¹*Bioengineering Department, University of Pittsburgh, Pittsburgh, PA, United States*, ²*Department of Mechanical Engineering, University of California Berkeley, Berkeley, CA, United States*, ³*Department of Aerospace and Mechanical Engineering, University of Arizona, Tucson, AZ, United States*
- 5:00PM Biaxial Mechanical Response of Small Bowel Mesentery: Experimental Measurements and Constitutive Modeling** SB³C2017-299
Keyvan Amini Khoi¹, Sophia Abdulhai², Ian C. Glenn², Todd A. Ponsky², Rouzbeh Amini¹, ¹*The University of Akron, Akron, OH, United States*, ²*Akron Children's Hospital, Akron, OH, United States*
- 5:15PM Stenting the Patient-Specific, Actively Contracting and Buckling Esophagus: A Finite Element Analysis** SB³C2017-300
Mathias Peirlinck¹, Nic Debusschere¹, Francesco Iannaccone¹, Peter Siersema², Benedict Verhegghe¹, Patrick Segers¹, Matthieu De Beule¹, ¹*Biofluid, Tissue and Solid Mechanics for Medical Applications Lab (IBiTech, bioMMeda), Ghent University, Ghent, Belgium*, ²*Department of Gastroenterology and Hepatology, University Medical Center Utrecht, Utrecht, Netherlands*

Saturday, June 24	4:00pm - 5:30pm
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Aneurysm Mechanics (Solids)

Tucson IJ

Session Chair: Ender A. Finol, *University of Texas at San Antonio, TX, United States*
Session Co-Chair: Hai-Chao Han, *University of Texas, San Antonio, TX, United States*

- 4:00PM A Structure-based Constitutive Model of Arterial Tissue** SB³C2017-301
Tarek Shazly, Alexander Rachev, *University of South Carolina, Columbia, SC, United States*

- 4:15PM Collagen Network Microstructure of the Ascending Thoracic Aortic Media Predicts Experimental Uniaxial Failure Behavior** SB³C2017-302
James R. Thunes¹, Julie A. Philippj^{1,2,3}, Thomas G. Gleason^{1,2,3}, David A. Vorp^{1,2,3}, Spandan Maiti¹, ¹Department of Bioengineering, University of Pittsburgh, Pittsburgh, PA, United States, ²Department of Cardiothoracic Surgery, University of Pittsburgh, Pittsburgh, PA, United States, ³McGowan Institute for Regenerative Medicine, University of Pittsburgh, Pittsburgh, PA, United States
- 4:30PM Correlations of Wall Stress and Geometry in Symptomatic and Ruptured Abdominal Aortic Aneurysms** SB³C2017-303
Sathyajeeth Chauhan¹, Carlos Gutierrez¹, Mirunalini Thirugnanasambandam¹, Victor De Oliveira², Satish Muluk³, Mark Eskandari⁴, Ender A. Finol⁵, ¹Biomedical Engineering, University of Texas at San Antonio, San Antonio, TX, United States, ²Management Science and Statistics, University of Texas at San Antonio, San Antonio, TX, United States, ³Thoracic & Cardiovascular Surgery, Allegheny Health Network, Pittsburgh, PA, United States, ⁴Feinberg School of Medicine, Northwestern University, Chicago, IL, United States, ⁵Mechanical Engineering, University of Texas at San Antonio, San Antonio, TX, United States
- 4:45PM Crosslinked Elastic Fibers are Necessary for Resistance to Stretch at Low Pressure and for Low Energy Loss in the Ascending Aorta** SB³C2017-304
Jungsil Kim¹, Marius Staiculescu¹, Robert Mecham¹, Hiromi Yanagisawa², Jessica Wagenseil¹, ¹Washington University, St. Louis, MO, United States, ²University of Tsukuba, Tsukuba, Japan
- 5:00PM Patient-Specific Mechanical Characterization of Abdominal Aortic Aneurysms and Healthy Aortas using 4D Ultrasound: An In Vivo Comparison Study** SB³C2017-305
Emiel M. J. van Disseldorp^{1,2}, Niels J. Petterson¹, Frans N. van de Vosse¹, Marc R. H. M. van Sambeek², Richard G. P. Lopata¹, ¹Biomedical Engineering, Eindhoven University of Technology, Eindhoven, Netherlands, ²Vascular Surgery, Catharina Hospital Eindhoven, Eindhoven, Netherlands
- 5:15PM Failure Behavior Of Human Ascending Thoracic Aortic Aneurysms In Shear Lap Versus Uniaxial Loading** SB³C2017-306
Christopher Korenczuk¹, Rohit Dhume², Colleen Witzenburg², Victor Barocas¹, ¹Department of Biomedical Engineering, University of Minnesota, Minneapolis, MN, United States, ²Department of Mechanical Engineering, University of Minnesota, Minneapolis, MN, United States

Saturday, June 24

4:00pm - 5:30pm

Tendon Mechanics and Structure (Solids/CTE)**San Ignacio**

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

Session Co-Chair: Ray Vanderby, University of Wisconsin, WI, United States

- 4:00PM Aged Supraspinatus Tendons Have Altered Dynamic Compressive and Poroelastic Properties** SB³C2017-307
Brienne K. Connizzo, Alan J. Grodzinsky, Biological Engineering, Massachusetts Institute of Technology, Cambridge, MA, United States
- 4:15PM The Human Achilles Tendon Shows Specialisation Towards Energy Storage That Is Affected By Ageing** SB³C2017-308
Dharmesh Patel¹, Ewa M. Spiesz², Chavaunne T. Thorpe³, Helen L. Birch⁴, Graham P. Riley⁵, Peter D. Clegg⁶, Hazel R. C. Screen¹, ¹School of Engineering and Materials Science, Queen Mary University of London, London, United Kingdom, ²Department of Bionanoscience, Delft University of Technology, Delft, Netherlands, ³Comparative Biomedical Sciences, Royal Veterinary College, London, United Kingdom, ⁴Institute of Orthopaedics and Musculoskeletal Science, University College London, London, United Kingdom, ⁵School of Biological Sciences, University of East Anglia, Norwich, United Kingdom, ⁶Department of Musculoskeletal Biology, University of Liverpool, Liverpool, United Kingdom
- 4:30PM Structural Remodeling of Fatigue Damaged Tendons by Exercise is Associated with Integrin Subunits α V and α 5** SB³C2017-309
Rebecca Bell¹, Remi Gendron², Jack Brenneman¹, Evan L. Flatow², Nelly Andarawis-Puri^{1,3,4}, ¹Sibley School of Mechanical and Aerospace Engineering, Cornell University, Ithaca, NY, United States, ²Department of Orthopaedics, Icahn School of Medicine at Mount Sinai, New York, NY, United States, ³Nancy E. and Peter C. Meinig School of Biomedical Engineering, Cornell University, Ithaca, NY, United States, ⁴Hospital of Special Surgery, Ithaca, NY, United States

SCIENTIFIC SESSIONS

- 4:45PM Multiscale Structure and Function of Rat Achilles Tendon** SB³C2017-310
 Andrea H. Lee, Dawn M. Elliott, *University of Delaware, Newark, DE, United States*
- 5:00PM Structural and Mechanical Consequences of Unloading on the Tendon-to-Bone Attachment** SB³C2017-311
 Alix C. Deymier¹, Andrea G. Schwartz², Zhonghou Cai³, Guy M. Genin⁴, Stavros Thomopoulos⁵, ¹*Columbia University, New York, NY, United States*, ²*Orthopedic Surgery, Washington University, St Louis, MO, United States*, ³*Advanced Photon Source, Argonne National Laboratory, Argonne, IL, United States*, ⁴*Dept. of Mech Engr and MatSci, Washington University, St Louis, MO, United States*, ⁵*Orthopedic Surgery and Biomedical Engineering, Columbia University, New York, NY, United States*
- 5:15PM Absence of Estrogen During Maturation Uniquely Affects Progesterone Receptor in Extra-articular Ligament and Tendon: Potential Mechanism for Mechanical Changes** SB³C2017-312
 Devin B. Lemmex, Natalie C. Rollick, Yohei Ono, David A. Hart, Ian K. Y. Lo, Gail M. Thornton, *University of Calgary, Calgary, AB, Canada*

Saturday, June 24	4:00pm - 5:30pm
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Pediatric Flow (Fluids)

Tucson GH

Session Chair: Vijay Vedula, *Stanford University, CA, United States*
Session Co-Chair: Anayiotos Andreas, *Cyprus University of Technology, Cyprus*

- 4:00PM Effects Of Aortic Coarctation On Ventricular Energetics in Hypoplastic Left Heart Syndrome** SB³C2017-313
 Lauren Carter¹, Tianqi Hang¹, Giovanni Biglino², Chad Smith¹, Tain Yen Hsia³, Richard Figliola¹, ¹*Department of Mechanical Engineering and Bioengineering, Clemson University, Clemson, SC, United States*, ²*Bristol Heart Institute, University of Bristol, Bristol, United Kingdom*, ³*Cardiorespiratory Unit, Great Ormond Street Hospital for Children, London, United Kingdom*
- 4:15PM Effect of Peristalsis Like Motion of the Right Ventricle on the Fluid Dynamics in 20 Weeks Old Human Fetal Right Ventricle** SB³C2017-314
 Hadi Wiputra, Kong Chun Chua, Nivetha Raju, Hwa Liang Leo, Choon Hwai Yap, *National University of Singapore, Singapore, Singapore*
- 4:30PM Porcine Small Intestinal Submucosa Mitral Valve Functionality Under Pediatric Conditions** SB³C2017-315
 Omkar V. Mankame¹, Sharan Ramaswamy¹, Lilliam Valdes-Cruz², Steven Bibevski², Frank Scholl², Ivan Baez², ¹*Biomedical Engineering, Florida International University, Miami, FL, United States*, ²*Joe DiMaggio Children's Hospital, Hollywood, FL, United States*
- 4:45PM A 4-D Computational Study Of Developmental Cardiac Mechanics In Zebrafish Embryos** SB³C2017-316
 Vijay Vedula¹, Juhyun Lee², Hao Xu³, C.-C Jay Kuo³, Tzung Hsiai⁴, Alison Marsden⁵, ¹*Department of Pediatrics (Cardiology), Stanford University, Stanford, CA, United States*, ²*Department of Bioengineering, University of California Los Angeles, Los Angeles, CA, United States*, ³*Department of Electrical Engineering, University of Southern California, Los Angeles, CA, United States*, ⁴*Department of Bioengineering and Division of Cardiology (Medicine), University of California Los Angeles, Los Angeles, CA, United States*, ⁵*Department of Pediatrics (Cardiology) and Department of Bioengineering, Stanford University, Stanford, CA, United States*
- 5:00PM Population Based Characterization of Early Avian Great Vessel Morphogenesis** SB³C2017-317
 Stephanie Lindsey¹, Irene Vignon-Clementel², Jonathan Butcher¹, ¹*Cornell University, Ithaca, NY, United States*, ²*INRIA-Paris, Paris, France*
- 5:15PM Respiratory Changes in Pulmonary Flow Distribution in Fontan Circulation: A Comparison between "5-D" MRI and CFD Simulation** SB³C2017-318
 David R. Rutkowski^{1,2}, Christopher J. Francois², Oliver Wieben^{2,3}, Alejandro Roldán-Alzate^{1,2,4}, ¹*Mechanical Engineering, University of Wisconsin-Madison, Madison, WI, United States*, ²*Radiology, University of Wisconsin-Madison, Madison, WI, United States*, ³*Medical Physics, University of Wisconsin-Madison, Madison, WI, United States*, ⁴*Biomedical Engineering, University of Wisconsin-Madison, Madison, WI, United States*

Saturday, June 24

4:00pm - 5:30pm

Surgical Device Design Applications (DDR/IAB)**San Luis****Session Chair:** Jeff Bischoff, *Zimmer Biomet, Inc., IN, United States***Session Co-Chair:** Scott Pierce, *Western Carolina University, NC, United States*

- 4:00PM Using Artificial Muscle To Fabricate Artificial Hearts – Harnessing Gigantic Deformation Of Dielectric Elastomers For Large Volume Fluid Pumping** SB³C2017-319
Zhe Li¹, Yingxi Wang², Choon Chiang Foo³, Jian Zhu², Choon Hwai Yap¹, ¹*Department of Biomedical Engineering, National University of Singapore, Singapore*, ²*Department of Mechanical Engineering, National University of Singapore, Singapore*, ³*Institute of High Performance Computing, Singapore, Singapore*
- 4:15PM Abstract Withdrawn** SB3C2017-320
- 4:30PM Validation Of Experimental Setup To Simulate And Model Non-Valved Glaucoma Drainage Devices** SB³C2017-321
Tabitha H. T. Teo¹, Paul M. Munden², Sara E. Wilson¹, Ronald L. Dougherty¹, ¹*Mechanical Engineering, University of Kansas, Lawrence, KS, United States*, ²*Department of Ophthalmology, University of Kansas, Kansas City, KS, United States*
- 4:45PM Characterization of Aliphatic Urethane Shape Memory Polymers for Biomedical Device Design** SB³C2017-322
Jingyu Wang¹, Shoieb Chowdhury¹, Yingtao Liu¹, Bradley Bohnstedt², Chung-Hao Lee¹, ¹*Aerospace and Mechanical Engineering, University of Oklahoma, Norman, OK, United States*, ²*Neurosurgery, University of Oklahoma Health Sciences Center, Oklahoma City, OK, United States*
- 5:00PM Improving Tissue Manipulation in Laparoscopic Resection Training Using Visual Force Feedback** SB³C2017-323
Rafael Hernandez¹, Arzu Onar-Thomas², Francesco Travascio¹, Shihab Asfour¹, ¹*Industrial Engineering, University of Miami, Coral Gables, FL, United States*, ²*Biostatistics, St. Jude Children's Research Hospital, Memphis, TN, United States*
- 5:15PM Improved Suction Device for Airway Management in Emergency and Military Clinical Scenarios** SB³C2017-324
Forhad Akhter¹, Michael Lasch¹, Eric Liu¹, Ricardo Pescador¹, Robert A. DeLorenzo², Bruce D. Adams², R. Lyle Hood¹, Yusheng Feng¹, ¹*University of Texas at San Antonio, San Antonio, TX, United States*, ²*University of Texas Health Science Center at San Antonio, San Antonio, TX, United States*

Saturday, June 24

4:00pm - 5:30pm

Multi-Scale Measures and Models of Engineered Materials and Tissues (CTE)**Tucson EF****Session Chair:** Sara Roccabianca, *Michigan State University, MI, United States***Session Co-Chair:** Ed Sander, *University of Iowa, IA, United States*

- 4:00PM Fibrous Double Network Model to Match Observed Failure Behavior of Collagen-Fibrin Co-gels** SB³C2017-325
David S. Nedrelow¹, Danesh Bankwala¹, Jeffrey D. Hyypio¹, Victor K. Lai², Victor H. Barocas¹, ¹*Biomedical Engineering, University of Minnesota, Minneapolis, MN, United States*, ²*Chemical Engineering, University of Minnesota, Minneapolis, MN, United States*
- 4:15PM Plasticity of Fibrous Collagen Tracts Formed by Contractile Cell Clusters** SB³C2017-326
Ehsan Ban¹, Matthew Franklin², Hailong Wang¹, Lucas Smith¹, Rebecca G. Wells¹, Jan T. Liphardt², Vivek B. Shenoy¹, ¹*University of Pennsylvania, Philadelphia, PA, United States*, ²*Stanford University, Stanford, CA, United States*
- 4:30PM Type III Collagen Is Critical To The Proper Functioning Of Knee Cartilage And Meniscus During Skeletal Development** SB³C2017-327
Chao Wang¹, Becky K. Brisson², Qing Li¹, Kev'ther Hoxha¹, Motomi Enomoto-Iwamoto³, Susan W. Volk², Lin Han¹, ¹*School of Biomedical Engineering, Science and Health Systems, Drexel University, Philadelphia, PA, United States*, ²*University of Pennsylvania, Philadelphia, PA, United States*, ³*University of Maryland, Baltimore, MD, United States*

SCIENTIFIC SESSIONS

- 4:45PM On the 3D Microenvironment of Valve Interstitial Cells Under Physiological Load** SB³C2017-328
Salma Ayoub, Karen C. Tsai, Amir H. Khalighi, Michael S. Sacks, *The University of Texas at Austin, Austin, TX, United States*
- 5:00PM Biological Tissues Show Poroelastic and Viscoelastic Behavior at Different Frequency Spectrums** SB³C2017-329
Ramin Oftadeh, Alan Grodzinsky, *Massachusetts Institute of Technology, Cambridge, MA, United States*
- 5:15PM A Novel Small-Specimen Planar Biaxial Testing Device for Inverse Model Validation of Soft Tissues** SB³C2017-330
Samuel Potter¹, Jordan Graves², Borys Drach³, Tim Woodard², Thomas Leahy², Chris Hammel², Aaron Feng², Aaron Baker², Michael Sacks¹, ¹*Mechanical Engineering, University of Texas at Austin, Austin, TX, United States*, ²*Biomedical Engineering, University of Texas at Austin, Austin, TX, United States*, ³*Mechanical & Aerospace Engineering, New Mexico State University, Las Cruces, NM, United States*

Poster Sessions

Posters will be presented in two sessions. Poster Session I will take place on Thursday June 22nd from 5:30-7:30 PM. Poster Session II will take place on Friday June 23rd from 12:30-2:00 PM. Please see the 'Instructions for Poster Presenters' on page 5 and the 'Poster Room Layout' on page 3 for details on placement of posters and individual presentation times.

