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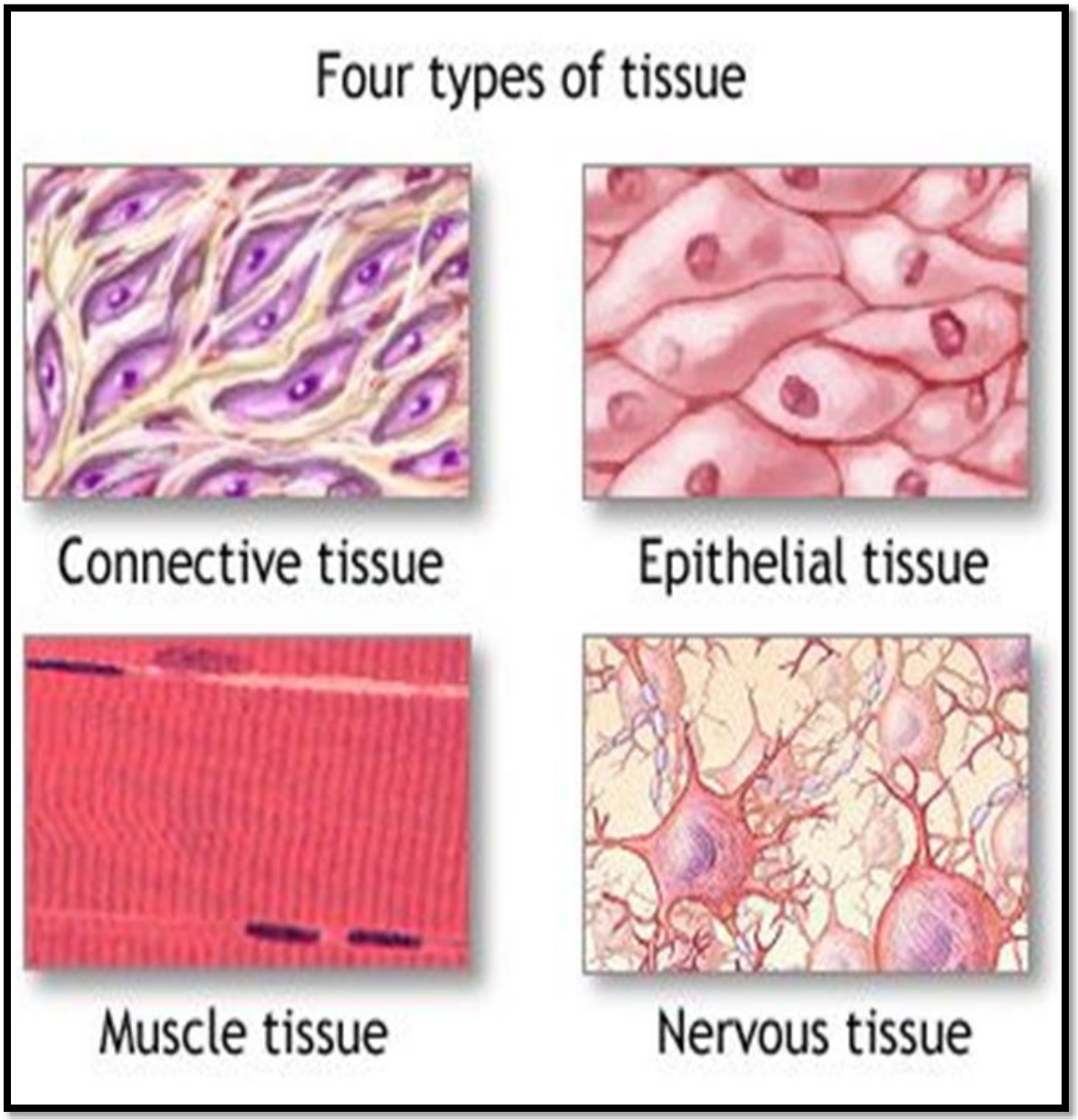
Animal Tissues

Tissues are groups of similar cells and extracellular products carrying a common function. Each tissue consists of identical cells in structure and function.

There are four basic animal tissues:

