



JOSEPH R. GEISSLER, Ph.D.

PROFESSIONAL BIOGRAPHICAL OUTLINE

BACKGROUND

Dr. Geissler earned a Bachelor of Science in Chemical Biology from Saint Joseph's University, a Master of Science in Biomedical Engineering from the New Jersey Institute of Technology, and a Doctor of Philosophy in Biomedical Engineering from the joint graduate program between Rutgers University and the New Jersey Institute of Technology. Dr. Geissler's academic background in biomedical engineering and professional experience in crashworthiness serve as the cornerstone for his expertise in accident reconstruction and injury mechanism analysis. Dr. Geissler utilizes these skills to quantify the severity and impact mechanics of vehicular collisions, slips, trips, falls, and other loading scenarios and to evaluate the human kinematic responses to these events while also investigating potential injury mechanisms and associated injury tolerances.

During his time as a graduate student, Dr. Geissler designed and conducted various orthopaedic research studies exploring the effects of bisphosphonate drugs, across various clinical doses, on the mechanical and micro-structural properties of bone tissue. Specifically, Dr. Geissler's research focused on investigating potential underlying mechanisms of atypical bone fractures that are associated with long-term bisphosphonate therapy. Dr. Geissler has completed coursework that included statics and dynamics, advanced biomechanics, orthopaedic biomechanics, computational biomechanics, and tissue engineering. His work has been recognized by the orthopaedic community through multiple oral presentations at annual society conference proceedings and has contributed to the growing literature highlighting the association between bisphosphonate therapies and atypical fractures.

SUMMARY OF EXPERIENCE

- Experienced in static and dynamic mechanical testing of whole bone and tissue-specific bone samples
- Developed novel *in-vivo* mechanical loading protocol to evaluate cellular activity within bone tissue of living animals
- Currently uses his biomedical engineering expertise to evaluate forensic evidence associated with impact loading conditions sustained during vehicular collisions, slips, trips, falls, and other impact loading scenarios
- Currently applies biomedical engineering principles to investigate real-world events to evaluate injury causation and tolerance
- Performs testing programs involving anthropometric test devices (ATDs) to evaluate the kinematic and kinetic responses of the human body during various loading conditions
- Performs scientific testing of sports equipment to evaluate performance and propose new designs that mitigate trauma and injury

AREAS OF EXPERTISE

- Injury Causation Biomechanics
- Injury Mechanism Analyses
- Human Kinematics and Kinetics Analyses and Testing
- Vehicular Accident Reconstruction
- Orthopaedic, Joint, and Spine Biomechanics
- Human Injury Tolerance

EDUCATION

- Doctor of Philosophy in Biomedical Engineering, joint program between Rutgers Biomedical & Health Sciences and the New Jersey Institute of Technology, NJ, 2018
 - Thesis: *Altered Biomechanical and Cellular Properties of Bisphosphonate-Treated Osteonal Bone Tissue*
- Master of Science in Biomedical Engineering, New Jersey Institute of Technology, NJ, 2012
 - Thesis: *Alendronate Treatment Elicits a Reduction in Fatigue-Life of Cortical Bone*
- Bachelor of Science in Chemical Biology, Saint Joseph's University, PA, 2009
 - Minor: Interdisciplinary Healthcare Ethics

PROFESSIONAL EXPERIENCE

June 2018 – Present | ARCCA, Incorporated | Senior Biomechanist

- Evaluates severity and impact mechanics of vehicular collisions, slips, trips, falls, and other impact loading scenarios using forensic evidence, physics, and biomechanical principles
- Utilizes expertise in anatomy, human kinematics, and injury mechanisms to perform injury causation analyses of various real-world scenarios
- Performs scientific testing involving anthropometric test devices (ATDs) to evaluate the kinematic response of the human body and explore associated injury mechanisms

May 2010 – February 2018 | Rutgers Biomedical & Health Sciences | Graduate Researcher

Project: Biomechanical Properties of Bisphosphonate Treated Bone

- Lead engineer for studies to investigate drug effects on mechanical properties of biological tissue
- Developed new protocol to test drug treated bone not traditionally used in orthopaedic research
- Conducted static and dynamic mechanical tests using an axial loading system and custom protocol
- Drafted engineering drawings and aided in fabrication of custom loading fixtures

Project: Effect of Bisphosphonate Treatment on Bone Formation in a Living System

- Lead engineer for study design, animal work, mechanical testing, and tissue processing
- Created LabVIEW program and DAQ-card interface to analyze and visualize test data in real-time
- Developed a new dynamic testing technique to load bone based on initial and real-time data
- Drafted engineering drawings and aided in fabrication of custom loading fixtures

