AL-mustaqbal university

College Of Health and Medical Techniques

Department of kidney dialysis techniques

Lec.1

Physiology

MSc. Zainab ali al-khafaji

What is Physiology?

Physiology examines the physical, chemical, and biological processes that occur within living organisms to maintain life.

Levels of Physiological Organization

1. **Cellular Level:**

Cells are the basic functional units of life.

Cellular physiology focuses on processes like transport, metabolism, and communication.

2. **Tissue Level:**

Tissues are groups of cells that perform specific functions.

Examples include muscle tissue (contraction) and nervous tissue (signal transmission).

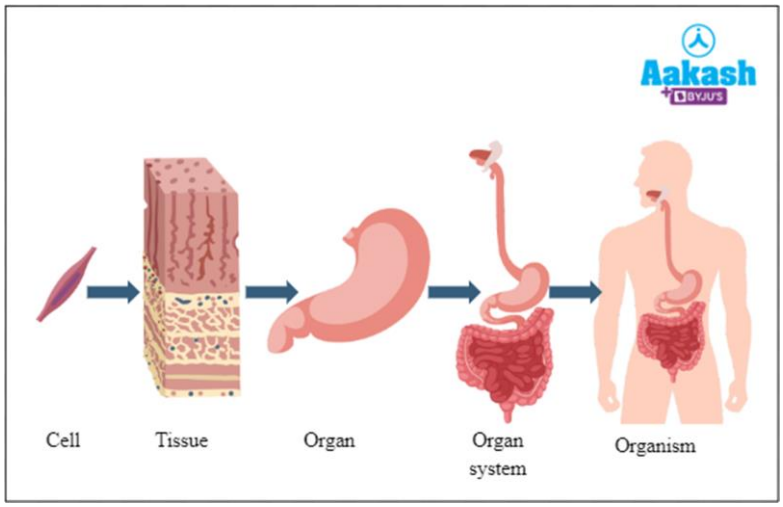
3. **Organ and System Level:**

Organs are composed of multiple tissues working together (e.g., the heart).

Organ systems, like the cardiovascular or digestive systems.

Whole-Body Level:

It includes all the organs and tissues that work together to maintain life and perform vital functions.



Physiological Systems

1. **Nervous System:**

Functions: Communication, sensory input, and motor output.

Central (brain and spinal cord) and peripheral components.

2. **Cardiovascular System:**

Functions: Circulates blood, delivers oxygen and nutrients, removes waste.

Includes the heart, blood vessels, and blood.

3. **Respiratory System:**

Functions: Gas exchange (oxygen and carbon dioxide).

Includes lungs, trachea, and related muscles.

4. **Digestive System:**

Functions: Breakdown of food, absorption of nutrients, and waste elimination.

Includes the stomach, intestines, liver, and pancreas.

5. **Endocrine System:**

Functions: Hormonal regulation of growth, metabolism, and reproduction.

Includes glands like the thyroid, adrenal, and pancreas.

6. **Musculoskeletal System:**

Functions: Movement, support, and protection.

Includes bones, muscles, and connective tissues.

7. **Immune System:**

Functions: Defense against pathogens and keeping internal health.

8. **Renal System:**

Functions: Filtration of blood, removal of waste, and fluid balance.

Includes kidneys, ureters, and bladder.

Blood physiology refers to the study of the functions and mechanisms of blood in keeping life. Blood is a unique fluid tissue that plays an essential role in transporting oxygen and nutrients, removing waste products, regulating body temperature, and supporting the immune system.