The Poster viewing area is located in the Arizona Ballroom and will be open throughout the conference.

Thursday, June 22 and Friday, June 23	5:30pm - 7:30pm
	12:30pm - 2:00pm

**Bachelors Level Student Paper Competition I --
Dynamics & Injury, Devices, and Imaging**

- The Effect of Floor Stiffness on Standing Posture and Sway** SB³C2017-P1
Daiane Aizen Grill¹, Sara E. Wilson¹, ¹*Department of Mechanical Engineering, The University of Kansas, Lawrence, KS, United States*
- Principal Component Analysis Of Gait And Cycling Experiments: Crosstalk Error Reduction And Corrected Knee Axes** SB³C2017-P2
Jordan Skaro¹, Harsh Goel¹, Scott Hazelwood², Stephen Klisch², ¹*Mechanical Engineering, California Polytechnic State University San Luis Obispo, San Luis Obispo, CA, United States*, ²*Mechanical Engineering, Biomedical Engineering, California Polytechnic State University San Luis Obispo, San Luis Obispo, CA, United States*
- Development of Head Impact Device for the Study of Indirect Traumatic Optic Neuropathy** SB³C2017-P3
Elizabeth M. Konopacki, Yik Tung Tracy Ling, Thao D. Nguyen, Kalia T. Ramesh, *HEMI: Hopkins Extreme Material Institute, Johns Hopkins University, Baltimore, MD, United States*
- EMG-Driven Inverse Dynamic Analysis of Knee Joint Contact Forces During Gait and Cycling Using OpenSim** SB³C2017-P4
Megan V. Pottinger¹, Katherine Mavrommati¹, Scott J. Hazelwood^{1,2}, Stephen M. Klisch^{1,2}, ¹*Biomedical Engineering Department, California Polytechnic State University, San Luis Obispo, CA, United States*, ²*Mechanical Engineering Department, California Polytechnic State University, San Luis Obispo, CA, United States*
- Differences in Material Properties of Thigh and Gluteal Soft Tissue Between Males and Females** SB³C2017-P5
Zachary J. Sadler, Joshua Drost, Wu Pan, Tamara Bush, *Mechanical Engineering, Michigan State University, East Lansing, MI, United States*
- Measurement of Retinal Blood Vessel Strain During Cyclic Rotation** SB³C2017-P6
Kendall R. McMillan, Brittany Coats, *Department of Mechanical Engineering, University of Utah, Salt Lake City, UT, United States*

Identification of Hysteresis Behavior of Pressure-Measuring Insoles SB³C2017-P7

Anthony Ghanem, Jessica DeBerardinis, Mohamed Trabia, Janet Dufek, Daniel Lidstone, *University of Nevada, Las Vegas, Las Vegas, NV, United States*

Heat and Mass Trends within a Rebuildable Drip Atomizer Electronic Cigarette SB³C2017-P8

Phoebe C. Belser¹, Timothy M. Raymond¹, Dabrina D Dutcher², James W. Baish³, ¹*Chemical Engineering, Bucknell University, Lewisburg, PA, United States*, ²*Chemistry and Chemical Engineering, Bucknell University, Lewisburg, PA, United States*, ³*Biomedical Engineering, Bucknell University, Lewisburg, PA, United States*

A Clinical Study: Thermal Contrast Amplification Reader Improves the Detection of Strep Throat for Lateral Flow Assays SB³C2017-P9

Erin Louwagie¹, Yiru Wang¹, Daniel Larkin², David Boulware³, John Bischof¹, ¹*Mechanical Engineering, University of Minnesota - Twin Cities, Minneapolis, MN, United States*, ²*HealthEast Clinic, St. Paul, MN, United States*, ³*Medicine, University of Minnesota - Twin Cities, Minneapolis, MN, United States*

Experimental Motion Tracking of the Membrane in the Penn State Pediatric Ventricular Assist Device SB³C2017-P10

Philip E. Crompton, Bryan Good, Keefe Manning, *Department of Biomedical Engineering, Pennsylvania State University, University Park, PA, United States*

Design and Characterization of a Helmholtz Resonator for Brain Magnetic Resonance Elastography SB³C2017-P11

Rachel E. Mickelson, Charlotte A. Guertler, Dennis J. Tweten, Ruth J. Okamoto, Philip V. Bayly, *Mechanical Engineering and Materials Science, Washington University in St. Louis, St. Louis, MO, United States*

Neurochi[®] Virtual Reality Simulator of the Cerebrospinal Fluid System SB³C2017-P12

Gabryel A. Conley Natividad¹, Brian Cleveley², Lucas R. Sass¹, Tao Xing³, Olivier Baledent⁴, Vartan Kurtcuoglu⁵, Bryn A. Martin¹, ¹*Biological Engineering, University of Idaho, Moscow, ID, United States*, ²*Virtual Technology and Design, University of Idaho, Moscow, ID, United States*, ³*Mechanical Engineering, University of Idaho, Moscow, ID, United States*, ⁴*BioFlow Image, University of Picardy Jules Verne, Amiens, France*, ⁵*Institute of Physiology, University of Zurich, Zurich, Switzerland*

Modeling the Skull-Brain Interface Using Sylgard 527 Phantoms SB³C2017-P13

Jake A. Ireland¹, Andrew A. Badachhape², Ruth J. Okamoto¹, Ramona S. Durham², Philip V. Bayly^{1,2}, ¹*Mechanical Engineering and Materials Science, Washington University in St. Louis, St. Louis, MO, United States*, ²*Biomedical Engineering, Washington University in St. Louis, St. Louis, MO, United States*

MR Elastography as Technique for Investigation of Blast Induced Traumatic Brain Injury SB³C2017-P14

Shannon N. Ingram¹, Grady Burnett¹, Joshua VanCura², David Tighe², Andrew B. Robbins¹, Michael R. Moreno³, ¹*Biomedical Engineering, Texas A&M University, College Station, TX, United States*, ²*Mechanical Engineering, Texas A&M University, College Station, TX, United States*, ³*Biomedical Engineering and Mechanical Engineering, Texas A&M University, College Station, TX, United States*

High Frequency Magnetic Resonance Elastography In-Vivo of the Spine SB³C2017-P15

Sean M. Rothenberger¹, Dooman Akbarian¹, Daniel Cortes¹, Thomas Neuberger², Corina Drapaca², ¹*Department of Mechanical and Nuclear Engineering, Pennsylvania State University, University Park, PA, United States*, ²*Pennsylvania State University, University Park, PA, United States*

Automated Optical Thickness Measurement System SB³C2017-P16

Raghav Malik^{1,2,3}, Ahmet Erdemir¹, ¹*Department of Biomedical Engineering and Computational Biomodeling (CoBi) Core, Lerner Research Institute, Cleveland Clinic, Cleveland, OH, United States*, ²*Electrical and Computer Engineering, Purdue University, West Lafayette, IN, United States*, ³*Mentor High School, Mentor, OH, United States*

Dynamic Changes in Iris Biometrics in Normal and Glaucomatous Eyes Following Physiological Dilation SB³C2017-P17

Matthew Wojcik¹, Anup D. Pant¹, Priyanka Gogte², Chidiebere Aninweze¹, Allie Stanley¹, Syril K. Dorairaj³, Vanita Pathak-Ray², Rouzbeh Amini¹, ¹*Biomedical Engineering, The University of Akron, Akron, OH, United States*, ²*LV Prasad Eye Institute, Hyderabad, India*, ³*Department of Ophthalmology, Mayo Clinic, Jacksonville, FL, United States*

Error Analysis and Optimization of Noninvasive Ultrasound Elasticity Imaging for Estimating Mechanical Properties of Human Tendon SB³C2017-P18

Hannah Schmitz¹, Liang Gao², Andres Nuncio Zuniga¹, Cindy Fastje¹, Mihra Talijanovic¹, Daniel Latt¹, Russell Witte¹, ¹*University of Arizona, Tucson, AZ, United States*, ²*University of Washington, Seattle, WA, United States*

Bachelors Level Student Paper Competition II -- Fluids & Microfluidics, Cellular & Tissue Mechanics, Physiology & Diseases

Impact of Shear Rate on Von Willebrand Factor Unfolding SB³C2017-P19

Joshua M. Riley¹, Xavier J. Candela¹, William O. Hancock¹, Peter J. Butler¹, Keefe B. Manning^{1,2}, ¹*Department of Biomedical Engineering, The Pennsylvania State University, University Park, PA, United States*, ²*Department of Surgery, Penn State Hershey Medical Center, Hershey, PA, United States*

Left Coronary Artery Thermal Modeling During Targeted Hypothermic Cooling SB³C2017-P20

Tyler C. Diorio¹, Nesrine Bouhrira^{2,3}, Jennifer E. Mitchell², Thomas L. Merrill^{2,3}, ¹*Department of Chemical Engineering, Rowan University, Glassboro, NJ, United States*, ²*FocalCool, LLC, Mullica Hill, NJ, United States*, ³*Department of Mechanical Engineering, Rowan University, Glassboro, NJ, United States*

In Vivo Biomechanics Of Trapeziometacarpal Joint SB³C2017-P21

Ryan Downing¹, Ken Fischer¹, Lance Frazer¹, Nolan Norton¹, E. Bruce Toby², Phil Lee², Terrence E. McIff², ¹*University of Kansas, Lawrence, KS, United States*, ²*University of Kansas Medical Center, Kansas City, KS, United States*

An Examination of Stress Concentrations Due to Myocardial Infarction in the Wall of the Human Left Ventricle

SB³C2017-P22

Arlynn C. Baker¹, Sudhir Kaul¹, Heather B. Coan², Martin L. Tanaka¹, ¹*Engineering and Technology, Western Carolina University, Cullowhee, NC, United States*, ²*Biology, Western Carolina University, Cullowhee, NC, United States*

Developing and Evaluating a Mechanical Bioreactor System to Investigate Tendon Mechanics and Mechanobiology

SB³C2017-P23

Abigail R. Raveling, Nathan R. Schiele, *Biological Engineering, University of Idaho, Moscow, ID, United States*

The Effect Of Fiber Orientation On Failure Patterns In The Bovine Meniscus During Tensile Loading SB³C2017-P24

Derek Q. Nesbitt, Madison E. Krentz, Trevor J. Lujan, *Department of Mechanical & Biomedical Engineering, Boise State University, Boise, ID, United States*

Viscoelastic Heating Of Bovine Intervertebral Disc SB³C2017-P25

Harrah Newman¹, Robby D. Bowles², Mark R. Buckley¹, ¹*Department of Biomedical Engineering, University of Rochester, Rochester, NY, United States*, ²*Department of Bioengineering, Department of Orthopaedics, University of Utah, Salt Lake City, UT, United States*

Using ASTM Standards To Reduce Clampsite Failures In Tensile Tests Of Soft Fibrous Tissue SB³C2017-P26

Madison E. Krentz, Derek Q. Nesbitt, Jeremy J. Creechley, Trevor J. Lujan, *Mechanical and Biomedical Engineering, Boise State University, Boise, ID, United States*

Change in Skeletal Muscle Stiffness After Running Competition Is Dependent on Both Running Distance and Recovery Time SB³C2017-P27

Cassidy Newman¹, Seyedali Sadeghi², Daniel H. Cortes^{1,2}, ¹*Pennsylvania State University, State College, PA, United States*, ²*Mechanical and Nuclear Engineering Department, Pennsylvania State University, State College, PA, United States*

Steady-State Characterization of the Mechanical Properties of the Pacinian Corpuscle SB³C2017-P28

Ellen T. Bloom¹, Julia C. Quindlen¹, Amy A. Claeson¹, Laura E. Ortega¹, Amy Moeller², Victor H. Barocas¹, ¹*Biomedical Engineering, University of Minnesota, Minneapolis, MN, United States*, ²*Orthopaedic Surgery, University of Minnesota, Minneapolis, MN, United States*

An Experimental Setup To Quantify Pressure-induced Microstructural Changes in Tricuspid Valve Anterior Leaflets

SB³C2017-P29

Anthony Black, Anup D. Pant, Vineet S. Thomas, Taylor Verba, Rouzbeh Amini, *The University of Akron, Akron, OH, United States*

Contribution of Collagen Fibers and Myocytes to Residual Stress in the Left Ventricular Wall SB³C2017-P30

Marissa R. Grobbel¹, Sheikh M. Shavik¹, Emma Darios², Stephanie W. Watts², Lik Chuan Lee¹, Sara Roccabianca¹, ¹*Mechanical Engineering, Michigan State University, East Lansing, MI, United States*, ²*Pharmacology and Toxicology, Michigan State University, East Lansing, MI, United States*

Optic Nerve Axon Count And Strain Comparisons between Normal And Glaucomatous Human Eyes SB³C2017-P31

Kelsey T. Sadlek¹, Katelyn F. Axman², Ehab A. Tamimi², Jonathan P. Vande Geest^{2,3,4}, ¹*Department of Chemical Engineering, University of Pittsburgh, Pittsburgh, PA, United States*, ²*Department of Bioengineering, University of Pittsburgh, Pittsburgh, PA, United States*, ³*McGowan Institute for Regenerative Medicine, University of Pittsburgh, Pittsburgh, PA, United States*, ⁴*Louis J. Fox Center for Vision Restoration, University of Pittsburgh, Pittsburgh, PA, United States*

Finite Element Based Simulation of Growth Morphomechanics of the Pharyngeal Arch Arteries SB³C2017-P32

Mark A. Lantieri, Jonathan T. Butcher, *Cornell University, Ithaca, NY, United States*

Characterization Of Transmural Morphological Properties In Porcine Thoracic Descending Aorta Using Multiphoton Fluorescent Microscopy And Image Processing SB³C2017-P33

T. Gillin², A. Hemmasizadeh¹, B. Gligorijevic², K. Darvish¹, ¹*Department of Mechanical Engineering, Temple University, Philadelphia, PA, United States*, ²*Department of Bioengineering, Temple University, Philadelphia, PA, United States*

TRPV1 Ion Channel Mediated Thermal Response of CA3 Hippocampal Pyramidal Neuron - A Simulation Study SB³C2017-P34

Renato Rios¹, Jun Xu², ¹*Department of Biology, Tarleton State University, Stephenville, TX, United States*, ²*Department of Engineering Technology, Tarleton State University, Stephenville, TX, United States*

