

Dr. Todd Bredbenner



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Abstract:

Skeletal fractures associated with bone loss result in substantial morbidity and mortality. Current methods for assessing fracture risk, based on measuring one or a limited set of bone traits, do not accurately identify individuals at risk and, therefore, expose individuals to fractures that might otherwise be avoided. Several recent studies show that variation in bone fracture risk results from the structural organization of a range of bone traits, rather than simple measures of a small number of traits. In this seminar, I will introduce statistical shape and trait modeling, which provides an unbiased means of characterizing the inherent combinations of traits (i.e., composite traits) that exist within musculoskeletal structures. I will provide examples illustrating the utility of statistical shape and trait modeling in investigating bone fracture risk. The overall goals of this work are to improve the accuracy of identification of individuals at risk for fracture, to develop the fundamental knowledge necessary to provide individualized treatment, and to implement practical means of transferring this knowledge and technology to the clinic. I will describe a pathway towards implementing these goals and towards understanding the relationships between functional outcome, multi-scale characterization of musculoskeletal structures, and the underlying molecular-level condition of the individual.

March 28, 2017

3:00-4:00p.m.

ENGR 4201

“The Role of Structural Variation in Skeletal Fracture Risk”

Biography:

Todd Bredbenner is a Senior Research Engineer at Southwest Research Institute, a private not-for-profit research Institute, where he has been employed since 2005. He holds adjunct appointments in the Orthopaedics Department at the University of Texas Health Science Center at San Antonio, the Biomedical Engineering Department at the University of Texas at San Antonio, and the Department of Engineering at St. Mary's University. He was a Postdoctoral Researcher at Southwest Research Institute and a Postdoctoral Fellow in the Departments of Orthopaedics and Mechanical and Aerospace Engineering at Case Western Reserve University. He received his Ph.D. (Mechanical Engineering) from Case Western Reserve University in 2003. Dr. Bredbenner utilizes a systems engineering approach to investigate the multi-scale processes associated with the development and progression of the effects of osteoporosis. His research involves imaging-based characterization and computational investigation of biomechanical structures over multiple length scales in association with functional outcome measures and molecular-level profiles to explore the relationships spanning the range of processes related to osteoporotic fracture.

He involves imaging-based computational modeling and experimental investigation of multi-scale biomechanical problems, with particular interest in improving the accuracy of identification of individuals at risk for fracture and developing the fundamental knowledge and practical means necessary to provide individualized treatment in the clinic.

He was awarded the American Society of Bone and Mineral Research Journal of Bone and Mineral Research Raisz-Drezner First Paper Award, a NIH Ruth L. Kirschstein NRSA Postdoctoral Fellowship, and an Orthopaedic Research Society Traveling Fellowship.