



Building Human Microvasculature for Regeneration and Disease Modeling

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Microvasculature helps define the tissue microenvironment. These vessels are highly heterogeneous in size and geometry, spanning three orders of magnitude in diameter, and their dysfunction is a systemic hallmark of many diseases. Yet studying them remains difficult because they are buried deep in tissues and are hard to access, visualize, and manipulate in patients. In this seminar, I will present engineering strategies that bring these “invisible” microvascular compartments into view. Using native collagen matrices, microfabrication, and multiphoton laser sculpting, my group builds perfused human microvessels across scales, including capillary-like networks with realistic 3D geometry and hemodynamics. I will show how vascular architecture combined with perfusion reshape luminal flow and endothelial responses, and how these microvessels can be integrated with hiPSC-derived vascular organoids to enhance survival. Together, our work establishes a path toward perfusable, scalable, long-lived human vascular tissue models that complement animal studies and enable mechanism-driven regeneration and disease modeling.



ABOUT the SPEAKER

Ying Zheng, PhD, is an Associate Professor of Medicine at Stanford University. She received her PhD in Bioengineering from the University of Michigan and completed her postdoctoral training at Cornell University. Prior to joining Stanford in 2026, she spent 15 years on the faculty of Bioengineering at the University of Washington, where she established a research program at the interface of vascular biology and bioengineering. Her laboratory develops perfusable 3D human microvessels and vascularized tissue models to understand how blood vessels develop, adapt, and fail in disease. By integrating vascular biology, stem cell engineering, biomaterials, and microphysiological systems, her work investigates endothelial identity, vascular remodeling, and cell–cell interactions across organ-specific microenvironments and disease states. Dr. Zheng received the NIH Director’s New Innovator Award for her innovative microvascular research. She continues to develop new approaches for disease modeling and regenerative medicine, and uncover fundamental mechanisms of human vascular biology.

Monday, September 21 at Noon
1003 Engineering Centers (Tong Auditorium)

