TEST

Sugar-water hemolysis test

A blood test that checks whether red blood cells break apart unusually easily when complement is activated

WHAT IT MEASURES
Red blood cell breakdown after complement activation

SAMPLE
Blood

FASTING NEEDED?
No

HOW LONG IT TAKES
Usually less than 10 minutes

RESULTS IN
Usually several days, varying by laboratory

USED FOR
Historical screening for paroxysmal nocturnal hemoglobinuria

MAIN LIMITATION
Less accurate than modern flow cytometry

Overview

The sugar-water hemolysis test is an older blood test used to look for red blood cells that are unusually sensitive to complement . Complement is a group of proteins in the immune system that can damage or destroy cells under certain conditions.

In the laboratory, red blood cells are placed in a low-salt sugar solution, usually made with sucrose. This environment encourages complement to attach to the cells. The laboratory then measures how many red blood cells break apart, a process called hemolysis .

The test was mainly used to screen for paroxysmal nocturnal hemoglobinuria , often shortened to PNH. PNH is a rare acquired blood disorder in which some blood cells lack protective surface proteins.

The sugar-water test is now considered outdated in many settings. Flow cytometry, which examines specific proteins on individual blood cells, is more accurate and can detect much smaller groups of affected cells.

Why the test is ordered

Historically, the test was ordered when a clinician suspected that red blood cells were being destroyed within the bloodstream. Possible reasons included unexplained anemia, dark urine caused by hemoglobin, or laboratory evidence of hemolysis.

It was also used when PNH was considered in someone with:

Today, these concerns are usually investigated with flow cytometry rather than the sugar-water test. A laboratory may still offer the older test for historical, educational, or limited local reasons.

- Unexplained low numbers of one or more blood cell types
- Bone marrow failure, including aplastic anemia
- Blood clots in unusual locations
- Repeated episodes of hemolysis without a clear cause

Who should have the test

Most people being evaluated for PNH should have flow cytometry instead. This modern test looks for missing protective proteins, commonly CD55 and CD59, or uses a marker called FLAER to identify affected white blood cells.

A sugar-water test may occasionally be used if modern testing is not immediately available. However, its result usually needs confirmation with flow cytometry.

The test is not suitable for general health screening. Symptoms such as tiredness, anemia, abdominal discomfort, or dark urine have many possible causes. Testing should be selected according to your symptoms, examination, blood count, and other laboratory findings.

How to prepare

You do not usually need to fast. You can generally eat, drink water, and have coffee as normal unless another test being collected at the same time requires different preparation.

Tell the healthcare team about:

Do not stop prescribed medicines unless the clinician responsible for them has told you to do so. If several blood tests are planned, follow the preparation instructions for the test with the strictest requirements.

- A recent blood transfusion
- Medicines that affect complement
- Recent treatment for a blood or bone marrow condition
- Any difficulty you have had with blood draws or fainting

What happens during the test

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

Collecting the sample generally takes less than 10 minutes. You may feel a brief scratch or pressure.

In the laboratory, your red blood cells are exposed to a sucrose solution and a source of complement. The laboratory compares the amount of red blood cell destruction with its own controls.

This is not the same as drinking sugar water. You do not swallow anything, and the test does not measure blood glucose or diabetes.

Understanding your results

Results may be reported as negative, positive, or as a percentage of red blood cells that broke apart under the test conditions. The laboratory should provide its own method and interpretive information.

A result showing increased hemolysis means that some red blood cells were unusually sensitive to complement in this laboratory setup. It can support suspicion of PNH, but it does not confirm the condition by itself.

Other blood disorders can sometimes produce an abnormal result. A positive result is therefore usually followed by flow cytometry.

A negative result means the test did not detect increased breakdown under those conditions. It does not fully rule out PNH. The test can miss a small population of affected cells, especially when few abnormal cells remain in the circulation.

Ranges and interpretation vary by laboratory, method, age, sex, pregnancy status, medicines, and clinical context. Results are best considered alongside your blood count, markers of hemolysis, symptoms, transfusion history, and more specific tests.

What affects the results

Several factors can make the result misleading even when the laboratory performs the procedure correctly.

A recent blood transfusion can dilute your own red blood cells with donor cells. This may reduce the amount of hemolysis and produce a negative or less abnormal result.

Active hemolysis can also remove the most vulnerable cells before the sample is taken. If only a small group of affected cells remains, the test may miss it.

Other important factors include:

Recent exercise, meals, coffee, and the time of day are not usually major influences on this test. The recent transfusion history and the condition of the sample matter much more.

- Sample age and storage: Red blood cells can change after collection, particularly if testing is delayed or the sample is stored incorrectly
- Complement activity: Differences in the serum used as a complement source can alter how much hemolysis occurs
- Small PNH populations: The older method may not detect a small group, or "clone," of affected cells
- Other hemolytic conditions: Some disorders besides PNH can make red cells break apart during the test
- Treatment or bone marrow recovery: Changes in the affected cell population can change results over time

Accuracy and limitations

The sugar-water test is less accurate than modern flow cytometry in both directions.

It can miss PNH when the affected cell population is small or has been diluted by transfused red blood cells. This means a negative result cannot reliably exclude the disorder.

It can also show increased hemolysis in conditions other than PNH. In other words, an abnormal result does not always mean PNH is present.

The test examines how red cells behave under artificial laboratory conditions. It does not directly identify the missing surface proteins that define PNH cells. It also provides limited information about affected white blood cells and platelets.

Flow cytometry is usually the better test because it can:

Even flow cytometry must be interpreted carefully after transfusion, during severe hemolysis, or when monitoring a very small cell population. Repeat testing may be appropriate when clinical concern remains despite an initial negative result.

- Examine several blood cell types
- Identify missing protective proteins directly
- Detect much smaller affected cell populations
- Measure the size of the affected population for follow-up

Risks and complications

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

Firm pressure over the needle site usually limits bruising. Serious complications from a standard blood draw are uncommon.

What happens next

A normal or negative result may be reviewed routinely with your other blood tests. If concern about PNH remains, flow cytometry may still be ordered because the sugar-water test can miss small affected populations.

An abnormal result usually leads to confirmatory flow cytometry. Other tests may include a complete blood count and measurements related to red blood cell destruction, such as bilirubin, lactate dehydrogenase, haptoglobin, and reticulocytes. These tests provide context but do not diagnose PNH on their own.

Arrange routine follow-up to discuss unexplained anemia, recurring dark urine, or abnormal blood counts.

Seek urgent medical care for new chest pain, significant difficulty breathing, coughing blood, one-sided leg swelling, fainting, sudden weakness, or a severe new headache. These symptoms have several possible causes, but they can require prompt assessment and should not wait for a routine test appointment.

Common questions

Can I drink coffee before the test?

Usually, yes. Coffee does not directly affect the sugar-water test. Check whether another blood test ordered at the same time requires fasting.

Does the time of day matter?

No specific time is generally required. Prompt transport and correct handling of the blood sample are more important.

Can I exercise beforehand?

Ordinary activity is unlikely to change the result. There is usually no need to avoid exercise specifically for this test.

Does the test measure blood sugar?

No. "Sugar water" describes the sucrose solution used in the laboratory. The test does not measure glucose and is not used to diagnose diabetes.

Will a recent blood transfusion affect it?

Yes. Donor red blood cells can dilute affected cells and make the result less abnormal or negative. Make sure the testing team knows when you were transfused.

Does a positive result mean I have PNH?

Not by itself. Other conditions can cause increased hemolysis in this test. Flow cytometry is usually needed to confirm or exclude PNH more reliably.

Sources

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