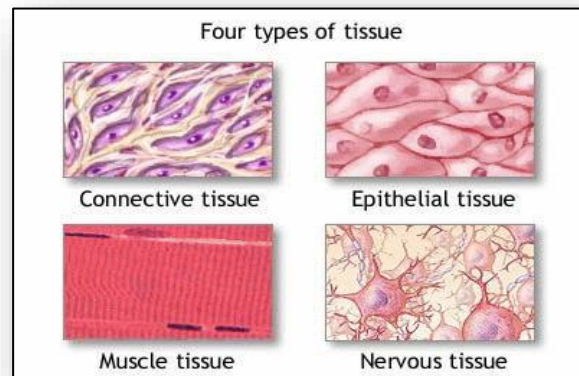




Animal Tissues and Blood Group Systems

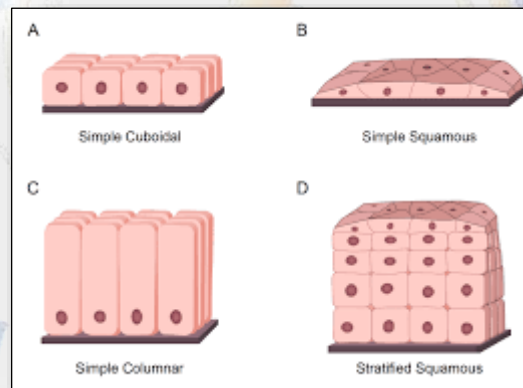
Tissue

- **Definition:** A group of identical cells combined with intercellular substance to perform a specialized role in multicellular organisms.



Types of Animal Tissues

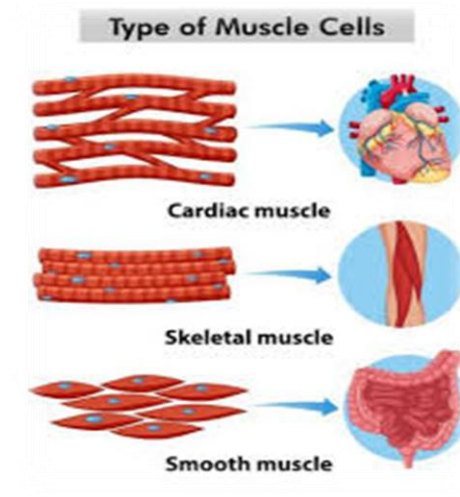
1. Epithelial Tissue:



- **Protective Layer:** Functions as a protective covering, consisting of one or more cell layers.
- **Shape:** Flat, column, cuboid.
- **Cell Arrangement:** Cells are closely packed, forming continuous sheets with intercellular junctions.
- **Functions:**
 - **Squamous Epithelium:** Shields underlying organs from mechanical injury, drying, and germ entry. Involved in excretion and gaseous exchange.
 - **Cuboidal Epithelium:** Provides mechanical support. Plays roles in absorption and excretion.
 - **Columnar Epithelium:** Offers protection to underlying tissues.
 - **Ciliated Epithelium:** Assists in moving mucus, urine, eggs, sperms, etc.
 - **Examples:** Skin, lining of body cavities, ducts, and tubes.



2. Muscular Tissue:



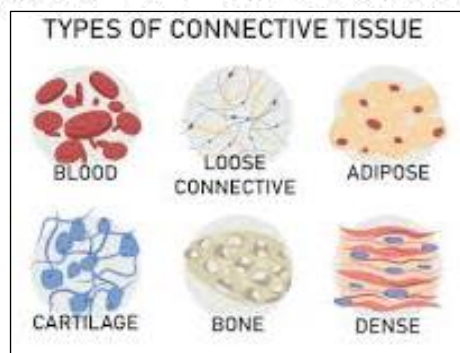
Characteristics:

- **Structure:** Composed of long, elongated cells known as muscle fibers.
- **Arrangement:** Muscle fibers are arranged parallel to each other.
- **Contractile Proteins:** Contain specialized proteins that contract and relax in a specific direction, enabling movement and locomotion.

Types of Muscle Tissue:

- **Striated Muscle (Skeletal Muscle):** Facilitates movement of body parts (e.g., arms, legs, neck).
- **Non-Striated Muscle (Smooth Muscle):** Facilitates involuntary actions such as food passage, air flow, blood circulation, and urinary bladder movements.
- **Cardiac Muscle:** Responsible for the beating of the heart and pumping of blood.

3. Connective Tissue:



Function: Connective tissues bind and join tissues, ensuring proper functioning of different organs.

