

Mechanical Engineering Department Seminar

3:35pm May 7, 2014
1130 Mechanical Engineering
111 Church Street SE, Minneapolis, MN 55455

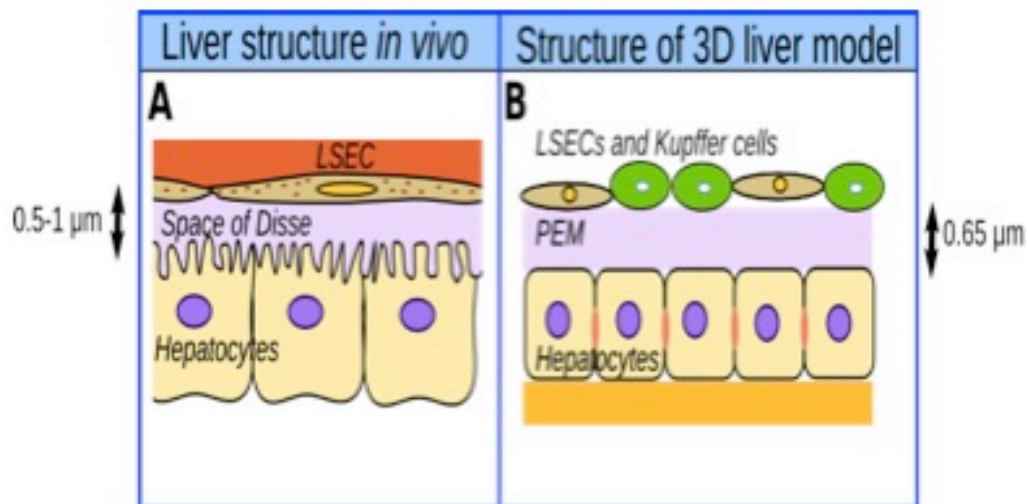


The Design of 3D Liver Models for Inter-Cellular Signaling and Toxicology Studies

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The liver plays a critical role in metabolism, biotransformation and detoxification. The design of in vitro models that mimic the stratified multi-cellular hepatic structure continues to be challenging. Hepatic cells rapidly lose their functions in culture, underscoring the need to recreate their microenvironment found in vivo. We have assembled a novel 3D organotypic liver model incorporating three different primary cell types (hepatocytes, liver sinusoidal endothelial, and Kupffer cells) and a polymeric membrane that mimics the Space of Disse. The polymeric membranes are free-standing, optically transparent, and derived from self-assembled multilayers. The mechanical properties of the polymeric membranes can be varied to mimic basement membranes that exhibit a wide range of physical properties. In our studies, only the 3D liver models simultaneously maintained hepatic phenotype and elicited proliferation while achieving cellular ratios found in vivo. Ongoing investigations using these liver models are focused on understanding inter-cellular communications between hepatic parenchymal and non-parenchymal cells, and, responsiveness to toxicants.



Bio: Dr. Rajagopalan is the Robert H. Hord Associate Professor in the Department of Chemical Engineering and a core faculty member in the School of Biomedical Engineering and Sciences at Virginia Tech. Dr. Rajagopalan earned her bachelor's degree from the Indian Institute of Technology, Kharagpur, India and obtained her Ph.D. from Brown University. In 2010, Dr. Rajagopalan was the recipient of the NSF Faculty Early Career Development Award (CAREER). She currently serves as the co-director for the Center on Systems Biology of Engineered Tissues and as the Program Director for an Interdisciplinary Graduate Education Program on Computational Tissue Engineering.