General Anatomy

Lecture 4: Appendicular Skeleton (1): Bones of Upper Limb

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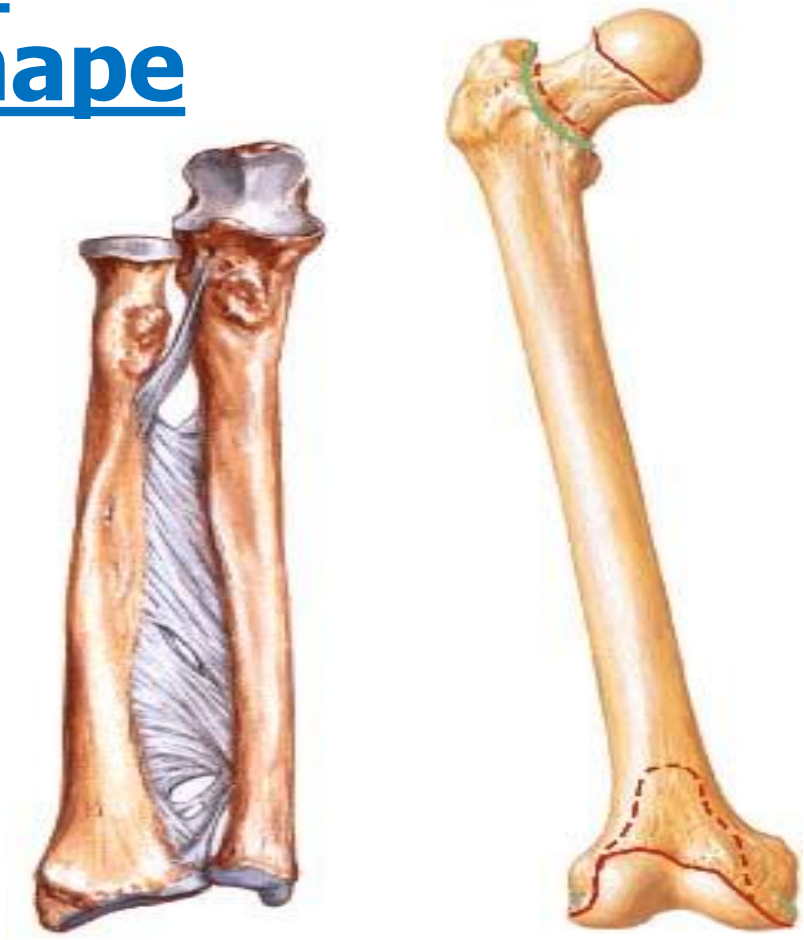
Classification of Bones

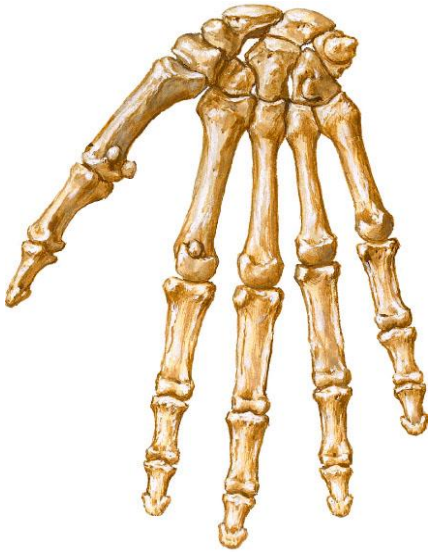
(A) Morphological (Anatomical) classification according to shape of bone:

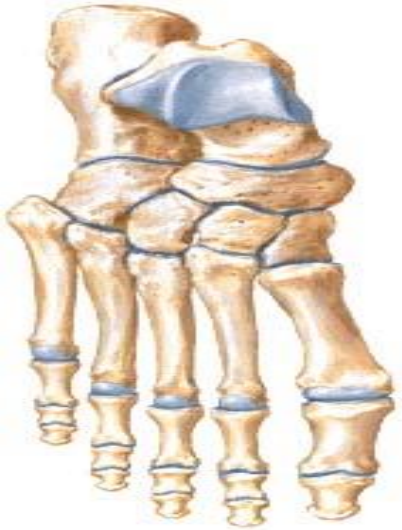
1. Long bones: have 2 ends & a shaft as bones of proximal & intermediate segments of the limbs (humerus, radius, ulna, femur, tibia & fibula).



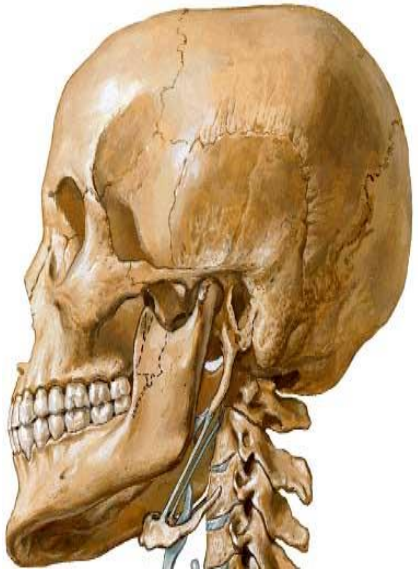
Classification of Bones (contd)

2. **Short bones:** as carpal & tarsal bones. These bones are strong & help in limited movements.

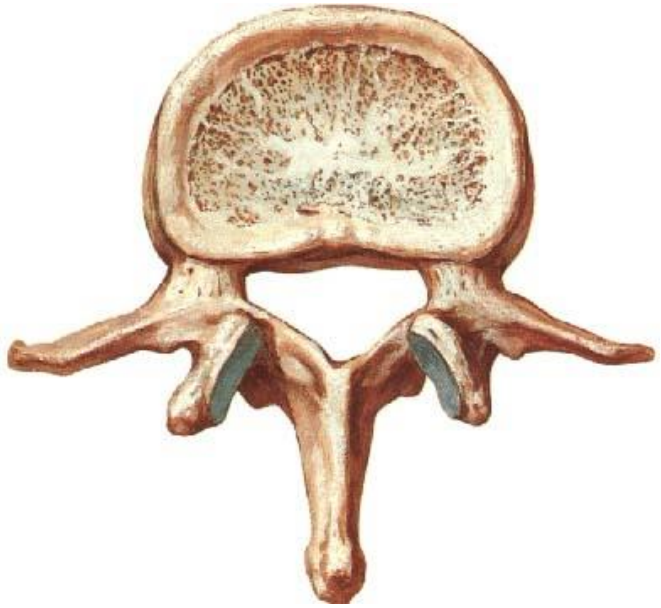




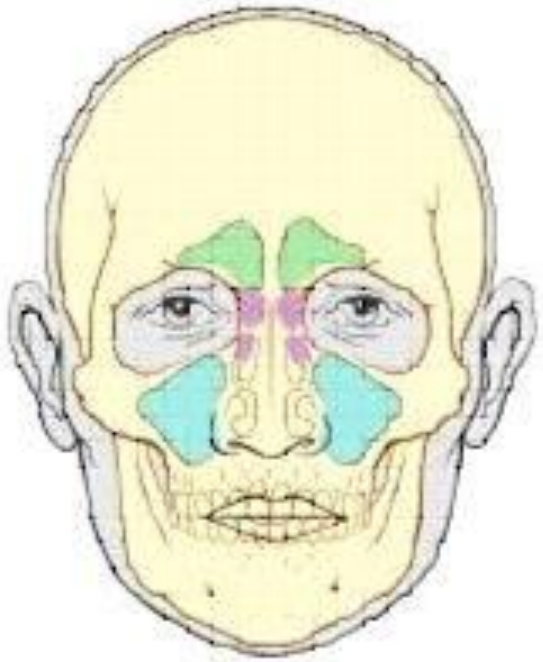
3. **Flat bones:** as scapula, sternum & skull cap. These have wide surface for muscle attachment or protection.



4. **Irregular bones: as vertebrae & hip bones.**



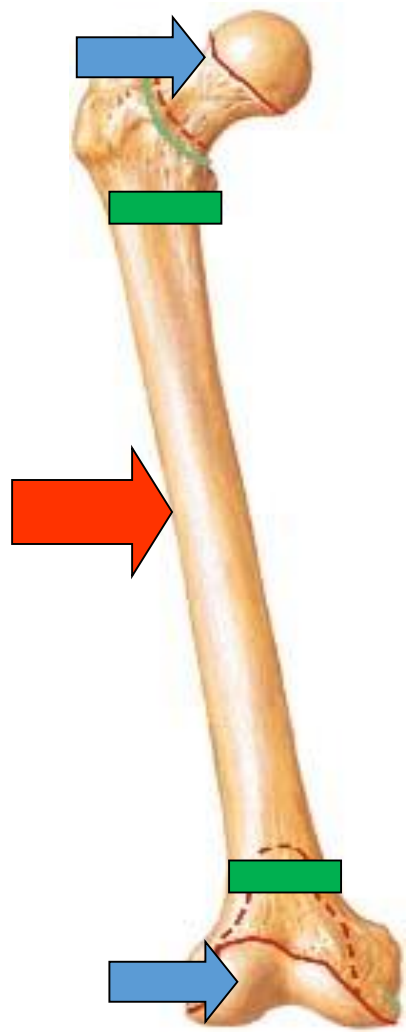
5. **Pneumatic bones: contain air-filled spaces lined with mucous membrane (paranasal sinuses) in skull bones (maxilla & frontal bones) to reduce the weight of skull, help in resonance of voice & warm air.**



6. **Sesamoid bone: are small nodules of bone found in the tendons of certain muscles to reduce friction over bony surfaces. e.g. patella & pisiform bones.**

@ Parts of a growing long bone:

1. 2 ends called epiphysis.
2. A shaft called diaphysis.
3. Epiphyseal plate of cartilage between the diaphysis & epiphysis. This is the most important factor for the growth of bone in length.
4. The part of the shaft close to the plate is called metaphysis.



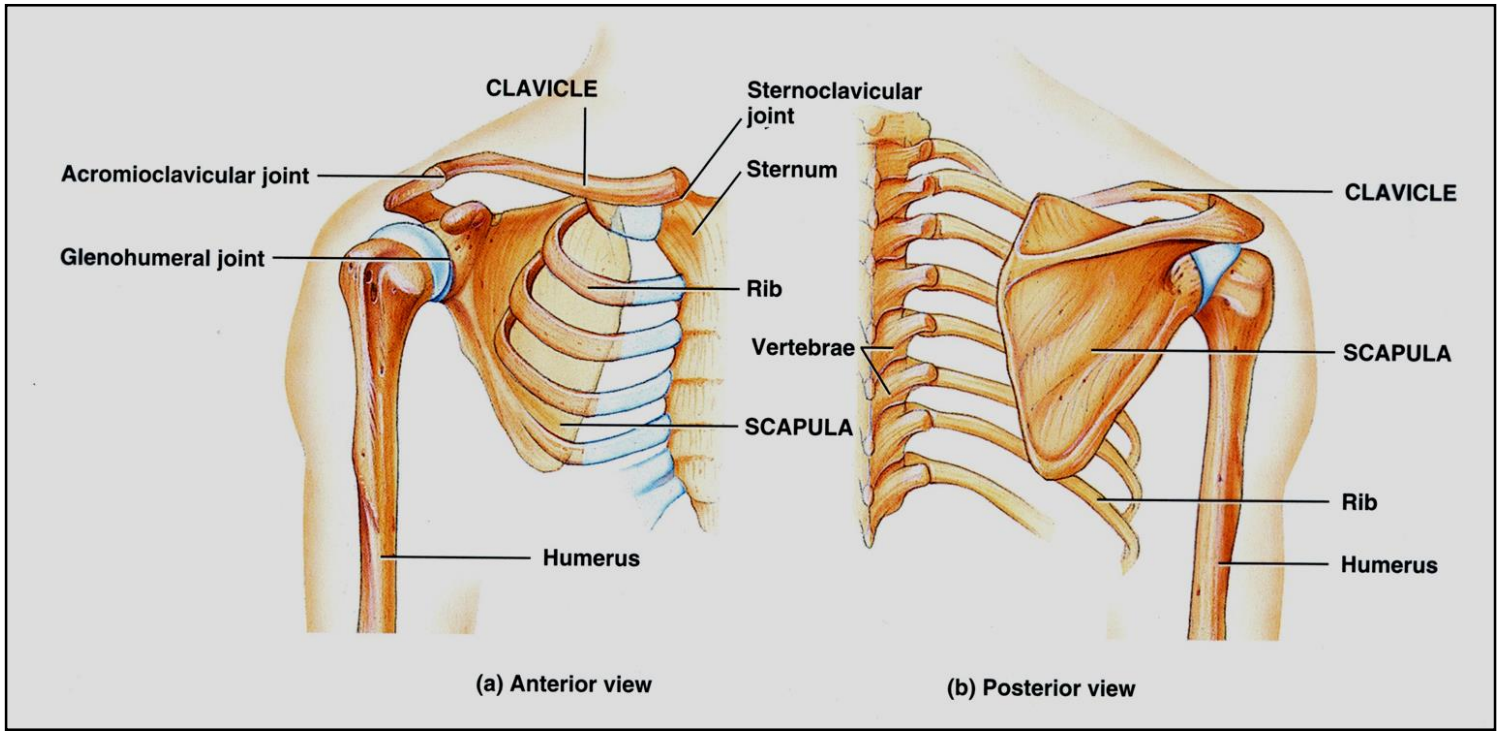
	The 2 ends	The shaft
1. Name:	epiphysis	diaphysis
2. Develops from:	2ry center of ossification	1ry center of ossification
3. Covered by:	Articular hyaline cartilage	Periosteum
4. Medullary (bone marrow) cavity:	Absent	Present
5. Formed of:	Spongy bone	Compact bone

Bones of Upper Limb

The Shoulder (Pectoral) Girdle

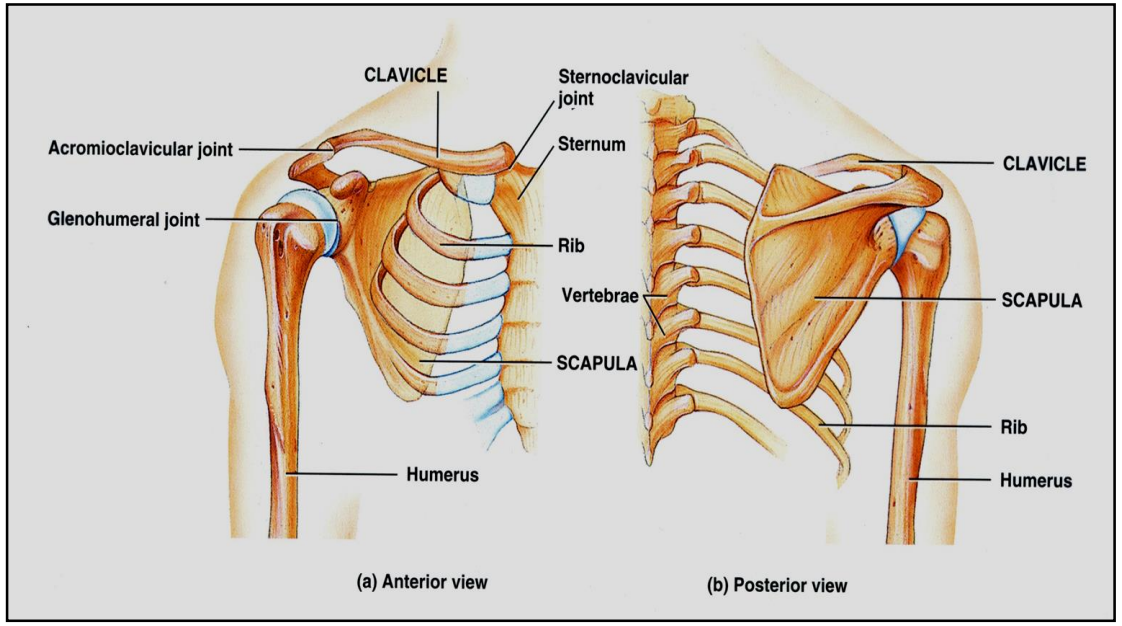
* It is formed by the bones that connect the axial skeleton (i.e. sternum) with the appendicular skeleton (i.e. Humerus or bone of arm).

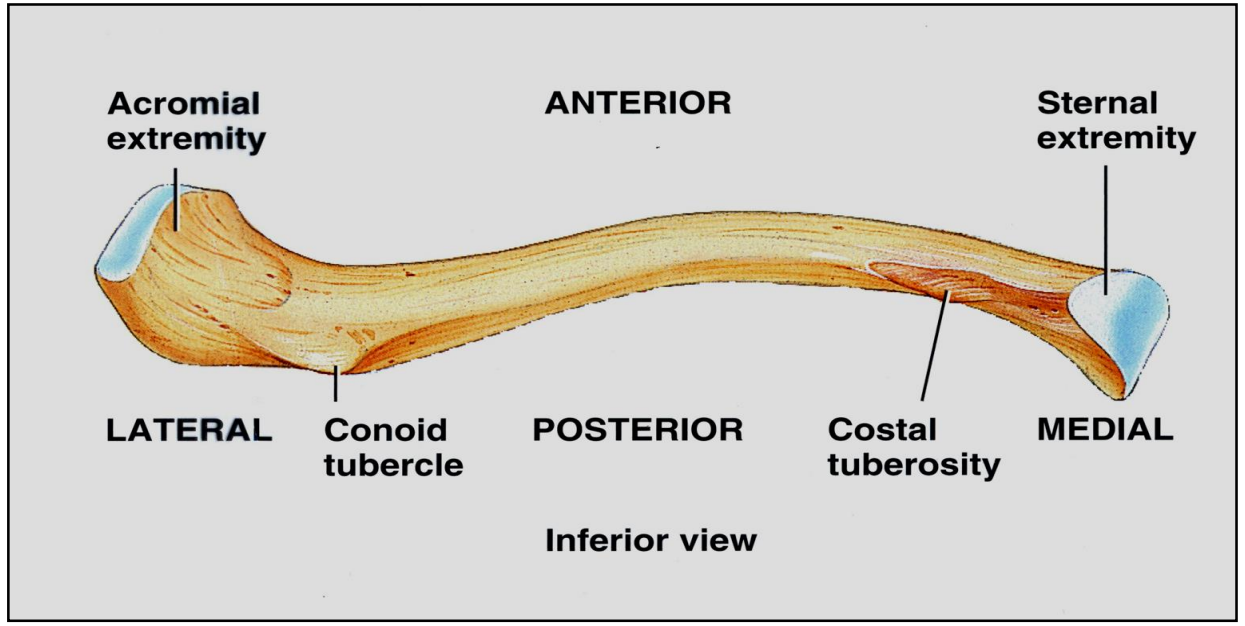
* It is formed of 2 bones: clavicle & scapula.



1. The Clavicle

* The clavicle is the anterior bone of pectoral girdle.
* It has two ends → medial and lateral.
* The medial end: is called the sternal end, it is rounded & articulates with manubrium part of sternum to form sterno-clavicular joint.
* The lateral end: is called acromial end, is broad and flat & articulates with the acromion process of scapula to form acromio-clavicular joint.



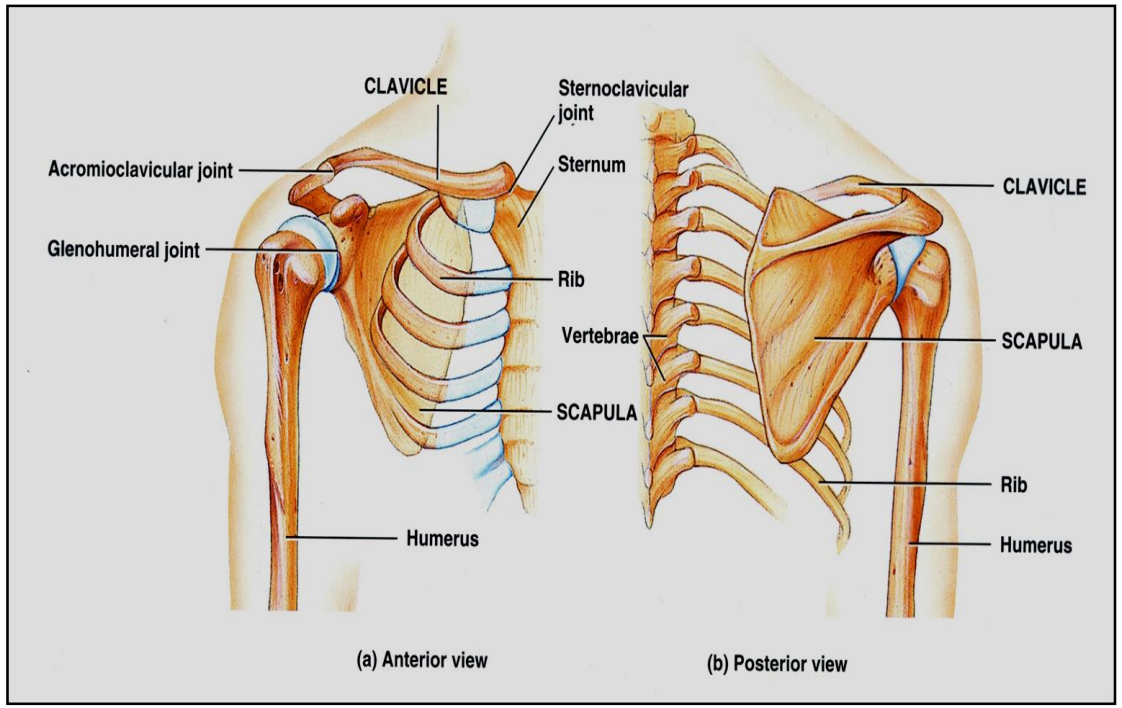


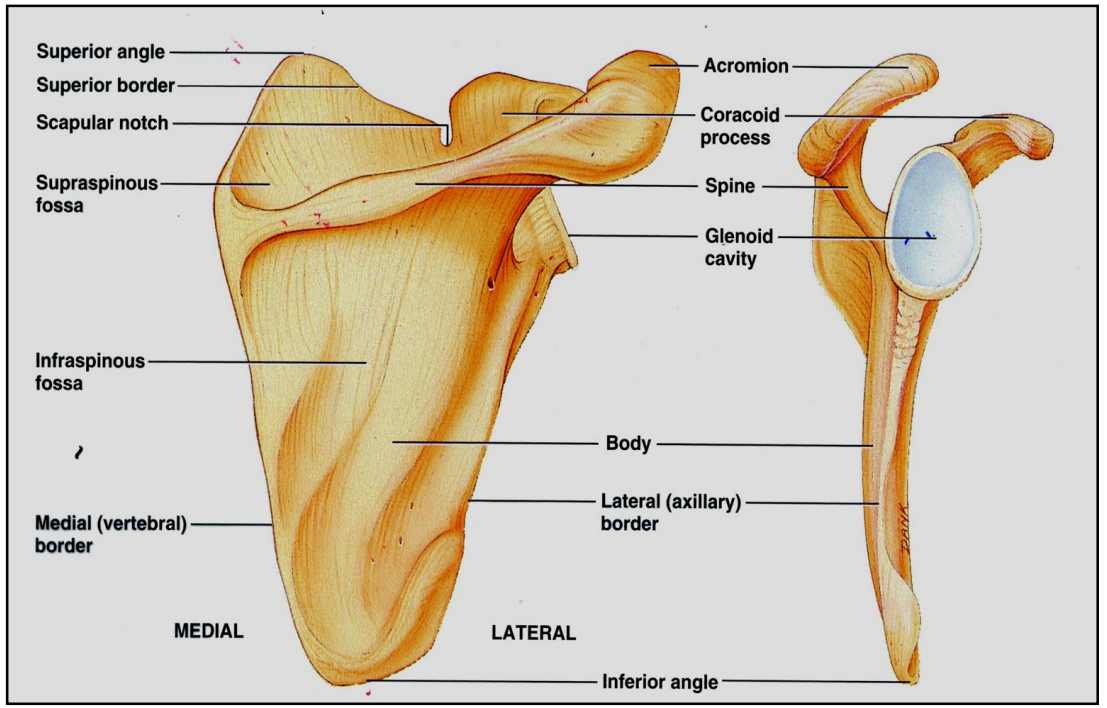
* The medial two-thirds of the clavicle is convex anteriorly, whereas the lateral one-third is concave anteriorly.

* The superior surface of the clavicle is smooth, whereas the inferior surface is rough.

2. The Scapula

* The scapula is the posterior bone of pectoral girdle.
* It is a large, flattened, triangular bone.
* It lies on the posterior wall of thorax, overlapping the 2nd – 7th ribs.
* It has two surfaces: anterior (costal) and posterior.

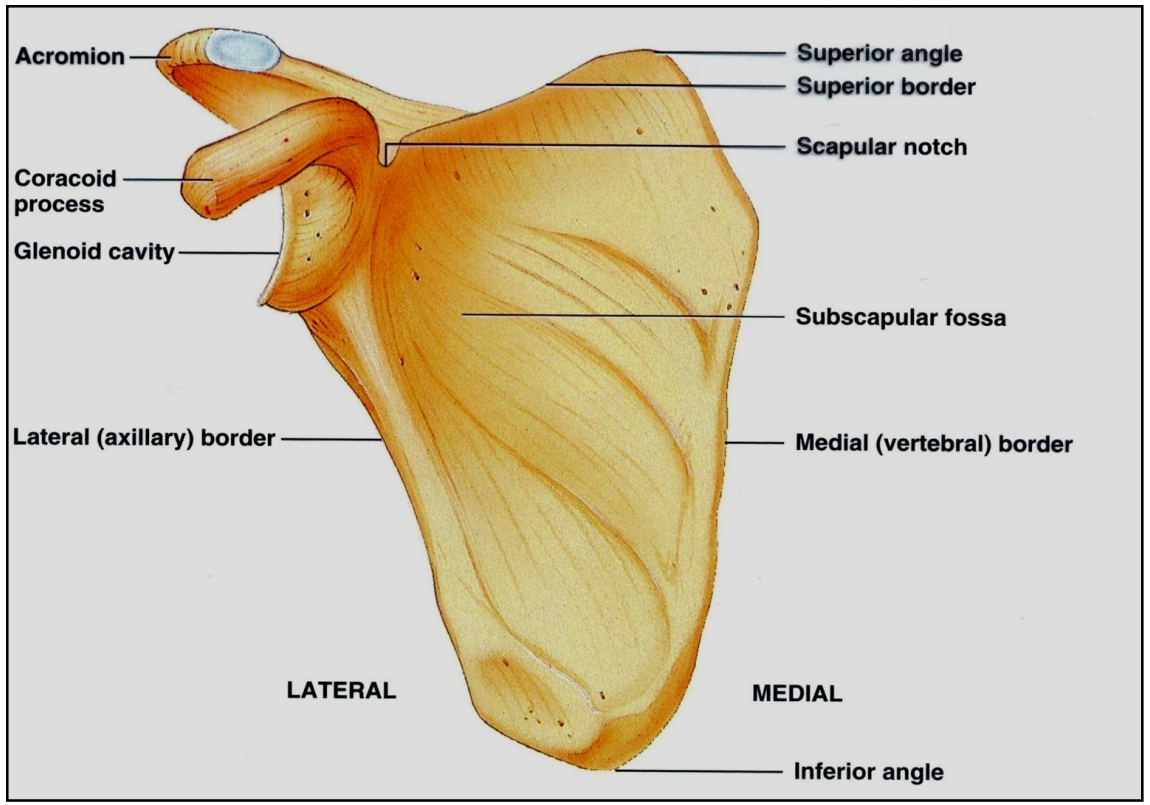


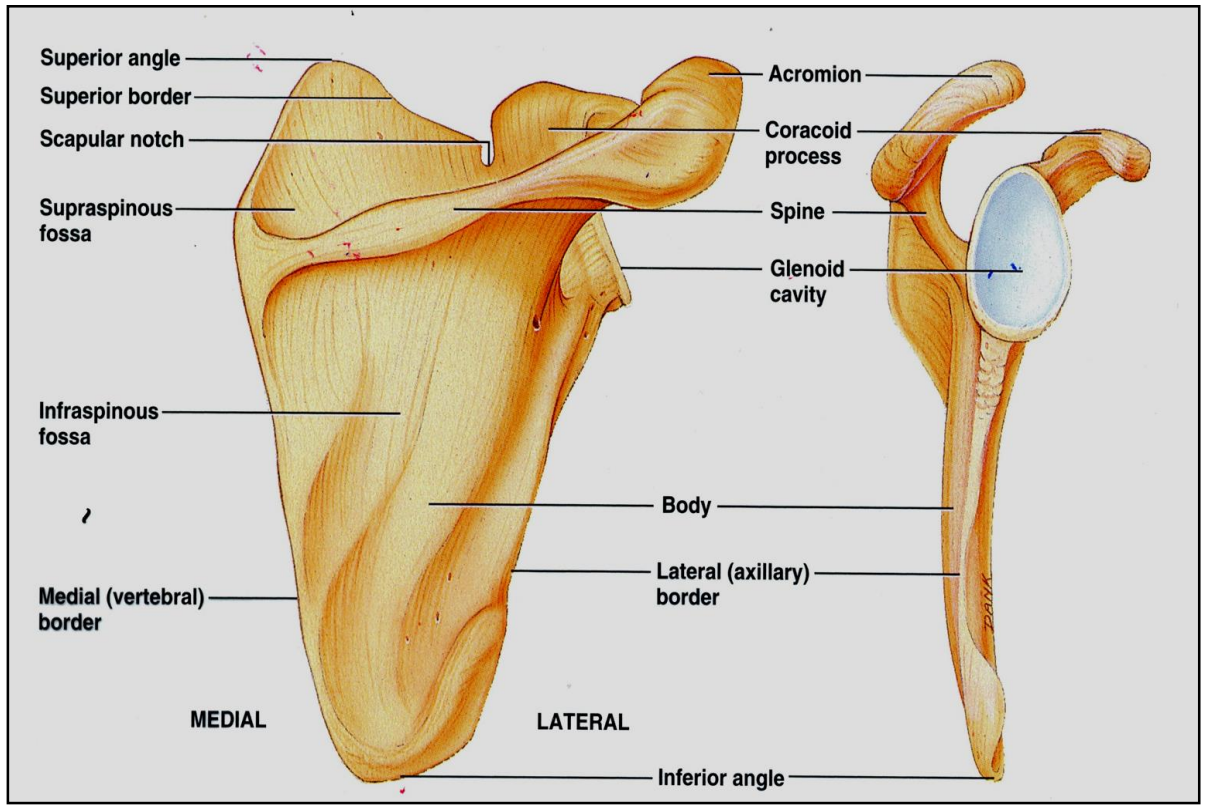


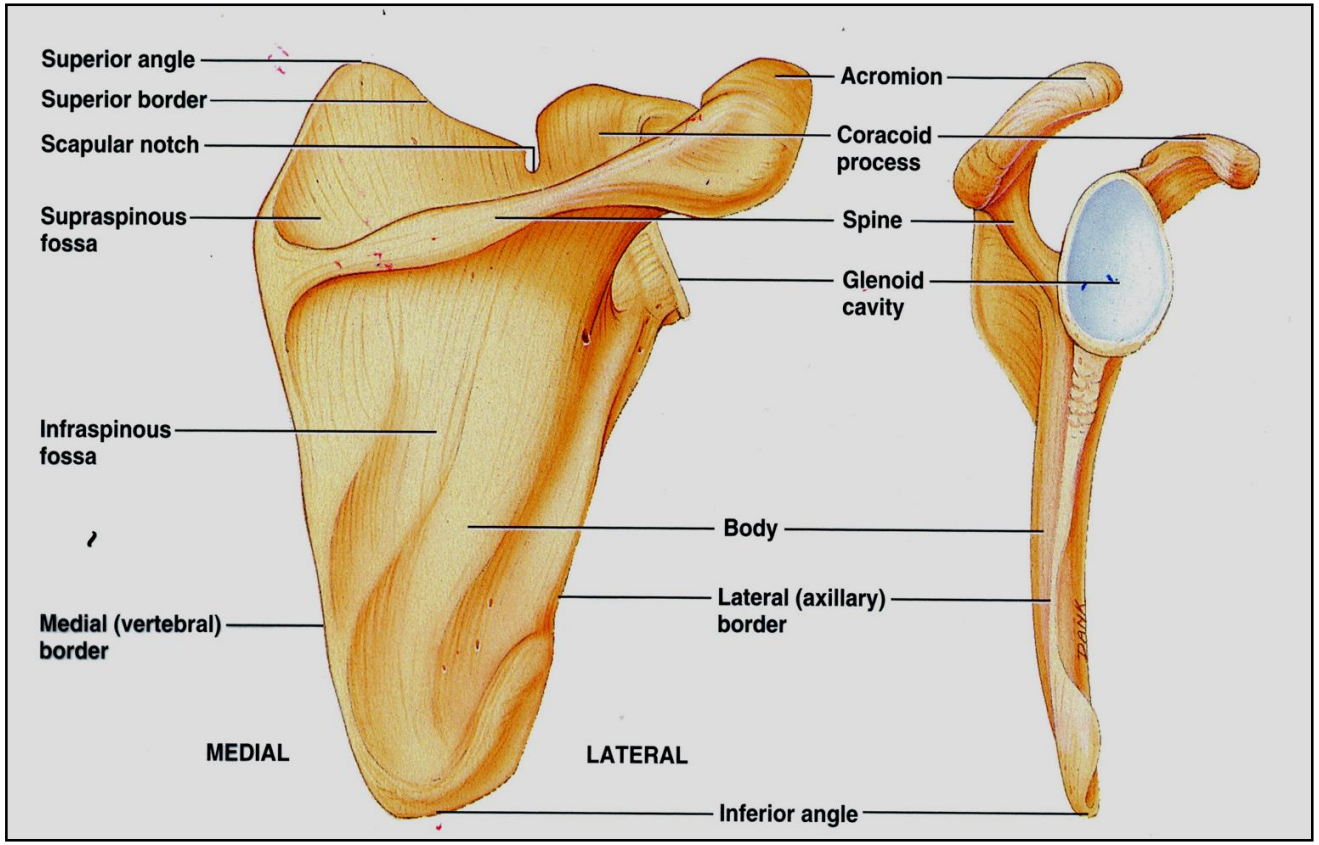
* It has three angles: superior, inferior & lateral.

* It has three processes: spine, acromion process & coracoid process.

* The costal (anterior) surface forms the subscapular fossa.

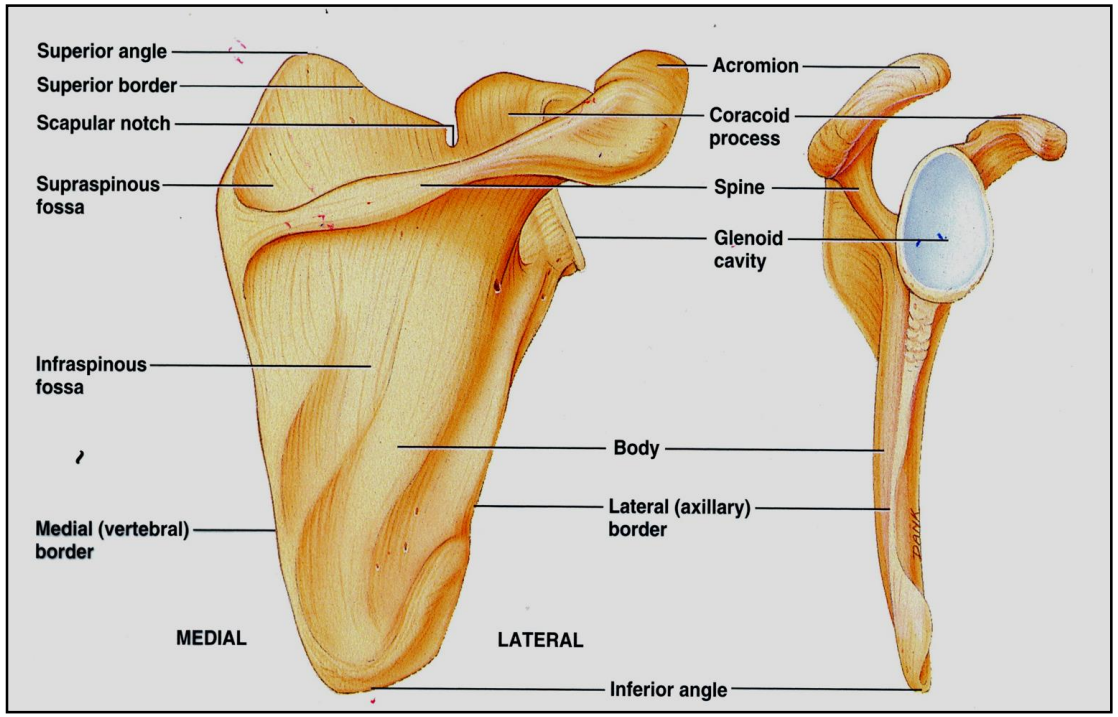


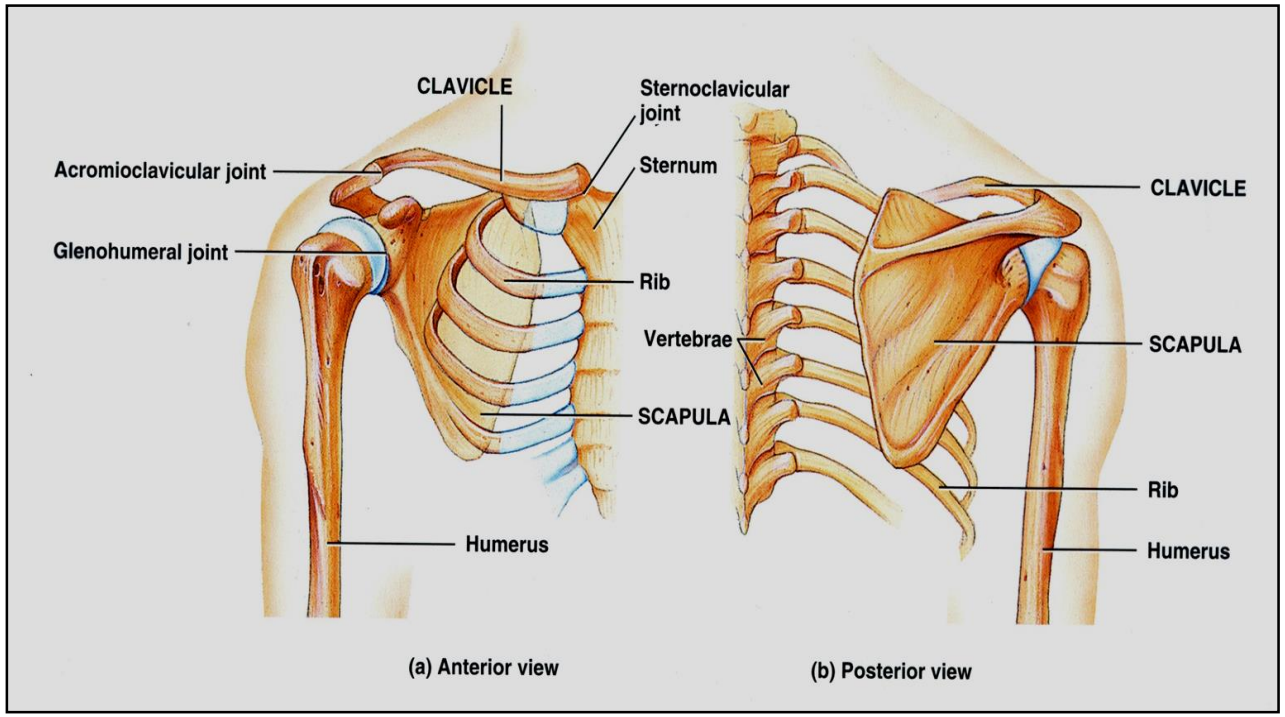




*** The posterior surface is divided into a smaller upper area → the supraspinous fossa & a larger lower area → the infraspinous fossa, by a shelf-like projection, called the spine of the scapula.**

*** The lateral end of the spine projects as a flattened, expanded process called the acromion process.**





*** The coracoid process arises from lateral end of superior border.**

*** The lateral angle of the scapula presents the glenoid cavity for articulation with head of the humerus (in shoulder joint).**

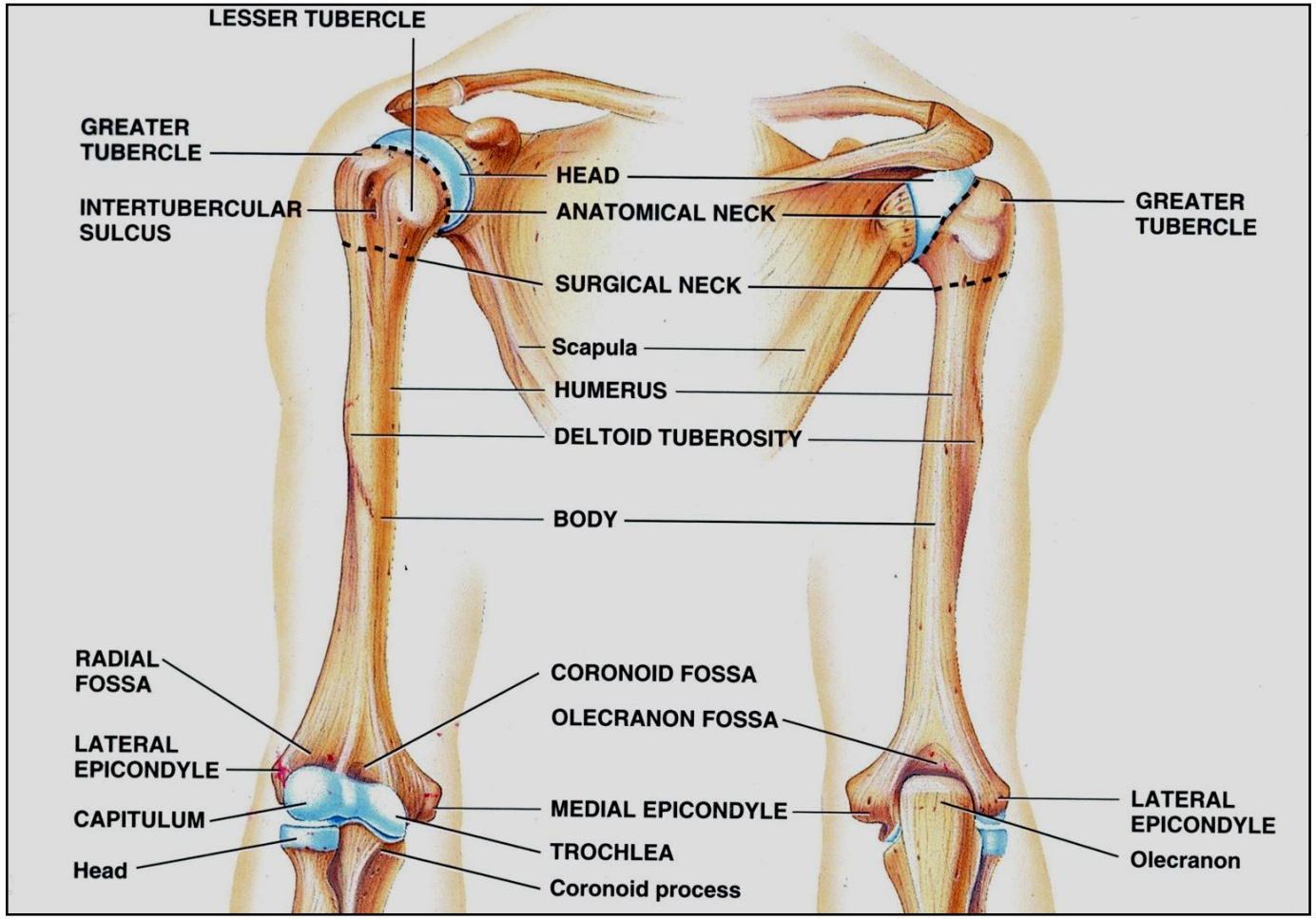
3. The Humerus

* This is the bone of the arm.

* It has an upper end, a shaft & a lower end.

A. The upper end: shows:

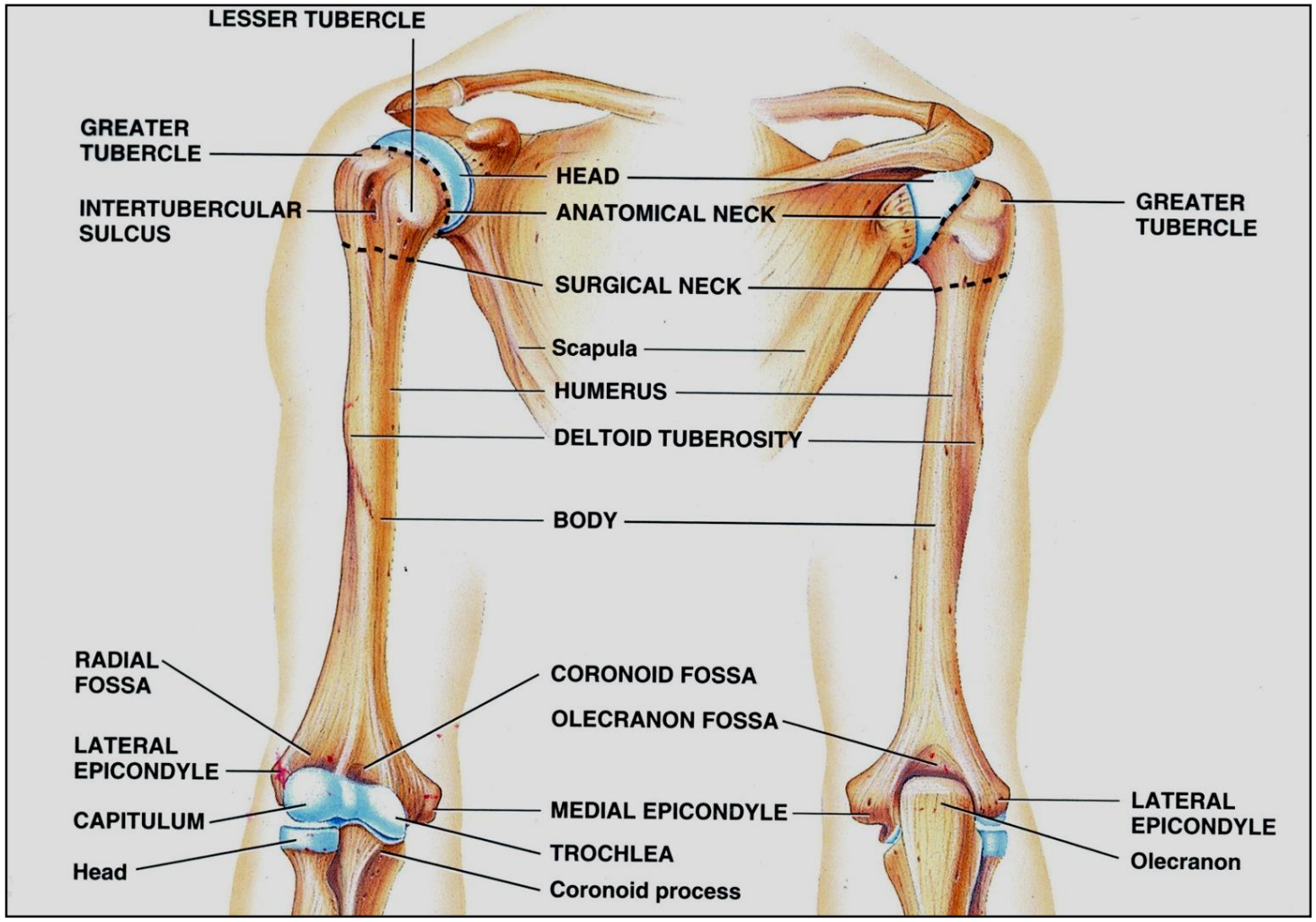
1. The head: which is less than half of a sphere. It articulates with the glenoid cavity of scapula to form shoulder (glenohumeral) joint.



2. The greater tuberosity (tubercle) → which is a lateral projection.

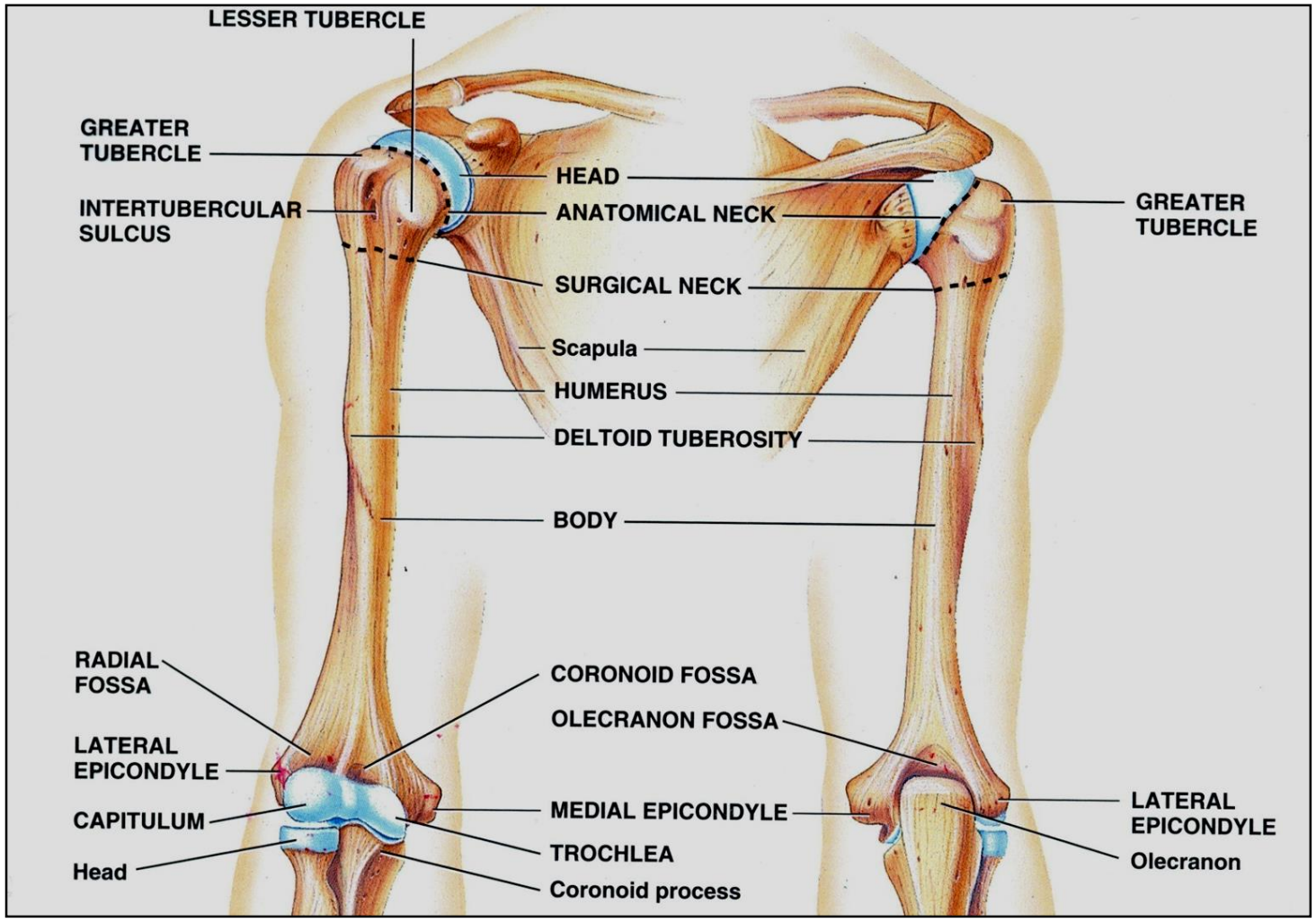
3. The lesser tuberosity (tubercle) → which is an anterior projection.

4. The bicipital groove (inter-tubercular sulcus) → separates the 2 tuberosities.



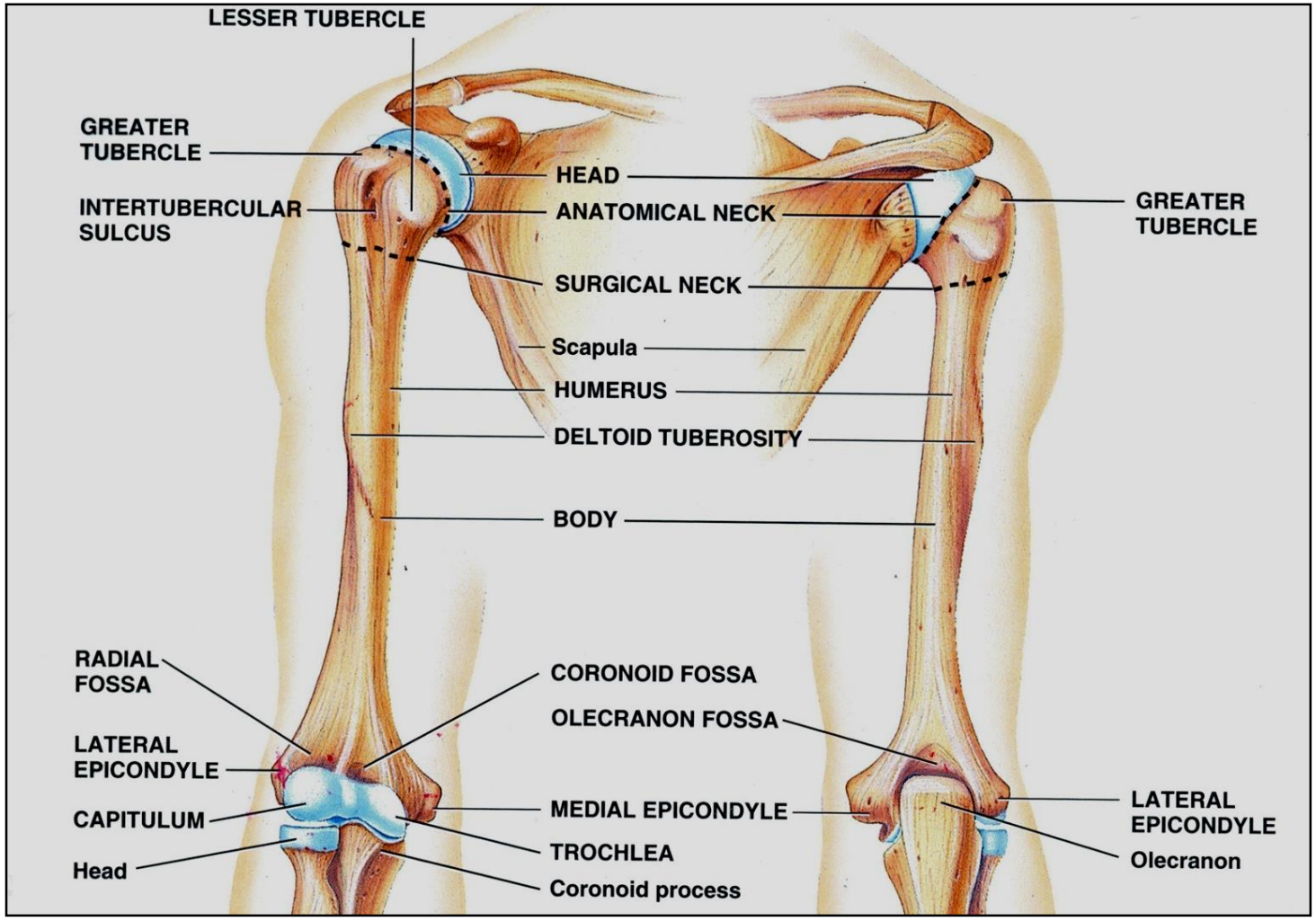
5. The anatomical neck → **is the margin of the head that separates it from the tuberosities.**

6. The surgical neck → **is the constriction that separates the upper end from the shaft.**



B. Shaft (body):

Laterally → it presents about its middle a rough area called the deltoid tuberosity.



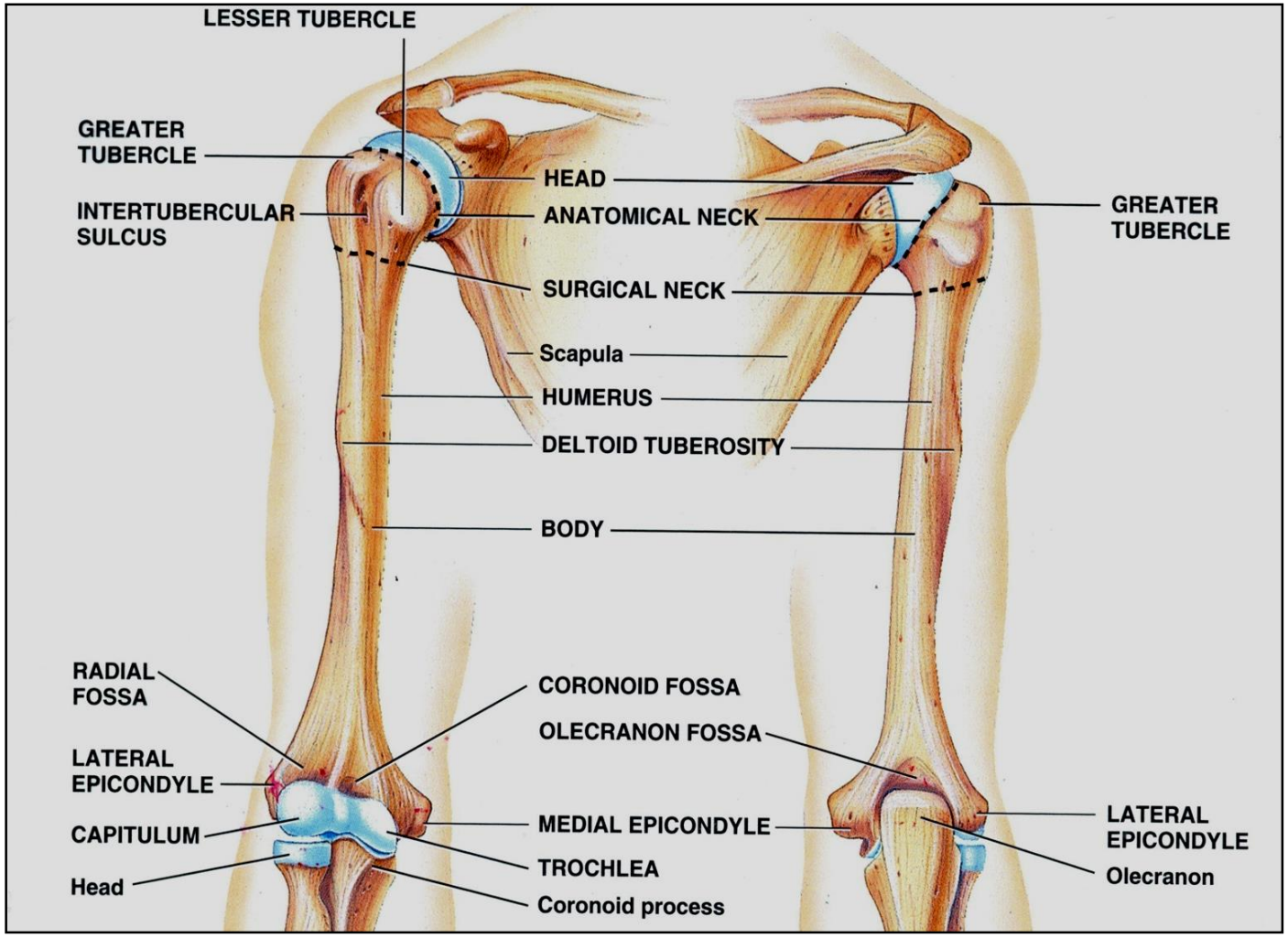
C. The Lower end: shows:

1. Two articular surfaces:

a. The capitrulum → a convex surface laterally. It articulates with the radius in humero-radial articulation.

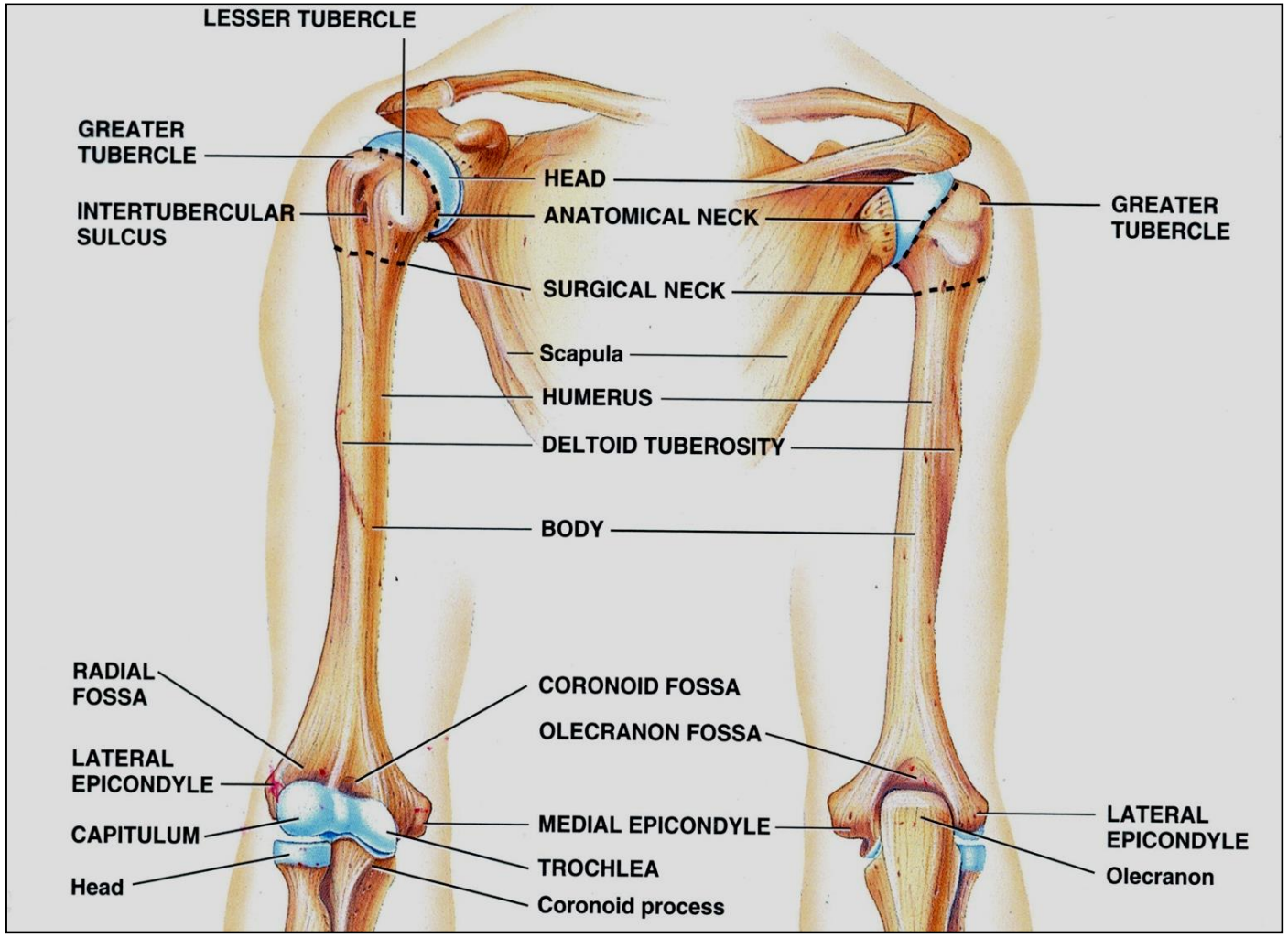
b. The trochlea → a pulley-shaped surface medially. It articulates with the ulna in humero-ulnar articulation.

*** Both the humero-radial & humero-ulnar articulations form the elbow joint.**



2. Two non-articular side projections → the medial & lateral epicondyles.

*** The medial epicondyle is more prominent and wider than the lateral, and is crossed on its posterior surface by ulnar nerve.**

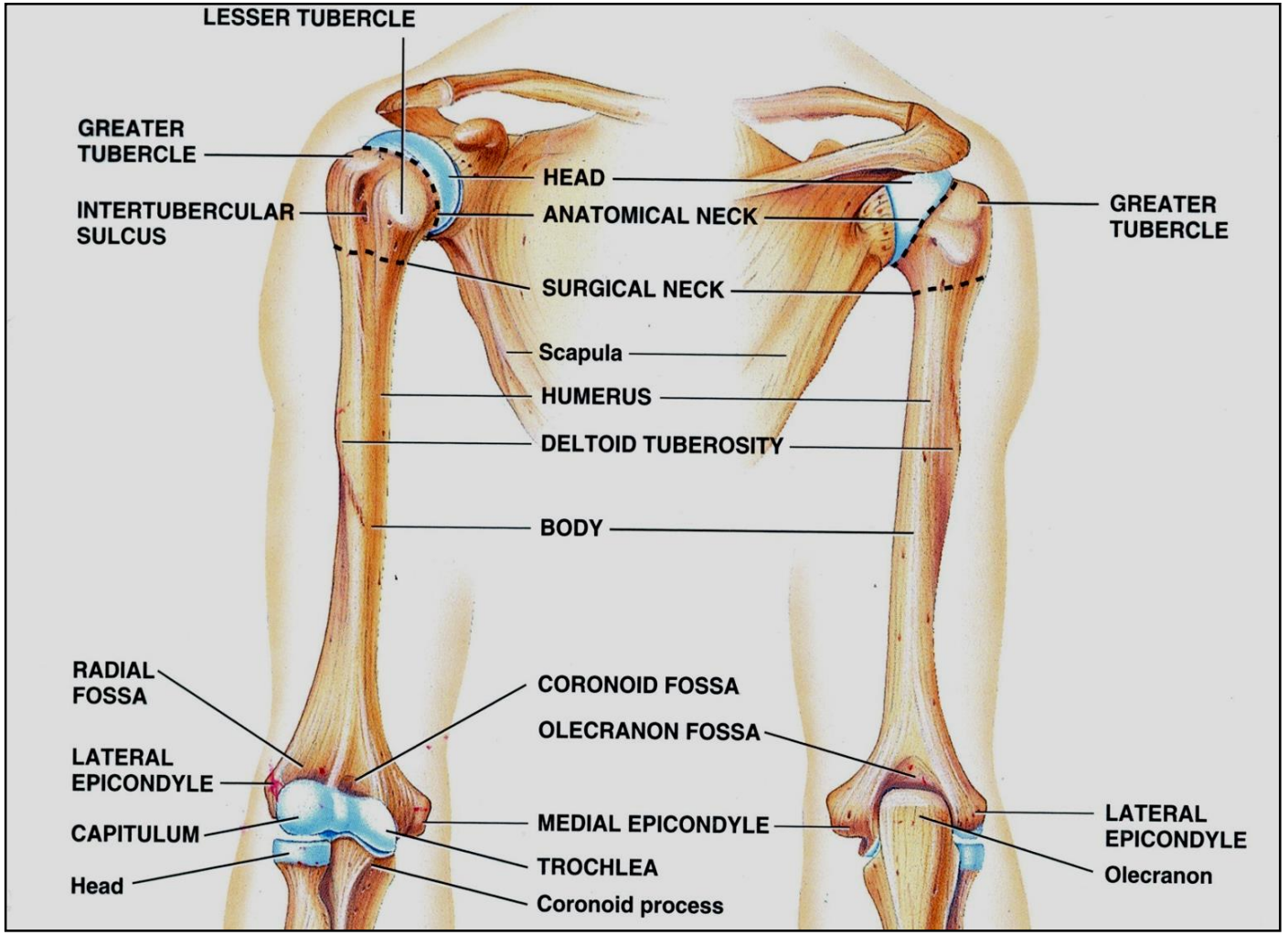


3. Three depressed fossae:

a. **Radial fossa →** above capitulum anteriorly.

b. **Coronoid fossa →** above trochlea anteriorly.

c. **Olecranon fossa →** above trochlea posteriorly.



4. The Radius

* This is the lateral bone of the forearm.

* It has an upper end, a shaft & a lower end.

A. The upper end: shows:

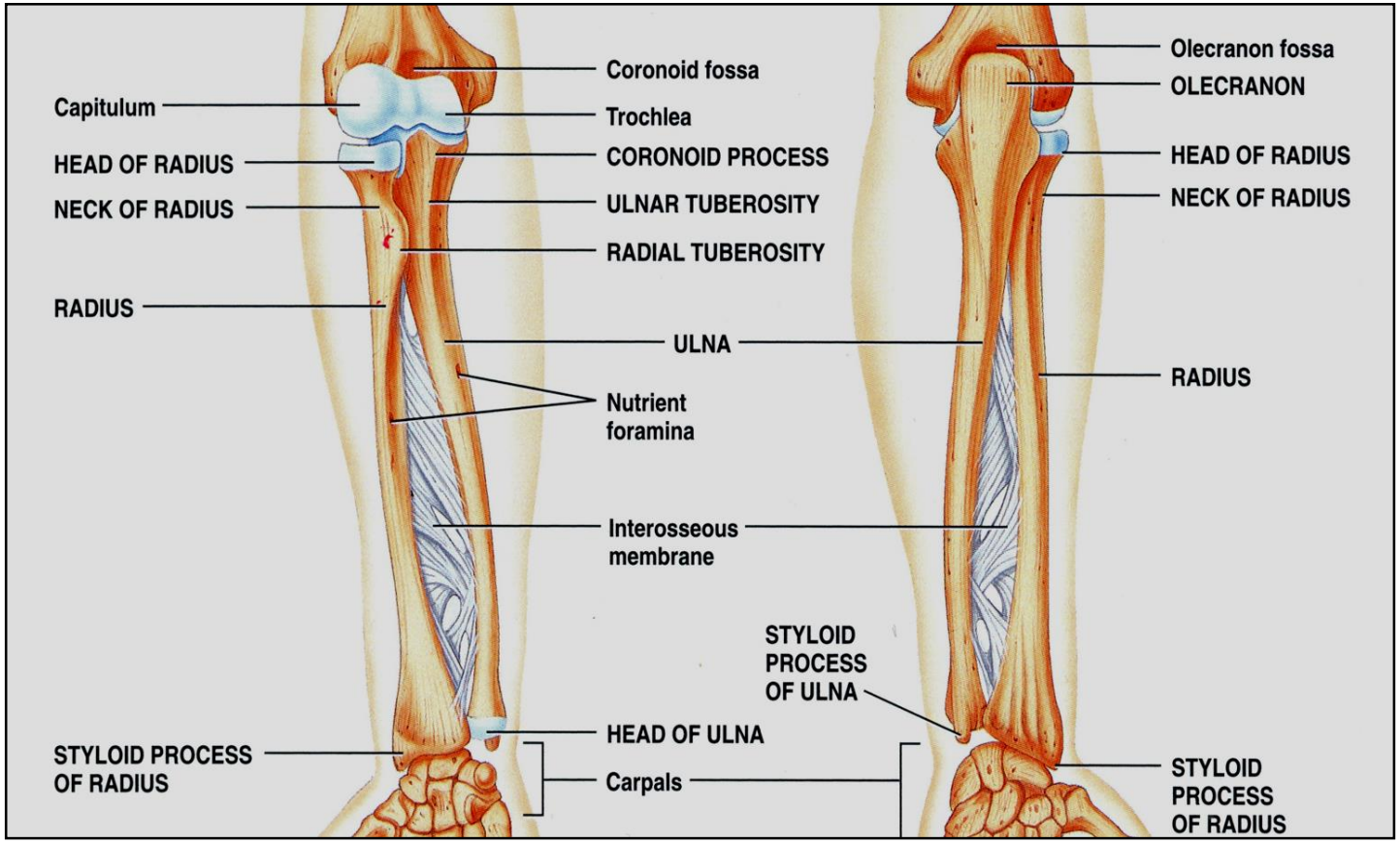
1. The head:

* Disc-shaped.

* It articulates superiorly with the capitalum of the humerus.

2. Neck.

3. Radial tuberosity: a projection on ulnar side of shaft below the neck.



B. Shaft (body):

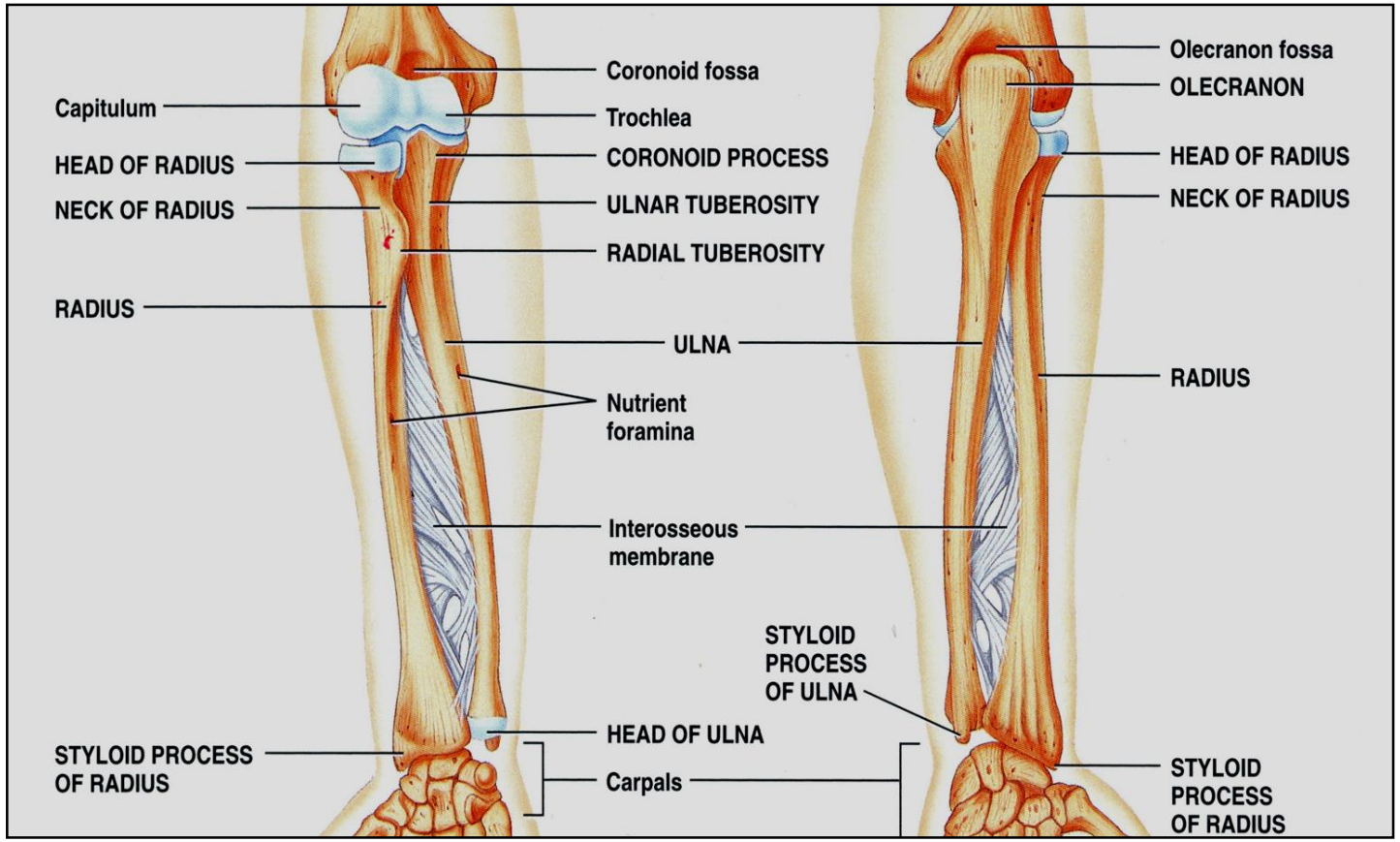
*** Has a sharp medial border, the interosseous border, to which the interosseous membrane is attached.**

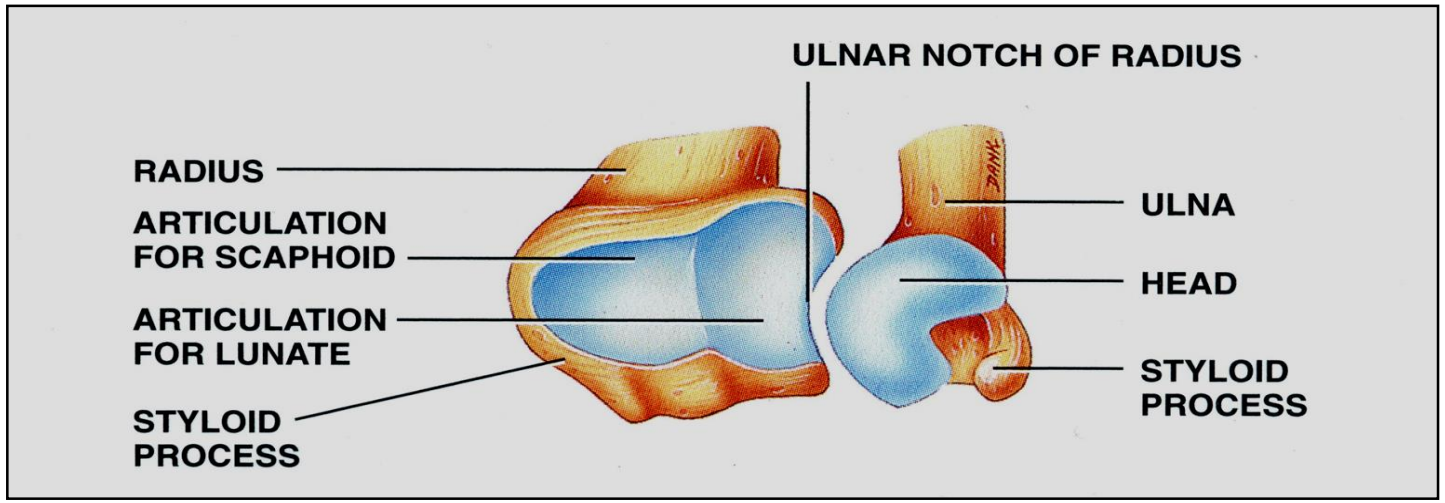
C. Lower end: shows:

1. The medial surface of lower end presents the ulnar notch, for articulation with head of ulna to form inferior radio-ulnar joint.

2. Styloid process.

3. The inferior surface of the lower end articulates with scaphoid bone (laterally) and the lunate bone (medially).





5. The Ulna

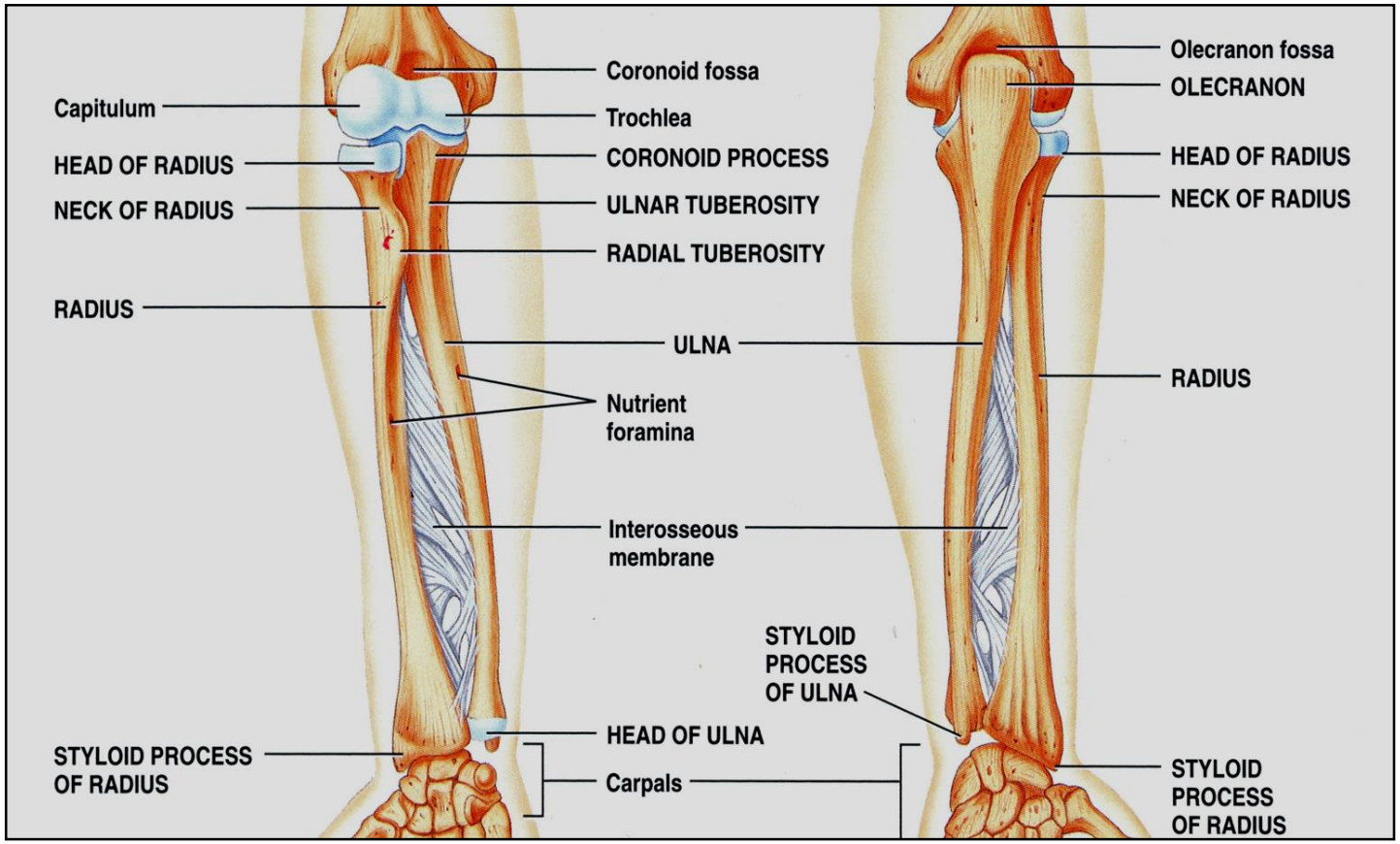
* This is the medial bone of the forearm.

* It has an upper end, a shaft & a lower end.

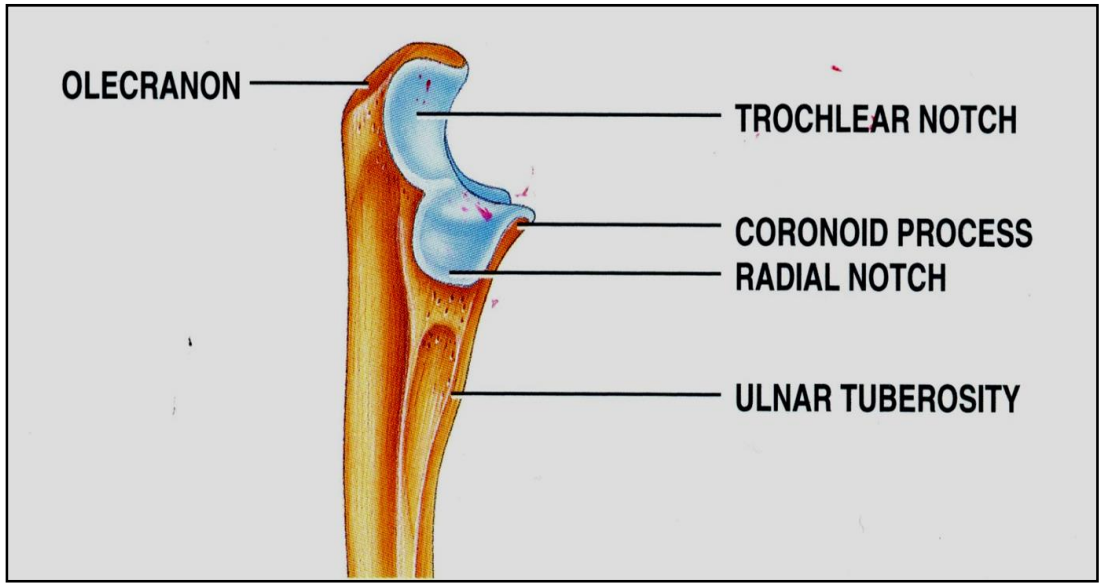
A. The upper end: shows:

1. The trochlear notch:

* A semilunar concavity that lies in the anterior aspect of the upper end of the bone.
* Articulates with the trochlea of the humerus.



2. The olecranon process
→ which forms the prominence of elbow.
3. The coronoid process.
4. The lateral surface of coronoid process presents the shallow radial notch, for articulation with head of radius to form superior radio-ulnar joint.

