

Peak exercise performance in Parkinson's disease before and 3 months after subthalamic deep brain stimulation (STN-DBS).

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Aim:

Deep brain stimulation in the subthalamic nuclei improves motor function considerably in Parkinson's disease (PD), but there is only limited data available regarding the effect of the treatment on exercise performance. Furthermore, it is known that PD can develop myocardial sympathetic degeneration, however only limited data is available regarding maximal physical performance and peak oxygen uptake in these patients compared to a normal reference population.

Therefore the aim was to test whether PD patients have the same exercise performance and peak oxygen uptake compared to a normal reference group, and to establish whether DBS-STN treatment improve exercise performance in the patients

Material and Methods:

7 male patients with idiopathic Parkinson's disease for 13±7 years were studied (age: 63±7 years, weight: 81±10kg, LBM: 58.9±6.6kg, Fat%: 23.8±4.4) before and 3 months after DBS-STN operation. Body composition was determined by DEXA scanning. Maximum oxygen uptake was determined on an electrically braked cycle ergometer initially at a 30 W load. Load was then increased 30 W every 2 min until the point of exhaustion. Oxygen uptake and carbon dioxide output were measured continuously using facemask and breath-by-breath technique, and averaged over 15 seconds. Heart rate was measured continuously during the test. The peak values were compared to a normal data base (Wasserman). Tests were performed at least 1½ h after last meal and in best attainable "on" condition prior DBS-STN operation and 3 months post. The Parkinson symptoms were assessed by Unified Parkinson's Disease Rating Scale (UPDRS).

Results:

	Pre-operative	Post-operative	p-value
Parkinson symptoms (UPDRS)	20.1±10.9	14.0±7.6	P=0.026
Max work load (Watt) (% of predicted)	142±68 (86.6±22.2)	147±53 (91.4±11.9)	P>0.05
Peak oxygen uptake (ml/min) (% of predicted)	2425±1016 (108±32)	2504±877 (114±27)	P>0.05
RER at max load	1.09±0.06	1.07±0.06	P>0.05
Max heart rate (min ⁻¹) (% of predicted)	140±23 (89±11)	142±27 (90±13)	P>0.05
O ₂ /heart rate	17.1±5.2 (120±25)	17.7±5.7 (121±25)	P>0.05
Maximal ventilation (l/min) (% of predicted)	99±42 (101±36)	101±28 (104±24)	P>0.05

Conclusion:

DBS-STN treatment decreased the Parkinson symptoms significantly.

There was no change in peak performance from before to 3 months after the DBS-STN operation. The peak oxygen uptake was normal compared to the reference group, even though the maximal heart rate was lower, leading to a significant increased O₂/heart rate compared to the reference group.