



“Mechanics Induced Morphogenetic Pattern Formation”

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Thursday, October 29, 2009
12:00 – 1:00 pm
2101 Engineering V

ABSTRACT:

The development and functionality of tissues depends on the morphology of individual cells. Despite the extensive studies on chemoattractant-induced morphodynamics, it is poorly understood what morphogenetic patterns cells develop in response to mechanical cues and how these patterns influence tissue development and homeostasis. By changing substrate mechanical properties, we observed spontaneous pattern formation at single- and multi-cell levels. These patterns were not controlled by phosphoinositide dynamics. Instead, they are generated by a myosin light chain kinase (MLCK)-mediated mechanical tugging and a myosin-enhanced diffusivity. A lateral inhibition model was proposed with predictions agreeing well with the experiment. Together with the chemotactic pathway, these form a two-level system to control morphogenesis in response to mechanical and chemical cues.