

## SPECTRAL ANALYSIS OF CEREBRAL HEMODYNAMICS AND GENDER DURING SET SHIFTING AND SET MAINTENANCE

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**Introduction:** Set shifting provokes gender related alterations of rapid cerebral hemodynamics in large basal cerebral arteries. However, no information on frequency patterns has been reported, especially when comparing phases of set shifting and set maintenance.

**Objectives:** In the following functional transcranial Doppler study (fTCD), we introduced spectral analysis to rapid cerebral hemodynamic changes.

**Aims:** To investigate signal characteristics during both phases and its correlate with sociodemographic and performance variables.

**Methods:** Male and female participants performed the Wisconsin Card Sorting Test during measurement of the middle cerebral arteries. Cerebral hemodynamics underwent spectral transformation during set maintenance and set shifting. Correlation analyses examined the linkage with sociodemographic and performance variables.

**Results:** Scattering of frequencies was significantly increased during set shifting as compared to set maintenance ( $P=0.006$ ). Increasing age was significantly associated with increasing variability of spectral frequencies during set maintenance ( $P<0.002$ ). In males, but not in females, higher age predicted increased variability of spectral frequencies during set shifting on the right hemisphere ( $P=0.002$ ). During that phase, males showed a frequency peak near 0.1 Hz (trend level).

**Conclusions:** This study provides evidence that spectral analysis of cerebral hemodynamics is a fruitful strategy to characterize gender differences and brain behavior relationships during higher cognitive functioning. Further covariates such as age, performance and hemisphere have to be considered. In other words, signal frequency of cerebral hemodynamics may be an underreported neurobiological marker in addition to signal strength, with special relevance for psychiatric diseases with cognitive dysfunction and/or gender differences, such as schizophrenia or major depression.