

Advances in organ-on-a-chip engineering

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The one-size-fits-all paradigm, where a therapy is tested without considering the genetic background of patients, is thought to hamper progress towards cures. The mission of our lab is to deliver on the promise of personalized medicine through development of personalized heart-on-a-chip models from human induced pluripotent stem cells and development of the next generation technologies using 3D printing and injection molding that will speed up production of organ-on-a-chip devices. This presentation will describe the development of new devices to build human iPSC derived models of polygenic left ventricular hypertrophy, monogenic heritable arrhythmia, cardiac fibrosis, viral myocarditis and cytokine storm resulting from COVID-19. The contribution of supporting cell types making up the myocardium such as resident cardiac macrophages and epicardial cells in capturing multifaceted disease effects in vitro will be discussed. New vascularized systems that enable studies of neutrophil and monocyte infiltration for the development of myocarditis models will be highlighted.