

# Practical anatomy lab.2

## Levels of organization

Mahdi Al-Anawy

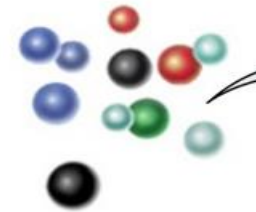
Assist lecturer

# Levels of organisation

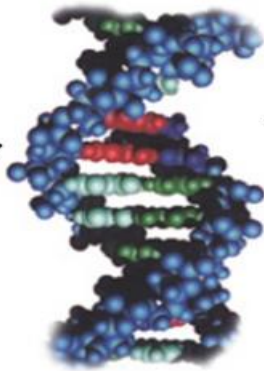
Levels :

- Cell ⇒ Tissue ⇒ Organ ⇒ Organ system  
⇒ Organism (Human).

**1 CHEMICAL LEVEL**



Atoms (C, H, O, N, P)



Molecule (DNA)

**2 CELLULAR LEVEL**



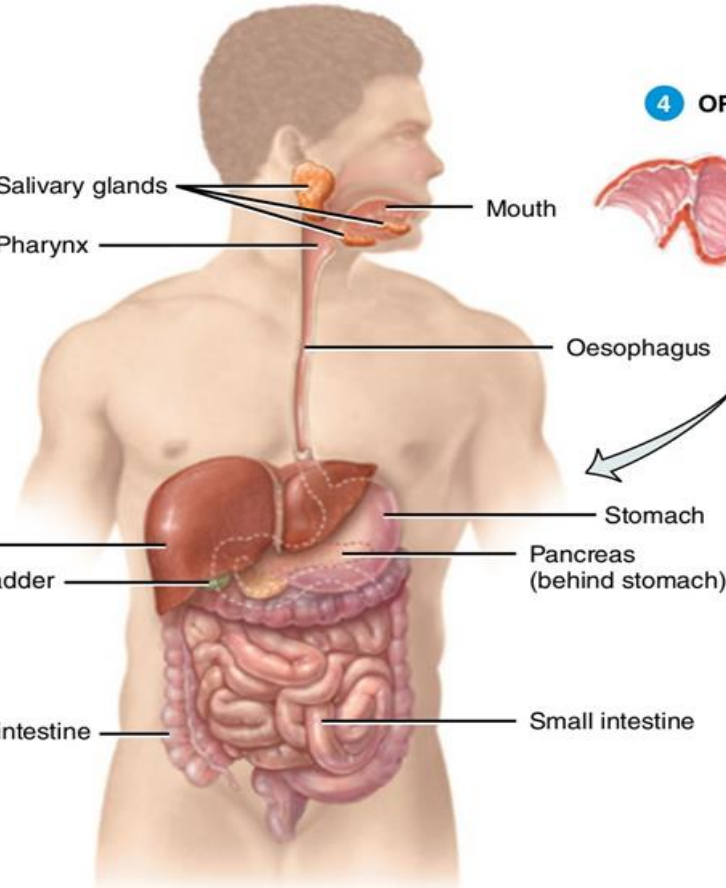
Smooth muscle cell

**3 TISSUE LEVEL**



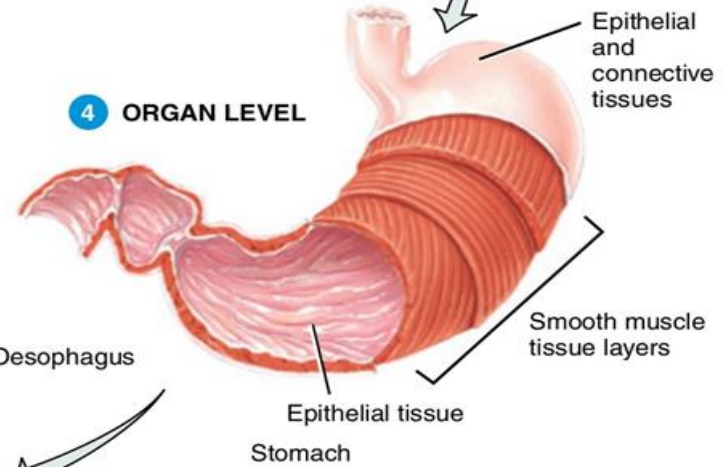
Smooth muscle tissue

**5 SYSTEM LEVEL**



Digestive system

**4 ORGAN LEVEL**



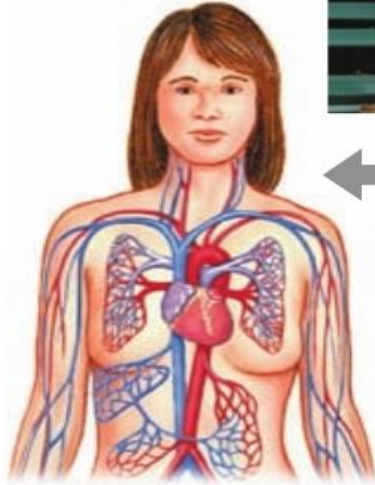
Mark Nielsen

**6 ORGANISMAL LEVEL**

S...



← The **organism level** is the highest level of organization and includes the structure and function of all the organ systems in the body.



← At the **organ system level**, a collection of organs functions as a unit to carry out a collection of related body activities.



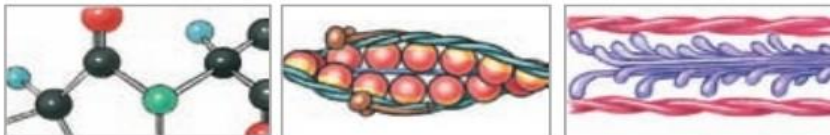
← At the **organ level**, two or more tissues are arranged into a structure that has a well-defined, three-dimensional shape and a specific bodily function.



← At the **tissue level**, collections of cells are grouped to perform a similar function.



← At the **cellular level**, organelles, which are composed of molecules, are organized in a unique way to form cells. The cell represents the fundamental unit of life.

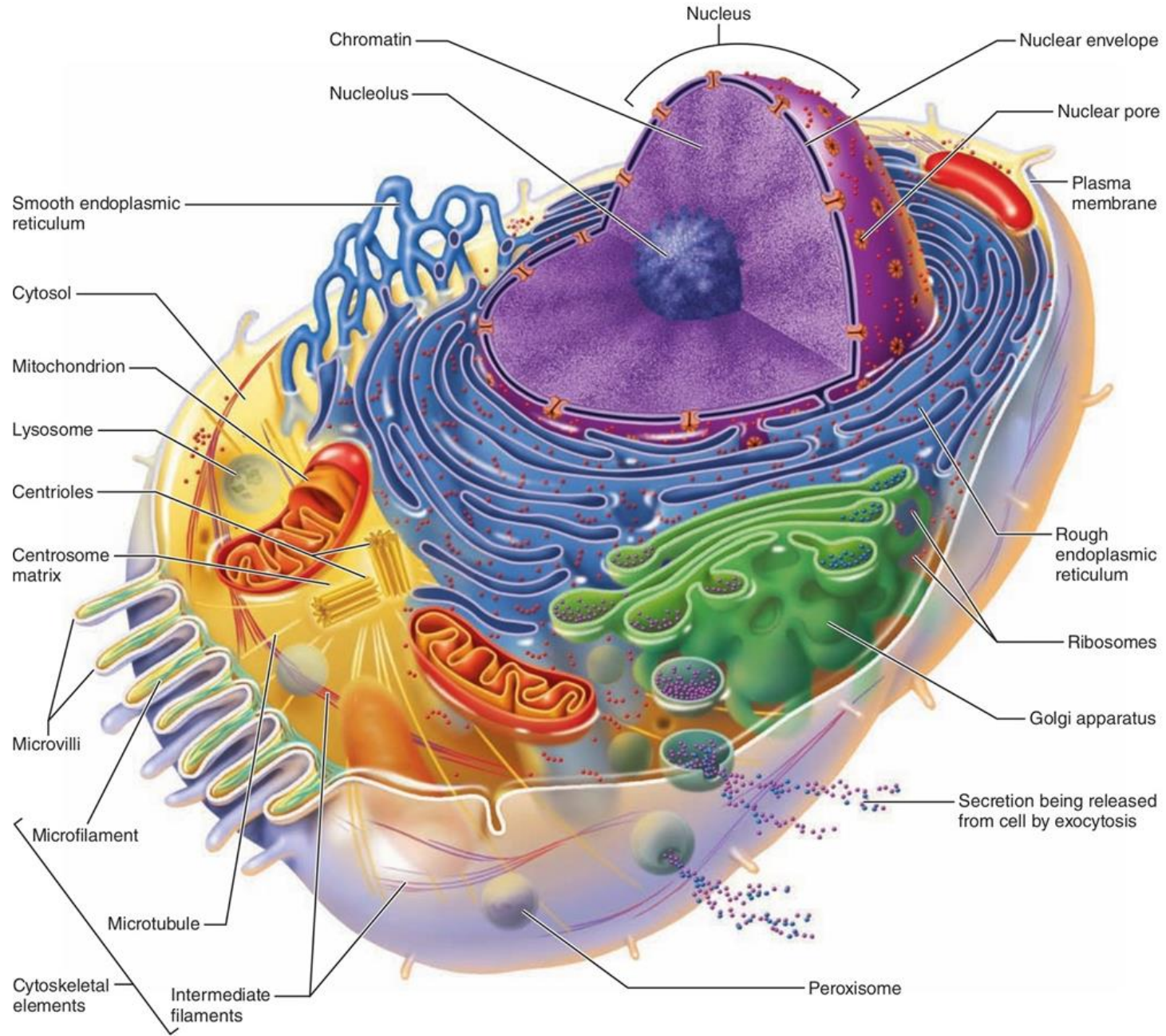


← At the **chemical level**, the chemical bonds between atoms give rise to molecules.

