

Neuropsychological outcomes of subthalamic nucleus deep brain stimulation in Parkinson's disease

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Despite the improvement of motor symptoms in Parkinson's disease after deep brain stimulation (DBS) of the subthalamic nucleus (STN) is well documented, there are open questions regarding its impact on cognitive functions. The aim of the present study was to assess the effect of bilateral DBS of the STN on executive and memory functions in PD patients using an unstimulated PD control group matched on age, education, disease duration, motor symptoms, medication and DBS indication. All PD patients included in study fulfilled the UK Parkinson's Disease Society Brain Bank clinical diagnostic criteria for PD. Thirteen PD patients with DBS implantation (DBS group) and 15 PD wait-listed patients (control group) participated in the study. Motor symptoms were assessed by the Unified Parkinson's Rating Scale (UPDRS) motor score, anxiety by the State and Trait Anxiety Inventory (STAI) and depression by the Beck Depression Inventory (BDI). A neuropsychological battery was used to assess cognitive functions, including general mental ability (Mini Mental State Examination), verbal (digit span) and spatial short-term memory (Corsi block-tapping task), working memory (n-back task) and executive functions (phonemic and semantic verbal fluency, Stroop task, Trail Making B task). Each task was administered twice: before and after surgery in the DBS group with the stimulators on and with a similar time interval between the two task-administration points in the control group. There was no significant difference between the DBS and the control groups' performance in tasks measuring short-term verbal, spatial and working memory and executive functions assessed by the Trail Making B and the Stroop Tasks. The DBS group showed a significant decline on the semantic verbal fluency task after surgery compared to its own baseline level ($p < .05$). The findings are discussed considering different possible effects of the STN DBS on frontostriatal networks.

Keywords: Parkinson Disease, deep brain stimulation, executive function, memory