



AL-Furat Al-Awsat Technical University

College of Medical Rehabilitation for Prosthetics

Humman Anatomy I

First Stage : Lec. 1

Lectuerer : Doaa Ali Saeed

Jehan Ahmed

Skeleton of the Upper limb

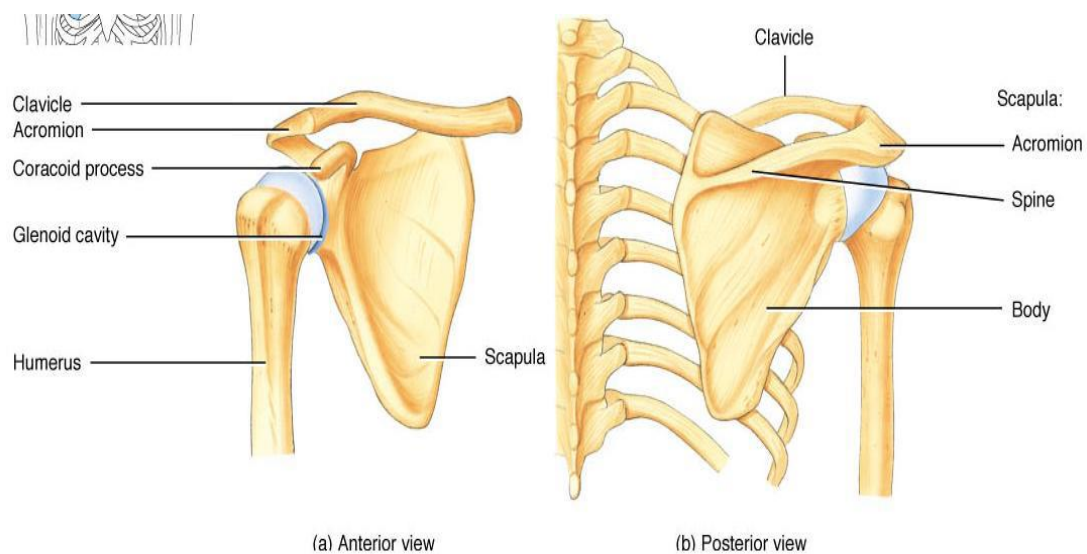
Its consist from :

1-Skeleton of the shoulder:

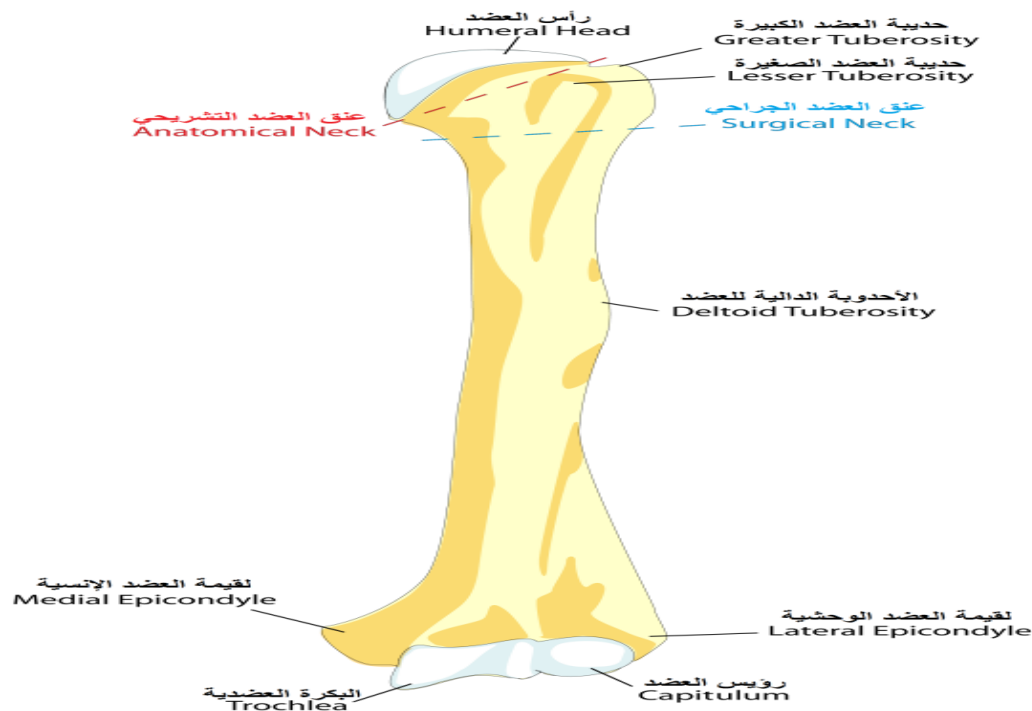
* clavicle bone: The clavicle is along slender bone lies horizontal across the neck

* scapula :The scapula is a flat triangular bone that lies on the posterior .

There are three angle to the scapula (superior ,inferior ,lateral angle).



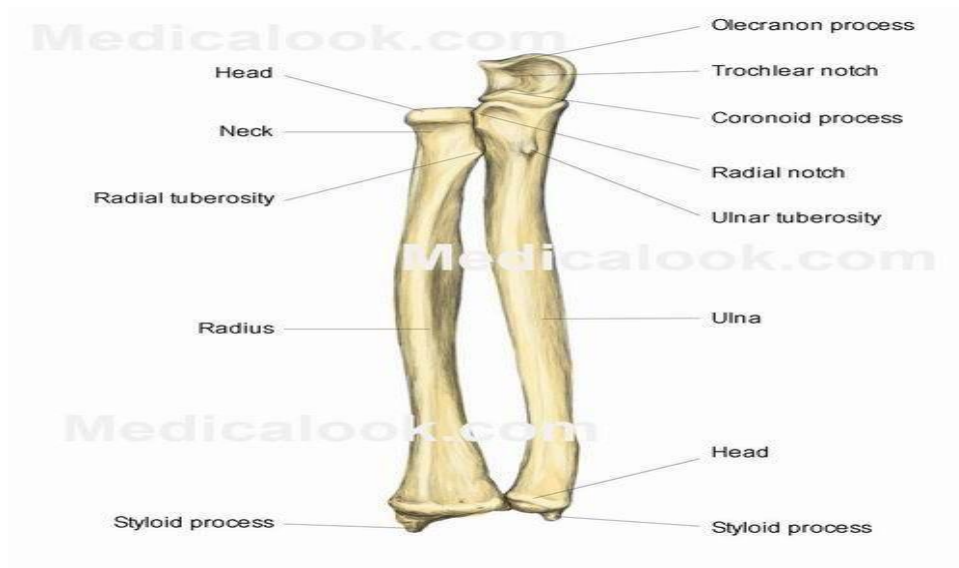
2-Skeleton of the upper arm (Humerus bone): Its long & strong bone in the upper arm which consist from (head, anatomical neck ,greater tuberosity +lesser tuberosity + inter-tubercular groove +shaft and lower end .



3- Skeleton of the forearm:

*Radius : Which is lateral bone consist of head , neck , radial tuberosity shaft and lower end called lateral styloid process that to the bone of the wrist by wrist joint .

*Ulna: Its long bone consist of upper end (olecranon process trochlear notch coronoid process radial notch), shaft and lower end. Called medial styloid process between the two bones there is inter-osseous space .

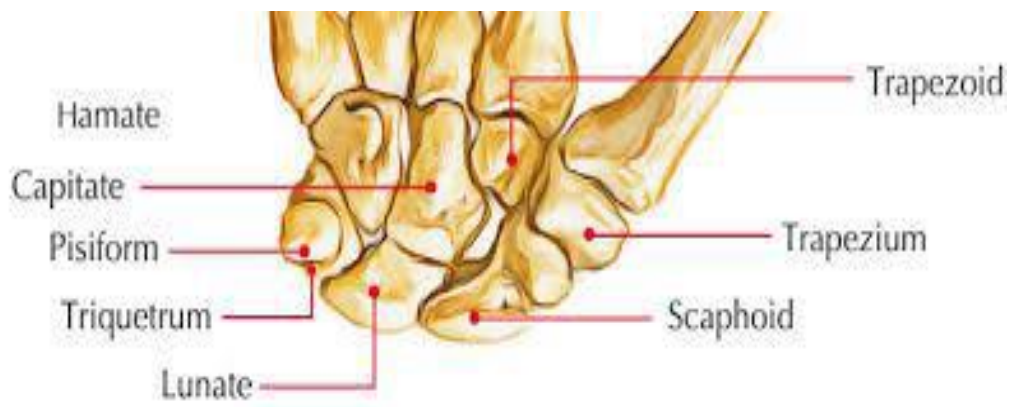


4- Skeleton of the hand :

skeleton of wrist which consist from 8 carpal bones . Bones made of two row of four bones in each raw .

*The proximal consist from (lateral to medial) scaphoid , lunate , triquetral , pisiform .

*The distal row consist from (trapezium , trapezoid , capitates and hamate

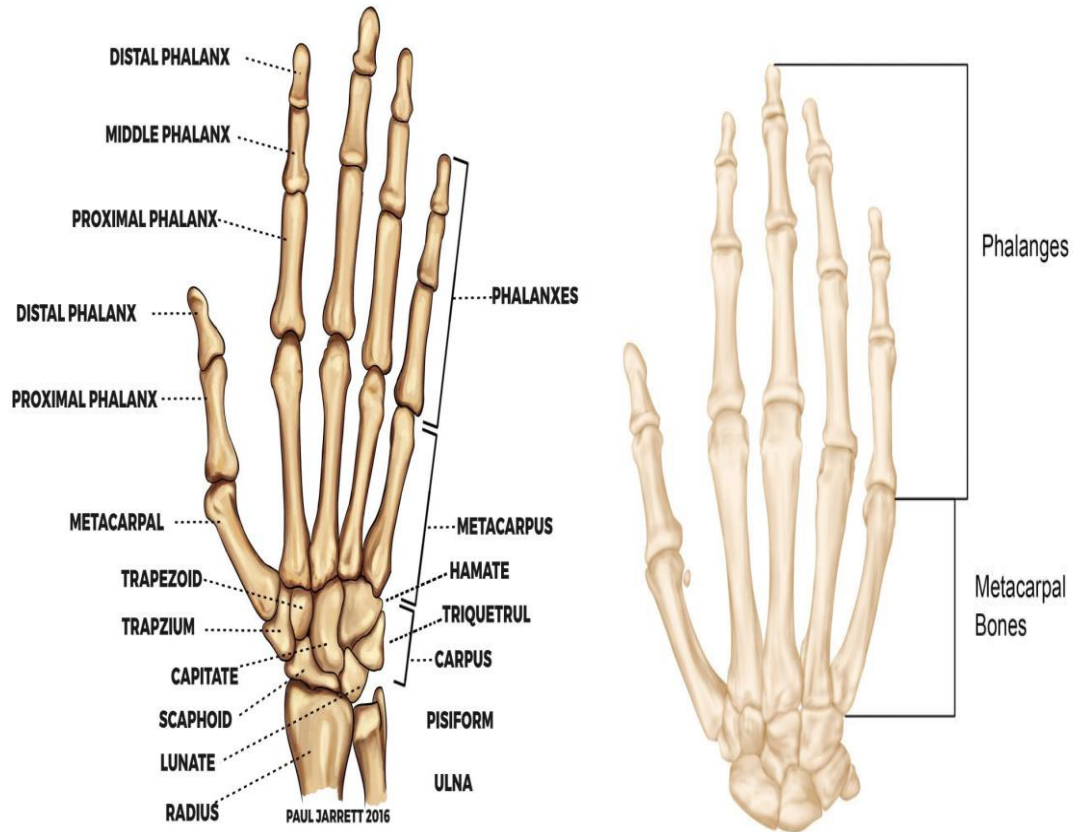


5-Skeleton of the palm (which consist from 5 metacarpal bones).

*1st metacarpal bone of the thumb is the shorter and mobile .

6-Skeleton of the fingers (which consist from phalanges).

There are three phalanges of the fingers but only two for the thumb.





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Skeleton of the Lower limb

The primary function of the lower limb is

*to support the weight of the body

* to provide stable in standing , walking and running .etc .

The lower limbs are divided into many regions:

1-Gluteal region . 2-Thigh . 3-Knee. 4-Leg . 5-Ankle joint . 6-Foot.

