**Spinal Cord Injury**

Spinal cord injuries involve damage to your spinal cord. This bundle of nerve fibers links your brain to nerves throughout your body. Damage to your cord can interrupt sensory signals and control over muscle movement. Scientific advances are opening new doors to improved outcomes after these injuries.

**Overview**

**What are spinal cord injuries?**

A spinal cord injury (SCI) happens when there’s damage to your [spinal cord](https://my.clevelandclinic.org/health/body/21946-spinal-cord), a thick bundle of nerve fibers that allows your [brain](https://my.clevelandclinic.org/health/body/22638-brain) to communicate with other [nerves](https://my.clevelandclinic.org/health/body/22584-nerves) almost everywhere else in your body. These injuries can range from minor and manageable to severe and permanent.

The spinal cord is one of the two components of your [central nervous system (CNS)](https://my.clevelandclinic.org/health/body/central-nervous-system-cns). Your nervous system is like a multilane expressway to and from your brain, the other component of the CNS. It has lanes for traffic leaving your brain and other lanes for traffic heading to your brain.

Your spinal cord connects to your spinal nerves, which are like on- and off-ramps that connect to peripheral nerves that branch out everywhere else in your body. Nerve signals are the cars that travel this expressway and use those on- and off-ramps.

Spinal cord injuries are like closures that affect the lanes in this expressway. But unlike a real-life expressway, the spinal cord has no detours. The traffic that uses the closed lanes can’t reach where it’s going. If the damage is severe enough, the closure might be permanent. That’s what causes [paralysis](https://my.clevelandclinic.org/health/diseases/15345-paralysis) and other severe SCI injury symptoms.

**Types of this condition**

There are two ways that experts organize the types of spinal cord injuries: By the way the injury affects your spinal cord and where in your spinal cord the injury happens. An SCI can interrupt nerve signal traffic going to and coming from anywhere below where it happens.

**By location**

* [**Cervical spine**](https://my.clevelandclinic.org/health/articles/22278-cervical-spine): This section is in your neck. It goes from the bottom of your skull to about the same level as your shoulders.
* [**Thoracic spine**](https://my.clevelandclinic.org/health/body/22460-thoracic-spine): This section stretches from your upper back to just below your navel (belly button).
* [**Lumbar spine**](https://my.clevelandclinic.org/health/articles/22396-lumbar-spine): This section is in your lower back. It extends about to the top of where your buttocks meet, but your spinal cord ends a couple of inches above that.
* **Sacral spine**: This section is in your back. It contains nerve roots below your butt to your tailbone.

**By severity**

* **Incomplete**: An incomplete SCI is like a closure that only affects some lanes. Others remain open, so some abilities below the injury remain intact.
* **Complete**: A complete SCI affects all the lanes. No traffic gets through. It usually means permanent loss of all abilities below the injury, including paralysis.

Your spinal cord has 31 segments (they line up with the 31 pairs of spinal nerves). Experts use letter-number combinations to designate them. The letter indicates the section of the spine, and the number indicates the segment. For example, C8 means the cervical spinal cord’s eighth (and lowermost) segment.

SCIs also commonly involve multiple phases. The first phase is the initial injury. But in the following hours and days, a secondary injury can also develop, causing swelling and further damage to your spinal cord.

**How common are spinal cord injuries?**

Spinal cord injuries are uncommon. Between 250,000 and 500,000 happen every year worldwide.

In the United States, there are about 18,000 new traumatic SCI cases each year. About 78% of people with a new SCI are [male](https://my.clevelandclinic.org/health/articles/sex-recorded-at-birth). The average age at the time of injury is 43.

**Symptoms and Causes**

**What are the symptoms of a spinal cord injury?**

The symptoms of an SCI depend on the affected signals. There are three types of signals that an SCI can affect: sensory, motor and autonomic.

**Sensory symptoms**

Sensory signals carry information to your brain. They tell your brain about the world around you and what’s happening to your body.

Your spinal cord mainly handles tactile (touch-based) signals. Examples include temperature, pressure, vibration, texture, etc. It also handles your self-positioning sense ([proprioception](https://my.clevelandclinic.org/health/articles/proprioception)). If you move your hand toward your face in a totally dark room but can stop your hand before it touches your nose, that’s an example of proprioception.

Examples of sensory symptoms include:

* Pain.
* [Numbness](https://my.clevelandclinic.org/health/symptoms/21015-numbness).
* [Tingling or “pins-and-needles” (paresthesia)](https://my.clevelandclinic.org/health/symptoms/24932-paresthesia).

**Motor symptoms**

Motor signals travel from your brain to your muscles. They’re how your brain moves parts of your body.

