TEST

# Anthrax blood test

An anthrax blood test checks blood for bacteria, genetic material, toxin, or antibodies linked to anthrax infection.

**WHAT IT MEASURES**
Anthrax bacteria, DNA, toxin, or antibodies

**SAMPLE**
Blood

**FASTING NEEDED?**
No

**HOW LONG IT TAKES**
Usually under 10 minutes

**RESULTS IN**
Hours to days; timing varies by laboratory

**USED FOR**
Diagnosis and confirmation, not routine screening

**MAIN LIMITATION**
Early testing or antibiotics can cause false-negative results

## Overview

An anthrax blood test looks for evidence of infection with Bacillus anthracis , the bacterium that causes anthrax. It is not a routine screening test and is generally used only after a possible exposure or when symptoms suggest infection.

"Anthrax blood test" can refer to several methods:

Blood culture, PCR, and toxin tests may help identify active infection. Antibodies take time to develop, so testing may require an early sample and another later.

Testing is usually arranged through a hospital, public health agency, or specialist laboratory. If anthrax is strongly suspected, treatment may begin before final results are available.

- Blood culture tries to grow the bacteria from blood
- PCR testing looks for bacterial genetic material, called DNA
- Toxin testing detects toxins made by the bacteria

- Antibody testing measures the immune response to anthrax

## Why the test is ordered

A healthcare team may order testing when symptoms and exposure history suggest anthrax. Possible exposures include contact with an infected animal or animal product, a laboratory accident, or a suspected deliberate release.

Blood testing can be especially useful when infection may have spread into the bloodstream, including in severe inhalational, gastrointestinal, injection-related, or skin anthrax.

The test may be used to:

A preliminary positive result is usually sent to a specialist reference laboratory for confirmation because related bacteria can resemble B. anthracis in routine testing.

- Help diagnose possible anthrax
- Confirm an initial laboratory finding
- Detect bacteria in the bloodstream
- Support a public health investigation
- Compare early and later antibody levels

## Who should have the test

Testing is generally reserved for people with a significant exposure, compatible illness, or suspicious laboratory finding. It is not normally useful simply for reassurance after an uncertain or low-risk event.

If you may have been exposed, seek prompt medical or public health advice even if you feel well. Decisions about preventive treatment depend on the exposure and should not wait for an antibody test to become positive.

Call emergency services for severe breathing difficulty, confusion, fainting, blue or grey lips, or rapidly worsening illness. Tell responders about any possible exposure. If you find a suspicious powder or object, do not touch or move it; follow local emergency instructions.

## How to prepare

You do not need to fast. You can usually eat, drink water, and have coffee as normal.

Tell the healthcare team if you have taken antibiotics like amoxicillin or doxycycline , as these can reduce the chance of growing bacteria from blood and may affect other findings. Do not stop prescribed antibiotics to improve a test result.

Also mention:

No special clothing or activity restrictions are normally needed. Follow separate instructions if other tests or procedures are planned.

- Previous anthrax vaccination
- Anthrax immune globulin or antibody treatment
- Medicines that suppress your immune system
- The date, place, and type of possible exposure
- When symptoms began

## What happens during the test

A healthcare professional cleans an area of skin, usually inside your elbow, and inserts a small needle into a vein. Blood is collected into one or more tubes.

For blood cultures, samples may be collected from more than one site or at different times to improve detection and help identify contamination. The blood draw usually takes less than 10 minutes, although several samples may take longer.

Suspected anthrax specimens require specific laboratory safety procedures. Initial testing may be local, but confirmation is generally performed by a designated reference or public health laboratory.

Antibody testing may require a second sample days or weeks later so the laboratory can check for a meaningful rise in antibodies.

## Understanding your results

There is no single number or universal reference range. Interpretation depends on the method, timing, medicines, vaccination history, and clinical circumstances.

A positive blood culture means bacteria grew from the sample. Specialist testing is needed to confirm whether they are B. anthracis .

A positive PCR result means targeted anthrax DNA was detected. This supports the diagnosis when the sample and clinical situation fit, although DNA may remain after bacteria are no

longer alive.

