

## AB051. Dynamics of visual cortex are dependent on pulvinar activity

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**Background:** It is well known that the pulvinar establishes reciprocal connections with areas of the visual cortex, allowing the transfer of cortico-cortical signals through transthalamic pathways. However, the exact function of these signals in coordinating activity across the visual cortical hierarchy remains largely unknown. In anesthetized cats, we have explored whether pulvinar inactivation affects the dynamic of interactions between the primary visual cortex (a17) and area 21a, a higher visual cortical area, as well as between layers within each cortical area. We found that pulvinar inactivation modifies the local field potentials (LFPs) coherence between a17 and 21a during a visual stimulation. In addition, the Granger causality analysis showed that the functional connectivity changed across visual areas and between cortical layers during pulvinar inactivation, the effects being stronger in layers of the same area. We observed that the effects of pulvinar inactivation arise at two different epochs of the visual response, i.e., at the early and late components. The proportion of feedback and feedforward functional events was higher during the early and the late phases of the responses, respectively. We also found that pulvinar inactivation facilitates the feedback propagation of gamma oscillations from 21a to a17. This feedback transmission was predominant during the late response. At the temporal level, pulvinar inactivation also delayed the signals from a17 and 21a, depending on the source and the target of the cortical layer. Thus, the pulvinar can not only modify the functional connectivity between intra and inter cortical layers but may also control the temporal dynamics of neuronal activity across the visual cortical hierarchy.

**Methods:** *In vivo* electrophysiological recordings of visual cortical areas, area 17 and 21a, in anesthetized cats, were then explored with temporal serial analysis (i.e., Fourier analysis, Coherence, Cross-correlation and Granger causality) of the local field potential.

**Results:** Inactivation of the thalamic nucleus modifies the dynamics of areas 17 and 21a. The changes observed depends on the source and the target of the cortical layer. The pulvinar inactivation arise at two different epochs of visual response.

**Conclusions:** The pulvinar modifies the functional connectivity between intra and inter cortical layers and may also control the temporal dynamics of neuronal activity across the visual cortical hierarchy.

**Keywords:** Cortico-thalamo-cortical loop; cortico-cortical connections; feedforward and feedback pathways

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