

SHOULDER

# SHOULDER

- ⦿ Connects arm to thorax
- ⦿ 3 joints
  - Glenohumeral joint
  - Acromioclavicular joint
  - Sternoclavicular joint

# SHOULDER MOVEMENTS

## ○ Scapula

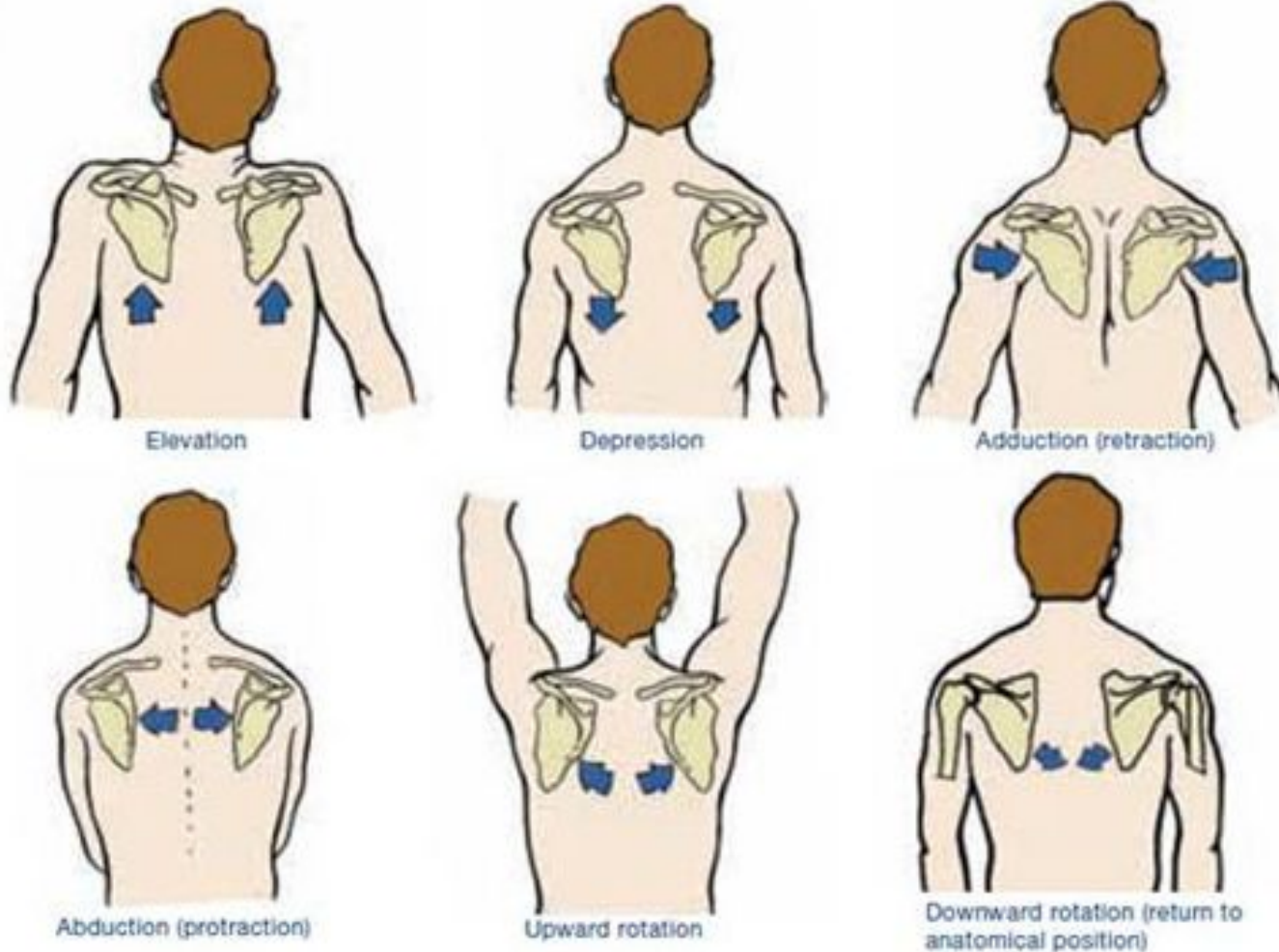
- Elevation
- Depression
- Protraction (abduction)
- Retraction (adduction)
- Downward Rotation
- Upward Rotation

