Early cortical circuits that regulate development and plasticity

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The mammalian brain contains billions of neurons that in primary sensory areas provide an exquisite representation of the external world. These primary sensory areas contain topographic maps of sensory stimulus features (i.e. ocular dominance and orientation in visual cortex or tonotopy in auditory cortex). This functional architecture is not hard-wired, but its development depends on neuronal activity and sensory experience. Our research focuses on answering the critical questions of how this architecture emerges, how experience shapes this process, and how neuronal circuits can be rapidly changed to adapt an organism’s performance to environmental or behavioral conditions.

Our developmental work to date has identified subplate neurons as a crucial component of the developing thalamocortical system. Without these neurons, cortical development does not proceed normally. We thus investigate how these neurons promote normal development and plasticity of the cerebral cortex.

References: