

New pacemaker may revolutionize treatment for epilepsy

A “pacemaker for the brain” is the first new development for treating epileptic seizures in more than 100 years.

The procedure is known as Vagus Nerve Stimulation (VNS), and it’s an alternative that does not involve the debilitating side effects that often accompany “standard” treatments from antiepileptic drugs or removal of brain tissue.

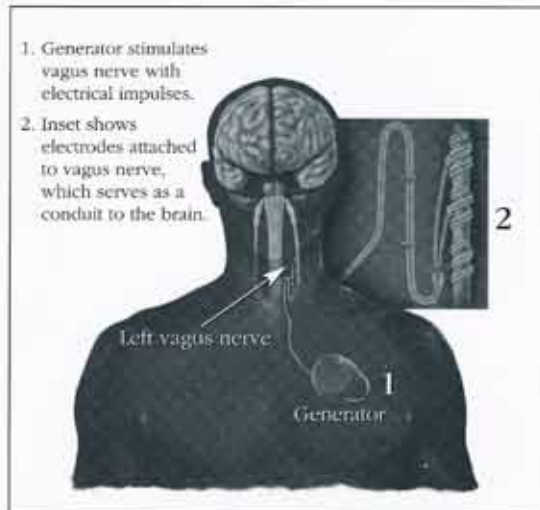
“It’s a terrific option for people to resume more normal lives,” said Dr. Kamiljit S. Paul, a Fox Valley neurosurgeon who is one of the few people in Wisconsin qualified to perform the procedure.

‘It was the best decision I ever made’

Epilepsy is perhaps the most unpredictable, uncontrollable condition known to medical science. People afflicted with the mysterious and burdensome disease are among the most resistive group of patients to treatment.

Compounding the problem is that brain damage occurs each time a person suffers a seizure, and people who have gained relief from VNS have suffered from two to 3,000 seizures per month. Types of seizures include brief staring episodes, a strange kind of *deja vu* feeling (a sensation of experiencing something that has occurred previously) with odd smells and fears, and tonic-clonic seizures, also known as grand mal.

The tonic-clonic seizures are terrifying and completely disruptive. They can involve loss of consciousness and convulsions -- sometimes marked by intense jerking of the limbs and head. Victims can break bones and suffer other injuries, and such seizures can occur with or without warning signs. Confusion, memory loss or exhaustion commonly follow a seizure.



VNS sends signals from the vagus nerve in the neck to the brain. The device is implanted in the chest and neck. The implant procedure does not involve the brain.

‘Seizures controlled our family’s lives for 25 years’

As complex as epilepsy is, VNS involves relatively minor procedures, according to Dr. Paul. With the patient under a general anesthesia, he makes a small incision under the left collar bone to place an electronic generator (about the size of a stop watch) under the skin, much like a cardiac pacemaker.

Dr. Paul then threads a coated wire under the skin to the neck. A small incision in a skin fold on the left side of the neck is made to wrap two electrodes around the vagus nerve. The surgery lasts from 45 minutes to two hours. Some patients go home after a six-hour hospital stay, while others remain overnight. Only temporary, minor pain results from the incisions. Scarring is minimal, including a small bulge from the generator being placed under the skin of the chest.

Two weeks after surgery, the patient visits Dr. Paul so the generator can be programmed to provide 24-hour-a-day doses of periodic electrical stimulation. The initial setting commonly involves 30 seconds of low electronic impulses to the brain every five minutes. Transmitted through the vagus

nerve, the impulses interrupt abnormal brain waves that cause epileptic seizures.

The patient also receives a small magnet. If he or she senses a seizure coming on, the hand-held magnet can be passed over the generator to activate an impulse, which can stop a seizure from progressing within three seconds.

The battery life of the generator can be as long as five years. When the battery wears out, the patient undergoes minor surgery to replace it.

'Stopping a seizure with my own hand is the most powerful feeling I ever experienced'

"Our aim is to stop seizures altogether," Dr. Paul said. However, physicians have not yet been able to achieve complete success. So far, the "Rule of Thirds" applies to long-term patient outcome. One-third of VNS patients have experienced profound improvement in their quality of life, one-third have experienced good improvement, and one-third have experienced little or no improvement.

Although some people gain immediate relief from VNS, it takes about a year for most patients to realize maximum benefit because the system must be adjusted gradually according to each individual's tolerance and condition.

The most frequently reported side effects of VNS are voice change (hoarseness), minor throat discomfort, a feeling of shortness of breath, and cough. But they typically only occur when the system is "on" and not during the majority of time when stimulation

is "off."

According to Dr. Paul, patients much prefer the VNS side effects to the risks of brain surgery or the memory loss, confusion, sedation, and inability to concentrate that often accompany antiepileptic drugs.

Furthermore, "Most patients must continually increase their



The electrical generator and wire leads

drug doses or change drugs because their bodies build up immunity to them," Dr. Paul said. "With VNS, physicians often stop prescribing certain drugs or reduce the amount of them."

In addition, patients do not build up tolerance to VNS. On the contrary, they respond better the longer they are on the treatment, according to Dr. Paul. Since VNS works automatically and continually, it's also not a treatment that can be forgotten or improperly administered.

'I only wish this technology had been available years ago'

After 10 years of study and extensive use in Europe, VNS received FDA approval in 1997 for patients 12 years of age and older. Worldwide,

about 1,000 people have received the treatment.

Although VNS doesn't offer a 100 percent success rate, Dr. Paul is "very excited about it. VNS offers a wonderful choice that wasn't available to people with epilepsy before. It feels so good to be able to help a group for whom there are so few answers and alternatives, especially the 20 percent who don't respond to prescribed treatments or those who are not candidates for brain surgery."

Dr. Paul stresses that VNS does not cure epilepsy, nor does it work for everybody. The mild electrical impulses can prevent or interrupt seizures. For some people, VNS has virtually eliminated seizures. Other patients have experienced reduction in the number and intensity of seizures. Yet others have noticed no improvement.

Nonetheless, Dr. Paul summarized, "It's very satisfying and emotionally gratifying to get just one person out of a protective helmet, behind the steering wheel again, back to work or school, to lead a more meaningful life by contributing to family and society."

For more information about VNS, contact Dr. Paul's offices at **920-231-9052** in Oshkosh or **800-231-9052** in Appleton.

* The subtitles are quotes from people whose lives have been improved by VNS.



Dr. Paul examines an x-ray.