PROCEDURE

Nerve biopsy

A nerve biopsy removes a small piece of nerve for laboratory examination.

PURPOSE
Identify certain diseases affecting peripheral nerves

PROCEDURE TYPE
Diagnostic surgical removal of a small sensory nerve segment

WHERE IT IS DONE
Outpatient clinic or operating theatre

ANAESTHESIA
Local anaesthesia, sometimes with sedation or general anaesthesia

HOW LONG IT TAKES
Usually 30 to 60 minutes

PREPARATION
Medication review; fasting only if sedation or general anaesthesia

RECOVERY
Same day; no driving after sedation or general anaesthesia

MAIN RISKS
Permanent numbness, nerve pain, bleeding, infection

RESULTS
Pathology usually takes one to several weeks

Overview

A nerve biopsy is an operation to remove a small section of a peripheral nerve. Peripheral nerves carry messages between your brain, spinal cord, skin, and muscles.

The sample is examined under a microscope for inflammation, abnormal proteins, blood vessel damage, infection, or other changes. Special stains and other laboratory techniques may be needed.

The sural nerve, which runs near the outside of the ankle, is often selected because it mainly provides sensation rather than muscle control. Another sensory nerve may be chosen if tests show that it is more likely to contain useful evidence.

Removing part of a sensory nerve usually leaves a permanent patch of reduced or absent feeling. For this reason, nerve biopsy is not a routine test for most people with numbness,

tingling, or other signs of peripheral nerve damage.

Why the procedure is performed

A nerve biopsy may be considered when other tests have not provided an answer and the result could change your treatment. It can be especially useful when a clinician suspects a condition that produces recognizable changes within a nerve.

Reasons may include investigating:

Before recommending a biopsy, your healthcare team will usually consider your symptoms, examination, blood tests, nerve conduction studies, and electromyography. Nerve conduction studies measure how well electrical signals travel through nerves. Electromyography examines the electrical activity of muscles.

A biopsy cannot identify every nerve disorder. Some diseases affect nerves unevenly, so a sample may look normal even when disease is present elsewhere.

- Inflammation of the nerve's blood vessels, called vasculitic neuropathy
- Amyloidosis, in which abnormal proteins collect in tissues
- Sarcoidosis or another inflammatory disease involving nerves
- Certain infections that can directly affect nerves
- An unusual, rapidly progressing, painful, or uneven pattern of nerve damage

Who should and should not have it

You may be offered a nerve biopsy if there is a specific suspected diagnosis, the chosen nerve is affected, and examining it is likely to guide treatment. Your team should explain what they are looking for and how each possible result would affect your care.

A nerve biopsy is usually not the right first test for common, slowly developing, symmetrical nerve problems. Blood tests, genetic testing, nerve conduction studies, or skin biopsy may provide the needed information with less risk.

The procedure may be avoided when:

It may need to be delayed if you have an infection or broken skin at the biopsy site. Bleeding problems, medicines that affect clotting, poor circulation, or conditions that impair wound healing require individual planning. These issues do not always prevent biopsy, but they can change when or how it is done.

- A diagnosis has already been made by a less invasive test
- The result is unlikely to change treatment
- The proposed nerve controls important muscles
- The expected information does not justify permanent sensory loss

How to prepare

Your treating facility's own instructions take priority because preparation differs according to the biopsy site and type of anaesthesia.

Give the team an up-to-date list of your medicines, supplements, allergies, and medical conditions. Tell them if you take an anticoagulant or antiplatelet medicine, sometimes called a blood thinner like warfarin or apixaban . Do not stop one unless the clinician responsible for the procedure gives you a clear plan.

You may eat and drink normally before a biopsy performed with local anaesthesia. If you will receive sedation or general anaesthesia, you will usually be told when to stop eating and drinking.

Ask whether you need someone to take you home. Arrange transport if you will receive sedation or general anaesthesia. Loose clothing that does not press on the dressing may be more comfortable.

What happens during the procedure

The healthcare team confirms the nerve and marks the biopsy site. For a sural nerve biopsy, this is usually near the outside of the ankle or lower leg.

With local anaesthesia, medicine is injected to numb the area. The injection can briefly sting. You remain awake, although sedation may be offered in some settings. General anaesthesia is occasionally used.

Once the area is numb, the surgeon makes an incision and identifies the nerve. A short section is removed and sent to a specialist pathology laboratory. You may notice pressure or pulling, but you should tell the team if you feel sharp pain.

Sometimes a small muscle sample is taken through the same or a nearby incision. This may improve the chance of finding disease affecting small blood vessels.

The incision is closed with stitches, adhesive strips, or surgical glue, then covered with a

dressing. The removed nerve segment does not grow back across the full gap in a predictable way.

Recovery and what to expect afterward

Mild to moderate soreness around the incision is expected. Use only the pain medicine recommended by your treating team. Pain should gradually improve rather than become more intense.

You can usually eat and drink normally after local anaesthesia. After sedation or general anaesthesia, begin according to the recovery team's instructions, especially if you feel nauseated.

Keep the dressing clean and dry as directed. If the biopsy was near your ankle, you may be asked to elevate the leg and limit prolonged standing, exercise, or heavy lifting for several days. Walking may be uncomfortable at first, but many people can walk carefully on the day of the procedure.

Do not drive after sedation or general anaesthesia for the period specified by your facility. Even after local anaesthesia, avoid driving if pain, a bulky dressing, or reduced movement would prevent you from controlling the vehicle safely.

