Laminar-Specific Activity in Frontal Cortex Suggests Mechanisms for Control of Working Memory

Submission ID 3000293

Submission Type Poster

Topic Neuroscience

Status Submitted

Submitter Andre Bastos

Affiliation MIT

SUBMISSION DETAILS

Presentation Type Either Poster or Oral Presentation

Presentation Abstract Summary All of the cerebral cortex has some degree of laminar organization, neurons with distinct connectivity patterns, embryonic origins, and molecular profiles. But there is little data on the laminar specificity of cognitive functions in frontal cortex. We recorded neuronal spiking/local field potentials (LFPs) using laminar probes from frontal areas (PMd, SEF, SMA, ACC, 46d/v, 8) of monkeys performing working memory (WM) tasks. LFP power in gamma (40-250 Hz) was strongest in superficial layers and in alpha/beta (4-22 Hz) in deep layers. Memory-delay activity, including spiking and stimulus-specific gamma bursting was predominate in superficial layers. LFPs from superficial and deep layers synchronized in alpha and beta bands. This was primarily unidirectional with alpha/beta in deep layers driving superficial-layer activity. The phase of deep-layer alpha/beta modulated the superficial-layer gamma bursting associated with working memory encoding. Thus, alpha/beta rhythms in deep layers may regulate the superficial-layer gamma that, in turn, maintains working memories.

Paper Upload (PDF) CCN_Submission.pdf

Co-author Information

* Presenting Author

First Name	Last Name	Affiliation	E-mail
Andre *	Bastos *	MIT	abastos@mit.edu
Roman	Loonis	MIT	roman.loonis@gmail.com
Simon	Kornblith	MIT	simonk@mit.edu
Michael	Lundqvist	MIT	lundqvis@mit.edu
Earl	Miller	MIT	ekmiller@mit.edu

Keywords

Keywords
gamma band oscillations
oscillations
working memory
prefrontal cortex
neocortex