Characterizing a Magnetic Bead Microrheometry System to Study the Regional Elasticity of Thrombi SB³C2017-P35

Ryan J. Betzold¹, Peter J. Butler¹, Keefe B. Manning^{1,2}, ¹*Biomedical Engineering, Pennsylvania State University, University Park, PA, United States*, ²*Surgery, Penn State Hershey Medical Center, Hershey, PA, United States*

Masters Level Student Paper Competition I -- Physiology & Diseases, Cellular & Tissue Mechanics, Devices

Bone Properties Surrounding Surface Modified Dental Implants: A Nanoindentation Study SB³C2017-P36

Ryan Doud, Ramzi Abou-Arraj, Jack Lemons, Alan Eberhardt, *UAB, Birmingham, AL, United States*

Tissue Coring Through Un-Retracted Cannula Insertion SB³C2017-P37

Alexandro Gonzalez, Malisa Sarntinoranont, *University of Florida, Gainesville, FL, United States*

Contribution of Repetitive Stretching to Neurite Injury in Cortex Primary Neuronal Cells SB³C2017-P38

Shota Shirasaki, Hiromichi Nakadate, Shigeru Aomura, Akira Kakuta, *Tokyo Metropolitan University, Tokyo, Japan*

Local Discontinuities in Aligned Fibrous Networks Attenuate Tissue-to-Nuclear Strain Transmission SB³C2017-P39

Tonia Tsinman¹, John M. Peloquin², Spencer E. Szczesny¹, Su-Jin Heo¹, Dawn M. Elliott², Robert L. Mauck¹, ¹*Bioengineering, University of Pennsylvania, Philadelphia, PA, United States*, ²*Biomedical Engineering, University of Delaware, Newark, DE, United States*

A Computational Analysis of Aortic Pulsatile Flow Conditions for Valve Tissue Formation SB³C2017-P40

Alexander T. Williams¹, Manuel Perez¹, Arash Moshkforoush¹, Omkar Mankame¹, Manuel Salinas², Nikalaos Tsoukias¹, Sharan Ramaswamy¹, ¹*Florida International University, Miami, FL, United States*, ²*Nova Southeastern University, Fort Lauderdale, FL, United States*

Validity Of Dynamic Mechanical Analysis For Shaped Meniscus SB³C2017-P41

Reo Tanabe¹, Seido Yarimitsu², Hiromichi Fujie², ¹*Division of Human Mechatronics Systems, Graduate School of System Design, Tokyo Metropolitan University, Tokyo, Japan*, ²*Department of Intelligent Mechanical Systems, Faculty of System Design, Tokyo Metropolitan University, Tokyo, Japan*

Effect of Fiber Architecture on Tissue Failure Dynamics: A Finite Element Study SB³C2017-P42

Minhao Zhou, Benjamin Werbner, Grace O'Connell, *Mechanical Engineering, University of California, Berkeley, Berkeley, CA, United States*

Mechanical Analysis of Heterogeneous Pulmonary Acinus Structure Using Image-based and Mathematical Models SB³C2017-P43

Keisuke Nishimoto, Kenichiro Koshiyama, Satoshi Ii, Shigeo Wada, *Osaka University, Osaka, Japan*

Geometric Modeling of Abdominal Aortic Aneurysms under Surveillance: A Retrospective Study SB³C2017-P44
Shalin Parikh¹, Aura Teasley¹, Mirunalini Thirugnanasambandam¹, Victor De Oliveira², Satish Muluk³, Ender A. Finol⁴,
¹*Biomedical Engineering, University of Texas at San Antonio, San Antonio, TX, United States*, ²*Management Science and Statistics, University of Texas at San Antonio, San Antonio, TX, United States*, ³*Thoracic & Cardiovascular Surgery, Allegheny Health Network, Pittsburgh, PA, United States*, ⁴*Mechanical Engineering, University of Texas at San Antonio, San Antonio, TX, United States*

Pulmonary Artery and Somatic Growth in Fontan Patients SB³C2017-P45
Akash Gupta¹, Ethan Kung^{1,2}, ¹*Department of Mechanical Engineering, Clemson University, Clemson, SC, United States*, ²*Department of Bioengineering, Clemson University, Clemson, SC, United States*

Clinical Outcomes in Microvascular Disease Patient-Subgroup With Epicardial Stenosis: A Pilot Study to Assess a Newly Developed Pressure-Flow Diagnostic Endpoint SB³C2017-P46

Ullhas U. Hebbar¹, Mohamed A. Effat², Srikara V. Peelukhana¹, Imran Arif², Rupak K. Banerjee¹, ¹*Department of Mechanical and Materials Engineering, University of Cincinnati, Cincinnati, OH, United States*, ²*Division of Cardiovascular Diseases, University of Cincinnati Medical Center, Cincinnati, OH, United States*

Device to Apply Loads at Targeted Magnitudes and Stroke Frequencies During Instrument Assisted Soft-Tissue Mobilization SB³C2017-P47

John B. Everingham, Peter T. Martin, Trevor J. Lujan, *Department of Mechanical and Biomedical Engineering, Boise State University, Boise, ID, United States*

Design, Testing, and Implementation of Controls and Interface for an Adaptable Exercise Device for People with Physical Disabilities SB³C2017-P48

John M. Hoyle, Alan W. Eberhardt, *University of Alabama at Birmingham, Birmingham, AL, United States*

Masters Level Student Paper Competition II -- Dynamics & Injury, Fluids & Microfluidics, Biotransport & Heat Transfer

High Magnitude Head Impact Exposure in Youth Football Games SB³C2017-P49

Eamon Campolettano, Ryan Gellner, Steven Rowson, *Virginia Tech, Blacksburg, VA, United States*

Characterization of Elevated Head Impact Exposure Between Individual Youth Football Players SB³C2017-P50

Ryan A. Gellner, Eamon T. Campolettano, Steven Rowson, *Virginia Tech, Blacksburg, VA, United States*

Morphometric Analysis of the Human Ankle Joint SB³C2017-P51

Tia Arvaneh^{1,2}, William E. Lee¹, Roy Sanders³, Peter Simon^{1,2,3}, ¹*Department of Chemical and Biomedical Engineering, University of South Florida, Tampa, FL, United States*, ²*Department of Biomechanics, Foundation for Orthopaedic Research and Education, Tampa, FL, United States*, ³*Department of Orthopaedics and Sports Medicine, University of South Florida, Tampa, FL, United States*

Morphological Analysis of Ovine Retina as a Function of Age SB³C2017-P52

Matt Byrne, Brittany Coats, *University of Utah, SLC, UT, United States*

Knee Biomechanics During Cycling are Similar for Normal Weight and Obese Subjects SB³C2017-P53

Juan D. Gutierrez-Franco¹, Jordan M. Skaro¹, Scott Hazelwood^{1,2}, Stephen M. Klisch^{1,2}, ¹*Mechanical Engineering, California Polytechnic State University, San Luis Obispo, CA, United States*, ²*Biomedical Engineering, California Polytechnic State University, San Luis Obispo, CA, United States*

Development of a Numerical Method for Assessment of Cerebrovascular Reserve Using 1D-0D Hemodynamic Simulation with Cerebral Autoregulation Model SB³C2017-P54

Changyoung Yuhn¹, Marie Oshima², ¹*Department of Mechanical Engineering, The University of Tokyo, Tokyo, Japan*, ²*Interfaculty Initiative in Information Studies, The University of Tokyo, Tokyo, Japan*

Improvement of Simulated Arterial Waveforms Using Measured Parameters by Ultrasonography SB³C2017-P55

Kodai Hirayama¹, Kiyomi Niki¹, Marie Oshima², Motoaki Sugawara³, ¹*Department of Biomedical Engineering, Tokyo City University, Tokyo, Japan*, ²*Interfaculty Initiative in Information Studies, The University of Tokyo, Tokyo, Japan*, ³*Department of Medical Engineering, Himeji Dokkyo University, Himeji, Japan*

Stereo and Tomographic Particle Image Velocimetry - 4D Flow MRI Validation SB³C2017-P56

Rafael Medero^{1,2}, Alejandro Roldán-Alzate^{1,2,3}, ¹*Mechanical Engineering, University of Wisconsin-Madison, Madison, WI, United States*, ²*Department of Radiology, University of Wisconsin, Madison, WI, United States*, ³*Department of Biomedical Engineering, University of Wisconsin, Madison, WI, United States*

A Novel Right-Side Assist Implementation Could Bring Potential Hemodynamic Improvements in Fontan Patients
SB³C2017-P57

Ehsan Mirzaei¹, Mino Kavarana², Dimitrios Georgakopoulos³, Ethan Kung^{1,4}, ¹*Mechanical Engineering, Clemson University, Clemson, SC, United States*, ²*Medical University of South Carolina, Charleston, SC, United States*, ³*Sunshine Heart, Inc., Eden Prairie, MN, United States*, ⁴*Bioengineering, Clemson University, Clemson, SC, United States*

Network Model of Extracellular Fluid Flow Through Rat Cerebral Cortex Parenchyma and Perivascular Spaces
SB³C2017-P58

Julian Rey, Malisa Sarntinoranont, *Mechanical Engineering, University of Florida, Gainesville, FL, United States*

Stochastic Modeling Of Biotransport In A Tumor With Uncertain Material Properties SB³C2017-P59

Miao Lu¹, Alen Alexanderian², Maher Salloum³, Liang Zhu¹, Ronghui Ma¹, Meilin Yu¹, ¹*Mechanical Engineering, University of Maryland, Baltimore County, Baltimore, MD, United States*, ²*Mathematics, North Carolina State University, Raleigh, NC, United States*, ³*Extreme Scale Data Science & Analytics Department, Sandia National Labs, Livermore, CA, United States*

Extracellular Matrix Composition Modulates the Migratory Response of Breast Cancer Cells in a 3D Microfluidic Culture SB³C2017-P60

Karina M. Lugo-Cintrón, Lucas Tomko, Patrick Ingram, Patricia Keely, David Beebe, *University of Wisconsin-Madison, Madison, WI, United States*

Cancer Associated Fibroblast-Induced Spatiotemporal Contraction in Pancreatic Ductal Adenocarcinoma

SB³C2017-P61

Michael Bradley¹, Yi Yang², Stephen Konieczny², Bumsoo Han¹, ¹*School of Mechanical Engineering, Purdue University, Lafayette, IN, United States*, ²*Department of Biological Sciences, Purdue University, Lafayette, IN, United States*

Biotransport Posters

Distribution Of Encapsulated Cells In A Phase-separated Ormosil Gel To Optimize Biodegradation SB³C2017-P62

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Charactering Intracellular Ice Formation During Freezing and Thawing of Lymphoblasts Using Low Temperature Raman Spectroscopy SB³C2017-P63

Guanglin Yu, Allison Hubel, *Mechanical Engineering, University of Minnesota, Minneapolis, MN, United States*

Thermal Fluid Models of a Temperature Controlled Sheath Used to Deliver Thermosensitive Hydrogel Inside Pancreatic Cancer Lesions SB³C2017-P64

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Tuning The Gold Nanoparticle Colorimetric Assay By Nanoparticle Size And Concentration SB³C2017-P65

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Shear-Augmented Dispersion Affects Cerebrospinal Fluid Solute Transport within the Subarachnoid Space but not within the Basement Membranes of the Brain SB³C2017-P66

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Using Micro-CT To Investigate Nanoparticle Distribution In Solid Tumors After Intratumoral Infusion SB³C2017-P67

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Nano-bio-thermal Interface: Nanosecond Plasmonic Heating Induced Selective Protein Inactivation SB³C2017-P68
Peiyuan Kang¹, Zhuo Chen², Steven O. Nielsen², Kenneth Hoyt^{3,4}, Sheena D'Arcy², Jeremiah J. Gassensmith², Zhenpeng Qin^{1,3,5}, ¹*Department of Mechanical Engineering, The University of Texas at Dallas, Dallas, TX, United States*, ²*Department of Chemistry and Biochemistry, The University of Texas at Dallas, Dallas, TX, United States*, ³*Department of Bioengineering, The University of Texas at Dallas, Dallas, TX, United States*, ⁴*Department of Radiology, The University of Texas at Southwestern Medical Center, Dallas, TX, United States*, ⁵*Department of Surgery, The University of Texas at Southwestern Medical Center, Dallas, TX, United States*

Feasibility Study Of A New Thermal Plasty Balloon SB³C2017-P69
 Shiqing Zhao¹, JinCheng Zou¹, Yuntao Ma¹, **Aili Zhang**^{1,2}, Lisa Xu^{1,2}, ¹*School of Biomedical Engineering, Shanghai Jiao Tong University, Shanghai, China*, ²*Med-X Institute, Shanghai Jiao Tong University, Shanghai, China*

Pro-angiogenic Hematopoietic Cells Mediate Pathologic Remodeling During Pulmonary Hypertension Through Serotonin 2B Receptor Signaling SB³C2017-P70
Nathaniel C. Bloodworth¹, James D. West², Christa Gaskill², Santhi Gladson², Sheila Shay², Susan Majka², and W. David Merryman¹, ¹*Biomedical Engineering, Vanderbilt University, Nashville, TN, United States*, ²*Allergy, Pulmonary, and Critical Care Medicine, Vanderbilt University, Nashville, TN, United States*

Constructing Analysis Suitable NURBS from Discrete Image-Based Models SB³C2017-P71
Adam R. Updegrove¹, Nathan M. Wilson², Shawn Shadden¹, ¹*Mechanical Engineering, University of California, Berkeley, Berkeley, CA, United States*, ²*Open Source Medical Software Corporation, Santa Monica, CA, United States*

Nanoparticle Re-Distribution in Tissue-Equivalent Gels Induced by Magnetic Nanoparticle Hyperthermia SB³C2017-P72
Qimei Gu, Myo Min Zaw, Timothy Munuhe, Ronghui Ma, Liang Zhu, *Mechanical Engineering, University of Maryland Baltimore County, Baltimore, MD, United States*

Thermal Expansion of The Cryoprotective Agent Cocktail DP6 in Combination with Various Synthetic Ice Modulators SB³C2017-P73
Prem K. Solanki, Yoed Rabin, *Department of Mechanical Engineering, Carnegie Mellon University, Pittsburgh, PA, United States*

Preferential Entrapment of Solutes in Ice Phase During Freezing of Protein-Cryoprotectant Solutions SB³C2017-P74
Sampreeti Jena¹, Raj Suryanarayanan², Alptekin Aksan¹, ¹*Mechanical Engineering, University of Minnesota, Minneapolis, MN, United States*, ²*Pharmaceutics, University of Minnesota, Minneapolis, MN, United States*

Bioheat Transfer in Lactating Human Breast SB³C2017-P75
Mohammad Aliakbari Miyanmahaleh¹, S. Negin Mortazavi², Fatemeh Hassanipour¹, ¹*Mechanical Engineering, University of Texas at Dallas, Richardson, TX, United States*, ²*Department of Integrative Biology, University of California, Berkeley, CA, United States*

Education Posters

Industrial Design for a Master of Engineering Project Course in Medical Device Development SB³C2017-P76
 Shea Tillman¹, Alan Eberhardt², ¹*Auburn University, Auburn, AL, United States*, ²*UAB, Birmingham, AL, United States*

'Exploring "ME"chanics: The Multiscale Mechanics of Me!' Summary of Outreach Lessons Learned SB³C2017-P77
Stephany Santos¹, Hannah Kackley¹, David M. Pierce², ¹*Department of Biomedical Engineering, University of Connecticut, Storrs, CT, United States*, ²*Departments of Mechanical Engineering/Biomedical Engineering, University of Connecticut, Storrs, CT, United States*

Creating Virtual Laboratories In Biomechanics SB³C2017-P78
Sara E. Wilson, *Mechanical Engineering, University of Kansas, Lawrence, KS, United States*

Inroducing Rehabilitative Design to Mechanical Engineering Students Using a Problem-Based Learning Approach SB³C2017-P79
Joshua Gargac, *Engineering, University of Mount Union, Alliance, OH, United States*

