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Presentation Abstract

Program#/Poster#:	553.16/I18
Title:	Slow frequency oscillations of synaptic activity in the neocortex
Location:	Halls B-H
Presentation Time:	Tuesday, Nov 16, 2010, 11:00 AM -12:00 PM
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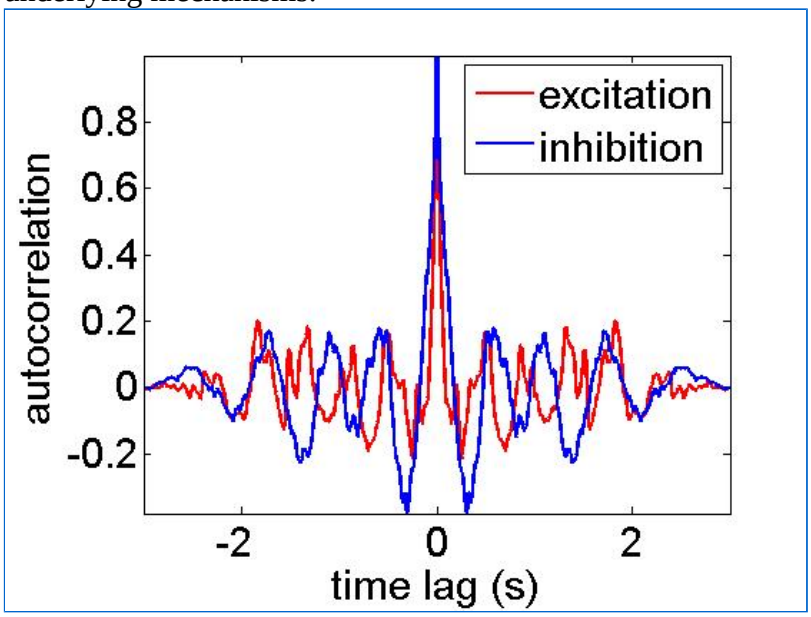
Abstract:	Even in the absence of sensory drive cortical neurons continuously receive synaptic inputs. The spatiotemporal structure of these synaptic barrages is not completely characterized. Using single and dual patch-clamp recording techniques in voltage-clamp mode, we recorded spontaneous excitatory and inhibitory inputs onto layer 2/3 pyramidal cells (PCs) and somatostatin-positive (SOM+) interneurons in acute coronal and thalamocortical slices of mouse somatosensory cortex. We disentangled excitatory and inhibitory events by biasing the membrane potential to their reversal potentials. Recording from individual cells in acute thalamocortical slices revealed the presence of a slow (0.5 - 5 Hz) non-stationary oscillatory component that was highly reproducible in both excitatory and inhibitory synaptic barrages onto PCs and SOM+ interneurons. Dual recordings from spatially proximal PC/PC, SOM+/SOM+, and PC/SOM+ pairs showed only weak correlations between their synaptic inputs, suggesting that the oscillations are confined to local microcircuits. To address whether the oscillations were of thalamic origin or intrinsically generated by the cortex, we recorded from the same cortical area in coronal slices lacking the ventrobasal nucleus of thalamus. The oscillations of synaptic activity persisted in the absence of thalamic input, implying that the recurrent circuitry of the neocortex is sufficient to sustain transient, slow oscillations. Putative roles of oscillatory synaptic activity are the maintenance of synaptic connections and the modulation of neuronal firing. Further exploration is necessary to determine the

underlying mechanisms.



Disclosures: **P. Puzerey**, None; **R. Fernandez Galan**, None.

Keyword(s): OSCILLATION

CORTEX

VOLTAGE CLAMP

Support: Mt. Sinai Health Care Foundation

Alfred P. Sloan Foundation

[Authors]. [Abstract Title]. Program No. XXX.XX. 2010 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2010. Online.