

INOVA

MAGAZINE

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STRONG SIGNALS

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*Deep brain stimulation
restores patients'
quality of life*

STRONG signals

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9 SURF STUDIOS

The once-simple pleasures of building Legos with her 5-year-old grandson and sewing prize-winning quilts became monumental tasks for Karen Troutman as the tremors in her hands grew progressively worse. Suffering since her thirties from essential tremor — an often-inherited chronic trembling of the hands, head or voice — Karen's medication to treat the movement disorder gradually lost effectiveness. Frustratingly, the Alexandria resident couldn't even handwrite her annual Christmas cards.

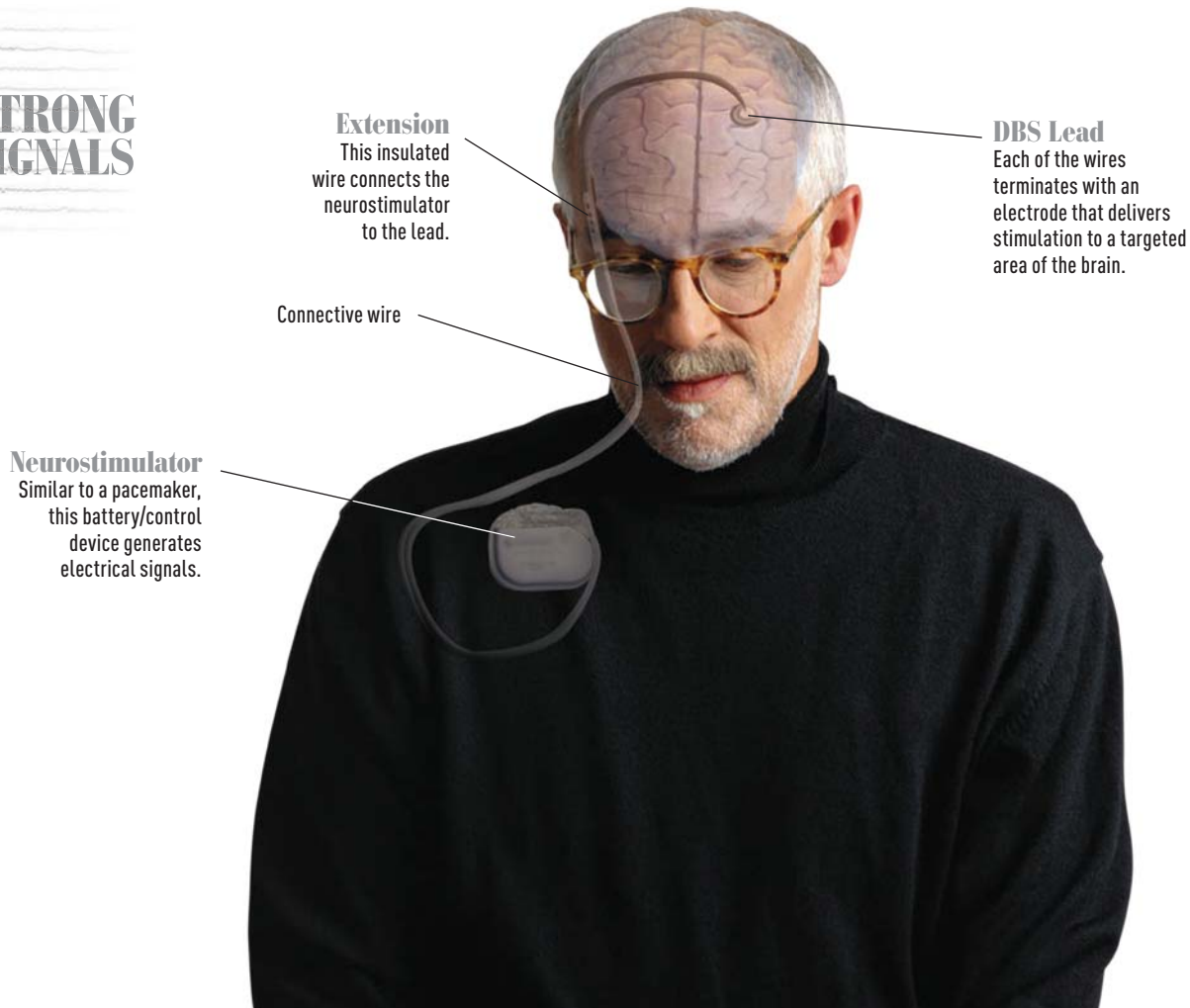
"My grandson would say, 'Grandma, your hand is shaking again,'" recalls Karen, 58, who vividly remembers her own grandfather's exasperation with the condition when she was a child. "That really got to me."