The Use Of Journals Can Expose Student Learning Methods In Capstone Design SB³C2017-P80
Ferris M. Pfeiffer, Suzanne Burgoyne, Rachel E. Bauer, Jennie P. Pardoe, *University of Missouri, Columbia, MO, United States*

Use of an Educational Tool Kit to Teach Mechanics of Materials SB³C2017-P81

Rita P. Patterson¹, Robin Bartoletti², Dennis P. Chou³, John Dignam³, Vijay Vaidyanathan⁴, ¹*Osteopathic Manipulative Medicine, University of North Texas Health Science Center, Fort Worth, TX, United States*, ²*Center for Innovative Learning, University of North Texas Health Science Center, Fort Worth, TX, United States*, ³*Mentis Sciences, Inc., Manchester, NH, United States*, ⁴*Biomedical Engineering, University of North Texas, Denton, TX, United States*

Design, Dynamics, and Rehabilitation Posters**Biomechanical Changes Precede Radiographic Evidence of Nontraumatic Vertebral Fracture Under Cyclic Loading: An Ex-Vivo Study SB³C2017-P82**

Nicole C. Corbiere-Gale¹, Stacey L. Zeigler², Christopher Towler², Kathleen A. Issen¹, Arthur J. Michalek¹, **Laurel Kuxhaus**¹, ¹*Mechanical and Aeronautical Engineering Department, Clarkson University, Potsdam, NY, United States*, ²*Physical Therapy Department, Clarkson University, Potsdam, NY, United States*

This Hand is My Hand, This Hand is Your Hand SB³C2017-P83

Joshua P. Drost, Tamara Reid Bush, *Mechanical Engineering, Michigan State University, East Lansing, MI, United States*

Does Pathological Human Tendon Adapt To Load And Is This Related To Clinical Outcome? A Systematic Review SB³C2017-P84

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Design and Testing of a 3D Printed Lower Limb Prosthesis SB³C2017-P85

McKenzie C. Evans, Cooper H. Welch, Hunter T. Dender, Nathaniel A. Godwin, Connor L. Martin, Elizabeth M. Scheig, S. Nima Mahmoodi, Beth A. Todd, *Mechanical Engineering, University of Alabama, Tuscaloosa, AL, United States*

Development of a Head Support Device for People With Hypermobility-Type Ehler-Danlos Syndrome SB³C2017-P86

Robert S. Pierce¹, Candace Ireton², Martin L. Tanaka¹, David Hudson³, ¹*Engineering and Technology, Western Carolina University, Cullowhee, NC, United States*, ²*Asheville, NC*, ³*Health and Human Sciences, Western Carolina University, Cullowhee, NC, United States*

Design of a Novel Multidirectional Fluid Shear Stress Bioreactor for Aortic Tissue SB³C2017-P87

Janet Liu, Philippe Sucusky, *Wright State University, Dayton, OH, United States*

Hip Cup Hiccups: Validating A Computational Model For Hip Cup Stability SB³C2017-P88

Mohsen Renani¹, Philippe Favre², **Jeff Bischoff**³, ¹*University of Missouri - Kansas City, Kansas City, MO, United States*, ²*Zimmer Biomet GmbH, Winterthur, Switzerland*, ³*Zimmer Biomet, Inc., Warsaw, IN, United States*

The Effect of Floor Stiffness on Standing Posture And Sway SB³C2017-P89

Daiane Aizen Grill, **Sara E. Wilson**, *Mechanical Engineering, University of Kansas, Lawrence, KS, United States*

Time Domain Analysis of Local Dynamic Stability May Be Useful in Predicting a Critical Event Before it Occurs SB³C2017-P90

Martin L. Tanaka, Chaoke Dong, *Engineering and Technology, Western Carolina University, Cullowhee, NC, United States*

Quantifying Locomotion Stability by Measuring the Deviation of the Extrapolated Center of Mass From the Centroid of Base of Support SB³C2017-P91

M. Alamoudi, F. Travascio, S. Asfour, *Department of Industrial Engineering, University of Miami, Miami, FL, United States*

Elbow And Shoulder Joint Torques Are Correlated With Body Mass Index But Not Game Pitch Count In Youth Baseball Pitchers SB³C2017-P92

Jim D. Darke¹, Eshan M. Dandekar², Arnel Aguinaldo³, Scott Hazelwood¹, Stephen M. Klisch⁴, ¹*Biomedical Engineering, California Polytechnic State University, San Luis Obispo, CA, United States*, ²*Kinesiology, California Polytechnic State University, San Luis Obispo, CA, United States*, ³*Kinesiology, Point Loma Nazarene University, San Diego, CA, United States*, ⁴*Mechanical Engineering, California Polytechnic State University, San Luis Obispo, CA, United States*

The Effect of Different Carrying Methods on Spatio-Temporal Gait Parameters SB³C2017-P93

Mohammed Alamoudi, Francesco Travascio, Shihab Asfour, *Industrial Engineering, University of Miami, Coral Gables, FL, United States*

Simulating Ingress for Cab Design SB³C2017-P94

Hyun-Jung Kwon¹, **Yujiang Xiang**², ¹*Transportation Research Center Inc., East Liberty, OH, United States*, ²*Mechanical Engineering, University of Alaska Fairbanks, Fairbanks, AK, United States*

Validation of a Patellofemoral Joint Model Driven by Knee Joint Kinematics SB³C2017-P95

Jonathan A. Gustafson¹, Kyle A. Berkow¹, John J. Elias², Richard E. Debski¹, Shawn Farrokhi³, ¹*Bioengineering, University of Pittsburgh, Pittsburgh, PA, United States*, ²*Akron General Medical Center, Akron, OH, United States*, ³*Naval Medical Center San Diego, San Diego, CA, United States*

Characterizing Brain Injury Criteria for Concussion through Reconstructions of Collegiate Football Head Impacts SB³C2017-P96

Bethany Rowson, Steven Rowson, Stefan M. Duma, *Virginia Tech, Blacksburg, VA, United States*

**Cell and Tissue Engineering Posters --
Mechanobiology and the Microenvironment**

A Method for Examining the Role of Mechanics in Apoptosis SB³C2017-P97

Zachary Goldblatt, Heather Cirka, Kristen Billiar, *Worcester Polytechnic Institute, Worcester, MA, United States*

Myosin Mediates Anisotropic Mechanosensing SB³C2017-P98

Shin Min Wen, Pen-Hsiu Grace Chao, *Institute of Biomedical Engineering, National Taiwan University, TAIPEI, Taiwan*

Substrate Displacements Induce Directed Keratinocyte Migration SB³C2017-P99

Hoda Zarkoob¹, Sathivel Chinnathambi¹, John Selby², **Ed Sander**¹, ¹*Biomedical Engineering, University of Iowa, Iowa City, IA, United States*, ²*Dermatology, University of Iowa, Iowa City, IA, United States*

Estrogen Deficiency Changes Mechanobiological Responses Of Osteoblasts To Fluid Flow Effecting Osteoblast Induced Osteoclast Differentiation SB³C2017-P100

Hollie Allison, Vishwa Deepak, Laoise M. McNamara, *Biomedical Engineering, National University Of Ireland, Galway, Galway, Ireland*

Abstract Withdrawn SB³C2017-P101

Predicting Cellular (Re)Orientation in Cyclically Stretched Collagen Gels due to Mechanical and Topographical Cues SB³C2017-P102

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Dose-Dependent Effects of Beta-Aminopropionitrile on Osteoblast Gene Expression and Collagen Production SB³C2017-P103

Silvia P. Canelon¹, Joseph M. Wallace^{2,3}, ¹*Weldon School of Biomedical Engineering, Purdue University, West Lafayette, IN, United States*, ²*Biomedical Engineering, Indiana University-Purdue University at Indianapolis, Indianapolis, IN, United States*, ³*Department of Orthopaedic Surgery, Indiana University School of Medicine, Indianapolis, IN, United States*

Effects of Low-intensity Ultrasound with Nanoparticle Concentration on Stem Cell Osteogenesis and Chondrogenesis SB³C2017-P104

Alexander Qin, Minyi Hu, Yi-Xian Qin, *Biomedical Engineering, Stony Brook University, Stony Brook, NY, United States*

Effect of Extracellular Matrix on Smooth Muscle Cell Migration Behaviour SB³C2017-P105

Toshiro Ohashi¹, Yasufumi Hagiwara², ¹*Faculty of Engineering, Hokkaido University, Sapporo, Japan*, ²*Graduate School of Engineering, Hokkaido University, Sapporo, Japan*

Predicting Individual Cardiomyocyte Fiber Organization in Spatially Constrained Cells SB³C2017-P106

William Sherman, Anna Grosberg, *University of California, Irvine, Irvine, CA, United States*

Cells Align Along Topographical Cues as a Result of Free Energy Minimization and Homeostasis SB³C2017-P107

Tommaso Ristori^{1,2}, Siamak S. Shishvan³, Gitta A. B. C. Buskermolen¹, Frank P. T. Baaijens^{1,2}, Sandra Loerakker^{1,2}, Vikram S. Deshpande³, ¹*Department of Biomedical Engineering, Eindhoven University of Technology, Eindhoven, Netherlands*, ²*Institute for Complex Molecular Systems, Eindhoven University of Technology, Eindhoven, Netherlands*, ³*Department of Engineering, University of Cambridge, Cambridge, United Kingdom*

Dormancy-capable Cancer Cell Isolation via Physical Proliferation Inhibition SB³C2017-P108

Julian A. Preciado¹, Samira Azarin², Emil Lou³, Alptekin Aksan¹, ¹*Department of Mechanical Engineering, ²Department of Chemical Engineering and Material Science, ³Department of Hematology, Oncology and Transplant, Department of Medicine, University of Minnesota, Twin Cities, Minneapolis, MN, United States*

Actomyosin Contractility Regulates Nucleus Pulposus Cell Biophysical and Biomechanical PropertiesSB³C2017-P109

Timothy Jacobsen, Paula Hernandez, Nadeen Chahine, *The Feinstein Institute for Medical Research, Manhasset, NY, United States*

Cell and Tissue Engineering Posters -- Tissue Engineering and Disease Models

Engineering Tendon Through a Multiscale Approach and Conditioning in a Bioreactor SB³C2017-P110

Brittany L. Banik, Justin L. Brown, *The Pennsylvania State University, University Park, PA, United States*

An In-Vitro Platform to Investigate Vascular Access Grafts for In-Situ Tissue Engineering under Hemodynamic Loading SB³C2017-P111

Eline E. van Haften, Marcel C. M. Rutten, Jurgen A. Bultink, Nicholas A. Kurniawan, Carlijn V. C. Bouten, *Biomedical Engineering, Eindhoven University of Technology, Eindhoven, Netherlands*

Design Features To Enable Physiological-Relevance In Flow For Optimizing Engineered Valve TissuesSB³C2017-P112

Manuel Perez-Nevarez, Omkar Mankame, Elnaz Pour Issa, Alex Williams, Alejandro Piñero, Sharan Ramaswamy, *Biomedical Engineering, Florida International University, Miami, FL, United States*

Mechanical Analysis of Pulmonary Hypertension via Adjoint Based Data Assimilation of a Finite Element ModelSB³C2017-P113

Henrik Finsberg¹, Ce Xi², J.L. Tan³, L. Zhong³, Lik Chuan Lee², **Samuel Wall**¹, ¹*Simula Research Laboratory, Lysaker, Norway, ²Michigan State University, East Lansing, MI, United States, ³National Heart Center, Singapore, Singapore*

Determination of Osteogenic Markers Using RNA Sequencing in Human Adipose Tissue Derived Adult Stem CellsSB³C2017-P114

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Junction Protein and Transport Characterization of Reconstructed Endothelium in a Microfluidic Cell Array with Mimicked Tumor Microenvironment SB³C2017-P115

Chun-Wei Chi, Chenghai Li, A.H. R. Ahmed, Elizabeth Benoy, Zeynep Dereli-Korkut, Sihong Wang, *Department of Biomedical Engineering, CUNY- City College of New York, New York, NY, United States*

Using Multicellular Building Blocks to Advance Bioprinting of 3D Tissues SB³C2017-P116

Swathi Swaminathan, Mi Thant Mon Soe, Qudus Hamid, Wei Sun, **Alisa Morss Clyne**, *Drexel University, Philadelphia, PA, United States*

Characterization of 3D Bioprinted Tissue Functionality SB³C2017-P117

Likitha Somasekhar¹, Cameron Hume², Carlos Martino¹, Kenia Nunes Bruhn³, Kunal Mitra¹, ¹*Department of Biomedical Engineering, Florida Institute of Technology, Melbourne, FL, United States, ²Department of Mechanical Aerospace Engineering, Florida Institute of Technology, Melbourne, FL, United States, ³Department of Biological Sciences, Florida Institute of Technology, Melbourne, FL, United States*

Engineering Extracellular Matrix Biofibers by Hollow Fiber Cell Culture SB³C2017-P118

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Improved Characterization of Spatially-Graded Mechanical Properties of Nanofibrous Scaffolds Via Inverse Problem Techniques SB³C2017-P119

Nicholas R. Hugenberg¹, David T. Corr², Assad A. Oberai¹, ¹*Rensselaer Polytechnic Institute, Malta, NY, United States, ²Biomedical Engineering, Rensselaer Polytechnic Institute, Malta, NY, United States*

Human Adipose Derived Stem Cells Cultured on Porous Poly L-Lactic Acid Scaffolds Prepared by Thermally Induced Phase Separation Method SB³C2017-P120

Harish Chinnasami, Ram Devireddy, *Mechanical Engineering Department, Louisiana State University, Baton Rouge, LA, United States*

Impact Of Cellular Cholesterol On Monocyte Chemotaxis SB³C2017-P121

Amit K. Saha^{1,2}, Shatha F. Dallo¹, Anand K. Ramasubramanian^{1,2}, ¹*Biomedical Engineering, University of Texas at San Antonio, San Antonio, TX, United States*, ²*Biomedical, Chemical & Materials Engineering, San Jose State University, San Jose, CA, United States*

Numerical Investigation of the Role Of Intercellular Forces On Collective Cell Migratory Behaviors SB³C2017-P122

Liqiang Lin, Xiaowei Zeng, *Department of Mechanical Engineering, University of Texas at San Antonio, San Antonio, TX, United States*

Collagenase Exposure Alters Neuronal Activity & Biochemical Regulators with Implications for Degenerative Pain SB³C2017-P123

Meagan Ita, Modupe Adegoke, Beth Winkelstein, *University of Pennsylvania, Philadelphia, PA, United States*

Inductive Electric Fields Hinder EGF Gradient Promoted Breast Cancer Cell Motility SB³C2017-P124

Ayush A. Garg¹, Travis Jones¹, Sarah M. Bushman², Jessica Shuman¹, Jacob Enders², Vish Subramaniam¹, Jonathan W. Song^{1,3}, ¹*Department of Mechanical and Aerospace Engineering, The Ohio State University, Columbus, OH, United States*, ²*Department of Biomedical Engineering, The Ohio State University, Columbus, OH, United States*, ³*The Comprehensive Cancer Center, The Ohio State University, Columbus, OH, United States*

**Cell and Tissue Engineering Posters --
Measurements and Modeling in Cell and Tissue Engineering**

A Thermodynamically-Motivated Model for Stress Fibre Reorganization SB³C2017-P125

William Ronan¹, Andrea Vigliotti², Vikram S. Deshpande³, ¹*Biomedical Engineering, National University of Ireland Galway, Galway, Ireland*, ²*Innovative Materials Laboratory, Italian Aerospace Research Centre, Capua, Italy*, ³*Department of Engineering, University of Cambridge, Cambridge, United Kingdom*

Implementation of a Rigorous Linear Viscoelastic Model for Measuring Cell Mechanical Properties Using a Microfluidic Extensional Flow Device SB³C2017-P126