Gluteal region : Which consist from:

A. Hip bone :

Its consist from two big bones which articulate anterior by symphysis pubis and posterior to the trunk by strong joint sacroiliac joint.

*They protect the structures which is part of abdomen,

**it connected the trunk to the lower limb

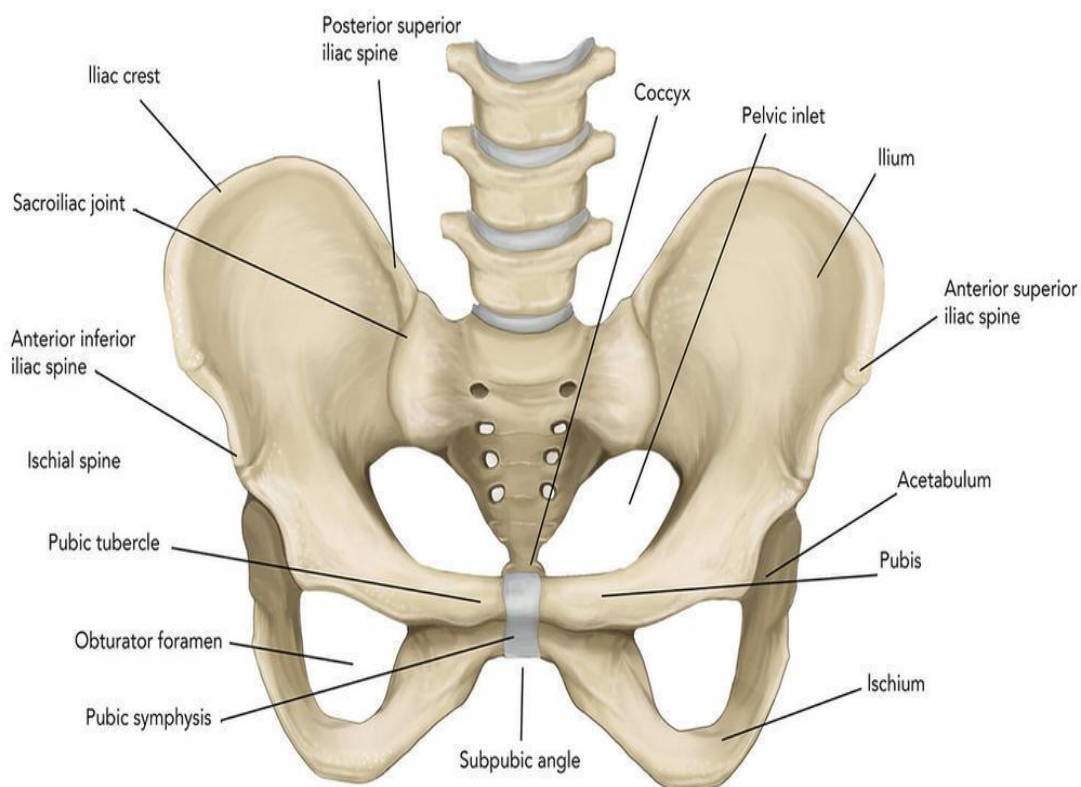
*** control the weight of the body on it.

Its consist from three bone united together (Ileum ,pubis, ischium).The outer surface of hip bone is deep depression called Acetabulum . That articulates to the femur bone .

B.Sacral bone :

Which consist from (5) big vertebra connect together which is triangular in shape, its base articulate with the 5th lumbar vertebra, and the apex to the down articulate with coccyx .

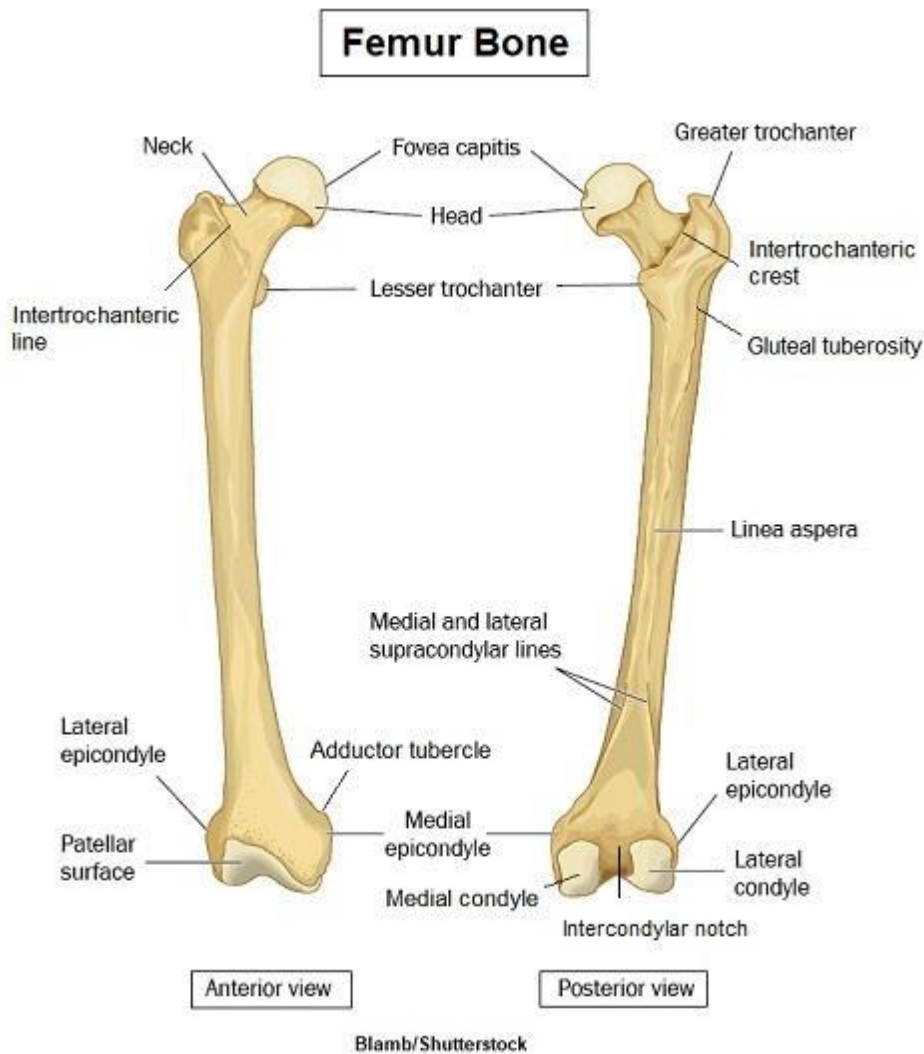
HIP BONE ANATOMY



Thigh: Femur bone its strong and long bone . It has (head ,neck ,greater and lesser trochanter , shaft(linea aspera posteriorly) , lower end (lateral and medial epicondyle) (lateral and medial condyle)

(intercondyle notch posteriorly patellar surface anteriorly)

The lower end articulated to knee joint to articulate to patella .



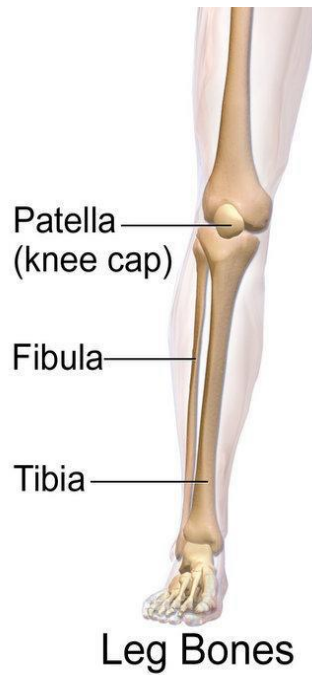
Leg:

1-Patella : It's the largest sesamoid bone triangle in shape , its attached to the tendon of the quadriceps femoris muscle .

2-Tibia : Its medial bone consist from upper end (head), shaft , lower end (medial melleulue).

3-Fibula :Its lateral bone has head , shaft , lower end (lateral melleulue)

Its function to Protect the tibia and in movement the foot outer and inner, **between the two bones has interosseous membrane.**

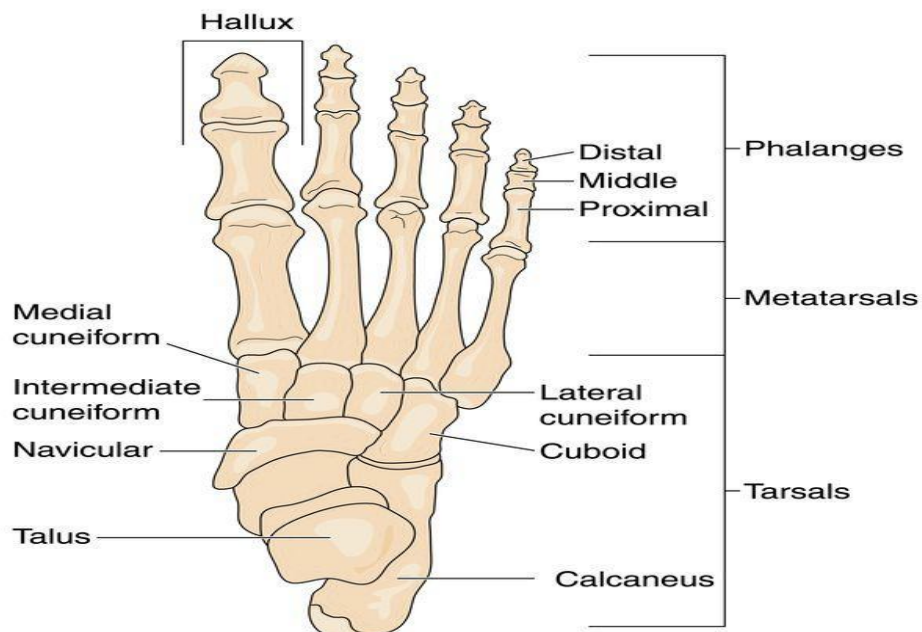


Skeleton of the ankle: Its consist from

*tarsal bones , its consist from 7th bones in two rows

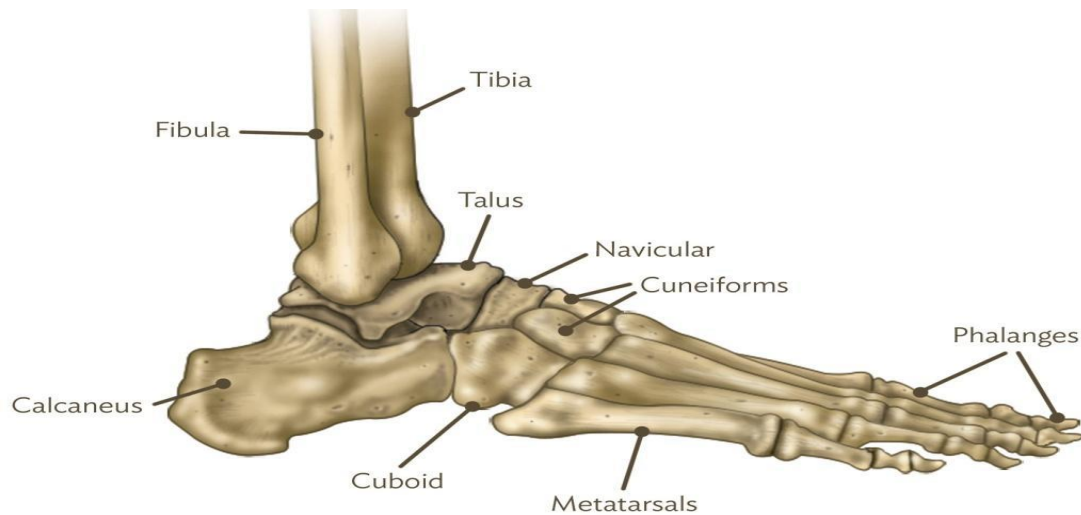
the posterior row has two bones (**Talus and Calcaneous**)

while the anterior row has 4 bones (**Cuneiform bone which is medial ,lateral ,intermediate**) +**Cuboids bone** . The 7 bone is Navicular bone.



Skeleton of the sole:

They consist from 5 metatarsal bones , each has base articulated with the anterior row of the ankle . the 1st is (big toe) , the 5th (little toe) .



Skeleton of the Toes

They contains of phalanges ,its small bone each toe has 3 phalanges except the Big toe has two .

