Multi-MPS Interactions for Chronic Inflammatory Disease: A scaling challenge

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The pioneering work of Shuler and colleagues over 20 year ago demonstrated the potential for using interconnected MPS for pharmacology and toxicology applications by showing metabolic conversion of a compound in one MPS and downstream effects on a second MPS. As the role of immunological contributions to drug safety have become more appreciated, the need for more complex immunologically-competent MPS has grown. This has driven development of more complex MPS that are also potentially valuable for modeling inflammatory diseases. This talk will address technical challenges in modeling complex diseases with “organs on chips” approaches include the need for relatively large tissue masses and organ-organ cross talk to capture systemic effects, as well as new ways of thinking about scaling to capture multiple different functionalities from drug clearance to cytokine signaling crosstalk. An example of how gut-liver interactions can be parsed at these levels will be featured, along with new approaches for culturing complex 3D tissues with synthetic extracellular matrix and higher-order multi-organ interactions involving immunology.