Biomedical Engineering Department
Title of the lecture 7:- Complete blood count
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Complete blood count (CBC) is a common blood test that gives information about five major parts of your blood: three types of cells (red blood cells, white blood cells, and platelets) and two values (hemoglobin and hematocrit) .

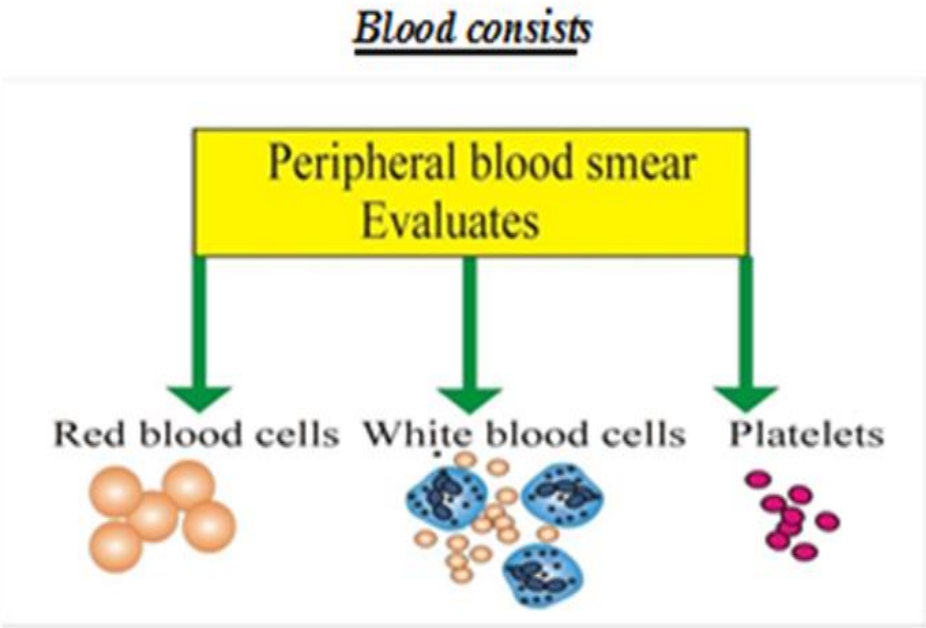

Figure - 2: Blood cells (WBCs , RBCs, and platelets) .

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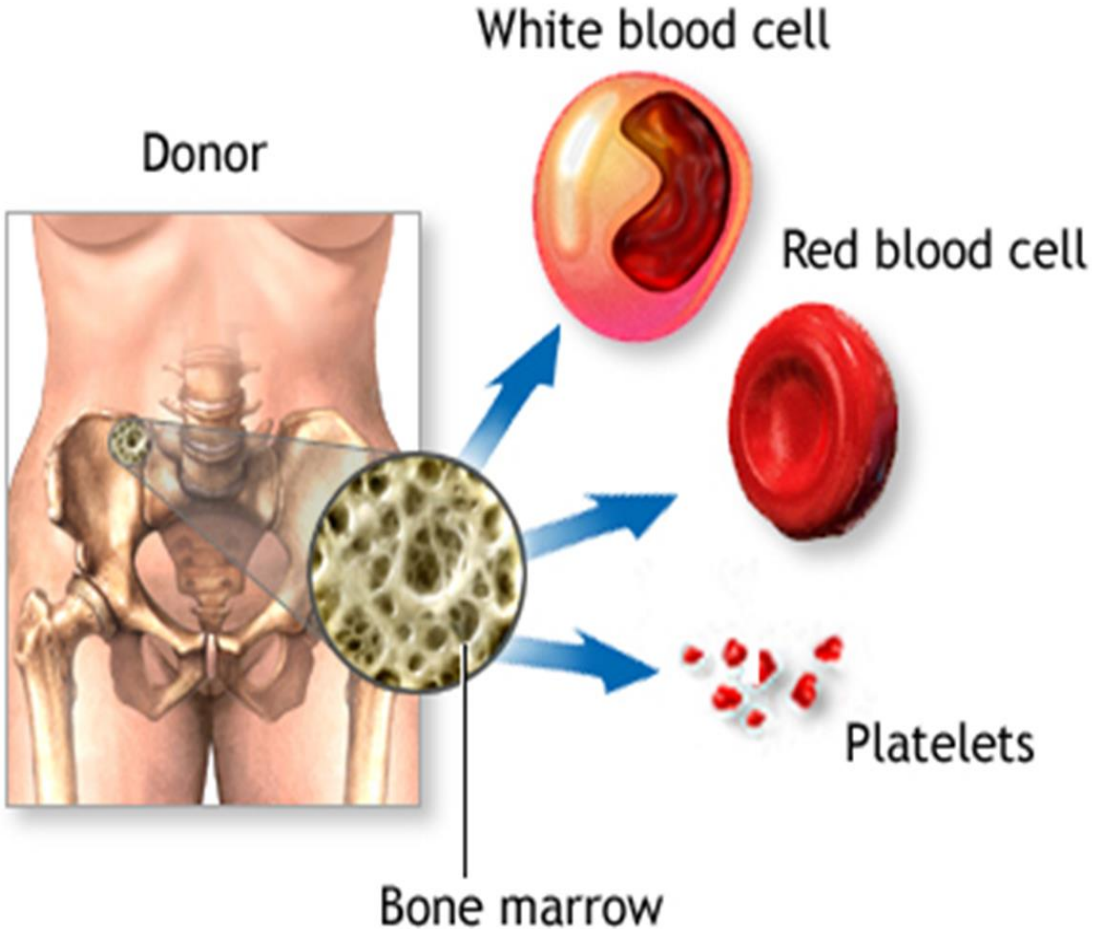


