

## Dr R E Pope

**Beneficence and Nonmaleficence**  
**Neurosurgeon and Spine Surgeon**

### Spinal Cord Stimulation

#### **What is neurostimulation?**

The use of electrical stimulation to relieve pain began in ancient times with the placement of torpedo fish directly onto painful body parts. Since then, the application of electrical stimulation to the body for pain relief has become much better and more sophisticated. In 1989, spinal cord stimulation (SCS) was approved by the Food and Drug Administration (FDA) as a treatment for chronic pain. Since that time, SCS has become a standard of care for patients with neuropathic chronic back and limb pain (nerve injury with abnormal nerve function producing pain). New technology has allowed for the development of neurostimulators that can allow patients with chronic back pain to reduce or eliminate their need for pain medications and return to comfortable, productive lives.

#### **How does spinal stimulation work?**

A small wire (called a lead) connected to a power source is surgically implanted under the skin. Low-level electrical signals are then transmitted through the lead to the spinal cord or to specific nerves to block pain signals from reaching the brain. Using a magnetic remote control, you can turn the current on and off, or adjust the intensity. The sensations derived from the stimulator are different for everyone; however, most patients describe it as a pleasant tingling feeling.

There are two kinds of systems available in spinal cord stimulation. The more commonly used system is a fully implanted unit that utilizes a pulse generator and a non-rechargeable battery that must be replaced over time. The second system relies on radio frequency and includes a transmitter and an antenna, which are carried outside the body (much like a pager or cell phone) and a receiver, which is implanted inside the body. Your physician will help you determine which system is better for you based on your condition, your lifestyle, and how much electrical energy is required to provide you with adequate pain relief.



#### **What is the goal of spinal cord stimulation?**

The goal of neurostimulation with SCS is to achieve significant or total relief from back pain and to be able to return to a happy productive lifestyle. While this therapy does not work for everyone, most patients with SCS are able to report a 50-70% reduction in their overall pain and are able to decrease or completely taper off narcotic painkiller medications. With successful SCS, patients can function during normal activities, return to work, and fully participate in family and community life.

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### **Who is a good candidate for spinal stimulation?**

This therapy is not for everyone. Generally, spinal cord stimulation may be considered when:

- a) Conservative treatments have not been successful.
- b) Surgery is not likely to help.
- c) The patient has no untreated drug addictions.
- d) The patient has had a psychological evaluation.
- e) The patient does not have a pacemaker or other contraindications.
- f) The patient has had a successful trial period with the spinal cord stimulator.

### **First step - the trial period**

Before a spinal cord stimulation system is permanently implanted, most physicians recommend a trial period. During this time, a temporary stimulator is surgically implanted to allow you to try the therapy for a while (a minimum of 24 hours, but can be up to several weeks)

### **What is the SCS trial? Why not implant the permanent system immediately?**

To make sure the patient will benefit from SCS, a temporary system is implanted and tried for a few days or a week. For the SCS trial, leads are placed beneath the skin and attached to a small generator the patient carries. The generator is similar to a pager or cell phone. If the SCS trial is successful, a complete permanent system with a generator is implanted at another time. The leads for the permanent system can be inserted the same way as in the trial. A small generator is surgically implanted beneath the skin in the upper buttock or abdomen. The wires are then connected and the entire system is implanted beneath the skin. Nothing is visible on the body.