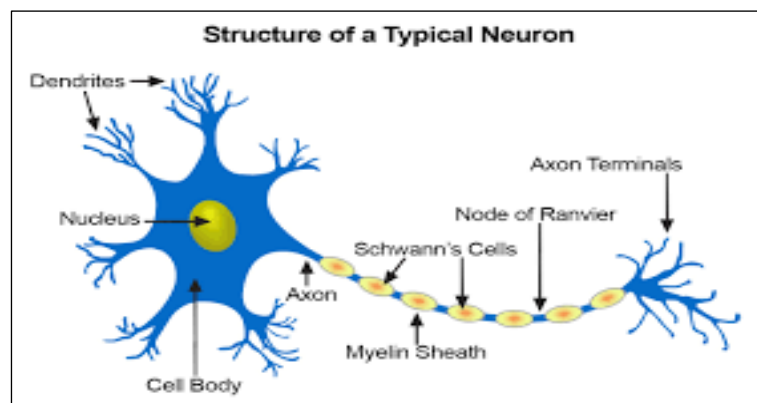
• **Types of Connective Tissue:**

- **Tendons:** Connects muscles to bones.



- **Ligaments:** Connects bones to bones.
- **Blood:** The only fluid connective tissue.
- **Areolar Tissue:** Supports internal organs and helps repair tissues.
- **Adipose Tissue:** Stores fat, acts as an insulator.
- **Cartilage:** Absorbs stress, provides flexibility, smoothens joint surfaces.
- **Vascular Tissue:** Transports nutrients, regulates body functions, defends against infections, and aids in clotting.

4. Nervous Tissue:



• **Characteristics:**

- Controls the body's response to changing conditions.
- Specialized for rapid transmission of stimuli across the body.

• **Main Components:**

- **Neurons:** Structural and functional units of the nervous system. Excitable cells that transmit electrical impulses.
- **Neuroglia:** Found in the brain and spinal cord. Provide support to neurons and nerve fibers.
- **Neurosecretory Cells:** Act as endocrine organs, releasing chemicals directly into the blood from their axons.

Blood :

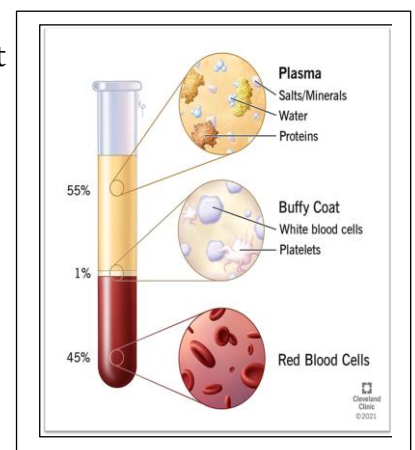
Definition: Blood is a fluid connective tissue that circulates throughout the body, delivering oxygen and nutrients to cells and tissues while removing waste products like carbon dioxide.

Composition: Blood constitutes about 8% of an adult's body weight, with an average adult having around 5-6 liters of blood.

Components of Blood :

1. Plasma:

- **Description:** Pale yellow liquid making up about 55% of blood.





- **Contents:** Contains water, salts, nutrients, enzymes, proteins (including serum globulin, serum albumin, and fibrinogen).
- **Function:** Responsible for transportation of digested food, hormones, etc., from one part to another part of the body.

2. Blood Cells:

Red Blood Cells (RBCs or Erythrocytes):

- **Hemoglobin:** An iron-rich protein giving blood its red color.
- **Production:** Produced in the bone marrow and are the most abundant cells in the blood.
- **Life Span:** 20 to 120 days; destroyed in the liver.
- **Function:** Transport oxygen from the lungs to tissues and organs and carry carbon dioxide back to the lungs for exhalation.
- **Nucleus:** No nucleus present.
- **Associated Disease:** Anemia (deficiency of hemoglobin).

White Blood Cells (WBCs or Leucocytes):

- **Description:** Colorless blood cells.
- **Formation:** Formed in bone marrow.
- **Life Span:** 2 to 4 days.
- **Nucleus:** Nucleus is present.
- **Function:** Play a key role in the immune system by fighting infections and foreign pathogens like bacteria and viruses.

Types:

1. Granulocytes:

- **Neutrophils:** 60-65% of WBCs. Destroy bacteria and act as first responders to infections.
- **Eosinophils:** 2-3% of WBCs. Combat parasitic infections and are involved in allergic reactions.
- **Basophils:** Least common, making up 0.5-1% of WBCs. Release histamine and other chemicals during allergic reactions.

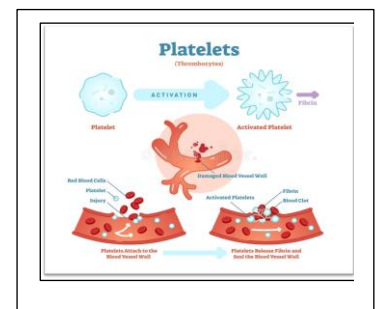
2. Agranulocytes:

- **Monocytes:** 6-8% of WBCs. Clean up dead cells and protect against pathogens by migrating to infection sites.
- **Lymphocytes:** B-lymphocytes and T-lymphocytes; essential for immune response, producing antibodies and destroying infected cells.

