



# Neuropsychological Functioning of Parkinson's Disease Patients Two Years Post Subthalamic Nucleus Deep Brain Stimulation Surgery

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## OBJECTIVE

- To assess neuropsychological functioning 2 years following subthalamic nucleus (STN) deep brain stimulation surgery (DBS) for the treatment of Parkinson's disease (PD).

## BACKGROUND

- Long-term cognitive outcome of STN DBS for the treatment of PD has shown declines in verbal fluency, verbal memory and visuospatial reasoning.
- However, results have been inconsistent across studies and a long-term comparison of DBS patients and medically treated PD patients has not been presented.

## PARTICIPANTS

- A comprehensive neuropsychological battery was used to examine the neurocognitive functioning of 10 bilateral STN DBS patients and 10 matched medically treated PD patients at baseline and at 2 years post-surgery.

Table 1 - Demographics

	<u>PD</u>	<u>DBS</u>
Age	57.5 (5.66)	61.2 (11.0)
Age of Onset	51.5 (6.91)	49.0 (8.43)
Education	15.5 (1.43)	14.0 (2.10)
H & Y	1.90 (0.46)	2.27 (0.62)

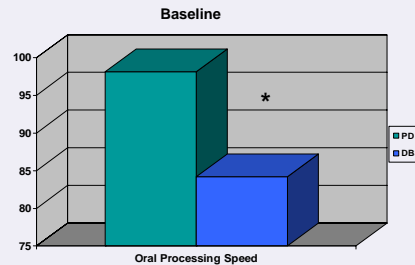
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## TESTS ADMINISTERED

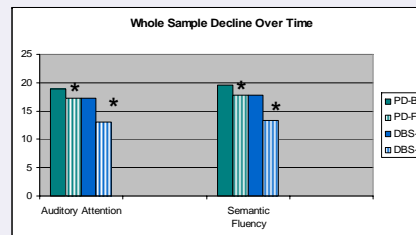
Basic orientation and mental status (Mini Mental Status Exam and Dementia Rating Scale), auditory attention (WAIS-III Digit Span), verbal memory (Rey Auditory Verbal Learning Test), nonverbal memory (Brief Visual Memory Test-Revised), confrontational naming (Boston Naming Test), sustained attention and executive functioning (STROOP Color Word Test), oral information processing speed (Symbol Digit Modalities Test), motor abilities (Hoehn and Yahr while on medication).

## RESULTS

- Age, PD onset age, education and PD staging were not significantly different between the groups (Table 1).
- Neuropsychological functioning at baseline indicated that the DBS patients were significantly slower on a timed, oral measure of sustained attention/concentration as compared to the medically managed PD patients (STROOP word subtest,  $p=.009$ ). No other significant baseline differences were found.

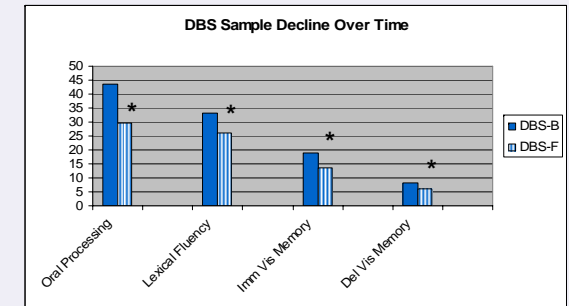


- At the two year follow-up evaluation, the entire sample (DBS and medically managed PD) evidenced declines in auditory attention (Digit Span,  $p=.005$ ) and semantic fluency (Animals,  $p=.001$ ).



## RESULTS CONT'D.

- In addition to these declines, patients who underwent DBS significantly declined in comparison to their medically treated counterparts on measures of oral information processing speed (Symbol Digit,  $p=.003$ ) and lexical fluency (FAS,  $p=.001$ ).
- An unexpected decline in both immediate and delayed visual memory for simple items was found (BVMT-R,  $p=.002$ ;  $p=.007$ , respectively). Differences for visual recognition memory were not found.



- In addition, verbal memory changes over time and between the groups were not significant.

## SUMMARY & CONCLUSIONS

- These results are supported by previous research which indicates that DBS patients experience declines in frontostriatal functioning, specifically oral processing speed and verbal fluency.
- However, our DBS group also experienced a significant decline in visual memory abilities over the two-year period as compared to a matched PD control group.
- Further research regarding the effects of DBS on the visual memory system is warranted.
- DBS candidates should be counseled about the potential long-term risk of visual memory and frontostriatal cognitive declines following DBS surgery.