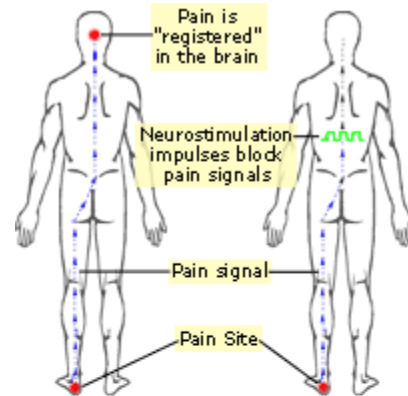


Neurostimulation

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.

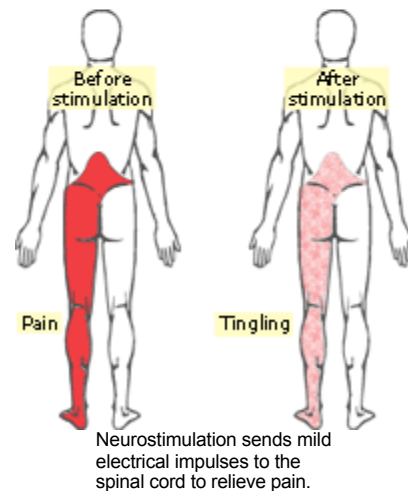
Some patients describe the feeling of neurostimulation as "tingling." You can also think of neurostimulation as the rubbing of your "funny bone" after you've bumped it. Rubbing masks the feeling of pain just as the tingling produced by the neurostimulation system masks the feeling of pain.



Patient Profile

People with certain kinds of chronic pain may be candidates for neurostimulation therapy. 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.



Types of Pain Treated

If you are experiencing chronic pain which has been unrelieved by corrective surgeries, or, you are experiencing uncomfortable side effects from medications for the treatment of chronic pain, whether or not the underlying cause has been treated with surgery, then you may be a candidate for Medtronic Pain Therapies for the following conditions.

Chronic Back and/or Leg Pain

This condition is described as pain that is felt in the back and/or leg that may result from spinal diseases including: arachnoiditis, degenerative disc disease, epidural fibrosis, failed back syndrome, lumbar disc herniation, osteoporosis, and spinal stenosis. Back pain is often located in the lower back, but it may extend to other areas, such as the thighs, calves, and feet. Affected areas may feel tender or sore to the touch, and the pain may increase with movement. This type of pain can be felt as sharp or knife-like pain, a burning sensation, or as a dull muscular ache. Symptoms can range from mildly uncomfortable to completely disabling.

Click on the following names to learn more about origins that may cause chronic back and/or leg pain.

- ? [Arachnoiditis](#)
- ? [Degenerative Disk Disease](#)
- ? [Epidural Fibrosis](#)
- ? [Failed Back Surgery Syndrome](#)
- ? [Lumbar Disk Herniation](#)
- ? [Osteoporosis Pain](#)
- ? [Spinal Stenosis](#)

Cancer Pain

Pain caused by cancer usually falls into one of two categories. *Nociceptive pain* is caused by damage to tissue. It is usually described as sharp, aching, or throbbing pain. It is often due to tumors or cancer cells that are growing larger and crowding body parts near the cancer site. It may also be from cancer that has spread to the bones, muscles or joints, or caused a blockage of an organ or blood vessels. *Neuropathic pain* happens when there is actual nerve damage. It may be caused by a tumor pressing on a nerve or a group of nerves. People often describe this pain as a burning or heavy sensation, or numbness.

Complex Regional Pain Syndromes (CRPS)

CRPS is the abbreviation used to describe the painful syndromes formerly known as Reflex Sympathetic Dystrophy (RSD) and Causalgia. CRPS usually develops in the foot or hand after an injury (such as a broken bone) or surgery that may involve nerve damage. The overriding symptom is extreme pain-frequently described as burning. Other symptoms can include sensitivity to touch, skin changes, swelling, weakness, and decreased function of the hand/foot.

