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(UG*) (POS-21) Physical Mechanisms of Tissue Boundary Formation and Tissue Internalization

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Tissue-tissue interface (compartment boundary) formation is an essential process during animal development and in disease. It has been shown that mechanical forces are important for both the establishment and maintenance of boundaries. For example, cables formed by actin and the molecular motor Myosin II are often found at compartment boundaries. However, how the boundaries are established or maintained during development and disease remains still unclear. In the *Drosophila* (fruit fly) embryo, the mesectoderm tissue separates ectoderm and mesoderm tissues, forming the ventral midline of the embryo. Eventually, mesectoderm cells are internalized becoming part of the central nervous system. It has been shown that during tissue internalization, a tension-bearing supracellular cable is formed at the mesectoderm-ectoderm interface by Myosin enrichment. As the mesectoderm internalizes this cable straightens even though the Myosin levels decrease at the boundary. During the internalization process, the ectoderm cells continue cell divisions. We hypothesize that increasing cell divisions leads to an increase in "tissue fluidity"and this fluidity defines the boundary shape, the internalization time, and the Myosin dynamics at the mesectoderm-ectoderm interface. To test this hypothesis, we used mathematical modelling together with *in vivo* manipulation of the boundary and image analysis. Our results suggest that the Myosin disassembly rate and tissue relaxation time control the internalization time and that the tissue fluidity maintains the linearity of the boundary.

Keyword-1

Tissue boundary formation

Keyword-2

Cell and tissue mechanics

Keyword-3

Collective cell behaviour

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