

CHAPTER – 10.1 Haematological Tests

10.1 COMPLETE BLOOD COUNT (CBC)

- The complete blood count (CBC) is an essential comprehensive blood panel that allows your doctor to evaluate each type of cell in your blood.
- The CBC measures the number of red blood cells (RBC), white blood cells (WBC), and platelets (PLT). Each of these types of blood cells performs important functions, so determining their levels can provide important health information.
- A CBC may be used to help diagnose a range of health conditions and also monitor how the body is affected by different diseases or medical treatments.

10.2 RED BLOOD CELLS MEASUREMENT

RBC, also called erythrocytes, carry oxygen from your lungs to the tissues and organs in your body. A CBC test includes several basic measurements of RBCs:

- **RBC count** is the total number of RBCs in your blood sample.
- **Hemoglobin** measures the amount of this oxygen-carrying protein that is found inside RBCs.
- **Hematocrit** measures the proportion of your total blood volume that consists of RBCs.

A CBC also provides details about the physical features of RBC. These are known as RBC indices, of which there are several kinds:

- **Mean corpuscular volume (MCV)** is a measurement of the average size of RBC.
- **Mean corpuscular hemoglobin (MCH)** is the average amount of hemoglobin inside each RBC.
- **Mean corpuscular hemoglobin concentration (MCHC)** is a calculated measurement of how concentrated hemoglobin is within RBC.
- **Red cell distribution width (RDW)** is a measurement of the variation in the size of your RBC.

The CBC may include the reticulocyte count, the total number of newly released young RBCs in your blood sample. It may also be measured as a percentage.

10.3 WHITE BLOOD CELLS MEASUREMENT

WBCs, also called leukocytes, are an important part of the body's immune system.

A standard CBC includes measures of the WBC count, which is the total number of WBCs in a sample of blood.

A common variation of the CBC is the CBC with differential. The WBC differential is a breakdown of the amount of each of five different types of WBCs:

- **Neutrophils:** Neutrophils make up the greatest percentage of WBCs and are produced by the bone marrow to fight a diverse array of inflammatory and infectious diseases.
- **Lymphocytes:** Lymphocytes such as B-cells and T-cells are found primarily in the lymph system and fight bacteria and other pathogens in the blood.
- **Monocytes:** Monocytes work in conjunction with neutrophils to combat infections and other illnesses while removing damaged or dead cells.
- **Eosinophils:** Eosinophils are WBCs activated in response to allergies and some types of infections.
- **Basophils:** Basophils are involved in the early identification of infections as well as wound repair and allergic reactions.

Initial blood testing may include a CBC with differential, or this test may be done after an abnormal initial standard CBC. Because each WBC type has a different function, the CBC with differential can be used to identify abnormal levels of specific WBCs, which may offer clues about an underlying health concern.

10.4 PLATELET MEASUREMENT

Platelets (PLT), also called thrombocytes, are cell fragments that circulate in the blood and play an essential role in blood clotting. When there is an injury and bleeding begins, PLT help stop bleeding by sticking to the injury site and clumping together to form a temporary plug.

A standard component of the CBC is the PLT count, which is the number of PLT in your blood sample.

In some cases, your doctor may have the laboratory also measure the mean PLT volume (MPV), which determines the average size of PLT.

Adult normal ranges:

Parameter	Male	Female
Haemoglobin g/L	135 - 180	115 - 160
WBC $\times 10^9/L$	4.00 - 11.00	4.00 - 11.00
Platelets $\times 10^9/L$	150 - 400	150 - 400
MCV fL	78 - 100	78 - 100
PCV	0.40 - 0.52	0.37 - 0.47
RBC $\times 10^{12}/L$	4.5 - 6.5	3.8 - 5.8
MCH pg	27.0 - 32.0	27.0 - 32.0
MCHC g/L	310 - 370	310 - 370
RDW	11.5 - 15.0	11.5 - 15.0
Neutrophils	2.0 - 7.5	2.0 - 7.5
Lymphocytes	1.0 - 4.5	1.0 - 4.5
Monocytes	0.2 - 0.8	0.2 - 0.8
Eosinophils	0.04 - 0.40	0.04 - 0.40
Basophils	< 0.1	< 0.1