The cognitive course in Parkinson’s disease patients treated with Deep Brain Stimulation of subthalamic nucleus – Correlations with qEEG

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Introduction.
Deep brain stimulation of the subthalamic nucleus (STN-DBS) improves motor functioning in Parkinson’s disease (PD) patients. Additionally, it can also influence cognitive functioning. In most PD patients, a decline of verbal fluency test performance after STN-DBS is often reported.

Objective: The purpose of this study was to determine whether preoperative quantitative electroencephalography (qEEG) may be useful in the preoperative assessment predicting cognitive changes in PD patients treated with STN-DBS.

Patients & Methods.
Cognitive performance of 16 PD patients who underwent bilateral STN-DBS and 15 PD controls (for sample characteristics see Table 1) was compared at baseline as well as after 24 months.
Cognitive domain scores were calculated combining Z-scores of different neuropsychological test, covering the following domains:
1) Attention
2) Executive function
3) Episodic & working memory
4) Verbal fluency
5) Visuo-construction
A preoperative 256-channels EEG was recorded of each patient at rest; global relative power spectra were
Statistics: Correlation and linear regression models

Results.
The decline of verbal fluency performance after two years in the PD group treated with STN-DBS was significant in comparison to the PD controls (p< 0.001). All other cognitive domains declined in the same manner as in the PD controls or remained stable. Increased global theta power (4-8 Hz) at baseline was associated with reduced post operative verbal fluency performance (r = 0.50, p< 0.05) at follow-up.

Discussion/Conclusion.
Consistent with the results of former studies, STN stimulation deteriorates verbal fluency in the course of two years. Accordingly, we observed significant decline in tests measuring verbal fluency in the group of PD patients treated with STN-DBS compared to a control group of PD patients. The decline of verbal fluency performance could be predicted by a reduced theta power at baseline. No other significant differences in cognitive alterations between patients in the STN-DBS group and the PD control group occur over two years.