1. Epithelial Tissues.
2. Connective Tissues.
3. Muscular Tissues.
4. Nervous Tissues.

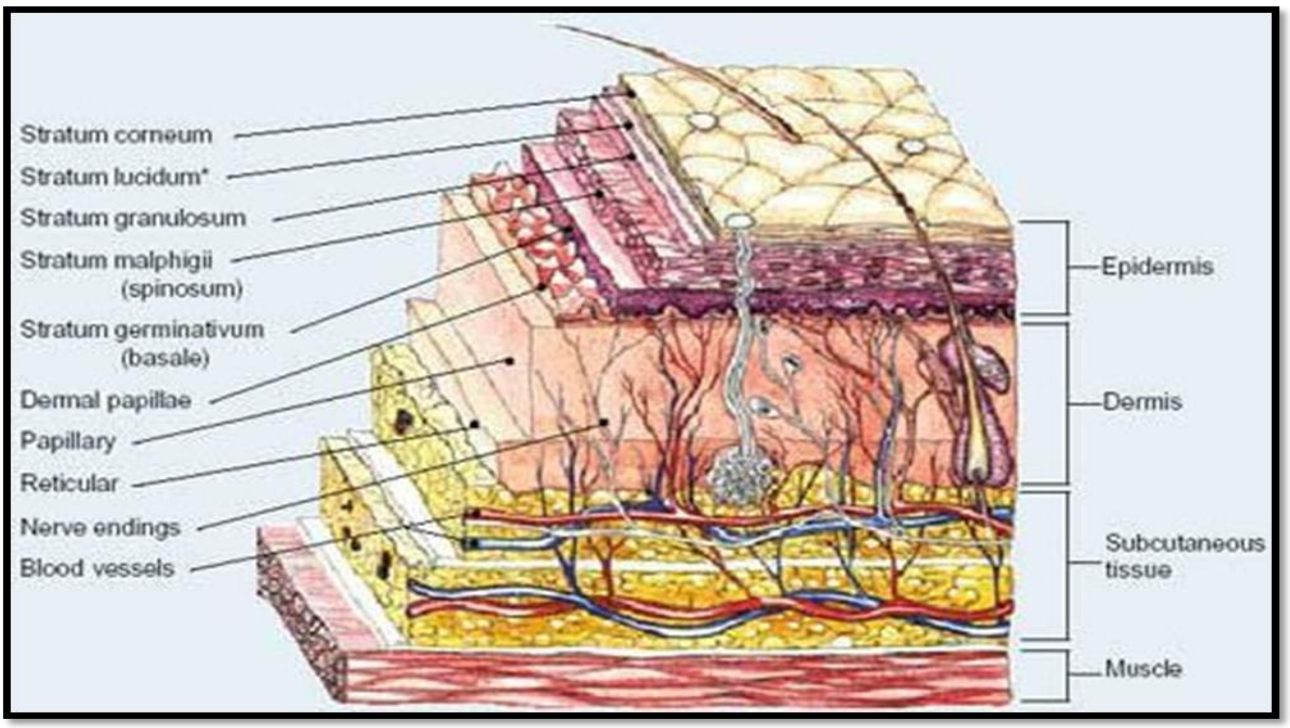


1. Epithelial Tissue

Epithelial tissue covers or lines everybody surface and body cavity. Epithelium tissue is composed of one or more layers of closely packed cells between two compartments.

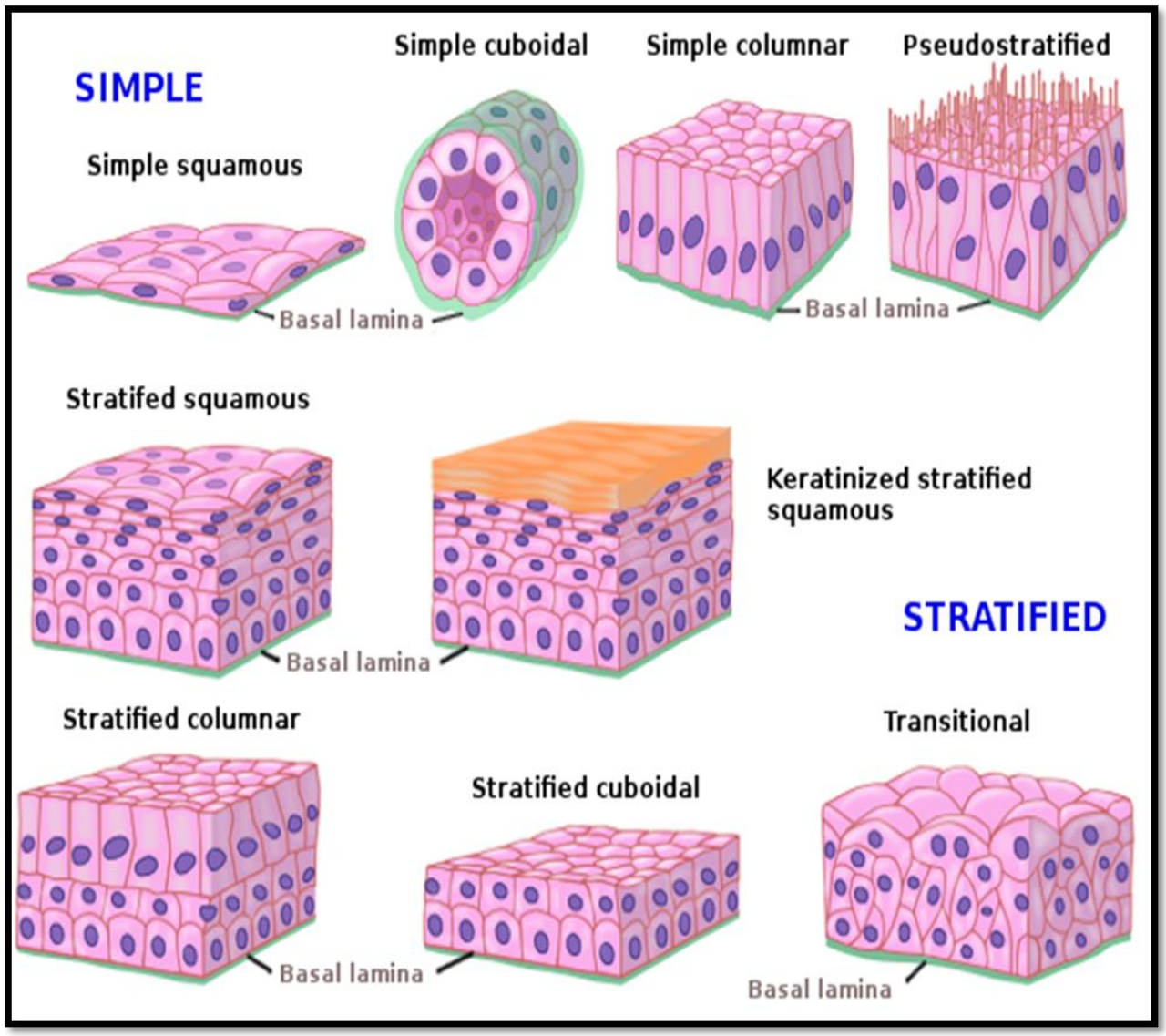
- **Apical surface:** Outer surface that faces the outside world.
- **Basal surface:** Inside surface secretes a basement membrane.

