

View this article online at: [patient.info/health/nerve-conduction-studies](https://patient.info/health/nerve-conduction-studies)

# Nerve Conduction Studies

---

Nerve conduction studies help to test how well and how fast nerves conduct electrical signals.

**Note:** the information below is a general guide only. The arrangements and the way tests are performed, may vary between different hospitals. Always follow the instructions given by your doctor or local hospital.

---

## What are nerve conduction studies?

Nerve conduction studies give doctors information about how well and how fast the nerves in your body send waves of electricity (electrical impulses). This test can be used to check for various different types of problems with the peripheral nervous system. The peripheral nervous system includes all the nerves in your body apart from those in your brain and within the spinal cord itself. Nerves in the brain and spinal cord make up the central nervous system.

## How do nerves work?

Nerves act a bit like electrical cables. They use waves of electricity (electrical impulses) to allow communication between the brain and all the other parts of the body. The brain can send signals, in the form of electrical impulses via the spinal cord to the peripheral nervous system. Peripheral nerves can be 'motor' nerves, which means they are attached to muscles and cause the muscles to clench (contract). They can be 'sensory' nerves, which means they are attached to special body sensors which detect things like heat, pressure, touch, etc. Or they can be mixed nerves, which means they have both a motor and a sensory part. Motor nerves use electrical signals to make muscles move. Sensory nerves send information about the environment back to the brain in the form of electrical impulses.

To work well, most nerves need to be surrounded by a special substance called myelin. Myelin provides a form of insulation for nerves, helping to keep the electrical impulses within the nerve fibre. If nerves are damaged the electrical signal often moves slower through the nerve fibre. The speed of the nerve impulse is one of the things that can be detected by nerve conduction studies.

## What are nerve conduction studies used for?

Nerve conduction studies are used for a wide variety of reasons including:

- To assess nerve damage following an injury.
- To check for damage to nerves, caused by **conditions such as diabetes**.
- To test for conditions affecting the nervous system.
- To check for 'trapped' nerves - **conditions such as carpal tunnel syndrome**.

## How do nerve conduction studies work?

Small electrical pulses made by a machine are used to mimic the electrical signals made by nerves. By attaching a small device that is able to detect electricity or supply electricity (an electrode) to the skin, the nerve can be stimulated with a very small electrical pulse. If the nerve is attached to a muscle, the muscle will clench (contract) in response to the electrical signal.

To test sensory nerves, the electrodes are usually attached to the fingers or toes with another electrode either at the ankle or wrist. When the electrical pulse is applied to the fingers or toes the sensory nerve carries the electrical signal away from the arm or leg. The electrode at the wrist or ankle detects the wave of electricity (electrical impulse) when it reaches that point.



Private image, via Wikimedia Commons

The electrodes are connected to a machine which generates the impulses and detects them. It can measure the time taken for the impulse to travel in the nerve from the first electrode to the second. This information, plus the distance between the two electrodes, can be used to work out the speed at which the impulse is travelling along the nerve. This is referred to as the conduction velocity. It is quite fast - usually, 50-60 metres per second.

Nerve conduction studies can also be used to measure whether the size of the waves of electricity (electrical impulses) decreases as it travels along the nerve.

## What happens during nerve conduction studies?

In this test, several electrodes are attached to your skin with tape or a special paste. The electrodes can be stick-on or made of small felt pads soaked in salt water solution. Felt electrodes are usually mounted in a plastic holder and kept in place with a strip of Velcro®.

A pulse-emitting electrode is placed directly over the nerve to be tested. If the nerve controls a muscle, a recording electrode is placed over the muscles under control of that nerve. Several quick electrical pulses are given to the nerve. The electrical pulses are very brief and feel like a sharp tapping sensation on the skin. Many people find this unpleasant but fortunately it does not last very long. The time it takes for the muscle to contract in response to the electrical pulse is recorded. The speed of the response is called the conduction velocity.

If the nerve being tested is a sensory nerve, the recording electrode is placed in a position that will record the impulses going back toward the brain. The same nerves on the other side of the body may be studied for comparison.

Nerve conduction tests may take from 15 minutes to 1 hour or more, depending on how many nerves and muscles are studied.

## What should I do to prepare for a nerve conduction study?

Usually very little. Your local hospital should give you specific information about any preparation necessary. If you take certain types of medication, such as muscle relaxants or other medicines called 'anticholinergics', your doctor may ask you to stop taking them a few days before the test. You should let the person testing you know if you have a pacemaker or defibrillator for your heart.

It is also helpful if your hands and feet are as warm as possible. If they are cold this may slow down the waves of electricity (electrical impulses). You may be asked to avoid hand lotions or creams. Loose-fitting clothing that can be rolled up to above the elbows and knees is very helpful. Bracelets, rings and watches will usually be removed for tests on the hands, and socks or tights removed for investigation on the feet.

## Are there any possible side-effects or complications?

While it may sound alarming to have a wave of electricity (electrical impulse) applied to your skin, the amount of electricity that passes through you is very small. Most people tolerate the test very well and have no side-effects or complications after the test.

## Further reading & references

- Bourke HE, Read J, Kampa R, et al; Clinic-based nerve conduction studies reduce time to surgery and are cost effective: a comparison with formal electrophysiological testing. *Ann R Coll Surg Engl.* 2011 Apr;93(3):236-40. doi: 10.1308/147870811X566385.
- Dyck PJ, Overland CJ, Low PA, et al; Signs and symptoms versus nerve conduction studies to diagnose diabetic sensorimotor polyneuropathy: CI vs. NPhys trial. *Muscle Nerve.* 2010 Aug;42(2):157-64. doi: 10.1002/mus.21661.

**Disclaimer:** This article is for information only and should not be used for the diagnosis or treatment of medical conditions. EMIS has used all reasonable care in compiling the information but make no warranty as to its accuracy. Consult a doctor or other health care professional for diagnosis and treatment of medical conditions. For details see our [conditions](#).

Original Author: Dr Rachel Hoad-Robson	Current Version: Dr Laurence Knott	Peer Reviewer: Dr Adrian Bonsall
Document ID: 12718 (v3)	Last Checked: 24/11/2015	Next Review: 23/11/2018

View this article online at: [patient.info/health/nerve-conduction-studies](http://patient.info/health/nerve-conduction-studies)

Discuss Nerve Conduction Studies and find more trusted resources at [Patient](#).

## Ask your doctor about Patient Access

- 🔍 Book appointments
- 🔍 Order repeat prescriptions
- 🔍 View your medical record
- 🔍 Create a personal health record (iOS only)



Simple, quick and convenient.  
Visit [patient.info/patient-access](http://patient.info/patient-access)  
or search 'Patient Access'