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Letter from the Guest Editors

Collection of Student Papers Presented at the 21st Annual Injury Biomechanics Symposium

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This focus issue comprises 26 leading studies from student researchers to advance knowledge in the field of injury biomechanics in the areas of automotive safety, injury mitigation for diverse populations, military protection, and sports safety. The manuscripts in this focus issue were presented at the *21st Annual Injury Biomechanics Symposium* hosted by the University of Virginia and the Insurance Institute for Highway Safety (IIHS). The Injury Biomechanics Symposium provides a welcoming atmosphere where new researchers present their novel research and receive feedback and support from the injury biomechanics community. The Symposium is a unique event bringing together students, academics, and industry participants, providing opportunities for networking, and allowing young researchers to form connections that have both immediate and long-term impacts on their academic and professional careers. This year's symposium featured a special tour of the IIHS Vehicle Research Center and live viewing of a high-speed car crash test.

Students from around the world submit abstracts based on their ongoing or recently completed research for review and acceptance into the Symposium. A technical committee comprising experts in the field of injury biomechanics from government, industry, and academia evaluated the abstracts and invited research studies to be presented. Each submission was ranked based on relevance to the field of injury biomechanics, importance, originality, and quality.

Submissions for the 2026 Symposium were sent in by students at Duke University, Imperial College London, Ludwig-Maximilians-Universität München, McMaster University, The Ohio State University, University of Michigan, University of Virginia, Virginia Tech, Wake Forest University School of Medicine, Washington and Lee University, and Wayne

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State University. The Symposium featured awards for the best oral and poster presentations judged by technical committee members and other experienced professionals. For the first 20 years of the symposium, the best oral presentation and written manuscript award was originally named in honor of Dr. Margaret H. Hines, who conducted injury biomechanics research at The Ohio State University over three decades ago. Beginning this year, the award has been renamed in honor of Dr. Peter Cripton, professor at the University of British Columbia. Peter has been a leader in the field of Injury Biomechanics for over two decades and has attended IBS with his students for the past 20 years. In addition, the University of British Columbia, through Peter's leadership, was the first school to host IBS outside of Ohio State in 2024. The winner of the 21st IBS Peter Cripton Best Oral Presentation was Mary Gallaher from the University of Virginia, who presented "Preliminary Impact and Injury Response of Varied Anthropometry PMHS in Frontal Sled Tests." The best poster presentation award is named in honor of Rod Herriott, a motor vehicle safety researcher at the Transportation Research Center for 39 years. His projects at the National Highway Traffic Safety Administration (NHTSA) Vehicle Research and Test Center included design and fabrication of test equipment, testing of vehicle components and airbags, and working with crash test dummies. Throughout his career, Rod spent countless hours mentoring and training new engineers in the area of biomechanics research and testing. The winner of the 21st IBS Rod Herriott Best Poster Presentation Award was Talia Busquets from Wake Forest University who presented "Quantitative CT and MRI-based Modeling Assessment of Spine Injury Risk Following Long-Duration Spaceflight."

Summary of Manuscripts in the Special Collection

Ten manuscripts were presented at the symposium. Topics included PMHS testing exploring effects of age and sex, simulations of human body models in vehicle-to-guardrail impacts, head injuries in blast scenarios, and bicycle helmet design:

- Preliminary Impact and Injury Response of Varied Anthropometry PMHS in Frontal Sled Tests, Gallaher et al.
- Thoracic Biomechanical Responses of Small Female PMHS in a Simplified Side Impact Condition, Anantharamakrishnan et al.
- Vehicle Front-End Architecture as a Driving Factor in Occupant Injury Risk During Vehicle-Guardrail Impacts: A Hybrid III Dummy-Based Numerical Study, Bubna et al.
- Comparison of Pelvis Injury Patterns and Loading Mechanisms in PMHS Tests and Real-World Side Impact Collisions, Nazari et al.
- Associations between Vehicle Safety Systems and Pilon Fracture Severity are Revealed by Using a Novel Objective Quantitative Fracture Energy Metric, Bangert et al.
- Failure Tolerance of Male and Female Lower Extremities Under Pure Bending and Combined Loading Modes, Carbon et al.
- Sex and Age Effects on Tibia Biomechanical Properties in Dynamic Four-Point Bending, Spangler et al.
- Behind Helmet Blunt Trauma Deformation Geometry under Different Helmet Materials, Pang et al.
- Influence of Blast Directionality, Intensity, and Combat Helmet Use on Head Surface Pressure Responses, Nelson et al.
- Deriving Representative Head Impact Profiles in Contact Sports: A Shape-Based Clustering Approach, Koumantou et al.
- Influence of Helmet Surface Protrusions on Youth Bicycle Helmet Impact Performance, Jung et al.

Summary of Poster Abstracts

Fifteen research posters were prepared and presented by student authors. The posters covered a wide breadth of works-in-progress and recently completed projects. Topics included military blast injuries, head impacts and sport helmet protection, human tissue characterization, spaceflight spine injuries, and car crash injuries for various occupants:

- Assessment of Layered Seat Cushion Configurations for Underbody Blast Protection, Sirhan et al.
- Quantifying Head Impact Exposure in Collegiate 15s Rugby and Relationship to Clinical Measures, Duma et al.
- Elderly Fatality in CIREN Cases: A Matched Case Review, Mann et al.
- The Relationship between PAEB Pulses and Injury Risk in Child, Teen, and Adult Pedestrian Collisions, Witmer et al.
- Quantifying Kinematic and Vibrational Responses in Hockey-Style Catcher's Mask, Gillespie et al.
- Incorporating Cortical Bone Property Variability into Simulations of Isolated Ribs under Anterior-Posterior Bending, Saenz-Betancourt et al.
- Lacrosse Ball Impacts on Women's Headgear, Metrey et al.

- Mechanical Characterization of the Liver and Kidney: A Systematic Review, Morris et al.
- Quantifying Changes in Mouthguard–Dentition Fit to Support Head Impact Measurement Validity, Chong et al.
- Whole-Body MRI to Assess Perfusion Success and Soft Tissue Injuries in PMHS Subjected to High-Rate Loading, Watts et al.
- Quantitative CT and MRI-based Modeling Assessment of Spine Injury Risk Following Long-Duration Spaceflight, Busquets et al.
- An Investigation of Local Accelerator Pedal Geometry Effects on Ankle Motion, Webb et al.
- How Do Different Human Body Models Affect Occupant Impact Responses and Restraint Design Optimizations in Frontal Crashes? Narayanan et al.
- The Potential Effects of Youth Hockey Helmet Shell Add-Ons, Calis et al.
- Evaluation of Surrogate Soft Tissue Candidates for Biofidelity and Durability, Pluim et al.

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Find the online focus issue here.

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