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### **Electrophysiological correlates of age-dependent memory processes in mathematical cognition**

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The aim of this study was to compare the frequency-specific characteristics of the EEG recorded in a young and elderly group during an arithmetic task. **Methods:** A group of old (N=19, mean age: 66.7 yrs) and young (N=32, mean age: 22 yrs) subjects were studied in a simple adding arithmetic operation. The EEG was recorded by 33 electrodes and 2048 ms epochs were analyzed by calculating frequency spectra, graph theoretical indexes and complexity measures. Behavioral measures (RT, number of errors) were also recorded. Repeated measures of ANOVA was used for statistical analysis. **Results:** Delta power increased in the task condition in both groups. In the delta and alpha1 bands Omega complexity decreased, while synchronization likelihood increased in the task condition in the elderly. A significant task elicited decrease was found for the graph theoretical indices in the theta band in the young. The number of correct responses was significantly lower and RT was higher in the elderly. **Conclusions:** The task-related increase of the delta frequency may be attributed to the process of arithmetic operation and increased demand on working memory. Task-dependent changes of nonlinear synchronization and graph theoretical indexes were observed in more frequency ranges than those obtained by the traditional methods, probably revealing both local and long-range synchronization increases required by arithmetic processing. **Keywords:** EEG, mental arithmetic, complexity, graph theory, synchronization