UW Medicine
UNIVERSITY OF WASHINGTON MEDICAL CENTER

Peripheral Nerve Problems

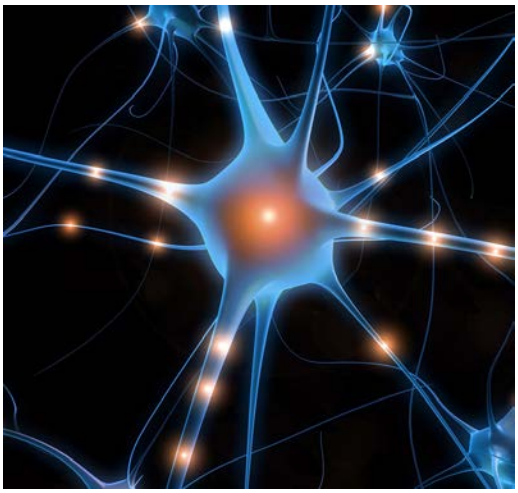
How they develop and ways to treat them

This handout explains how nerves work, what happens when they are injured, and how peripheral nerve problems are assessed and treated. Ask your doctor for more information about your type of injury.

How Nerves Work

Nerve cells (*neurons*) have long, slender branches called *nerve fibers*. These fibers help nerve cells receive sensory information from the skin, other organs, and muscles.

The nerve cells then send electrical signals out along other nerve fibers to the spinal cord, which carries this information to the brain. The brain responds by sending electrical signals down the spinal cord and out along nerves to the muscles, which makes them move.



A nerve cell has long slender branches called nerve fibers. These fibers help your body feel sensation and help your muscles move.

These nerve pathways are always sending and receiving information. Your ability to do everyday activities depends on how well this complex system is working.

Peripheral Nerve Injury

Peripheral nerves are nerves that are outside the brain and spinal cord. Information from your skin and other organs travels to the brain and back out to the muscles along the same peripheral nerve.

If your peripheral nerves are damaged from injury or disease:

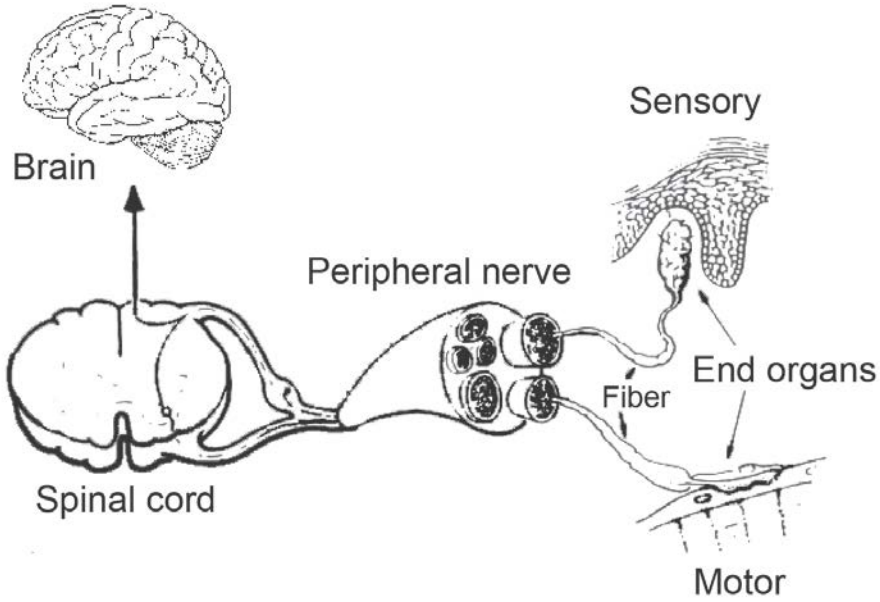
- Your ability to feel sensation may be limited.
- You also may have muscle weakness and pain.

Peripheral Nerve Clinic/Neurosurgery | Box 356165
1959 N.E. Pacific St., Seattle, WA 98195 | 206.598.5637

Your symptoms and your treatment for peripheral nerve damage depend on where the damaged nerve is and how it was injured. Your nerve may be able to recover on its own. But, if the damage is too severe, you may need surgery.

