

第30回 最先端脳科学セミナー

Perceptual memory consolidation during NREM sleep requires a cortical top-down circuit

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日時: 2016年8月5日(金) 17:00~18:30

場所: 日医工オーデトリウム (医薬イノベーションセンター1F)

要旨

Non-rapid eye movement (NREM) sleep is essential for consolidation of an animal's motor and sensory learning experiences. During sleep, bottom-up inputs from sensory organs to the brain are largely silenced and inactive. However during the NREM phase synchronous oscillations ranging from 0.5 to 4 Hz (slow wave activity) occur across cortical regions. These observations have led to the hypothesis that interregional transfer of internal information during NREM sleep has a significant role in memory consolidation. Recently, we identified a cortical top-down circuit that underlies somatosensory perception in the mouse hindpaw (Neuron 2015). However, the role of top-down cortical inputs during sleep in memory, particularly in the consolidation mechanism, has yet to be examined. We developed a novel perceptual learning task that requires sleep for memory consolidation and examined the role of top down input during sleep. During NREM sleep between the learning and retrieval periods, the optogenetic inhibition of an anatomically identified cortical top-down input from M2 to S1, but not vice versa, resulted in the suppression of functional communication causality from M2 to S1, the absence of reactivated S1 neurons, and behavioral deficits in texture memory consolidation. In NREM sleep and sleep-deprived states, closed-loop asynchronous or synchronous M2-S1 co-activation, respectively, reduced or prolonged memory retention. Top-down cortical information flow in NREM sleep is thus required for perceptual memory consolidation.

【参考】 *Neuron*, 86 (5): 1304-16, 2015

Science, 352 (6291): 1315-8, 2016

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