TEST

Hemoglobinuria test

A hemoglobinuria test checks urine for free hemoglobin released from red blood cells.

WHAT IT MEASURES
Heme pigment in urine, including free hemoglobin

SAMPLE
Urine

FASTING NEEDED?
No

HOW LONG IT TAKES
About 5 to 10 minutes

RESULTS IN
Same day to two days, depending on laboratory

USED FOR
Diagnosis and monitoring

MAIN LIMITATION
Dipsticks cannot separate hemoglobin from red cells or myoglobin

Overview

A hemoglobinuria test looks for hemoglobin in your urine. Hemoglobin is the oxygen-carrying protein inside red blood cells. It normally stays within those cells.

Hemoglobin may enter the urine when red blood cells break apart within the bloodstream. This is called intravascular hemolysis . The kidneys filter some of the released hemoglobin into the urine, which is known as hemoglobinuria .

Testing usually begins with a urine dipstick. This chemically treated strip reacts to heme , a part of hemoglobin. However, it also reacts to intact red blood cells and to myoglobin, a similar protein released by injured muscles. A positive dipstick therefore does not prove that free hemoglobin is present.

The laboratory may examine the urine under a microscope. A positive dipstick with few or no red blood cells can suggest hemoglobin or myoglobin rather than bleeding into the urinary tract. Further urine and blood tests are often needed to tell the difference.

Why the test is ordered

Your healthcare professional may order the test if your urine appears red, brown, or tea-coloured, or if another urine test unexpectedly shows blood.

It may also be used when there is concern about red blood cell breakdown. Possible reasons include certain immune conditions, reactions involving blood transfusion, mechanical damage to blood cells, infections, inherited blood disorders, or a rare condition called paroxysmal nocturnal hemoglobinuria.

The test may help investigate:

Dark urine has many possible causes, including dehydration, food pigments, medicines, liver problems, blood in the urine, hemoglobin, or myoglobin. Its appearance alone cannot identify the cause.

- Dark urine without many red blood cells on microscopy
- Possible destruction of red blood cells within the bloodstream
- A suspected reaction during or after a blood transfusion
- The effects of severe muscle injury, which can resemble hemoglobinuria
- Changes in someone already being monitored for a blood disorder

Who should have the test

This test is usually used for people with relevant symptoms, examination findings, or abnormal blood or urine results. It is not generally used as a stand-alone screening test for everyone.

Testing may be appropriate if a routine dipstick detects blood, especially when urine microscopy does not show enough red blood cells to explain the result. It may also be considered if blood tests suggest that red blood cells are breaking down.

A positive dipstick needs to be interpreted alongside your health history. Menstruation, recent exercise, muscle symptoms, urinary symptoms, medicines, pregnancy, kidney function, and a recent transfusion can all affect what the result means.

How to prepare

Fasting is not normally required. You can usually eat and drink as usual unless other tests being performed at the same time have different instructions.

Avoid deliberately drinking a large amount of water just before collecting the sample. Very

diluted urine can make small amounts of heme harder to detect.

Tell the healthcare professional arranging the test if you:

Do not stop prescribed medicines or supplements unless you have been specifically told to do so.

- Are menstruating or have vaginal bleeding
- Recently completed strenuous exercise
- Have had a muscle injury
- Recently received a blood transfusion
- Take vitamin C supplements or medicines that change urine colour
- Have difficulty providing a clean urine sample

What happens during the test

You will usually be asked to provide a clean-catch, midstream urine sample.

First, clean around the urinary opening if cleansing materials are provided. Begin urinating into the toilet, then collect some urine in the sterile container without touching its inside. Finish urinating into the toilet.

The laboratory may place a dipstick into the sample. If the blood section changes colour, the sample may be examined under a microscope to look for intact red blood cells. Some laboratories can perform more specific testing for urine hemoglobin if needed.

The collection itself takes only a few minutes. If you cannot provide a sample immediately, ask how it should be stored and how soon it must reach the laboratory.

Understanding your results

A result is often reported as negative or positive, sometimes with a graded amount such as trace, small, moderate, or large. Reporting systems differ among laboratories.

A negative result means no heme was detected at the test's reporting threshold. It does not completely exclude a very small or intermittent amount.

A positive dipstick result can come from:

Microscopy helps with interpretation. If many red blood cells are present, bleeding somewhere in the urinary system is more likely than true hemoglobinuria. If the dipstick is positive but few

or no red blood cells are seen, hemoglobin or myoglobin becomes more likely.

