TEST

Protein C blood test

A blood test that measures protein C, which helps prevent excessive blood clotting.

WHAT IT MEASURES
Activity or amount of protein C, a natural anticoagulant

SAMPLE
Blood

FASTING NEEDED?
No

HOW LONG IT TAKES
About 5 to 10 minutes

RESULTS IN
Usually several days; laboratory turnaround differs

USED FOR
Investigating suspected inherited or acquired protein C deficiency

MAIN LIMITATION
Anticoagulants and acute illness can produce misleading results

Overview

Protein C is a protein made mainly by your liver. It helps control blood clotting by switching off certain clotting proteins when they are no longer needed. It requires vitamin K to work properly.

A protein C blood test usually measures how well protein C works. This is called a protein C activity test . A separate protein C antigen test measures how much protein C is present.

These tests can help investigate protein C deficiency. Deficiency may be inherited through a change in the PROC gene, or acquired because of another condition or medicine. A low result by itself does not show which type you have.

Protein C testing does not diagnose a current deep vein thrombosis or pulmonary embolism. Suspected blood clots need assessment with tests such as an ultrasound or a CT scan.

Why the test is ordered

The test may be ordered as part of a selective assessment for thrombophilia , meaning a

tendency to develop blood clots more easily than usual.

Reasons for testing may include:

Not everyone who develops a blood clot needs this test. Recent surgery, immobility, cancer, pregnancy and estrogen-containing medicines can provide other explanations for a clot. Testing is most useful when the result could affect your care or help assess relatives.

- A blood clot at an unusually young age or in an unusual location
- Repeated blood clots without a clear temporary trigger
- A close relative with confirmed protein C deficiency
- A severe clotting disorder in a newborn
- Unusual skin damage after starting warfarin
- A low protein C result that needs confirmation

Who should have the test

Your healthcare professional may suggest testing after reviewing your personal and family history. Testing is often selective because a result does not always change how a blood clot is treated.

Children or adults with a parent, sibling or child who has confirmed inherited protein C deficiency may sometimes be offered testing. The timing and value of testing can differ for each family.

Protein C levels are naturally lower in newborns and young children than in adults. Testing children therefore requires age-appropriate interpretation, ideally with advice from a clinician experienced in clotting disorders.

Testing during an acute clot or serious illness may not give a reliable answer. In many non-urgent situations, testing is postponed until you are clinically stable and the result can be interpreted alongside your anticoagulant treatment.

How to prepare

You can usually eat and drink normally before the test. Water and coffee do not directly change protein C levels, although cream or sugar may matter if other fasting blood tests are being taken at the same appointment.

Tell the person arranging the test about every medicine and supplement you take. This is

especially important for warfarin, direct oral anticoagulants such as apixaban or rivaroxaban, and heparin.

Do not stop an anticoagulant like warfarin or apixaban on your own. Stopping it can increase your risk of a serious blood clot. Your healthcare team will decide whether testing should be delayed, interpreted with caution, or performed using a method less affected by your medicine.

Also mention recent blood clots, severe infections, liver problems, vitamin K deficiency, pregnancy, recent transfusions and treatment with plasma or protein C concentrate.

What happens during the test

A healthcare professional places a needle into a vein, usually inside your elbow or on the back of your hand. Blood is collected into a tube containing an anticoagulant that prevents the sample from clotting before analysis.

The blood draw usually takes a few minutes. Pressure is applied to the area afterward to reduce bruising.

The laboratory may first perform a protein C activity test. If the activity is low, an antigen test may be added or requested later to help identify the pattern.

Understanding your results

Your report will usually show protein C activity as a percentage or in units set by the laboratory. An antigen result may also be reported.

Reference ranges and interpretation vary by laboratory, test method, age, sex, pregnancy status, medicines and clinical context. Use the range printed on your own report rather than comparing your number with a range found elsewhere.

A low activity result means protein C did not work as strongly as expected in that sample. It does not by itself prove an inherited deficiency. Warfarin, vitamin K deficiency, liver disease, severe illness and other acquired conditions can also lower the result.

When activity is confirmed as low:

Results are interpreted with your clotting history, family history, medicines and the timing of the sample.

