TEST

Blood differential test

A blood differential measures the numbers and proportions of different white blood cells.

WHAT IT MEASURES
Five main types of white blood cells and their proportions

SAMPLE
Blood from a vein

FASTING NEEDED?
No, unless other ordered tests require it

HOW LONG IT TAKES
Usually 5 to 10 minutes

RESULTS IN
Same day to several days, varying by laboratory

USED FOR
Diagnosis and monitoring

MAIN LIMITATION
Percentages can mislead when the total white cell count changes

Overview

A blood differential measures the different types of white blood cells in your blood. These cells are part of your immune system and help your body respond to infections, inflammation, allergies and other health problems.

The test usually measures five main cell types:

A differential is often included with a complete blood count, or CBC. A CBC also measures total white blood cells, red blood cells, haemoglobin and platelets.

- Neutrophils , which respond especially to bacterial infection and tissue injury
- Lymphocytes , which are involved in antiviral like acyclovir or oseltamivir responses and antibody production
- Monocytes , which help remove damaged cells and germs
- Eosinophils , which may increase with allergies, some skin conditions and certain parasites
- Basophils , which take part in allergic and inflammatory responses

Why the test is ordered

A blood differential can help explain why the total white blood cell count is high or low and show whether a particular cell type has changed.

It may be ordered for symptoms linked to infection, inflammation, an immune condition or a blood disorder. Examples include ongoing fever, repeated infections, swollen lymph nodes, unexplained tiredness or an unusual rash. These symptoms have many possible causes, so the test does not provide a diagnosis by itself.

It can also monitor a condition or treatment. Chemotherapy and medicines that affect the immune system can change white blood cell numbers.

Who should have the test

You may have a differential as part of a CBC when being assessed for new symptoms, following up an abnormal blood count or having treatment monitored.

A differential is not needed with every CBC. Its usefulness depends on why the blood count was ordered and whether any findings need closer examination.

Children, adults and pregnant people can have the test. Results must be compared with a range suited to the person's age and circumstances.

How to prepare

No fasting is needed for a blood differential by itself. You can usually eat, drink water and take your usual medicines.

Other tests collected at the same appointment may require fasting or timed preparation. Follow the instructions for the full set of tests.

Tell the person arranging the test about prescription medicines, non-prescription medicines and supplements. Do not stop a medicine unless specifically advised to do so.

Strenuous exercise can temporarily raise some white blood cell counts. If practical, avoid intense exercise shortly before the blood draw and sit quietly for a few minutes beforehand.

What happens during the test

A healthcare worker 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. Blood is collected into a tube that prevents clotting.

The needle is usually in place for less than a minute, and the appointment often takes 5 to 10 minutes.

Most differentials are performed by an automated analyser. If it identifies unusual cells or cannot classify them reliably, laboratory staff may examine a stained drop of blood under a microscope. This is called a blood film or peripheral blood smear.

Understanding your results

Results may show each white cell type as a percentage and as an absolute count , meaning the actual number in a set volume of blood.

The absolute count is often more informative. A high neutrophil percentage, for example, does not always mean there are too many neutrophils. It may look high because another cell type is low.

Your report may include:

Reference ranges vary by laboratory, age, sex, pregnancy status, medicines and clinical context. Use the range printed on your report.

A result outside that range is not automatically evidence of disease. Infection, inflammation, physical stress, medicines and normal variation can affect the differential. The full CBC, your symptoms and changes over time matter more than one isolated number.

- The total white blood cell count
- Absolute counts and percentages for each cell type
- Flags for high, low, immature or unusual-looking cells
- Comments from a laboratory specialist if a blood film was examined

What affects the results

Factors that may alter white blood cell counts include:

Medicines can also change the pattern. Corticosteroids like prednisone or hydrocortisone can raise circulating neutrophils while lowering some other white cell types. Chemotherapy may reduce white cells. Lithium, medicines that stimulate bone marrow, some seizure medicines and some immune treatments can also affect results.

Delayed testing, clotting in the tube or cell changes during storage can interfere with classification. The laboratory may repeat the analysis or request a fresh sample rather than report an unreliable result.

- Recent infection, injury, surgery, burns or vaccination
- Strenuous exercise, emotional stress, pain or a seizure
- Pregnancy, labour and the period soon after birth
- Smoking, age and time of day
- Dehydration
- Recent transfusion or major blood loss
- Removal or reduced function of the spleen

Accuracy and limitations

Automated analysers count many cells and are generally reliable for common, mature white blood cells. However, they may have difficulty separating immature, damaged or abnormal cells. A machine flag can be a false alarm, while small numbers of unusual cells may occasionally be missed.

Accuracy varies with the analyser, cell type, sample and condition being investigated. There is no single figure for how often a differential misses a condition or reports an abnormality that is not present.

A manual blood film can clarify cell appearance, but it examines fewer cells and may be less precise for rare cell types. If a specific blood disorder is suspected, flow cytometry, genetic testing or a bone marrow examination may provide information that a differential cannot.

The test can identify a pattern but usually cannot establish its cause.

Risks and complications

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

What happens next

A result only slightly outside the laboratory range may need no immediate action. It may be

compared with earlier results or repeated after a temporary illness has passed.

More substantial or persistent changes may lead to a blood film, repeat CBC or tests for a possible cause. Follow-up depends on which cells are affected, the absolute counts, other blood results and your symptoms.

Routine follow-up is appropriate if you feel well and have been asked to discuss or repeat an abnormal result.

Seek prompt medical advice if you have been told that your neutrophil count is very low and you develop a fever or feel acutely unwell. Use emergency services for severe trouble breathing, confusion, fainting or other rapidly worsening symptoms rather than waiting for a routine appointment.

Common questions

Can I drink coffee before the test?

Yes, if you are only having a blood differential. Coffee may not be allowed if another test requires fasting, so check the instructions for the whole appointment.

Does the time of day matter?

White blood cell numbers can change during the day. Timing is rarely critical for a routine test, but follow-up samples may be collected at a similar time for easier comparison.

Can I exercise beforehand?

Light activity is unlikely to be a problem. Avoid a hard workout shortly before testing if possible because it can temporarily raise the white blood cell count.

Do I need to stop my medicines?

Usually not. Some medicines affect white blood cells, but stopping them without advice may be unsafe. Make sure your medicines are considered when the result is interpreted.

Why was a blood film added?

The analyser may have detected cells it could not classify, immature cells or an unexpected pattern. A laboratory professional examines the cells under a microscope for more detail.

Will an abnormal result mean I have an infection?

Not necessarily. Infection is one possible cause, but inflammation, medicines, physical stress and blood or immune conditions can produce similar changes. Interpretation requires the full blood count and clinical context.

Sources

- MedlinePlus Medical Test: Blood Differential
- MedlinePlus Medical Test: Complete Blood Count
- Mayo Clinic: Complete blood count
- Merck Manual Professional Edition: Overview of White Blood Cell Disorders
- American Family Physician: Evaluation of Patients with Leukocytosis
- International Council for Standardization in Haematology: Recommendations for standardization of nomenclature and grading of peripheral blood cell morphological features