Catherine Kuo
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Engineering Embryonic Microenvironments to Guide Musculoskeletal Engineering & Regeneration.

Thursday, Feb 26
90 Snell Library
11:15am – 12:30pm

Refreshments will be served

ABSTRACT Tendons are critical load-bearing tissues of the musculoskeletal system that transfer forces from muscle to bone and stabilize joint structures. Despite surgical intervention, injured or diseased tendon is challenged by reparative wound healing responses that result in scar tissue and mechanical dysfunction. This significant challenge has motivated stem cell-based tissue engineering efforts to generate tendon replacements. However, advances have been limited, due in part to an incomplete understanding of tendon development. In particular, there is a need to identify effective factors to guide tenogenesis of stem cells and markers to assess progress. Toward that end, we are systematically characterizing spatiotemporal mechanical, biochemical and molecular properties of the developing embryonic tendon microenvironment. Outcomes are identifying design parameters for biomaterials and bioreactors with which to present embryonic cues that may guide stem cell differentiation and neo-tissue formation. Additionally, characterization of structure-property relationships of developing tendon is finding new markers of functional tendon formation. These engineered tissues may be useful as *in vivo* replacements, and as platforms for research to study mechanisms of tissue formation. Importantly, these efforts are broadly applicable across tissue systems. Successful outcomes from our studies may advance efforts to enhance tendon healing and regeneration, as well as provide bench-top platforms with which to investigate tissue development, homeostasis, disease and healing.

BIOGRAPHY Catherine K. Kuo is an Assistant Professor in the Biomedical Engineering Department at Tufts University and a faculty member of the Sackler School of Graduate Biomedical Sciences at Tufts University School of Medicine. She received her B.S.E. in Materials Science and Engineering and her Ph.D. in Biomaterials / Macromolecular Science and Engineering from the University of Michigan, Ann Arbor. She then pursued postdoctoral training in the Cartilage Biology and Orthopaedics Branch of the National Institute of Arthritis, Musculoskeletal and Skin Diseases at the NIH. Dr. Kuo's research focuses on understanding mechanical and biochemical influences of embryonic tendon development and scarless healing to inform stem cell-based tissue engineering and regeneration strategies. She is also interested in engineering tissue models as platforms to investigate mechanisms of embryonic development, adult tissue homeostasis, disease and healing. Dr. Kuo is a recipient of a March of Dimes Basil O'Connor Starter Scholar Research Award and an NSF CAREER Award.