

Investigating TGF- β -regulated cell proliferation decisions in single cells

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The transforming growth factor- β (TGF- β) signaling is one of the most important signaling events as it regulates many cellular responses including cell proliferation, migration, and death. It is well known that TGF- β has different roles in the regulation of cell proliferation depending on the specific cellular context. Although the main components of the TGF- β pathway have been extensively studied, it remains unclear how cells decode and integrate TGF- β signal into cell fate decisions in single cells. We plan to combine mathematical modeling and quantitative experiments to analyze how the cells read TGF- β activation and translate it into cell proliferation fate decision at single cell level. We will perform live-cell imaging experiments to trace the correlations between Smad signaling dynamics and cell proliferation in individual cells with different TGF- β stimulations using microfluidics system. Mathematical models will be developed to explore how Smad signaling dynamics decide cell proliferation responses. In this project, we aim at getting a better understanding on how single cells decipher Smad signaling dynamics, which may provide new insights for controlling cell proliferation with the manipulation of TGF- β signaling.