- Examples of epithelial tissue in humans : (Skin, hair, and nails)



Cell shapes.

- **Squamous epithelial cells**: Flattened.
- **Cuboidal epithelium cells:** Basically cube-shaped or roundish.
- **Columnar epithelium cells**: Long and thin (like a column).



Types of epithelial tissues

Functions of Epithelial Tissues:

1. Protection- from microbes, physical injury, water loss--- etc.

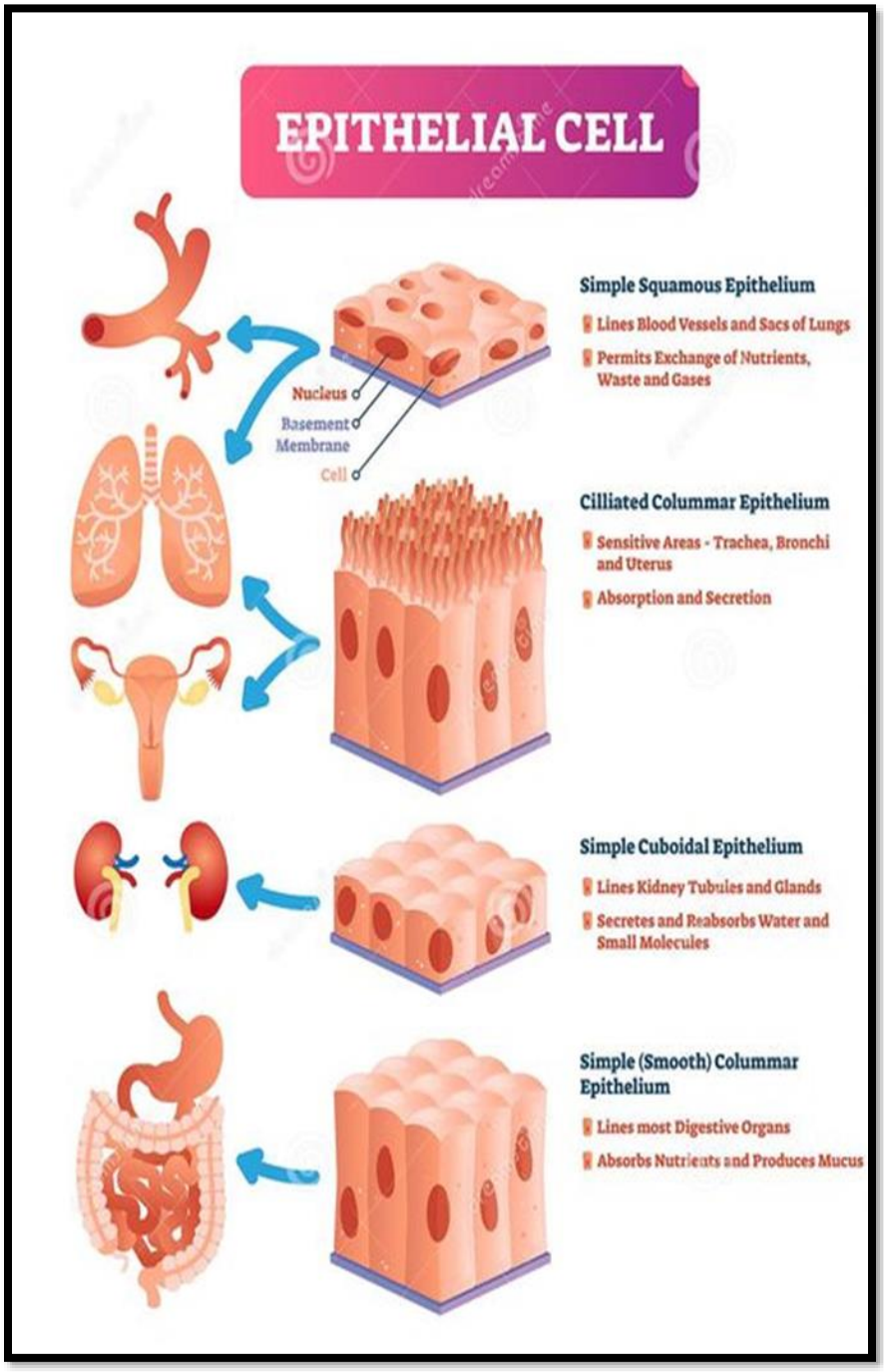
2. Absorption- of food, water etc in the intestine.