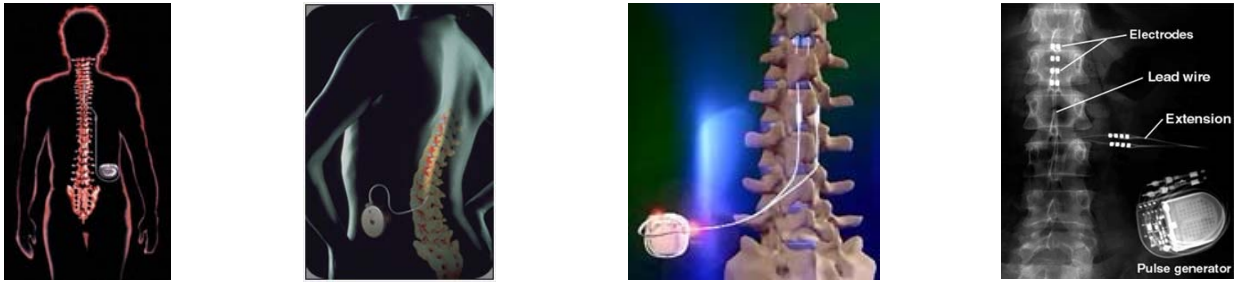
### **Next step - implantation**

#### **How is this done? What will happen to me?**

In spinal cord stimulation, the physician first numbs the skin using a local anesthetic. Soft, thin wires with electrical leads at the tip are placed through a needle (with or without an incision) into the back near the spinal column. The physician, either an interventional pain specialist or spine surgeon, determines the best location based on the individual patient's pain. Once the lead has been implanted, the stimulation system will be activated and you will help the surgeon determine how well the system works on your pain.. The Programming device is usually implanted in the abdominal area and this part of the operation may be done under a light general anaesthetic. Other areas of the body can be used if the abdomen is not comfortable for you. Depending on your body shape and size, the receiver should not be easily visible through the skin. You can expect some pain and swelling at the incision site and in the area where the receiver is implanted. This is normal and should only last a few days. Your doctor may prescribe a pain relief medication to help during this time.

Immediately following implantation, you should avoid lifting, bending, stretching, and twisting. However, light exercise, such as walking, is encouraged to build strength and help relieve pain.

Using a programming device outside the body, the system can be programmed in a way similar to using a remote control to adjust a TV. The area or intensity of stimulation can be changed, and the system can be turned on and off or adjusted to provide the best pain relief. Programming is initially done at the physician's office, and patients can learn how to control the stimulation on their own at home to adjust it to their pain.



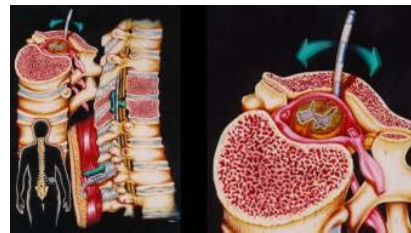
Many systems today have rechargeable batteries that can easily be recharged at home. To recharge the batteries, the patient places the recharging unit over the skin where the generator is implanted. Batteries may require recharging several times a month.

The latest technology provides coverage of different pain types (sensations) simultaneously (i.e. burning, aching, and stinging). It is referred to as multiple independent constant current technologies (MICC). Using this technology, each electrode lying over the spinal cord can be controlled independently. Currently, this technology is available with an added feature; the patient can program the stimulator with user-friendly software.

### Risks and benefits

As with any surgical procedure, there are risks, including:

- Infection
- Bleeding
- Headache
- Allergic Reaction
- Spinal Fluid Leakage
- Paralysis



In addition, there are some risks that are specific to the spinal cord stimulator. These may include:

- Stimulation stops or only works intermittently
- Stimulation occurs in the wrong location
- Over-stimulation
- The lead could move or become damaged (this may require surgical repositioning or removal)
- Poor system connection

However, there are also numerous benefits to using this type of therapy, including:

- Spinal cord stimulation allows you to be in control of your pain relief - you decide when it is needed
- Since the system is portable, you should be able to resume all of your usual daily life activities at home and at work
- You can travel, since your pain relief travels with you (keep in mind that sitting for long periods of time can increase pain)
- You will be able to participate in most recreational activities such as walking, swimming, and gardening
- Alleviating some or all of you pain will have a positive effect on your mental outlook, decrease stress, and improve your overall quality of life

### Things to Keep in Mind:

Since spinal cord stimulators utilize electric impulses as well as magnets, there are a few precautions users must keep in mind, including:

- 1) Do not drive or use heavy equipment while the stimulator is activated. However, you can use the stimulator if you are a passenger.
- 2) Spinal cord stimulators may set off metal detectors (such as in airports). You will be given special identification that certifies you have a spinal cord stimulation system. Be sure to carry this with you to get you through these checkpoints.
- 3) Anti-theft devices (such as in retail stores) may temporarily increase stimulation if your system is on when you walk through. This will not harm the system, but may not be pleasant for you. It's usually best to turn off the stimulator before walking through any of these devices.
- 4) When flying, airline personnel may require you to turn off the stimulator during take off and landing.
- 5) Normal household equipment, such as cell or portable phones, computers, TVs, microwaves, and other appliances are safe to use with the stimulator. The stimulator should not cause any interference with these items.
- 6) The magnet on the stimulator control device may cause damage to certain items or erase information on items with magnetic strips such as bank or credit cards, video or audiocassettes, and computer disks. The magnet can also stop watches and clocks, so you may want to store the magnet at least two inches away.

**Is it right for you?**

While there is no guarantee that spinal cord stimulation will alleviate all of your discomfort, most patients report a 50% - 70% decrease in pain. This decrease can make your pain much more manageable and allow you to return to a more active life. Not everyone can benefit from this therapy; however, it might be worth a visit to your spine specialist to see if you are a good candidate.