TEST

CSF total protein

A CSF total protein test measures all proteins in the fluid surrounding your brain and spinal cord.

WHAT IT MEASURES
Total protein in fluid surrounding the brain and spinal cord

SAMPLE
Cerebrospinal fluid collected by lumbar puncture

FASTING NEEDED?
No, unless sedation requires it

HOW LONG IT TAKES
Usually 30 to 60 minutes

RESULTS IN
Usually one to two days; laboratory turnaround differs

USED FOR
Helping diagnose brain, spinal cord, and nerve conditions

MAIN LIMITATION
Abnormal results are nonspecific and blood contamination can mislead

Overview

Cerebrospinal fluid, or CSF, is the clear fluid around your brain and spinal cord. A CSF total protein test measures the combined amount of protein in a sample of this fluid.

Most CSF protein is albumin, a protein also found in blood. Smaller amounts include antibodies called immunoglobulins. Protein can enter CSF from the blood or be produced within the nervous system.

The sample is usually collected through a lumbar puncture, also called a spinal tap. During this procedure, a needle is placed between bones in your lower back. The needle does not enter the spinal cord.

CSF total protein is not used on its own to diagnose a condition. It is usually interpreted with your symptoms, examination, medical history, and other CSF results.

Why the test is ordered

Your healthcare team may order CSF total protein when investigating inflammation, infection, bleeding, or another problem involving the brain, spinal cord, or nerves.

It may form part of an assessment for meningitis or encephalitis, which are infections or inflammation around the brain. It can also contribute to an evaluation for conditions that damage nerve coverings, affect CSF flow, or cause abnormal cells to enter the fluid.

The test is commonly ordered with a CSF cell count, glucose measurement, and tests for bacteria or viruses. Depending on the clinical question, the laboratory may also check antibodies, oligoclonal bands, or abnormal cells.

Total protein cannot show which specific protein is increased. More targeted tests may be needed when the type or source of protein matters.

Who should have the test

CSF total protein is not a routine screening test. It is generally used when symptoms, examination findings, or earlier tests suggest that examining the fluid around the nervous system could provide useful information.

A lumbar puncture may not be appropriate immediately if there are concerns about increased pressure inside the skull, a serious bleeding risk, or infection near the needle site. Your healthcare team may arrange blood tests or brain imaging first. Imaging is not required before every lumbar puncture.

Reference values differ for newborns, children, and adults. Protein levels also tend to change with age, so an adult range should not be applied to a baby or young child.

How to prepare

Fasting is usually unnecessary. You can normally eat and drink unless you have been given separate instructions because you will receive sedation or have another procedure.

Tell the team arranging the test if you:

Do not stop a prescribed blood-thinning medicine on your own. The timing of any pause must be planned around the medicine, your bleeding risk, and why you take it.

Wear comfortable clothing. You may also want to arrange transport home, especially if sedation is planned or the facility advises you not to drive afterward.

- Take anticoagulants like warfarin or apixaban , antiplatelet medicines, or medicines affecting blood clotting
- Have a bleeding disorder or low platelet count
- Are pregnant or may be pregnant
- Have an infection, rash, or wound on your lower back
- Have had spinal surgery or have significant spinal curvature
- Previously had difficulty with a lumbar puncture

What happens during the test

You usually lie on your side with your knees drawn up or sit leaning forward. This helps open the spaces between the bones of your lower back.

The skin is cleaned, and a local anaesthetic numbs the area. You may briefly feel stinging from the anaesthetic. A thin needle is then guided between the lower spinal bones into the space containing CSF.

You may feel pressure, but sharp or persistent pain should be reported immediately. Some people notice a brief tingling sensation down a leg if the needle passes near a nerve.

CSF drips into sterile collection tubes. Several tubes may be collected because different tests require separate samples. The needle is removed, and a small dressing is applied.

The collection itself often takes only a few minutes, although positioning and preparation make the full appointment longer.

Understanding your results

Results are usually reported in milligrams per decilitre, abbreviated mg/dL, or grams per litre, abbreviated g/L. Use the reference interval printed on your own report rather than comparing the number with a range found elsewhere.

Ranges and interpretation vary by laboratory, age, sex, pregnancy status, medicines, and clinical context. The collection site and laboratory method also matter. CSF taken from the lower back normally contains more protein than fluid taken from spaces closer to the brain.

A raised result means the sample contains more total protein than expected for that laboratory and situation. Possible explanations include inflammation, infection, bleeding, reduced CSF flow, damage to nerves or their coverings, or increased movement of protein from blood into

CSF. Blood accidentally introduced during the lumbar puncture can also raise the result.

A normal result does not rule out every neurological infection, inflammatory condition, or other nervous system disorder. Some conditions cause changes in specific proteins without producing a clear rise in total protein.