3. Transport- sometimes has cilia (tiny hair) that move things along a tube.

4. Filtration- in kidneys

5. Gas exchange- in lungs

6. Secretion- eg. form glands that secrete various substances eg. mucous, sweat, digestive juices.



2. Connective Tissue.

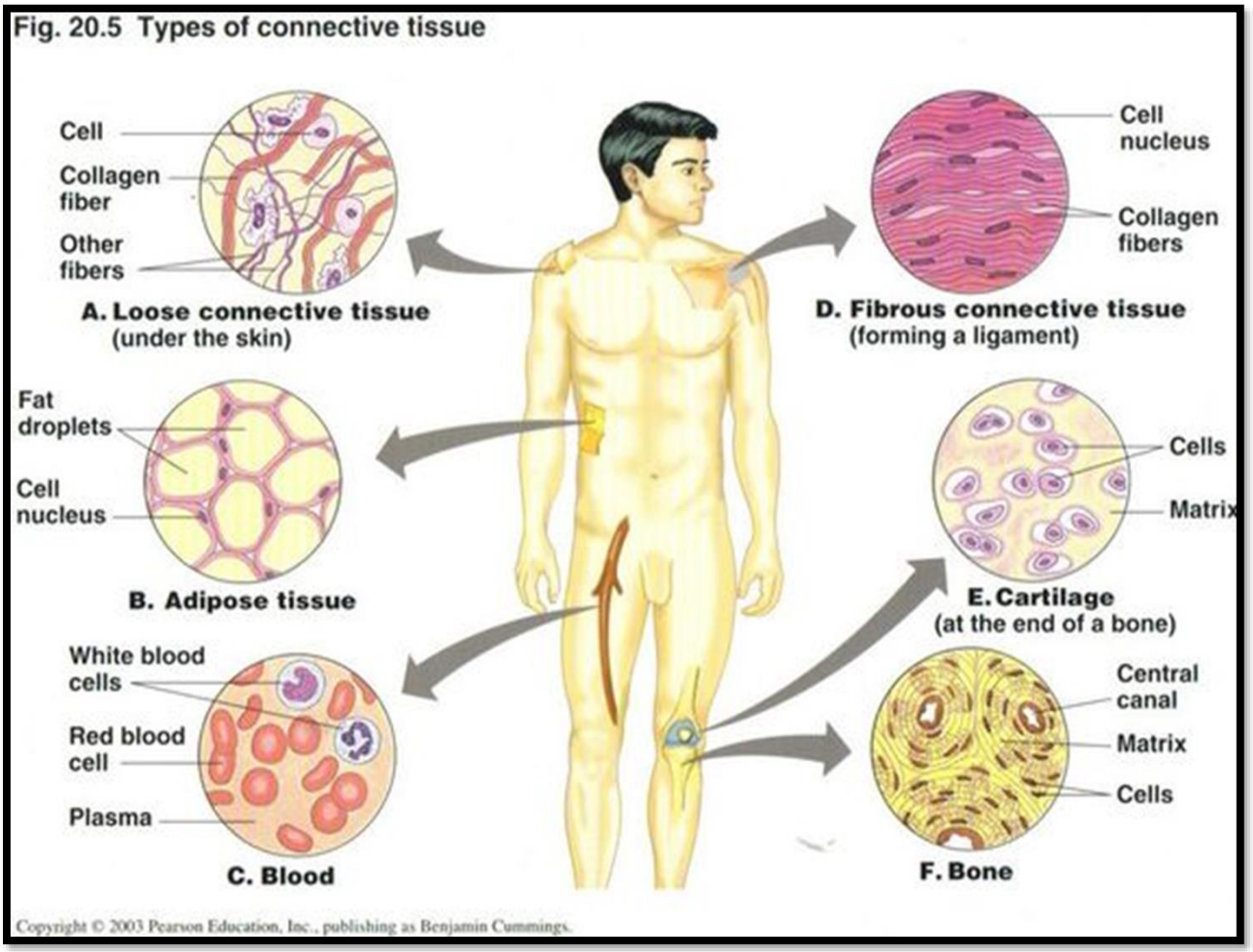
The most widespread and abundant type of tissue in animals, It is found in between other tissues in body. It is the most diverse in structure and function.

- Types of connective tissues include : bone , cartilage , fat , blood and lymphatic tissues.

- Connective tissues are made up of cells , fibers and a gel – like substances.

- Connective tissue supports, protects, and binds organs.

- Each type of connective tissue has a specific function.



Most connective tissue contains.

- **Fibroblasts**
- **Polysaccharides**
- **Collagen**
  - Most abundant protein in an animal body
  - Synthesis requires Vitamin C
- **Elastin**

Functions of Connective tissue:

