HEALTH BASICS

Brain & nervous system

The brain and nervous system form the body's communication and control network.

WHAT IT IS
The brain, spinal cord, nerves, and their communication network

WHERE IT COMES UP
Neurological examinations, scans, test results, and related diagnoses

WHY IT MATTERS
Controls movement, sensation, thinking, and automatic body functions

WHAT IT IS NOT
Not a disease or a single diagnosis

WHO TO ASK
Primary care clinician, neurologist, or emergency service

HOW IT IS CHECKED
Neurological examination, with targeted scans or electrical tests

Overview

The brain and nervous system are the body's main communication and control network. Together, they receive information, process it, and send instructions around the body.

The central nervous system consists of the brain and spinal cord. The peripheral nervous system includes the nerves that branch from the brain and spinal cord into the face, limbs, organs, and other tissues.

This network supports conscious activities such as speaking and walking. It also manages many automatic functions, including breathing, heart rate, digestion, temperature control, and blood pressure.

"Brain and nervous system" is not a disease or diagnosis. It is a broad name for connected parts of the body. Many different conditions can affect those parts, so a neurological concern cannot usually be understood from one symptom or test alone.

How it works

The brain receives information from inside and outside your body. It compares that information

with memories and current needs, then coordinates a response.

Different brain areas have specialised roles, although they work together. The cerebral cortex supports abilities such as language, attention, memory, sensation, and voluntary movement. Deeper structures help manage emotions, movement, sleep, hormones, and basic survival functions. The cerebellum helps coordinate balance and accurate movement. The brainstem connects the brain to the spinal cord and helps control breathing, alertness, and other automatic functions.

The spinal cord carries signals between the brain and much of the body. It also manages some reflexes. A reflex is a rapid, automatic response, such as pulling your hand away from something hot.

The system communicates through specialised cells called neurons . Electrical signals travel along a neuron. Chemicals called neurotransmitters carry messages across the tiny gap, or synapse, between cells.

Other cells, called glial cells , support and protect neurons. They help supply nutrients, manage the chemical environment, clear waste, and produce insulation called myelin. Myelin allows many nerve signals to travel more quickly.

The peripheral nervous system has several functional parts:

The brain and spinal cord are protected by bone, membranes called meninges, and cerebrospinal fluid. Cerebrospinal fluid is the clear liquid surrounding the brain and spinal cord. A filtering system called the blood-brain barrier also limits which substances can pass from the blood into brain tissue.

- The sensory system carries information such as touch, pain, temperature, sound, and body position
- The motor system sends instructions to skeletal muscles
- The autonomic system helps regulate organs, glands, heart rate, digestion, and blood pressure

Why it matters for your health

Almost every part of daily life relies on the nervous system. It allows you to recognise people, understand speech, feel where your limbs are, plan movements, form memories, and respond to danger.

Its wide role also explains why neurological problems can look very different. A change may affect strength, sensation, vision, balance, speech, memory, behaviour, bladder control, or an

automatic body function. The pattern often matters more than any single change.

For example, a clinician may consider which side of the body is affected, whether the change began suddenly, and whether it comes and goes. This information can help identify whether a problem may involve the brain, spinal cord, a nerve, a muscle, or another body system.

A neurological examination checks functions such as alertness, speech, eye movement, strength, reflexes, sensation, coordination, and walking. It does not test every possible condition, but it helps guide decisions about further testing.

What can go wrong

Many different diseases, injuries, and temporary situations can affect the brain or nerves. These include:

Other health problems can disturb nervous system function without starting there. Examples include low blood sugar, severe electrolyte imbalance, medication effects, alcohol or drug exposure, vitamin deficiency, and reduced oxygen supply.

Some patterns need emergency assessment. Call emergency services for a sudden facial droop, arm weakness, speech difficulty, new severe confusion, loss of consciousness, or a sudden inability to walk. A first seizure, a seizure lasting longer than expected, or repeated seizures without recovery also needs urgent help.

Seek emergency care after a head or neck injury if there is worsening drowsiness, repeated vomiting, weakness, seizure activity, severe confusion, or fluid or blood coming from the ears or nose. Fever with a severe headache, stiff neck, marked drowsiness, or a rash that does not fade under pressure also requires urgent assessment.

Changes that develop gradually or keep returning are usually suitable for routine medical review, unless they become severe or sudden. Examples include persistent tingling, tremor, recurring headaches, worsening balance, or gradual memory concerns.

- Stroke , caused by interrupted blood flow or bleeding in the brain
- Seizures , caused by bursts of abnormal electrical activity in the brain
- Meningitis or encephalitis , involving inflammation or infection around or within the brain
- Traumatic brain or spinal cord injury
- Multiple sclerosis , which damages myelin in the central nervous system
- Peripheral neuropathy , meaning damage to nerves outside the brain and spinal cord
- Neurodegenerative diseases , which involve progressive damage to nerve cells

- Brain, spinal cord, or nerve tumours
- Nerve compression , such as carpal tunnel syndrome or pressure on a spinal nerve

What you can do

If you are learning about normal anatomy and have no health concern, there is nothing you need to test or monitor. There is no single screening test for the whole nervous system.

If you notice a new or recurring change, record details that could help a clinician understand the pattern:

Bring an up-to-date list of medicines, supplements, allergies, and major medical conditions. If an episode affected awareness or memory, an account from someone who witnessed it may be useful.

Tests are selected according to the history and examination. They may include blood tests, CT or MRI scans, an electroencephalogram to record brain electrical activity, or nerve conduction studies and electromyography to assess nerves and muscles. A lumbar puncture collects cerebrospinal fluid from the lower back when that information is needed.

Useful questions include what part of the nervous system may be involved, what the proposed test can show, whether any medicines could contribute, and what changes should prompt urgent help.

- When it began and whether the onset was sudden or gradual
- Which body areas were affected
- How long it lasted and whether it fully resolved
- What you were doing at the time
- Any injury, fever, new medication, substance exposure, or missed meal
- Photos or videos of visible changes, when safe and appropriate

Common questions

Are the brain and mind the same thing?

The brain is a physical organ. "Mind" describes experiences such as thought, awareness, memory, and emotion. These experiences rely on brain activity, but the terms are not interchangeable.

Are all nerves connected directly to the brain?

No. Many nerves connect to the spinal cord. Twelve pairs of cranial nerves connect directly to the brain and brainstem, serving functions such as sight, hearing, facial movement, and swallowing.

Can nerves repair themselves?

Some peripheral nerves can regrow after certain injuries, although recovery may be incomplete. Nerve cells and pathways in the brain and spinal cord have much more limited repair ability. The outcome relates to the location, cause, and extent of damage.

Does an abnormal scan always explain a problem?

No. Scans sometimes show changes unrelated to the reason they were performed. They can also appear normal in conditions that affect electrical activity, small nerves, or function rather than visible structure. Results need to be interpreted with your history and examination.

Which specialist deals with the nervous system?

A neurologist assesses and manages many disorders of the brain, spinal cord, and nerves. Neurosurgeons perform operations involving these structures. Depending on the concern, care may also involve rehabilitation clinicians, psychiatrists, pain specialists, physiotherapists, or other services.

Sources

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- National Institute of Neurological Disorders and Stroke - Neurological Diagnostic Tests and Procedures
- National Cancer Institute - Definition of nervous system
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- NHS - Symptoms of a stroke
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