2023 Summer Biomechanics, Bioengineering, and Biotransport Conference
June 4th – 8th, 2023
Vail, Colorado

Building Interfaces Across Tissues, Disciplines, and Communities
Funding for this conference was made possible (in part) by the National Science Foundation and the National Institutes of Health. 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. The 2023 Summer Biomechanics, Bioengineering, and Biotransport Conference (SB³C) organizers gratefully acknowledge the support of the National Science Foundation and the National Institutes of Health.

Congratulations to the 2022 Cover Art Contest Winner:

Kacper Ostalowski, Joseph A. Insley, and Jifu Tan, Northern Illinois University.

Title: Direct Numerical Simulation of Blood Flow with Cells in Retina Vascular Network

Description: The photo depicts the transport of red blood cells through a patient-specific retina vascular network. The velocity magnitude is indicated by the background color in the tubes. The top inset illustrates the accumulation of cells in a T-branch vessel, while the bottom inset provides an enlarged view of cells in complicated vessels with branches and loops.
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1 Forward and Acknowledgement

Dear SB³C Community,

On behalf of the entire Organizing Committee and the SB³C Foundation, we welcome you to Vail for the 2023 Summer Bioengineering, Biomechanics and Biotransport Conference (SB³C). This year’s conference theme is “Building Interfaces Across Tissues, Disciplines, and Communities”. This theme highlights three critical issues that face our community: (i) interfacing across basic research and translation, including biomechanics, bioengineering, and biotransport; (ii) interfacing across large research institutions and institutions with fewer research opportunities, including many minority-serving institutions; and (iii) developing emerging fields with high translational potential, including biomechanics and biotransport at tissue interfaces and focus areas such as women’s health. Our plenary speaker, Dr. Amy Wagoner-Johnson, exemplifies this theme, with work that bridges fields such as biomaterials and biomechanics with understudied areas such as women’s reproductive health. We hope that attendees will look for the theme of building interfaces throughout the conference and be inspired to apply these approaches to their own research.

At SB³C 2023, we will honor several ASME medal winners through award lectures. The H.R. Lissner Medal winner, Dr. Boris Rubinsky, is honored for the invention of numerous medical technology devices used to treat tens of thousands of patients worldwide, including imaging-monitored multiprobe cryosurgery, among others. Dr. Alison Marsden will receive the Van C. Mow Medal for her scholarly work in pediatric cardiology, advancements in surgical care of children with heart defects, and exemplary leadership in ASME and women in STEM. Dr. Jessica Oakes will receive the Y.C. Fung Early Career Medal for outstanding work in respiratory mechanics that has significantly advanced the understanding of asthma, smoking, and inhalable drug delivery, and for strong advocacy in diversity, equity, and inclusion efforts. Dr. Tamara Bush will be honored as the winner of the Savio L-Y. Woo Translational Biomechanics Medal for innovative work in several biomechanical areas, including thumb biomechanics, that have direct clinical application in improving patient outcomes. Dr. Victor Barocas will receive the Robert M. Nerem Education and Mentorship Medal for exceptional commitment to undergraduate and graduate education as a teacher, mentor, administrator, editor, and advocate for community and diversity in bioengineering. We congratulate the awardees and encourage you to attend their plenary talks.

A highlight of our conference is the Student Paper Competition (SPC), which awards top students at the BS, MS, and PhD levels. The SB³C Foundation will support awards for all winners and travel for 36 PhD finalists. Additional funding from the NSF will support travel for the top SPC BS and MS finalists. If you’re a student, be sure to attend the professional development and social activities planned by the ASME-BED Student Leadership Committee (SLC), including an axe-throwing melee in the Zen Patio (we’re not kidding).

Finally, with support from the NIH, NSF, and our diversity sponsors, we will celebrate the diversity of our community throughout SB³C 2023. Diversity travel awards will support 49 students to attend the conference, many for the first time. We will also enjoy a Diversity Mentorship event, LGBTQ+ Networking, and a Women’s Networking events. Please take advantage of these opportunities to learn how to support ALL bioengineers.

We hope you take time to relax, reconnect with colleagues you have known for years, and meet new colleagues who will become lifelong friends and collaborators. Enjoy the beautiful activities in and around Vail. We thank the entire SB³C Organizing Committee, the ASME-BED Technical Committees and SLC, Boscov’s Travel, the SB³C Foundation, and all the abstract reviewers and SPC judges who are essential to the success of our conference.

Enjoy the conference, and please join us again in 2024!

Stavros Thomopoulos, Conference Chair
Columbia University

Guy Genin, Program Chair
Washington University at St. Louis
1.1 Conference Code of Conduct

Conference organizers expect all participants to ensure a safe environment. The SB³C Foundation and the conference organizers are dedicated to providing a harassment-free experience for everyone, regardless of gender, gender identity and expression, age, sexual orientation, disability, physical appearance, body size, race, ethnicity, religion (or lack thereof), or technology choices. We do not tolerate harassment of conference participants in any form, including bullying, discrimination, inappropriate physical contact, and intimidation. Sexual language and imagery are appropriate only within the context of conference content relating specifically to reproductive health, and are not appropriate for any other conference venue, including talks, workshops, parties, Twitter and other online media. By attending the SB³C, you agree to follow this Code of Conduct. We thank you for helping us continue to make the SB³C a respectful and welcoming event for all participants.

If you experience or witness harassment or any other behavior that violates this code of conduct, please report it immediately to the Conference Chair (chair@sb3c.org). We take all reports of harassment seriously and will respond promptly to investigate and address the situation. All communications will be kept confidential. Individuals who have questions, concerns or complaints related to harassment are also encouraged to contact the HHS Office for Civil Rights (OCR). Information about how to file a complaint with HHS OCR can be found on the OCR’s webpage. Filing a complaint with the Conference Chair is not required before filing a complaint of discrimination with HHS OCR, and seeking assistance from the Conference Chair in no way prohibits filing complaints with HHS OCR. Furthermore, individuals can also notify the NIH about concerns of harassment, including sexual harassment, discrimination, and other forms of inappropriate conduct at NIH-supported conferences.

After de-identifying the individual who made the complaint, the conference chair will discuss the complaint with the Program Chair and the Diversity Chair and offer the accused individual or individuals the opportunity to defend themselves against the complaint. Conference participants violating these rules may be sanctioned or expelled from the conference without a refund at the discretion of the conference organizers. All allegations will be reported to the HHS Office for Civil Rights for further investigation. Sanctions may additionally include reporting to the violator’s home institution for further investigation and/or disallowing registration and participation in future SB³C meetings.

1.2 Conference COVID Policy

The health and safety of our attendees and guests at SB³C 2023 is paramount. As such, we encourage all attendees to self-administer a COVID test no more than one day prior to arrival at the conference site. There is no need to log or report negative test results.

If your test is positive, please stay home and email info@sb3c.org immediately. If you are already on-site and feel unwell at any point or test positive, please self-quarantine in your guest room and contact info@sb3c.org immediately. Free test kits are also available from the U.S. federal government for U.S. residents, and we highly recommend bringing some to the meeting. For our international guests, if your country requires testing for re-entry, our SB³C registration desk will have recommended testing sites for your convenience.

All attendees and hotel staff are encouraged to wear masks when indoors, except when presenting, eating, or drinking. We will provide as many opportunities as possible to eat and drink outdoors.

We appreciate your partnership in ensuring the health and safety of all of our guests. We will continue to monitor the situation and adjust these policies as needed.
2 General Information

All times below are in MT.

2.1 Registration Hours

The registration desk will be open during the following hours:

- Sunday, June 4: 12pm – 7:30pm
- Monday, June 5: 7:30am – 1:30pm
- Tuesday, June 6: 8am – 1:30pm
- Wednesday, June 7: 12:30pm – 4:30pm
- Thursday, June 8: 1pm – 3pm

2.2 Networking Events

- **Sunday, June 4, 2023, 5:30 - 7:00 PM, Cascade ABC**
  **Industry/Exhibitor Networking Event**
  We invite you to join us for a special networking mixer following our Translational Technology Pitch Competition. Network with the competition finalists, Industry panelists, and our Exhibitors. This is also a great opportunity for current and future Junior Faculty who are looking to purchase equipment for their labs to talk to our Exhibitors!

- **Monday, June 5, 2023, 3:15 - 4:15 PM, Cascade ABC**
  **LGBTQ+ Networking Event**
  This is a great opportunity to meet your fellow LGBTQ+ and ally colleagues at SB3C. The event will include icebreaker games and a special trivia game focusing on the history of the Pride month. Snacks will be served. We hope to see you there!

- **Monday, June 5, 2023, 6:30 - 8:30 PM, Alpine Hall**
  **Welcome Reception**

- **Tuesday, June 6, 2023, 1:00 - 2:30 PM, Outdoor Tent**
  **Prospective Junior Faculty Poster Session**
  During this poster session, senior graduate students and postdocs will network with faculty members attending SB3C, for the purpose of presenting a vision for their future faculty careers. Participants are encouraged to practice their presentation of a cohesive research record and compelling research plans for the future, while also highlighting their experiences and plans in the areas of funding, teaching, and service. The goal of this event is to foster, within the supportive community of SB3C, the development of young and diverse researchers in biomechanics, bioengineering, and biotransport.

- **Tuesday, June 6, 2023, 4:00 - 5:00 PM, Cascade ABC**
  **Women’s Networking Event**
  The purpose of the ASME BED Women’s Group is to provide mentoring, networking and communication for women involved in biomedical engineering to help further their careers and facilitate award nominations.
Tuesday, June 6, 2023, 7:00 - 9:00 PM, Zen Garden
ASME BED Student Networking Event and Axe-Throwing Melee
Join us for the SB3C 2023 Student Networking Event hosted by the ASME BED Student Leadership Committee (SLC)! All students attending the conference are invited to unwind and connect with one another outdoors. Students will be introduced to the current SLC members, learn more about our mission to support the bioengineering student community, and hear about opportunities to contribute. Afterward, students can network over outdoor games such as axe throwing.

Wednesday, June 7, 2023, 7:00 - 10:00 PM, Zen Garden
20th Anniversary BEDRock Concert
The SB$^3$C conference date and venue each year coincide with the annual concert of BEDrock, the world’s most influential unknown band. This year, the band will gather at the SB$^3$C for its 20th year anniversary! (Many of you will recall their Miami debut in 2003). Come dance to the band as it takes us through a history of the BEDrock repertoire. Come see if this is the year we lose a percussionist to spontaneous human combustion! There is never a cover charge and all are invited.

Thursday, June 8, 2023, 7:00 - 10:30 PM, Alpine Hall
Banquet and Awards Ceremony
Be sure to plan your travel to enable you to stay through the banquet that closes the conference! In addition to a final gathering with all your friends and a dining experience designed by Corey Neu, the winners of the student competitions will be announced. The ASME Medals and awards will be presented at the banquet. You won’t want to miss it.
2.3 Committee Meetings

The committee meetings listed below are open to all except the ASME BED Executive meeting, SB\textsuperscript{3}C Board meeting, and the JBME Editors meeting. Attending these meetings is a terrific way to get more involved with the Bioengineering Division of the ASME! Please consider joining one or more of the meetings listed below.

**Monday, June 5**

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<thead>
<tr>
<th>Meeting</th>
<th>Location</th>
<th>Time</th>
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<tr>
<td>ASME Bioengineering Division (BED) Executive Meeting</td>
<td>Valhalla</td>
<td>2:15 - 3:45 PM</td>
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**Wednesday, June 7**

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<thead>
<tr>
<th>Meeting</th>
<th>Location</th>
<th>Time</th>
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<tr>
<td>SB\textsuperscript{3}C Board Meeting</td>
<td>Valhalla</td>
<td>7:30 - 8:30 AM</td>
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<tr>
<td>Industry Meeting</td>
<td>Cascade ABC</td>
<td>8:30 - 9:20 AM</td>
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<tr>
<td>Fluid Mechanics Meeting</td>
<td>Cascade D</td>
<td>8:30 - 9:20 AM</td>
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<tr>
<td>Education Meeting</td>
<td>Gore AB</td>
<td>8:30 - 9:20 AM</td>
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<tr>
<td>Tissue and Cellular Engineering Meeting</td>
<td>Gore CD</td>
<td>8:30 - 9:20 AM</td>
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<tr>
<td>Biotransport Meeting</td>
<td>Cascade ABC</td>
<td>9:30 - 10:20 AM</td>
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<tr>
<td>Design, Dynamics, and Rehabilitation Meeting</td>
<td>Cascade D</td>
<td>9:30 - 10:20 AM</td>
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<tr>
<td>Solid Mechanics Meeting</td>
<td>Gore CD</td>
<td>9:30 - 10:20 AM</td>
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<tr>
<td>ASME BED Open Business Meeting</td>
<td>Gore CD</td>
<td>10:30 - 11:30 AM</td>
</tr>
<tr>
<td>Journal of Biomechanical Engineering Editors Meeting</td>
<td>Valhalla</td>
<td>11:30 AM - 1:30 PM</td>
</tr>
<tr>
<td>ASME BED Student Leadership</td>
<td>Zermatt</td>
<td>5:00 - 6:00 PM</td>
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2.4 Instructions for Poster Presenters

The poster exhibit tent is located near the Zen Garden and will be available to attendees starting on Monday morning. Poster boards will be identified by a number corresponding to the abstract number of the poster listed in the Program Book (P1, P2, etc.). Please hang your poster at the corresponding number. Posters for Poster Session I should be set up before 12:30pm and must be removed by 5:30 pm on Monday, June 5. Posters for Poster Session II should be set up before 12:30 pm and must be removed by 5:30 pm on Tuesday, June 6.

Poster Session I will be held on Monday, June 5th, 2022 from 1:00pm – 2:30pm. Poster Session II will be held on Tuesday, June 6th, 12:45pm – 2:15pm. Authors should stand next to their poster during the assigned session. Authors may also stand at their posters at any time, such as during scheduled breaks.

2.5 Conference Site Map
3 Conference Organizing Committees

3.1 Organizing Committee

Stavros Thomopoulos, Conference Chair
Columbia University

Guy Genin, Program Chair
Washington University at St. Louis

Diversity Chair
Mona Eskandari
UC Riverside

Exhibits Co-Chair
Craig Goergen
Purdue U

Exhibits Co-Chair
Kyoko Yoshida
U of Minnesota

Finance Chair
Vicky Nguyen
Johns Hopkins U

Info/Online Chair
Brianne Connizzo
Boston U

Local Arrangements
Corey Neu
U of Colorado

Publications Chair
Grace O’Connell
UC Berkeley

Social Media Chair
Colleen Witzenburg
U of Wisconsin

Student Paper Comp.
Kristin Miller
UT Dallas
3.2 ASME-BED Technical Committee Chairs

Bumsoo Han, Biotransport Committee Chair, Purdue University
Sihong Wang, Biotransport Committee Co-Chair, City College of New York
Anita Singh, Design, Dynamics, & Rehabilitation Committee Chair, Temple University
Antonia Zaferiou, Design, Dynamics, & Rehabilitation Committee Co-Chair, Stevens Institute
Alejandro Roldan-Alzate, Fluids Committee Chair, University of Wisconsin-Madison
Lucas Timmins, Fluids Committee Co-Chair, University of Utah
Victor Lai, Education Committee Chair, University of Minnesota
Zhongping Huang, Education Committee Co-Chair, West Chester University
Chiara Bellini, Education Committee Co-Chair, Northeastern University
Ethan Kung, Industry Committee Co-Chair, Clemson University
Lin Li, Industry Committee Co-Chair, Eli Lilly
Kristin Myers, Solid Mechanics Committee Chair, Columbia University
David Pierce, Solid Mechanics Committee Co-Chair, University of Connecticut
David Corr, Tissue & Cellular Engineering Committee Chair, Rensselaer Polytechnic Institute
Alix Deymier, Tissue & Cellular Engineering Committee Co-Chair, Rensselaer Polytechnic Institute

3.3 Student Paper Competition Committee

Kristin Miller, Chair, University of Texas, Dallas
Megan Killian, Ph.D. Level, University of Michigan
Mariana Kersh, M.S. Level, University of Illinois at Urbana-Champaign
Mary Kathryn Sewell-Loftin, B.S. Level, University of Alabama at Birmingham
Anita Singh, Undergraduate Student Design Competition, Temple University

Thank you to all committee members!
4 Special Sessions, Plenary Speakers, and Workshops

**Translational Technology Pitch Competition**

Sunday, June 4  
Time 4:00 - 5:30 PM  
Zermatt

Translational Technology Pitch Competition” at this year’s SB3C Conference in Vail, Colorado will highlight the excellent translational work within our research community. This will be a presentation-style session wherein a screened set of finalists will give brief pitches to a panel of academic and industry experts.

Submitted abstracts were reviewed based on product concept impact, clarity of development path, and overall mission. Selected abstracts get an opportunity to present in front of a panel consisting of industry and academic experts. The panel will cross-examine each team in a fast-paced series of questions before providing feedback on the technology, regulatory and business path forward. A networking mixer will follow in Cascade ABC from 5:30-7:00pm.

**Industry and Exhibitor Networking Event**

Sunday, June 4  
Time 5:30 - 7:00 PM  
Cascade ABC

We invite you to join us for a special networking mixer following our Translational Technology Pitch Competition. Network with the competition finalists, Industry panelists, and our Exhibitors. This is also a great opportunity for current and future Junior Faculty who are looking to purchase equipment for their labs to talk to our Exhibitors!

**Effective Experimental and Computational Workflows with Applications to Biological Tissues**

Sunday, June 4  
Time 5:30 - 7:00 PM  
Gore AB

Organizers: Luke Mattar, University of Pittsburgh, Caleb Berggren, University of Utah, Rouzbeh Amini, Northeastern University

Developing and fine-tuning workflows to answer important research questions can be challenging for students at all career stages. Thus, the goal of the workshop is to expose trainees to various workflows commonly used to conduct computational and experimental studies involving biological tissues. The workshop will be approximately 75 minutes long and feature 3 diverse panel members who will demonstrate their workflows live and allow for direct dialogue between all attendees (including QA). The workshop will also provide trainees an opportunity to network and learn from leaders in the community while bridging the gap between different disciplines. Furthermore, the workshop will provide a crucial opportunity for individuals to learn how they can become involved in the ASME-BED Student Leadership Committee to assist the future generation of students attending the annual SB3C conference.
Promoting Research Self-Efficacy to Facilitate Inclusion and Diversity in Mentoring Relationships

Program Directors: The event will be led by guest speaker Dr. Diana Azurdia, the Director for the Graduate Programs in Biosciences at UCLA

Self-efficacy is the perceived confidence people have in their ability to perform a specific task or skill. This often stems from our diverse life experiences. This interactive workshop is designed to help students and faculty thrive in the mentoring relationship, as well as, offer a forum for participants to share experiences with one another and build community. The event will be led by Dr. Diana Azurdia, the Director for the Graduate Programs in Biosciences at UCLA where she leads a strategic plan to enhance diversity in the biomedical graduate student population. Dr. Azurdia is Guatemalan-American and the first in her family to attend college. She received her B.S. from CSULA and her Ph.D. in Biochemistry and Molecular Biology from UCLA. A major area of focus includes cultivating a strong inclusive graduate training culture through program development in the areas of personal well-being, professional development, mentorship, and leadership. Dr. Azurdia’s research examines the doctoral training years to identify disparities in academic outcomes, with the goal of developing effective programmatic interventions. Additionally, she uses her platform as a Center for the Improvement of Mentored Experience in Research (CIMER) Principal Facilitator to promote inclusive mentoring practices nationally.

Blurring interfaces across engineering + X: a brief look across several projects with a deeper dive into the mechanical and structural microenvironment of cervix

Plenary: Amy Wagoner Johnson, Carle Illinois College of Medicine

Here, I will briefly describe my experience in blurring interfaces in research and education/administration, including engineering materials for coral restoration and as a faculty member and leader in the first engineering-based college of medicine. I will then focus on research related to the mechanics of the cervical microenvironment with applications to preterm birth (PTB). PTB birth affects millions of families annually and the rate of PTB is increasing, despite advances in care. The cervix helps maintain pregnancy; it is firm early and softens, or remodels, and changes shape as pregnancy progresses, allowing the fetus to pass during birth. Early changes to the cervical microstructure and/or shape...
of the proximal end, called cervical funneling, correlate with PTB. Our recent work shows the heterogeneity of cervical remodeling with pregnancy and how heterogeneity can lead to funneling. We further used indentation as a tool to probe heterogeneous and anisotropic microscale response of cervix and showed that cross-linking of collagen fibrils and glycosaminoglycans-facilitated deformation contribute to time-dependent and shear-regulated constituent interactions. These interactions lead to a stiffer response with longitudinal fiber deformation. Understanding the evolution of microstructural and compositional changes and the associated deformation mechanisms may lead to early detection and treatment, thus decreasing risk for PTB.

TUESDAY, JUNE 6

Integration of Uncertainty Quantification into Experimental and Computational Biofluid Mechanics

Organizers: Alejandro Roldán-Alzate, University of Wisconsin - Madison, Lucas Timmins, University of Utah

Advances in experimental and computational biofluid mechanics have yielded a remarkable understanding of the complex flow features across the physiologic domain. As a result, these data are advancing knowledge on the role of biofluid mechanics across the molecular, cellular, tissue, and organ levels. Furthermore, data are increasingly being integrated into clinical decision-making, medical device design, and FDA production evaluation. Unfortunately, experimental and computational studies are marred by uncertainties that limit confidence in experimental analysis and model predictions. While not always acknowledged, uncertainties exist in, for example, velocity measurements, image noise, boundary conditions, segmented anatomy, and tissue material properties that propagate to variability in output measures. This workshop aims to introduce advances in uncertainty quantification (UQ) and discuss their direct application across research domains in biofluid mechanics. We anticipate this workshop will appeal to colleagues in both experimental and computational biofluid mechanics and offer an opportunity to engage with colleagues in biosolid mechanics, where UQ has immediate application.

Bridging Length Scales in Tissue Mechanics with Image Based Mechanics

Organizers: Ottman Tertuliano, University of Pennsylvania, Callan Leutkemeyer, University of Illinois, Corey Neu, University of Colorado

Understanding the deformation and failure mechanics of tissues in a context that spans fundamental and clinical applications has been challenging. This is in part due to the imaging disparity between smaller scale laboratory tissue characterization and lower resolution clinical, diagnostic capabilities. Constructing a holistic understanding of tissue deformation via experiments and computations across length scales would help bridge this divide. i.e., what can one tissue length scale tell us about another? The goal of this workshop is to promote cross-fertilization of ideas and collaborative experimental and computational methods that can advance our understanding of deformation in tissues across length scales by coupling image-based techniques with mechanics. Image references: Kakaletsis et al. BMMB (2022), Sieverts et al. Commun. Mater (2022), McGhee et

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<tr>
<th>Wednesday, June 7</th>
<th>Time 9:30 AM - 12:30 PM</th>
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<tr>
<td><strong>Force Based Manipulative Therapy for Spine Treatment: What is it and how can engineers help?</strong></td>
<td>Cascade E</td>
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<tr>
<td><strong>Organizers:</strong> Beth Winkelstein, University of Pennsylvania, Victor Barocas, University of Minnesota, Arin Ellingson, University of Minnesota</td>
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<td>This workshop will provide an overview SPINEWORK, an-NIH funded initiative to build a network of researchers and projects dedicated to understanding mechanisms by which force-based manipulations (FBMs) may alleviate spine pain. Force-based manipulations, such as those used by chiropractors and massage therapists, offer great promise as non-drug-based therapeutic approaches for neck and low back pain, but how and why they help is not well-understood, nor is the variability in their effectiveness across individuals and/or patient populations understood. An additional challenge with FBM research is that as an alternative therapy, FBM lacks a history of connection between the practitioners and relevant engineering and physiology research communities. The goal of this workshop is to begin to do that – by educating engineers and trainees about relevant issues of (1) FBM methods, (2) spinal pain, and (3) possible opportunities for research. Attendees will interact with practitioners, and build connections across disciplines and beyond engineering.</td>
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<th>Wednesday, June 7</th>
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<tr>
<td><strong>SimVascular Workshop</strong></td>
<td>Zermatt</td>
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<tr>
<td><strong>Organizers:</strong> Alison Marsden, Stanford University, David Parker, Stanford University, Shawn Shadden, UC Berkeley, Vijay Vedula, Columbia University, Nathan Wilson, Open Source Medical Software Corporation</td>
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| SimVascular is a fully open-source software package providing a complete pipeline from medical image data to cardiovascular blood flow simulation results and analysis. It offers capabilities for image segmentation, unstructured adaptive meshing, physiologic boundary conditions, and multi-physics simulations. The svFSI finite element solver incorporates fluid structure interaction capabilities, including large deformation motion with an Arbitrary Lagrangian Eulerian (ALE) formulation, electrophysiology, and cardiac mechanics solvers. An accompanying vascular model repository (VMR) provides over 150 freely available clinical data sets with image data and simulation results from different parts of the vascular anatomy. The VMR supports research in machine learning, medical devices, and reduced order modeling. Extensive online documentation and video tutorials with clinical examples are provided online. In this workshop, we will offer focused sessions tailored to new and experienced users. New users will be guided through step-by-step tutorials, covering basic steps of model construction, meshing, flow simulations, and best practices (and pitfalls to avoid) for high quality results. For experienced users, we will cover advanced topics such as cardiac mechanics and electrophysiology, reduced order modeling, interactive surgical planning, and automated scripting via the Python interface. Users will have the opportunity to discuss current challenges from their research with the SimVascular developers and thus
participants are encouraged to bring their own models and questions to the workshop.

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<th>Wednesday, June 7</th>
<th>Time 9:30 AM - 11:30 AM</th>
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<tr>
<td><strong>Reimagining Scientific Visualization with Augmented Reality</strong></td>
<td>Gore AB</td>
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<td><strong>Organizers:</strong> Manuel Rausch &amp; Mrudang Mather, University of Texas - Austin</td>
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<tr>
<td>Augmented reality (AR) is a next-generation visualization paradigm that boasts many advantages over existing data visualization tools such as images, videos, and scientific visualization software. Specifically, AR visualizations can represent the complete spatiotemporal aspects of data, are interactive in nature, and are easily accessible via smartphones. However, they’ve found limited adoption in the scientific community to date. This is, in part, due to the domain-specific expertise and proprietary software and hardware previously required to create AR models. To help overcome these challenges, in this workshop we will introduce the fundamentals of computer graphics and 3D modeling required to create AR visualizations and open-source tools to create, host, and share AR models of scientific results. Specifically, we will help attendees create and share AR models of their very own scientific results. Furthermore, attendees will leave this workshop with the requisite knowledge and skills to integrate AR within their own teaching, research, and outreach activities.</td>
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<th>Wednesday, June 7</th>
<th>Time 11:30 AM - 1:30 PM</th>
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<tr>
<td><strong>Machine Learning in Biomechanics and Imaging</strong></td>
<td>Powell</td>
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<tr>
<td><strong>Organizers:</strong> Stephanie Cone, University of Delaware, Daniel Cortes, Penn State University</td>
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<td>The Machine Learning in Biomechanics and Imaging workshop will provide an introductory overview of Machine Learning (ML) fundamentals, and then will highlight current ML applications in biomechanics and imaging research. ML is a tool that can be used in virtually all areas in biomechanics to increase data throughput and enhance the reliability of analyses. ML is speeding up and revolutionizing paradigms in healthcare, precision medicine and wearable sensing among other fields of interest to SB3C attendees.</td>
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<tr>
<th>Thursday, June 8</th>
<th>Time 9:00 AM - 1:00 PM</th>
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<tr>
<td><strong>CRIMSON Workshop</strong></td>
<td>Cascade ABC</td>
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<tr>
<td><strong>Organizers:</strong> Alberto Figueroa Alverez, Abhilash Malipeddi &amp; Elizabeth Livingston, University of Michigan</td>
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<td>This workshop will demonstrate the CRIMSON (Cardiovascular Integrated Modelling and Simulation) software environment. CRIMSON is a powerful, user-friendly system for computational hemodynamics studies. The package encompasses segmentation of vascular structures from medical images, construction of arterial geometric models, finite element mesh generation, designing and applying boundary conditions, running incompressible Navier-Stokes simulations, and post-processing and visualizing output fields such as velocity, pressure and wall shear stress. CRIMSON leverages open-source standards such as MITK, VMTK, OpenCascade, and Veranda, and provides state-of-the-art 1D and 3D fluid-structure interaction solvers. It is easily customizable.</td>
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The workshop will include an overview of the workflow and basic features of the software, including the Python interface. The workshop will also include demonstrations. Participants are encouraged to download the software prior to the meeting and install it on their laptops. The Windows version is preferred, although a Linux version is available as well. Participants are also encouraged to review the software documentation available on the CRIMSON website prior to the meeting. Participants are encouraged to contact the workshop organizers prior to meeting if they are interested in developing their own Python-based scripts for material or boundary condition specification.

