Systems-level analysis of the vertebrate segmentation clock

Abstract:
The vertebrate segmentation clock is a gene expression oscillator controlling segmentation of the vertebral column. Oscillatory Hes/Her family genes create a transcriptional negative feedback loop. We developed a stochastic two-dimensional computational model that successfully reproduces how the period, amplitude and synchronization of the segmentation clock are regulated in different genetic backgrounds. We validated the major predictions of our model by quantifying rapid degradation of Her7 protein and spatially-increasing gradient of translational time-delay of Her1 protein in zebrafish embryos. We further demonstrated that expression of oscillating genes are activated by Notch and Wnt but repressed by RA signaling.

Host: Prof. David Kleinfeld

Monday, February 10, 2014
1:00 PM
NSB Auditorium 1205