Life Sciences Seminar

Quantifying and perturbing the movement of extracellular signaling proteins

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Extracellular signaling molecules coordinate early embryonic development. In zebrafish, the secreted Nodal signaling proteins were proposed to function as classical morphogens that disperse from a localized source to control the development of distant cells. However, recent findings suggest that Nodals may not move over a distance and instead signal mainly to neighboring cells which, due to Nodal auto-induction, relay the signal to distant cells. I will present experiments performed in zebrafish embryos in which I directly test these two models of Nodal signaling and my efforts to unveil the mechanisms of Nodal dispersal.First, I assessed the endogenous Nodal signaling range in transplantation experiments and tested whether Nodal dispersal requires a relay mechanism. Second, I established that the diffusion of extracellular proteins can be tuned with membrane tethers. Using these tethers as tools, I found that the high diffusivity of Leftys long-range Nodal inhibitors is important to robustly dampen Nodal signaling. Third, I wanted to reveal the molecular basis for the vastly different diffusivities of the long-range Leftys and the short-range Nodals. I will present my findings of co-immunoprecipitation/mass spectrometry experiments to identify putative Nodal diffusion regulators that may explain the short Nodal range. Together, my data support a model in which zebrafish Nodals disperse in the tissue to signal over short distances which is consistent with the idea that Nodal diffusion underlies embryonic tissue patterning.

Monday, February 10, 2020 11:00am - 12:00pm
Heinzel Seminar Room / Office Bldg West (I21.EG.101)

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