Blood Components and Their Functions

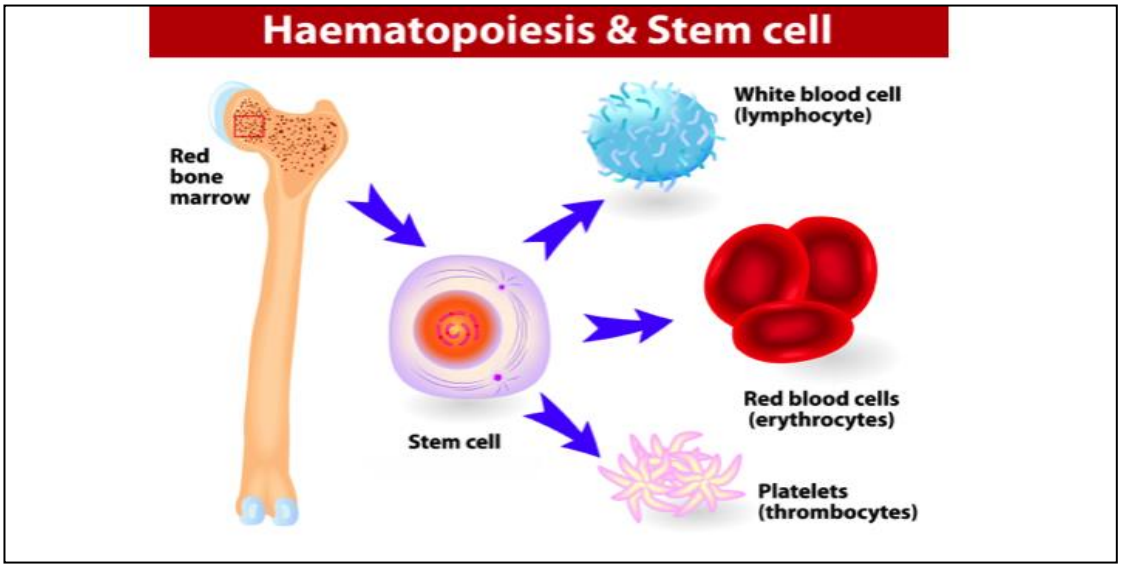
Blood consists of two main components:

1. **Plasma**:
   - Comprises about 55% of blood.
   - Contains water (90%), proteins (e.g., albumin, globulins), and dissolved substances (e.g., glucose, hormones).
   - Functions include transporting nutrients, hormones, and maintaining acid-base balance.

2. **Cellular Elements:**

1. **Red Blood Cells (RBCs):**
   - Contain hemoglobin for oxygen transport.
   - Lifespan is approximately 120 days

2. **White Blood Cells (WBCs):**
   - Responsible for immune defense.
   - Include lymphocytes, neutrophils, and monocytes.
3. **Platelets:**
   - Play a role in blood clotting.

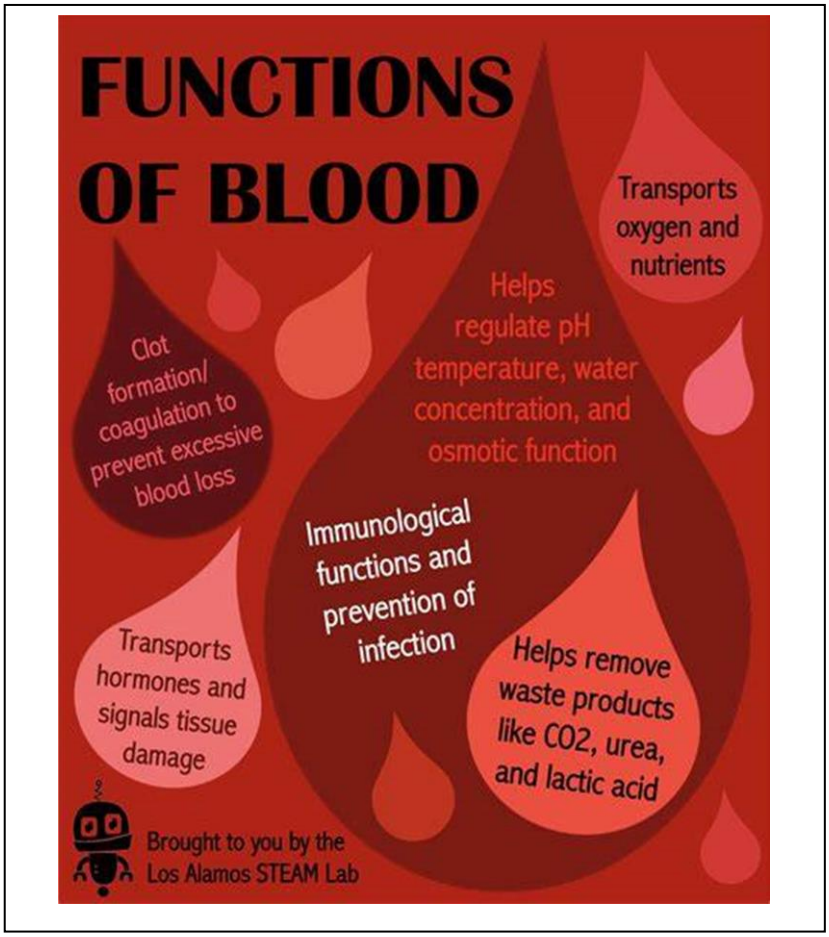


Primary Functions of Blood

1. **Transportation:**
   - Oxygen from the lungs to tissues and carbon dioxide back to the lungs.
   - Nutrients from the digestive system to cells.
   - Hormones and enzymes throughout the body.