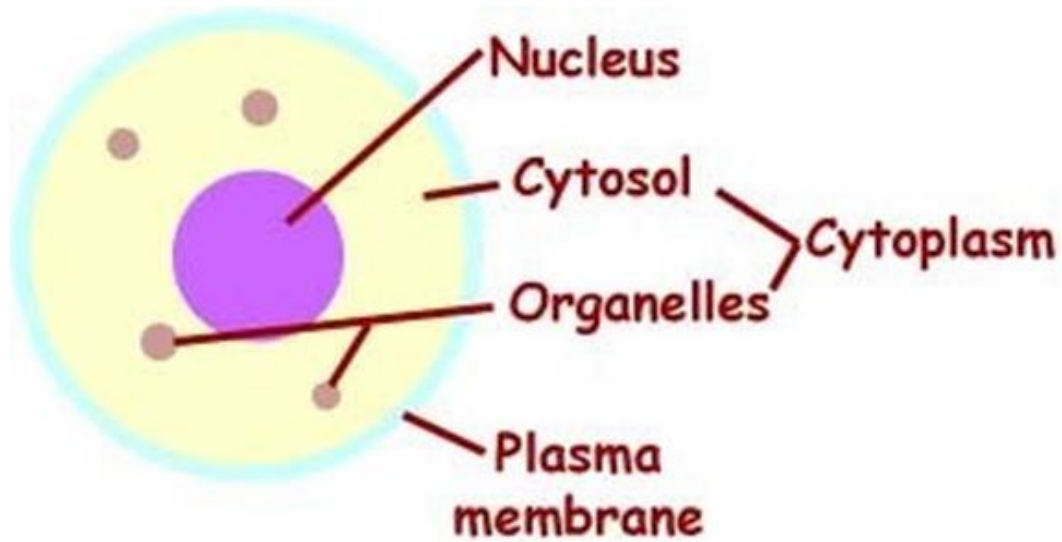
# Cell

- Cell: Membrane, Cytoplasm, Nucleus, DNA, Organelles, Mitochondria, Ribosomes

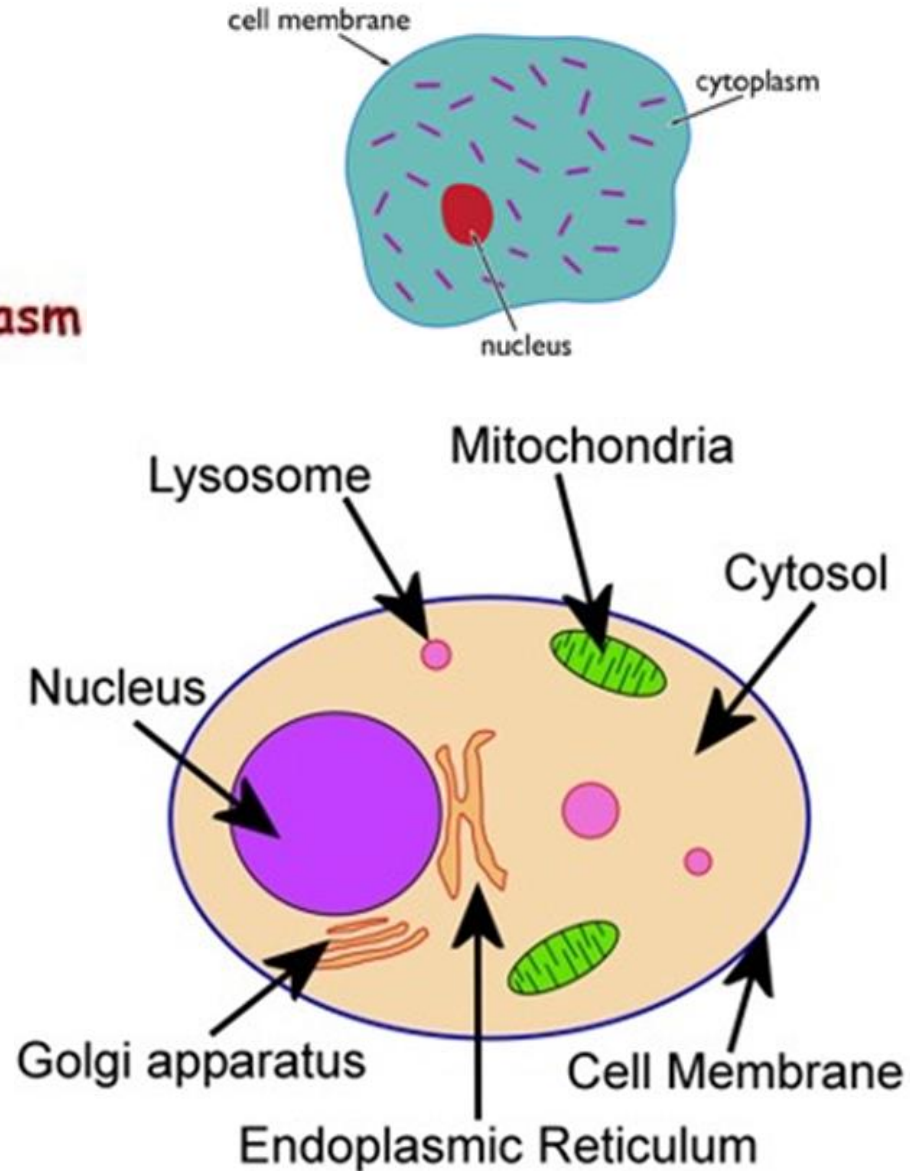
# Cellular anatomy



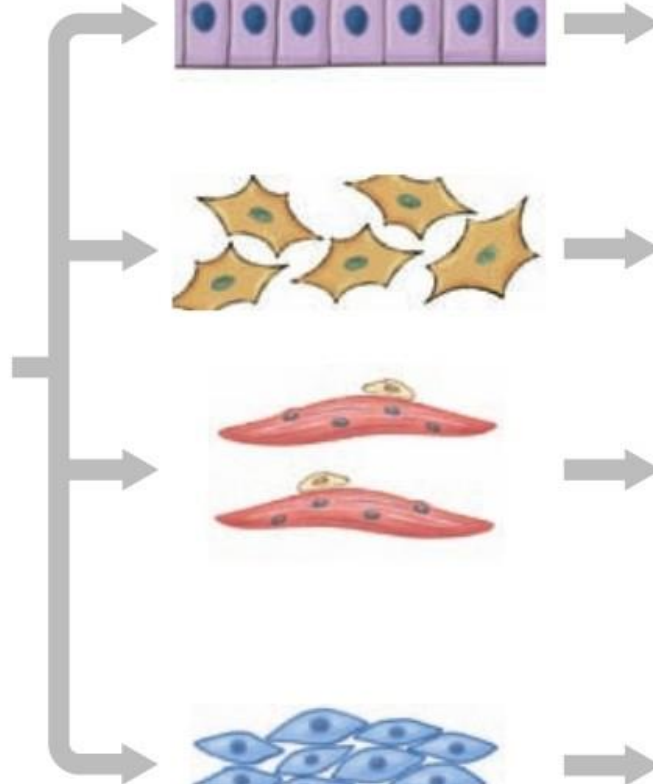
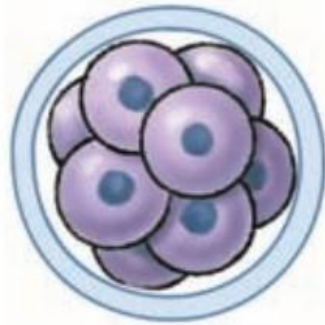
# Basic cell



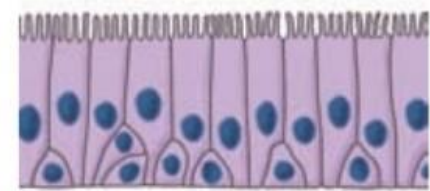
## Human Cell



# Cell and tissues



The differentiation of the four tissue types from a single cell: the fertilized ovum



Epithelial tissue



Connective tissue



Muscle tissue

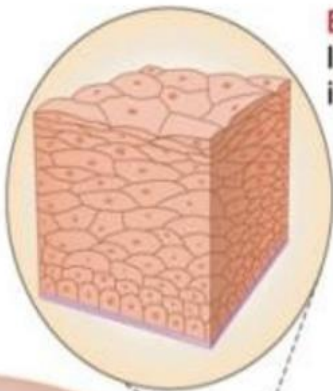


Neural tissue

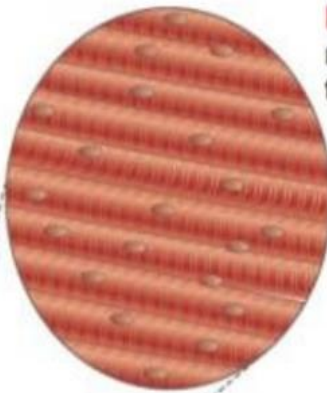


# Types of tissues

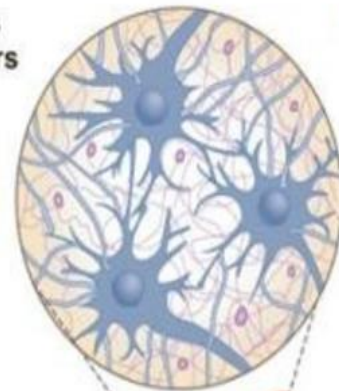
1. Epithelial
2. Connective
3. Muscular
4. Nervous.



