



JOHNS HOPKINS
BIOMEDICAL ENGINEERING

BME Seminar Series

Whasil Lee, PhD

Assistant Professor, Biomedical
Engineering, University of
Rochester

Monday, November 14, 2022

1:00 p.m.

Traylor 709

Faculty host: Michael Miller



Notable story of PIEZO1 in Osteoarthritis

Abstract: Mechanotransduction is a dynamic and ubiquitous process throughout human physiology and pathophysiology. Piezo1 is an essential mechano-sensing Ca^{2+} -permeating channel associated with human health and disease; it has recently received a spotlight at the 2021 Nobel prize. In this talk, Dr. Lee will present notable roles and regulations of Piezo1 channels in cartilage health and disease. More than 50 million Americans suffer from degenerative cartilage disorders due to trauma, inflammation, or aging, yet there are no FDA-approved disease-modifying drugs. Articular chondrocytes are intrinsically mechanosensitive, and mechanical cues heavily influence the metabolic activity of chondrocytes, such as biosynthesis and remodeling of extracellular matrix (ECM) in cartilage. Dr. Lee has developed engineered tools to study the roles of Piezo1 in osteoarthritis (OA) for over a decade. As reading pathophysiologic mechano-transduced Ca^{2+} signaling, she has found critical roles of Piezo1 in cartilage degeneration. This talk will focus the Piezo1-dependent chondrocyte mechanotransduction in inflammatory conditions and post-anterior cruciate ligament (ACL)-injuries. Are we one step closer to resolving OA?

Bio: Dr. Whasil Lee is an assistant professor in the departments of Biomedical Engineering (BME) and Pharmacology and Physiology (PHP) at the University of Rochester, Rochester, NY. In particular, she is interested in the role of mechanical injury and inflammation as an effector of cartilage degeneration and has NIH funding to support an independent research program on the mechano-heterogeneity and morphology of chondrocytes (R35 GM147054). The Lee Mechanobiology laboratory investigates fundamental mechanisms and roles of mechanosensitive Ca^{2+} channels in cellular mechanosensitivity and phenotypes of load-bearing musculoskeletal cells. Over the years, we have identified essential roles of Piezo1 mechanosensitive channels in knee cartilage degeneration in vitro; Piezo1 channels sense arthritic stimuli, including mechanical trauma (PNAS, 2014; PMID: 25385580), inflammation in articular chondrocytes in knee joints (PNAS, 2021, PMID: 33758095), and joint loading-dependent OA progression in mouse models (Osteoarthritis & Cartilage Open, 2021; doi 10.1016).