

***Talk on Tuesday, 14. January 2025***

***Start: 10:15 Uhr till 11.30 Uhr***

***in HS 424***

***The talk will be presented in English***

# **The role of sleep spindles and their temporal patterns in motor memory consolidation**

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Learning a new motor skill is not just a matter of practice, but also relies on memory consolidation mechanisms. The consolidation of motor skills benefits from brief bursts of neural activity during sleep, called sleep spindles (11 - 16 Hz), through the timed and repeated reactivation of newly formed motor memories. Current trends propose that a timely phase-locking between slow oscillations (0.5 - 1.25 Hz) and spindles facilitates the induction of learning-related synaptic plasticity. Also, Recent evidence highlights a temporal cluster-based

organization of spindles in “trains”, which is thought to be an inherent clocking sleep mechanism for efficient memory reprocessing and consolidation. Over the past few years, we have sought to evaluate the role of sleep spindles and their temporal dynamics in motor memory consolidation using different learning paradigms. Sleep spindle activity was assessed during a nap after motor sequence learning using different practice modalities: physical practice, motor imagery and action observation. Then, we evaluated the contribution of spindles’ clustering and coupling in motor memory consolidation by promoting local synaptic depression in sensorimotor cortical regions through upper-limb immobilization following motor sequence learning. By combining behavioral measures and sleep EEG analyses, we suggest that spindle trains may promote skill-specific strengthening of motor memories. Conversely, sporadic reactivations of the memory trace during isolated spindles (i.e., outside trains) may create memory-instability conditions leading to enhanced skill generalization.