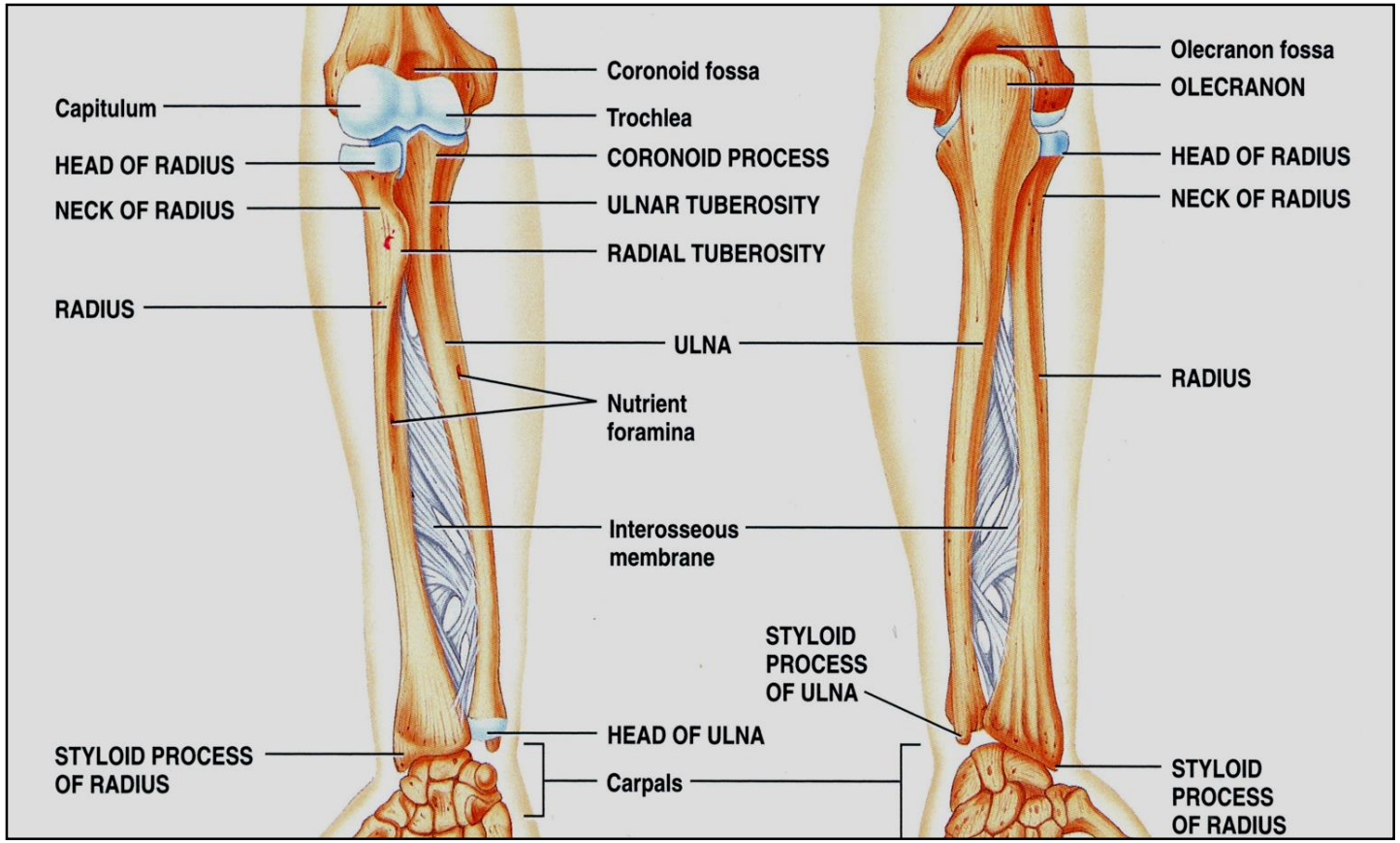


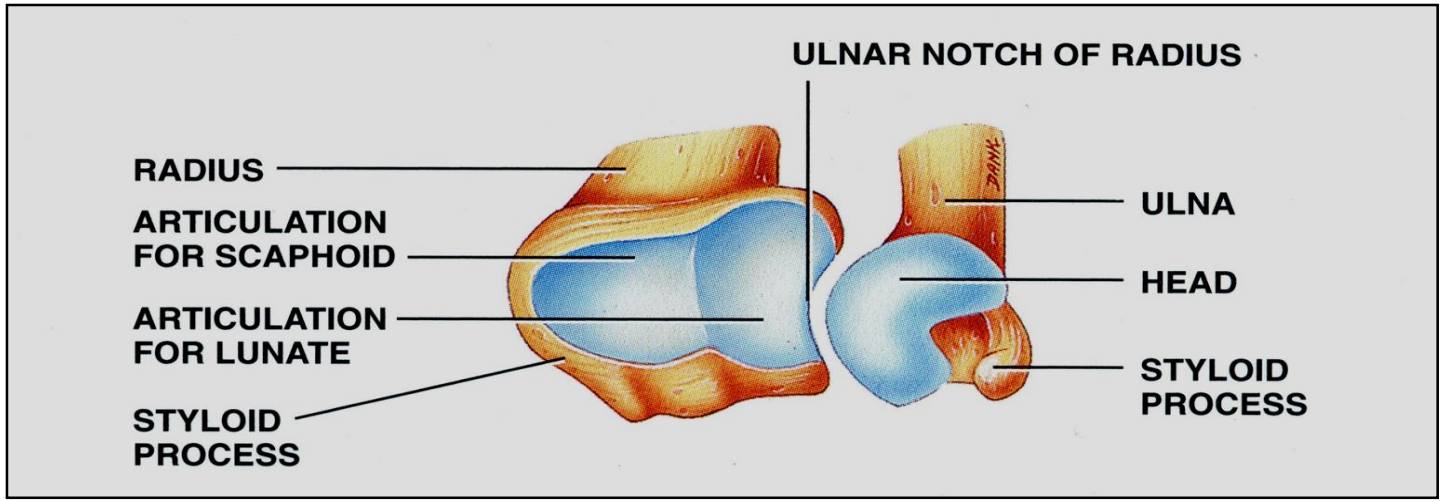
B. Shaft (body):

*** Has a sharp lateral border, the interosseous border, to which the interosseous membrane is attached.**

C. Lower end:

*** shows head and styloid process of ulna.**





6. Bones of Hand

A. The Carpal Bones (Carpus):

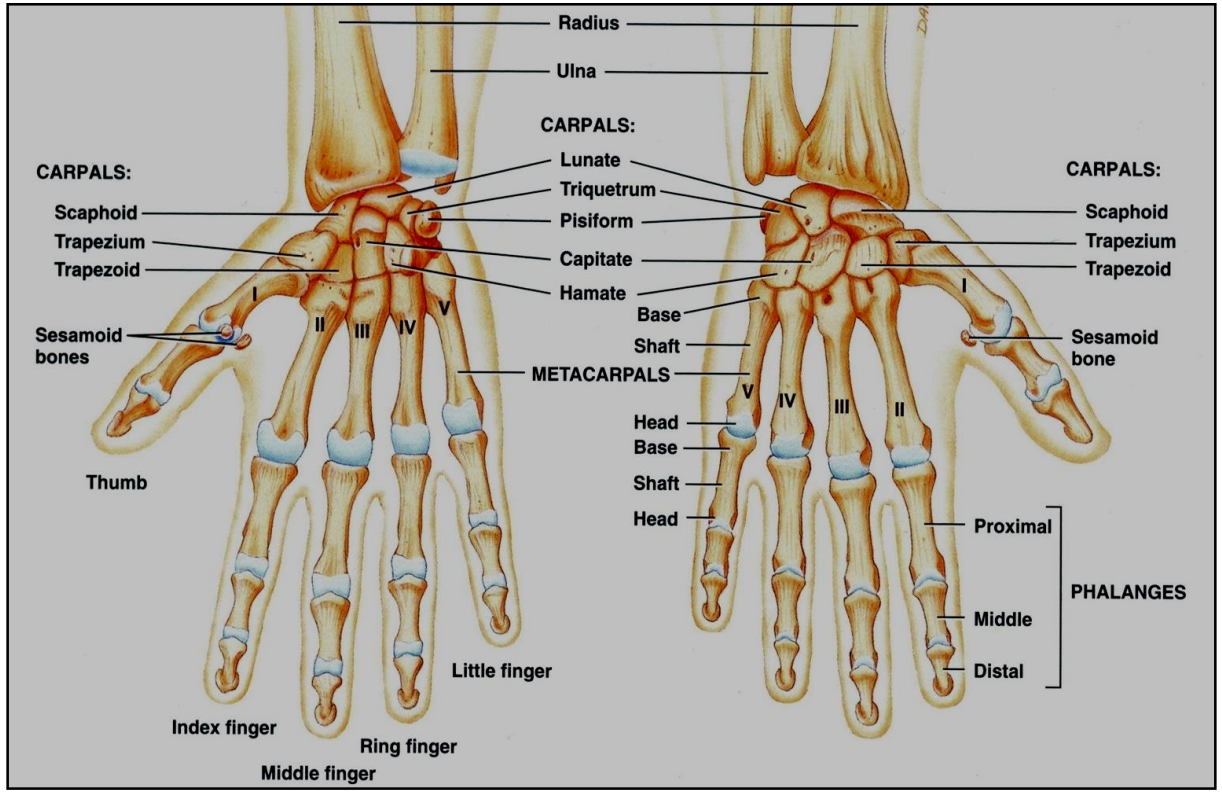
*** The carpal bones are eight bones which are arranged in a proximal and a distal row, and are held firmly together by ligaments.**

A. Proximal row:

*** Is formed by the following bones (from lateral to medial): scaphoid, lunate, triquteral, and pisiform.**

B. Distal row:

*** Is formed by the following bones (from lateral to medial): trapezium, trapezoid, capitate, and hamate.**



B. The Metacarpal Bones:

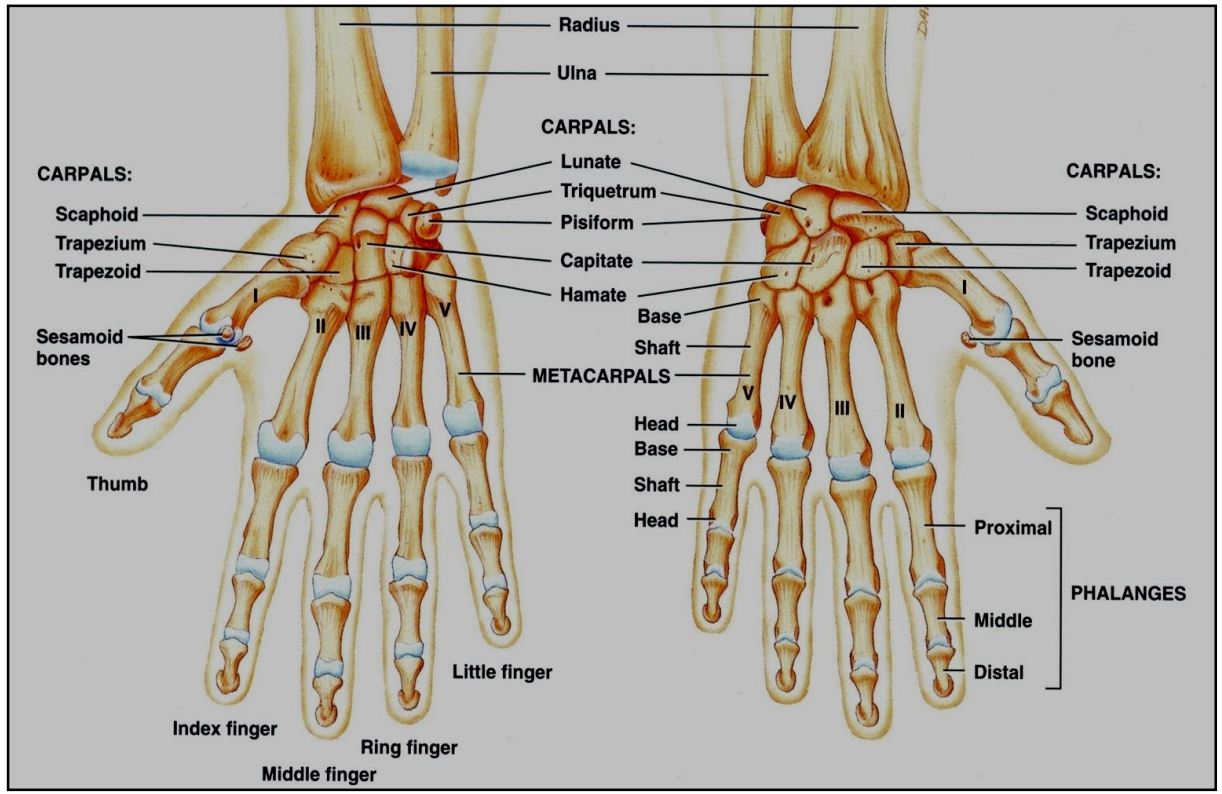
* There are five metacarpal bones; the 1st one is that of the thumb.

* Each metacarpal has: a proximal base, a body, and a distal head.

C. The Phalanges:

* There are two phalanges in the thumb and three in each of the medial four digits.

* Each phalanx has: a proximal base, a body, and a distal head.



Thank You Thank You Thank You!!!!

General Anatomy

Lecture 5: Appendicular Skeleton (2): Bones of Lower Limb

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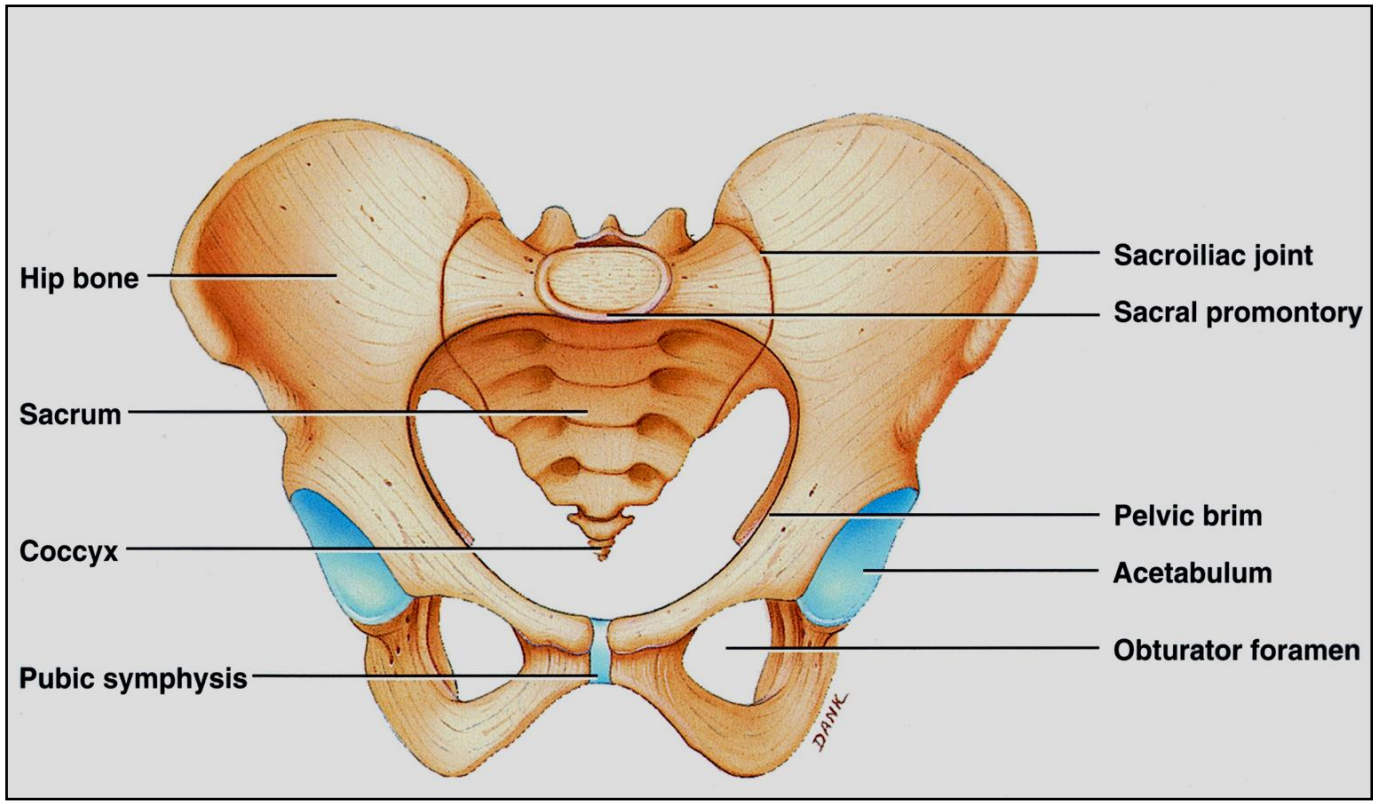
Bones of Lower Limb

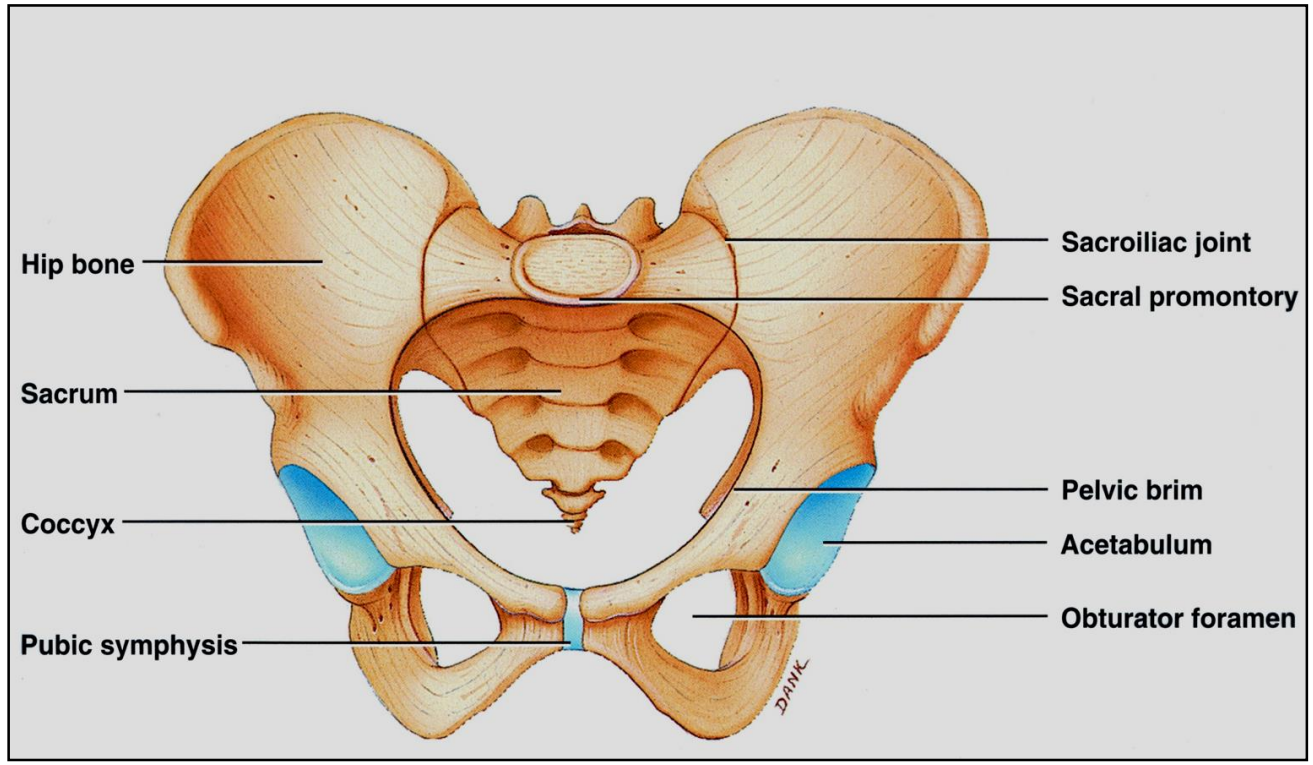
The Pelvic Girdle

* The pelvic girdle connects bones of lower limb to axial skeleton.
* The pelvic girdle consists of the two hip bones.
* The hip bones articulate posteriorly with the sacrum to form sacroiliac joints, and anteriorly with each other to form symphysis pubis.



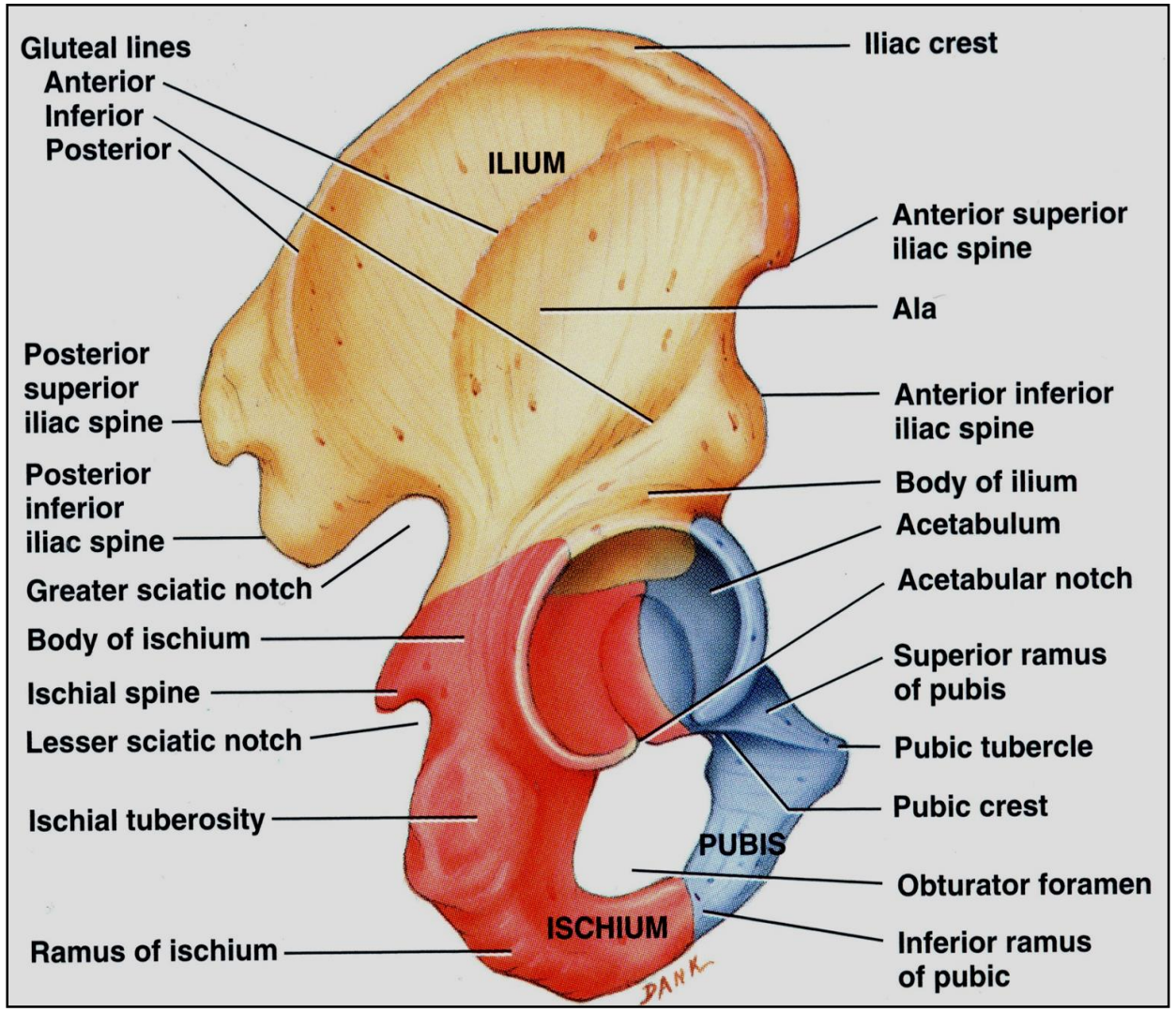
1. The Hip Bone

* Each hip bone is large & irregularly-shaped.
* Its lateral surface bears near it center a deep cup-shaped cavity termed the **acetabulum**, which articulates with head of femur to form **hip joint.**
* Below the acetabulum the bone presents a large oval or triangular gap, **the obturator foramen.**
* The hip bone has three parts: ilium, pubis, and ischium.



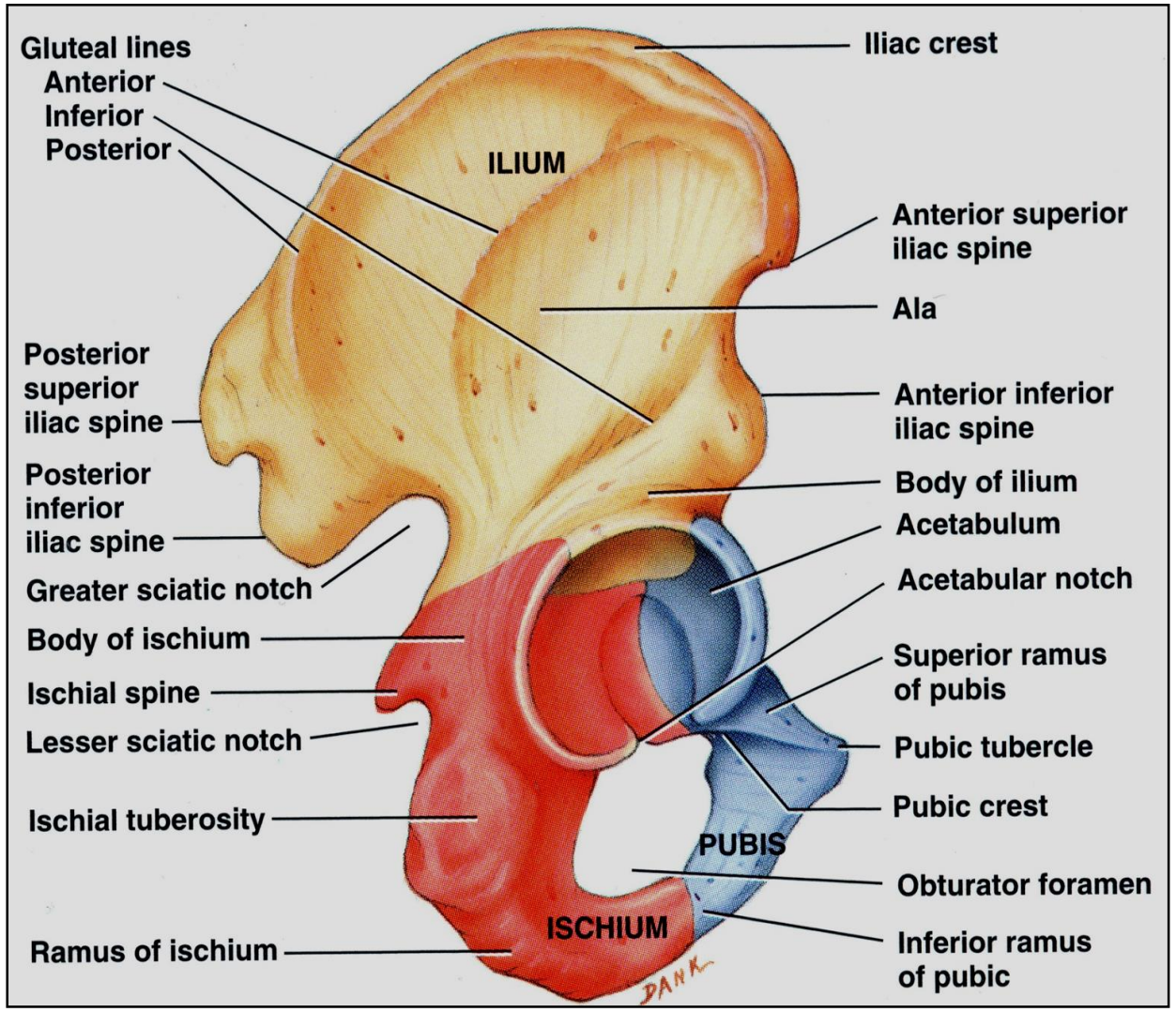
A. The Ilium

* Includes the upper part of acetabulum & the expanded, flattened area of bone above it.
* Its upper margin is curved and is termed **iliac crest.**
* Its anterior border presents anterior superior iliac spine (ASIS) & anterior inferior iliac spine (AIIS).
* Its posterior border presents posterior superior iliac spine (PSIS) & posterior inferior iliac spine (PIIS).
* The lateral surface of the ilium is called the **gluteal surface.**



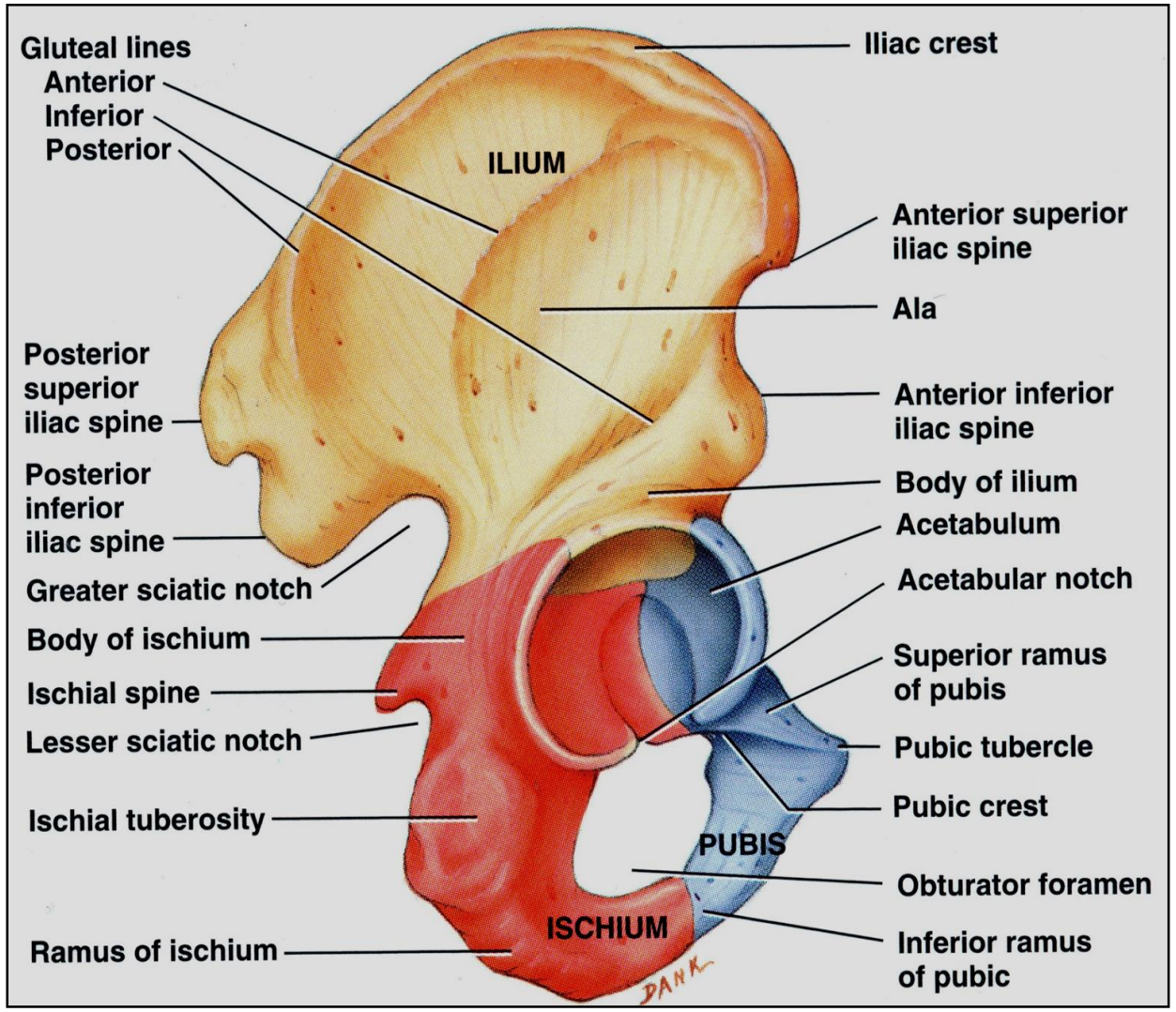
B. The Pubis

* Forms the anterior portion of the lower expanded part of the hip, and the lower anterior part of the acetabulum.
* It consists: a body, a superior ramus, and an inferior ramus.
* The body articulates with the body of the opposite pubis forming the symphysis pubis.



C. The Ischium

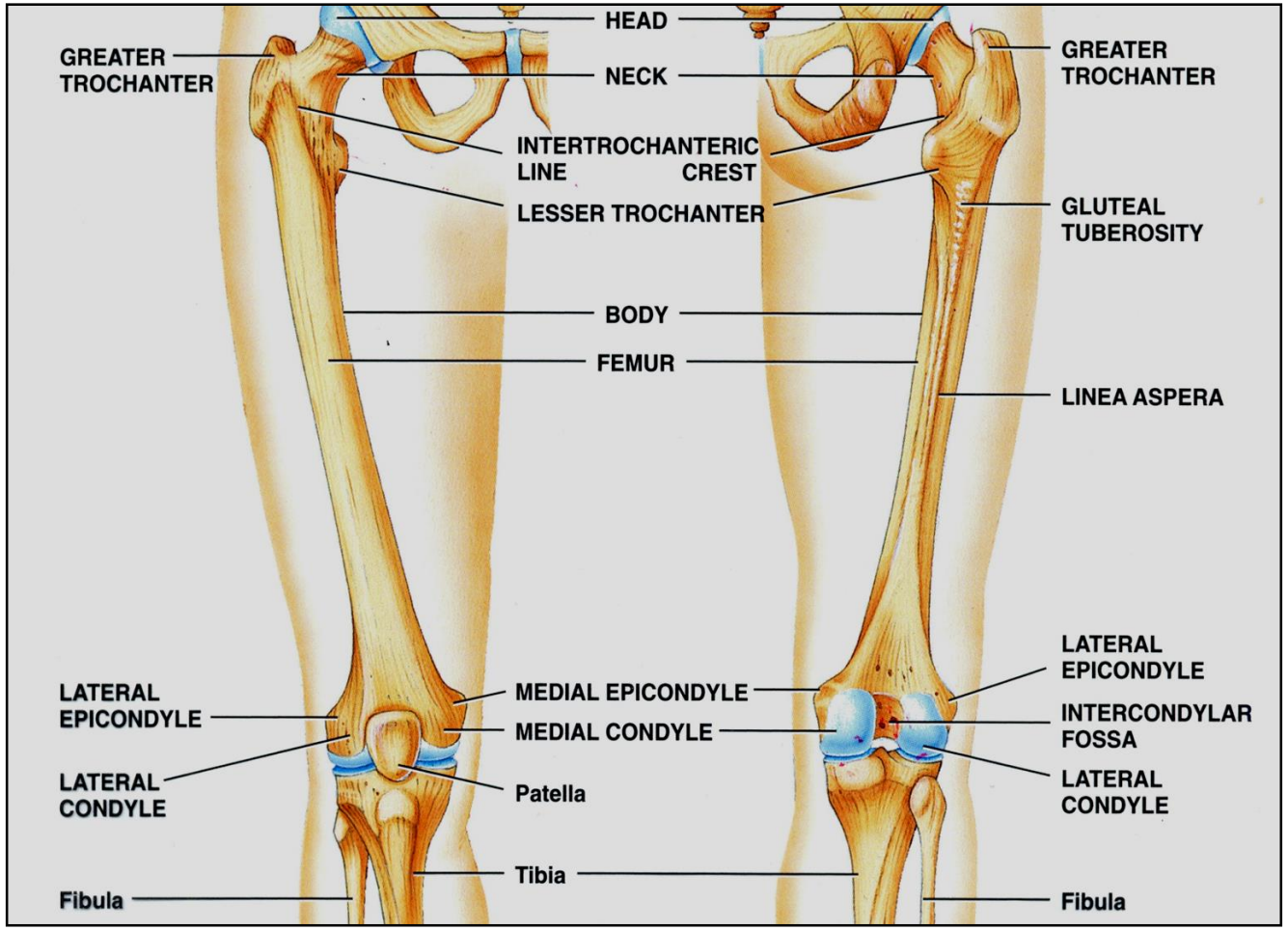
* Forms the posterior portion of the lower expanded part of hip and the lower posterior part of acetabulum.
* It consists of: a body and a ramus, which is continuous with the inferior ramus of the pubis.
* The ischial tuberosity is a large rough area situated on the lower part of the body.
* The posterior border of ischium is continuous with posterior border of ilium.
* It presents a sharp projection called ischial spine, which intervenes between the greater and lesser sciatic notches.



2. The Femur

A. Upper end:

* Shows a head, neck, and greater and lesser trochanters.
* The head, which is more than half of a sphere, articulates with acetabulum of the hip, to form the hip joint.
* The neck is about 5 cm long & connects the head to shaft.
* The intertrochanteric line is a rough ridge, which runs downwards and medially on anterior aspect of the bone from greater trochanter to lesser trochanter.

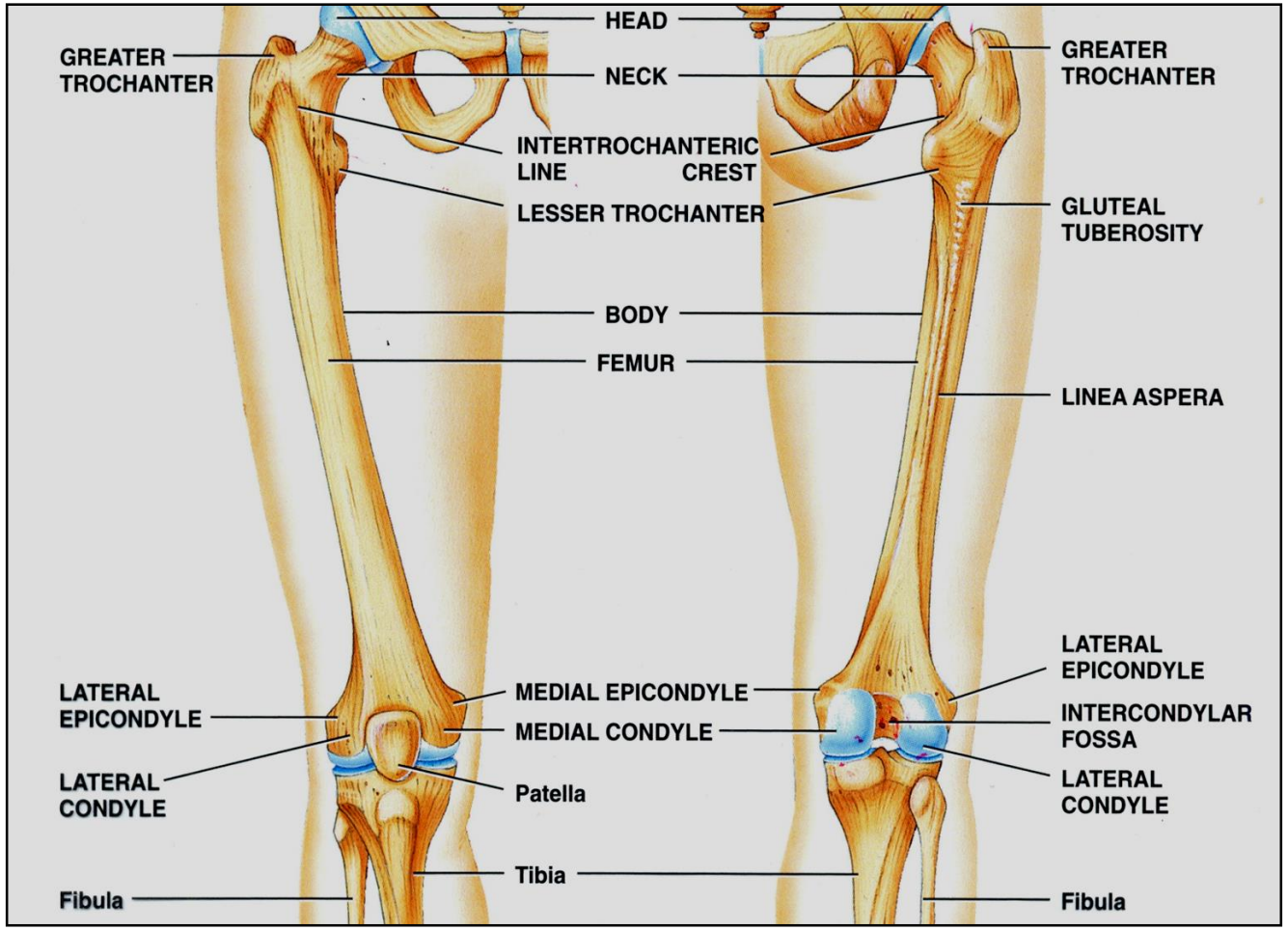


* The intertrochanteric crest is a smooth elevation on posterior aspect of the bone between greater and lesser trochanters.

B. Shaft:

* The middle third of the posterior aspect of femur presents a broad, rough vertical ridge termed **linea aspera.**

* Superiorly, the linea aspera is continuous with another vertical ridge, called **gluteal tuberosity.**

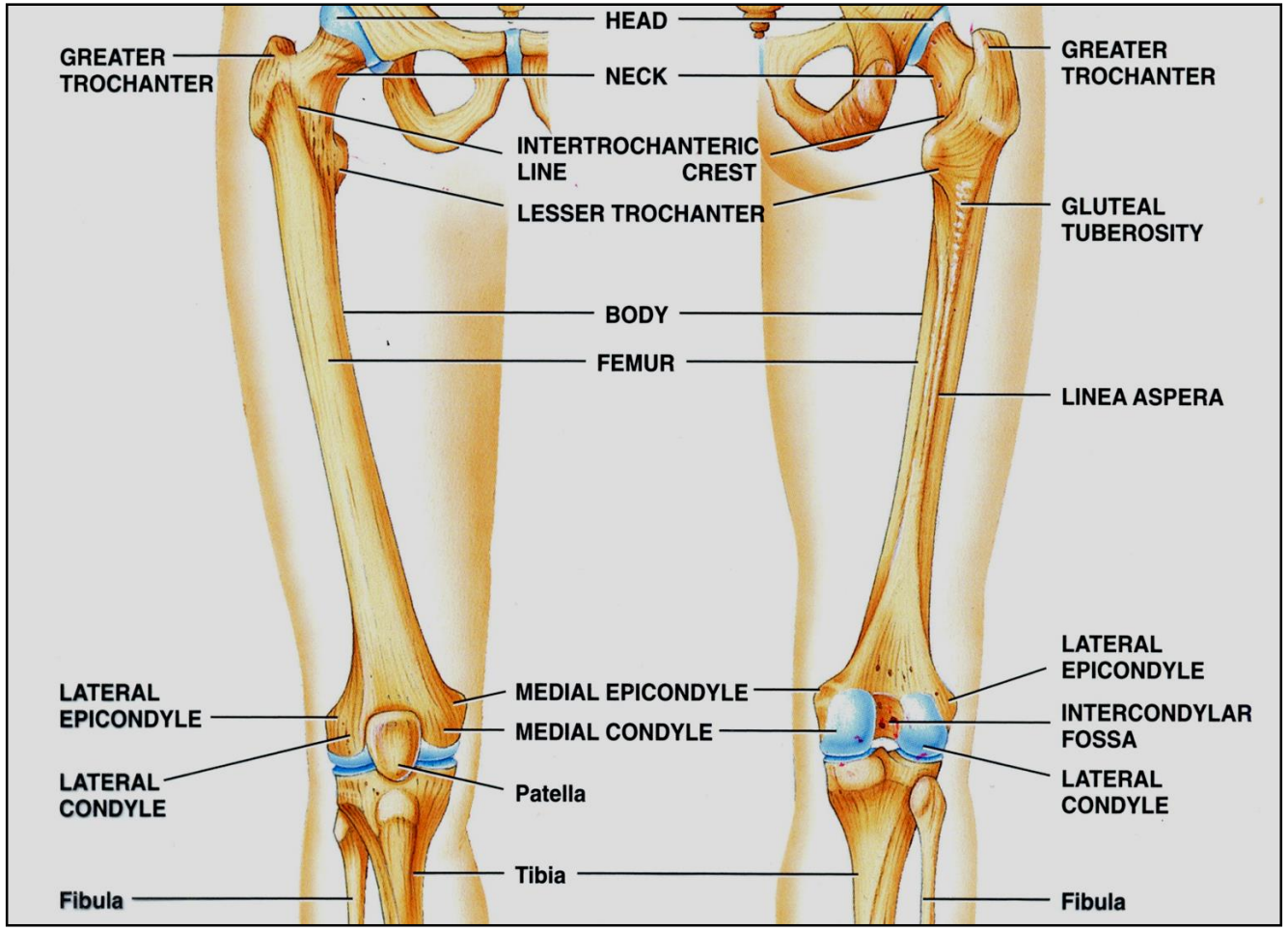


C. Lower end:

* The expanded lower end consists of two large masses, the medial and lateral condyles, which unite anteriorly, but separated posteriorly by the deep intercondylar fossa or notch.

* Anteriorly, the condyles exhibit a broad n-shaped articular surface for articulation with the patella anteriorly and the tibia below.

* Superior to the medial and lateral condyles, are the medial, and lateral epicondyles, respectively.

