TEST

RBC count

An RBC count measures the number of red blood cells in your blood.

WHAT IT MEASURES
Number of red blood cells in a given blood volume

SAMPLE
Blood

FASTING NEEDED?
No, unless required for other tests

HOW LONG IT TAKES
About 5 to 10 minutes

RESULTS IN
Usually same day; longer at some laboratories

USED FOR
Screening, diagnosis support, and monitoring

MAIN LIMITATION
Hydration changes concentration without changing total red cell mass

Overview

A red blood cell count, or RBC count, measures how many red blood cells are present in a specific volume of blood. Red blood cells carry oxygen from your lungs to your tissues. They contain haemoglobin, the protein that binds oxygen.

The RBC count is usually part of a complete blood count, also called a CBC or full blood count. A CBC also measures haemoglobin, haematocrit, white blood cells, platelets, and red blood cell size.

The RBC count is not the same as haemoglobin or haematocrit. Haemoglobin measures the amount of oxygen-carrying protein in your blood. Haematocrit estimates how much of your blood volume consists of red blood cells. Clinicians usually interpret these measurements together.

Why the test is ordered

An RBC count can help assess whether your blood contains fewer or more red blood cells than

expected.

A low count may occur with blood loss, reduced red blood cell production, or faster destruction of red blood cells. Possible causes include iron deficiency, vitamin deficiency, kidney disease, inflammation, inherited blood conditions, and some medicines. The count alone cannot identify the cause.

A high count may occur when your body makes extra red blood cells, such as in response to low oxygen. It can also result from dehydration, which reduces the liquid portion of blood and makes the cells appear more concentrated.

The test may also be used to monitor a known condition or a treatment that can affect blood cell production.

Who should have the test

An RBC count may be included in blood testing when you have symptoms such as tiredness, weakness, breathlessness, unusual bleeding, or headaches. These symptoms have many possible causes and do not necessarily mean your RBC count is abnormal.

The test may also be ordered:

Routine testing is not needed at the same frequency for everyone. Your health history, symptoms, medicines, and previous results help determine when testing is useful.

- As part of a general health assessment
- During pregnancy or before some procedures
- To monitor kidney, blood, inflammatory, or bone marrow conditions
- Before or during treatments that may affect blood cell production
- After significant bleeding or a blood transfusion

How to prepare

You do not normally need to fast for an RBC count. You can usually eat and drink as normal.

If the same blood sample will be used for tests that require fasting, follow the instructions provided for those tests. Water is generally allowed during fasting, but confirm the instructions you received.

Tell the person ordering the test about recent bleeding, pregnancy, blood transfusions, high-altitude travel, and medicines or supplements. Staying normally hydrated may make the

result more representative of your usual level. Do not deliberately drink excessive amounts of water.

What happens during the test

A healthcare professional usually takes blood from a vein in your arm. They clean the skin, place a band around your upper arm, and insert a small needle. The blood is collected into a tube containing a substance that prevents clotting.

The needle is normally in place for less than a minute. The full appointment often takes about 5 to 10 minutes.

In some settings, especially for babies or young children, blood may be collected from a heel or finger instead.

Understanding your results

Results are commonly reported as cells per litre or cells per microlitre. Your report should show the unit and the laboratory's reference range.

Do not compare a number from one laboratory directly with a range from another without checking the units. Reference ranges and interpretation vary by laboratory, age, sex, pregnancy status, medicines, altitude, and clinical context.

A result outside the range does not by itself diagnose a condition. A mildly low or high result can be temporary or related to changes in blood fluid volume.

Haemoglobin, haematocrit, and red blood cell size provide important context. For example, anaemia is generally assessed mainly through haemoglobin rather than the RBC count alone. Some inherited conditions can produce many small red blood cells, so the RBC count may appear normal or high even when haemoglobin is low.

Trends are often more useful than one isolated measurement. If you have previous CBC results, your clinician may compare them with the new result.

What affects the results

Several factors can change the RBC count without representing a lasting change in red blood cell production:

Occasionally, the sample itself affects the result. Cold-reacting antibodies can make red blood

cells clump together, causing an automated machine to count too few cells. A delayed, clotted, or poorly collected sample may need to be repeated.

