Biocomplexity of Inducible Cells

Bradly Alicea
Cellular Reprogramming Laboratory
Michigan State University
http://www.msu.edu/~aliceabr
http://reprogramming.net

In recent years, biotechnological advances have allowed for differentiated cells representing one state (e.g. fibroblasts) to be converted into both pluripotent (e.g. stem-like) and differentiated (e.g. neuronal) cell types. While many studies have focused on optimizing the process of conversion solely through advanced techniques in cell transfection and transgenic delivery, a smaller but growing area of research has focused on understanding the fundamental processes behind reprogramming using physical models and computational approaches. In this talk, I will introduce the term "inducible" to reinterpret reprogramming as a stochastic, combinatorial, and heterogeneous process. This will follow with a review of both recently published and original research that provides insight into multiple aspects of this process. This includes models that focus on cell proliferation, molecular cascades within a single cell, and the role of infection and intercellular signaling in predicting phenotypic conversion. While a series of competing models are introduced, the goal is not to converge at a “right” or “wrong” answer. Instead, the goal is to appreciate the diversity of approaches required to gain a full appreciation of the biocomplexity inherent in this developmental-like process. To put this diversity of approaches into context, future directions for modeling and wet-lab investigation will be discussed.