TEST

Serum free hemoglobin test

A blood test that measures hemoglobin released from red blood cells into serum

WHAT IT MEASURES
Hemoglobin circulating outside red blood cells

SAMPLE
Blood

FASTING NEEDED?
No

HOW LONG IT TAKES
Usually less than 10 minutes

RESULTS IN
One to several days, varying by laboratory

USED FOR
Diagnosing and monitoring red blood cell breakdown

MAIN LIMITATION
Blood cells can break during collection and falsely raise results

Overview

A serum free hemoglobin test measures hemoglobin that is circulating outside red blood cells. Hemoglobin is the protein that carries oxygen in your blood. It is normally contained inside red blood cells.

When red blood cells break apart, they release hemoglobin. This process is called hemolysis . A raised free hemoglobin result can support evidence of intravascular hemolysis, meaning red blood cells are breaking down within the bloodstream.

The test uses serum, the liquid left after a blood sample has clotted and the blood cells have been removed. Some laboratories instead measure free hemoglobin in plasma, the liquid part of blood collected before clotting. Serum and plasma results are not automatically interchangeable because collection methods and laboratory techniques differ.

This is usually a specialized test rather than part of a routine blood count. It cannot, by itself, show why red blood cells are breaking down.

Why the test is ordered

The test may be ordered when there is concern about red blood cell destruction within the circulation. Possible reasons include:

Your care team will usually consider this result alongside a complete blood count and other markers of hemolysis. These can include bilirubin, lactate dehydrogenase, haptoglobin, a reticulocyte count, a blood smear, and urine testing.

- Investigating laboratory or clinical evidence of hemolysis
- Checking for breakdown linked to a mechanical heart valve
- Monitoring blood damage during extracorporeal membrane oxygenation, heart-lung bypass, or another blood-contacting device
- Helping assess a possible transfusion reaction
- Monitoring a known condition that causes intravascular hemolysis

Who should have the test

You may have this test if other findings suggest that red blood cells are breaking down inside your bloodstream. For example, a clinician may order it after an unexpected fall in hemoglobin, dark urine, jaundice, or abnormal results from other hemolysis tests.

People with certain mechanical circulation devices may have repeated testing. In this setting, changes over time can be more useful than one result.

The test is not generally used to screen people without symptoms, risk factors, or related abnormal results. A high value does not establish a diagnosis, and a normal value does not rule out every form of hemolysis.

How to prepare

You usually do not need to fast. You can generally eat and drink as normal unless other blood tests ordered at the same time require fasting.

Tell the person arranging the test about medicines, supplements, a recent blood transfusion, and any implanted or external blood-circulation device. Do not stop a prescribed medicine unless you have been specifically told to do so.

Strenuous exercise can temporarily increase red blood cell breakdown in some people. If the test is planned rather than urgent, ask whether you should avoid hard exercise beforehand.

Follow the laboratory's instructions because collection requirements are especially important for this test.

What happens during the test

A healthcare professional takes blood from a vein, usually in your arm. A band may be placed around your upper arm, and the skin is cleaned before a small needle is inserted.

The collection itself usually takes less than 10 minutes. The tube must be handled carefully because damage to red blood cells after collection can release hemoglobin and make the result misleading.

The laboratory separates the serum from the blood cells and measures the free hemoglobin. Depending on the method, the test may use how hemoglobin absorbs light or a chemical reaction that produces a measurable signal.

Understanding your results

Your report should show your result, its unit of measurement, and the laboratory's reference interval or decision level. There is no single result range that should be applied to every laboratory. Methods, specimen types, units, age, sex, pregnancy status, medicines, and clinical circumstances can affect interpretation.

A raised result means more hemoglobin than expected was detected outside red blood cells. This may reflect hemolysis occurring in the body. It can also happen if blood cells broke during collection, transport, clotting, or processing.

A result within the laboratory's expected range makes substantial intravascular hemolysis less likely at the time of collection. It does not completely exclude mild, intermittent, or earlier hemolysis. Some types of red blood cell destruction mainly occur in the spleen or liver and may not produce much circulating free hemoglobin.

Trends are often important when monitoring a mechanical device. A rising or falling value may provide more information than a single measurement, but results should be compared using the same specimen type and preferably the same laboratory method.

What affects the results

This test is unusually sensitive to what happens to the blood sample after it leaves your body.