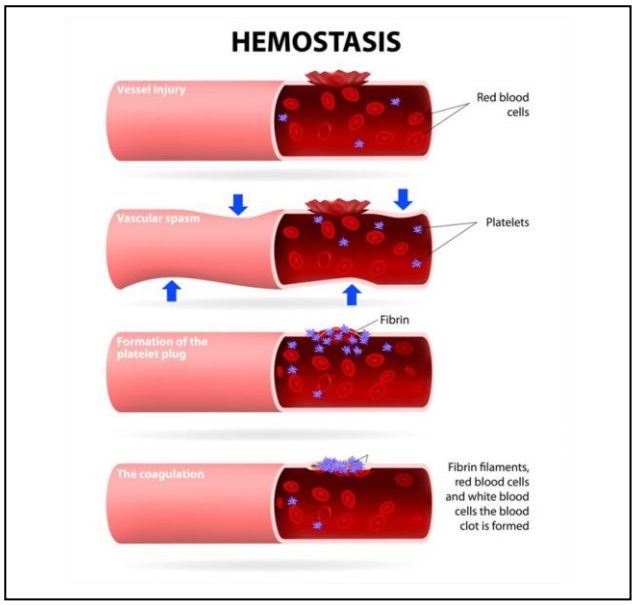
2. **Regulation**:
   - Keeping acid-base balance (pH).
   - Regulating body temperature.
   - Preserving fluid and electrolyte balance.

3. **Protection**:
   - Generating antibodies to combat infections.
   - Blood clotting to prevent excessive bleeding.

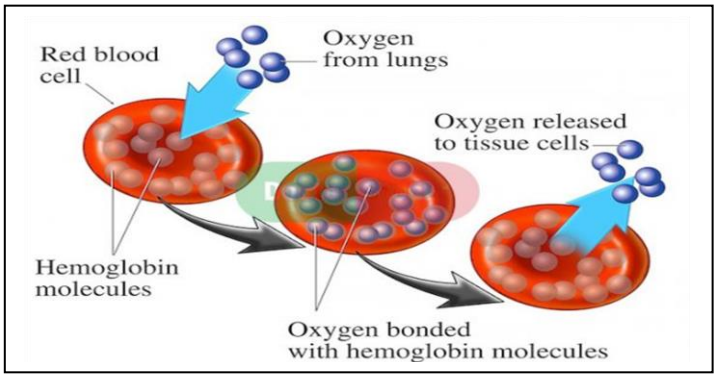


Physiological Mechanisms of Blood Function

1. **Blood Clotting (Hemostasis):**
   - Involves three primary stages:
   1. Vasoconstriction (narrowing of blood vessels).
   2. Platelet aggregation.
   3. Formation of a fibrin clot.



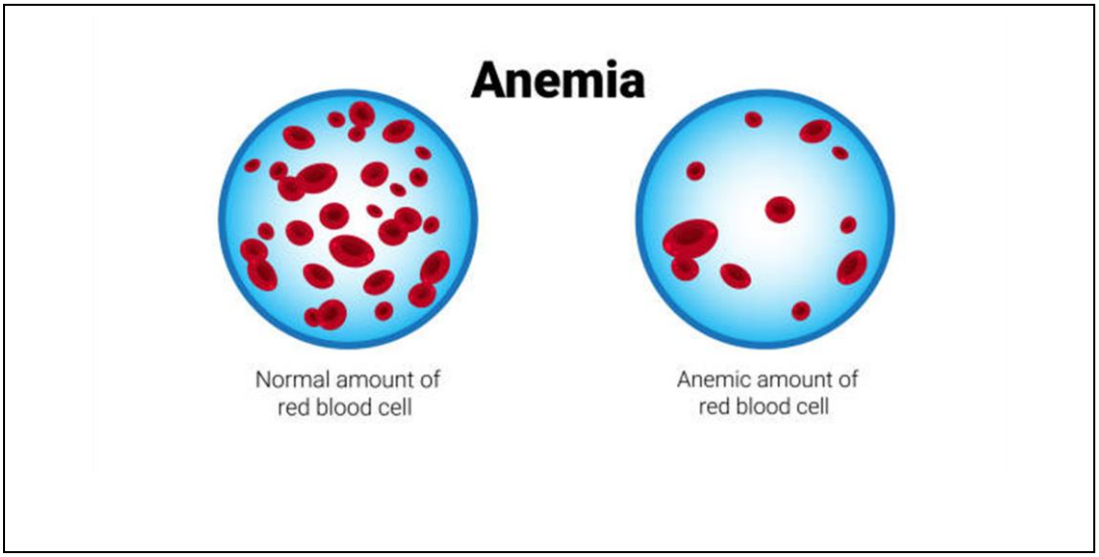
2. **Oxygen and Carbon Dioxide Transport:**
   - Mediated by hemoglobin in red blood cells.
   - Regulated by oxygen pressure in tissues and blood.



