

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

UNIT-III (Body fluids and blood)

CLASS:4

TOPIC – Blood grouping, Rh factors, transfusion, its significance

BLOOD GROUPING

Human blood grouping is based on the presence or absence of certain proteins, called antigens, on the surface of red blood cells. There are many different blood group systems, but the most well-known are the ABO and Rh systems.

ABO system: The ABO system is based on the presence or absence of two antigens, called A and B, on the surface of red blood cells. There are four blood types in the ABO system: A, B, AB, and O.

Type A blood has only the A antigen on red blood cells

Type B blood has only the B antigen on red blood cells

Type AB blood has both the A and B antigens on red blood cells

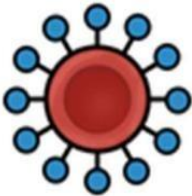
Type O blood has neither the A nor B antigen on red blood cells

Rh system: The Rh system is based on the presence or absence of another antigen, called the Rh factor, on the surface of red blood cells. If someone has the Rh factor,

they are Rh-positive (Rh+), and if they do not have the Rh factor, they are Rh-negative (Rh-).

Other blood group systems:

- There are many other blood group systems that are less well known but still important for medical purposes, such as the Kell, Duffy, and Kidd systems. Each system is based on a different set of antigens and can be used for more specific matching in blood transfusions or organ transplants.
- Blood grouping is important for blood transfusions and organ transplants, as a mismatch in blood type can lead to a potentially life-threatening reaction by the recipient's immune system. Therefore, it is important to determine a person's blood type before any medical procedures involving blood or blood products.

ABO BLOOD GROUPS	Group A	Group B	Group AB	Group O
Red blood cell type				
Antibodies in Plasma	 Anti-B	 Anti-A	NONE	 Anti-A and Anti-B

Rh FACTOR

- The Rh factor is a type of protein that is present on the surface of red blood cells in most people. If a person has the Rh factor, they are Rh-positive (Rh+), and if they do not have the Rh factor, they are Rh-negative (Rh-).
- Rh factors are important in blood transfusions and in pregnancy. If an Rh-negative woman becomes pregnant with an Rh-positive fetus, there is a risk that her immune system will recognize the Rh factor as foreign and produce antibodies against it. This is known as Rh sensitization and can cause hemolytic disease of the newborn (HDN), a condition in which the mother's antibodies attack the baby's red blood cells, leading to anaemia and other complications.
- To prevent Rh sensitization in a pregnancy, an Rh-negative mother may receive an injection of a medication called Rh immunoglobulin (RhIg) at certain points during the pregnancy and after delivery. RhIg works by binding to any Rh-positive fetal cells in the mother's bloodstream before they can stimulate her immune system to produce antibodies.
- In blood transfusions, it is important to match the Rh factor of the donor blood with the recipient's blood to prevent a similar immune response. For example, an Rh-negative person should receive Rh-negative blood to avoid developing antibodies against the Rh factor.
- Rh factors are just one aspect of blood grouping, which also includes the ABO blood group system and other less common blood group systems. Knowing a person's blood type and Rh factor is important for medical procedures involving blood or blood products to ensure compatibility and prevent complications.

Blood transfusion:

- Blood transfusion is a medical procedure in which blood is transfused from one person to another. The purpose of a blood transfusion is to replace the blood that has been lost due to injury or surgery, to increase the number of red blood cells in the body, or to replace blood components such as platelets or clotting factors.
- The significance of blood transfusion is that it can be life-saving in many situations, such as in cases of severe bleeding or anaemia. Transfusion of blood or blood products can restore the oxygen-carrying capacity of the blood, replace lost clotting factors to prevent bleeding and improve immune function by replacing antibodies.
- However, blood transfusions are not without risks. One of the most serious risks is the transmission of infectious diseases, such as HIV, hepatitis B and C, and Zika virus, if the donated blood is not properly screened. Other risks include allergic reactions, transfusion reactions, and transfusion-associated circulatory overload (TACO) in which too much blood is transfused too quickly, leading to fluid overload and heart failure.

- Disorders of the blood include a wide range of conditions that affect the production, function, or destruction of blood cells and blood components.

Some common blood disorders include:

1. **Anaemia:** a condition in which the body does not have enough red blood cells or haemoglobin to carry oxygen to the tissues
2. **Haemophilia:** a genetic disorder that affects the body's ability to produce clotting factors, leading to excessive bleeding and bruising
3. **Thrombocytopenia:** a condition in which there are too few platelets in the blood, leading to abnormal bleeding and bruising
4. **Leukaemia:** a type of cancer that affects the blood and bone marrow, leading to abnormal production of white blood cells
5. **Sickle cell disease:** a genetic disorder that affects the shape of red blood cells, leading to pain, organ damage, and other complications

Treatment of blood disorders depends on the specific condition and may include medications, blood transfusions, bone marrow transplants, or other therapies.

RETICULOENDOTHELIAL SYSTEM

The reticuloendothelial system (RES), also known as the mononuclear phagocyte system (MPS), is a network of cells and tissues in the body that play a critical role in the immune system and in the clearance of foreign substances and cellular debris from the blood and tissues.

The RES consists of several types of cells, including macrophages, monocytes, dendritic cells, and certain types of white blood cells. These cells are located primarily in the spleen, liver, lymph nodes, and bone marrow, and they work together to identify and remove foreign particles and cellular debris from the bloodstream.

The main functions of the RES include:

Phagocytosis: The cells of the RES are capable of engulfing and digesting foreign particles such as bacteria, viruses, and other pathogens that have entered the body.

Clearance of waste products: The RES also plays a role in removing cellular debris and metabolic waste products from the blood.

Antigen presentation: The cells of the RES are capable of presenting antigens to other cells of the immune system, which helps to initiate and coordinate immune responses.

Iron recycling: The RES is responsible for recycling iron from old or damaged red blood cells and returning it to the bloodstream for reuse.

Disorders of the RES can lead to a range of health problems, including immunodeficiency, autoimmune diseases, and certain types of cancer. For example, dysfunction of the RES can contribute to the development of chronic inflammatory diseases such as rheumatoid arthritis and lupus. In some cases, drugs that target the cells of the RES, such as macrophages, may be used as a therapeutic approach for these conditions.

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.