THE UNIVERSITY OF ARIZONA
COLLEGE OF ENGINEERING
Biomedical Engineering

DEPARTMENT OF BIOMEDICAL ENGINEERING SEMINAR SERIES

PRESENTS

Beth A. Winkelstein, PhD

Departments of Bioengineering & Neurosurgery
University of Pennsylvania, Philadelphia, PA

"Getting to the 'Root' of Pain: Signs, Signals & Solutions"

BIO: The broad goal of Winkelstein's research is to understand the mechanisms of injury from sports, automotive and degenerative conditions, especially those injuries that produce pain. By combining biomechanical and immunological techniques, her lab can define the relationships between injury to the cervical spine/neck and physiological cascades of persistent pain. Particular emphasis is placed on understanding injury to individual structures in the neck, such as the facet joints, nerve roots and spinal cord and how mechanical loading to these structures elicits pain. Through this work she can begin to develop thresholds for mechanical injury that produce persistent pain; and work towards a definition of the neck's tolerance for painful injury. Additional research efforts are aimed at understanding the role of biomechanics in the neuroimmunologic changes of the central nervous system that contribute to persistent pain. Applications of her current work are in the areas of automotive and whiplash-related injury and sports injuries and have implications for design efforts in automobiles that are aimed at preventing whiplash injuries.

ABSTRACT: Although a variety of injury mechanisms are hypothesized to cause pain, understanding how nerve root injuries and the associated tissue loading scenarios produce and mediate pain is highly complex and involves biomechanics, neuroscience and clinical tools. Our work incorporates the simultaneous measurement of neural tissue biomechanics, behavioral sequelae (pain symptoms) and neuronal molecular and physiological cascades that contribute to the onset and maintenance of pain. We integrate in vivo, in vitro and computational modeling to define a mechanistic understanding of how pain can be initiated and maintained, even for subfailure or transient tissue loading of the spinal nerve roots and nerves. This presentation will focus on our work in nerve root-mediated painful injury. We are defining the spatiotemporal regulatory mechanisms by which mechanical signals from loading to the nerve root regulate local responses in that tissue, its neuronal cell bodies in the DRG, as well as those cellular systems in the spinal cord that contribute to persistent pain. This presentation will focus not just on understanding these painful loading scenarios, but will also integrate findings from imaging techniques to define brain responses and also novel treatment approaches to treat pain, including pharmacologic and biomedical devices, with direct clinical translation. Using these coordinated studies we have been able to begin to define mechanical thresholds for tissue tolerance, pain, and cellular dysfunction; and are able to identify and design effective treatments.

Please join us on
Monday, April 22nd, 2019
12:00-12:50 pm, Keating Bldg., Room 103
Refreshments will be available at 11:50 am

Host: Kaveh Laksari, Ph.D.
klaksari@email.arizona.edu

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