

What is the vagus nerve?

The vagus nerve, the longest nerve in the body, extends from each side of the brain stem and down to the abdomen. It is part of the autonomic nervous system which controls involuntary body functions and unconscious body procedures. The vagus nerve helps control functions of the diaphragm, voice box, stomach and even heart.

What is VNS therapy?

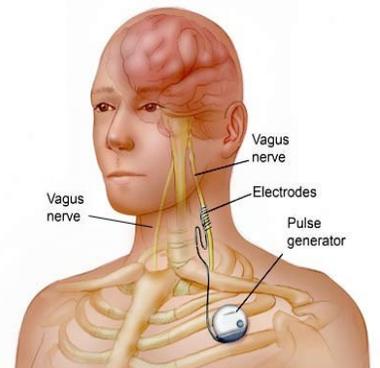
Vagus nerve stimulation (VNS) was approved by the FDA in 1997 as an adjunctive therapy treatment for drug resistant epilepsy. In 2017, the FDA approved VNS therapy in children as young as four with partial onset seizures resistant to antiepileptic medications.

The VNS is a implanted, programmable device known as a pulse generator because it sends repeating, low pulses of electrical current. It can operate regardless of seizure warning signs. The goals of VNS treatment are to reduce the number, length, and/or severity of seizures.

- The VNS device, similar to a pacemaker, is implanted under the skin in the left chest
- It involves a stimulator (electrical pulse) that sends an electrical stimulation through the vagus nerve to the brain
- This battery in the device can last about 5-10 years but is patient specific based on the model and simulation settings

How does it work?

- A doctor will program the VNS device to continuously operate by setting the strength and duration of the electrical impulses. This means the device will turn on and shut off based on programmable time intervals that are adjustable and patient specific. These are referred to as **normal settings**.
- The patient also has their own control over the VNS. By swiping a magnet across the left chest, the magnet can send an additional electrical burst to the brain that may help stop the seizure or decrease the seizure's length. It can be used at any time during a seizure though most effective if used initially at the start of the seizure. These are referred to as **magnet mode settings**.
 - The specialty magnet should be swiped across the VNS; from the left chest towards the left armpit. The magnet should not be held continuously over the device as this may inadvertently risk shutting off the VNS.
 - Clothes do not need to be removed but a heavy coat can be opened.
 - The magnet can be used by the individual or caregiver. It can even be worn as a watch or on a belt.
 - Repeated swipes can be performed per healthcare provider orders. Magnet strength will usually last about 3 years depending on settings and use before requiring replacement.
- The latest advancement in VNS models introduced the *AspireSR* and *SenTiva* (2017). These models additionally monitor and detect heart rate increases associated with seizures. Rapid rise in heart rate, based on the individual's baseline, will trigger an automatic stimulation to help stop the seizure, shorten its length, or improve the recovery period.



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Side Effects

- Hoarse voice
- Cough
- Dysphagia
- Muscle twitching
- Headache
- Indigestion
- Nausea
- Vomiting
- Difficulty breathing

SHNIC school nurses information:

Specific health issues for individual health care plans

- Diagnosis including type of seizure, description of seizure, and typical length
- Additional student specific seizure characteristics including triggers, warning signs, timeline of occurrence, and behavior following a seizure
- Documentation of VNS implantation including date and current settings
- Orders for magnet mode settings including when to swipe, repeat swipe, etc.
- Current medication list for home and school
- Orders for emergency seizure medications including when to administer, dose, route
- Seizure action plan, when to call 911
- Documentation of where VNS magnet is located, who is trained to use the magnet
- Safety precautions including magnet safety
- Documentation/log of seizures
- Education of staff about implantable devices, restrictions



Caution: The user should seek medical advice before entering environments that are protected by a warning notice preventing entry by patients implanted with a cardiac pacemaker or defibrillator.

- Users should exercise reasonable caution in avoiding devices that generate a strong electric or magnetic field. Such devices may include strong magnets, tablets, hair clippers, loudspeakers, TENS units, and ultrasound machines.
- Keep this type of equipment at least 20 centimeters (8 inches) away from your chest and follow precautions in your device user manual.
- MRI procedures should be performed only as described in device manual.
- Most routine diagnostic procedures, such as fluoroscopy and radiography, are not expected to affect system operation.
- Properly operating microwave ovens, electrical ignition systems, power transmission lines, theft-prevention devices, metal detectors, and cell phones are not expected to affect the generator.

Magnet Safety

- Do not store device magnet by credit cards, televisions, computers, or watches.
- Do not drop the magnet as it may damage its effectiveness.

Resources & Manuals

American Association of Neurological Surgeons– VNS

<http://www.aans.org/Patients/Neurosurgical-Conditions-and-Treatments/Vagus-Nerve-Stimulation>

Epilepsy Foundation– VNS

<http://www.epilepsy.com/learn/treating-seizures-and-epilepsy/devices/vagus-nerve-stimulation-vns>



Helpful hidden device information for school nurse

Type of device: _____
Serial #: _____
Model #: _____
Implant date: _____

For school health professional working with student

Experience with device: Y N
Device manual at school: Y N
DME contact information: Y N

Device specific

Alarms: Y N
Battery: Y N
Back up equipment at school: Y N

Precautions to consider at school

Positioning of student: Y N
Emergency plan in place: Y N
Physical activity restriction: Y N
Magnet sensitivity: Y N
Emergency outlet: Y N

Liva Nova- VNS Therapy

<https://us.livanova.cyberonics.com/>
(* Formerly Cyberonics)