

Cellular Reconstitution of Complex 3D Tissue Shapes

Initiative: "Leben?" - Ein neuer Blick der Naturwissenschaften auf die grundlegenden Prinzipien des Lebens
(beendet)

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The shape and function of tissues, organs, and organisms are profoundly linked and emerge during the process of morphogenesis. Traditionally, the underlying principles of morphogenesis have been investigated by studying the embryogenesis of optically and genetically accessible model species. However, due to the intrinsic complexity of the evolutionarily evolved molecular, cellular, and tissue feedbacks, inferring the rules of morphogenesis from watching and manipulating embryogenesis is a formidable challenge. Here, the research team proposes to develop an in vitro tissue reconstitution platform that allows for the rigorous testing of the current paradigms of tissue shape generation and in principle will allow to generate arbitrary 3D tissue shapes. The key idea is to selectively program stress patterns into flat, surface-bonded, epithelial monolayers by micro-patterning curvature inducing cell-types. Patterned monolayers can then be released from the surface and observed folding into their pre-programmed 3D shapes by high resolution microscopy. The team envisions that this new synthetic approach to study tissue folding and morphogenesis will allow to reveal and understand the mechanisms of how complex shapes emerge in multicellular life and open a new research field of complex tissue reconstitution.

Projektbeteiligte

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