A positive toxin result means an anthrax-associated toxin was detected. Toxin testing is usually limited to specialist laboratories.

A positive antibody result shows an immune response to anthrax-related proteins. Antibodies can result from infection or vaccination, so a rise between early and later samples is often more informative than one result.

A negative result does not always exclude anthrax. Results may be negative early in infection, after antibiotics, or when infection remains limited to one area of the body.

## What affects the results

Timing is important because bacteria, DNA, toxins, and antibodies appear at different stages. An early antibody sample may be negative before the immune system has produced a measurable response.

Antibiotics can reduce living bacteria in the blood, making cultures negative even when infection was present. PCR may continue to detect DNA, but this does not prove that live bacteria remain.

Other factors include:

A recent transfusion should be reported when antibody results are interpreted. Food, coffee, ordinary exercise, pregnancy, kidney function, and time of day do not usually affect whether anthrax bacteria or DNA are detected.

- Too little blood collected for culture
- Delayed or incorrect specimen transport
- Infection limited to the skin or another local site
- Anthrax vaccination
- Immune-suppressing illness or medicines
- Contamination with other Bacillus bacteria

## Accuracy and limitations

There is no single accuracy percentage for anthrax blood testing. Reliability depends on the method, illness stage and type, specimen quality, and whether antibiotics were started.

Blood culture can confirm bloodstream infection when live bacteria are present, but it may

miss infection after antibiotics, early in illness, or when anthrax is confined to one site.

PCR can detect small amounts of DNA and may be faster than culture. However, contamination can occasionally cause a positive result, and PCR cannot always show whether bacteria are alive.

Antibody tests may miss recent infection because antibodies have not developed. A single positive result may reflect vaccination or a reaction to a related organism.

Blood is not always the best sample. Depending on the suspected form of anthrax, testing may also use fluid from a skin lesion, tissue, respiratory or pleural fluid, or cerebrospinal fluid.

## Risks and complications

A blood draw may cause brief pain, a small bruise, or minor bleeding. Some people feel light-headed or faint during or shortly after the procedure.

## What happens next

A preliminary positive result usually triggers urgent confirmation at a specialist laboratory. Healthcare and public health teams may review the exposure and arrange tests from other body sites.

Treatment should not be delayed when clinical concern is high. Decisions also consider symptoms, exposure history, imaging, and other laboratory findings.

If a result is negative but concern remains, the next step may be another blood sample, a different method, or a more suitable specimen. Antibody testing may be repeated later to check for a rise.

Follow the monitoring plan you are given. Seek urgent reassessment if symptoms develop or worsen after a possible exposure. Severe breathing difficulty, confusion, collapse, or rapidly worsening illness requires emergency care.

## Common questions

Can I drink coffee before an anthrax blood test?

Yes. Coffee does not normally affect culture, PCR, toxin, or antibody testing. Follow different instructions if other fasting tests are being collected.

Do I need to fast?

No. You can usually eat and drink normally.

Does the time of day matter?

Usually not. Timing in relation to exposure, symptoms, antibiotics, and vaccination matters more.

Can I exercise beforehand?

Yes. Ordinary exercise does not usually alter the results. If you feel unwell, avoid strenuous activity and seek medical advice rather than waiting for the appointment.

How long do results take?

Preliminary findings may be available within hours or days. Confirmation can take longer if specimens must be sent to a reference laboratory. Antibody testing may require a later sample.

Can a blood test prove exposure before I have symptoms?

Usually not. A negative early test cannot reliably exclude exposure, and antibodies may not yet be detectable. Public health teams assess the exposure itself when deciding whether preventive treatment is needed.

## Sources

- Centers for Disease Control and Prevention. Clinical Overview of Anthrax
- Centers for Disease Control and Prevention. Clinical Testing and Diagnosis for Anthrax
- Bower WA, Hendricks K, Pillai S, et al. Clinical Framework and Medical Countermeasure Use During an Anthrax Mass-Casualty Incident. MMWR Recommendations and Reports . 2023;72(6):1-47
- World Health Organization. Anthrax in Humans and Animals . Fourth edition. 2008