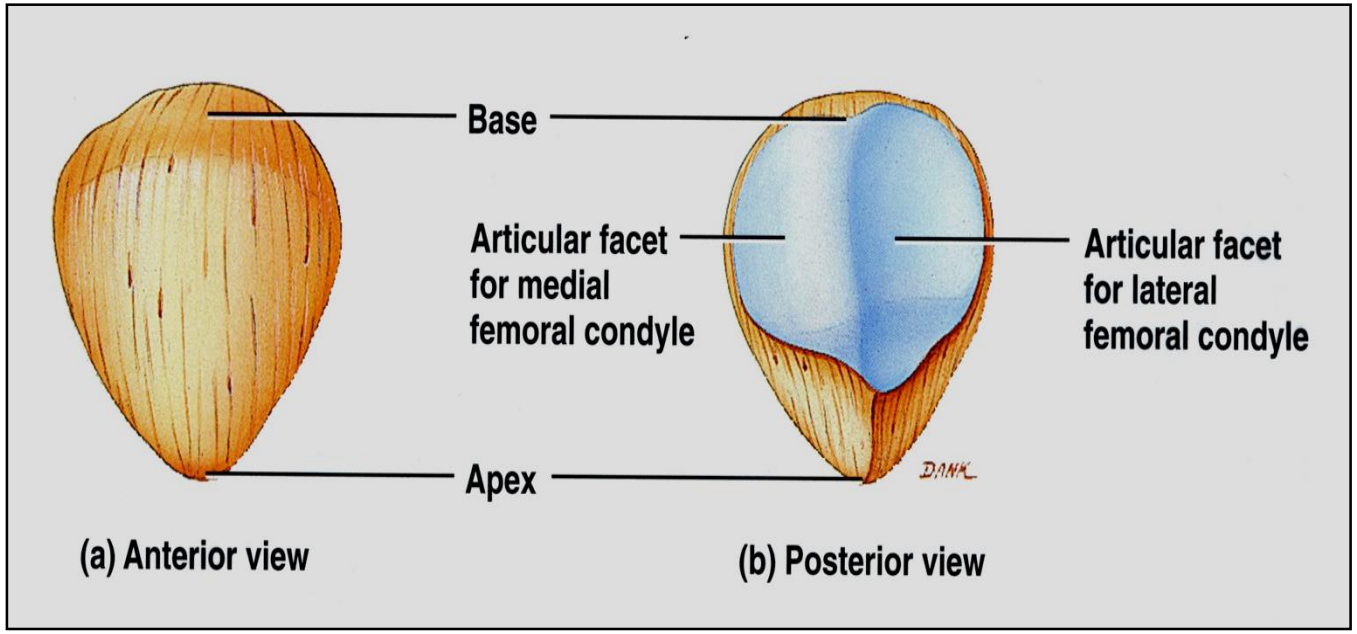


3. The Patella

*** The patella is a triangular sesamoid bone (bone inside tendon), located in front of the knee joint.**

*** The base of the patella forms the upper border, whereas the apex is pointed inferiorly.**

*** The posterior surface contains two articular facets, for articulation with the medial and lateral condyles of the femur (in knee joint).**



4. The Tibia

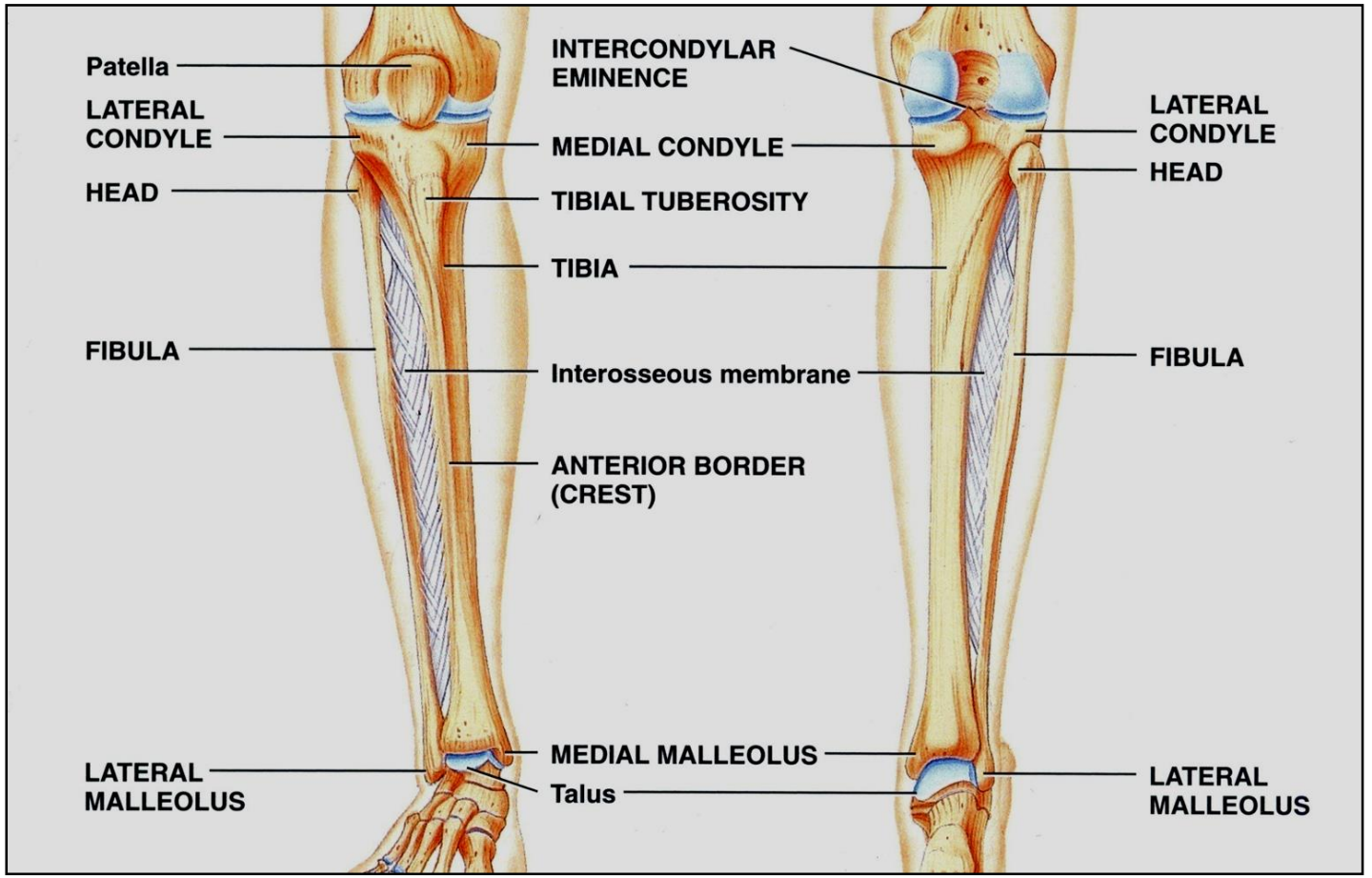
* The tibia is the medial, larger, and much stronger one of the two bones of the leg.

A. Upper end:

* Shows the medial and lateral condyles.

* The medial condyle is relatively larger than the lateral one.

* The upper surface of each condyle is smooth and articulates with the corresponding condyle of femur (in the knee joint).

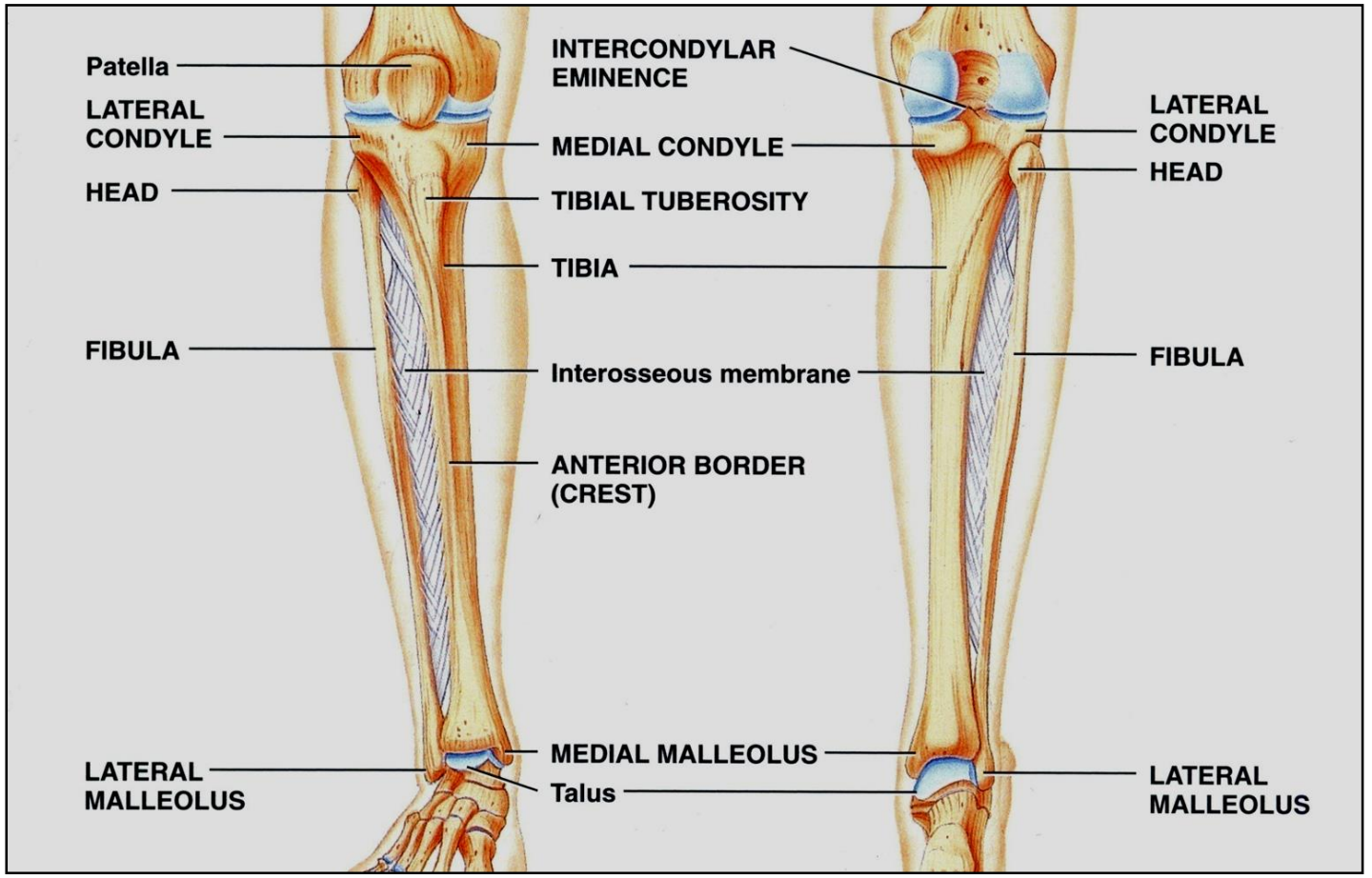


* On the posterior aspect of the lateral condyle there is a facet for articulation with the head of fibula forming the superior tibio-fibular joint.

B. Shaft:

* The tibial tuberosity lies at the upper end of anterior border of the shaft.

* The lateral border is sharp and is called the interosseous border to which the interosseous membrane is attached.

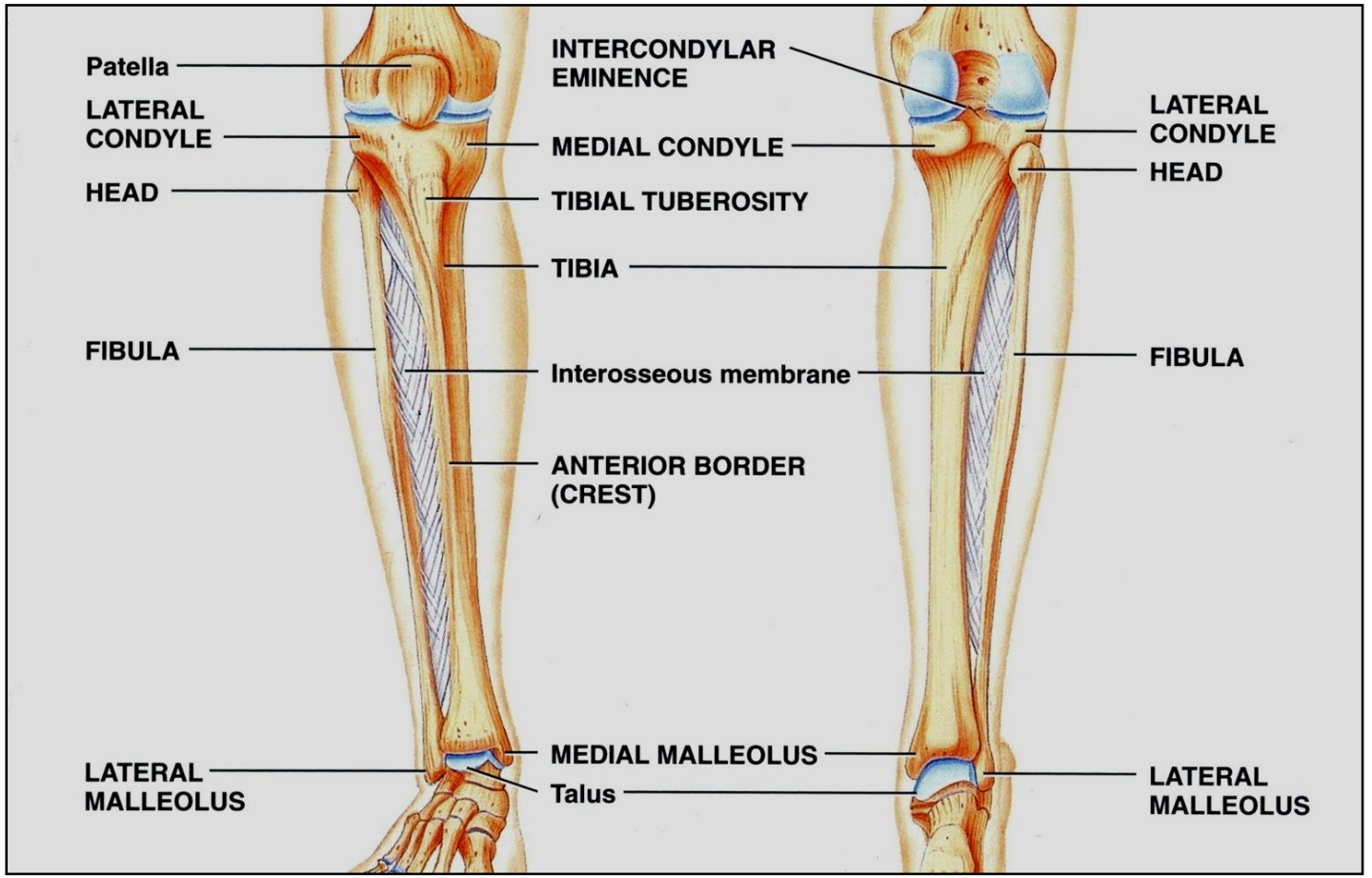


C. Lower end:

* The medial aspect of the lower end presents inferiorly the **medial malleolus.** This forms the prominence on medial aspect of ankle.

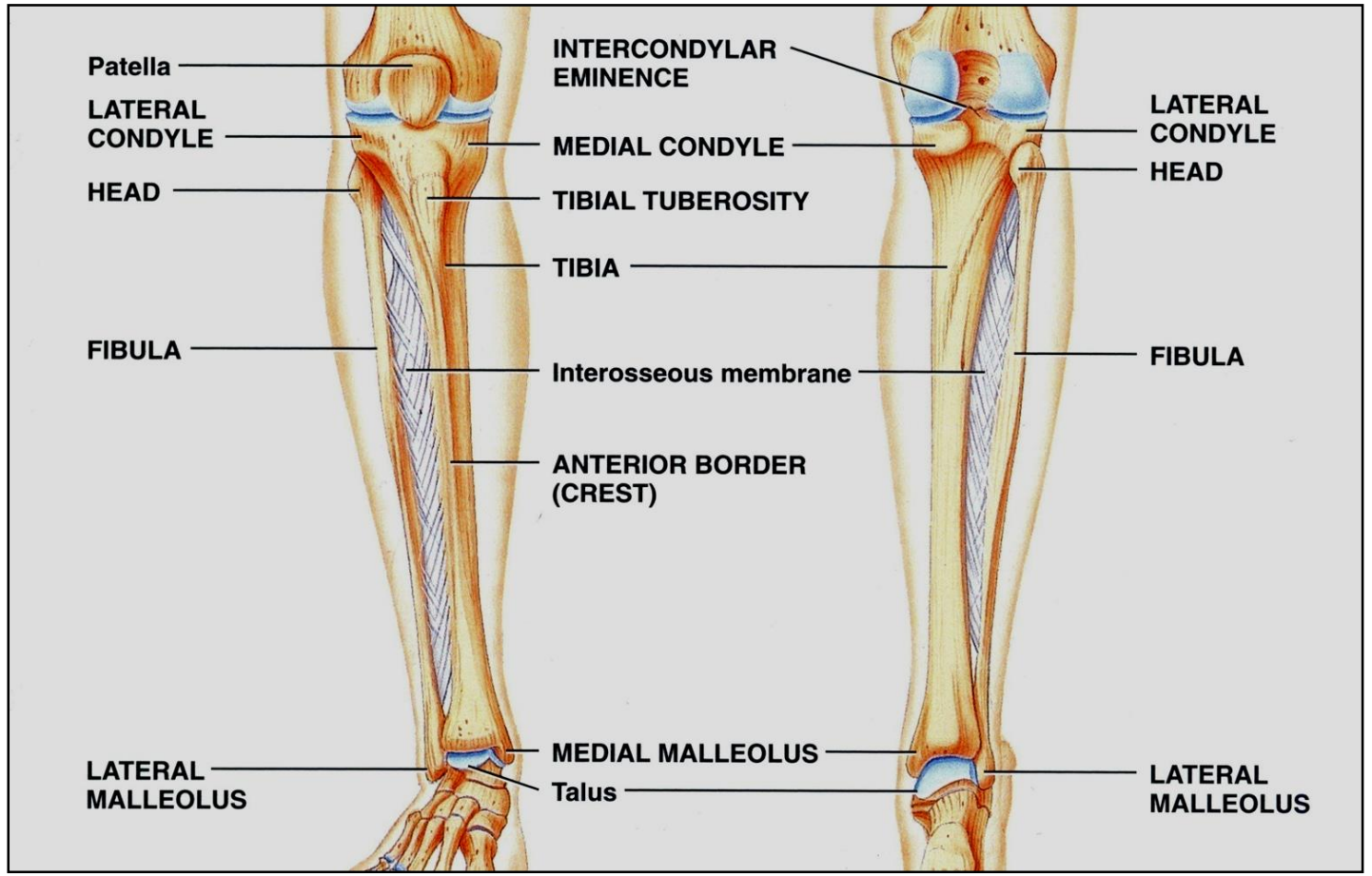
* The inferior surface of this end articulates with talus bone (in ankle joint).

* On the lateral aspect of lower end, there is a rough depression, the **fibular notch,** to which the lower end of fibula articulates forming the **inferior tibio-fibular joint.**



5. The Fibula

* The fibula is the lateral bone of the leg.
* It has an upper end (head), shaft, and lower end.
* The medial border of the shaft is called interosseous border, to which the interosseous membrane is attached.
* The lower end has a projection, the lateral malleolus. This forms the prominence on the lateral aspect of the ankle.



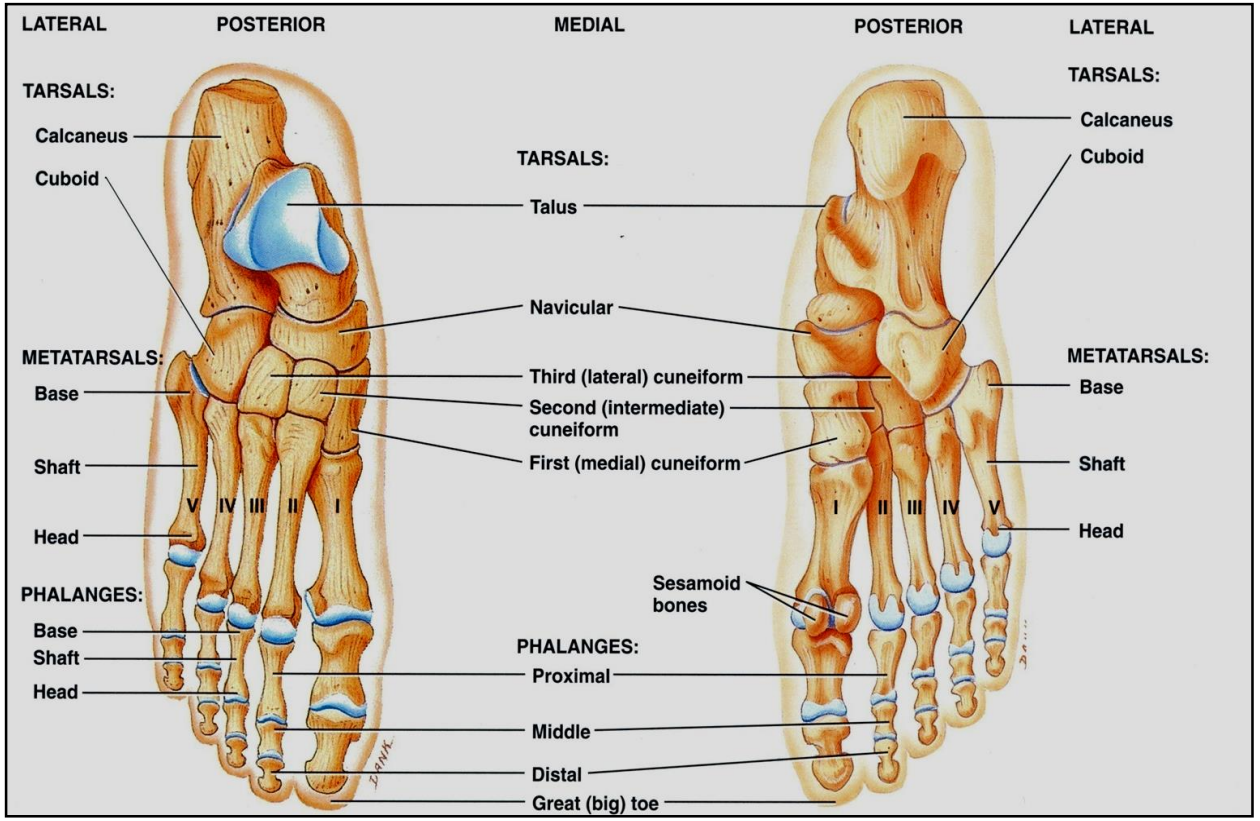
6. Bones of Foot

A. The Tarsal Bones (Tarsus):

* Form the proximal region of foot.

* It consist of two large bones: talus & calcaneus + five smaller bones: cuboid & navicular bones and the medial, intermediate & lateral cuneiform bones.

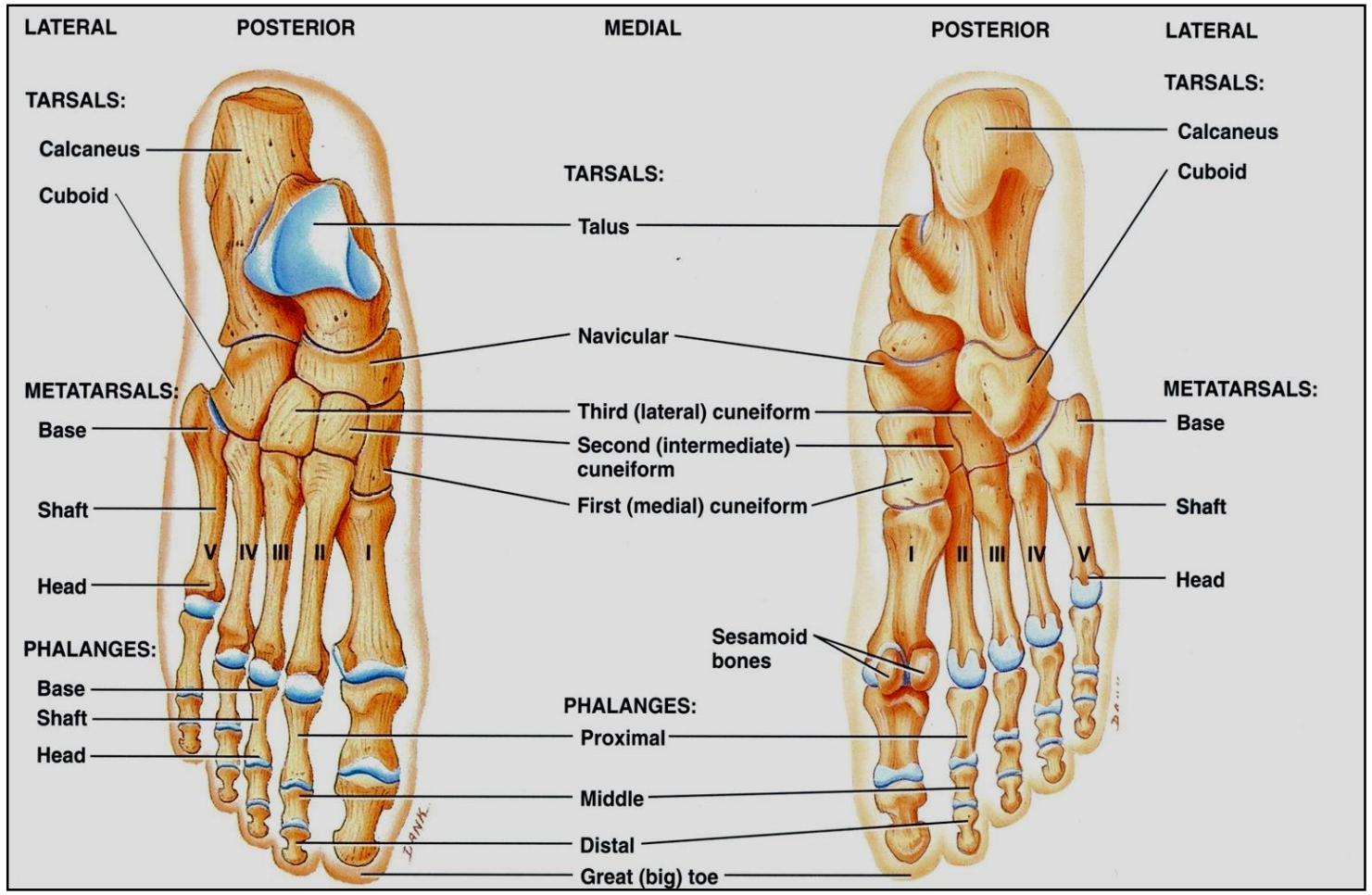
* The talus bone articulates superiorly with lower end of the tibia to form ankle joint, inferiorly with calcaneus, and anteriorly with navicular bone.



* The three cuneiform bones articulate posteriorly with the navicular bone and anteriorly with the 1st, 2nd & 3rd metatarsal bones.

* The cuboid bone articulates posteriorly with calcaneus, medially with lateral cuneiform, and anteriorly with the fourth and fifth metatarsal bones.

* Joints between tarsal bones are called the intertarsal joints.



B. The Metatarsal Bones:

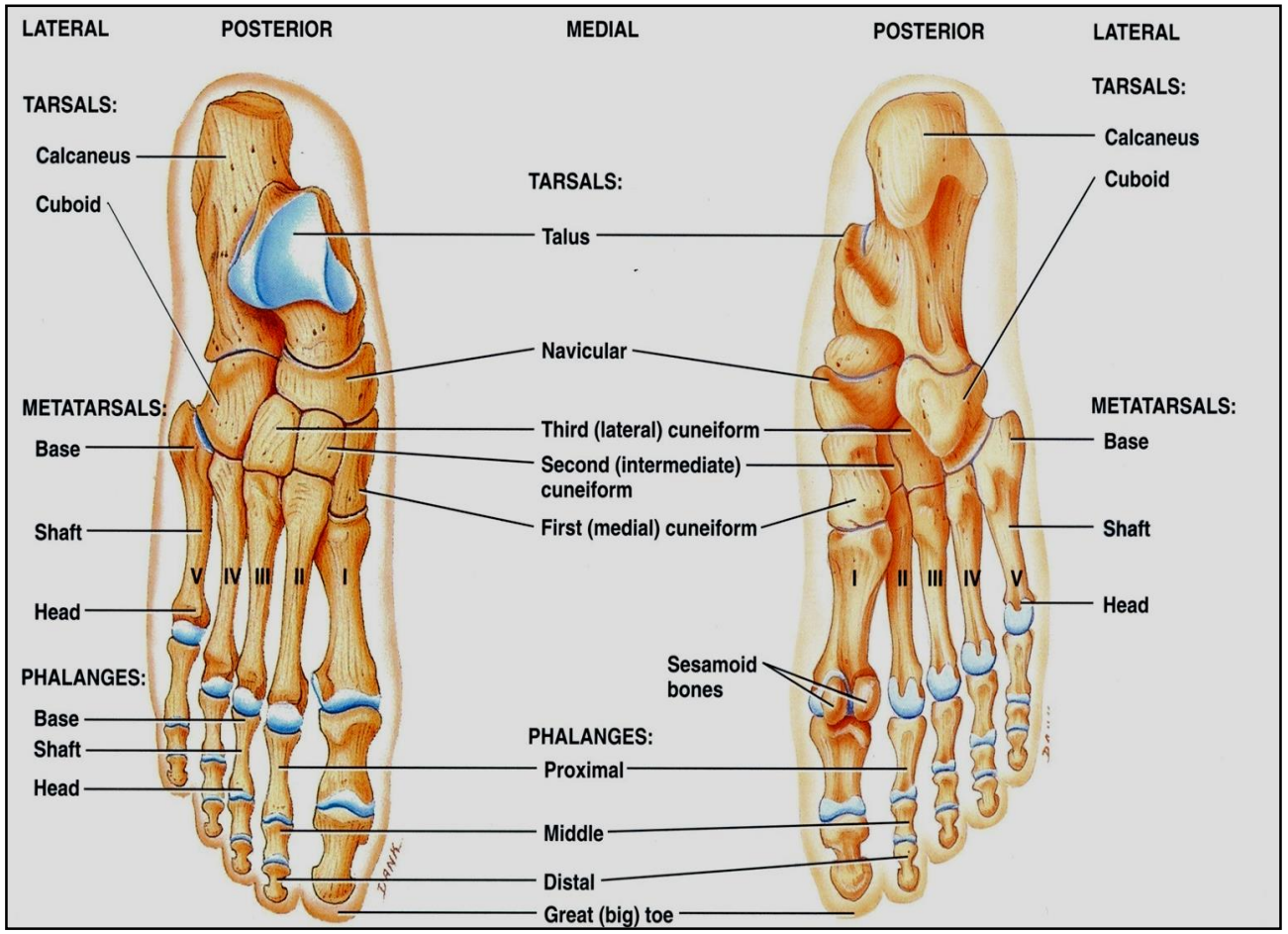
* In each foot there are five metatarsal bones. The 1st one is that of the big toe.

* Each one has a proximal base, a body & a distal head.

C. The Phalanges:

* There are two phalanges in the big toe and three in each one of the lateral four digits.

* Each phalanx has a proximal base, a body & a distal head.



Arches of the Foot

* The tarsal and metatarsal bones are arranged in such a way that they form arches in longitudinal and transverse axes of the foot.

* The function of these arches is to distribute body weight over the soft and hard tissues of the foot.

* Flat foot:

* Bones are held in position by ligaments and muscles tendons.

* Weakness of these ligaments and tendons results in a decrease in the height of the arches.

Thank You Thank You Thank You!!!!

General Anatomy

Lecture 6: Muscular System

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Muscles

* **Muscles are characterized by contraction** which means the capacity of the muscle fibers to contract.

* **Types of muscles:**

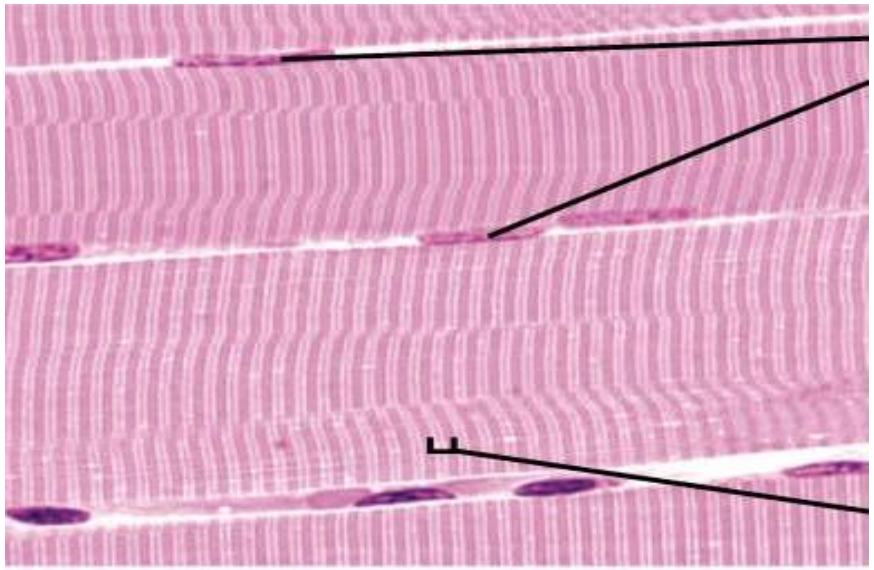
1. Skeletal muscle.
2. Smooth muscle.
3. Cardiac muscle.

I. Skeletal Muscles

1. Contraction: **Voluntary.**

2. Site:
* Main bulk of our bodies.
* Attached to skeleton (bones) eg. Muscles of limbs.
* Produce movement of skeleton.

3. Striations:
* Striated (show alternating light & dark bands).



4. Nerve supply: Somatic nerves.

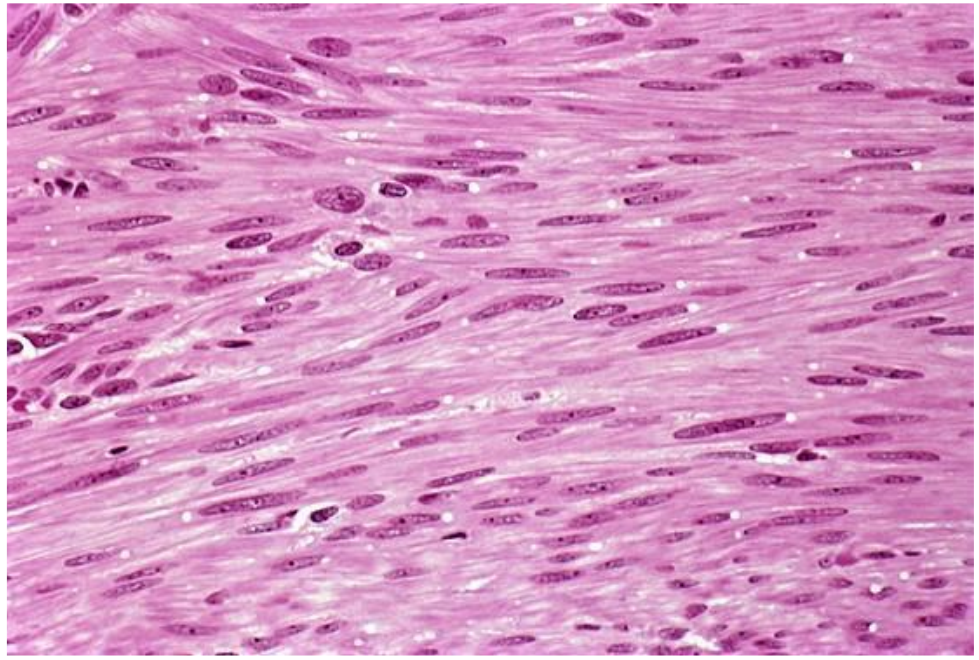
5. Contraction: Rapid.

II. Smooth Muscles

1. Contraction: **Involuntary.**

2. Site: * Muscles in wall of viscera eg. Muscles of gastro-intestinal tract (GIT), urinary system, respiratory system, genital system & those of blood vessels.

3. Striations: Non-striated.



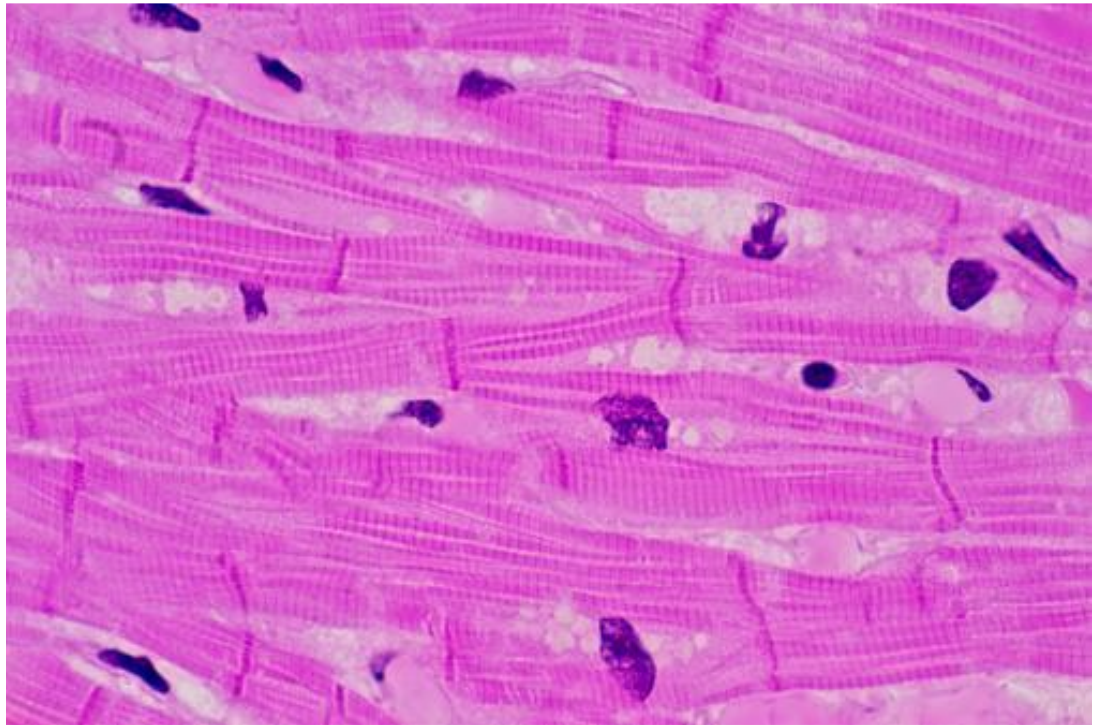
4. Nerve supply: Autonomic nerves.

5. Contraction: Slow.

III. Cardiac Muscles

1. Contraction: **Involuntary.**

2. Site: Myocardium of heart.



3. Striations: Striated.

4. Nerve supply: Autonomic nerves.

5. Contraction: Has a rhythm.

Skeletal Muscles

* **Usually each muscle has 2 attachments:**

1. Origin: The most fixed attachment (usually proximal).

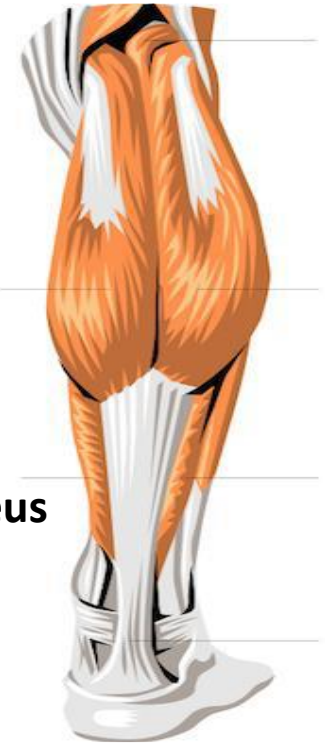
2. Insertion: The most mobile attachment (usually distal).

* **Usually when the muscle contracts** → it gets shorter by approximating the insertion to the origin.

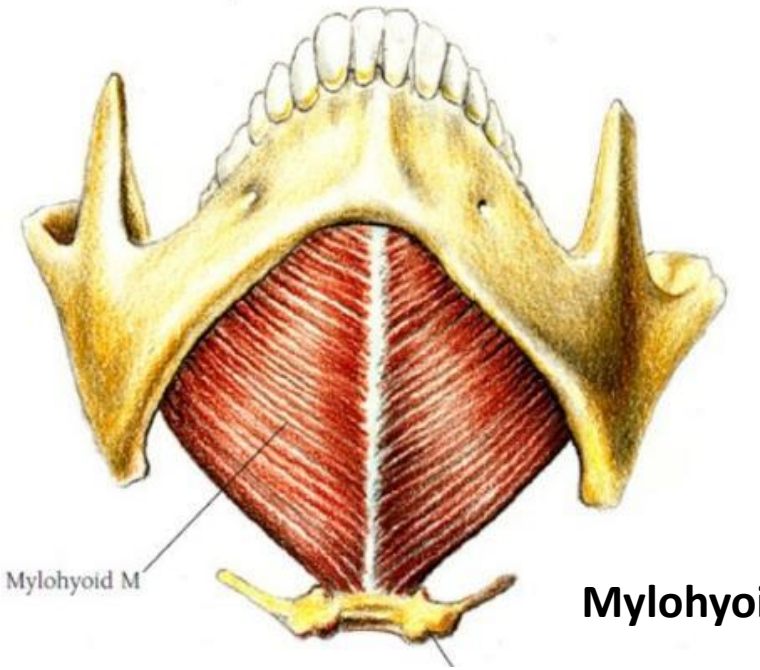
* Way of attachment of muscles:

1. **By fleshy fibers** :eg. Popliteus muscle.
2. **By tendon** (a long fibrous cord): eg. Tendocalcaneus & biceps.
3. **By raphe** (a fibrous band that separates flesh muscles from each other): eg. Pharyngeal muscles & mylohyoid muscle.

Popliteus



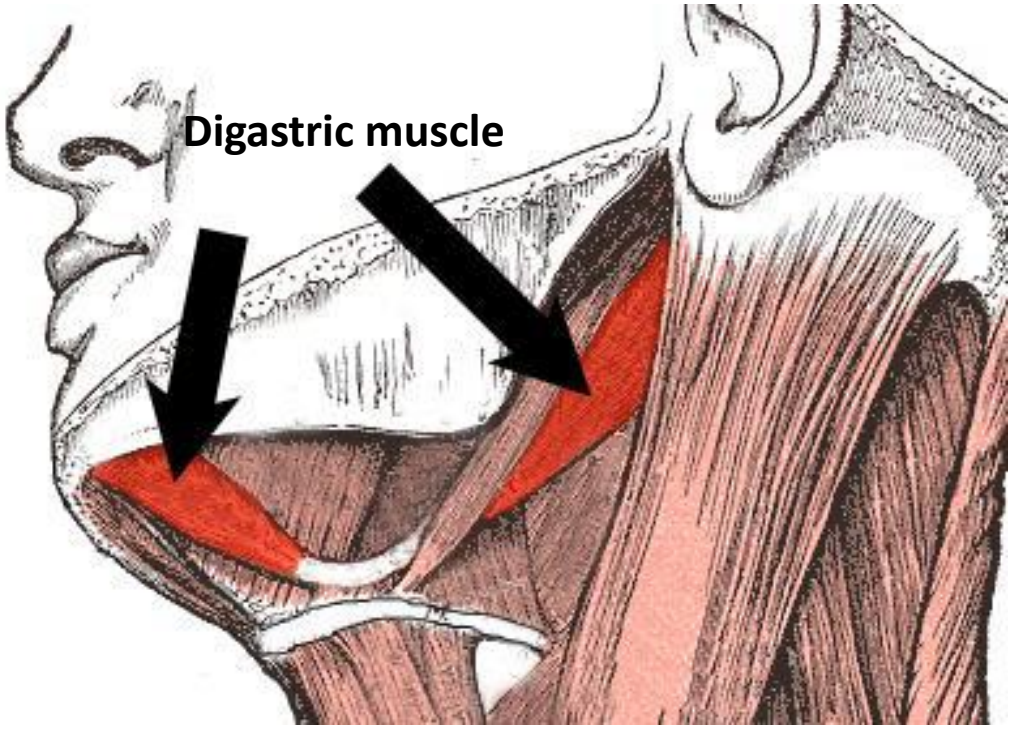
Tendocalcaneus



Mylohyoid muscle

4. **By aponeurosis** (flat fibrous sheet): eg. Aponeurosis of external oblique abdominal muscle.
5. **Attached to skin**: eg. Facial muscles.
6. **Attached to an intermediate tendon**: A muscle may have 2 fleshy bellies & an intermediate tendon in between & so the 2 bellies are inserted into this tendon eg. Digastric muscle.

Aponeurosis of external oblique abdominal muscle



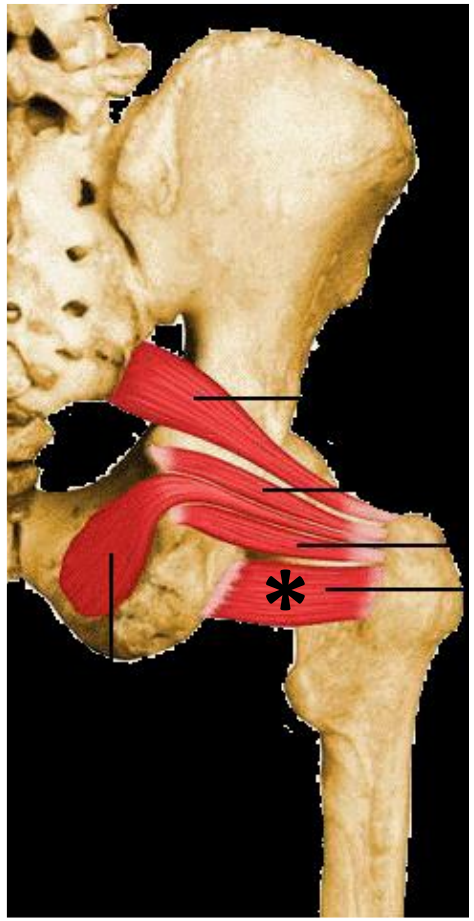
Shape of Muscles

The muscles can be classified into different types according to the shape of the muscle fibers in relation to the line of pull of the muscle.

