



Orthopaedic Institute of Ohio
801 Medical Drive
Lima, Ohio 45804
419-222-6622

Neurostimulation:

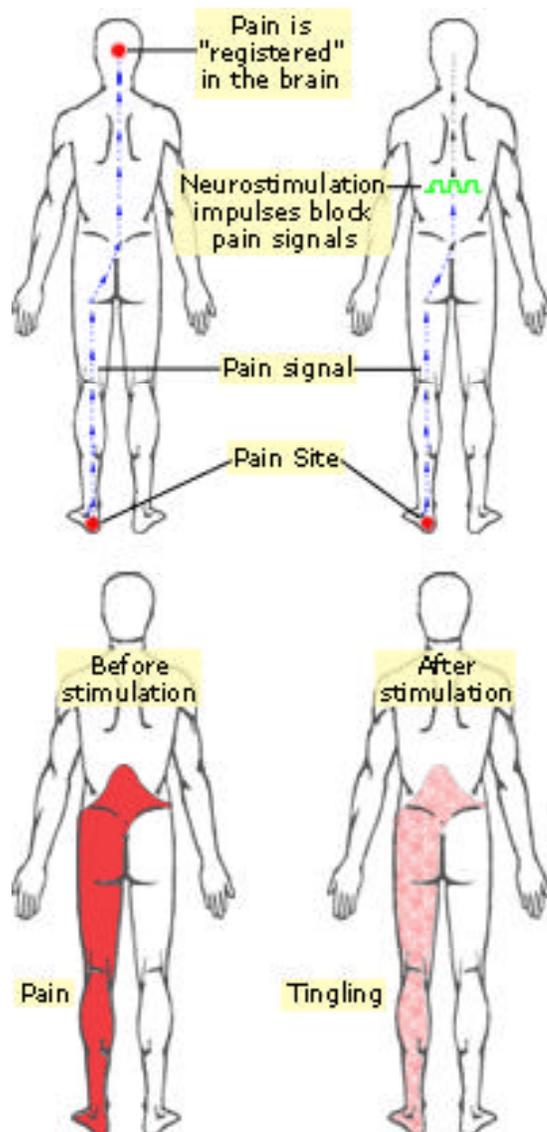
Neurostimulation is the stimulation of the spinal cord by tiny electrical impulses. An implanted lead (a flexible insulated wire), which is powered by an implanted battery or receiver, is placed near your spinal cord. This lead and an implanted neurostimulator send electrical impulses that block the pain messages to your brain.

Some patients describe the feeling of neurostimulation as “tingling.” You can also think of neurostimulation as the rubbing of your “funny bone” after you’ve bumped it. Rubbing masks the feeling of pain just as the tingling produced by the neurostimulation system masks the feeling of pain.

Patient Profile

People with certain kinds of chronic pain may be candidates for neurostimulation therapy. Click here to learn about [types of pain treated](#). The following criteria are used to determine whether or not neurostimulation is appropriate for chronic pain sufferers:

- More conservative therapies have failed to adequately help the pain.
- An observable pathology exists that is associated with the pain.
- Further traditional surgical intervention is not indicated.
- No serious untreated drug habituation for your pain condition exists.
- Psychological evaluation and clearance for implantation have been received.
- No medical issues exist that would present problems with doing the surgery.
- The screening test is successful.



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Trial and Implant

Neurostimulation Trial

In order to have a neurostimulation system implanted, you must first have a successful neurostimulation trial. The trial screening procedure—or test stimulation—consists of a short test stimulation period in the operating room and an evaluation period of several days at home. During the evaluation period, your doctor determines your response to neurostimulation and your level of pain relief. It also gives you an opportunity to experience the system and enables the doctor to assess your battery requirements.

During the trial screening, your doctor will place a lead in your back to deliver electrical stimulation to the spinal cord. The lead placement is one of the keys to successful results with a neurostimulation system. Your involvement is very important to proper placement, so be sure to follow your doctor's instructions carefully.

Typically, you will receive a local anesthetic and mild sedatives to keep you comfortable during the procedure. After that, your doctor will place the lead in your back.

There are two types of neurostimulation trials: percutaneous and “cut-down.” For the percutaneous trial, a needle is placed in your back. Through it, the test stimulation lead is inserted into the desired area of the spine. The end of the lead that remains on the outside of your body is secured to your back with surgical tape. After the trial period concludes (usually after several days), the lead will be removed. The percutaneous test stimulation is similar to an epidural nerve block, except that the lead will be inserted and left in your back during the trial.

For the cut-down trial stimulation, your doctor makes a surgical incision, implants the permanent lead, and closes the incision. If you qualify for implantation in the latter case, the permanent lead will stay in place but will be attached to the implanted neurostimulator.

After the lead is placed, your doctor will connect the lead wires to an external screener that allows your nurse or doctor to adjust your stimulation.