1. Glue- eg. areolar tissue.

2. Support & movement- eg. bone & cartilage.

3. Nutrient storage- eg. bone, adipose.

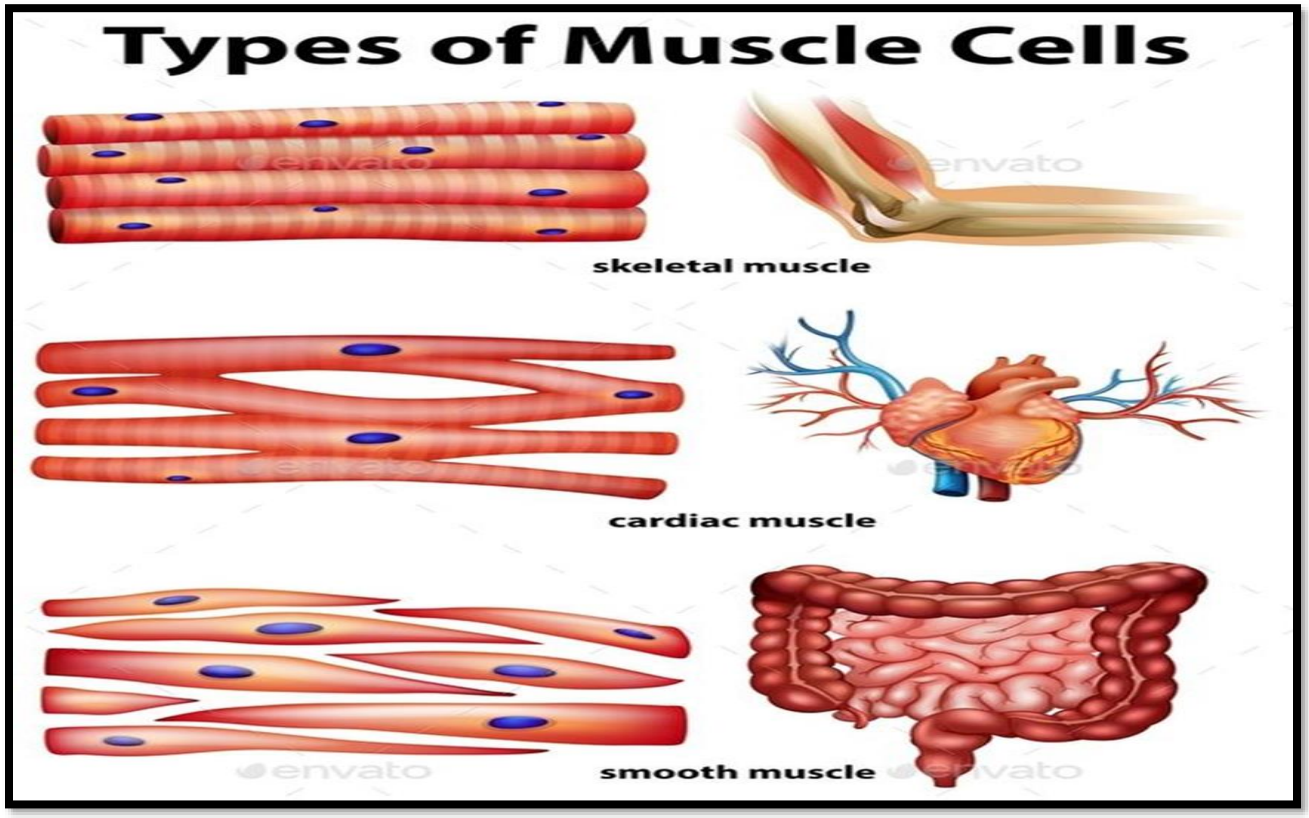
4. Temperature homeostasis- eg. fat for heat production and cold insulation

5. Transport- eg. blood, lymph.

3. Muscle Tissue.

Muscle tissue is a specialized tissue found in animals, which is composed of cells that have special ability to shorten or contract in order to produce movement of body parts . Muscle tissue consists of fibers of muscles cells connected together in sheets and fibers which is known as **Muscles** .

There are three basic types of muscle tissue. (**skeletal**, **cardiac** and **smooth**) classified according to appearance of their contractile cells and location.



Skeletal muscle tissue.

A muscle tissue that is attached to the bones and is involved in the functioning of different parts of the body .Is generally responsible for voluntary movement within the body, mainly of the skeleton but also other structures such as the eyes and upper

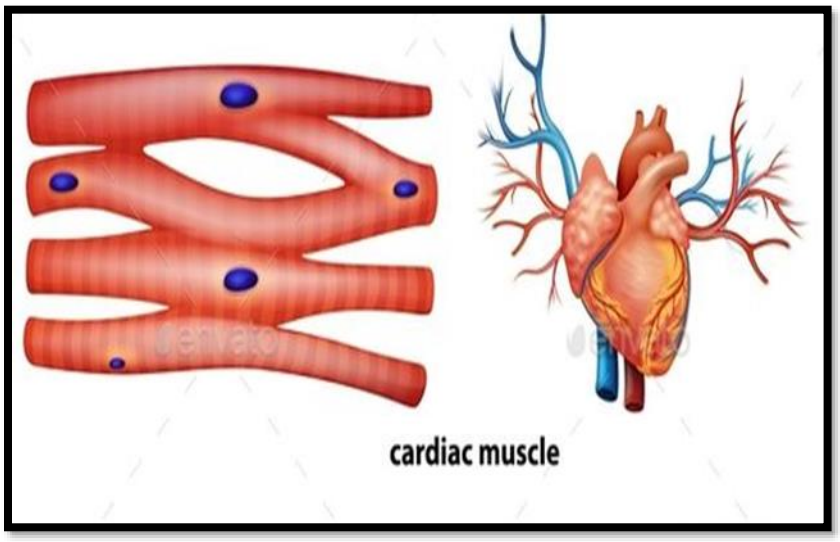
esophagus for swallowing. It is composed of long multinucleated cells called muscle fibers which generally extend the entire length of a muscle from tendon to tendon.