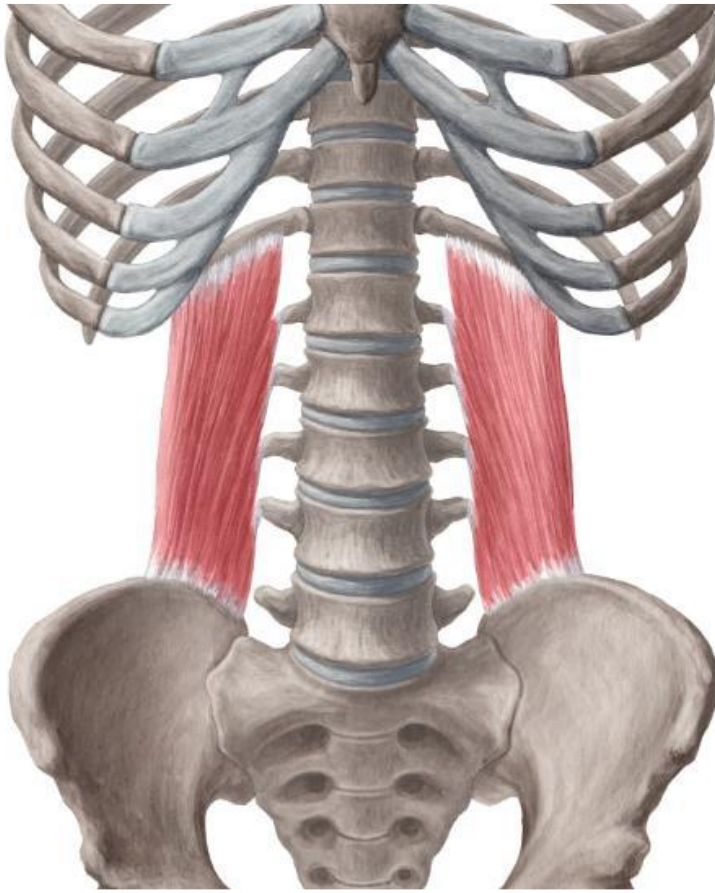
A. Parallel Fibers:

* May be:

1. Quadrilateral: eg. Quadratus lumborum & quadratus femoris.



Quadratus Femoris

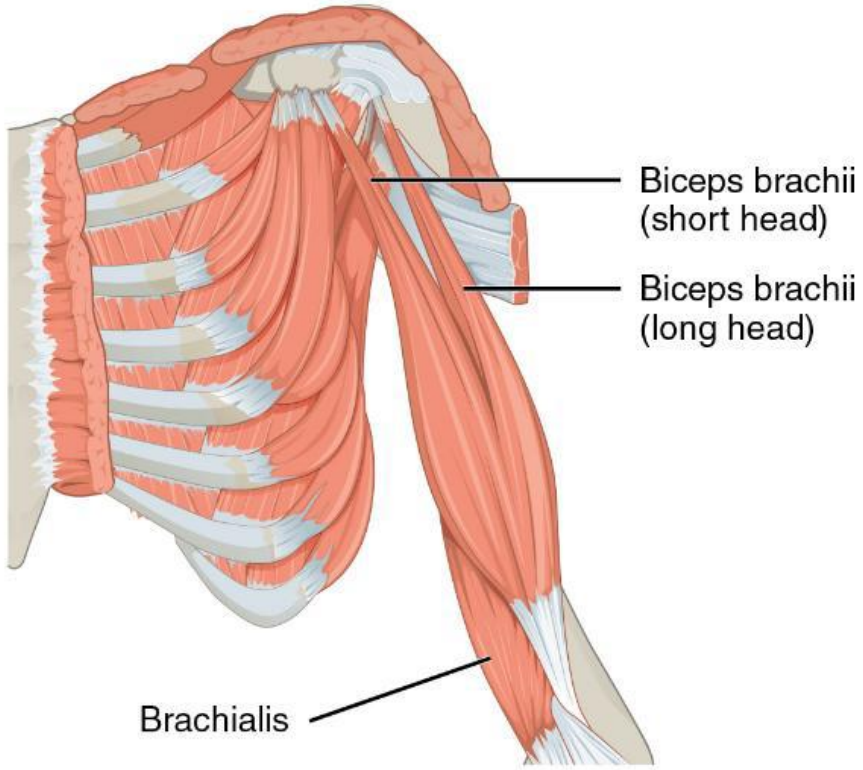


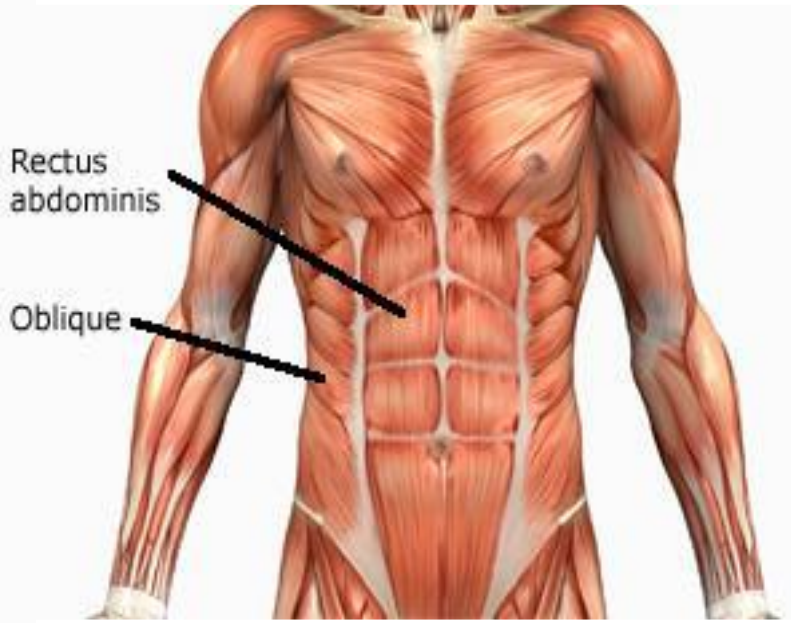
Quadratus Lumborum

2. Fusiform: eg. Biceps brachii.

3. Strap-like: eg. Sartorius.

4. Strap-like with tendinous intersections: eg. Rectus abdominis.





B. Oblique Fibers:

1. Pennate fibers:

i. Unipennate:

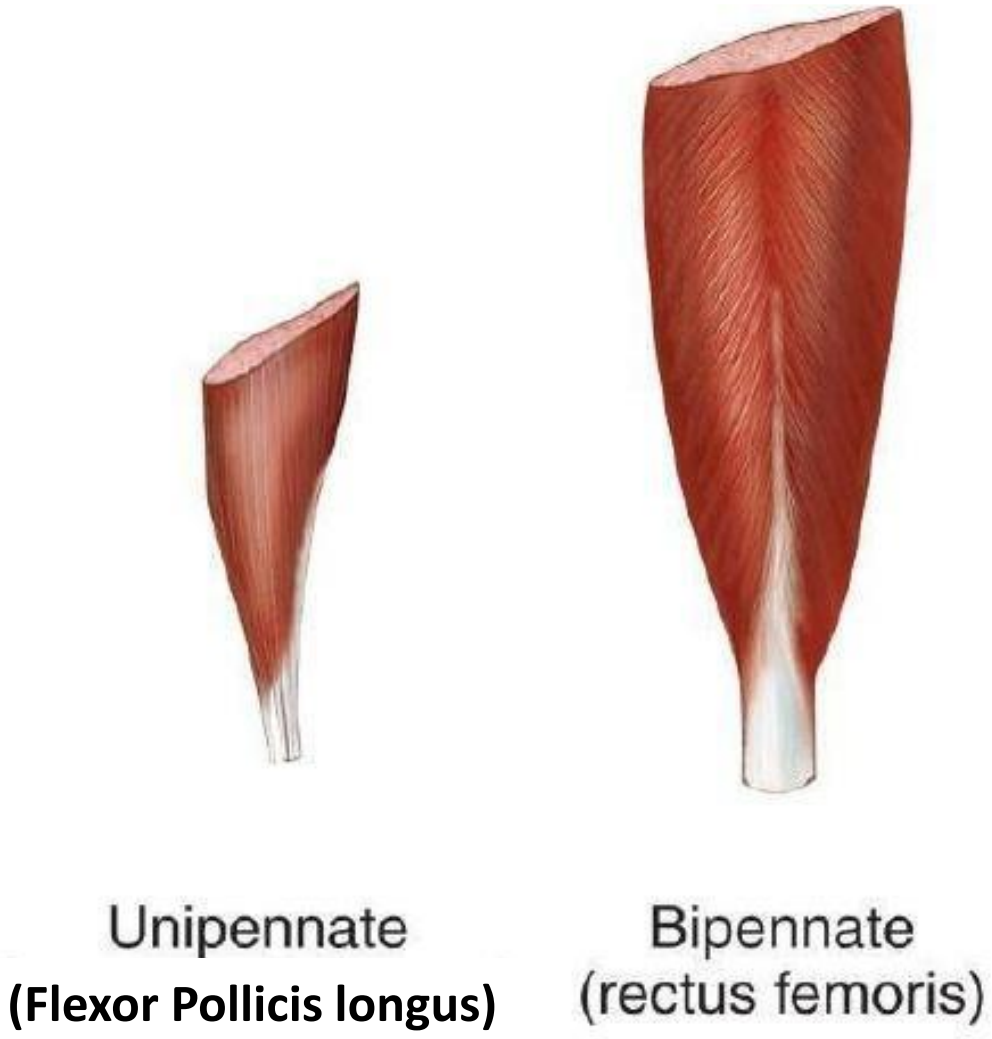
* Fibers run along one side of the tendon (like half a feather).

* Example: Palmar Interosseii &
  Flexor pollicis longus.

ii. Bipennate:

* Tendon in the middle & fibers are attached to its 2 sides (like a complete feather).

* Example: Dorsal Interosseii &
  Rectus femoris.



Unipennate
(Flexor Pollicis longus)

Bipennate
(rectus femoris)

iii. Multipennate:

* A series of bipennate fibers (several feathers beside each other).

* Example: Deltoid.

Multipennate
(deltoid)

iv. Circumpennate:

* Fibers converge on a tendon to be attached to the circumference of the tendon.

* Example: Tibialis anterior.

2. Triangular fibers:

* Muscle fibers converge from wide attachment to a narrow terminal tendon.

* Example: Temporalis.

Temporalis

C. Spiralized Fibers:

* When the muscle contracts → the fibers become spiral.
* Examples: Trapezius & Pectoralis major.

D. Cruciate Fibers:

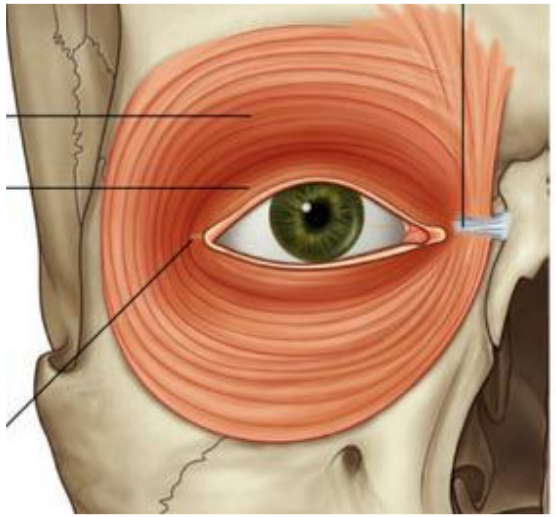
* Muscle fibers run in different planes & directions.
* Example: Sternocleidomastoid.

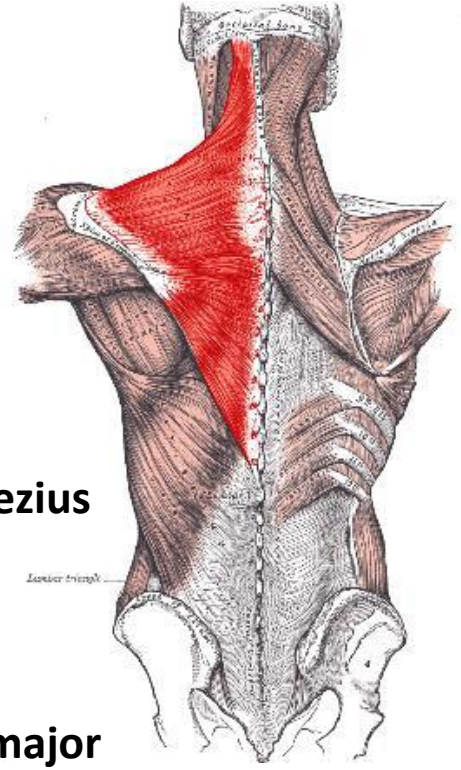
E. Circular Fibers:

* Muscle fibers form complete circles.
* Example: Orbicularis oculi muscle.

Sternocleidomastoid

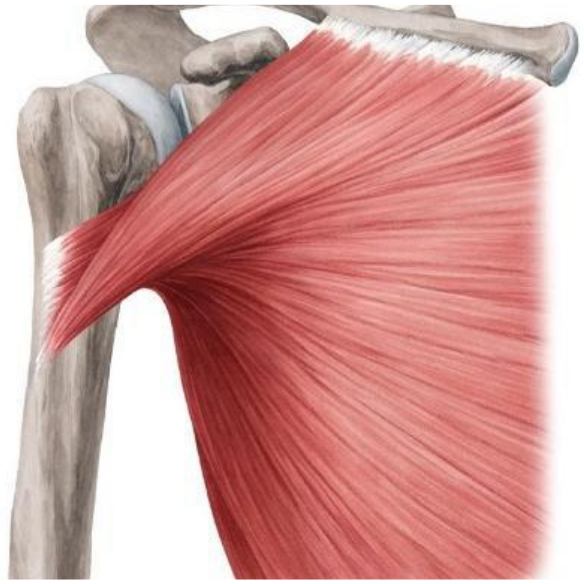
Orbicularis oculi





Trapezius

Pectoralis major



Coordination within Muscle Groups

* Movements often are the result of several skeletal muscles acting as a group rather than acting alone.

* Most skeletal muscles are arranged in opposing (antagonistic) pairs at joints: eg. flexors & extensors; abductors & adductors, and so on.

* Within opposing pairs, one muscle, is called the prime mover or agonist, which contracts (gets shorter) to cause an action while the other muscle, the antagonist, stretches (relaxes) to allow the movement caused by the prime mover.

* The antagonist and prime mover are usually located on the opposite sides of the bone or joint.

Thank You Thank You Thank You!!!!

General Anatomy

Lecture 7: Muscles of Head &Neck

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Muscles of Scalp:

Occipito-frontalis Muscle

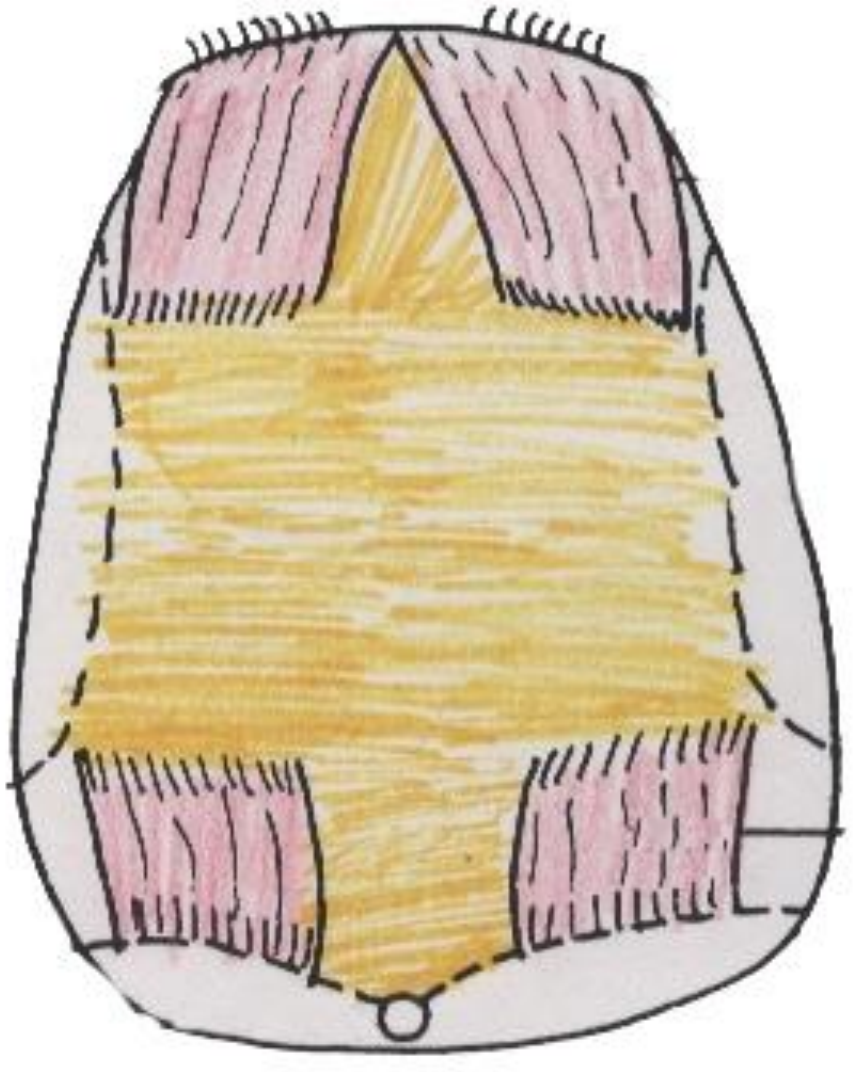
* Scalp has only ONE muscle which is the **occipito-frontalis muscle.**

* It is formed of **2 frontal bellies** and **2 occipital bellies** which are inserted in the epicranial aponeurosis.

* **Epicranial Aponeurosis:**

* A sheet of strong fibrous tissue on the skull cap.

* Receives the insertion of the frontal and occipital bellies.

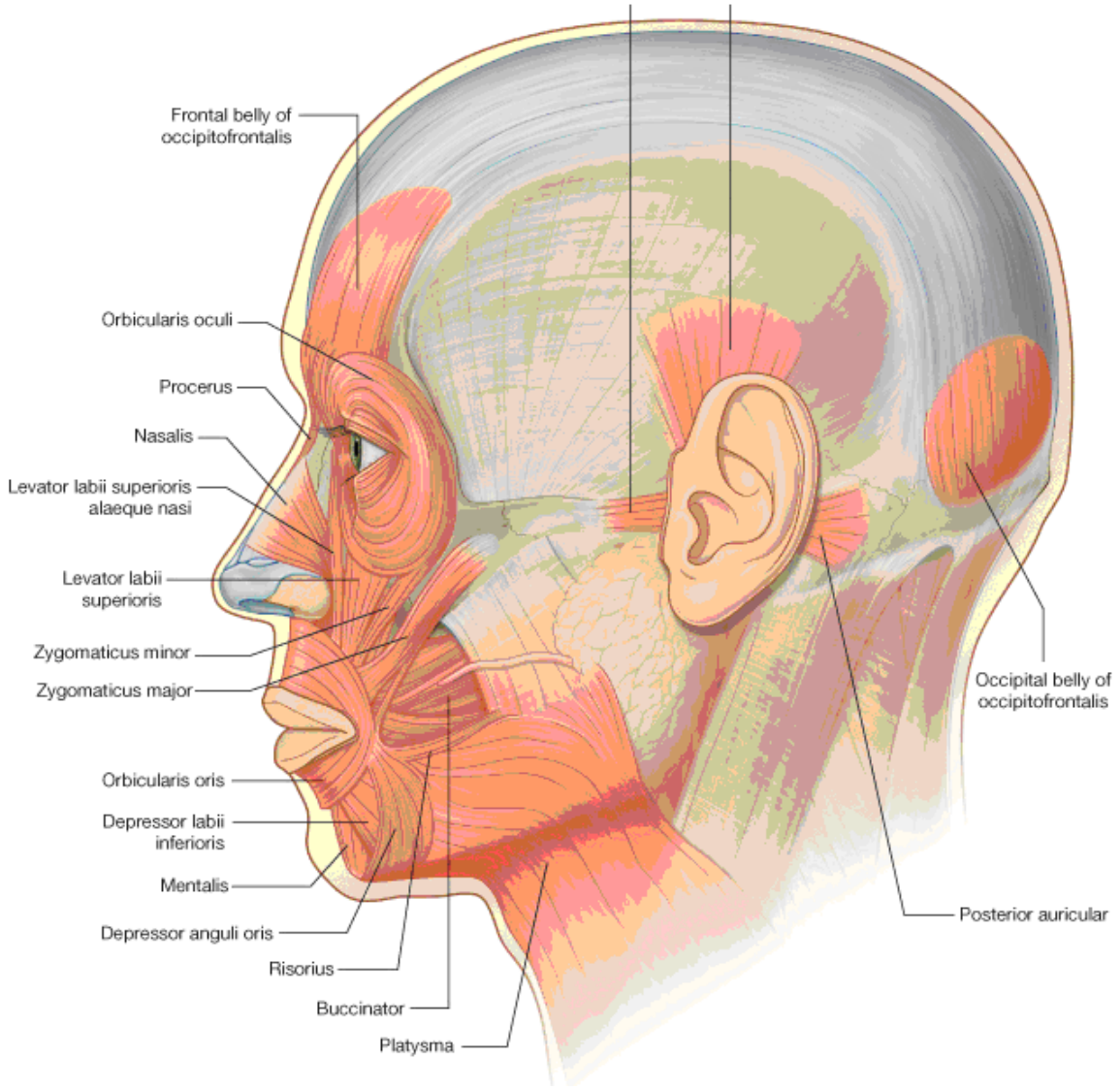


* **Frontal bellies** → take origin from eyebrows & are inserted in epicranial aponeurosis.

* **Occipital bellies** → take origin from occipital bone & are inserted in epicranial aponeurosis.

* **Action of muscle:** Pull the scalp backwards and raise the eyebrows thus causing the transverse wrinkles of forehead (giving expression of fear or surprise).

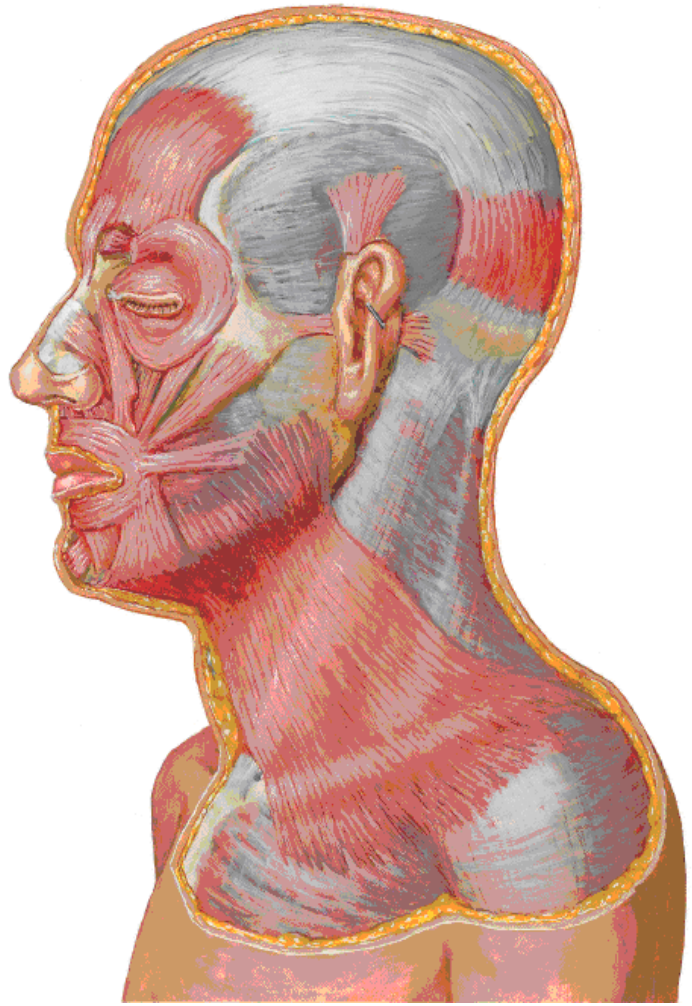
* **Nerve supply:** Facial nerve.



Muscles of Face
Muscles of Facial Expressions

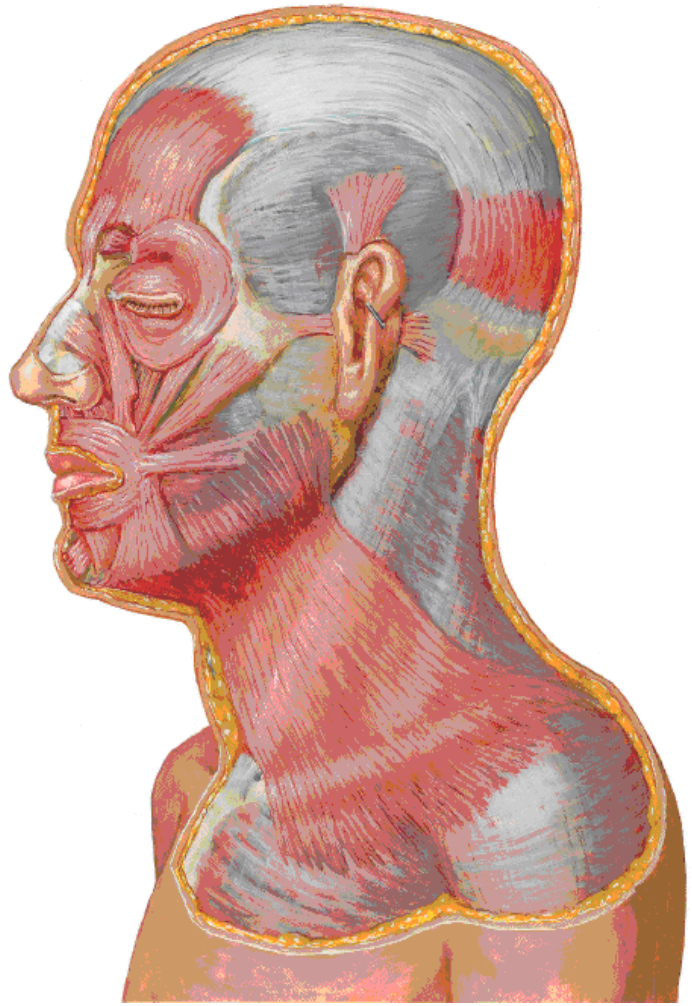
@ General characteristics :

1. All the muscles : arise from the bones of the skull or subcutaneous tissue.
2. All the muscles : are inserted into the skin.
3. Action : they move the skin of face in the different facial expressions (therefore called **muscles of facial expressions**).
4. Nerve supply : all are supplied by the Facial Nerve.



Muscles of Face (contd)

5. Site : lie in the superficial fascia and there's no deep fascia in the face. (i.e. they lie subcutaneous).
6. They serve 2 main functions:
   a. They act as sphincters or dilators to the orifices in face which are :
      @ Orbit (guarded by eyelids).
      @ Nose (guarded by nostrils).
      @ Mouth (guarded by lips).
   b. Facial expressions and help in speaking & mastication.



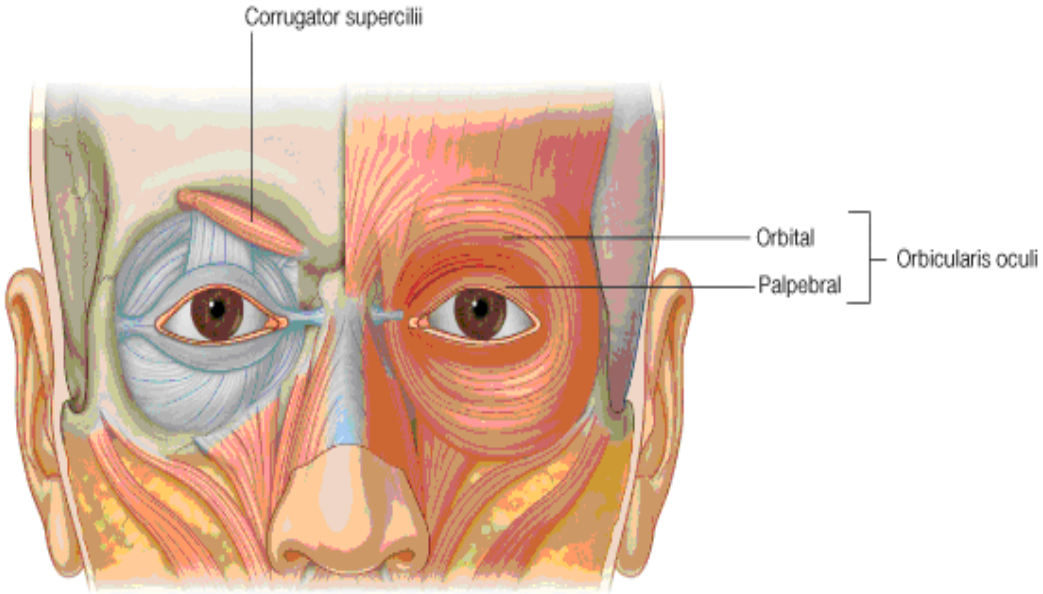
(A) Orbital Group
(Muscles of Orbit & Eyelids)

Orbicularis Oculi

* This is the sphincter of the eyelids (i.e. closes the eyes).
* It encircles the orbital opening.
* It consists of 3 parts :

a. Palpebral part:

Action: gentle closure of eyelids (during sleeping & blinking → helps in flow of tears).

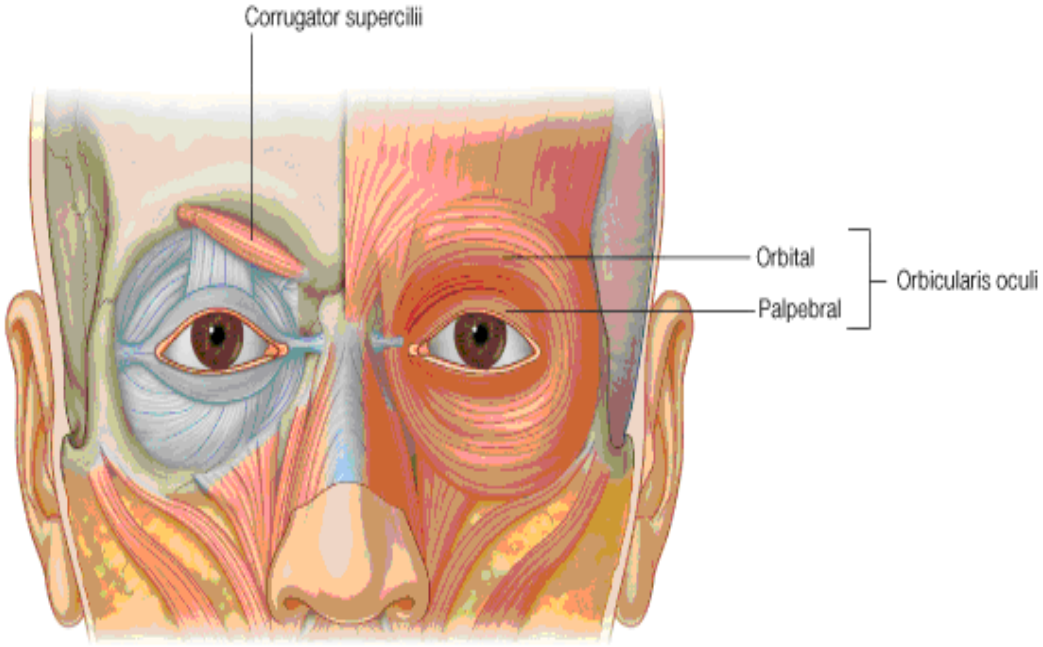


b. Orbital part:

* Action : firm closure of eyelids (for protection from dust & light).

c. Lacrimal part:

* A small part which lies medially.
* Action: Dilates the lacrimal sac to help drainage of tears.



* Nerve supply of Orbicularis Oculi muscle: **Facial N.**

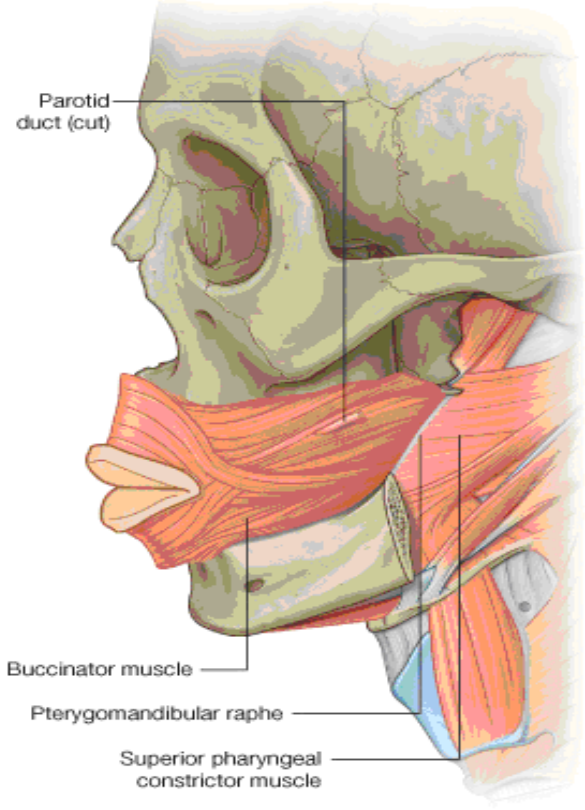
(B) Oral Group

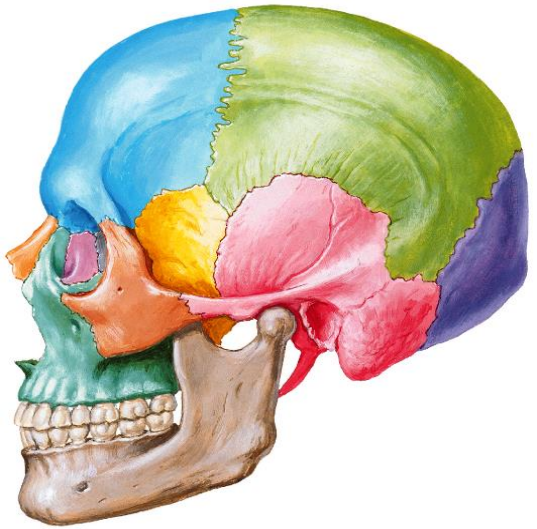
(Muscles of Lips and Cheeks)

(1) Buccinator

* It is the muscle of he cheeks.
* **Origin : from maxilla & mandible.**
* **Insertion: in lips.**
* **N. supply** : Facial N.
* **Action :**

1. Prevents the accumulation of the food in the vestibule of the mouth (by pressing cheeks against teeth).
2. Whistling (buccina = trumpet) and blowing of air.
3. Suckling (in babies).

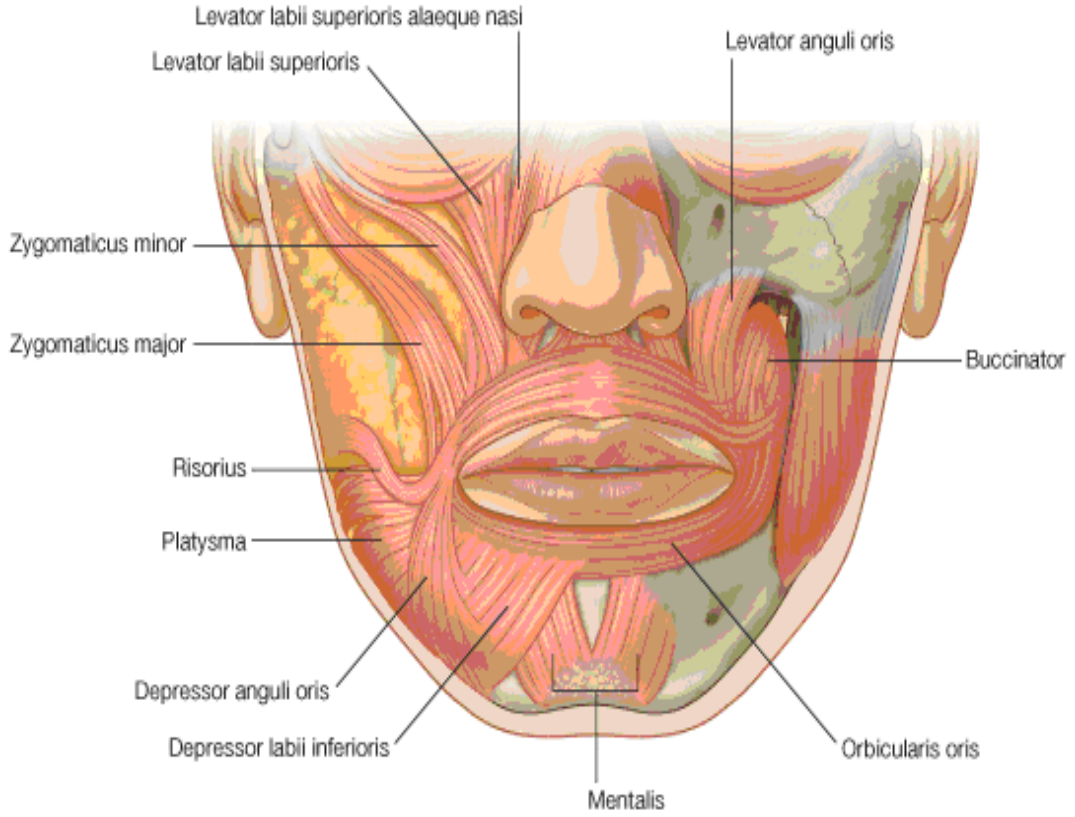




(2) Orbicularis Oris

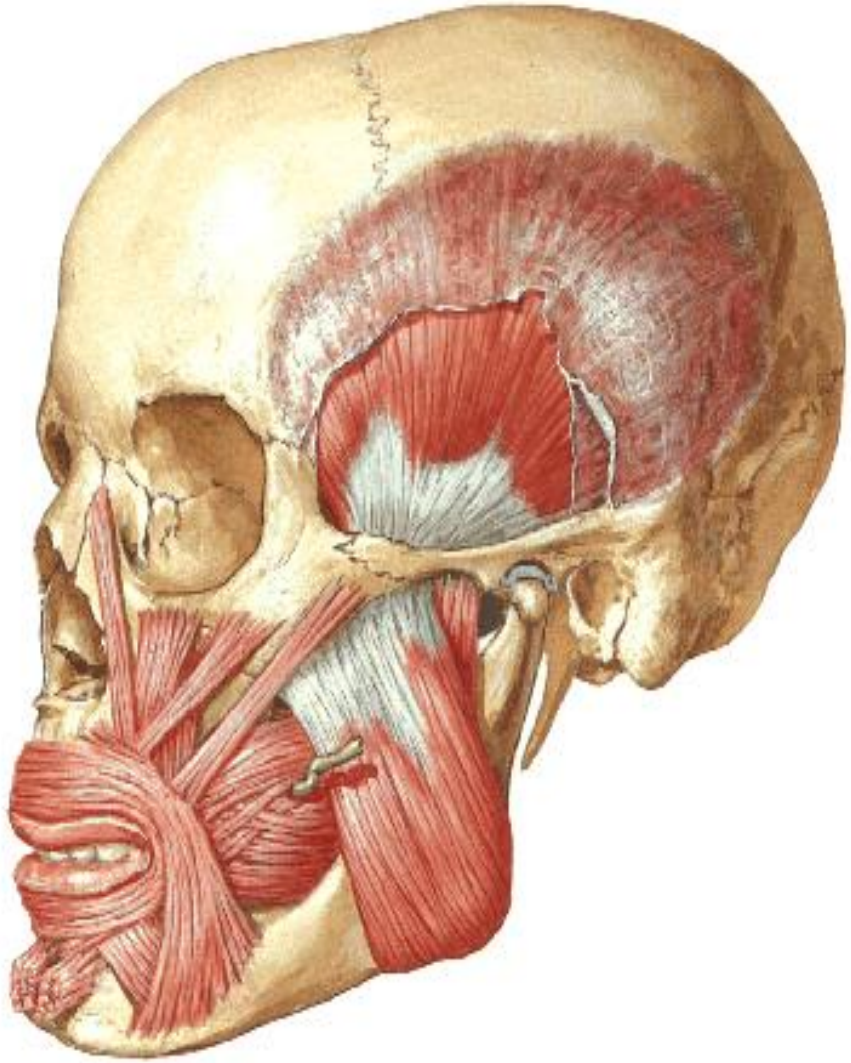
* It is the sphincter muscle of the lips (approaches lips together & help in whistling & speech).
* It is a circular muscle around the mouth (forming ellipse around the mouth).

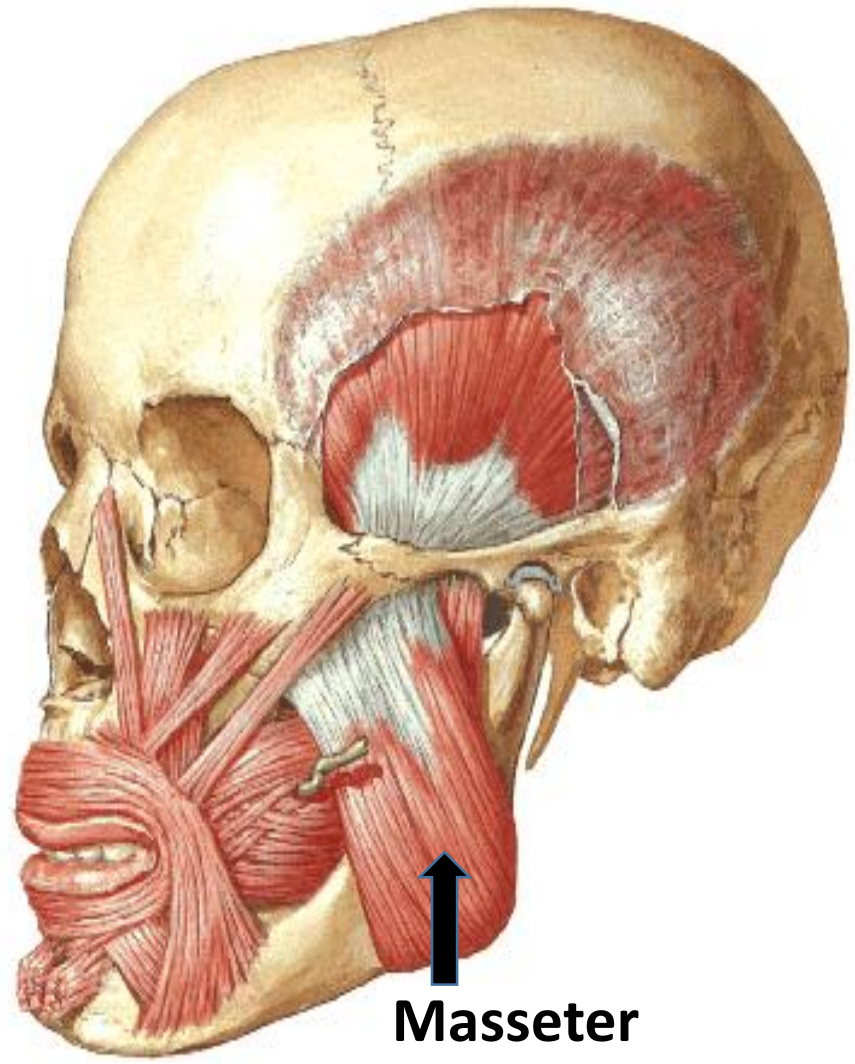
@ It is formed of 4 quadrants : upper right, lower right, upper left and lower left.

