

How Nerves Work and Heal

Nerves are the body's wiring. They carry tiny electrical signals between your brain and the rest of you, telling muscles to move and carrying back what you feel: touch, temperature, position and pain. When a nerve is irritated, squashed or cut, those signals get disrupted, and you notice it as pins and needles, numbness, weakness or pain. The good news is that nerves can recover. They heal slowly and in a fairly predictable way, and understanding that pattern makes the wait far less worrying. This page explains, in plain language, what nerves do and how they mend; and for the curious, the final section goes a step deeper into the biology.

What a nerve is and what it does

Think of a nerve as a bundle of insulated cables. Each “cable” is a single nerve fibre, and a whole nerve (like the median nerve at your wrist) contains thousands of them packed together, wrapped in protective sheaths a bit like the layers of a cable bundle.

The signals travel in two directions, so nerves do three main jobs:

- **Motor:** signals travel *out* from your brain and spinal cord to your muscles, telling them when and how hard to contract. This is how you grip, pinch and move.
- **Sensory:** signals travel *back in* from your skin, joints and tendons, carrying touch, vibration, temperature, pain and your sense of where your limb is in space.
- **Autonomic:** automatic background signals you never think about, controlling things like sweating and the width of small blood vessels (which is why an injured patch of skin can feel dry or change temperature).

Each fibre has a living core (the **axon**) that carries the signal, and many fibres are wrapped in a fatty **insulation** layer called myelin. Just like the plastic coating on an electrical wire, this insulation stops the signal leaking away and lets it travel much faster.

What happens when a nerve is injured

Nerves get into trouble in two broad ways, and the symptoms tell you which.

A squashed or compressed nerve. When a nerve is pressed on (for example the median nerve in carpal tunnel syndrome, or the funny-bone nerve at the elbow) the insulation and blood supply to that segment suffer first.

The signals slow down or get blocked as they pass the squeezed spot. You feel this as pins and needles, numbness and clumsiness, often worse at night or in certain positions, and the muscles supplied by that nerve may weaken over time. Because the cable itself usually stays intact, relieving the pressure often allows a good recovery.

A cut or torn nerve. A laceration, a deep cut, or a severe stretch can divide the fibres themselves. Now the connection is physically broken: the part of the nerve beyond the injury is cut off from the brain and spinal cord, so you lose feeling and movement in everything that nerve supplied. A cleanly divided nerve usually needs to be surgically repaired, stitched together so the fibres have a path to grow back along.

The reason symptoms appear at all is simple: a signal that cannot get through is a signal that does not arrive. Block the motor fibres and the muscle weakens; block the sensory fibres and the skin goes numb or tingles; irritate the fibres and you get pain.

How nerves heal

Nerve healing is genuinely slow, and it helps to know that in advance so the pace doesn't feel like failure.

When fibres have been damaged, they regrow from the point of injury **outwards towards the skin and muscle, at roughly one millimetre a day, about an inch a month.** That rule of thumb explains a lot:

- **The further the target, the longer the wait.** A nerve injured high up (say near the elbow) has to regrow a long way down to reach the fingertips, which can take many months. A small cut near the fingertip recovers far sooner.
- **Sensation usually returns before fine strength.** As fibres reach the skin you may first notice a vague awareness, then tingling (often a buzzing or electric feeling when the area is tapped, a *good* sign that fibres are advancing), then crude touch, and finally finer discrimination. Power and fine coordination tend to come last.
- **Early, clean repair matters.** A divided nerve does best when it is repaired promptly and accurately, because the body's support cells that guide regrowth work best in the months right after injury and lose some of their effect over time.

What helps recovery: keeping the joints supple and the muscles healthy with the hand-therapy exercises you're given, protecting numb skin from burns and cuts (it won't warn you of harm), not smoking, and being patient. Re-training your brain to interpret the returning signals, through guided sensory exercises, is also part of getting a good result. If a nerve that should be improving on a timeline isn't, that's worth reviewing, as some injuries need surgery to give recovery the best chance.

See also

- [Nerve tests and conduction studies](#) – how we measure whether a nerve is conducting normally
- [Carpal tunnel and nerve compression](#) – a common compressed-nerve problem at the wrist

- Tendon and nerve repair – what surgical repair of a divided nerve or tendon involves