

POSTER PRESENTATION

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Dynamics of the thalamo-cortical system driven by pulsed sensory stimulation

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From Twenty Second Annual Computational Neuroscience Meeting: CNS*2013 Paris, France. 13-18 July 2013

There exists a large body of evidence pointing to an essential role of sleep in memory consolidation [1-3]. In particular non-REM sleep seems to be important for consolidating declarative memories [4]. Boosting the so-called slow oscillations (<1 Hz) during non-REM sleep via transcranial electric stimulation leads to a potentiation of memory [5]. It has also been demonstrated that slow oscillations can be induced by optogenetic, magnetic and acoustic stimulation [6-8]. Here we present data from human sleep studies and modeling results on the thalamo-cortical system under sensory stimulation, that give new clues for effective stimulation protocols. We use a population model that exhibits important features of brain activity during non-REM sleep, e.g. spindles, cortical

Slow oscillations with gamma activity and clock-like delta oscillations. The model aims at reproducing evoked responses of auditory and visual stimuli at several frequencies. We extend previous results on the phase-dependent response of isolated cortex [9] to stimuli which are time-locked to spindle and slow oscillation events and test the hypothesis that the main factor determining thalamic gating properties in non-REM sleep is the phase of the cortical slow oscillation.

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Published: 8 July 2013

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doi:10.1186/1471-2202-14-S1-P67

Cite this article as: Weigenand et al.: Dynamics of the thalamo-cortical system driven by pulsed sensory stimulation. *BMC Neuroscience* 2013 **14**(Suppl 1):P67.

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