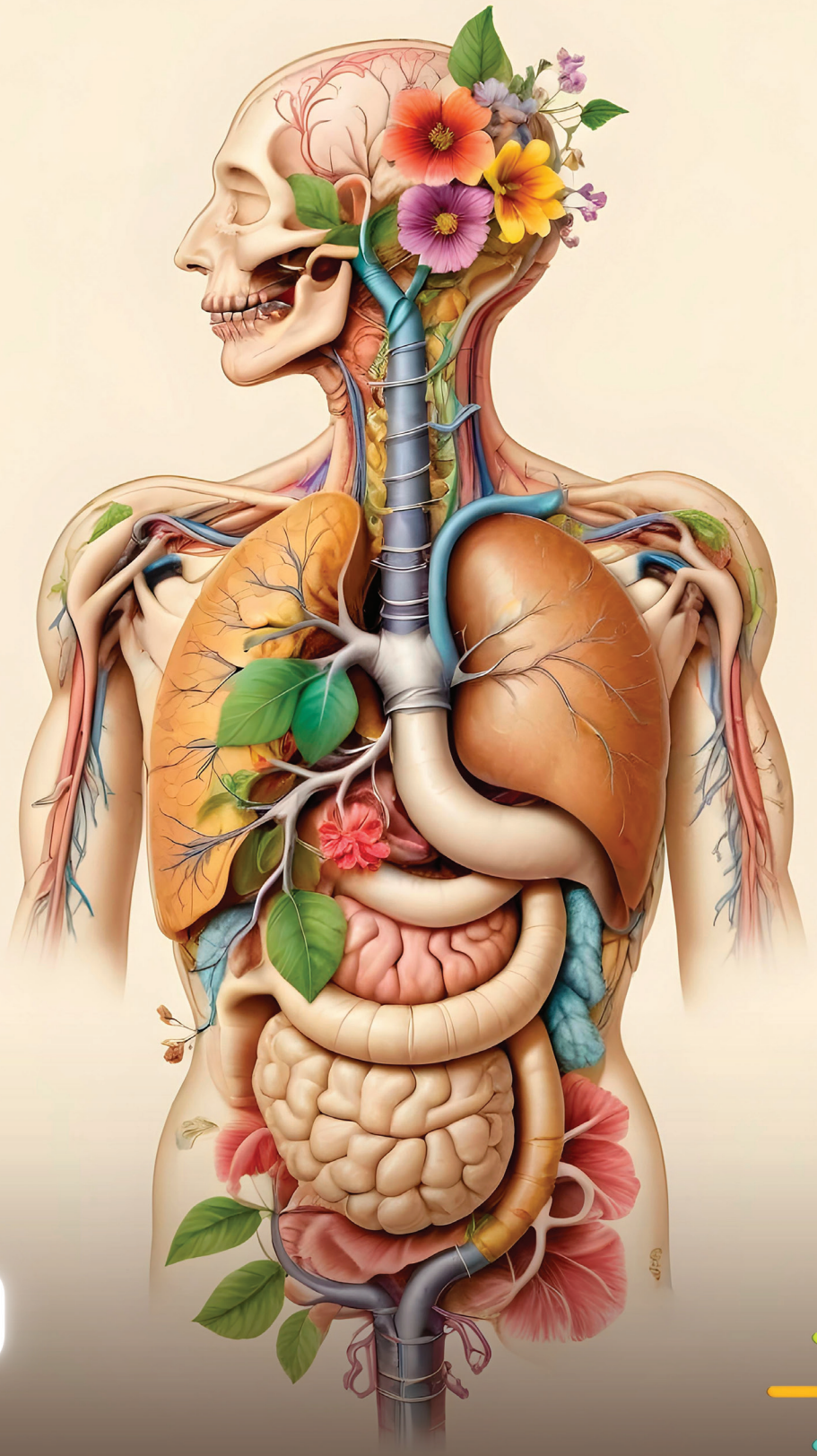
ANATOMY

Module Foundation



2029

SMART VISION INSTITUTE

نبراس Nebras

في البداية نتمنى أن نكون قدمنا لكم ما يفيدكم و تتمنوه و نسألكم الدعاء لكل من كتب و أعاد صياغة هذا المحتوى و دققه ..

بشكل مباشر أو غير مباشر ...

نبراس

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Index

Introduction of Anatomy

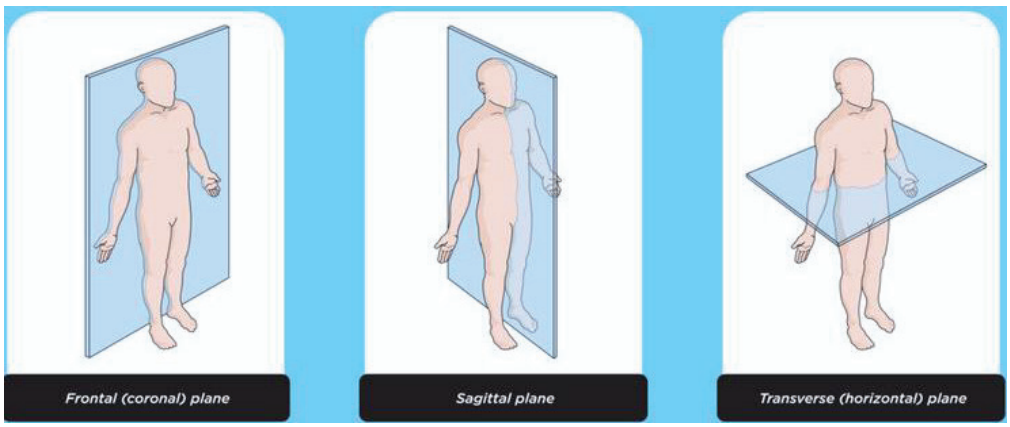
Anatomical position: الموضع التشريحي

- Anatomy is the science of the structure of the body.
- Clinical anatomy is the study of the structure of the body in relation to medicine and health problems.
- All descriptions of the human body are based on the assumption that the person is standing upright, with the upper limbs hanging by the sides and the face and the palms of the hands are facing forwards. This is called the Anatomical Position.

Anatomical position:
Standing upright
Upper limb hanging by the side
Face and palms Facing forward

Anatomical Planes: مستويات التشريح

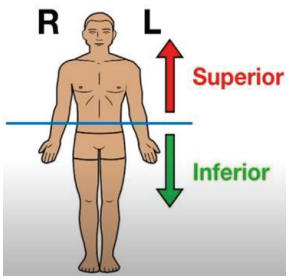
- **Median sagittal plane:** vertical plane passing through the middle of the body, dividing it into equal right and left halves.
- Planes parallel to this plane are called sagittal or Paramedian plane.
- **Paramedian plane** is a vertical plane that divides the body into right and left parts.
- **Coronal plane** is a vertical plane at right angle to the sagittal plane, and it divides the body into anterior and posterior parts.
- **Horizontal or the transverse planes** are at right angles to both the sagittal and the coronal planes, It divides the body into upper and lower parts.

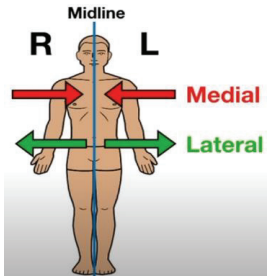


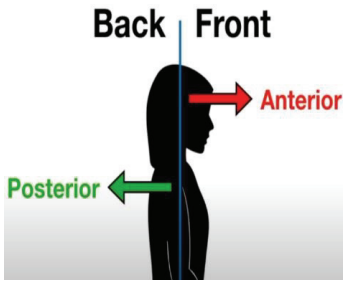
Terms of Anatomy:

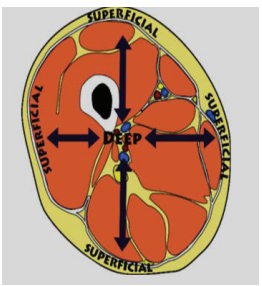
A. Terms of positions: المواضع

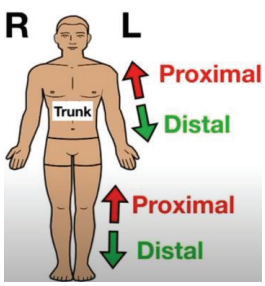
Superior (cranial): أعلي	Nearer to the head.
Inferior (caudal): أسفل	Nearer to the foot
Medial: قريب من الجسم	Nearer to the middle line.
Lateral: بعيد عن الجسم	Far away from the middle line.
Anterior (ventral): أمامي	Nearer to the front of the body.
Posterior (Dorsal) : خلفي	Nearer to the back of the body.
Superficial: سطحي	Nearer to the skin.
Deep: عميق	Far away from the skin.
Proximal: قريب **(Terms use only for limbs)**	Nearer to the root of the limb.
Distal: بعيد **(Terms use only for limbs)**	Far away from the root of the limb.
Palm of the hand: باطن اليد	Anterior part of the hand
Dorsum of the hand :ظهر اليد	Posterior part of the hand
Sole of the foot (plantar): باطن القدم	Bottom of the foot
Dorsum of the foot : ظهر القدم	Superior part of the foot

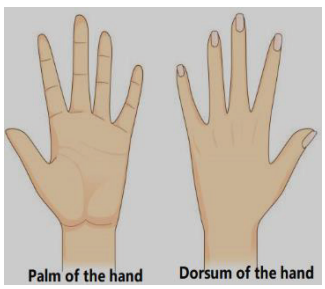


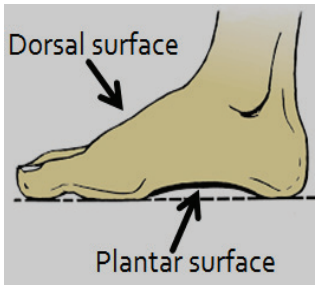








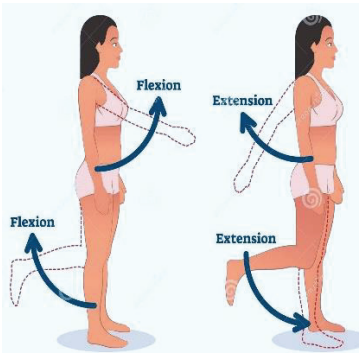


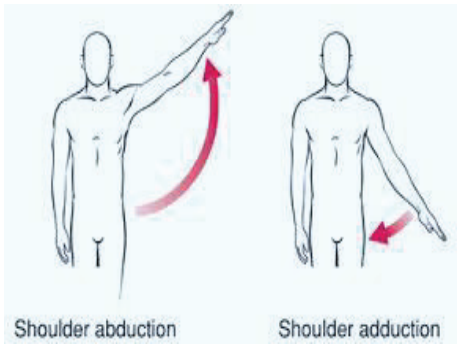


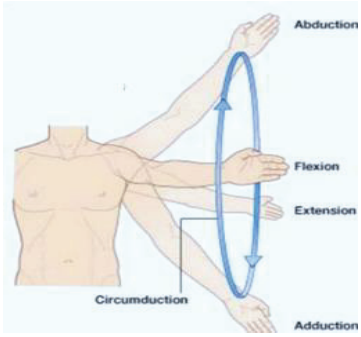
B. Terms of Movement: الحركات

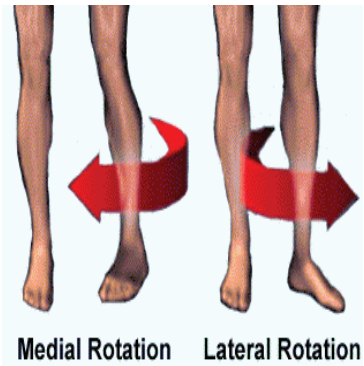
Most of the joints flexion is bending anteriorly except in the knee joint where flexion is bending posteriorly

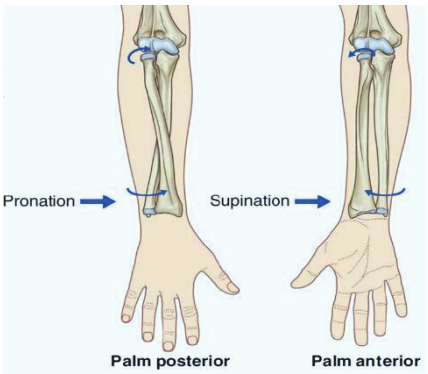
Flexion ثني	Bending
Extension استقامه	Straightening
Abduction بعيد عن الجسم	Movement away from the median plane
Adduction قريب من الجسم	Means movement towards the median plane
Circumduction دوران	▪ Circular movement which includes (flexion, abduction, extension and adduction) ▪ Occurs in few joints as the shoulder and the hip joint.
Medial rotation دوران باتجاه الجسم	Anterior surface of the bone faces medially
Lateral rotation دوران بعيدا عن الجسم	Anterior surface of the bone faces laterally
Supination (ONLY in FORARM)	Normal resting position of the forearm (Palm faces forward , radius and ulna not crossed ,thumb is lateral)
Pronation (ONLY in FORARM)	Palm of the hand faces backwards, the radius and the ulna are crossed and the thumb is medial.
Inversion (ONLY in FOOT)	Planter surface of the foot faces medially.
Eversion (ONLY in FOOT)	Planter surface of the foot faces laterally

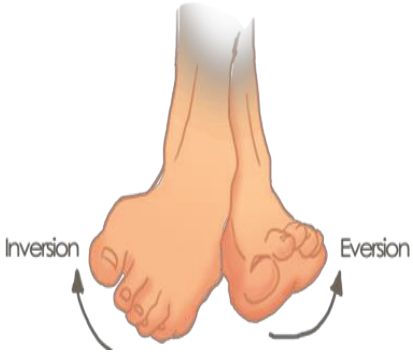








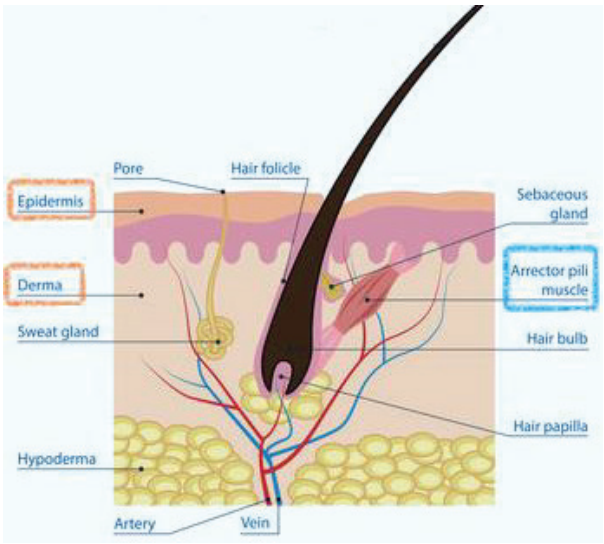




Layers of the body

A. Skin

- Skin is the outer layer that covers the body.
- The study of skin is termed "dermatology" as derma means skin.
- It is thick in some places (palm of the hand) and thin in other places (eye-lids).
- It is hairy in some places (scalp) and non-hairy in other places (lips, palm of hand and sole of foot)
- The skin has 4 appendages which are developed from the epidermis. These are: nails, hair, sebaceous glands and sweat glands
- It also contains muscles (erector pili), vessels, nerves and lymphatics.
- Skin is formed of two layers; an outer thin "Epidermis" and an inner thick "Dermis"



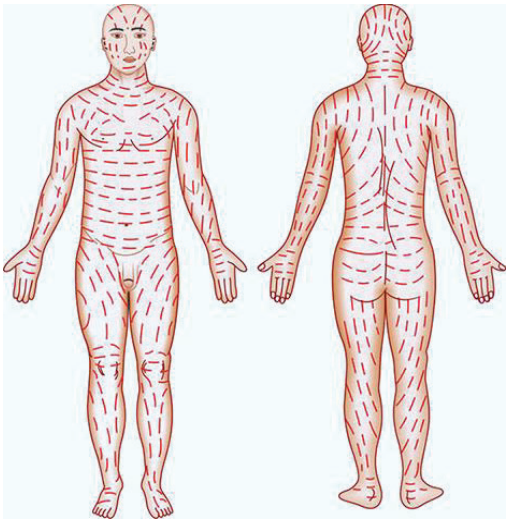
- The epidermis is epithelial in nature and ectodermal in origin.
- The dermis is connective tissue in nature and mesodermal in origin.

Vessels, Nerves and Lymphatic Vessels:

- Small arteries (arterioles) in the deep part of the dermis give branches to supply the different structures of the dermis e.g., hair follicles, sweat glands and connective tissue.
- Blood is recollected by small veins (venules).
- Nerves present in the dermis are either:
  - Nerves that transfer orders from the brain to the different structures of the dermis (erector muscles, sweat glands and blood vessels).
  - Nerves that carry sensation to the brain from nerve endings.
- The nerve endings are receptors to different types of sensations (pain, touch and temperature). Thus, these nerves help to keep the body aware of the changes in the environment.
- Lymphatic vessels are fine vessels that carry extracellular tissue-fluid (lymph) back to the veins.

Connective Tissue of the Dermis:

- **Definition:** Flexible connective tissue generally thicker than the epidermis
- The collagen fibers are groups of fibers running parallel to each other.
- They pass in certain direction in each part of the body.
- Generally they are arranged transversely in the trunk and neck, but longitudinally in the limbs.
- This special arrangement of collagen fibers is called **"Langer's Lines".**
- It is important for surgeons to study these lines, so that when they make an incision not to injure too much collagen fibers.
- Incisions made across **"Langer's Lines"** result in gapping of the wound and prominent scar tissue.



Epidermis	Dermis
Outermost layer of the skin	Inner layer of the skin
Ectodermal	Mesodermal
Superficial layer and is relatively thin	Deeper and thicker
Avascular	Vascular

Applied Anatomy:

- **Skin incisions:**
  - The skin of anterior abdominal wall is incised during operations in order to reach underlying organs, The insions are mostly transverse according to Langer`s lines in order to leave narrow scar.

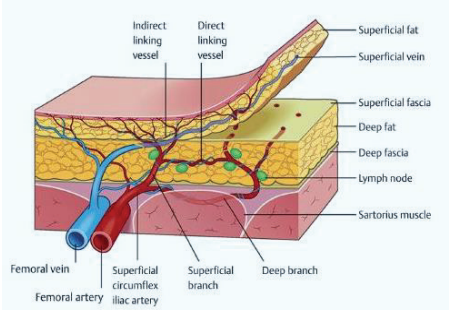
- **Burns:**
  - During burns the skin is removed from the area burnt, Burns are classified into degree according to the depth of the burn and its size
- **Albinism:**
  - Is the Absence of melanin pigment from the skin, the skin looks white in color with pinkish ting of the underlying vessels.

B. Fascia

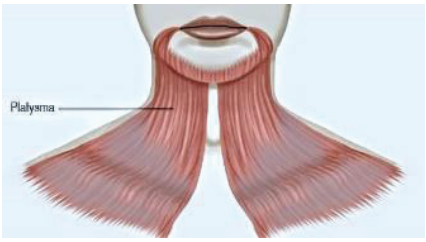
Definition:

- Collection of connective tissue that lies either under the skin (superficial) or deeply situated where it invests the muscles and en-sheathes blood vessels (deep fascia).

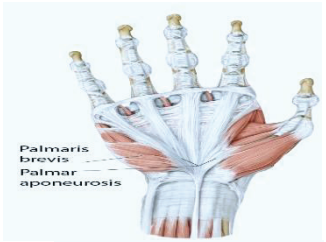
Superficial Fascia:

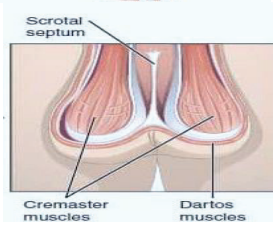


- **Definition:** It is the fatty connective tissue just under the skin. It contains small blood vessels and nerves that pass to supply the overlying skin.
  - These vessels and nerves are called "Cutaneous Vessels and Nerves".
  - In females, the superficial fascia contains more fat and thus it forms a thick fatty yellowish layer under the skin.
  - In few places in the body, the superficial fascia does not contain fat, as in the eyelids
  - **In some places it contains muscles as:**
    - Face → fascial muscles.
    - Neck → platysma muscle.
    - Palm → Palmaris brevis muscle.
    - Scrotum → dartos muscle
  - **In some places it contains glands as:** The mammary gland pectoral region.



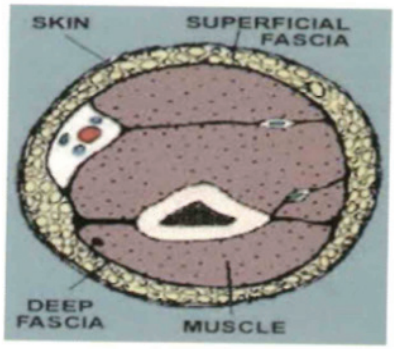
- **Functions of superficial Facia:**
  - **The Superficial Fascia Contains Fat That:**
    1. Acts as a food reservoir.
    2. Insulates the body heat from the environment.
    3. Gives the rounded contour of female body.
  - **The Superficial Fascia Contains Vessels and Nerves:**
    1. The vessels help in regulating body temperature.
    2. The nerves carry the sensations from the skin.
  - **The Superficial Fascia in few places, Contains:**
    1. Muscles as the fascial muscles, platysma muscle, Palmaris brevis muscle and the dartos muscle.
    2. Glands as the mammary gland in the pectoral region.

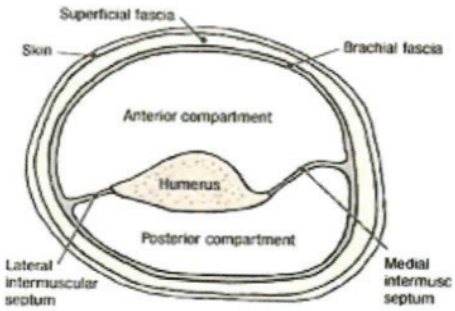




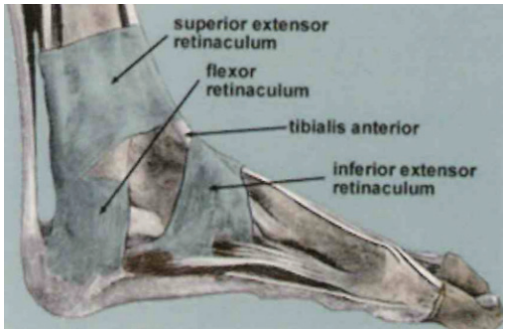
Deep Fascia:

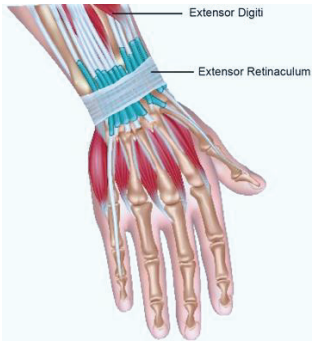
- **Definition:** It is a strong dense white fibrous membrane that covers the muscles .
  - It sends fibrous tissue septa separating the muscles which are attached to the bone. These are called "intermuscular septa".
  - These fascial septa between the muscles facilitate the movements of the groups of muscles and also act as spaces between the muscles for the passage of nerves and vessels (neurovascular bundles).





