Quantitative modeling and analyses of TGF-β signaling dynamics

Zhike Zi

Abstract:

The TGF-β signaling pathway is important for regulating diverse aspects of cellular responses such as cell proliferation, differentiation, migration, and death. The duration of signaling responses can be critical for alerting cell fate decisions in response to growth factor. The duration of TGF-β/Smad signaling response appears to be ligand dose dependent and cell type specific. In this work, I will talk about our work on the modeling and quantitative analysis of TGF-β/Smad signaling responses. In a recent work, we found that TGF-β pathway displays different sensitivities to the ligand doses at different time scales. We have shown that while short-term Smad2 phosphorylation (P-Smad2) is graded, long-term P-Smad2 response is switch-like to the changes in TGF-β doses. Furthermore, switch-like responses were observed for TGF-β induced long-term gene expression and growth inhibitory responses. In addition, I will discuss my ongoing work on the distinct Smad signaling dynamics in different cell types.