

Animal Tissue

Epithelial

- Simple Squamous
- Simple Cuboidal
- Simple Columnar
- Stratified epithelium

Muscular

- Skeletal or Striated muscle
- Visceral or Smooth muscle
- Cardiac muscle

Connective

- Loose connective tissue
 - Areolar
 - Adipose
- Dense connective tissue
 - Tendon
 - Ligament
- Skeletal connective tissue
 - Bone
 - Cartilage
- Liquid connective tissue
 - Blood
 - Lymph

Nervous

Connective Tissue

- Connective tissue is a fundamental tissue type in the human body, characterized by its extracellular matrix and diverse cell population.

Functions:

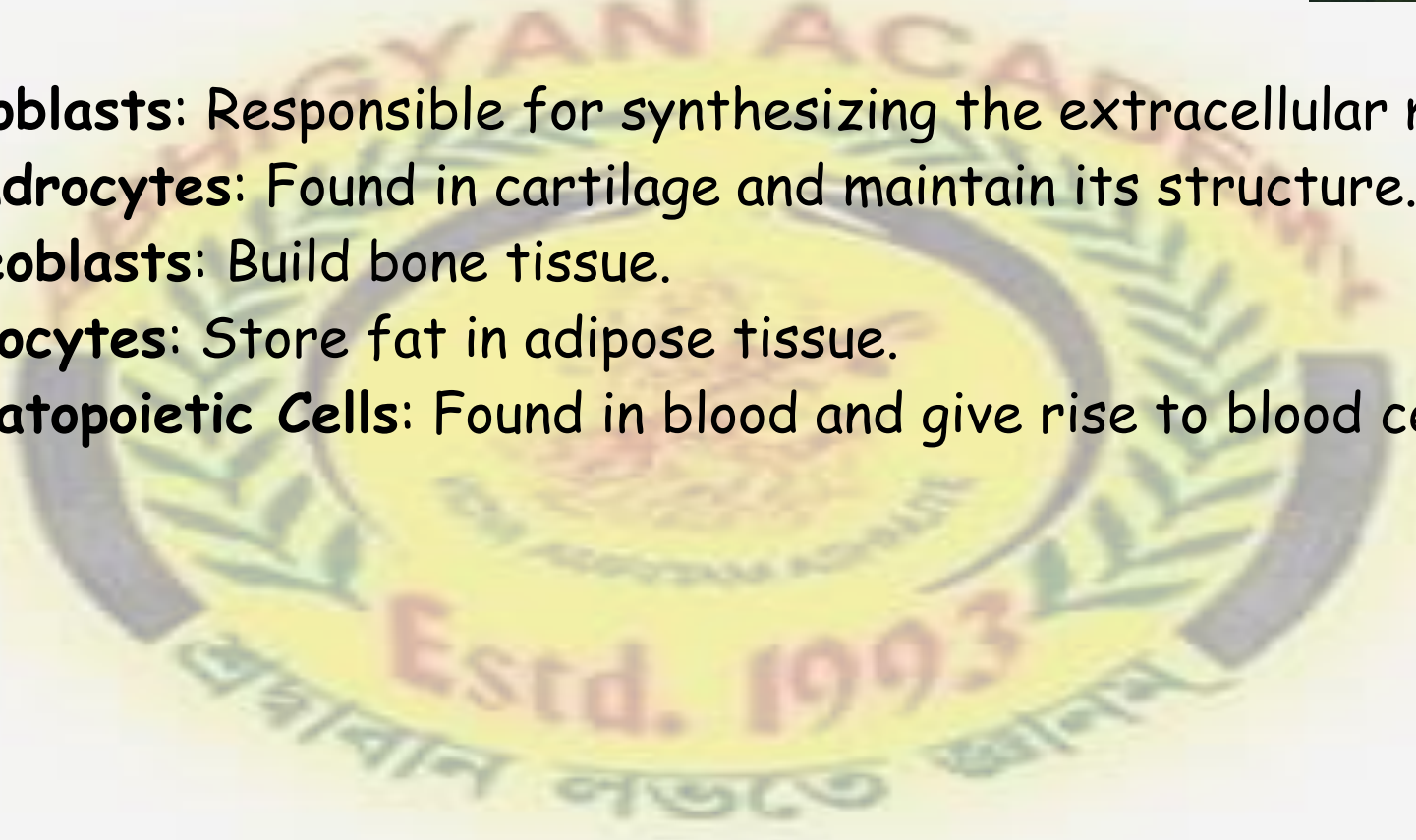
- **Support:** It provides structural support to different organs, tissues, and body structures.
- **Connectivity:** Connective tissue connects and anchors organs, muscles, and bones in the body.
- **Protection:** It protects vital organs, such as the brain and heart.
- **Transport:** Blood, a type of connective tissue, transports oxygen, nutrients, and waste products throughout the body.
- **Energy Storage:** Adipose tissue (a type of connective tissue) stores energy in the form of fat
- **Immune Response:** Connective tissue houses immune cells that are essential for the body's defense against pathogens

