

Directing the self-organization of more complex and reproducible 3D tissue models

Zev Gartner

Programs of self-organization guide the formation of tissue structures in vivo with reproducible statistical properties. When beginning with suitable cells, the same programs operate in vitro, allowing the formation of tissue models such as organoids that replicate in vivo cell type complexity and local tissue architecture. However, organoids are far more heterogeneous than their in vivo counterparts, particularly in their architecture across hundreds of microns—a length scale that contributes to many high-order tissue functions. Guiding self-organization into more complex, reproducible, and functional tissues requires new concepts, biomaterials, and instrumentation. I will present some progress towards developing generalizable strategies that improve the outcome of self-organization in vitro, as well as applications to building vascular, intestine, mammary, brain, and tumor tissues.