Blood system disorders (Hematopathology)

Blood is a fluid connective tissue constituting about 7% of our total body weight (about 5 liters in the human).

The formed elements of the blood are broadly classified as red blood cells (erythrocytes), white blood cells (leucocytes) and platelets (thrombocytes) and their numbers remain remarkably constant for each individual in health.

What is Hematology?

The word hematology comes from the Greek haima (means blood) and logos means(discourse).

Hematology is the study of blood in health and disease. It includes problems with the red blood cells, white blood cells, platelets, blood vessels, bone marrow, lymph nodes, spleen, and the proteins involved in bleeding and clotting (hemostasis and thrombosis). Hematology encompasses the study of blood cells and coagulation.

A hematologist is a medical doctor who applies this specialized knowledge to treat patients with blood conditions.

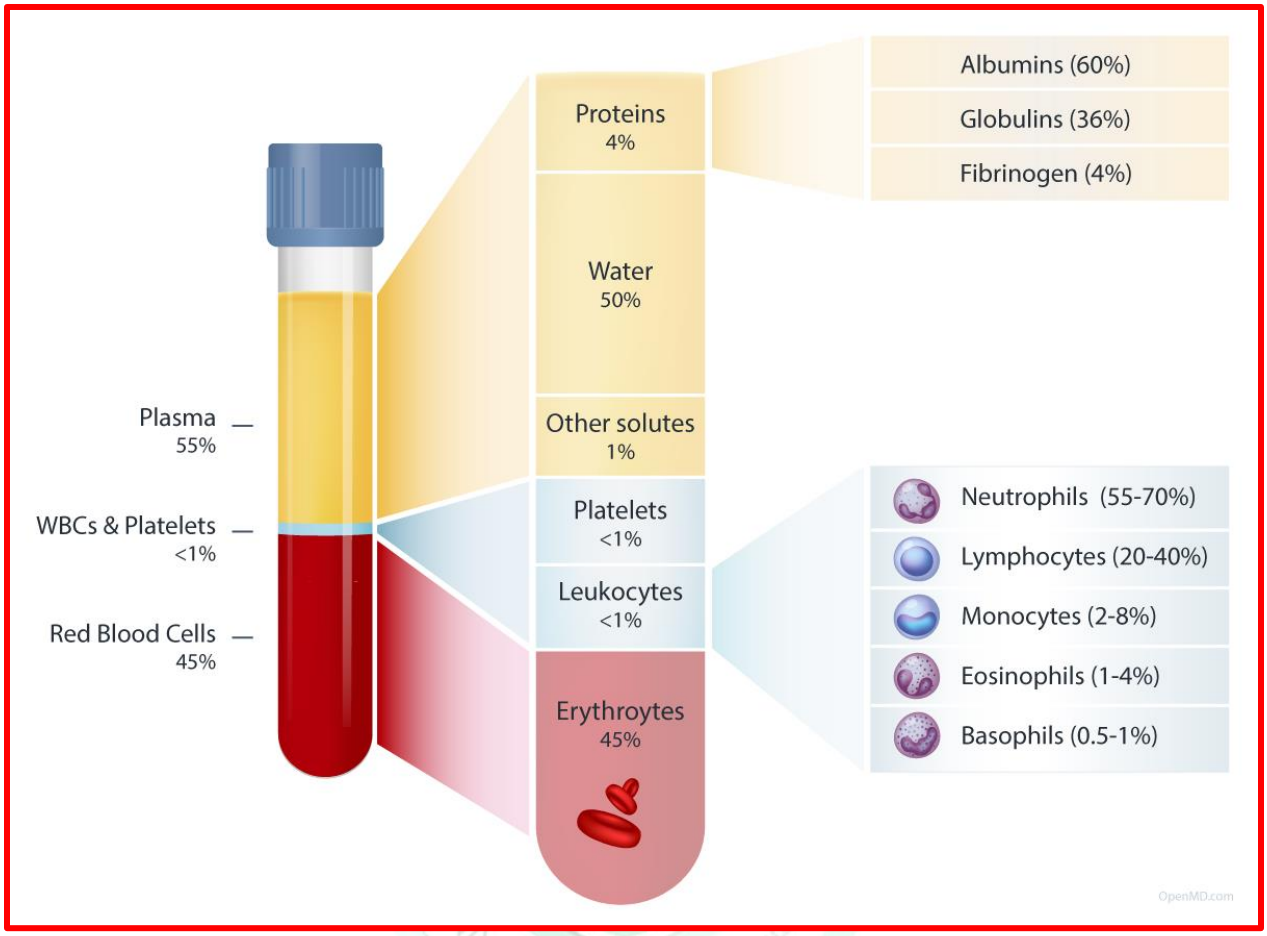
Blood disorders are conditions that keep parts of your blood from doing their jobs:

- Red blood cells carry oxygen throughout your body.