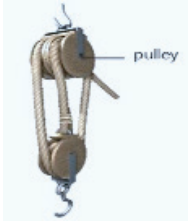
  - In some places the deep fascia is thickened to form "retinacula" around the wrist and ankle, to keep the long tendons in place close to bones.





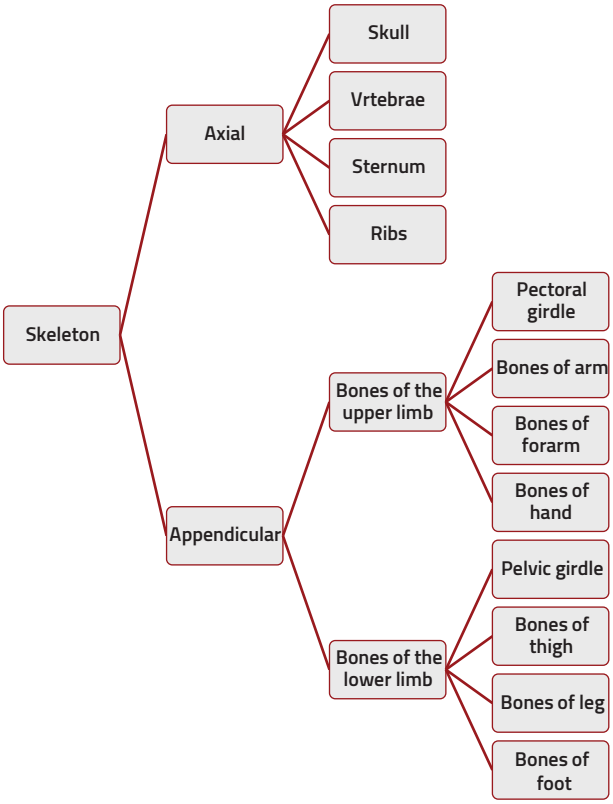
  - Around the big vessels the deep fascia thickens in a form of a sheath surrounding vessels and nerves to protect them as the "Femoral Sheath" and the "Carotid Sheath".

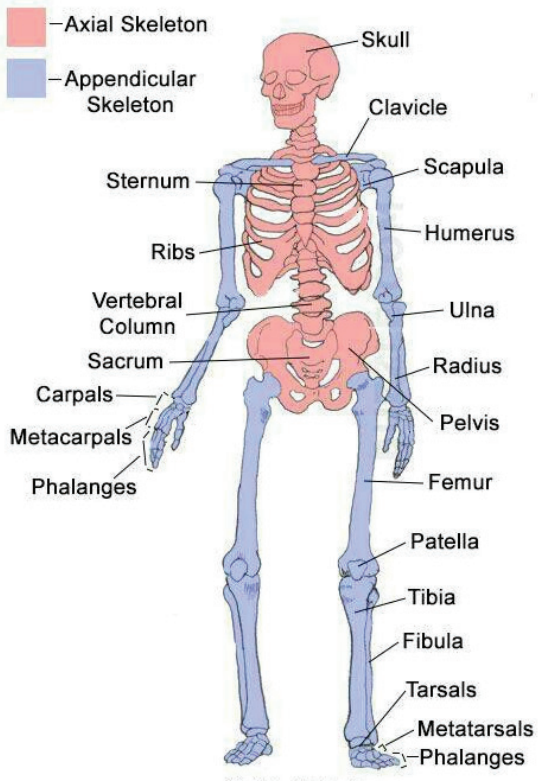
- **Function of deep fascia:**
  1. The intermuscular septa separate the different groups of muscles, and so facilitate their action.
  2. The retinacula at the wrist and ankle, keep the tendons close to the bones, and also act as pulleys around which the tendons move.
  3. The neurovascular sheathes protect the enclosed big vessels and nerves.
  4. In some places, it gives attachments to muscles

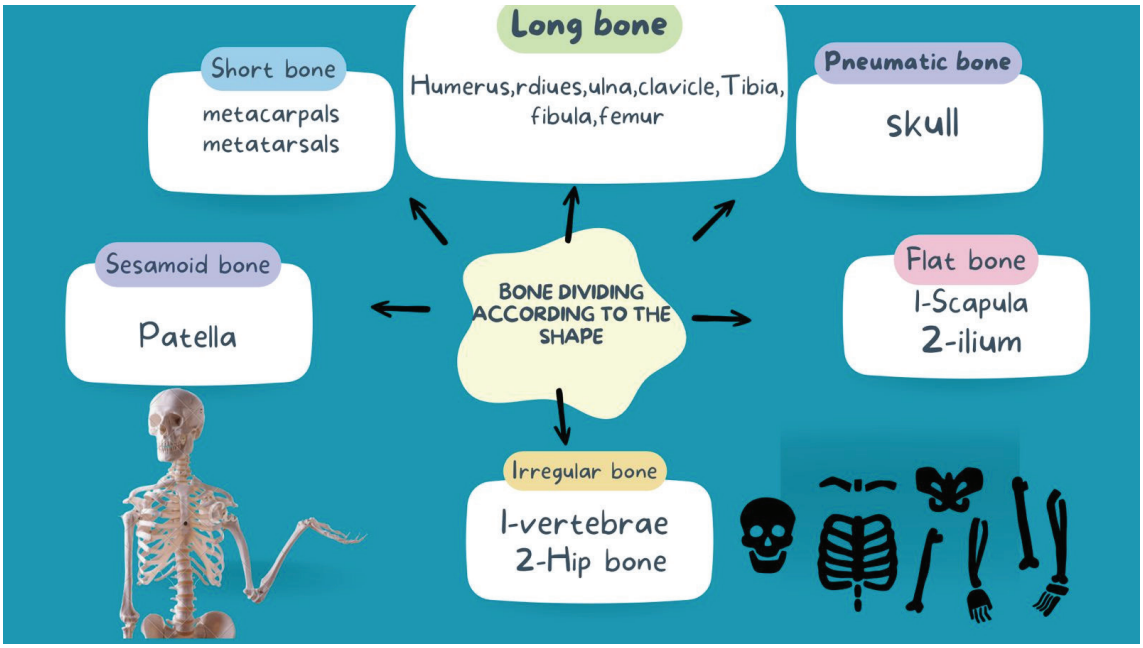


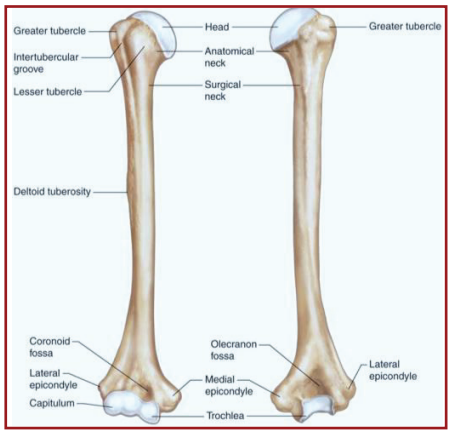
Bones

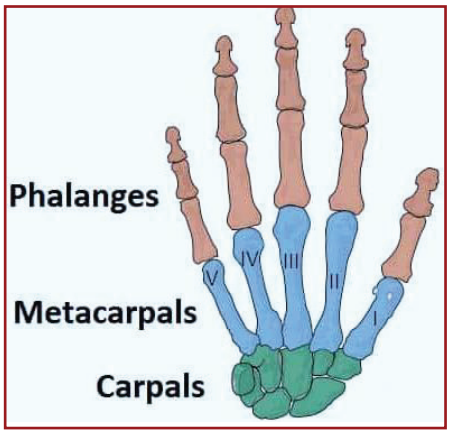
- Bones form the skeleton of the body, there are more than 200 separate bones forming the skeleton
- The study of bone is called **"Osteology".**

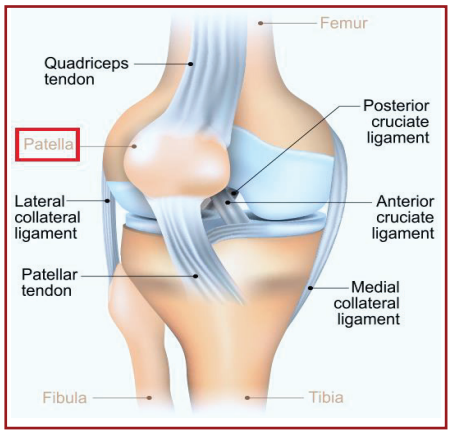












- **Humerus:**
  Long bone of arm
- **Each long bone has:**
  Upper end, lower end and shaft

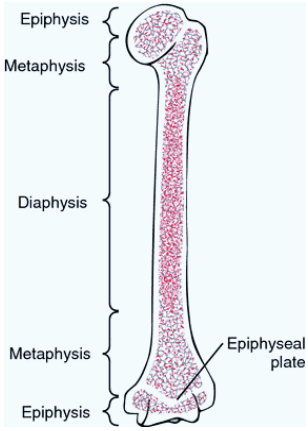
- **Metacarpal bones:**
  Short bones of hand
- **Have the same parts of long bones but shorter**

- **Patella:**
  Sesamoid bone in front of knee joint

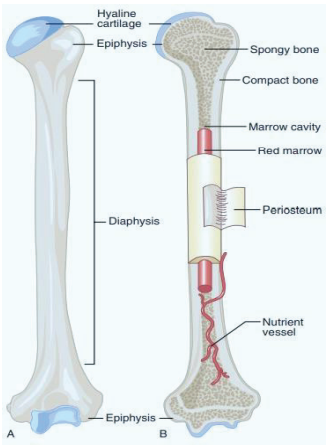
- **Each long bone has growing end and non-growing end:**
  - Growing End of Humerus → upper end
  - Growing End of radius and ulna → lower ends
  - Growing End of femur → lower end
  - Growing End of Tibia and fibula → upper ends
- **Nutrient Artery:**
  - Each bone is capable of growth and repair. Thus, each bone receives its nutrient artery.
  - It enters the bone at a certain place and with a certain direction.
  - The nutrient artery in the long bones is directed towards the non-growing end.
  - In the Humerus it runs towards the lower end of the bone or the elbow.
  - To know the direction of the nutrient artery, we say: "To elbow I go, from knee I flee".