Time away from work depends on the biopsy site and your job. Desk work may be possible within a few days. Work involving prolonged standing, climbing, or heavy physical activity may require more time.

A patch of numbness beyond the incision is expected and is often permanent. Tingling or altered sensitivity may occur around its edges. Stitches that do not dissolve are usually removed at a planned follow-up visit.

Risks and possible complications

Your surgeon should discuss the expected loss of sensation and the possibility of complications before you consent.

Important risks include:

Weakness is less likely when a purely sensory nerve is sampled. However, nerve anatomy differs between people, and an unexpected connection to motor fibres can occasionally affect movement.

A biopsy may also be nondiagnostic. This means that the sample does not provide a clear

answer, particularly when disease affects only scattered areas.

- Permanent numbness in the area supplied by the sampled nerve
- Persistent burning, shooting pain, or unpleasant sensitivity
- A painful nerve-end swelling called a neuroma
- Bleeding, bruising, or a collection of blood under the skin
- Wound infection, delayed healing, or wound separation
- A noticeable or tender scar

Results and follow up

A pathologist examines the nerve's fibres, protective covering, supporting tissue, and small blood vessels. Testing may include special stains, protein studies, or electron microscopy, which uses a powerful microscope to show very small structures.

Results commonly take one to several weeks. Complex testing or review at a specialist centre may take longer.

At routine follow-up, your healthcare team should explain whether the sample showed a specific disease, nonspecific damage, or no clear abnormality. They should also discuss how reliable the result is when combined with your other tests.

A negative biopsy does not always exclude a patchy condition such as vasculitis. Your care plan should be based on the full clinical picture, not the biopsy alone.

Alternatives

The best alternative depends on what your team is trying to find. Ask what information each option can and cannot provide.

Blood and urine tests can identify diabetes, vitamin problems, immune conditions, abnormal proteins, and some infections. They are less invasive but cannot show the nerve's microscopic structure.

Nerve conduction studies and electromyography show which nerves are affected and the pattern of damage. They do not usually reveal the exact tissue process causing it.

Genetic testing can diagnose many inherited neuropathies without removing nerve tissue. It may not find a cause if the responsible genetic change is unknown or not included in the test.

A skin biopsy can measure small sensory nerve fibres with a much smaller wound. It is useful

for some small-fibre neuropathies but cannot fully assess deeper nerves or their blood vessels.

For suspected amyloidosis, fat, bone marrow, salivary gland, or another affected organ may sometimes be sampled instead. These sites can be less likely to cause permanent numbness, but they may miss disease that is present in a nerve.

Muscle biopsy may help when blood vessel inflammation or muscle disease is suspected. It provides different information and may be performed with a nerve biopsy.

Observation or treatment without biopsy is sometimes considered. This avoids surgery but can leave uncertainty, and treatment may have important side effects if the suspected diagnosis is wrong.

When to call your healthcare team

For routine questions, contact the team during normal hours if you are unsure about dressing care, activity, stitch removal, or when your results will be available.

Contact the treating team promptly if you develop increasing redness, warmth, swelling, drainage, worsening pain, fever, wound opening, or numbness spreading far beyond the expected area. Also report new weakness or bleeding that returns after initially stopping.

Seek emergency care for bleeding that does not stop with firm pressure, a foot or hand that becomes cold, pale, or blue, or rapidly increasing swelling with severe pain. Chest pain, severe breathing difficulty, or collapse also require emergency help.

Common questions

Will I be asleep?

Usually not. Many nerve biopsies are performed with local anaesthesia while you are awake. Sedation or general anaesthesia may be used based on the biopsy site, facility, and your medical needs.

Can I drive home?

Not after sedation or general anaesthesia. Arrange for someone to take you home. After local anaesthesia, driving may still be unsafe if pain or the dressing limits movement.

How painful is a nerve biopsy?

The numbing injection may sting, and you may feel pressure during the procedure. Soreness afterward is common. Persistent burning or electric-shock-like nerve pain is possible but is not an expected part of routine healing.

Will the numbness go away?

A numb patch is expected because a section of sensory nerve has been removed. Some nearby sensation may change over time, but complete recovery should not be assumed.

Can I walk afterward?

After an ankle-area biopsy, most people can walk carefully the same day. You may need to limit distance, elevate the leg, and avoid strenuous activity while the wound heals.

When will I know the result?

Initial pathology usually takes at least several days, and complete results often take one to several weeks. Your team may wait for all special tests before explaining the findings.

Sources

- Joint Task Force of the EFNS and PNS. "European Federation of Neurological Societies/Peripheral Nerve Society Guideline on the use of nerve biopsy in the diagnosis of peripheral neuropathy." Journal of the Peripheral Nervous System . 2010;15:164-175.
- England JD, Gronseth GS, Franklin G, et al. "Practice Parameter: Evaluation of distal symmetric polyneuropathy-role of autonomic testing, nerve biopsy, and skin biopsy." Neurology . 2009;72(2):177-184.
- "Nerve biopsy: Current indications and decision tools." Muscle & Nerve . 2021;64(2):125-139.
- Hilton DA, Jacob J, Househam L, Tengah C. "Complications following sural and peroneal nerve biopsies." Journal of Neurology, Neurosurgery & Psychiatry . 2007;78(11):1271-1272.