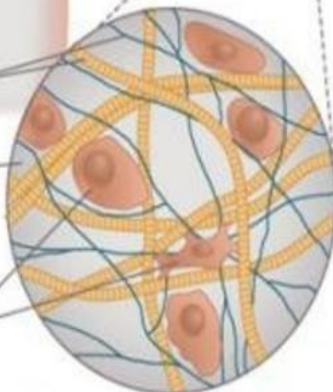
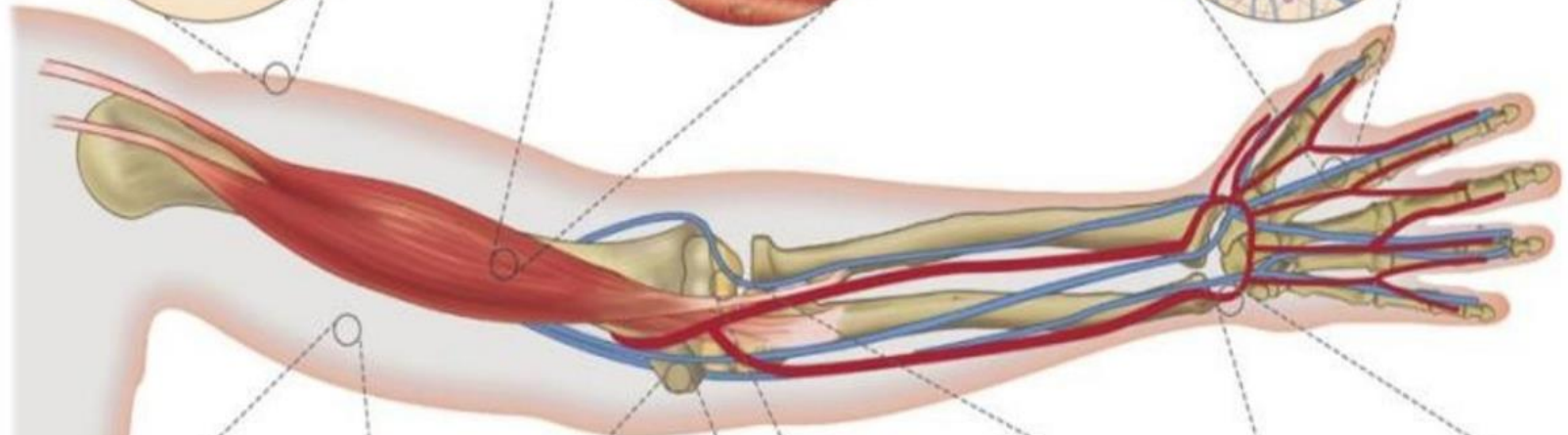
**Epithelial tissue** lines surfaces in the body



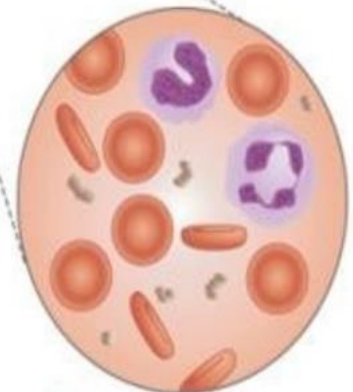
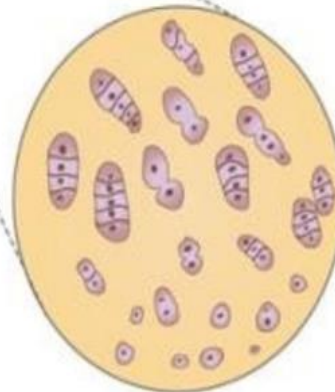
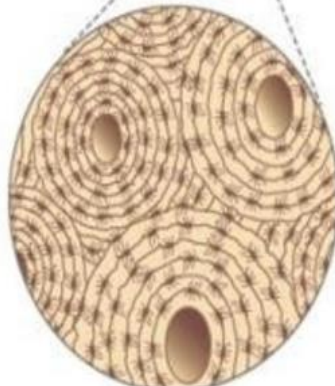
**Muscle tissue** is made up of fibers that contract



**Nervous tissue** consists of cells with projections that transmit electrical signals



Protein fibers  
Soft extracellular matrix  
Cells



**Connective tissues:**

**Loose connective tissue** acts as padding under skin and elsewhere.

**Bone**

Bone and cartilage are connective tissues made up of cells in a hard or stiff extracellular matrix.

**Cartilage**

**Blood** is a connective tissue made up of cells in a liquid matrix.

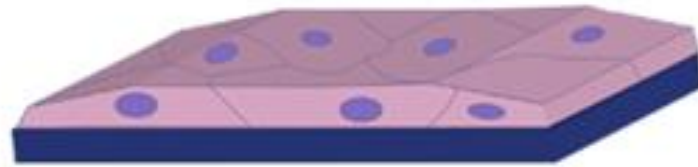
- Epithelial tissue:
  1. Simple
  2. Stratified.
- Connective:
  1. Loose
  2. Dense
  3. Specialized ( Bone, cartilage and blood)

