

## NETWORK MECHANISMS OF MEMORY FORMATION AND CONSOLIDATION

The 'two-stage' theory of memory posits that memory traces initially formed in the hippocampus (HPC) during the waking state are progressively transferred to the neocortex during sleep, where they are stored and available for long term recall. Candidate target neocortical areas include the medial prefrontal cortex (mPFC), which receives monosynaptic input from the HPC. Coordination between the two structures could involve several brain oscillations. Accordingly, HPC and mPFC theta (7-8 Hz) oscillations coordinate during learning, leading to the emergence of specific cell assemblies, and task-related neural activity patterns are subsequently replayed during sleep, including HPC sequences and mPFC assemblies. Our recent work has tested potential mechanisms of HPC sequences during memory formation, and provided evidence of a causal role in memory consolidation for hippocampal ripples (150-200 Hz) and associated replay, and for their coordination with cortical delta waves (0.1-4 Hz) and spindles (10-20 Hz), leading to the reorganization of selected mPFC subnetworks during sleep.