Joanna D. Dahl, *Engineering, University of Massachusetts Boston, Boston, MA, United States*

Investigation of Fiber Architecture Effects on Axonal Deformation During Transverse and Axial Loading via a Coupled Network-Axon Model SB³C2017-P127

Vahhab Zarei¹, Sijia Zhang², Beth A. Winkelstein², Victor H. Barocas³, ¹*Mechanical Engineering, University of Minnesota, Minneapolis, MN, United States*, ²*Bioengineering, University of Pennsylvania, Philadelphia, PA, United States*, ³*Biomedical Engineering, University of Minnesota, Minneapolis, MN, United States*

Detecting Environmental PH Using Mechanical Properties Of Microorganism SB³C2017-P128

Wenjun Zheng¹, Hua Yang², Guanghui Xuan¹, Letian Dai³, Yunxiao Hu³, Shuijin Hu⁴, Shengkui Zhong⁵, Zhen Li³, Mingyuan Gao¹, Shimei Wang³, **Yuan Feng**¹, ¹*School of Radiological and Interdisciplinary Sciences (RAD-X), Soochow University, Suzhou, China*, ²*College of Resources and Environmental Sciences, Nanjing Agricultural University, Nanjing, China*, ³*Nanjing Agricultural University, Nanjing, China*, ⁴*North Carolina State University, Raleigh, NC, United States*, ⁵*Soochow University, Suzhou, China*

Bioinspired Polymer Infiltrated Hydroxyapatite Nanocomposite Hybrids SB³C2017-P129

Rohit Khanna, Xiaodu Wang, *Mechanical Engineering, University of Texas at San Antonio, San Antonio, TX, United States*

Myocyte-collagen Interaction In The Heart: An Experimentally-guided Modeling Study SB³C2017-P130

Sheikh Mohammad Shavik, Marissa Grobbel, Lik Chuan Lee, Sara Roccabianca, *Mechanical Engineering, Michigan State University, East Lansing, MI, United States*

Influence of the Divalent Cation Crosslinker and Its Concentration on the Elastic Modulus and Permeability of Alginate Hydrogels SB³C2017-P131

David M. Kingsley, David T. Corr, *Biomedical Engineering, Rensselaer Polytechnic Institute, Troy, NY, United States*

Solids Posters -- Bone and Cartilage

Measurement of Thermal Conductivity of Cortical Bone SB³C2017-P132

Seon Jeong Huh¹, Hee Joon Lee¹, **JuEun Lee**², ¹*Mechanical Engineering, Kookmin University, Seoul, Korea, Republic of*, ²*Mechanical Engineering, University of the Pacific, Stockton, CA, United States*

Determining the Optimal Screw Configuration for Tibia Plate Fixation of Compound Fractures: A Finite Element Study SB³C2017-P133

Andrew L. Sori, Shihab Asfour, **Francesco Travascio**, *Industrial Engineering, University of Miami, Coral Gables, FL, United States*

Alterations in Equine Tibial Contact Pressure and Bone Stress Due to Femoral Cysts are Independent of Kinematic Constraints SB³C2017-P134

Lance L. Frazer¹, Elizabeth M. Santschi², Kenneth J. Fischer³, ¹*Bioengineering Graduate Program, University of Kansas, Lawrence, KS, United States*, ²*College of Veterinary Medicine, Department of Clinical Sciences, Kansas State University, Manhattan, KS, United States*, ³*Mechanical Engineering, University of Kansas, Lawrence, KS, United States*

A New Reaction-Diffusion-Strain Model for Predicting the Process of Skull Growth and Defect Formation SB³C2017-P135

Chanyoung Lee, Reuben H. Kraft, *Department of Mechanical and Nuclear Engineering, Pennsylvania State University, University Park, PA, United States*

A Novel Method for Imaging Whole Bone 3D Fracture During Mechanical Testing SB³C2017-P136

Kyle A. Bodnyk, Michael J. Heyden, Richard T. Hart, *Department of Biomedical Engineering, The Ohio State University, Columbus, OH, United States*

Analysis of Mineral Distribution in the Trabecular Bone of Normal and Estrogen Deficient Rat Ulnae and Radii Using Micro CT and Nanoindentation SB³C2017-P137

Laura M. O'Sullivan, Eoin P. Parle, Laoise M. McNamara, *National University of Ireland, Galway, Galway, Ireland*

Ultrastructural Origin of Brittleness of Bone Using a Finite Element Approach SB³C2017-P138

Abu Saleh Ahsan, Mohammad Maghsoudi-Ganjeh, Xiaowei Zeng, Xiaodu Wang, *Mechanical Engineering, University of Texas at San Antonio, San Antonio, TX, United States*

Development of Stochastic Structural Finite Element Model for Trabecular Bone SB³C2017-P139

Saif Alrafeek, Peter Gustafson, James Jastifer, *Western Michigan University, Kalamazoo, MI, United States*

Post -Yield Anisotropic Hardening Behavior of Trabecular Bone SB³C2017-P140

David Nolan, **Patrick McGarry**, *National University of Ireland Galway, Galway, Ireland*

Effects of Combinational Treatment Strategies on Bones of Contused Animals SB³C2017-P141

Brittany King¹, Sarah Townsend², Katherine Glunt², Jennifer Kadowec¹, Andrea J. Vernengo³, **Anita Singh**^{1,2}, ¹*Mechanical Engineering, Rowan University, Glassboro, NJ, United States*, ²*Biomedical Engineering, Widener University, Chester, PA, United States*, ³*Chemical Engineering, Rowan University, Glassboro, NJ, United States*

Probabilistic Commonality Of Trabecular Bone Structures: Is It a Result of Nature's Design? SB³C2017-P142

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Material Sensitivity Analysis Of Elbow Joint Cartilage Parameters In A Finite Element Model SB³C2017-P143

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Sustaining Low Friction by Load Sharing Mechanism in Hydrogels for Cartilage Implants SB³C2017-P144

Elze M. Porte, Philippa M. Cann, Marc A. Masen, *Mechanical Engineering, Imperial College London, London, United Kingdom*

Evaluation Of The "Membrane" Effect Of The Lamina Splendens Of Articular Cartilage: Implications For OA SB³C2017-P145

Ferris Pfeiffer, Joe Rexwinkle, Andrew Polk, Aaron Stoker, Nikki Werner, Sydney Timmerman, *University of Missouri, Columbia, MO, United States*

Effects of Freezing on Mechanical Properties of Bovine, Ovine, and Porcine Articular Cartilage SB³C2017-P146
Kelly J. Vazquez, Corinne R. Henak, *Mechanical Engineering, University of Wisconsin-Madison, Madison, WI, United States*

Sensitivity of Cartilage Contact Mechanics Predictions to Subject Specific Loading Conditions SB³C2017-P147
Penny R. Atkins, Niccolo M. Fiorentino, Samuel A. Colby, Andrew E. Anderson, *University of Utah, Salt Lake City, UT, United States*

Solids Posters -- Musculoskeletal

Three Dimensional Measurement of Metatarsal Pronation In Patients With Hallux Valgus SB³C2017-P148
Bradley C. Campbell¹, Stephen F. Conti², Mark Carl Miller³, ¹*University of Pittsburgh, Pittsburgh, PA, United States*,
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Post-Operative Effects of Altering Flexion and Extension Gaps During Total Knee Arthroplasty: A Finite Element Study SB³C2017-P149
Ruth A. Solomon, Andrew L. Sori, Shihab Asfour, **Francesco Travascio**, *Industrial Engineering, University of Miami, Coral Gables, FL, United States*

Computational Analysis of the Changes in Intradiscal Pressure at Adjacent Segments After Posterior Fixation for Burst Fracture SB³C2017-P150
Shady Elmasry, Shihab Asfour, **Francesco Travascio**, *Industrial Engineering, University of Miami, Coral Gables, FL, United States*

An Efficient Numerical Integration Method for Non-linear Viscoelastic Modeling SB³C2017-P151
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Influence of the Disc Height and Annulus Fibrosus Area over the Range of Motion of the Human Spine, A Probabilistic Analysis SB³C2017-P152
Hector E. Jaramillo, *Energetica y Mecanica, Universidad Autonoma de Occidente, Cali, Colombia*

Cervical Spine Finite Element Model with Anatomically Accurate Asymmetric Intervertebral Discs SB³C2017-P153
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Amin Joukar, Anoli Shah, Ali Kiapour, Ardalan Seyed Vosoughi, Anand K. Agarwal, Hossein Elgafy, Nabil Ebraheim, Vijay K. Goel, *University of Toledo, Toledo, OH, United States*

Characterization of the Average Lumbar Spine Intervertebral Disc Annulus Properties Based on Raw Data Sets SB³C2017-P155
Jessica Coogan¹, Brian Stemper², Daniel Nicoletta¹, ¹*Southwest Research Institute, San Antonio, TX, United States*, ²*Medical College of Wisconsin, Milwaukee, WI, United States*

Finite Element Method for Predicting Failure Location of Annulus Fibrosus in Uniaxial Tension SB³C2017-P156
Benjamin Werbner, Minhao Zhou, Grace O'Connell, *Mechanical Engineering, University of California, Berkeley, Berkeley, CA, United States*

A Semi-Automated Approach for Creating a Subject-Specific Finite Element Model of the Intervertebral Disc SB³C2017-P157
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Collagen Fiber Orientation of Tendon Bone Insertion Tissues SB³C2017-P158
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Age-Dependent Function of the Anterior Cruciate Ligament During Post-Natal Skeletal Growth in the Porcine Model
SB³C2017-P159

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Three Dimensional Strain Analysis Of The Human Anterior Cruciate Ligament During Anterior Tibial Translation
SB³C2017-P160

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Evaluating the Appropriateness of Transversely Isotropic Constitutive Theories for Structural Ligaments
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Establishing the Proper Reference Configuration for Finite Element Models of the Supraspinatus Tendon
SB³C2017-P162

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A Cell-Based Cross-Correlation Imaging Analysis Method for Quantification of 3-D Tendon Strains SB³C2017-P163

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A New Method to Determine Subject-specific Properties of Knee Ligaments Using Bayesian Calibration
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Determining the Potential Role of Glycosaminoglycan Clusters in Tendon Mechanical Homeostasis SB³C2017-P165

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Multiaxial Mechanical Responses of Anterior Cruciate Ligament Bundles Reflect Differences in Microstructure
SB³C2017-P166

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Periodontitis's Affect on the Shear Mechanical Behavior of the Fibrous Periodontal Ligament. A Transversely Isotropic Hyperelastic Model. SB³C2017-P167

David S. NedreLOW, Victor H. Barocas, *Biomedical Engineering, University of Minnesota, Minneapolis, MN, United States*

Role of Vascular Recession on the Nutrition of the Human Meniscus: A Computational Analysis SB³C2017-P168

Francesco Travascio¹, Alicia Jackson², Shihab Asfour¹, ¹*Industrial Engineering, University of Miami, Coral Gables, FL, United States*, ²*Biomedical Engineering, University of Miami, Coral Gables, FL, United States*

Characterization of the In-Vivo Inflammatory Response to Polycarbonate-Urethane Wear Debris SB³C2017-P169

Maoz Shemesh¹, **Jonathan J. Elsner**², Noa Cohen¹, Lotem Mahluf¹, Roni Noyvirt¹, Shmuel Israeli³, Judit Krausz³, Natalia Edison³, Nimrod Rozen³, Eran Linder-Ganz¹, ¹*Active Implants, Netanya, Israel*, ²*Active Implants, Memphis, TN, United States*, ³*Haemek Medical Center, Afula, Israel*

Solids Posters -- Tissue Mechanics

Nanoindentation Based Approach for the Mechanical Characterization of Polymeric Microspheres for Drug Delivery SB³C2017-P170

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Multi-Scale Mechanical Properties of Collagen Matrix SB³C2017-P171

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Modeling Mechanical Property Changes of Collagen Fibrils Following Cyclic Loading SB³C2017-P172

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Race Related Differences in Sclera Thickness Using Microcomputed Tomography SB³C2017-P173

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Determination Of Proper Storage Condition And Constitutive Model For Porcine Urinary Bladder Wall Mechanical Properties SB³C2017-P174

Tyler Tuttle, Tamara Reid Bush, **Sara Roccabianca**, *Mechanical Engineering, Michigan State University, East Lansing, MI, United States*

Comparative Study of the Tensile Strength of Commonly Utilized Suture Materials SB³C2017-P175

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A Finite-Element Model of Pacinian Corpuscle Clustering in Human Skin SB³C2017-P176

Julia C. Quindlen, Victor H. Barocas, *Biomedical Engineering, University of Minnesota, Minneapolis, MN, United States*

Modeling Creep Indentation of Brain Slices As A Fiber-Reinforced Biphase Material SB³C2017-P177

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Postural Influence on Thoracoabdominal Organs of 5th, 50th, and 95th Percentile Male Subjects SB³C2017-P178

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Determination of Proper Storage Condition and Constitutive Model For Rat Back Skin Mechanical Properties SB³C2017-P179

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Characterization of Pediatric Brain Viscoelasticity Using Multi-Frequency Magnetic Resonance Elastography SB³C2017-P180

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Lung Micromechanics of Pulmonary Fibrosis: A Finite Element Analysis SB³C2017-P181

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Nonlinear Viscoelastic Responses of PLGA Fibers Under Physiologic Conditions SB³C2017-P182

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Ex-Vivo Biomechanical Characterization of Arteriovenous Fistulas SB³C2017-P183

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Assessment of Material Properties of Thin Film Wound-Treatment Polymers SB³C2017-P184

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Pressure Induced Damage Of Pulmonary Artery SB³C2017-P185

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Abstract Withdrawn SB³C2017-P186**Transesophageal Echocardiography Enables Regional Quantification of Left Ventricular Strain in a Porcine Model of Myocardial Infarction** SB³C2017-P187

William M. Torres¹, Alison T. Thames², Tarek Shazly¹, Francis G. Spinale², ¹*University of South Carolina, Columbia, SC, United States*, ²*University of South Carolina School of Medicine, Columbia, SC, United States*

Early Remodeling of Pulmonary Autograft After Ross Procedure: Wall Stress Analysis SB³C2017-P188

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Spatial Scaling in Multiscale Models: A Method for Coupling Agent-based and Finite-element Models of Tissue Remodeling SB³C2017-P189

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Region-Specific Orthotropic Growth of the Pediatric Thoracic Spine Through Finite Element Methods SB³C2017-P190

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Biomechanics of Early Embryonic Brain Morphogenesis SB³C2017-P191

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Vascular Growth and Remodeling with Stochastic Optimal Stress-driven Fiber Deposition SB³C2017-P192

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The Effects of Alignment and Misalignment of Autografts in the Repair of Volumetric Muscle Loss Injuries SB³C2017-P193

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A Biomechanical Comparison Of Two Methods Of Scapular Neck Fracture Fixation SB³C2017-P194

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Development And Application Of A Six-year-old Child Pedestrian Finite Element Model SB³C2017-P195

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Measuring Oligodendrocyte Mechanics Following Simulated Traumatic Brain Injury SB³C2017-P196

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Morphometric Analysis of Cerebellum in Type I Chiari Malformation SB³C2017-P197

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Composite Hydrogel: a New Tool for Reproducing the Mechanical Behaviour of Soft Human Tissues SB³C2017-P198

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Strain Responses Of The Human Brain With Morphologically Age-Appropriate Head Models SB³C2017-P199

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Interrupted High-Rate Compression of Porcine Brain Tissue Utilizing the Split-Hopkinson Pressure Bar Method SB³C2017-P200

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A Method to Leverage Detailed and Simplified Occupants for Computational Efficiency in Pre-Crash Simulations SB³C2017-P201

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Solids Posters -- Cardiovascular

Predicting Stent Graft Rotation in Patient Specific Abdominal Aortic Aneurysm Repair Using Finite Element Analysis SB³C2017-P202

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Mechanical Characterisation and Modelling of Thrombus Material SB³C2017-P203