# Types of epithelial tissues

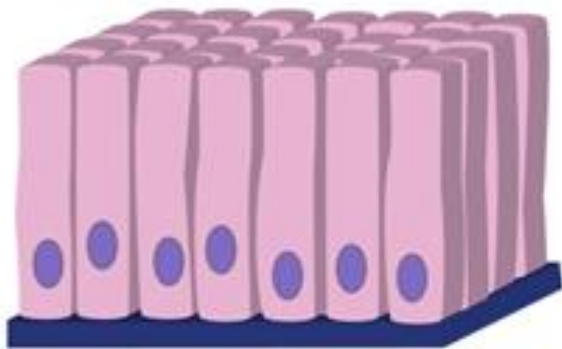
## Epithelial Tissue



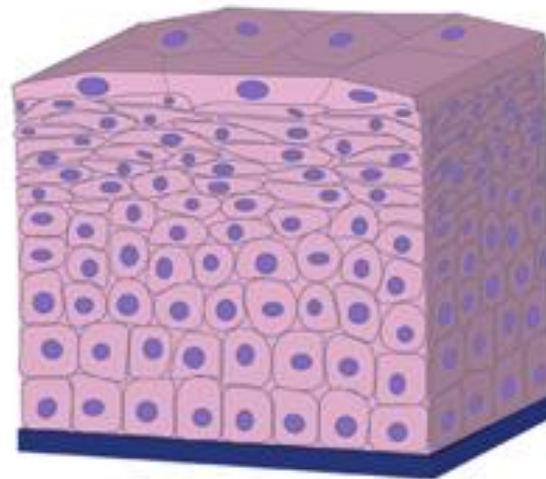
**Simple Cuboidal**



**Simple Squamous**

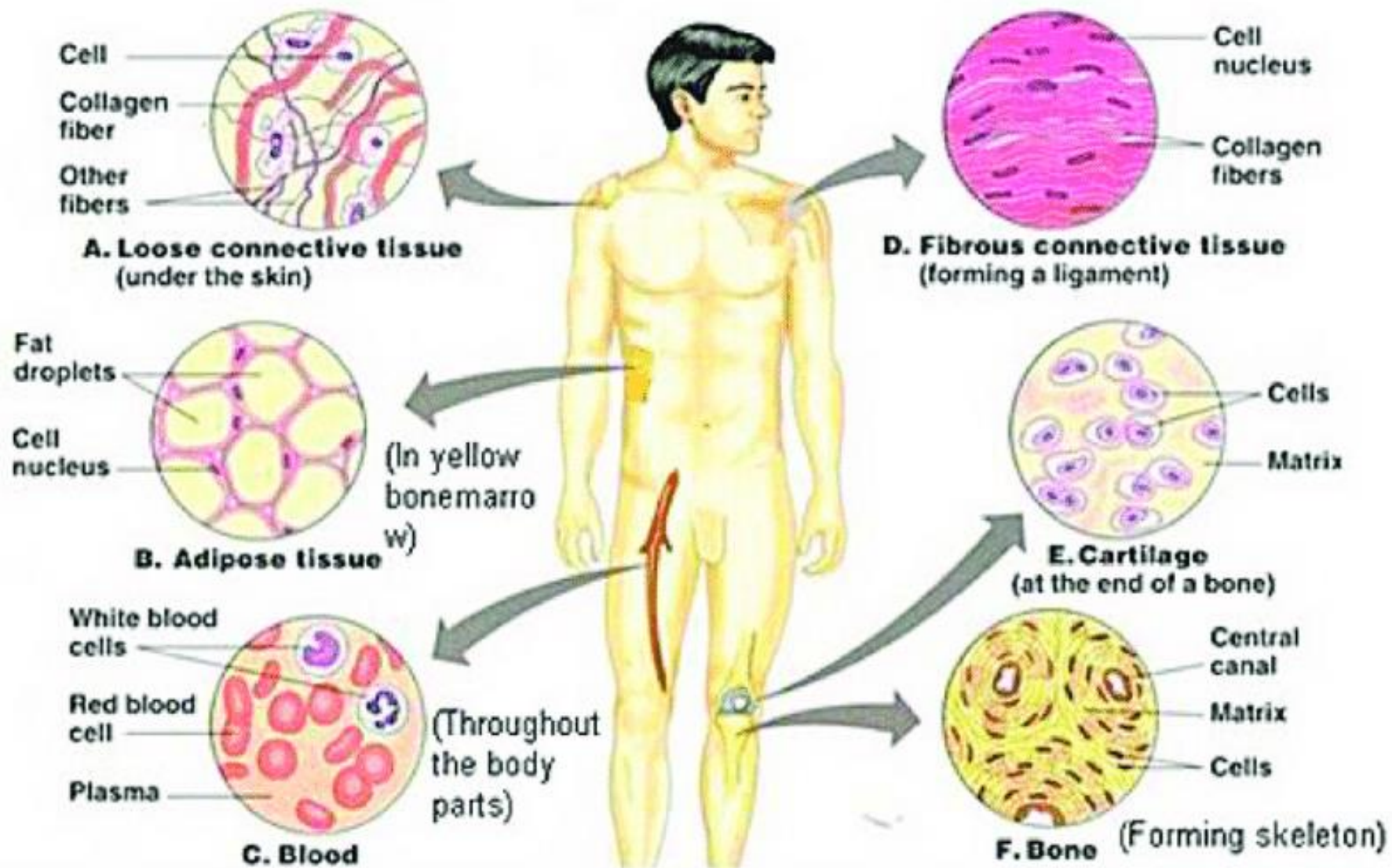


**Simple Columnar**



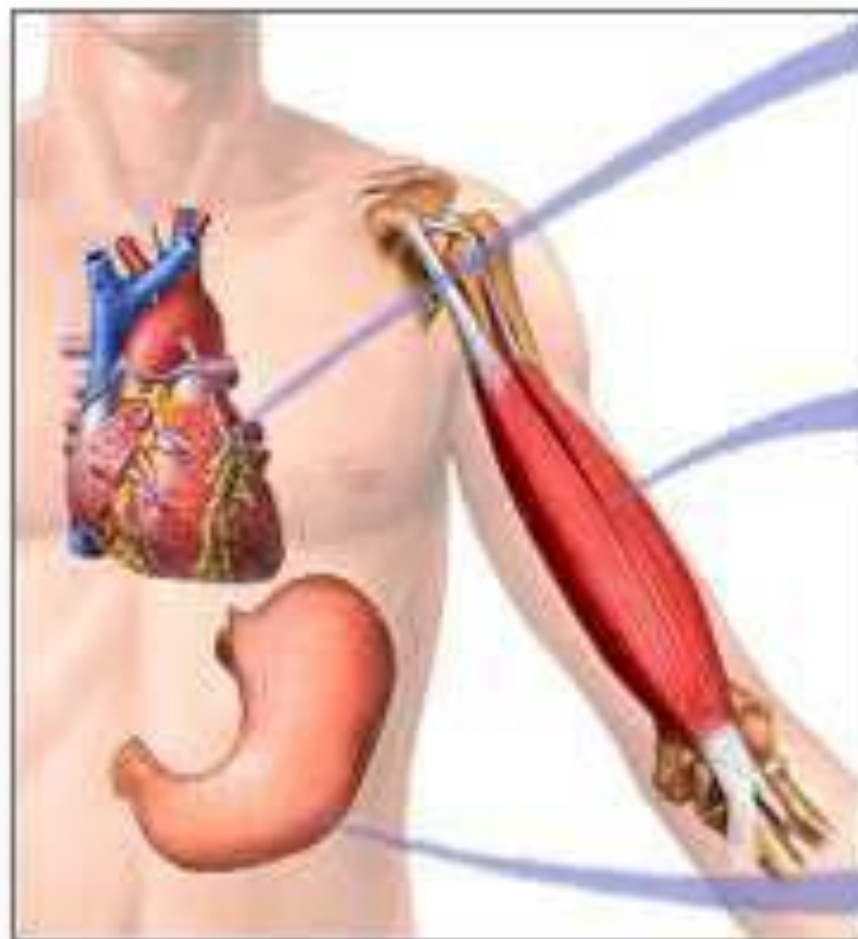
**Stratified Squamous**

# Connective tissue



# Muscular tissue:

1. Cardiac
2. Smooth
3. Skeletal.



Cardiac muscle cell



Skeletal muscle cell



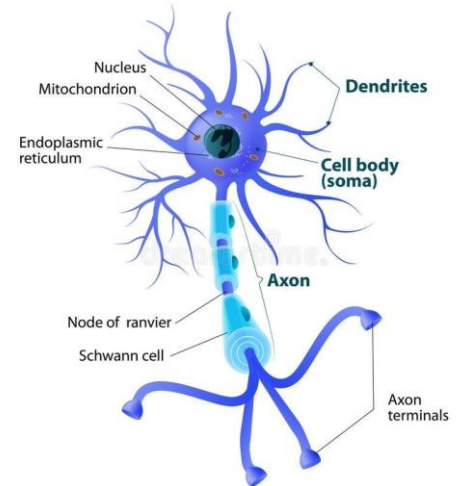
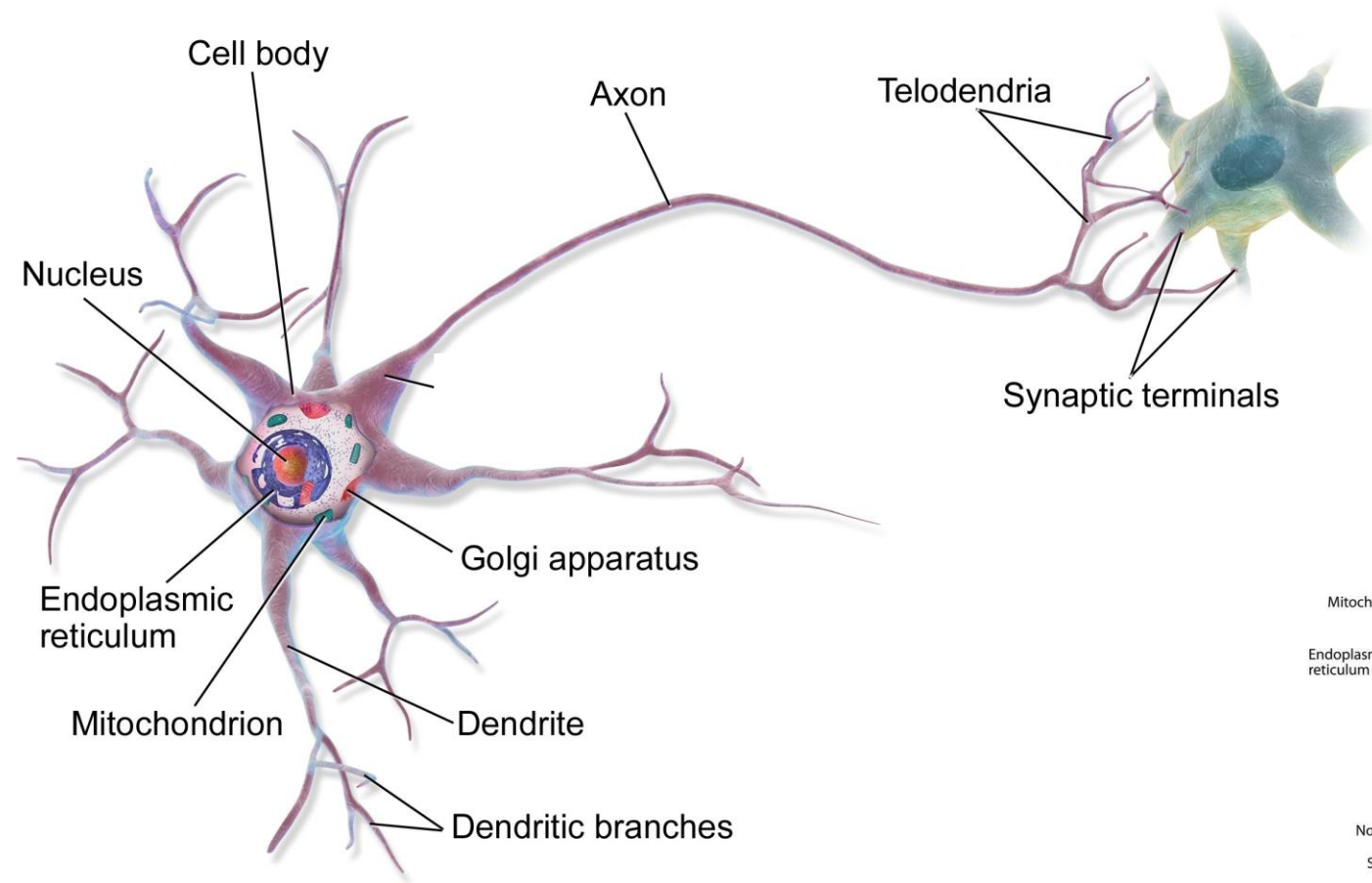
Smooth muscle cell

# Nervous tissue :

- Neuron ( soma, axon, dendrites)
- Neuroglia
- White matter
- Grey matter.

