

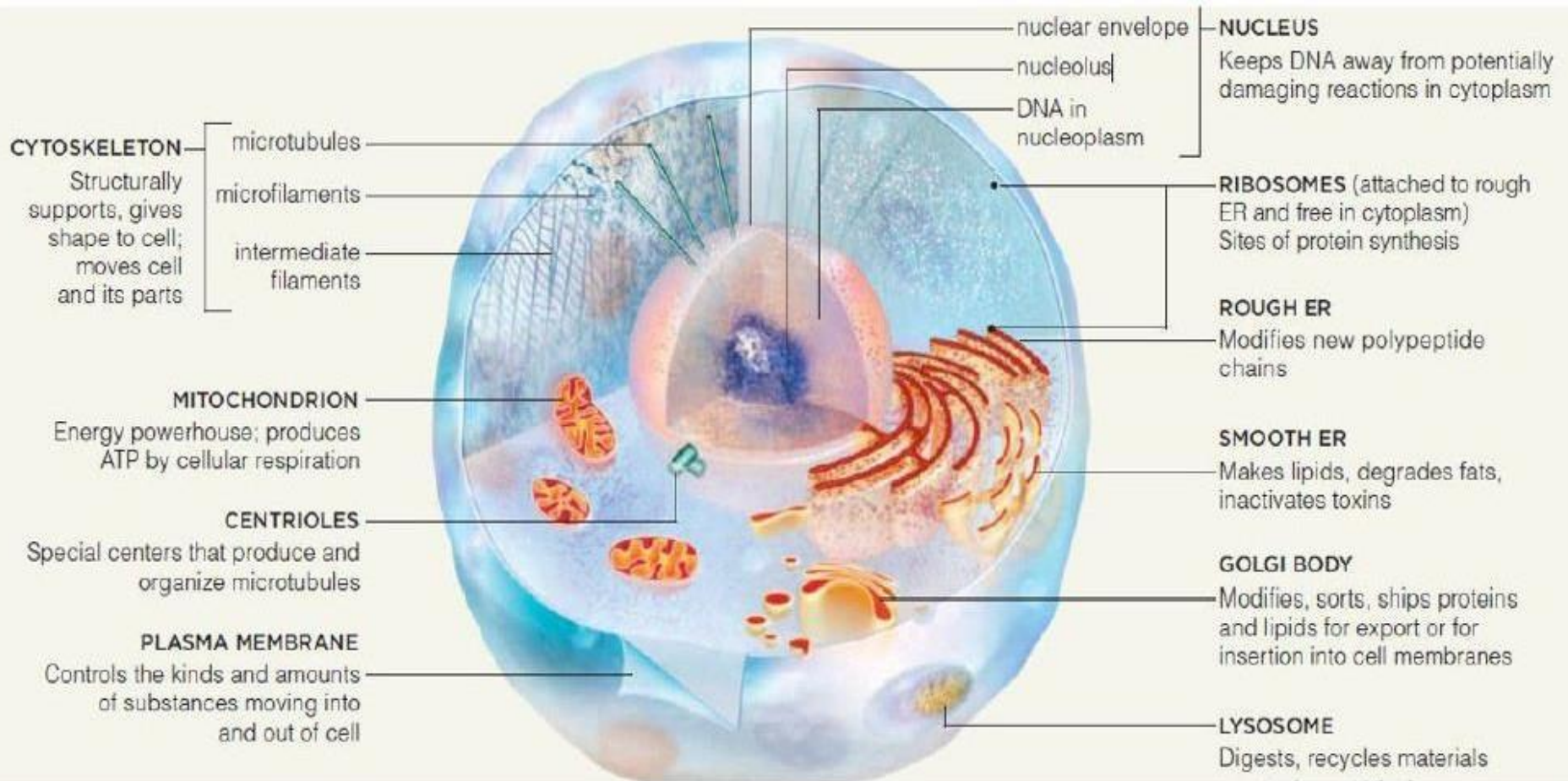
Lec. 4 Theory

ANS

Type of Human cells and Tissues

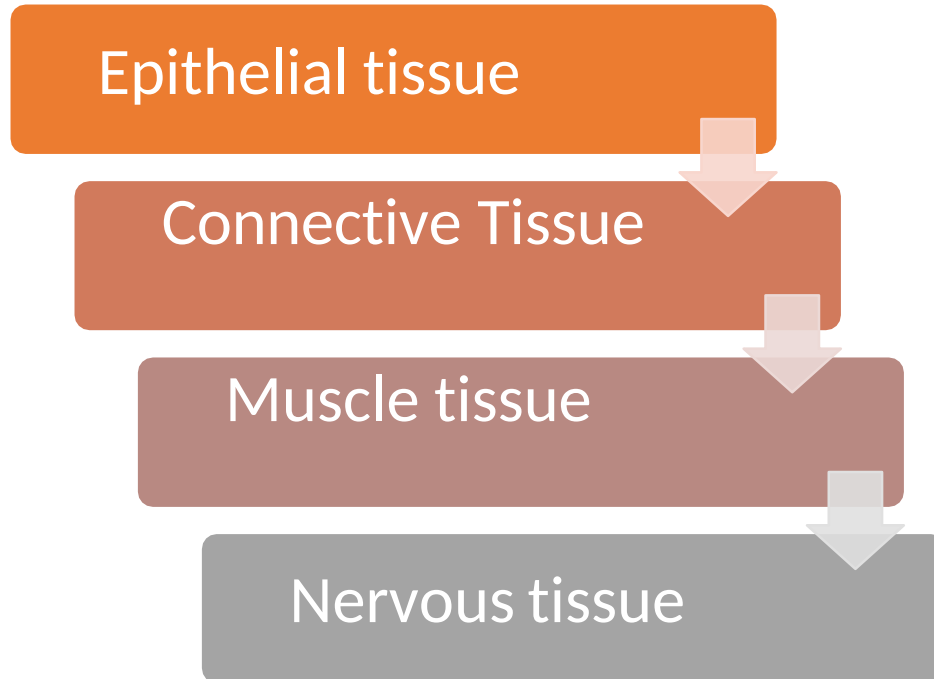
Dr. Kamal M.

The parts of a typical human cell and their functions



Types of human tissues

