

HUMAN ANATOMY AND PHYSIOLOGY-I, BP-101(T)

UNIT-III (Body fluids and blood)

CLASS:1

TOPIC – Introduction to Body fluids and blood

There are several different types of fluids in the human body, each with its own specific function. Here are some of the most important body fluids:

1. **Blood:** Blood is a liquid connective tissue that circulates throughout the body via blood vessels. Its main function is to transport oxygen, nutrients, and hormones to the body's tissues and organs and remove waste products.
2. **Lymph:** Lymph is a clear fluid that is part of the lymphatic system. It contains white blood cells that help fight infections and is also involved in removing waste products from the body.
3. **Cerebrospinal fluid:** Cerebrospinal fluid (CSF) is a clear, colourless liquid that surrounds the brain and spinal cord. It provides cushioning and shock absorption for these organs and also helps to remove waste products.
4. **Synovial fluid:** Synovial fluid is a thick, slippery fluid that lubricates the joints and helps to reduce friction between bones.
5. **Gastric juice:** Gastric juice is a mixture of enzymes and acids secreted by the stomach to help digest food.
6. **Saliva:** Saliva is a watery fluid produced in the mouth and contains enzymes that help break down food.
7. **Sweat:** Sweat is a clear, salty fluid that is secreted by sweat glands in the skin. It helps to regulate body temperature by cooling the body through evaporation.
8. **Urine:** Urine is a liquid waste product that is produced by the kidneys and contains various substances that the body needs to eliminate, such as urea and excess water.

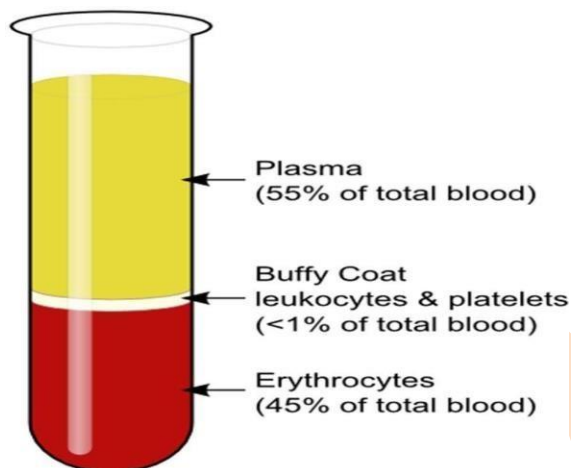
Each of these fluids plays an important role in maintaining the overall health and function of the body.

Composition of blood:

Blood is a fluid connective tissue that consists of plasma, blood cells and platelets. It circulates throughout our body delivering oxygen and nutrients to various cells and tissues. It makes up 8% of our body weight. An average adult possesses around 5-6 litres of blood.

Components of Blood:

There are many cellular structures in the composition of blood. When a sample of blood is spun in a centrifuge machine, they separate into the following constituents: Plasma, buffy coat and erythrocytes. Thus blood contains RBC, WBC, platelets and plasma.



Plasma:

The liquid state of blood can be contributed to plasma as it makes up to ~55% of blood. It is pale yellow in colour and when separated. Blood plasma consists of salts, nutrients, water and enzymes. Blood plasma also contains important proteins and other components necessary for overall health. Hence, blood plasma transfusions are given to patients with liver failure and life-threatening injuries.

Components of Blood Plasma:

Blood plasma has several protein components. Proteins in blood plasma are:

- ☐ Serum globulin
- ☐ Serum albumin
- ☐ Fibrinogen

The serum contains only globulin and albumin. Fibrinogen is absent in serum because it is converted into fibrin during blood clotting.

Functions of Plasma:

- ☐ Redistributing water where your body needs it.
- ☐ Delivering hormones, nutrients and proteins to parts of your body and helping to exchange oxygen and carbon dioxide.
- ☐ Supporting blood vessels from collapsing or clogging.
- ☐ Maintaining blood pressure and circulation.
- ☐ Regulating body temperature by absorbing and releasing heat.

