BDR SEMINAR (Kobe & online hybrid)

Fu-Lai Wen

National Central University

Wednesday, December 17, 2025

15:00-16:00

1F Auditorium, DB Building C, Kobe / Broadcast online via Zoom

Zoom meeting URL will be announced on the event day by e-mail.

※Non-BDR members: Please register from the following link.

https://krs2.riken.jp/m/bdrseminarregistration (Registration deadline Dec 14)

Biophysics of cyclic stretch-induced cell columnarization

Summary

Tissues consist of many cells that work together to perform a specific function for the living organism. While cells within a tissue are constantly perturbed by time-varying mechanical forces from the surroundings, they are capable of maintaining their structures required for execution of normal physiological functions. To understand how cells sense and respond to a dynamic mechanical stimulation, we subjected MDCK cells (a canine kidney epithelial cell line) to a persistent uniaxial cyclic stretch (CS), and found that MDCK cells autonomously transformed from a cuboidal to a columnar shape with increased cell height and reduced cell width. In particular, the CS-induced cell shape transformation is associated with the remodeling of intracellular cytoskeletons and intercellular junctions. Through atomic force microscopy (AFM) measurements and mathematical modeling analyses, we further confirmed that these molecular remodeling processes result in an increase of tensile forces at both the apical and the basal sides of cells, which in turn promote the shape transformation. Our findings thus reveal a mechanobiological mechanism by which epithelial cells adapt to a dynamic mechanical stimulation.