

Sleep parameters, functional status and time post-stroke are associated with off-line motor skill learning in people with c

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Abstract: BACKGROUND: Mounting evidence demonstrates that individuals with stroke benefit from sleep to enhance learning of a motor task. While stage NREM2 sleep and REM sleep have been associated with offline motor skill learning in neurologically intact individuals, it remains unknown which sleep parameters or specific sleep stages are associated with offline motor skill learning in individuals with stroke. METHODS: Twenty individuals with chronic stroke (>6 months following stroke) and 10 control participants slept for three consecutive nights in a sleep laboratory with polysomnography. Participants practiced a tracking task the morning before the third night and underwent a retention test the morning following the third night. Offline learning on the tracking task was assessed. Pearson's correlations assessed for associations between the magnitude of offline learning and sleep variables, age, upper-extremity motor function, stroke severity, depression, and time since stroke occurrence. RESULTS: Individuals with stroke performed with significantly less error on the tracking task following a night of sleep ($p=0.006$) while the control participants did not ($p=0.816$). Increased sleep efficiency ($r=-0.285$), less time spent in stage NREM3 sleep ($r=0.260$), and more time spent in stage REM sleep ($r=-0.266$) were weakly-to-moderately associated with increased magnitude of offline motor learning. Furthermore, higher upper-extremity motor function ($r=-0.400$), lower stroke severity ($r=0.360$), and less time since stroke occurrence ($r=0.311$) were moderately associated with increased magnitude of offline motor learning. CONCLUSION: This study is the first study to provide insight into which sleep stages and individual characteristics may be associated with offline learning in people with stroke. Further research is needed to delineate which factors or combination of factors promote offline motor learning in people with neurologic injury to best promote motor l