Transverse arch:

Its more in the metatarsal bone , it has important in walking depend on strong tendon that help by muscles for protect the arch .





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Central bones

Skeleton System

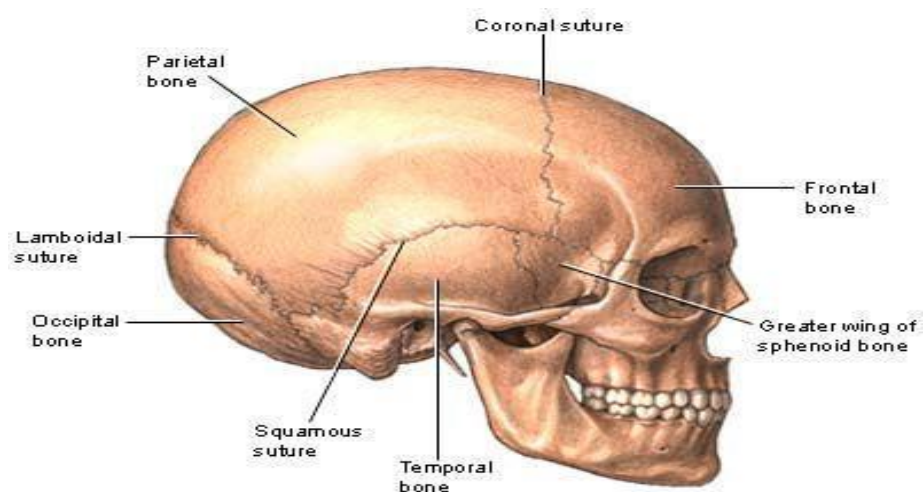
The skull

The skull has(22) bones and formed of 2 sets of bones (cranium) and (face).

All these bones are connected at immobile joints called sutures except The mandible which is connected to the skull by freely movable joint.

Sutures are:

1.coronal suture. 2.sagittal suture. 3.lambdoid suture. 4.squamous suture



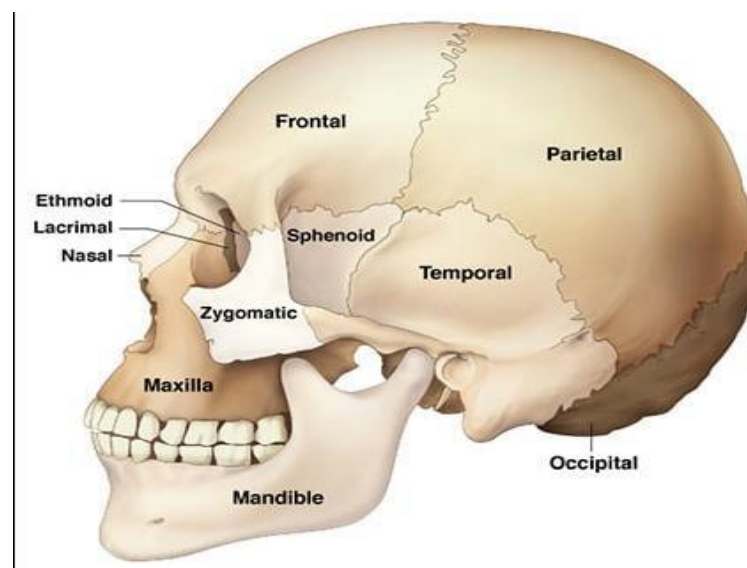
-Bones of the cranium :

Single bones :

1. Frontal bone ; In the front
2. Occipital bone ; in the back
3. Ethmoid bone ; in the base
4. Sphenoid bone ; in the base

Paired bones :- One on each side

1. parietal bones (2) bones above.
2. Temporal bones (2) bones below.



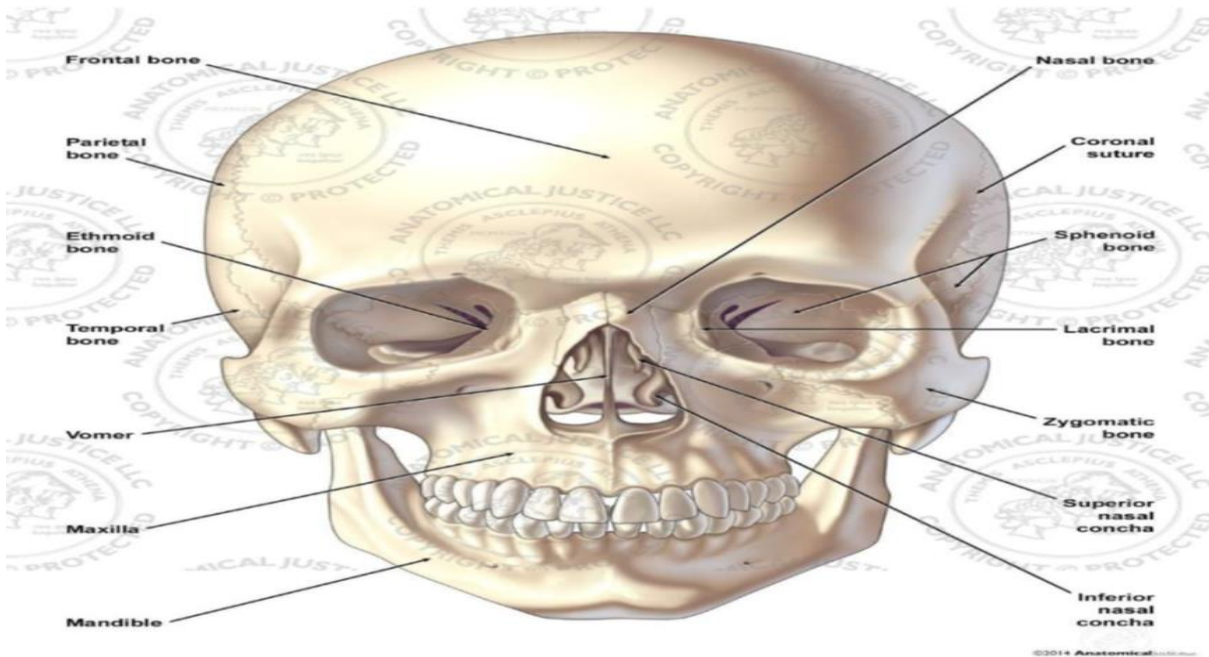
-Bones of the face :

They hold the eyes in the anterior position and allow the facial muscles to express our feelings . They consist of (14) bone (two single and (12) paired)

Single bones :- In the middle .

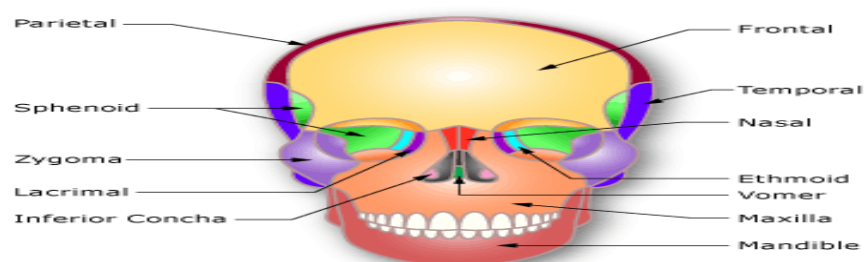
1. vomer :- forms most of the nasal septum
2. mandible:- forms the lower jaw

Anterior Anatomy of the Skull



Paired bones :-

1. maxillae (2) :- They fuse together to form the upper jaw .
2. palatine bones (2) :- They are found behind the maxillary processes and form the posterior part of the hard palate
3. Zygomatic bones (2):-They form the bones of the cheek and also form a part of the lateral wall of the orbit (eye socket)
4. Lacrimal bones (2) They form the bridge of the medial wall of the orbit each bone carries a groove for passage of tear(lacrima) These bones are small in size
5. Nasal bones (2):- They form the bridge of the nose.
6. Inferior conches (2):- They are thin curved bones. Each bone appear projecting from the lateral wall of the nose



Thoracic cage:

Consist of the followings:

a. Ribs

b. thoracic Vertebrae

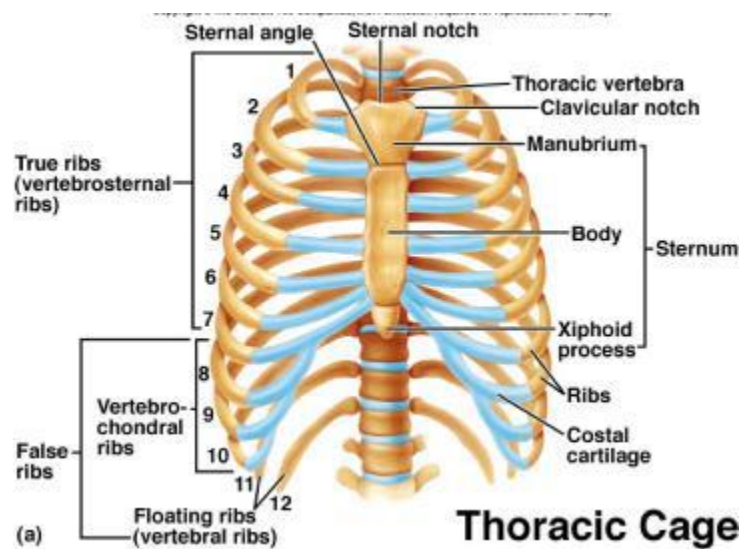
c. sternum :consist of : manubrium .. body.. xiphoid process.

d. costal cartilages

* True ribs are directly attached to the sternum (first seven pairs) by costal cartilages

* false ribs are joined to the 7th rib at 7th costal cartilage (Three pairs)

* floating ribs (Two pairs).





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Vertebral column

It's the back which extent from the skull to the tip of coccyx , and can be define as the posterior surface of the trunk. It the central-bony pillar of the body , its support the skull , shoulder girdle , upper limbs , and thoracic cage , and by way of the pelvic girdle transmit the body weight to the lower limb .

Within its cavity lie the spinal cord , roots of the spinal nerves and the covering meanings to which the vertebral column gives great

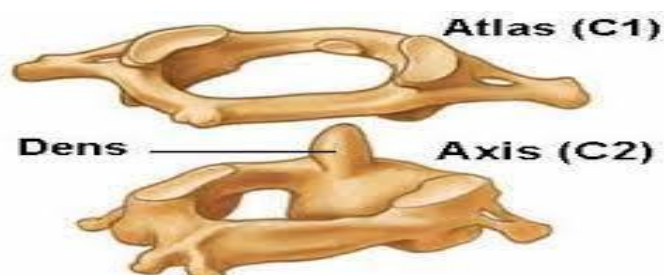
The vertebral column composed from 33 vertebrae :

7 cervical ; 12 thoracic ; 5 lumber ; 5 sacral (fused to form the sacrum) and 4 coccygeal (the lower 3 are fused)

1-Cervical vertebrae

Its (7) vertebrae , the 1st one called Atlas which articulate with the occipital bone of the skull by Atlanto-occipital .

The 2nd vertebrae called Axis which support the movement of the atlas vertebrae and skull .



2-Thoracic vertebrae

Its (12) vertebrae each one has big body + long spine , its articulate with the ribs of the chest

3-Lumbar vertebrae

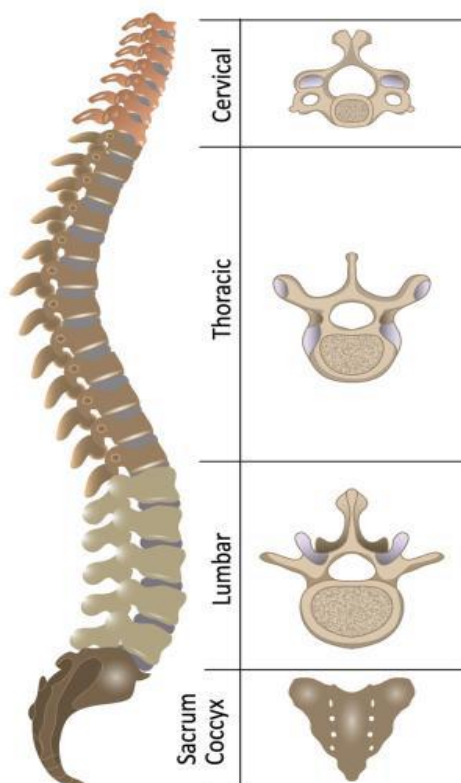
They are (5) in number , it's the biggest one in the vertebral column, it has restriction in movement, and has kidney shape , the vertebral canal is triangular in shape .