Skeletal muscle tissue characteristics.

- Pulls on bones to move body parts
- Cells are long and cylindrical
- Have a striated (striped) appearance
- Voluntary muscle
    - Can deliberately make the cells contract
- Stores glycogen

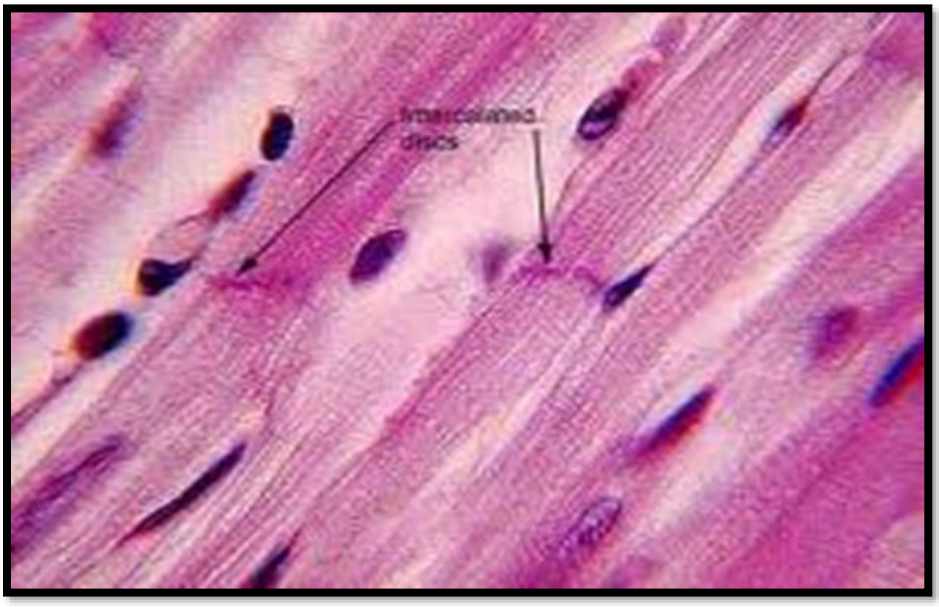
Cardiac muscle tissue.

Is striated muscle, like skeletal muscle; however, it is localized to the walls of the heart.



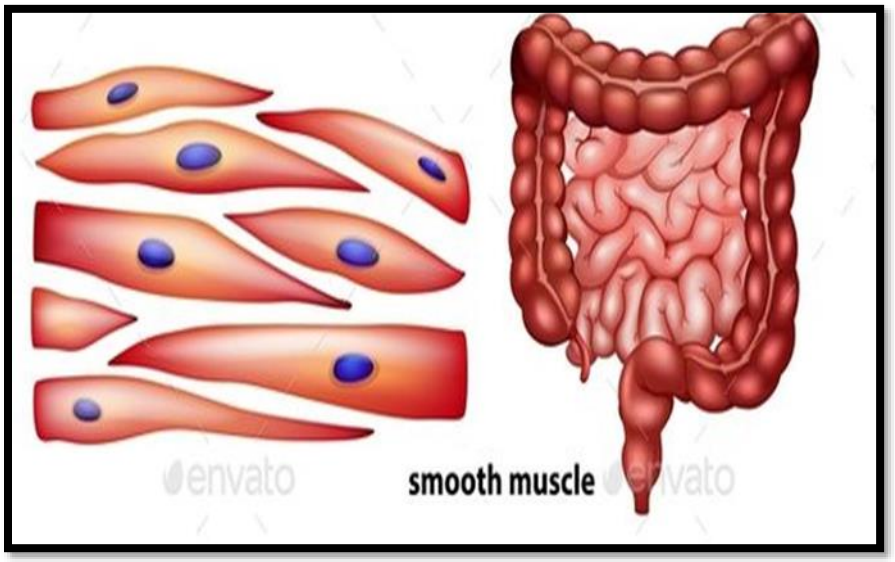
Skeletal muscle tissue characteristics.

- Occurs only in the heart wall.
- Consists of branching cells, each with a nucleus.
- Cells connected by adhering junctions.



Smooth muscle tissue.

Smooth muscle fibers are long and tapered at both ends, generally ranging in length from 20-200µm, no striations (hence, "smooth") because the actin and myosin filaments do not show the same degree and kind of organization as seen in striated muscle (skeletal and cardiac); like in cardiac muscle, there is a single central nucleus for each cell; however, in smooth muscle the nucleus conforms to the cell shape, unlike the typically round nucleus of cardiac fibers; it is under involuntary control and is capable of slow, sustained contractions.



Smooth muscle tissue characteristics.