Motor symptoms can include:

* Weakness (reduced strength).
* Paralysis (lack of muscle control).
* [Spasticity](https://my.clevelandclinic.org/health/symptoms/14346-spasticity) (muscles that remain flexed uncontrollably).

**Autonomic symptoms**

[Autonomic](https://my.clevelandclinic.org/health/body/23273-autonomic-nervous-system) signals run processes you don’t have to think about (“autonomic” sounds like “automatic,” and autonomic signals handle automatic processes).

Autonomic symptoms can include:

* Heart rate disruptions, especially [slow heart rate (bradycardia)](https://my.clevelandclinic.org/health/diseases/17841-bradycardia).
* Blood pressure disruptions, especially [low blood pressure (hypotension)](https://my.clevelandclinic.org/health/diseases/21156-low-blood-pressure-hypotension).
* Body temperature disruptions, especially [low body temperature (hypothermia)](https://my.clevelandclinic.org/health/diseases/21164-hypothermia-low-body-temperature).
* [Urinary incontinence](https://my.clevelandclinic.org/health/diseases/17596-urinary-incontinence) or [fecal incontinence](https://my.clevelandclinic.org/health/diseases/14574-fecal-bowel-incontinence).
* Erectile dysfunction.

**What can cause a spinal cord injury?**

Spinal cord injuries can happen for many reasons. Possible causes include (but aren’t limited to):

* **Motor vehicle crashes**. These are the most common cause. They make up more than 37% of all SCIs.
* **Falls**. They make up about 31% of all SCIs.
* **Violence-related injuries**. This includes penetrating injuries from bullets or sharp objects like knives. They make up about 15% of all SCIs.
* **Sports-related injuries**. These account for about 8% of SCIs. Diving is the most common sports-related spinal cord injury.

Other common causes of or contributing factors to spinal cord injuries include:

* Conditions that make it easier for your bones to break, like [osteopenia](https://my.clevelandclinic.org/health/diseases/21855-osteopenia) and [osteoporosis](https://my.clevelandclinic.org/health/diseases/4443-osteoporosis).
* [Spine tumors](https://my.clevelandclinic.org/health/diseases/17500-spinal-tumors), including [cancers](https://my.clevelandclinic.org/health/diseases/12194-cancer).
* Cysts or fluid-filled cavities within your spinal cord ([syringomyelia](https://my.clevelandclinic.org/health/diseases/6126-syringomyelia)).
* Infections that attack your spinal cord, or cause swelling and inflammation in surrounding tissues that then press on your spinal cord.
* Lack of blood flow (ischemia) to your spinal cord.
* Congenital spinal conditions, such as [myelomeningocele](https://my.clevelandclinic.org/health/diseases/22813-myelomeningocele) or [spina bifida](https://my.clevelandclinic.org/health/diseases/8719-spina-bifida).
* Autoimmune or inflammatory conditions like [Guillain-Barré syndrome](https://my.clevelandclinic.org/health/diseases/15838-guillain-barre-syndrome), [multiple sclerosis](https://my.clevelandclinic.org/health/diseases/17248-multiple-sclerosis), [neuromyelitis optica](https://my.clevelandclinic.org/health/diseases/9858-neuromyelitis-optica-nmo) or [transverse myelitis](https://my.clevelandclinic.org/health/diseases/8980-transverse-myelitis).
* Genetic conditions like [hereditary spastic paraplegia](https://my.clevelandclinic.org/health/diseases/hereditary-spastic-paraplegia).
* Electrocution (if the electric current travels along or near your spinal cord).

**What are the complications of spinal cord injuries?**

SCIs can have severe complications, many of which are permanent. SCIs commonly cause a partial or total loss of abilities in body parts below the injury. That can cause certain forms of paralysis:

* [**Tetraplegia**](https://my.clevelandclinic.org/health/symptoms/23974-quadriplegia-tetraplegia) (sometimes known as “quadriplegia”): This is paralysis from the neck down. It involves an injury to the cervical segments of your spinal cord. The complications can vary [depending on the location of the injury](https://my.clevelandclinic.org/health/symptoms/23974-quadriplegia-tetraplegia#care-and-treatment:~:text=How%20does%20the%20location%20of%20a%20problem%20affect%20quadriplegia%3F).
* [**Paraplegia**](https://my.clevelandclinic.org/health/symptoms/23984-paraplegia): This is paralysis that affects your lower body only. It involves an injury to the thoracic, lumbar or sacral segments of your spinal cord. The complications of this can also vary depending on the location of the injury, but usually affect body functions and abilities from your chest down.