Tissues are groups of cells with a common structure (form) and function (job).

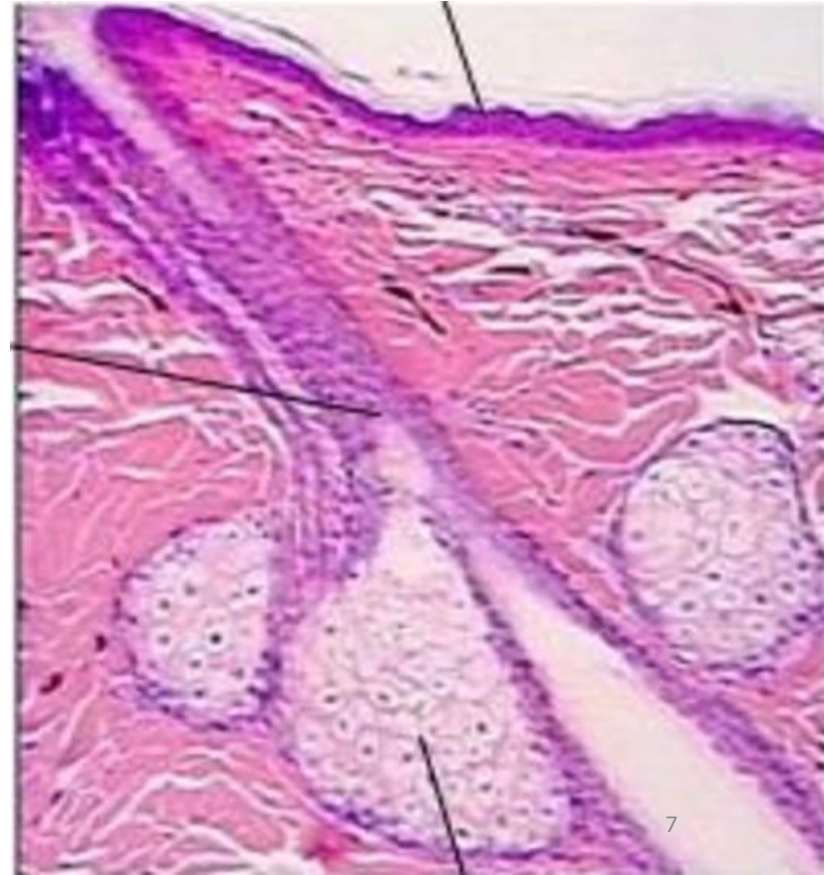


Epithelial tissues

Epithelial tissues are thin tissues that cover all the exposed surfaces of the body.

