



# Turning Back the Clock

Deep brain stimulation for Parkinson's disease.

BY JAMIE TALAN

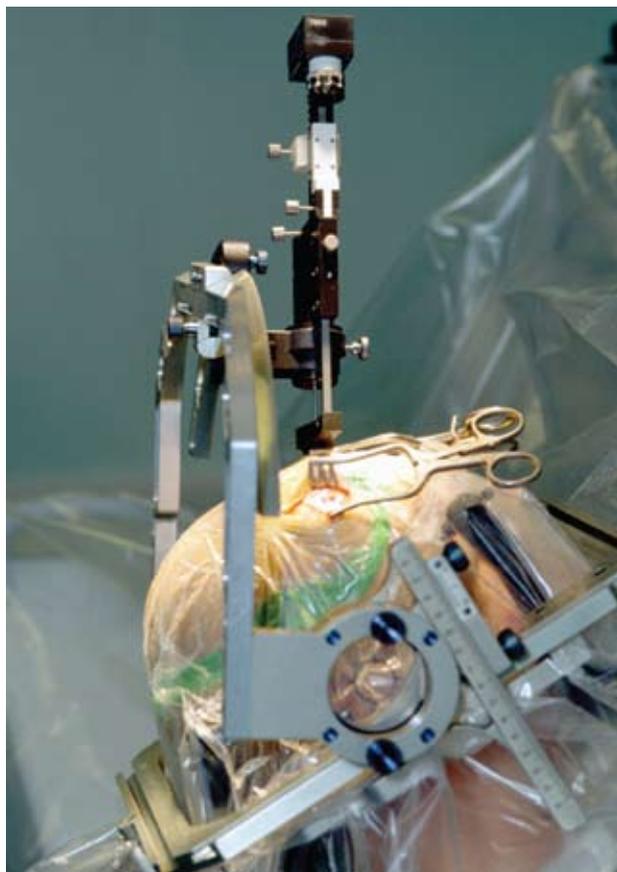
**D**onald Rosenfelt didn't think his shaking limbs and slowed speech were that noticeable. But after deep brain stimulation (DBS), even casual acquaintances embraced him, shocked at the difference. For 30 years, the New Jersey attorney, now 73, had been swallowing the standard pills to keep his symptoms in check. But over time they became less effective. Apparently, he didn't notice that things had gotten so bad.

Last fall, he scheduled an appointment with a neurologist, who examined him and said: "Get deep brain stimulation."

## WHAT IS DEEP BRAIN STIMULATION?

Parkinson's disease (PD) is a progressive neurological disorder marked by tremors, rigidity, slowed movement, and unsteady gait. PD causes depletion of the neurotransmitter dopamine—a chemical that relays signals between neurons and other cells—in a region of the brain called the substantia nigra that helps control movements. Standard medications for PD, such as levodopa, replace dopamine. But over time the cells no longer respond as efficiently to these therapies, causing symptoms to fluctuate throughout the day. And Parkinson's drugs cause their own motor problems over time—restless movements called dyskinesias.

Like drug therapy, DBS is not a cure and does not stop PD from progressing. But it can improve symptoms for people who have been responsive to dopamine-replacement therapies but are no longer getting steady relief. When medications do not work at all, DBS usually won't either, according to Blair Ford, M.D., professor of clinical neurology and medical director of movement disorders surgery at Columbia University. Dr. Ford notes that the surgery is most promising for people who experience complications



**DEEP BRAIN STIMULATION**  
Insertion of an electrode during surgery on a patient with Parkinson's disease.

DBS does not stop Parkinson's progress. But it can improve symptoms when drugs fail to provide steady relief.

with medications—such as dyskinesias or wearing off—or who have severe tremors.

"We are temporarily turning back the clock for these patients," says Ron Alterman, M.D., a neurosurgeon at Mount Sinai School of Medicine in New York, NY, who specializes in DBS surgery.

The procedure involves implanting electrodes in the brain that are connected to a battery pack in the chest. Once the device is turned on and calibrated, the brain is bathed round-the-clock in high-frequency stimulation. Stimulating certain parts of the brain can improve a range of symptoms—from shaking to slowed movements—for some people. Tens of thousands of PD patients have opted for these stimulators since federal drug regu-

lators approved it for tremor in 1997.

Patients undergo two surgical procedures. First, neurosurgeons drill one or two holes in the skull to thread an insulated wire with four hair-thin electrodes into specific regions of the brain. Then, a few days or a week later, a small battery-powered pacemaker is implanted in the chest and connected to the electrodes.

The key is placing the stimulating electrodes in the correct part of the brain. Two areas seem to work for PD: the subthalamic nucleus and the globus pallidus.