4-Sacral vertebrae

They are (5) vertebrae ,they are joint together to form sacrum bone , which is triangular in shape ,the base is in the upper and the apex in the lower part , articulated with coccyx .

5- Coccygeal vertebrae

Its small bone triangular consist from (4) vertebrae .

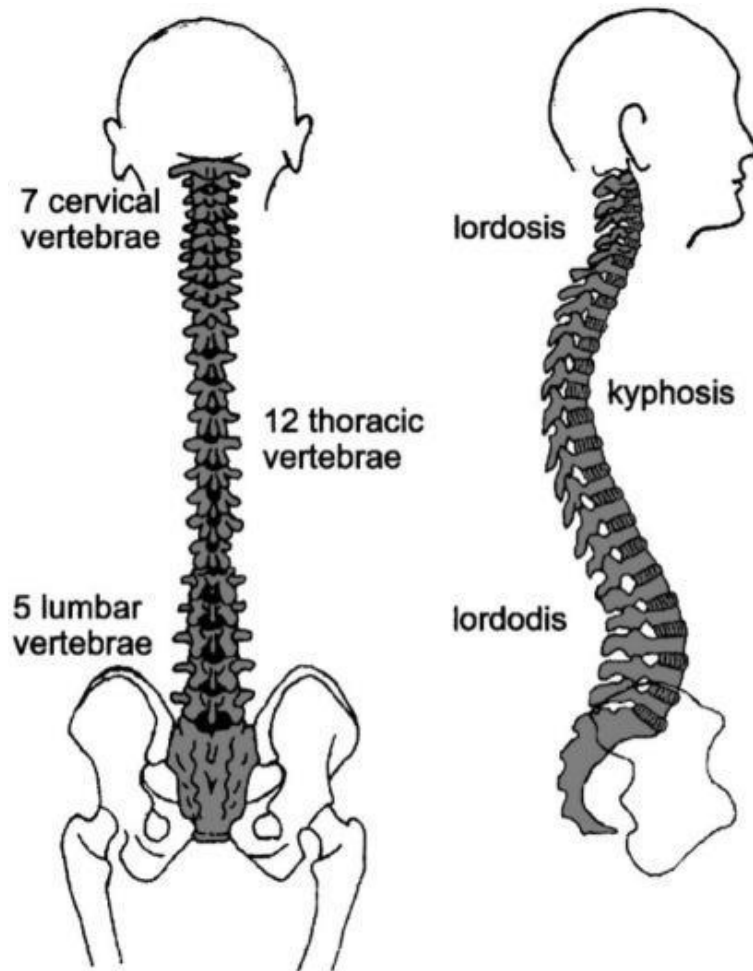


The curvatures of the vertebral column

1-Kyphosis (Thoracic curvature) .

2-Lordosis (Lumber curvature) .

3-Scoliosis (side curvature) .





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JOINTS

Definition of Joint:

It is the site of meeting of two or more bones.

Types of Joints: There are 3 types of joints according to the nature of the connecting tissues and Connection Movement

1-Fibrous joints	2-Cartilaginous joints	3-Synovial joints
1.The bones connected by fibrous tissue	1. The bones connected by cartilaginous tissue.	1.The bones are separated by a joint cavity that is surrounded by a fibrous capsule & synovial membrane.
2.are fixed joints (not movable)	2. may allow slight movements (slightly movable).	2.are freely movable joints
3. sutures of the skull	3. 1 st rib and sentrum	3. knee joint

Types of Joints:

Hinge- A hinge joint allows extension . (Elbow, Knee) *

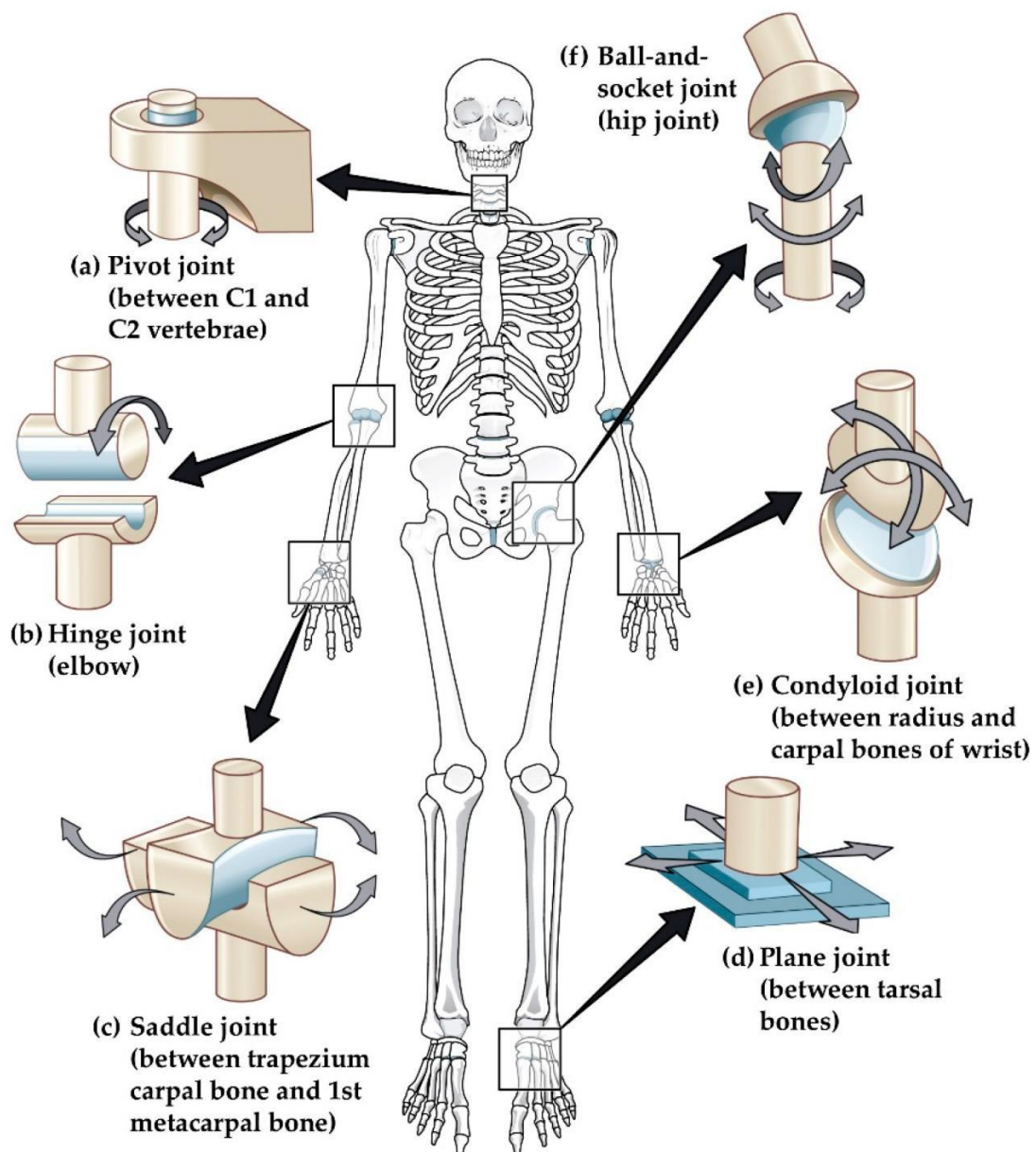
***Ball and Socket**- A ball and socket joint allows for radial movement in almost any direction. (Hip, Shoulder)

***Gliding**- plane joint bones slide past each other. Mid-carpal and mid-tarsal joints are gliding joints. (Hands, Feet)

Saddle- allowing a wide range of movement. (Thumb)

* **Pivot joint** : between C1 & C2

* **Condyloid joint** : between radius and carpal bones



Urinary System

practical anatomy

Lecture 8

DouaaAliSaeed

Components of the Urinary System

1-Kidneys

Location and Shape

- Located retroperitoneal on both sides of the vertebral column.
- Bean-shaped organs.

Anatomical Structure

- Renal Cortex

Contains glomeruli and convoluted tubules.

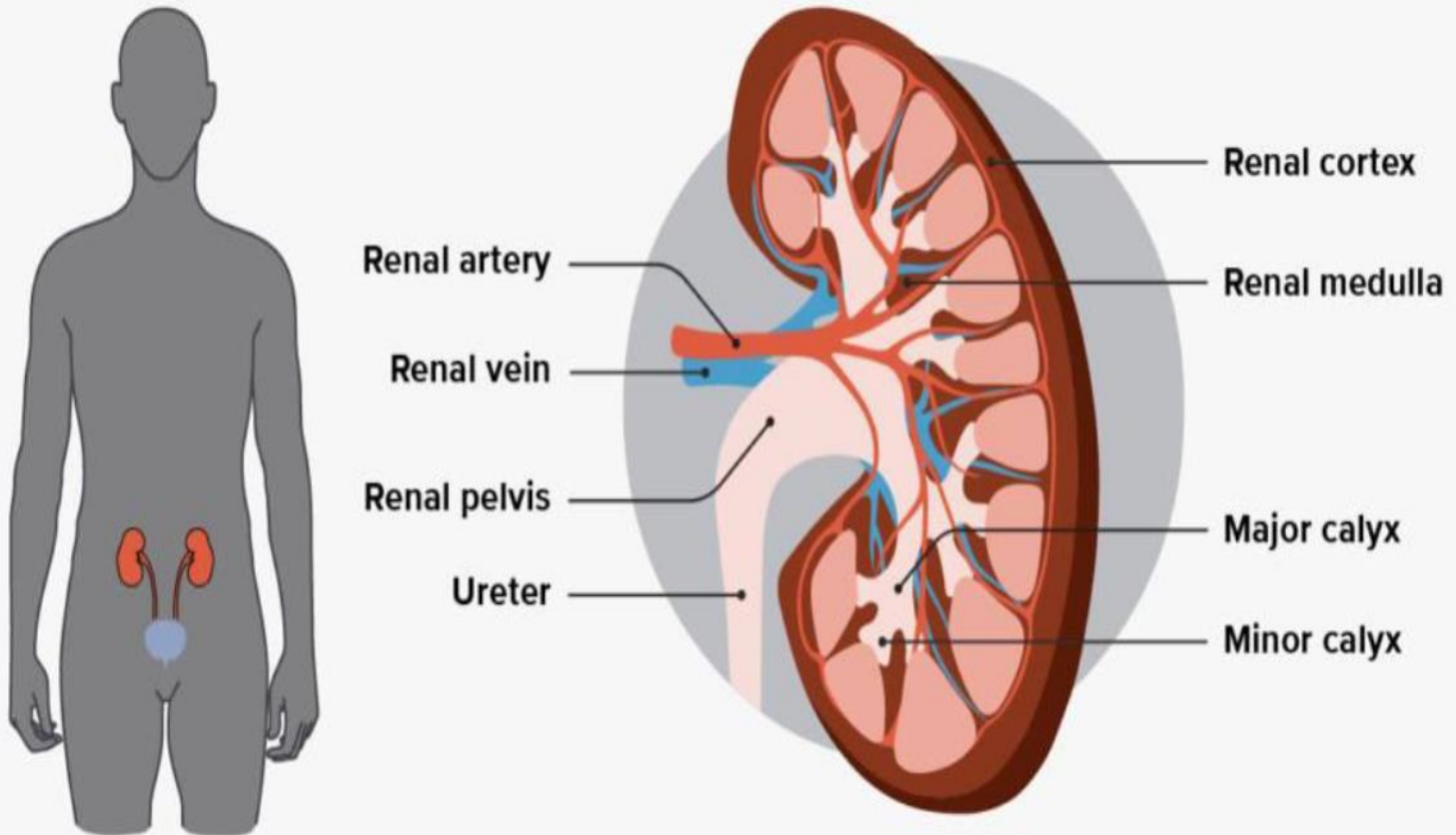
- Renal Medulla

Composed of renal pyramids.

- Renal Pelvis

Collects urine and passes it to the ureter.

Location and Anatomy of the Kidneys



Functional Unit: Nephron

Each nephron consists of

1. Glomerulus

A network of capillaries where filtration occurs.