Bone	Growing end	Nutrient artery
Humerus	Upper end	Towards the lower end of the bone
Radius	Lower ends	Towards the upper end of the bone
Ulna	Lower ends	Towards the upper end of the bone
Femur	Lower ends	Towards the upper end of the bone
Tibia	Upper end	Towards the lower end of the bone
Fibula	Upper end	Towards the lower end of the bone

Parts of a Growing Long Bone:



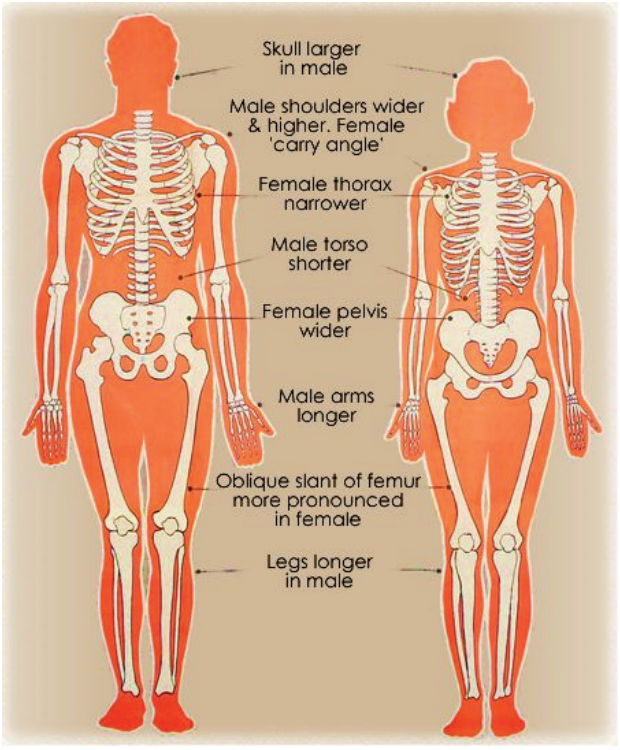
- A long bone consists of two ends and a shaft.
- Each end is called an epiphysis, the epiphysis is formed of spongy, cancellous bone.
- The shaft is called diaphysis
- In a growing bone, epiphysis is separated from the diaphysis by a plate of cartilage, (epiphyseal plate).
- This epiphyseal plate is the site of increase in length of the bone.
- At a certain age, when growth is completed, these plates ossify.
- The region of the shaft close to the epiphyseal plate is called metaphysis.



- The shaft is formed of compact bone enclosing a cavity which is filled with bone marrow.
- **This cavity is called:** a medullary cavity or a bone marrow cavity.
- The shaft is covered by a fibrous membrane: the periosteum.
- The parts of the bone that articulate are covered with hyaline articular cartilage.

Functions of Bones:

1. Bones form the supporting frame-work of the body.
2. Bones protect the underlying structures, e.g. the skull protects the brain.
3. Bones give the attachments to the muscles and also act as levers لإحداث for movement.
4. Bones store calcium and phosphorus.
5. The bone marrow acts as a factory for the formation of the blood cells.

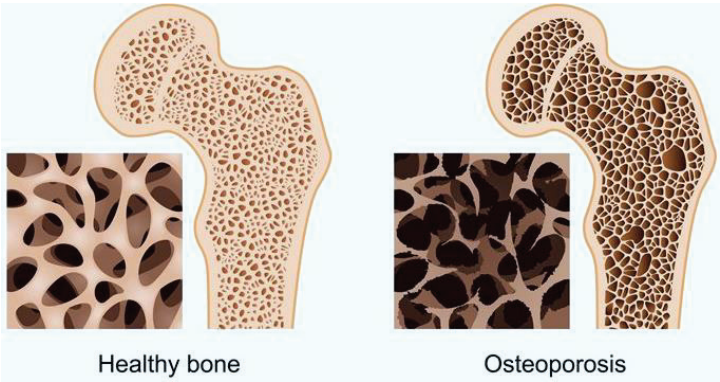


N.B:

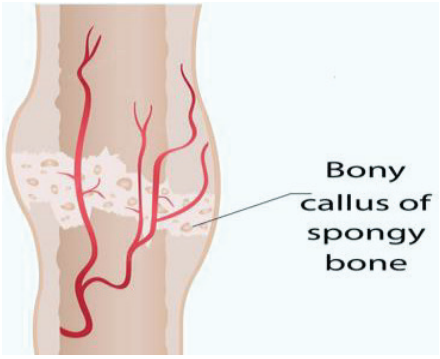
There are sex differences between male and female bones. Usually the male bones are longer, heavier thicker, stronger and possess prominent impressions for muscular attachments.

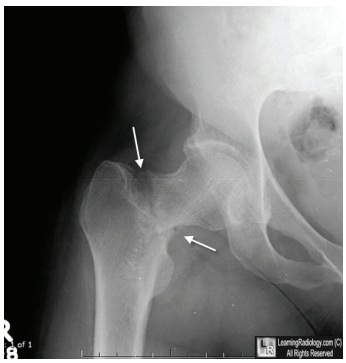
Applied Anatomy:

- **Osteoporosis: هشاشه العظام**
  - It is the most common bone disease.
  - It affects more the elderly white women
  - The bones lose their mass and become brittle and subject to fracture
  - Milk and other calcium sources and moderate exercise can slow the progress of osteoporosis.



- **Bone fractures كسور العظام:**
  - Bone is a living tissue. When it is fractured it heals by callus formation.
  - Fractures result from accidents
  - Patients with osteoporosis are more liable to fractures.
  - The most common fracture in elderly is fracture neck femur.

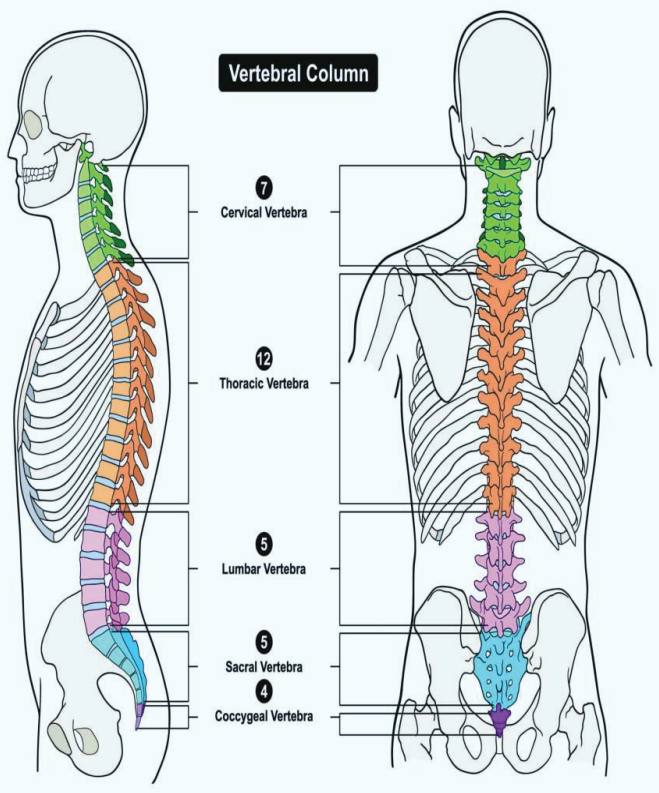




Vertebral column

العمود الفقري

- The vertebral column (backbone or spine) is a midline column formed of 33 Vertebrae separated by intervertebral cartilaginous discs.
- It houses and protects the spinal cord in its spinal canal.
- In the side view, the vertebral column presents several curves, which correspond to the different regions of the column.

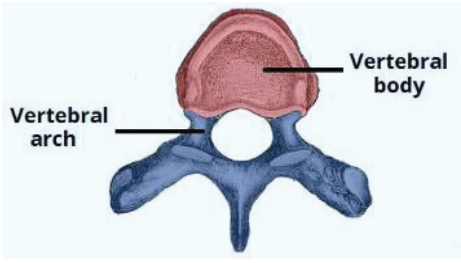


Cervical	7 vertebra
Thoracic	12 vertebra
Lumbar	5 vertebra
Sacral	5 vertebra

All these vertebrae have:

Vertebral body → anteriorly

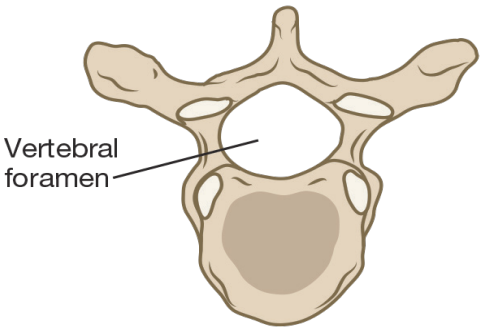
Vertebral Arch → posteriorly

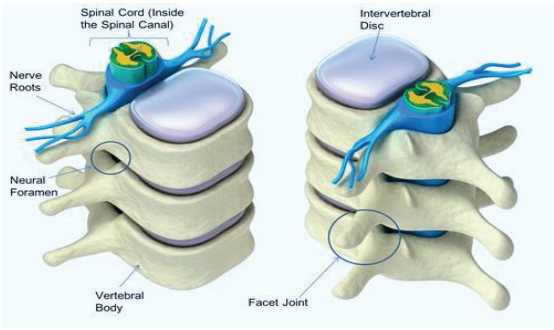


- **Vertebral Body**
  - The vertebral body is the anterior part of the vertebrae.
  - It is the weight-bearing component
  - Its size increases as the vertebral column descends (having to support increasing amounts of weight)

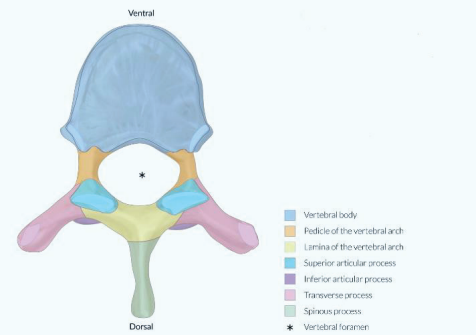
Vertebral Arch

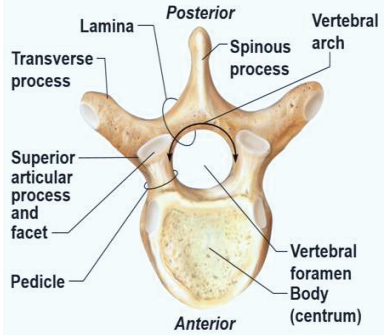
- The vertebral arch refers to the lateral and posterior parts of the vertebrae.
- The vertebral arch with the vertebral body, forms an enclosed hole, called a vertebral foramen.
- The foramina of the all vertebrae line up to form the vertebral canal, which encloses the spinal cord.



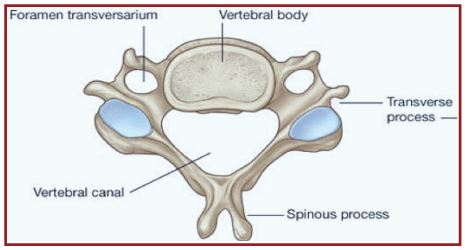


- **The vertebral arches have a number of bony prominences, which act as attachment sites for muscles and ligaments:**
  - **Pedicles:**
    There are two of these, one left and one right, they point posteriorly meeting the lamina.
  - **Lamina:**
    The bone between the transverse and spinous processes.
  - **Transverse processes:**
    These extend laterally and posteriorly away from the pedicles. In the thoracic vertebrae, the transverse processes articulate with the ribs.
  - **Articular processes:**
    At the junction of the lamina and the pedicles, superior and inferior processes arise. These articulate with the articular processes of the vertebrae above and below.
  - **Spinous processes:**
    Posterior and inferior projection of bone, a site of attachment for muscles and ligaments.