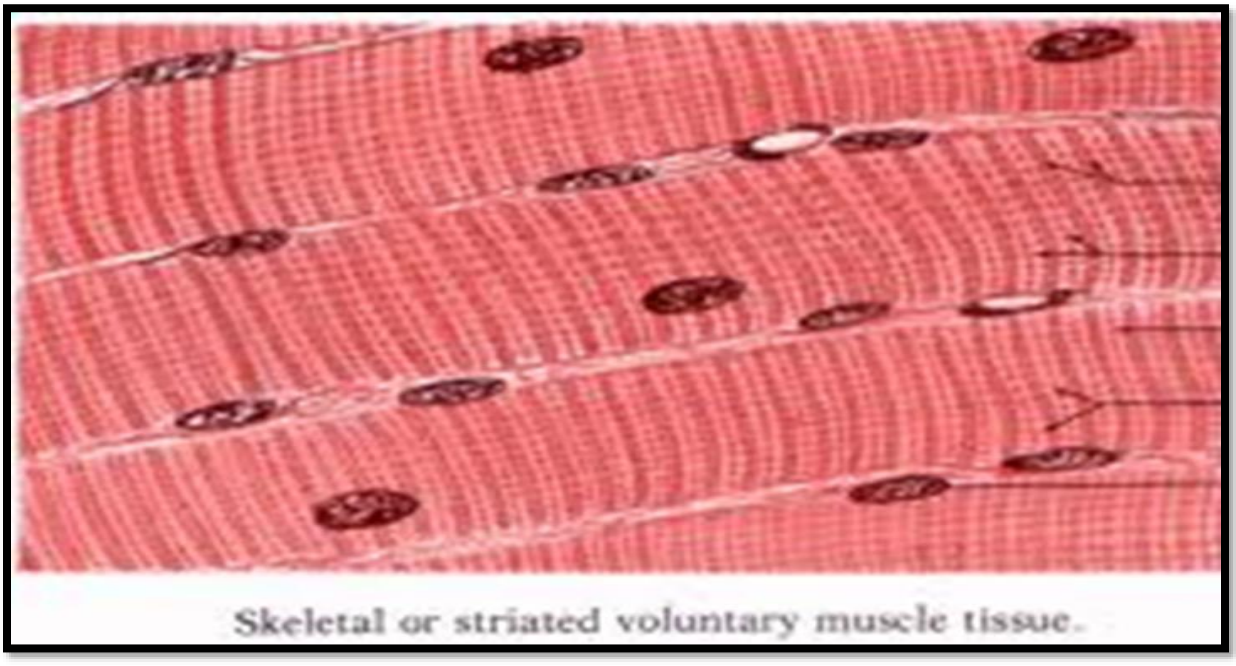
- Located in the wall of some blood vessels and internal organs
- Consist of unbranched cells with a nucleus
- Cells tapered at both ends
- Not striated
- Contracts more slowly than skeletal muscle tissue
    - Contractions can be sustained longer

Functions of Muscle Tissue:

1. movement- both **voluntary** movements such as swimming and running and internal **involuntary** movements of various organs such as the pumping heart, and peristalsis of the digestive organs.

2. Posture

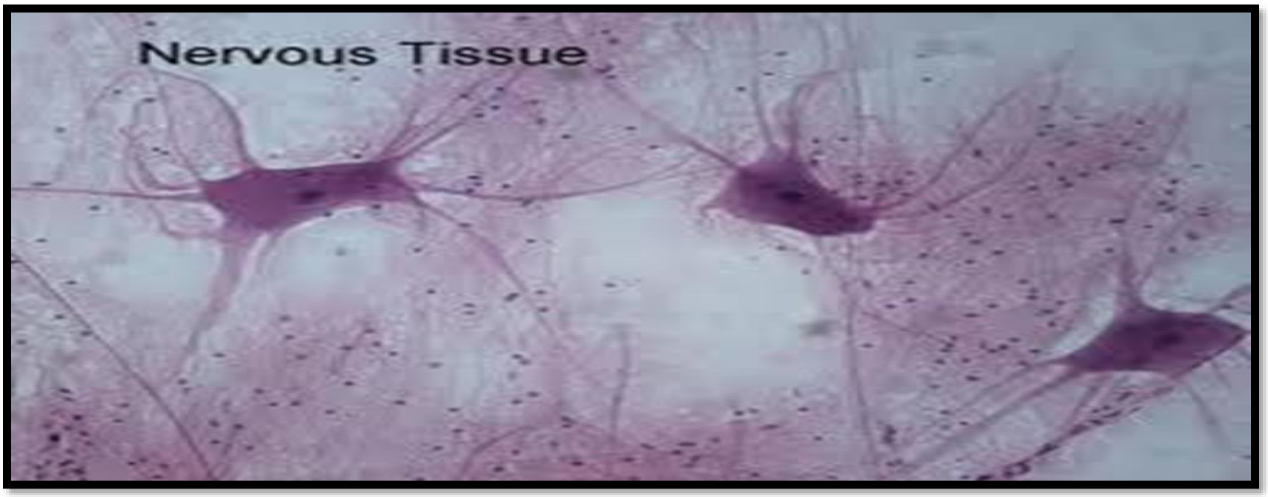
3. Heat generation- used for **movement.**



Skeletal or striated voluntary muscle tissue.

4. Nervous Tissue

Nervous tissue is the main tissue component of the nervous system. The nervous system regulates and controls bodily functions and activity.