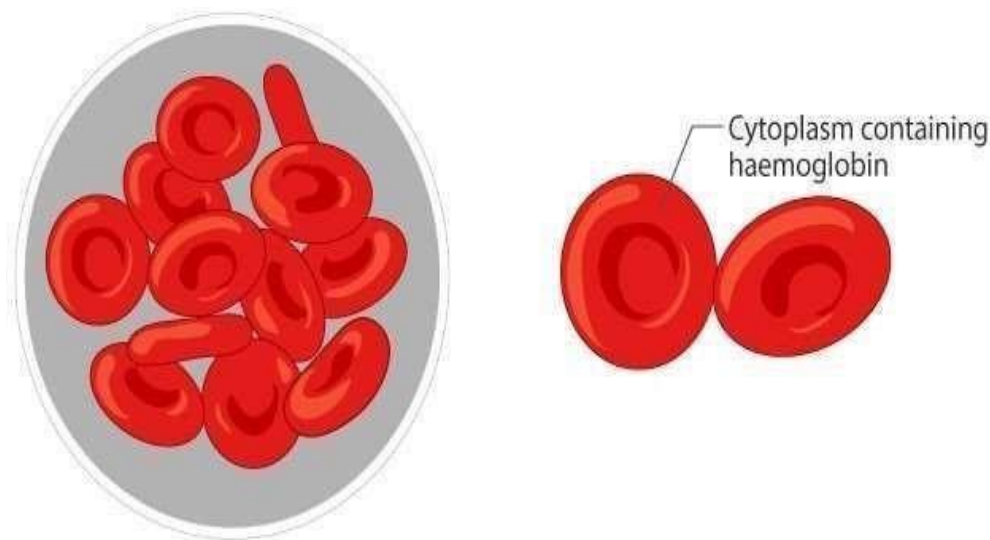
- ☐ Removing waste from cells and transporting it to your liver, lungs and kidneys for excretion.
- ☐ Helping to clot blood.
- ☐ Defense against bacterial, viral, fungal and parasitic infections.

Types of Blood Cells:

We have seen blood consist of cells known as formed elements of blood. These cells have their own functions and roles to play in the body. The blood cells which circulate all around the body are as follows:

Red blood cells (Erythrocytes):

- RBCs are biconcave cells without nucleus in humans; also known as erythrocytes.
- RBCs contain the iron-rich protein called haemoglobin; gives blood its red colour. RBCs are the most copious blood cells produced in bone marrows.
- Their main function is to transport oxygen from and to various tissues and organs.
- RBCs are formed in the red bone marrow from [hematopoietic stem cells](#) in a process known as [erythropoiesis](#).
- In adults, about 2.4 million RBCs are produced each second. The normal RBCs count is 4.5 to 5 millions per cu.mm.
- RBCs have a lifespan of approximately 100-120 days.
- After they have completed their lifespan, they are removed from the bloodstream by the [spleen](#).



White blood cells (Leucocytes):

Leucocytes are colourless blood cells. They are colourless because it is devoid of haemoglobin. They are further classified as granulocytes and agranulocytes. WBCs mainly contribute to immunity and defence mechanism.

Types of White Blood Cells:

There are five different types of White blood cells and are classified mainly based on the presence and absence of granules.

- Granulocytes
- Agranulocytes

Granulocytes:

They are leukocytes, with the presence of granules in their cytoplasm. The granulated cells include- eosinophil, basophil, and neutrophil.

Eosinophils:

- They are the cells of leukocytes, which are present in the immune system.
- These cells are responsible for combating infections in parasites of vertebrates and for controlling mechanisms associated with allergy and [asthma](#).
- Eosinophil cells are small granulocyte, which are produced in the bone marrow and makes 2 to 3 per cent of whole WBCs. These cells are present in high concentrations in the digestive tract.

Basophils:

- They are the least common of the granulocytes, ranging from 0.5 to 1 per cent of WBCs.
- They contain large cytoplasmic granules, which play a vital role in mounting a non-specific immune response to pathogens, and allergic reactions by releasing histamine and dilating the blood vessels.
- These white blood cells have the ability to be stained when exposed to basic dyes, hence referred to as basophil.
- These cells are best known for their role in asthma and their result in inflammation and bronchoconstriction in the airways.
- They secrete serotonin, histamine and heparin.

Neutrophils:

- They are normally found in the bloodstream.
- They are predominant cells, which are present in pus.
- Around 60-65 percent of WBCs are neutrophils with a diameter of 10-12mm.

IMPORTANT QUESTIONS:**2M QUESTIONS:**

1. Define blood.
2. Classify blood groups.
3. What is haemoglobin.
4. Define Artery and Vein.
5. Define: 1. blood Pressure 2. Hematopoiesis 3. Erythropoiesis 4. Anaemia.
6. Explain blood transfusion.
7. Explain reticulo-Endothelial System.
8. Define blood coagulation and enlist its pathways.
9. What is lymph.

5M QUESTIONS:

- 1) Write about coagulation of blood.
- 2) Explain the process of haemoglobin formation in brief.
- 3) Write about composition and functions of blood.
- 4) Write a note on anemia with its types.
- 5) Write an explanatory note on lymphatic system.
- 6) Discuss about ABO blood group system.

10M QUESTIONS:

- 1) Write about coagulation of blood.
- 2) Write about composition and functions of blood.
- 3) Write an explanatory note on lymphatic system.
- 4) Discuss about ABO blood group system.

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