- Low activity with low antigen can suggest reduced protein C production

- Low activity with a usual antigen level can suggest protein that is present but functions poorly
- A normal result makes many forms of deficiency less likely but may not exclude every inherited variant

What affects the results

Warfarin lowers protein C because it blocks vitamin K-dependent clotting proteins. Testing while taking warfarin can therefore look abnormal even when you do not have an inherited deficiency. Levels also take time to recover after warfarin is stopped.

Direct oral anticoagulants can interfere with some activity methods. In certain clot-based tests, they may make protein C activity appear higher than it is, potentially hiding a deficiency. The effect depends on the medicine, its concentration and the laboratory method.

A new blood clot, severe infection, disseminated intravascular coagulation or other major illness can reduce protein C. These situations can make it difficult to tell whether a low result is temporary or inherited.

Other influences include:

Some abnormal antibodies and high levels of other clotting proteins can interfere with clot-based activity tests. Cloudy, strongly haemolysed or unusually coloured blood samples can affect optical laboratory methods.

Ordinary daily activity and moderate exercise are not usually major influences. You generally do not need to rest or avoid exercise unless you have been given separate instructions.

- Liver disease, because protein C is made in the liver
- Vitamin K deficiency or poor vitamin K absorption
- Kidney conditions that cause protein loss in urine
- Pregnancy and estrogen-containing medicines
- Age, especially infancy and early childhood
- Certain cancer treatments, including asparaginase
- Recent plasma transfusion or protein C concentrate
- An underfilled collection tube or delayed sample processing

Accuracy and limitations

Protein C activity testing is usually better than an antigen test for the first assessment. It can detect both a reduced amount of protein and protein that is present but does not work properly. An antigen test alone can miss the second pattern.

No single percentage describes how often this test is right or wrong in every setting. Performance differs between activity methods, laboratories, genetic variants and people taking anticoagulants.

A false low result can occur when protein C is reduced temporarily by warfarin, acute illness, liver disease or vitamin K deficiency. This may suggest inherited deficiency when none is present.

A false normal result can occur if a medicine interferes with a clot-based method or if the inherited change is not detected well by that particular assay. A result near the laboratory cutoff can also move between normal and low when repeated.

For these reasons, an unexpected low result is commonly confirmed with another sample taken under more suitable conditions. Antigen testing can help classify a confirmed deficiency. Genetic testing may be useful when results remain unclear or when a specific familial PROC variant is known, but it can also find changes whose meaning is uncertain.

Risks and complications

The main risks are brief discomfort, a small bruise and feeling faint during or after the blood draw. Serious complications from routine blood collection are uncommon.

What happens next

A normal result may end the investigation, or other clotting tests may be considered based on your history. A low result is often repeated when you are well and when interfering medicines can be managed safely.

Further assessment may include a protein C antigen test, tests of liver function or vitamin K status, and review by a blood-clotting specialist. Testing close relatives or arranging genetic testing may be discussed if inherited deficiency is confirmed.

Your treatment should not be changed based on this result alone. The decision to use or continue an anticoagulant also considers whether you have had a clot, what caused it, bleeding risk and other health factors.

Routine follow-up is appropriate for discussing an unexpected result when you otherwise feel

well. Seek urgent medical help for new one-sided leg swelling or pain, sudden shortness of breath, chest pain, coughing up blood, fainting, or sudden weakness or difficulty speaking. Painful or spreading skin changes after starting warfarin also need prompt medical assessment.

Common questions

Can I drink coffee before a protein C test?

Usually, yes. Fasting is not normally required. If other blood tests are being taken, check whether those tests require fasting or allow only water.

Does the time of day matter?

Protein C testing is not usually scheduled for a specific time of day. Timing in relation to anticoagulant doses, recent illness and treatment is often more important.

Can I exercise beforehand?

Normal activity and moderate exercise are unlikely to affect the result significantly. Avoiding exercise is not usually necessary unless your healthcare team gives you different instructions.

Should I stop warfarin or another blood thinner first?

No-not without specific medical instructions. Warfarin can lower protein C, while other anticoagulants can interfere with some test methods, but stopping treatment can be dangerous.

How long after a blood clot should I be tested?

Testing during or soon after an acute clot can be difficult to interpret. The appropriate timing depends on your illness, anticoagulant treatment and why the result is needed.

Does a low result mean my family members have it?

Not necessarily. Low protein C can be acquired rather than inherited. Family testing is usually considered only after your result has been confirmed and an inherited cause is reasonably likely.

Sources

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