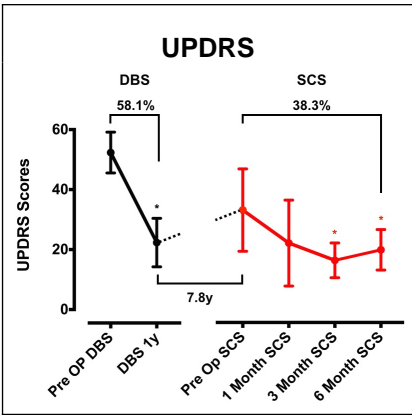


Spinal Cord Stimulation Improves Gait in Patients with Parkinson’s Disease Previously Treated with Subthalamic Nucleus Deep Brain Stimulation

Carolina Pinto de Souza; Clement Hamani; Carolina De Oliveira Souza; William Lopez Contreras; Maria Gabriela Dos Santos Ghilardi; Rubens Gisbert Cury; Egberto Reis Barbosa; Manoel Jacobsen Teixeira; Erich Talamoni Fonoff
University of São Paulo Functional Neurosurgery of IPq-HCFMUSP São Paulo Brazil

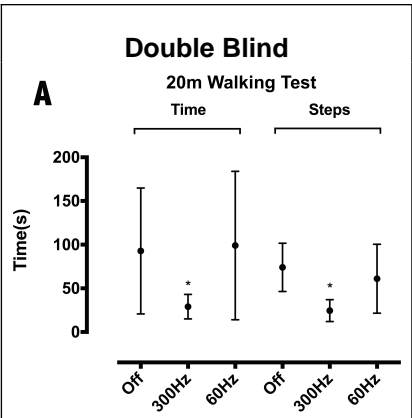
Introduction

Dopaminergic medications and deep brain stimulation (DBS) are well-established treatments for controlling motor symptoms and improving quality of life in Parkinson’s disease (PD). While these therapies ameliorate cardinal motor symptoms, their effects on postural instability and gait disturbance (PIGD) are not sustained at long-term. At present, the treatment of PD patients who continue to experience PIGD even after optimized medical therapy and DBS is considered quite challenging. This is of importance as falls associated with postural instability⁴ and gait disturbance are major sources of morbidity and mortality in advanced PD.



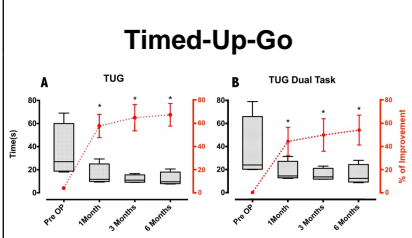
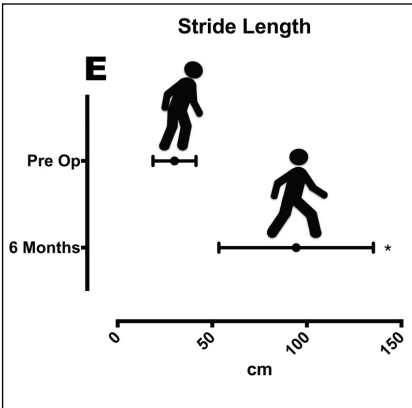
Methods

We conduct a phase 1 clinical trial in four PD patients who experienced significant PIGD after subthalamic DBS. Primary outcome were changes in gait 6 months after thoracic SCS at 300Hz compared to baseline. These were measured with the Timed Up and GO test (TUG), TUG dual task (DT) and the 20-meter-walk test. Secondary outcome were changes in UPDRS III, freezing of gait (FOG-Q) and quality of life (PDQ-39). To confirm the effects of SCS, gait performance was measured in double-blinded experiments carried out at 300Hz or 60Hz (settings that generated equally perceived paresthesias). All evaluations were carried out while patients were receiving DBS.



Results

Six months following SCS 300Hz, patients (OFF meds) had significant improvements in the TUG (63.2%, $p=0.006$) and the 20m-walking test (58.0% decrease in time; $p=0.05$; 65.7% decrease in the number of steps, $p<0.009$) as compared to preoperative baseline. In addition, patients experienced significant improvements in UPDRS III (38.3% “OFF” meds $p=0.034$), FOG-Q (56.4 % “ON” meds, $p<0.001$) and PDQ-39 (44.7% “ON” meds, $p=0.002$; mobility). Blinded “OFF” medication “ON” DBS assessments confirmed primary outcome data, showing significant objective improvements in gait after 300Hz SCS but not at 60Hz.



Conclusions

PD Patients tolerated 300Hz SCS very well, experiencing significant improvement in gait measures and quality of life.

Learning Objectives

To study the safety and efficacy of spinal cord stimulation on postural instability and gait disturbance in patients with Parkinson’s disease previously treated with Deep brain stimulation.

References

1. Fuentes R, Petersson P, Siesser WB, et al. Spinal cord stimulation restores locomotion in animal models of Parkinson’s disease. Science 2009; 323: 1578–82.
2. de Andrade EM, Ghilardi MG, Cury RG, Barbosa ER, Fuentes R, Teixeira MJ, Fonoff ET. Spinal cord stimulation for Parkinson’s disease: a systematic review. Neurosurg Rev. 2016 Jan;39(1):27-35.