TEST

Glucose-6-phosphate dehydrogenase test

A blood test that measures an enzyme protecting red blood cells from damage.

WHAT IT MEASURES
G6PD enzyme activity in red blood cells

SAMPLE
Blood

FASTING NEEDED?
No

HOW LONG IT TAKES
Usually less than five minutes

RESULTS IN
Usually a few days; timing differs by laboratory

USED FOR
Diagnosing deficiency and screening before certain medicines

MAIN LIMITATION
Recent red cell breakdown can look falsely normal

Overview

A glucose-6-phosphate dehydrogenase test measures the activity of an enzyme called G6PD in your red blood cells. Enzymes are proteins that help chemical reactions happen in the body.

G6PD helps protect red blood cells from oxidative stress, a type of chemical damage. If G6PD activity is low, certain infections, foods, or medicines can sometimes trigger red blood cells to break down faster than the body can replace them. This is called haemolysis .

Low G6PD activity is usually inherited. The gene is on the X chromosome, so biological sex can affect how the condition is inherited and how test results appear. People with two X chromosomes may have a mixture of red blood cells with higher and lower enzyme activity.

The test measures enzyme activity. It does not show whether red blood cells are currently breaking down, identify a specific trigger, or predict exactly how you will react to every medicine.

Why the test is ordered

The test may be ordered to investigate possible G6PD deficiency or to check whether a particular medicine can be used safely.

Reasons may include:

Other blood tests are usually needed if haemolysis is suspected. These may include a complete blood count, bilirubin, reticulocyte count, haptoglobin, and a blood film.

- Unexplained anaemia caused by rapid red blood cell breakdown
- Jaundice, meaning yellowing of the skin or eyes, particularly in a newborn
- Dark urine or a rapid fall in haemoglobin after an infection, food, or medicine
- A known family history of G6PD deficiency
- Screening before medicines that can cause serious haemolysis in people with low G6PD activity
- Clarifying an earlier screening result

Who should have the test

You may be offered testing if your symptoms, blood results, family history, or previous reaction suggest possible G6PD deficiency.

Testing is also important before certain medicines. Examples include rasburicase, used to manage high uric acid during some cancer treatments, and some medicines used to prevent or treat malaria. The type of G6PD test needed can differ between medicines, so the prescriber should follow the medicine's specific testing instructions.

Routine screening practices differ between countries and healthcare systems. Testing may also be considered in newborns with significant or unexplained jaundice, particularly when family background or history increases the possibility of G6PD deficiency.

Having ancestry from an area where G6PD deficiency is more common does not by itself confirm that you have it. A test is needed to measure your enzyme activity.

How to prepare

You do not need to fast. You can usually eat, drink water, and take your regular medicines unless you have separate instructions for another test being collected at the same appointment.

Tell the healthcare team if you:

Do not stop a prescribed medicine solely to prepare for this test. If the test is being arranged before a new medicine, wait for instructions about when to start it.

- Recently received a blood transfusion
- Are currently having, or recently had, an episode of haemolysis
- Have recently been treated for severe anaemia
- Are pregnant
- Take a medicine that requires G6PD testing
- Have had a previous G6PD result or genetic test

What happens during the test

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

The blood draw generally takes less than five minutes. A small amount of blood is collected into a tube and sent to a laboratory.

Newborn testing may use blood from a heel prick, cord blood, or a vein, depending on local practice and the testing method.

Understanding your results

Results are usually reported as the amount of G6PD activity in relation to the number or mass of red blood cells. Some laboratories report activity per gram of haemoglobin. Others may describe the result as normal, intermediate, or deficient.

There is no single reference range that applies to every laboratory. The method, units, age, biological sex, pregnancy status, medicines, recent transfusion, and clinical situation can all affect interpretation. Use the range printed on your own report.

A result within the laboratory's expected range usually means that enough G6PD activity was detected in the tested cells. It does not completely rule out deficiency if the test was done during or soon after haemolysis, or after a transfusion.

A low result supports G6PD deficiency. How low the activity is may help with decisions about medicines, but it does not predict the severity of every future reaction.

An intermediate result can occur when the sample contains a mixture of cells with different activity levels. This is particularly relevant for people with two X chromosomes. A repeat

quantitative test or genetic testing may sometimes help clarify the result.

What affects the results

The timing of this test matters.

During acute haemolysis, older and more vulnerable red blood cells may be destroyed first. The remaining blood contains a larger proportion of young red blood cells, called reticulocytes , which generally have more G6PD activity. The result can therefore appear normal even when deficiency is present.

