

Topic: Blood Composition and Function

Class: B.Sc Part –III (Hons.)

Paper: V

Group – B

Faculty Name: Dr. Kumari Sushma Saroj

Department: Zoology

**College: Dr. L. K. V. D College, Tajpur ,
Samastipur**

- **Red blood cells**
- Red blood cells (RBCs), also known as erythrocytes, have two main functions:
- To pick up oxygen from the lungs and deliver it to tissues elsewhere
- To pick up carbon dioxide from other tissues and unload it in the lungs

- An erythrocyte is a disc-shaped cell with a thick rim and a thin sunken centre. The plasma membrane of a mature RBC has glycoprotein and glycolipids that determine a person's blood type.
- On its inner surface are two proteins called spectrin and actin that give the membrane resilience and durability. This allows the RBCs to stretch, bend and fold as they squeeze through small blood vessels, and to spring back to their original shape as they pass through larger vessels.

- RBCs are incapable of aerobic respiration, preventing them from consuming the oxygen they transport because they lose nearly all their inner cellular components during maturation
- The cytoplasm of a RBC consists mainly of a 33% solution of hemoglobin (Hb), which gives RBCs their red colour. Haemoglobin carries most of the oxygen and some of the carbon dioxide transported by the blood.
- Circulating erythrocytes live for about 120 days. As a RBC ages, its membrane grows increasingly fragile. Without key organelles such as a nucleus or ribosomes, RBCs cannot repair themselves.
- Many RBCs die in the spleen, where they become trapped in narrow channels, broken up and destroyed. Haemolysis refers to the rupture of RBCs, where haemoglobin is released leaving empty plasma membranes which are easily digested by cells known as macrophages in the liver and spleen.

- **White blood cells:**
- White blood cells (WBCs) are also known as leukocytes. They can be divided into granulocytes and agranulocytes. The former have cytoplasm that contains organelles that appear as coloured granules through light microscopy, hence their name.
- **Granulocytes:**
- **Neutrophils:** Neutrophils are also called polymorphonuclear (PMN) because they have a variety of nuclear shapes. They play roles in the destruction of bacteria and the release of chemicals that kill or inhibit the growth of bacteria.
- **Eosinophils:** These have large granules and a prominent nucleus that is divided into two lobes. They function in the destruction of allergens and inflammatory chemicals, and release enzymes that disable parasites.
- **Basophils:** They have a pale nucleus that is usually hidden by granules. They secrete histamine which increases tissue blood flow via dilating the blood vessels, and also secrete heparin which is an anticoagulant that promotes mobility of other WBCs by preventing clotting.

- **Agranulocytes:**
- **Lymphocytes:** These are usually classified as small, medium or large. Medium and large lymphocytes are generally seen mainly in fibrous connective tissue. Lymphocytes function in destroying cancer cells, cells infected by viruses, and foreign invading cells. In addition, they present antigens to activate other cells of the immune system. They also coordinate the actions of other immune cells, secrete antibodies and serve in immune memory.
- **Monocytes:** They are the largest of the formed elements. They function in differentiating into macrophages, which are large phagocytic cells, and digest pathogens, dead neutrophils, and the debris of dead cells. Like lymphocytes, they also present antigens to activate other immune cells.