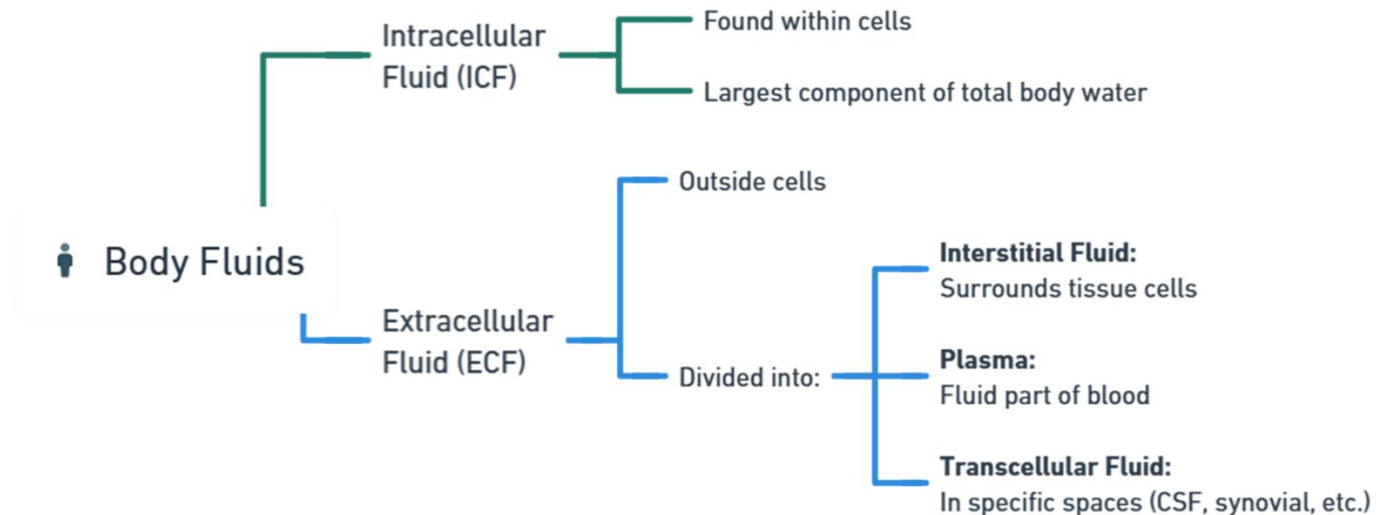


Body Fluids and Blood

Body Fluids

- Body fluids are essential liquids found within the human body that play vital roles in maintaining physiological functions and overall health.
- These fluids are distributed throughout the body's tissues, cells, and cavities, and each type serves specific functions.



Types of Body Fluids and Their Functions

1. Blood

- Blood is a vital fluid circulating within blood vessels.

Components:

- Red blood cells (erythrocytes), white blood cells (leukocytes), platelets (thrombocytes), and plasma.

Functions:

A. Transportation:

- Carries oxygen, carbon dioxide, nutrients, hormones, and waste products.

B. Immune Response:

- White blood cells defend against infections and diseases.

C. Clotting:

- Platelets help form clots to stop bleeding.

D. Regulation:

- Helps regulate pH balance, temperature, and electrolyte levels.

2. Lymph

- A clear fluid that flows through the lymphatic system, a network of vessels and nodes.

Functions:

A. Immune Function

- Contains lymphocytes, which fight infections and diseases.

B. Fluid Balance:

- Maintains fluid balance by collecting excess tissue fluid and returning it to the bloodstream.

3. Interstitial Fluid

- Fluid that surrounds and bathes cells in tissues throughout the body.

Functions:

A. Nutrient Exchange:

- Provides a medium for the exchange of nutrients, oxygen, and waste products between blood vessels and cells.

4. Cerebrospinal Fluid (CSF)

- A clear fluid circulating within the brain's ventricles and the spinal cord's subarachnoid space.

Functions:

A. Protection:

- Cushions and protects the central nervous system (CNS).

B. Buoyancy:

- Provides buoyancy to the brain.

5. Synovial Fluid

- Fluid found in the cavities of synovial joints (e.g., knee, hip, shoulder).

Functions:

A. Lubrication:

- Acts as a lubricant and shock absorber, reducing friction between joint cartilage surfaces for smooth movement.

6. Serous Fluid

- A watery, clear fluid found in the pleural, pericardial, and peritoneal cavities.

Functions:

A. Friction Reduction:

- Reduces friction between the layers of serous membranes surrounding vital organs like the lungs, heart, and abdominal organs.

7. Gastrointestinal Fluids

- Includes saliva, gastric juices, pancreatic juices, bile, and intestinal fluids.

Functions:

A. Digestion:

- Involved in the digestion and absorption of nutrients.

8. Urine

- A fluid produced by the kidneys and excreted through the urinary system.

Functions:

A. Waste Removal:

- Eliminates waste products and excess substances.

B. Regulation:

- Helps maintain electrolyte balance and regulate blood pressure.

