TEST

Donath-landsteiner test

A blood test that looks for an antibody linked to paroxysmal cold hemoglobinuria.

WHAT IT MEASURES
Anti-P antibody causing cold-triggered red blood cell destruction

SAMPLE
Blood

FASTING NEEDED?
No

HOW LONG IT TAKES
About 5 to 10 minutes

RESULTS IN
Several days, varying by laboratory

USED FOR
Diagnosing paroxysmal cold hemoglobinuria

MAIN LIMITATION
Mishandled or cooled samples can produce false-negative results

Overview

The Donath-Landsteiner test is a specialized blood test for a Donath-Landsteiner antibody, usually an anti-P antibody .

This antibody can attach to red blood cells when blood is cold. It may then activate immune proteins called complement and destroy the cells as the blood warms again.

This pattern is linked to paroxysmal cold hemoglobinuria (PCH), a form of autoimmune hemolytic anemia. In this condition, the immune system mistakenly damages red blood cells. Hemoglobin released from the damaged cells may pass into the urine, making it dark red or brown.

The test is usually performed in a specialist transfusion or immunohematology laboratory. Careful temperature control from collection onward is essential.

Why the test is ordered

The test helps investigate hemolysis , meaning red blood cells are destroyed faster than the

body can replace them.

It may be ordered if you have a rapid fall in red blood cells, dark urine, jaundice or blood test evidence of hemolysis. PCH often develops after an infection, particularly in children, but it can also affect adults.

Other tests commonly include:

In PCH, the direct antiglobulin test often detects complement on red blood cells without detecting immunoglobulin G (IgG). This can raise suspicion but does not confirm PCH.

- A complete blood count
- A reticulocyte count
- Bilirubin, lactate dehydrogenase and haptoglobin tests
- A direct antiglobulin test, or direct Coombs test
- Blood typing and examination of blood cells under a microscope

Who should have the test

You may be offered the test if your symptoms and initial results suggest sudden red blood cell destruction caused by a cold-reacting antibody.

It is not used to screen people who feel well. Dark urine has many possible causes, so the result must be considered alongside symptoms, an examination and other laboratory findings.

PCH was historically associated with syphilis but is now more often investigated after an infection. Your healthcare team may arrange separate testing for an underlying infection.

How to prepare

You do not need to fast. You can usually eat, drink water and take your usual medicines unless other tests at the same appointment require different preparation.

Tell your healthcare team about recent blood transfusions and treatments that affect the immune system. These can influence related results or reduce the amount of antibody available to detect.

The laboratory must arrange to keep the sample warm. You should not heat it yourself. The collection tube may be prewarmed and kept near body temperature until the serum is separated from the blood cells.

What happens during the test

A healthcare professional inserts a needle into a vein, usually in your arm, and collects blood into one or more tubes. This normally takes a few minutes.

The sample may need to remain near body temperature during transport and processing.

In the laboratory, your serum is mixed with suitable red blood cells and complement. One mixture is cooled and then warmed to body temperature, while control samples are kept under other temperature conditions.

If the antibody is present, it attaches during cooling and causes red cell breakdown during warming. This two-temperature reaction is why it is called a biphasic hemolysin test.

Understanding your results

The result is usually reported as positive, negative or inconclusive rather than as a number.

A positive result means the expected cold-then-warm red cell destruction occurred and the controls worked correctly. Alongside evidence of hemolysis, this strongly supports PCH. It does not indicate how severe the anemia is or how long it will last.

A negative result means the antibody pattern was not detected, but it does not always rule out PCH. The antibody level may be low, may have fallen as the illness improved or may have been reduced in the serum if the sample cooled before processing.

An inconclusive result can occur if the controls fail or red cells break down for another reason. The laboratory may recommend a new sample or testing at a reference laboratory.

What affects the results

Sample handling is the main concern. If the tube cools before the serum is separated, the antibody may attach to the person's own red cells. Too little may then remain in the serum, causing a false-negative result.

Other factors include:

Specialist laboratories use controls and may add fresh complement to reduce these problems.

Food, coffee, time of day and recent exercise do not have a meaningful direct effect on the test. Age, pregnancy and kidney function do not usually change the reaction itself, although they may affect interpretation of anemia and related tests.

- Delayed transport or processing
- Incorrect sample temperature
- A low antibody level as an illness resolves
- Insufficient active complement
- Reagent red cells without the required P antigen
- Plasma exchange or immune-suppressing treatment
- A recent transfusion, which can complicate interpretation

Accuracy and limitations

When collection and controls are correct, a positive result is strong evidence of the characteristic anti-P antibody. However, nonspecific red cell breakdown or faulty controls can occasionally make a result appear positive.

False-negative results are more likely if the sample cooled too soon, testing was delayed, complement activity was inadequate or the antibody level had fallen. Published accuracy rates vary because PCH is uncommon and methods are not fully standardized.

The test should not be used alone. Blood counts and hemolysis tests show whether red cells are being destroyed and how much anemia is present. The direct antiglobulin test detects complement attached to red cells, while the Donath-Landsteiner test more specifically identifies the biphasic antibody associated with PCH.

If suspicion remains high after a negative result, the test may be repeated with carefully controlled warm handling.

Risks and complications

The risks are those of an ordinary blood draw. You may have brief pain, a small bruise or feel faint during or shortly after the procedure.

What happens next

Your healthcare team will interpret the result with your blood count, urine findings, direct antiglobulin test and other evidence of hemolysis. Follow-up may include repeat blood counts to check whether anemia is improving.

A positive result may lead to assessment for a recent infection or another contributing condition. A negative or inconclusive result may lead to a repeat warm-handled sample, specialist review or testing for other causes of autoimmune hemolytic anemia.

Seek prompt medical advice if you develop dark red or brown urine, worsening yellowing of the skin or eyes, marked weakness or increasing breathlessness. Call emergency services for severe difficulty breathing, chest pain, fainting, confusion or other rapidly worsening symptoms.

Common questions

Can I drink coffee before the test?

Yes. Coffee does not directly affect the test. Check whether any other tests require fasting.

Does the time of day matter?

No meaningful daily antibody pattern is known. Timing may matter so the laboratory can process the sample promptly and keep it warm.

Can I exercise beforehand?

Usual light activity should not change the result. Avoid strenuous exercise if you are unwell, anemic, dizzy or short of breath.

Do I need to keep myself warm before the blood draw?

Stay comfortably warm, but special heating is not usually required. Correct handling of the tube is more important.

Why might I need the test again?

It may be repeated if the sample cooled, processing was delayed, the controls failed or the result did not match other findings.

How quickly will I get the result?

Results often take several days and may take longer if the sample is sent to a reference laboratory.

Sources

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