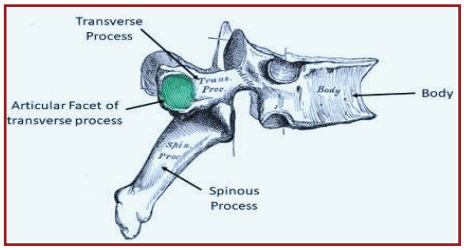




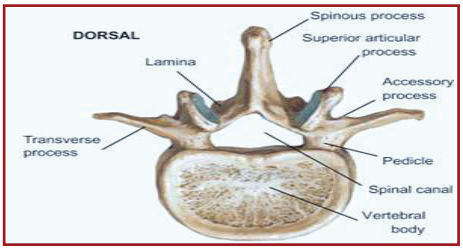
- The main character of cervical vertebra is the presence of foramen transversarium
- The main character for thoracic vertebra is the presence of articular facets.
- The main character of lumbar vertebra is the Absence of these two features



Cervical vertebra showing foramen transversarium



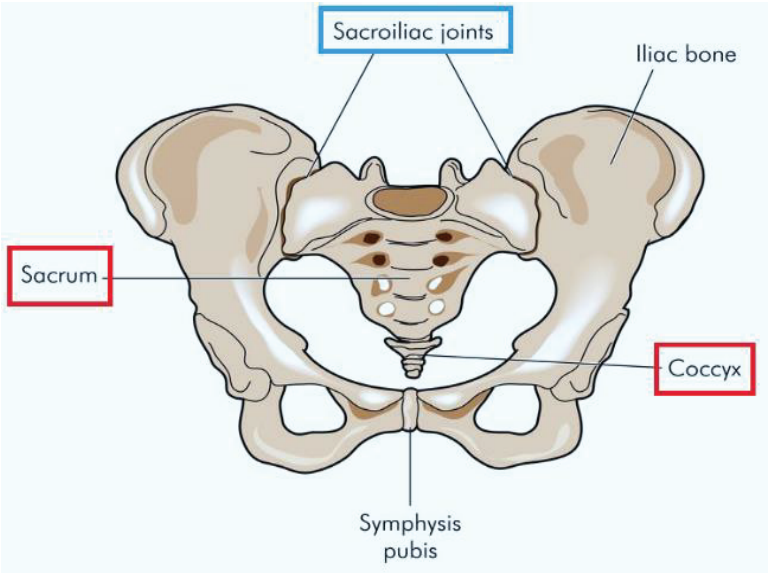
Thoracic vertebra showing articular facets



Lumber vertebra has no foramen transversarium nor articular facets

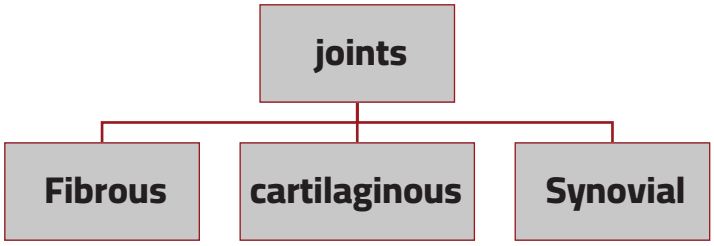
Sacrum and Coccyx

- The **sacrum** is a collection of five fused vertebrae.
- It is described as an inverted triangle, with the apex pointing inferiorly.
- On the lateral walls of the sacrum are facets, for articulation with the pelvis at the sacro-iliac joints.
- The **coccyx** a small bone, which articulates with the apex of the sacrum.
- It is recognized by its lack of vertebral arches.
- Due to the lack of vertebral arches, there is no vertebral canal, and so the coccyx does not transmit the spinal cord.



Joints

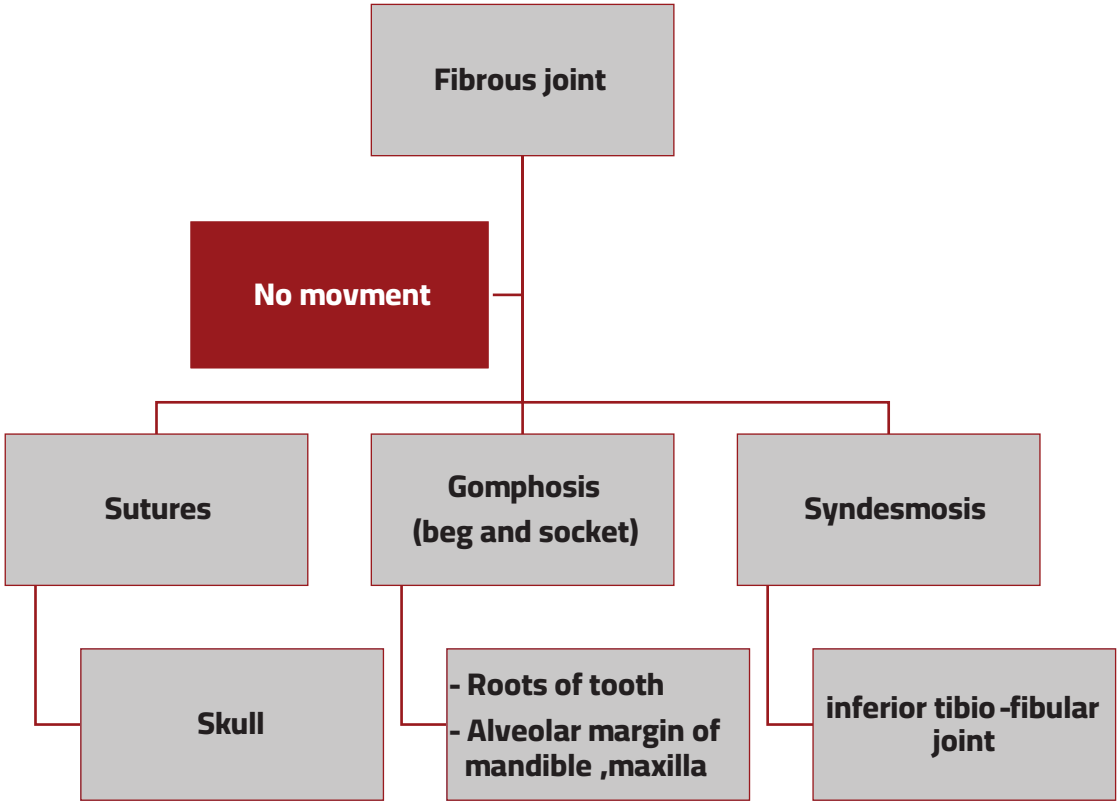
- It is a point of meeting of two or more bones.
- Joints are divided according to the material separating the bones into: Fibrous, cartilaginous and synovial joints.



Types of joints:

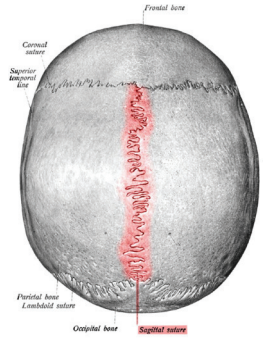
1. Fibrous Joints:

- It is the point of meeting of two or more bones, and the bones are separated by fibrous tissue.
- There is no movement in fibrous joints.



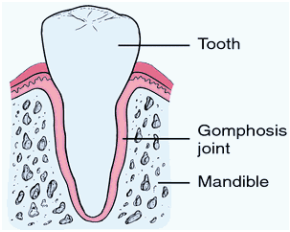
Sutures:

- The bones have serrated edges.
- The bones are separated by minimal amount of fibrous tissue.
- **Example:** sutures of the skull.



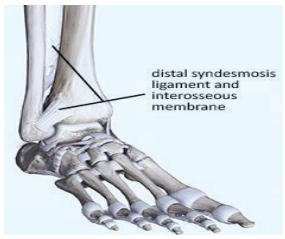
Gomphosis (Peg & Socket):

- The bones are peg & socket. (عاشق ومعشوق)
- The bones are separated by moderate amount of fibrous tissue.
- **Example:** roots of teeth & the alveolar margin of maxilla or mandible.



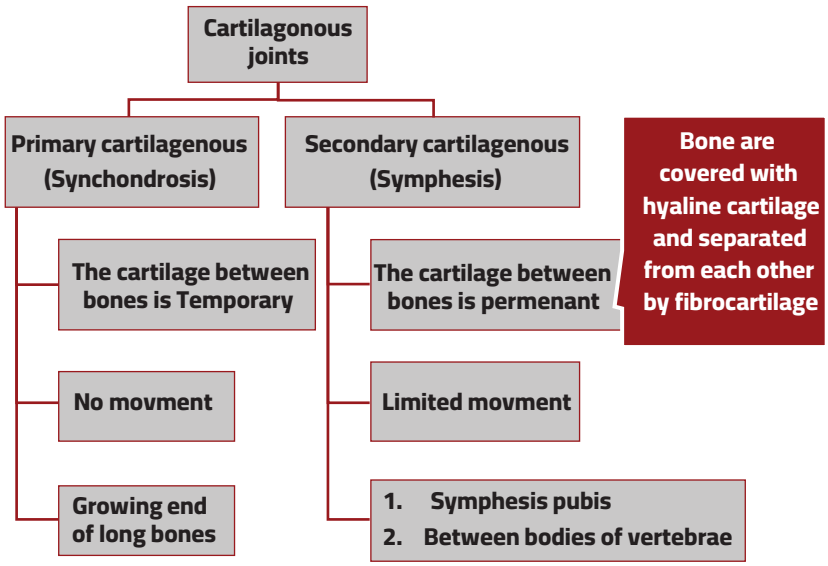
Syndesmosis:

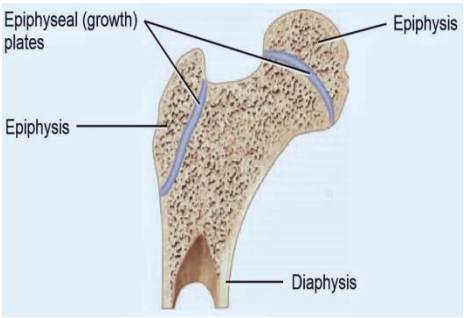
- The bones are rough, and separated by a big amount of fibrous tissue (interosseous ligament).
- **Example:** inferior tibiofibular joint (distal tibiofibular joint), this joint is just above ankle joint

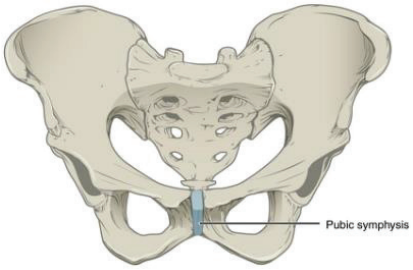


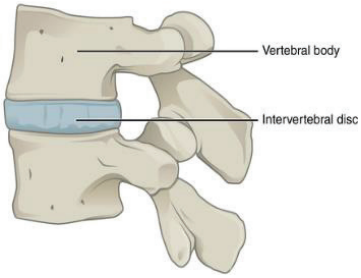
2. Cartilaginous joint:

- It is the point of meeting of two or more bones, The bone is separated by cartilage