**Thursday, June 8**

**Time 9:00 AM - 1:00 PM**

**FEBio Workshop**

**Cascade D**

**Organizers:** Jeffrey Weiss, University of Utah, Gerard Ateshian, Columbia University

The FEBio workshop will offer beginning and intermediate users of FEBio a full-day course on how to setup FEBio models, run, and analyze them. All demos will be given using FEBioStudio, the new, fully integrated software environment for FEBio. The workshop will be divided in several focused, hands-on sessions, with topics including importing geometry, creating surface and volume meshing, doing solid mechanics and biphasic analyses, handling material anisotropy, setting up contact models, performing parameter optimizations, and more. Participants will also learn proven techniques for debugging their models, avoiding common pitfalls, and improving runtime performance. There will also be opportunities for discussing specific modeling challenges with the FEBio developers, so participants are encouraged to bring their own models and questions to the workshop.

**Thursday, June 8**

**Time 9:00 AM - 1:00 PM**

**Stem Cell Bioengineering for Modeling Development and Disease**

**Core AB**

**Organizers:** Jianping Fu, University of Michigan, Xioming He, University of Maryland

In the past decade, stem cell-derived embryo and organ models (embryoids and organoids) have been developed to recapitulate different aspects of mammalian development. However, these embryoids and organoids only recapitulate limited aspects of the multiscale orders manifested during mammalian development. Their limited biological fidelity, with restricted developmental potential or tissue- or organ-level phenotypes and functions, hinders both mechanistic studies of mammalian development as well as translational applications. Through integrating bioengineering technologies, there is a recent emerging trend in the development of embryoids and organoids to reconstruct higher-order developmental events, including long-range tissue patterning and morphodynamics, tissue-tissue interactions, as well as organism-level organizations and functions. Thus, the aspiration for this workshop is to bring together stem cell bioengineers, theoretical physicists, and biomaterial scientists, who share common interests in studying mammalian development, to tackle emerging open questions in the field of embryoids and organoids. In this workshop, we will put together a theme and discussion framework useful for developing high-fidelity embryoids and organoids that display hierarchies in multiscale orders. Under this framework, we will invite renowned researchers to discuss their recent work in the development of embryoids and organoids that acquire higher-level orders through diverse bioengineering approaches.
Demystifying the Review and Editing Process

Organizers: Darryl Dickerson, Florida International University

This workshop is designed to provide current and potential reviewers/editors of the Journal of Biomechanical Engineering with an opportunity to discuss their practices and to generate practical advice for reviewing and editing manuscripts in the biomechanical engineering field. All participants will be introduced to the Journal of Biomechanical Engineering and its review and editing processes. Participants will be placed in small groups with varying levels of reviewing and editing experience in each group. Groups will engage in discussion to discuss various aspects of reviewing and conduct a mock review of a journal paper. Based on this experience, groups will generate and report out on their “Advice for Authors” and “Advice for Reviewers”. Groups will generate and report on their Advice for Editing. The Journal of Biomechanical Engineering editorial board will then serve as a panel to answer questions from participants generated by the activities. The facilitators will synthesize the discussion and provide resources to help participants apply their new skills in reviewing and editing in their own scholarship. Participants will be asked to sign up for reviewing and potential guest editor opportunities in the Journal of Biomechanical Engineering.
5 Awards

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.

2023 Boris Rubinsky, Ph.D.

Prof. Rubinsky Boris received his BSc and MSc from the Technion in Israel and the Ph.D. from MIT. In 1980 he joined the Mechanical Engineering Department at UC Berkeley and later the UC Berkeley Bioengineering Department, of which he was one of the founders. At UC Berkeley he was the Chancellor’s Professor and the Silverman Distinguished Professor of Bioengineering till 2008 and is now a Professor of the Graduate School. From 2007 to 2009, he took a leave of absence, to found the Department of Bioengineering and the Center for Bioengineering in the Service of Humanity and Society at the Hebrew University that brought together Israeli and Palestinian students. PhD graduates from that program are now Professors at top Israeli and Palestinian Universities. Rubinsky’s research spans numerous areas, from plasma arc welding in space to Weierstrass-Mandelbrot modeling of turbulence. He contributed to various fields of bioengineering, pioneering several leading medical technologies, which he led from pioneering the concept to developing the clinical practice and commercialization. Note-worthy are the technology of imaging monitored cryosurgery which is now the clinical standard of the field, the technology of non-thermal irreversible, which is now clinical and at the forefront of minimally invasive surgery, the technology of non-invasive electromagnetic detection of internal bleeding which is in clinical trials, MEMS technology for single cell analysis which is now ubiquitous and many others.
The Robert M. Nerem Education and Mentorship Medal is given to an individual who has demonstrated a sustained level of outstanding achievement in education and mentoring of trainees. Examples of meritorious activities include leadership within the nominee’s institution, mentoring activities that are above and beyond those expected from others employed in similar positions, mentoring activities tailored to meet the needs of the trainees, and innovative mentoring activities.

Victor Barocas received his B.S. and M.S. in Chemical Engineering from MIT and his Ph.D. in Chemical Engineering from the University of Minnesota. Despite receiving all of his degrees in Chemical Engineering, he found a welcoming and supportive home in BED almost 30 years ago, including – like everyone, it seems – being treated kindly by Bob Nerem. He worked briefly as an Assistant Professor of Chemical Engineering at the University of Colorado before returning to the University of Minnesota, where he is now a Professor of Biomedical Engineering as well as a Fellow of ASME and BMES. His research focuses on bridging scales with the intent of understanding how tissue level driving forces lead to microscale events, and how those events, collectively, lead back to tissue-level changes. His interest in novel computational and experimental biomechanical techniques has led him to study a wide range of topics and systems over his career, including aortic wall mechanics, vibrotactile sensing in the fingers, ocular mechanics, ligament mechanics in the spine, and cell-matrix interactions. He served as the co-Editor-in-Chief of the ASME Journal of Biomechanical Engineering from 2012-2021.
Van C. Mow Medal

The Van C. Mow Medal is bestowed upon an individual who has made significant contributions to the field of bioengineering through research, education, professional development, leadership in the development of the profession, as a mentor to young bioengineers, and with service to the bioengineering community. The individual must have earned a Ph.D. 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.

2023 Alison Marsden, Ph.D.

Alison Marsden is the Douglass M. and Nola Leishman Professor of Cardiovascular Disease in the Departments of Pediatrics, Bioengineering, and, by courtesy, Mechanical Engineering at Stanford University. Her research focuses on the development of numerical methods for cardiovascular biomechanics, including finite element methods for biofluids problems, uncertainty quantification, and optimization. Her team applies engineering methods for patient specific modeling and treatment planning to impact patient care in cardiovascular surgery and congenital heart disease. She graduated with a BSE degree in Mechanical Engineering from Princeton University in 1998, and a PhD in Mechanical Engineering from Stanford in 2005. She was a postdoctoral fellow at Stanford University in Bioengineering from 2005-07. From 2007-2015 she was a faculty member in Mechanical and Aerospace Engineering at UCSD. Her work has been recognized for contributions to the field with a Burroughs Wellcome Fund Career Award at the Scientific Interface in 2007, an NSF CAREER award in 2011, and the Van C. Mow medal from the ASME Bioengineering Division in 2023. She has been elected fellow of several scientific societies including the American Institute for Medical and Biological Engineering (2018), the Society for Industrial and Applied Mathematics (2018), the American Physical Society (2020) and the Biomedical Engineering Society (2021). She has published over 160 journal articles and serves on the editorial boards of leading journals in biomechanics and computational science. She holds leadership roles in the ASME Bioengineering Division and the American Physical Society. She participates in numerous activities to support diversity equity and inclusion as the DEI chair for Stanford’s Institute for Computational and Mathematical Engineering and as an IDEAL faculty leader at Stanford. She leads two major open science efforts, the SimVascular open-source project and the Vascular Model Repository, in the biomechanics community.
Awards

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 Triantafylllos Stylianopoulos
2017 Kristin Myers
2018 Spencer P. Lake
2019 Grace D. O’Connell
2020 Matthew B. Fisher
2021 Kristin S. Miller
2022 Zhenpeng Qin
2023 Jessica Oakes

Y.C. Fung Early Career Medal

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

2023 Jessica Oakes, Ph.D.

Jessica Oakes joined the Department of Bioengineering as a tenure-track Assistant Professor at Northeastern University in 2016. Following completion of her PhD in 2013 (UC San Diego), she continued research in aerosol medicine as a postdoc fellow at INRIA Paris, France and at UC Berkeley, supported by a Whitaker Fellowship, a UC Presidential Postdoc Fellowship, and an American Lung Association Fellowship. Now, her research group focuses on combining experimental and numerical techniques to predict, quantify, and optimize aerosol dosimetry, and the corresponding structure/function response, in the lung. Dr. Oakes’s is the recipient of the Outstanding New Environmental Scientist award from NIH/NIEHS, where she is focusing on modeling pulmonary health consequences of fire smoke originating from the wildland urban interface regions. Her research is also generously supported by the FEMA/DHS Assistance to Firefighters grant program, NIH NHLBI, and the Bill and Melinda Gates Foundation.
Savio L-Y. Woo Translational Biomechanics 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.

2023 Tamara Bush, Ph.D.

Dr. Bush is an accomplished Professor in Mechanical Engineering and Bioengineering, as well as an Associate Dean for Inclusion and Diversity at Michigan State University (MSU). Her research in biomechanics has had a significant impact on engineering mechanics, material science, modeling, medicine, and diversity in STEM. She has received funding for her research from NSF, NIH, and various industries. Recently, she was awarded an NSF Partnership for Innovation award to develop and commercialize a wheelchair system for persons with disabilities. She and her students collaborate with Spectrum Health and a team of five hand surgeons to used biomechanics to better understand the effects of surgery on thumb function. Additionally, she is exploring ways to make autonomous vehicles accessible to people with mobility impairments. Dr. Bush has given numerous keynotes and invited talks. She has mentored over 60 undergraduate and 44 graduate students from diverse backgrounds. She has received several accolades for her contributions to the field, including the Founders’ Award from the American Society of Biomechanics, the rank of Fellow of the American Society of Mechanical Engineers, and Fellow of the American Institute for Medical and Biological Engineering (AIMBE). She has also received the MSU Inspirational Woman Award for Professional Achievement and has twice been awarded the MSU College of Engineering Withrow Teaching Award.
Edward Grood Interdisciplinary Team Science Medal in Bioengineering

The Edward Grood Interdisciplinary Team Science Medal in Bioengineering seeks to recognize a team of scientists and engineers who have collaboratively carried out impactful interdisciplinary science and engineering research in the bioengineering field.

2023 The Spine Research Interdisciplinary Team, led by Dawn Elliott and Robert Mauck

Dawn Elliott is the Blue and Gold Distinguished Professor of Biomedical Engineering at the University of Delaware. She is the PI and founding Director of the NIH-funded Delaware Center for Musculoskeletal Research. Dr. Elliott was the founding chair of the BME department at Delaware from 2011-2020. Prior to joining Delaware, she spent 12 years as faculty in Orthopaedic Surgery at the University of Pennsylvania, where she was promoted to full professor. Her multi-scale approach integrates mechanical testing, mathematical modeling, and multi-modal imaging, spanning from the entire joint, to the tissue-level, and to the micro-scale. Robert Mauck is the Mary Black Ralston Professor of Orthopaedic Surgery and Professor of Bioengineering and Director of the McKay Orthopaedic Research Laboratory at the University of Pennsylvania. He is also a Research Career Scientist and Co-Director of the Translational Musculoskeletal Research Center at the CMC VA Medical Center in Philadelphia. Dr. Mauck’s research program is focused on the engineering and mechanobiology of musculoskeletal tissues, with a particular interest in restoring articular cartilage, the knee meniscus, and the intervertebral disc. The Spine Research Interdisciplinary Team - Dawn Elliott and Robert Mauck have collaborated for over 17 years and published over 44 papers that include dozens of co-authors, 11 of whom are part of the Spine Research Interdisciplinary Team. The Team includes three spine surgeons (Edward Vresilovic, Harvey Smith, Neil Malhotra), one large animal surgical veterinarian (Thomas Schaer), three former trainees who have been promoted to professional team members (Lachlan Smith, Sarah Gullbrand, John Peloquin), and four former trainees who are now independent faculty at other institutions (Nandan Nerukar, Grace O’Connell, Daniel Cortes, John Martin). The Team has a sustained record of pioneering research and innovative technology development in three convergent areas: 1) Structure-Function and Degeneration, 2) Tissue-Engineered Replacements, and 3) Injectable Therapies.
Awards

Award Lecture Abstracts

Sunday, June 4, 2023, 3:00 - 3:45 PM EDT, Alpine Hall

Boris Rubinsky, H. R. Lissner Medal

Title: Bioengineering Technologies – From Pioneering Concepts to Clinical Practice

My research spans numerous areas from numerical analysis to fundamental science to engineering design, from plasma arc welding in space to inverse algorithms to Weierstrass- Mandelbrot modeling of turbulence. This presentation is a very brief survey of a few selected areas from my body of research, that may be of interest to a bioengineering audience. First, I will describe the pioneering work on imaging monitored cryosurgery and the commercialization of this technology, which is now used by everyone in the field of cryosurgery. Following is description of the patented directional solidification cryomicroscopy and the insight in cryobiology it has enabled. The discovery of the cryoprotective properties of antifreeze proteins has led to the formation of two companies I co-founded, “A/F Protein” and “Aqua Bounty Technologies”. For the latter, which is the first company to produce a genetically engineered animal for food (a salmon) with FDA approval, I have developed a genetic algorithm to evaluate the possible environmental danger of the technology. I will also describe advances in medical imaging technology that we pioneered including the patented technology for imaging through the internet and cells phones with a focus on electrical impedance tomography. This has led to a patented, clinical minimally invasive electromagnetic technology for detection bleeding in the brain which is now commercialized with FDA and EU approval by “Cerebrotech”. The first patented MEMS chip with a live cell (now ubiquitous) and its uses for genetic engineering and viability detection will be described. The concept of non-thermal irreversible electroporation which we pioneered and brought from concept to clinical practice and commercialization will be introduced and the numerous clinical applications in which it is now used will be described. The fundamental thermodynamics of isochoric cryobiology will be introduced, and the range of applications described. I will describe the concept of Temperature Controlled 3D Cryoprinting. Last, I will introduce my current research on regenerative medicine which led to successful implantation of pancreatic islets in an extracellular matrix formed in the liver with non-thermal irreversible electroporation.

Monday, June 5, 2023, 8:00 - 9:00 AM MT, Alpine Hall

Victor Barocas, Robert M. Nerem Education and Mentorship Medal

Title: 10 Important Things People Have Said to Me

When a friend of mine found out that I had won the Nerem Medal, he suggested that I come up with a set of “Rules of Life” a la Bob Nerem’s famous list (“There are no such things as mistakes, only lessons,”...). It was a nice idea, but Bob Nerem already did it better than I ever could, and it wouldn’t feel right. Instead, I made a list of 10 things that people have said to me over the years that helped shape the person, scientist, and educator that I am. Some were meaningful right away. Others meant little at the time but have grown in importance as I reflect on them. Some will be important to some people but not to others. Some may seem redundant with each other. Most will not have a significant effect on most people’s lives. It’s kind of a hodgepodge. I hope, though, that the talk will encourage people to think more about what has helped inform and change their own lives. In case you read this and skip the talk, thank you to every member of BED for all that it has given me over the years.
Awards

Alison Marsden, Van C. Mow Medal

**Title:** Computational model-driven design in pediatric cardiac surgery: playing in the sandbox

Congenital heart disease (CHD) affects 1 in 100 babies and is the leading cause of infant mortality in the US. Among the most severe forms of CHD is single ventricle physiology, in which the heart develops with only one functional pumping chamber. These patients typically undergo three open chest surgeries, culminating in the Fontan procedure. Multiscale models, combining hemodynamics with lumped parameter models of physiology, have been used extensively to propose and evaluate novel surgical methods for single ventricle palliation. In this talk, we will present recent work that goes beyond traditional computational fluid dynamics to model mechanobiology and cardiac function. In particular, we will discuss recent progress to develop a finite element framework for fluid solid growth simulations, demonstrated for the design and simulation of tissue engineered vascular grafts. We will then present recent work on multi-physics simulations of cardiac function, coupling fluid mechanics, electrophysiology and active contraction of the heart. We illustrate the application of these models to guide the design of a 3D bioprinted pulsatile conduit as a secondary power source for patients with Fontan physiology. We will discuss the importance of open-source software and data repositories in the field of biomechanics. Finally, we highlight the need for computational modeling to provide a “sandbox” to drive treatment innovation for high-risk patients.

Jessica Oakes, Y. C. Fung Early Career Award

**Title:** Lung Biomechanics with Aerosol Exposure

The lung is a beautiful organ with airway passages that span several orders of magnitude in size. The primary function of the lung is to participate in gas exchange and to protect the body from inhaled toxins. Once inhaled, particles can deposit on the vast surface area of the lung, causing local and systemic inflammation. Lung structure and function can significantly deteriorate depending on the deposition extent of toxic particles (e.g., those originating from wildland fires, cigarettes/e-cigarettes). This talk will explore the utilization of physiologically based computational models to determine deposited dose. Utilization of these models to design relevant animal exposure experiments will be highlighted. We will discuss how inhalation of toxic particles originating from wildland fire smoke and e-cigarettes impacts lung biomechanics and explore the biological underpinnings of lung remodeling.

Thursday, June 8, 2023, 6:00 - 7:00 PM MT, Cascade A-F

The Spine Research Interdisciplinary Team, Leads: Dawn Elliott Robert Mauck, Edward Grood Interdisciplinary Team Science Medal in Bioengineering

**Title:** The Power of Collaborative Science

Dawn and Rob could not agree on an abstract topic for the Collaborative Science lecture. Dawn wanted to share her thoughts on the Dobbs decision, gun control, the environment, and the crisis of democracy. Rob wanted to talk about unicorns (RIP Stacee). Moreover, they did not get input or approval from their co-authors on the theme of this talk. Therefore, it is unclear what they will talk about during the meeting, and it may come to blows on the podium. You should come see the spectacle. While Drs. Elliott and Mauck have already failed spectacularly in their leadership role in putting together this abstract, and do not yet have a set theme for their talk, this should in no way reflect on the transdisciplinary spine research team. Each member of this team, at various times over the course of nearly two decades, has made amazing contributions, advanced the science of spine structure function and developed novel tissue engineering and regenerative medicine approaches to address spine disease. This team deserves the credit for the publications, patents, and impact of these projects. During the talk, in
addition to taking pot shots at one another, Drs. Elliott and Mauck will surely recognize these outstanding individuals, discuss how teams form and grow, how the work moves forward in fits and starts (but inexorably), and how to sustain a productive collaboration over time.

Tamara Bush, Savio L-Y. Woo Medal

Title: Using Biomechanics to Impact Lives and Clinical Care

As members of the SB3C community, we are all uniquely trained in areas of Biomechanics, Bioengineering and Biotransport and because of this, we have the ability to use our training and experiences to touch the lives of people. In this talk, I will share a few ways my lab has impacted the health, function and overall well-being of people through the use of biomechanics. This influence occurs in many forms - including assessment, evaluation and device development. My team and I are privileged to work with partners and communities – including individuals with disabilities and teams of hand surgeons- who collaborate with us and share the common goal of improving peoples’ lives.
6 Scientific Sessions
SB³C 2023 Meeting Pitch Competition

Sunday, June 4
4:00PM – 5:30PM MT

Translational Technologies Pitch Competition Finals

Zermatt

Session Chairs: Ethan Kung, Clemson University of Utah
Lyle Hood, University of Texas at San Antonio

4:00PM
On-Demand, Volumetric Liquid Biopsy From Solid Tumors SB³C2023-PC01
Y. Kimura¹, MC. Sheehan², NR. Raghuraman², D. Downing², G. Srimathveeravalli²
¹Osaka University Graduate School of Medicine, ²University of Massachusetts, Amherst

4:20PM
Improving Clinical CT Image Data To Develop Better Fracture Risk Algorithms And Patient Outcomes SB³C2023-PC02
Lance L. Frazer¹, Nathan Louis¹,², Kal L. Clark³, Daniel P. Nicolella¹
¹Southwest Research Institute, ²University of Michigan, ³University of Texas Health Science Center at San Antonio

4:40PM
SLIC-VAD: A Wirelessly Powered LVAD With Magnetic Levitation Bearings SB³C2023-PC03
Shweta Karnik¹, Huang Chen¹, Simon Kiang⁴, Arun Kumar Kota², Yaxin Wang³, Joseph Cavallaro⁴, Oscar H Frazier³, Lakshmi Prasad Dasi¹
¹Georgia Institute of Technology and Emory University, ²North Carolina State University, ³Texas Heart Institute, ⁴Rice University

5:00PM
I-KinCor: Revolutionizing Pediatric Duct–Dependent Surgeries SB³C2023-PC04
Luis René Mata Quiñonez¹, Shweta Karnik¹, Srujana S. Joshi¹, Leon Cheng¹, Holly Bauser-Heaton, MD¹,², Lakshmi Prasad Dasi¹
¹Georgia Institute of Technology and Emory University, ²Children's Healthcare of Atlanta
Poster Session: Translational Technologies

Cascade ABC

P1  Solving the Problem of Bicycle Helmet Fit SB3C2023-PC05
William J. Makowski, Thomas L. Martin, William A. Schaudt
Virginia Tech

P2  Faciliflow: An Implantable Device to Prevent the Onset of Breast Cancer-Related Lymphedema SB3C2023-PC06
A. Swarup¹, A. Vella¹, K. Rowley², J. Frattolin¹, J. Moore Jr.¹
¹Imperial College, ²Lymphma Motus, Ltd.

P3  Predicting Fracture Healing by Measuring Compliance Via Direct Electromagnetic Coupling SB3C2023-PC07
Kevin M. Labus¹, Kirk C. McGilvray¹, Branislav Notaros¹, Milan Ilic², Julie Dunn³, Christian M. Puttlitz¹
¹Colorado State University, ²University of Belgrade, ³University of Colorado Health North

P4  Tackling Antimalarial Drug Resistance in Africa Using Novel Drug Repurposing and Nanotechnology Strategies SB3C2023-PC08
Samuel W. Uzondu, Petra O. Nnamani, Anthony A. Attama
University of Nigeria

P5  Tapping into Ligament Tension with Our Ligament Tensiometer to Enhance Outcomes Following Orthopedic Procedures SB3C2023-PC09
Lesley R. Arant, Kai M. Heineman, Josh D. Roth
University of Wisconsin-Madison

P6  Orthopedic Cast Saw SB3C2023-PC10
Ryan A. DeJesus, Nicholas J. Graham, Evan M. Lunney, Jaedan D. Morton
The Pennsylvania State University

P7  Artificial Multi-Organ Replacement (AMOR) System SB3C2023-PC11
Nanye Du, Suhail Ahmad, Shaohang Hao, Ziyuan Wang, Ye Jin, Alexander Novokhodko, Dayong Gao
University of Washington

P8  A Novel Hardware and Software Device to Non-Invasively Predict Post Thrombotic Syndrome SB3C2023-PC12
Cyrus J. Darvish, Pete H. Gueldner, Rabih A. Chaer, David A. Vorp, and Timothy K. Chung
University of Pittsburgh

P9  Polymeric Transcatheter Aortic Valve Replacement (TAVR) for Treating Aortic Stenosis SB3C2023-PC13
B. Kovarovic¹, O.M. Rotman¹, M. Slepian², D. Bluestein¹
¹Stony Brook University, ²University of Arizona

P10 Automatically Perfusible Human Vessel Chip Platform for Preclinical Research in Hazardous Containment Environments and Space SB3C2023-PC14
J. Eades¹, A. Kumar¹, A. Jain¹,²
¹Texas A&M University, ²Houston Methodist Hospital
Monday, June 5 9:45AM – 11:15AM MT

Machine Learning in Biofluids

Session Chairs: Amir Arzani, University of Utah
Fanwei Kong, University of California, Berkeley

9:45AM  A Deep Learning Approach For Cardiac Model Construction For Congenital Heart Disease Patients SB³C2023-402
Fenwei Kong, Alison L. Marsden
Stanford University

10:00AM  Enhancing Corrupt Cardiovascular Flow Data With Machine Learning SB³C2023-026
Hunor Csala, Amirhossein Arzani
University of Utah

10:15AM  Automatic Model Construction For Patient-Specific Aortic Flow Simulations Using Geometric Deep Learning SB³C2023-273
Pan Du, Delin An, Chaoli Wang, Jian-Xun Wang
University of Notre Dame

10:30AM  Physics-informed Neural Networks with Fourier-based Activation Function To Model Complex Cardiovascular Flows SB³C2023-015
Arman Aghaee, M. Owais Khan
Toronto Metropolitan University

10:45AM  Data-Enhanced Personalized Models For Coronary Hemodynamics And Myocardial Perfusion SB³C2023-014
Karthik Menon¹, Zachary Sexton¹, Owais Khan², Daniele Schiavazzi³, Koen Nieman¹, Alison Marden¹
¹Stanford University of Texas Dallas, ²Toronto Metropolitan University, ³University of Notre Dame

11:00AM  Machine Learning-Based Reduced Order Modelling For The Simulation Of Braided Stent Deployment. SB³C2023-303
Beatrice Bisighini¹.².³, Miquel Aguirre¹.⁴.⁵, Baptiste Pierrat¹, David Perrin², Stéphane Avril¹
¹University of Lyon, ²Predisurge, ³University Tor Vergata, ⁴Universitat Politècnica de Catalunya, ⁵Gran Capità
Monday, June 5  
9:45AM – 11:15AM MT

**Soft Tissue Mechanics**

Session Chairs: Kyoko Yoshida, *Univ of Minnesota*  
Colleen Witzenburg, *Univ of Wisconsin*

**9:45AM**  
A Clot Composition Dependent Hyperelastic Model In The Simulation Of Direct Aspiration Thrombectomy SB3C2023-362  
K. Bein Snee¹, R. McCarthy², P.E. McHugh¹, B. Fereidoonzezhad³, J.P. McGarry¹  
¹University of Galway, ²Cerenovus, ³TU Delft

