



EPILEPSY & The Facts

Vagal Nerve Stimulator (VNS)

What is Vagus Nerve Stimulation?

Vagus nerve stimulation (VNS) is a type of treatment in which short bursts of electrical energy are directed into the brain via the vagus nerve, a large nerve in the neck. The energy comes from a battery, about the size of a silver dollar, which is surgically implanted under the skin, usually on the chest. This is a relatively new type of treatment. It may be tried when other treatment is not effective. Just how it works to prevent seizures is being studied.

How Can it Control Seizures?

It is thought that nerve fibers from the vagus nerve carry information to the brainstem and thence to areas of the brain known to be involved in seizures. Epileptic seizures are caused by normally well-organized brain waves becoming completely disorganized. It has been suggested that stimulation of the vagus nerve may be able to intercept this abnormal brain activity, preventing seizures.

What's involved in a Vagus Nerve Stimulation procedure?

Patients must undergo a one to two hour operation performed under general (or local and regional) anesthesia. Two incisions are made - each about five to six cm. long - one on the left chest wall, and the other on the neck. A small pulse generator, about the size of a stopwatch, is surgically implanted in the patient's upper left chest. Wires are tunneled under the skin and attached to the vagus nerve in the neck. The electrical connection between the vagus nerve and the pulse generator is checked before the incision is closed.

After a short healing period, the battery-powered pulse generator is programmed by the doctor to begin sending a particular "dosage" of stimulation to the vagus nerve, say 30 seconds of stimulation, at five minute intervals, with a strength of 0.25 milliamperes of electrical current. During follow-up visits the generator can be "ramped up" to higher levels of stimulation to achieve better seizure control.

Can the patient activate their Vagus Nerve Stimulator?

Some people with epilepsy experience an aura (which is really a simple partial seizure) warning them that a bigger seizure is about to occur. In these cases passing a hand-held magnet over it can activate the pulse generator. This sends a burst of stimulation to the vagus nerve, which may stop the seizure or make it less severe. A caregiver or companion can also use the magnet.

What are the side-effects of Vagus Nerve Stimulation?

As with any surgery, there is a risk of infection. When the vagus nerve is actually being stimulated, many people experience a tingling in the neck or hoarseness in their voice. Some have reported throat, ear or tooth pain, coughing and shortness of breath. For those people whose generator is programmed for a high intensity stimulation, these symptoms may exist continually, not solely when the nerve is being stimulated. Having the intensity or duration of the stimula-



Because vagus nerve stimulation is a new treatment, we cannot yet know for sure what long-term side-effects there might be from chronic stimulation of the left vagus nerve. Studies so far find it safe over a period of time.

Does Vagus Nerve Stimulation work?

Studies indicate that this new treatment may reduce seizure frequency and severity in some people with otherwise intractable epilepsy. Recent findings pointed to no significant improvement in seizures in one-third of VNS patients, moderate improvement in one-third, and a major improvement in one-third, meaning seizure frequency decreased by more than 50 per cent. Some patients respond immediately, while others must have the dosage of stimulation increased to reach therapeutic levels. It may take months before any improvement is realized.

Is Vagus Nerve Stimulation a recognized medical treatment?

The Canadian Health Protection Branch approved Vagus Nerve Stimulation in March 1997, specifically for those patients over the age of 12 whose partial-onset seizures (with or without secondary generalization) are not well controlled by anti-epileptic drugs.

When is Vagus Nerve Stimulation used?

Vagus Nerve Stimulation is used only as a “last-resort” and is not yet widely available. As well as its approved use for treating partial-onset seizures in people over 12 years old, VNS may have potential use for other seizure types and epilepsy syndromes, including symptomatic generalized epilepsies. Limited experience suggests that VNS may also be effective in children, particularly with Lennox-Gastaut syndrome. Identifying who would be a good candidate for VNS remains a challenge.

Is Vagus Nerve Stimulation covered by provincial health insurance?

Vagus Nerve Stimulation per se is not covered by OHIP, so the costs of the device and the surgery have to come out of the hospital’s budget. According to XYCORP, the Canadian distributor of the VNS device, the procedure is currently being done (or is about to become available on a limited basis) at the following centres in Ontario: Hospital For Sick Children, St. Michael’s Hospital, Toronto Western Hospital, Ottawa General Hospital, Ottawa Children’s Hospital, Kingston General Hospital and London Health Sciences Centre-University Campus. There is often a long waiting list. Privately, the device may cost in the \$15,000-\$20,000+ range in Ontario, but the hospital, however, must be willing to perform the surgery.