The most important source of error is in vitro hemolysis . This means red blood cells broke apart in the tube rather than in your circulation. Difficult needle placement, forcefully drawing blood through a small needle, vigorous tube shaking, transport through some pneumatic tube systems, delayed separation, or unsuitable storage can raise the result.

Other influences include:

Age and pregnancy may affect the broader blood picture, although they are not usually major direct causes of a falsely raised free hemoglobin measurement. The laboratory may reject a visibly hemolyzed sample because it can be impossible to tell whether the hemoglobin was released before or after collection.

- Recent strenuous exercise: Running and other intense activity can cause temporary hemolysis
- Timing: Free hemoglobin can change quickly as it binds to haptoglobin and is cleared
- Recent transfusion: This changes the red blood cell population and may complicate interpretation
- Mechanical devices: Pumps, artificial valves, or tubing can physically damage red blood cells
- Medicines or illness: Some can cause genuine hemolysis rather than directly interfering with the assay
- Kidney function: The kidneys help handle filtered hemoglobin, affecting the overall pattern of blood and urine findings
- Lipemia or bilirubin: Very fatty serum or marked jaundice can interfere with some light-based methods

Accuracy and limitations

The test can detect hemoglobin outside red blood cells, but it cannot reliably determine where or when the cells broke apart. A raised result may correctly detect free hemoglobin yet give the wrong impression about what happened in your body if the sample was damaged.

False-positive results most often come from collection or handling-related hemolysis. Interference from bilirubin, lipids, or the assay method can also make some results less reliable.

The test may miss mild or intermittent hemolysis if the sample is collected between episodes. Free hemoglobin can also bind rapidly to haptoglobin or be cleared, so timing matters. Hemolysis occurring mainly outside the bloodstream may be better detected through other blood findings.

No single test confirms every cause of hemolysis. A complete blood count, reticulocyte count, bilirubin, lactate dehydrogenase, haptoglobin, blood smear, and direct antiglobulin test may be more useful for identifying the pattern or cause. Plasma free hemoglobin may be preferred for some mechanical-device monitoring protocols, so serum and plasma tests should not be substituted without checking the method.

Risks and complications

The risks are those of a routine blood draw. You may have brief discomfort, a small bruise, or feel light-headed.

Persistent bleeding or infection at the needle site is uncommon. Tell the person taking the sample if you have previously fainted during blood tests or take medicine that affects clotting.

What happens next

If the result is raised, the usual next step is to review how the sample was collected and whether the laboratory reported visible hemolysis. Repeating the test with careful collection may help when sample damage is suspected.

Your clinician may compare the result with your symptoms, blood count, bilirubin, haptoglobin, lactate dehydrogenase, urine findings, and recent results. If you use a mechanical circulation device, its function may also be checked. This is routine follow-up rather than proof that the device has failed.

Arrange prompt medical advice if you develop new dark or red-brown urine, yellowing of the skin or eyes, marked weakness, or worsening shortness of breath. During or soon after a transfusion, immediately report fever, chills, back or chest pain, breathing difficulty, or dark urine to the healthcare team.

Seek emergency help for severe breathing difficulty, chest pain, fainting, confusion, or signs of a severe reaction. These symptoms require assessment regardless of the test result.

Common questions

Can I drink coffee before the test?

Usually, yes. Fasting is not normally required, so plain coffee is generally acceptable. Follow any separate instructions if you are having other tests at the same appointment.

Does the time of day matter?

There is usually no required time of day. Timing in relation to symptoms, a transfusion, strenuous exercise, or mechanical-device treatment may matter more than the clock time.

Can I exercise beforehand?

Light everyday activity is unlikely to matter. Strenuous or prolonged exercise can temporarily increase hemolysis, so ask whether you should avoid it before a planned test.

Should I stop my medicines?

No medicine should be stopped solely for this test unless your clinician tells you to. Some medicines can contribute to genuine hemolysis in certain circumstances, so provide an up-to-date medication list.

Why does my report say the sample was hemolyzed?

It means red blood cells broke and released hemoglobin into the sample. This may have occurred in your body, but it commonly happens during collection or handling. A carefully collected repeat sample may be needed.

Is this the same as a hemoglobin blood test?

No. A standard hemoglobin test measures the total hemoglobin carried inside red blood cells and helps assess anemia. A serum free hemoglobin test measures hemoglobin that has escaped from those cells.

Sources

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