9. Sweat

- A fluid produced by sweat glands in the skin.

Functions:

A. Temperature Regulation:

- Helps cool the body through evaporative heat loss.

B. Waste Elimination:

- Removes small amounts of waste products and electrolytes.

These fluids serve several important functions:

These fluids serve several key functions:

1. Transportation:

- Carry nutrients, oxygen, hormones, and waste. For example, blood transports oxygen from the lungs to cells and removes carbon dioxide.

2. Temperature Regulation:

- Help regulate body temperature, such as sweat cooling the body.

3. Protection:

- Contain white blood cells and antibodies to defend against pathogens, boosting the immune system.

4. Lubrication:

- Provide lubrication in joints, like synovial fluid, reducing friction for smooth movement.

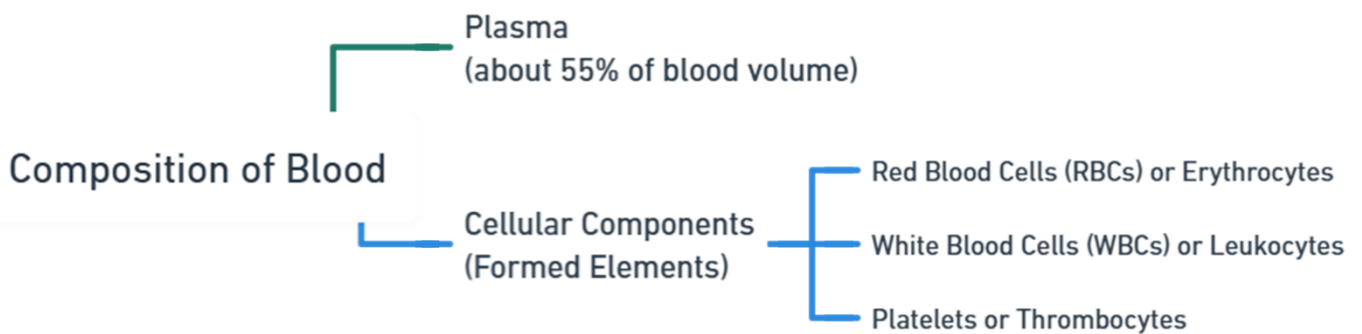
5. Digestion:

- Aid in digestion, with fluids like saliva and gastric juices helping to break down food.

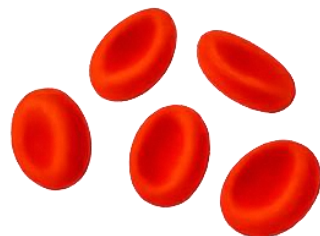
Blood: Composition and Functions

- Blood is a specialized connective tissue consisting of cells suspended in a liquid matrix called plasma.
- Blood is composed of various cellular components, including red blood cells (erythrocytes), white blood cells (leukocytes), and platelets (thrombocytes), suspended in plasma.
- The red blood cells are responsible for oxygen transport, while white blood cells are involved in immune responses. Platelets aid in clotting.

Composition of Blood



Formed Elements of Blood



Red Blood Cells



Platelets



Monocyte



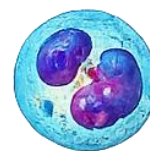
Lymphocyte



Eosinophil



Basophil



Neutrophil

White Blood Cells

1. Plasma (about 55% of blood volume)

- Plasma is the liquid portion of blood, primarily made of water (about 90%) and contains dissolved proteins, glucose, mineral ions, hormones, and other substances.

Functions:

A. Transport Medium:

- Carries nutrients, waste products, and hormones throughout the body.

B. Regulation:

- Helps regulate body temperature and maintain the acid-base balance.

2. Cellular Components (Formed Elements)

- The cellular components, or formed elements, include red blood cells (RBCs), white blood cells (WBCs), and platelets.
- Each has specific roles:

A. Red Blood Cells (RBCs) or Erythrocytes

- The most abundant blood cells, responsible for oxygen transport.

Functions:

- **Oxygen Transport:** RBCs transport oxygen from the lungs to body tissues and remove carbon dioxide, a waste product of cellular metabolism.
- **Haemoglobin:** RBCs contain haemoglobin, an oxygen-binding protein that gives them their red color.
- **Acid-Base Balance:** RBCs help maintain the blood's pH balance.

B. White Blood Cells (WBCs) or Leukocytes

- Nucleated cells crucial for the immune system, protecting the body against infections and diseases.

Types and Functions:

- Neutrophils:** The most abundant WBCs, which phagocytize (engulf and destroy) bacteria and foreign particles.
- Lymphocytes:** Produce antibodies and regulate immune responses; include:
 - **B-cells:** Produce antibodies.
 - **T-cells:** Directly attack infected cells and regulate immune responses.
 - **Natural Killer (NK) Cells:** Kill abnormal cells, such as cancerous or virus-infected cells.
- Monocytes:** Transform into macrophages that phagocytize pathogens, dead cells, and debris.
- Eosinophils:** Combat parasitic infections and participate in allergic reactions.



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