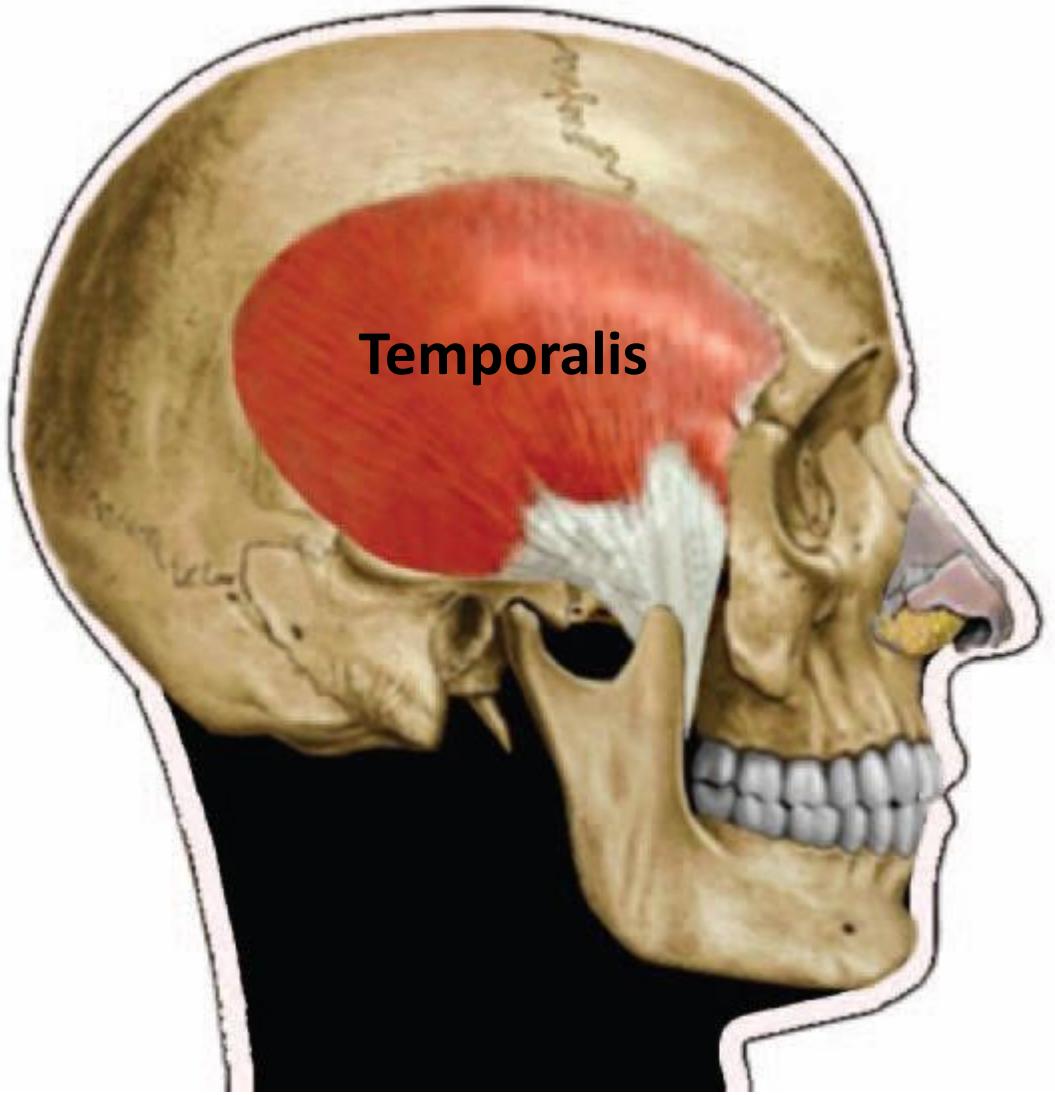


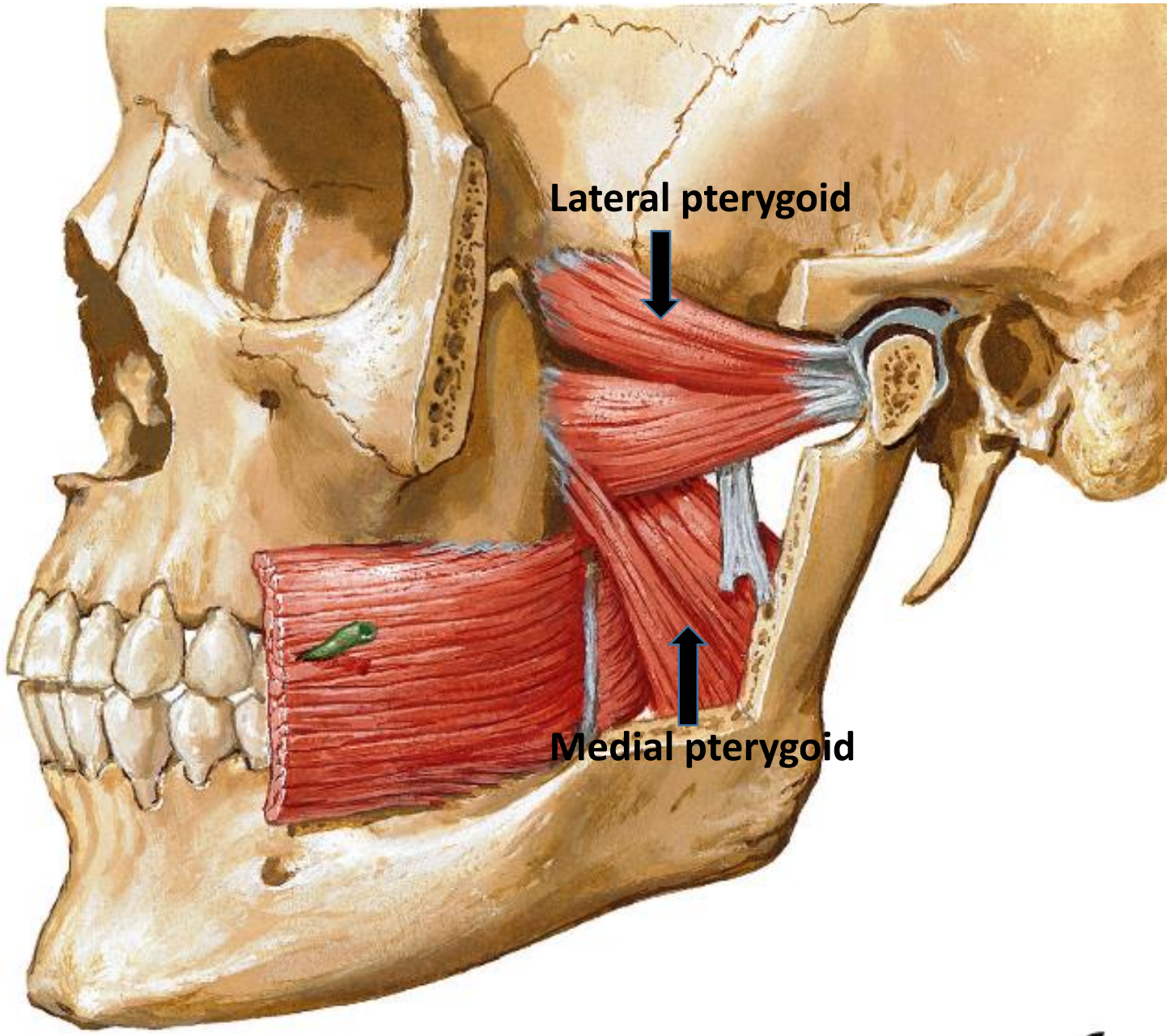
Muscles of Mastication

* These are 4 muscles which arise from the skull.
* All are inserted into the mandible.
* They are : Temporalis, Masseter, Medial pterygoid & Lateral pterygoid.
* They are all supplied by the mandibular nerve.
* All act on temporo-mandibular joint (TMJ).




Masseter


Temporalis


Lateral pterygoid
Medial pterygoid

ACTION OF MUSCLES OF MASTICATION

- **ALL MUSCLES OF MASTICATION → ELEVATE THE MANDIBLE TO CLOSE THE MOUTH, EXCEPT LATERAL PTERYGOID WHICH DEPRESSES THE MANDIBLE TO OPEN THE MOUTH.**

- **ALL MUSCLES OF MASTICATION PROTRUDE THE MANDIBLE, EXCEPT TEMPORALIS WHICH RETRACTS THE PROTRUDED MANDIBLE.**

Extraocular Muscles(Muscles of eyeball)

*** We have 7 extraocular muscles:**

* They lie outside the eyeball.
* They are responsible for the movements of the eyeball.
* They include:

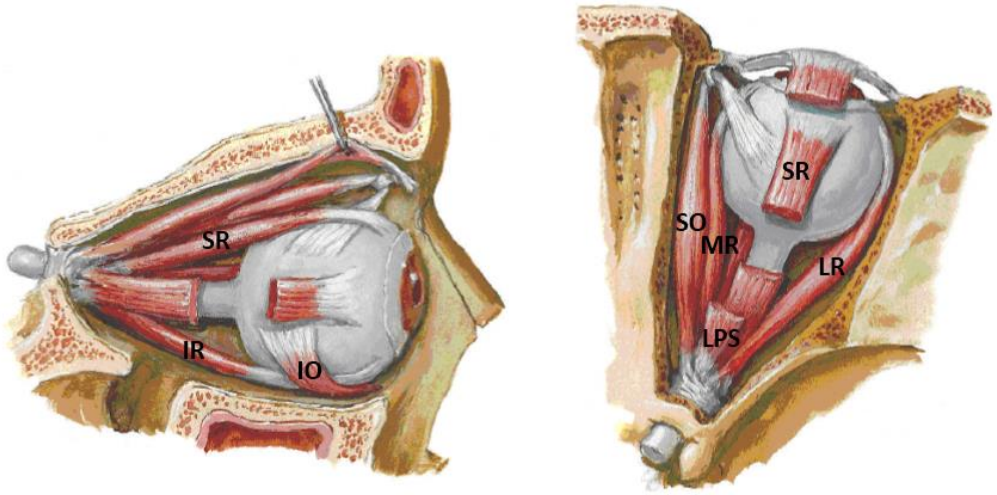
A. 4 recti muscles:

1. Superior rectus.
2. Inferior rectus.
3. Medial Rectus.
4. Lateral rectus.

B. 2 oblique muscles:

1. Superior oblique.
2. Inferior oblique.

C. Levator palpebrae superioris.



N.B.: All the 7 extraocular muscles are supplied by the Oculomotor N. (3rd cranial nerve) EXCEPT:

1. Lateral rectus **(LR6)** : Abducent N. (6th cranial nerve).
2. Superior oblique **(SO4)**: Trochlear N. (4th cranial nerve).

Muscles of Neck:

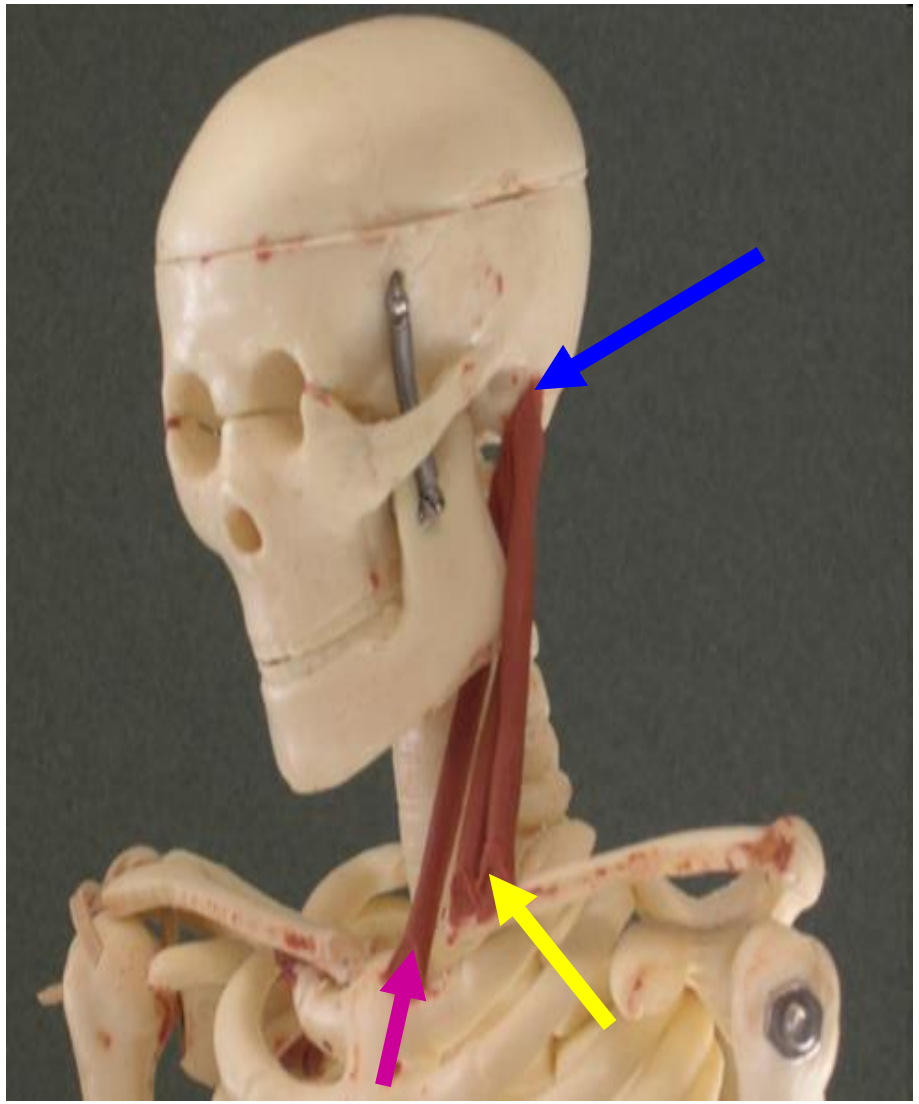
A. Sternomastoid muscle

* **Origin** :

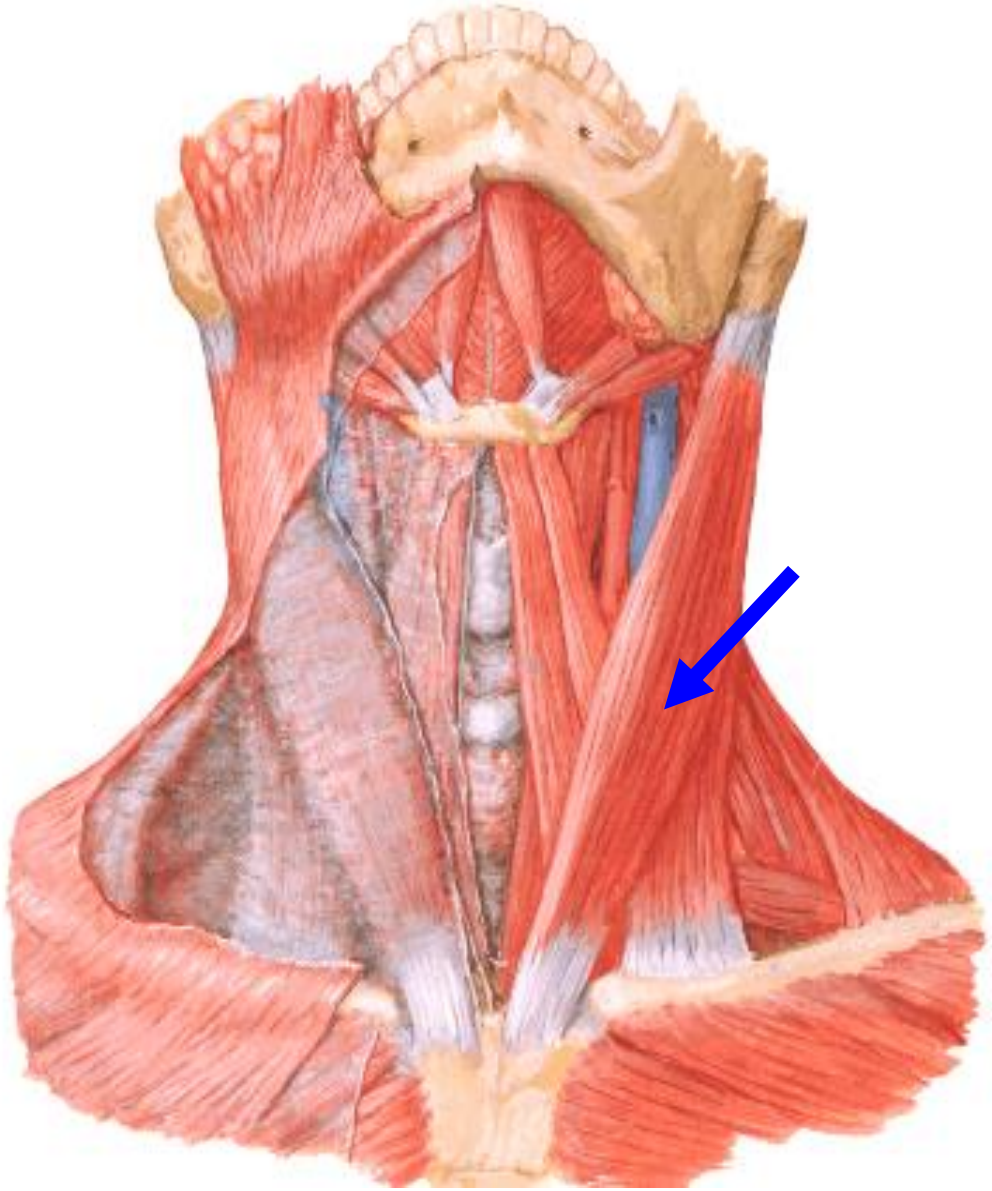
**Sternal head → front of manubrium sterni.

**Clavicular head → medial 1/3 of clavicle.

* **Insertion** : mastoid process.

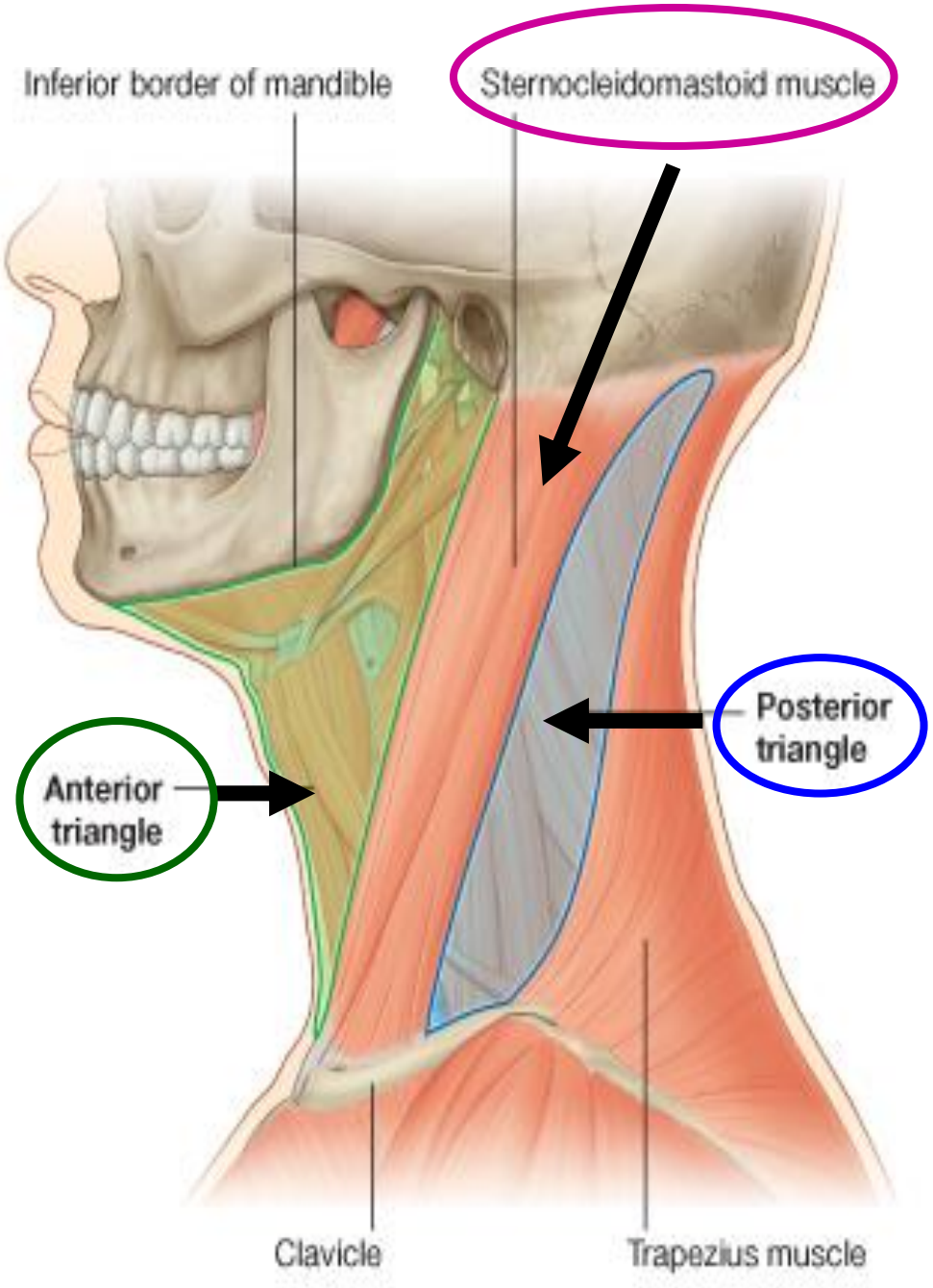


* **Nerve supply: Spinal accessory N. (11th cranial nerve).**
* **Action :**
* **One muscle bends the head to its own side & turns the face to the opposite side.**
* **Both muscles acting together pull the head forwards & flex the neck.**



* **Sternomastoid divides the side of the neck into 2 triangles:**

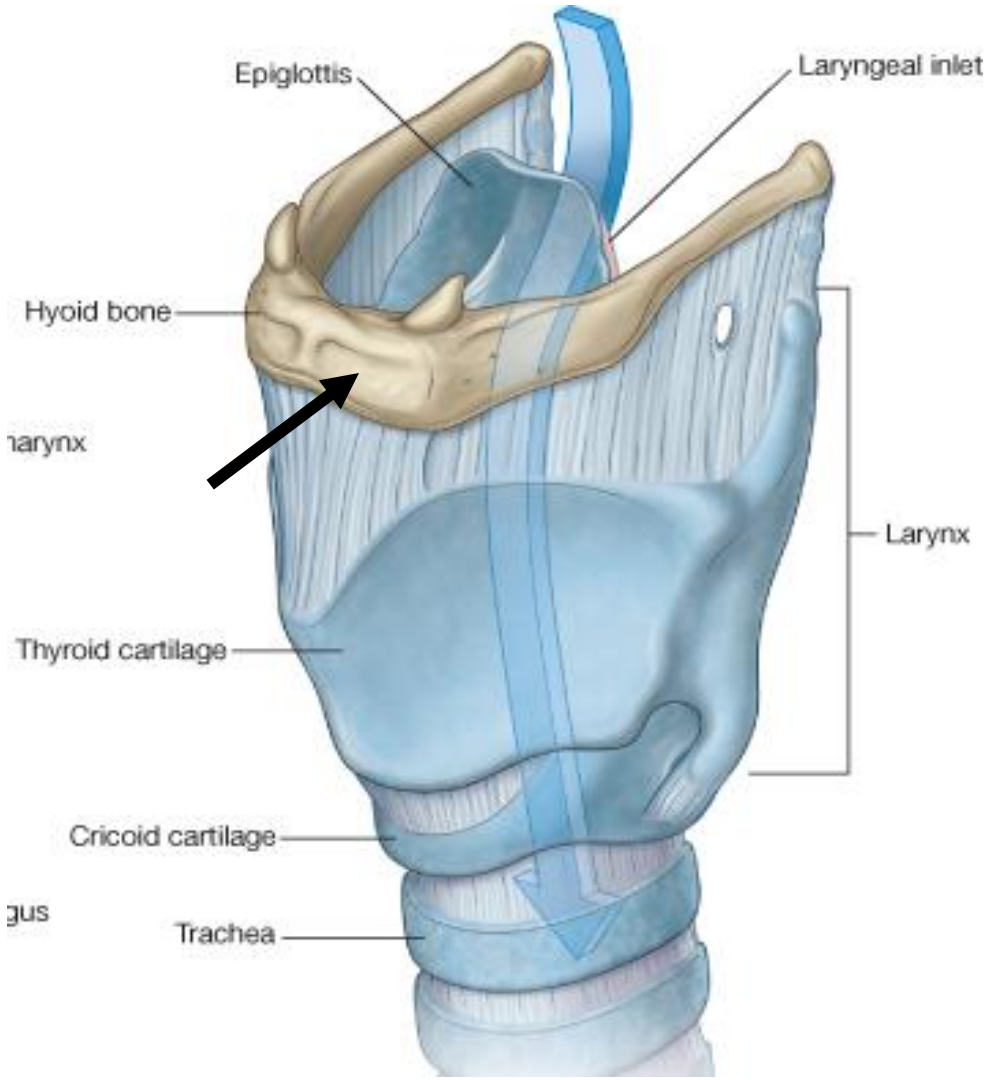
1. **Anterior triangle**
   → **infront of the sternomastoid.**
2. **Posterior triangle**
   → **behind the sternomastoid.**



What is the Hyoid bone ?

* A small U- shaped bone located just superior to the larynx.

* It does not articulate with any other bone but is suspended from the skull by stylohyoid ligament.



B. Suprahyoid Muscles

1. Digastric Muscle

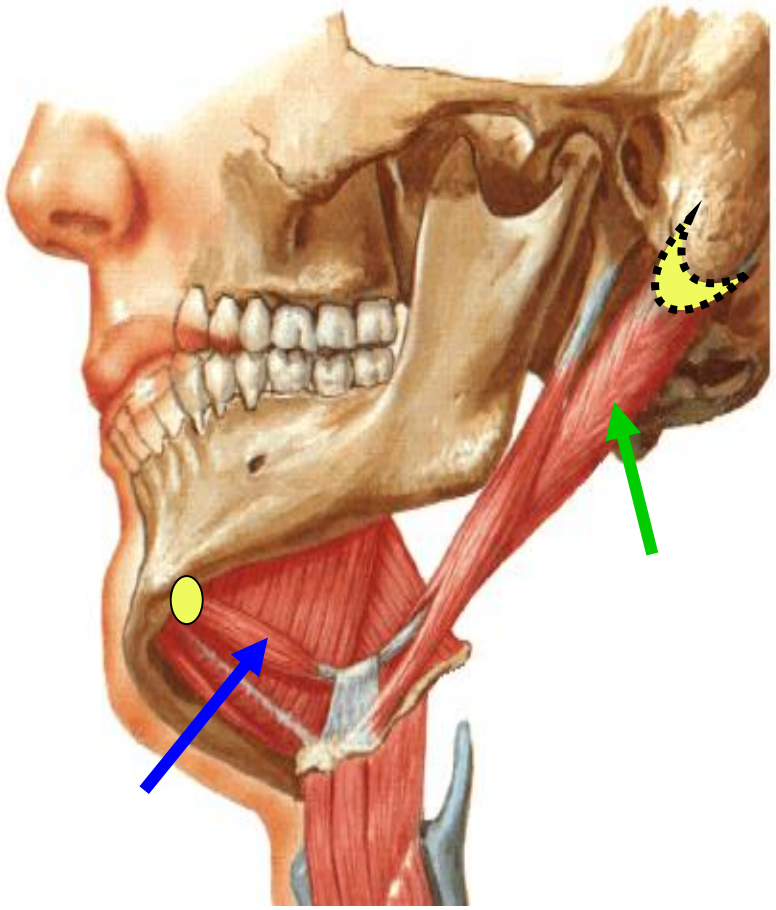
* Origin :

* Anterior belly → lower border of mandible.

* Posterior belly → medial surface of mastoid process.

* Insertion :

* Both bellies meet at an intermediate tendon attached to → Hyoid bone.



1. Digastric Muscle (contd.)

*** Action :**

1. **Raises hyoid bone (during swallowing).**
2. **Depresses mandible (if the hyoid bone is fixed)**

*** Nerve supply:**

- **Anterior belly → mylohyoid N. (from mandibular N.).**
- **Posterior belly → facial nerve.**

2. Mylohyoid Muscle

*** Origin :**

*** Mylohyoid line of mandible**

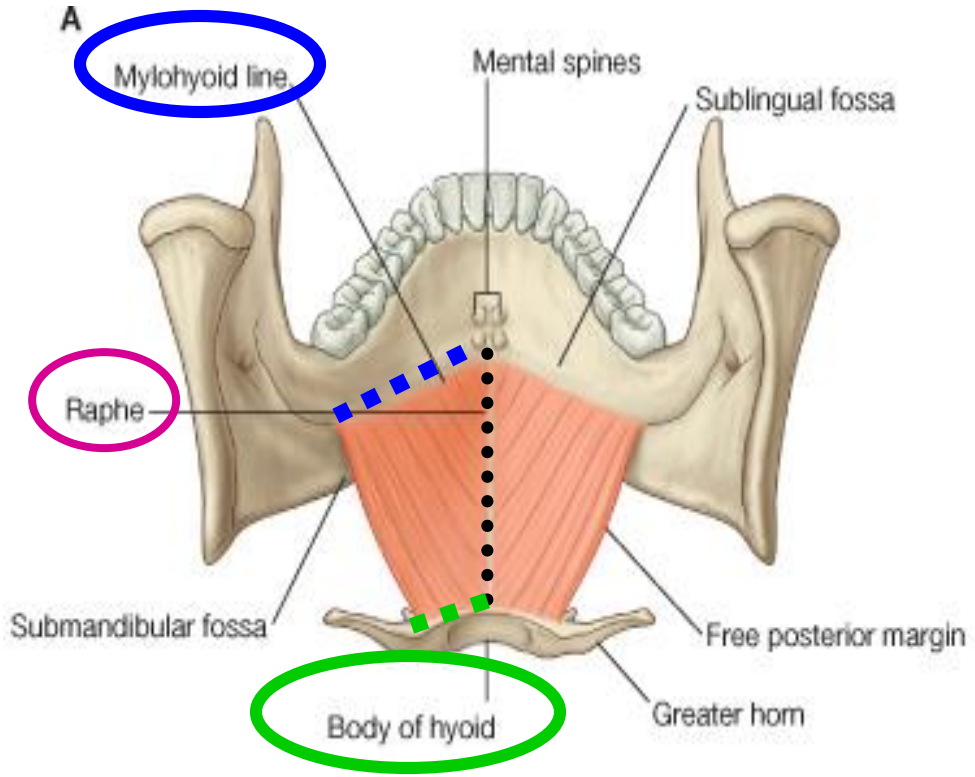
*** Insertion :**

*** Mylohyoid raphe (between symphysis menti & hyoid bone)**

*** Nerve supply : Mylohyoid nerve (from mandibular nerve).**

*** Action:**

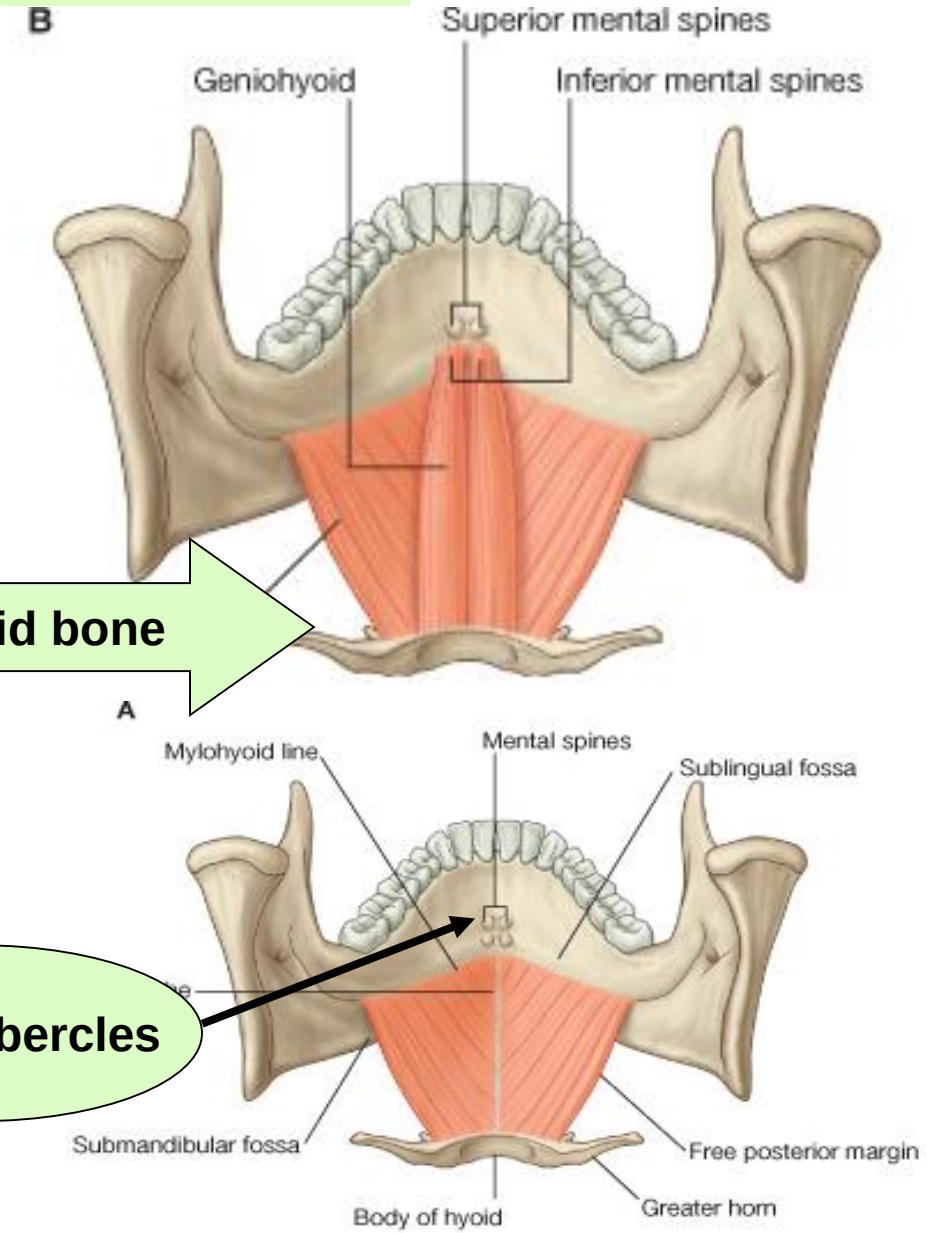
1. **Elevates hyoid bone during swallowing**
2. **Support the floor of the mouth**
3. **Depresses mandible**



3. Geniohyoid Muscle

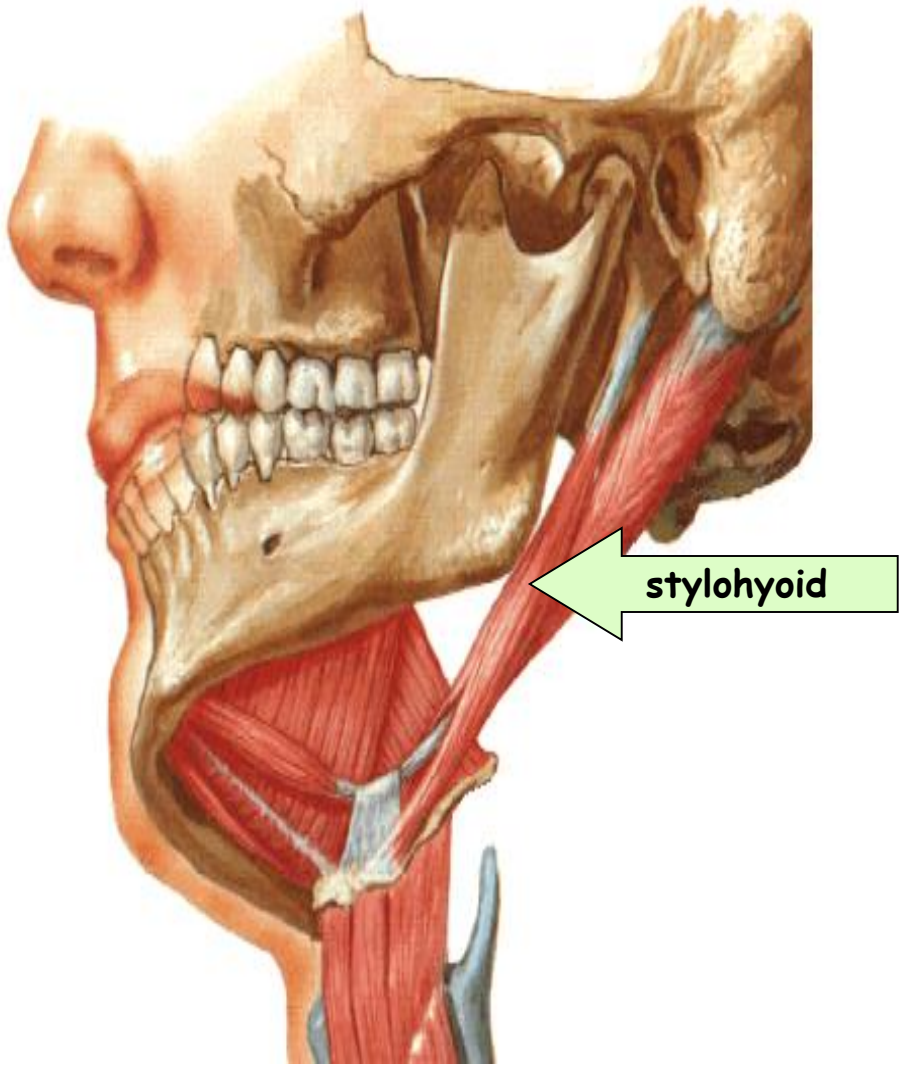
* It lies deep to mylohyoid (above it)
* Origin :
* Genial tubercle of mandible
* Insertion:
* Body of Hyoid bone
* Nerve supply:
* C1 fibers (1st spinal nerve) (through hypoglossal nerve)
* Action :

1. Elevates hyoid bone
2. Depresses mandible



4. Stylohyoid Muscle

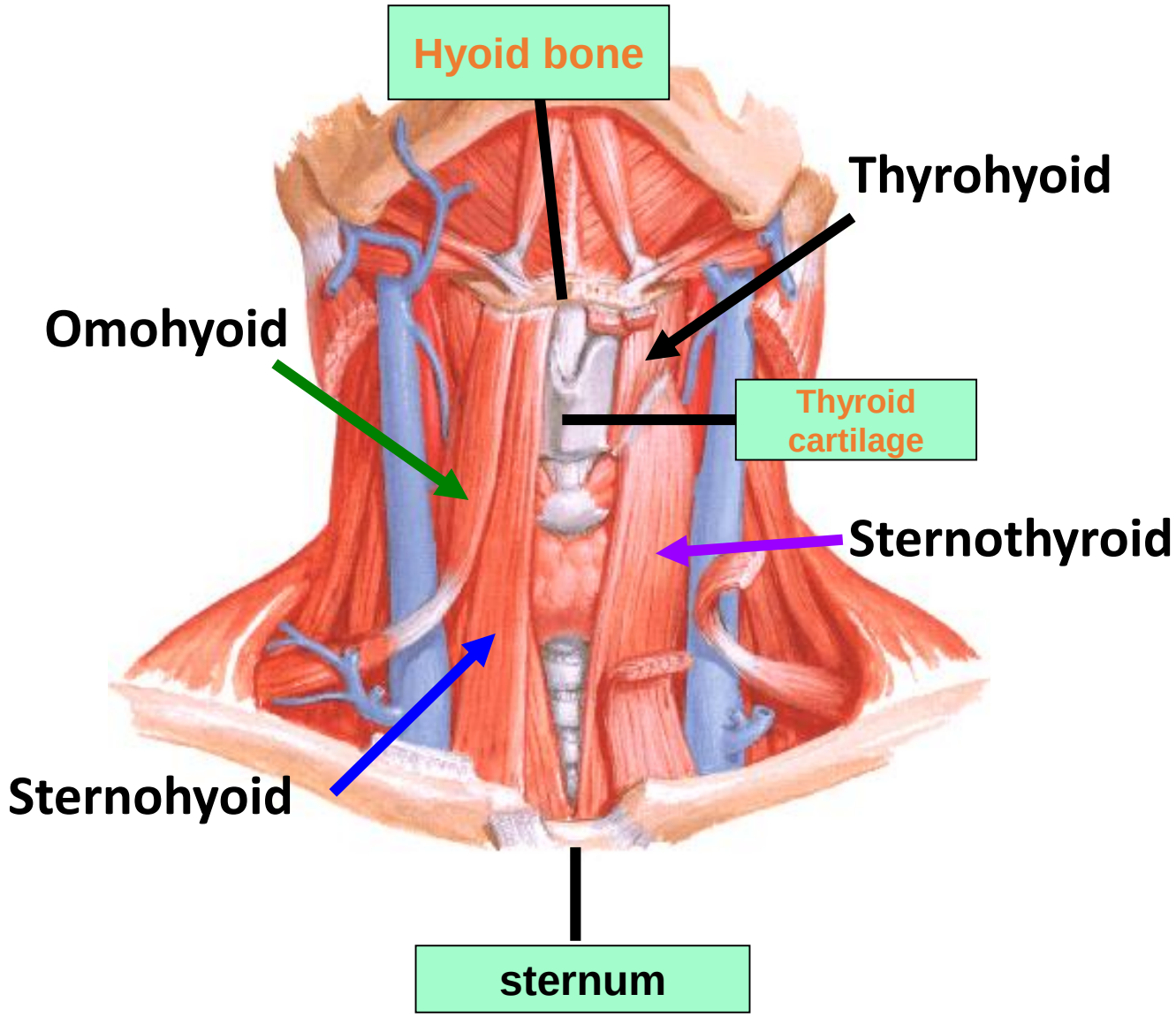
* A small muscle that lies along upper border of posterior belly of digastric
* Origin → styloid process
* Insertion → hyoid bone
* Nerve supply → facial nerve
* Action → elevates hyoid bone



C. Infrahyoid Muscles

* 4 muscles that lie below the hyoid bone.
* Include:

1. Sternohyoid.
2. Omohyoid.
3. Sternothyroid.
4. Thyrohyoid.



C. Infrahyoid muscles (contd.)

* All infrahyoid muscles are supplied by Ansa Cervicalis (C1,2,3) except Thyrohyoid which is supplied directly by C1 (through hypoglossal N.).

@ All infrahyoid muscles depress the hyoid bone.

Thank You Thank You Thank You!!!!

General Anatomy

Lecture 8: Muscles of Thorax, Abdomen & Pelvis

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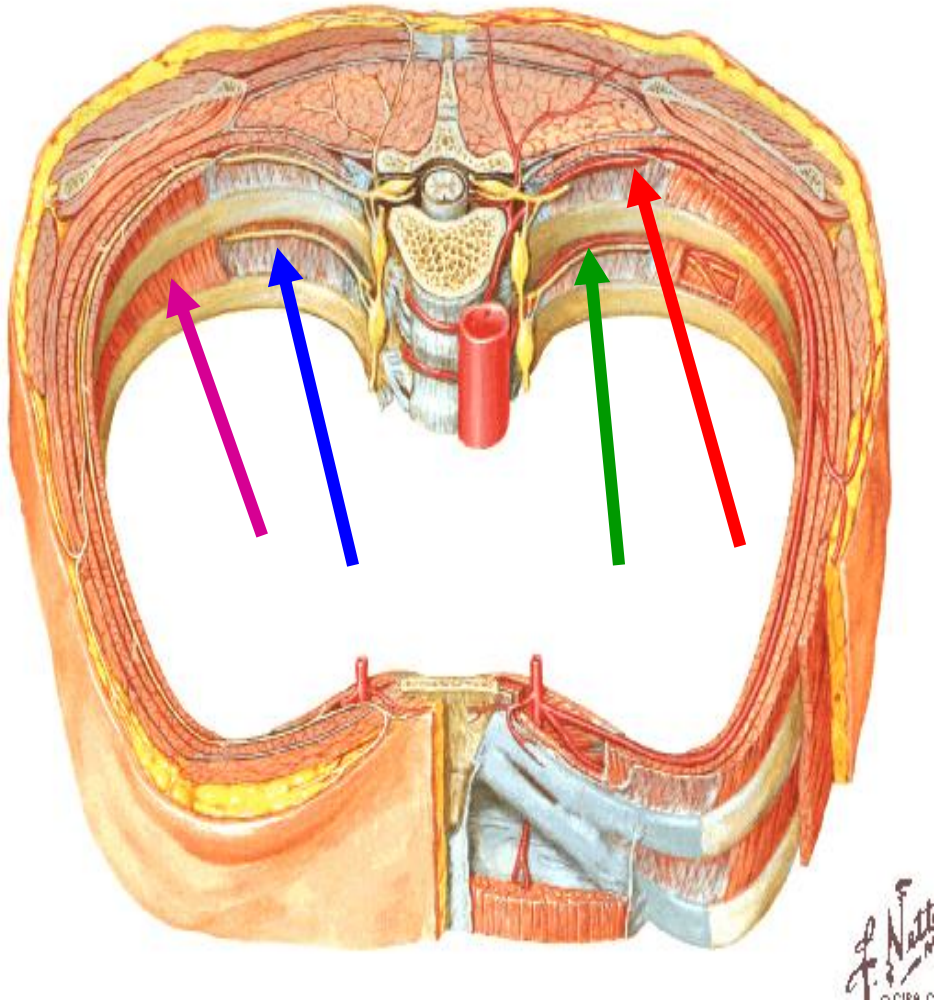
Thoracic Wall

* Formed by the thoracic cage + the soft tissues which occupy the intercostal spaces.

