

Introductory Remarks to Symposium 21

System memory consolidation during sleep

Til Ole Bergmann and Jan Born, Tübingen

The collaborative research center on 'Plasticity & Sleep' (TR-SFB 654) brings together investigators who study the role of sleep in promoting the consolidation of memories in the neurobehavioral, metabolic, and immune system. The unifying assumption is that the plastic processes underlying sleep-dependent memory consolidation in these systems are, despite their different anatomical substrates, partly conveyed via very similar mechanisms, transforming memories from an initially labile to a stable form for long-term storage. Because storage capacities are limited, system consolidation must additionally reduce information by abstracting the behaviorally or functionally relevant 'gist'. Jan Born will introduce the collaborative research center and the key concepts of active system memory consolidation across systems. Susanne Diekelmann will demonstrate how learning-associated odor cues presented during sleep can induce reactivation and reorganization of previously acquired memory traces, resulting in improved memory performance. Til Ole Bergmann will discuss the neuro-oscillatory mechanisms underlying the hippocampal-neocortical redistribution of memories during sleep, namely the interaction of neocortical slow oscillations (< 1 Hz), thalamocortical spindles (12-15 Hz), and hippocampal ripples (~80-100 Hz). Gordon Feld will review the neuro-chemical machinery of plasticity in the brain that is mediating sleep-dependent memory consolidation, presenting pharmacological studies that target specific neurotransmitter systems in humans (e.g., glutamate, GABA, dopamine, acetylcholine). Tanja Lange will draw the link to immunological memory, that is the formation of antigen-specific T and B cells, and introduce the sleep-specific processes that subserve its consolidation. Albrecht Forster will demonstrate that even organisms with comparably simple nervous system, such as *Aplysia californica*, benefit from sleep when tested on an operant avoidance learning task. Jens Klinzing will show that the acetylcholine-esterase inhibitor physostigmine administered during sleep does not suppress the memory-enhancing effect of odor-induced memory reactivation in humans.

Symposium 21

Friday, March 24, 2017
11:30 – 13:30, Lecture Hall 10

Chairs: Til Ole Bergmann and Jan Born, Tübingen

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| 11:30 | Opening Remarks |
| 11:40 | Susanne Diekelmann, Tübingen
CUEING MEMORY REACTIVATION DURING SLEEP (S21-1) |
| 12:00 | Til Ole Bergmann, Tübingen
NEURONAL OSCILLATIONS MEDIATING SLEEP-DEPENDENT MEMORY CONSOLIDATION (S21-2) |
| 12:20 | Gordon Feld, Tübingen
THE NEUROCHEMICAL MECHANISMS OF SLEEP-DEPENDENT MEMORY CONSOLIDATION (S21-3) |
| 12:40 | Tanja Lange, Lübeck
EFFECTS OF SLEEP ON IMMUNOLOGICAL MEMORY PROCESSES (S21-4) |
| 13:00 | Albrecht Vorster, Tübingen
THE EFFECT OF SLEEP ON OPERANT CONDITIONING IN <i>APLYSIA CALIFORNICA</i> (S21-5) |
| 13:10 | Jens Gerrit Klinzing, Tübingen
NO EFFECTS OF INCREASED ACETYLCHOLINE ON ODOR-INDUCED MEMORY REACTIVATION DURING SLOW WAVE SLEEP (S21-6) |
| 13:20 | Concluding Remarks |