Project: Mechanical Function of Piezoelectric Bone Implant

- Consulted with NJIT engineering lab to explore mechanical testing of custom bone implant
- Contributed to literature review, study design, implant design, and mechanical testing
- Developed loading protocol to accommodate custom sample geometry and desired study controls

TEACHING AND EDUCATIONAL OUTREACH EXPERIENCE

June 2011 – June 2012 | National Science Foundation | Graduate STEM Fellowship K-12 Education

- Awarded fellowship based on proposal to integrate hands-on technology into STEM lesson plans
- Improved science communication and technology integration skills of Newark science educators
- Developed technology integration workshops for educators earning continuing education credits

August 2013 – Present | Urban Scholar Society, Inc. | Founder and President

- Drafted articles of incorporation and obtained 501(c)3 status for educational non-profit
- Established educational collaborations between high schools and local biotech companies
- Trained graduate students in STEM pedagogy resulting in demonstrations at Liberty Science Center

January 2013 – March 2016 | SMART Winter Program at Rutgers NJ Medical School | Science Educator

- Taught classes focused on science, medicine, and epidemiology for 30 6th and 7th grade students
- Generated hands-on, inquiry-based educational material that made complex scientific topics palatable for urban youth interested in pursuing careers in science and healthcare industries

June 2013 | STEM Curriculum, Learning, and Assessment at NJIT | Invited Presenter

- Developed and hosted training sessions for high school educators highlighting educational resources and hands-on tools that can be used to enhance the classroom experience for students
- Taught educators responsible and reliable techniques for integrating technologies into the classroom environment

PROFESSIONAL AFFILIATIONS

- Society of Automotive Engineers
- Association for the Advancement of Automotive Medicine

SELECTED AWARDS AND HONORS

- American Society of Biomechanics – Journal of Biomechanics Award, 2013
- American Society for Bone and Mineral Research – Young Investigator Travel Grant, 2012
- National Science Foundation – Graduate STEM Fellowship K-12 Education, 2011-2012
- NASA-sponsored NJ Space Grant Consortium – Graduate Fellowship Award, 2010-2011
- Sigma Xi Research Society – Grant in Aid of Research Award, 2010

PEER-REVIEWED PUBLICATIONS

Bajaj D*, **Geissler JR***, Allen MR, Burr DB, Fritton JC. (2014) The Resistance of Cortical Bone Tissue to Failure under Cyclic Loading is Reduced with Alendronate. *Bone* 64: 57-64. *First authors of equal contribution.

Geissler JR, Bajaj D, Fritton JC. (2015) American Society of Biomechanics Journal of Biomechanics Award 2013: Cortical Bone Tissue Mechanical Quality and Biological Mechanisms Possibly Underlying Atypical Fractures. *J Biomech* 48 (6): 883-894.

Bajaj D, **Geissler JR**, Allen MR, Burr DB, Fritton JC. (2016) Response to Courtney et al. *Bone* 89: 77-79.

ORAL PRESENTATIONS AT ANNUAL SOCIETY CONFERENCE PROCEEDINGS

Geissler JR, Ball, JB, Fritton JC. (2019) *Long-Term Alendronate Exacerbates the Effects of Aging on the Dynamic Mechanical Properties of Cortical Bone Tissue*. 65th Annual Meeting of the Orthopaedic Research Society, Austin, TX.

Geissler JR, Bajaj D, Allen MR, Burr DB, Fritton JC. (2013) *Alendronate Treatment Elicits a Reduction in Mechanical Properties and the Density of Osteocyte Cell in Cortical Tissue*. Journal of Biomechanics Award Finalists Session at the 37th Annual Meeting of the American Society of Biomechanics, Omaha, NE.

Geissler JR, Bajaj D, Monsuruddin S, Allen MR, Burr DB, Fritton JC. (2012) *Lower Osteocyte Lacunar Density in Osteons of Alendronate Treated Canine*. Plenary Session at the 34th Annual Meeting of the American Society for Bone and Mineral Research, Minneapolis, MN.

Geissler JR, Bajaj D, Allen MR, Burr DB, Fritton JC. (2012) *Alendronate Treatment Elicits a Reduction in Fatigue-Life of Canine Cortical Bone*. Spotlight Session at the 58th Annual Meeting of the Orthopaedic Research Society, Long Beach, CA.

Bajaj D, **Geissler JR**, Allen MR, Burr DB, Fritton JC. (2011) *Fatigue Life Characterization of Long-Term Alendronate-Treated Canine Cortical Bone Tissue*. 57th Annual Meeting of the Orthopaedic Research Society, Long Beach, CA.