## ○ Arm (Shoulder Joint)

- Flexion
- Extension
- Abduction
- Adduction
- Medial Rotation
- Lateral Rotation

# SCAPULAR MOVEMENTS

Figure 3-34  
Scapular  
movements



# SHOULDER MOVEMENTS

- Movement of shoulder can affect spine and rib cage
  - Flexion of arm → Extension of spine
  - Extension of arm → Flexion of spine
  - Adduction of arm → Ipsilateral sidebending of spine
  - Abduction of arm → Contralateral sidebending of spine

# SHOULDER GIRDLE

- Scapulae
- Clavicles
- Manubrium
- Provides mobile base for movement of arms

# CLAVICLE

- ◉ Collarbone
- ◉ Elongated S shaped bone
- ◉ Articulates with Sternum through Manubrium
- ◉ Articulates with Scapula through Acromion
- ◉ Ligaments
  - Costoclavicular - Anchor clavicle to 1st rib
  - Coracoclavicular - Anchor clavicle to scapula

# Sternoclavicular Joint

Saddle Joint

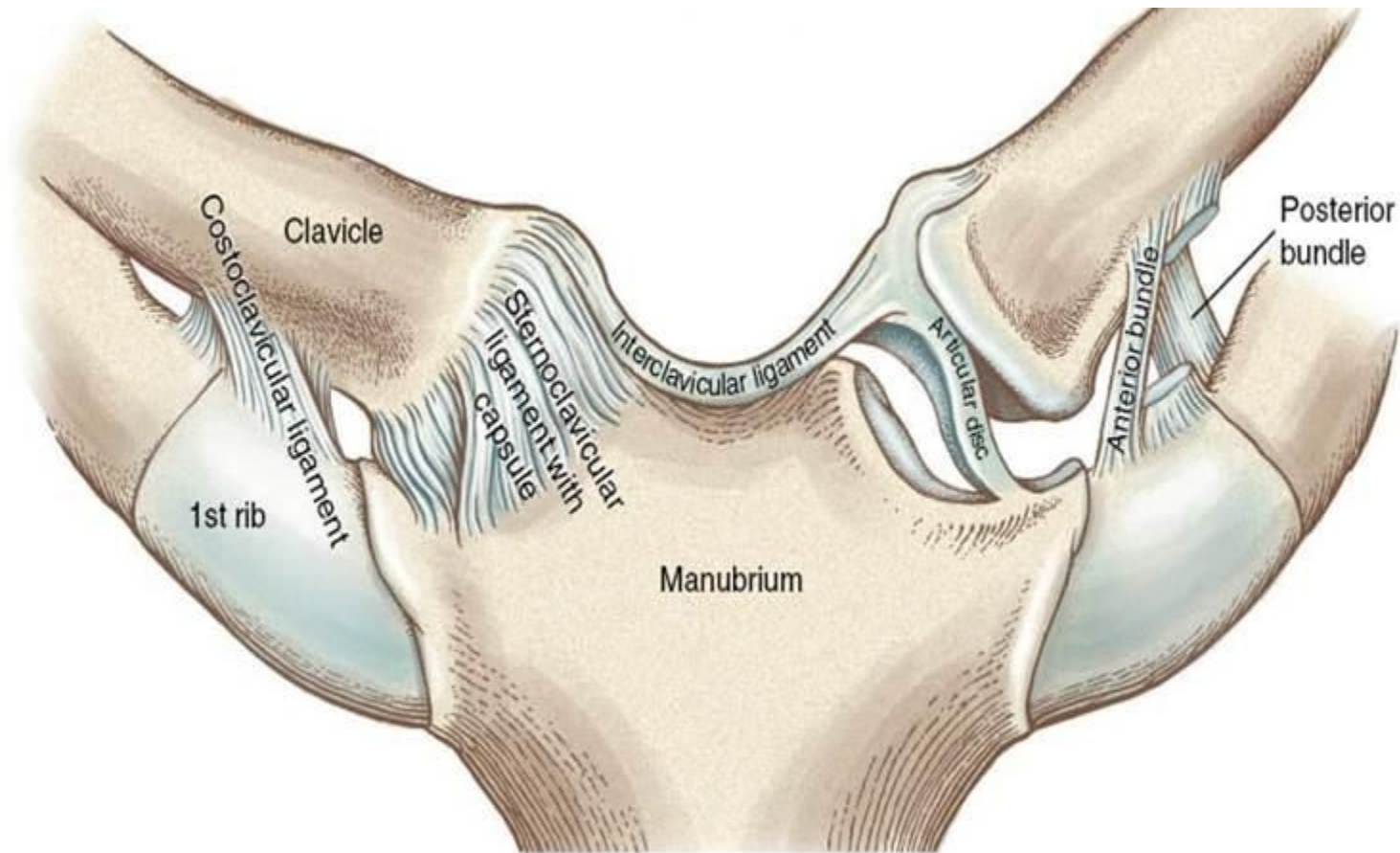
Flexion/Extension