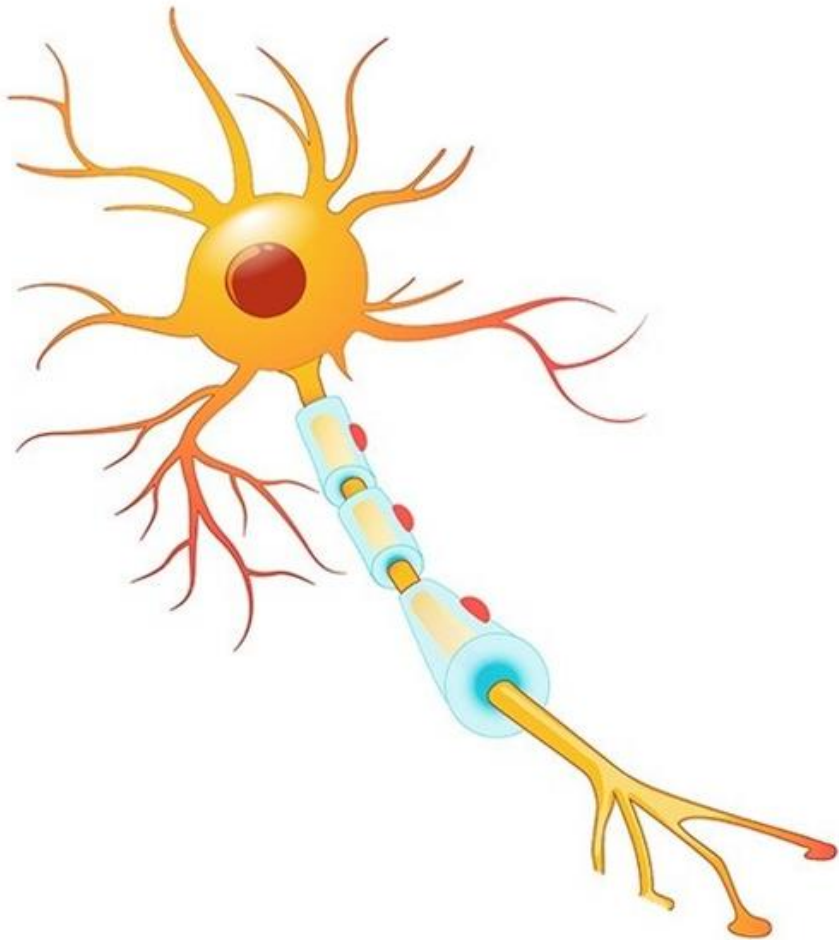


# Neuron

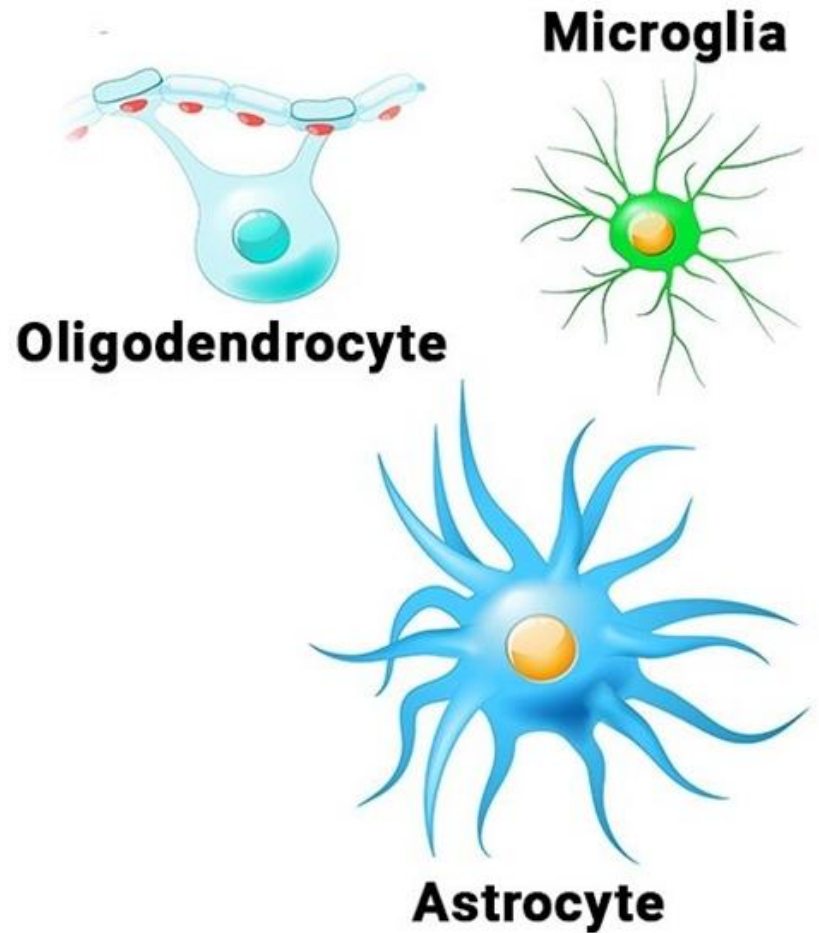


# Neuroglia

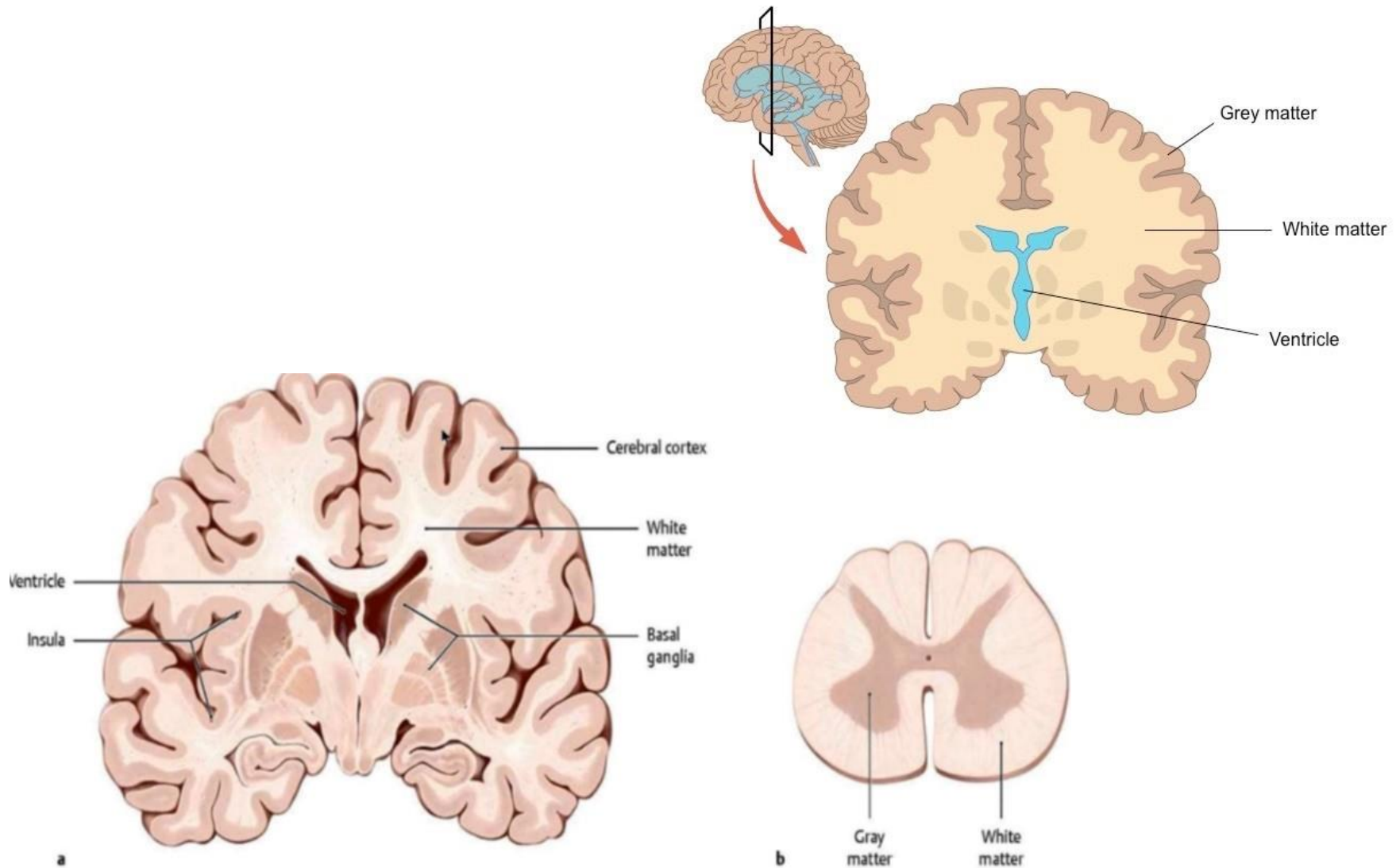
## Neuron



## Neuroglia

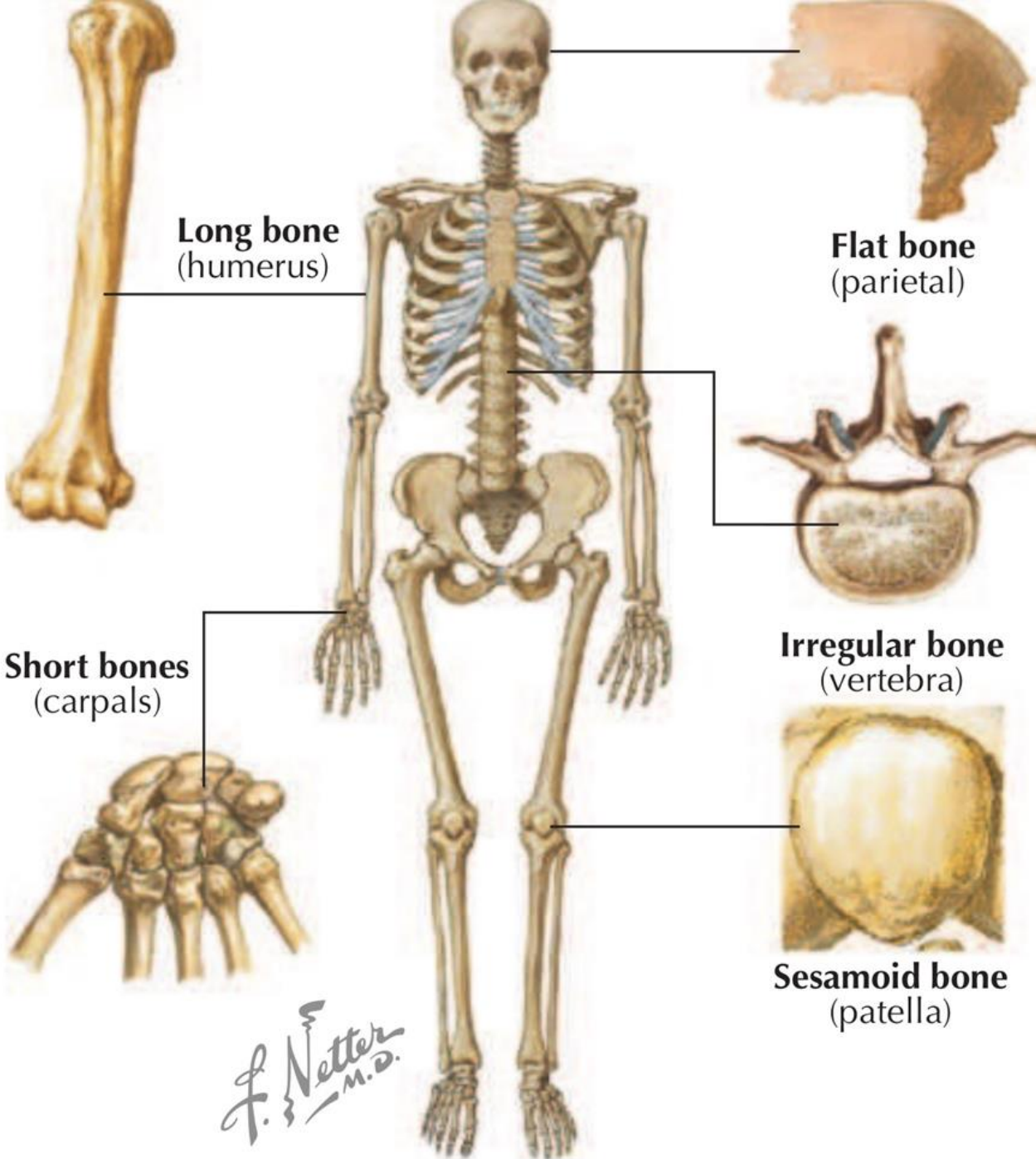


# White matter and Grey matter.



# Bones :

- Long
- Short
- Flat
- Irregular
- sesamoid..etc



**Long bone**  
(humerus)

**Flat bone**  
(parietal)

