

# DEPARTMENT OF BIOMEDICAL ENGINEERING SEMINAR SERIES

*presents*

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“Leveraging brain biomechanics to understand and prevent concussions”

**Abstract:** Every year 1.7 million people are diagnosed with traumatic brain injury (TBI) in the USA, 80% of which is categorized as mild. The numbers for undiagnosed cases are much higher still. Until recently, mild TBI (mTBI) was generally ignored as a minor health issue and its effects were thought to disappear after a short recovery period. However, emerging evidence suggests that this injury is by no means mild and such insults to the brain could lead to chronic neurodegeneration. Solving a complex problem such as mTBI requires a multi-faceted approach. In this talk I will focus on two aspects of mTBI: how do external forces on the head drive the brain’s dynamic motion and deformation, and how can we improve the current state-of-the-art in head protective equipment using the biomechanics of the head. In both cases, it is of utmost importance to have accurate measurements of the effect of external forces on the pursuing kinematics of the head, and also to develop models that can accurately capture the effects of head kinematics on the brain tissue. We used a combination of modeling and neuroimaging techniques to show low frequency dynamic motions dominate the brain-skull interaction and that this frequency range coincides with head motions that frequently occur in contact sports. Using detailed finite element simulations, we explored how multi-modal behavior in deeper brain regions, such as corpus callosum, could lead to strain concentration patterns and pathology. Finally, I will discuss how novel approaches in protective equipment using smart-expandable helmets could give better protection for our most important organ.

*Please join us on*

Monday, September 11, 2017  
2:00-2:50 pm, Keating Bldg, Room 103  
Refreshments will be available at 1:45 pm

Host: Jane Mohler, Ph.D.  
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*Persons with a disability may request a reasonable accommodation by contacting the Disability Resource Center at 621-*

