

Complete Blood Count (CBC)



Description and Clinical Significance

In a complete blood count determination, the following parameters are measured from EDTA whole blood. Further important values can be calculated from these. The analyses and calculations are performed automatically; microscopic verification by medical laboratory technicians is only required in cases of ambiguity or severely abnormal findings.

Parameters and Reference Ranges

(Guideline values; differences exist depending on age and sex):

Red Blood Count (RBC):

- Erythrocyte Count (RBC): 4.0–5.7 T/L
- Hemoglobin (Hb): 11.8–17.0 g/dL
- Hematocrit (Hct): 37–50 %
- MCV (Mean Corpuscular Volume, calculated): 82–98 fL
- MCH (Mean Corpuscular Hemoglobin, calculated): 27–32 pg
- MCHC (Mean Corpuscular Hemoglobin Concentration, calculated): 31–35 g/dL
- Reticulocyte Count: 30–100 G/L
- Erythrocyte Morphology: (from stained blood smear, via microscopy or digital image recognition)

Elevated Values:

An increase in erythrocyte count, hematocrit, or hemoglobin can be caused by diseases of the heart or lungs, or by increased autonomous production in myeloproliferative neoplasms (essential thrombocythemia, polycythemia vera, chronic myeloid leukemia, etc.).

Decreased Values:

Low hemoglobin levels (anemia) can have various causes. Based on erythrocyte indices, the reticulocyte count, and other parameters, the potential cause can be identified. For details on the workup of anemia, see basic hematology literature.

White Blood Count (WBC):

Leukocyte Count (WBC): 3.6–9.5 G/L

Differential Blood Count: Relative (%) and absolute (G/L) count of the various leukocyte types (neutrophil, eosinophil, basophil granulocytes; lymphocytes; monocytes; precursors, etc.); performed from a stained blood smear via microscopy or digital image recognition. Deviations in the leukocyte count or the differential blood count indicate a hematologic systemic disease and require further diagnostic investigation.

Platelet Count (PLT): 150–350 G/L

Elevated Values:

Reactive elevation in infections, trauma, surgical interventions, or pregnancy ; increased autonomous production in myeloproliferative neoplasms (essential thrombocythemia, polycythemia vera, chronic myeloid leukemia, etc.).

Decreased Values:

Severely low platelet counts lead to an increased risk of bleeding, which increases significantly, especially at counts below 10 G/L. The causes of thrombocytopenia are diverse. For further investigation, use this app or hematology guidelines, or the Onkopedia guideline on thrombocytopenia.

Pre-analytics

A complete blood count analysis is performed automatically from EDTA whole blood using specialized analyzers. Attention must be paid to precise blood collection, avoidance of contamination, correct filling of the blood collection tube, and thorough mixing with the EDTA.

References

Thomas L, Labor und Diagnose, 2023, Release 5: <https://www.labor-und-diagnose.de/index.html>

Parameterkatalog des Klinischen Instituts für Labormedizin, Med.Univ.Wien und AKH Wien:

<https://www.akhwien.at/default.aspx?pid=3982>

Leistungsverzeichnis der Klinischen Chemie, Univ.Klinikum Ulm:

<https://www.uniklinik-ulm.de/zentrale-einrichtung-klinische-chemie/leistungsverzeichnis.html>

Onkopedia Leitlinie zur Thrombozytopenie:

<https://www.onkopedia.com/de/onkopedia/guidelines/thrombozytopenien/@@guideline/html/index.html>