**Short bones**  
(carpals)

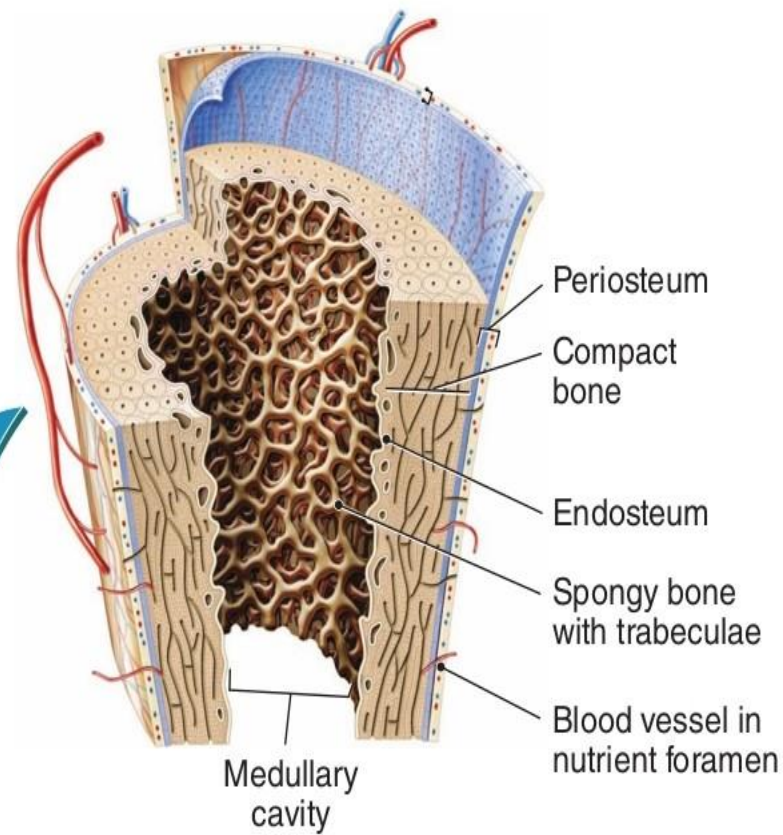
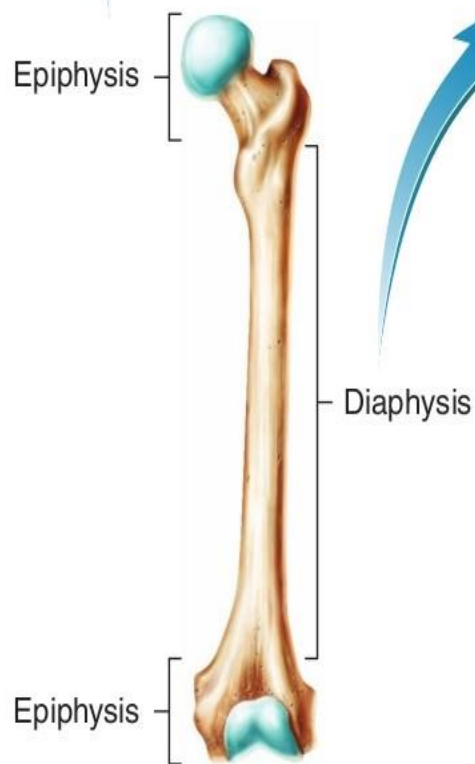
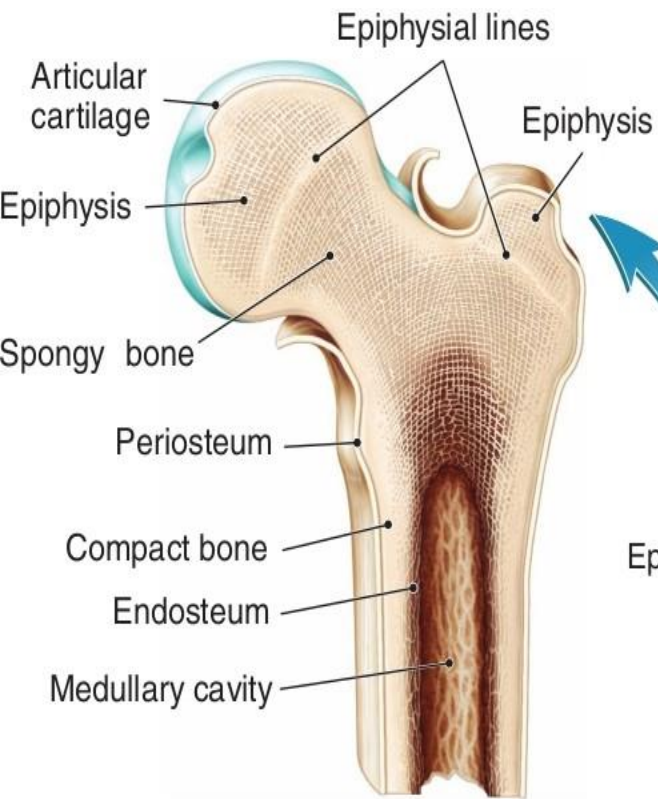
**Irregular bone**  
(vertebra)

**Sesamoid bone**  
(patella)

*F. Netter*  
M.D.

# Bone structure :

- Compact bone
- spongy bone
- Epiphyses
- diaphyses(shaft).



# Cartilage

- ligaments (bone to bone)
- Tendons (muscle to bone).