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Abstract Withdrawn SB³C2017-P204

Mouse Aortic Mechanics assessed from Finite Element Simulation using Ring Pull Test Properties SB³C2017-P205

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A Comparison of Morphological Parameters in Asian and Caucasian Abdominal Aortic Aneurysm Patients Using Biomechanical and Machine Learning Methods SB³C2017-P206

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Multidimensional Aneurysm Growth: A Bioengineering Approach to Assess Thoracic Aortic Aneurysms SB³C2017-P207

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Characterisation of Mechanical Properties of Vascular Tissue in a Quasi-2D Setting SB³C2017-P208

Stefan Sanders, Frans van de Vosse, Marcel Rutten, *Eindhoven University of Technology, Eindhoven, Netherlands*

Towards Accurate Atherosclerotic Plaque Failure Models: Investigating Matrix-Calcification Delamination SB³C2017-P209

Brian L. O'Reilly, Peter E. McHugh, Patrick McGarry, *Biomedical Engineering, National University of Ireland, Galway, Ireland*

Non-Contact Measurement of Carotid Artery Pulsewave Velocity: Neck Phantom and Preliminary In-vivo Results SB³C2017-P210

Stephen Greenwald¹, Jonathan Reeves^{1,2}, Shyam Thacker¹, Awais Yousof¹, Malcolm Birch^{1,2}, Viviana Mancini³, Daniela Thommasin³, Patrick Segers³, Louise Marais⁴, Pierre Boutouyrie⁴, ¹*Blizard Institute, Barts & The London School of Medicine & Dentistry, Queen Mary University of London, London, United Kingdom,* ²*Clinical Physics, Barts Health Trust, London, United Kingdom,* ³*Institute Biomedical Technology, Ghent University, Ghent, Belgium,* ⁴*Département de pharmacologie - Toxicologie, INSERM, Paris, France*

New Implantable Force Transducer For The Aortic Annulus SB³C2017-P211

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Characteristics Of Clots From Acute Ischemic Stroke And Laboratory Analogs SB³C2017-P212

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Three Part Hyperelastic Law for Anisotropic Aortic Tissue: Model Development and Experimental Validation SB³C2017-P213

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A Semiautomatic Method for the Detection of Patient Specific Aortic Geometries and Mechanical Properties Using 4D Flow MRI SB³C2017-P214

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Modeling of Myocardium Compressibility and its Impact in Computational Simulations of the Functioning Heart SB³C2017-P215

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Topological and Geometrical Analyses of 3D Epicardial Elastin Fiber Network SB³C2017-P216

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Biaxial Mechanical Properties of Porcine Tricuspid Valve Leaflets SB³C2017-P217
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Effect Of Layer- And Organ-scale Prestrain On The Opening-Closing Behavior Of A Heart Valve SB³C2017-P218
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A Biologically Motivated Computational Model to Explain Anisotropic Prestretch in the Mitral Valve SB³C2017-P219
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Finite Element Modeling of Mitral Valve Patch Augmentation & Effects on Chordal Force Distribution
 SB³C2017-P220
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A Parametric Study Of The Optimal Shape And Leaflet Properties In Bioprosthetic Heart Valves SB³C2017-P221
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In-Vivo Stress Estimation of The Functional Heart Valve and Its Implications For Annuloplasty Ring-Based Valve Surgical Repair SB³C2017-P222
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Phenomenological based Constitutive Modeling of Jugular Venous Tissue SB³C2017-P223
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Mechanical and Structural Characterization of Pulmonary Arteries in Two PAH Animal Models SB³C2017-P224
Daniela Velez-Rendon, Erica R. Pursell, Daniela Valdez-Jasso, *Bioengineering, University of Illinois at Chicago, Chicago, IL, United States*

Statics and Dynamics of Aortic Segment with Residual Stresses SB³C2017-P225
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Fluids Posters -- Cardiovascular Devices, Valves, and Flows

Physiology-Modeling Coupled Experiment: A High Fidelity Hardware-In-The-Loop Hybrid Model for the Circulation
 SB³C2017-P226
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In-vitro Validation Of A Lumped-parameter Model For A Fontan Right-side Assist Device SB³C2017-P227
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Towards a Multifidelity Hemodynamic Model Pipeline for the Analysis of Cardiovascular Flow Under Uncertainty
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A CFD-based Genetic Algorithm Applied To the Design of Flow-diverting Stent for Identifying the Wire Configuration that Maximally Disrupts the Bundle of Aneurysm Inflow SB³C2017-P229

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Optimization Of Systemic-to-Pulmonary Shunt Design in the Assisted Bi-directional Glenn SB³C2017-P230

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Hemodynamics Consequences of Different Designs of the MonaLSA Stent Graft SB³C2017-P231

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Nonlinear Dynamics of Dacron Aortic Prostheses Conveying Pulsatile Flow SB³C2017-P232

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A Novel Modeling Approach to Quantify Coronary Perfusion after Transcatheter Aortic Valve Replacement

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Predicting Calcific Aortic Valve Disease Progression and Its Effect on Transcatheter Aortic Valve Deployment in Bicuspid Valves SB³C2017-P234

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Implication Of Flow Dependence Of Valve Area On The Formulation Of A Severity Index For Calcific Aortic Valve Stenosis SB³C2017-P235

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Sub-Annular Deployment In Valve-in-Valve Is Most Optimal When Considering Both Pressure Gradients And Leaflet Thrombosis Risk SB³C2017-P236

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In Vitro Assessment of Prosthetic Valve Fluid Mechanics in the Pediatric Pulmonary Outflow Tract SB³C2017-P237

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Novel Technique for Optical Strain Measurements on the Mitral Valve Anterior Leaflet SB³C2017-P238

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Simulation of Blood as a Particulate Flow in The Hinge Gap Region of a Mechanical Heart Valve SB³C2017-P239

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Effect of Left Versus Right Coronary Flow Waveforms on Aortic Sinus Hemodynamics SB³C2017-P240

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Suppressing Unsteady Flow In Arterio-Venous Fistulae SB³C2017-P241

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Fluids Posters -- Cardiovascular Diagnostics and Flow and Aneurysms

Quantification of Changes in Blood Flow Dynamics in Left Ventricles of Porcine Hearts Before and After Myocardial Infarction SB³C2017-P242

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A Simulation Study of the Age-Related Changes in the Cardiovascular System SB³C2017-P243

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CFD-Shape Optimization Coupling Explains Partial Restoration of Homeostatic WSS in Venous Neointimal Hyperplasia SB³C2017-P244

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Computational Access Flow Reduction Effect on Wall Shear Stress in Brachiocephalic Fistulae SB³C2017-P245

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Dynamic Mesh Computational Fluid Dynamics Of The Chick Embryonic Heart Based On 4D High-frequency Ultrasound Imaging SB³C2017-P246

Sheldon Ho, Yue Yin Loh, Hadi Wiputra, Choon Hwai Yap, *NUS, Singapore, Singapore*

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A Multiscale Model of the Endothelial Glycocalyx as Mechanosensor of Hemodynamic Shear Forces SB³C2017-P248

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Abstract Withdrawn SB³C2017-P249**Quantification of Ventricular Hemodynamic and Wall Shear Stress Abnormalities in Discrete Subaortic Stenosis SB³C2017-P250**

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Inconsistent Application of the Scalar Stress Concept in the Power-law Hemolysis Model SB³C2017-P251

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Fictitious Domain Particle-based Modeling for Thrombosis SB³C2017-P252

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Abstract Withdrawn SB³C2017-P254

A Virtual Inter-Laboratory Comparison of Predicted Hemodynamic Indices in Intracranial Aneurysms: Consistent or Not? SB³C2017-P255

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Ontology for Cerebral Aneurysm Morphometrics SB³C2017-P257

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Fluids Posters -- Biological Flows

Fluid Mechanics and Evolution of Cooperation SB³C2017-P258

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Fluid-Structure Interaction Of The Non-contact Tonometry Test SB³C2017-P259

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The Effects Of Preconditioning On Uniaxial Tensile Tests Of Porcine Cornea SB³C2017-P260

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Intraocular Pressure Measurement Through the Laser Induced Cavitation Bubbles Dynamics. SB³C2017-P261

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Infant Oral Cavity Pressure Data Processing SB³C2017-P262

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An In Vitro Model of Intrathecal Cerebrospinal Fluid Dynamics With Dorsal and Ventral Spinal Cord Nerve Rootlets SB³C2017-P263

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Accelerating Cardiovascular Segmentation With Convolutional Neural Networks SB³C2017-P264

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How Temperature Influences the Viscosity of Hornworm Hemolymph SB³C2017-P265

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Computational Model of an Initial Lymphatic Network SB³C2017-P266

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Hemodynamic Effects of Stenosis in the Inferior Vena Cava Conduit and Left Pulmonary Artery of the Fontan Circulation SB³C2017-P269

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Sickle Red Blood Cell Adhesion to Heme Activated Endothelial Cells in Microscale Flow SB³C2017-P271

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Parametric Analysis Of New Coronary Artery Bypass Configurations SB³C2017-P272

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Undergraduate Design Competition Posters

DART Brace: Daily Advanced Range of Motion Therapy for Maximizing Function SB³C2017-P273

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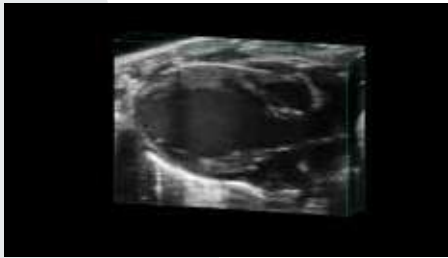
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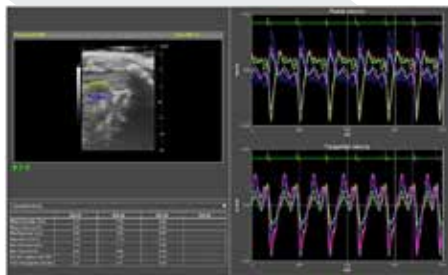


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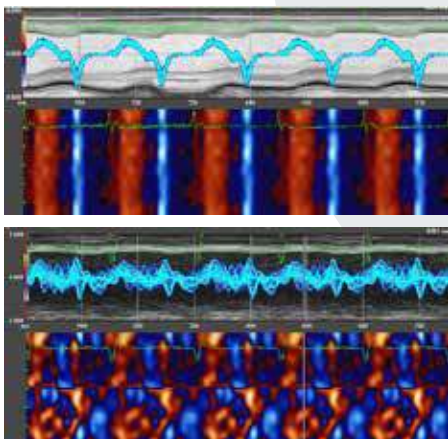
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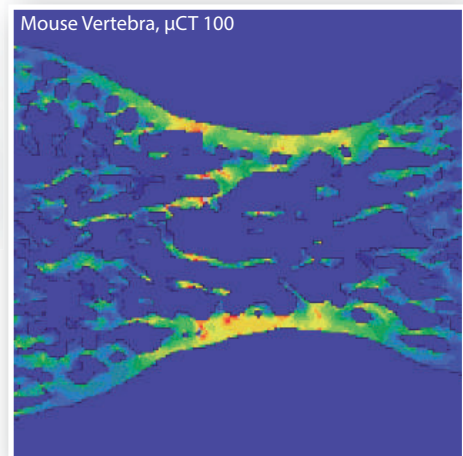
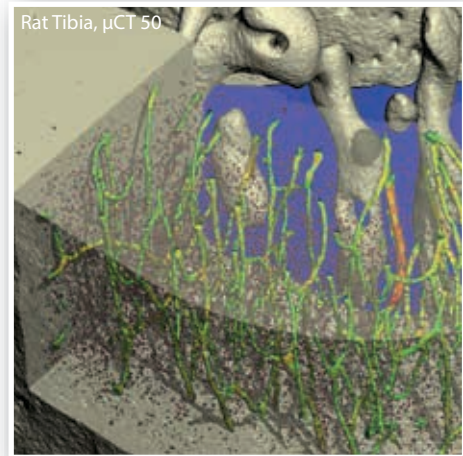


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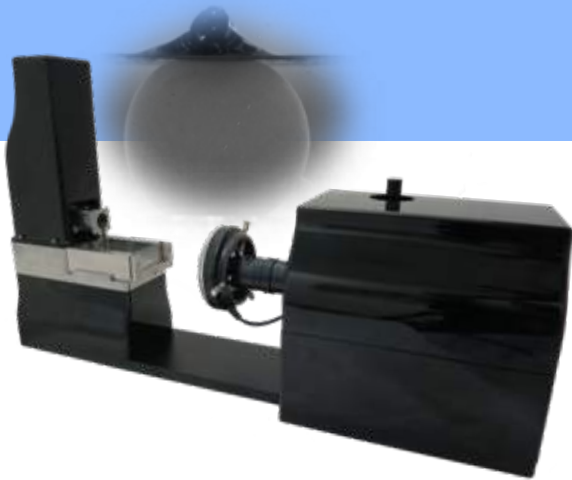
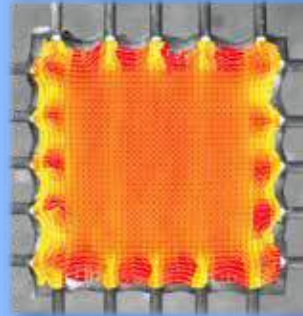
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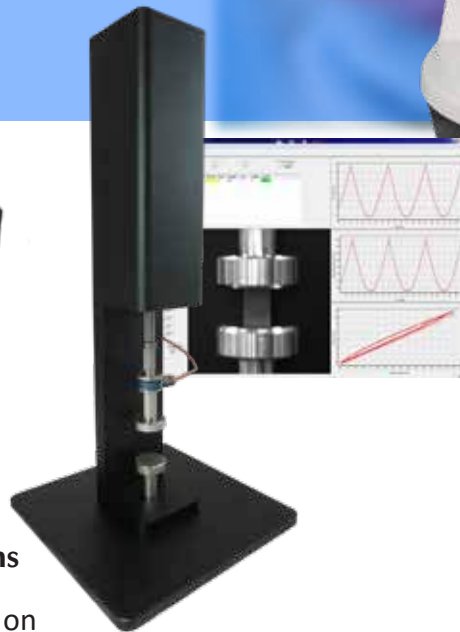
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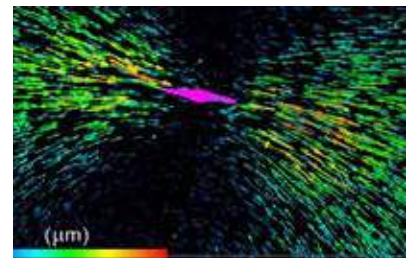
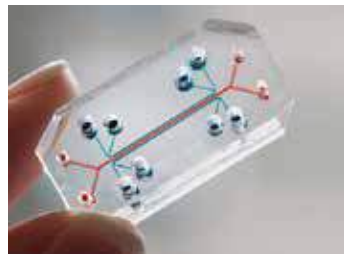
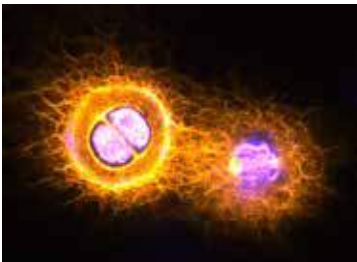


