

FINAL

Spinal Cord Stimulation for Patients

Spinal Cord Stimulation, or SCS, therapy involves the application of micro-currents of electricity to specific regions of the spinal cord, to change the perception of pain. The most common use of SCS in North America is to treat pain. However, in Europe, these devices are also commonly used to treat conditions that result in insufficient blood flow, such as vascular disease in the extremities and heart. In properly selected cases spinal cord stimulation can be remarkably effective at relieving pain and improving functional capacity.

SCS produces a sensation of tingling in the affected area of the body that decreases the painful sensation experienced by the patient. SCS changes or alters the perception of pain at the level of the **central nervous system** (brain and Spinal cord) by altering underlying neural pathways and changing how the brain interprets or processes painful stimuli.

Patients are frequently familiar with other electrical stimulating devices such as **TENS (transcutaneous electrical nerve stimulation)** but SCS is something entirely different and effects pain pathways differently. Studies show that there is no meaningful correlation between whether TENS helps (or not) and the effectiveness of SCS.

SCS and PNS were developed for the treatment of neuropathic (nerve) pain. This pain is typically associated with injury to nerves and is described by patients as burning, shooting, or tingling. It may be associated with other neurologic changes like painful numbness or a greatly increased sensitivity to things that would not normally produce pain, such as a light touch. For example, back surgery can cause irreversible damage to nerves causing chronic lower extremity pain. Diabetes is another example of a condition that can damage nerves in the arms and legs and leave the patient with severe burning and/or tingling sensations that are often associated with numbness and pain. Neuropathic pain typically does not respond well to narcotic pain medications and many of the agents that can be effective can cause side effects or other problems.

The Trial

Although some physicians advocate early use of this modality, most will at least first attempt a more conservative treatment approach and only turn to SCS if those methods fail to achieve adequate relief for the patient. The Medicare program and most major insurers require a psychological evaluation to screen for conditions that can limit this therapy's effectiveness. A trial is performed before the permanent neuromodulation device is inserted and typically lasts three to seven days. For the trial, the doctor will place wire(s) (referred to as leads) through a needle into the **epidural space** and steer(s) these to lie over the specific areas of the spinal cord that correlate with the distribution of pain.

During the trialing procedure, you must be aware enough to answer questions about whether you feel stimulation and also where you feel it. The doctor will try to position the leads in a location that provides a tingling sensation overlying the painful areas. Once a good location is identified, the doctor will remove the needle and secure the leads to the skin. A temporary external pulse generator (battery) will be attached to the end of the lead that's outside of the body, and this is programmed to provide stimulation (a soothing tingling sensation) to the areas of the body where pain is experienced.

There are typically eight different contact points on each lead and usually one or two leads are inserted for the **trial**, although this depends on the pattern of pain and its location. Since each of those contacts can be positive, negative, or off, the doctor literally has thousands of combinations available to optimize the

stimulation pattern. During the trial period the patient is asked to keep track of whether the stimulation relieves pain and to monitor its effect on their ability to perform normal activities of daily living. After the trialing period the patient and physician jointly make a decision as to whether it makes sense to have the device permanently implanted.

How it Works

The SCS system consists of a programmable (and usually rechargeable) pulse generator (the battery) that generates the individual and particular stimulation pattern for that patient. The generator is connected under the skin to the leads that are placed in the **spinal canal**, as described above. Your “mileage” on the battery will be determined by how often you use it and how high the settings are. Replacing the battery means replacing the entire pace maker-sized pulse generator. Rechargeable generators typically are recharged every 1-2 weeks (depending on usage and energy requirements) in a simple procedure by placing a recharging device directly over the implanted battery and recharging through the skin. (Today’s rechargeable generators typically last 7-9 years.)

The leads come in two types: those that can be placed through a needle (**percutaneous** leads) and those that are placed surgically (paddle leads). Paddle leads are more stable in terms of position and also more energy efficient, but are also associated with the need for a larger surgical procedure to insert them with all the other associated risks and concerns. Both approaches have their merits and the patient should discuss these with their physician to determine the optimal choice for their individual circumstance.

With SCS the patient uses a controller, like the remote for your TV, which allows the patient to turn the device on and off, and to adjust a variety of stimulation characteristics and patterns. Another major advantage of SCS is that it can reduce the need for medications, avoiding many of the risks and related side effects that come with all that treatment. In fact, some patients who use these systems find they can even eliminate medications altogether.