- White blood cells help protect your body from infection.

- Platelets help your blood to clot so you don't bleed more than normal.

Blood disorders may be cancerous or noncancerous.



Functions of Blood:

1. Distribution & Transport

a. Oxygen from lungs to body cells

b. Carbon dioxide from body cells to lungs

c. Nutrients from GI tract to body cells

d. Nitrogenous wastes from body cells to kidneys

e. Hormones from glands to body cells.

2.Regulation (maintenance of homeostasis)

a. Maintenance of normal body pH by blood proteins (albumin) & bicarbonate

b. Maintenance of circulatory/interstitial fluid by electrolytes that aid blood proteins (albumin)

c. Maintenance of temperature (blushed skin).

Protection

a. platelets and proteins "seal" vessel damage

b. protection from foreign material & infections by leukocytes, antibodies& complement proteins.

Anemia

Anemia a decrease in red cell mass is also defined as a decrease in the hemoglobin concentration or decrease in the hematocrit when compared with a normal group.

Anemia is functionally defined as a decrease in the competence of blood to carry oxygen to tissues thereby causing tissue hypoxia.

The symptoms of anemia depend upon the degree of reduction in the oxygen-carrying capacity.

Classification of Anemia according to Severity:

1. Mild anemia Hb < 11 – 8 g/dl

2. Moderate Hb <8 - > 5g/dl

3. Severe anemia Hb < 5 g/dl

Hemolytic anemia results from an increase in the rate of red cell destruction. The life span of the normal red cell is 100-120 days; in the hemolytic anemia varying degrees shortens it.

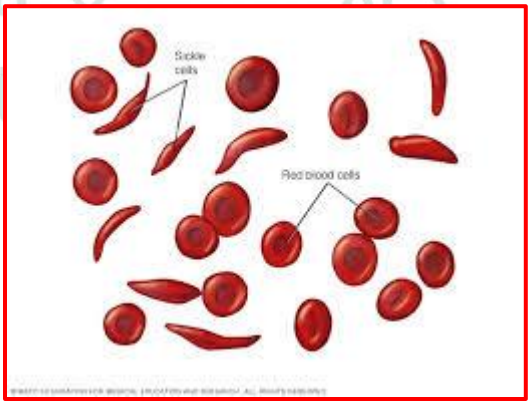
Most hemolysis occurs extravascularly; i.e. in phagocyte cells of the spleen, liver and bone marrow (monocytic-macrophage system). Hemolysis usually stems **(1)** from intrinsic abnormalities of RBC contents (Hb or enzymes or membrane (permeability structure of lipid content or **(2)** problems extrinsic to RBCs (serum antibodies (AB), trauma in the circulation or infectious agents).

Sickle cell anemia

The term sickle cell disease is used generically to describe a group of genetic disorders characterized by the production of the abnormal hemoglobin S (HbS). Sickle cell anemia (SCA) is the most common type of sickle cell disease and represents the homozygous form, in which the individual inherits a double dose of the abnormal gene, which codes for hemoglobin S.

Thalassemia

The thalassemia's are a heterogenous group of disorders with a genetically determined reduction in the rate of synthesis of one or more types of the normal hemoglobin polypeptide chain. This results in a decrease in the amount of the hemoglobin involving the affected chain.



There are two main groups of thalassemia:

1. Alpha thalassemia, affecting the synthesis of alpha chain

2. Beta Thalassemia, affecting the synthesis of Beta chainز

People with thalassemia have fewer healthy red blood cells and less hemoglobin than normal. They may also have smaller-than-normal red blood cells. A reticulocyte count (a measure of young red blood cells) may indicate that your bone marrow isn't producing enough red blood cells.