**10:00AM**  
Using Bayes' Optimization For Inverse Finite Element Analysis Of The Tricuspid Valve In Hypoplastic Left Heart Syndrome SB3C2023-338  
Colton J. Ross¹, Jaden Norman¹, Arshid Mir¹, Harold M. Burkhart¹, Ming-Chen Hsu², Chung-Hao Lee¹  
¹University of Oklahoma, ²Iowa State University

**10:15AM**  
Calcified Plaque Has A Local Effect On The Dissection Behavior Of Human Aortas SB3C2023-563  
Carly L. Donahue, Ruturaj Badal, Victor H. Barocas  
University of Minnesota

**10:30AM**  
Influence Of Material Parameter Variability On The Predicted Coronary Artery Biomechanical Environment Via Uncertainty Quantification SB3C2023-413  
David Jiang, Caleb C. Berggren, Y.F. Jack Wang, Jake A. Bergquist, Lindsay C. Rupp, Zexin Liu, Rob S. MacLeod, Akil Narayan, Lucas H. Timmins  
University of Utah

**10:45AM**  
Spatial Configurations Of 3D Extracellular Matrix Density And Anisotropy Simultaneously Guide Angiogenesis SB3C2023-084  
Steven A. LaBelle¹, Steve A. Maas¹, Adam Rauff¹, Gerard A. Ateshian², Jeffery A. Weiss¹  
¹University of Utah, ²Columbia University

**11:00AM**  
Spatiotemporal Evolution Of Collagen Micro-Mechanics Under Breast Cancer Cell Driven Remodeling SB3C2023-125  
Adil Khan, Jacopo Ferruzzi  
University of Texas at Dallas
Ocular and Lower Abdomen Biomechanics  
Cascade E

Session Chairs: Jake Hermann, University of Iowa  
Katrina Knight, University of Pittsburgh

9:45AM  Lamina Cribrosa Beam Insertions. The Humble Heroes Of The Lamina-Sclera Interplay SB3C2023-513  
Fengting Ji, Hua Yi, Ian A. Sigal  
University of Pittsburgh

10:00AM  Mechanical Properties of Porcine Iris Stroma Using Micro-Indentation: The Effect Of Temperature And Hydration SB3C2023-495  
F. Sebastian¹, G. Bailey¹, V. Kondiboyina¹, S. Dorairaj², R. Amini¹  
¹Northeastern University, ²Mayo Clinic

10:15AM  Structural And Functional Heterogeneity Of The Uterosacral Ligaments In The Rat SB3C2023-243  
Joseph G. Thomas, Kandace Donaldson, Yizheng Zhu, Clara Gimenez, Raffaella De Vita  
Virginia Tech

10:30AM  Biaxial Mechanics Of The Murine Vagina During Postpartum Healing Before And After Elastic Fiber Disruption SB3C2023-272  
Shelby E. White¹, Lily M. Buchanan², Niyousha Karbasion³, Matthew R. Bersi³, Maria Florian-Rodriguez⁴, Kristin S. Miller²,³  
¹Tulane University, ²University of Texas, Dallas, ³Washington University in St. Louis, ⁴University of Texas, Southwestern

10:45AM  Passive Mechanics Of Deep And Superficial Human Female Pelvic Floor Muscles SB3C2023-455  
Megan R. Routzong¹,³, Justin Dubik², Raffaella De Vita², Marianna Alperin³, Pamela A. Moalli¹, Steven D. Abramowitch¹  
¹University of Pittsburgh, ²Virginia Tech, ³University of California, San Diego

11:00AM  Bladder Wall Stress Is Lower In Female Compared To Male In A Murine Model Of Ex-Vivo Filling SB3C2023-422  
Eli Broemer, Pragya Saxena, Nathan R. Tykocki, Sara Roccabianca  
Michigan State University
Biotransport in Therapeutic Design and Analysis
Cascade F

Session Chairs: Chris Rylander, University of Texas at Austin
R. Lyle Hood, University of Texas at San Antonio

9:45AM A Biphasic Fluid-Structure Interaction Model Of Backflow During Infusion Into Agarose Gel SB3C2023-090
Arthur D. Ayers, Joshua H. Smith
Lafayette College

9:45AM Thermodynamics Of Phase Transformation Of Water: Theory And Experiments SB3C2023-301
Raphael J. Kepecs, Gerard A. Ateshian
Columbia University

10:00AM Model For Heat Conduction In Vaporizable Endoskeletal Droplet In Response To X-Ray Photon Absorption SB3C2023-578
William N. Frantz, David H. Thomas, Mark A. Borden
University of Colorado

10:00AM Computational Modeling Of Machine Perfusion Of The Human Liver Vasculature SB3C2023-585
Daniel Emerson, Yoed Rabin, Levent Burak Kara
Carnegie Mellon University

10:15AM Conformal Ablation Of Atherosclerotic Plaque Based On Multi- Electrodes And NSGA II SB3C2023-590
Hongying Wang, Ruizhe Hou, Shiqing Zhao, Aili Zhang
Shanghai Jiao Tong University

11:00AM N-Acetyl Cysteine Rescues Chondrocytes From Oxidative Stress And Increases Their Metabolic Activity SB3C2023-275
Austin C. Jenk1,2, Elisabeth A. Lemmon1,2, Sarah E. Gullbrand1,2, Robert L. Mauck1,2
1University of Pennsylvania, 2Veterans Affairs Medical Center
Engineered In Vitro Models

Session Chairs: Nathaniel Dyment, University of Pennsylvania
Kristan Worthington, University of Iowa

9:45AM  Modeling Cardiac Fibrosis: Understanding the Effects of Exogenous Extracellular Matrix on 3D Cardiac Tissues SB³C2023-229
Natalie Weiss-Pachter, Kristen Allen, Tracy Hookway
Binghamton University

10:00AM  Engineered Composite Fibrous Hydrogels that Mimic Dynamic Developmental Signals during Fibrous Tissue Development SB³C2023-376
Karen L. Xu¹, Jason A. Burdick¹,², Robert L. Mauck¹
¹University of Pennsylvania, ²University of Colorado

10:15AM  An explant-in-a-chip perfusion model for ex vivo preservation of tissue viability and function with applications for personalised medicine in cancer SB³C2023-419
Imperial College London

10:30AM  Prolonged Subculture and Progerin Expression Sensitize VSMCs to Three Dimensional Fiber Structures SB³C2023-374
Yu-Yu Hsueh, Pen-hsiu Grace Chao
National Taiwan University

10:45AM  The Role Of Monocyte And Macrophages In The Development Of Aortic Valve Calcification In A 3D Tri-Culture In Vitro Model SB³C2023-121
Fateme Salemizadehparizi, Peter Huang, Mei-Hsiu Chen, Gretchen J. Mahler
Binghamton University

11:00AM  Development of a Schlemm’s canal "inner wall on a chip" for high content biomechanical screening SB³C2023-417
Seyed Mohammad Siadat¹, Jacques A. Bertrand², Babak N. Safa¹, Darryl R. Overby², W. Daniel Stamer³, C. Ross Ethier¹
¹Georgia Institute of Technology, ²Imperial College of London, ³Duke University
Monday, June 5 9:45AM – 11:15AM MT

Cartilage: Composition and Lubrication

Gore CD

Session Chairs: Jennifer Puetzer, Virginia Commonwealth University
Phoebe Szarek, University of Connecticut

9:45AM  Mechanical Weakening Precedes Cartilage Loss During Osteoarthritis Progression Across the Human Tapezium SB³C2023-196
Brendan D. Stoeckl¹, Kendall M. Masada¹,², Lorielle G. Laforest¹, Michael W. Hast¹, David R. Steinberg¹,², Robert L. Mauck¹,²
¹University of Pennsylvania, ²Corporal Michael J. Crescenz VA Medical Center

10:00AM  Quantitative Raman Measurement Of Cartilage Composition Via Tissue Phantom Calibration SB³C2023-461
Erik Ersland¹, Dev Mehrotra¹, Mark W. Grinstaff¹, Brian D. Snyder², Mads S. Bergholt³, Michael B. Albro¹
¹Boston University, ²Beth Israel Deaconess Medical Center, ³King’s College London

10:15AM  Decorin Maintains Cartilage Surface Integrity And Chondrocyte Mechanotransduction During Aging SB³C2023-159
M. Fan¹, B. Kwok¹, P. Singh¹, J. Xiang¹, L. Qin², D.E. Birk³, R.V. Iozzo⁴, R.L. Mauck², L. Han¹
¹Drexel University, ²University of Pennsylvania, ³University of South Florida, ⁴Thomas Jefferson University

10:30AM  A chemo-mechano-biological model of cartilage in FEBio: Studies of pathological loading, homeostatic adaptation and bio-chemical treatments SB³C2023-486
Muhammed M. Rahman¹, Paul N. Watton², Corey P. Neu³, David M. Pierce¹
¹University of Connecticut, ²University of Sheffield, ³University of Colorado

10:45AM  Synovial Fluid Provides A Protective Effect In Articular Cartilage Fatigue Failure SB³C2023-215
Columbia University

11:00AM  The Role of Hyaluronic Acid in the Synergistic Lubrication of Articular Cartilage SB³C2023-082
Emily P. Lambeth, David L. Burris, Christopher Price
University of Delaware
Monday, June 5 9:45AM – 11:15AM MT

Translational Bioengineering

Powell

Session Chairs: Lin Li, Eli Lilly
Elizabeth Shih, University of Minnesota

9:45AM  Shifting The Endovascular Paradigm: Patient-Specific Treatment Of Intracranial Aneurysms Using Shape Memory Polymers And Additive Manufacturing
SB3C2023-124
Sergio A. Pineda-Castillo1, Tanner Cabaniss1, Bradley N. Bohnstedt2, Chung-Hao Lee1
1University of Oklahoma, 2Indiana University

10:00AM  Impacts Of Type V Collagen Insufficiency On Cutaneous Wound Healing And Scar Formation
SB3C2023-153
Y. Liu1, C. Wang1, D.C. Stewart2, E.M. O’Brien1, B.K. Brisson2, D.E. Birk3, K.L. Spiller1, S.W. Volk2, L. Han1
1Drexel University, 2University of Pennsylvania, 3University of South Florida

10:15AM  Understanding Impacts Of Collagen Organization In An Infected Diabetic Wound Model Treated With A Novel Oxygenating And Antibacterial Hydrogel
SB3C2023-168
Hannah A. Durr1, Samuel D. Salinas2, Rouzbeh Amini2, Nic D. Leipzig1
1University of Akron, 2Northeastern University

10:30AM  Development And Utilization Of A Vascularized In Vitro Physiologically Representative Skin Tissue Platform For Burn Injury Investigation
SB3C2023-257
S. Brocklehurst, N. Ghoussafim, K. Zuniga, D. Stolley, M.N. Rylander
University of Texas

10:45AM  Proteomic Characterization And Metabolic Labeling Of A Fibrin-Based In Vitro Wound Healing Model
SB3C2023-418
Dalton Miles1, Tyler Tuttle1, Julian Jimenez2, Yifan Guo2, Adrian Buganza-Tepole2, Sarah Calve1,2
1University of Colorado, 2Purdue University

11:00AM  Experimental And Computational Analysis Of The Injection-Induced Mechanical Changes In The Skin Microenvironment During Subcutaneous Injection Of Biologics
SB3C2023-518
Yingnan Shen, Sameep R. Shah, Kejie Zhao, Bumsoo Han
Purdue University
Cardiovascular Mechanobiology

Session Chairs: Bryan Good, University of Tennessee
Friederike Schäfer, Norwegian University of Science and Technology

9:45AM  Effect of aging, sex, and gene (fibulin-5) on the arterial stiffness of mouse: 20 weeks adult mice with fibulin-5 knockout are older than 100 weeks wild-type mice
SB3C2023-341
H. Dong1, J. Ferruzzi2, M. Liu1, L. Brewster3, R. Gleason1
1Georgia Institute of Technology, 2University of Texas, Dallas, 3Emory University

10:00AM  Functional Differences in Human Aortic Valve Interstitial Cells from Patients with Varying Calcific Aortic Valve Disease SB3C2023-458
R. Tuscher1, A. Khang1, T. West1, G. Ferrari2, M. Sacks1
1University of Texas, Austin, 2Columbia University

10:15AM  Reduced Vascular Smooth Muscle Cell Mechanoadaptation in an in vitro Model of Cerebral Amyloid Angiopathy SB3C2023-279
Samuel F. Boland, Patrick W. Alford
University of Minnesota

10:30AM  Constitutive Modeling Of Mouse Arteries Suggests Changes In Directional Coupling And Extracellular Matrix Remodeling That Depends On Artery Type, Age, Sex And Elastin Amounts SB3C2023-300
Keshav A. Kailash, Jie Z. Hawes, Austin J. Cocciolone, Robert P. Mecham, Jessica E. Wagenseil
Washington University in St. Louis

10:45AM  Determining How VEGFR-2 Inhibition Affects Phosphorylation And Function In The Presence Of Mechanical Strain SB3C2023-320
Bronte Miller, Michael Heim, Bryan Mortimer, M.K. Sewell-Loftin
University of Alabama at Birmingham

11:00AM  A Testable Mechanism for Force Generation and Maintenance in the Tonic Smooth Muscle SB3C2023-606
Suzzane E. Stasiak, Dhanajay T. Tambe, Harikrishnan Parameswaran
Northeastern University
Thrombosis and Hemolysis

Cascade ABC

Session Chairs: Debanjan Mukherjee, University of Colorado Boulder
Bryan Good, University of Tennessee

11:30 AM  
**Numerical Predictions Of Flow-Induced Hemolysis: Can The Accuracy Of The Power Law Model Be Improved Using Calibrated Coefficients?**  
SB3C2023-371  
Alberto Mantegazza¹, Nicolas Tobin², Keefe B. Manning², Brent A. Craven³  
¹Polytechnic University of Bari, ²Pennsylvania State University, ³US FDA

11:45 AM  
**An In Vitro Assessment of Emboli Trajectories Within a Patient Specific Model: Investigation into the Influence of Thrombus Size, Mechanical Properties, and Cerebral Blood Pressure**  
SB3C2023-308  
A. Glynn¹,², A. Consoli³, B. Murphy¹,², R. McCarthy², C. Lally¹,⁴  
¹Trinity College Dublin, ²Cerenovus, ³Hôpital Foch, ⁴RCSI & TCD

12:00 PM  
**Hematocrit Is A Potent Driver Of Platelet Adhesion At Supraphysiological Shear Rates**  
SB3C2023-126  
C. Watson¹, K. Manning¹,²  
¹Pennsylvania State University, ²Penn State Hershey Medical Center

12:15 PM  
**Computational Simulation Of Patient-Specific Blood Coagulation In Stent Thrombosis**  
SB3C2023-404  
Janneke M.H. Cruts¹, Mohammad Rezeimoghaddam², Frans N. van de Vosse², Frank J.H. Gijsen¹,³  
¹Erasmus Medical Center, ²Eindhoven University of Technology, ³Delft University of Technology

12:30 PM  
**Image driven simulation of hemodynamics around a dynamic clot in vivo**  
SB3C2023-566  
Chayut Teeraratkul¹, Timothy J. Stalker², Maurizio Tomaiuolo³, Debanjan Mukherjee¹  
¹University of Colorado, ²Thomas Jefferson University, ³Wills Eye Hospital

12:45 PM  
**Multiscale, Cell-Resolved Simulations of Red Blood Cells in Macroscale Flows for Hemolysis Prediction**  
SB3C2023-105  
Grant J. Rydquist, Mahdi Esmaily  
Cornell University
Vascular Pathology and Fluid Flow  
Cascade D  
Session Chairs: Grant Rydquist, Cornell University 
Alejandro Roldán-Alzate, University of Wisconsin - Madison  

11:30AM  Computational Fluid Dynamics Study To Investigate The Impact Of Sudden Physiological Actions On Cerebrospinal Fluid Pressure And Flow SB3C2023-311  
Sarah Vandenbulcke1, Paul Condon2,3, Haribalan Kumar2,3,4, Soroush Safaei3, Samantha Holdsworth2,3, Joris Degroote1, Patrick Segers1  
1Ghent University, 2Tairāwhiti-Gisborne, 3University of Auckland, 4GE Healthcare  

11:45AM  Blood Flow Energy Profiles in Coronary Arteries Predict Myocardial Infarction SB3C2023-309  
M. Lodi Rizzini1, A. Candreva1,2, V. Mazzi1, C. Chiastra1, B. De Bruyne3, C. Collet3, D. Gallo1, U. Morbiducci1  
1Politecnico di Torino, 2Zurich University Hospital, 3OLV-Clinic  

12:00PM  Evolution Of The Hemodynamic Properties And Arterial Wall Remodeling In Pulmonary Arterial Hypertension SB3C2023-154  
H. Mu, D. Valdez-Jasso  
University of California, San Diego  

12:15PM  Hemodynamics Of Coarctation Of The Aorta - Comparison Of A Distributed Lumped Parameter Model And 4D Flow MRI SB3C2023-128  
Labib A. Shahid1, Matthew A. Culver1, James P. Rice1, Haben Berhane2, Cynthia K. Rigsby3, Joshua D. Robinson3, Lindsay M. Griffin3, Michael Markl2, Colleen M. Witzenburg1, Alejandro Roldán-Alzate1  
1University of Wisconsin-Madison, 2Northwestern University, 3Lurie Children’s Hospital of Chicago  

12:30PM  Mitigating Post-TAVR Thrombogenic Risk: Design And Optimization of Novel Trileaflet and Bicuspid Aortic Valve Devices SB3C2023-109  
Kyle J. Baylous1, Brandon J. Kovarovic1, Salwa B. Anam1, Ryan T. Helbock1, Marvin J. Slepian2, Danny Bluestein1  
1Stony Brook University, 2University of Arizona  

12:45AM  A Computational Assessment of Stroke Predictors After Transcatheter Aortic Valve Replacement SB3C2023-491  
B. Vogl1, Z. Wang2, A. Chavez Ponce3, A. El Shaer3, M. Alkhouli3, H. Hatoum1  
1Michigan Technological University, 2The Ohio State University, 3Mayo Clinic
Ocular and Lung Biomechanics

Session Chairs: Yi Hua, University of Mississippi
Arina Korneva, Virginia Tech

11:30AM  Eye-Specific Modeling Of Effects Of Intraocular Pressure On Optic Nerve Head Oxygenation SB³C2023-297
Yuankai Lu, Yi Hua, Bingrui Wang, Fuqiang Zhong, Andrew Theophanous, Shaharoz Tahir, Po-Yi Lee, Ian A. Sigal
University of Pittsburgh

11:45AM  Effects of Glaucoma and Optic Nerve Crush on the Biomechanical Behavior Of Mouse Astrocytic Lamina Cribrosa SB³C2023-510
Johns Hopkins University

12:00PM  Quantifying the Remodeling Strain in the Lamina Cribrosa Years After Pressure Lowering Surgery SB³C2023-208
Cameron A. Czerpak, Harry A. Quigley, Thao D. Nguyen
Johns Hopkins University

12:15PM  The Influence Of Recruitment Maneuvers On Localized Murine Lung Strains Assessed With Digital Image Correlation SB³C2023-123
University of California, Riverside

12:30PM  Quantifying Temporal Dynamics Of Alveolar Recruitment During Mechanical Ventilation SB³C2023-236
Daniel S. Meggo, Edward A. Sander, Jacob Herrmann
University of Iowa

12:45AM  Probing Lung Function At High Spatiotemporal Resolution Via Crystal Ribcage SB³C2023-434
Boston University
Sex, Age, and Disease in Brain and Head Injury
Session Chairs: Kaveh Laksari, University of Arizona
Ken Monson, University of Utah

11:30AM Sex Difference In Axon Dynamic Behavior Under Axial Loading And Unloading SB3C2023-324
C. Zhang, S. Ji
Worcester Polytechnic Institute

11:45AM Evolution Of Human Cortical Thickness And Morphology Throughout Growth And Development SB3C2023-041
Nagehan Demirci, Maria A. Holland
University of Notre Dame

12:00PM Age- And Sex-Based Skull Thickness Distribution For Predicting Skull Fracture Patterns SB3C2023-428
Yousef Alsanea, Timothy Dixon, Tagrid Ruiz-Maldonado, Brittany Coats
University of Utah

12:15PM Spatial Gradient in Brain Mechanical Properties Changes Through Development But Is Consistent During Adulthood SB3C2023-239
Kyra E. Twohy¹, Grace McIlvain¹,², Jeffrey M. Spielberg¹, Curtis L. Johnson¹
¹University of Delaware, ²Georgia Institute of Technology

12:30PM High Resolution MR Elastography of the Human Brain: Technical Development and Applications in Aging and Alzheimer’s Disease SB3C2023-132
E. Triolo¹, O. Khegai², A. Alipour², T. Hedden², P. Balchandani², M. Kurt¹,²
¹University of Washington, ²Mount Sinai

12:45AM The Relationship Between Imbalance Symptom And Cardiac Pulsation Induced Mechanical Strain In The Brainstem And Cerebellum For Chiari Malformation Type I SB3C2023-471
Mohamad Motaz F. Al Samman¹, Alaaddin Ibrahimy², Blaise Simplice Talla Nwotchouang³, John N. Oshinski⁴, Daniel L. Barrow⁴, Philip A. Allen⁵, Rouzbeh Amini¹, Rafeeqe A. Bhadelia⁶, Francis Loth¹
¹Northeastern University, ²Yale University, ³University of Akron, ⁴Emory University, ⁵Harvard
Bioprinting and Emerging Technology in TCE

Session Chairs: Deva Chan, Purdue University
Edward Sander, University of Iowa

11:30AM  Particulated ECM Biomaterial Inks Enable 3D Bioprinting of Osteochondral In Vitro Models With Multi-Scale Architecture SB³C2023-535
Juliet O. Heye, Shannon A. Blanco, Jeanne E. Barthold, Emily Y. Miller, Corey P. Neu
University of Colorado

11:45AM  Novel Metabolic Labeling Demonstrates A Critical Role Of Decorin In The Assembly And Turnover Of Cartilage Matrix SB³C2023-399
T. Li¹, M. Fan², A. Porter², B. Kwok¹, C. Wang¹, D.E. Birk³, R.V. lozzo⁴, X.L. Lu², R.L. Mauck², L. Han¹
¹Drexel University, ²University of Delaware, ³University of South Florida, ⁴Thomas Jefferson University, ⁵University of Pennsylvania

12:00PM  Modeling Human Sex-Specific Fibrotic Activation In 3D-Bioprinted Pulmonary Artery Adventitia SB³C2023-039
Duncan J. Davis-Hall, Chelsea M. Magin
University of Colorado

12:15PM  A Thermodynamic Framework For The Evolution Of Sarcomeres In Cardiomyocytes Subjected To Dynamic Loading SB³C2023-522
Ryan J. Coleman¹, Vikram S. Deshpande², Patrick McGarry¹
¹University of Galway, ²University of Cambridge

12:30PM  Effects of Conditional SV40-T Immortalization on Human Retinal Progenitor Cell Differentiation SB³C2023-593
Qi Wang, Jessica A. Cooke, Budd A. Tucker, Kristan S. Worthington
University of Iowa

12:45AM  Sub-Millimeter Stiffness Gradients Within 3d Printed Composite Scaffolds For Osteochondral Tissue Engineering SB³C2023-517
Kevin N. Eckstein, A. Camila Uzcategui, John E. Hergert, Sarah A. Schoonraad, Stephanie J. Bryant, Robert R. McLeod, Virginia L. Ferguson
University of Colorado
Monday, June 5 11:30AM – 1:00PM MT

Cartilage: Imaging and Degeneration

Session Chairs: Jill Middendorf, Johns Hopkins University
David Pierce, University of Connecticut

11:30AM Enzymatic Digestion Does Not Compromise Sliding-Mediated Cartilage Lubrication SB³C2023-182
Meghan E. Kupratis, Atia Rahman, David L. Burris, Elise A. Corbin, Christopher Price
University of Delaware

11:45AM Raman Probe Predicts Cartilage Functional Mechanical Properties Better Than ORSI Score And MRI T2* Mapping SB³C2023-547
Masumeh Kazemi¹, Chenhao Yu¹, Farida Korna¹, Dev Mehrotra¹, Erik Ersland¹, Juncheng Zhang¹, Thomas P. Schaer², Julie B. Engiles², Mark W. Grinstaff¹, Brian D. Snyder³, Mads S. Bergholt⁴, Michael B. Albro¹
¹Boston University, ²University of Pennsylvania, ³Beth Israel Deaconess Medical Center, ⁴King's College London

12:00PM Cartilage Strain And T1rho MRI Mapping In Response To Load In An Initial ACL-Reconstructed Patient Cohort SB³C2023-169
Emily Y. Miller, Hongtian Zhu, Woowon Lee, Corey P. Neu
University of Colorado

12:15PM Cartilage Contact Pressures During Walking are Related to T2 Relaxation Times in Patients with Knee Osteoarthritis SB³C2023-479
Benjamin D. Bernarding, Austin J. Carcia, Adam J. Bradshaw, Johnny Huard, Scott Tashman, Lauren E. Watkins, Colin R. Smilth
Steadman Philippon Research Institute

12:30PM In Vivo Assessment Of Passive And Active Articular Cartilage Strain Recovery SB³C2023-283
Shu-Jin Kust, Dana Voinier, Kyle D. Meadows, Dawn M. Elliott, Daniel K. White, Axel C. Moore
University of Delaware

12:45AM Sensitivity Of Finite Element Models To Relationship Between T2 Relaxation And Modulus In Articular Cartilage SB³C2023-483
Alexander A. Donabedian, Deva D. Chan
Purdue University
Monday, June 5 11:30AM – 1:00PM MT

Bioengineering Design I

Session Chairs: Ria Mazumder, *Widener University*
Sriram Balasubramanian, *Drexel University*

11:30AM  Photo-Curing Extracellular Matrix Sealant For Stopping Vascular Hemorrhage
SB3C2023-199
Luke E. Schepers¹, Brooke L. Martindale², Alycia G. Berman², Hannah L. Cebull¹, William Van Alstine³, Sydney E. Hollingshead², Tyler Novak², Craig J. Goergen¹
¹*Purdue University*, ²*Cook Biotech Inc.*, ³*Cook Research Inc.*

11:45AM  Evaluating The Effects Of Coordinate System Selection on Thumb Carpometacarpal Joint Angles
SB3C2023-387
Adam J. Chrzan¹, Nicole D. Arnold¹, Kevin Chan², Tamara Reid Bush¹
¹*Michigan State University*, ²*Spectrum Health*

12:00PM  Development and Validation of a Smart Screwdriver (SSD) for Spine Surgery
SB3C2023-436
Allison M. Tanner, Daniel Jacobson, Alexander W. Hooke, James S. Fitzsimmons, Chunfeng Zhao, Brett A. Freedman
*Mayo Clinic*

12:15PM  Development of an Artificial Temporomandibular Joint Disc Replacement and Surgical Strategy
SB3C2023-584
Jason Kuiper, Ryan Dobbs, Jeremiah Easley, Christian Puttlitz, Kevin Labus
*Colorado State University*

12:30PM  Regenerative Rehabilitation Of Muscle Defect Under Mechanical Stimulation: An Organ Culture Study
SB3C2023-381
D. Jacho, E. Yildirim-Ayan
*University of Toledo*

12:45AM  Optimization Of A Bioprinted Pulsatile Fontan Conduit Using A Multiphysics Simulation Framework
SB3C2023-066
Zinan Hu¹, Jessica E. Herrmann¹, Mark A. Skylar-Scott¹, Tain-Yen Hsia², Alison L. Marsden¹
¹*Stanford University*, ²*University of Central Florida*
Multiscale Models, Cardiovascular System

Zermatt

Session Chairs: Arianna Forneris, University of Calgary
Lei Fan, Marquette University

