

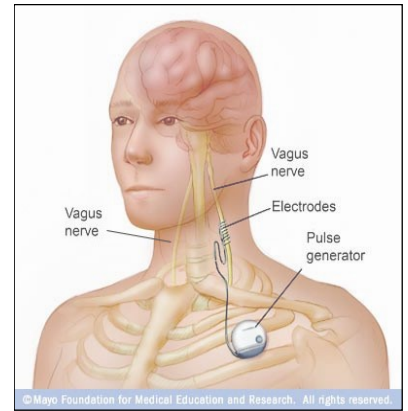
# VAGUS NERVE STIMULATOR

## What is the vagus nerve?

The vagus nerve, the longest nerve in the body, extends from each side of the brain stem down to the abdomen. It is part of the autonomic nervous system which controls involuntary body functions and unconscious body actions. 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, the VNS sends low and repeating pulses of electrical current through the vagus nerve to the brain. It operates regardless of seizure warning signs. This battery powered device is similar to a pacemaker and implanted under the skin in the left chest. The goals of VNS treatment are to reduce the number, length, and/or severity of seizures.

## How does it work?

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|-----------------------------|--|
| <b>Normal settings</b>      | A healthcare provider 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.  |
| <b>Magnet mode settings</b> | 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.                            |
| <b>Heart rate settings</b>  | The latest advancement in VNS models introduced the <i>AspireSR</i> and <i>SenTiva</i> (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. |

## Helpful information

- 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.
- Repeated swipes can be performed per healthcare provider order. Magnet strength will usually last about 3 years depending on settings and use before requiring replacement.
- The magnet can be used by the individual or caregiver. It can even be worn as a watch or on a belt.
- Side effects include hoarse voice, cough, dysphagia, muscle twitching, headache, indigestion, nausea, vomiting, or difficulty breathing.
- Clothes do not need to be removed to use the magnet but a heavy coat should be opened.



Kennedy Krieger Institute

The **Specialized Health Needs Interagency Collaboration (SHNIC)** program is a collaborative partnership between the Kennedy Krieger Institute and the Maryland State Department of Education.

<p><b>Device safety considerations</b></p>	<p>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.</p> <p>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.</p> <p>Keep this type of equipment at least 20 centimeters (8 inches) away from your chest and follow precautions in your device user manual.</p> <p>MRI procedures should be performed only as described in device manual.</p> <p>Most routine diagnostic procedures, such as fluoroscopy and radiography, are not expected to affect system operation.</p> <p>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.</p>
<p><b>Magnet safety considerations</b></p>	<p>Do not store device magnet by credit cards, televisions, computers, or watches.</p> <p>Do not drop the magnet as it may damage its effectiveness.</p>

### Specific health issues for Individualized Healthcare Plan

- Diagnosis including type of seizure, description of seizure, and typical duration
- 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
- Documentation of where VNS magnet is located, who is trained to use the magnet
- Safety precautions including both device and magnet safety considerations
- Documentation/log of seizures
- Communicate with school staff, parents, and provider any changes or concerns about the student's disease or device
- Medical device information (see SHNICs "Medical Device Information Guide")
- Consideration of team discussion for a possible 504/IEP and Emergency Evacuation Plan
- Emergency Care Plan (ECP) related to medical needs in the school setting and staff education/training as appropriate for each

#### Resources & Manuals

**Kennedy Krieger Institute– Epilepsy Clinic**

<https://www.kennedykrieger.org/patient-care/centers-and-programs/epilepsy-at-kennedy-krieger>

**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>