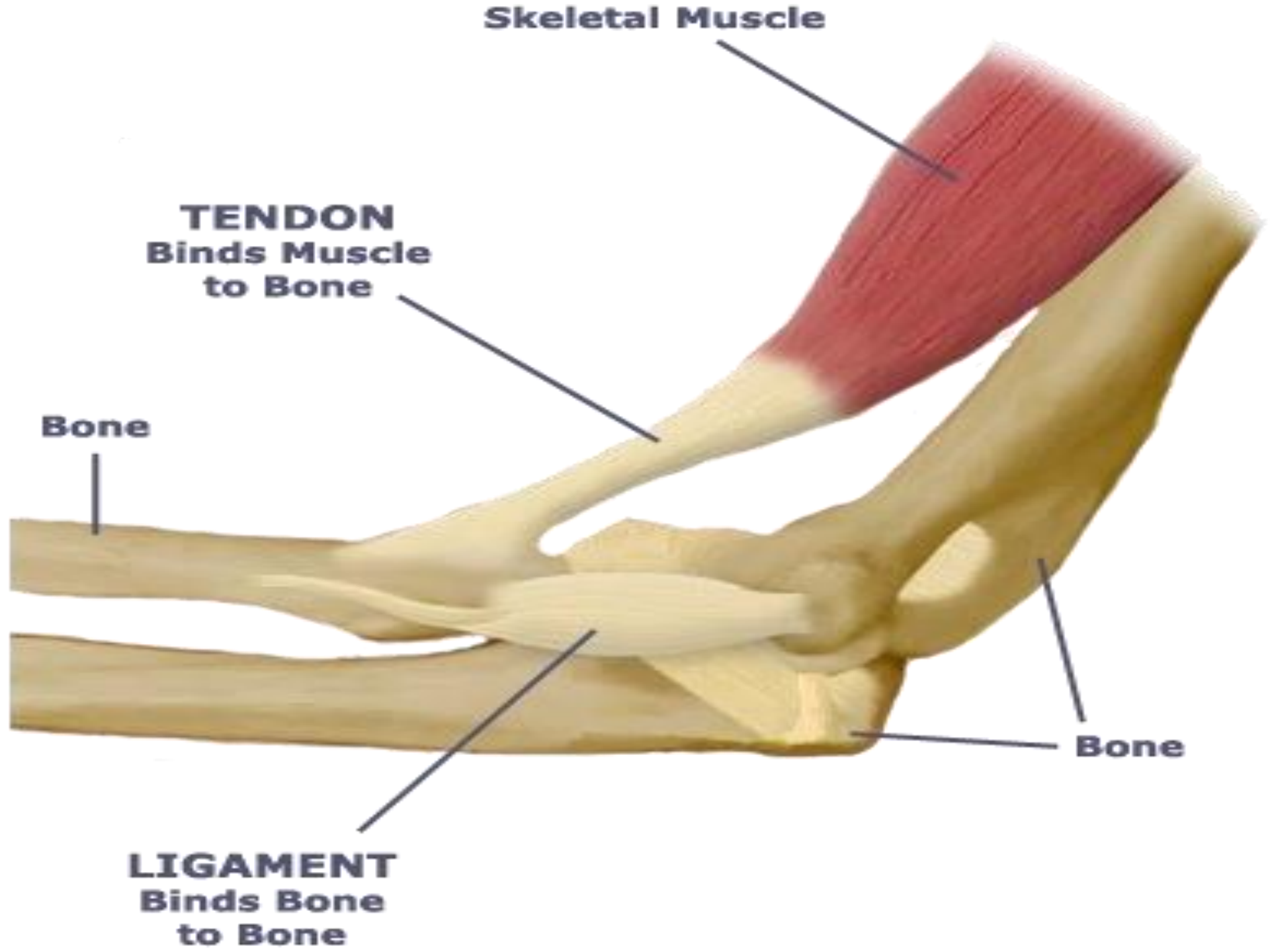
**Skeletal Muscle**

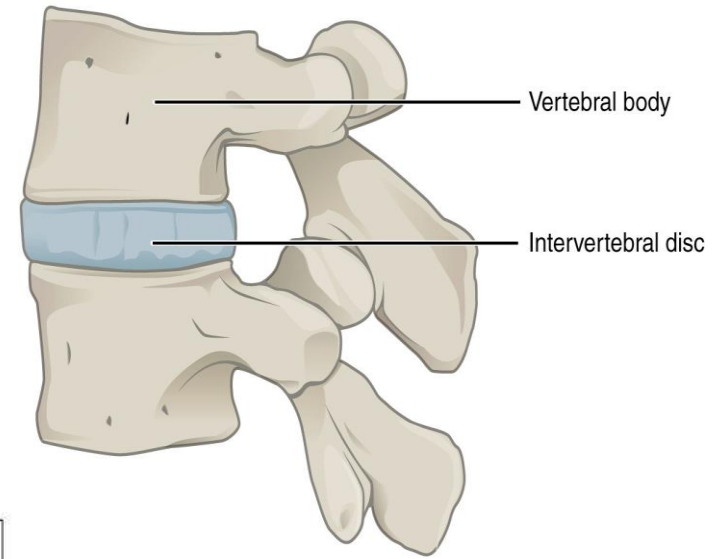
**TENDON**  
Binds Muscle  
to Bone

**Bone**

**Bone**

**LIGAMENT**  
Binds Bone  
to Bone

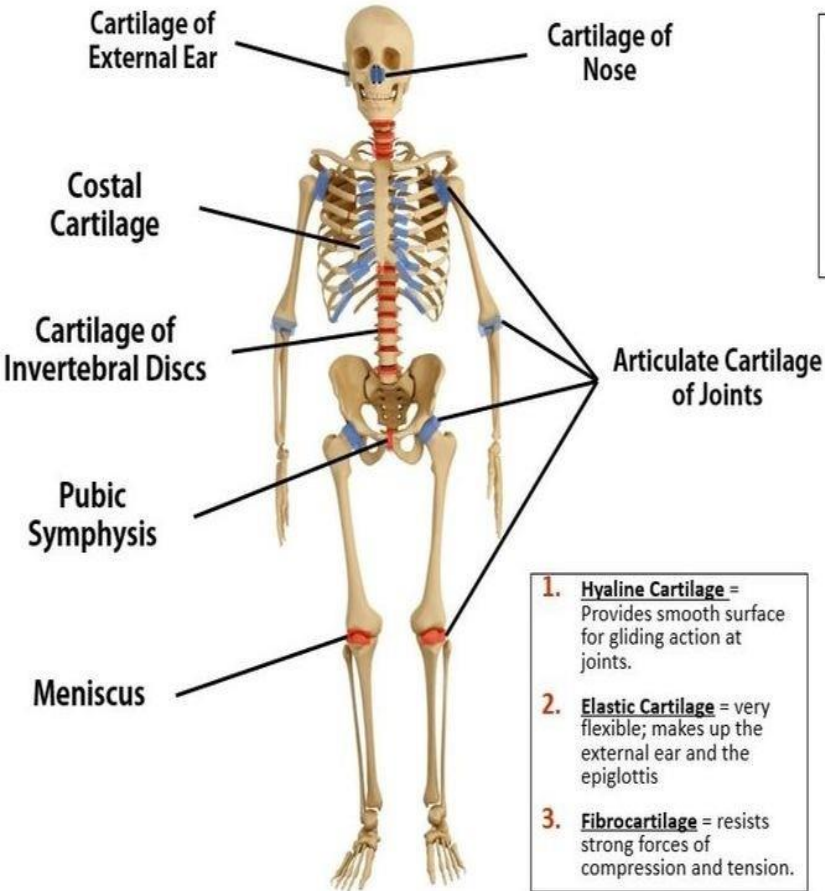




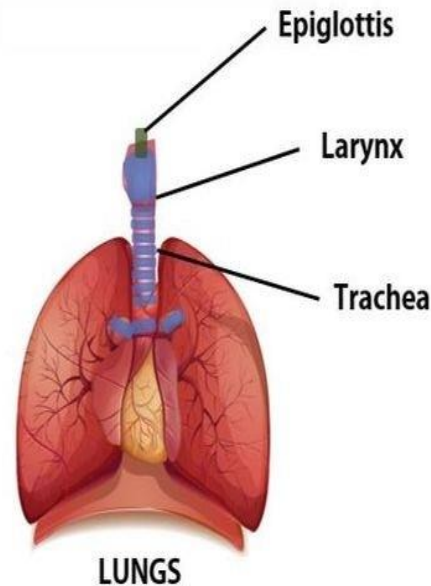
Lateral view

### Cartilage Locations Within the Skeleton

- Hyaline Cartilage
- Fibrocartilage
- Elastic Cartilage



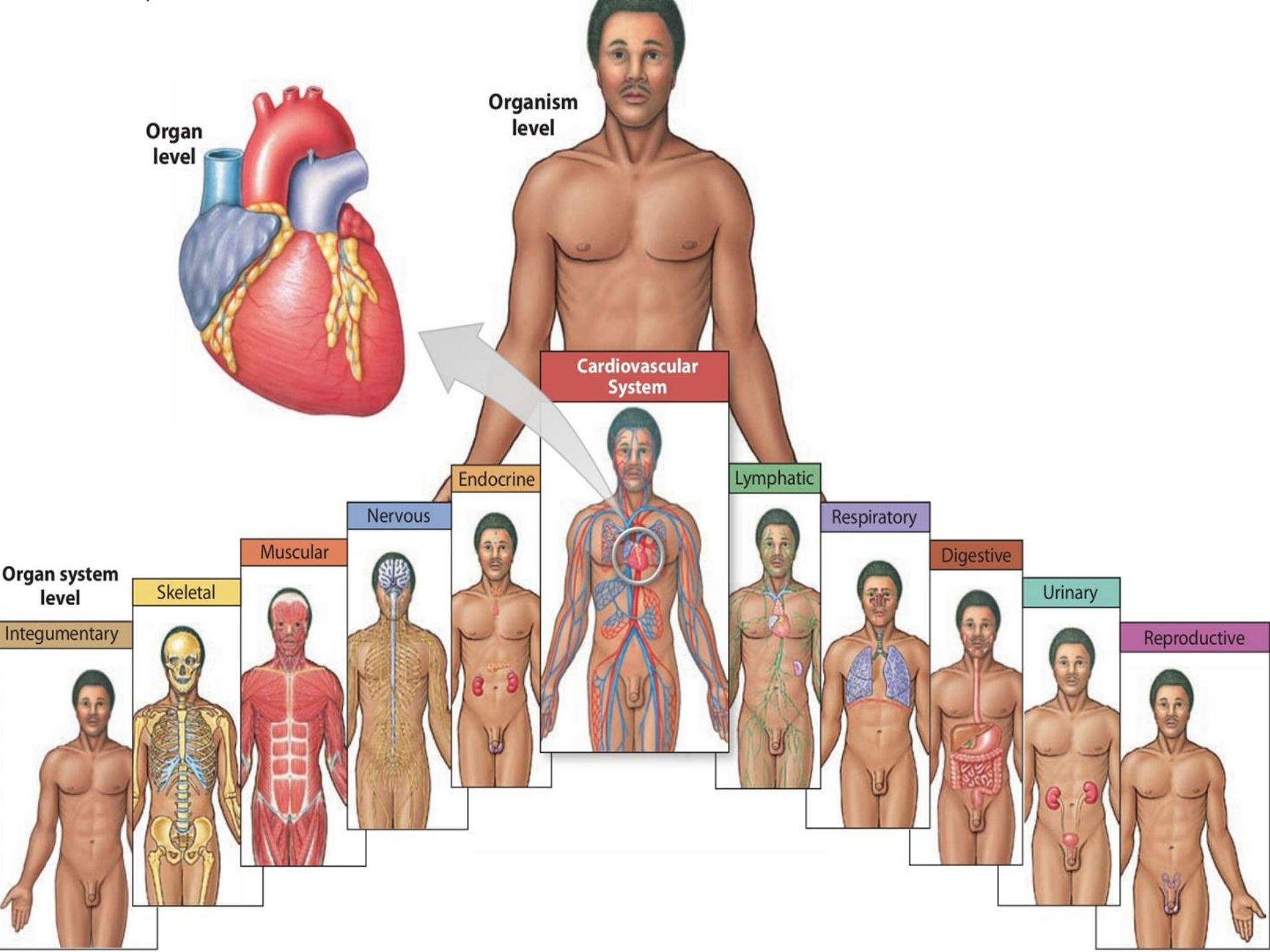
1. **Hyaline Cartilage** = Provides smooth surface for gliding action at joints.
2. **Elastic Cartilage** = very flexible; makes up the external ear and the epiglottis
3. **Fibrocartilage** = resists strong forces of compression and tension.