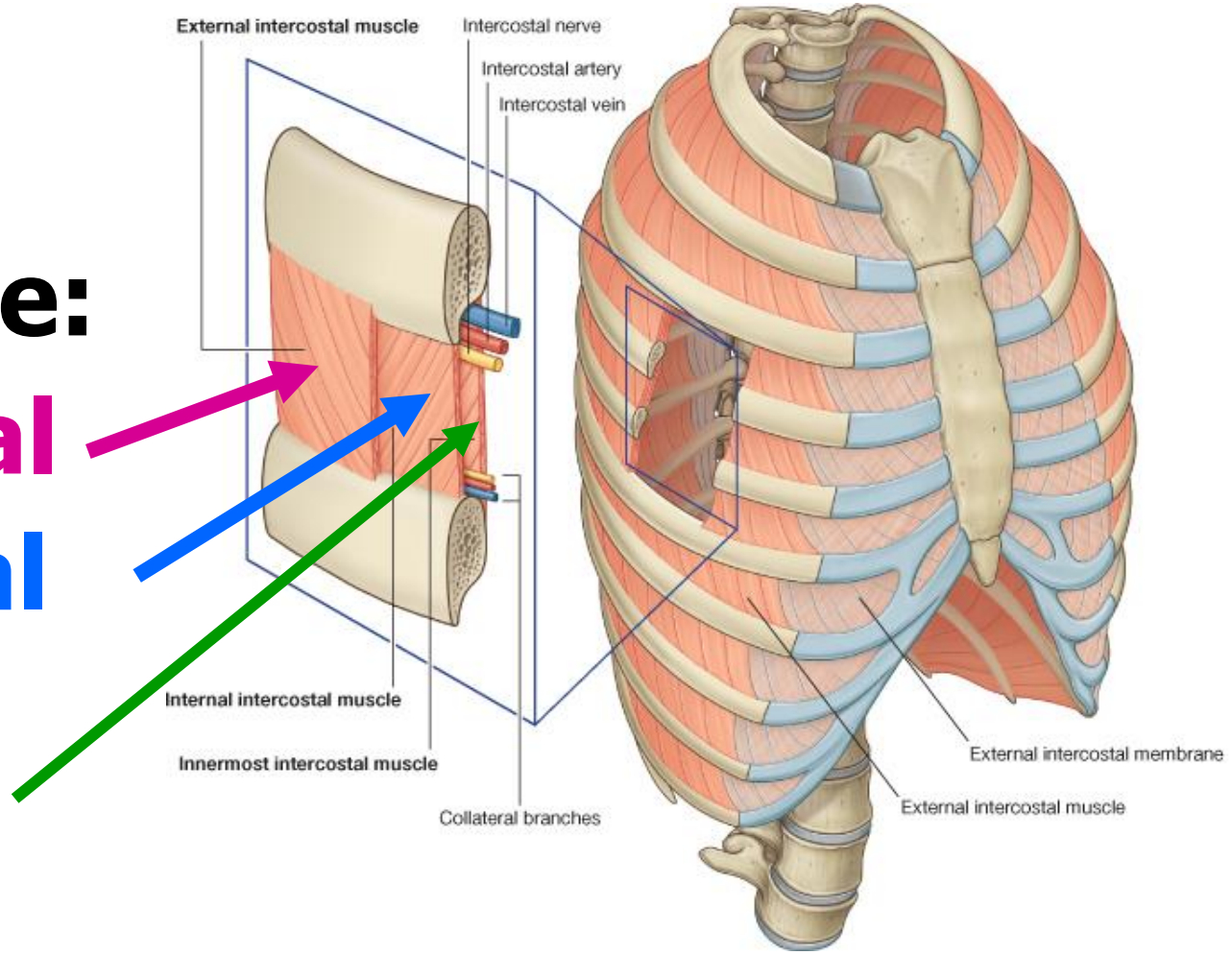
* It includes Intercostal muscles, membranes, nerves & vessels.



Intercostal muscles and membranes

** 3 layers of flat muscles from outside→ inwards are:

1. External intercostal
2. Internal intercostal
3. Innermost intercostal

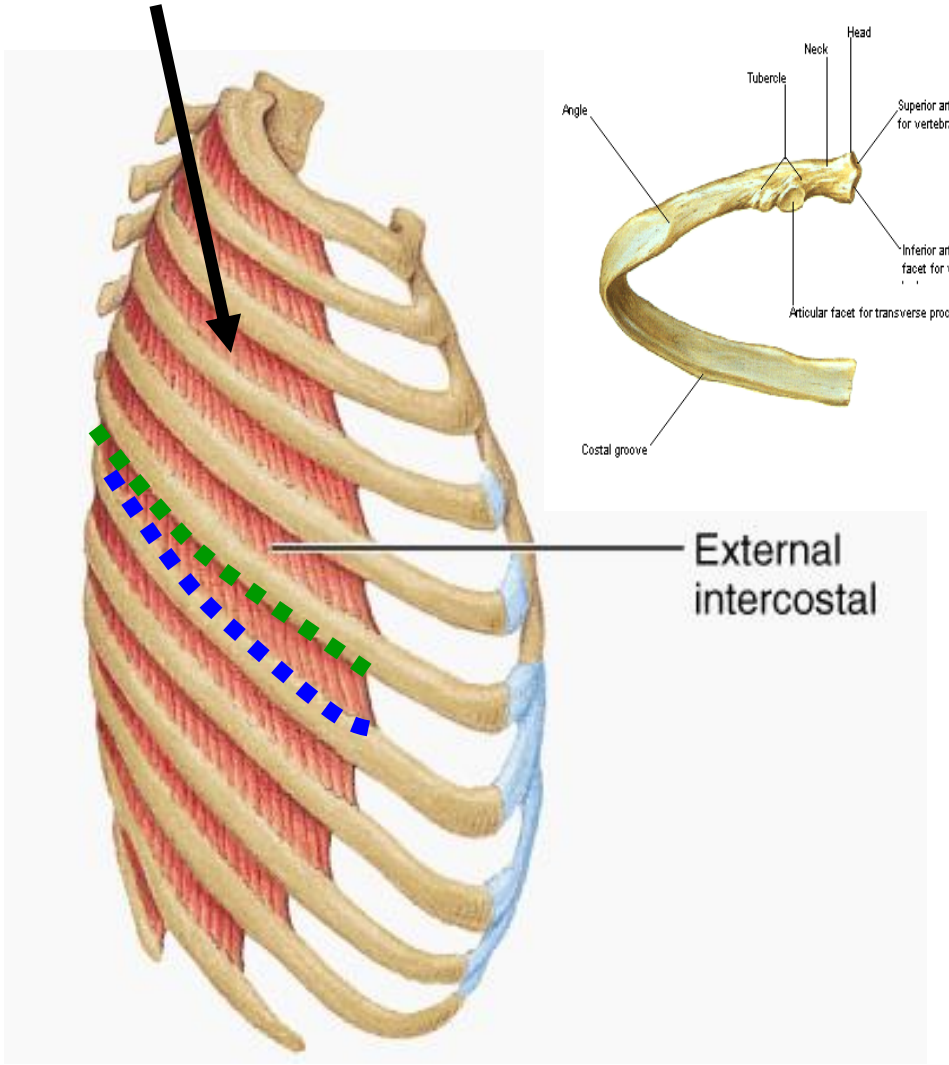


1. External intercostal Muscle

* Direction of fibers → obliquely downwards & forwards.

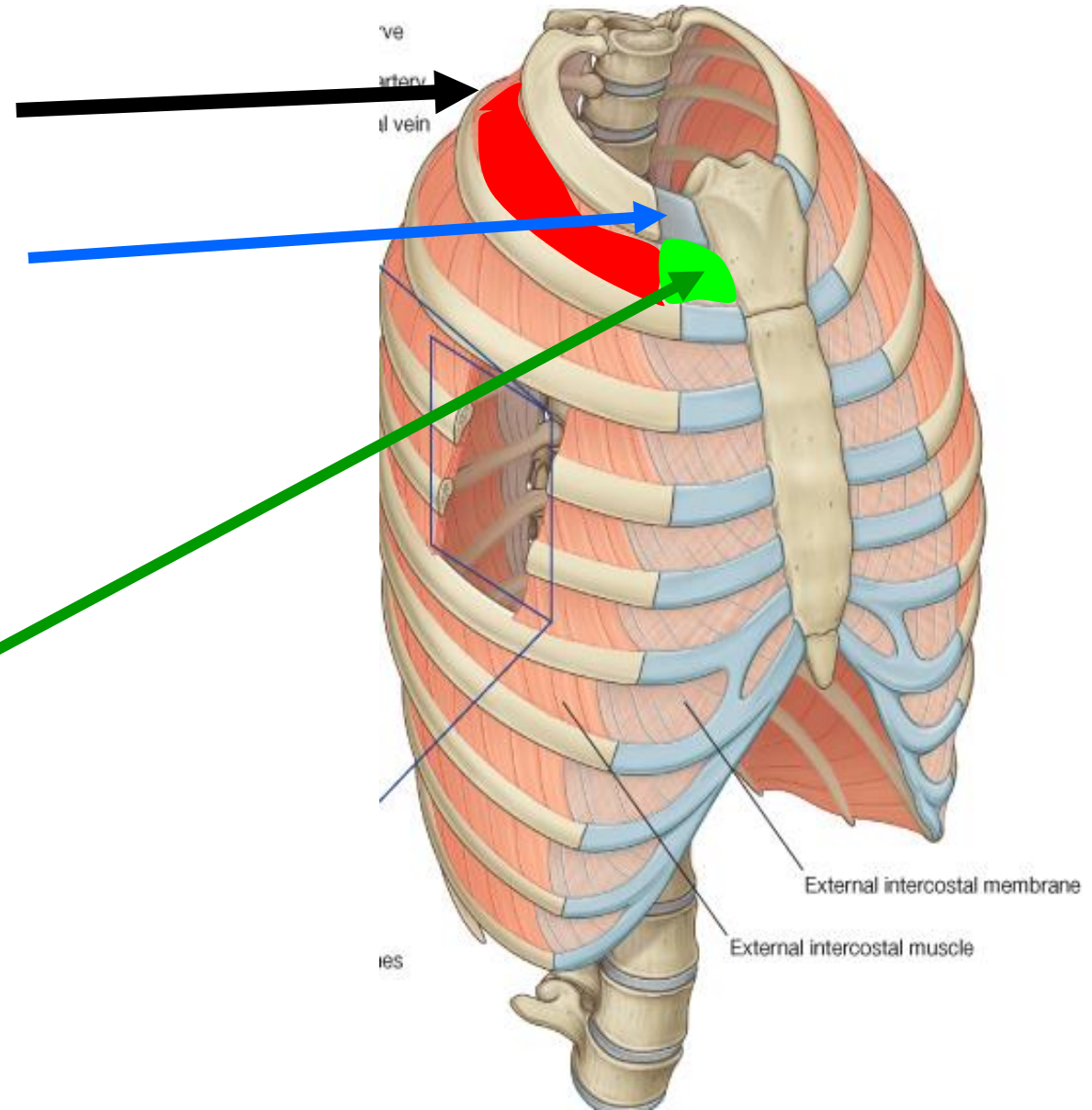
* Origin → lower border of rib above.

* Insertion → upper border of rib below.



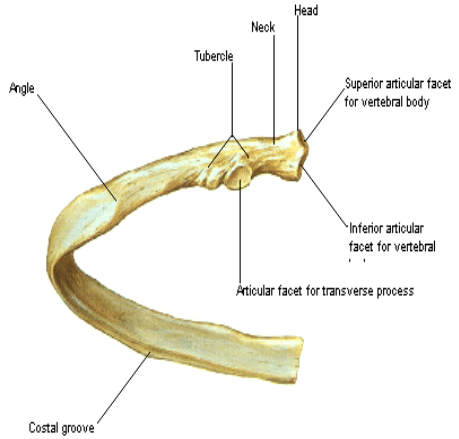
1. External intercostal Muscle (contd.)

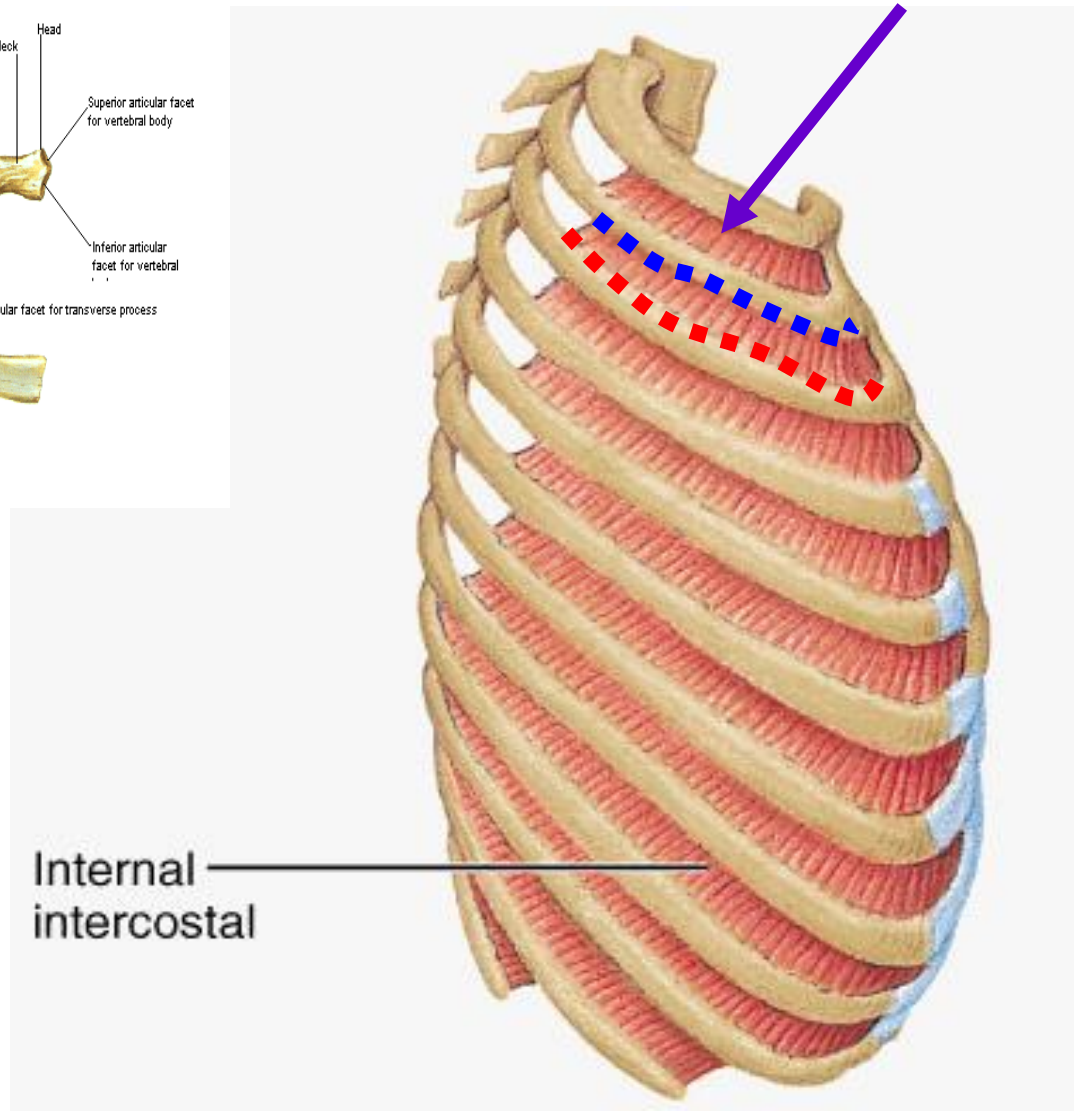
* **Extent**→ from from tubercle of rib posteriorly to **junction of rib with its costal cartilage** (costo-chondral junction) **anteriorly** where it is **replaced by external (anterior) intercostal membrane** which extends to lateral margin of sternum.



2. Internal intercostal muscle

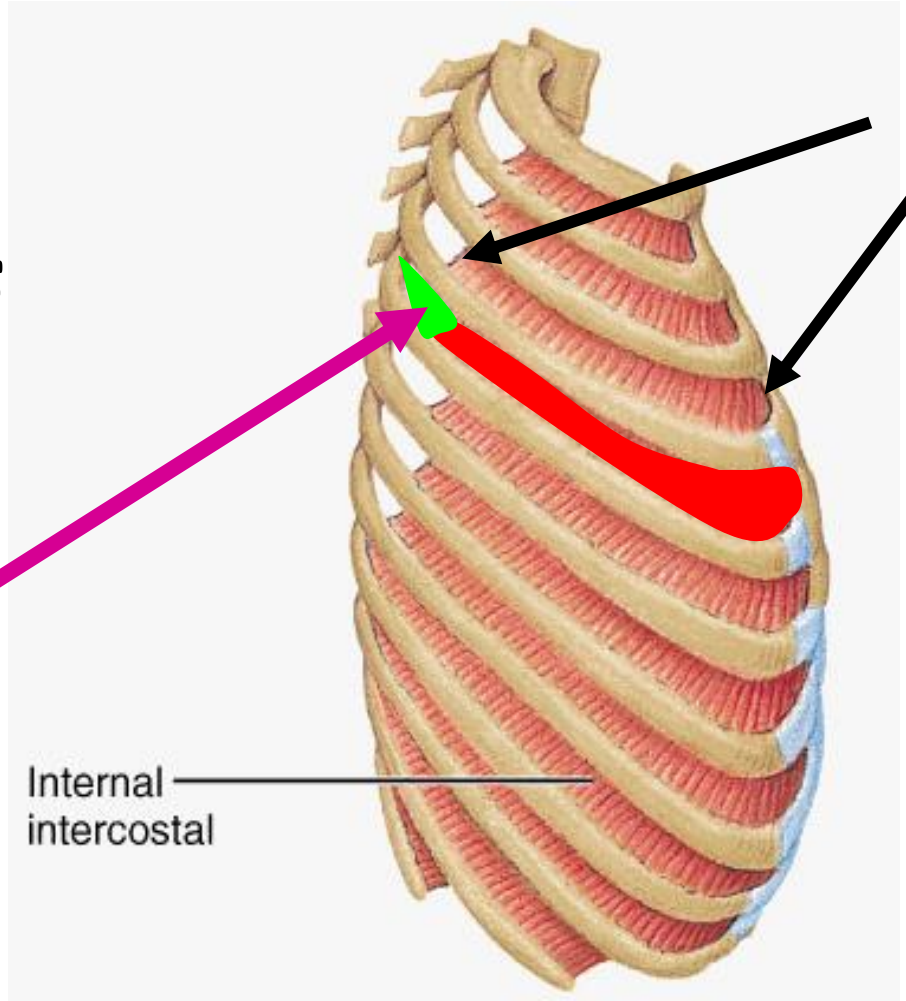
* **Direction of fibers** → **downwards & backwards.**
* **Origin** → **costal groove of rib above.**
* **Insertion** → **upper border of rib below.**





2. Internal intercostal muscle (contd.)

* Begins from lateral margin of sternum anteriorly to angle of rib posteriorly where it is replaced by internal (posterior) intercostal membrane.



3. Innermost intercostal muscle

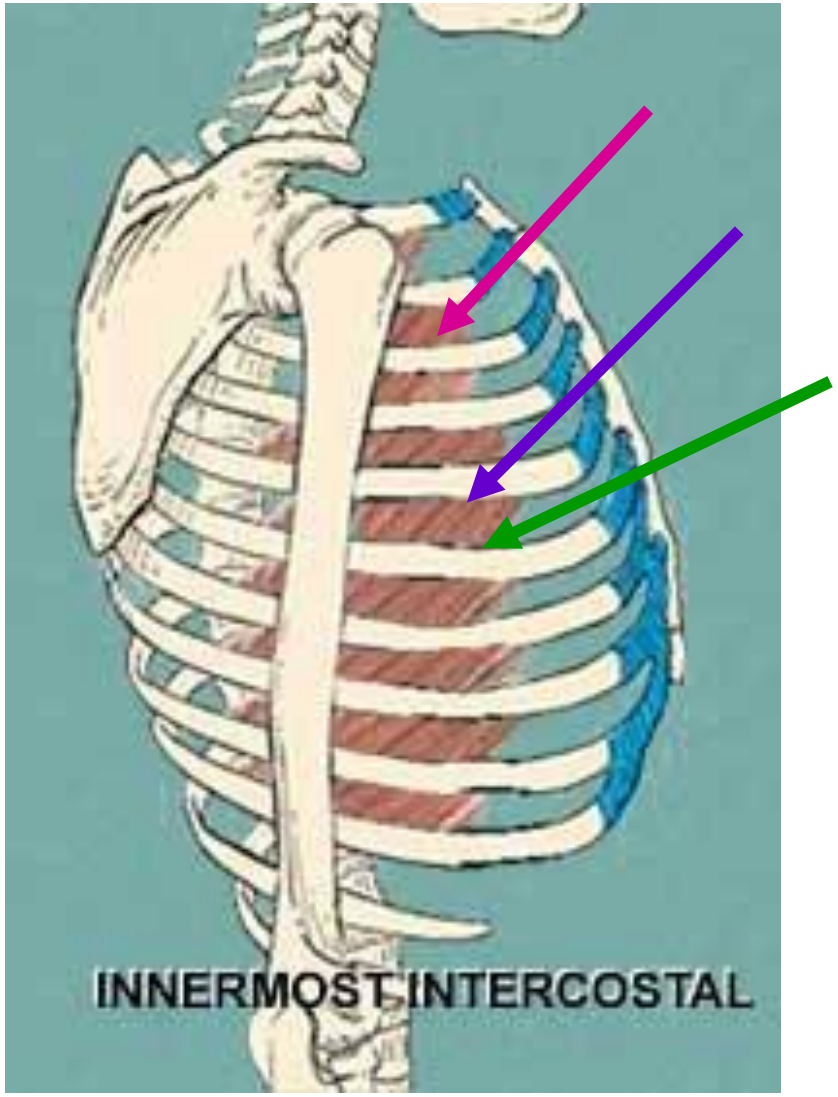
* It is the deepest part of internal intercostal which is split off by the intercostal nerve & vessels.

* Direction of fibers → downwards & backwards.

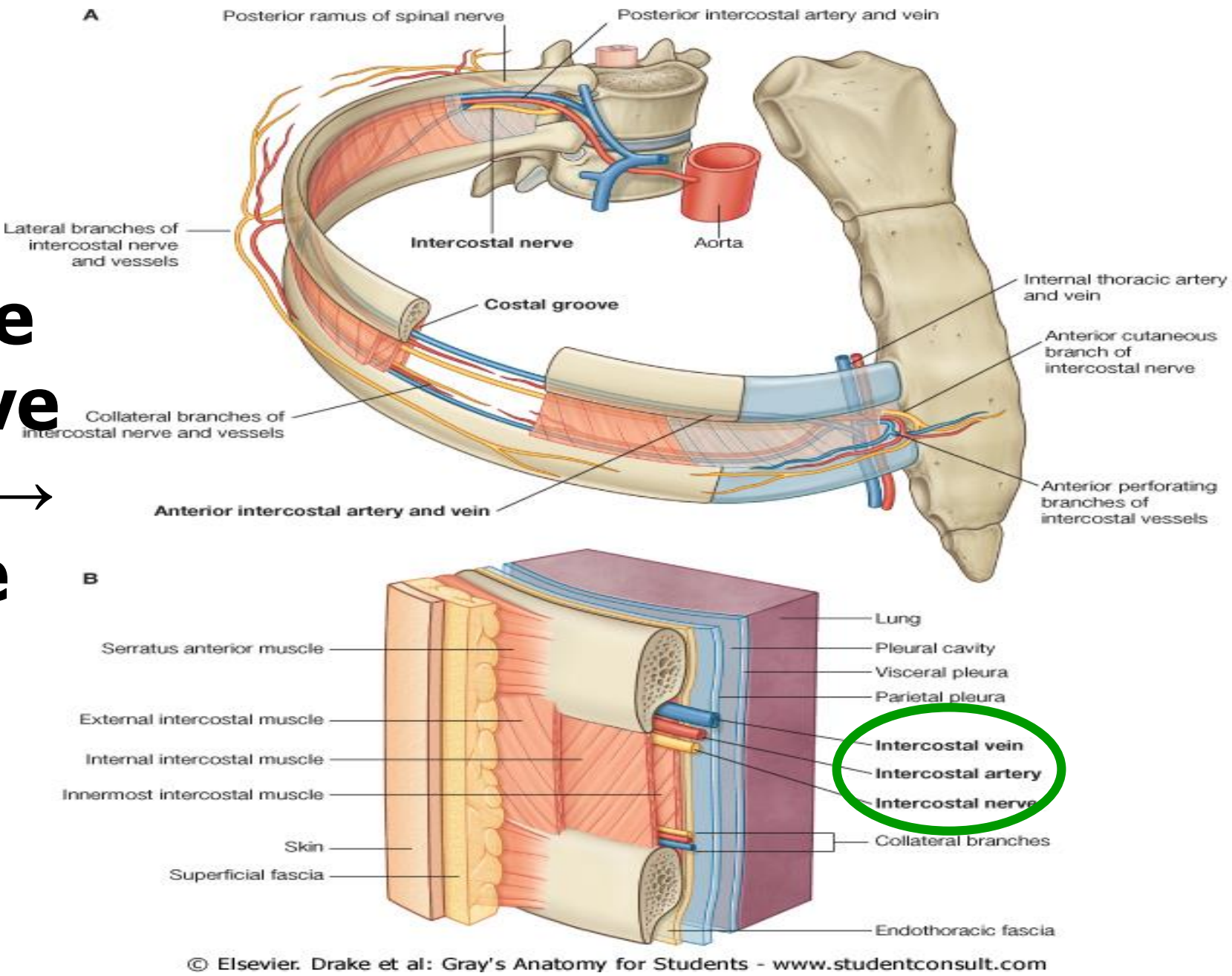
* Origin→ costal groove of rib above.

* Insertion → upper border of rib below.

* Occupies the middle 2/4 of intercostal space.



*** The neurovascular plane (i.e. the plane where the intercostal nerve & vessels run) → lie between the intercostal & innermost intercostal muscles.**



** Action of Intercostals:

- External intercostals → elevate the ribs (inspiration).
- Internal & innermost intercostals → depress the ribs (expiration).

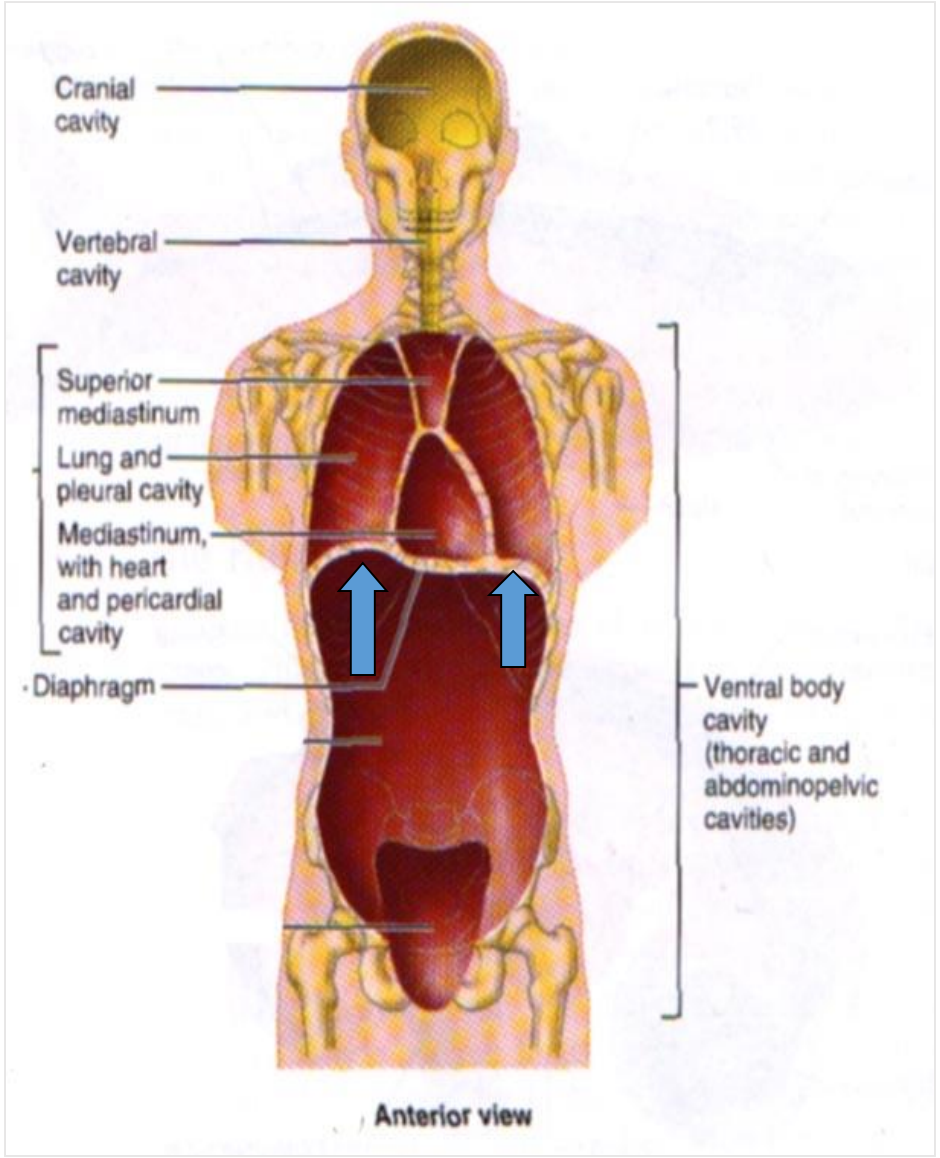
** Innervation of Intercostal Muscles:

All are supplied by the corresponding intercostal nerves.

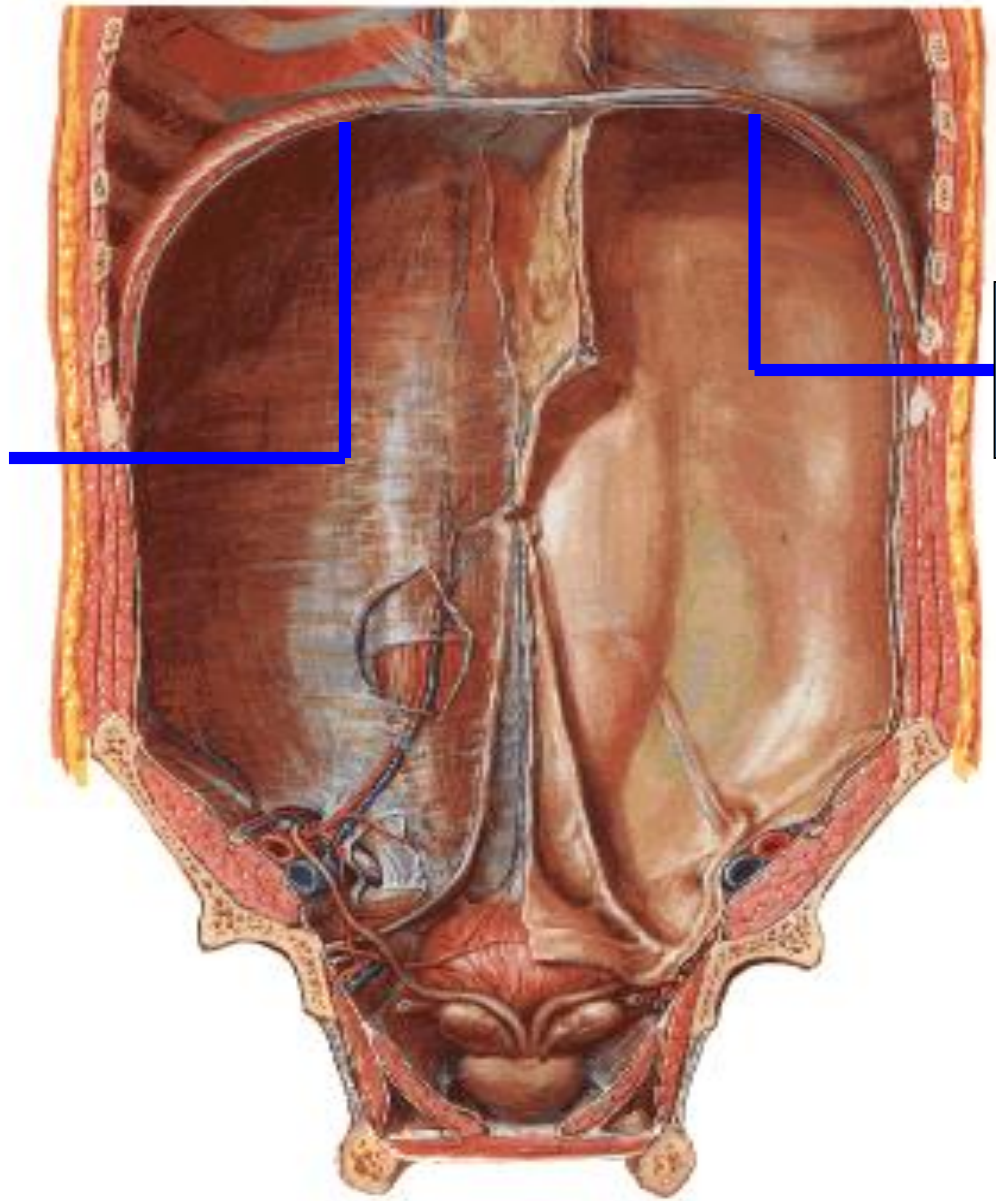
B: Diaphragm:

SHAPE OF DIAPHRAGM

* Dome shaped.
* A musculo-tendinous partition which separates the thoracic cavity from the abdominal cavity.
* Upper surface is convex towards the thoracic cavity.
* Lower surface is concave towards the abdominal cavity.
* Right side is called Right copula & bulges higher up than the left copula.



Internal View

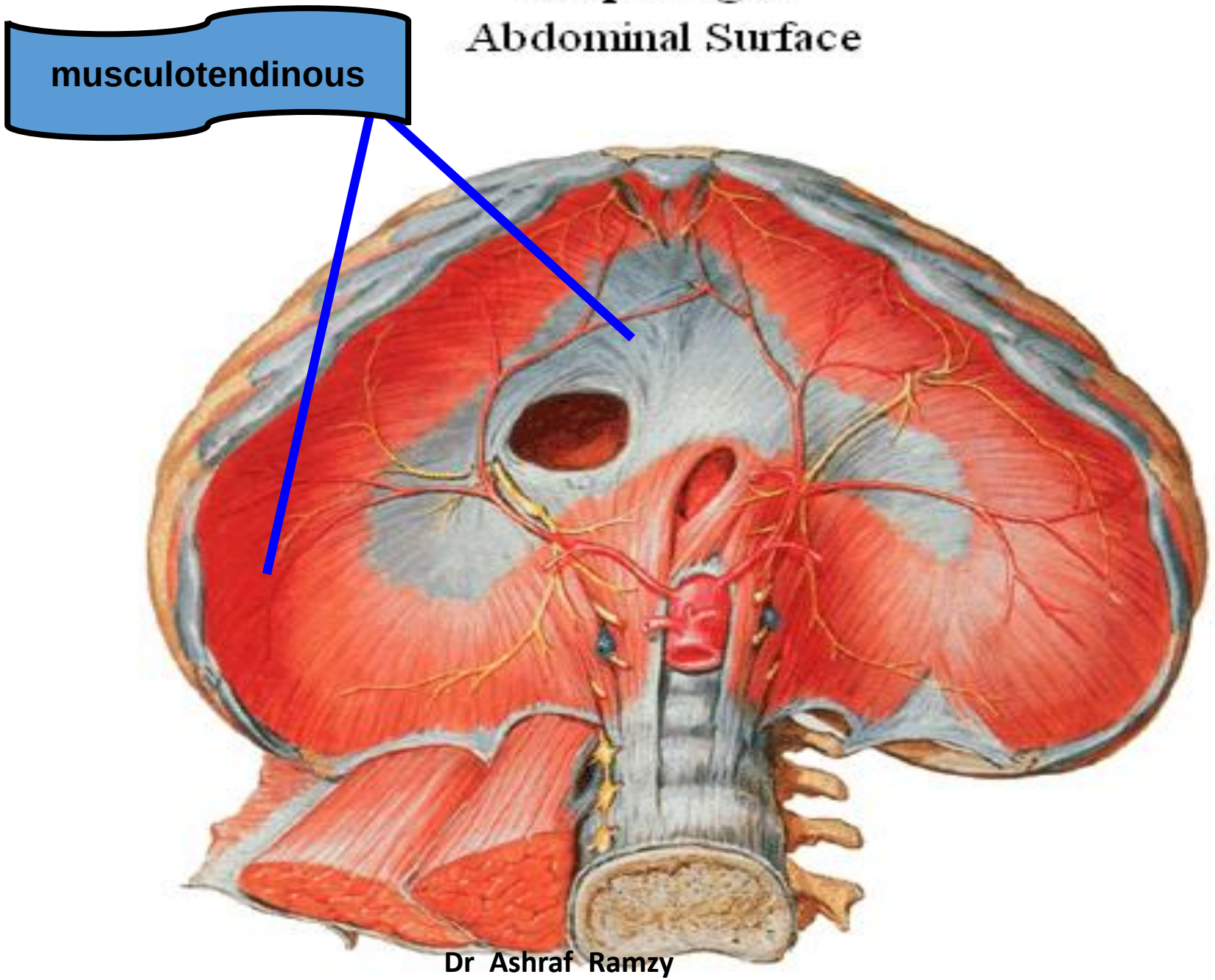


left copula

Right copula

Diaphragm

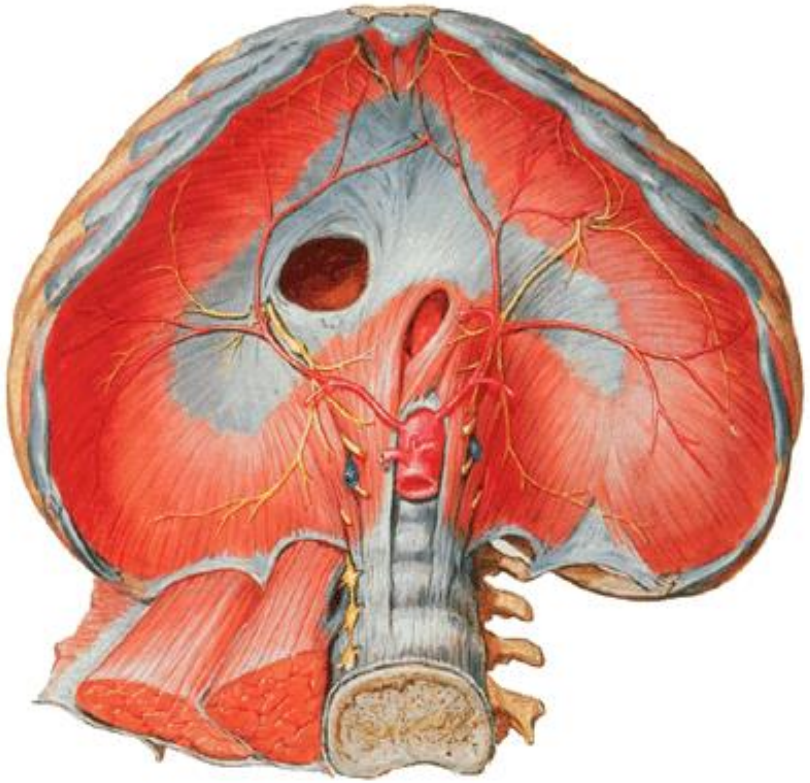
Abdominal Surface

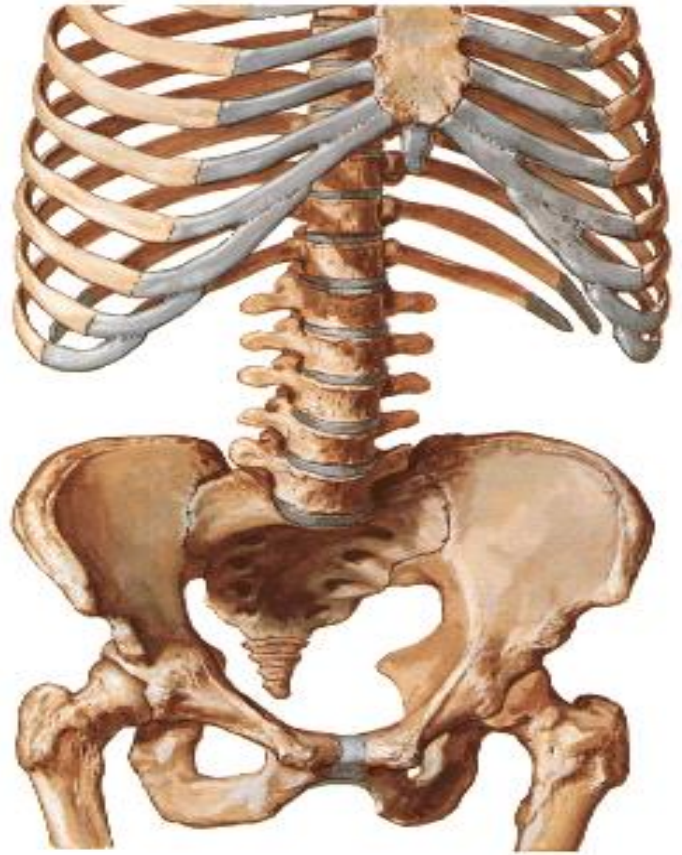


Origin of the Diaphragm:

* From circumference of the thoracic outlet:

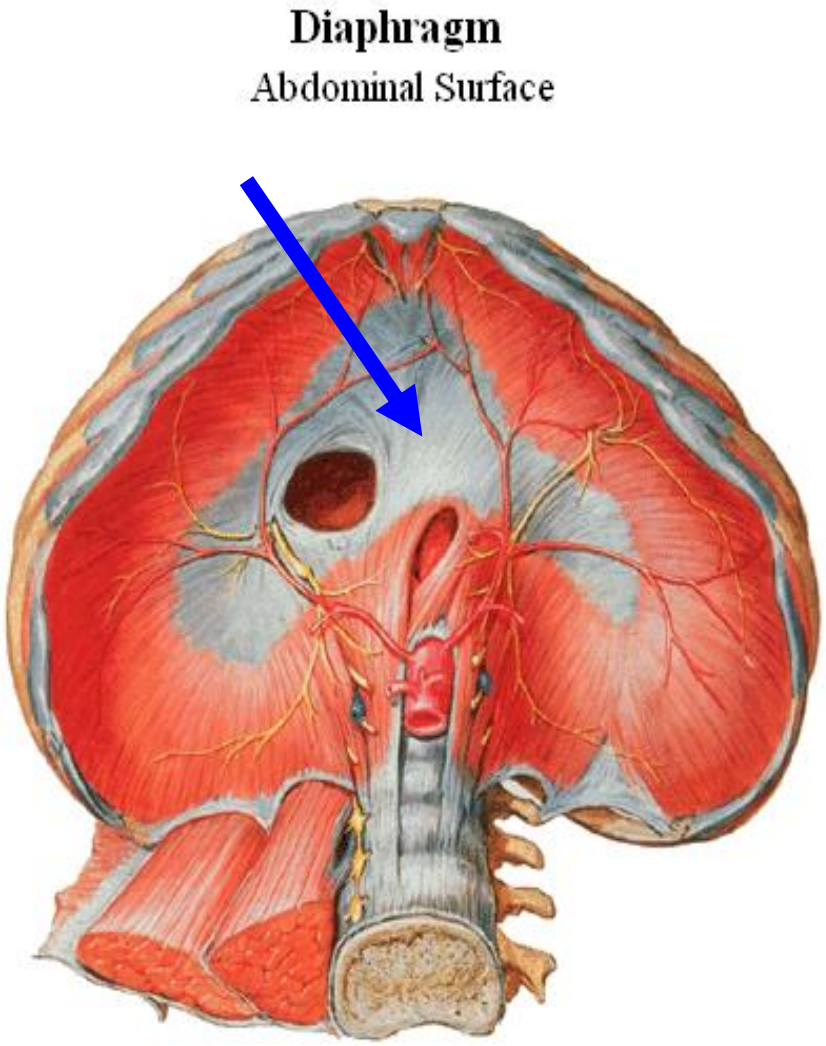
1. Sternal origin → from back of xiphoid process.
2. Costal origin → from the inner surfaces of the lower 6 costal cartilages.
3. Vertebral origin → from upper 3 lumbar vertebrae.