Most peripheral nerve injuries affect one of these areas:

- The neck and *upper extremity* (arm and hand)
- The buttocks and *lower extremity* (leg and foot)



A peripheral nerve and how it connects to the spinal cord and end organs (where the nerve ends)

Neck and Upper Extremity Injuries

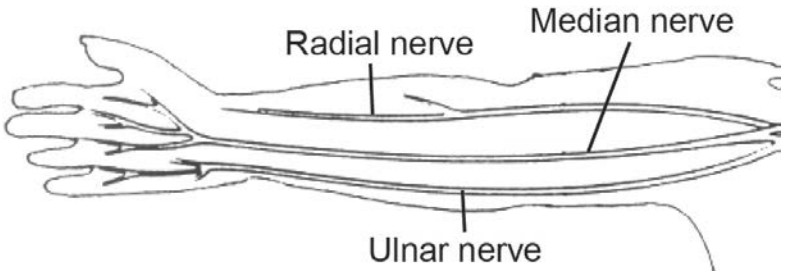
Brachial Plexus

The *brachial plexus* is a group of nerve fibers that begins in your neck, at the *lower cervical* and *upper thoracic* sections of your spinal cord. From there, the nerves travel into your chest, up through your neck, into your armpit, and out to your arm and hand.

The different nerves in the brachial plexus are:

- The **radial nerve**: This nerve helps you straighten your arm at the elbow, extend your hand at the wrist, and straighten your fingers.
- The **median nerve**: This nerve helps you bend your hand at the wrist and move your fingers.
- The **ulnar nerve**: This nerve works with the median nerve to move your fingers. The ulnar nerve also controls most of the small muscles in your hand that you use for doing small movements, such as typing.

Peripheral Nerve Clinic/Neurosurgery | Box 356165
1959 N.E. Pacific St., Seattle, WA 98195 | 206.598.5637



Arm showing brachial plexus with radial, median, and ulnar nerves

Lumbo-sacral Plexus

The *lumbo-sacral plexus* is made up of 2 groups of nerve fibers that begin in your lower back:

- The nerves in your *lumbar plexus* travel from your spinal cord into your abdomen, groin, thighs, knees, and calves.
- The nerves in your *sacral plexus* travel from your spinal cord into your pelvis, buttocks, genitals, thighs, calves, and feet.

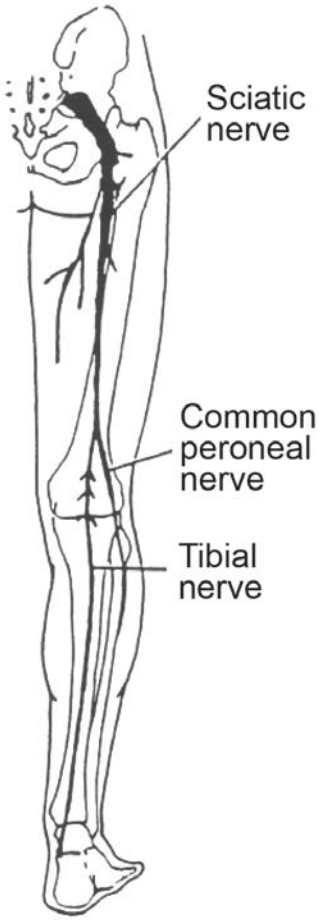
After leaving the lumbo-sacral plexus, the nerve fibers divide into several distinct nerves. The largest nerve in the leg is the *sciatic nerve*. It runs through your buttocks and down the back of your legs. The upper part of the sciatic nerve flexes your leg at the knee.

At about knee level, the sciatic nerve divides into 2 nerves:

- The *tibial nerve* pushes your foot down and turns it in.
- The *common peroneal nerve* lifts your foot up and turns it out.

Another nerve in the lumbo-sacral plexus is the *femoral nerve*. It crosses your groin area on its way into the front of your thigh. The femoral nerve helps extend your leg at the knee.

We will carefully test your muscle strength and how well your nerves are sending information. These tests will tell us where your nerve is injured and how badly it is damaged.



Leg showing lumbo-sacral plexus with sciatic, common peroneal, and tibial nerves

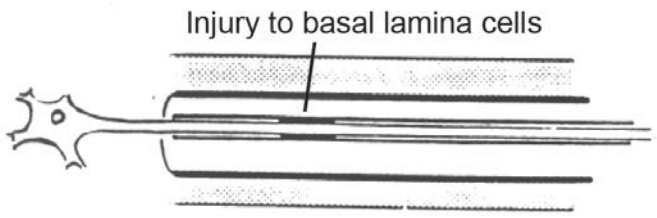
Peripheral Nerve Clinic/Neurosurgery | Box 356165
1959 N.E. Pacific St., Seattle, WA 98195 | 206.598.5637

Recovering from Your Injury

Recovery from peripheral nerve injury depends on how severe the injury is.