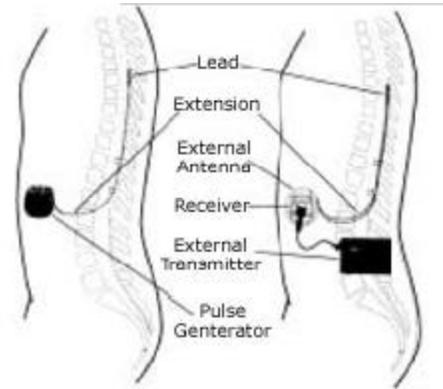


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Implant Procedure

If your neurostimulation trial is successful, you may be a candidate for implantation of a neurostimulation system.

The surgical procedure to implant the neurostimulation system may require a brief hospital stay. Before the surgery, you and your doctor will decide where to position the neurostimulator for your comfort. During the surgical procedure, an incision is made over the spine so that your doctor can place the lead and connect it to the extension. The extension is tunneled under the skin and connected to the neurostimulator. Your doctor will then form a pocket under your skin (usually in the abdominal area) that is large enough to hold the neurostimulator. Once the extension is connected to the neurostimulator, the incisions are closed and the surgery is complete



How the System Works

Neurostimulators are implantable, pacemaker-sized devices that send electrical stimulation through a lead to electrodes implanted near the spinal cord or an affected peripheral nerve. Stimulation is felt as a tingling sensation. A neurostimulator includes an integrated circuit (a miniature computer), a radio-wave transceiver, a battery, and a connector block.

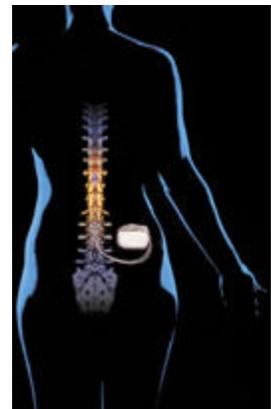
The stimulation can be adjusted in terms of strength and area of coverage via an external programming device. The implantable neurostimulation system or receiver does not make any noise. It may be felt as a small bulge under your skin, but does not normally show through your clothes.

The system delivers a small electrical signal to the spinal cord to reduce the pain signal. In exchange, you feel a tingling sensation.

Two types of Neurostimulation Systems

There are two types of neurostimulation systems: a fully implanted system with an internal power source; and an implanted system with an external power source.

The main difference is the battery location. The fully implanted system uses a battery that is implanted beneath the skin. The externally powered system uses a battery source that is worn outside the body. It provides power without the need of a surgical procedure to replace a worn-out power supply. The externally powered system requires an antenna to be placed on your skin with an adhesive patch in order to receive stimulation. (The antenna sends a signal from the transmitter to the receiver when placed on the skin over the receiver.) Some neurostimulation systems are implanted using two leads. Your doctor will work with you to help you select the system that is most appropriate for your needs

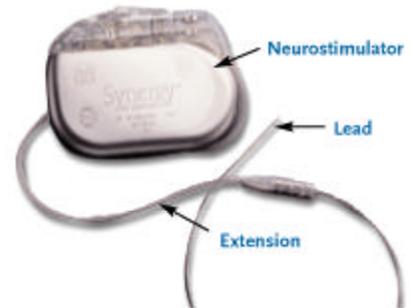


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Equipment Overview - Fully Implanted System

The fully implanted neurostimulation system consists of an implantable neurostimulator, an implantable lead and extension, a programmer used by physicians, a patient programmer and an external control magnet that turns the system on or off.

The implantable neurostimulator is the device that generates the exact electrical impulses that are sent to your spinal cord to control your pain. The neurostimulator contains a special battery and electronics to create these impulses. The device is most frequently placed under the skin in your abdomen.



Lead

Neurostimulation leads are special insulated wires designed to deliver neurostimulation to the spinal cord. A neurostimulation system may use one lead (single-channel) or two leads (dual-channel). The lead is about 11 inches long and is placed under the skin near your spine. It contains a set of electrodes through which the electrical stimulation is delivered to the spinal cord.

Extension

The extension is a small cable about 20 inches long that is placed under the skin and connects the lead to the neurostimulator used by physicians.

Programmer Used by Physicians

The programmer lets your doctor adjust your neurostimulation system to the appropriate level for your pain. This programmer consists of a computer, programming head, and a printer. The programming head is placed over the area where the neurostimulator is implanted to program the settings by use of radio waves. This procedure is done through the skin and is generally considered to be painless.

When you visit the doctor's office, your neurostimulation system can be reprogrammed to more effectively deal with your pain. For example, the multiple electrodes on leads can be readjusted to provide differing patterns of pain coverage. The strength of the pain coverage can be altered to accommodate lesser or greater pain.



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Patient Programmer:

The hand-held patient programmer allows you to program your own stimulation (within the settings your physician has selected. The patient programmer allows you to adjust the stimulation according to your pain between visits to the doctor's office. Depending on your need for pain control, you can use the patient programmer to turn your system off and back on. You can also direct your system to provide greater or lesser pain relief (by increasing or decreasing the tingling), within limits set by your doctor. You will not be able to change those limits on your own, but you may discuss the need for possible changes with your doctor. A 9-volt battery is required to operate the programmer.



Control Magnet

The control magnet is an optional accessory used to turn the stimulation ON and OFF as needed. NOTE: This magnet should be kept away from items such as credit cards, computers, videotapes, etc., that can be demagnetized.



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