A recent blood transfusion can also produce a misleading result. Donor red blood cells may have normal enzyme activity and temporarily mask your own lower activity.

Other influences include:

Most foods, coffee, ordinary exercise, and the time of day do not meaningfully change G6PD activity. They do not require special preparation.

Medicines or infections may trigger haemolysis in someone with deficiency, but they do not usually create an inherited G6PD deficiency. Their main effect on testing is indirect: if haemolysis has already happened, the result may be falsely reassuring.

- A high reticulocyte count after bleeding or treatment for anaemia
- A very high white blood cell count if those cells are not removed before testing
- Delays in testing or incorrect sample temperature, which can reduce measured activity
- The laboratory method and the cutoff used to classify results
- Differences among red blood cell populations in people with two X chromosomes

Accuracy and limitations

A quantitative enzyme test, which gives a measured activity level, generally provides more information than a qualitative screening test that reports only whether activity is above or below a cutoff.

Qualitative screening tests can identify many people with clearly low activity. However, they may miss intermediate deficiency, especially in people with two X chromosomes whose blood contains a mixture of cells with different G6PD activity.

No single percentage describes how often testing misses deficiency. Accuracy changes with the method, cutoff, sample handling, age, red blood cell turnover, transfusion history, and

timing after haemolysis.

The most important false-negative result is a normal-looking level during or soon after acute haemolysis. If suspicion remains, repeat testing after the red blood cell population has recovered may give a clearer answer.

A falsely low result is less common but may occur if enzyme activity falls because the sample was stored or transported incorrectly. Laboratories use handling requirements and quality checks to reduce this risk.

Genetic testing can look for changes in the G6PD gene. It may be useful when enzyme results remain unclear, when a familial variant is known, or when detailed medicine decisions require clarification. Genetic testing does not directly measure current enzyme activity and may not detect every possible variant.

Risks and complications

A blood draw may cause brief discomfort, a small bruise, or minor bleeding where the needle entered. Some people feel light-headed or faint, but serious complications are uncommon.

What happens next

If the result is normal and the sample was taken at a reliable time, no further G6PD testing may be needed. The result may then be used alongside other information to guide treatment or medicine choices.

If the result is low or intermediate, you may be given information about medicines and other triggers that could cause haemolysis. Do not assume that every medicine warning applies equally to every result; risk can differ by drug, dose, and measured enzyme activity.

Repeat testing may be arranged if the sample was collected during haemolysis, after a transfusion, or when the result does not fit the rest of the clinical picture. A quantitative test or genetic test may be considered if an earlier screen was unclear.

Routine follow-up is appropriate for discussing an unexpected result, family testing, or future medicine choices.

Seek urgent medical advice if you develop new jaundice, dark urine, marked weakness, or breathlessness after an infection, food exposure, or new medicine. Seek emergency help for severe difficulty breathing, chest pain, fainting, confusion, or rapidly worsening symptoms.

Common questions

Can I drink coffee before the test?

Yes. Coffee does not usually affect G6PD enzyme activity. If other fasting blood tests are being collected, follow the instructions for those tests.

Does the time of day matter?

No. G6PD activity does not normally change enough during the day to require morning or afternoon testing.

Can I exercise beforehand?

Ordinary exercise is unlikely to affect the result. If you are unwell, severely anaemic, or recovering from haemolysis, ask whether the timing should be changed.

Can the test be normal even if I have G6PD deficiency?

Yes. This can happen during or soon after haemolysis because younger red blood cells have higher enzyme activity. A recent transfusion can also mask lower activity.

How long after a transfusion should I wait?

There is no single waiting period suitable for everyone. It depends on the amount transfused, your red blood cell turnover, and why testing is needed. The laboratory or specialist team may recommend delayed or repeat testing.

Will this test tell me which medicines are safe?

Not by itself. The result helps with medicine decisions, but each medicine has its own guidance. The dose, reason for treatment, measured enzyme activity, and available alternatives also matter.

Sources

- ARUP Consult: Glucose-6-Phosphate Dehydrogenase Deficiency
- Mayo Clinic Laboratories: Glucose 6-Phosphate Dehydrogenase Enzyme Activity, Blood
- MedlinePlus Medical Test: G6PD Test
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- Gammal RS, et al. Expanded CPIC Guideline for Medication Use in the Context of G6PD Genotype. Clinical Pharmacology & Therapeutics. 2023;113(2):333-341

- World Health Organization: Technical consultation to review the classification of glucose-6-phosphate dehydrogenase deficiency