

Sleep and directed forgetting.

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A crucial function of memory is to forget irrelevant information. Some authors hypothesized that sleep could favour this process. In this study, we examined the influence of sleep and total sleep deprivation on memory consolidation and active forgetting using function magnetic resonance imaging (fMRI).

Young subjects performed a directed forgetting task (item procedure). During encoding, words were presented during 1 second, and were followed by the instruction “to be remembered (TBR)” or “to be forgotten (TBF)” during 3 seconds. Then, subjects were randomly divided in two groups whether they slept (RS group, n = 14) or not (TSD group, n = 12) during the first post-learning night. Memory performance was assessed after two recovery nights using a recognition task consisting in the presentation of words that subjects have to categorize as previously encountered (whatever the instruction furnished) or not.

TSD participants recognized as much TBR items as did RS participants ($p>.98$), but also more TBF items ($p<.05$) and produced more false alarms ($p<.01$). In addition, hippocampal response in RS participants was larger for TBR items categorized as old compared to TBR items that were forgotten, but also for TBF items that were later recognized compared to forgotten ones. These results provide evidence that the brain during sleep differentially processes TBR and TBF items, and that this process appears to be contingent upon hippocampal activity at encoding. Our results indicate that brain activity at learning is crucial to determine the fate of memories during subsequent sleep episodes.