Who are the DBS Team of Specialists?

Kathryn Holloway, M.D.

Dr. Holloway is the Neurosurgical Director at the Southeast/ Richmond Parkinson's Disease and Clinical Center (PADRECC). A full professor of neurosurgery, she has been performing deep brain stimulation since 1997. She has been an attending surgeon at Virginia Commonwealth University Medical Center/Medical College of Virginia and McGuire Veterans Affairs Medical Center since 1990. She is a member of the Executive Committee of the American Society of Stereotactic and Functional Neurosurgery. Dr. Holloway is an innovator in the development of improved surgical techniques for DBS surgery, and is well published in the movement disorders field. She serves as an instructor for other surgeons learning DBS surgery techniques.

Mark S. Baron, M.D.

Dr. Baron is the Director of the Southeast/Richmond Parkinson's Disease and Clinical Center (PADRECC) and Acting Chief of Neurology at the Hunter Holmes McGuire VA Medical Center. He is an Associate Professor of Neurology at the Virginia Commonwealth University. Dr. Baron completed his neurology training at Boston City Hospital and completed a combined clinical and research fellowship in movement disorders at Emory University in 1994. He was on faculty at Emory until moving to Richmond in 2002. In addition to clinical practices at the VA and VCU, Dr. Baron provides intra-operative electrophysiological monitoring of patients undergoing deep brain stimulation surgeries for Parkinson's disease and other movement disorders. Dr. Baron is involved in a number of clinical and basic science research projects.

Miriam L. Hirsch, M.S., R.N

Ms. Hirsch is the Neurosurgical Nurse Coordinator at the Southeast/Richmond Parkinson's Disease and Clinical Center (PADRECC) and previously was at Virginia Commonwealth University (VCU) Medical Center, Harold F. Young Neurosurgical Center, Movement Disorders Program. Ms. Hirsch is responsible for programming and coordinating care of patients with deep brain stimulation neurostimulators in preparation for surgery, during surgery and as an outpatient. With over 15 years experience working with people with Parkinson's disease and their family caregivers, she also provides educational programs for patients, families and healthcare providers.

Whom to Contact for Additional Information?

Please contact the SE PADRECC neurosurgical nurse coordinator at (804) 675-6284 or toll-free (800) 784-8381 x 6284 if you have any questions or need additional information.

Deep Brain Stimulation (DBS) Fact Sheet

Referral for Surgery

Hunter Holmes McGuire VAMC
Richmond, VA

Parkinson's Disease Research, Education and Clinical Center

(PADRECC) Southeast

What Services and Care are Offered at Southeast PADRECC?

PADRECC services and continuing care include evaluation for DBS, DBS surgery with or without post-operative follow-up care and programming, evaluation of patients for diagnosis and recommendations for medical treatment. Patients may continue with PADRECC follow-up care if requested.

When is it time to consider DBS surgery?

PD symptoms are well controlled initially by anti-PD medication. As the illness progresses however, the symptoms become more challenging to treat and manage, often times requiring additional medications with increased doses. Once patients start to experience motor fluctuations including dyskinesias or "off" episodes, the option of DBS surgery should be considered.

Patients with poorly controlled tremor are likely to want to consider DBS surgery long before motor fluctuations occur. For these individuals, DBS is very effective in treating the tremor now as well as to treat future Parkinson's symptoms as they develop.

Some patients will ask about surgery very early on in the hopes of preventing any disability. We know that the course of the disease is variable. Certain patients will have a very benign course. In addition, we have no evidence at this time that DBS treatment slows the rate of progression of the disease and we know it is not curative. Patients should only consider surgery once they are experiencing significant symptoms despite best medication therapy.

How do Doctors Make a Referral?

An electronic referral entitled **Movement Disorders/ Parkinsons/ PADRECC** is required for evaluation for DBS through a CPRS inter-facility consult (IFC).

If this IFC has not yet be created between the referring facility and the SE PADRECC, please forward the name of the clinical applications coordinator (CAC) from the referring facility to Cathy McGrady, Administration Officer for the SE PADRECC by calling (804) 675-5690 or through e-mail cathy.mcgrady@va.gov)or by contacting the SE PADRECC clinic at (804) 675-5931.

Who is eligible for care?

Veteran patients from referring VA facilities located in Maryland, Virginia, West Virginia, Kentucky, Tennessee, North Carolina, South Carolina, Georgia, Alabama, Florida, Puerto Rico, and parts of Mississippi and who meet the necessary criteria are eligible for DBS surgery at the Southeast PADRECC, McGuire VA Medical Center in Richmond, VA.