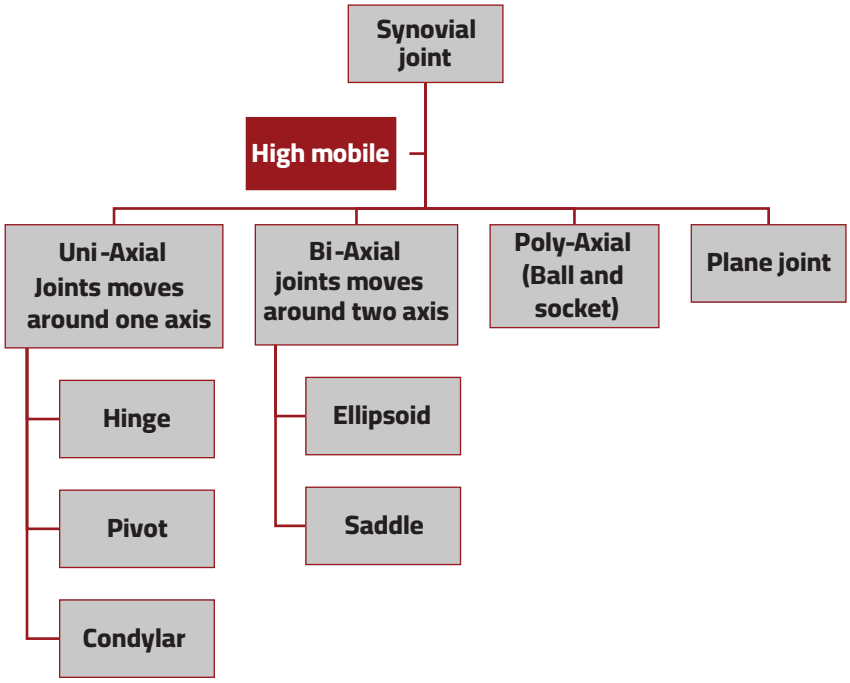






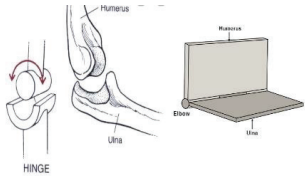
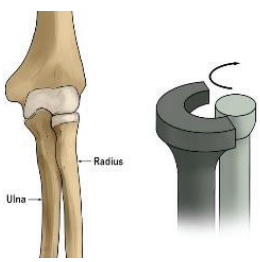
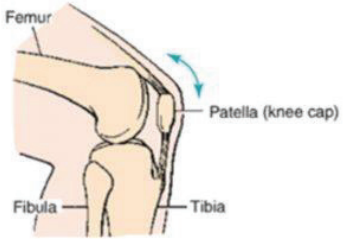
3. Synovial joints:

- The bones are separated by cartilage and by synovial fluid.
- Most of the joints of the limbs are synovial.
- They permit considerable mobility.



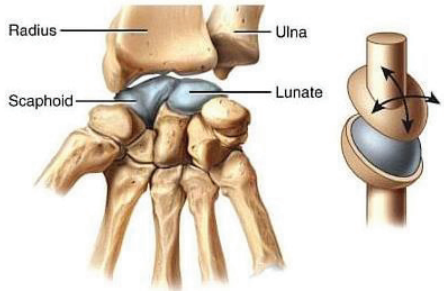
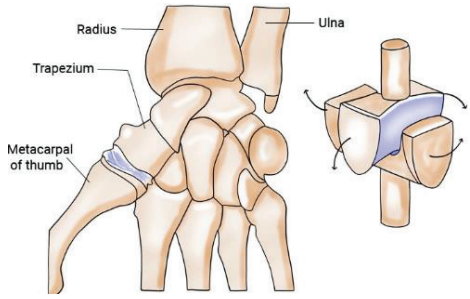
I. Uniaxial joint:

Joints move around one axis

	Hinge joint	Pivot joint	Condylar joint
Action	Moves Around Horizontal Axis	Disc rotate in a ring The axis is longitudinal	Two knuckles (Projection) of one bone with two shallow concavities (cavity) of another
Ex.	Elbow joint	Superior radio-ulnar joint	Knee joint
Place	Between trochlea of the Humerus and trochlear notch of ulna	Disc shape :Head of radius rotate inside Ring : Ulna and surrounding ligament	
			

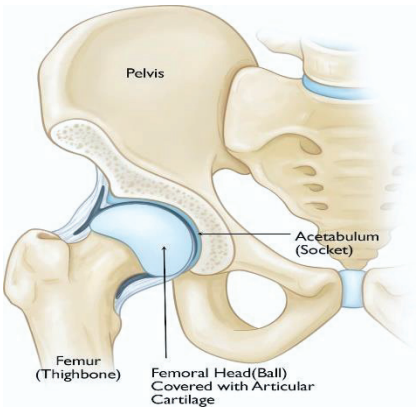
II. Bi-Axial:

The joint moves around two axes.

	Ellipsoid joints	Saddle joints
Shape	Oval convex articular surface with elliptical concavity	Concavo-convex articulate with convexo-concave
Ex.	Wrist join / Radiocarpal joint	Carpometacarpal joints of thumb
Action	Flexion ,Extension Abduction, Adduction	Flexion ,Extension Abduction, Adduction Slight rotation
		

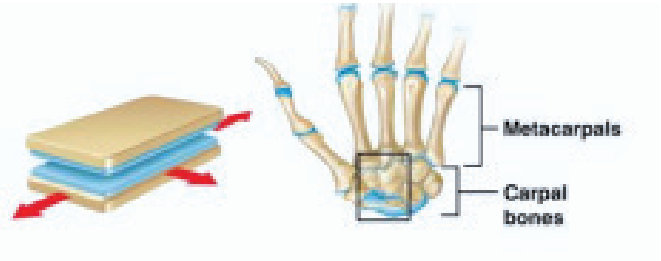
III. Poly-axial joint "Ball & Socket":

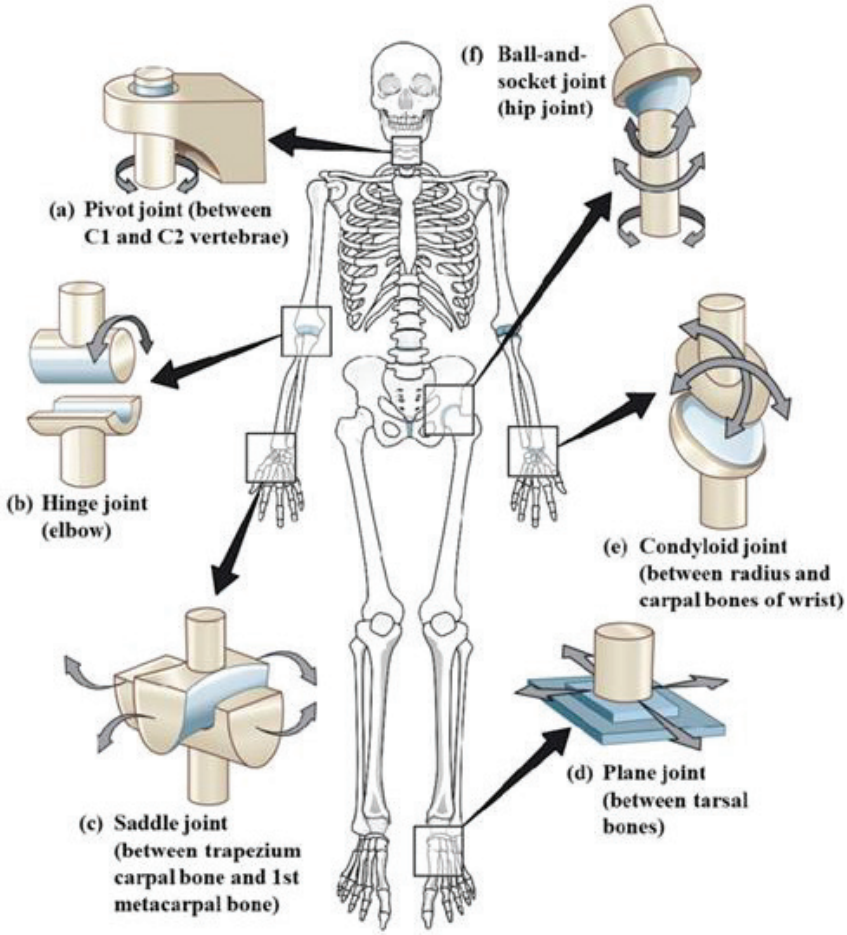
- Ball articulates with a socket.
- Example: Hip joint & Shoulder joint. (The head of the femur *ball* articulate with acetabulum of the hip bone *Socket*)
- Movements wide range (flexion, extension, abduction, adduction, medial rotation, lateral rotation and circumduction).



IV. Plane joints:

- Two smooth flat movement
- **Movement:** Gliding movement
- **Example:** Inter-carpal joints



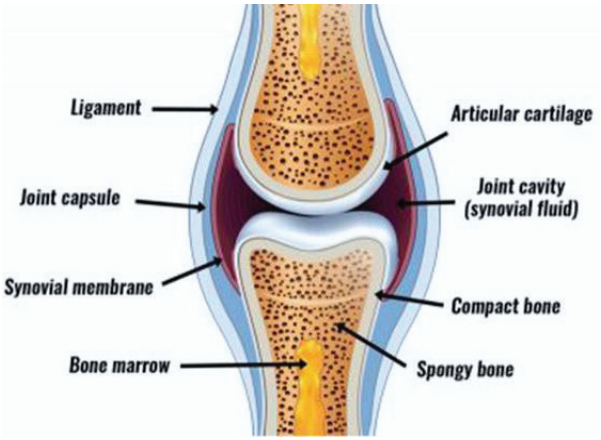


Nerve supply of the joints:

- The nerve supply of any joint comes from the nerves that supply the muscles acting on that joint.
- This is called "Hilton's Law".

General Features of Synovial Joints:

- The bones are covered with hyaline cartilage.
- The bones are separated by synovial fluid.
- There is a capsule that covers the joint.
- There is a synovial membrane that lines the capsule and covers all intracapsular structures except the articular surfaces.



- Ligaments are capsular or accessory.
  - The capsular ligaments are thickened parts of the capsule.
  - The accessory ligaments are fibrous tissue bands connecting the two bones outside the capsule.
- **Inside the joint, there may be other structures as:**
  - Cartilaginous structures which may be in the form of a disc (sternoclavicular joint) or a meniscus (knee joint) or a labrum (shoulder joint).
  - Tendon of a muscle as the tendon of the long head of biceps in the shoulder joint.

Applied Anatomy of joints:

- **Osteoarthritis:** التهاب المفاصل
  - It is a common disease affecting the big joints especially in females.
  - It is associated with fragmentation of the articular cartilage.

