

Correlation of the Tractography-based Target Motor Improvement in Deep Brain Stimulation for Patients with Parkinson's Disease Josue Moises Avecillas-Chasin MD; Juan A. Barcia MD PhD

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Learning Objectives

By the conclusion of this session, participants should be able to: 1) Describe the importance of volume of tissue activated models to study the clinical improvement in patients underwent DBS, 2) Identify the tractography-based target in patients with Parkinson's disease.

Introduction

Localization of the motor region of the subthalamic nucleus for deep brain stimulation (DBS) in patients with Parkinson's disease (PD) is possible with tractography through the connections from the M1/SMA. In this work, we evaluate the relation between the modulation of the motor STN and the motor improvement of patients with PD using patient-specific volume of tissue activated (VTA)



Methods

We include 6 patients underwent bilateral STN-DBS (12 electrodes). We obtained the motor zone of the STN using tractography. We used the Optivise® software package to obtain the VTA of each clinically effective electrode's contact of every patient. We obtained the UPDRS III score of each side of the patients (12 scores). We computed the percentage of improvement based on the pre and postoperative scores. Finally, we obtained the percentage of overlapping between the VTA and tractographical target of the STN. We used the Spearman correlation to analyze the relationship between the VTA/motor STN overlap and the percentage of motor improvement.



Results

The Wilcoxon test revealed a statistically significant improvement of all patients after STN-DBS (p=0.0024). Correlation analysis showed a positive correlation between the VTA/motor STN and the percentage of motor improvement (r=0.59; moderate correlation) with a statically significant result (p=0.045).





Conclusions

Stimulation in the motor part of the STN obtained by tractography is associated with a better motor improvement than stimulation outside of the motor part of the STN. There is positive correlation between the electrical influence of this tractographical target with the degree of motor improvement.

References

 Avecillas-Chasin JM, Rascón-Ramírez F, Barcia JA. Tractographical model of the cortico-basal ganglia and corticothalamic connections: Improving Our Understanding of Deep Brain Stimulation. Clin Anat. 2016 May;29(4):481-92. doi: 10.1002/ca.22689.
Avocillas-Chasin JM, Alonso-Eroch F.

 Avecillas-Chasin JM, Alonso-Frech F, Parras O, Del Prado N, Barcia JA.
Assessment of a method to determine deep brain stimulation targets using deterministic tractography in a navigation system. Neurosurg Rev.
2015 Oct;38(4):739-50; discussion
751. doi: 10.1007/s10143-015-0643 1. Epub 2015 May 12. PubMed PMID: 25962557.

3. Vanegas-Arroyave N, Lauro PM, Huang L, Hallett M, Horovitz SG, Zaghloul KA, Lungu C. Tractography patterns of subthalamic nucleus deep brain stimulation. Brain. 2016 Apr;139(Pt 4):1200-10. doi: 10.1093/brain/aww020. Epub 2016 Feb 26.