CDB SEMINAR

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The Salk Institute for Biological Studies

Thursday, March 8, 2012
11:00~12:00 A7F Seminar Room

Secreted Semaphorins from Degenerating Larval ORN Axons Direct Adult Projection Neuron Dendrite Targeting

Summary

During assembly of the Drosophila olfactory circuit, projection neuron (PN) dendrites pre-pattern the developing antennal lobe before the arrival of axons from their presynaptic partners, the adult olfactory receptor neurons (ORNs). We previously found that levels of transmembrane Semaphorin-1a, which acts as a receptor, instruct PN dendrite targeting along the dorsolateral-ventromedial axis. Here we show that two secreted semaphorins, Sema-2a and Sema-2b, provide spatial cues for PN dendrite targeting. Sema-2a and Sema-2b proteins are distributed in gradients opposing the Sema-1a protein gradient, and Sema-1a binds to Sema-2a-expressing cells. In Sema-2a and Sema-2b double mutants, PN dendrites that normally target dorsolaterally in the antennal lobe mistarget ventromedially, phenocopying cell-autonomous Sema-1a removal from these PNs. Cell ablation, cell-specific knockdown, and rescue experiments indicate that secreted semaphorins from degenerating larval ORN axons direct dendrite targeting. Thus, a degenerating brain structure instructs the wiring of a developing circuit through the repulsive action of secreted semaphorins.

Reference:

Sweeney LB, Chou YH*, Wu Z*, Joo W*, Komiyama T, Potter CJ, Kolodkin AL, Garcia KC, Luo L. *Neuron*. 72(5):734-47 (2011)

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