



Neuromodulation: How Nerve Stimulation Works

PATIENT INFORMATION GUIDE

What Is Neuromodulation?

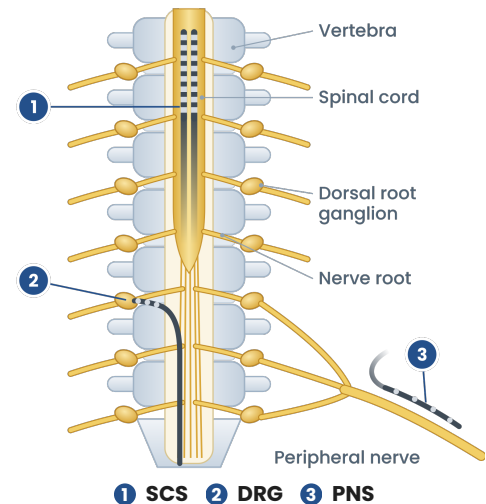
Neuromodulation uses a small implanted device to send mild electrical pulses to the nerves that carry pain. Instead of masking pain with medication, it changes the pain signal itself before your brain receives it. It is used for long-standing pain, especially nerve-related pain, that has not improved enough with other treatment. There are three main types: **spinal cord stimulation (SCS)**, **dorsal root ganglion stimulation (DRG)**, and **peripheral nerve stimulation (PNS)**.

How It Works

Pain starts as a signal in a nerve. That signal travels to the spinal cord, where nerve cells act like a relay station, deciding how much of it to pass up to the brain. Only when the signal reaches the brain do you feel pain.

A stimulator places thin wires called **leads** at a chosen point along that pathway. The pulses change how the nerve cells there process and relay pain, so a weaker signal reaches the brain. Depending on the device and settings, you may feel a gentle tingling over the painful area, or nothing at all.

Stimulation does not cut, burn, or damage nerves, and it does not fix the underlying cause of your pain. Because nothing is destroyed, the device can be adjusted, turned off, or removed.



The Parts of a System

- **Leads** — thin, flexible wires with electrical contacts at the tip.
- **Generator** — a small battery, like a pacemaker, under the skin of the buttock or flank.
- **Remote control** — turns stimulation up, down, or off. Some generators are rechargeable.
- **Programming** — settings can be changed at any time without another procedure.

SCS, DRG, and PNS: What Is the Difference?

All three use the same idea. The difference is *where* the leads are placed, which determines how wide an area they cover.

	SPINAL CORD (SCS)	DORSAL ROOT GANGLION (DRG)	PERIPHERAL NERVE (PNS)
Where the lead sits	In the space just behind the spinal cord, inside the spinal canal.	On a nerve cell cluster beside the spine, where one nerve root exits.	Next to one specific nerve outside the spine.
Area covered	Broad — the low back and both legs, or the neck and arms.	Focused — a specific area such as the foot, knee, or groin.	Focused — the area served by that one nerve.
Commonly used for	Pain after back or neck surgery, chronic back and leg pain, CRPS, diabetic nerve pain.	CRPS of the leg or foot; nerve pain limited to one area, such as the groin or knee.	Chronic shoulder, knee, or low back pain, nerve injury, and pain after an amputation.
How it is placed	Through a needle under X-ray. Trial first, then a permanent implant.	Through a needle under X-ray. Trial first, then a permanent implant.	Through a needle, often with ultrasound. Some are temporary (about 60 days).
What it feels like	A gentle tingling, or no sensation, depending on the settings.	Little tingling; less change with sitting, standing, or lying down.	A mild tingling or pulsing over the targeted area.

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Neuromodulation: Is It Right for Me?

PATIENT INFORMATION GUIDE

Who May Be a Candidate

You may be a good candidate if:

- Your pain has lasted 6 months or longer.
- Physical therapy, medications, and injections have not given lasting relief.
- Your pain is nerve-related, or persists after spine surgery.
- Surgery is not an option, or you want to avoid another operation.
- You are ready to stay active and take part in your own care.

It may not be right for you if:

- You have an active infection.
- You have a bleeding problem, or blood thinners cannot be safely paused.
- Depression, anxiety, or substance use is not yet under treatment.
- Your pain comes from a problem that needs surgical repair, such as nerve compression causing weakness.
- You would be unable to use the remote or charger.

Step by Step

STEP	WHAT HAPPENS
1. Evaluation	We review your history, exam, imaging, and past treatments to confirm the diagnosis and that neuromodulation fits your type of pain.
2. Psychological evaluation	Required by Medicare and most insurance plans. It does <i>not</i> mean anyone thinks your pain is "in your head." Pain affects sleep and mood, and addressing them improves results.
3. Trial (about 7 days)	Temporary leads are placed through a needle with no incision and connected to a small stimulator worn outside the body. You keep a daily pain and activity log, and the leads are removed in the office. Insurers require a trial before a permanent SCS or DRG implant.
4. Decision	A trial is considered successful when pain improves by at least half and you can do more. If it does not, the leads come out and nothing is left behind.
5. Permanent implant	An outpatient procedure with sedation. The leads are placed and connected to a generator under the skin. Most patients go home the same day.
6. Recovery	Limit bending, twisting, lifting, and reaching overhead for about 6 weeks while the leads settle into place. Settings are fine-tuned at follow-up visits.

The Honest Summary

Neuromodulation is not a cure. The goal is meaningful relief — typically at least half — with better function and sleep, and for some patients, less need for pain medication. Not everyone responds, and the benefit can lessen over time. That is exactly why you try it before you commit to it.

Risks

- Infection, which may require removing the device.
- Lead movement, which may need reprogramming or a second procedure.
- Bleeding, including rare bleeding near the spinal cord.
- Spinal fluid leak causing a headache (SCS and DRG).
- Soreness at the generator site; device or battery problems.
- Rarely, nerve or spinal cord injury.

Living With a Device

- **MRI:** most current systems allow MRI under specific conditions. Always tell the imaging center first.
- **Never have diathermy** (deep-heat therapy). It can cause serious injury.
- Carry your device ID card and tell every doctor, dentist, and airport screener.
- Rechargeable systems are charged on a regular schedule at home.

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