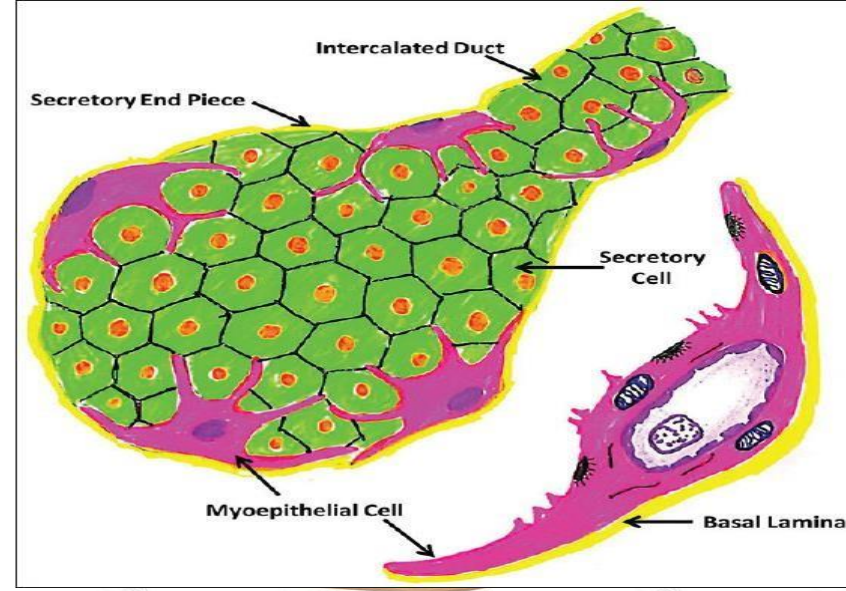
The locations of epithelial cells:

- Cover the exterior **body surfaces**
- line internal closed **cavities** (including the vascular system)
- Found in **body tubes** that communicate with the exterior (the alimentary, respiratory, and genitourinary tracts).
- Found **in glands** and their **ducts**.



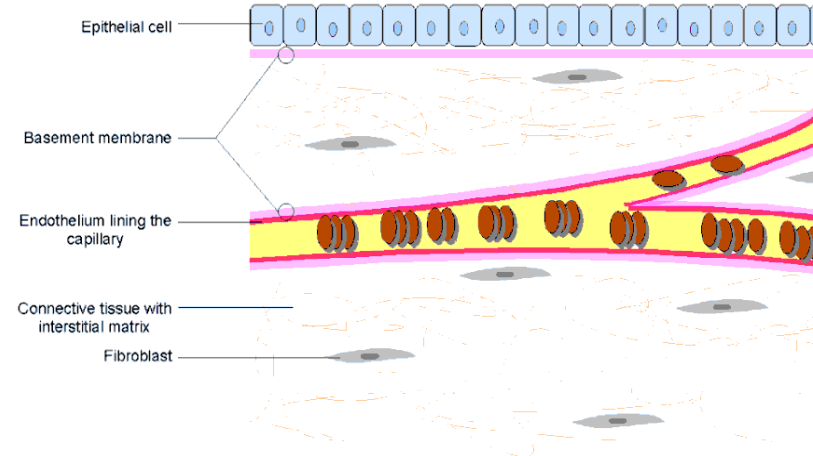
Function of epithelial cells:

- Covering and protection (**skin**)
- Secretion and excretion (**gland**)
- Absorption (**intestine**)
- Sensation (**neuroepithelial cell**)
- Contraction (**myoepithelial cell**)



