

研究業績 英文表記

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表題	睡眠が脳活動および集中力へ与える影響
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英文	
Title	Effects of Sleep on Brain Activity and Concentration Performance
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Abstract	<p>Background: Sleep is essential for maintaining physical health and cognitive function; sleep deprivation impairs attention, memory, academic performance, and decision-making. The prevalence of sleep disorders is increasing; however, the underlying mechanisms remain unclear, and their effects on cognitive function remain obscure. Herein, we examined the influence of sleep on concentration tasks from a neuroscientific perspective using electroencephalography (EEG).</p> <p>Methods: This study enrolled 17 healthy young adults (3 women, 14 men; age: 20.9 ± 0.66 years). Participants completed a “sleep diary” using a free smartphone application to measure sleep quality from the previous night through the morning. Subsequently, they were instructed to perform a concentration task comprising a calculation problem based on the Uchida-Kraepelin test (a psychological test also termed the work inspection test). During the task, cerebral activation was measured using EEG. Task performance was calculated as the number of tasks and incorrect answers. Spearman’s rank correlation coefficient was applied to analyze correlations between sleep diary entries, Uchida-Kraepelin test, and EEG.</p> <p>Results: No significant correlation among sleep duration, number of tasks, and number of incorrect answers was observed. Significant correlations were observed in left frontal β and γ waves and right frontal α and γ waves ($p < 0.05$). β and γ waves showed changes in the left frontal lobe and were positively correlated, and incorrect answers increased as EEG power levels increased. Similarly, α and γ waves in the right frontal lobe were positively correlated, and incorrect answers increased as EEG power levels increased. No significant correlation was found between sleep and concentration the following morning. A significant correlation was found between frontal lobe α, β, and γ waves.</p> <p>Conclusion: The increased power of these waves leads to a higher number of errors during concentration tasks, indicating that performance on concentration tasks depends on frontal lobe activity, regardless of sleep quality.</p>
keyword	Sleep, Concentration, Electroencephalography, Brain Function, Neuroimaging

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