- Hydration: Dehydration concentrates the blood and can raise the measured count. Excess fluid or intravenous fluids can lower it through dilution.
- Pregnancy: Blood plasma usually expands more than red blood cell mass, which can lower the measured concentration.
- Altitude: Living or spending time at high altitude can increase red blood cell production because less oxygen is available.
- Recent exercise: Strenuous exercise can temporarily concentrate the blood through fluid shifts.
- Posture: Moving from lying down to standing can cause small concentration changes.
- Smoking or carbon monoxide exposure: These can reduce oxygen delivery and sometimes increase red blood cell production.
- Recent bleeding: The count may change over time as fluid volume and red blood cell production adjust.
- Recent transfusion: Donated red blood cells can affect the count and may make it harder to assess your usual level.
- Medicines and treatments: Chemotherapy may reduce cell production. Testosterone and medicines that stimulate red blood cell production may increase it.
- Altered red cell turnover: Conditions that destroy cells early or increase their replacement can change the count and related measurements.

Accuracy and limitations

Modern laboratory analysers count large numbers of cells and are generally precise. Laboratories use quality checks and may inspect a blood smear under a microscope when results appear unusual.

There is no single rate for how often an RBC count misses a condition or incorrectly suggests one. This is because the test is not designed to diagnose one specific disease, and different conditions affect the count in different ways.

A normal count does not rule out every blood disorder. Haemoglobin may be low despite a normal RBC count, and early disease may not yet have changed the number of cells. Conversely, dehydration can produce a high count even when the body has not made extra red blood cells.

Other tests may be more useful for answering specific questions. These can include a repeat CBC, blood smear, reticulocyte count for newly made red cells, iron studies, vitamin B12 or folate tests, kidney tests, oxygen measurements, or haemoglobin testing for inherited conditions.

Risks and complications

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

What happens next

If your result is within the laboratory's range and your other measurements are reassuring, no specific follow-up may be needed.

A mildly abnormal result is often reviewed alongside your symptoms, medical history, and the rest of the CBC. Your clinician may repeat the test, particularly if dehydration, recent exercise, illness, pregnancy, bleeding, or a sample problem could have affected it.

Further testing may be appropriate if the abnormality persists or if haemoglobin, haematocrit, cell size, white blood cells, or platelets are also abnormal.

An RBC result alone is rarely an emergency. Seek urgent medical care for severe difficulty breathing, chest pain, fainting, new confusion or weakness, uncontrolled bleeding, or blue or grey lips or skin. Otherwise, arrange routine follow-up to discuss an unexpected result.

Common questions

Can I drink coffee before an RBC count?

Yes, if you are having only an RBC count or CBC. If other blood tests require fasting, you may be asked to have only water. Follow the instructions for the full set of tests.

Does the time of day matter?

An RBC count usually does not need to be taken at a particular time. Hydration, posture, and daily activity can cause small changes, so repeat tests are sometimes done under similar conditions.

Can I exercise beforehand?

Normal activity is usually fine. Strenuous exercise can temporarily concentrate your blood, so

avoiding a hard workout beforehand may provide a more typical baseline when that matters.

Do I need to stop my medicines?

Do not stop prescribed medicines for an RBC count unless the prescriber specifically tells you to. Provide an up-to-date list because some medicines can affect red blood cell production.

Can my period affect the result?

Menstrual bleeding, especially if heavy or prolonged, can contribute to a low count over time. Tell your clinician if your periods have changed or are unusually heavy.

How soon after a transfusion is the result reliable?

The count can be measured immediately, but it will include transfused red blood cells and may not represent your usual level. Interpretation depends on when and why the transfusion was given.

Sources

- U.S. National Library of Medicine, MedlinePlus: Red Blood Cell Count
- U.S. National Library of Medicine, MedlinePlus: Complete Blood Count
- National Health Service: Red blood cell count
- Merck Manual Professional Edition: Evaluation of Anemia
- Briggs C, Culp N, Davis B, d'Onofrio G, Zini G, Machin SJ. ICSH guidelines for the evaluation of blood cell analysers . International Journal of Laboratory Hematology . 2014;36(6):613-627.