Mild Injury

A mild injury causes damage only to the *basal lamina* cells. These cells protect (*insulate*) the nerve fibers. If you have a mild injury, your full function will most likely return, taking several weeks at the most.

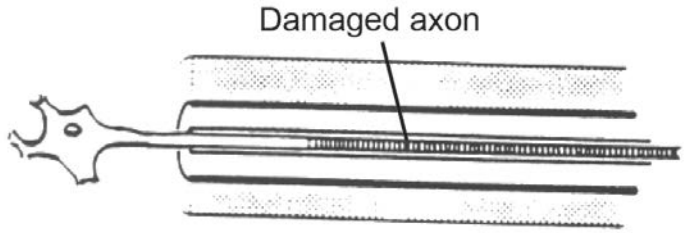


Moderate Injury

In a moderate injury, the nerve fiber (*axon*) is damaged and cannot send steady electrical signals. But, the structure around the nerve is not injured.

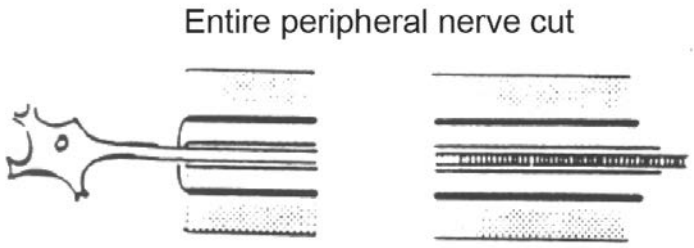
If you have a moderate injury, your nerve fibers will slowly grow back (*regenerate*) and be able to send electrical signals again. Nerve fibers regrow at about 1 inch a month. Full recovery depends on where the injury is and how long the nerve fibers are.

Recovery from a moderate nerve injury usually takes several months. Most times, the damaged nerve never regains full function.



Severe Injury

In a severe injury, the peripheral nerve is either cut all the way or is so damaged that it cannot grow back. The loss of function is often permanent.



Peripheral Nerve Clinic/Neurosurgery | Box 356165
1959 N.E. Pacific St., Seattle, WA 98195 | 206.598.5637

Assessing Your Injury

Assessing your nerve injury takes several steps:

- First, a *neurologist* (a doctor who studies nerves) will give you an *electromyogram* (EMG) and *nerve conduction studies*. These tests show where your nerve injury is and how severe it is.

  These tests can also show if your nerves are starting to recover on their own. You may have these tests done more than once to see how well your nerves are regrowing.

- A *neurosurgeon* (a surgeon who specializes in treating peripheral nerve injuries and diseases) will then examine you, review your test results, and decide if more tests need to be done.

  The tests may show that:

  - Your peripheral nerve is healing and you do not need surgery.
  - Your peripheral nerve problem requires surgery.
  - It is unclear if your nerve is healing, and you will need to be checked again later.

  After reviewing all your test results, your neurosurgeon will talk with you about a treatment plan.

Deciding About Surgery

Timing is important when deciding about having surgery. Damaged nerves need time to regrow, and most times your doctor will want to watch your progress to see if the nerve can recover on its own. But, if surgery is needed, it should be done fairly soon after the injury occurs for the surgery to have the best effect.

Another reason to have surgery soon after your injury occurs is that when nerves in an area of your body do not work for a long time, your muscles break down (*atrophy*) and your joints weaken (*degenerate*).

Your doctor will consider both the need to watch your progress and the need to do surgery as soon as possible. Electrical studies will help decide the best timing of your surgery. Your doctor will talk with you about your treatment and surgery options.

Treating Open Wounds

If your injury is a sharp, open wound and you lost all nerve function right away, your nerve can probably be repaired with surgery. In this kind of wound, the nerve is cleanly cut and there is little damage to the rest of the nerve or the area around it. The surgeon is then able to sew (*suture*) the nerve ends back together.