Feature of epithelial cells

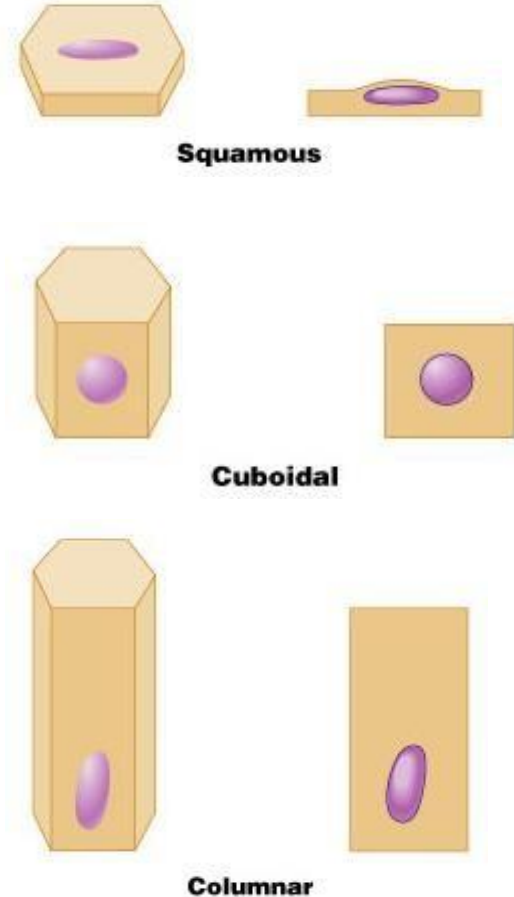
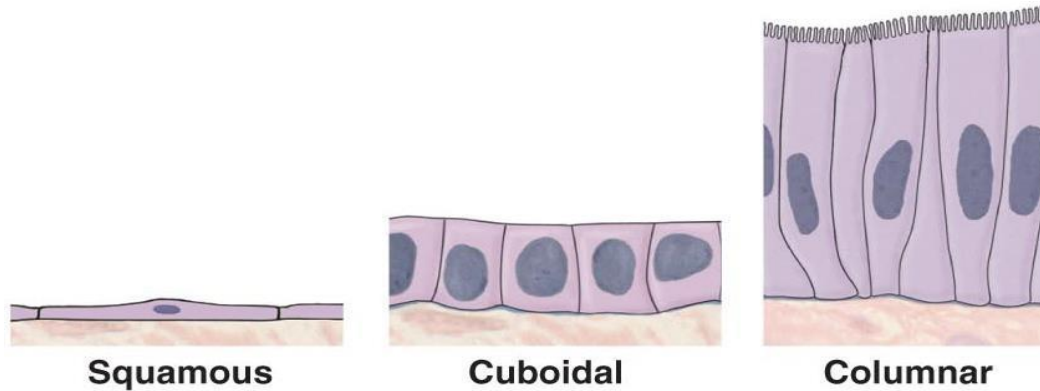
- Packed and contiguous cells
 - Little or no intercellular materials
 - Cells are usually joined by a cell-to-cell junction.



Classification of Epithelial cells

cells are classified into three main cell groups according to their shapes:

1. **squamous** (flat platelike)
2. **cuboidal** (height and width similar)
3. **columnar** (height 2–5 times greater than width)



Classification of Epithelial cells

Depending on the layers, cells are classified into:

1. **One layer:** simple epithelium
2. **More than one layer:** stratified epithelium

Unusual types of epithelial tissue:

Pseudostratified epithelium: False layered (appears to be more than one layer, but it is one layer).

Transitional epithelium: This tissue consists of multiple layers of epithelial cells which can contract and expand in order to adapt to the degree of distension needed.



simple squamous



simple cuboidal



simple columnar



stratified squamous



stratified cuboidal



stratified columnar



Pseudostratified columnar



transitional

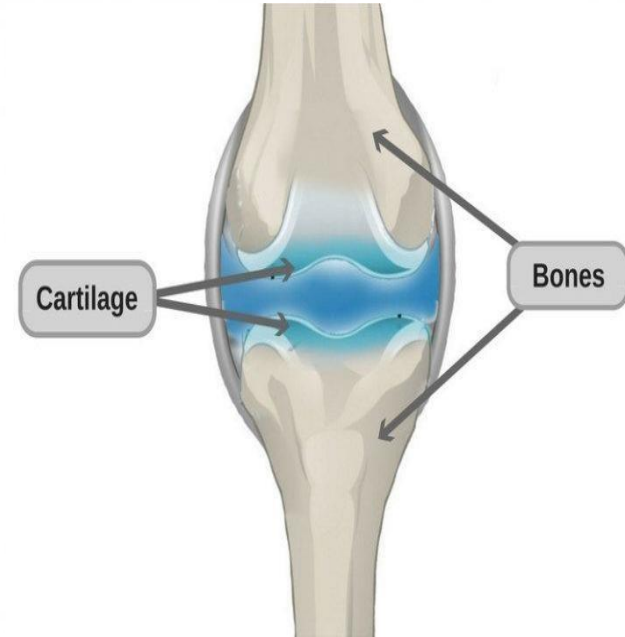
Epithelial Tissues

Connective tissues

The tissue that forms a continuum with the other 3 major tissues to maintain a functionally integrated body.

