Vagus nerve stimulation (VNS) therapy for epilepsy

What is VNS therapy for epilepsy?
VNS therapy involves a small electrical device, like a pacemaker, which is implanted under the skin of your chest. The device sends electrical impulses to your brain through a nerve in your neck called the vagus nerve. The aim is to reduce the number of seizures you have and make them less severe.

How does VNS therapy work?
VNS therapy uses the VNS system, which is made up of 3 parts:
- A small pacemaker-like device, called a generator
- A thin, flexible wire, called a lead
- A hand-held magnet

The vagus nerve sends messages between the brain and other parts of the body. In VNS therapy, a generator is connected to the vagus nerve by a lead. The generator is programmed to send electrical impulses to the vagus nerve at regular intervals, all day, every day. These impulses are then carried by the vagus nerve to the brain. This regular stimulation can help to reduce the number of seizures you have and make them less severe.

You can also sweep the hand-held magnet over the generator to send more impulses to the vagus nerve. This could be if you have an aura (warning) before a seizure, if you feel a seizure starting, or when you are having a seizure. Some people find that using the magnet stops a seizure happening, shortens the seizure or makes the seizure less severe. A carer, or family member, can also use the magnet, if they see you having a seizure. The magnet can also be used to stop the stimulation for a short time.¹

Newer models of the VNS generator can also detect increases in heart-rate. In some people with epilepsy an increase in heart-rate can be a sign that they are having a seizure. When the generator detects an increase in heart-rate, it automatically sends more impulses to the vagus nerve. This may help to stop a seizure happening or make it less severe.²

Can I have VNS therapy?
There are strict criteria for having VNS therapy on the NHS, and only some people with epilepsy are eligible. It is restricted for adults and children with epilepsy when other treatments have not worked or are not suitable. To be eligible for VNS therapy you must still be having seizures despite trying a number of different epilepsy medicines, or your epilepsy medicine

causes you too many side-effects. You must also be unsuitable for epilepsy brain surgery, or you have had brain surgery but are still having seizures.3

If you think VNS therapy might help you, talk to your epilepsy specialist.

What does VNS surgery involve?
Surgery to implant the VNS system is carried out by a neurosurgeon, usually under general anaesthetic. The operation takes between 1 and 2 hours and you usually go home the same day, or the next day. The neurosurgeon makes 2 small cuts, 1 in a natural crease on the left of your neck, and 1 in the left-hand side of your chest, below your collarbone. The generator is placed under the skin in your chest. A lead is inserted under the skin to connect the generator to the left vagus nerve in the neck.4

As with any operation, there is a slight risk of reaction to the anaesthetic. There is also a small risk of bleeding and infection. Your surgeon will give you more information before the operation takes place.

You might have some pain for a while from the area of the implant after VNS surgery. Your doctor can prescribe something for this.

What happens after VNS surgery?
The generator is usually left switched off for two weeks after surgery. This is to help your body heal. After that, it is usually switched on by a specialist nurse in a clinic. They will gradually increase the settings over a number of weeks. This gives you a chance to get used to the stimulation over time.

What are the benefits of VNS?
The benefits of VNS can include the following:
- Having fewer seizures
- Having less severe seizures or shorter seizures
- Having improved quality of life5

You might not see any improvement in your seizures at first. You might find your seizure control slowly improves over the first 2 years after the VNS system is fitted.6 For most people, VNS does not stop seizures completely.7

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**Will I get side-effects from VNS?**
The most common side-effect reported from VNS is hoarseness/a change in voice. Other common side effects include:
- Sore throat
- Shortness of breath
- Coughing

Other possible side-effects include palpitations, difficulty swallowing and stomach discomfort. The side-effects of VNS usually happen during stimulation periods, and may improve over time. If you find the side-effects uncomfortable talk to your epilepsy nurse. They may be able to help by altering the level of stimulation.


**Will I still need to take epilepsy medicine after the VNS system has been fitted?**
VNS is designed to be used in addition to epilepsy medicine, not to replace it. Most people need to keep taking epilepsy medicine after they have had a VNS system fitted. Some people are able to reduce the amount of epilepsy medicine they take over time. You will be able to talk to your epilepsy specialist about any possible changes to your medicine.

**Is it safe to have an MRI scan with a VNS system fitted?**
Some types of magnetic resonance imaging (MRI) are dangerous when you have a VNS system fitted and could cause you serious injury. They can also be dangerous if you have had the VNS system removed, but still have some of the lead remaining. If an MRI is recommended for you it’s important that everyone involved in the scan knows about your VNS system. They may need to take precautions to carry out the scan safely.

**Can I go through airport security scanners with a VNS system fitted?**
Airport security scanners should not affect the device or be affected by it. The makers of the VNS therapy system recommend that to be safe, you should walk through the scanner at a steady pace, not linger in the area and stay at least 40 centimetres from the equipment.

You can find a full list of VNS system precautions in the [VNS Patient Manual](http://en.eu.livanova.cyberonics.com/resources/patients-manuals).

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How long does the generator last?
At some point, the generator will need replacing when the battery runs low. The generator battery can last between 1 and 16 years,\(^{11}\) depending on the model and settings used. Your doctor or nurse can tell when the battery is running down during your follow up appointments. They will then arrange for a new generator to be fitted. This involves a small operation, which lasts less than an hour.

How do I get a replacement magnet?
If you need a replacement magnet, contact your epilepsy specialist nurse. They should be able to provide you with a new magnet free of charge.\(^{12}\)

How can I find out more?
You can get more information about VNS therapy from the website of Livanova, who make the VNS therapy system.

If you’re thinking about VNS therapy for your child, [this site by Livanova](http://en.eu.livanova.cyberonics.com/resources/patients-manuals) may help them understand more.

What other systems are available for treating epilepsy?
A number of companies have launched or are developing other systems to treat epilepsy. At the moment, none has been approved for treatment on the NHS. Examples include:

Transcutaneous vagus nerve stimulation (t-VNS) – the Nemos device
This device stimulates the vagus nerve through the ear. It is made up of an external stimulator, which is connected by a wire to an earpiece worn in the ear. More information is available from the [Nemos website](http://nemos.com).

External trigeminal nerve stimulation (eTNS) – the Monarch system
This system consists of an external stimulator, connected by wires to two pads on the forehead. These pads send a signal to the trigeminal nerve. The makers say this nerve is known to play a role in the prevention of seizures. More information is available from the [Monarch website](http://monarchoutside.com).

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\(^{12}\) Email from Fable, November 23, 2015.
About this information
This information is written by Epilepsy Action’s advice and information team, with guidance and input from people living with epilepsy, and medical experts. If you would like to know where our information is from, or there is anything you would like to say about the information, please contact us at epilepsy.org.uk/feedback

Epilepsy Action makes every effort to ensure the accuracy of information but cannot be held liable for any actions taken based on this information.

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- Text ACT NOW to 70700 (This will cost you £5 plus your usual cost of sending a text. Epilepsy Action will receive £5.)
- Send a cheque payable to Epilepsy Action to the address below.

Did you know you can also become a member of Epilepsy Action from as little as £1 a month? To find out more, visit epilepsy.org.uk/join or call 0113 210 8800.

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