



Neuroscience Center of Excellence

Seminar

"Experience-dependent Rewiring of Cortical Circuits"

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The fine-tuning of circuits in sensory cortex requires sensory experience during an early critical period. Visual deprivation (VD) during the critical period has catastrophic effects on visual function, including loss of visual responsiveness to the deprived eye, reduced visual acuity, and loss of tuning to many stimulus characteristics. These changes occur faster than remodeling of thalamocortical axons, but the intracortical plasticity mechanisms that underlie them are incompletely understood. Long-term depression (LTD) of excitatory intracortical synapses has been proposed as a general candidate mechanism for the loss of cortical responsiveness following visual deprivation[^]. Alternatively (or in addition), the decreased ability of the deprived eye to activate cortical neurons could be due to enhanced intracortical inhibition. Here we show that VD leaves excitatory layer 4 connections unaffected, but dramatically potentiates inhibitory feedback between fast-spiking basket cells (FS cells) and star pyramidal neurons (star pyramids). Further, a novel form of long-term potentiation of inhibition (LTPi) could be induced at FS to star pyramid synapses, and was occluded by prior visual deprivation. These data suggest that potentiation of inhibition is a major cellular mechanism underlying the deprivation-induced degradation of visual function, and that a novel form of LTPi plays an important role in fine-tuning cortical circuitry in response to visual experience.

**12:00pm September 11, 2007, 8th Floor Neuroscience Center
Conference Room, LSU Lion's Building,
2020 Gravier Street, New Orleans**