Painful Neuropathy

Nerves connect the spinal cord to the body, and help the brain communicate with skin, muscles, and internal organs. Painful neuropathy is a common neurological disorder resulting from damage to nerves that generates severe chronic pain. It may be caused by nutritional imbalances, alcoholism, toxins, infections, or autoimmunity, or may be the result of illnesses such as kidney failure or cancer. In approximately one-third of cases, the cause of neuropathy is unknown.

Arachnoiditis

Arachnoiditis is inflammation of the delicate, web-like membranes that cover the spinal cord. It may result from infection, such as meningitis, or from trauma such as surgery, lumbar puncture, or myelography (a test to diagnose disorders of the spinal canal and cord). If the inflammation becomes chronic, it means that the nerve roots (peripheral nerves exiting the spinal cord) are damaged.

As a result, people will experience chronic debilitating pain in the low back and legs. Symptoms include weakness, numbness, tingling, stinging and burning in the legs. Conservative treatment focused on pain management is generally recommended. Surgery to remove adhesions is generally not recommended because scar tissue may continue to develop, and the spinal canal may be exposed to additional trauma. Neurostimulation may be considered after conservative pain management treatments have failed.

If you think you have this type of pain, talk to your doctor to learn whether you may be a candidate for neurostimulation. Your doctor (or a doctor to whom you are referred) will put you through a selection process to determine if these treatments may benefit you. Results vary, not every result is the same.

Degenerative Disk Disease

The intervertebral disc, the cushion between vertebral bodies, is prone to degenerative changes associated with the normal aging process and wear and tear. Degenerative disease can cause discs to flatten and lose their ability to absorb shock. Occasionally discs will degenerate prematurely in young, active adults.

Degenerative disc disease symptoms range from mild occasional backaches to chronic low back pain that is severe enough to limit daily activities. The pain is typically located in the back and may have associated thigh pain. The pain is typically aggravated when stress is placed on the low back by sitting, bending, lifting, or twisting. Mild to moderate symptoms are usually successfully managed with nonsurgical treatment. Surgery may be considered for severe symptoms that are unbearable, progressive, or restrict normal daily activities. Neurostimulation may be considered when conservative and surgical interventions fail, or as an alternative to surgery in select cases.

If you think you have this type of pain, talk to your doctor to learn whether you may be a candidate for neurostimulation. Your doctor (or a doctor to whom you are referred) will put you through a selection process to determine if these treatments may benefit you. Results vary, not every result is the same.

Epidural Fibrosis

Epidural fibrosis is a back pain condition caused by the formation of fibrous scar tissue within the spinal canal, on the tough membrane surrounding the spinal cord (dura mater). Scarring in the epidural space (the space inside the dura matter) around the lumbar peripheral nerve roots tethers them so that they do not move normally with

movements of the vertebral column and muscles of the spine. The tethered roots become stretched and irritated, causing pain in the low back and legs that can be debilitating.

Symptoms of epidural fibrosis include weakness, numbness, tingling, and stinging and burning in the legs. Mild to moderate symptoms usually are successfully managed with nonsurgical treatment such as oral medications, physical therapy, or epidural injections of medication near the affected nerves. Surgery may be considered for severe symptoms that are unbearable, progressive, or restrict normal daily activities. Neurostimulation may be considered after conservative pain management treatments have failed.

If you think you have this type of pain, talk to your doctor to learn whether you may be a candidate for neurostimulation. Your doctor (or a doctor to whom you are referred) will put you through a selection process to determine if these treatments may benefit you. Results vary, not every result is the same.

Failed Back Surgery Syndrome (FBS)

This pain syndrome describes chronic, severe back and leg pain that usually occurs after back surgery. Multiple factors can contribute to FBS, which can be extremely troubling and disabling:

- ? The original disease has reoccurred or was not treated completely.¹ Examples include recurrent disc herniation and ongoing pressure on a nerve.
- ? Complications may arise from back surgery or the natural healing process that follows back surgery.¹ A joint may become irritated because surgery altered the person's posture and way of moving. Scarring from surgery may cause nerves to become overactive and generate pain.
- ? Other condition(s) may mediate ongoing complaint of back pain.¹ Conditions such as depression, anxiety, sleeplessness, and/or deconditioning may be present and need to be treated when possible.