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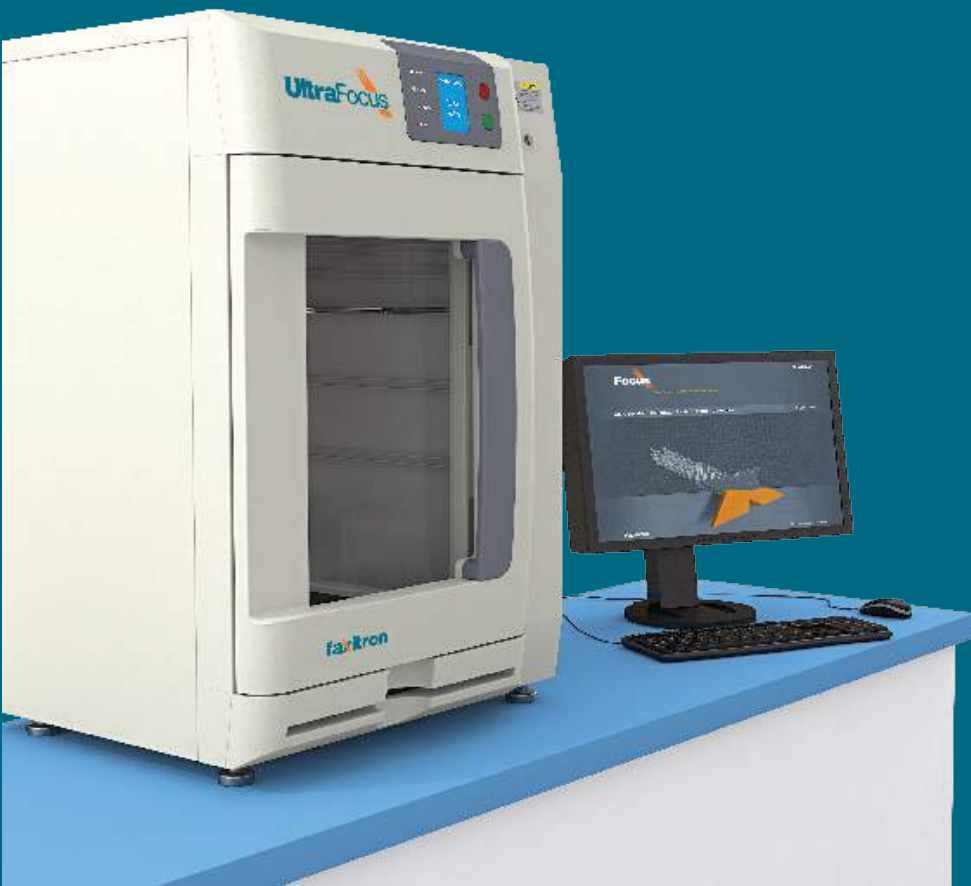
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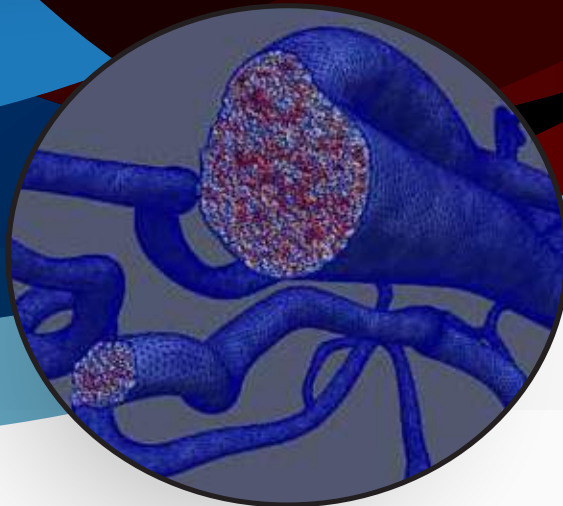
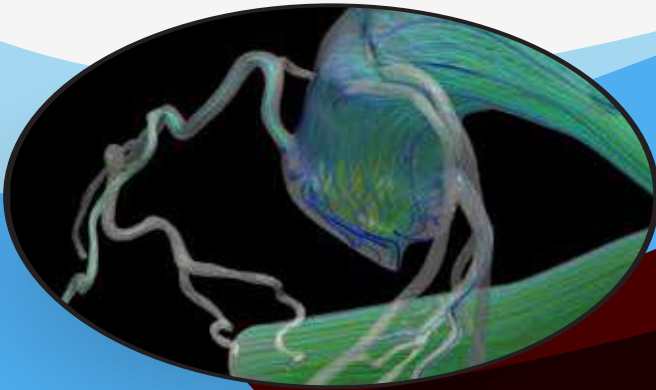
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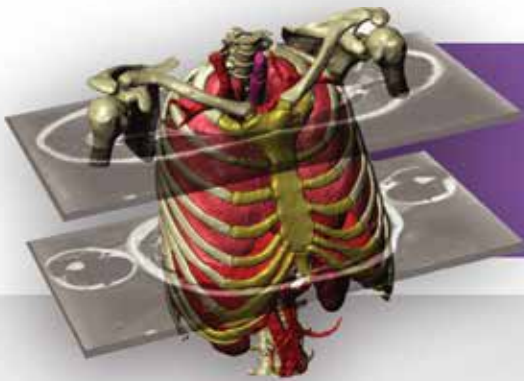
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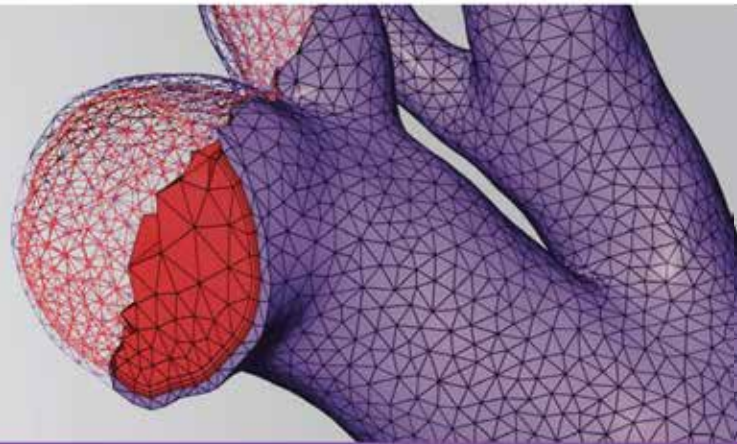


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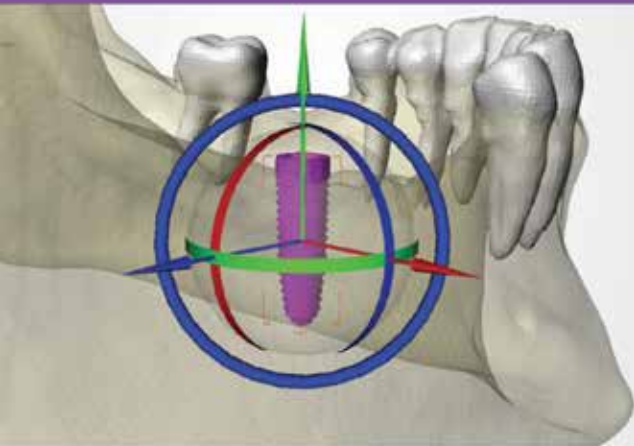
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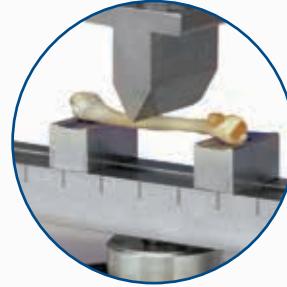
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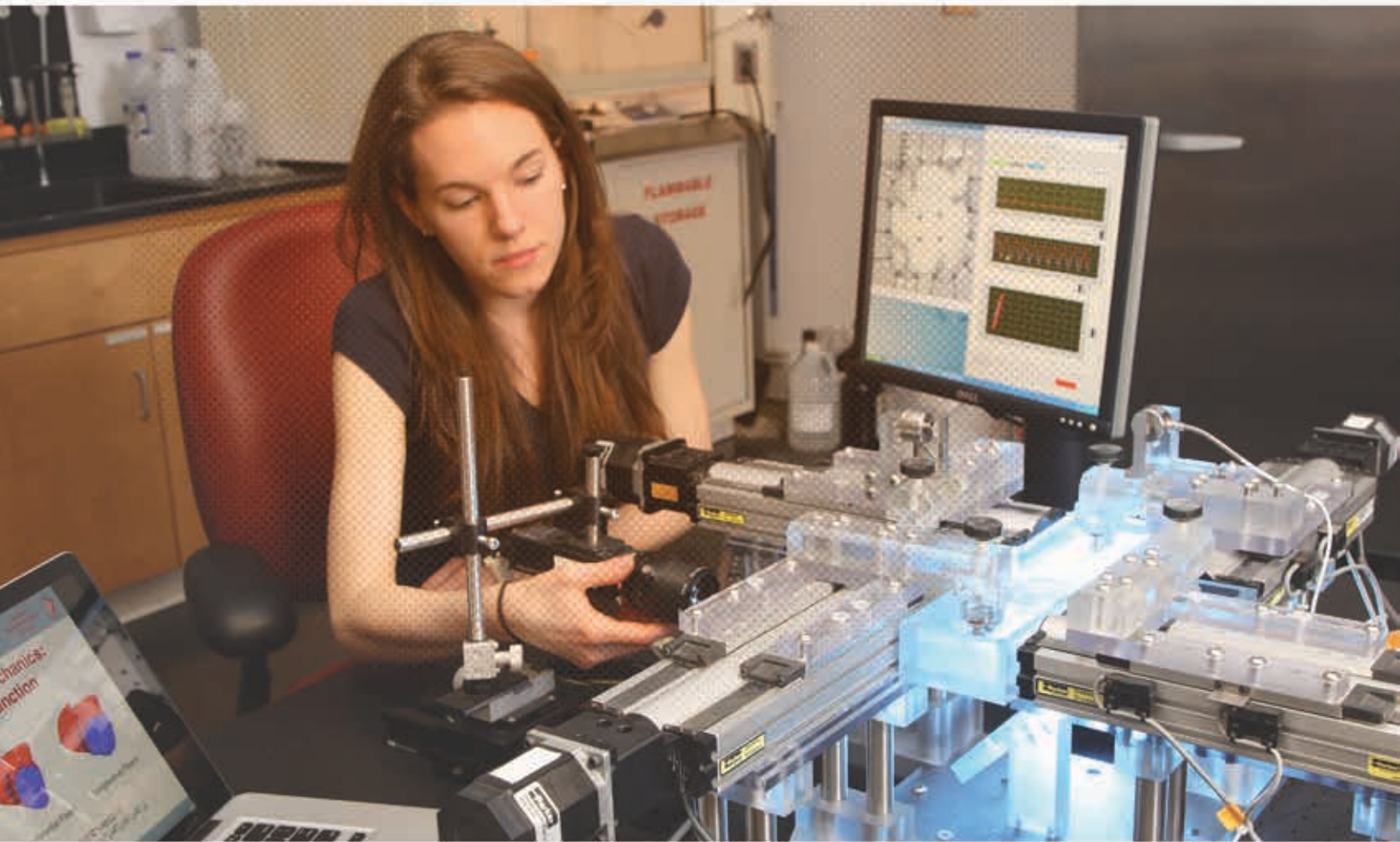
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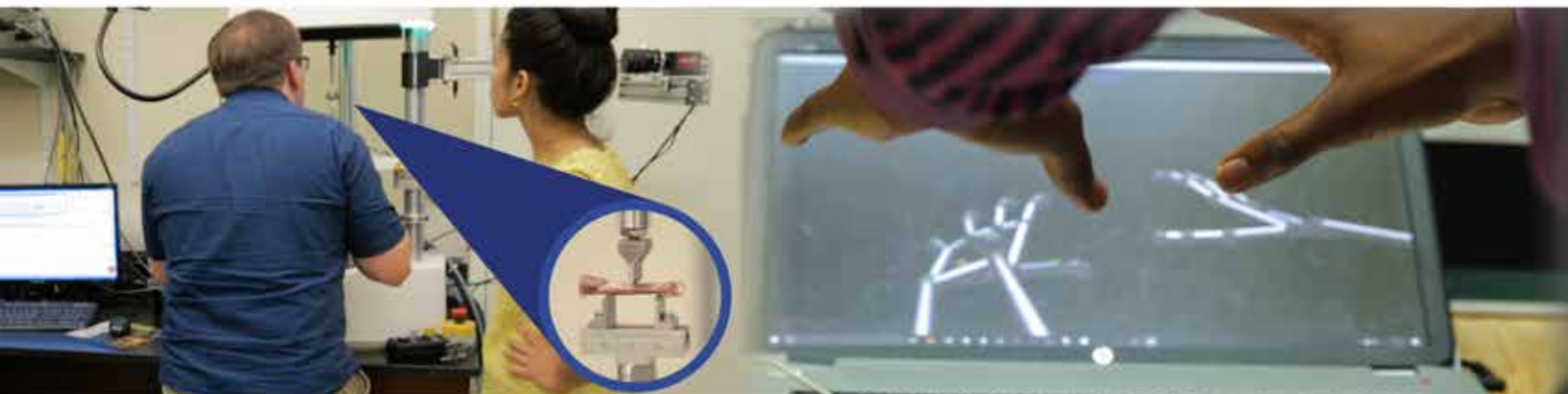
BIOMEDICAL ENGINEERING



The VCU Department of Biomedical Engineering, located in the dynamic capital of Richmond, Virginia, offers B.S., M.S., and Ph.D. degrees in Biomedical Engineering as well as a combined M.D./Ph.D. program. The graduate program was founded in 1984, making it one of the first biomedical engineering programs in Virginia.

We are undertaking a significant expansion of our graduate programs.

We maintain a close, collaborative relationship with VCU Health, a leading academic medical center, where students receive personalized attention as they work on groundbreaking research. Faculty specialize in a variety of research areas including mechanobiology and regenerative medicine, rehabilitation engineering, human-computer interfaces, biomechanics, biomaterials, imaging and cardiovascular devices.



For more information about our programs, contact undergraduate director **Paul Wetzel** (pawetzel@vcu.edu) or graduate director **Jennifer Wayne** (jwayne@vcu.edu)

biomedical.egr.vcu.edu



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Prof Merryn Tawhai
University of Auckland,
New Zealand



Prof Xavier Trepap
IBEC Barcelona, Spain



Prof Clemens van
Blitterswijk
Maastricht University,
The Netherlands



UNDERGRADUATE AND MASTERS DEGREES

Our unique undergraduate curriculum builds around a core of **6** courses to provide students with a multidisciplinary base for the quantitative analysis of biological systems, which leads to a choice of one of four possible concentrations to dive deeply into an area of great importance to bioengineering. Students can continue onto a masters degree program in these concentrations which will provide significant opportunities for student research.

4 CONCENTRATIONS

- » Bioimaging and Signal Processing
- » Cell and Tissue Engineering
- » Biomechanics
- » Biomedical Devices

“ What I like about Northeastern’s Bioengineering program is its interdisciplinary nature which gives you the freedom to shape your educational experience through a variety of concentrations, coops across the industry, and accessible on-campus research. Sharing this journey with passionate students and faculty in the heart of Boston’s innovative biotech scene makes it an exciting program to be a part of. ”



— Zachary Flinkstrom, bioengineering student

PHD DEGREES

Our interdisciplinary PhD program in Bioengineering draws on the expertise of faculty across the University and reflects the significant strengths of bioengineering research in multiple areas. Students accepted to the program will complete a rigorous core curriculum in basic bioengineering science followed by completion of an immersion track curriculum.