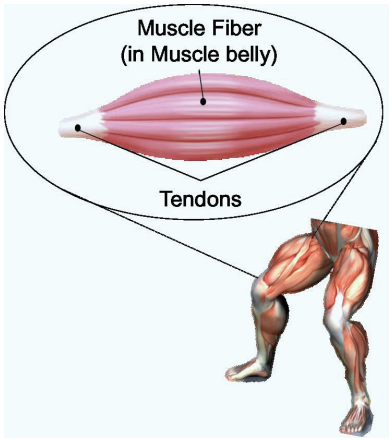
Muscles

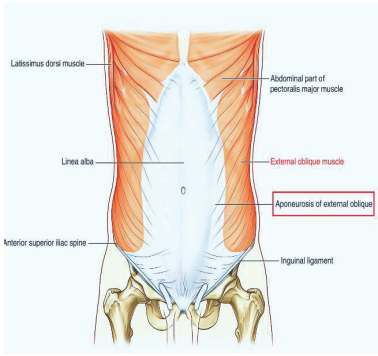
- Study of muscles called Myology.
- Muscles make up about %40 of our body weight.
- Muscle Tissue has the property of contractility which means the capacity of becoming short in response to an appropriate stimulus.
- **There are 3 types of muscles: skeletal, smooth, and cardiac.**

Skeletal muscle	Smooth muscle	Cardiac muscles
Voluntary muscles (Under conscious control)	Involuntary muscle (Not under conscious control)	Involuntary muscles
Muscles attached to the skeleton	Wall of alimentary canal Wall of Urinary bladder Wall of Vessels	Only found in heart (Wall of atria, Ventricle)

Skeletal Muscles

- **Parts of a Skeletal Muscle:**
  - Usually, the skeletal muscle is formed of a middle reddish fleshy part (the belly), and two rounded whitish fibrous ends (the tendon)
  - Flat muscles, as in the anterior abdominal wall, end by a flat sheet of fibrous tissue (aponeurosis)





Attachments of a Skeletal Muscle:

- The muscle is attached from both sides to bones.
- One of the attachments is called an origin and the other is an insertion.
- The Origin is the fixed and the proximal part of the muscle.
- The Insertion is the mobile and the distal part of the muscle.

Work of the Muscles:

1. Prime mover (agonist):

- It is the chief muscle responsible for a particular movement.
- e.g., brachialis in elbow flexion

2. Antagonist:

- - A muscle that antagonizes the action of the prime mover
- - e.g., triceps during elbow flexion.

3. Fixator:

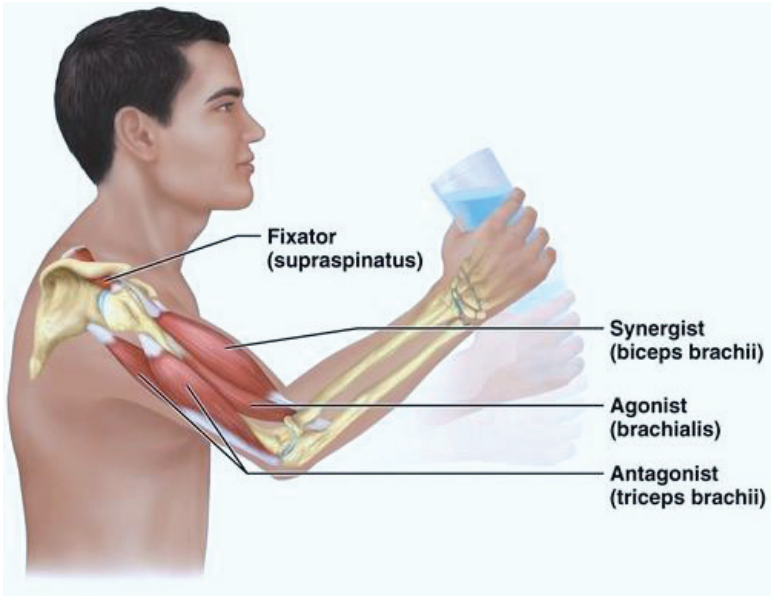
- A muscle that stabilizes one attachment of a muscle so that the other end may move.
- e.g., muscles holding the scapula steady act as fixators when deltoid moves the humerus.

4. Synergist:

- A muscle that stabilizes intermediate joints to prevent unwanted movement.
- e.g., If a muscle acts on several joints and the movement in one joint is only desired, the synergist muscle acts to prevent the movement of the other joints.
- For example, the extensors of the wrist act during flexion of the fingers to prevent the flexors of the fingers from acting on the wrist.

N.B:

A muscle that acts as a prime mover for one activity can act as an antagonist, fixator, or synergist at other times.



Types of Skeletal Muscles According to the Arrangement of its Fibers:

- The muscles are either parallel or pinnate muscles depending on the direction.

1. Parallel:

- The muscle fibers are arranged parallel extending along the whole length of the muscle.
- e.g., sartorius muscle in the thigh.

2. Pennate:

- The muscles have short parallel fibers lying obliquely to the axis of the muscle.

The pennate muscles include 3 types:

i. Unipennate:

- The tendon extends in one side of the muscle, and the fleshy muscle fibers pass obliquely to be attached to this tendon.
- e.g., Flexor pollicis longus muscle in the forearm, the palmer interossei in the hand.

ii. Bipennate:

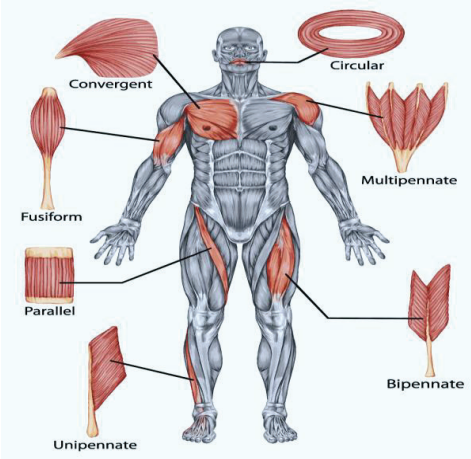
- The tendon extends in the middle of the muscle, and the fleshy muscle fibers pass obliquely to both sides of the tendon (like a feather).

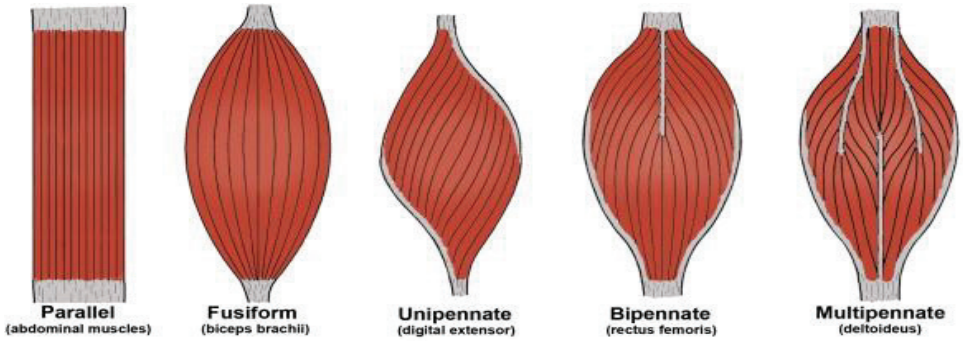
iii. Multipennate:

- The series of bipennate muscles are fused together in one muscle.
- e.g., Deltoid muscle of the shoulder.

N.B:

- The parallel type of muscles has a wider range of movement as their muscle fibers are long and pass through the whole length of the muscle.
- The pennate type of muscles is stronger as they possess fleshy muscle fibers in addition to tendinous intersection.



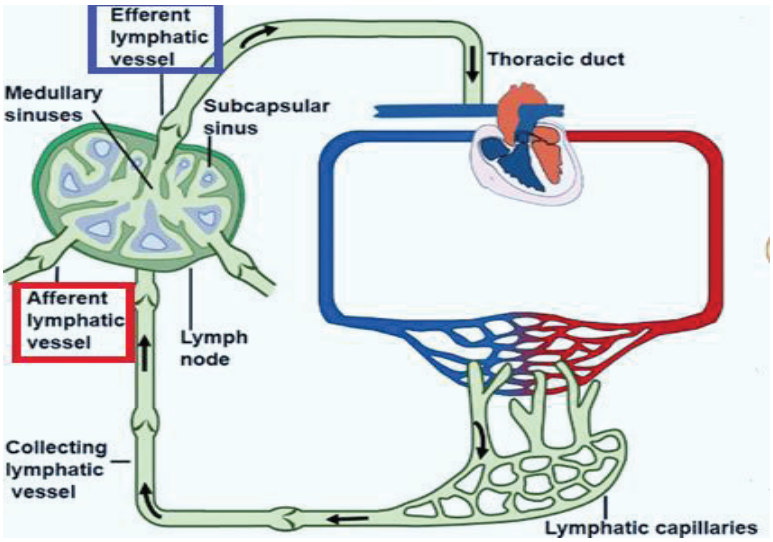


Lymphatic System

- The lymphatic system carries excess of the extracellular fluid back to the venous system.
- This fluid is the result of filtration from capillaries.
- **The lymphatic system consists of:**
  1. lymphatic vessels
  2. lymph nodes
  3. lymphatic ducts
  4. Spleen

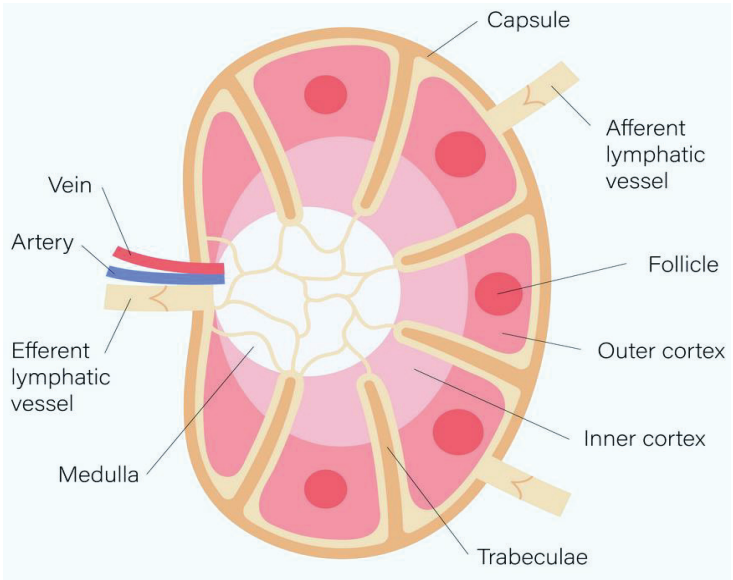
I. Lymphatic vessels:

They start as small lymphatic vessels that collect to form larger lymphatic that enter lymph node (afferent), leave it as (efferent)



II. Lymph Nodes:

- **Definition:** Small oval bodies along the course of lymphatic vessels
- **Structure:** convex outer surface and concave inner surface which contain hilum
- **Functions of lymph nodes:**
  1. 1.Act as a filter as they prevent micro-organisms and certain substances from entering the blood stream.
  2. Formation of lymphocytes.
  3. Formation of antibodies.