Who is a Good Candidate for DBS Surgery?

Good candidates are patients who:

- initially had a good response to medications to treat their Parkinson's disease (PD), but later developed side effects that limit their effectiveness. Such side effects include: dyskinesias (extra movements), motor fluctuations including "wearing off" periods (medication wears off before the next dose is due), neuro-psychiatric complications such as hallucinations and other side effects such as nausea and hypotension.
- have significant tremors even if the tremor has never been adequately managed by the PD medications

Who might NOT BE considered for DBS surgery?

Poor candidates for DBS surgery are patients who:

- are too unhealthy to undergo surgery
- have significant dementia. These individuals tend to recover more slowly, or not at all from surgery, and their dementia may even worsen. In addition, improved mobility from surgery, in the face of worsening dementia, often creates many new challenges.
- are diagnosed with Parkinson's plus or atypical parkinsonism syndromes such as multiple system atrophy and progressive supranuclear palsy and/or who have never responded to PD medications

Relative but not absolute contraindications

- cardiac pacemakers and defibrillators
- regular MRI imaging
- Anti-coagulant therapy such as Coumadin or Aggrenox

What are the Benefits and Risks of DBS?

*PD symptoms that **significantly improve** with DBS surgery:*

- festinating gait
- freezing episodes
- motor fluctuations
- tremor
- rigidity
- dystonia
- slow movements or bradykinesia

*PD symptoms that **may improve** with DBS surgery:*

- masked face
- pain related to tremor, stiffness, or dystonia

*PD symptoms that **will not improve or may worsen**:*

- speech
- dementia
- mood - depression, anxiety, obsessive or compulsive

How Does DBS Effect Memory and Cognition?

Patients with normal memory function show no significant post operative decline in most routine memory tests. Patients with dementia however do experience a decline which may or may not represent the natural history of dementia.

What Can Be Expected from DBS?

On average, DBS surgery results in a 40-60% improvement in the motor features of PD. Many patients experience fluctuations between periods where there medicines are acting optimally or "on time" and when their medicines are providing little to no benefit or "off time." These motor fluctuations often become more frequent and unpredictable as the disease progresses.

We expect DBS to improve the "off" times to a pre-operative "best on" level of functioning. The "best on" periods are expected to improve only slightly however. This rule, however, does not apply to those who can not tolerate the medicines, nor does it apply to those with dyskinesia or tremor. For example, dyskinesias are worsened by medicine but improve dramatically with DBS and tremor is often difficult to manage with medications but is well treated with DBS.

What are the Potential risks of DBS surgery?

- 1-3% risk of intracranial hemorrhage which can lead to loss of speech, paralysis, coma, or death.
- 5% risk of infection which usually requires removal of the DBS system.
- 2% risk that DBS will offer little or no benefit. This can be due to a wrong diagnosis such as a Parkinson's Plus condition or to suboptimal lead placement requiring revision.
- risks of anesthesia which are dependent on the patient's overall medical history.

How to get started? *DBS Pre-Operative Evaluation*

After initial contact is made, patients are given a packet of educational materials and are asked to complete a motor diary. Clinical notes are obtained from the referring neurologist and primary care provider. If a patient has not been seen by a neurologist, a PA-DRECC appointment with a movement disorders specialist will be scheduled to confirm that the patient is a good candidate for surgery.

Steps of the evaluation process

1. Evaluation of diagnosis, stage of disease, evaluation of the patient's general health, and discussion of surgery
2. Off PD medication/On PD medication motor examination. The degree of impairment that patients experience when their medicines are not working or "off" time can be assessed by performing an examination of the patient after s/he has been off all PD medications for approximately 8 hours ("off score"). This is compared to the benefit that the patient gets when their medications are working or "on score" assessed after taking the PD medications.
3. Neuropsychological testing
4. MRI for intraoperative guidance using the Richmond VAMC scanner and final decision on eligibility and desire for surgery

How is DBS Performed at McGuire VAMC?

The frameless method

The surgical technique used by the Richmond team utilizes frameless stereotaxy, microelectrode recording, and test stimulation to place the DBS lead in the best possible location within the brain.

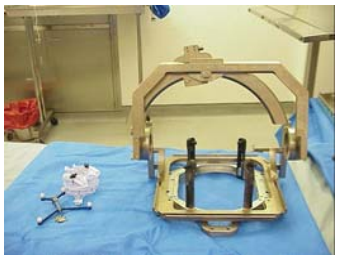
The traditional method involves the use of a stereotactic frame, a large metal ring that is attached to the patient's head by four pins. The frame is placed prior to the CT or MRI scan and is left in place until the end of the procedure.

