Hedgehog Signaling: From Neurons to Astrocytes During Cortical Synapse Development

June 7

Tuesday, 12:30pm

Online Webinars

For Researchers

Speaker:

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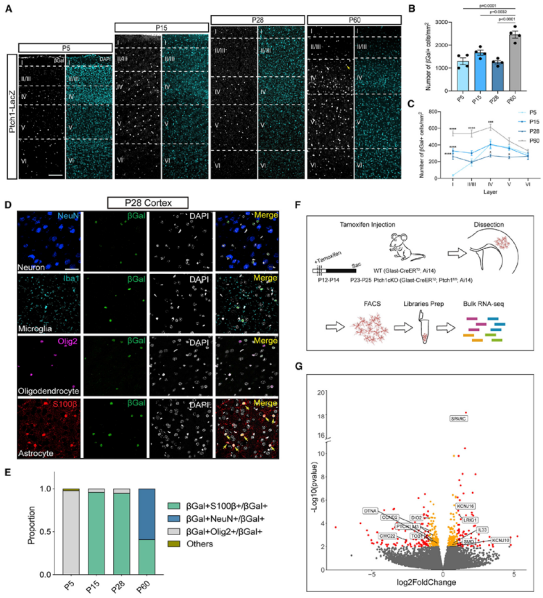
Abstract

Neuron-astrocyte interactions play a critical role in the regulation of synapse formation and circuit assembly. However, questions remain as to how astrocytes 'know' when and where to activate expression of synaptogenic factors. Our data suggests that neuron derived Sonic hedgehog may serve to coordinate the spatial temporal patterning of molecular programs in astrocytes to coordinate synapse assembly in specific layers of the cortex. We've shown that canonical Sonic hedgehog (Shh) pathway signaling in cortical astrocytes acts to coordinate layer-specific synaptic connectivity. We find that loss of Shh in layer V neurons reduces astrocyte complexity and coverage by astrocytic processes in tripartite synapses; conversely, cell-autonomous activation of Shh signaling in astrocytes promotes cortical excitatory synapse formation. Furthermore, Shh-dependent genes Lrig1 and Sparc distinctively contribute to astrocyte morphology and synapse formation. Shh signaling appears to regulate the molecular specialization of developing astrocytes throughout the brain. I will discuss our recent progress toward understanding how Shh signaling promotes the development and function of region-specific brain circuits.



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3. Baizabal JM, Mistry M, García MT, Gómez N, Olukoya O, Tran D, Johnson MB, Walsh CA, Harwell CC. **The Epigenetic State of PRDM16-Regulated Enhancers in Radial Glia Controls Cortical Neuron Position.** Neuron. 2018 Jun 6;98(5):945-962.e8. doi: 10.1016/j.neuron.2018.04.033. Epub 2018 May 17. Erratum in: Neuron. 2018 Jul 11;99(1):239-241. PMID: 29779941; PMCID: PMC6667181.

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