TEST

Cerebrospinal fluid (CSF) culture

A CSF culture checks fluid around the brain and spinal cord for infection-causing organisms.

WHAT IT MEASURES
Growth of bacteria or fungi from cerebrospinal fluid

SAMPLE
Cerebrospinal fluid collected by lumbar puncture

FASTING NEEDED?
No, unless sedation requires fasting

HOW LONG IT TAKES
Usually 30 to 60 minutes, including collection

RESULTS IN
Preliminary 1-2 days; longer for some organisms and laboratories

USED FOR
Diagnosis of infection around the brain and spinal cord

MAIN LIMITATION
Antibiotics before collection can prevent organism growth

Overview

Cerebrospinal fluid, or CSF, is the clear fluid surrounding your brain and spinal cord. A CSF culture checks whether bacteria, fungi, or certain other microorganisms grow from a sample of this fluid.

The sample is usually collected through a lumbar puncture, also called a spinal tap. If an organism grows, further tests may identify it and show which medicines are likely to work.

A culture is often ordered with a cell count, glucose and protein measurements, a Gram stain, and molecular tests such as polymerase chain reaction, or PCR. Routine bacterial culture does not usually test for viruses. Fungi and mycobacteria, including those that cause tuberculosis, require special cultures and may take longer to grow.

Why the test is ordered

The test helps diagnose meningitis or another infection involving the brain, surrounding

tissues, a brain drain, or an implanted device such as a shunt.

Identifying the microorganism can guide treatment and allow susceptibility testing to show whether it is sensitive or resistant to particular medicines.

Because central nervous system infections may require urgent treatment, antibiotics or antifungal medicines may begin before culture results are available. Collecting CSF before treatment can improve the chance of growth, but necessary treatment should not be delayed solely to obtain a culture.

Who should have the test

CSF testing may be recommended for fever with severe headache, neck stiffness, confusion, marked drowsiness, seizures, or new neurological problems. It may also be considered after brain or spinal surgery, following a head injury that creates an infection risk, or when a shunt or drain may be infected.

Newborns, older adults, and people with weakened immune systems may have less typical symptoms. Most headaches do not require a lumbar puncture; the decision depends on symptoms, examination findings, medical history, and whether collecting CSF is safe.

Seek emergency care for severe headache with fever and neck stiffness, new confusion, difficulty waking, a seizure, rapidly worsening illness, or a new non-fading purple or red rash with fever.

How to prepare

A CSF culture does not require fasting. If you will receive sedation, follow instructions about when to stop eating or drinking. In an emergency, testing and treatment may proceed without routine preparation.

Tell the healthcare team about:

Do not stop prescribed medicines unless the team responsible for the procedure tells you to.

Some people need blood tests or brain imaging first. Imaging may be arranged if there is concern about increased pressure inside the skull, a mass, bleeding risk, or another condition that could make lumbar puncture unsafe.

- Blood-thinning medicines or a bleeding disorder
- Recent antibiotics or antifungal medicines

- Medicine or local anaesthetic allergies
- Pregnancy or possible pregnancy
- Previous lower-back surgery or spinal problems
- A recent infection, procedure, or hospital stay

What happens during the test

You usually lie on your side with your knees drawn up or sit leaning forward. The skin on your lower back is cleaned, and local anaesthetic is injected. A thin, hollow needle is then passed between two lower-back bones into the space containing CSF, below where the spinal cord usually ends.

You may feel pressure. Tell the clinician if you feel sharp, electric, or shooting pain, and stay as still as possible.

CSF drips into sterile tubes for culture and other tests. The fluid pressure may also be measured. The needle is then removed and a small dressing applied. Collection takes several minutes, but positioning, preparation, and recovery make the appointment longer.

Understanding your results

Results are usually reported as positive or negative rather than as a number.

A positive culture means a microorganism grew. The report may identify it and include susceptibility results showing which medicines are more or less likely to work. Clinicians also consider whether the organism could be contamination from the skin.

A negative culture means no organism grew under the conditions used. It does not completely rule out infection. Antibiotics like amoxicillin or doxycycline before collection, low numbers of organisms, a small sample, or an organism requiring special methods can cause a negative result.

Preliminary bacterial results may be available within one or two days. Final results take longer, while fungal and mycobacterial cultures may require days to weeks. Results are interpreted with symptoms and other CSF, blood, and imaging findings.

What affects the results

Factors that can make results negative or misleading include:

Age, pregnancy, kidney function, and recent transfusion do not usually affect growth directly, but they may influence symptoms, procedure planning, treatment, and interpretation.

- Antibiotics or antifungal treatment: Medicines taken before collection can prevent organisms from growing.
- Small sample volume or low organism numbers: Infection may be missed if few organisms are present.
- Transport problems: Delays or unsuitable conditions can allow organisms to die.
- The wrong culture type: Routine culture may not detect fungi, tuberculosis bacteria, or organisms requiring special methods.
- Skin contamination: Skin bacteria can enter the sample and produce a misleading positive result.
- An implanted device: Some device-related bacteria grow slowly or remain attached to the device.

Accuracy and limitations

Growth of a disease-causing organism provides strong evidence of infection and may guide antimicrobial treatment. However, culture can miss infection after treatment, when few organisms are present, when too little CSF is collected, or when special conditions were not requested.

A culture can also be falsely positive because of skin contamination. Clinicians assess the organism, other CSF findings, implanted devices, and the person's condition.

PCR may be more useful when a rapid answer is needed, a virus is suspected, or antibiotics have reduced the chance of culture growth. Blood cultures may also identify the cause of bacterial meningitis. No single test detects every infection.

Risks and complications

The culture itself has no direct physical risk, but lumbar puncture does. Temporary lower-back soreness and a headache that worsens when upright are the most common problems. Minor bleeding or bruising can occur; infection introduced during the procedure and significant bleeding around the spinal canal are uncommon.

Lumbar puncture can be unsafe when pressure inside the skull is greatly increased for certain

reasons. The healthcare team checks for warning signs and may arrange imaging first.

Contact the team promptly for a persistent or severe post-procedure headache, fever, worsening back pain, leg weakness or numbness, or fluid leaking from the puncture site.

What happens next

If the culture is positive, treatment may be started or adjusted for the identified organism. Some infections require infection-control or public-health action.

A negative result is reviewed with the Gram stain, cell count, glucose, protein, PCR, blood cultures, imaging, and response to treatment. Further tests or another sample may occasionally be needed.

Ask when the final culture and susceptibility report will be ready. Do not wait for routine follow-up if you develop severe or worsening headache, confusion, difficulty waking, a seizure, new weakness, or breathing difficulty; seek emergency care.

Common questions

Can I drink coffee before a CSF culture?

Usually, yes. Follow different instructions if sedation is planned.

Does the time of day matter?

No. When serious infection is suspected, prompt testing and treatment matter more than the time of day.

Can I exercise beforehand?

Ordinary activity does not affect culture results, although avoiding strenuous exercise may be more comfortable if you have back pain or feel unwell.

Does a lumbar puncture hurt?

The numbing injection may sting briefly, followed by pressure during needle placement. Report sharp, electric, or shooting pain immediately.

How long will I wait for results?

Early bacterial findings may be available within one or two days. Final bacterial results can take several days, while fungal or mycobacterial cultures may take weeks.

Will antibiotics make the result negative?

They can prevent bacteria from growing even when infection is present. Tell the team what

you took and when, but do not delay prescribed treatment to improve the result.

Sources

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