Which DBS Site has the Most Significant Speech Outcomes on Patients with PD: A Systematic Review

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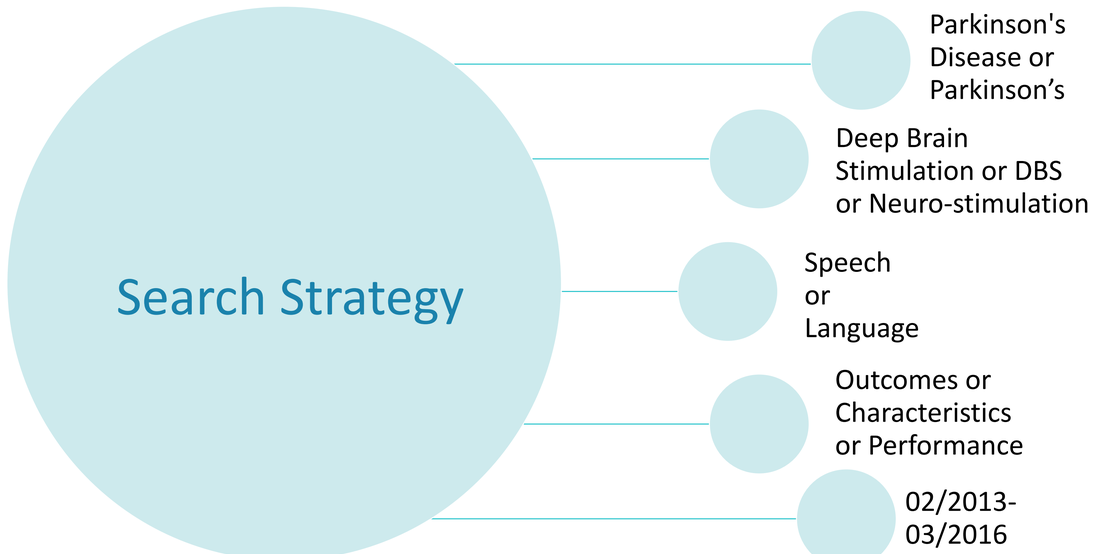
Purpose

This study investigated the recent literature concerning speech outcomes after subthalamic nuclei (STN) deep brain stimulation (DBS) versus globus pallidus (GPi) DBS. The aim of the study was to confirm previous research, collected by Lukins, Tisch, & Jonker (2013), suggesting greater positive speech outcomes after GPi DBS.

Background

With more advances in technology, more patients with Parkinson's Disease (PD) may be elected to undergo DBS. Due to this, it is important to understand the Speech and Language consequences that may result following certain DBS sites. There is emerging evidence to suggest that the GPi site is more beneficial for speech outcomes than the STN site. The proposed study will examine the latest research conducted after February 2013, during which a comprehensive systematic review was completed. Our review of the literature revealed limited research involving DBS sites on speech outcomes. Therefore, there is a need for increased awareness and research regarding this topic.



Methods and Materials

A systematic review was conducted January through March 2016 using the inclusion criteria stated in the Lukins et al. (2013) systematic review. This includes resources gathered strictly from the PubMed database, "full text", and "English language". Case reports were excluded from the inclusion criteria. Lukins et al. (2013) included publications from 1999 through February 2013, however we reviewed the most recent literature from February 2013 and onward. 29 articles met the initial search, but 23 were later exclude based on title and abstract review. Only 4 articles met the full inclusion criteria and were appraised for quality. All differences in appraisals were resolved through discussion and further analysis of the studies.

Results

Articles utilized in the review included one Case-Control study, one Randomized Control Trial Study, and two Retrospective Cohort Studies. The Case-Control Study found that the STN site might not affect speech outcomes, as it did not influence cognitive functions. The Randomized Control Trial study conducted by Dietz et al. (2013) found that fluency is less sensitive to stimulation than the GPi site, as compared to the STN. After stimulation of the STN, one of the Retrospective Studies conducted by Tamaka et al. (2015) found negative voice feature changes. The final Retrospective Study conducted by Chou, Lin, & Huang (2015) found little speech improvement, with the majority of patients presenting with speech deterioration after STN stimulation.

Authors	Type	Subthalamic Nucleus	Globus Pallidus
Chou et al. (2015)	Retrospective Study Randomized Control Trial	X	N/A
Dietz et al. (2013)	Randomized Control Trial	X	√
Tanaka et al. (2015)	Retrospective Study	X	N/A
Tremblay et al. (2015)	Case Control Study	---	N/A

Discussion

The results of our study indicate that more research needs to be conducted in regards to this topic. Most of the relevant studies were not directly comparing STN DBS speech outcomes to GPi speech outcomes. Now that there is foundational research documenting more negative speech outcomes from the STN DBS, this topic needs to be buttressed by higher quality studies. Once the validity of the proposed topic is found, it will have important clinical speech implications for patients with PD who may undergo DBS.

References

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Symbol	Meaning
X	Deterioration in Speech and/or Language
√	Positive Effect on Speech and/or Language
---	No Change
N/A	Not Represented in Study