Seminar/Talk

Topological morphogenesis of neuroepithelial organoids

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Host: Martin Loose & Edouard Hannezo

Animal organs exhibit complex topologies involving cavities and tubular networks, which underlie their form and function. However, how topology emerges during organ morphogenesis remains elusive. In this seminar, I will present our recent work, where we combined tissue reconstitution and quantitative microscopy to show that trans and cis epithelial fusion govern tissue topology and shape. These two modes of topological transitions can be regulated in neuroepithelial organoids, leading to divergent topologies as found from live imaging. We develop a theory to explain the mechanical basis of epithelial fusion, and find that the morphological space is captured by a single control parameter analogous to the reduced Gaussian rigidity of an epithelial surface. Finally, we identify lysophosphatidic acid synthesis as a pharmacologically accessible pathway that regulates the frequency of trans and cis fusion, and demonstrate the control of organoid topology and shape. Our findings leads to future research for the characterization, prediction, and control of multicellular morphogenesis, enabling the advanced engineering of organoid form and function.

Tuesday, October 19, 2021 04:00pm - 05:00pm
Big Seminar Room B (big) 63 seats (I23.EG.102)

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