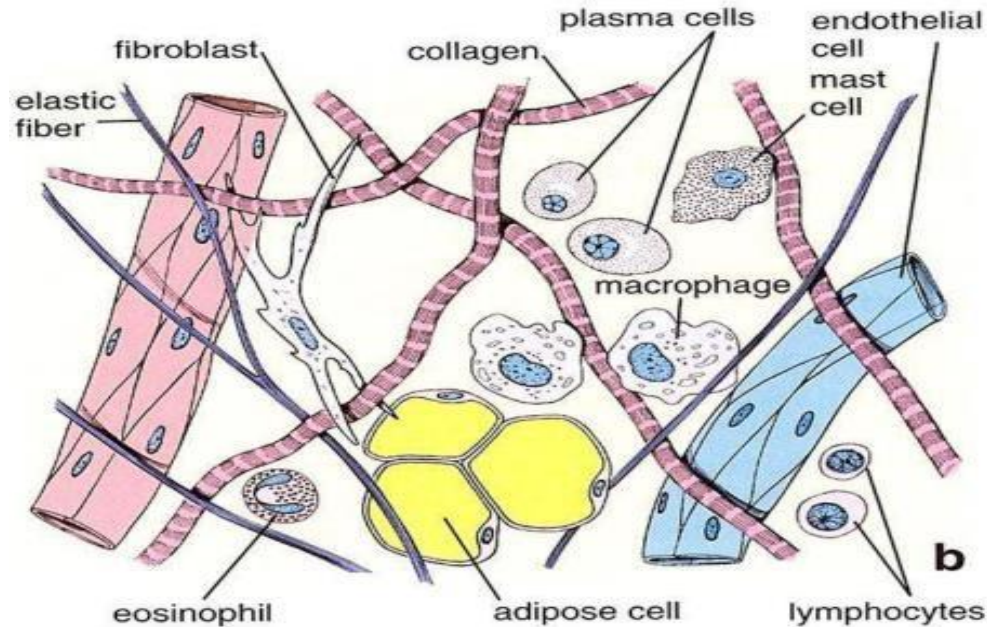
- **Functions of connective tissues:**

1. **Protection** (Eg: skull protects brain)
2. **Connecting and binding** (Eg: tendons bind muscle to bone)
3. **Storage** (Eg: bone stores calcium and phosphorous)
4. **Transportation** (Eg: blood transports gases, nutrients and waste products)
5. **Body defence** (Eg: macrophage in some tissue attack foreign particle)
6. **Structural frame work** (Eg: skeleton in human body)
7. **Cushion and insulation** (Eg: cartilage in joints)



Content of connective tissues

1. **Cells** (macrophage, fibroblast, mast cell.....)
2. **Protein fibres** (collagen, elastic and reticular)
3. Ground substance



Classification of connective tissues

I. Connective Tissue Proper

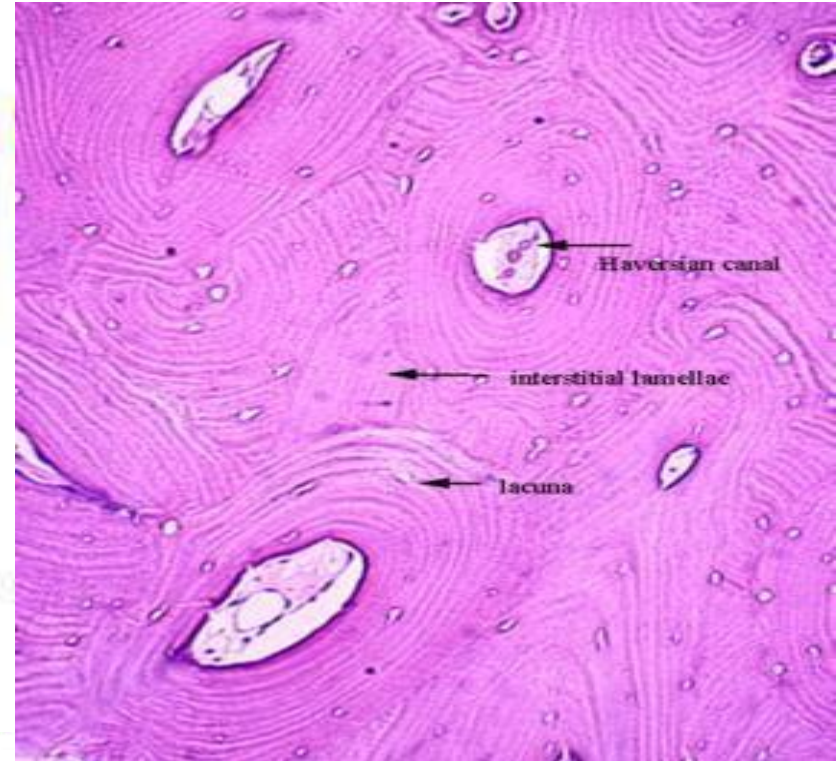
- **Loose connective tissue** (provides padding between and around organs and tissues)
- **Dense connective tissue** :
 - ✓ Regular (found in tendons, and ligaments)
 - ✓ Irregular (found in skin, and digestive tract)