2. Bowman's Capsule

Receives the glomerular filtrate.

3. Proximal Convoluted Tubule (PCT)

Reabsorption of water, glucose, and amino acids.

4. Loop of Henle

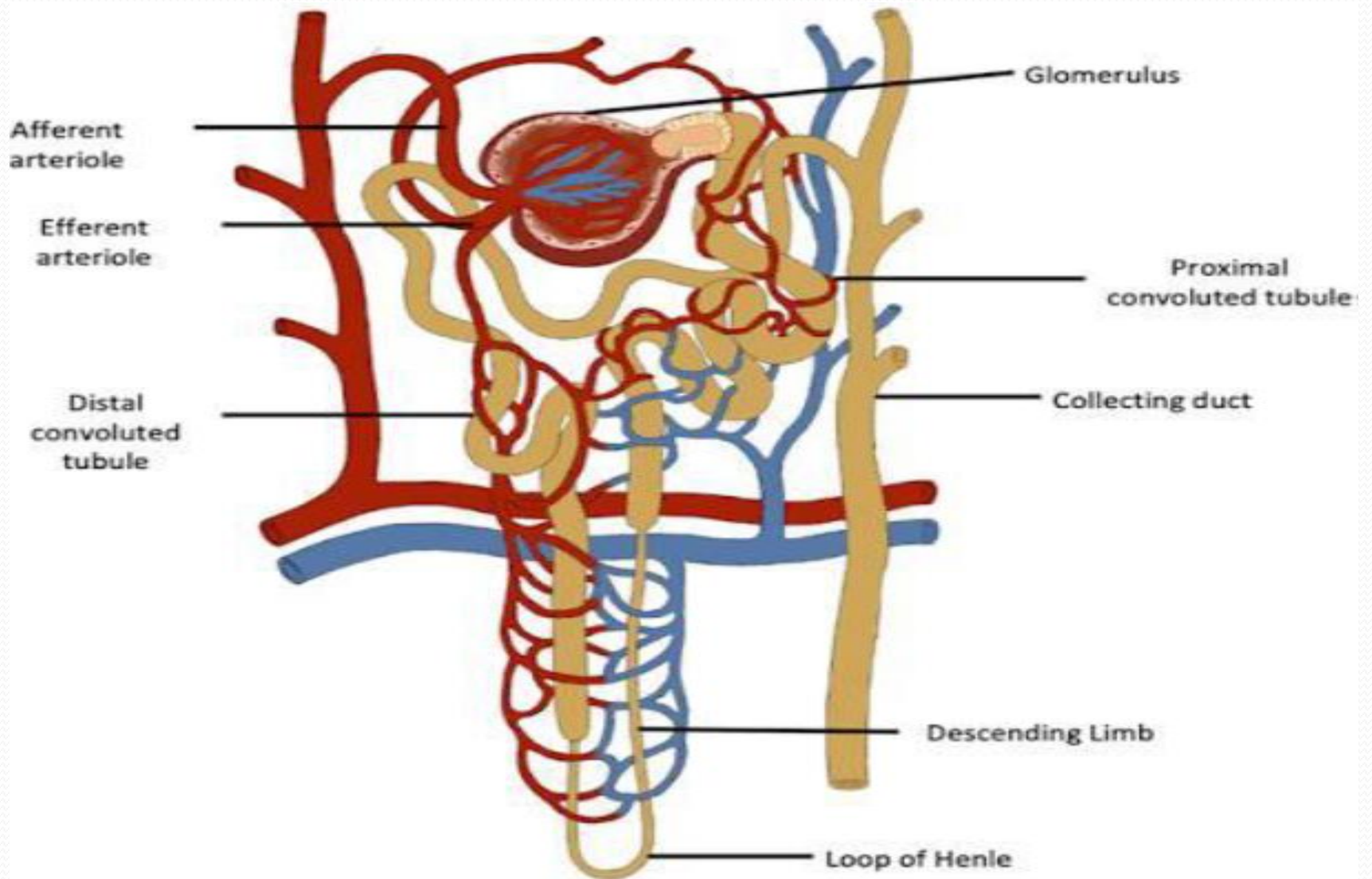
Concentration of urine and regulation of water and salts.

5. Distal Convoluted Tubule (DCT)

Regulation of sodium and potassium.

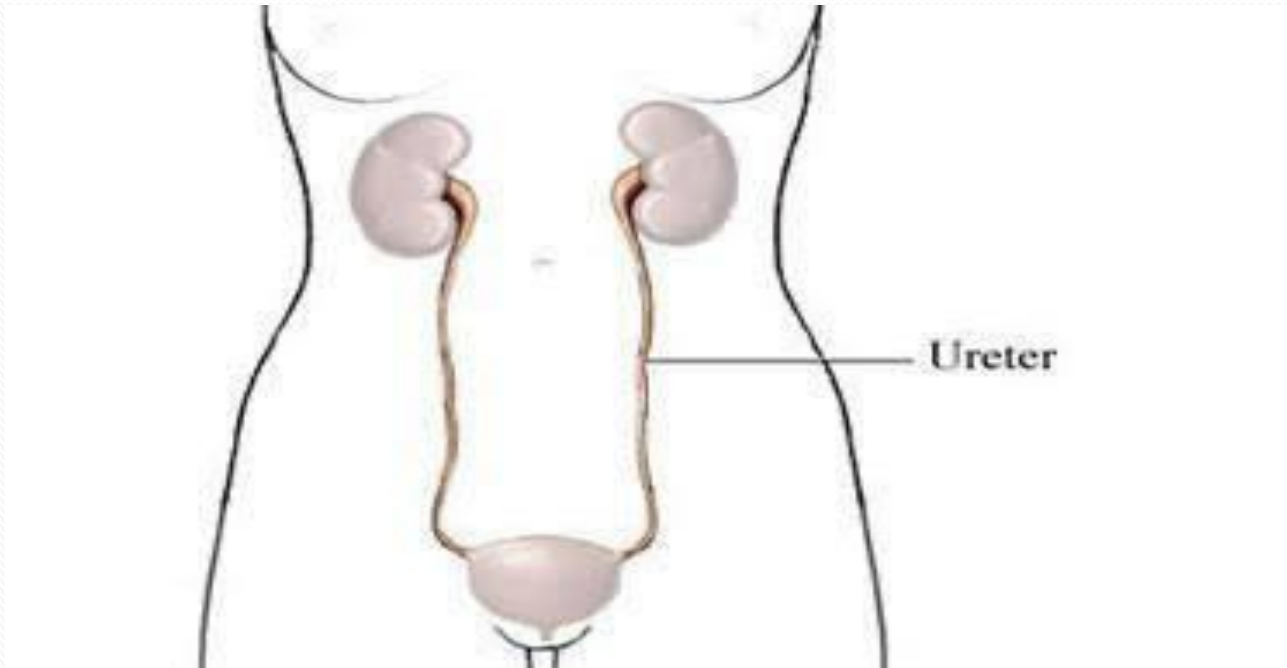
6. Collecting Duct

Determines the final concentration of urine.



2-Ureters

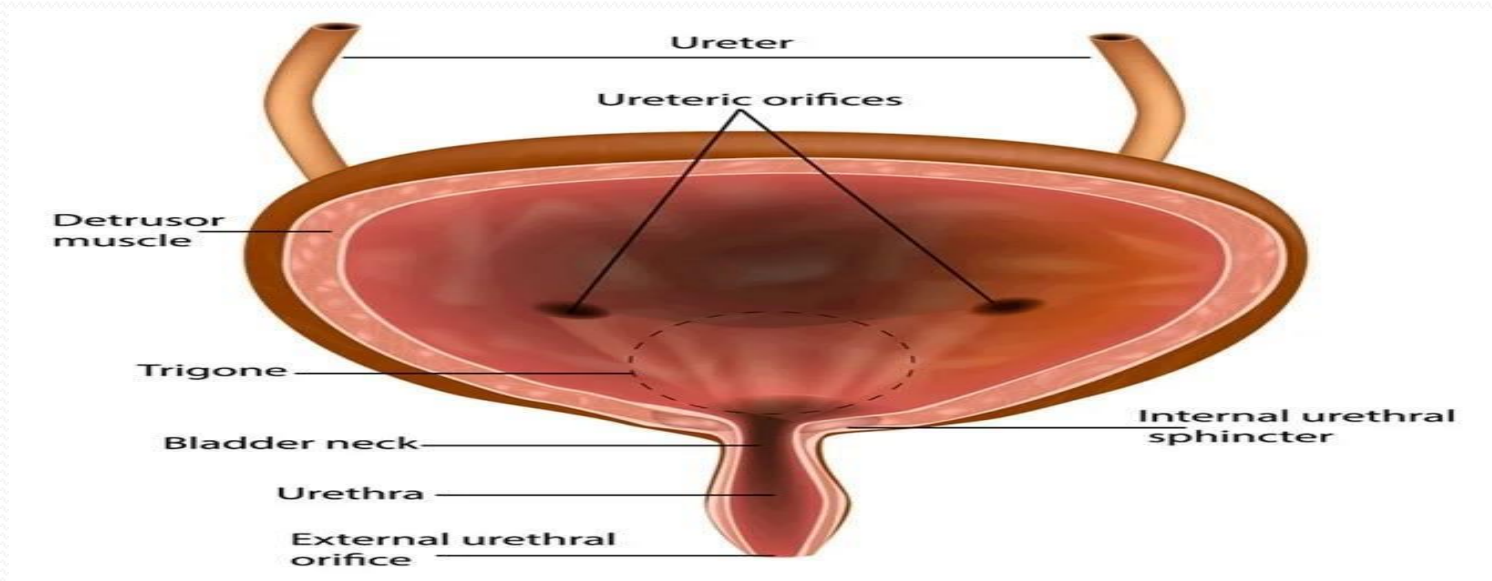
- Two muscular tubes, about 25–30 cm long.
- Transport urine from the kidneys to the urinary bladder.
- Prevent backflow of urine by a physiological valve at the bladder entrance.



3-Urinary bladder

A hollow muscular organ located in the pelvis.

- Composed mainly of the detrusor muscle.
- Normal capacity: 400–600 mL.
- Temporarily stores urine until urination



4-Urethra

- A tube that carries urine out of the body
- Male: longer (18–20 cm) and shared with the reproductive system.
- Female: shorter (3–4 cm), which increases the risk of urinary tract infections

Urine Formation Process

Urine formation occurs in three main steps:

1-Filtration(Glomerular)

Occurs in the glomerulus, where blood plasma is filtered without large proteins.

2-Reabsorption(Tubular)proximal

Useful substances such as water and glucose are returned to the blood.

3-Secretion(Tubular)distal

Harmful substances such as hydrogen ions and some drugs are excreted.

Functions of the Urinary System

1. Excretion of metabolic wastes

Such as urea, uric acid, and creatinine produced by metabolism.

2. Regulation of body water

By increasing or decreasing urine output.

3. Regulation of electrolytes

Including sodium, potassium, calcium, and chloride.

4. Regulation of blood pH

By excreting hydrogen ions or reabsorbing bicarbonate.

5. Regulation of blood pressure

Through the renin–angiotensin–aldosterone system (RAAS).