11:30AM Multiscale Model Predictions Of Heart Growth During Hypertensive Rat Pregnancies SB3C2023-147
Molly S. Kaissar, Kyoko Yoshida
University of Minnesota

11:45AM A Computational Model of Coarctation of the Aorta in Rabbits SB3C2023-235
Ashley A. Hiebing¹, Matthew A. Culver¹, John F. LaDisa Jr.², Colleen W. Witzenburg¹
¹University of Wisconsin, ²Medical College of Wisconsin

12:00PM Numerical and Computational Analysis of Artery Stresses Considering Active Contractility SB3C2023-609
N. Goulbourne, Y. Li
University of Michigan

12:15PM Multiscale Modeling of Baroreflex Feedback Loop in Response to Acute Myocardial Infarction SB3C2023-092
Hossein Sharifi, Kenneth S. Campbell, Jonathan F. Wenk
University of Kentucky

12:30PM Toward a biomechanical model of aortic development SB3C2023-393
Bruno V. Rego, Sae-II Murtada, Guangxin Li, George Tellides, Jay D. Humphrey
Yale University

12:45AM A 1D Model Characterizing The Role Of Spatiotemporal Contraction Distributions On Lymph Transport SB3C2023-155
Farbod Sedaghati, J. Brandon Dixon, Rudolph L. Gleason
Georgia Institute of Technology
PhD-Level Student Paper Competition Session I:
Multiscale Biomechanics and Fluid Dynamics/Transport
Cascade ABC

Session Chairs: Debanjan Mukherjee, *University of Colorado*
Lucas Timmins, *University of Utah*

9:30AM  Characterizing Headform Friction Coefficient For Helmet Testing SB⁹C2023-142
Nicole E-P. Stark, Steve Rowson
*Virginia Tech*

9:45AM  Tuning Of The Mechanical Boundary Conditions Parameters For A Patient-
Specific Thoracic Aorta Model SB⁹C2023-192
Leonardo Geronzi¹, Antonio Martinez¹,², Aline Bel-Brunon³, Michel Rochette², Marco
Sensale², Pier Paolo Valentini¹, Marco E. Biancolini¹
¹*University of Rome Tor Vergata*, ²*Ansys*, ³*INSA Lyon*

10:00AM  Toward Generalizable Brain Deformation Estimators For Head Impacts With
Unsupervised Domain Adaptation And Deep Learning SB⁹C2023-030
Xianghao Zhan, Jiawei Sun, Yuzhe Liu, Nicholas Cecchi, Enora Le Flao, Olivier Gevaert,
Michael Zeineh, David Camarillo
*Stanford University*

10:15AM  Learning Diffeomorphic Deformations for Whole Heart Mesh Generation
SB⁹C2023-113
Arjun Narayanan, Fanwei Kong, Shawn C. Shadden
*University of California, Berkeley*

10:30AM  Correlations Between Mass Transport, Elastic Fiber Fragmentation, And Thoracic
Aortic Aneurysm Severity SB⁹C2023-111
Christie L. Crandall, Carmen M. Halabi, Jessica E. Wagenseil
*Washington University in St. Louis*

10:45AM  Successful transplant of cryopreserved kidneys enabled by engineering-based
protocol optimization SB⁹C2023-110
Zonghu Han, Joseph S. Rao, Lakshya Gangwar, Bat-Erdene Namsrai, Jacqueline
Pasek-Allen, Srivasupradha Ramesh, Michael L. Etheridge, Erik B. Finger, John C.
Bischof
*University of Minnesota*
PhD-Level Student Paper Competition Session II:
Cardiovascular Mechanics and Remodeling

Cascade D

Session Chairs: Joao Soares, Virginia Commonwealth University
Joseph van Batenburg-Sherwood, Imperial College London

9:30AM Contribution Of Microtubule Network To The Passive Anisotropic Viscoelasticity Of Healthy Right Ventricle SB3C2023-050
Kristen LeBar, Kellan Roth, Wenqiang Liu, Erith Evans, Jassia Pang, Adam Chicco, Zhijie Wang
Colorado State University

9:45AM Suppressing Leaflet Thickening and Stiffening May Restore Tricuspid Valve Function SB3C2023-150
Mrudang Mathur¹, Marcin Malinowski²,³, Tomasz A. Timek³, Manuel K. Rausch¹
¹University of Texas, Austin, ²Medical University of Silesia, ³Spectrum Health

10:00AM Sex Differences in Right Ventricular Chamber Elastance and Stiffness in an Animal Model of Pulmonary Arterial Hypertension SB3C2023-177
Ethan D Kwan, Tsui Min Wang, Hao Mu, Becky A Hardie, Daniela Valdez-Jasso
University of California, San Diego

10:15AM Multiscale Model Translates Microscale Vascular Smooth Muscle Cell Mechanics to Tissue-Scale Aortic Contraction SB3C2023-148
Shannon M. Flanary, Seokwon Jo, Emilyn U. Alejandro, Victor H. Barocas
University of Minnesota

10:30AM Heterogeneity Of Red Cell Mechanical Properties Drives Pathophysiology In Sickle Cell Disease SB3C2023-064
Dillon C. Williams, David K. Wood
University of Minnesota

10:45AM Restored Normal Blood Flow Plus Atorvastatin Promotes Atherosclerosis Regression SB3C2023-108
Morgan A. Schake, Ian McCue, Samuel Harvey, Evan Curtis, Forrest Kievit, Ryan M. Pedrigi
University of Nebraska-Lincoln
Undergraduate Design Competition
Gore AB

Session Chairs: Antonia Zaferiou, Stevens Institute of Technology

9:30AM  The History And Goals Of The Undergraduate Design Competition
Anita Singh
Temple University

9:45AM  Pulse Oximeter For Simulation Mannequin SB3C2023-624
Marina Walsh, Benjamin Aon, Hatice S. Emanet, Cheyenne M. Miller, Chiamaka G. Oduah, Ria Mazumder
Widener University

10:00AM  3D Printed Mouth Guard For Temporomandibular Joint Dysfunction SB3C2023-635
Christopher N. Barnes, Jorge M. Pumachagua, Elias P. Saliba
Embry-Riddle Aeronautical University

10:15AM  Design Of A Prophylactic Knee Brace To Prevent ACL Injuries In Female Athletes
SB3C2023-637
J. DiVanna, E. LoVerde, M. Taibi
Manhattan College

10:30AM  Elert: A Haptic Emergency Alert System For The Auditorily Impaired SB3C2023-643
Emily Bartling, Ruth Hammon, Deven Cobb, Jerritt Gutierrez
Rose-Hulman Institute of Technology

10:45AM  A Digital Incentive Spirometer for Aiding Lung Recovery Post-Surgery SB3C2023-647
Isabella T. Mirro, Yi-An Hsieh, Jackson C. Dooley, Parth K. Mody, Josh Freedman
University of Pennsylvania
Tuesday, June 6 9:30AM – 11:00AM MT

**PhD-Level Student Paper Competition Session III:**
**Morphogenesis, Maternal/Abdominal Health**

**Session Chairs:** Sihong Wang, *The City College of New York*
Sihong Wang, *The City College of New York*
Alix Deymier, *University of Connecticut*

9:30AM  
**Vascular remodeling during late-gestation pregnancy: an in-vitro assessment of the murine thoracic aorta**  
Ana I. Vargas, Samar Tarraf, Chiara Bellini, Rouzbeh Amini  
*Northeastern University*

9:45AM  
**Maternal Anatomy Drives Mechanical Loading in the Proximal Cervix During Pregnancy**  
Erin Louwagie, Jada Hinds, Lindsey Carlson, Timothy Hall, Helen Feltovich, Kristin Myers  
*Columbia University*

10:00AM  
**Mechanical Changes of the Pregnant Murine Uterus**  
Emily A. Hoffmann, Shanmugasundaram Nallasamy, Kyoko Yoshida  
*University of Minnesota*

10:15AM  
**Towards Enhanced Non-Invasive Assessment Of Bladder Urodynamics - Validation Of Dynamic 3D MRI In A Patient-Specific In Vitro Model Of The Bladder**  
Jeams Rice, Jack Gwertzman, Alejandro Roldán-Alzate  
*University of Wisconsin - Madison*

10:30AM  
**Using Microinjected Fluid Droplets To Locally Perturb Epithelial Mechanics And Branching Morphogenesis In Cultured Embryonic Organs**  
Shelby R. Mohr-Allen, Victor D. Varner  
*University of Texas*

10:45AM  
**Ectopic Changes in Tissue Stiffness Disrupt Epithelial Buckling and FGF-10-Induced Budding Morphogenesis in Cultured Embryonic Lungs**  
Kara E. Peak, Victor D. Varner  
*University of Texas*
PhD-Level Student Paper Competition Session IV: 
Musculoskeletal and Mechanobiology/Tissue Engineering

Session Chairs: Jacopo Ferruzzi, University of Texas at Dallas
Stephanie Cone, University of Delaware

11:15AM  Stiffness Of Direct-Write, Near-Field Electrospun Gelatin Fibers Generates Differences In Tenocyte Gene Expression SB3C2023-240
Zachary G. Davis¹, Drew W. Koch¹, Grant M. Scull¹, Ashley C. Brown¹, Lauren V. Schnabel¹, Matthew B. Fisher¹,²
¹North Carolina State University, ²University of North Carolina at Chapel Hill

11:30AM  Role Of Sex And Sex Hormones In Pulmonary Artery Adventitial Fibroblast Mechanosignaling SB3C2023-120
Yufan Lin, Daniela Valdez-Jasso
University of California, San Diego

11:45AM  Type V Collagen Plays An Essential Role In The Development Of Knee Articular Cartilage And Meniscus SB3C2023-152
Bryan Kwok¹, Mingyue Fan¹, Prerana Singh¹, David Birk², Robert L. Mauck³, Nathaniel A. Dyment³, Eiki Koyama⁴, Lin Han¹
¹Drexel University, ²University of South Florida, ³University of Pennsylvania, ⁴Children’s Hospital of Philadelphia

12:00PM  Focal Adhesion Kinase Regulates Mechanosensitive Gene Transcription And Tendon Maturation SB3C2023-230
Thomas P. Leahy, Srish S. Chenna, Louis J. Soslowsky, Nathaniel A. Dyment
University of Pennsylvania

12:15PM  Mechanical Models Of Collagen Networks For Understanding Changes In The Failure Properties Of Aging Mouse Skin SB3C2023-259
Nathan J. Witt¹, Alan E. Woessner², Jacob Herrmann¹, Kyle P. Quinn², Edward A. Sander¹
¹University of Iowa, ²University of Arkansas

12:30PM  Moderated TGF-Beta Delivery Via Latent TGF-Beta Conjugated Scaffolds For Improving Engineered Articular Cartilage SB3C2023-214
Tiabai Wang¹, Zhonghao Dai¹, Celina C. Maldonado¹, Prem Nelesh¹, Junhan Liao¹, Sung Yeon Kim¹, Andrew Martin¹, Joanne E. Murphy-Ullrich², Mark W. Grinstaff¹, Michael B. Albro¹
¹Boston University, ²University of Alabama
PhD-Level Student Paper Competition Session V: 
Musculoskeletal Biomechanics

Cascade D

Session Chairs: Deva Chan, Purdue University
Spence Lake, Washington University at St. Louis

11:15AM  A Novel Laser Ablation Model For Studying Local Microdamage Repair In Live Tendon Explants SB3C2023-067
Anthony N. Aggouras, Matthew T. Lim, Jeroen Eyckmans, Brianne K. Connizzo
Boston University

11:30AM  Collagen Crosslinking Dramatically Impairs the Frictional Performance of Articular Cartilage SB3C2023-037
Meghan E. Kupratis, Uriel Gonzalez, Atia Rahman, David L. Burris, Elise A. Corbin,
Christopher Price
University of Delaware

11:45AM  Overexpression Of Enhanced Yellow Fluorescent Protein Fused With Channelrhodopsin Causes Contractile Dysfunction In Skeletal Muscle SB3C2023-065
Syeda N. Lamia¹, Carol S. Davis¹, Peter C.D. Macpherson¹, T. Bradley Willingham²,
Yingfan Zhang², Chengyu Liu², Susan V. Brooks¹, Brian Glancy², Megan L. Killian¹
¹University of Michigan, ²National Institutes of Health

12:00PM  Temporal and spatial dynamics of new bone formation in cyclic treatment regimens of parathyroid hormone-related peptide (PTHrP) SB3C2023-114
Tala Azar, Kruti Desai, Justin Leggin, Yuanhang Li, Wenzheng Wang, Arie Jones, Wei-Ju Tseng, Nathaniel Dyment, X. Sherry Liu
University of Pennsylvania

12:15PM  Shear Strain Stiffening In Ligaments Arises From Unaligned Fibers And Is Amplified By Axial Strain SB3C2023-095
Jonathan L. Blank, Darryl G. Thelen, Joshua D. Roth
University of Wisconsin-Madison

12:30PM  Development Of An In Vitro Model To Explore Collagen Fiber Regeneration With Aged Human Mensical Cells SB3C2023-231
Austin G. Gouldin, Jennifer L. Puetzer
Virginia Commonwealth University
PhD-Level Student Paper Competition Session VI: Emerging Tissue Mechanobiology & Biomechanics II

Session Chairs: Erin Berlew, *University of Pennsylvania*
Jill Middendorf, *Johns Hopkins University*

**11:15AM**
**Damkohler Number Analysis For Predicting Biomolecule Gradients In Engineered Tissues**
*SB3C2023-187*
Sedat Dogru, Matthew Simkulet, Halide Z. Haciguzeller, Michael B. Albro
*Boston University*

**11:30AM**
**Multiaxial Loading Attenuates Fibroblast Activation In An In Vitro Model Of Fibrosis**
*SB3C2023-181*
Ghiska Ramahdita¹, Xiangjun Peng¹, Mohammad Jafari², David Schufts¹, Guy M. Genin¹, Farid Alisafaei², Nathaniel Huebsch¹
¹*Washington University in St. Louis, ²New Jersey Institute of Technology*

**11:45AM**
**Deep Learning Enables Accurate Estimation Of Tissue Deformation In Vivo**
*SB3C2023-163*
Reece D. Huff¹, Frederick C. Houghton¹, Conner C. Earl², Elnaz Ghajar-Rahimi², Ishan Dogra¹, Andrew J. Darling², Frederick W. Damen², Guoyang Zhou², Denny Yu², Craig J. Goergen², Carisa Harris-Adamson¹, Grace D. O’Connell¹,³
¹*University of California – Berkeley, ²Purdue University, ³University of California- San Francisco*

**12:00PM**
**Time And Strain Dependent Properties Of The Extracellular Collagen Matrix Regulate Cellular Mechanical Memory And Activation Level Of Fibroblast Cells**
*SB3C2023-209*
Yuan Hong¹, Xiangjun Peng¹, Haomin Yu¹, Mohammad Jafari², Delaram Shakiba¹, Jacob Sandler¹, Kenneth M. Pryse¹, Justin M. Sacks¹, Elliot L. Elson¹, Guy M. Genin¹, Farid Alisafaei¹,²
¹*Washington University in St. Louis, ²New Jersey Institute of Technology*

**12:15PM**
**Nuclear Export Inhibition Jumbles Epithelial-Mesenchymal States and Gives Rise to Migratory Disorder in Healthy Epithelia**
*SB3C2023-134*
Carly M. Krull, Haiyi Li, Amit Pathak
*Washington University in St. Louis*

**12:30PM**
**Collective Autologous Chemotaxis In Cancer Cells**
*SB3C2023-087*
Louis González, Andrew J. Mugler
*University of Pittsburgh*
Patient Specific Flow and Physiology
Cascade ABC

Session Chairs: Alejandro Roldán-Alzate, University of Wisconsin-Madison
Lucas Timmins, University of Utah

1:45PM  Association of hemodynamic forces with patterns of coronary artery disease and atherosclerotic plaque phenotypes SB3C2023-370
Diego Gallo¹, Alessandro Candreva¹, Maurizio Lodi Rizzini¹, Valentina Mazzì¹, Daniel Munhoz², Jean Paul Aben³, Bernard De Bruyne², Claudio Chiastra¹, Carlos Collet², Umberto Morbiducci¹
¹Politecnico di Torino, ²OLV-Clinic, ³Pie Medical Imaging BV

2:00PM  Patient-Specific Flap Motion, False Lumen Flow, and Aortic Stiffness in Acute Uncomplicated Type B Aortic Dissections Using 4D Flow MRI and 2D PC MRI: A Preliminary Study SB3C2023-391
H. Cebull¹, S. Hashemi², K. Porte¹, J. Oshinski¹, J. Oshinski², B.G. Leshnower¹, M. Piccinelli¹
¹Emory University, ²Children’s Healthcare of Atlanta, ³Georgia Institute of Technology

2:15PM  Predicting Hemodynamic Outcomes In Patients With Borderline Left Ventricles Under Uncertainty SB3C2023-156
Yurui Chen¹, Isao A. Anzai¹, Justin S. Tran², David M. Kalfa¹, Vijay Vedula¹
¹Columbia University, ²California State University

2:30PM  Non-Invasive Estimation of Pressure Drop Across Aortic Coarctation SB3C2023-149
Priya J. Nair¹, Martin R. Pfaller¹, Seraina A. Dual², Doff B. McElhinney¹, Daniel B. Ennis¹, Alison L. Marsden¹
¹Stanford University, ²KTH Royal Institute of Technology

2:45PM  Association Between Resistance To Cerebrospinal Fluid Flow And Cardiac-Induced Brain Tissue Motion For Chiari Malformation Type1 SB3C2023-475
Saeed Mohsenian¹, Alaaddin Ibrahimy², John N. Oshinski³, Blaise Simplice Talla Nwotchuang⁴, Rafeeqe A. Bhadelia⁵, Daniel L. Barrow⁶, Rouzbeh Amini¹, Francis Loth¹
¹Northeastern University, ²Yale University, ³Emory University, ⁴University of Akron, ⁵Harvard Medical School

3:00PM  High-Fidelity Fluid-Structure-Interaction Modelling Explains Flow-induced Bruits and Murmurs in Cerebral Aneurysms SB3C2023-205
David A. Bruneau¹, Kristian Valen-Sendstad², David A. Steinman¹
¹University of Toronto, ²Simula Research Laboratory
Wednesday, June 7 1:45PM – 3:15PM MT

Fluid Velocity Mapping and Flow Characterization
Cascade D

Session Chairs: Jessica Oakes, Northeastern University
Ryan Pedrigi, University of Nebraska

1:45PM Towards High Spatiotemporal Resolution Blood Flow Velocity Field Mapping For Mice: A Validation Study SB³C2023-583
Mingyi Tang¹,², David A. Steinman¹, Craig A. Simmons¹,²
¹University of Toronto, ²Ted Rogers Centre for Heart Research

2:00PM The Generation of Synthetic Geometric Datasets for Flow Characterization in the Carotid Bifurcation SB³C2023-440
Retta El Sayed¹,², Paul Klein², John N. Oshinski¹, Tiziano Passerini²
¹Georgia Institute of Technology, ²Siemens Healthineers

2:15PM Surrogate Models For Pressure Gradients In Coronary Artery Stenoses SB³C2023-527
Elizabeth R. Livingston, Siddhartha Srivastava, Krishna Garikipati, C. Alberto Figueroa
University of Michigan

2:30PM Impact of wall distensibility on emerging features of carotid bifurcation hemodynamics SB³C2023-130
Sara Zambon¹, Marachiara Arminio¹, David A. Steinman², Claudio Chiastra¹, Umberto Morbiducci¹, Diego Gallo¹
¹Politecnico di Torino, ²University of Toronto

2:45PM Quantification Of Embolus Transport To The Brain From Carotid Stenosis Sites SB³C2023-497
Ricardo Roopnarinesingh¹, Neel Jani², Michelle Leppert¹, Debanjan Mukherjee¹
¹University of Colorado, ²University of Wisconsin-Madison

3:00PM Subject-Specific One-Dimensional Fluid Dynamics Model Of Chronic Thromboembolic Pulmonary Hypertension SB³C2023-165
Amirreza Kachabi, Mitchel J. Colebank, Naomi C. Chesler
University of California, Irvine
Reproductive Biomechanics and Pregnancy

Cascade E

Session Chairs: Megan Routzong, University of California, San Diego
Callan Luetkemeyer, University of Illinois

1:45PM Material Parametric Analysis Of Polypropylene During A Contact Sensitive Simulation Of A Ball Burst Test Of A Prolapse Mesh SB3C2023-476
Madeline Hackett¹, Teseo Schneider², Zachary Ferguson³, Daniele Panozzo³, Denis Zorin⁴, Pamela Moalli⁵, Steven Abramowitch⁴
¹University of Pittsburgh, ²University of Victoria, ³New York University

2:00PM Modelling Of The Uterosacral Ligament Suggests Changes In Microarchitecture During Pregnancy SB3C2023-179
Lea M. Savard¹, Catalina S. Bastias¹, Kathleen Connell¹, Sarah Calve¹, Callan M. Luetkemeyer², Virginia L. Ferguson¹
¹University of Colorado, ²University of Illinois

2:15PM Biaxial Contractility Of The Murine Cervix With Elastic Fiber Deficiency SB3C2023-512
Mari J.E. Domingo¹, Avery G. Franques¹, Qinhan Zhou², Kristin S. Miller²
¹Tulane University, ²University of Texas

2:30PM Time-Dependent Material Properties Of Nonhuman Primate Uterine Layers Through Gestation SB3C2023-529
Daniella M. Fodera¹, Echo Z. Xu¹, Shuyang Fang¹, Ivan Rosado-Mendez², Timothy Hall², Helen Feltovich²,³, Michelle L. Oyen⁴, Kristin M. Myers¹
¹Columbia University, ²University of Wisconsin-Madison, ³Mount Sinai, ⁴Washington University in St. Louis

2:45PM A Longitudinal Study Of The Anatomical Changes Of The Pregnant Murine Vagina Using Magnetic Resonance Imaging SB3C2023-217
Aileen C. Suarez¹, Clara J. Gimenez¹, Jennifer M. Munson¹, Kristin S. Miller², Kristin M. Myers³, Steven D. Abramowitch⁴, Raffaella De Vita¹
¹Virginia Tech, ²University of Texas, ³Columbia University, ⁴University of Pittsburgh

3:00PM Diffusion MRI Characterizes Microstructural Changes Of The Cervix During Pregnancy SB3C2023-592
Noel Naughton¹, Amir Ostadi Moghaddam¹, Mariana Kersh¹, Sanmi Koyejo², Amy Wagoner Johnson¹, Bruce Damon¹,³
¹University of Illinois, ²Stanford University, ³Carle Health
Biotransport in Drug Delivery  
Cascade F  
Session Chairs: Govind Srimathveeravalli, *UMass Amherst*  
Nichole Rylander, *University of Texas at Austin*

1:45PM  
**Lymph Node Conduit Modelling Offers Insight Into The Role Of Fluid Flow In Antigen Deposition**  
SB3C2023-457  
Daniel J. Watson¹, Willy V. Bonneuil¹, James Marshall¹, Peter Xie¹, Thomas Adam¹, Jennifer Frattolin¹, Matthew J. Russell², Francesca Fasanella Masci³, Angela E. Goode¹, Shafa Balaram¹, Alexandra E. Porter¹, Anil A. Bharath¹, Bindi S. Brook², Robert J.B. Nibbs³, James E. Moore Jr¹  
¹*Imperial College London*, ²*Nottingham University*, ³*Glasgow University*

2:00PM  
**CD44 Mechanosignaling May Regulate Drug Resistance In Ovarian Cancer**  
SB3C2023-195  
Maranda E. Kramer, Allison Criswell, Mary Kathryn Sewell-Loftin  
*University of Alabama at Birmingham*

2:15PM  
**Functionalized Particulate Carriers Targeting Abdominal Aortic Aneurysms Under Flow**  
SB3C2023-349  
Moran Levi¹, Yevgeniy Kreinin¹, Ido Rachbuch¹, Perla Namour¹, Josué Sznitman¹, Meinrad Gawaz², Netanel Korin¹  
¹*Technion – IIT*, ²*Univesrity of Tuebingen*

2:30PM  
**Investigation Of Bioeffects From Microbubble And Focused Ultrasound Assisted Blood Brain Barrier Disruption**  
SB3C2023-423  
Jane J. Song, Payton J. Martinez, Kang-ho Song, Jenna Steiner, Adam Green, Natalie Serkova, Mark A. Borden  
*University of Colorado*

2:45PM  
**Development Of A TGFβ2 Eluting Tissue Engineered Vascular Graft With Tunable Delayed Release**  
SB3C2023-369  
Katarina M. Martinet, Tracey Moyston, Stephen C. Balmert, Steven R. Little, Jonathan P. Vande Geest  
*University of Pittsburgh*

3:00PM  
**A Lattice-Boltzmann Fluid-Structure Interaction Framework For The Inertial Transport Of Bioparticles In Microfluidic Devices**  
SB3C2023-469  
Alberto Mantegazza, Dario De Marinis, Marco D. de Tullio  
*Polytechnic University of Bari*
1:45PM Optimization Of Lipid Nanoparticles For Localized mRNA Delivery In Fracture Repair SB3C2023-498
Anna Laura Nelson1,2, Chiara Mancino3, Josh Choe4, Gianluca Fontana4, Johnny Huard1, William Murphy4, Francesca Tarabal13, Nicole Ehrhart2, Chelsea Bahney1,2,5
1Steadman Philippon Research Institute, 2Colorado State University, 3Houston Methodist, 4University of Wisconsin-Madison, 5University of California, San Francisco

2:00PM Acellular ECM Powder Provides Lateral Integration And Structural And Cellular Signaling In A 12-Month Goat Implant SB3C2023-539
Jeanne E. Barthold1, Julieta Heye1, Kaitlin McCreery1, Katie Bizzaza2, Jeremiah Easley2, Ben Gadomski2, Corey P. Neu1
1University of Colorado, 2Colorado State University

2:15PM Stem Cell-Derived Exosomes Promote Cell Homing and Angiogenic Differentiation For Dental Pulp Regeneration SB3C2023-444
Venkateswaran Ganesh, Piedad C. Gomez-Contreras, Henry L. Keen, Kyungsup Shin, James A. Martin, Dongrim Seol
University of Iowa

2:30PM Superficial Meniscus Cells And Highly Proliferative And Migratory And Generate Functional Tissue Despite A Lower Cellular Mechanosensitivity SB3C2023-112
Sereen SF. Assi1, Elizabeth Bernstein1, Edward D. Bonnevie1,2, Emily E. Sharp1, Ryan C. Locke1,2, Robert L. Mauck1,2
1University of Pennsylvania, 2Crescenz VA Medical Center

2:45PM Viscoelasticity and Micro-phase Separation Mediate Meniscal Cell Migration through Hyaluronic Acid Hydrogels SB3C2023-138
Karen L. Xu1, Hooman Fallahi2, Lin Han2, Robert L. Mauck1, Jason A. Burdick1,3
1University of Pennsylvania, 2Drexel University, 3Univesity of Colorado

3:00PM Sustained-release losartan from peptide nanofibers promotes chondrogenesis SB3C2023-485
Kohei Yamaura1, Nicholas A. Sather2, Anna Metlushko2, Haruki Nishimura1, Radoslav Z. Pavlovic2, Sealy Hambright1, Sudheer K. Ravuri1, Marc J. Philippon1,3, Samuel I. Stupp2, Chelsea S. Bahney1,4, Johnny Huard1
1Steadman Philippon Research Institute, 2Northwestern University, 3Steadman Clinic, 4University of California, San Francisco
Predictive Models in Cardiovascular Biomechanics

