TEST

Pleural fluid culture

A pleural fluid culture checks fluid around a lung for infection-causing germs

WHAT IT MEASURES
Growth of infection-causing germs from fluid around the lung

SAMPLE
Pleural fluid collected by thoracentesis

FASTING NEEDED?
Usually no; sometimes before sedation

HOW LONG IT TAKES
Usually 20-40 minutes for fluid collection

RESULTS IN
Usually 2-5 days; longer for slow growers, laboratory-specific

USED FOR
Diagnosing pleural infection and identifying the organism

MAIN LIMITATION
Antibiotics and low organism numbers can cause false negatives

Overview

Pleural fluid is the thin layer of liquid between the lung and the inside of the chest wall. This space is called the pleural space. Normally, it contains only a small amount of fluid.

An abnormal build-up is called a pleural effusion. If infection is possible, some fluid may be removed and sent for culture. A culture gives bacteria or other germs time to grow in the laboratory so they can be identified.

The sample is usually collected through a procedure called thoracentesis, also known as pleural aspiration. A needle or small tube is passed through the chest wall into the fluid, usually with ultrasound guidance.

Pleural fluid culture is not a screening test. It is used alongside symptoms, imaging and other pleural fluid tests to investigate a specific effusion.

Why the test is ordered

The test is mainly ordered when an infection in the pleural space is possible. This may happen

with pneumonia or when imaging shows a new or unexplained pleural effusion.

The culture may help:

Other tests are normally performed on the same sample. These may include cell counts, protein, lactate dehydrogenase, glucose and pH. These measurements can show inflammation or features of a complicated infection even when the culture is negative.

A Gram stain may also be performed. This is a rapid laboratory check for bacteria, but it can miss infections when few organisms are present.

- confirm that live germs are present
- identify the type of bacterium or other organism
- guide the choice of antibiotic or other treatment
- distinguish infection from some non-infectious causes of an effusion

Who should have the test

You may be offered pleural fluid culture if you have a pleural effusion and there is concern about infection. Reasons can include fever, pneumonia, chest pain that is worse with breathing, or inflammatory findings in the fluid.

The test may also be considered for an unexplained effusion, particularly if infection remains one of several possible causes.

Routine cultures mainly look for common bacteria. If tuberculosis, fungi or another unusual infection is possible, the laboratory needs specific instructions and may require additional samples. These cultures often take much longer.

Not every pleural effusion needs sampling. A very small effusion may be unsafe or unhelpful to drain, while some effusions have a clear cause that can be followed in another way.

How to prepare

You can usually eat and drink normally. Fasting may be needed if sedation or another procedure is planned at the same time. Follow the instructions from the service performing the thoracentesis.

Before the procedure, tell the healthcare team about:

Do not stop prescribed medicines, including antibiotics or blood thinners like warfarin or apixaban , unless you receive specific instructions. Stopping an antibiotic like amoxicillin or

doxycycline may allow an infection to worsen.

Wear clothing that makes it easy to reach your back or side. If sedation is planned, you may need someone to take you home.

- blood-thinning or antiplatelet medicines
- a bleeding disorder or low platelet count
- allergies to local anaesthetic, dressings or cleaning solutions
- pregnancy or possible pregnancy
- previous problems during chest procedures

What happens during the test

Ultrasound is usually used to locate the fluid and choose a safe entry point. You may sit leaning forward or lie on your side, depending on the amount and location of the fluid.

The skin is cleaned, and local anaesthetic is injected to numb the area. This can sting briefly. A needle or narrow catheter is then guided between the ribs into the pleural space.

You may feel pressure or an urge to cough as fluid is removed. Tell the healthcare professional if you develop pain, breathlessness, dizziness or feel faint.

Some fluid is placed in sterile containers. It may also be put directly into blood culture bottles at the bedside, which can improve the chance of recovering bacteria. The laboratory incubates the sample and checks it for growth.

The needle or catheter is removed, and a dressing is applied. A chest X-ray is not always needed afterward, but one may be arranged if there are symptoms or concern about a complication.

Understanding your results

Pleural fluid culture does not have a universal numerical reference range. The main result is reported as no growth or as the name of an organism that grew.

A positive culture means a germ grew from the sample. The report may include antibiotic susceptibility results, which show which medicines are more or less likely to work against that organism.

Not every positive result proves a pleural infection. Germs from the skin or equipment can occasionally contaminate the sample. The organism found, the number of positive containers

and the other fluid findings help determine whether the result is meaningful.