Platelets (Thrombocytes):

- **Description:** Tiny disc-shaped cells.
- **Formation:** Formed in bone marrow.
- **Life Span:** 3 to 5 days.
- **Nucleus:** No nucleus present.
- **Function:** Play a crucial role in blood clotting and wound healing.

Prevent excessive bleeding by forming clots at injury sites.





Blood Vessels:

• Types:

- **Arteries:** Carry oxygen-rich blood away from the heart.
- **Veins:** Carry deoxygenated blood back to the heart.
- **Capillaries:** Connect arteries and veins, facilitating the exchange of oxygen, nutrients, and waste between blood and tissues.

Functions of Blood :

- **Transport:** Carries oxygen from the lungs to tissues and carbon dioxide from tissues to the lungs, along with nutrients, hormones, and waste products throughout the body.
- **Regulation:** Helps regulate body temperature, pH levels, and fluid balance.
- **Protection:** Defends against infections through white blood cells and antibodies; involved in clotting to prevent blood loss.
- **Nutrient Distribution:** Delivers essential nutrients like glucose, amino acids, and fatty acids to cells.
- **Waste Removal:** Transports waste products like urea and carbon dioxide to excretory organs for elimination.

Major Blood Group Systems

ABO Blood Group System:

• Type A:

- **Antigens:** A antigens on red blood cells.
- **Antibodies:** Anti-B antibodies in plasma.

• Type B:

- **Antigens:** B antigens on red blood cells.
- **Antibodies:** Anti-A antibodies in plasma.

• Type AB:

- **Antigens:** Both A and B antigens on red blood cells.
- **Antibodies:** No antibodies in plasma.
- **Key Fact:** Universal recipient.

• Type O:

- **Antigens:** No antigens on red blood cells.
- **Antibodies:** Both anti-A and anti-B antibodies in plasma.
- **Key Fact:** Universal donor.

Rh Blood Group System:

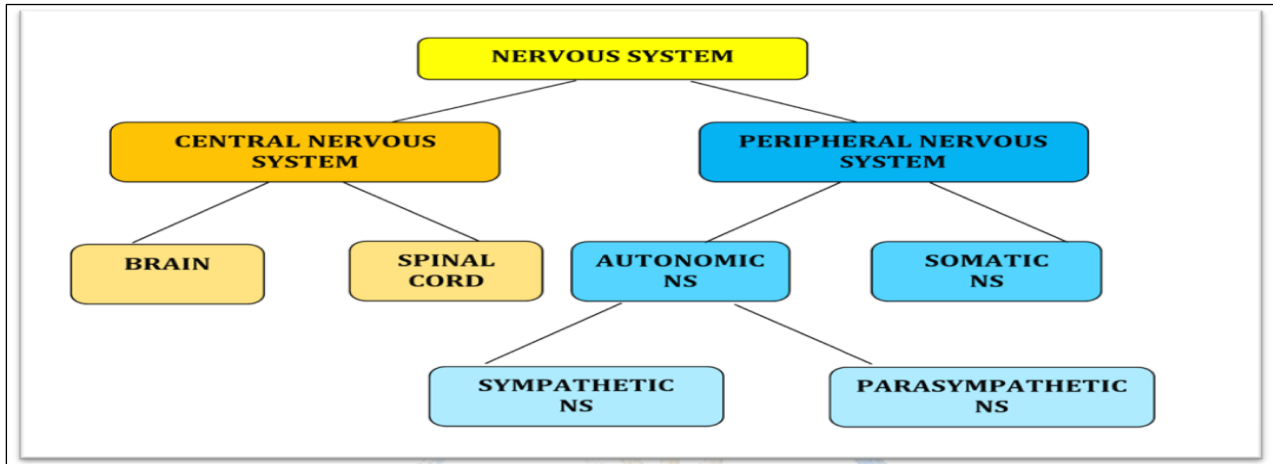
- Rh-Positive (Rh+): Presence of Rh (D) antigen on red blood cells.
- Rh-Negative (Rh-): Absence of Rh (D) antigen on red blood cells.

	GROUP A	GROUP B	GROUP AB	GROUP O
RED BLOOD CELL TYPE				
ANTIBODIES IN PLASMA			None	
ANTIGENS IN RED BLOOD CELL	A Antigen	B Antigen	A and B Antigens	None



Nervous System in Human Beings

The nervous system is a complex network of nerves and cells (neurons) responsible for transmitting signals between different parts of the body. It coordinates and controls various bodily functions, including movement, thought, sensation, and autonomic activities.