Session Chairs: Lucas Timmins, University of Utah
           Jonathan Wenk, University of Kentucky

1:45PM  Towards Real-Time Predictive Models of Transcatheter Aortic Valve Replacement Procedures via Reduced Order Modeling SB3C2023-328
       I Shah1,3, F. Ballarin2, A. Venezian1, L. Dasi1
       1Georgia Institute of Technology, 2Università Cattolica del Sacro Cuore, 3Emory University

2:00PM  Predicting Long-term Patient-Specific Outcome Of Cardiac Resynchronization Therapy Using A Fast Computational Model SB3C2023-249
       Clara E. Jones1, Derek J. Bivona2, Kenneth C. Bilchick2, Pim J.A. Oomen1
       1University of California, Irvine, 2University of Arizona

2:15PM  Aortic Wall Stress Concentration As A Predictor Of Type A Aortic Dissection SB3C2023-351
       Christina Sun1, Tongran Qin1, Asanish Kalyanasundaram2, Wei Sun1, John Elefteriades2, Liang Liang3
       1Lake Forest, 2Yale University, 3University of Miami

2:30PM  A Modular Framework For Strong 3D/0D Coupling In Cardiac Mechanics Simulations SB3C2023-032
       Aaron L. Brown, Zinan Hu, Alison L. Marsden
       Stanford University

2:45PM  A Neural Network Finite Element Approach For High-Speed Cardiac Pressure-Volume Simulations SB3C2023-459
       Shruti Motiwale, Wenbo Zhang, Michael S. Sacks
       University of Texas at Austin

3:00PM  No Strings Attached: Predicting Tricuspid Valve Coaptation Without In Vivo Chordal Geometry SB3C2023-473
       Mrudang Mathur, Vijay Dubey, Manuel K. Rausch
       University of Texas at Austin
Bioengineering Design II

Session Chairs: Zhongping Huang, *West Chester University*
Anita Singh, *Temple University*

1:45PM  Mixed Approaches to Noninvasive Ventilation Mask Design: Triphasic Mixture Theory Material Model Calibration and Global Finite Element Analysis SB\(^3\)C2023-290
Anne D. Zakrajsek\(^1\), Marty O. Visscher\(^1\), Vivek Narendran\(^1,2\), Eric A. Nauman\(^1\)
\(^1\)University of Cincinnati, \(^2\)Cincinnati Children’s Hospital

2:00PM  Retropubic Trocar Temporal Characteristics Between Expert and Novice Surgeons SB\(^3\)C2023-438
Md A. Arif, Austin Bachar, Gregory W. King, Gary Sutkin, Antonis P. Stylianou
University of Missouri

2:15PM  Continuous inter-limb gait coordination and stability in veterans and service members with transtibial limb loss: influences of prosthetic ankle-foot devices SB\(^3\)C2023-221
Alexis Sidiropoulos\(^1\), Brad D. Hendershot\(^2\), Jonathan Gladish\(^2\), David Herlihy\(^1,3\), Jason Maikos\(^1\)
\(^1\)New York Harbor Healthcare System, \(^2\)Extremity Trauma and Amputation Center of Excellence, \(^3\)Narrows Institute of Biomedical Research and Education

2:30PM  Analysis of a New Socket Based Reference Frame for Ankle Rollover Shape for Transtibial Prostheses SB\(^3\)C2023-451
David Herlihy\(^1\), John Chomack\(^2\), Jason Maikos\(^2\)
\(^1\)Narrows Institute of Biomedical Research and Education, \(^2\)New York Harbor Healthcare System

2:45PM  Development Of A Novel Hand Worn Sensor For Objective Assessment Of Hand Dexterity In Neurodegenerative Conditions SB\(^3\)C2023-035
Conor D. Hayden\(^1\), Deirdre Murray\(^1,2\), Dara Meldrum\(^1\), Dermot Geraghty\(^1\), Orla Hardiman\(^1,2\), Bruce P. Murphy\(^1\)
\(^1\)Trinity College Dublin, \(^2\)Beaumont Hospital

3:00PM  The Impact Of Regulating The Plantarflexion And Dorsiflexion Resistance Of An Articulated Ankle Foot- Orthosis On Lower Limb Kinematics And Kinetics Of Stroke Survivors During Ambulation SB\(^3\)C2023-406
Oluwaseye P. Odanye\(^1\), Emily E. Steffensen\(^1\), Christopher J. Burcal\(^1\), Aaron D. Likens\(^1\), Elisa S. Arch\(^2\), Brian A. Knarr\(^1\)
\(^1\)University of Nebraska, \(^2\)University of Delaware
Wednesday, June 7

Cardiovascular Tissue Structure and Mechanics

Zermatt

Session Chairs: Jonathan Vande Geest, University of Pittsburgh
Lakshmi Dasi, Georgia Institute of Technology

1:45PM Right Ventricular Myocardium Remodeling in Pulmonary Arterial Hypertension is Sex Dependent SB3C2023-265
Becky A. Hardie, Jessica Huberts, Daniela Valdez-Jasso
University of California, San Diego

2:00PM Cyclic Stretch Results in Directionally Dependent Recellularization Aligned with Cellular Stress Avoidance Reorientation SB3C2023-267
Adam W.Y. Ley, Eric Slaughter, Victor H. Barocas, Robert T. Tranquillo
University of Minnesota

2:15PM Evaluation Of Hypertension And Intraluminal Vascular Injury On The Biomechanics Of The Murine Femoral Artery SB3C2023-508
J. Caleb Snider¹, Zachary Tentor², Yujun Xu¹, Matthew R. Bersi¹
¹Washington University in St. Louis, ²University of Virginia

2:30PM Impact of local collagen architecture on rupture behavior of tissue-engineered atherosclerotic plaque caps SB3C2023-012
Hanneke Crielaard¹, Tamar B. Wissing¹,², Su Guvenir Torun¹, Pablo de Miguel¹,³, Gert-Jan Kremers¹, Frank J.H. Gijsen¹,³, Ali C. Akyildiz¹,³, Kim van der Heiden¹,²
¹Erasmus Medical Center, ²Eindhoven University of Technology, ³Delft University of Technology

2:45PM An Optimized Method For Constitutive Model Fitting Of Soft Tissues Bi-Directional Mechanical Stress-Stretch Data SB3C2023-119
Sayed Ahmadreza Razian, Alexey Kamenskiy, Majid Jadidi
University of Nebraska at Omaha

3:00PM Mechanical Characterization of Porcine Tricuspid Valve Anterior Leaflets Over Time: Applications to Ex-vivo Studies SB3C2023-582
Julia Clarin, Dominique Dang, Lucas Santos, Rouzbeh Amini
Northeastern University
Heart Valve Fluid Mechanics

Cascade ABC

Session Chairs: Hoda Hatoum, *Michigan Tech*
Lucas Timmins, *University of Utah*

3:30PM  Impact of Blood Pressure on Coronary and Sinus Flow Dynamics After Aortic Valve Replacement SB3C2023-562
B. Vogl1, S. Lilly2, V. Thourani3, M. Alkhouli4, B. Lindman5, H. Hatoum1
‘Michigan Technological University, 2The Ohio State University, 3Piedmont Heart Institute, 4Mayo Clinic, 5Vanderbilt University

3:45PM  Biomechanical Analysis Of A Fetal Pulmonary Heart Valve Replacement SB3C2023-388
Sanchita S. Bhat, Katelynne Berland, Anna Farnan, Katherine Vietmeyer, Lakshmi Prasad Dasi
*Georgia Institute of Technology*

4:00PM  On The Closure Kinematics Of Aortic Mechanical Heart Valves Versus Bioprosthetic Heart Valves SB3C2023-044
Syed Samar Abbas, Iman Borazjani
*Texas A&M University*

4:15PM  Bio-Inspired Polymeric TAVR To Improve Durability Outcomes SB3C2023-204
Nipa Khair1, Sanchita Bhat2, Katie Vinterella2, Satheesh Kumar Harikrishnan2, Lakshmi Prasad Dasi2, Susan James1
‘Colorado State University, 2Georgia Institute of Technology

4:30PM  Experimental Study of Flow-Mediated Fibrin Clot Accumulation in Prosthetic Heart Valves SB3C2023-367
Yevgeniy Kreinin, Moran Levi, Yahel Talmon, Josué Sznitman, Netanel Korin
*Technion - IIT*

4:45PM  Effect Of Sinotubular Junction Size In TAVR Leaflet Thrombosis And The Potential Of TAV-in-TAV Procedure: A Fluid Structure Interaction Based Thrombogenic Risk Assessment Analysis SB3C2023-299
Symon Reza1, David Oks2, Brandon Kovarovic1, Mariano Vázquez2, Danny Bluestein1
‘Stony Brook University, 2Computer Applications in Science and Engineering

1Stony Brook University, 2Computer Applications in Science and Engineering
Emerging Areas in Thrombosis and Vascular Modeling

Session Chairs: Diego Gallo, Politecnico di Torino
              Hannah Cebull, Emory University

3:30PM Shear-Mediated Platelet Adhesion Dynamics And Multi-Platelet Aggregation: In Vitro Validated Multiscale Simulations Using Coarse-Grained Molecular Dynamics And Dissipative Particle Dynamics SB³C2023-288
Peineng Wang, Yicong Zhu, Jawaad Sheriff, Peng Zhang, Yuefan Deng, Danny Bluestein
Stony Brook University

3:45PM Investigating Changes in Hematological and Hemorheological Parameters in a Mouse Stent Implantation Model SB³C2023-274
D. Kokkinidou, E. Kaliviotis, C. Shammas, A. Anayiotos, K. Kapnisis
University of Technology

4:00PM Usability Of Low-cost 3D Visualization Sharing Interfaces For Cardiovascular Blood Flow Dynamics Data SB³C2023-509
Zainab Husain¹, Noah Egnatis¹, Karol Calò², Diego Gallo², Umberto Morbiducci², Peter Coppin³, David A. Steinman¹
¹University of Toronto, ²Politecnico di Torino, ³Ontario College of Art and Design

4:15PM Excessive Shear Rate, not Shear Stress, is Responsible for Cell Mechanolysis in Small Bore Needle Injections SB³C2023-368
George Morgan, Lamis Elsawah, Alejandro Esclamado-Cadenas, Amelie Daudet, Jennifer Frattolin, Daniel Watson, Qian Xu, Nicola Negrini, Adam Celiz, James E. Moore Jr.
Imperial College London

4:30PM Real-Time Optimization of the Total Cavopulmonary Connection via Reduced Order Modeling SB³C2023-331
I Shah¹,², F. Ballarin³, T. Iliescu⁴, O. San⁵, L. Dasi¹, A. Wei⁶, A. Veneziani²
¹Georgia Institute of Technology, ²Emory University, ³Università Cattolica del Sacro Cuore, ⁴Virginia Tech, ⁵Oklahoma State University, ⁶University of Massachusetts

4:45PM Validation Of The Coupled Momentum Method Against A Compliant Aortic Phantom In A Hybrid Mock Circulatory Loop SB³C2023-358
Francesco Bardi¹,²,³, Emanuele Gasparotti¹, Emanuele Vignali¹, Miquel Aguirre², Stéphane Avril², Simona Celi¹
¹BioCardioLab, ²INSERM, ³PrediSurge
Wednesday, June 7 3:30PM – 5:00PM MT

Multiscale Biomechanics

Cascade E

Session Chairs: Pim Oomen, University of California – Irvine
Chung-Hao Lee, University of Oklahoma

3:30PM  Anisotropic Stiffness Measured Using A Toroidal Probe In Meso Level And Cell Level SB^3C2023-251
J. Li, T. Paradis, M. Vandadi, N. Rahbar, K.L. Billiar
Worcester Polytechnic Institute

3:45PM  A Validated Data-Driven, Constitutive Model Of Type II Collagen Including Failure SB^3C2023-228
Phoebe Szarek, David M. Pierce
University of Connecticut

4:00PM  Active Microtissue Arrays For Probing Tissue Response To Dynamic Conditioning SB^3C2023-366
William P. Cortes, Kalyn R. Younger, Thao D. Nguyen, Daniel H. Reich
Johns Hopkins University

Ryan R. Mahutga, Victor H. Barocas, Patrick W. Alford
University of Minnesota

4:30PM  A Non-Contact Microfluidic Approach To Distinguish Large Extracellular Vesicles From Idh1-Mutated Glioblastoma Cells Based On Stiffness SB^3C2023-342
Mi Ho Jeong, Hyungsoo Im, Joanna B. Dahl
Massachusetts General Hospital

4:45PM  Augmented Reality Visualization Of Biomechanical Wall Stresses On Abdominal Aortic Aneurysms Using Artificial Intelligence SB^3C2023-511
Timothy K. Chung, Nathan L. Liang, David A. Vorp
University of Pittsburgh
Wednesday, June 7  3:30PM – 5:00PM MT

**Experimental Head and Injury Mechanics**

**Session Chairs:** Brittany Coats, *University of Utah*
Mehmet Kurt, *University of Washington*

**3:30PM**  Head Kinematics in Stock Car Racing: Quantifying Differences Between Tracks
SB³C2023-514
Sophia R. Zoch¹,², Logan E. Miller¹,², Cole M. Binder², Destiny R. Mason¹,², John P. Patalak³, Matthew G. Harper³, Jillian E. Urban¹,², Joel D. Stitziel¹,²
¹Virginia Tech-Wake Forest, ²Wake Forest School of Medicine, ³National Association for Stock Car Auto Racing

**3:45PM**  Late Triggering of Tagged MRI for Measurement of In Vivo Brain Deformation during Head Rotation
SB³C2023-551
Yuan-Chiao Lu¹, Andy Knutsen¹, Ahmed Alshareef¹, Wen-Tung Wang², Joy Mojumder², Jerry L. Prince³, Philip Bayly⁴, John A. Butman², Dzung L. Pham²,⁵
¹Henry M Jackson Foundation for the Advancement of Military Medicine, ²National Institutes of Health, ³Johns Hopkins University, ⁴Washington University at St. Louis, ⁵Uniformed Services University

**4:00PM**  Non-Concussive Head Impact Kinematics And Brain Strain Distribution In Collegiate Football
SB³C2023-344
Enora Le Flao¹, Xianghao Zhan¹, Nicholas J. Cecchi¹, Yuzhe Liu¹, Ashlyn A. Callan¹, Landon P. Watson¹, Collin Pang¹, Gerald A. Grant¹,², Michael M. Zeineh¹, David B. Camarillo¹
¹Stanford University, ²Duke University

**4:15PM**  Behavioral Impairments In Repetitive Mild Traumatic Brain Injury
SB³C2023-262
S. Vafadar, H. Li, S. Assari, S.J. Ward, R.F. Tuma, K. Darvish
Temple University

**4:30PM**  Influence of Fragment Impact Attributes in Cutaneous Injury
SB³C2023-086
O. Elsafty, R. Dauskardt
Stanford University

**4:45PM**  A Methodology to Obtain Injury and Biomechanical Data from Live Swine Experimentation for Behind Armor Blunt Trauma
SB³C2023-302
Alok S. Shah¹, Narayan Yoganandan¹, Mary F. Otterson¹, Brian D. Stemper¹, Joost Op’t Eynde², Cameron D. Bass², Justin McMahon³, Robert S. Salzar³, B. Joseph McEntire⁴
¹Medical College of Wisconsin, ²Duke University, ³University of Virginia, ⁴US Army Aeromedical Research Laboratory
Biophysical Effects on Cells and Tissues

Wednesday, June 7 3:30PM – 5:00PM MT

Session Chairs: Sarah Calve, University of Colorado
Victor Varner, University of Texas at Dallas

3:30PM  Effect of the Physical Environment on Embryonic Kidney Progenitor and Explant Culture SB³C2023-174
Aria (Zheyuan) Huang, Alex J. Hughes
University of Pennsylvania

3:45PM  Elastic Fibers Confer Tensile Stiffness To The Dorsal Mesentery, Driving Buckling Morphogenesis Of The Small Intestine SB³C2023-425
Elise A. Loffet, John F. Durel, Hyunjee Lim, Richard Kam, Nandan L. Nerurkar
Columbia University

4:00PM  A Thermodynamic Framework For Sarcomere Formation In Cardiomyocytes Spread On Micro-Patterned Substrates SB³C2023-253
Ryan J. Coleman¹, Vikram S. Deshpande², Patrick McGarry¹
¹University of Galway, ²University of Cambridge

4:15PM  Cyclic Stretch Inhibits Cell Invasion And Migration In 3D Scaffolds SB³C2023-017
Rozanne W. Mungai, Kevin Piskorowski, Grace Jolin, Ying Lei, Kristen L. Billiar
Worcester Polytechnic Institute

4:30PM  Connecting Cyclic Stress To Nephron Induction In Kidney Organoids and 3D Co-Culture Models SB³C2023-178
John M. Viola, Alex J. Hughes
University of Pennsylvania

4:45PM  Delineating Effects of Substrate Stiffness, Chemistry, and Cyclical Strain on Lung Fibroblasts Gene Expression SB³C2023-258
Qi Wang, Kristan S. Worthington, Edward A. Sander
University of Iowa
Wednesday, June 7  3:30PM – 5:00PM MT

Structure and Function in Biomechanics
Gore CD

Session Chairs: Stephanie Cone, University of Delaware  
Kara Peak, University of Texas - Dallas

3:30PM  
Cell-Scale Measurements Of Tissue Viscoelasticity Using Thermoresponsive  
Mechanosensors In Engineered Tumor Models SB3C2023-489  
Benjamin E. Campbell, Stephanie Mok, Christina-Marie Boghdady, Nikita Kalashnikov,  
Luke McCaffrey, Christopher Moraes  
McGill University

3:45PM  
Finite Elements Of Multiscale Mixtures (Fe2M): Theory, Numerical Implementation,  
And Analyses Of Size Effects SB3C2023-389  
Ashkan Almasi¹, Tim Ricken², David M. Pierce¹  
¹University of Connecticut, ²University of Stuttgart

4:00PM  
Surgical Augmentation And Preservation Of Remnant ACL Tissue Best Restores  
Knee Function After Partial ACL Injury SB3C2023-023  
S. Cone¹,², R. Salbego¹, J. Roth¹, P. Lang¹  
¹University of Wisconsin, ²University of Delaware

4:15PM  
Characterizing The Biaxial Properties Of Skeletal Muscles Of The Mouse Hindlimb  
SB3C2023-599  
Katherine R. Knaus, Rebecca Hardie, Jessica Huberts, Daniela Valdez-Jasso  
University of California, San Diego

4:30PM  
Cyclic Strain Induces Matrix Turnover To Better Maintain Tendon Composition In  
Explant Culture SB3C2023-069  
Anthony N. Aggouras, Brianne K. Connizzo  
Boston University

4:45PM  
Microstructure-Based Estimation Of The Effective Stiffness Of Crosslinked,  
Embedded Fiber Networks SB3C2023-330  
Sotirios Kakaletsis¹, Emma Lejeun², Manuel Rausch¹  
¹University of Texas at Austin, ²Boston University
Growth and Remodeling I

Session Chairs: Colleen Witzenburg, University of Wisconsin - Madison
Jacopo Ferruzzi, University of Texas - Dallas

3:30PM  Multiscale Model Predicts the Effect of Beta Blockers on Ventricular Remodeling in Dogs with Experimental Mitral Valve Regurgitation SB³C2023-315
J. Bracamonte¹, L. Watkins², J. Saucerman², J. Holmes¹
¹University of Alabama at Birmingham, ²University of Virginia

3:45PM  Computational Modeling Of Arterial Growth And Remodeling Including Mechanosensitive Notch Signaling SB³C2023-420
Jordy van Asten¹, Marcos Latorre³, Cansu Karakaya¹, Frank Baaijens¹, Cecilia¹:³, Tommaso Ristori¹, Jay Humphrey⁴, Sandra Loerakker¹
¹Eindhoven University of Technology, ²Universitat Politècnica de València, ³Åbo Akademi, ⁴Yale University

4:00PM  Growth And Remodeling Of The Pulmonary Arterial Tree For Evolution Of Pulmonary Arterial Hypertension SB³C2023-546
Jason M. Szafron, Weiguang Yang, Jeffrey A. Feinstein, Marlene Rabinovitch, Alison L. Marsden
Stanford University

4:15PM  Multiscale Computational Modeling Of TGFbr1/2 Knock-Out In Adult Mouse Aortas SB³C2023-575
Ana C. Estrada, Linda Irons, Jay D. Humphrey
Yale University

4:30PM  Semi-Automatic Quantification of Early Structural Remodeling Following Myocardial Infarction SB³C2023-089
Catherine C. Eberman, Colleen M. Witzenburg
University of Wisconsin

4:45PM  Mechanical Characterization of Sheep Lymphatic Growth and Remodeling SB³C2023-106
Sophia M. Mavris, Zhanna V. Nepiyushchikh, J. Brandon Dixon, Rudolph L. Gleason
Georgia Institute of Technology
Wednesday, June 7
3:30PM – 5:00PM MT

Modeling in the Cardiovascular System

Zermatt

Session Chairs: Manuel Rausch, University of Texas - Austin
Beatrice Bisighini, Mines Saint-Etienne

3:30PM
Classification-based super-resolution reconstruction in CMR to quantify four-dimensional myocardial strains in mice SB3C2023-545
Tanmay Mukherjee¹, Sakthivel Sadayappan², Reza Avazmohammadi¹,³
¹Texas A&M, ²University of Cincinnati, ³Houston Methodist Academic Institute

3:45PM
A Novel Image-based Computational Framework to Evaluate the Material Properties of Arterial Tissue from High-resolution Magnetic Resonance Image Data SB3C2023-505
Y.F. Jack Wang, Samer S. Merchant, Edward W. Hsu, Lucas H. Timmins
University of Utah

4:00PM
Novel Automated Aortic Root Echocardiography Feature Tracking Algorithm For Pediatric Aortopathy SB3C2023-176
Elnaz Ghajar-Rahimi¹, Frederick W. Damen¹,², Benjamin J. Landis², Craig J. Goergen¹,²
¹Prudue University, ²Indiana University

4:15PM
3D Passive Strain Mapping of the Embryonic Zebrafish heart SB3C2023-587
Alex L. Gendernalik¹,², David Bark¹,²
¹Colorado State University, ²Washington University

4:30PM
Computational modeling study of the effects of pulmonary hypertension on right heart perfusion SB3C2023-024
Lei Fan¹, Jenny S. Choy², Ghassan S. Kassab², Lik Chuan Lee¹
¹Michigan State University, ²California Medical Innovations Institute

4:45PM
Imaging And Mechanical Characterization Of Human Blood Clot Analogues With Different Compositions And Degrees Of Contraction SB3C2023-395
Rachel Cahalane¹, Janneke M.H. Cruts¹, Ahlam Rachid², Kim van Gaalen¹, Heleen M.M. van Beusekom¹, Moniek de Maat¹, Marcel L. Kijkshoorn¹, Nikki Boodt¹, Aad van der Lugt¹, Frank Gijsen¹,³
¹Erasmus Medical Center, ²Eindhoven University of Technology, ³Delft University of Technology
Cardiovascular Devices and Design  
Cascade ABC  
Session Chairs: Zahra Keshavarz-Motamed, McMaster University  
Ethan Kung, Clemson University  

1:45PM  
Analyzing The Impact Of TAVR Device Orientation On Post-TAVR Paravalvular Leakage Severity And Thrombogenicity In Bicuspid Aortic Valve Patients  
SB³C2023-076  
S. Anam¹, B. Kovarovic¹, A. Hamdan², R. Haj-Ali³, D. Bluestein¹  
¹Stony Brook University, ²Rabin Medical Center, ³Tel-Aviv University  

2:00PM  
In Silico Investigation on Stroke Risks from Left Ventricular Assist Device  
SB³C2023-538  
Sreeparna Majee¹, Akshita Sahni¹, Erin E. McIntyre¹, Jay D. Pal², Debanjan Mukherjee¹  
¹University of Colorado, ²University of Washington  

2:15PM  
Hemodynamic Performance Of Dual Lumen VV ECMO Cannulas  
SB³C2023-284  
Louis P. Parker¹, Anders Svensson Marcial², Torkel B. Brismar², Lars Mikael Broman²,³, Lisa Prohl Wittberg¹  
¹Royal Institute of Technology, ²Karolinska Institute, ³Karolinska University Hospital  

2:30PM  
A Preliminary In Silico Study On The Fluid Dynamic Changes With Central Venous Catheter Insertion  
SB³C2023-414  
B. Su, H. Palahnuk, T. Harbaugh, E. Rizk, S.W. Hazard, K.B. Manning  
Penn State University  

2:45PM  
Predicting Device Related Thrombosis After Left Atrial Appendage Occlusion Using Computational Fluid Dynamics  
SB³C2023-151  
B. Vogl¹, A. Chavez Ponce², A. El Shaer², A. Bavo³, M. De Buele³, M. Alkhouli², H. Hatoum¹  
¹Michigan Technological University, ²Mayo Clinic, ³FEops  

3:00PM  
Development Of A Novel Polymeric TAVR Valve: Design Optimization And Addressing TAVR Clinical Complications  
SB³C2023-408  
B. Kovarovic¹, R. Helbock¹, O.M. Rotman¹, K. Baylous¹, M. Slepian², D. Bluestein¹  
¹Stony Brook University, ²University of Arizona
Thursday, June 8 1:45PM – 3:15PM MT

Savio Woo Session I: Joint, Ligament, and Muscle
Cascade D

Session Chairs: Daniel Cortes, Pennsylvania State University
Beth Winkelstein, University of Pennsylvania

1:45PM
Strain Thresholds for Neuronal Activation During High-Rate Tensile Loading to Failure: Implications for Pain and Trauma SB3C2023-078
Daniel Du, Sittinon Nuethong, Prabesh Ghimire, Beth A. Winkelstein
University of Pennsylvania

2:00PM
Estimating Soleus Muscle Volume By Anthropometric And Ultrasound-Measurable Parameters SB3C2023-372
Shabnam Rahimnezhad\textsuperscript{1}, Karin G. Silbernagel\textsuperscript{2}, Daniel H. Cortes\textsuperscript{1}
\textsuperscript{1}Pennsylvania State University, \textsuperscript{2}University of Delaware

2:15PM
Quantifying The Effect Of Femoral Component Internal Rotation On Ligament Forces For Total Knee Arthroplasty With Varus Tibial Alignment SB3C2023-448
Jonathan Glenday, Jonathan Vigdorchik, Peter Sculco, Cynthia Kahlenberg, David Mayman, Eytan Debbi, Joseph Lipman, Timothy Wright, Fernando Quevedo Gonzalez
Hospital for Special Surgery

2:30PM
The Role of Posterior Cruciate Ligament on Femoral Rollback in Medial Congruent Total Knee Arthroplasty: A Computational Study SB3C2023-525
Hospital for Special Surgery

2:45PM
Blebbistatin As A Method To Improve Outcomes Following Joint Capsule Release Surgery In An In Vivo Rat Elbow Model SB3C2023-083
Austin J. Scholp, Timothy P. Fowler, Emily Petersen, Douglas Fredericks, James A. Martin, Aliasger K. Salem, Edward A. Sander
University of Iowa

3:00PM
Obesity Affects The Biomechanics Of The Posterior Kinetic Chain During Manual Lifting SB3C2023-456
Sergio A. Lemus\textsuperscript{1}, Mallory Volz\textsuperscript{1}, Francisco Beron-Vera\textsuperscript{1}, Mitchell Hurtado\textsuperscript{1}, Eduard Tiozzo\textsuperscript{1}, Arlette Perry\textsuperscript{1}, Thomas M. Best\textsuperscript{1,2}, Francesco Travascio\textsuperscript{1,3}
\textsuperscript{1}University of Miami, \textsuperscript{2}UHealth Sports Medicine, \textsuperscript{3}Mount Sinai
Emerging Mechanobiology and Biomechanics I
Cascade E