Elevation/Depression

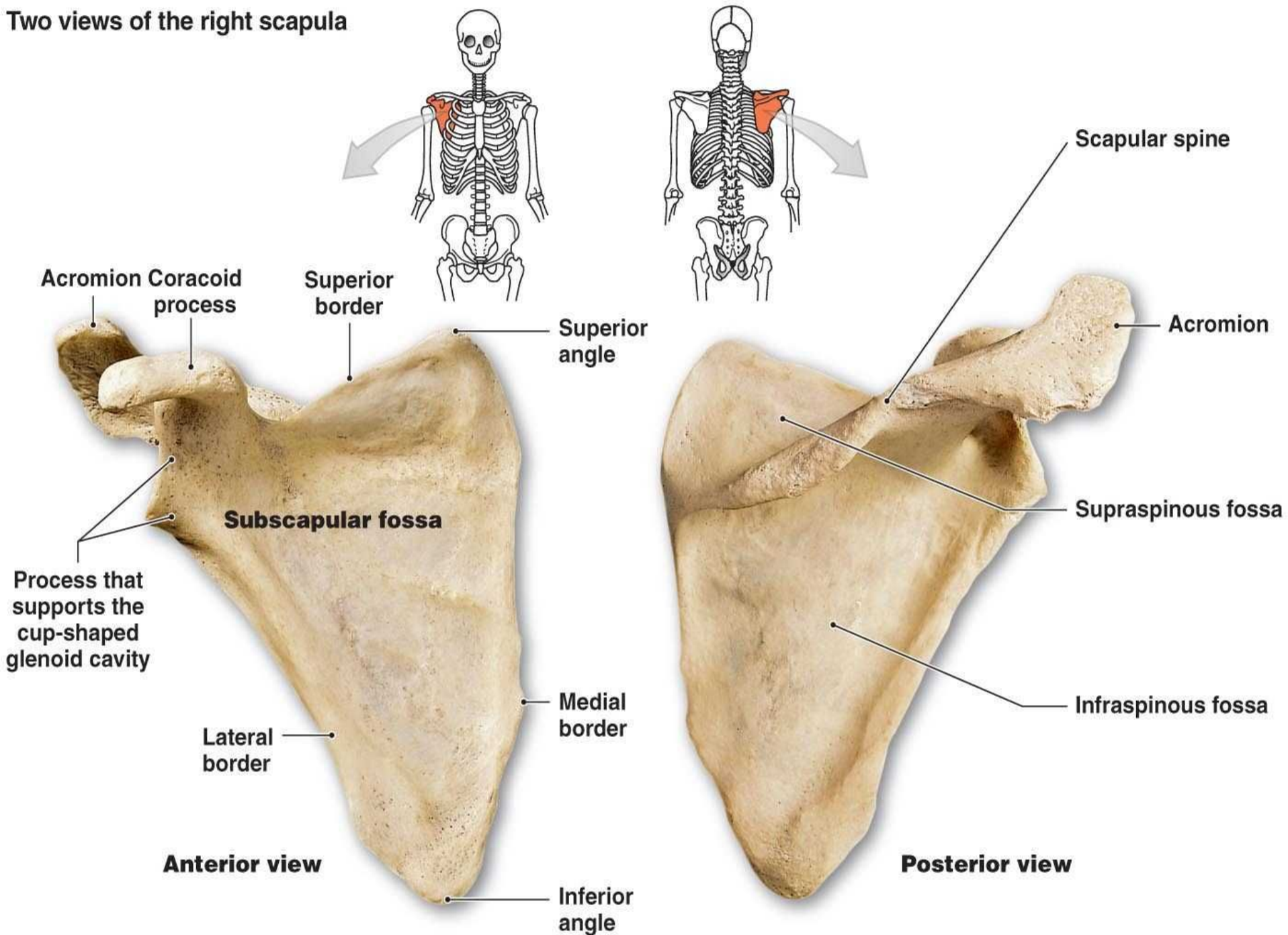
Limited Rotation



# STERNOCLAVICULAR JOINT



## Two views of the right scapula

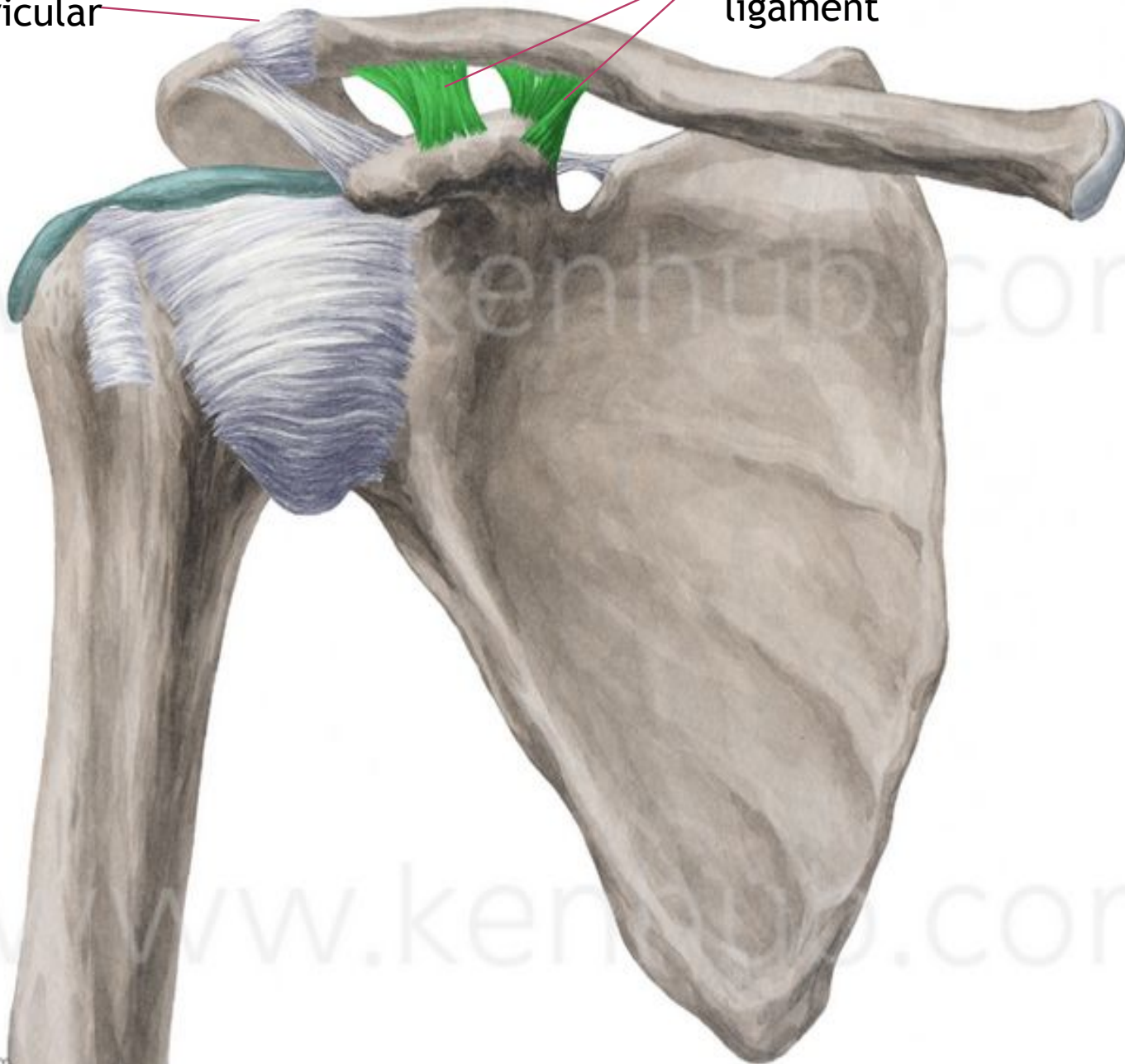


# ACROMIOCLAVICULAR JOINT

- Acromion articulates with clavicle
- Gliding joint - opens and closes angle between scapula and clavicle
- Acromioclavicular ligament - where joint capsule thickens on superior portion
- Coracoclavicular ligament offers main support for joint