Insertion of Diaphragm:

* Fibers from sternal, costal & vertebral parts converge to be inserted into a crescentic shaped **central tendon.**
* Central tendon is fibrous in structure, semilunar in shape & have one median & 2 lateral leaflets.

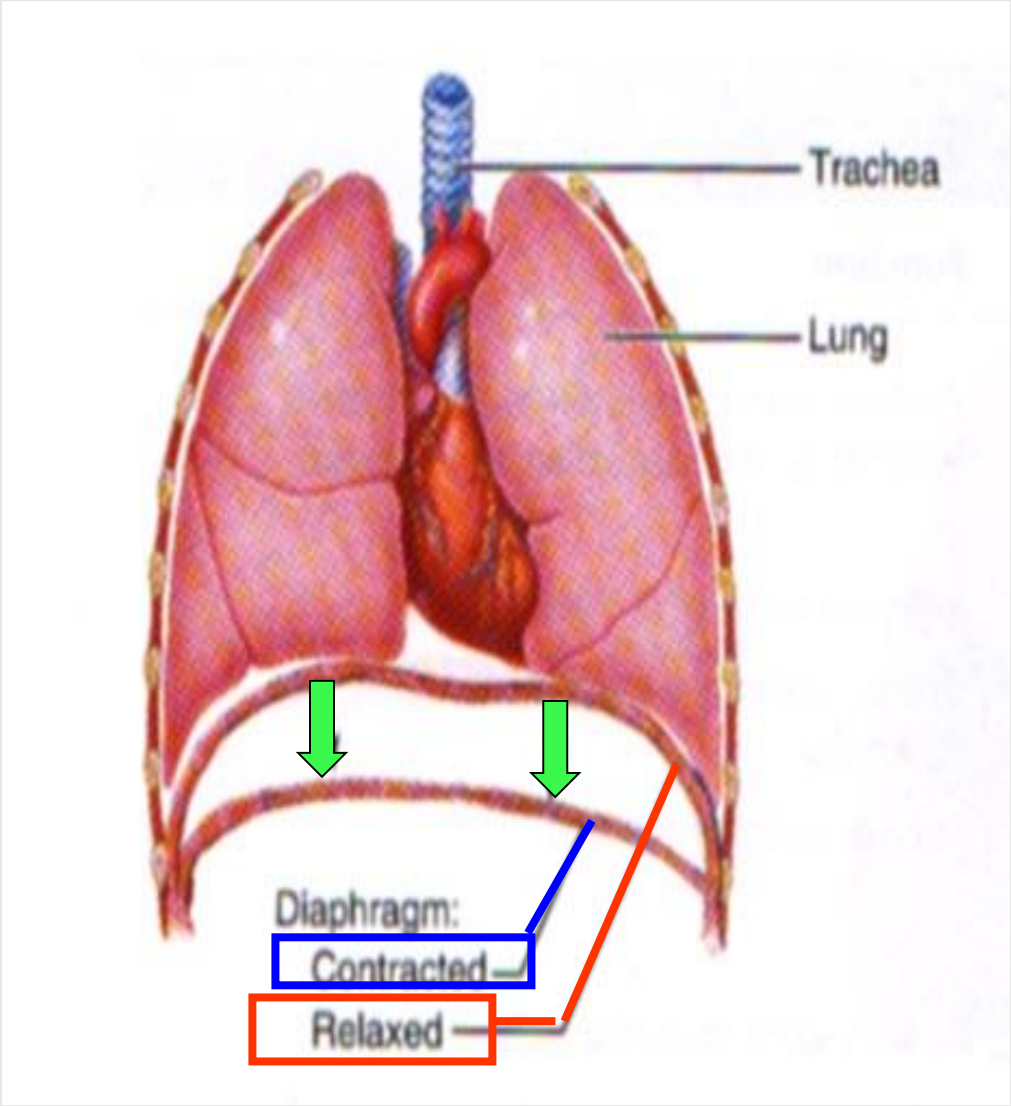


Nerve supply of Diaphragm:

* **Motor supply: right & left phrenic nerves**

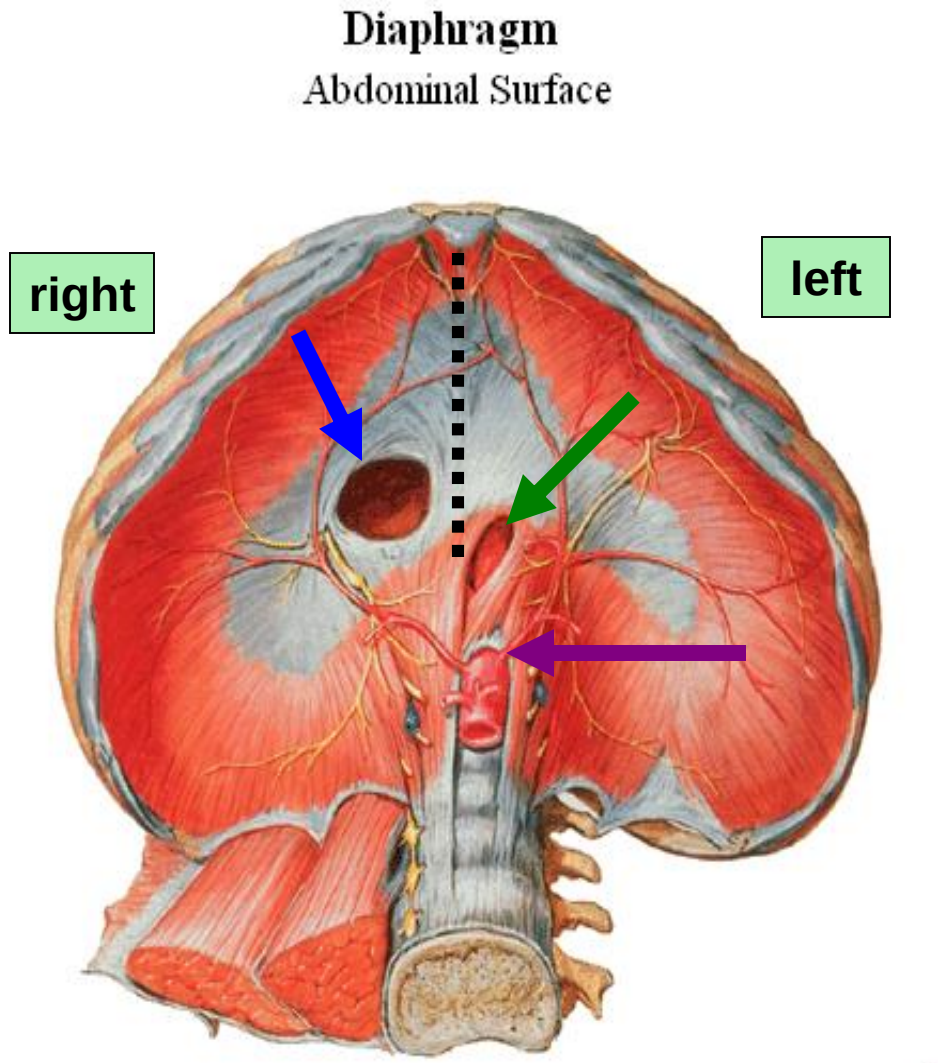
Action of Diaphragm:

* Diaphragm is the main muscle of inspiration.
* When it contracts → it descends to increase the vertical diameter of the thoracic cavity.
* It is active during forced expulsive acts, e.g. coughing, vomiting, defecation, urination and parturition.



Major foramina of the diaphragm

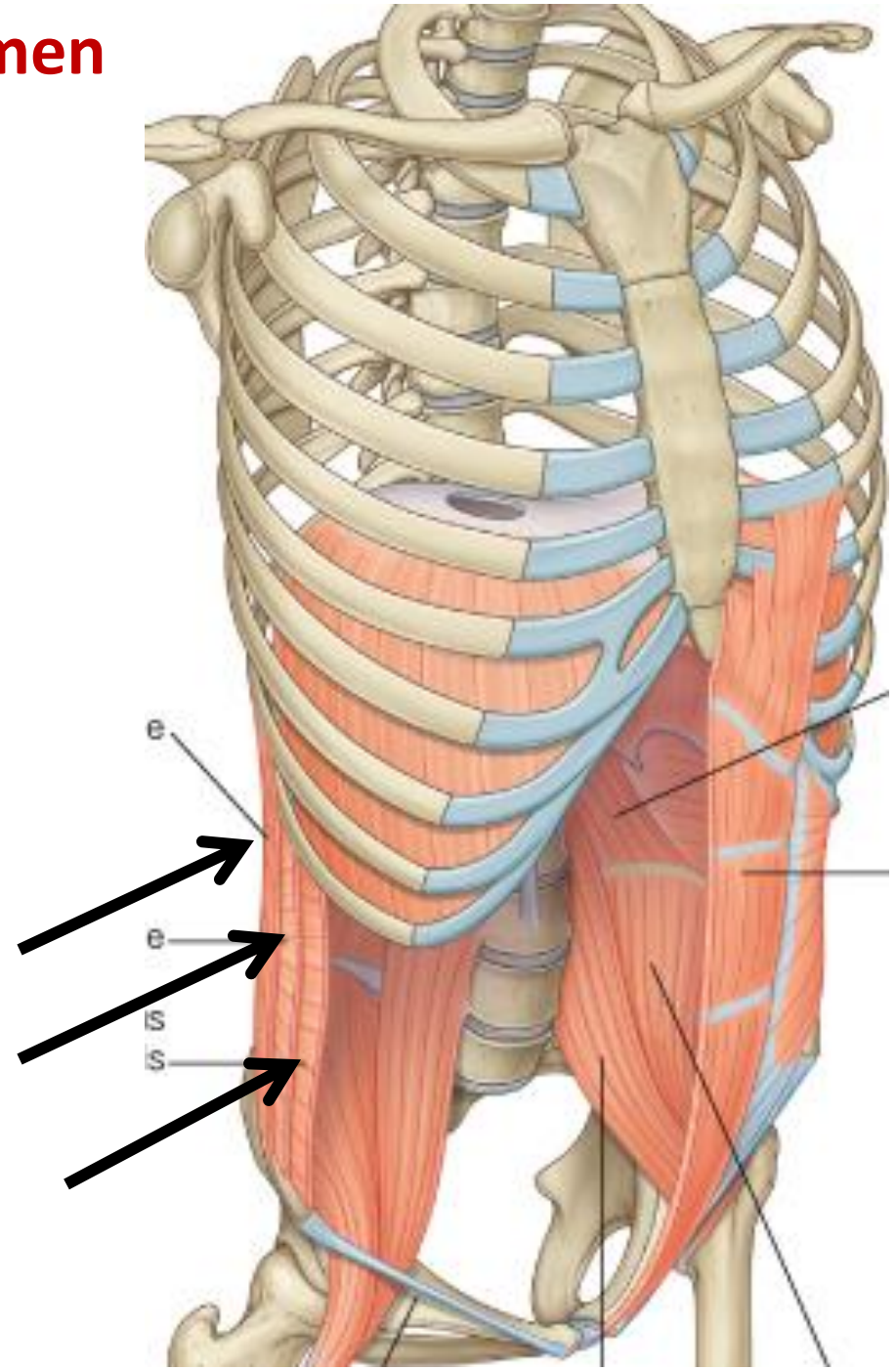
1. Inferior Vena caval opening → 1 inch to the right of median plane piercing central tendon.
2. Oesophageal opening → 1 inch to left of median plane piercing right crus.
3. Aortic opening → in mid line behind median arcuate ligament.

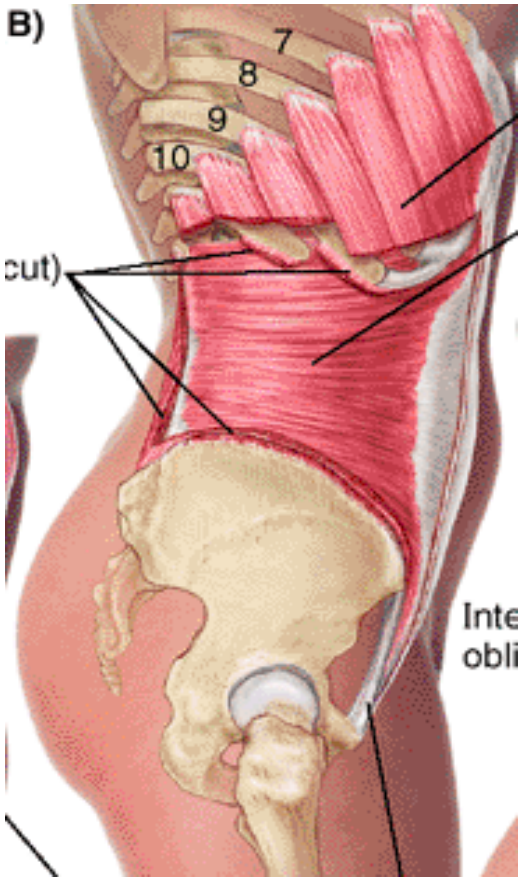


Muscles of Anterior Abdominal Wall

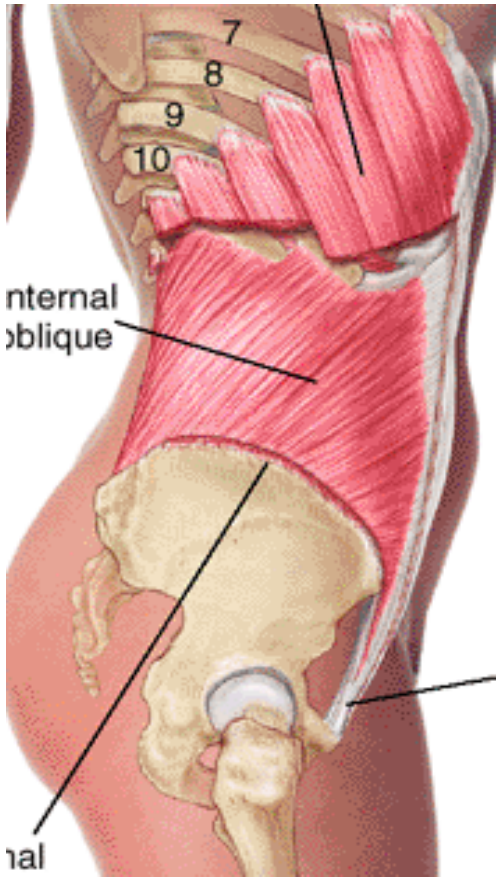
* Three flat muscles whose fibers begin posterolaterally, pass anteriorly, and are replaced by an aponeurosis as the muscle continues towards the midline:

1. External oblique ms.
2. Internal oblique ms.
3. Transversus abdominis ms.

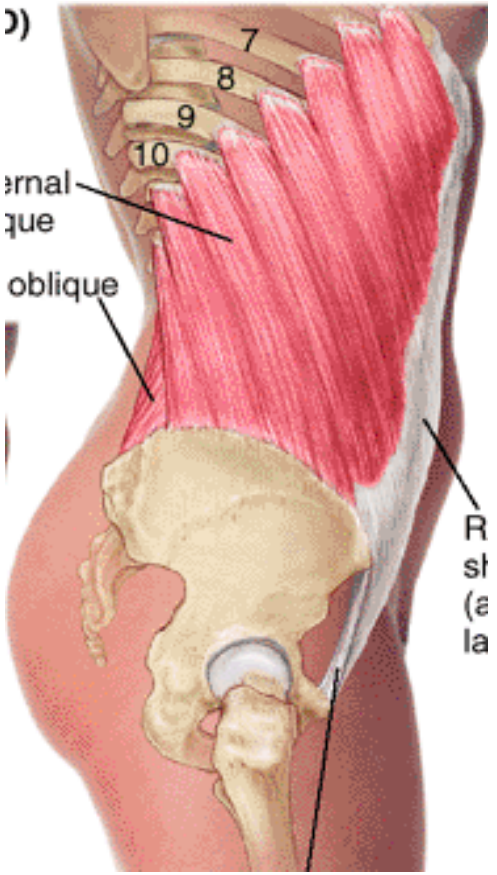




Transversus abdominis
(Its fibers run transeversely)



Internal oblique
(Its fibers run obliquely downwards, backwards & laterally)



External oblique
(Its fibers run obliquely downwards, forwards & medially)

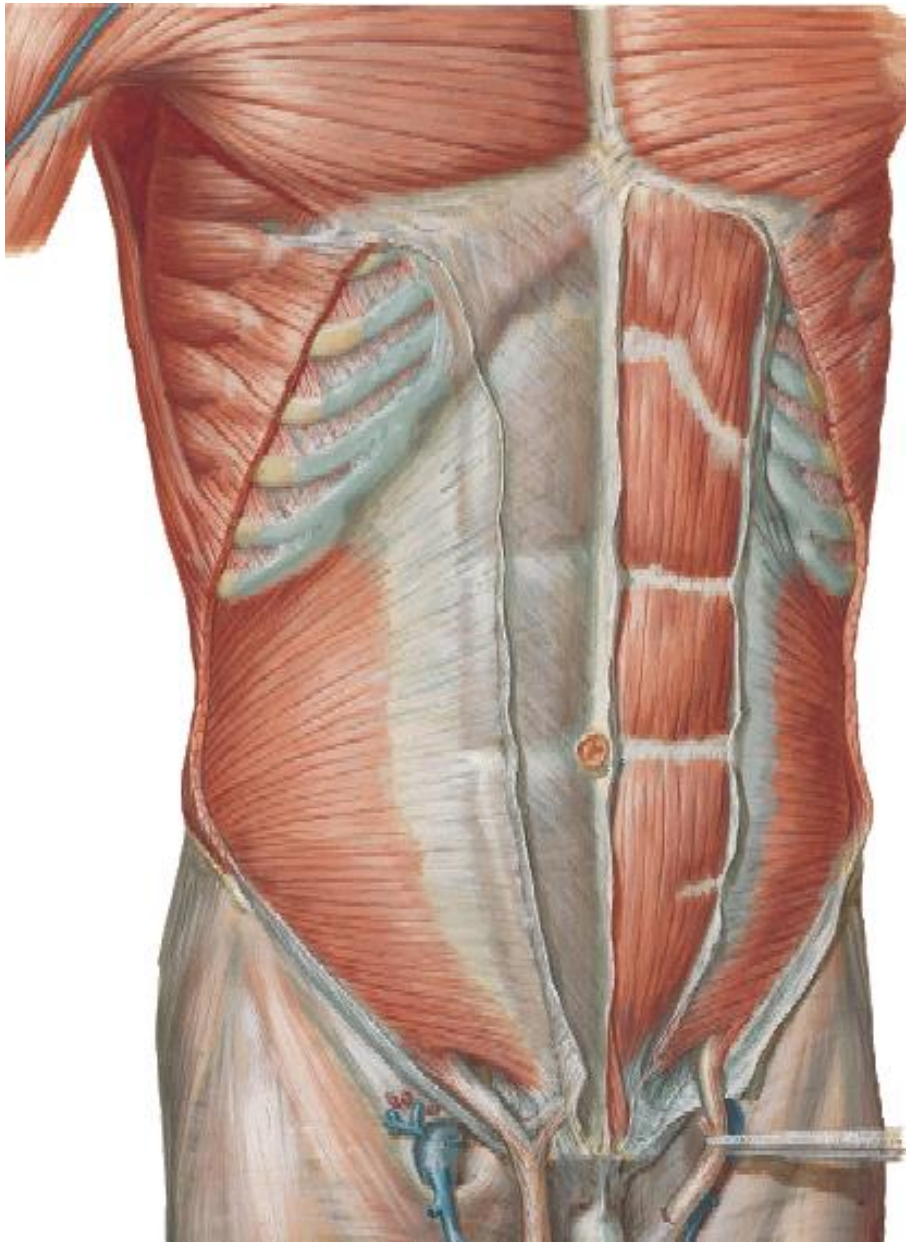
They have different direction of muscle fibers to strengthen the abd. wall.

* The muscles have wide fleshy origin & aponeurosis towards insertion forming:

    1. Rectus Sheath.

    2. Linea alba

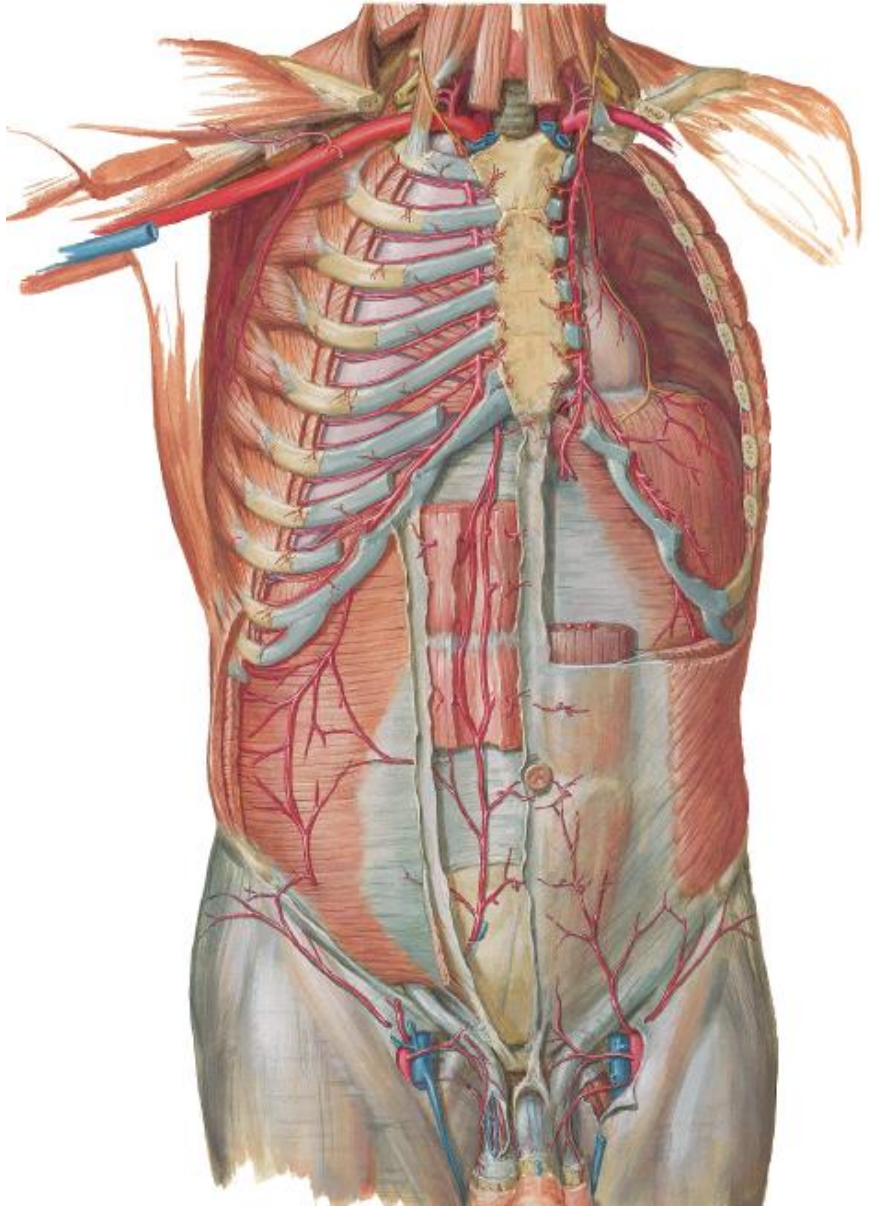
* The rectus abdominis is a vertical muscle, near the midline, which is enclosed within a tendinous sheath (Rectus heath) formed by the aponeuroses of the flat muscles



* Neurovascular plane:

* Lies between internal oblique & transversus abdominis.

  * Vessels & nerves run in this plane.



** Innervation of muscles of Anterior Abdominal Wall:

The 3 anterolateral muscles & the rectus are supplied by lower six thoracic spinal nerves (T7 to T12).

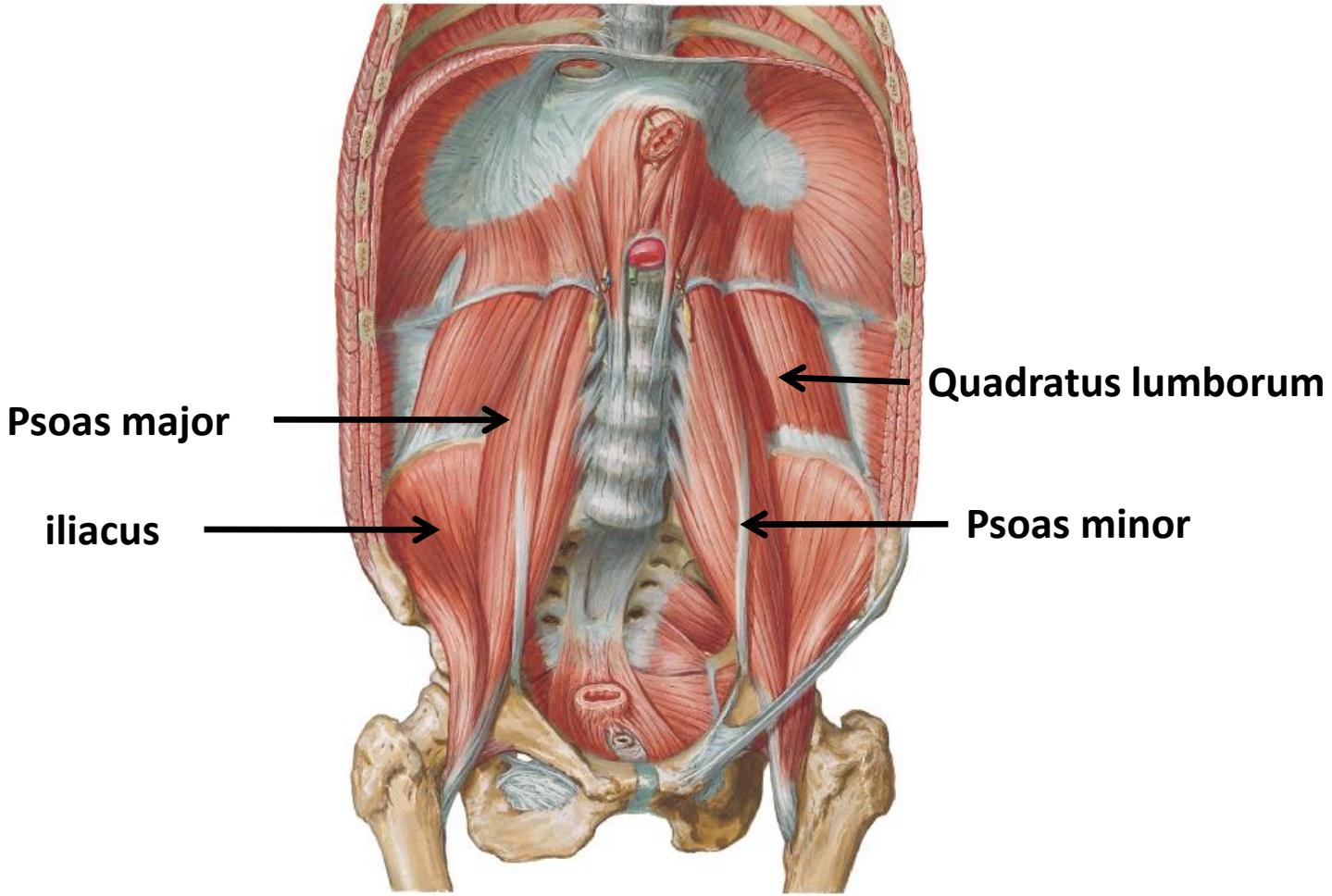
** Action of muscles:

1. **Support & protect abdominal contents.**
2. **Expiration.**
3. **Expulsive acts as vomiting, micturition, defecation, labour.**
4. **Movements of the trunk:**
    - **Flexion of the trunk.**
    - **Lat. Flexion of the trunk.**

MUSCLES OF POSTERIOR ABDOMINAL WALL

They are 4 muscles:

1. **Psoas major.**
2. **Psoas minor (may be absent).**
3. **Quadratus lumborum.**
4. **Iliacus.**



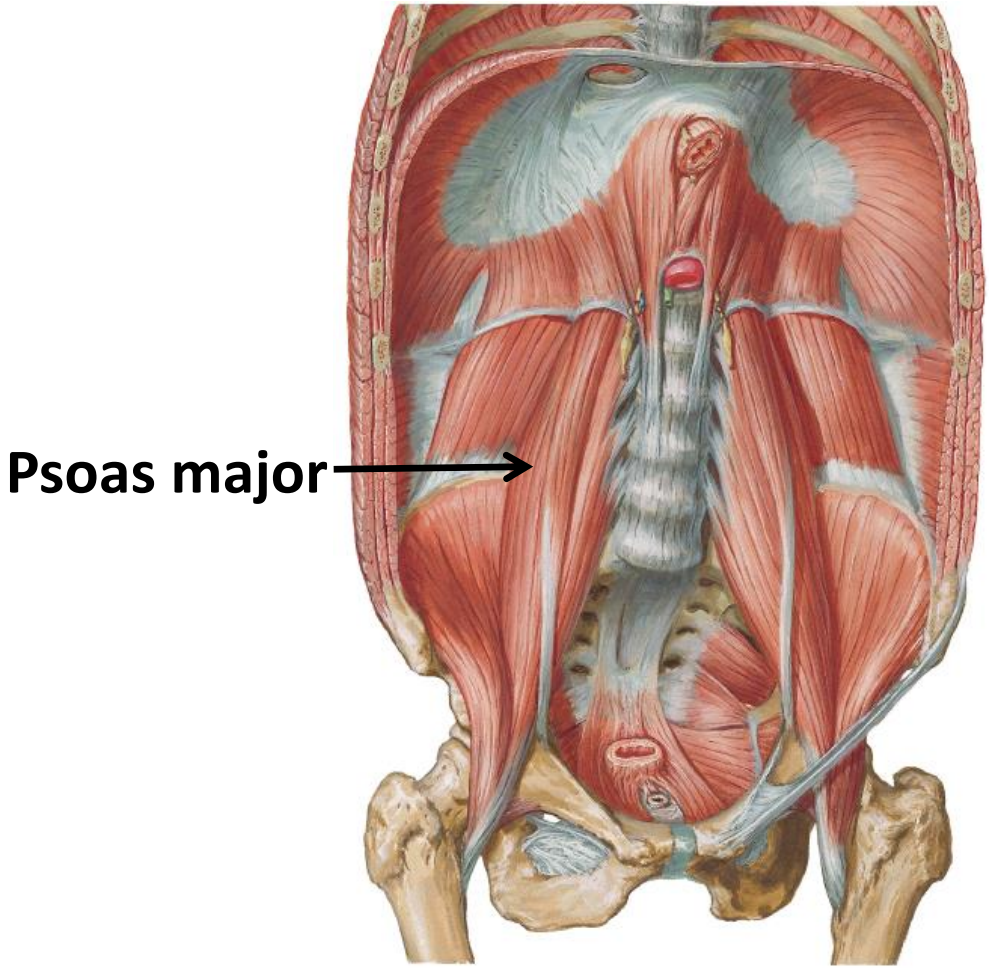
1. Psoas Major

*** Origin:** from lumbar vertebrae.

*** Insertion:** into lesser trochanter of femur.

*** Action:**

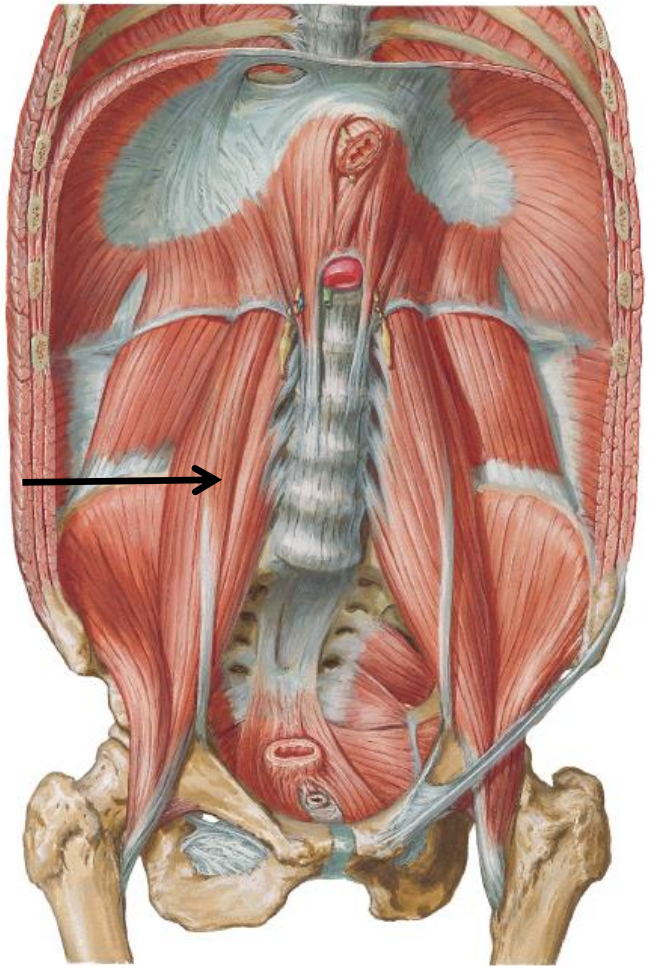
1. The main flexor of thigh (hip joint).
2. It can flex the trunk on the thigh



2. Psoas Minor

* **May be absent.**
* **Origin: from 1st lumbar vertebra.**
* **Insertion: into hip bone.**
* **Action:**

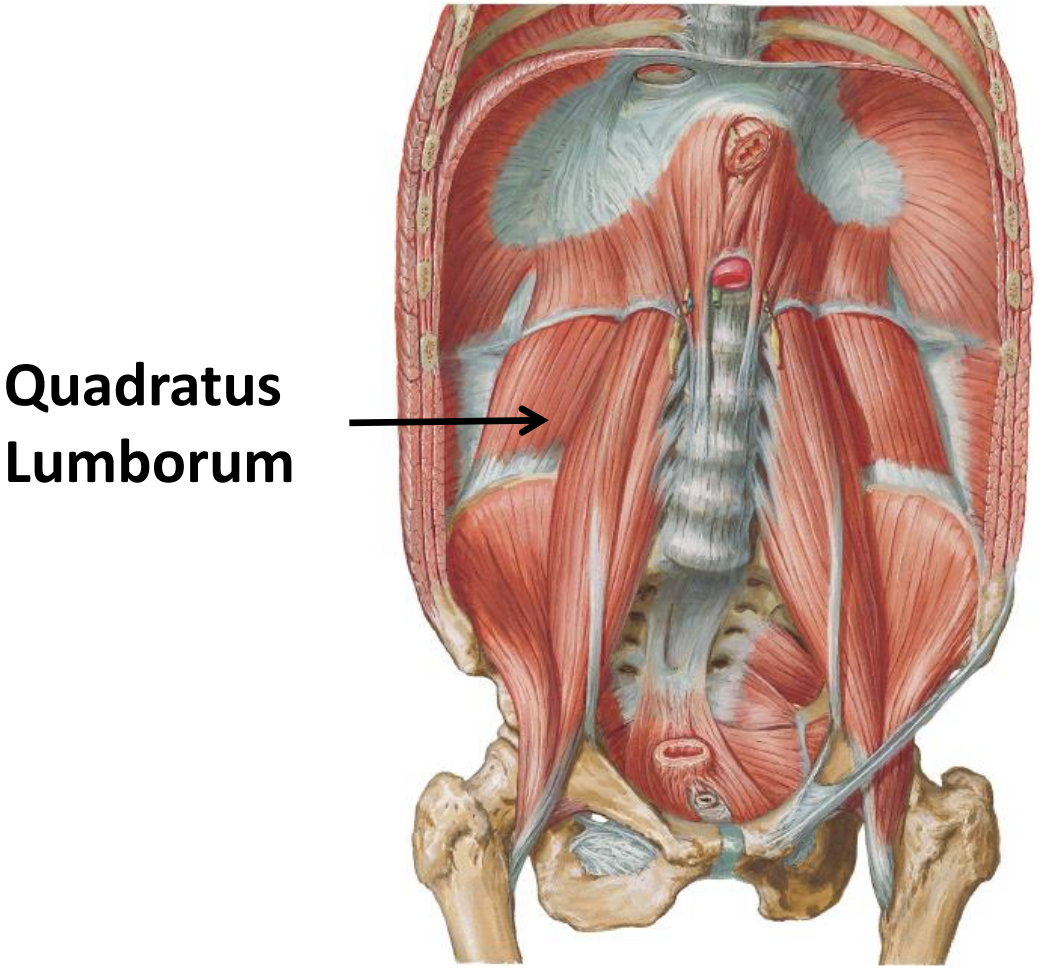
Helps in flexion of thigh (hip joint).



3. Quadratus Lumborum

* **Origin:** from iliac crest of hip bone.
* **Insertion:** into last rib.
* **Action:**

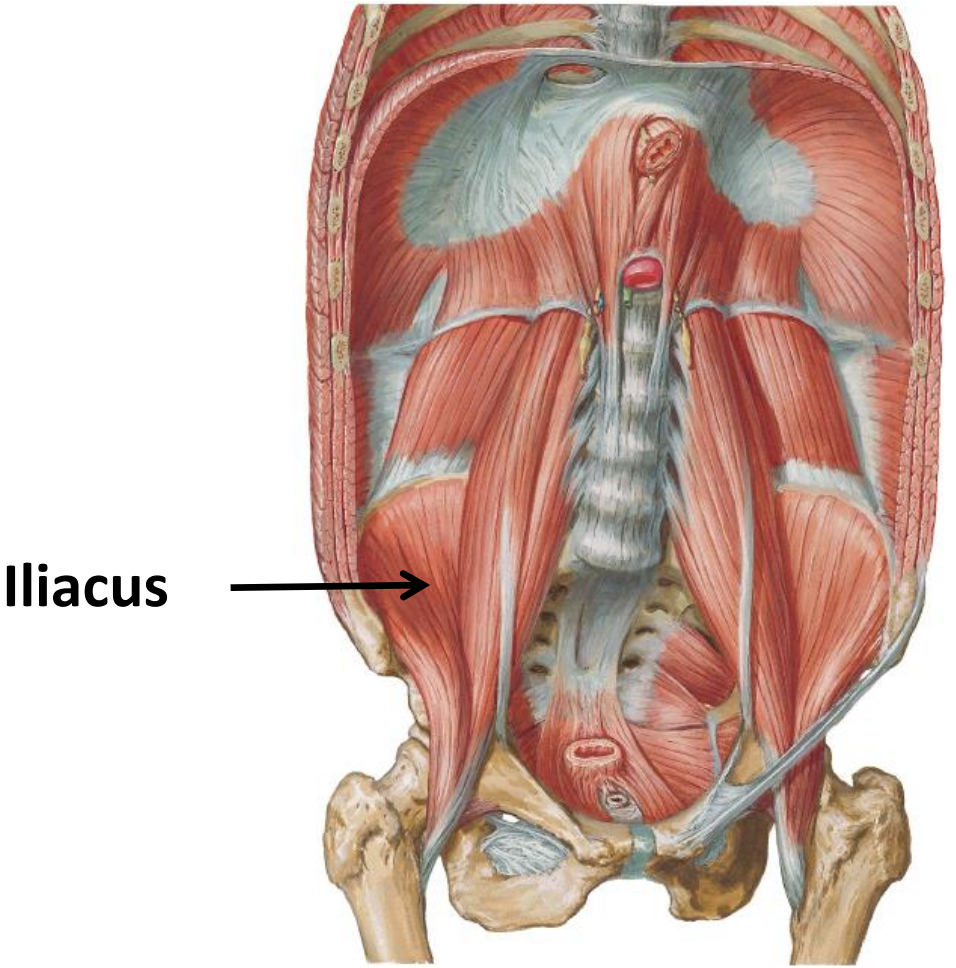
1. Lateral flexion of the trunk.
2- Extension of trunk.



4. Iliacus

* **Origin:** from hip bone.
* **Insertion:** lesser trochanter of femur.
* **Action:**

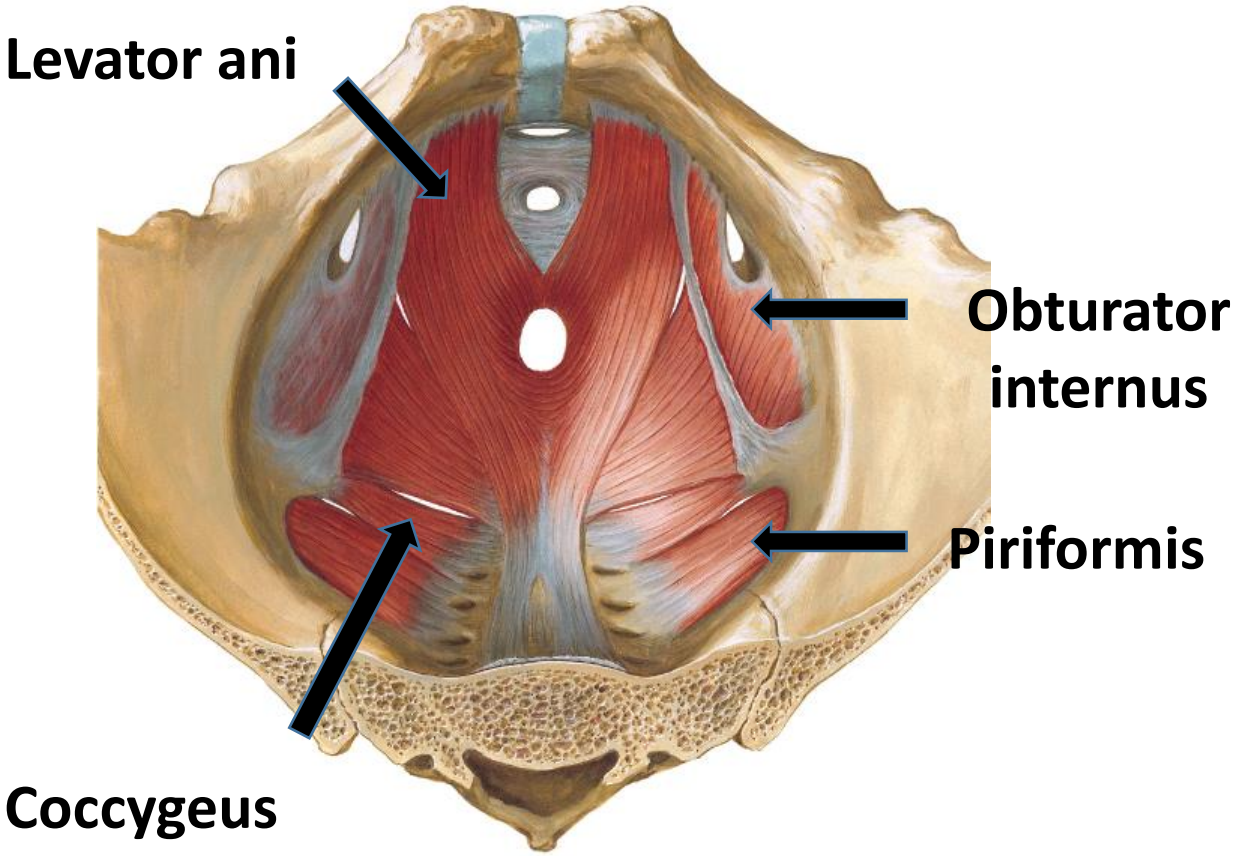
Helps in flexion of thigh (hip joint).



MUSCLES OF PELVIS

** **Muscles of the pelvic wall:** piriformis and obturator internus.

** **Muscles of the pelvic floor (pelvic diaphragm):** levator ani and coccygeus.



Thank You Thank You Thank You!!!!