Other possible complications include:

* [Autonomic dysreflexia](https://my.clevelandclinic.org/health/diseases/24378-autonomic-dysreflexia-ad) (with injuries at or above T6, the sixth thoracic spinal nerve).
* [Spinal (neurogenic) shock](https://my.clevelandclinic.org/health/diseases/22175-neurogenic-shock).
* Nerve pain ([neuropathic pain](https://my.clevelandclinic.org/health/diseases/15833-neuropathic-pain)).
* [Pneumonia](https://my.clevelandclinic.org/health/diseases/4471-pneumonia).
* Urinary tract infections.
* Blood clots in your legs and lungs.
* Pressure sores.
* [Sepsis](https://my.clevelandclinic.org/health/diseases/12361-sepsis).
* [Death](https://my.clevelandclinic.org/health/articles/23144-what-happens-when-you-die) (especially when the injury is higher up in your spine).

Your healthcare provider is the best person to tell you more about the possible complications you might experience. They can also help you understand how to recognize and react to them.

**Diagnosis and Tests**

**How are spinal cord injuries diagnosed?**

A healthcare provider can usually diagnose a spinal cord injury using multiple methods, including:

* **A**[**physical exam**](https://my.clevelandclinic.org/health/diagnostics/17366-physical-examination). Your provider does this to look for clues or evidence of the injury’s extent.
* **A**[**neurological exam**](https://my.clevelandclinic.org/health/diagnostics/22664-neurological-exam). Your provider will do this to test specific abilities of your nervous system. This involves seeing if you can move your limbs by testing your strength and checking your sensation and reflexes.
* **Imaging scans**. Examples include [computed tomography (CT)](https://my.clevelandclinic.org/health/diagnostics/4808-ct-computed-tomography-scan) and [magnetic resonance imaging (MRI)](https://my.clevelandclinic.org/health/diagnostics/4876-magnetic-resonance-imaging-mri) scans. CT scans are faster and show your provider bone-related injuries or problems. MRI scans take longer but provide ultra-detailed images of bones, soft tissues, nerves, etc.
* **Diagnostic tests**. Examples of these include [electromyography](https://my.clevelandclinic.org/health/diagnostics/4825-emg-electromyography) and [nerve conduction tests](https://my.clevelandclinic.org/health/treatments/24821-nerve-conduction-study). They measure electrical signals reaching your muscles, which can help locate nerve or spinal cord damage interfering with signals.

**Management and Treatment**

**How are spinal cord injuries treated?**

The treatment for SCIs varies widely. The first distinction is whether or not it’s injury-related. A suspected trauma-related SCI is ALWAYS a medical emergency. SCIs due to certain other causes are also medical emergencies. Emergency causes include:

* **Infections**. These can rapidly become deadly when not treated.
* **Lack of blood flow (ischemia)**. Restoring blood flow is a critical, lifesaving priority.
* **Autoimmune conditions**. These can also cause severe complications without quick treatment when they develop suddenly (such as with Guillain-Barré syndrome).

**Trauma-related spinal cord injury**

You should always act cautiously and do everything possible to prevent further spinal cord damage or other injuries. People without proper training and qualifications shouldn’t move someone with a possible SCI. The only exception is when not moving the injured person would put them in imminent danger of death or further injury (like from a car crash where the vehicle is on fire).

Emergency medical personnel are usually the first to assess a trauma-related SCI. Their goal will be to immobilize the spine and limit or prevent spinal cord damage (they’ll also treat or start managing other critical issues).

In a hospital facility, treating a trauma-related SCI happens mainly in an intensive care unit (ICU) because of the severity of these injuries. Treating an SCI often involves directly addressing the injury itself. Many methods can help, including:

* **Surgery**: The main priority of surgery is to relieve pressure on your spinal cord. It can also repair damage related to surrounding injuries pressing on your spinal cord.
* **Medications**: Medications like steroids reduce swelling and inflammation around your spinal cord.
* **Traction**: This helps hold you in place to minimize movement around your SCI.
* **Splints, braces, halos or other support devices**: Similar to traction, these keep the area around your SCI stable. But unlike traction, you can wear these and move around with them on.

There are also many experimental treatments that researchers are exploring. These include some of the following:

* **Induced**[**hypothermia**](https://my.clevelandclinic.org/health/diseases/21164-hypothermia-low-body-temperature): Lowering your body temperature can slow damage to spinal cord tissue and lower inflammation and swelling. While not yet common practice, its use is growing.
* **Neuroprotective treatments**:These are medications or other treatment approaches that limit or prevent damage after an initial injury.
* **Neuroregenerative treatments**: These are medications or treatment approaches that help damaged spinal cord or nerve tissue regenerate and repair itself.

