00523 Auditory Stimulation of Sleep Slow Oscillations Modulates Subsequent Memory Encoding Through Altered Hippocampal Function

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Aims: Slow oscillations (SO) during sleep contribute to the consolidation of learned material. How the encoding of declarative memories during subsequent wakefulness might benefit from their enhancement during sleep is less clear. In this study, we aimed to investigate the impact of acoustically enhanced SO during a nap on subsequent encoding of declarative material.

Methodology: Thirty-seven healthy young adults (mean ± SD: 22.5 ± 2.3 years; 18 males) were studied under two conditions: stimulation (STIM) and no stimulation (SHAM), in counter-balanced order following a night of sleep restriction (4h time-in-bed; TIB). In the STIM condition, auditory tones were phase-locked to the SO up-state during a 90-min nap opportunity. In the SHAM condition, corresponding time-points were marked but tones were not presented. 30-min after awakening, participants encoded pictures while undergoing fMRI. Picture recognition was tested 60-min later.

Result: Acoustic stimulation augmented SO across the group but there was no group level benefit on memory. However, greater SO enhancement correlated with greater recollection. SO enhancement was also positively correlated with hippocampal activation at encoding. Although spindle activity increased this did not correlate with memory benefit or shift in hippocampal signal.

Conclusion: Acoustic stimulation during a nap can benefit encoding of declarative memories but there was large inter-individual variability. The level of hippocampal activation at encoding positively correlated with SO augmentation.