

# Anatomical correlates of rapid eye movement sleep-dependent plasticity in the developing cortex

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## Abstract

Rapid eye movement (REM) sleep is expressed at its highest levels during early life when the brain is rapidly developing. This suggests that REM sleep may play important roles in brain maturation and developmental plasticity. We investigated this possibility by examining the role of REM sleep in the regulation of plasticity-related proteins known to govern synaptic plasticity in vitro and in vivo. We combined immunohistochemistry with a classic model of experience-dependent plasticity in the developing brain known to be consolidated during sleep. We found that after the developing visual cortex is triggered to remodel, it is reactivated during REM sleep (as measured by FOS+ and ARC+ cells). This is accompanied by expression of several proteins implicated in synaptic long-term potentiation (PSD95 and phosphorylated (p), mTOR, cofilin, and CREB) across the different cortical layers. These changes did not occur in animals deprived of REM sleep, but were preserved in control animals that were instead awakened in non- (N) REM sleep. Collectively, these findings support a role for REM sleep in developmental brain plasticity.

synaptic remodeling, brain development, paradoxical sleep, sleep function, ocular dominance

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