Functions of Nervous Tissue

1. To sense internal and external environmental changes.
2. Coordination and control of muscles and glands.

Neural tissue consists of two cell types:

1- Neurons:

- Nerve cell is responsible for the transfer and processing of information in the nervous system, consists of **a soma, axon, and dendrites.**

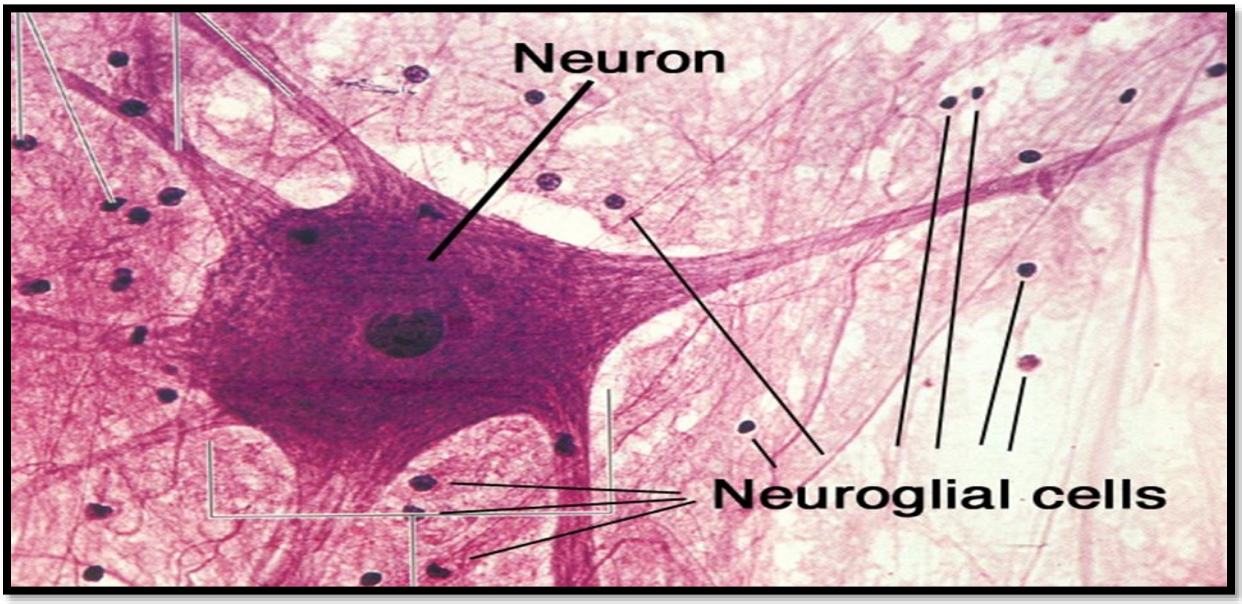
• Structural Classification of Neurons.

• **Anaxonic•** Has many processes but cannot differentiate between axons and dendrites.

• **Bipolar** • The cell body is between two axons.

• **Pseudounipolar** • The cell body is off to one side of the axon.

• **Multipolar** • Typically has a single axon and multiple dendrites



Functional Classification of Neurons

• Sensory

- Sends information from the peripheral nervous system (PNS) to the Central Nervous System (CNS).
- Somatic sensory and visceral sensory.

• Motor

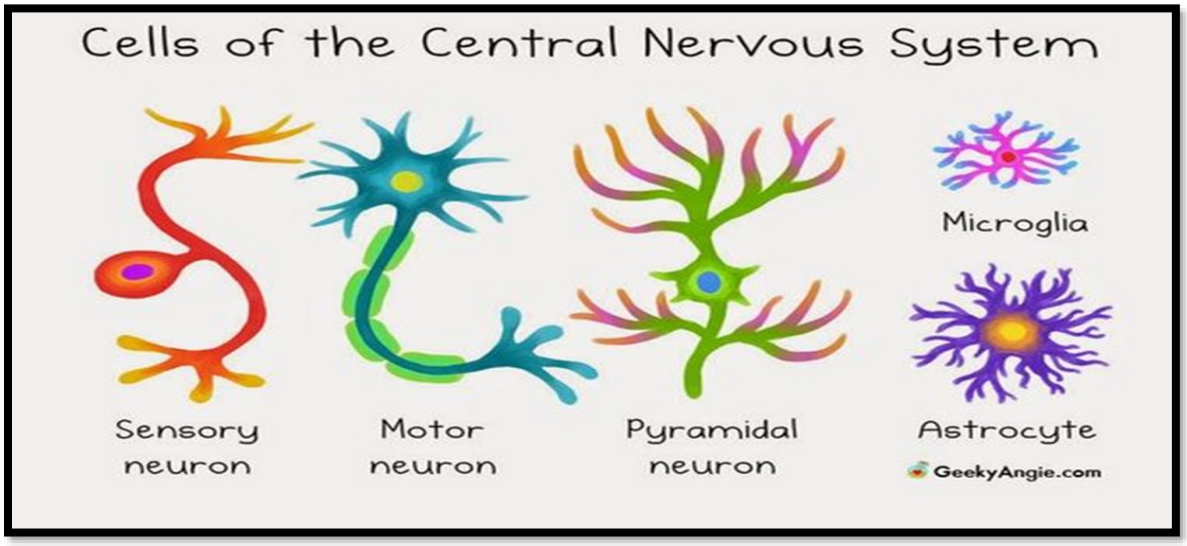
- Sends information from the CNS to the periphery.

• Interneurons

- Situated between the motor and sensory neurons.
- Analyze sensory input and coordinate motor outputs
- Can be excitatory or inhibitory.

2- Neuroglia (also called glial cells)

- Supporting cells
- Protect the neuron.



Functions and characteristics of Neuroglia

- Provide the framework for the neural tissue
- Maintain the intercellular environment
- Act as phagocytes
- Over 100 billion
- Roughly five times the number of neurons
- Have the ability to reproduce