II. Specialized Connective Tissue

- **Blood**
- **Adipose** (found beneath skin, around kidney, yellow bone marrow, intermuscular and visceral organ)
- **Reticular** (found in spleen, lymph node and bone marrow)

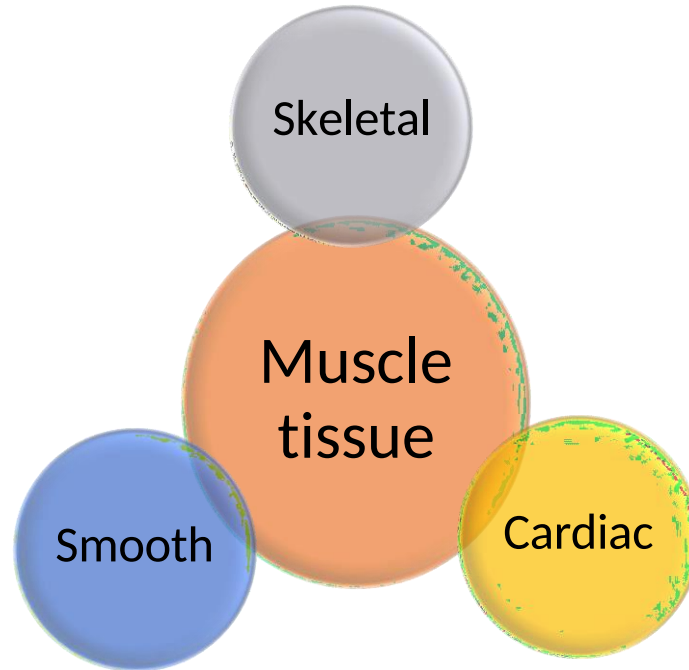
III. Supporting Connective Tissue

- **Cartilage**
 - ✓ Hyaline (found in nose, trachea and ribs, limbs)
 - ✓ Elastic (found in ear and epiglottis)
 - ✓ Fibrocartilage (found in knee joint and intervertebral discs)
- **Bone**



Muscle tissues

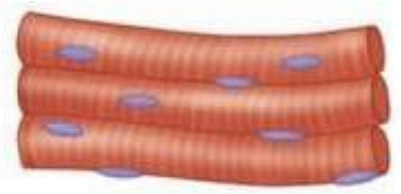
Muscle tissue is a **soft tissue**. It is composed of cells that have the special ability to **shorten** or **contract** in order to produce movement of the body parts.



Types of Muscle Tissue

Skeletal:

- Cells with obvious striations
- Contractions are voluntary
- Multinucleated and cylindrical cells
- attached to bones



Skeletal muscle

Cardiac:

- Cells are striated
- Contractions are involuntary
- uni or binucleated and branched cells
- found in heart



Cardiac muscle

Smooth:

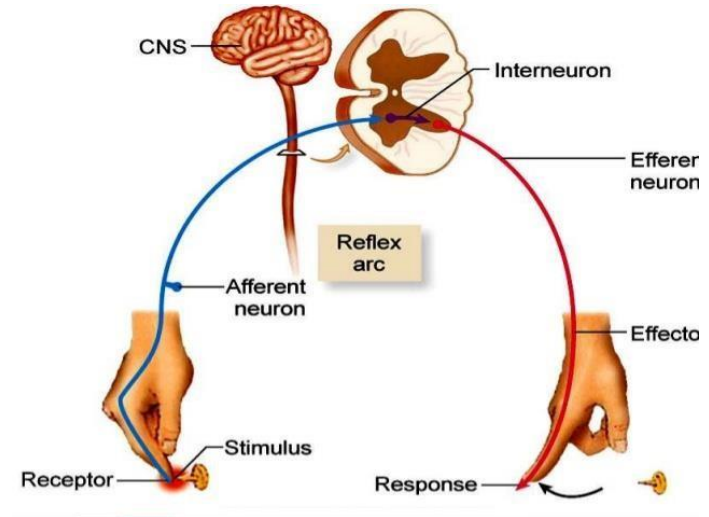
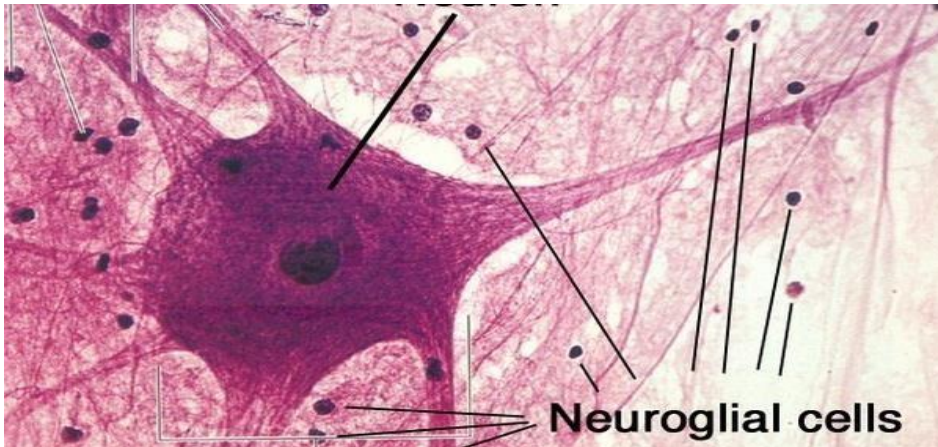
- Lack striations
- Contractions are involuntary (*not* voluntary)
- Single fusiform shape
- assists in the movement of internal viscera (stomach, blood vessels, bladder etc).



Smooth muscle

Nervous tissues

- Nervous tissue is the term for groups of organized cells in the **nervous system**, which is the organ system that controls the body's **movements, sends and carries signals to and from the different parts of the body**, and has a role in controlling bodily functions such as digestion, secretion, sensation....etc.



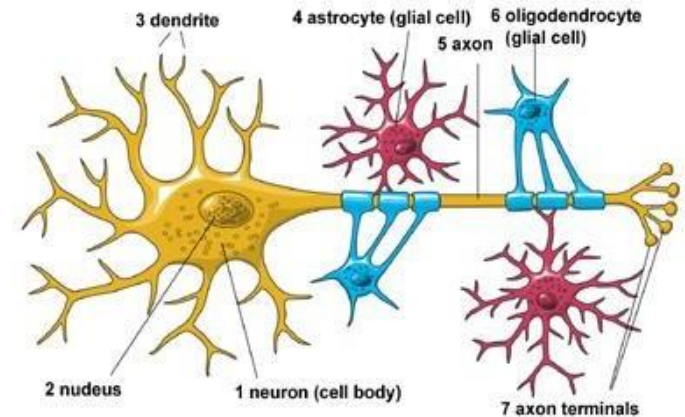
Cells of Nervous Tissue

■ Neurons

- Functional units of the nervous system; receive, process, store, and transmit information to and from other neurons, muscle cells, or glands.

■ Neuroglia (supporting) cells

- Provide metabolic and structural support for neurons, insulation (myelin sheath), and phagocytic functions.



Structures of Neurons

1. **Cell body:** It consists of a **nucleus** with easily visible nucleolus and some special organelles.
2. **Dendrites:** are treelike extensions at the beginning of a neuron that help increase the surface area of the cell body.
3. **Axon:** An extension of the cell body that is specialized for conducting **electrical impulses** (action potentials).
4. **The terminal buttons:** are located at the end of the neuron and are responsible for sending the signal on to other neurons. At the end of the terminal button is a gap known as a ***synapse***.