Session Chairs: Soham Ghosh, Colorado State University
Ian Sigal, University of Pittsburgh

1:45PM  
Nuclear Deformation Of The Tricuspid Valve Interstitial Cells: The Effects Of Nuclear Orientation And Extracellular Matrix Structure SB3C2023-222  
Mina Pakzadmanesh, Samuel D. Salinas, Vineet S. Thomas, Rouzbeh Amini  
Northeastern University

2:00PM  
Ultrasoft Edge-Labelled Hydrogel Sensors Reveal Internal Tissue Stress Patterns In Invasive Engineered Tumors SB3C2023-223  
C.M. Boghdady, W. Lee, V. Lelarge, R.L. Leask, L. McCaffrey, C. Moraes  
McGill University

2:15PM  
Deep Learning Enhances Micro-Computed Tomography Image Resolution Of Murine Femurs SB3C2023-604  
Michael A. David1, Tillman James2, Douglas J. Adams1  
1University of Colorado, 2Washington University at St. Louis

2:30PM  
The Role Of Skin Biomechanics In Tactile Perception Of Anti-Aging Formulations SB3C2023-206  
S. Hendrickx-Rodriguez, O. Elsafty, R. Dauskardt  
Stanford University

2:45PM  
Constitutive Modeling Of The Airway Tree Informed By Experimental Biaxial Mechanical Behavior SB3C2023-019  
S. Sattari1, CA. Mariano1, T. Sigaeva2, M. Eskandari1  
1University of California, Riverside, 2University of Waterloo

3:00PM  
Integrated Right Ventricular-Pulmonary Artery Biomechanics In Pulmonary Hypertension SB3C2023-197  
Sunder Neelakantan1, Peng Zhang2,3, Gaurav Choudhary2,3, Reza Avazmohammadi1  
1Texas A&M University, 2Providence VA Med Center, 3Brown University
Biotransport in Directed Cell Migration

Session Chairs: Netanel Korin, Technion
Joanna Dahl, University of Massachusetts

1:45PM
A Microfluidic Platform To Investigate Transport Phenomena In Chemokine Gradient Establishment SB3C2023-380
J. Frattolin¹, D.J. Watson¹, W.V. Bonneuil¹, F. Fasanella Masci², M. Russell³, B.S. Brook³, R.J.B. Nibbs², J.E. Moore Jr¹
¹Imperial College London, ²University of Glasgow, ³University of Nottingham

2:00PM
Quantitative Assessment Of The Role Of Chromatin Mechanics And Architecture In Monolayer Cell Migration SB3C2023-397
Jack Forman, Brady Hine, Eric Havenhill, Samantha Kaonis, Soham Ghosh
Colorado State University

2:15PM
The Mechanics And Morphodynamics Of 3D Migrating Cancer Cells SB3C2023-432
Bo Sun
Oregon State University

2:30PM
Interstitial Chemokine Gradients And Dendritic Cell Migration During Inflammation SB3C2023-464
Matthew J. Russell¹, Francesca Fasanella Masci², Willy V. Bonneuil³, Daniel J. Watson⁴, Jennifer Frattolin⁴, James E. Moore Jr. ⁴, Robert J.B. Nibbs², Bindi S. Brook¹
¹University of Nottingham, ²University of Glasgow, ³KTH Royal Institute of Technology, ⁴Imperial College London

2:45PM
Mechanoregulation Of Cadherin Expression In A 3D Co-Culture SB3C2023-431
Vaishali Bala, Faith Muriuki, M.K. Sewell-Loftin
University of Alabama at Birmingham

3:00PM
Cellular Signal Processing Machinery During Directed Migration Of Cancer Cells SB3C2023-359
Andrew Mugler, Bumsoo Han
¹University of Pittsburgh, ²Purdue University
Mechanobiology in Cancer, Inflammation, and Motility

Gore AB

Session Chairs: Jacopo Ferruzzi, University of Texas at Dallas
Alix Deymier, University of Connecticut

1:45PM

Macrophage Signaling Alters Fibroblast Responses to Mechanical Loading
SB³C2023-519
McKenzie E. Sup, Min Kyu M. Kim, Lee Song, Beth Ashinsky, Jieon J. Kim, Stavros Thomopoulos
Columbia University

2:00PM

Stromal Cells Modulate Chemo-Mechanical Factors In The Tumor Microenvironment Required For Leader Cell Driven Collective Migration
SB³C2023-141
Jessanne Y. Lichtenberg¹, Trey P. Redman¹, Ella Ramamurthy¹,², Christopher A. Lemmon¹, Priscilla Y. Hwang¹
¹Virginia Commonwealth University, ²University of California, Berkeley

2:15PM

Mechanosensitivity of Naïve and Pro-inflammatory Macrophage Polarization upon Extravasation in 3D Musculoskeletal-like Tissue
SB³C2023-560
University of Toledo

2:30PM

Mechanically Primed Cells Transfer Memory To Fibrous Matrices For Invasion Across Environments Of Distinct Stiffness and Dimensionality
SB³C2023-185
José Almeida, Jairaj Mathur, Ye Lim Lee, Bapi Sarker, Amit Pathak
Washington University in St. Louis

2:45PM

Impact of Type V Collagen Deficiency on Fibroblast Mechanosensing Under Inflammatory Stimulation
SB³C2023-384
N. Patel¹, T. Li¹, J. Duggan¹, S.M. Kallish², K.L. Spiller¹, R.J. Petrie¹, L. Han¹
¹Drexel University, ²University of Pennsylvania

3:00PM

Mechanical Stiffening of Extracellular Matrix by Neutrophil Extracellular Traps Promotes Breast Cancer Progression
SB³C2023-405
C.-M. Boghdady, N. Wong, A. Shen, E. Solymoss, M. de Meo, A. Chandrasekaran, R. Rayes, Y. Chen, A. Ghagre, A. Ehrlicher, L. McCaffrey, J. Spicer, P. Siegel, C. Moraes
McGill University
Fibrocartilage: Intervertebral Disc, Meniscus, TMJ

1:45PM  Non-enzymatic Glycation Strengthens Annulus Fibrosus Through Crosslinks Aligned With Primary Collagen Fibers SB3C2023-031
Minhao Zhou, Erin Archibeck, Yarah Feteih, Yousuf Abubakr, Grace D. O’Connell
University of California

2:00PM  Multiscale Biomechanics Across Scales: Micromechanics and Nonlinear Viscoelasticity of the Nucleus Pulposus in Inflammation SB3C2023-573
Timothy D. Jacobson, Gerard A. Ateshian, Nadeen O. Chahine
Columbia University

2:15PM  Influence of Multidirectional Loading On Meniscus Wear Behavior SB3C2023-435
Kate J. Benfield, Katherine J. Fors, Trevor J. Lujan
Boise State University

2:30PM  Identifiability of Poroelastic Model Parameters Using Uniaxial Tension Data: Role of 3D Strain and Unloading SB3C2023-504
John M. Peloquin, Dawn M. Elliott
University of Delaware

2:45PM  Comparison Of Mechanical Response of TMJ and Knee Cartilage Under Dynamic Loading SB3C2023-143
Annie Porter¹, Michael Santare¹, Lin Han², John Peloquin¹, X. Lucas Lu¹
¹University of Delaware, ²Drexel University

3:00PM  Tribological Assessment of PVA Hydrogels as Interpositional Implant Materials in the Temporomandibular Joint SB3C2023-353
Kevin M. Labus, Jason P. Kuiper, Christian M. Puttlitz
Colorado State University
Educational Education: Challenges and Innovations

Session Chairs: Chiara Bellini, Northeastern University
Zhongping Huang, West Chester University

1:45PM  Computation For Bioengineering And Mechanical Engineering Students: An Experiential Learning Opportunity In Norway SB3C2023-318
Samuel D. Salinas¹, Ana I. Vargas¹, Turner Jennings¹, Sean Harington¹, Mohammad J. Sadeghinia², Mojgan Y. Jacobsen³, Trine Eide³, Cecilie Udberg-Helle³, Torill Andersen Eidsvaag⁴, Torjer A. Olsen⁵, Jonathan Crossen⁵, Victorien Prot², Bjørn H. Skallerud², Rouzbah Amini⁷
¹Northeastern University, ²Norwegian University of Science and Technology, ³Kinn Education and Resource Centre, ⁴Univesrity of Bergen, ⁵UiT The Arctic University of Norway

2:00PM  Integration Of FEBio As An Instructional Tool For Undergraduate Biomechanics SB3C2023-412
David Jiang, Jeffrey A. Weiss, Lucas H. Timmins
University of Utah

2:15PM  ChatGPT And The Future Of Education In Biomedical And Mechanical Engineering SB3C2023-588
Sara E. Wilson
University of Kansas

2:30PM  Mega Data Analysis of Sex Distribution of Study Samples Reported in Summer Biomechanics, Bioengineering, & Biotransport Annual Meeting Abstracts SB3C2023-093
F. Sebastian, A. Hurgoi, M. Schaenen, H. Shah, V. Rivera, K. Le, D. Ng, R. Amini
Northeastern University

2:45PM  Bringing Discussions of Accessibility to Engineering Classrooms SB3C2023-378
N. Rich¹, S. Johnson¹, C. Bellini²
¹Tatum Robotics, ²Northeastern University

3:00PM  It Takes a Village: Catalyzing Clinically-driven Undergraduate Design Projects at the Nexus of Engineering, Medicine and Business SB3C2023-337
Byron D. Erath, Laurel Kuxhaus
Clarkson University
Biomechanical Considerations in Cardio. Biomechanics

Session Chairs: Kyoko Yoshida, University of Minnesota
Matthew R. Bersi, Washington University in St. Louis

1:45PM
The Effects Of Strain History On Aortic Valve Interstitial Cell Activation In A 3D Hydrogel Environment SB3C2023-071
Toni M. West, Daniel P. Howsmon, Miles W. Massidda, Helen N. Vo, Athena A. Janobas, Aaron B. Baker, Michael S. Sacks
University of Texas at Austin

2:00PM
Improving Anti-Thrombogenic Potential Of A Porohyperelastic Bilayered Vascular Graft Using Luminal Reversal Flow SB3C2023-164
Ali Behrangzade1, Sang-Ho Ye1,2, William R. Wagner1,2, Jonathan P. Vande Geest1,2,3
1University of Pittsburgh, 2McGowan Institute for Regenerative Medicine, 3Vascular Medicine Institute

2:15PM
Measurement of clot attachment forces to biomaterials and comparison to a hyperelastic simulation SB3C2023-317
Jose L. Monclova, Sara E. Almasy, Nicolas Tobin, Vikas Kannojiya, Francesco Costanzo, Scott Simon, Keefe B. Manning
Penn State

2:30PM
Biomechanical Effects Of Annuloplasty Ring Sizing For Functional Mitral Regurgitation Repair SB3C2023-140
Gediminas Gaidulis, Muralidhar Padala
Emory University

2:45PM
Investigating Elastin Fiber Kinematics In Porcine Epicardial Layer With Laser Scanning Confocal Microscopy SB3C2023-345
Sara R. McMahan1, Alan Taylor1, Duc Khang Chung1, Jiazhu Xu1, Matthias Peltz2, Pietro Bajona1,2, Yi Hong1, Jun Liao1
1University of Texas, 2Drexel University

3:00PM
Comparison of some novel 1D implementations of hyperelastic arterial models with 3D approaches for a cylindrical test case SB3C2023-453
Jacob Sturdy1, Friederike Schäfer1, Aleksander Sinek1,2, Mateusz Mesek1,2, Marek Rojczyk2, Wojciech P. Adamczyk2, Bartomiej Melka2, Ziemowit Ostrowski2, Ryszard Białecki2
1Norwegian University of Science and Technology, 2Silesian University of Technology
Emerging Areas in Biofluids

Session Chairs: Joseph van Batenburg-Sherwood, Imperial College London
Ellie Rahbar, Wake Forest University

3:30PM Effects of Wildland Fire Smoke Exposure on Airflow and Particle Deposition in the Mouse Respiratory Tract SB3C2023-443
Matthew J. Eden, Jacqueline Matz, Chiara Bellini, Jessica M. Oakes
Northeastern University

3:45PM The Effects of Cerebrospinal Fluid and Hyperelastic Model on Aneurysm Wall Vibration Using High-fidelity Fluid-structure Interaction Simulations SB3C2023-379
Kei Yamamoto\(^1\), David Bruneau\(^2\), David Steinman\(^2\), Kristian Valen-Sendstad\(^1\)
\(^1\)Simula Research Laboratory, \(^2\)University of Toronto

4:00PM Dynamic Response Characterization Of Sheep Lymphatic Pumping During Growth And Remodeling SB3C2023-541
Young Jae Ryu, Sophia Mavris, Zhanna Nepiyushchikh, Rudolph L. Gleason, J. Brandon Dixon
Georgia Institute of Technology

4:15PM Improved In Vivo Measurements Of Outflow Facility In Mice By Accounting For The Time-Varying Effects Of Anesthesia SB3C2023-480
Michael Madekurozwa\(^1\), Nicholas Tolman\(^2\), Simon W. John\(^2\), Darryl R. Overby\(^2\), Joseph van Batenburg-Sherwood\(^1\)
\(^1\)Imperial College London, \(^2\)Columbia University

4:30PM Left Renal Vein Stenosis Alters Renal Venous Impedance During Murine Pregnancy SB3C2023-200
Jennifer L. Anderson\(^1\), Riley L. Holloway\(^1\), Paula A. Torres Loza\(^1,2\), David G. Reuter\(^3\), Craig J. Goergen\(^1\)
\(^1\)Purdue University, \(^2\)National University of Colombia, \(^3\)Seattle Children’s Hospital

4:45PM Dynamics Of Shear Stress In Embryonic Chick Heart Anatomies Reconstructed From Light Sheet Fluorescence Microscopy SB3C2023-219
K. Giesbrecht, S. Rossi, M. Bressan, B. Griffith
University of North Carolina at Chapel Hill
Savio Woo Session II: Ligament & Tendon Growth & Loading  
Cascade D  

Session Chairs: Jeffrey Weiss, University of Utah  
Stephanie Cone, University of Delaware

3:30PM  ACL Injury And Joint Instability Leads To Meniscal Hypertrophy In A Skeletally Immature Porcine Model  
SB3C2023-536  
Jacob D. Thompson, Margaret E. Easson, Danielle Howe, Lauren V. Schnabel, Jeffrey T. Spang, Brian G. Pietrosimone, Matthew B. Fisher  
North Carolina State University

3:45PM  Mechanical and Multiscale Structural Changes Due to Repetitive Fatigue Loading in an In Vivo Rat Overuse Model  
SB3C2023-218  
Pooja Chainani1,2, Maria Buzo Mena1, Daniela Yeritsyan1, Daniela Caro1, Kaveh Momenzadeh1, Joseph P. DeAngelis2, Arun J. Ramappa2, Ara Nazarian1,2  
1Harvard Medical School, 2Boston University

4:00PM  Changes in Viscoelastic Mechanical Properties and Gene Expression in Rat Achilles Tendon Due to Treadmill Running Depend on Exercise Intensity and Duration  
SB3C2023-532  
Margaret K. Tamburro, Kelsey A. Bonilla, Snehal S. Shetye, Thomas P. Leahy, Jeremy D. Eekhoff, Daniel C. Farber, Louis J. Soslowsky  
University of Pennsylvania

4:15PM  Reduced Postnatal Loading After Sciatic Nerve Resection Impairs Achilles Tendon Growth And Maturation  
SB3C2023-454  
Talayah A. Johnson1, Natalie Fogarty1, Alisia Lin1, Tonia K. Tsinman1, Xi Jiang1, Eiki Koyama2, Lin Han3, Josh R. Baxter4, Robert L. Mauck1, Nathaniel A. Dyment1  
1University of Pennsylvania, 2Children’s Hospital of Pennsylvania, 3Drexel University

4:30PM  Tendon Overload Using A Rodent Model Of Synergist Ablation Leads To Mechanical Degeneration  
SB3C2023-494  
Lily M. Lin, Ellen T. Bloom, John M. Peloquin, Michael H. Santare, Justin Parreno, Karin G. Silbermagel, Dawn M. Elliott  
University of Delaware

4:45PM  Cellular Senescence Suppresses ECM Synthesis In Response To Mechanical Unloading in Tendon Explants  
SB3C2023-047  
Emma J. Stowe, Brianne K. Connizzo  
Boston University
Emerging Mechanobiology and Biomechanics II

Cascade E

Session Chairs: Hannah Cebull, Purdue University
Chiara Bellini, Northeastern University

3:30PM Plasticity And Avalanche Failure In Computational Models Of Pulmonary Collagen-Elastin Fiber Networks SB3C2023-598
Jacob Herrmann¹, Yuqing Deng², Béla Suki²
¹University of Iowa, ²Boston University

3:45PM Determining Strains From Intact Airway Inflation Tests As Compared To Isolated Uniaxial And Biaxial Tensile Tissue Testing SB3C2023-166
Crystal A. Mariano¹, Stanislav Polzer², Mona Eskandari¹
¹University of California, Riverside, ²VSB-Technical University of Ostrava

4:00PM PolyFEM: Finite Element Solver For Complex Biomechanics Problems SB3C2023-441
Pranav Jain¹, Liam Martin², Zachary Ferguson¹, Torkan Gholamalizadeh³, Faezeh Moshfeghifar¹, Kenny Erleben⁴, Steven Abramowitch², Daniele Panozzo¹, Teseo Schneider⁵
¹New York University, ²University of Pittsburgh, ³3Shape ApS, ⁴University of Copenhagen, ⁵University of Victoria

4:15PM Spatial Mapping The Material And Structural Properties Of The Uterine Fibroid-Myometrium Boundary SB3C2023-298
Daniella M. Fodera¹, Johanna L. Lund-Jackson1, Shuyang Fang1, Arnold Advincula1, Michelle L. Oyen2, Kristin M. Myers1
¹Columbia University, ²Washington University in St. Louis

4:30PM Design And Evaluation Of A Floating Platform System For Mechanical Testing Of Mesoscale Gels And Tissues SB3C2023-403
Tyler G. Tuttle, Sarah Calve
University of Colorado Boulder

4:45PM Modeling Ultrasound-Derived Acoustic Radiation Forces In Hydrogels Using 3D Force Microscopy SB3C2023-096
Kevin P. Grassie, Fei Wang, Bryan D. Huey, Yusuf M. Khan
University of Connecticut
Innovative Brain Mechanics Characterization

Cascade F

Session Chairs: Maria Holland, University of Notre Dame
Reuben Kraft, Pennsylvania State University

3:30PM ElastUNet: Three-Dimensional Discovery of Elastic Material Parameters Using Deep Learning SB³C2023-057
Ali Kamali, Kaveh Laksari
University of Arizona

3:45PM Inverse Finite Element Modeling Captures Wave Propagation in High-Rate Oscillatory Shear Tests on Porcine Brain Tissue SB³C2023-172
Gregory M. Boiczyk, Noah R. Pearson, Kenneth L. Monson
University of Utah

4:00PM Identifying Commonalities of Harmonic Brain Deformation Induced by Magnetic Resonance Elastography in Vivo SB³C2023-180
J.D. Escarcega¹, A.A. Alshareef², A.K. Knutsen², R.J. Okamoto¹, P.V. Bayly¹
¹Washington University, ²Henry M. Jackson Foundation for the Advancement of Military Medicine

4:15PM Investigating the Frequency-Dependent Skull-Brain Motion Transmissibility through MR Elastography SB³C2023-600
F. Rezayaraghi¹, E. Triolo², C. Neher¹, M. Kurt¹,²
¹University of Washington, ²Mount Sinai

4:30PM Novel Magnetic Resonance Imaging Phantoms For Investigating Skull-Brain Mechanics SB³C2023-576
Joy Mojumder¹, Suhas Vidhate², Yuan-Chiao Lu¹,³, Ahmed Alshareef³,⁴, Curtis L. Johnson⁵, Dzung L. Pham¹,⁶, John A. Butman¹
¹National Institutes of Health, ²Intuitive Surgical, Inc., ³Henry M. Jackson Foundation, ⁴University of South Carolina, ⁵University of Delaware, ⁶Uniformed Services University

4:45PM Post-mortem Changes in Anisotropic Mechanical Properties of Brain Tissue Measured by MR Elastography SB³C2023-033
Shuaihu Wang¹, Charlotte A. Guertler¹, Ruth J. Okamoto¹, Curtis L. Johnson², Matthew D.J. McGarry³, Philip V. Bayly¹
¹Washington University in St. Louis, ²Delaware University, ³Dartmouth College
Mechanobiology in Tissue and Cellular Engineering

Gore AB

Session Chairs: Spencer Szczesny, Pennsylvania State University
Virginia Ferguson, University of Colorado

3:30PM  Prestress On Nascent Desmosomes Regulates Electrophysiology Of Stem Cell-Derived Heart Muscle SB3C2023-346
Daniel W. Simmons, David R. Schuften, Jingxuan Guo, Kasoorelope Oguntuyo, Ghiska Ramahdita, Mary Munsell, Brennan Kandalaft, Missy Pear, Nathaniel Huebsch
Washington University in St. Louis

3:45PM  Epigenetic Treatments Restore Nuclear Architecture in Cardiomyocyte Cultures SB3C2023-556
Stephanie E. Schneider, Adrienne K. Scott, Corey P. Neu
University of Colorado

4:00PM  Synaptopodin Enables Focal Adhesions To Resist Perpendicular Force SB3C2023-224
Chengqing Qu¹, Shumeng Jiang¹, Farid Alisafaei², Jeffrey H Miner¹, Hani Y. Suleiman¹, Guy M. Genin¹
¹Washington University in St. Louis, ²New Jersey Institute of Technology

4:15PM  Multiscale Mechanobiologically Optimized Scaffold Designs For Bone Tissue Engineering SB3C2023-054
Timothy O. Josephson, Elise F. Morgan
Boston University

4:30PM  In-Situ Viscoelasticity Measurement Of Cell Monolayer By Strain Sensing Of Elastohydrodynamic Force In Microfluidic Channel SB3C2023-216
Tianzheng Guo, Xiaoyu Zou, Shalini Sundar, Xinqiao Jia, Charles Dhong
University of Delaware

4:45PM  Development Of An Activating And Inactivating Optogenetic Toolbox For Perturbation Of Rhoa-Yap Mechanotransductive Feedback SB3C2023-173
Erin E. Berlew, Annapurna Pranatharthi-Haran, Brian Y. Chow, Joel D. Boerckel
University of Pennsylvania
Spine and Shoulder Mechanics  
Gore CD

Session Chairs: Arin Ellingson, University of Minnesota  
Grace O’Connell, University of California, Berkeley

3:30PM  
Examination of the Coupled Motion of the Lumbar Functional Unit During Dynamic Motion  
SB3C2023-558  
Matthew R. MacEwen, Rebecca E. Abbot, Victor H. Barocas, Arin M. Ellingson  
University of Minnesota-Twin Cities

3:45PM  
Risk Of Vertebral Endplate Failure During Vertebral Fracture  
SB3C2023-060  
Neilesh R. Frings, Elise F. Morgan  
Boston University

4:00PM  
Cyclic Loading Comparison Between Standard Ultra-High Molecular Weight Polyethylene Blocks And Biofidelic Solid Rigid Polyurethane Blocks For ASTM Pedicle Screw Testing  
SB3C2023-333  
Jeremy G. Loss¹, Robb W. Colbrunn¹, Kevin J. Lawson²  
¹Cleveland Clinic, ²Ascension Medical Group

4:15PM  
Bulk Properties of the Murine Spine are Maintained During 30-Days of Microgravity on the International Space Station  
SB3C2023-088  
Shiyin Lim¹, Joanna E. Veres¹, Eduardo A.C. Almeida², Grace D. O’Connell¹  
¹University of California – Berkeley, ²NASA Ames Research Center

4:30PM  
Adaptive Changes In The Bat's Shoulder Anatomy Allow For Repetitive Overhead Motions  
SB3C2023-528  
Iden Kurtaliaj¹, Jennifer Kunes¹, K. Michael Rowley²³, Lynn Ann Forrester¹, Mikhail Golman¹, Guy M. Genin⁴, Sharon M. Swarz², Stavros Thomopoulos¹  
¹Columbia University, ²Brown University, ³California State University East Bay, ⁴Washington University at St. Louis

4:45PM  
Evaluating The Effect Of Soft Tissue Forces On The Fixation Mechanics Of Reverse Shoulder Arthroplasty: A Finite Element Analysis Driven By Musculoskeletal Simulations  
SB3C2023-400  
Jonathan Glenday¹, Benjamin Johnston², Fernando Quevedo Gonzalez¹ Lawrence Gulotta¹, Andreas Kontaxis¹  
¹Hospital for Special Surgery, ²Cornell University
Growth and Remodeling II

Session Chairs: Kyoko Yoshida, *University of Minnesota*
Adrian Buganza Tepole, *Purdue University*

3:30PM  The mTOR Inhibitor Rapamycin Decreases Subchondral Thickness And Affects Variability In The Tibial Plateau Of Common Marmosets SB3C2023-336
Michael D.K. Focht1, Dennis M. Minton2,3, Adam B. Salmon4,5, Adam R. Konopka2,3, Mariana E. Kersh1
1University of Illinois, 2University of Wisconsin-Madison, 3William S. Middleton Memorial Veterans Hospital, 4University of Texas, 5Audie L. Murphy Hospital

3:45PM  Growth And Remodeling In Sparse And Semi-Sparse Tissues: Bridging The Gap Between The Constrained Mixture Model And Eshelby's Inclusion SB3C2023-446
Ryan R. Mahutga, Elizabeth D. Shih, Patrick W. Alford
*University of Minnesota*

4:00PM  Personalized Finite Element Model Of Pediatric Tissue Expansion SB3C2023-135
Tianhong Han1, Kaleem Ahmed2, Arun Gosain2, Taeksang Lee3, Adrian Buganza Tepole1
1Purdue University, 2Northwestern University, 3Myongji University

4:15PM  Telocollagen Injectable Significantly Improves Supraspinatus Tendon Mechanical Strength After Full-Tendon Tear in Rats SB3C2023-553
Alexandrea A. Silverman1, Nicolo Rossi2, Jeffrey A. Paten1, Mark A. Randolph2, Luke S. Oh2,3, Jeffrey W. Ruberti1
1Northeastern University, 2Massachusetts General Hospital, 3Rothman Orthopaedics

4:30PM  Computational Analysis of Heart Valve Growth and Remodeling in Pulmonary Autografts after the Ross Procedure SB3C2023-292
Elmer Middendorp1, Fabian Bräu2,3, Frank P.T. Baaijens1, Jay D. Humphrey4, Christian J. Cyron5,6, Sandra Loerakker1
1Eindhoven University of Technology, 2Singapore National Eye Center, 3Singapore-MIT Alliance for Research and Technology, 4Yale University, 5Hamburg University of Technology, 6Helmholtz-Zentrum

4:45PM  Identifying Contributors to Aneurysmal Progression in the Marfan Aorta Using a Constrained Mixture Model SB3C2023-295
David S. Li1, Cristina Cavinato2, Marcos Latorre3, Jay D. Humphrey1
1Yale University, 2University of Montpellier, 3Valencia Polytechnic University
Noninvasive Metrics for Cardio. Biomechanics

Session Chairs: Jun Liao, University of Texas

3:30PM
Pre-Operative Functional Characterization Of Aortic Neck In Abdominal Aortic Aneurysms And Its Association With Type I Endoleak Following EVAR Procedure SB²C2023-482
A Forneris¹,², A. Satriano², R.A. Beddoes², R.D. Moore¹, E.S. Di Martino¹,²
¹University of Calgary, ²ViTAA Medical Solutions

3:45PM
4D Ultrasound-Based Strain Can Characterize Early Progression of Myocardial Infarction in Mice and Rats SB³C2023-048
Conner C. Earl¹,², Ana C.M. Omoto³, Karthik Annamalai¹, Alyssa Richards¹, Samuel X. Zhang¹, Adalyn M. Meeks¹, Alexandre A. de Silva³, Craig J. Goergen¹,²
¹Purdue University, 2Indiana University, 3University of Mississippi

4:00PM
Comparison Between Material Properties Obtained from Ultrasound Image Based Inverse FE Method Against Ex-Vivo Inflation Test SB³C2023-385
Hadi Wiputra¹, Sydney Q. Clark², Craig J. Goergen², Matthew R. Bersi³, Victor H. Barocas¹
¹University of Minnesota, ²Purdue University, ³Washington University in St. Louis

4:15PM
Procedural Strategy Impact On Outcomes Of Transcatheter Aortic Valve Replacement For Bicuspid Aortic Valves SB³C2023-131
Breandan Yeats¹, Sri Krishna Sivakumar¹, Milad Samaee¹, Pradeep Yadav², Venkateshwar Polsani², Vinod Thourani², Stephanie Sellers³, Janarthanan Sathanathan³, Lakshmi Dasi¹
¹Georgia Tech & Emory University, ²Piedmont Heart Institute, ³University of British Columbia

4:30PM
A New Approach To Characterize Trabeculae Carneae Structures Using High-Resolution Human Heart Images SB³C2023-567
Yasamin Seddighi¹, Keith Bartels², Hai-Chao Han¹
¹University of Texas at San Antonio, ²Southwest Research Institute

4:45PM
Evaluating the use of Elastic Registration for Determining Atrioventricular Valve Annulus Mechanics SB³C2023-390
Devin W. Laurence¹, Christian Herz¹, Silvani Amin¹, Ana Sulentic¹, Patricia Sabin¹, Andras Lasso², Matthew A. Jolley¹
¹Children's Hospital of Philadelphia, ²Queen’s University
Poster Sessions

Posters will be presented in two sessions as listed below. Please see the “Instructions for Poster Presenters” on Page 8. The poster viewing area is located in the Gore Pavilion and will be open throughout the conference.

