

Cell and Tissue Mechanics in Zebrafish Gastrulation

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Tissue morphogenesis during embryonic development is brought about by mechanical forces which are generated by the specific biophysical and motility properties of its constituent cells. It has also been suggested that embryonic tissues behave like immiscible liquids with a given surface tension and that differences in surface tension between tissues determine their spatial configuration during embryogenesis. To understand how single cell biophysical and motility properties regulate tissue surface tension and how tissue surface tension controls tissue organization in development, we are studying the specific function of germ layer progenitor cell adhesion, cell cortex tension and motility in determining germ layer organization during zebrafish gastrulation. We found that the combinatorial activity of progenitor cell adhesion, cortex tension and motility determines germ layer tissue surface tension and that differences in germ layer tissue surface tension influence germ layer organization during gastrulation. We will discuss these findings in the light of different hypotheses explaining how single cell biophysical properties determine tissue morphogenesis in development.

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