CDB SEMINAR

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11:00-12:00 Seminar Room A7F

Junctional tension fluctuation and accompanying dynamics of adherens junction components during cell–cell boundary deformations in epithelia

Summary

Epithelial tissue morphogenesis is fundamental to embryonic development. At the apical side of epithelial tissues, the cell-cell boundaries form framework of the tissue, and deformations in these boundaries, e.g. boundary contraction and elongation, and associated forces form the mechanical basis of tissue morphogenesis. To precisely describe functions of cell boundary deformations in a tissue, comprehensive elucidations of mechanics underlying different boundary dynamics, their transitions, and accompanying molecular dynamics are essential.

Using amnioserosa cells, which exhibit rapid cell boundary oscillations (contraction and elongation; 1 period = 2~5 min) during *Drosophila* dorsal closure, we demonstrated that cell junctional tensions closely correlated with boundary dynamics and shapes. Based on the correlations, we developed a method to non-invasively estimate the junctional tension over time, and found that the tension dynamically fluctuates during boundary oscillations. Furthermore, we showed that an adherens junction (AJ) molecule, vinculin, dynamically accumulates to or dissociates from oscillating boundary in a junctional-tension-dependent manner (Hara et al., *Curr. Biol.*, 2016).

Interestingly, our recent observations indicate that the other AJ components (E-cadherin, α-catenin, etc.) also dynamically fluctuate its density and stability in response to the junctional tension changes. It suggests that the AJ molecules have abilities to respond rapidly against tension changes in order to modify the mode of cell boundary deformation or reorganize cell-cell junctions during tissue morphogenesis.

In this presentation, I will provide an overview of mechanics underlying cell boundary deformations in *Drosophila* epithelium, and highlight the short-term dynamics of AJ components responding to rapid tension changes. We will also discuss the potential roles of the oscillatory dynamics of AJ components in global tissue dynamics.

KEYWORDS:

Epithelial morphogenesis, Cell boundary contraction, Cell boundary elongation, Junctional tension, Tension estimation, adherens junction, E-cadherin, α-catenin, vinculin, Drosophila

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