A negative result means no organism grew under the conditions used. It does not rule out infection. Bacteria may be present in low numbers, trapped in another pocket of fluid, damaged by previous antibiotics or unable to grow using routine methods.

Interpretation varies with laboratory methods, age, sex, pregnancy status, medicines and the wider clinical context. Imaging, symptoms, blood tests and the appearance and chemistry of the fluid often matter as much as the culture.

What affects the results

Antibiotics taken before the sample is collected are a major reason for a negative culture despite infection. Even one or more earlier doses can reduce the number of living bacteria available to grow.

Other factors include:

Placing fluid into suitable culture bottles promptly can increase the chance of finding bacteria. However, it does not remove the possibility of false-negative or contaminated results.

Food, coffee, exercise and the time of day do not usually change whether germs grow from pleural fluid. Age and pregnancy do not directly alter culture growth, although they may affect how the procedure and overall findings are assessed. A recent blood transfusion does not usually affect this culture.

- a small sample or very low number of organisms
- sampling a pocket that does not contain the infection
- delay in transporting or processing the fluid
- exposure to oxygen when anaerobic bacteria are suspected
- failure to request special fungal or mycobacterial cultures
- contamination by normal skin bacteria during collection
- recent chest surgery, drainage or another pleural procedure

Accuracy and limitations

Pleural fluid culture can identify the cause of infection when live organisms grow, but it misses a substantial number of genuine pleural infections. A negative culture is therefore interpreted with the rest of the evidence rather than used alone.

False-negative results are especially likely after antibiotics, when few bacteria are present, or when the infection is divided into separate pockets. Some organisms are difficult or slow to grow.

False-positive results are less common but can occur through contamination. A skin organism found in only one container may be less convincing than the same organism found repeatedly alongside other signs of infection.

Other tests may be better for particular questions. Pleural fluid pH, glucose and imaging can help identify an infection that needs drainage even when culture is negative. Blood cultures may find an organism that the pleural sample misses.

Tests that detect microbial genetic material may help in selected cases, including after antibiotics, but availability varies. They can detect material from dead organisms and may not provide full antibiotic susceptibility information. Suspected tuberculosis may require targeted cultures, molecular tests or a pleural biopsy.

Risks and complications

The culture itself does not add meaningful risk once the sample has been collected. Most risks come from thoracentesis.

Temporary pain, coughing, bruising or feeling faint can occur. Air can occasionally enter the pleural space and partly collapse the lung, a complication called pneumothorax. Bleeding and infection at the needle site are uncommon.

Removing a large amount of fluid can rarely cause breathing problems from rapid lung re-expansion. Ultrasound guidance and monitoring help reduce procedural risks.

Seek prompt medical advice after the procedure for increasing pain, fever, redness, drainage or worsening breathlessness. Severe breathlessness, blue or grey lips, coughing up significant blood, collapse or uncontrolled bleeding requires emergency care.

What happens next

Preliminary information may be available within a day, but routine bacterial cultures often need several days. Slow-growing bacteria, fungi and tuberculosis cultures may take weeks. Turnaround times vary by laboratory and organism.

If a germ grows, the report may be updated when identification and antibiotic susceptibility testing are complete. Treatment may be adjusted based on these findings.

A negative result does not always end the investigation. Follow-up may include review of the fluid chemistry, blood tests and chest imaging. Further drainage, another sample or a pleural biopsy may be considered if the effusion persists or the cause remains unclear.

Mild soreness at the puncture site can usually be followed routinely. New or worsening breathing difficulty after thoracentesis should not wait for the culture result.

Common questions

Can I drink coffee before the test?

Usually, yes. Avoid it only if you were told to fast because sedation or another procedure is planned.

Do I need to stop eating beforehand?

Most thoracentesis procedures do not require fasting. Follow your appointment instructions, as local anaesthetic, sedation and other planned procedures can change the requirements.

Does the time of day matter?

No. Pleural fluid culture is not normally affected by the time of collection. Prompt transport and correct handling matter more.

Can I exercise before the procedure?

Ordinary activity does not change the culture result. Avoid arriving very breathless from strenuous exercise, and follow any activity instructions related to your lung condition.

Should I stop antibiotics so the culture is more accurate?

No. Antibiotics can lower the culture yield, but stopping them without specific medical advice may be unsafe. Tell the healthcare team which antibiotics you have taken and when.

Why is my result taking so long?

Cultures require time for organisms to grow. Additional time may be needed to identify the germ and test which medicines affect it. Fungal and tuberculosis cultures can take several weeks.

Sources

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