



## 2023 Summer Biomechanics, Bioengineering, and Biotransport Conference Student Paper Competition

The Student Paper Competition (SPC) was held at the 2023 Summer Biomechanics, Bioengineering, and Biotransport Conference (SB3C). As in past years, there are three competition levels: Ph.D., M.S., and B.S. levels, with more than 300 abstracts submitted across all competitions. To ensure fair assessment of student work, each competition level is separated into multiple technical areas. The Ph.D.-level competition consisted of 36 finalist presentations within six in-person podium presentations. The M.S. and B.S.-level competitions featured in-person poster sessions. The top student presentations in each competition level received cash prizes.

The 2023 ASME-BED/SB3C Student Paper Competition Committee, composed by Drs. Kristin S. Miller (SPC Chair), Megan Killian (Ph.D.-level SPC Chair), Mariana Kersh (M.S.-level SPC Chair), and Mary Kathryn Sewell-Loftin (B.S.-level SPC Chair), would like to acknowledge and thank all of the participating students, their co-authors, their institutions, and the effort of ~200 anonymous persons from the ASME-BED/SB3C community who served as in-person judges and abstract reviewers for the competitions. Furthermore, we would like to acknowledge sponsorship from the SB3C Foundation and NSF supporting the SPC. The support of our community and sponsors is imperative to the success of the Student Paper Competition and the ability to showcase the high-quality research from our students and community. This special issue features invited papers chosen from the winners of the Ph.D.-level of the Student Paper Competition, as well as the ASME Medal winner papers.

We would like to recognize and congratulate the following awardees from the 2023 SB3C Student Paper Competition:

### B.S. Competition Winners

#### Group 1

First Place: Brandon Chelstrom, University of Wisconsin-Madison, “Failure in Articular Cartilage: Finite Element Predictions of Stress, Strain, and Pressure Under Micro-Indentation Induced Fracture.”

Runner-up: Joanna Veres, University of California, Berkeley, “Optimization of Mounting Methods for Tension-Compression Testing of Murine Intervertebral Disc Joints.”

Runner-up: Mary Laudon, University of Wisconsin-Madison, “Handheld Shear Wave Tensiometer Measurements are Sensitive to Regional Loading in Phantom.”

### Group 2

First Place: Eric Liu, University of British Columbia, “Normal Variation in Frequency- and Time-Domain Resting State EEG Metrics.”

Runner-up: Paige Phillips, University of Texas at San Antonio, “Characterization of a Polymeric Device for Localized and Controlled Drug Delivery to Cervical Cancer.”

Runner-up: Catalina Bastias, University of Colorado Boulder, “Pregnancy and Age Differentially Affect Mechanically-Induced Collagen Damage in Murine Uterosacral Ligaments.”

### M.S. Competition Winners

#### Group 1

First Place: Cyrus J. Darvish, University of Pittsburgh, “Visualizing the Orifice of Visceral Arteries for In Situ Fenestration of AAA Endovascular Stent Grafts.”

Runner-up: Collin E. Haese, University of Texas at Austin, “The Role of Annuloplasty Ring Shape and Size on Tricuspid Valve Repair.”

Runner-up: Jacob M. Wright, Ichan School of Medicine Mt. Sinai, “A Novel Self-Sealing Dialysis Port.”

#### Group 2

First Place: Yin-Yuan Huang, Washington University, “Promotion of Chronic Wound Healing by Aligned Fiber Scaffolds: Modeling and Model Verification.”

Runner-up: Emily E. Sharp, University of Pennsylvania, “Click Chemistry-Based Injectable Hydrogel for Repair of the Annulus Fibrosis Following Intervertebral Disc Herniation.”

Runner-up: Zachary J. Harbin, Purdue University, “Computational Mechanobiology Model Evaluating Healing of Postoperative Cavities Following Breast-Conserving Surgery.”

### Ph.D. Competition Winners

#### Multiscale Biomechanics and Fluid Dynamics/Transport

First Place: Arjun Narayanan, University of California Berkeley, “Learning Diffeomorphic Deformations for Whole Heart Mesh Generation.”

Runner-up: Christie Crandall, Washington University in St. Louis, “Correlations Between Mass Transport, Elastic Fiber Fragmentation, and Thoracic Aortic Aneurysm Severity.”

Runner-up: Leonardo Geronzi, University of Rome Tor Vergata, Via del Politecnico, “Tuning of the Mechanical Boundary

Conditions Parameters for a Patient-Specific Thoracic Aorta Model.”

#### **Cardiovascular Mechanics and Remodeling**

First Place: Dillon Williams, University of Minnesota, “Heterogeneity of Red Cell Mechanical Properties Drives Pathophysiology in Sickle Cell Disease.”

Runner-up: Shannon Flanary, University of Minnesota, “Multiscale Model Translates Microscale Vascular Smooth Muscle Cell Mechanics to Tissue-Scale Aortic Contraction.”

Runner-up: Ethan Kwan, University of California San Diego, “Sex Differences in Right Ventricular Chamber Elastance and Stiffness in an Animal Model of Pulmonary Arterial Hypertension.”

#### **Morphogenesis, Maternal/Abdominal Health**

First Place: Shelby Mohr-Allen, University of Texas at Dallas, “Using Microinjected Fluid Droplets to Locally Perturb Epithelial Mechanics and Branching Morphogenesis in Cultured Embryonic Organs.”

Runner-up: Kara Peak, University of Texas at Dallas, “Ectopic Changes in Tissue Stiffness Disrupt Epithelial Buckling and FGF-10-Induced Budding Morphogenesis in Cultured Embryonic Lungs.”

Runner-up: Ana I. Vargas, Northeastern University, “Vascular Remodeling During Late-Gestation Pregnancy: An in vitro Assessment of the Murine Thoracic Aorta.”

#### **Musculoskeletal and Mechanobiology/Tissue Engineering**

First Place: Nathan Witt, University of Iowa, “Mechanical Models of Collagen Networks for Understanding Changes in the Failure Properties of Aging Mouse Skin.”

Runner-up: Bryan Kwok, Drexel University, “Type V Collagen Plays an Essential Role in the Development of Knee Cartilage and Meniscus.”

Runner-up: Yufan Lin, University of California San Diego, “Role of Sex and Sex Hormones in Pulmonary Artery Adventitial Fibroblast Mechanosignaling.”

#### **Musculoskeletal Biomechanics**

First Place: Meghan Kupratis, University of Delaware, “Collagen Crosslinking Dramatically Impairs the Frictional Performance of Articular Cartilage.”

Runner-up: Anthony Aggouras, Boston University, “Novel Laser Ablation Model for Studying Local Microdamage Repair in Live Tendon Explants.”

Runner-up: Jonathon Blank, University of Wisconsin-Madison, “Shear Strain Stiffening in Ligaments Arises from Unaligned Fibers and is Amplified by Axial Strain.”

#### **Emerging Tissue Mechanobiology and Biomechanics II**

First Place: Louis Gonzales, University of Pittsburgh, “Collective Autologous Chemotaxis in Cancer Cells.”

Runner-up: Carly Krull, Washington University in St. Louis, “Nuclear Export Inhibition Jumbles Epithelial-Mesenchymal States and Gives Rise to Migratory Disorder in Healthy Epithelia.”

Runner-up: Reece Huff, University of California, Berkeley, “Deep Learning Enables Accurate Estimation of Tissue Deformation in vivo.”

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