

# Deep Brain Stimulation (DBS): Pacemakers for the Brain

By Joseph G. Sramek, M.D



**D**eep Brain Stimulation (DBS) is an exciting new surgical option for patients with neurologic disorders that produce abnormalities in muscle tone, abnormal posturing, and tremors, including Parkinson's Disease, Essential Tremor, Dystonia, Huntington's Disease, and MS tremor. During DBS surgery, electrodes are implanted within the brain to deliver continuous high frequency stimulation of various deep nuclei in the brain (Subthalamic Nucleus, Globus Pallidus Interna, VIM nucleus) in an attempt to normalize pathologically altered neuronal circuitry. The stimulation offers patients relief from the tremors, rigidity, slow-

ness of movement, stiffness and may help balance problems associated with their conditions.

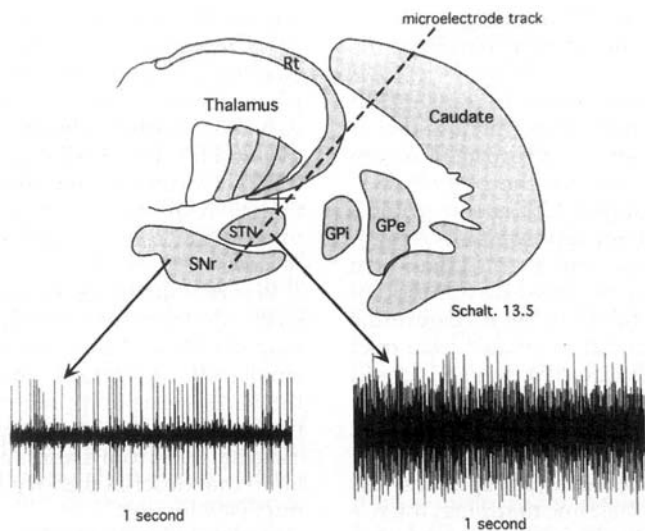
DBS is reversible, does not permanently damage the brain, and the stimulation can be adjusted as

a patient's condition changes over time. Stimulation of the subthalamic nucleus (STN) of the brain has been the most successful in reducing levodopa-induced involuntary movements (dyskinesias), tremor, bradykinesias (slowness) and rigidity (stiffness). Also, patients experience a dramatic reduction in the dose of levodopa after DBS of the STN.

DBS involves the implantation of a very thin lead containing four electrode contacts into a specific target area in the brain. The lead extends through a small opening in the skull and is connected to an extension wire, which is connected to an impulse generator or "pacemaker" implanted under the skin over the chest. Programming of the stimulation is easy and painless. The effects of surgery are seen on the opposite side of the body (contralateral effects). Therefore, most patients receive bilateral stimulators for control of symptoms on both sides of the body.

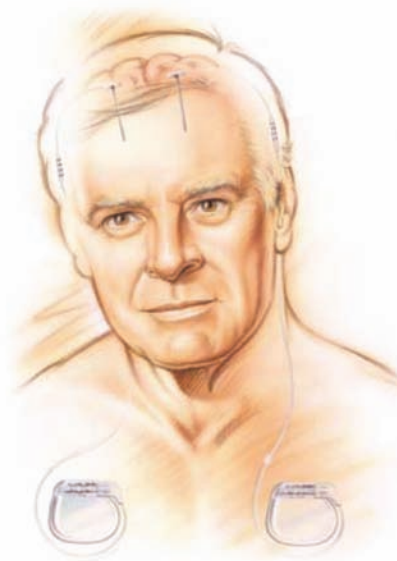
Wyoming Medical Center's computerized brain-mapping technology aids the surgeon in finding the precise location in the brain where nerve signals generate the tremors and other symptoms. The patient is awake during surgery to allow the surgical team to assess the patient's brain functions. While the electrode is being advanced through the brain, the patient does not feel any pain because of the unique nature of the human brain and its inability to generate pain signals. A second surgery is done later to implant the stimulators below the collarbone. The stimulators are turned on for the first time 2-3 weeks after implantation.

DBS is ideal for patients who have already received the maximum benefit from medication therapy and are experiencing marked disability. In properly selected patients, Deep



Microelectrode recording in the subthalamic nucleus (lower right) and substantia nigra, pars reticulata (lower left), before placement of stimulating electrode.

Brain Stimulation is remarkably safe and effective. Patients can experience between 60 to 80 percent improvement in such symptoms as tremor and slowness of movement. Patients on average report a 50 percent improvement in their walking and balance. Similarly, patients with dyskinesia due to their medications experience over 80 percent reduction in their involuntary movements. Most patients are able to significantly reduce their medications following DBS.



Stimulating electrodes and battery packs are located in this illustration.

**Joseph G. Sramek M.D.** is a board eligible neurosurgeon with Central Wyoming Neurosurgery. His special interests include brain surgery and functional neurosurgery for movement disorders. You may contact his office at **307-266-4000**.

If you would like a CME in your community on this topic or would like to watch a DBS surgery, please contact Mike Phillips at 307-577-2304.

## The Heart Center of Wyoming Switches to TAXUS Drug Eluting Stents

The Heart Center at Wyoming Medical Center recently adopted Boston Scientific's FDA approved TAXUS Express Coated Stent. TAXUS is a new Paclitaxel-Eluting Coronary Stent System that helps prevent restenosis of a coronary artery following balloon angioplasty and stenting. Clinical trial data for the TAXUS stent (N=1,326) demonstrated consistently excellent results. The system has also demonstrated safety and endothelial healing for a wide range of patients.

Paclitaxel, a derivative of taxol, is a potent antineoplastic agent with long-lasting antiproliferative effects. It allows normal endothelialisation of arterial wall, thereby being better than radioactive stents.

Previously cardiologists at Wyoming Medical Center utilized Johnson & Johnson's Cordis CYPHER Sirolimus-Eluting Stent System, as it was the only FDA approved coated stent. Clinical trial results have been the same or better with the TAXUS system although a head to head comparative study has not yet been conducted.

The TAXUS-IV clinical trial covered 1,326 patients at 73 U.S. sites. Results include the following:

- The target lesion revascularization (TLR) rate in the TAXUS group was 3% versus 11.3% in the control group.

- The TAXUS group also experienced a significantly lower rate of target vessel revascularization (TVR) than did the control group (4.7% vs. 12%, respectively).
- The binary in-segment (includes 5 mm proximal and distal to stent) restenosis rate in the TAXUS group was 7.9%, compared with 26.6% in the control group; in-stent binary restenosis rates were 5.5% and 24.4% respectively.
- The overall rates of major adverse cardiac events (MACE) were 8.5% in the TAXUS group and 15% in the control group.

### Clinical trial results have been the same or better with the TAXUS system...

Wyoming Medical Center is committed to providing patients with the clinical advantages of the latest technology. "The extremely low restenosis rates at nine months represent a new benchmark" for treating patients with clogged arteries, said Dr. Gregg W. Stone, the principal investigator of the TAXUS-IV study. Stone is vice chairman of the Cardiovascular Research Foundation at the Lenox Hill Heart and Vascular Institute in New York.