Symptoms may include diffuse, dull, and achy pain located primarily in the back and sharp, pricking, and stabbing pain that radiates from the back to the legs. Patients with Failed Back Surgery Syndrome should be evaluated and treated in an interdisciplinary setting where a group of healthcare professionals from varied fields work together toward a common goal for the patient. Treatments may range from non-surgical to surgical depending on the cause(s) of pain. neurostimulation may be considered after conservative treatments have failed and when further corrective surgery is not indicated.

If you think you have this type of pain, talk to your doctor to learn whether you may be a candidate for neurostimulation. Your doctor (or a doctor to whom you are referred) will put you through a selection process to determine if these treatments may benefit you. Results vary, not every result is the same.

Lumbar Disk Herniation

Disc herniation occurs when a lumbar disc becomes damaged and pushes into the spinal canal or nerve roots. Many factors increase the risk for disc herniation, which may develop either suddenly, or gradually over a few weeks or months. Some contributing factors include:

- ? lifestyle choices, such as poor diet and lack of regular exercise,
- ? natural aging that affects disc strength and resiliency,
- ? poor posture, and
- ? injury from daily wear and tear and incorrect lifting.

Symptoms include lower back pain and radicular pain (pain that radiates down one or both legs into the thigh, calf, and/or foot). The pain, which may be either intermittent or continuous, can be sharp, dull, burning, numb, or tingly. Symptoms can also include weakness in one or both legs. Rarely bladder and bowel control is lost. The pain may get worse by sneezing, coughing, or straining to pass stools. The pain may be aggravated by sitting, prolonged standing, or movements that twist the spine, and may be relieved by walking, lying down, or movements that relax the spine.

Most patients will improve with conservative treatment, including oral medications, epidural injections (injections of medication into the space near the affected nerves), and physical therapy. Surgery may be indicated when symptoms persist despite conservative treatment or when constant pain, leg weakness, or loss of bladder and bowel control occur. Neurostimulation may be considered when conservative and surgical interventions fail or as an alternative to surgery in select cases.

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Osteoporosis Pain

Osteoporosis is a disease in which bones become fragile and more likely to fracture (break). Risk factors for osteoporosis include older age, female gender, family history, small-bone structure, slender body weight, normal or early menopause, cigarette smoking, inadequate calcium in the diet, and certain medications to treat chronic diseases.

If left untreated, osteoporosis can progress painlessly until a bone fractures. These fractures typically occur in the hip, spine, and wrist. Spinal or vertebral compression fractures may have serious consequences, including severe back pain, deformity, and nerve damage.

The majority of mild to moderate compression fractures are treated with oral pain medications and immobilization using a brace. Percutaneous vertebroplasty and kyphoplasty are new surgical procedures that may be indicated in severe compression fractures. Surgical stabilization and fusion may be indicated in cases of neurologic compromise (damage to spinal cord and nerves). Medtronic Intrathecal Drug Delivery System may be considered when conservative and surgical interventions fail or as an alternative to surgery in select cases.

Spinal Stenosis

Spinal stenosis is a disease that usually affects the lower back, but can also be located in the neck or mid-spine. It results from the narrowing of the spinal canal, which holds the spinal cord and nerves that connect it to the body. The disease is usually the result of the aging process as the spine experiences wear and tear, which causes the bones and soft tissues to become impaired or diseased.

When the spinal canal becomes too narrow, it squeezes the nerves and soft tissues, causing with low back or buttock pain, numbness, or even loss of bodily functions. The pain may radiate from the back to the lower extremities, such as calves or feet This radiating pain is called radicular pain. At times walking and standing may worsen the pain. In mild to moderate cases of spinal stenosis, symptoms may be controlled using nonsurgical treatment such as oral medications, physical therapy, or epidural injections (injections of medication into the space near the affected nerves). Surgery may be considered for severe symptoms that are unbearable, progressive, or that restrict normal daily activities. Neurostimulation may be considered when conservative and surgical interventions fail or as an alternative to surgery in select cases.

If you think you have this type of pain, talk to your doctor to learn whether you may be a candidate for neurostimulation. Your doctor (or a doctor to whom you are referred) will put you through a selection process to determine if these treatments may benefit you. Results vary, not every result is the same.