SMART
Singapore-MIT Alliance for Research and Technology

BioSym
BIOSYSTEMS AND MICROMECHANICS

Introductory Talks by New Researchers @ BioSyM
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Nuclear deformability is regulated by cell geometric constraints

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Date: 17th October 2016, Monday

Time: 12 pm to 1 pm

Venue: Perseverance Room, Enterprise Level 5

Abstract

Physical properties of the cell nucleus are important for various cellular functions such as gene expression and cell migration. We probed the role of cell geometry in regulating nuclear deformability and chromatin dynamics. Cells constrained on small circular geometry exhibited enhanced nuclear fluctuations and chromatin dynamics compared to those on large polarized geometry. Nucleus and chromatin are physically coupled to the cytoskeleton via links on the nuclear envelope and lamin meshwork. We observed that cells with small circular geometry had short and dynamic actomyosin structures, which provided the driving force for nuclear fluctuations, and lower lamin A/C levels, which resulted in softer nuclei. We conclude that active forces from the cytoskeleton and rigidity from lamin A/C nucleoskeleton can together regulate nuclear and chromatin dynamics. Because chromatin remodeling is a necessary step in transcription control, and genome integrity and cellular deformability during migration, our results highlight the importance of cell geometric constraints as critical regulators in cell behavior.

Short Biography

Ekta joined SMART-BioSym in September 2016 as a postdoc in Krystyn's group. Her research interests include mechanobiology, biophysics and forces in living systems. She completed her doctoral degree in Mechanobiology Institute, National University of Singapore in the lab of Prof. G. V. Shivashankar, focusing on nuclear mechanics and genome regulation.