Types of Connective Tissue

- **Connective Tissue Proper:** Includes loose and dense connective tissue, which provides support and flexibility.
- **Cartilage:** A firm but flexible tissue found in the nose, ears, and joints.
- **Bone:** Hard tissue that forms the skeleton and provides support and protection.
- **Blood:** Fluid connective tissue responsible for transporting oxygen, nutrients, and immune cells.
- **Extracellular Matrix (ECM):** Connective tissue contains an extracellular matrix composed of fibers (collagen, elastic) and ground substance (fluid and proteins). This matrix contributes to tissue structure and function.

Cells in Connective Tissue:

- **Fibroblasts:** Responsible for synthesizing the extracellular matrix.
- **Chondrocytes:** Found in cartilage and maintain its structure.
- **Osteoblasts:** Build bone tissue.
- **Adipocytes:** Store fat in adipose tissue.
- **Hematopoietic Cells:** Found in blood and give rise to blood cells.



- **Cartilage:**

- **Types:** Three main types: hyaline cartilage, fibrocartilage, and elastic cartilage, each with specific functions and locations.
- **Function:** Provides cushioning and support in joints, respiratory structures, and the ear.

- **Bone:**

- **Structure:** Bone tissue is composed of osteocytes embedded in a mineralized extracellular matrix.
- **Functions:** Provides structural support, protects vital organs, and serves as a site for blood cell production (hematopoiesis).

- **Blood:**

- **Components:** Comprised of plasma (liquid), red blood cells (carry oxygen), white blood cells (immune response), and platelets (clotting).
- **Function:** Responsible for the transport of oxygen, nutrients, hormones, and waste products.

Blood

- **Composition of Blood:**

- **Blood Plasma:** The liquid portion of blood, composed mainly of water(90%), electrolytes, and proteins.- 55%
- **Blood Cellular Components:** Include red blood cells (erythrocytes), white blood cells (leukocytes), and platelets (thrombocytes).-45%

- **Functions of Blood:**

- **Transportation:** Blood carries oxygen, nutrients, hormones, and waste products throughout the body.
- **Immune Response:** White blood cells help protect the body against infections and foreign invaders.
- **Hemostasis:** Platelets are essential for blood clotting to prevent excessive bleeding.
- **Regulation:** Blood helps regulate body temperature, pH balance, and fluid balance.

- **Red Blood Cells (Erythrocytes):**
 - **Function:** Erythrocytes transport oxygen from the lungs to body tissues and carry carbon dioxide back to the lungs for exhalation.
 - **Hemoglobin:** Hemoglobin is a protein within red blood cells that binds to oxygen.
 - Lifeline of RBC- 12 days
 - Spleen -Graveyard of RBC and also blood bank of our body.
- **White Blood Cells (Leukocytes):** - Lifeline 10-14days
 - **Types:** Different types of white blood cells serve various immune functions, including neutrophils, lymphocytes, monocytes, eosinophils, and basophils.
 - **Immune Response:** White blood cells are essential components of the immune system, defending the body against infections.

- **Platelets (Thrombocytes):**

- **Function:** Platelets play a critical role in blood clotting (coagulation) to stop bleeding when blood vessels are injured.
- **Clotting Factors:** The clotting process involves a complex interaction of clotting factors and fibrin formation.
- Vitamin K and calcium ions helps in Blood clotting
- Heparin pigment which prevent blood clotting in vessels

- **Blood Types:**

- **ABO Blood Group System:** The ABO blood group classification is based on the presence or absence of specific antigens (A and B) on the surface of red blood cells.
- **Rh Factor (Rhesus):** The Rh factor is another antigen that determines the Rh-positive or Rh-negative status of blood.

