HEALTH BASICS

Central nervous system

The central nervous system is the brain and spinal cord working together.

WHAT IT IS
The brain and spinal cord together

WHERE IT COMES UP
Neurological diagnoses, scans, spinal taps, and medicine information

WHY IT MATTERS
Controls movement, sensation, thought, and vital body functions

WHAT IT IS NOT
Not a disease or diagnosis

WHO TO ASK
Primary care clinician or neurologist

HOW IT IS CHECKED
Neurological examination, imaging, electrical tests, or spinal fluid analysis

Overview

The central nervous system, often shortened to CNS , is the brain and spinal cord. It receives information, processes it, and helps coordinate what your body does.

The CNS is not a disease or a diagnosis. It is one part of the nervous system. The other main part is the peripheral nervous system , which includes nerves outside the brain and spinal cord. These nerves carry messages between the CNS and the rest of the body.

You may see "CNS" in a scan report, diagnosis, medicine leaflet, or discussion about an injury. For example, a clinician may describe a condition as affecting the CNS rather than the peripheral nerves.

The CNS is involved in movement, sensation, language, memory, emotions, sleep, breathing, and many automatic body functions. Different areas have different jobs, although they work as connected networks rather than as isolated parts.

How it works

The brain interprets information and directs many body activities. Its major regions include the

cerebrum, cerebellum, and brainstem.

The cerebrum is the largest part. It supports thought, memory, language, sensation, and voluntary movement. Its right and left halves are connected, and each contains areas with specialized roles.

The cerebellum , near the back of the brain, helps coordinate movement, posture, and balance. The brainstem connects the brain with the spinal cord. It helps regulate alertness, breathing, heart rate, swallowing, and other essential functions.

The spinal cord is a long bundle of nervous tissue running from the brainstem through the spinal canal. The spinal canal is the protected space inside the bones of the spine. The cord carries messages between the brain and body. It also helps produce reflexes, such as quickly pulling your hand away from something hot.

The CNS contains billions of specialized cells. Neurons carry electrical and chemical messages. Glial cells support neurons, manage their surroundings, help form insulation around nerve fibres, and take part in immune responses.

Areas rich in neuron cell bodies are often called grey matter . Areas containing many insulated nerve fibres are called white matter . Both are found in the brain and spinal cord.

Several structures protect the CNS:

The blood-brain barrier is selective, not completely sealed. It helps keep the brain's environment stable, but it can also make it harder for some medicines to reach brain tissue.

- The skull protects the brain, while the spine surrounds the spinal cord
- The meninges are layers of tissue covering the brain and spinal cord
- Cerebrospinal fluid cushions the CNS and circulates around it
- The blood-brain barrier controls the movement of many substances from blood into brain tissue

Why it matters for your health

A condition's location within the nervous system affects which changes it may cause and which tests may help. A problem in the brain may affect speech, memory, vision, movement, or behaviour. A problem in the spinal cord may affect strength, sensation, bladder control, or movement below the affected level.

Location also influences treatment planning. Medicines intended to act in the brain may need to cross the blood-brain barrier. A compressed spinal cord may require a different assessment from damage to a peripheral nerve in an arm or leg.

Clinicians therefore try to localize a neurological concern. This means working out which part of the nervous system may be involved. Your history and neurological examination often provide the first clues.

What can go wrong

Many different conditions can affect the CNS. The CNS itself is not an illness, and a reference to it does not show which condition, if any, is present.

Conditions involving the CNS include:

These conditions do not all cause the same changes. Effects depend on the area involved, how quickly the problem develops, and its underlying cause.

Call emergency services for sudden face drooping, arm weakness, difficulty speaking, or loss of vision. These may be signs of a stroke. A first seizure, a seizure that does not stop, or repeated seizures without recovery also needs emergency help.

Other emergency warning signs include new weakness or loss of sensation after a head, neck, or back injury; sudden loss of consciousness; or a severe headache with fever, stiff neck, confusion, or marked drowsiness.

Less sudden concerns usually begin with routine medical assessment. Arrange an appointment for persistent or recurring changes such as unexplained numbness, worsening balance, repeated headaches, memory changes, tremor, or gradual weakness. These changes have many possible causes and do not by themselves identify a CNS condition.

- Stroke , caused by blocked blood flow or bleeding in the brain
- Meningitis or encephalitis , involving infection or inflammation around or within the brain
- Multiple sclerosis , which damages the protective covering around CNS nerve fibres
- Epilepsy , in which abnormal brain electrical activity causes repeated seizures
- Brain or spinal cord injury , including injuries after a fall or collision
- Tumours in or near the brain or spinal cord
- Spinal cord compression , which places pressure on the cord
- Neurodegenerative conditions , such as Parkinson's disease or Alzheimer's disease

What you can do

There is no single routine screening test for the whole CNS in a person without a specific concern. You do not need to arrange a brain scan simply to "check" that your CNS is working.

If you have a neurological concern, keep a clear record of:

A clinician may perform a neurological examination. This can assess strength, sensation, reflexes, coordination, eye movements, speech, memory, and walking.

Further tests are selected to answer a particular question. CT and MRI scans create images of the brain or spinal cord. An EEG records electrical activity from the brain. A lumbar puncture , sometimes called a spinal tap, collects cerebrospinal fluid from the lower back for testing. Blood tests may look for infection, inflammation, nutritional problems, or other causes.

Before imaging, tell the testing service about implanted devices, metal fragments, pregnancy, or previous reactions to contrast material. Ask what the proposed test is looking for, what preparation is needed, and how you will receive the results.

- When the change began and whether it was sudden or gradual
- Which body areas are affected
- How long episodes last and how often they occur
- Any triggers, injuries, fever, new medicines, or substance use
- Photos or videos of visible episodes, when safe and appropriate

Common questions

Is the spinal cord the same as the spine?

No. The spinal cord is nervous tissue. The spine is the column of bones, discs, joints, and ligaments that supports the body and surrounds the cord.

Are the nerves in my arms and legs part of the CNS?

No. They belong mainly to the peripheral nervous system. They connect the brain and spinal cord with muscles, skin, and organs.

Can a blood test check the CNS?

There is no single blood test that checks the entire CNS. Blood tests can help identify possible causes of neurological changes, but results must be considered alongside your history, examination, and sometimes other tests.

What does "CNS depressant" mean?

A CNS depressant is a substance that slows activity in the brain. The term may apply to certain medicines, alcohol, or other drugs. Effects can include sleepiness and slower reactions. Very

slow breathing or difficulty waking someone is an emergency.

Can the CNS repair itself?

Recovery depends on what happened, where it occurred, and how much tissue was affected. The brain can sometimes reorganize connections, a process called neuroplasticity . This does not mean that every injury or condition can be reversed.

Sources

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