But the burgeoning use of a life-altering technology known as deep brain stimulation (DBS) meant that Karen didn't have to settle for her grandfather's fate. Following a three-year ramp-up and \$500,000 investment in cutting-edge equipment as part of Inova's expanded Movement Disorders Program, the mother of three was the first patient to undergo DBS — often described as a pacemaker for the brain because it delivers constant electrical pulses to counteract abnormal brain activity — at Inova last fall.

Fifteen more Inova patients with a variety of movement disorders are set to undergo the surgery in coming months, with a projected 50 to 100 such procedures to be performed annually.

"There's really no other program here in Northern Virginia that has the human manpower

STRONG SIGNALS



Extension
This insulated wire connects the neurostimulator to the lead.

DBS Lead
Each of the wires terminates with an electrode that delivers stimulation to a targeted area of the brain.

Connective wire

Neurostimulator
Similar to a pacemaker, this battery/control device generates electrical signals.

All the Right Connections

Deep brain stimulation delivers constant electrical pulses to counteract abnormal brain activity. How it works: A neurostimulator, which is placed above the collarbone, attaches to brain electrodes with tiny internal wires.

and resources to do this type of surgery,” explains neurosurgeon Mahesh Shenai, MD, MBA, Director of Functional and Restorative Neurosurgery. “Only a handful of programs nationwide have a community-based DBS program. But Inova has streamlined the process to overcome these barriers — such as having the right people and equipment — so we can have a world-class program in a community setting.”

‘A DIFFERENCE THAT ALWAYS BRINGS TEARS TO PEOPLE’S EYES’

Dr. Shenai, who came to Inova three years ago, was joined last summer by movement disorders specialists Drew Falconer, MD, and Sean Rogers, MD, PhD, to launch Inova’s Movement Disorders Program. Part of Inova Neuroscience and Spine Institute, the program offers care and treatment for patients with Parkinson’s disease, essential tremor, dystonia and other related conditions.

Many of these patients cope with escalating disability as their tremors, stiffness and uncoordinated movements progress, making everyday tasks such as eating, drinking, writing and

buttoning clothes extremely difficult. But drug regimens targeting symptoms of these movement disorders typically offer less relief over time. DBS, which even 15 years ago was considered a treatment of last resort, has come into mainstream use for patients with even moderate cases, as research indicates the surgery carries no more risk than other neurosurgeries, Dr. Falconer says.

Now DBS is an option for Inova patients with Parkinson’s, essential tremor (ET) and dystonia and may be expanded as research at Inova and elsewhere unveils its potential effectiveness for a wide range of other conditions, including epilepsy and depression. Up to 30 percent of Parkinson’s patients and 70 percent of ET patients are excellent candidates for DBS, Dr. Falconer notes, and the slightly older population surrounding Inova includes many of these patients.

“They go from a disabling tremor that doesn’t allow them to eat right or function normally to no tremor, with no medication needed in some patients,” he adds. “It’s a difference that always brings tears to people’s eyes.”

THE 'NEW FRONTIER': THE GENOMICS OF PARKINSON'S DISEASE

As Inova research efforts increasingly spotlight genetics to reveal the underpinnings of various medical conditions, movement disorders specialist Drew Falconer, MD, hopes that Parkinson's disease will soon join the list.