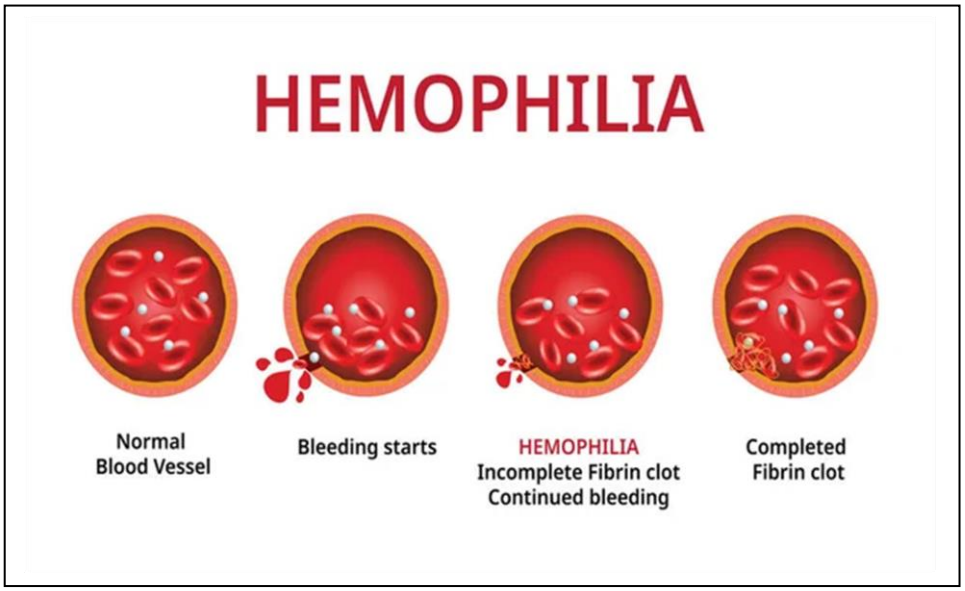
3. **Blood Pressure Regulation:**
   - Dependent on blood volume and flow rate.
   - Controlled by mechanisms such as the nervous system and hormones (e.g., adrenaline, renin-angiotensin system).

Disorders Related to Blood Physiology

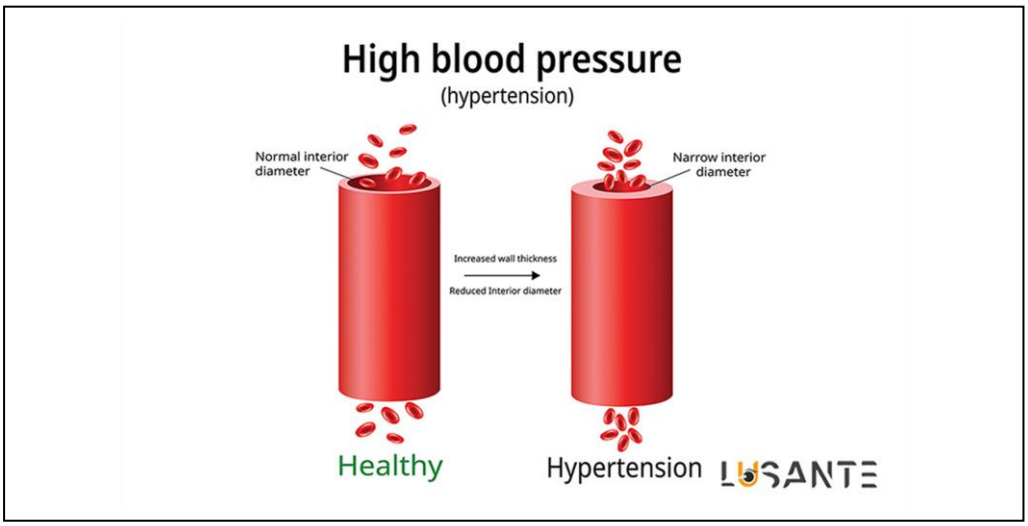
1. **Anemia**:
   - A deficiency in hemoglobin or red blood cells.
   - Causes fatigue and weakness.



2. **Hemophilia:**
   - A genetic disorder affecting blood clotting ability.



3. **Hypertension**:
    - Affects normal blood flow and can lead to cardiovascular issues.



4. **Autoimmune Disorders:**
    - Conditions like lupus, where the immune system attacks blood components.