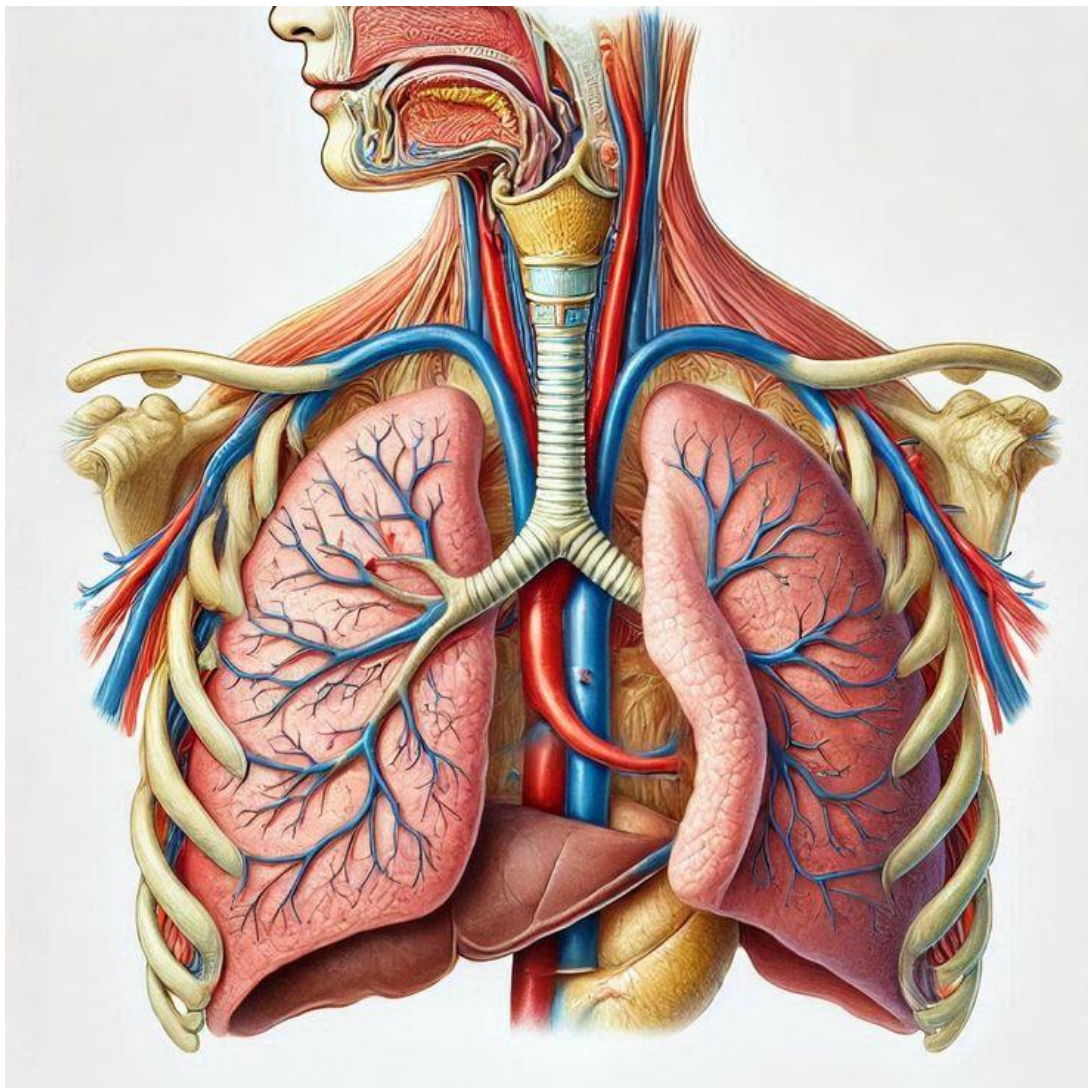
6. Hormonal functions

Secretion of erythropoietin (stimulates red blood cell production).

7. Contribution to activation of vitamin D

The respiratory system

The respiratory system, which includes air passages, pulmonary vessels, the lungs, and breathing muscles, aids the body in the exchange of gases between the air and blood, and between the blood and the body's billions of cells. Most of the organs of the respiratory system help to distribute air, but only the tiny, grape-like alveoli and the alveolar ducts are responsible for actual gas exchange.

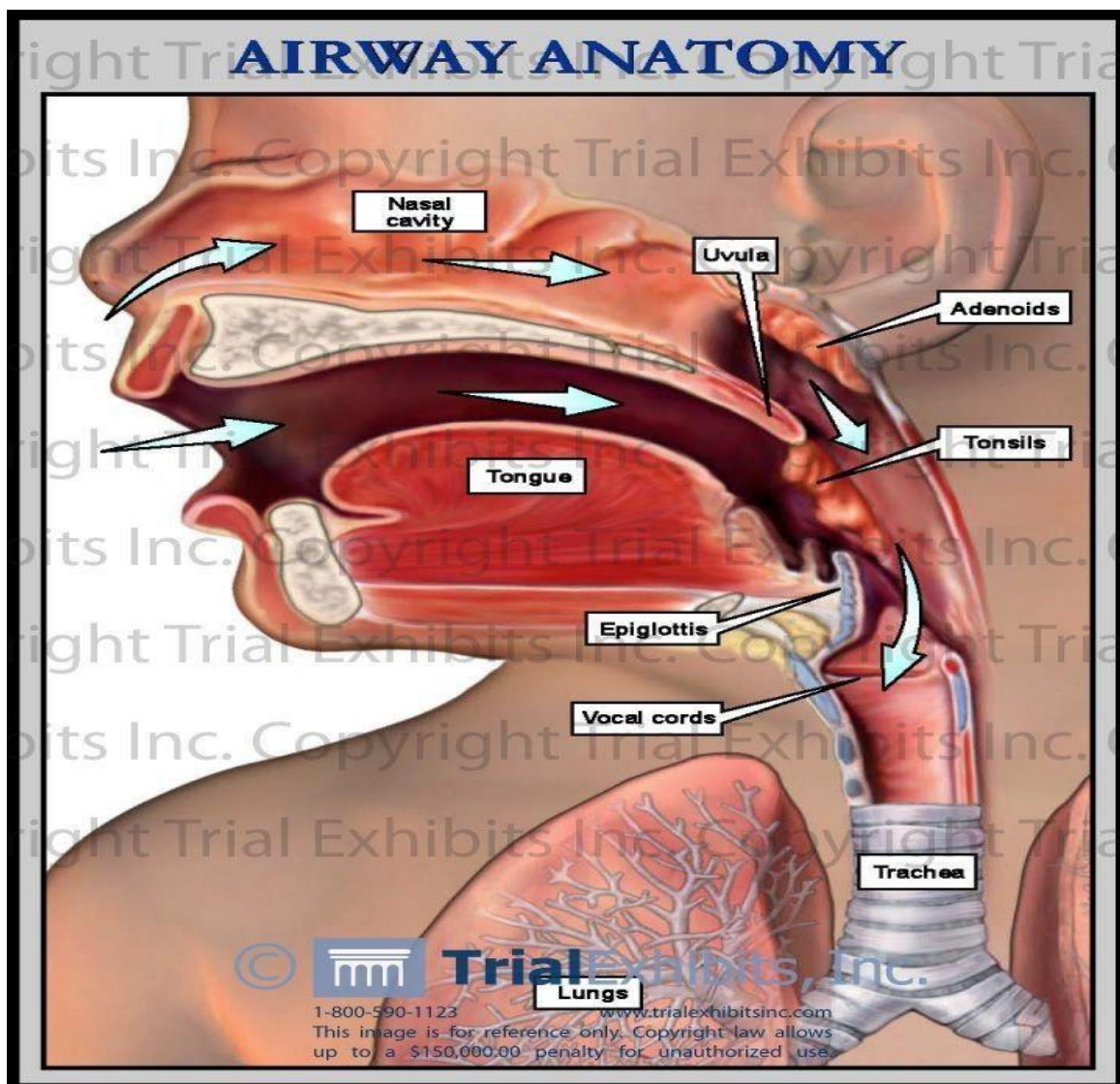


In addition to air distribution and gas exchange, the respiratory system filters, warms, and humidifies the air you breathe. Organs in the .respiratory system also play a role in speech and the sense of smell

The respiratory system also helps the body maintain homeostasis, or balance among the many elements of the body's internal environment.

:The respiratory system is divided into two main components-

1.Upper respiratory tract: Composed of the nose, the pharynx, and the larynx, the organs of the upper respiratory tract are located outside the .chest cavity



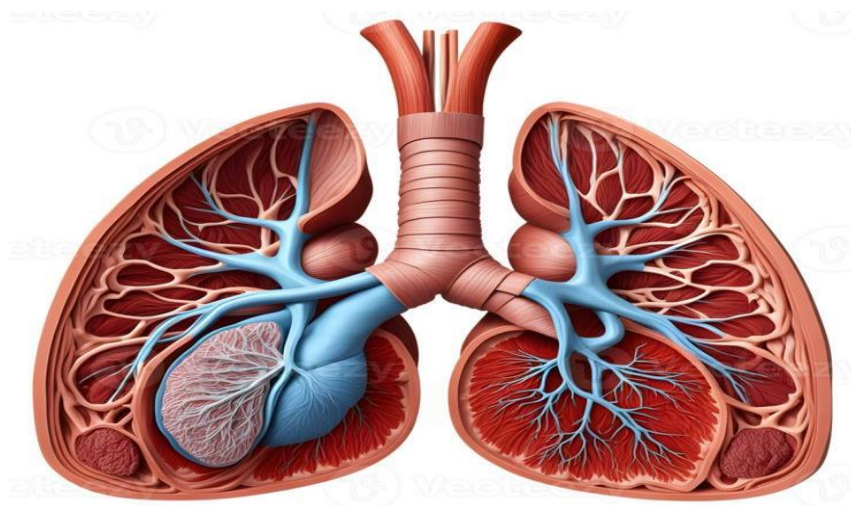
A.Nasal cavity: Inside the nose, the sticky mucous membrane lining the nasal cavity traps dust particles, and tiny hairs called cilia help move them to the nose to be sneezed or blown out.

B.Sinuses: These air-filled spaces along side the nose help make the skull lighter

C.Pharynx: Both food and air pass through the pharynx before reaching their appropriate destinations. The pharynx also plays a role in speech

D.Larynx: The larynx is essential to human speech

2.Lower respiratory tract: Composed of the trachea, the lungs, and all segments of the bronchial tree (including the alveoli), the organs of the lower respiratory tract are located inside the chest cavity



A.Trachea: - Located just below the larynx, the trachea is the main airway to the lungs

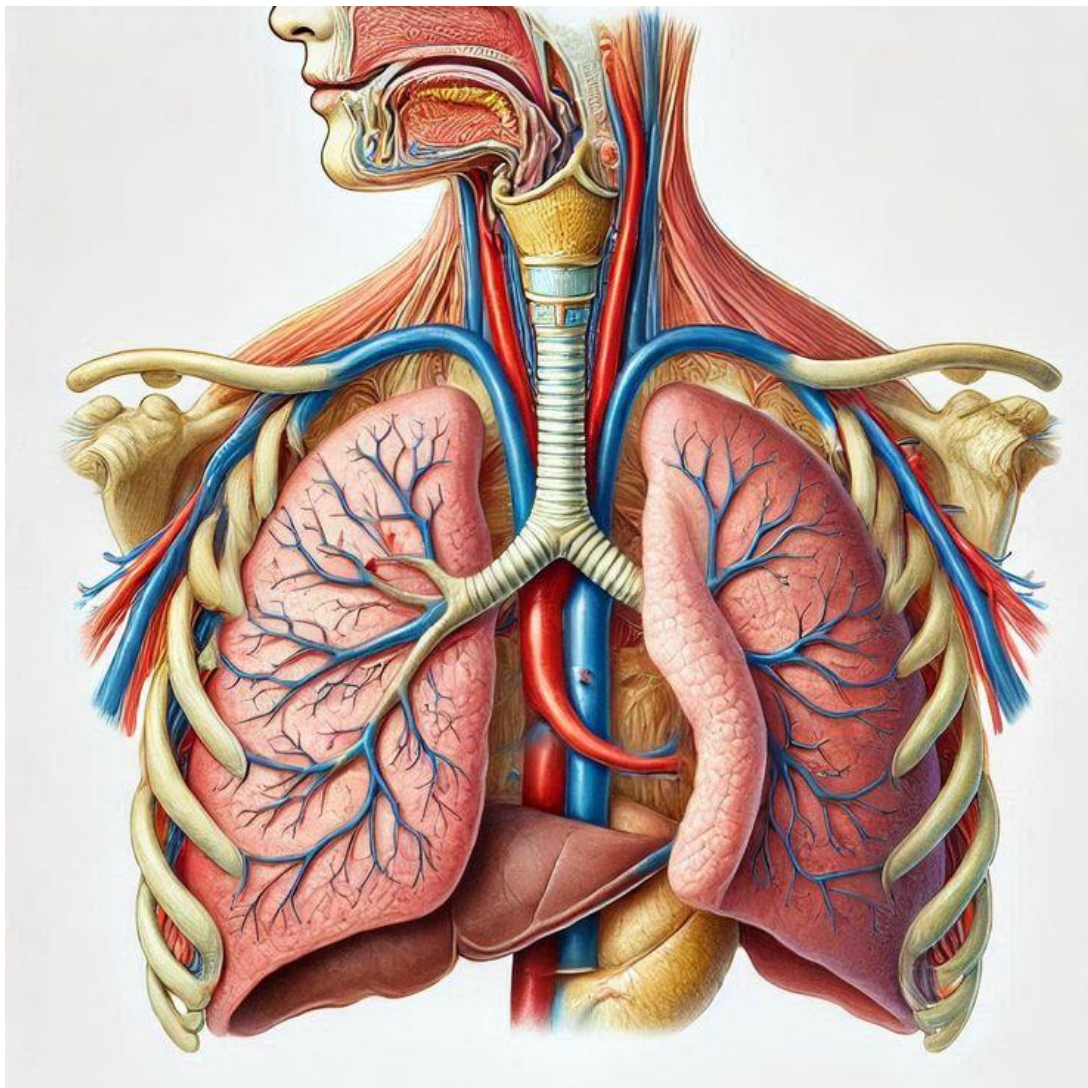
B.Lungs: Together the lungs form one of the body's largest organs. - They're responsible for providing oxygen to capillaries and exhaling carbon dioxide

C.Bronchi: The bronchi branch from the trachea into each lung and - create the network of intricate passages that supply the lungs with air

D.Diaphragm: The diaphragm is the main respiratory muscle that contracts and relaxes to allow air into the lungs.

