Universität Basel

Research Project

DevBoundaries - Formation of tissue boundaries during zebrafish embryogenesis

Third-party funded project

Project title DevBoundaries - Formation of tissue boundaries during zebrafish embryogenesis
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Organisation / Research unit
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During animal development, boundaries need to be established between cell types to guarantee the physical and functional integrity of tissues. However, the underlying mechanisms are poorly understood because it has been challenging to analyze the coordination of gene expression, cell proliferation and cell movement needed for boundary formation. I will probe the in vivo mechanisms of boundary formation using the zebrafish embryonic shield region as a model system. The shield contains overlapping progenitor cells that give rise to various midline structures whose boundaries form and sharpen during gastrulation. I will use imaging and genetic approaches to determine how shield cells differentiate and generate tissue boundaries.ă ă Aim 1: To characterize lineage, movement and differentiation of shield progenitors and their descendants, I will use in toto light-sheet imaging. This approach will generate a dynamic atlas detailing the cellular basis of boundary formation.ă ă Aim 2: To characterize the gene expression changes during the separation of shield progenitors and their descendants, I will use spatial transcriptomics. This aim will create a dynamic atlas detailing the transcriptomic basis of boundary formation.ă ă Aim 3: To define the molecular basis of boundary formation, I will disrupt candidate genes involved in boundary formation. This approach will determine if differentiation and morphogenesis are coupled during boundary formation and define molecular pathways that ensure robust boundary formation.ă ă Together, the proposed approaches will identify cellular and genetic mechanisms controlling boundary formation during embryogenesis.

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