

# Department of Clinical Neuropsychology

## Understanding Deep Brain Stimulation for Movement Disorders



Deep brain stimulation (DBS) is an elective brain surgery designed to improve function and quality of life. It reduces certain motor symptoms of, for example, Parkinson's disease (PD) and essential tremor (ET).

### DBS Procedure

- Neurosurgeons implant electrodes ("wires") into a specific part of your brain. These electrodes are connected to a generator (like a pacemaker) that is implanted in your chest. The generator sends electrical pulses to the brain, which may reduce some motor symptoms of PD and ET.
- Electrodes may be implanted on one side (unilateral) or both sides (bilateral) of the brain. Your doctors will decide whether you need unilateral or bilateral electrodes.

### Who Should Consider DBS?

#### DBS is considered when:

- The side effects of PD or ET medications are intolerable.
- PD or ET medications do not adequately control motor symptoms.
- An individual has unstable or unpredictable response to PD medication.

#### DBS is not a good procedure for:

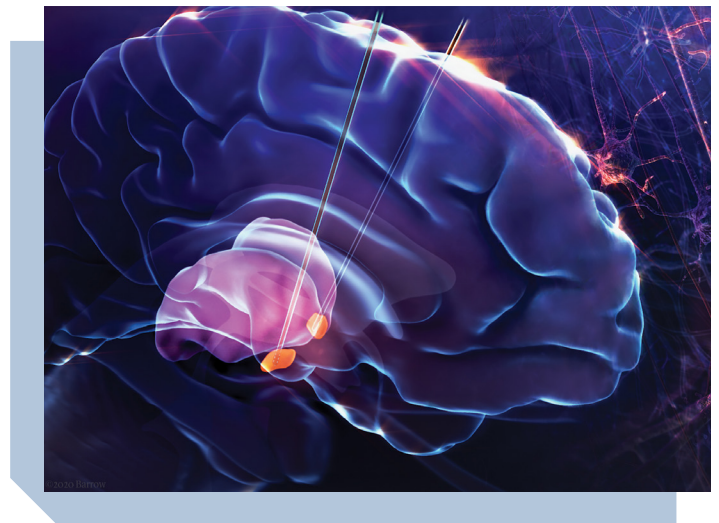
- Individuals with movement disorder who also have dementia, because this procedure may worsen their thinking ability.
- Individuals with atypical parkinsonisms, such as multiple system atrophy or progressive supranuclear palsy.
- Individuals who are not physically healthy enough for surgery.
- Individuals with marked or poorly controlled psychiatric disturbances.

### Evaluation for DBS

- A neurologist will evaluate you. The neurologist will obtain detailed information regarding current symptoms and their course. They will also usually complete a neurological examination to test motor functioning. For

instance, you may be asked to sit, stand, walk, and extend your arms.

- For PD, a specific motor examination called ON/OFF testing will be completed to see how much benefit you receive from your PD medication. This exam is performed after you have stopped all PD medication for approximately 8 hours and after being given a standard dose of medication.
- Neuropsychological testing relies on paper and pencil tests to evaluate performance across different areas of thinking, such as memory and language. This testing can provide individuals personalized recommendations to improve their overall quality of life and can identify persons who are at undue risk for cognitive and behavioral side effects of DBS.
- An MRI of your brain will also be completed.



### Benefits of DBS

#### Individuals with PD usually have significant improvement in the following symptoms:

- Tremor (shaking)
- Rigidity (stiffness)
- Muscle contractions (dystonia or "cramping")
- Motor slowing (bradykinesia)
- Involuntary writing movement (dyskinesias)
- Symptom fluctuations

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### **The following symptoms sometimes improve for individuals with PD:**

- Reduced facial expression (masked facial expression)
- Pain related to tremor
- Dystonia

### **For individuals with ET, the benefits of DBS include reduced tremor:**

- Many individuals with ET have a 70% to 80% reduction in tremor after DBS.
- This treatment is most effective for hand and arm tremors.

## **Risks of DBS**

### **General risks of DBS include the following:**

- There is a 1% to 3% risk of intracranial hemorrhage (bleeding in the brain).
- There is a 5% risk of infection, which may require device removal.
- There is a 2% risk of little to no benefit.
- There are anesthesia risks that are reviewed with your physician as part of the presurgical process.

### **Cognitive risks of DBS for individuals with PD include the following:**

- Between 25% and 50% of individuals with PD have difficulty with word-finding (tip of the tongue phenomenon) within 6 months after bilateral DBS. However, very few people are significantly bothered by this in their daily life.
- Milder declines in other aspects of thinking occur in 10% to 15% of patients within 6 months of surgery. Such changes may reduce the quality of life gains associated with DBS.
- Serious cognitive adverse events following DBS are very rare (less than 2% of patients).
- There is a risk of depression and anxiety. Both of these conditions can be treated.

### **Cognitive risks of DBS for individuals with ET include the following:**

- Less than 2% of individuals experience a decline in word-finding.
- With bilateral DBS, there is a risk of poor coordination (ataxia) and slurred speech.
- There is a small risk of depression and anxiety. Both of these conditions can be treated.

## **Postoperative Care and Recovery**

- Individuals who have DBS are usually discharged from the hospital about 1 day after surgery.
- The pulse generator is usually implanted in a separate outpatient procedure that is completed about 1 week after electrode placement.
- The DBS system will be turned on and programmed 2–6 weeks after surgery during an outpatient appointment with the neurologist.
- Follow-up considerations
  - Additional DBS stimulator adjustment and programming visits generally occur more often during the first 6 months or until motor symptom benefit is maximized (about once monthly).
  - After stimulation settings are stabilized, patients generally follow up for stimulator adjustments once or twice per year.
- Other important considerations
  - DBS does not cure or stop disease progression in PD and ET.
  - DBS provides approximately the same percentage of symptom reduction as medication but with greater reliability.

## **Resources**

Additional resources for patients and caregivers, such as educational materials, support groups, and more, can be found below.

### **American Parkinson Disease Association, Arizona Chapter**

[www.apdaarizona.org](http://www.apdaarizona.org)

### **Parkinson's Foundation**

[www.parkinson.org](http://www.parkinson.org)

### **Muhammad Ali Parkinson Center at Barrow Neurological Institute**

[www.barrowneuro.org/get-to-know-barrow/centers-programs/muhammad-ali-parkinson-center](http://www.barrowneuro.org/get-to-know-barrow/centers-programs/muhammad-ali-parkinson-center)

### **International Essential Tremor Foundation**

[essentialtremor.org](http://essentialtremor.org)