8 TRACKS

- » Bioimaging and Signal Processing
- » Biomechanics and Mechanobiology
- » BioMEMs/BioNANO
- » Biochemical and Bioenvironmental Engineering
- » Motor Control
- » Biocomputing
- » Cell and Tissue Engineering
- » General Bioengineering Studies

“ My goal starting graduate school was to acquire the knowledge and skills necessary to be part of the cutting edge of human progress as we learn how to engineer biology. The courses I took, combined with the experimental techniques and computational methods practiced in my research, met that goal and exceeded my expectations. Mentoring undergraduate research and being involved in the diverse research community at Northeastern and in Boston has made my PhD journey even more rewarding and fulfilling. Without a doubt Bioengineering at Northeastern was the right choice for me! ”



— Jeffrey Bouffard, bioengineering PhD student

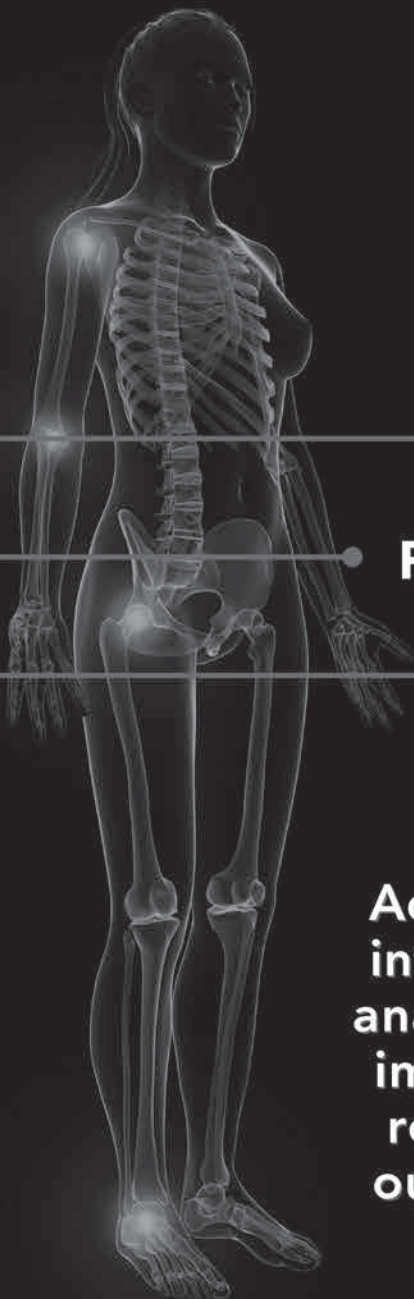
COOPERATIVE EDUCATION AND EXPERIENTIAL LEARNING

Experiential learning, anchored by our signature cooperative education program, lies at the heart of a Northeastern education. Our broad mix of experience-based education programs—including co-op, student research, service learning, and global learning—build the connections that enable students to transform their lives. These connections enrich classroom studies, fuel intellectual and personal growth, and provide students with opportunities to explore their path and discover their passion.

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The UCI [Department of Biomedical Engineering's](http://www.bme.uci.edu) mission is to inspire engineering minds for the advancement of human health.

Established in 2002, the UCI BME Department offers two undergraduate degree programs, M.S. and Ph.D. degrees in biomedical engineering and a combined M.D./Ph.D. degree in conjunction with the UCI Scholl of Medicine. There are currently 23 full-time faculty and 59 affiliated faculty. Research areas include micro/nano medicine, biophotonics, biocomputation and tissue engineering, with clinical emphases in neuroengineering, cardiovascular diseases, cancer and ophthalmology.

Included in these opportunities are major campus research centers at the Beckman Laser Institute (biophotonics), the Edwards Lifesciences Center for Advanced Cardiovascular Technology, the Chao Family Comprehensive Cancer Center, the Integrated Nanosystems Research Facility, the Laboratory of Fluorescence Dynamics, and the Micro/nano Fluidics Fundamentals Focus Center. Because of its interdisciplinary nature, biomedical engineering attracts students with a variety of backgrounds.

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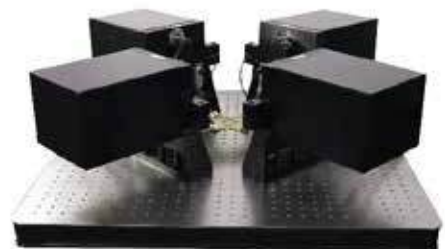
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DEGREE PROGRAMS

The Joint Department of Biomedical Engineering is incorporated into both NC State University and the University of North Carolina at Chapel Hill. We offer Doctor of Philosophy (Ph.D.), Master of Science (M.S.), and Professional Science Masters (P.S.M.) degrees.

RESEARCH CENTERS AND FACILITIES

The **Biomedical Research Imaging Center (BRIC)**, established in 2005 and located in the brand new (2014) Marsico Hall, serves as a backbone for pre-clinical and clinical imaging research, and includes some of the most state-of-the-art biomedical imaging facilities in the world. Core resources include multiple MRI systems (9.4 T, 7 T and 3 T), including one of only a handful of MR-PET systems in the country, two cyclotrons, and a radiochemistry facility. State-of-the-art systems for other imaging modalities include ultrasound, optical imaging, PET-CT, SPECT-CT, and carbon nanotube CT.

Micro and Nano devices are fabricated on both campuses using state-of-the-art facilities: the **NC State Nanofabrication Facility (NNF)** at NC State University and the **Chapel Hill Analytical and Nanofabrication Laboratory (CHANL)** at UNC. An 800 sq.-ft.-class 1000 cleanroom is housed within the BME department. It contains tools for micro/nanofabrication and is geared towards studies at the interface of engineering and biology. Advanced 3-D printing tools and technologies are present on both campuses.

Regenerative Medicine infrastructure spans multiple colleges at both NC State and UNC to include facilities within the School of Medicine, College of Veterinary Medicine, College of Textiles, Center for Comparative Medicine and Translational Research, and the College of Engineering. Infrastructure encompasses core facilities and research labs with capabilities of stem cell isolation, expansion, and differentiation; novel scaffolding and biomaterial development, testing, and scale-up; cell and tissue bioreactors; small and large animal model evaluation; and more. A **GMP facility** is currently being designed and built on the NC State campus to further advance and translate novel regenerative medicine products.



The **Rehabilitation Engineering Center (REC)** is a new center across both campuses. The state-of-the-art gait lab is located in Engineering Building III room 1408 (1,400 square feet) on NC State's Centennial Campus and is handicap accessible. The gait lab is equipped with two motion capture systems, multiple EMG systems, a EEG system, a dual-belt instrumented treadmill with incline, a portable indirect calorimetry system, a real-time ultrasound system, a biodex dynamometer, a powered overhead bodyweight support System, and a plantar pressure measurement system. Right next to the gait lab is a fabrication lab (700 square feet), dedicated to fabricating braces and experimental components. A similar setup is also available at **UNC-Chapel Hill at the Motion Analysis Laboratory**. Additionally, clinical resources are available at UNC for patient recruitment, screening, fabricating and fitting prosthetics and orthotics, PT/OT training, and outcome measurement. Furthermore, advanced 3-D printing machines and machine shops are present on both campuses.

DEGREE REQUIREMENTS

A minimum of 30 semester hours of graduate study is required for the Master of Science (M.S.) degree. A minimum of 3 credit hours is required for thesis research.

Ph.D. students must complete a core curriculum of 27 hours of course work including research seminar, written and oral comprehensive preliminary examinations, in-depth research, a written research dissertation, and a final oral defense of the research.

GRADUATE RESEARCH

With more than 30 tenured and tenure-track faculty members, our graduate program embraces interdisciplinary collaboration within five sub-disciplines of biomedical engineering, as well as dozens of other collaborative areas.

RESEARCH AREAS

Biomedical Imaging

Research in the Biomedical Imaging area includes hardware, image processing, signal processing, imaging contrast agents, image segmentation, applications, and imaging informatics. Modalities of particular interest include ultrasound imaging, magnetic resonance imaging, x-ray, SPECT, PET and live-cell imaging.

Biomedical Microdevices

Research in Biomedical Microdevices involves lab-on-chip, organ-on-chip, rare-cell capture devices, single-molecule DNA sequencers, integrated sensors and other micro-scale technologies. Microdevices are engineered for clinical diagnostics and therapeutics as well as for applications in basic biomedical research.

Pharmacoengineering

Pharmacoengineering research works at the interface of engineering and pharmaceutical sciences to develop safer and more effective medicines and drug delivery systems. Focus areas include immunoengineering, design of nanoparticles with embedded sensors and payloads, stem-cell delivery technologies, and image-guided therapeutics.

Rehabilitation Engineering

Research in Rehabilitation Engineering aims to restore the motor function and quality of life of individuals with physical disabilities. Focus areas include the study of tissue/musculoskeletal biomechanics, sensorimotor integration, human movement control in healthy persons and individuals with sensorimotor deficits, development and translation of bio-inspired prosthetics and orthotics, rehabilitation robotics, neural interfaces, and technologies for fall prevention.

Regenerative Medicine

Research in the Regenerative Medicine area includes cutting-edge approaches to replace, engineer, or regenerate tissues and/or organs. Approaches encompass functional tissue engineering and the use of molecular biology, bioreactors, biomechanics, cytomechanics, synthetic and extracellular matrix derived biomaterials and scaffolds, biomimetics, stem cells, and mechanobiology to engineer living tissues. Investigations are performed at both the basic and applied science level with emphasis on translational investigations to best improve patient care.

ADMISSIONS

In addition to the minimum admissions requirements below, all applicants must have competitive GRE scores. International applicants must have a total score of at least 80 on the Internet-based Test (iBT), or an overall band score of at least 6.5 on the International English Language Testing System (IELTS).

ADMISSIONS REQUIREMENTS

Transcript(s) documenting an undergraduate or graduate degree in engineering or a quantitative science. A minimum GPA of 3.0 on a 4.0 scale is required; historically, admitted BME applicants have GPAs above 3.33/4.0. Scores from the GRE general exam taken within the last five years. Minimum V/Q GRE scores greater than the 50th percentile is required; historically, admitted BME applicants have V/Q GRE scores above the 50th/70th percentile, respectively. A 1–2 page personal statement discussing research interests and relevant background experience. The statement must identify professors within the department with whom you are interested in working. Three recommendation letters that discuss your potential for graduate study.

COST OF STUDY

Tuition and fees for full-time study are set by North Carolina State University or The University of North Carolina at Chapel depending on the institution receiving the student's application.

FINANCIAL AID

The department guarantees all admitted Ph.D. students funding for the first year. This funding comes from one of three sources: internal fellowships, teaching assistantships (TAs), and research assistantships (RAs). Internal fellowships and TAs are funded from department and university resources. RAs are granted by faculty members to students who are interested in working on projects in faculty member's lab. After the first year of study students are expected to transfer to RAs. Regardless of the funding source, tuition and health insurance are paid for the student by the department or faculty grant. Student out-of-pocket expenses are limited to student fees.

APPLICATION DEADLINES

Current deadlines are posted on the BME website at: <http://www.bme.ncsu.edu/admissions-info/>

NOTES

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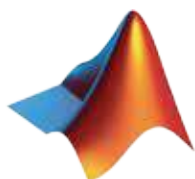


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CEMB
Center for Engineering MechanoBiology

SB³C 2017 - PROGRAM AT A GLANCE

Room	Tucson AB	Tucson CD	Tucson GH	Tucson IJ	San Ignacio	San Luis	San Pedro
WEDNESDAY, June 21, 2017							
7 am-1:20 pm	Committee Meetings (see page 5 for room numbers)						
1:30-2:30 pm	'How-To' Session: SimVascular	'How-To' Session: FEBio					
2:45-4:15 pm	Heart Valve Mechanics	Spine Mechanics	Thrombosis	CV Growth, Remodeling, & Repair	Bone Biomechanics	Biotransport and Microfluidics	Regulation of Mechano-Transduction
4:15-4:30 pm	Break (Arizona Foyer)						
4:30-6:00 pm	Soft Tissue Characterization and Modeling	Taber Session: Growth & Remodeling	Atherosclerosis	Biofluids	Micro-Engineered Physiologic Systems	Strategies to Improve Rehabilitation Treatments	Microenvironmental Control of Tissue Formation and Cell Function
6:15-8:00 pm	Opening Reception (Ania Terrace)						

THURSDAY, June 22, 2017							
11 am - 12 pm	Diversity / Mentoring Event (Arizona 3-5, <i>registration required</i>)						
11:15-12:30 pm	Lunch and Poster Viewing (Arizona 6-12)						
12:30-2:00 pm	Multiscale Analysis of Cartilage and Intervertebral Disk	Soft Tissue Mechanobiology	Heart Valve Flow and Function	Cardiovascular Devices	Active Learning in Biomechanical Eng. Education	Hyperthermia, Cryotherapy, and Cryopreservation	Disease Models and Engineered Therapies
2:00-2:15 pm	Break (Arizona Foyer)						
2:15-3:45 pm	Mechanics and Modeling of Musculoskeletal Soft Tissues	Ocular Biomechanics	Giddens Session: Cardiovascular Fluid Dynamics / Atherosclerosis	Cardiac Mechanics	Mechanical Regulation of Remodeling and Repair	Measurement in Movement and Trauma	Therapeutic Materials for Repair and Regeneration
3:45-4:00 pm	Break (Arizona Foyer)						
4:00-5:30 pm	FUNG, MOW, AND WOO AWARD LECTURES (Tucson EF)						
5:30-7:30 pm	POSTER SESSION I and Happy Hour -- Including BS & MS Student Paper Competitions (Arizona 6-12)						
9:00-10:30 pm	Open Executive Committee Meeting (San Ignacio)						

FRIDAY, June 23, 2017							
All Day	Poster Viewing (Arizona 6-12)						
11 am-12:30pm	Workshop: Additive Manufacturing and Biofabrication	Workshop: Ocular Biomechanics: What's Our Vision?		Workshop: Grad School Pro Tips		Workshop: Medical Imaging for Physiological Flows	
12:30-2:00 pm	POSTER SESSION II (Arizona 6-12, with Lunch)						
2:00-2:15 pm	Break (Arizona Foyer)						
2:15-3:45 pm	PhD Competition: Imaging, Biofluid Mechanics, and Biotransport	PhD Competition: Tissue Mechanics and Characterization	PhD Competition: Cell Mechanics and Mechanobiology	PhD Competition: Diseases, Injury, and Remodeling		PhD Competition: Extracellular Matrix Biomechanics	PhD Competition: Biomaterials and Material-Cellular Interaction
3:45-4:00 pm	Break (Arizona Foyer)						
4:00-5:30 pm	Upper and Lower Extremity Joint Mechanics	Head Injury & Injury Biomechanics 1	Imaging and Diagnostics	Undergraduate Design Competition	Vascular Mechanics	Nano- and Micro-Therapeutics	Mechanical Regulation of Morphogenesis
5:30-5:45 pm	Break (Arizona Foyer)						
5:45-6:45 pm	PLENARY LECTURE – L. Mahadevan - “On Growth and Form – Geometry, Physics and Biology” (Tucson EF)						
6:45-7:45 pm	SB3C Women’s Networking Event (Arizona 2) and IAB / SLC Networking Mixer (Arizona 3-5, <i>registration required</i>)						
8:00-10:00 pm	BEDROCK CONCERT (Ania Terrace)						

SATURDAY, June 24, 2017							
10:30 am-2 pm	Industry Advisory Board (IAB) Workshop (Tucson AB) and Connection Luncheon (<i>registration required</i>) --- details on page 8						
11:00-11:50 am	Student Leadership Council Meeting (San Ignacio)						
12:30-2:00 pm	Workshop: Bench to Bedside - Tendon Repair and Regeneration	Workshop: MATLAB in Education and Research					
2:00-2:15 pm	Break (Arizona Foyer)						
2:15-3:45 pm	Head Injury & Injury Biomechanics 2	Reproductive Biomechanics	Aneurysm	Vascular, Lymphatic, and Ocular Transport	Tendon Tissue Engineering and Regeneration	Experimental Modeling for Clinical Surgical Applications	Measures / Models of Cell Mechanics & Microenvironment (Tucson EF)
3:45-4:00 pm	Break (Arizona Foyer)						
4:00-5:30 pm	Head Injury & Injury Biomechanics 3	Reproductive, Ocular, and Gastrointestinal Biomechanics	Pediatric Flow	Aneurysm Mechanics	Tendon Mechanics and Structure	Surgical Device Design Applications	Measures / Models of Materials and Tissues (Tucson EF)
5:30-5:45 pm	Break (Arizona Foyer)						
5:45-6:45 pm	LISSNER MEDAL AWARD LECTURE (Tucson EF)						
6:45-7:15 pm	Lissner Reception (Ania Terrace)						
7:15-9:30 pm	Banquet and Awards Ceremony (Arizona 6-7)						