There is no single numerical range that applies to every method. Results and their meaning vary by laboratory, age, sex, pregnancy status, medicines, kidney function, and clinical context.

- Intact red blood cells, called hematuria
- Free hemoglobin from broken-down red blood cells
- Myoglobin released by damaged muscle
- Contamination or chemical interference

What affects the results

Several factors can produce a positive or negative result without a laboratory error.

Strenuous exercise can cause temporary blood or pigment in urine. Muscle injury can release myoglobin, which reacts on the same dipstick pad as hemoglobin. Menstrual blood or bleeding from outside the urinary tract can contaminate the sample.

Cleaning products containing oxidizing chemicals, including bleach, can cause a positive dipstick reaction if they enter the container. A poorly collected or old sample can also be misleading.

Vitamin C can interfere with some dipsticks and cause a negative result even when heme is present. Very concentrated or acidic urine and large amounts of protein may also reduce the dipstick reaction. Very diluted urine can break apart red blood cells, leaving a positive dipstick but few intact cells under the microscope.

A recent blood transfusion matters because a transfusion reaction can cause genuine hemoglobin release. Medicines may cause red or brown urine without producing a positive heme reaction, while some medicines can contribute to red blood cell breakdown in susceptible people.

Hemoglobin release may be intermittent. A sample collected between episodes can be negative even if earlier or later samples are positive.

Accuracy and limitations

Urine dipsticks are good at detecting heme, but they are not specific for hemoglobinuria. They may say "blood" when the substance is actually myoglobin or when intact red blood cells are present. This is the test's main limitation.

Microscopy can miss red blood cells if they have broken apart in dilute urine or if the sample is delayed. Conversely, contamination can make a result appear positive when there is no bleeding or abnormal pigment coming from the urinary tract.

A negative test can miss small or intermittent amounts of hemoglobin. Vitamin C and certain urine conditions may also weaken the chemical reaction.

When the distinction matters, urine testing is combined with blood tests. A blood count, bilirubin, lactate dehydrogenase, haptoglobin, blood smear, and plasma free hemoglobin may help assess red blood cell breakdown. A creatine kinase blood test is usually more useful when muscle injury and myoglobin are suspected.

Risks and complications

Providing a urine sample is painless and has no direct physical risk. The main practical issue is contamination, which may require another sample.

Any additional blood tests can cause brief discomfort, a small bruise, or occasional light-headedness.

What happens next

A negative result may need no further action if you are well and the reason for testing has resolved. If symptoms or other abnormal results continue, the test may be repeated or followed by more specific testing.

A positive dipstick is usually checked against urine microscopy and your other results. Follow-up may include blood tests for red blood cell breakdown, muscle injury, kidney function, or infection. The next step is based on the overall pattern, not the urine result alone.

Arrange prompt medical assessment for new red or brown urine, especially if it continues or occurs with pain, fever, marked weakness, or reduced urine output.

Seek emergency help for dark urine accompanied by trouble breathing, chest pain, fainting, confusion, severe weakness, or symptoms beginning during or soon after a blood transfusion. These symptoms require urgent assessment regardless of the urine test result.

Common questions

Can I drink coffee before the test?

Usually, yes. Fasting is not required, and coffee does not directly create hemoglobin in urine. Avoid excessive fluid intake because very diluted urine may be harder to interpret.

Does the time of day matter?

Often it does not. A first-morning sample may be requested because it is usually more concentrated. If hemoglobin release is intermittent, the timing of symptoms may matter more than the time on the clock.

Can I exercise beforehand?

Strenuous exercise can temporarily produce a positive dipstick or release myoglobin from muscle. Tell the healthcare professional if you exercised recently; a repeat sample after a period without strenuous activity may be considered.

Can my period affect the result?

Yes. Menstrual blood can contaminate the sample and produce a positive result. If testing is not urgent, you may be asked to collect another sample after bleeding has stopped.

Does a positive result mean I have kidney disease?

No. The result can reflect intact red blood cells, free hemoglobin, myoglobin, contamination, or interference. Kidney function and other tests are needed to understand the cause.

Why do I need blood tests as well?

A urine dipstick cannot identify the source of heme. Blood tests can look for red blood cell breakdown, muscle injury, anemia, and changes in kidney function.

Sources

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