But surgery is just the first step in a process that requires a great deal of fine-tuning. Sometimes the settings don't work; other times, the battery goes bad and symptoms emerge without warning. Specialists in DBS say that good results

depend on proper patient selection. (See “Am I a Good Candidate for DBS?” box.)

### DOES DBS WORK FOR PARKINSON’S?

A recent multi-center study conducted at VA hospitals across the country supports what doctors have been seeing in their practices: In the right hands, steady electrical stimulation can virtually eliminate the fluctuations in symptoms caused by the wearing off of medication. In the VA study, which was published in the *Journal of the American Medical Association* in January, patients who had DBS improved significantly more than those who received the best medications.

About 120 patients had DBS in either the subthalamic nucleus or globus pallidus. The rest received the best drug therapy without DBS. A quarter of the patients were older than 70, and each patient was followed for six months.

Patients in the study kept daily diaries of their movement. Parkinson’s medicines provide smaller windows of relief from symptoms over time, and the investigators wanted to know how much time was spent in the “on” state—with good motor control—compared to the “off” state, when symptoms break through.

Those who had undergone DBS had gained an extra 4.6 hours a day of “on” time compared to those who received medication only. More than 70 percent of DBS patients said they had improvements in motor function, compared to 32 percent of those who took medication only. No one knows why the stimulation works, but scientists have evidence that it normalizes activity in the globus pallidus and subthalamic nucleus.

The surgery was not without risks, though. According to Frances Weaver,

## Am I a Candidate for DBS?

According to Dr. Ford, the **BEST CANDIDATES** for DBS are people who:

- ▶ have **TYPICAL PD** with tremor,
- ▶ respond to **LEVODOPA**,
- ▶ are in **GOOD HEALTH**,
- ▶ are of **SOUND MIND**, and
- ▶ have a **SUPPORTIVE NETWORK** of family and friends.

Advanced age does not exclude an otherwise healthy individual from considering DBS.

The **POOREST CANDIDATES** for surgery are people who:

- ▶ do **NOT** have **TYPICAL PD** and
- ▶ do **NOT** respond well to **LEVODOPA**.

Patients with dementia, apathy, depression, poor medical health and little family support probably should not undergo DBS. But in all cases, consult with your doctor.

Ph.D., of the Edward Hines Jr. Veteran’s Hospital in Chicago, IL, 49 of the 121 patients experienced at least one adverse event, most related to infections at the time of the surgical procedure. One patient died from a cerebral hemorrhage (bleeding in the brain). There were also more falls in those who had had DBS than those on medication. One explanation for this, Dr. Weaver says, is that the DBS patients felt better and therefore were more likely to return to previous activities.

Other studies—such as those conducted by Michael Okun, M.D., and Kelly Foote, M.D., of the University of Florida—confirm an increased risk for infections at the implant site and stroke following DBS. They also found that some patients develop slurred speech related to the stimulation following surgery.

### GEORGE’S STORY

The story of deep brain stimulation is the latest chapter in electrician George Doeschner’s long journey to find freedom from PD symptoms. Chapter one of Doeschner’s story began when he was 40. His wife noticed on a walk in the mountains that his right arm wasn’t swinging in sync

with his left. They also noticed a tremor in Doeschner’s pinky. His doctor said not to worry—it was probably a pinched nerve. Four months later, the tremor grew in tempo, and in 1980 he was diagnosed with PD.

Chapter two: Doeschner’s neurologist waited a few years before putting him on levodopa. But when he finally began using it, the levodopa didn’t work well enough to control his body.

Chapter three began in 2000, when Doeschner elected to have an implantation of fetal stem cells. Not only did it fail to improve his symptoms, but he developed abnormal movements from the transplant itself—dyskinesias similar to those caused by levodopa.

In January 2006, Doeschner underwent DBS surgery. His tremors stopped once the stimulator was turned on and the settings adjusted. He started taking levodopa, and the combination of the stimulation and the medicine made him feel his age for the first time in decades. He began doing electrical work around the house. “It was great,” he says.

Doeschner has had to return to his neurologist’s office for adjustments—and the technology can fail, as he learned during a recent trip to the hospital. An electrical glitch shut his stimulator off and his body began jerking uncontrollably. An hour later, a nurse from his doctor’s office arrived with the magnet that resets the battery pack. (Patients carry their own battery-operating magnets, but his wife had taken it home.) His uncontrolled limbs finally settled quietly back to his sides.

As for Donald Rosenfelt, he noticed the change right away. After DBS his tremor disappeared. He could play golf again. And he’s happy to be hugged by people who are amazed at his fluid gait. NN