Peripheral Nerve Clinic/Neurosurgery | Box 356165
1959 N.E. Pacific St., Seattle, WA 98195 | 206.598.5637

Treating Closed Wounds

Most peripheral nerve injuries occur when an area is hit or stretched, but the skin is not broken. This means that it may not be clear how much damage has been done to the nerve and to the area around it. Your doctor will need to watch your progress over time before deciding about surgery.

If the amount of nerve injury is not known:

- Your doctor cannot predict how well the nerve will recover on its own.
- Over the next 3 to 4 months, your doctor will do a series of tests and *electrodiagnostic* studies to see if your damaged nerve is starting to regrow.
- If the tests do not show healing, your doctor will likely advise surgery.

If the nerve has been cut:

- Your doctor still may not be able to tell the full extent of the injury.
- For the next several weeks, your doctor will watch your injury to see if a scar starts to form.
- If a scar starts to form, your surgeon can remove the scar tissue and repair the damaged part of your nerve.
  - If there is only a small gap between the two cut ends of the nerve, your surgeon can suture the two ends together.
  - If the gap is large, your surgeon will need to use *nerve grafts*. A nerve graft acts as a bridge between the 2 nerve ends. It helps the nerve fibers reconnect as they grow back. The graft will probably be taken from a nerve in your lower leg called the *sural nerve*. The sural nerve is used because it is easy for your surgeon to get to.
- After you recover from surgery, your only side effect will be a mild loss of feeling along the outside of your lower leg.

Surgery Risks and Side Effects

All surgery involves some risks, but major problems from this surgery are rare. Your doctor will advise surgery if the expected benefits are greater than the risks.

Some risks of surgery include:

- Problems with the incision, such as poor healing or infection.
- Side effects of general anesthesia. Your anesthesiologist will talk with you about these side effects.
- Pain at the incision site. You will receive pain medicine for this.

Peripheral Nerve Clinic/Neurosurgery | Box 356165
1959 N.E. Pacific St., Seattle, WA 98195 | 206.598.5637

- Damage to tissues that are either involved in your injury or disease or are in the same area:
  - Surgery may damage healthy nerves, causing more changes in feeling, muscle weakness, or pain.
  - Surgery may damage major blood vessels, which are often in the same area as nerves. If this damage causes too much blood loss, you may need a blood transfusion. All blood used for transfusions is carefully tested, but there is still a small risk that it may carry a disease. Damage to a blood vessel may also cause swelling or loss of your arm, hand, leg, or foot.

Your neurosurgeon will talk with you about any other risks that are involved in the surgery you will have.

After Surgery

- You will stay in the hospital 1 to 5 days after surgery. The length of your stay depends on the type of surgery you had and how quickly you recover.
- Begin to move around as soon as you can after surgery. It is very important to move the part of your body where your surgery was done. Your activity will be limited only by your level of comfort, unless your doctor tells you otherwise. At most, you will not need to restrict your activities for more than a few days.
- Your doctor and nurses will closely monitor your level of activity and encourage you to move. Staying active after surgery will help:
  - Ease stiff joints
  - Reduce scar tissue that could restrict your nerve function
  - Keep your muscles healthy
- Your doctor may refer you to a physical therapist (PT). The PT will teach you exercises to help your body heal and strengthen. Seeing the PT is only a start. It will be up to you to do these exercises as often as prescribed. You will become your own physical therapist during your recovery.

Follow-up

Your neurosurgeon will follow your progress for many years after your surgery. This long follow-up is needed because it takes a long time for nerve fibers to regrow and reconnect.

If your surgeon used a nerve graft, it will also take a while for your body to adjust to how the new nerves work. Try to be patient and keep a positive attitude.

Peripheral Nerve Clinic/Neurosurgery | Box 356165
1959 N.E. Pacific St., Seattle, WA 98195 | 206.598.5637

Peripheral Nerve Clinic Staff

Staff at the Peripheral Nerve Clinic are here to help. Please feel free to call the clinic at 206.596.5637 with any questions you may have about your peripheral nerve problem, its treatment, and your care.

Map to University of Washington Medical Center

Questions?

Your questions are important. Call your doctor or health care provider if you have questions or concerns.

Peripheral Nerve Clinic: 206.598.5637

Published PFES: 06/2010, 11/2010, 11/2014
Clinician Review: 11/2014
Reprints on Health Online: https://healthonline.washington.edu

Peripheral Nerve Clinic/Neurosurgery | Box 356165
1959 N.E. Pacific St., Seattle, WA 98195 | 206.598.5637