



**Spinal cord stimulation** is used most often after nonsurgical pain treatment options have failed to provide sufficient relief. It is an implanted device that sends low levels of electricity directly into the spinal cord to relieve pain. Spinal cord stimulation can improve overall quality of life and sleep, and reduce the need for pain medicines and is typically used along with other pain management treatments.

## **What is a spinal cord stimulator and how does it work?**

Spinal cord stimulators consist of thin wires (the electrodes) and a small, pacemaker-like battery pack (the generator). The electrodes are placed in the epidural space between the spinal cord and the vertebral body, and the generator is placed under the skin, usually near the buttocks or abdomen. Spinal cord stimulators allow patients to send the electrical impulses using a remote control when they feel pain. Both the remote control and its antenna are outside the body.

Traditional spinal cord stimulators replace the sensation of pain with light tingling, called paresthesia. For patients who find this paresthesia uncomfortable, newer devices offer “sub-perception” stimulation that cannot be felt.

Many of the latest devices are placed by physicians with highly specialized training in interventional pain management under fluoroscopic guidance.

## **What is spinal cord stimulation used for?**

Spinal cord stimulation is used most often after nonsurgical pain treatment options have failed to provide sufficient relief. Spinal cord stimulators may be used to treat or manage different types of chronic pain, including:

- Back pain, especially back pain that continues even after surgery (failed back surgery syndrome, post laminectomy pain syndrome)
- Complex regional pain syndrome (CRPS)
- Arachnoiditis (painful inflammation of the arachnoid, a thin membrane that covers the brain and spinal cord)
- Injuries to the spinal cord
- Neuropathy (ex: diabetic neuropathy and cancer-related neuropathy from radiation, chemotherapy etc)
- Peripheral vascular disease
- Pain after an limb amputation (Phantom pain)
- Visceral abdominal pain and perineal pain



Spinal cord stimulation can improve overall quality of life and sleep, and reduce the need for pain medicines. It is typically used along with other pain management treatments, including medications, exercise, physical therapy and relaxation methods.

## Who should get a spinal cord stimulator?

As with all treatments, your doctor will want to make sure spinal cord stimulation is right for you — and that it is likely to provide significant relief from your chronic pain. To make this recommendation, your pain specialist will likely order imaging tests and psychological screening. Some insurance companies require psychological screening to ensure disorders like depression or anxiety aren't worsening your pain.

Each patient is different, but generally, people who benefit the most from spinal cord stimulation are those who:

- Have not experienced sufficient pain relief with medications, less-invasive therapies or prior surgeries
- Do not have psychiatric disorders that would decrease the effectiveness of the procedure

## Spinal Cord Stimulator Types

Spinal cord stimulators come in two main types:

1. Conventional implantable pulse generator (IPG) is a battery-operated spinal cord stimulator. A battery is placed under the skin during an operation and it lasts for several years. When the battery reaches its end of life it must be replaced. This device can be a good choice for people with pain in just one body part because it has a lower electrical output.
2. Rechargeable IPG works similarly to the conventional device, with the difference that the battery can be recharged without another surgery. Because the energy source is rechargeable, these stimulators can put out more electricity. This may be a better choice for people with pain in the lower back or in one or both legs, as the electrical signal can reach further.

Your physician will explain how to operate the device and adjust the intensity of the electrical signal, which all types of stimulators support. Different body positions may require different stimulator settings, such as one setting that works better for sitting and another for walking). To help you easily access the most used settings, most devices allow doctors to save two or three preset programs. Some newer devices feature several waveforms for electricity delivery, including high frequency, burst and high-density stimulation.



## **Spinal Cord Stimulator Surgery**

Spinal cord stimulators require two procedures to test and implant the device: the trial and the implantation.

### **Spinal Cord Stimulator Trial**

The first step is a trial period. Your pain management physician will implant temporary electrodes for you to test out. Under X-ray guidance they are carefully inserted in the epidural space of the spine. The location of your pain affects where these electrodes will be placed along the spine. Your physician may ask for your feedback during the procedure to best position the electrodes. The generator/battery will be outside the body, typically on a belt, you'll wear around your waist. The trial procedure is typically performed in the office. For about a week, you will evaluate how well the device reduces your pain. The trial is considered a success if you experience a 50% or greater reduction in pain level.

If unsuccessful, the electrodes can easily be removed in the clinic without damage to the spinal cord or nerves. If successful, surgery is scheduled to permanently implant the device.

### **Spinal Cord Stimulator Implantation**

During the permanent implantation procedure, the generator is placed underneath the skin and the trial electrodes are replaced with sterile electrodes. Unlike the trial electrodes, these will be anchored by sutures to minimize movement.

The implantation can take about 1 hour and is typically performed as an outpatient procedure.

After the local anesthesia has been administered, your physician will make one incision (typically along your lower abdomen or buttocks) to hold the generator and another incision (along your spine) to insert the permanent electrodes. The incisions are about the length of a driver's license. As in the trial procedure X-ray is used to determine where the electrodes are placed.

Once the electrodes and generator are connected and running, your physician will close the incisions.



## **Spinal Cord Stimulator Implant Recovery**

Patients leave the same day as their procedure — once the anesthesia has worn off. For several days after surgery, your incisions may be painful. Try not to stretch, twist or reach, which could pull at the incisions. Dressings will be placed over the incision sites, which can be removed after about 3 days. In most cases, incisions heal within about 2-4 weeks after surgery.

Your doctor will discuss your recovery plan, but generally lighter activity is recommended for about 2 weeks after surgery.