LUNGS

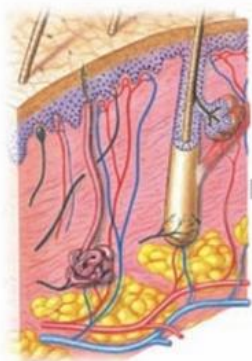
# Organ systems:

1. Integumentary
2. Skeletal and muscular (musculoskeletal)
3. Nervous
4. Endocrine
5. Cardiovascular
6. Lymphatic
7. Respiratory
8. Digestive
9. urinary
10. Reproductive system.

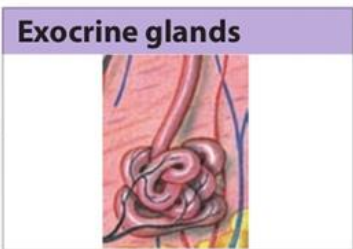
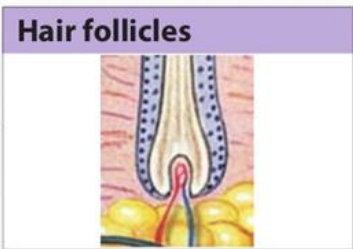
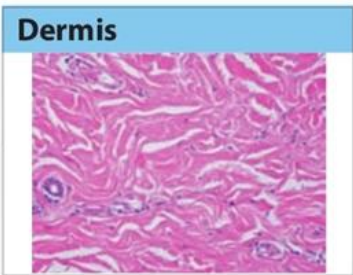


# Skin:

- Epidermis
- Dermis
- Hair follicle
- Sweat gland
- sebaceous gland
- Nail



**Cutaneous membrane**

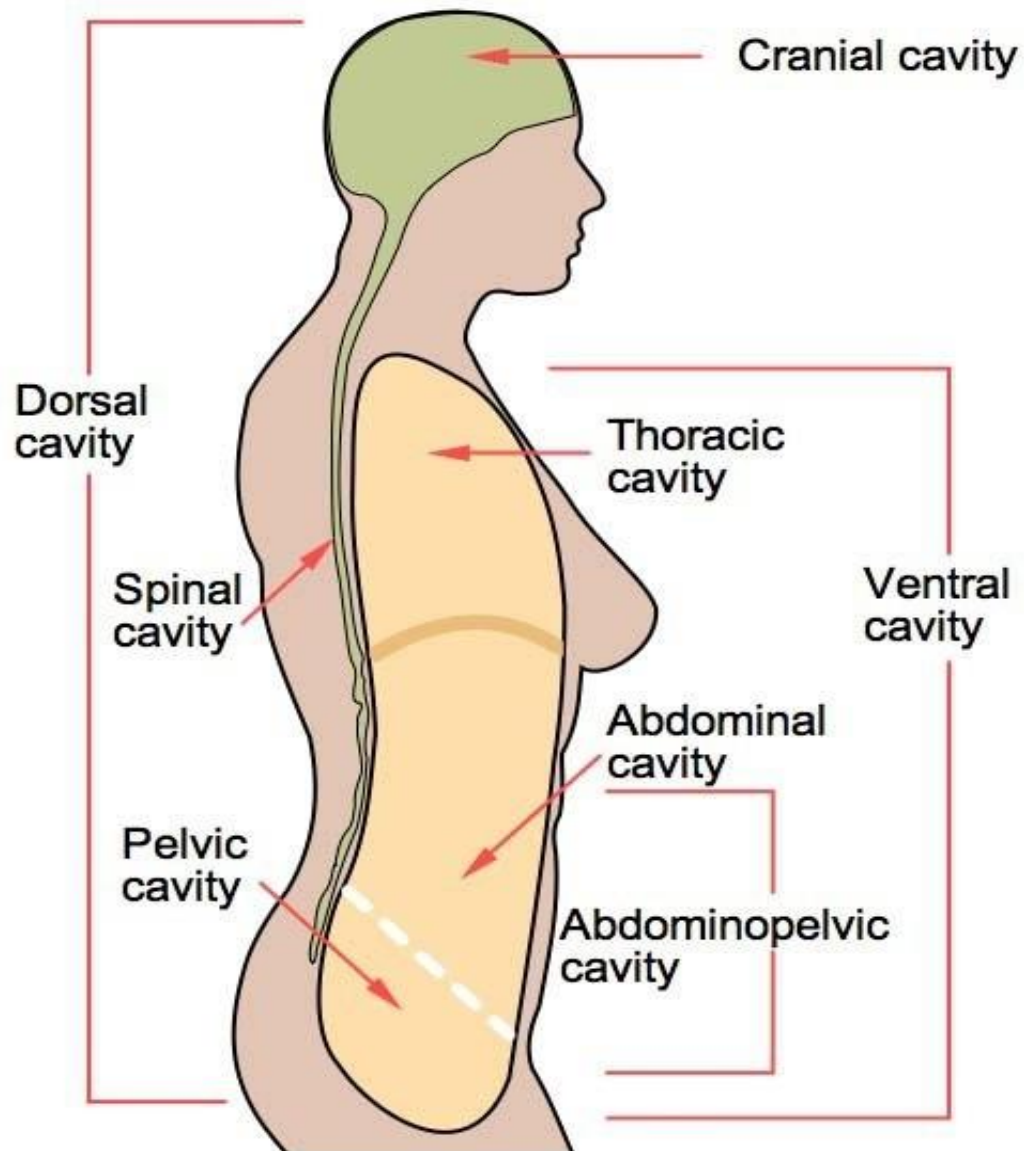


**Accessory structures**

# Body cavities:

- Cranial cavity
- Spinal cavity
- Thoracic cavity
- Abdominal cavity
- Pelvic cavity.

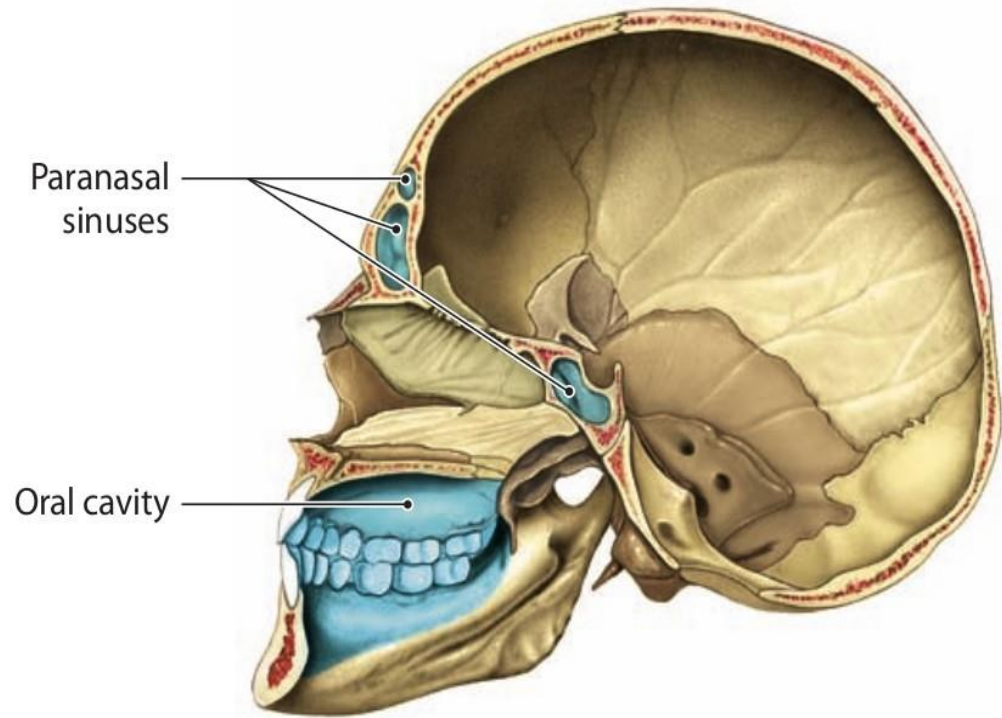
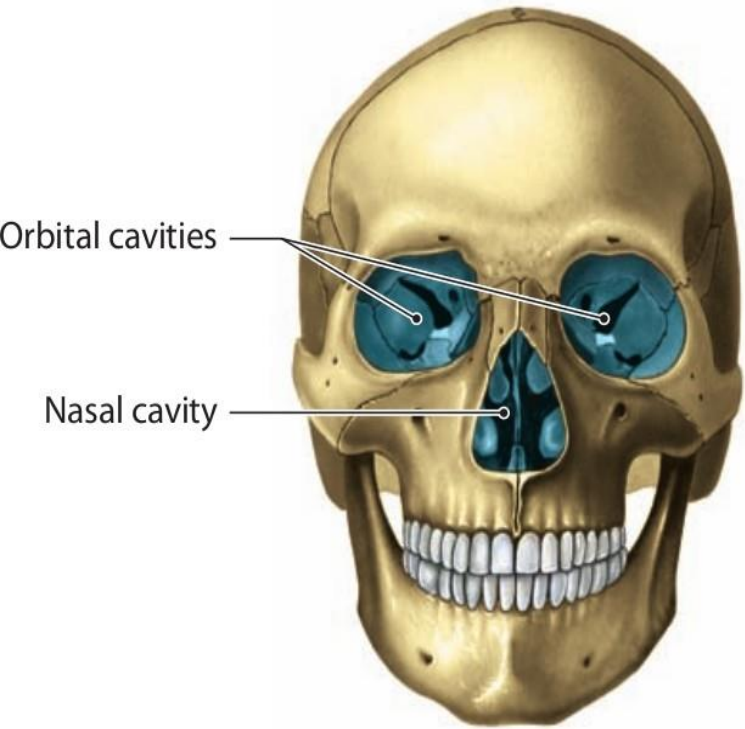
# Body cavities:





# Skull cavities :

- Orbital cavity
- Cranial cavity
- Nasal cavity
- Oral cavity
- Paranasal sinuses.



*Thank you for listening*