Low CSF protein is less commonly important. It may be seen when CSF is being produced or lost unusually quickly, but the result must be considered with other findings.

What affects the results

A "traumatic tap" is one of the most important influences. This means the needle has passed through a small blood vessel, allowing blood to mix with the CSF. Because blood contains much more protein than CSF, even limited contamination can push the result upward. The red blood cell count and changes between collection tubes help the laboratory assess this.

Age matters. Newborns generally have higher CSF protein than older children, while levels may rise again across adulthood. Using an unsuitable age range can make a result appear abnormal when it is not.

The place where the sample was collected also matters. Lumbar CSF usually has more protein than ventricular CSF collected near the brain. Results from these sites are not directly interchangeable.

Different laboratory methods can produce slightly different measurements and reference intervals. Very bloody, unusually coloured, or highly concentrated samples may interfere with some methods.

Medicines do not usually cause a simple, predictable change in CSF total protein. However, treatments that affect inflammation, infection, bleeding, or the immune system may influence the underlying process. Medicines placed directly into the spinal fluid can also affect its composition.

Pregnancy and sex are usually less influential than age, collection site, and blood contamination, but they remain part of the clinical context. A recent blood transfusion does not usually create a direct, predictable change, although it may complicate interpretation when blood contamination or blood disorders are involved.

Eating, coffee, time of day, and ordinary activity have little direct effect on CSF protein. There are few useful ways to alter the result through preparation.

Accuracy and limitations

The laboratory measurement is generally reliable when the sample is collected and handled correctly. Its main weakness is not measuring protein accurately; it is that many different conditions can produce the same result.

A high result may correctly show increased protein but cannot identify the cause. Blood contamination can make the test appear abnormal when the CSF itself was not. Age-inappropriate reference ranges can do the same.

The test can also miss clinically important problems. Total protein may remain within the laboratory range early in an infection or when only a particular protein is abnormal.

Other CSF tests may answer a more specific question. Cell counts, glucose, culture, and molecular tests can help investigate infection. Oligoclonal bands and the IgG index assess certain immune proteins. Cytology or flow cytometry may be better when abnormal cells are suspected.

Risks and complications

The protein measurement does not harm you, but collecting CSF requires a lumbar puncture. A headache can develop afterward, and you may have temporary tenderness or bruising in your lower back.

Bleeding, infection, and lasting nerve injury are uncommon. Your healthcare team checks for factors that could make the procedure unsafe before proceeding.

Contact the service that performed the test promptly if you develop a severe or persistent headache, fever, increasing redness or fluid leaking from the needle site, or worsening back pain.

Seek emergency help for new weakness, loss of bladder or bowel control, confusion, a seizure, or difficulty staying awake. These are not routine effects of a lumbar puncture.

What happens next

Your result will be reviewed alongside the appearance and pressure of the CSF, cell counts, glucose, and any infection or immune tests. Some specialised results take longer than total protein.

If the result is mildly raised but the rest of the assessment is reassuring, routine follow-up or repeat review may be all that is needed. A repeat lumbar puncture is not automatically

required.

If other findings suggest infection, bleeding, inflammation, or abnormal cells, further tests or treatment may be arranged promptly. Urgency is based on the whole clinical picture, not the protein result alone.

Common questions

Can I drink coffee before the test?

Usually, yes. Coffee does not meaningfully change CSF total protein. Avoid it if your instructions require fasting for sedation or another procedure.

Does the time of day matter?

Usually not. CSF total protein does not have a clinically important daily pattern that requires routine testing at a particular time.

Can I exercise beforehand?

Ordinary activity is unlikely to change the result. Follow local instructions if strenuous exercise worsens your symptoms or if you have been asked to rest before the procedure.

Do I need to fast?

Not for the protein test itself. Fasting may be required if you will receive sedation, so follow the instructions from the facility performing the lumbar puncture.

Will the lumbar puncture hurt?

The local anaesthetic may sting briefly, and you may feel pressure during needle placement. Tell the person performing the procedure if you feel sharp pain or persistent tingling.

Can I drive afterward?

Policies differ. You should not drive if you received sedation, feel unwell, or were specifically advised against it. Ask the facility about transport arrangements before the appointment.

Sources

- MedlinePlus: Cerebrospinal Fluid Analysis , US National Library of Medicine
- American Family Physician: Cerebrospinal Fluid Analysis , 2021;103(7):422-428
- Mayo Clinic Laboratories: Protein, Total, Spinal Fluid , laboratory test catalogue

- Consensus guidelines for lumbar puncture in patients with neurological diseases , Alzheimer's & Dementia: Diagnosis, Assessment & Disease Monitoring , 2017;8:111-126
- Guidelines on routine cerebrospinal fluid analysis , European Federation of Neurological Societies task force, European Journal of Neurology , 2006;13(9):913-922