Components of the Nervous System:

1. Central Nervous System (CNS):

- **Brain:**

- Control center of the nervous system, located within the skull.

- **Spinal Cord:**

- Transmits signals between the brain and the rest of the body.
- Controls reflex actions.

2. Peripheral Nervous System (PNS):

- **Definition:** Consists of all nerves outside the CNS, including cranial nerves (originating from the brain) and spinal nerves (originating from the spinal cord).

- **Functions:**

- **Somatic Nervous System:**

- Controls voluntary movements of the skeletal muscles.

- **Autonomic Nervous System:**

- Regulates involuntary body functions like heartbeat, digestion, and respiration.

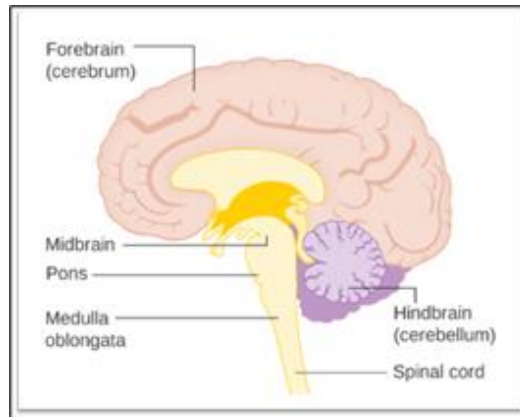
- Divisions of the Autonomic Nervous System:

- **Sympathetic Nervous System:** Prepares the body for 'fight or flight' responses during stressful situations.

- **Parasympathetic Nervous System:** Promotes 'rest and digest' functions, conserving energy during restful states.



Human Brain:



- **Protection:** Covered by meninges membrane and encased in the cranium, surrounded by cerebrospinal fluid (CSF).
- **Weight:** 1.0 - 1.5 kg.
- **Composition:** Primarily composed of neurons, with an estimated 86-100 billion neurons.
- **Role:** Central to thoughts, interpretation, and control of body movements.
- **Skull Composition:** Consists of 22 bones—8 cranial and 14 facial bones—providing frontal, dorsal, and lateral protection.
- **Cerebrospinal Fluid (CSF):**
Fills hollow spaces, cushions the brain, and circulates within the skull and spinal cord.

Parts of the Brain:

1. Forebrain:

- **Cerebrum:**
 - Most developed and largest part of the brain.
 - Manages memory, consciousness, intelligence, and sensory interpretation.
- **Thalamus:**
 - Center for sensing cold, pain, and heat.
- **Hypothalamus:**
 - Located below the thalamus.
 - Regulates body temperature, mood, emotions, appetite, heart rate, and other autonomic functions.
 - Center for thirst, hunger, love, and hate.

2. Midbrain:

- **Tectum:** Controls reflex movements of the neck, eyes, and head; relays sensory information from the ears.
- **Tegmentum:** Connects with the spinal cord, thalamus, and cerebral cortex; involved in reflex actions, body movements, and attention.
- **Functions:** Controls vision and hearing.



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3. Hindbrain:

- **Cerebellum:**

- Second-largest part of the brain.
- Maintains body balance.

- **Medulla Oblongata:**

- Located in the lowest brain region.
- Controls autonomic functions like heartbeat, respiration, sneezing, and digestion.

- **Pons:**

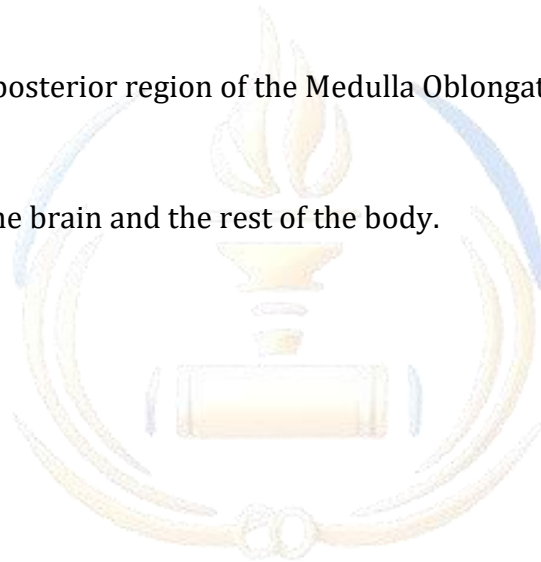
- Positioned between the medulla and midbrain.
- Regulates respiration and sleep cycles.

Spinal Cord:

- **Location:** Extends from the posterior region of the Medulla Oblongata.

- **Function:**

- Center for reflex actions.
- Carries impulses between the brain and the rest of the body.



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