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VIRTUAL

iPSZÜRICH

A Lecture Series Focused on Induced Pluripotent Stem Cells
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BIOENGINEERING ORGANOID FATE AND MORPHOGENESIS

Organoids serve as increasingly widespread model systems for understanding the complex interplay between biochemical and physical signals which govern in vivo fate specification, patterning and morphogenesis. While some elements of these complex biological processes can now be recreated in vitro, the current reliance on reductionist culture conditions largely overlooks the extracellular factors which promote multicellular growth and reorganization, leading to stochastic and poorly controllable outcomes. We tackle the challenge of reconstructing the multifactorial in-vivo microenvironment by deploying synthetic matrices in combination with customized devices which allow us to spatiotemporally control and manipulate mechanical forces to study early development events. Our work with organoid-based models of neural tube morphogenesis and paraxial mesoderm development suggests that the way forward towards engineering reproducible and scalable patterned tissue constructs may involve harnessing cells' inherent capacities for self-organization by providing mechanically active microenvironments.

