# BDR SEMINAR in Kobe

"CDB SEMINAR" and "QBiC SEMINAR" have been renamed "BDR SEMINAR".


## Hiroshi Koyama

National Institute for Basic Biology


**Thursday, June 28, 2018**

16:30-17:30, Seminar Room D2F

# Tissue elongation and pattern formation of cells on symmetrically expanding external environment


**Summary**

Cell movement is crucially important for morphogenesis and pattern formation during development of multicellular organisms. Previous studies have largely focused on cell-autonomous movement caused by directional cell migration, local activation of cell-cell boundary tensions, differential cell-cell adhesiveness, etc. In contrast, non-cell-autonomous movement induced by the mechanical actions of surrounding tissues has not been studied well. To unravel contributions of non-cell-autonomous movement to morphogenesis and pattern formation, we theoretically analyzed movement of cell clusters placed on a symmetrically expanding tissue or field. Interestingly, a cell cluster, which receives frictional forces from the field, was passively elongated. In other words, symmetric field induced asymmetric deformation of the cell cluster. To analyze the mechanism underlying this counterintuitive phenomenon, we performed further theoretical analyses, and found that expanding fields cause cell clusters to manifest their intrinsic abilities to asymmetrically deform. Elongation depended on differential cellular stiffness, indicating the involvement of cellular stiffness in pattern formation of cells. Elongation of the notochord located on a growing embryo in mice may be explained by this model. Expanding fields also cause the formation of distinct cell clusters aligned in a linear fashion, which is observed during development of various tissues. Fields would be actually expanded in vivo during growths of embryos and tissues or during epiboly induced by radial intercalation of cells. We propose the considerable roles of symmetric external environments in the diverse pattern formation and morphogenesis with the cooperation of differential cellular stiffness.



**Host: Tatsuo Shibata**
Physical Biology, BDR
tatsuo.shibata@cdb.riken.jp
Tel:078-306-3264 (ext:3264)



**RIKEN Center for Biosystems Dynamics Research (BDR)**