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Project title :

Molecular mechanisms regulating GABAergic circuit development in mammalian brain.

General Project Description:

In the cerebral cortex, neural networks consist of two broad classes of neurons: excitatory projection neurons, primarily using glutamate as neurotransmitter, and inhibitory local-circuit interneurons, comprising about 20-30% of all cortical neurons and primarily using gamma-aminobutyric acid-GABA as a neurotransmitter. Disruption of the balance between excitatory and inhibitory synaptic activities is believed to cause diseases such as epilepsy, autism and schizophrenia. The overall goal of my laboratory is to study the molecular mechanisms regulating GABAergic synapse development, by using a combination of molecular, imaging and electrophysiological techniques.

References:

Huang ZJ, Di Cristo G, Ango F (2007). Development of GABA innervation in the cerebral and cerebellar cortices, *Nature Review Neuroscience* 8:673-686.

Chattopadhyaya B, Di Cristo G, Wu CZ, Knott G., Kuhlman SJ, Fu Y, Palmiter RD, Huang ZJ (2007). Regulation of GABAergic axon branching and synaptic innervation by GAD67-mediated GABA synthesis and signaling, *Neuron* 54:889-903.

Huang ZJ, Di Cristo G, Ango F (2007). Development of GABA innervation in cerebral and cerebellar cortex. *Nature Review Neuroscience*, 8: 673-686.

Di Cristo G, Chattopadhyaya B, Kuhlman SJ, Fu Y, Bélanger M-C, Wu CZ, Rutishauser U, Maffei L, Huang ZJ (2007). Activity-dependent PSA expression promotes the maturation of GABA inhibition and the onset of critical period plasticity. *Nature Neuroscience* 10:1569-1577.

Huang ZJ, Di Cristo G (2008). Time to change : retina sends a messenger to promote plasticity in visual cortex. *Neuron*, 59 :355-358.

Huckfeldt RM, Schubert T, Morgan JL, Godinho L, Di Cristo G, Huang ZJ, Wong RO (2009). Transient neurites of retinal horizontal cells exhibit columnar tiling via homotypic interactions. *Nature Neuroscience*, 12:35-43.

Discipline: neurophysiology, biochemistry, molecular biology, cell biology.

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