



Engineering Stem Cell Fate

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Abstract: The emergence of human induced pluripotent stem cell (iPSC) technologies has introduced a transformative avenue for uncovering the intricacies underlying human development, disease, and tissue homeostasis. While iPSCs inherently possess the potential to differentiate into nearly any cell type within the body, their effective differentiation hinges on precise conditions that steer their fate. Although genetic tools and *in vivo* models have illuminated the signaling pathways guiding stem cell fate, translating these cues to *in vitro* environments often lacks the mechanical and architectural context, or niche, that orchestrates developmental processes. The Smith lab strategically employs engineering methodologies to fabricate microenvironments that mirror facets of the stem cell milieu. The overall goal of these approaches in the Smith lab is to advance the development of *in vitro* tools for guiding lineage specification, ultimately leading to the creation of model systems conducive to investigating various dimensions of stem cell fate determination. Specifically, the Smith lab is interested in controlling germ layer specification and mimicking gastrulation in a dish, as well as building stem cell models of the placenta, vasculature, and liver.

Bio: Quinton Smith is an Assistant Professor in Chemical and Biomolecular Engineering at the University of California, Irvine (UCI), and holds joint appointments in the Departments of Biomedical Engineering and Materials Science and Engineering. He received his bachelor's degree in chemical engineering from the University of New Mexico in 2011 and his Ph.D. in chemical and biomolecular engineering from Johns Hopkins University in 2017. As a graduate student, he was mentored by Dr. Sharon Gerecht and used engineering approaches to investigate the role of mechanical forces on stem cell differentiation towards vascular populations. He was named a Siebel Scholar as a graduate student, and the National Science Foundation Graduate Research Fellowship Program and a National Institutes of Health F31 fellowship supported his work. As a Howard Hughes Medical Institute Hanna Gray Postdoctoral Fellow under the mentorship of Dr. Sangeeta Bhatia at the Massachusetts Institute of Technology, Dr. Smith focused on leveraging microfluidic and organoid technology to model liver development and morphogenetic processes. Dr. Smith was recently named a PEW Biomedical Scholar, which supports his research at UCI using stem cell-based model systems to study health disparities in the context of metabolic and cardiovascular disorders.

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