

Deep brain stimulation for Parkinson's disease

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Deep Brain Stimulation (DBS) is a surgical treatment for Parkinson's Disease (PD) designed to alleviate motor symptoms such as tremor, rigidity, bradykinesia, and dyskinesia. It involves the implantation of electrodes in specific brain areas and is typically considered for patients whose symptoms cannot be adequately controlled by medication.

Mechanism of Action

DBS delivers continuous electrical impulses to targeted brain regions, modulating abnormal neuronal activity. It does not destroy brain tissue but rather disrupts problematic signal patterns.

Primary Targets

Subthalamic Nucleus (STN): Most commonly targeted, improving all major motor symptoms and reducing medication requirements. see [Subthalamic deep brain stimulation for Parkinson's disease](#).

Globus Pallidus Internus (GPi): Preferred for patients with significant dyskinesias or those intolerant to STN stimulation.

Thalamus (Vim): Effective for tremor-dominant PD but limited in addressing other symptoms.

Procedure

Preoperative Evaluation: Includes neurological assessment, neuroimaging (MRI/CT), and neuropsychological testing.

Surgery:

Electrode implantation under local anesthesia (to assess motor improvements during the procedure).

Pulse generator placement in the chest under general anesthesia.

Postoperative Programming: Tailoring stimulation settings to optimize symptom control and minimize side effects.

Benefits

Significant reduction in motor symptoms.

Decreased reliance on dopaminergic medications.

Improved quality of life in appropriate candidates.

Risks and Limitations

Risks: Hemorrhage, infection, lead migration, and hardware complications.

Side effects: Speech disturbances, balance issues, and mood changes.

Does not cure PD or stop disease progression.

Future Directions

Advances in imaging and targeting for precision. Closed-loop DBS systems that adapt stimulation based on real-time neural activity. Exploring DBS in early-stage PD and its neuroprotective potential.

Cramer et al. from the [University of Minnesota](#), sought to determine whether racial and [socioeconomic disparity](#) in the utilization of [deep brain stimulation](#) (DBS) for [Parkinson's disease](#) (PD) have improved over time. They examined DBS utilization and analyzed factors associated with placement of DBS. The [odds](#) of DBS placement increased across the study period while White PD patients were 5 times more likely than Black patients to undergo DBS. Individuals, regardless of racial background, with two or more comorbidities were 14 times less likely to undergo DBS. Privately insured patients were 1.6 times more likely to undergo DBS. Despite increasing DBS utilization,

significant disparities persist in access to DBS ¹⁾.

Methods

Modified power-on programming method.

Traditional power-on programming method.

Indications

[Deep brain stimulation for Parkinson's disease Indications.](#)

Prognosis

[Deep brain stimulation for Parkinson's disease prognosis.](#)

Case series

[Deep brain stimulation for Parkinson's disease case series.](#)

¹⁾

Cramer SW, Do TH, Palzer EF, Naik A, Rice AL, Novy SG, Hanson JT, Piazza AN, Howard MA, Huling JD, Chen CC, McGovern RA. Persistent racial disparities in [deep brain stimulation for Parkinson's disease](#). Ann Neurol. 2022 Apr 19. doi: 10.1002/ana.26378. Epub ahead of print. PMID: 35439848.

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