Calling the genomics of Parkinson's the "new frontier," Dr. Falconer says such research might reveal disease subtypes; determine individual prognoses; and point the way toward more effective treatment for the progressive neurological disease, which causes tremors, stiffness and slow movement, among other symptoms.

Dr. Falconer and fellow movement disorders specialist Sean Rogers, MD, PhD, who earned his PhD in neurosciences, joined Inova last summer as part of its launch of the Movement Disorders Program, which treats patients with Parkinson's, essential tremor, dystonia and related disorders. Neurology specialists at Inova could tap into work already in progress at Inova Translational Medicine



Institute (ITMI) — established in 2010 to explore the connection between genomics and the future of health — to unearth the genetic foundation of Parkinson's, he says.

"One of the big problems with Parkinson's disease research up to this point is that it lumps people in one group and ignores that every person with Parkinson's has their own brand of Parkinson's disease," Dr. Falconer explains. "Everyone is completely different, but it takes knowing that caveat to really treat these patients, and the basis of that is genomics."

DNA samples of Parkinson's patients at Inova could be collected and analyzed to identify gene sequences related to the disease and serve as a potential biomarker for which patients' cases may progress slowly or rapidly.

"If we don't target this at a genetic level, we're missing out," says Dr. Falconer, adding that he expects Inova to initiate research on the genomics of Parkinson's within the coming year.

INOVA TECHNOLOGY ENSURES PRECISE SURGERY, RESULTS

While not a cure for movement disorders, DBS works by targeting regions in the brain implicated in causing abnormal movements. The device is activated over several weeks in a three-step process. It includes an initial surgery — sometimes done while the patient is awake — to implant electrodes; a shorter second surgery to implant a neurostimulator above the collarbone that attaches to brain electrodes with tiny internal wires; and an office visit to program, fine-tune and turn on the device. Ongoing follow-up allows the device to be adjusted — in potentially four million ways — to the changing needs of the patient, Dr. Falconer says.

With hundreds of DBS procedures collectively under their belts and state-of-the-art technology at their disposal, Drs. Shenai, Falconer and Rogers aim to tailor each DBS device to a patient's specific needs. Inova's new surgical equipment even allows them to "listen" to brain neurons as electrodes are implanted, ensuring precise placement and optimal results.

"It's a very detailed and involved process and we need to be within 1 millimeter of error to get the result we want," Dr. Shenai explains. "Knowing which region we're targeting puts us in the ballpark, but at the time of surgery we want to figure out what base we're on."

Success rates reinforce the value of DBS: Parkinson's disease patients typically show 80 to 90 percent improvement in patient scores and can reduce medication use by 60 percent, while the vast majority of ET patients' tremors are completely resolved.

"This is the most exciting part for our patients: getting continual benefit while actually reducing or eliminating medications," Dr. Rogers says.

OFFERING PREVIOUSLY UNATTAINABLE TREATMENT

Karen's improvement was both immediate and "fascinating," with no shaking in her right hand after DBS surgery and no further ET medication needed.

"I did my own Christmas cards this year," she says, "and I did them really quickly, too. It was really impressive."

Part of a multidisciplinary Inova Movement Disorders Program team that also includes neuropsychiatrists, neurophysiologists, and physical, occupational and speech therapists, Drs. Falconer, Shenai and Rogers say they never tire of witnessing the thrilling changes DBS brings to patients' lives.

"It's a very dramatic point in time when a patient realizes the symptoms they've had for many years or decades are now under control," Dr. Shenai says. "They usually react with a combination of elation and awe, and I react the same way. It never gets old."

Dr. Falconer contends that Inova's DBS initiative indisputably sets the healthcare system apart.

"It's all about access and knowing what's available to make people feel better," he says. "Many times in our patients, the gap between doing just OK and achieving meaningful improvement is just access. Patients can get access to treatment here that before was unattainable." ■



BRAINS AT WORK

Learn more about the Movement Disorders Program at inova.org/move.