CBC can help doctor do the following.

Diagnose a health problem. Doctor may order a CBC if have unexplained symptoms like weakness, fever, redness, swelling, ,bleeding.

Monitor a health problem. Doctor may regularly order CBCs to monitor condition if have been diagnosed with a disorder that affects blood cell counts.

Monitor your treatment .Certain medical treatments can affect your blood cell counts and may require regular CBCs. Doctor can evaluate how well treatment is working based on your CBC

A standard CBC includes the following:

- WBC count
- RBC count
- Hemoglobin.
- Hematocrit.
- Mean cell volume (MCV)
- Mean corpuscular hemoglobin (MCH)
- Mean corpuscular hemoglobin concentration (MCHC)

White Blood Cell Count:

Synonyms: WBC

The white blood cell (WBC) count measures the number of WBCs (also called leukocytes) in the blood. WBCs, which help the body fight infection. An abnormal WBC count may indicate an infection, inflammation, or other stress in the body. For example, a bacterial infection can cause the WBC count to increase, or decrease, dramatically. There are 5 different types of WBC in a human body. A high WBC count is indicative of an inflammation or infection somewhere in the body, while a low WBC count can mean that the person is vulnerable to certain ailments which could include blood marrow disorder, auto-immune disorder.

WBC Normal Range

4,000 to 10,000 cells/mcL

Types of WBCs

WBCs, also called leukocytes, are an important part of the immune system. These cells help fight infections by attacking bacteria, viruses, and germs that invade the body.

White blood cells originate in the bone marrow but circulate throughout the bloodstream. There are five major types of white blood cells:

neutrophils

lymphocytes

eosinophils

monocytes

basophils

DLC is differential count. Normal values

1. Neutrophils = 48 % to 77 %
2. Lymphocytes = 10 % to 40 %
3. Eosinophils = 0.3 % to 7 %
4. Monocytes = 0.6 % to 9.6 %
5. Basophils = 0.3 to 1 %

TABLE 41.2 Differential White Blood Cell Count

Cell Type	Normal Value (percent)	Elevated Levels May Indicate
Neutrophil	54–62	Bacterial infections, stress
Lymphocyte	25–33	Mononucleosis, whooping cough, viral infections
Monocyte	3–9	Malaria, tuberculosis, fungal infections
Eosinophil	1–3	Allergic reactions, autoimmune diseases, parasitic worms
Basophil	<1	Cancers, chicken pox, hypothyroidism