The respiratory system

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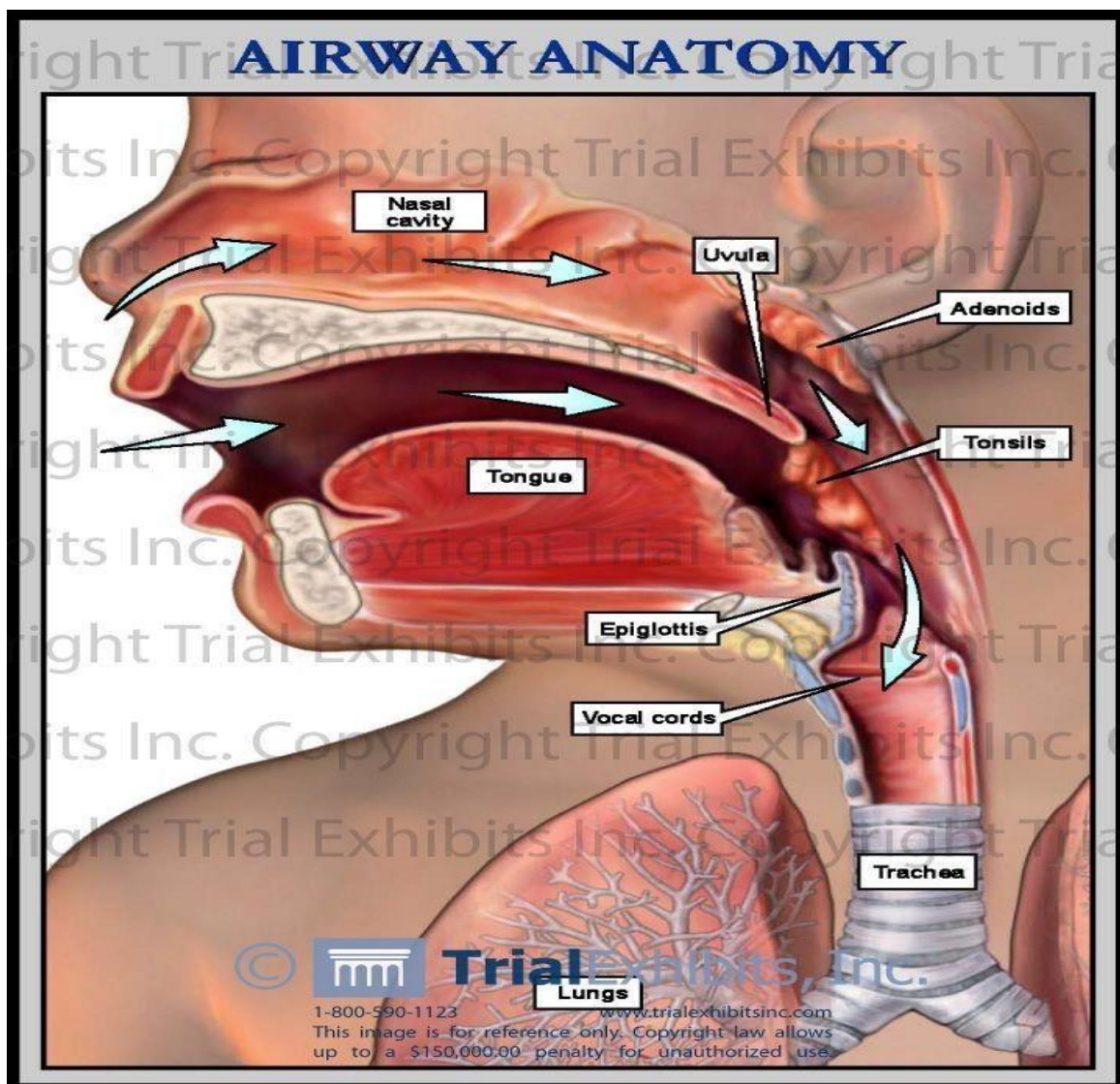


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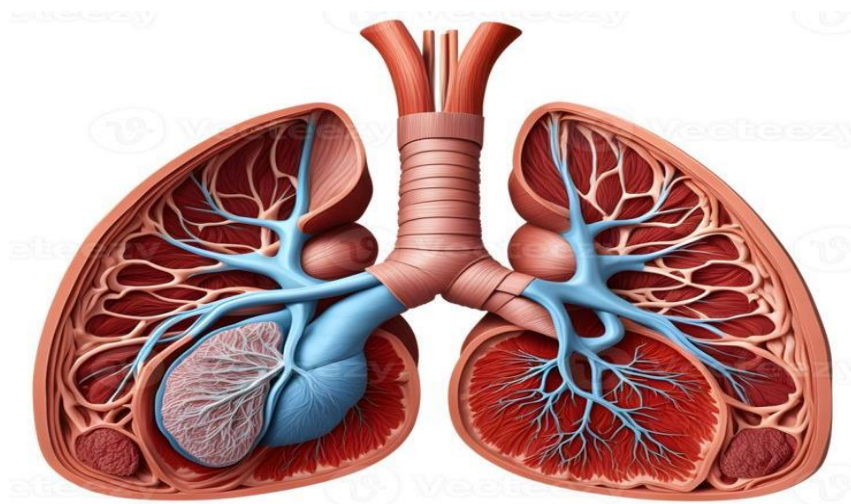
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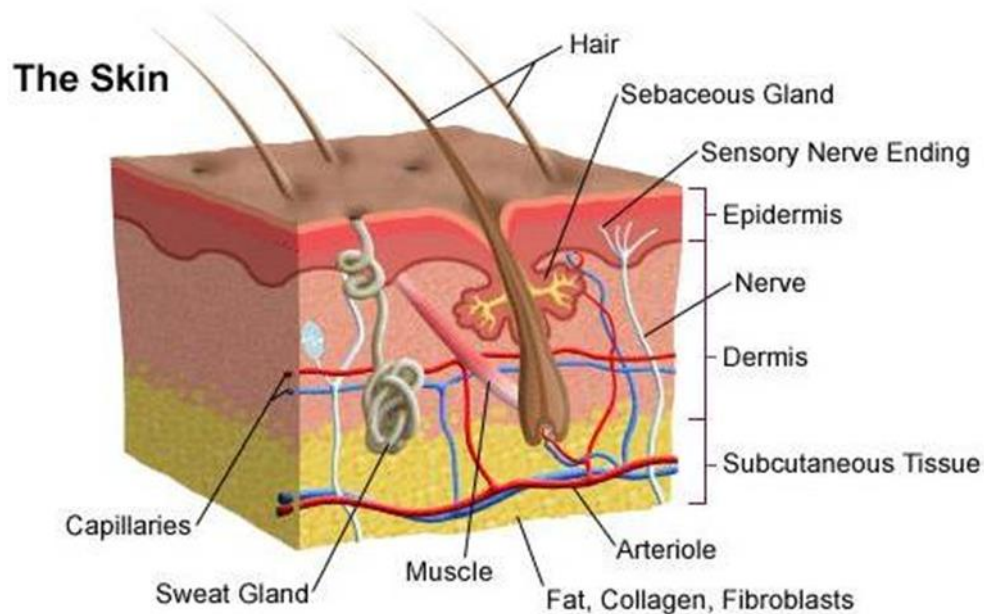
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D.Diaphragm: The diaphragm is the main respiratory muscle that .contracts and relaxes to allow air into the lungs.

Integumentary System

The integumentary system consists of the skin, hair, nails, the subcutaneous tissue below the skin, and assorted glands .



Skin Functions

1. Protection from injury
2. Protection against infection
3. Regulates body temperature
4. Regulates water loss
5. Chemical synthesis
6. Sensory perception

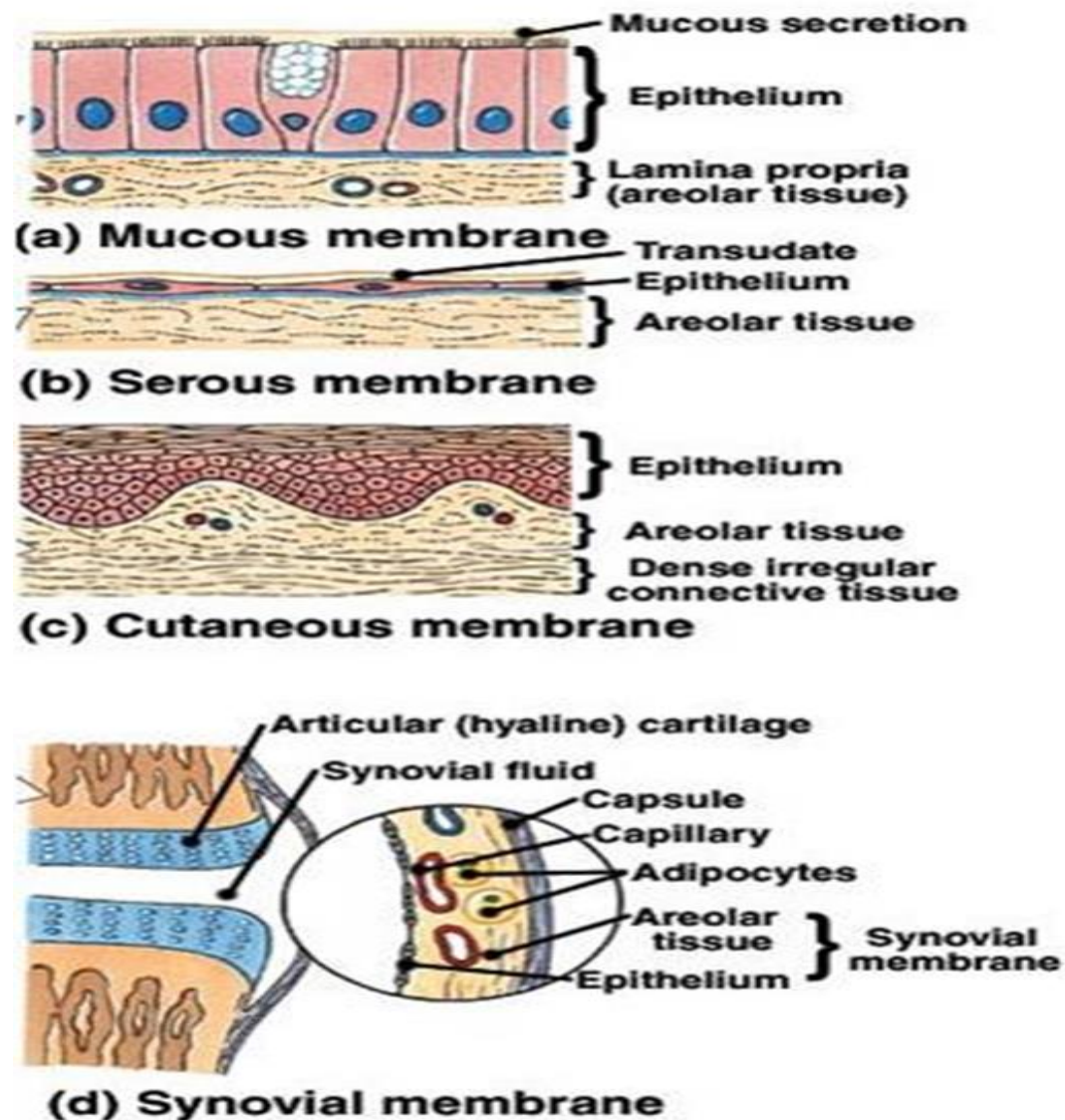
Types of Membranes

A. Serous Membranes: Line body cavities that have no opening to the outside, secrete a watery fluid called serous fluid that lubricates surfaces