We have replaced this framed approach with a frameless one which involves placing 5 small bone screws or fiducials, using local anesthetic, several days before surgery. This allows for the pre-operative CT and MRI scans to be done prior to the day of surgery. The neurosurgeon uses these merged scans to create a surgical plan in order to avoid blood vessels and to optimize lead trajectories. By doing the scanning and surgical plan ahead of time, the average procedure time is reduced by several hours. There may be some discomfort associated with fiducial placement. Patients are prescribed pain medication to take as needed.

Unilateral versus Bilateral Lead Placement

Unilateral placement may be appropriate for patients who have more troubling symptoms on just one side. It is also considered if a patient is frail and who may not be able to tolerate a longer surgery due to fatigue and other factors.

Day of surgery



frameless versus framed

On the day of surgery, the patient is positioned comfortably in the operating room with his/her head and neck resting on a cervical support which is attached to the table. The front of the collar is used to secure the patient while asleep but is removed once fully awake and conscious. Propofol sedation is used to sedate the patient while skin incision(s) and burr hole(s) are made.

Once the microelectrode is in place, the patient is awakened. Recording begins at this time. The device used to hold and advance the microelectrode is attached directly to the burr hole allowing patients to adjust their head position in an effort to get more comfortable. This is possible because all of the equipment moves as a unit with the patient. Once the microelectrode recording is completed, test stimulation is performed to determine efficacy and side effects. The microelectrode may need to be moved if there is little improvement or if there are troubling side effects and this is done through the same burr hole.

Once an optimal spot is located, the actual DBS lead is inserted and secured into place. This process is repeated for the other side of the brain for patients undergoing bilateral stimulator placement.

The battery and extensions are placed several days later under general anesthesia after patients have fully recovered from the intracranial surgery. However, unilateral lead placement is shorter and less tiring so that the battery and extension are generally placed on the same day as the DBS lead.

Post-Operative Care and Recovery

Patients who have a unilateral stimulator placed usually have the battery implanted during the same surgery. Most are discharged from the hospital the day after surgery.

Patients who have bilateral stimulators placed may require a 1-5 day hospital stay after stimulator placement. Patients who are in poor health before surgery will recover more slowly and may require a prolonged stay in the hospital or rehabilitation facility.

The battery implantation procedure is performed as an outpatient surgery approximately 1 week following lead placement. The DBS system will be turned on approximately 2 weeks after surgery during a routine clinic visit for suture removal. Testing all electrodes for efficacy and side effects or “mapping” occurs 1 month after surgery.

Patients continue on their preoperative medications unless they are causing troubling side effects. The PD medications are adjusted by the neurologist as necessary as the stimulation is maximized. The goal is to optimize the patient’s motor functioning while eliminating those medications that cause troublesome side effects.

Additional programming visits may be necessary for the first 3 months. Once the stimulation is maximized, these visits tend to occur less frequently, typically only once or twice per year

Post-Operative Limitations

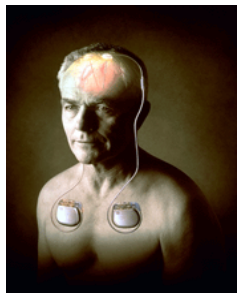
Patients may not have an MRI because the DBS equipment can heat up as a result and cause brain damage. However, a head MRI can be performed using very specific scanning equipment and with supervision from an experienced DBS team.
Patients may not have diathermy or therapeutic ultrasound. However, diagnostic ultrasound is safe.

If patients undergo any surgery, only bipolar cautery may be used. Monopolar cautery, using a Bovie, is contraindicated
If skin cancer surgery is required within 3 inches of any of the DBS components (battery, extensions, leads) a DBS surgeon should be involved in the case.

Battery Replacement

DBS batteries typically last for 3-5 years, depending on the settings. The replacement of the battery is done on an outpatient basis and is performed with local anesthetic with the option of IV sedation. The actual surgery takes about 15 minutes and the risks involve damage to or infection of the system.

What Other Movement Disorders Can Be Treated with DBS?



We offer DBS surgery for other medically refractory movement disorders including:

- **Essential Tremor** (ET)
- **Dystonia** (Torticollis, Primary)
- **Tourette’s Syndrome**

The referral process is the same, however the pre-surgical work-up may vary.