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<td>Tuesday, June 6, 12:45PM – 2:15PM MT</td>
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Poster Session I

Biotransport

P1 Molecular dynamics studies of sugar solutions for controlling water rotational relaxation time SB\(^3\)C2023-098
Kang Hu, Ryo Shirakashi
University of Tokyo

P2 Repeatability And Backlash Distances Of Microneedles Displaced Using A Novel Actuation Block SB\(^3\)C2023-241
Brianna E. Morales, Christopher G. Rylander
University of Texas at Austin

P3 Non-Invasive Stroke Work As A Predictor Of Myocardial Contractility In Duchenne Muscular Dystrophy SB\(^3\)C2023-238
Israel O. Ajiboye\(^1\), Navaneeth Chandran\(^1\), Michael D. Taylor\(^2\), Rupak K. Banerjee\(^1\)
\(^1\)University of Cincinnati, \(^2\)Cincinnati Children’s Hospital Medical Center

P4 MRI Guided Focused Ultrasound Drug Delivery to DIPG Tumors in a Mouse Model SB\(^3\)C2023-025
Payton J. Martinez, Genna Nault, Jenna Steiner, Natalie Serkova, Adam Green, Mark Borden
University of Colorado

P5 A Cost Function Approach Applied to Muscle Cryopreservation SB\(^3\)C2023-013
Casey J. Kraft, Weston J. Upchurch, Michael L. Etheridge, Paul A. Iaizzo, John C. Bischof
University of Minnesota

P6 Enabling Cryopreservation Through Vitrification And Rewarming At The Scale Of A Human Organ SB\(^3\)C2023-171
Lakshya Gangwar\(^1\), Zonghu Han\(^1\), Mikaela Hintz\(^1\), Jacqueline L. Pasek-Allen\(^1\), Robert C. Goldstein\(^2\), Michael L. Etheridge\(^1\), John C. Bischof\(^1\)
\(^1\)University of Minnesota, \(^2\)AMF Life Systems LLC

P7 Frequency Optimization of a Novel Skin Blood Flow Transducer SB\(^3\)C2023-501
Georgia E. Robles, Christopher M. Francis, Saeed I. Latif, David A. Nelson
University of South Alabama
Characterization Of Cellular Response To Endovascular Ablative Therapies In 2D And 3D

S. Brocklehurst, Amin Sabaghan, D. Stolley, N. Ghousifam, E. Cressman, D. Fuentes, M.N. Rylander

University of Texas at Austin

Design, Dynamics, & Rehabilitation

Joint Space Of The First Carpometacarpal Joint: Correlation Between Computed Tomographic And Simulated X-Ray Measurement

David Jordan, C. Kent Kwoh, Zong-Ming

University of Arizona

Changes In Thumb Force Due To Osteoarthritis

Nicole D. Arnold¹, Adam J. Chrzan¹, Kevin Chan², Tamara Reid Bush¹

¹Michigan State University, ²Spectrum Health

Fluid Mechanics

Poroelastic Model Of Trabecular Structures In The Developing Heart

Christine Miller Buffinton, James W. Bush

Bucknell University

A self-powered pump for patients with a single ventricle heart

Mahdi Esmaily, Dongjie Jia

Cornell University

A Comparative Study on the Difference in Arteriovenous Fistula CFD Simulations Based on Geometry Length

Kaitlin M. Southern, Fatemeh Bahmani, Veeranna Maddipati, Stephanie M. George

East Carolina University

Patient-Specific Pulmonary Hypertension Simulations in Sickle Cell Disease Patients, a Viscosity Model Study

Fatemah Bahmani, Alex Vahdati, Veeranna Maddipati, Stephanie M. George

East Carolina University

Sensitivity of Platelet Activation in an ECMO Pump due to Different Modelling Approaches

Francesco Fiusco¹, Lars Mikael Broman²,³, Lisa Prahl Wittberg¹

¹KTH Royal Institute of Technology, ²Astrid Lindgren’s Children’s Hospital, ³Karolinska Institutet

Post-MitraClip Mitral Valve Gradient with MitraClip G4

Shelley C. Gooden¹, Mani A. Vannan², Konstantinos D. Boudoulas³, Vinod H. Thourani², Pradeep K. Yadav², Lakshmi P. Dasi¹

¹Georgia Institute of Technology, ²Piedmont Heart Institute, ³Wexner Medical Center
P17 Fluid-Structure Interaction Simulation In An Idealised Model Of The Dissected Aorta: Relation Between False Lumen Pressure And Outflow Via Side Branches SB\textsuperscript{3}C2023-383 Amith Balasubramanya\textsuperscript{1}, Lise Gheysen\textsuperscript{1}, Nele Famaey\textsuperscript{2}, Joris Degroote\textsuperscript{1}, Patrick Segers\textsuperscript{1} \textsuperscript{1}Ghent University, \textsuperscript{2}KU Leuven

P18 A Computational Model For The Roughness Of Coronary And Cerebral Artery Stenosis And Treatment For Diabetes Mellitus Disease SB\textsuperscript{3}C2023-433 S. Piskin \textsuperscript{1}Istinye University

P19 Effect of Aortic Curvature on Bioprosthetic Aortic Valve Performance SB\textsuperscript{3}C2023-490 B. Vogl\textsuperscript{1}, R. Gadhya\textsuperscript{1}, Z. Wang\textsuperscript{2}, A. Chavez Ponce\textsuperscript{3}, A. El Shaer\textsuperscript{3}, M. Alkouili\textsuperscript{3}, H. Hatoum\textsuperscript{1} \textsuperscript{1}Michigan Technological University, \textsuperscript{2}The Ohio State, \textsuperscript{3}Mayo Clinic

P20 Vorticity Transport In Aneurysms Of The Abdominal Aorta SB\textsuperscript{3}C2023-356 Valentina Mazzi\textsuperscript{1}, Karol Calò\textsuperscript{1}, Maurizio Lodi Rizzini\textsuperscript{1}, Ludovica Saccaro\textsuperscript{2,3}, Diego Gallo\textsuperscript{1}, Angelo Iollo\textsuperscript{2,3}, Umberto Morbiducci\textsuperscript{1} \textsuperscript{1}Politecnico di Torino, \textsuperscript{2}Université de Bordeaux, \textsuperscript{3}Inria-Bordeaux Sud-Ouest

P21 Investigating The Role Of Eccentric Inlet Conditions On Hemodynamic Results At Different Stages Of Aneurysm Growth SB\textsuperscript{3}C2023-601 Federica Galbiati\textsuperscript{1,2}, Emanuele Vignali\textsuperscript{3}, Katia Capellini\textsuperscript{3}, Claire Morin\textsuperscript{2}, Stéphane Avril\textsuperscript{2}, Emiliano Costa\textsuperscript{1}, Simona Celi\textsuperscript{3} \textsuperscript{1}RINA Consulting SpA, \textsuperscript{2}INSERM, \textsuperscript{3}BioCardioLab

P22 A Fluid-Solid-Growth Framework For Simulating Patient-Specific Vascular Growth And Remodeling Using Constrained Mixture Theory SB\textsuperscript{3}C2023-268 Erica L. Schwarz\textsuperscript{1}, Martin R. Pfaller\textsuperscript{1}, Jason Szafron\textsuperscript{1}, Christopher Breuer\textsuperscript{2}, Jay D. Humphrey\textsuperscript{3}, Alison L. Marsden\textsuperscript{1} \textsuperscript{1}Stanford University, \textsuperscript{2}Nationwide Children’s Hospital, \textsuperscript{3}Yale University

P23 Towards Modeling Acute Ischemic Stroke: In Vitro Experiments and Simulations of Blood Flow and Mean Arterial Pressure in an Artificially Clotted Cerebrovascular Model SB\textsuperscript{3}C2023-447 Saurabh Bhardwaj\textsuperscript{1}, Brent A. Craven\textsuperscript{2}, Jacob E. Sever\textsuperscript{1}, Francesco Costanzo\textsuperscript{1}, Scott D. Simon\textsuperscript{1}, Keefe B. Manning\textsuperscript{1} \textsuperscript{1}Pennsylvania State University, \textsuperscript{2}US FDA

P24 The Influence Of Hemodiluted Blood Viscosity On Patient Hemodynamics During Cardiopulmonary Bypass SB\textsuperscript{3}C2023-162 Nafis M. Arefin, Allison R. Cripps, Bryan C. Good \textit{University of Tennessee}

P25 Validating Multi-scale Coronary Simulation Pipeline Against Coronary Intravascular Velocity and Pressure Measurements SB\textsuperscript{3}C2023-016 Anahita A. Seresti\textsuperscript{1}, Alison L. Marsden\textsuperscript{2}, Andrew M. Kahn\textsuperscript{3}, M. Owais Khan\textsuperscript{1} \textsuperscript{1}Toronto Metropolitan University, \textsuperscript{2}Stanford University, \textsuperscript{3}University of California – San Diego
Multi-Omic Analysis Of Resected Thrombi Identifies Complex Traits Associated With Ischemic Stroke Etiology
Briana A. Santo, Kerry E. Poppenberg, Andre Monteiro, Adnan H. Siddiqui
University of Buffalo

Laser Ablation: A New Leaflet Modification Strategy To Prevent Coronary Obstruction In Redo Tavr
John T. Briansky, Masod Sadipour, Ali Azadani
University of Denver

Verification Errors In Eulerian Power-Law Hemolysis Model Predictions In Simple Flows
Mohammad M. Faghih, Brent A. Craven, M. Keith Sharp
1US FDA, 2University of Louisville

Endothelial Nuclear Morphology is Incrementally Sensitive to Shear Stress Magnitude and Directionality
Jaideep Sahni, Mehwish Arshad, Peter D. Weinberg, Ryan M. Pedrigi
1University of Nebraska-Lincoln, 2Imperial College London

Computational Study of Role of Ultra Large Von Willebrand Factor in COVID-19 Related Thrombosis
Nahid Rahmati, Nima Maftoon
University of Waterloo

Rotational Impact-Induced Brain Injury, a Biomimetic Study
Q. Wang, J. Lang, R. Nathan, Q. Wu
1Villanova University, 2Southeast University, 3Pennsylvania State University

Solid Mechanics: Cardiovascular

High-Throughput Automated Mechanical Analysis of Human Induced Pluripotent Stem Cell Derived Cardiac Microtissue
H. Kobeissi, E. Lejeune
Boston University

Changes In Right Ventricle Anisotropic Viscoelastic Behavior With Pulmonary Hypertension Development
Colorado State University

A Three-node Rotation-free Kirchhoff-love Shell Formulation For Cardiovascular Applications
L. Shi, Y. Chen, V. Vedula
Columbia University

Establishment Of A Validated Finite Element Framework To Predict The 3D, Patient-Specific Arterial Mechanical Environment
Caleb C. Berggren, Y.F. Jack Wang, Lucas H. Timmins
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P36 Anisotropic Material Property and Local Strength Characterization of Human Carotid Plaques: A Bayesian Optimization Based Inverse Finite Element Modeling SB^3C2023-091
S. Guvenir Torun¹, B. Kaaij¹,², P. de Miguel Munoz¹,², H. Crielaard¹, H.J.M. Verhagen¹, G.J. Kremers¹, A.F.W. van der Steen¹, A.C. Akyildiz¹,²
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P37 Changes in Myocardial Deformation Induces Abnormalities in Valvular Dynamics Causing Mitral Valve Regurgitation SB^3C2023-294
Tawfik M. Hussein¹,², Gediminas Gaidulis²,³, Michael Silverman³, John N. Oshinski¹,³, Muralidhar Padala²,³
¹Georgia Institute of Technology, ²Carlyle Fraser Heart Center, ³Emory University

P38 Computational Assessment of Elastin in a Hybrid Modelling Approach of Arterial Biomechanics SB^3C2023-321
Yousof MA. Abdel-Raouf¹, Mathias Peirlinck², Nele Famaey², Patrick Sips¹, Patrick Segers¹
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P39 Pattern Of Aortic Valve Leaflet Calcification In As Patients: In-Vivo Geometric Description Of Calcific Progression SB^3C2023-006
Mohamed Abdelkhalek, Zahra Keshavarz-Motamed
McMaster University

P40 An Inverse FE Method To Quantify The Relationship Between Mechanical Properties And Residual Stresses In The Myocardium SB^3C2023-478
Manoj Ghosh, Marissa Grobbel, Lik Chuan Lee, Sara Roccabianca
Michigan State University

P41 Effects Of Chordae Rupture On Tricuspid Valve Septal Leaflet Strains: An Ex-Vivo Study On Porcine Hearts SB^3C2023-227
Julia Clarin¹, Keyvan Amini Khoiy², Samuel D. Salinas¹, Dipankar Biswas², Kourosh T. Asgarian³, Francis Loth¹, Rouzbeh Amini¹
¹Northeastern University, ²The University of Akron, ³Jersey Shore University

P42 Right Ventricular Global Longitudinal Strain And Ventricular Dynamics In Patients With Pulmonary Hypertension SB^3C2023-521
Alexandra M. Janowski, Scott Visovatti, Raymond L. Benza, Rebecca R. Vanderpool
The Ohio State

P43 Viscoelastic and Fracture Properties of Clot from Human and Bovine Blood SB^3C2023-104
Gabriella P. Sugerman, Sapun H. Parekh, Berkin Dörtdivanlıoğlu, Manuel K. Rausch
University of Texas at Austin

P44 Biomechanical Characterization Of Neonatal Aortic Coarctation Tissue Informs The Need To Design Bespoke Patient Therapies For Neonatal Coarctation Of The Aorta SB^3C2023-094
Niall Linnane¹,²,³, Robert Johnston¹, Damien P. Kenny²,³, Caitriona Lally¹
¹Trinity College Dublin, ²Royal College of Surgeons, ³Children’s Health Ireland
P45 Ultrasound Imaging To Characterize Inflated Atherosclerotic Plaques SB3C2023-327
Yasmine Guendouz1, Brooke Tronifoglio1, Sherif Sultan2,3, Niamh Hynes2,3, Cleona Gray4, Caitriona Lally1
1Trinity College Dublin, 2University Hospital Galway, 3Galway Clinic, 4Mater Misericordiae University Hospital

P46 Design, Computational And Experimental Evaluation, And 3D Printing Of Patient Specific Stents For Treatment Of Paediatric Aortic Coarctation SB3C2023-286
Robert D. Johnston1, Niall Linnane1,2,3, Samuel Geraghty1, Conor O’Keeffe1, Shirsha Bose1, Damien Kenny3, Caitriona Lally1
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P47 Using A Three-Dimensional Biventricular Mathematical Model To Help Understand Sex Differences In The Onset And Progression Of Pulmonary Arterial Hypertension SB3C2023-211
Kristen M. Garcia, Becky A. Hardie, Jennifer Stowe, Daniela Valdez-Jasso
University of California – San Diego

P48 Multiscale Modeling of Myofiber Disarray In The Left Ventricle Using A Stress-Based Reorientation Law SB3C2023-118
Mohammad Mehri, Charles K. Mann, Hossein Sharifi, Kenneth S. Campbell, Jonathan F. Wenk
University of Kentucky

P49 Method Of Applying Twist To Complex Femoropopliteal Artery Deformations In A Finite Element Study SB3C2023-565
Ali Ahmadi, Anastasia Desyatova
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P50 Implementation Of Experimentally Acquired Tricuspid Valve Leaflet Pre-Strains To An In-Silico Finite Element Model SB3C2023-137
Colton J. Ross1, Arshid Mir1, Harold M. Burkhart1, Ming-Chen Hsu2, Devin W. Laurence3, Chung-Hao Lee1
1University of Oklahoma, 2Iowa State University, 3Children’s Hospital of Philadelphia

P51 Patient-Specific Predictive Simulation of Transcatheter Edge-to-Edge Repair in Humans with Mitral Regurgitation SB3C2023-452
Natalie T. Simonian1, Sneha Vakamudi2, Mark J. Pirwitz2, Alison M. Pouch3, Joseph H. Gormann, III3, Robert C. Gorman3, Michael S. Sacks1
1University of Texas at Austin, 2Ascension Texas Cardiovascular, 3University of Pennsylvania

P52 Comparing The Elastic And Fracture Properties Between Fibrin And Whole Blood SB3C2023-407
Grace N. Bechtel1, Gabrielle P. Sugerman1, Sapun H. Parekh1, Manuel K. Rausch1,2
1University of Texas at Austin, 2Oden Institute for Computational Engineering and Sciences
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P53  Effect Of Muscle Activation on Head-Neck Response in Simulated Frontal Impact Compared To A Unique Military Data Set  SB^3C2023-072
Jesse W. Gerringer\(^1,2\), Karthik Somasundaram\(^1,2\), Frank Pintar\(^1,2\)
\(^1\textit{Medical College of Wisconsin and Marquette University of Tennessee, }\)\(^2\textit{VA Medical Center}

P54  Development of Three - Dimensional Finite Element Model of the Neonatal Brachial Plexus  SB^3C2023-027
Sarah J. Wright, Michele J. Grimm
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P55  Measurement Error Associated With Decoupling Of Instrumented Mouthguards  SB^3C2023-245
Ryan A. Gellner, Mark T. Begonia, Matthew Wood, Lewis Rockwell, Taylor Geiman, Caitlyn Jung, Steve Rowson
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P56  Effect Of Excitation Direction And Frequency On Regional Dynamic Deformation Of The Human Brain  SB^3C2023-561
Ruth J. Okamoto\(^1\), Jordan D. Escarcega\(^1\), Ahmed Alshareef\(^2\), Curtis Johnson\(^3\), Philip V. Bayly\(^1\)
\(^1\textit{Washington University, }\)\(^2\textit{Henry M. Jackson Foundation for the Advancement of Military Medicine, }\)\(^3\textit{University of Delaware}

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P57  Raman Specroscopic Probe Predicts The Composition And Functional Mechanical Properties Of The Intervertebral Disc  SB^3C2023-550
Chenhao Yu\(^1\), Masumeh Kazemi\(^1\), Farida Korna\(^1\), Erik E. Ersland\(^1\), Mark W. Grinstaff\(^1\), Thomas P. Schaer\(^2\), Mads S. Bergholt\(^3\), Edward J. Vresilovic\(^4\), Brian D. Snyder\(^5\), Michael B. Albro\(^1\)
\(^1\textit{Boston University, }\)\(^2\textit{University of Pennsylvania, }\)\(^3\textit{King’s College London, }\)\(^4\textit{University of Delaware, }\)\(^5\textit{Beth Israel Deaconess Medical Center}

P58  The Effectiveness of Custom ACL Bracing in Adolescent Populations: A Finite Element Analysis  SB^3C2023-009
Alexandria D. Mallinos\(^1\), Brian L. Davis\(^1\), Kerwyn C. Jones\(^2\)
\(^1\textit{Cleveland State University, }\)\(^2\textit{Akron Children’s Hospital}

P59  Bendable Osteochondral Allografts for Improved Congruence: Comparison of Computational and Cadaveric Models  SB^3C2023-194
Katherine A. Spack\(^1\), Courtney A. Petersen\(^1\), Peter T. Shyu\(^1\), Edward Guo\(^1\), James T. Cook\(^2\), Melvin P. Rosenwasser\(^1\), Clark T. Hung\(^1\), Gerard A. Ateshian\(^1\)
\(^1\textit{Columbia University, }\)\(^2\textit{University of Missouri}

P60  Mechanical Failure Properties Of Porcine Annulus Fibrosus: An I-PREDICT Study  SB^3C2023-382
J. Seifert\(^1,2\), A. Shah\(^1,2\), L.L. Frazer\(^4\), N. Yoganandan\(^1,2\), B.S. Shender\(^3\), J.B. Sheehy\(^3\), G. Paskoff\(^3\), T. Bentley\(^5\), D.P. Nicolella\(^4\), B.D. Stemper\(^1,2\)
P61 Calcium Signaling In In-Situ Chondrocytes Under Dynamic Compressive Loading
Vineel Kondiboyina, Timothy Boyer, Sandra J. Shefelbine
Northeastern University

P62 Partial Meniscectomy Of The Meniscal Inner Part Increases The Meniscal Deformation And Extrusion
Satoshi Yamakawa, Tomoki Ohori, Issei Ogasawara, Akira Tsujii, Shoji Konda, Seira Sato, Takashi Kanamoto, Ken Nakata
Osaka University

P63 Effects Of External Bathing Solution Osmolarity On Tribological Rehydration And Cartilage Lubrication
Shamimur R. Akanda, David L. Burris, Chris Price
University of Delaware

P64 Slick Yet Stuck: Elucidating The Underlying Adhesive Mechanisms In Articular Cartilage
Jamie M. Benson, David L., Burris
University of Delaware

P65 Partial Meniscus Transplant To Treat Horizontal Cleavage Tear Restores Contact Areas Similar to Partial Meniscectomy
Farid Amirouche¹,², Eric Chang¹, Asher Lichtig¹, Jason Koh²
¹University of Illinois, ²NorthShore University Health System

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P66 Multiscale Characterization of Human Tooth with Combination of SEM, AFM, and FEM
Y. Zhai¹, J. Wang¹, Z. Shi¹, T. Premaraj², S. Premaraj², T. Karpova¹, P. Dong¹, L. Gu¹
¹Florida Institute of Technology, ²Nova Southeastern University

P67 Depth Map Image Based Inflation Test For Mechanical Characterization Of Soft Matter
Rahul L. Maurya¹, Yash K. Shrivastava², Samarth S. Raut¹
¹Indian Institute of Technology, ²Manipal University Jaipur

P68 Micromechanical Model Of Mechanosensitive Collagen Tissues
Kalyn G. Younger, William Cortes, Daniel H. Reich, Thao D. Nguyen
Johns Hopkins University

P69 A Mesoscale Model Of Skin To Investigate The Role Of The Dermis-Epidermis Interface On The Tissue Biomechanics
O. Moreno Flores¹, M. Rausch², A. Buganza Tepole¹
¹Purdue University, ²University of Texas at Austin
P70 Deep Learning Framework For Stress Strain Analysis Over Point Cloud SB³C2023-429
Jia Lu, Nishant Sundaravaradan
University of Iowa

P71 An Inexpensive, Shared Biaxial Device To Study The Multiscale Mechanics Of Soft Materials SB³C2023-332
Alberto Madariaga, Chien-Yu Lin, Mrudang Mathur, Manuel K. Rausch
University of Texas at Austin

P72 Negative-Pressure Lung Mechanics Of Fibrotic And Emphysematous Mouse Lungs SB³C2023-021
K.A.M. Quiros¹, T.M. Nelson¹, A. Ulu¹, E.C. Dominguez¹, T.M. Nordgren¹,², M. Eskandari¹
¹University of California - Riverside, ²Colorado State University

P73 The Material Properties of Healthy Versus Diseased Mouse Lung Parenchyma SB³C2023-049
T.M. Nelson, K.A.M. Quiros, C.A. Mariano, S. Sattari, M. Eskandari
University of California – Riverside

P74 Histopathology of Capsule and Cartilage Predict Elbow Biomechanics via Machine Learning SB³C2023-605
Michael A. David¹, Spencer P. Lake²
¹University of Colorado, ²Washington University in St. Louis

P75 Understanding mechanotransduction of the distal colon and rectum by multiscale and multimodal computational modeling SB³C2023-516
Amirhossein Shokrani, Ashkan Almasi, Bin Feng, David M. Pierce
University of Connecticut

P76 Effects Of GAGs On Microstructure Of Corneal Extracellular Matrix SB³C2023-116
M.E. Emu, H. Hatami-Marbini
University of Illinois at Chicago

P77 Effect Of GAGs On Tensile Properties Of Porcine Cornea SB³C2023-363
H. Hatami-Marbini
University of Illinois at Chicago

P78 Fibrous Finite Element Modeling Of Posterior Sclera SB³C2023-278
Mohammad R. Islam, Fengting Ji, Manik Bansal, Yi Hua, Ian A. Sigal
University of Pittsburgh

P79 Comparing Five Methods To Identify Fracture Toughness Of Soft Tissues SB³C2023-540
Matthew J. Lohr, Manuel K. Rausch
University of Texas at Austin

P80 Extracting Inhomogeneous Orientation Distribution Functions From 3d Image Data Of Fibrous Tissues For Finite Element Simulations SB³C2023-242
Adam Rauff, Michael R. Herron, Steve A. Maas, Jeffrey A. Weiss
University of Utah
Tissue & Cellular Engineering

P81 Understanding Ciliary Waveforms Through Optimization SB³C2023-533
Louis G. Woodhams, Philip V. Bayly
Washington University in St. Louis

P82 Targeting the Chromatin Remodeling in Mesenchymal Stromal Cells Under Hyper Oxidative Stress for Maintaining Cell Phenotype and Viability SB³C2023-335
Lauren A. Monroe, Samantha Kaonis, Neda Kabi, Abigail Fennell, Jack Forman, Soham Ghosh
Colorado State University

P83 Mechanical Regulation of Lumen Growth SB³C2023-557
Wenhui Tang¹, Anqi Chen², Jessie Huang³, Darrell N. Kotton³, Shengqiang Cai⁴, Ming Guo¹
¹MIT, ²Harvard University, ³Boston University, ⁴University of California – San Diego

