Neuroscience data talk

Spatio-temporal dynamics of narrowband-gamma in the mouse early visual system

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The narrowband-gamma rhythm (NB-gamma, 50-70 Hz) is a prominent feature of activity in the mouse's dorsal lateral geniculate nucleus (dLGN) of the thalamus during visual stimulation with uniform full-field stimuli of high luminance. However, it is not clear to what extent NB-gamma influences downstream spiking activity in primary visual cortex (V1) and whether it does so during stimulation with naturalistic scenes, which contain complex spatial distributions of luminance. In this study, we investigated the relationship between spiking activity and the V1 local field potential (LFP) in simultaneous extracellular recordings from dLGN and V1, during visual stimulation with a uniform high-luminance stimulus as well as natural scenes. During grey-screen visual stimulation, we found that bursts of NB-gamma oscillations in the V1-LFP modulated V1 spiking activity, differentially recruiting excitatory vs. inhibitory neurons across cortical layers at distinct phases. In the context of natural scenes, we observed that the V1-LFP NB-gamma tracked luminance in a local portion of the visual field. Moreover, when local luminance was high, we found that NB-gamma recruited individual V1 neurons with retinotopic specificity. Our results thus show that NB-gamma is not merely a globally uniform rhythm, but that it has a complex temporal and spatial structure capable of tracking luminance in local regions of the visual field. Together, these findings imply a role for the NB gamma oscillation for encoding luminance during naturalistic vision.

Thursday, May 11, 2023 04:00pm - 05:00pm
Raiffeisen Lecture Hall, Central Building

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