Red Blood Cell Count

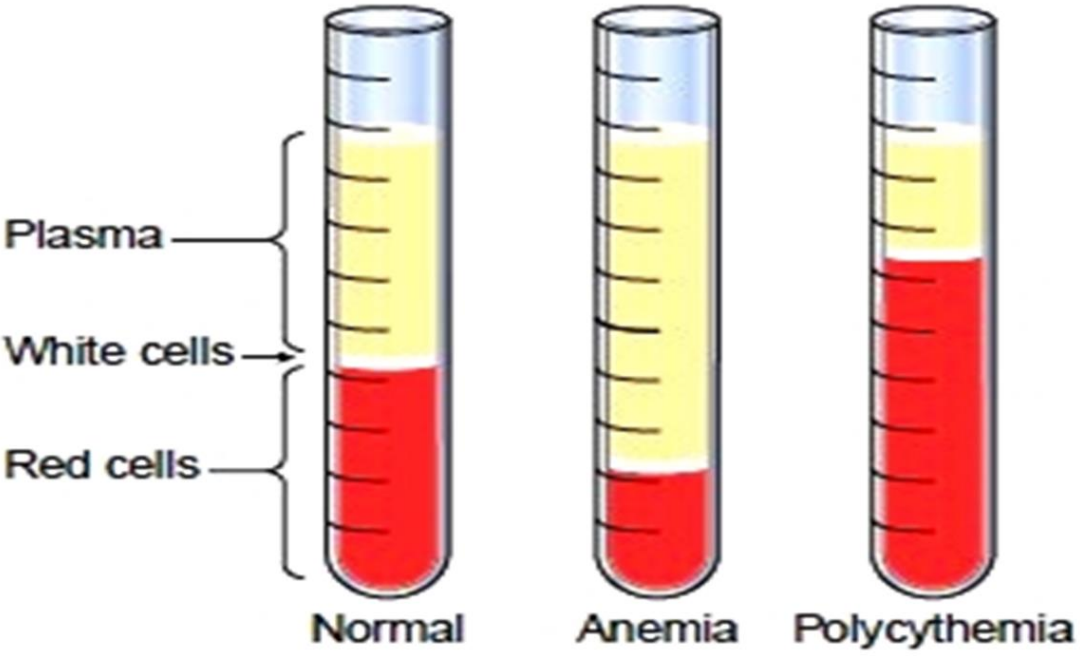
Synonyms: RBC; Erythrocyte

This measures the total number of (RBC's) Red Blood Cells in the blood. RBC's are vital to our survival since they carry oxygen (as well as carbon di-oxide) throughout the body. A deficiency (low count) of RBC may be indicative of anemia or other medical conditions. A high RBC count (or high levels of haemoglobin) could point to an underlying condition like heart disease or polycythemia.

RBC Normal Range

MEN 4.5 million to 5.5 million (cells/mcL)

WOMEN 3.8 million to 4.8 million (cells/mcL)


Plasma
White cells
Red cells
Normal
Anemia
Polycythemia

Hematocrit:

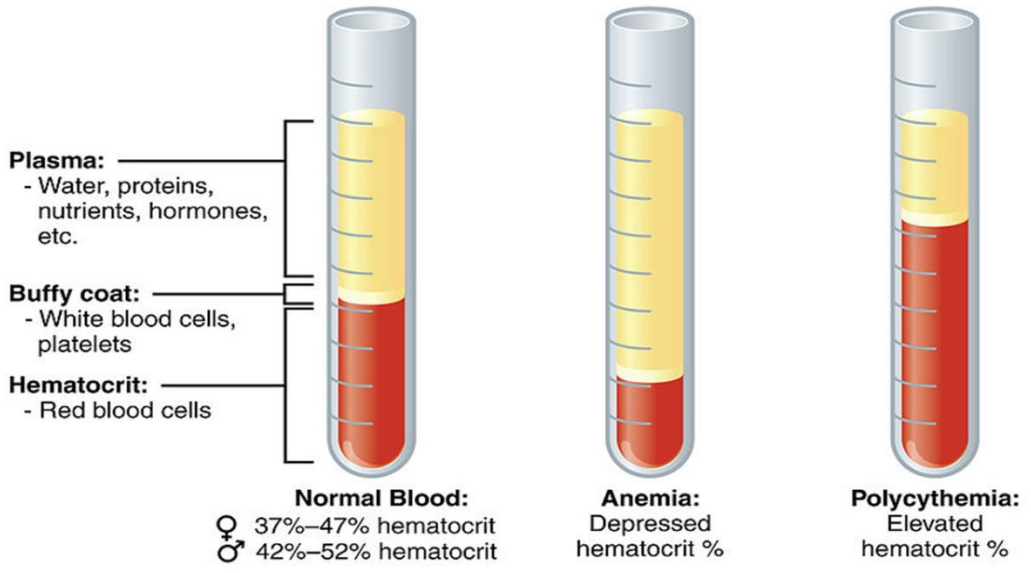
Synonyms: Hct

This is a value that tells us the ratio or percentage (of our blood) that is made up of Red Blood Cells (RBC's).

HCT Normal Range

FOR MEN 40% to 50%.

FOR WOMEN 36% to 46%.



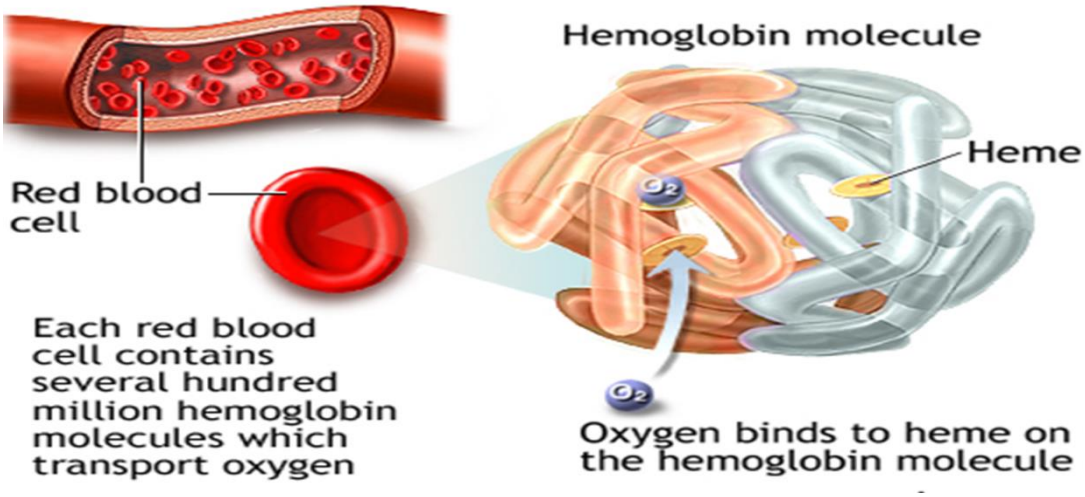
HAEMOGLOBIN Count

Haemoglobin refers to a type of protein that is found in Red Blood Cells. Haemoglobin plays a very important in body, since its primary responsible to carry oxygen to all parts of body. It can also be used to monitor the efficacy of treatment for anemia.

HAEMOGLOBIN Normal Range

MEN 13-17 gm/dl

WOMEN 12-15 grams/dl



Mean Cell Volume

Synonyms: MCV

Use: The MCV test measures the average red blood cell size, and is used to determine the presence and cause of anemia, such as microcytic anemia or macrocytic anemia. This is the average size of red blood cells. If they’re bigger than normal, your MCV goes up. That could happen if you have low vitamin B12 or folate levels. If red blood cells are smaller, you could have a type of anemia. A normal-range MCV score is 80 to 96. MCV normal range

83 to 101 fl.

Platelet Count:

Syn: Plt; Thrombocyte

platelets play an important role in blood clotting and the prevention of bleeding. When a blood vessel is damaged, platelets clump together and plug the hole until the blood clots. If the platelet count is too low, a person can be in danger of bleeding in any part of the body.

A platelet count that's lower than normal (thrombocytopenia) or higher than normal (thrombocytosis) is often a sign of an underlying medical condition, or it may be a side effect from medication.

PLATELET Normal Range

150,000 to 410,000 platelets/mcL