**SCI from non-traumatic causes**

The treatments for non-traumatic SCI can vary widely. They depend mostly on what’s causing them, but other factors can play a role, too. Your healthcare provider is the best person to tell you more about the possible treatments and which they recommend.

**Long-term support**

People with an SCI will likely need additional care in the weeks and months that follow their injury. Some types of care may need to continue for years or indefinitely. Some examples include:

* **Physical or occupational therapy**: These types of therapy help you build strength and learn how to manage and adapt to the effects of your injury.
* **Speech therapy**: People with injuries high in their spinal cord may benefit from speech therapy. It can help with swallowing and communication.
* **Mental healthcare**: SCI is traumatic in ways that go beyond the physical effects. The event that caused the injury may be a source of distress on its own. People with SCIs also have a higher risk of developing depression or dying by suicide after their injury.
* **In-home care and support**: People with more severe SCIs, especially higher in their spine, may need in-home support care and services. Home health services of various kinds can provide these kinds of care.

**Prevention**

**Can spinal cord injuries be prevented?**

SCIs are almost always accidental and happen unpredictably. But there are things you can do to reduce the risk of having one. They include:

* Use safety equipment and restraints whenever recommended.
* Drive cautiously and defensively.
* Prevent falls when possible.
* Use extreme caution anytime you’re around firearms.
* Never dive or jump into water where you can’t see the bottom.
* Avoid misusing prescription medications, recreational drugs and alcohol.

**Outlook / Prognosis**

**What can I expect if I have a spinal cord injury?**

What you can expect depends on the severity and location of your injury, the treatment(s) you receive after and much more. Your healthcare provider is the best person to tell you more about what you can expect. They can tailor the information they provide to your specific case and circumstances.

**How long do spinal cord injury symptoms last?**

With fast care to limit damage early on, it’s more likely that an SCI will have limited effects and you’ll make a greater recovery. But your spinal cord doesn’t regenerate like nerves elsewhere in your body. That’s why SCIs are often — but not always — permanent. Your healthcare provider is the best source of information about how long the symptoms should last.

**What’s the outlook for spinal cord injuries?**

The outlook for SCIs is generally guarded depending on the level and extent of injury, but there have been major improvements in care for people with an SCI. The reasons why the outlook is often guarded include:

* **Risk of complications**. People with an SCI have a very high risk of developing complications related to their injury. That includes pneumonia, [urinary tract infections](https://my.clevelandclinic.org/health/diseases/9135-urinary-tract-infections), constipation, blood clots, skin issues like [pressure injuries](https://my.clevelandclinic.org/health/diseases/17823-bedsores-pressure-injuries) and much more.
* **Mental health effects**. Having an SCI doesn’t just affect physical health. It also has major impacts on mental health. Having an SCI increases your chances of developing conditions like [depression](https://my.clevelandclinic.org/health/diseases/9290-depression). The risk of dying by [suicide](https://my.clevelandclinic.org/health/articles/11352-recognizing-suicidal-behavior) also increases.
* **Cost**. Many SCIs require long-term care or the use of assistive devices. These can be expensive. It can also be draining or time-consuming to seek out resources that might help you.

**Living With**

**When should I see my healthcare provider, or when should I seek care?**

Anytime an SCI is possible because of an injury, you need immediate medical attention. Delaying could negatively affect the outcome of your injury and treatment. And if you suspect a chronic condition might be damaging your spinal cord, you should see a healthcare provider as soon as possible.

If you have an SCI, your healthcare provider will recommend follow-up visits after your initial treatment. You should see your provider as recommended.

**When should I go to the emergency room?**

There are many complications of SCIs that need emergency medical care. The possible complications vary depending on the severity and location of your injury, along with other factors. Because of this, your healthcare provider is the best source of information about the specific symptoms or issues that mean you need emergency care.

**What questions should I ask my doctor?**

There are many questions you may want to ask your healthcare provider if you or a loved one has an SCI. Some examples include:

* Where is the injury?
* How severe is the injury?
* What abilities will this injury affect?
* Will the damage be permanent?
* Are there treatments that might repair the damage or prevent it from worsening?
* What are the possible complications from this injury?
* What symptoms should I watch for that might mean I need medical attention?
* What kind of support care and services might be necessary?
* Are there organizations or groups in my area that might be able to help?

**A note from Cleveland Clinic**

Spinal cord injuries (SCIs) are among the most severe and disruptive events you can experience, and their effects are often permanently life-changing. But despite that, advances in medical care and ongoing research offer hope for more effective treatments for these injuries. That means many people with these injuries can adapt to and manage the effects of the injury.

