Neurophysiological Basis of Sleep’s Function on Memory and Cognition

Abstract:

While sleep is a period of bodily rest, it is also a period of brain activity and an opportunity for cognitive function that we take for granted. Marked changes in neural activity and the neurochemical amalgam allow for cognitive processing to occur in ways that are not possible over wake. Selective memory consolidation and generalization of declarative, procedural and emotional memories have vast impacts on waking cognitive performance. Decisions are improved by sleep-dependent generalization. One might imagine that the flood of product descriptions viewed when online shopping in the evening is integrated with our stored memories to isolate the ideal features based on the future uses the product might serve. Simultaneously, we can generate creative ideas upon awakening as the result of combining memories over sleep. Collectively, the function of the sleeping brain should entice us to sleep.

Progress in understanding how these great achievements come about over sleep has been rapid over the past decade. As the present model and other models are tested and honed, we may better understand how impairments in sleep account for learning and cognitive deficits in developmental populations and clinical populations. Treating sleep may improve cognitive function, and conversely, enhancing daytime cognitive activities may provide a similar wealth of benefits to subsequent sleep.