Kengaku Group SEMINAR

Mechanisms of short- and long-term mechanosensing

Dr. Haguy Wolfenson

Assistant Professor
Rappaport Faculty of Medicine, Technion- Israel Institute of Technology, Haifa, Israel

Fri 6 Dec. 2019, 17:00-18:00

Venue:

2F Seminar Room, KUIAS/iCeMS Main Building

Abstract：Cells respond to mechanical signals from their environment in a variety of ways. In particular, the rigidity of the extracellular matrix (ECM) to which cells adhere is a critical determinant of the most fundamental cellular processes, including cell migration, differentiation, death, and growth. In order to test the rigidity of the ECM, cells apply cytoskeletal-based forces to it; however, there are fundamental aspects of this 'mechanosensing' process that are poorly understood. In my talk, I will discuss our recent findings on the kinetics of contractile force generation during mechanosensing. Based on a mathematical model of cell contractility, we predict that for a broad range of physiological and laboratory conditions the contractile force scales with the environment's rigidity, where the proportionality factor is an intrinsic, cell-specific time-dependent contractile displacement that is non-mechanosensitive, i.e. independent of the environment's rigidity. Our extensive experiments on various adherent cells show that, as predicted, the time-dependent contractile displacement is independent of the rigidity, varied more than 15-fold. Furthermore, we show that the intrinsic time-dependent contractile displacement is directly related to the evolution of the actomyosin network, properly quantified by the time-dependent concentration of F-actin. The emerging picture unifies various other existing observations on cellular contractility and provides a novel framework to address the process of mechanosensing.

Key Words：Mechanosensing, ECM

Supported by Nakatani Foundation

Contact: Naotaka Nakazawa, iCeMS Kengaku Group, ext:9833