BIOMEDICAL ENGINEERING
Carnegie Mellon University

Thursday, February 14, 2019
10:30 – 11:30 a.m.
Posner Hall A35

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Examining Homeostatic Regulation of Tissue Properties and Tendon Pathology Through the Use of Novel Explant Culture Models

Abstract: Tendon and ligament tears, often associated with age-related degeneration, are among the most prevalent and devastating musculoskeletal injuries affecting the population. Our work is focused on how the maintenance of tissue properties is coordinated and controlled throughout life, and using this knowledge to identify mechanisms of age-related tendon degeneration. Through the development of novel murine tendon explant culture models, including a rotator cuff organ culture model, we are able to maintain living cells in their native three-dimensional environment and control mechanical and biochemical stimuli, providing a number of benefits over traditional in vitro or in vivo experiments. Currently, we are using these models to explore inflammation- and loading-induced tendon damage using a combination of added biologics and custom-designed loading bioreactors. Specifically, we seek to identify the role of pro-inflammatory factors in altering overall tendon health and explore the efficacy of targeted and broad-spectrum therapeutics in delaying or preventing cytokine-induced tendon degeneration. Ultimately, these studies will be critical in identifying and decoupling initiating factors in age- and loading-related tissue damage in order to aid in the prevention of tendon and ligament injuries, develop and evaluate appropriate therapies, and advise regenerative medicine strategies.