B. Mucous Membranes: Line cavities and tubes that open to the outside

C. Synovial Membranes: Form the inner lining of joint cavities, secrete a thick fluid called synovial fluid.

D. Cutaneous Membrane – also known as skin

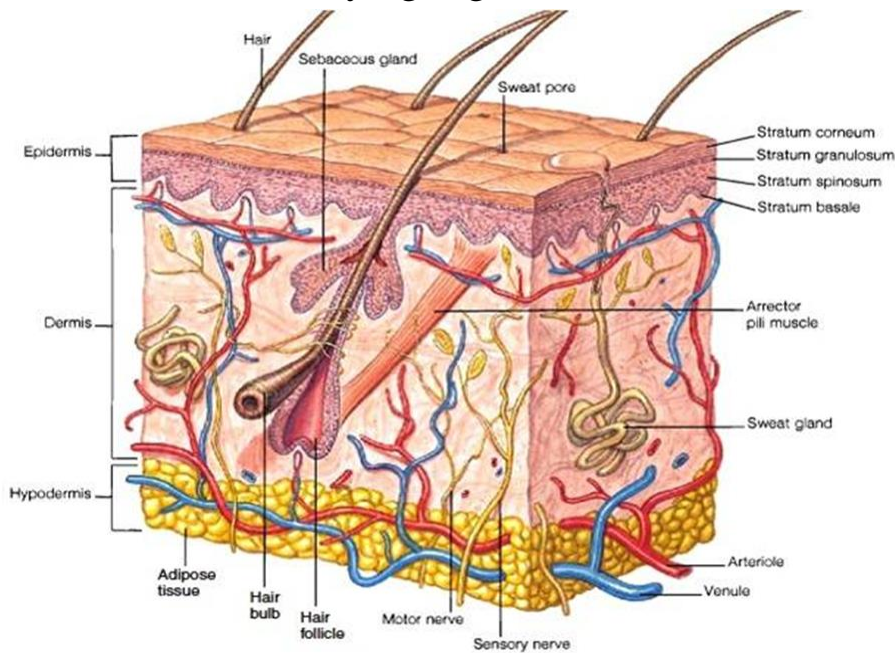


Skin Layers and Attachment Layer

1. **Epidermis:** Covers internal + external surfaces of body

2. **Dermis:** Inner layer – Contains accessory skin structures

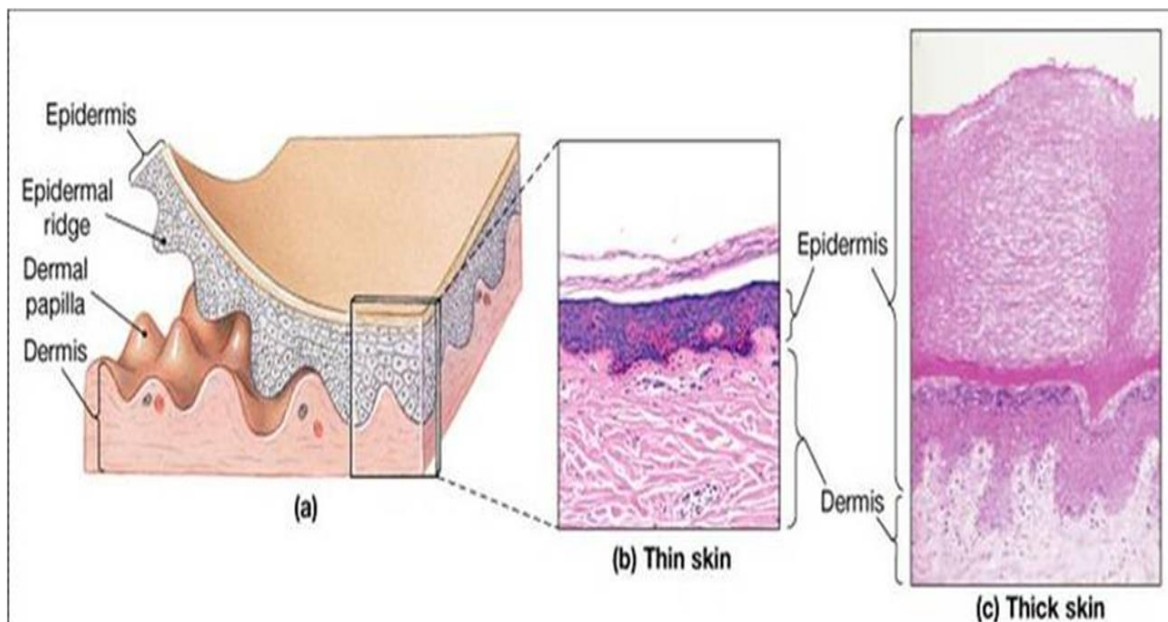
3.Hypodermis or subcutaneous layer :Attaches the skin to underlying organs & tissues



Thin skin vs. Thick skin

A.Thin - 1-2 mm on most of the body and 0.5 mm in eyelids – Hairy; Covers all parts of the body except palms, soles

B.Thick - up to 6 mm thick on palms of hands and soles of feet; Hairless; Covers palms, and soles



Epidermal Cell Types

Keratinocytes - 90 % of epidermal cells are keratinized contains keratin (fibrous protein) protects and waterproofs the skin

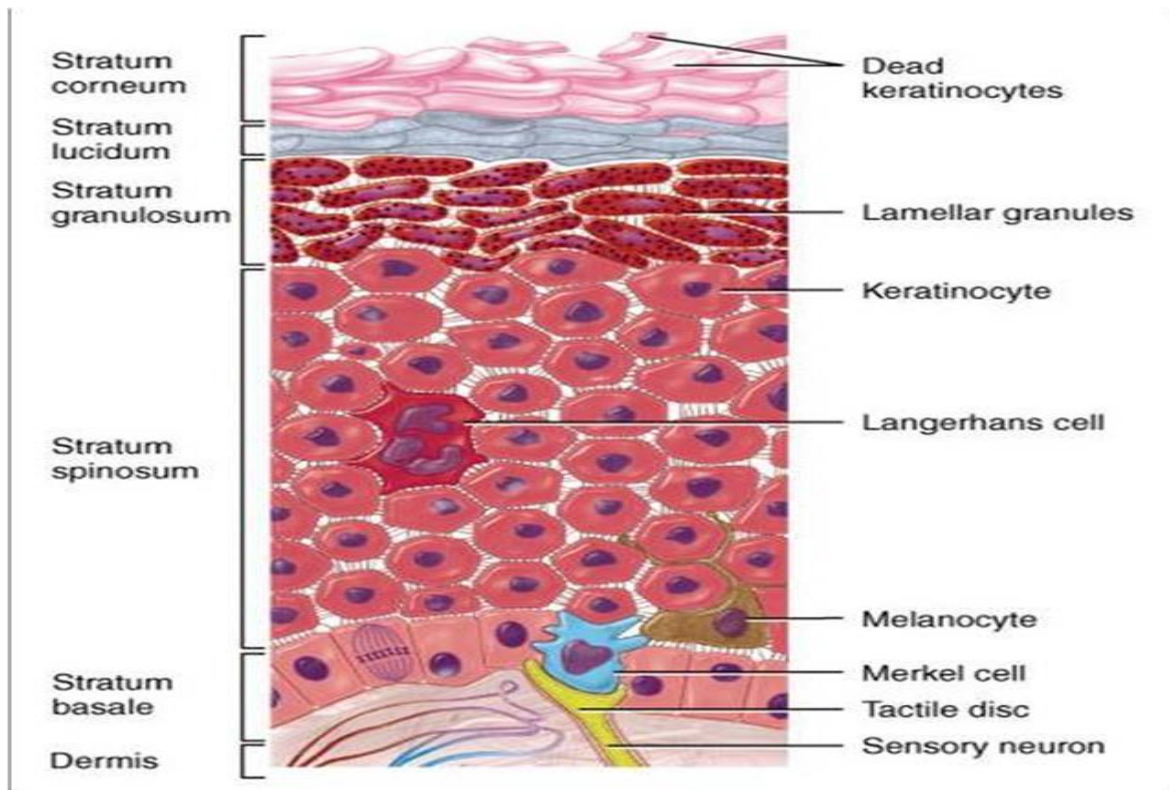
Melanocytes - 8% of the epidermal cells produces melanin contributes to skin color and absorbs UV light

Langerhans cells - Arise from red bone marrow and migrate to the epidermis -Constitute small portion of epidermal cells - Participate in immune responses Easily damaged by UV light

Merkel cells - Least numerous of the epidermal cells Found in the deepest layer of the epidermis-Along with tactile discs, they function in sensation of touch

Epidermal Layers

- 1.Stratum corneum - nuclei and organelles are destroyed by lysosomes and the cells fill with keratin
- 2.Stratum lucidum - only found in the palms and soles of feet 3-5 layers of clear, flat, dead keratinocytes -Dense packed intermediate filaments Thick plasma membranes
- 3.Stratum granulosum - cells start to become keritanized -- Secretes lipid-rich secretion that acts as a water sealant
- 4.Stratum spinosum - 8-10 layers of keratinocytes skin both strength and flexibility
- 5.Stratum basale - Also referred to as stratum germinatum - where new cells are formed -

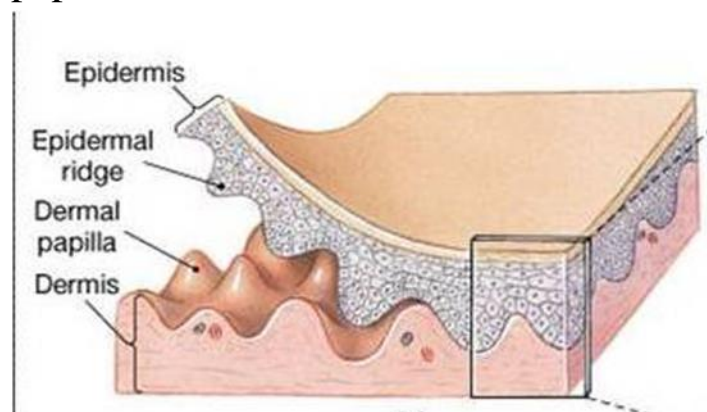


Dermis

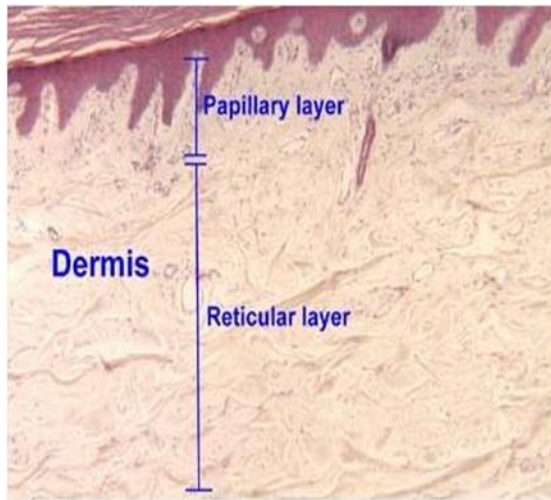
Second deepest part of the skin Composed mainly of connective tissues (collagen and elastic fibers)

1.Papillary Layer – Surface area is increased due to projections called dermal papillae which contains capillaries or tactile receptors

Epidermal ridges conforms to the dermal papillae



2.Reticular Layer -Contains hair follicles, nerves, sebaceous and sudoriferous glands



Hypodermis

(Subcutaneous) Attaches the skin to underlying organs and tissues

.Not part of the skin - lies below the dermis

.Contains connective tissue and adipose tissues (subcutaneous fat) for insulation

.Infants and elderly have less of this than adults and are therefore more sensitive to cold