

The acute effects of DBS on cardiovascular autonomic and sudomotor function

Kristi Meksi¹, L. Brusa², C. Piano³, F. Bove³, E. Garasto¹, R. Cerroni⁴, N.B. Mercuri¹, A. Stefani⁴, C. Rocchi¹

1 Neurology Unit, Policlinico Tor Vergata, University of Rome "Tor Vergata", Rome, Italy

2 Neurology Unit, Ospedale S.Eugenio, Rome, Italy

3 Neurology Unit, Fondazione Policlinico Universitario Agostino Gemelli IRCCS, Rome, Italy

4 Parkinson's Disease Center, Policlinico Tor Vergata, University of Rome "Tor Vergata", Rome, Italy

Introduction: Deep brain stimulation of the subthalamic nucleus (STN-DBS) is an effective treatment option for advanced Parkinson's disease (PD). Currently, there are few and contradictory data on the effects of DBS on the autonomic nervous system [1-2].

Aim: To examine the acute cardiovascular and sudomotor effect in 10 patients with advanced PD in whom electrodes had been implanted in the bilateral STN. Heart rate (HR), blood pressure (BP) and respiratory rate were continuously recorded under supine resting conditions and at the 3rd and 10th minute head-up tilt test at 65° (HUTT). Sudomotor function was assessed by means of the Sudoscan. Patients were examined under three conditions: with deep brain stimulation in progress and CAPIT condition (DBS on/Th off), 30 minutes after switching off the DBS, in CAPIT (DBS off /Th off) and 30 minutes after switching on the stimulator and in best on condition after administering melevodopa/carbidopa 100/25 mg (DBS on /Th on). The pre-HUTT supine (baseline) values of systolic and dystolic BP and HR and the changes expressed as delta (raw data) from baseline were compared with those recorded during HUTT at minute 3' and minute 10' by t-test. Statistical significance was set at p<0.05.

Results: A significant reduction in systolic BP was found at minute 10 of HUTT only in the DBS on/Th on condition. No other significant differences in HR, BP and sudomotor function were found among the three conditions.

Conclusions: STN stimulation has no significant impact on HR and BP under basal conditions and during orthostatic stress. Sudomotor function was also not affected. The reduction of systolic BP at 10 min in the DBS on/Th on condition is related to the effect of acute therapy. DBS may exert a positive effect on cardiovascular reactivity with indirect mechanism as it allows the levodopa load.

References:

- [1] Kaufmann H, Bhattacharya KF, Voustantiouk A, Gracies JM. Stimulation of the subthalamic nucleus increases heart rate in patients with Parkinson disease. *Neurology*. 2002 Nov 26;59(10):1657-8. doi: 10.1212/01.wnl.0000034180.21308.c0. PMID: 12451221.
- [2] Stemper B, Beric A, Welsch G, Haendl T, Sterio D, Hilz MJ. Deep brain stimulation improves orthostatic regulation of patients with Parkinson disease. *Neurology*. 2006 Nov 28;67(10):1781-5. doi: 10.1212/01.wnl.0000244416.30605.f1. PMID: 17130410.