Systems pharmacology of cardiac signaling networks

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Abstract
Cardiac signaling networks control the response of the heart to a variety of pathological stresses, many of which result in heart failure. The complexity of these networks often hinders our ability to predict and fully understand the impact of therapeutic interventions. In this talk, I will discuss two projects in which we are using systems pharmacology approaches to address these challenges of prediction and systems-level understanding. First, I will introduce our large-scale models of the cardiac fibroblast signaling network. Integration of this model with drug-target interaction databases permitted virtual screening for therapeutic strategies that have distinct effects on cardiac fibrosis depending on the spatiotemporally heterogeneous extracellular environment. However, alternative approaches may be needed when there is little prior knowledge of relevant signaling pathways, such as in cardiac regeneration. In the second half of the talk I will describe our high-content phenotypic screening to identify numerous compounds that enhance proliferation of human iPSC-derived cardiomyocytes. In both fibroblast and cardiomyocyte regeneration projects, closing the loop between modeling and experiment is essential for prioritization and mechanistic understanding of therapeutic strategies.

Biography
Dr. Jeff Saucerman is an Associate Professor of Biomedical Engineering at the University of Virginia. He leads a research group in cardiac systems biology, focused on identifying and controlling the molecular networks involved in heart failure. He received a B.S. in Engineering Science from Pennsylvania State University, Ph.D. in Bioengineering from the University of California San Diego, and completed a postdoctoral fellowship with Dr. Donald Bers at Loyola University Chicago. Dr. Saucerman has received a number of awards including an NSF CAREER Award, Fellow of the American Heart Association, and the Dean’s Excellence in Teaching Award from the University of Virginia School of Medicine.