- **Blood Disorders:**

- ❖ **Anemia:** A condition characterized by a decrease in the number of red blood cells or a decrease in their ability to carry oxygen.
- ❖ **Leukemia:** A type of cancer that affects white blood cells, leading to their uncontrolled proliferation.
- ❖ **Thrombocytopenia:** A disorder characterized by a low platelet count, which can result in bleeding problems.

Lymph

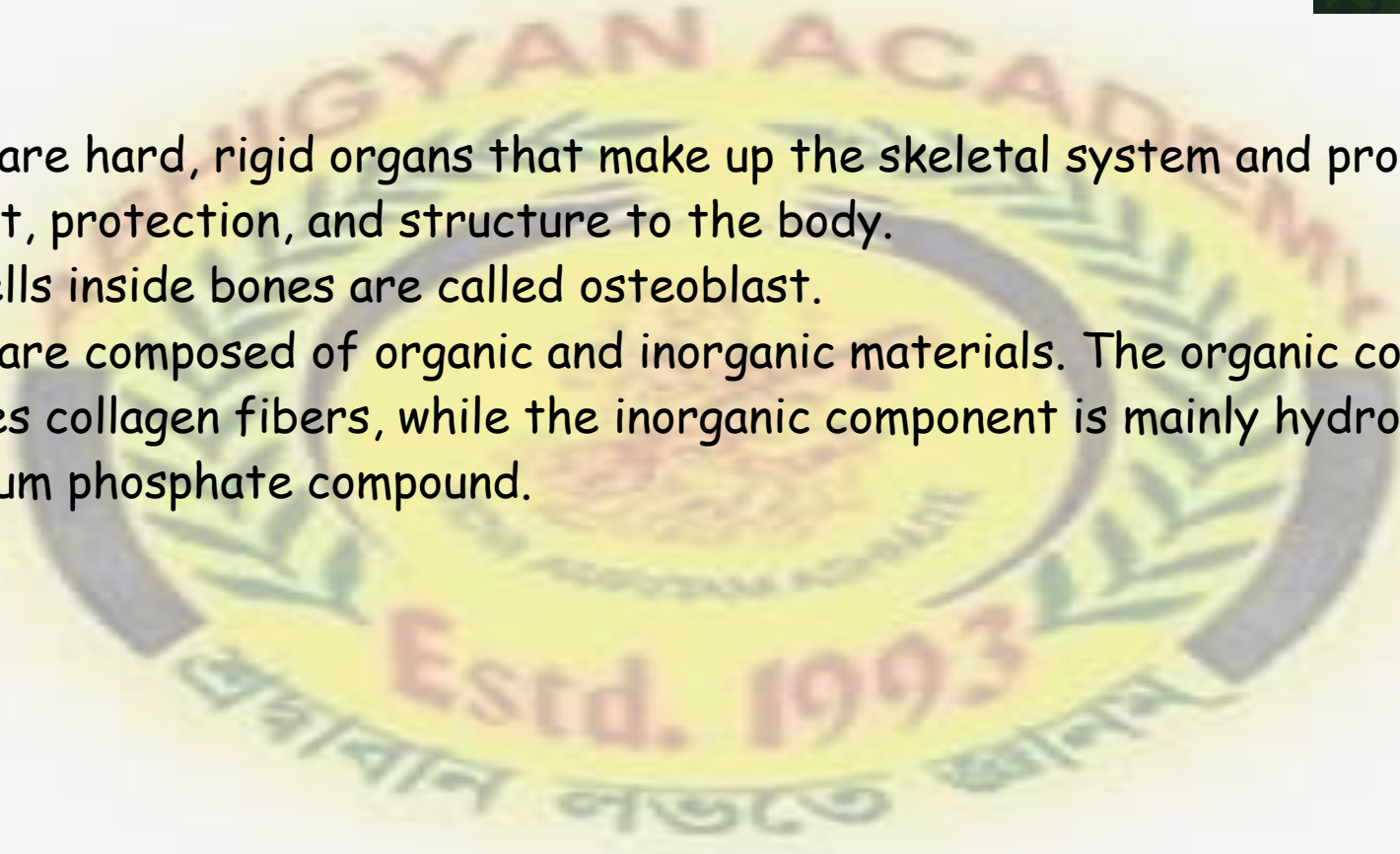
- Lymph is a clear, watery fluid that is similar in composition to blood plasma. It is a component of the lymphatic system.
- **Formation:**
 - ❖ Lymph is formed when interstitial fluid (fluid that surrounds cells) enters lymphatic capillaries.
 - ❖ This fluid is then transported through lymphatic vessels.
- **Composition:**
 - ❑ Lymph contains water, electrolytes, proteins, fats, and cellular components.
 - ❑ Lymphatic capillaries allow for the absorption of dietary fats and fat-soluble vitamins from the digestive system.