P84 Fabrication And Mechanical Characterization Of Direct Ink Write 3D Printed Methacrylated Hyaluronic Cerium Oxide Scaffolds SB³C2023-472
Aritra Chatterjee¹, Jordan Turner², Jonathan Banks², Joan Adebowale², Deva D. Chan¹, Juana Mendenhall²
¹Purdue University, ²Morehouse College

P85 Functionalized Nanowires Successfully Load And Sustain Release Of NGF SB³C2023-594
Molly E. Czachor¹, Joel A. Finbloom², Nafisa A. Elghazali², Darnell L. Cuylear², Kevin O. Rivera², Tejal A. Desai³, Chelsea S. Bahney¹,²
¹The Steadman Philippon Research Institute, ²University of California – Riverside, ³Brown University

P86 The Association Between Clot Presentation On Ct, Biological Composition, And Material Properties: Implications For Pre-Treatment Imaging Biomarkers SB³C2023-421
TaJania D. Jenkins¹,², Briana A. Santo¹,², Shiaw-Sing K. Ciecierska¹, Tatsat R. Patel¹,², Debanjan Mukherjee³, Adnan H. Siddiqui¹,², Vincent M. Tutino¹,²
¹Canon Stroke and Vascular Research Center, ²University at Buffalo, ³University of Colorado

P87 A Vascularized Tissue Model To Investigate Human Synoviocyte - Endothelial Cell Crosstalk In Joint Health and Disease SB³C2023-410
Hannah M. Zlotnick¹, Abhishek P. Dhand¹,², Matthew D. Davidson¹, Gabriel J. Rodriguez-Rivera¹, Christopher J. Calo¹, Hannah K. Weppner¹, Laurel E. Hind¹, Jason A. Burdick¹
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P88 Quantifying Alignment in Engineered Tissue Constructs Using Raman Spectroscopy and Computational Modeling SB³C2023-193
Maedeh Lotfi, Hui Zhou, Janny Piñeiro Llanes, Ghatu Subhash, Chelsey S. Simmons, Malisa Sarntinoranont
University of Florida
Amobarbital Prevents Intervertebral Disc Degeneration By Inhibiting Oxidative Stress
Venkateswaran Ganesh¹, Deborah A. Vacek¹, Douglas C. Fredericks¹, Emily B. Petersen¹, Youssef W. Naguib¹,², Anupam Tiwari¹, Yochana Kancheria³, Mitchell C. Coleman¹, James A. Martin¹, Aliasger K. Salem¹, Tae-Hong Lim¹, Dongrim Seol¹
¹University of Iowa, ²Deraya University, ³Des Moines University

Gelatin Hydrogel Poly-Caprolactone 3D Printed Composite Biomaterial Characterization For Meniscal Tissue Engineering
Anthony J. El Kommos, Gabi Schwartz, Andy J. Morejon
University of Miami

Multi-physics Modeling of Neural Dendrite Growth With Electrical Polarization
Shuolun Wang, Xincheng Wang, Maria A. Holland
University of Notre Dame

Highly Parallel Production of Designer Organoids by Mosaic Patterning of Progenitors
Catherine M. Porter, Alex J. Hughes
University of Pennsylvania

Epithelial Monolayers Develop Density and Effective Temperature Differentials to Migrate across Confined Matrices
W.J. Lin, A. Pathak
Washington University

Undergraduate Research and Design

3D Printed Patient-Specific Lower Extremity Model For Assessing Developmental Dysplasia Of The Hip
E. Fontz¹, O. Burkowski¹, J. Palmer¹, E. Scott¹, C. Price²,³, V. Huayamave¹
¹Embry-Riddle Aeronautical University, ²International Hip Dysplasia Institute, ³Orlando Health

Numerical Modeling For Infants With Ductal-Dependent Pulmonary Flow
S. Mulla, M.H. Alzaeim, W.S. Basha, K.B. Kose
Istanbul Medipol University

Development of a Novel Animal Model for Osteochondritis Dissecans: A Radiofrequency Ablation Approach
Kosisochukwu Ogbonna-ukuku, Boyuan Liu, Kristine Fischenich, Virginia L. Ferguson
University of Colorado

Significance of Vasa Vasorum Oxygen Supply in the Nourishment of the Aneurysmal Wall
Manoela Neves, Alexis Throop, Rana Zakerzadeh
Duquesne University
Biomechanical Follow-Up And Evaluation Of Aneurysm Growth  
F.A.M. Garbou, O.O.M. Elnamla, W.A.K.A. Saber, K.B. Kose  
*Istanbul Medipol University*

Heart Rate Impact On Plaque Deposition At The Carotid Artery Bifurcation  
Ramita Sajankila, Esha Navaneethakrishnan, Elvan Dogan, Amir K. Miri  
*New Jersey Institute of Technology*

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**Bachelor’s Level Research**

**P100** The Effects Of Progeria On Central Vascular Tissue, Blood Flow, And Blood Pressure  
L. Roukoz¹, T. Hopper¹, S. Murtada², J. Humphrey², C.A. Figueroa¹  
¹*University of Michigan*, ²*Yale University*

**P101** Computational Modeling Of Hemodynamics In Aortic Root Enlargement  
Surya Sanjay¹, Mia Bonini¹, Alexander Makkinejad¹, Maximilian Balmus², Marc Hirschvogel², Nicholas Burris¹, Bo Yang¹, David Nordsletten¹  
¹*University of Michigan*, ²*King’s College London*

**P102** High Aortic Diameter Variation Is Associated With Turbulent-Like Flow Conditions In Post-Norwood Patients  
Vivian Tan¹, Ankavipar Saprungruang², Brandon Peel², Christopher K. Macgowan², David J. Barron², Shi J. Yoo², M. Owais Khan¹  
¹*Toronto Metropolitan University*, ²*University of Toronto*

**P103** Development and Assessment of a New Web Application to Measure the Orientation and Alignment of Fibrous Tissue  
Katherine J. Fors, Kyle Shannon, Kate J. Benfield, Trevor J. Lujan  
*Boise State University*

**P104** Computational Modeling of Fluid Perfusion in a Biphasic Vocal Folds Tissue During Phonation: Potential Role of Permeability  
Isabella McCollum, Alexis Throop, Durwash Badr, Rana Zakerzadeh  
*Duquesne University*

**P105** Failure in Articular Cartilage: Finite Element Predictions of Stress, Strain, and Pressure Under Micro-Indentation Induced Fracture  
Brandon P. Chelstrom, Dipul Chawla, Corinne R. Henak  
*University of Wisconsin-Madison*

**P106** Comparison Of Left Ventricular Function Estimated From Inverse Finite Element Modeling Using 3D Echocardiographic And Magnetic Resonance Images  
Chenghan Cai¹, Lei Fan¹, Jenny S. Choy², Ghassan S. Kassab², Lik Chuan Lee¹  
¹*Michigan State University*, ²*California Medical Innovations Institute*

**P107** A New Method For Generating Virtual Bone Scans For The Purpose Of Investigating The Effects Of Cortical Microstructure  
Zachary B. Toth, Joshua Gargac  
*Ohio Northern University*
Nintendo LABO For Serious Gaming
Amanda M. Wells, Logan M. Suiter, Jacob G. Colwell, Joshua A. Gargac
Ohio Northern University

Fracture Risk Prediction Using Finite Element Modeling in a Canine Model of Osteosarcoma
Chloe R. Brekhus¹, Kevin M. Labus¹, Bernard Seguin², Christian M. Puttlitz¹, Benjamin C. Gadomska¹
¹Colorado State University, ²VCA Central Victoria Veterinary Hospital

A Bioreactor towards Mechanically Stimulating Stem Cell Differentiation in Bioprinted Orthopedic Tissue Constructs
Shreya Garg, Isadora S. Dos Passos, Hossein Vahid Alizadeh, Carolyn Kim, Jiannan Li, Yunzhi Peter Yang
Stanford University

Fisetin Treated Human Bone Marrow Aspirate Concentrate Rapidly Reduces Senescence Signatures
Jacob B. Singer, Haruki Nishimura, Yoichi Murata, Sealy Hambright, Chelsea S. Bahney, Sudheer Ravuri, Johnny Huard, Marc J. Philippon
SteadmanPhilippon Research Institute

Evaluating The Understandability Of Real-Time Sonified Biofeedback Prototypes For Balance Training
Vibha R. Iyer¹,², Mitchel A. Tillman¹, Antonia M. Zaferiou¹
¹Stevens Institute of Technology, ²Georgia Institute of Technology

Analysis of Frictional Forces During Blood Clot Removal in Experimental Models of Acute Ischemic Stroke
Omar N. Elkhayyat, Bryan C. Good
University of Tennessee

Micro-Computed Tomography For The Determination Of The Dentin-Enamel Junction Density Gradient Width
Bradley S. Rosenberg, Michael Truhlar, Sobhan Katebifar, Alix C. Deymier
University of Connecticut Health

Directional Migration of Ovarian Cancer Cells in a 3D Microtissue Model
Peyton E. Clark, Asha Kumari, Karthikeyan Mythreye, M.K. Sewell-Lottin
University of Alabama at Birmingham

Investigating sport-specific parameters of impacts in ice hockey
University of British Columbia

Normal Variation in Frequency- and Time-Domain Resting State EEG Metrics
Eric Liu¹,², Cidnee Luu¹, Lyndia Wu¹
¹University of British Columbia, ²University of Toronto
P118 Optimization Of Mounting Methods For Tension-Compression Testing Of Murine Intervertebral Disc Joints SB\textsuperscript{3}C2023-626
J. Veres, S. Lim, G.D. O'Connell
University of California, Berkeley

P119 Pregnancy And Age Differentially Affect Mechanically-Induced Collagen Damage in Murine Uterosacral Ligaments SB\textsuperscript{3}C2023-628
Catalina S. Bastías\textsuperscript{1}, Lea M. Savard\textsuperscript{1}, Kathleen Connell\textsuperscript{1}, Kathryn Jacobson\textsuperscript{1}, Sarah Calve\textsuperscript{1}, Virginia L. Ferguson\textsuperscript{1}, Callan M. Luetkemeyer\textsuperscript{1,2}
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P120 Simultaneous Measurements of Temperature and Blood Perfusion Rate During Surface Cooling to Evaluate Cooling Penetration in Human Shoulder Region SB\textsuperscript{3}C2023-612
Jacob Lombardo, Md Jawad Naseem, Liang Zhu
University of Maryland, Baltimore County

P121 The Impact Of Lactation On Pregnancy-Induced Cardiac Hypertrophy During Postpartum In Mice SB\textsuperscript{3}C2023-634
Gracine H. Sime, Arden C. Shen, Molly S. Kaissar, Jennifer L. Anderson, Craig J. Goergen, Kyoko Yoshida
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P122 Application of 3D Printing in Shape Memory Polymer-Based Endovascular Embolization for Preventing Intracranial Aneurysm Rupture SB\textsuperscript{3}C2023-631
Tanner Cabaniss\textsuperscript{1}, Sergio A. Pineda-Castillo\textsuperscript{1}, Bradley N. Bohnstedt\textsuperscript{2}, Chung-Hao Lee\textsuperscript{1}
\textsuperscript{1}University of Oklahoma, \textsuperscript{2}Indiana University

P123 Modulating The Axial Displacement Of Two Photon Polymerized Human Lamina Cribrosa Models SB\textsuperscript{3}C2023-620
Brock J. Pemberton, Remi J. Shittu, Jonathan P. Vande Geest
University of Pittsburgh

P124 Eye-specific 3D Models Of Lamina Cribrosa Hemodynamics Show Shared Trends In Blood Flow, Oxygenation And Sensitivity To Vessel Diameter SB\textsuperscript{3}C2023-629
Andrew Theophanous\textsuperscript{1}, Shaharoz Tahir\textsuperscript{1}, Yuankai Lu\textsuperscript{1}, Yi Hua\textsuperscript{1,2}, Ian A. Sigal\textsuperscript{1}
\textsuperscript{1}University of Pittsburgh, \textsuperscript{2}University of Mississippi

P125 Characterization Of A Polymeric Device For Localized And Controlled Drug Delivery To Cervical Cancer SB\textsuperscript{3}C2023-657
P. Phillips, M. Elbjorn, J. Provençio, D. Di Rocco, R.L. Hood
University of Texas at San Antonio

P126 Investigating Anthropomorphic Hand Movement Patterns To Sign American Sign Language (ASL) Accurately And Repeatedly SB\textsuperscript{3}C2023-655
Lillie Bukzin\textsuperscript{1}, Sophi Schneider\textsuperscript{1}, Julia Zelevinsky\textsuperscript{1}, Ethan Danahy\textsuperscript{1}, Samantha Johnson\textsuperscript{2}
\textsuperscript{1}Tufts University, \textsuperscript{2}Tatum Robotics

P127 Quantitative Polarized Light Imaging of Porcine Pulmonary Valve Leaflets SB\textsuperscript{3}C2023-626
Shreya Sreedhar, Connor Link, Daniel P. Pearce, Colleen M. Witzenburg
University of Wisconsin-Madison
Handheld shear wave tensiometer measurements are sensitive to regional loading in phantom collateral ligaments

Mary E. Laudon, Lesley R. Arant, Joshua D. Roth

University of Wisconsin-Madison

A Mechanical Model Of Glenohumeral Stability Across Species

S. Li¹, I. Kurtalija², S. Swartz³, S. Thomopoulos², G.M. Genin¹

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Automating Collagen Gel Image Segmentation Using Detectron2: An Application of Modern Computer Vision Techniques

Michael I. Cafiero¹, Spencer P. Lake¹, Michael A. David²

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Clinical Immersion of Undergraduate Biomedical Engineering Students: Best Practices for Short-Term Programs

Emily L. Lothamer¹,², Katherine R. Moravec¹,², Amy Hoene¹, P. Mike Wagoner¹, Daniel J. Beckman¹, Craig J. Goergen¹,²

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Tracking The Response Of A Sustained Dynamic Compression Device In An Ovine Tarsal Fusion Model

Erin E. Estrada¹, Jeremiah T. Easley¹, David L. Safranski², Dave Latt³, Naohiro Shibuya⁴, Christian M. Puttlitz¹, Ben C. Gadomski³

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Fluid-Structure Interaction Simulation And Experimental Validation Of Bioprosthetic Heart Valves

Masod Sadipour, Ali Azadani

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A Novel Self-Sealing Dialysis Port

Jacob M. Wright¹, Alan I. Benvenisty², Kenneth R. Nakazawa², Marina de Cos¹, Kirk N. Campbell¹, Eric G. Lima², Evren U. Azeloglu¹

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An Anthropomorphic, Actuated Wrist for Achieving Biomimetic Motion of a Robotic Hand

Jonathan M. Rooney¹, Samantha T. Johnson², Chiara Bellini¹

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Multi-Modal Analysis Of Intracranial Aneurysms To Explore The Relationship Between Wall Enhancement, Phenotype, Internal Stress, And Intrasaccular Hemodynamics


University of Buffalo
A Multi Center Ilias Registry Based Diagnostic Cutoff For Pressure Drop Coefficient In Relation To The Current Pressure And Flow Endpoints In Patients With Coronary Artery Dysfunction

Shreyash M Manegaonkar¹, Mohamed A Effat¹, Tim P van de Hoe², Rupak K Banerjee¹

¹University of Cincinnati, ²Amsterdam UMC

Reaction Kinetics In Electroosmotic Flow Driven Microfluidic Device For Detection Of Antigen

Israel O. Ajiboye, Rupak K. Banerjee

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Quantification Of Tumor Biophysical Heterogeneity Through Mechanical And Ultrastructural Analysis

Bradley J. Mahaffey, Zachary P. Fowler, Zoe Lung, Viven Dang, Neha Anil, Marco Munoz, Joseph Chen

University of Louisville

Studying The Mechanical Reference Domain Of The Heart For Cardiovascular Biomechanics

John Sayut¹, Javiera Jilberto Vallejos¹, Sandra Hager¹, Mia Bonini¹, Marc Hirschvogel¹, David A. Nordsletten¹,²

¹University of Michigan, ²King’s College London

Assessing Transmural Myocardial Perfusion In Healthy And Diseased Pigs Using Multi-Scale Computational Modeling

Victoria E. Sturgess¹, Alyssa Taylor-LaPole², Cooper M. Warren³, Hamidreza Gharahi¹, Elaleh Rahbar¹, Jonathan D. Tune³, Daniel Beard¹, C. Alberto Figueroa¹

¹University of Michigan, ²NC State University, ³University of North Texas, ⁴Wake Forest

Bulk Material Density is Associated with Mechanical Response of Polydimethylsiloxane and Porcine Thoracic Aortic Tissue


University of Pittsburgh

Visualizing the Orifice of Visceral Arteries for In Situ Fenestration of AAA Endovascular Stent Grafts

Cyrus J. Darvish, Nicholas P. Lagerman, Oldrich Virag, Mohammad H. Esfami, David A. Vorp, Timothy K. Chung

University of Pittsburgh

The Role Of Annuloplasty Ring Shape And Size On Tricuspid Valve Repair

Collin E. Haese, Mrudang Mathur, Manuel K. Rausch

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¹*University of Colorado*, ²*University of Rome*

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¹*Wake Forest*, ²*Virginia Tech*

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¹*Western Carolina University*, ²*US FDA*

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1Michigan State University, 2California Medical Innovation Institute

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1Georgia Institute of Technology, 2Emory University, 3Northeast Georgia Medical Center

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P45  Comparing Approaches to Estimate Failure Strength of Sutured Patches Used in
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Earley¹, Peter E. Hammer¹,², David M. Hoganson¹,²
¹Boston Children’s Hospital, ²Harvard College

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¹Children’s Hospital of Philadelphia, ²Queen’s University, ³Archetype Medical Inc., ⁴Western
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¹Eindhoven University of Technology, ²Catharina Hospital Eindhoven, ³Ecole des MINES Saint-
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Aikaterini Tziotziou¹, Eline Hartman¹, Suze-Anne Korteland¹, Antonius F.W. van der Steen¹, Joost Daemen², Jolanda Wentzel¹, Ali C. Akyildiz¹,³
¹Erasmus Medical Center, ²Delft University of Technology

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Ali Kamali, Kaveh Laksari
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Brooke Tornifoglio¹, Sarah McElroy², Alan J Stone³, Karin Shmueli⁴, Catriona Lally¹,5
¹Trinity College London, ²Siemens Healthcare, ³St. Vincent’s University Hospital, ⁴University College London, ⁵Royal College of Surgeons

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¹Trinity College London, ²Boston Scientific Corporation

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C. Yang¹, A.S. Weiss², A Tarakanova¹
¹University of Connecticut, ²The University of Sydney

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University of Glasgow

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¹University of Miami, ²Georgia Institute of Technology, ³Sutra Medical Inc

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¹University of Tennessee, ²Vanderbilt University Medical Center

P66 Viscoelastic And Shear Mechanical Properties Of Human Hypertrophied Septum SB³C2023-347
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¹University of Texas, ²Drexel University

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1University of Texas at San Antonio, 2Allegheny Health Network, 3Northwestern University

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Taisiya Sigaeva1, Yanhang Zhang2
1University of Waterloo, 2Boston University

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1Villanova University, 2University of Pennsylvania, 3University of Nevada

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1Yale University, 2Universitat Politeneica de Valencia, 3Maastricht University

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1Boston University, 2Massachusetts General Hospital

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1Colorado State University, 2Stanford University

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1Imperial College London, 2Royal Centre for Defence Medicine
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Christopher Miller, T Christian Gasser
KTH Royal Institute of Technology, University of Southern Denmark

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Predictive Growth Analysis of Abdominal Aortic Aneurysms Under Surveillance Using Geometric Measures
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University of Texas at San Antonio, Allegheny Health Network, Northwestern University

Vascular Smooth Muscle Cells Retain Their Material Properties in Mechanically Variant Microenvironments
Elizabeth D Shih, Ryan R Mahutga, Katriel S Ng, Patrick W Alford
University of Minnesota

Determining The Geometrical Properties of Urinary Bladder Wall During Passive Filling
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M Talukder, S Kale
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A Predictive Model For The Coverage Of Wounds By Skin Grafts
Haomin Yu, Mohammad Jafari, Yuan Hong, Jacob Sandler, Guy M Genin, Farid Alisafaei
Washington University, New Jersey Institute of Technology

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Drexel University, Wayne State University, University at Albany, Temple University

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Rate Effects and Material Characterization of Skin During Puncture  
Joseph S LeSueur, Frank A Pintar  
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1*National Institutes of Health, 2Henry M Jackson Foundation*

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Turner Jennings, Rouzbeh Amini, Sinan Müftü  
*Northeastern University*

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*Stevens Institute of Technology*

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Ritika R Menghani, Reuben H Kraft  
*Pennsylvania State University*

A Large Deformation Multiphase Continuum Mechanics Model For Shock Loading Of Soft Porous Materials  
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1*University of Colorado, 2Army Research Laboratory*

A Constitutive-Finite Element Model of Cyclic Head Rotations in the Neonatal Piglet  
Ruhit Sinha1, Qianhong Wu2, Ji Lang3, Anne E Staples1  
1*Virginia Tech, 2Villanova, 3Southeast University*

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*Virginia Tech*

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1*Washington University, 2University of Oxford*
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E Dimbath$^1$, L de Castro Brás$^2$, S George$^2$, A Vadati$^2$  
$^1$Duke University, $^2$East Carolina University

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Colin R Smith, Rony-Orijit Dey Hazra, Alex Brady, Matthew T Provencher, Peter J Millett, Scott  
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P100 Effect of Labrum Size on Cartilage Mechanics in a Patient with Cam-Type  
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Luke T Hudson$^1,2$, Travis G Maak$^1$, Andrew E Anderson$^1,2$, Gerard A Ateshian$^3$, Jeffrey A Weiss$^1$  
$^1$University of Utah, $^2$Scientific Computing and Imaging Institute, $^3$Columbia University

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P104  Evaluation of The Relative Stiffness Of Surgically Treated Ruptured and Contralateral  
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Silbernagel$^3$, Daniel H Cortes$^1$  
$^1$Pennsylvania State University, $^2$Hershey Medical Center, $^3$University of Delaware
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P106 Muscle Err-Gamma Overexpression Mitigates The Muscle Atrophy After ACL Rupture
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Aiping Lu1, Katie Sikes2, Ping Guo1, Matthieu Huard1, Kelly Santangelo2, Scott Tashman1, Vihang A Narkar3, Johnny Huard1
1Steadman Philippon Research Institute, 2Colorado State University, 3University of Texas

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1University of Connecticut, 2University of York

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<td>4:00 – 5:30 pm</td>
<td>Industry/exhibitor networking event (SB3C Industry Committee)</td>
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<td>Translational technology pitch competition</td>
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<td>5:30 – 7:00 pm</td>
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<td>Effective Experimental and Computational Workflows with Applications to Biological Tissues (ASME Student Leadership Committee)</td>
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<td>MONDAY, June 5, 2023</td>
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<td>8:00 – 9:30 am</td>
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<td></td>
<td>Nerem ASME Medal: Victor Barocas</td>
<td>Mow ASME Medal: Alison Marsden</td>
<td>Fung ASME Medal: Jessica Oakes</td>
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<td>9:45 – 11:15 am</td>
<td>Machine Learning in Biofluids</td>
<td>Soft Tissue Mechanics</td>
<td>Ocular and Lower Abdomen Biomechanics</td>
<td>Biotransport in Therapeutic Design and Analysis</td>
<td>Engineered In Vitro Models</td>
<td>Cartilage: Composition and Lubrication</td>
<td>Translational Bioengineering</td>
<td>Cardiovascular Mechanobiology</td>
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<td>11:15 – 11:30 am</td>
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<td>Coffee Break</td>
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<td>11:30 – 1:00 pm</td>
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<td>Thrombosis and Hemolysis</td>
<td>Vascular Pathology and Fluid Flow</td>
<td>Ocular and Lung Biomechanics</td>
<td>Sex, Age, and Disease in Brain and Head Injury</td>
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<td>1:00 – 2:30 pm</td>
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<td>POSTER SESSION I with Lunch, Including BS &amp; MS Student Paper Competitions (outdoor tent)</td>
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<td>3:15 – 4:15 pm</td>
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<td>LGBTQ+ Networking Event</td>
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<td>4:15 – 6:15 pm</td>
<td>Workshop: Promoting Research Self-Efficacy to Facilitate Inclusion and Diversity in Mentoring Relationships</td>
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<td>6:30 – 8:30 pm</td>
<td>Welcome Reception</td>
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<td>TUESDAY, June 6, 2023</td>
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<td>8:15 – 9:15 am</td>
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<td>PLENARY: Amy Wagoner-Johnson</td>
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<td>9:30 – 11:00 am</td>
<td>PhD I: Multiscale Mechanics and Transport</td>
<td>PhD II: Cardio, Mechanics and Remodeling</td>
<td>Undergraduate Design Competition</td>
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<td>11:00 – 11:15 am</td>
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<td>Coffee Break</td>
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<td>11:15 – 12:45 pm</td>
<td>PhD IV: Musculoskeletal and Skin Tissue Eng.</td>
<td>PhD V: Musculoskeletal Biomechanics</td>
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<td>12:45 – 2:15 pm</td>
<td>POSTER SESSION II with Lunch, Including BS &amp; MS Student Paper Competitions (outdoor tent)</td>
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<td>2:15 – 3:45 pm</td>
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<td>Prospective Junior Faculty Poster Session (outdoor tent)</td>
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<td>2:15 – 3:45 pm</td>
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<td>Uncertainty Quantification Workshop</td>
<td>Image-Based Mechanics Workshop</td>
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<td>4:00 – 5:00 pm</td>
<td>Women’s Faculty and Post-Doc Networking Event</td>
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<td>7:00 – 9:00 pm</td>
<td>Student Networking Event and Axe-Throwing Melee (Location: Zen Garden. No, seriously!)</td>
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<td>9:30 – 12:30 pm</td>
<td>Force-Based Manipulative Spine Therapy</td>
<td>Augmented Reality Workshop</td>
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<td>SimVascular Workshop</td>
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<td>9:30 – 12:30 pm</td>
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<td>9:30 – 12:30 pm</td>
<td>Committee Meetings</td>
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<td>11:30 – 1:30 pm</td>
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<td>12:45 – 1:45 pm</td>
<td>Snacks &amp; Coffee Break</td>
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<td>3:30 – 5:00 pm</td>
<td>Heart Valve Fluid Mechanics</td>
<td>Thrombosis and Vascular Modeling</td>
<td>Multiscale Biomechanics</td>
<td>Experimental Fluid and Injury Mechanics</td>
<td>Biophysical Effects on Cells and Tissues</td>
<td>Structure and Function in Biomaterials</td>
<td>Growth and Remodeling I</td>
<td>Modeling in the Cardiovascular System</td>
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<td>5:00 – 6:00 pm</td>
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<td>5:00 – 6:00 pm</td>
<td>ASME BED Student Leadership Committee Meeting (Location: Zermatt)</td>
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<td>7:00 – 10:00 pm</td>
<td>20™ ANNIVERSARY ASME BED Student Leadership Committee Meeting (Location: Not-So-Zen-Anymore Garden)</td>
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<td>9:00 – 10:00 am</td>
<td>CRIMSON Workshop</td>
<td>FEBio Workshop</td>
<td>Stem Cell Bioengineering Workshop</td>
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<td>Demystifying the Review and Editing Process</td>
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<td>Coffee Break</td>
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<td>6:00 – 7:00 pm</td>
<td>Grood ASME Medal: Dawn Elliott and Rob Mauck</td>
<td>Woo ASME Medal: Tamara Bush</td>
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<td>7:00 – 7:30 pm</td>
<td>Banquet Reception</td>
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<td>7:30 – 10:00 pm</td>
<td>Banquet and Awards Ceremony</td>
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