III. Lymphatic duct:

- **There are two lymphatic ducts:** Thoracic duct, right lymphatic duct

Thoracic duct:

Beginning:

- In the cisterna chili in the abdomen (in front of the lumbar vertebrae)

Course

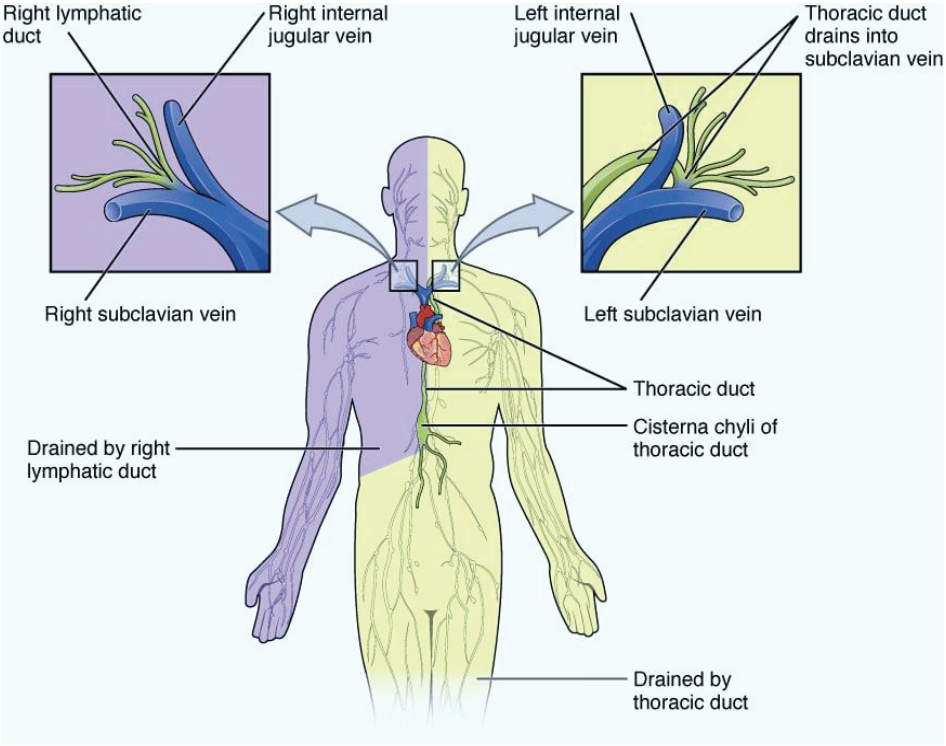
- It ascends through the posterior abdominal and thoracic walls (deviating to the left side).

Termination:

- At the junction of left subclavian and left internal jugular veins.

Drainage:

- It drains lymph from all the body except the upper right quadrant.



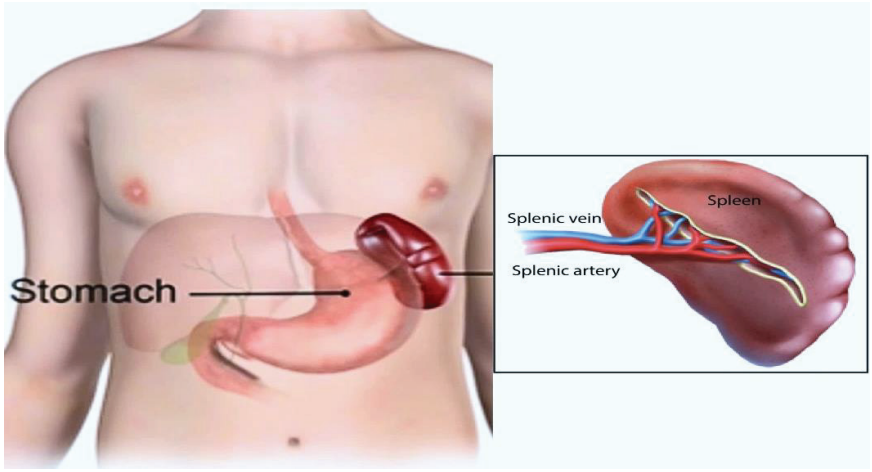
Right lymphatic duct:

- It is much smaller in size.
- Drains lymph from the upper right quadrant (right side of the head and neck, right upper limb, and right side of the chest)
- It terminates at the junction of right subclavian and right internal jugular veins

IV. Spleen:

- **Position:**

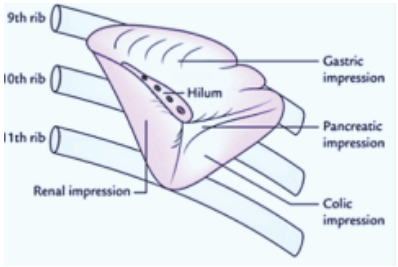
- The spleen lies in the left hypochondrium between the stomach and diaphragm.



- **Shape:** It has two ends, three borders and two surfaces.

Ends:

- Tapering posterior (medial) end directed upwards, backwards and medially.
- Broad anterior (lateral) end directed downwards, forwards and laterally.
- lies parallel to the left ribs number 9,10,11
- Its long axis lies parallel to the shaft of the 10th rib



Borders:

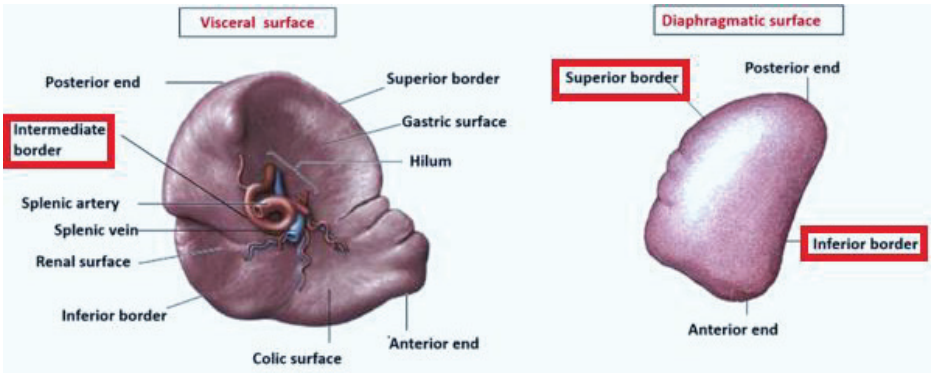
- Upper Border:

Sharp and notched

- Lower Border:

Broad

- Intermediate border: It starts from the medial end of spleen till the hilum.



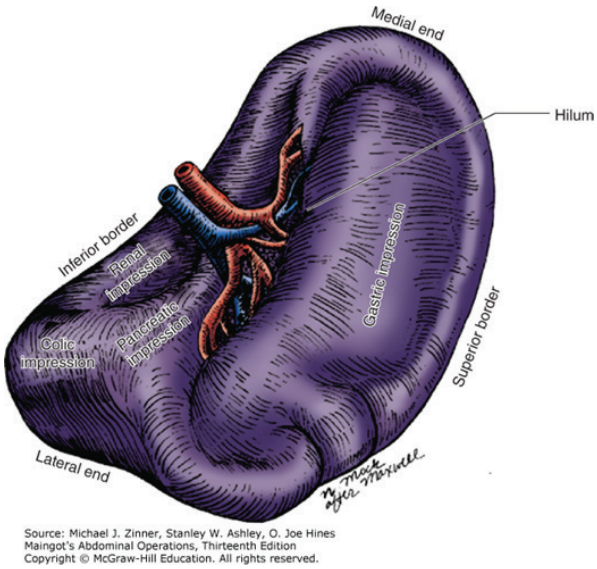
Surfaces:

1 - Diaphragmatic surface:

- It is convex and lies opposite the posterior part of 9,10,11 ribs
- It is related to the diaphragm which separate it from left lung, pleura and 9, 10,11 ribs.

2 - Visceral surface:

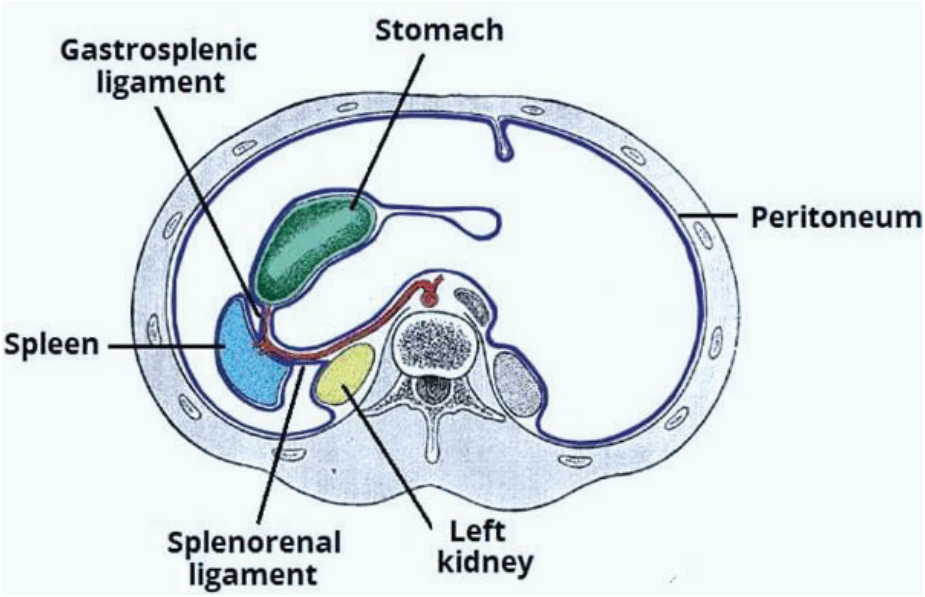
- It is concave, irregular and directed to the abdominal cavity.
- **It contains the hilum and carries impressions for abdominal organs:**
  a. Gastric impression: above the hilum
  b. Renal impression: below the hilum.
  c. Colic impression: close to the lateral end.
  d. Pancreatic impression: below the lateral end of the hilum.



Source: Michael J. Zinner, Stanley W. Ashley, O. Joe Hines
Maingot's Abdominal Operations, Thirteenth Edition

- **Peritoneal connections:**
  - It is completely covered by peritoneum of greater sac except at the hilum.
  - **It is attached to:**

1. **Gastrosplenic ligament:** From the fundus and greater curvature of stomach to the hilum of spleen.
2. **Lienorenal ligament:** From the lower border of the hilum of spleen to the anterior surface of kidney.



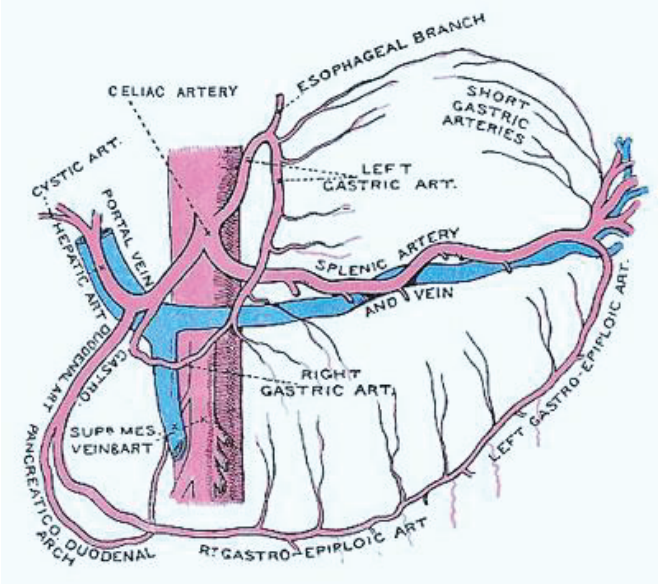
- **Blood supply of spleen:**

Arterial supply:

- The splenic artery from the coeliac trunk from abdominal aorta.
- It passes in the lienorenal ligament with the tail of pancreas.
- It divides at the hilum into 6-5 branches which enter the spleen separately.

Venous drainage:

- The splenic vein passes on the posterior surface of the pancreas to unit with superior mesenteric vein to form portal vein which enters the liver.



Arterial supply:	▪ The splenic artery (it passes through lienorenal ligament) ▪ It is a branch from coeliac trunk
Venous drainage:	▪ The splenic vein (it passes on posterior surface of pancreas)