- **Lymphatic System:**

- ❖ The lymphatic system consists of lymphatic vessels, lymph nodes, tonsils, spleen, and thymus gland.
- ❖ It functions to transport lymph, filter it, and house immune cells.
- **Functions of Lymph:**
- ❖ **Immune Response:** Lymph contains immune cells, such as lymphocytes and macrophages, which help defend the body against infections.
- ❖ **Fluid Balance:** It helps maintain fluid balance by returning excess tissue fluid to the bloodstream.
- ❖ **Transport of Nutrients:** Lymphatic vessels transport dietary lipids and fat-soluble vitamins (A, D, E, K) from the digestive system.

Bones and Cartilage

- Bones are hard, rigid organs that make up the skeletal system and provide support, protection, and structure to the body.
- The cells inside bones are called osteoblast.
- Bones are composed of organic and inorganic materials. The organic component includes collagen fibers, while the inorganic component is mainly hydroxyapatite, a calcium phosphate compound.



Types of Bones:

- **Long Bones:** Longer than they are wide, such as the femur and humerus. They provide support, movement, and leverage.
- **Short Bones:** Roughly cube-shaped bones, like the carpals in the wrist. They provide stability and support.
- **Flat Bones:** Thin and flat bones, including the skull bones and scapulae. They offer protection and serve as attachment points for muscles.
- **Irregular Bones:** Bones with complex shapes, like the vertebrae and facial bones. They have unique functions and forms.

Types of Bone Tissue:

- **Compact Bone:** Dense and hard outer layer of bone that provides strength and protection.
- **Spongy (Cancellous) Bone:** Less dense, porous inner part of bone that contains bone marrow.

Functions of Bones:

- **Support:** Bones provide structural support for the body and maintain its shape.
- **Protection:** Bones protect vital organs. For example, the skull protects the brain, and the ribcage protects the heart and lungs.
- **Movement:** Muscles attach to bones, allowing for voluntary and involuntary movements.
- **Blood Cell Production:** Red bone marrow within certain bones produces red blood cells, white blood cells, and platelets (hematopoiesis).
- **Mineral Storage:** Bones store minerals such as calcium and phosphorus, which are released into the bloodstream when needed for bodily functions.

Cartilage

Types of Bone Tissue:

- **Compact Bone:** Dense and hard outer layer of bone that provides strength and protection.
- **Spongy (Cancellous) Bone:** Less dense, porous inner part of bone that contains bone marrow.
- Cells in cartilage are called chondrocytes
- They are most commonly found in at the ends of long bones, in the nose, and in the trachea and located in the external ear, epiglottis, and parts of the larynx

Functions of Cartilage:

- **Support:** Cartilage provides structural support, helping to maintain the shape and integrity of various body structures.
- **Cushioning:** It acts as a shock absorber, reducing friction and preventing damage to bones in joints.
- **Flexibility:** Cartilage's flexibility allows for smooth joint movement and resilience in structures like the external ear.

Cartilage Growth and Repair:

- **Chondrocytes:** These are the primary cells found in cartilage, responsible for producing and maintaining the cartilaginous matrix.
- **Avascularity:** The lack of blood vessels in cartilage makes it less efficient at repairing itself compared to other tissues like skin or bone.
- **Articular Cartilage:** The cartilage covering the ends of bones in synovial joints is known as articular cartilage. Damage to this cartilage can lead to joint pain and osteoarthritis.