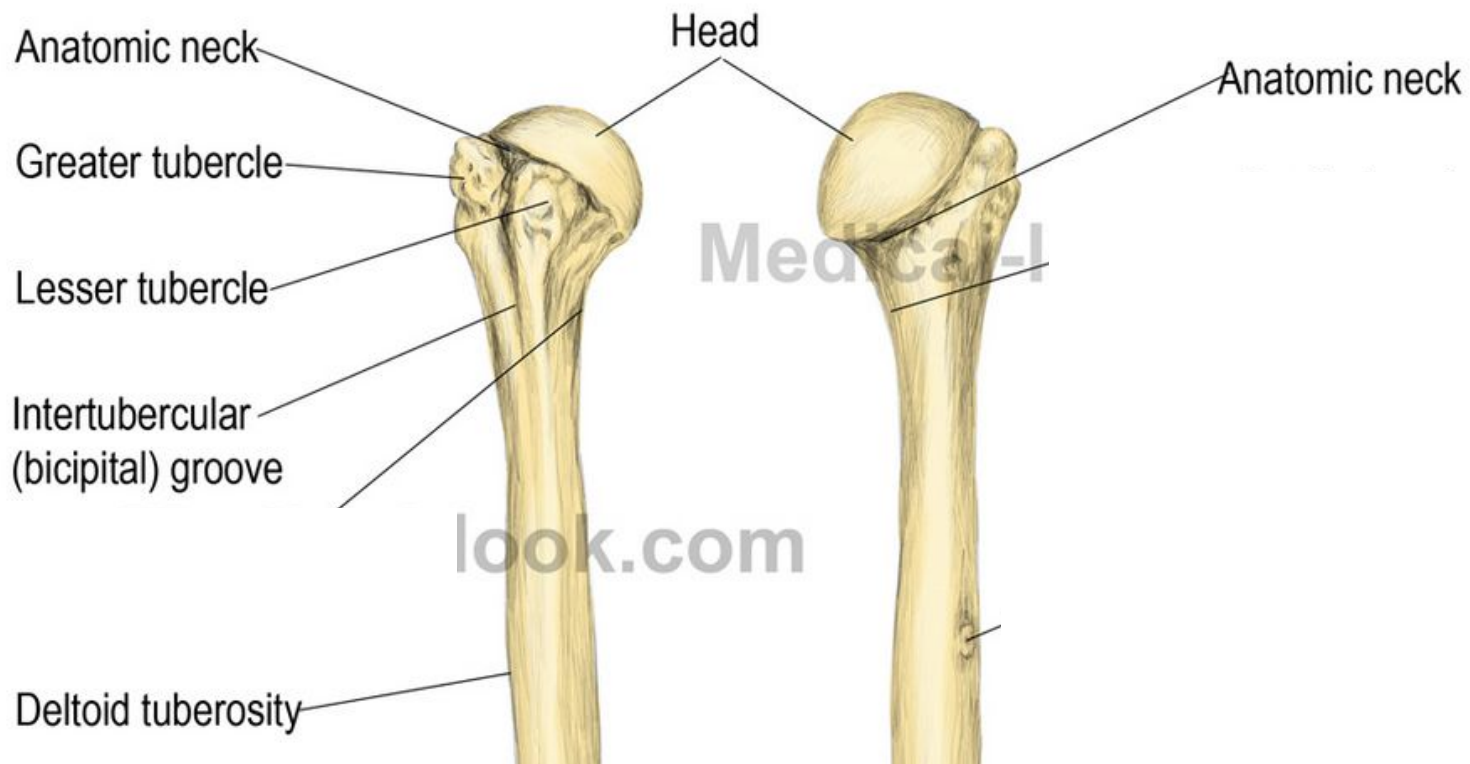
Acromioclavicular  
joint

Coracoclavicular  
ligament





# HUMERUS



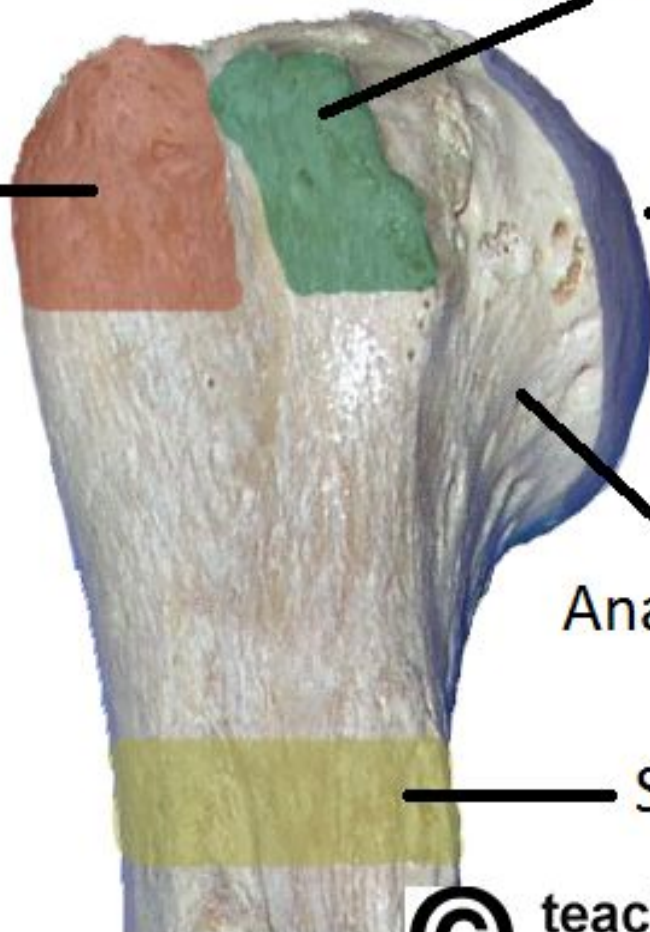
Lesser tubercle

Greater  
tubercle

Head

Anatomical neck

Surgical neck



**teachmeanatomy**

The #1 Applied Human Anatomy Site on the Web.

# GLENOHUMERAL JOINT

- Ball and Socket Joint
- Glenoid cavity and head of humerus
- Primary joint of shoulder
- Mobile but unstable joint
  - Head is 2-3X larger than cavity
  - Cavity is shallow

# GLENOHUMERAL JOINT CAPSULE

## ◉ Attachments

- Outer rim of glenoid cavity
- Anatomical neck of humerus

## ◉ Ligaments

- Superior - Coracohumeral ligament
  - Coracoid process to greater tubercle
- Anterior - 3 glenohumeral ligaments
  - Border of glenoid cavity to lesser tubercle and neck

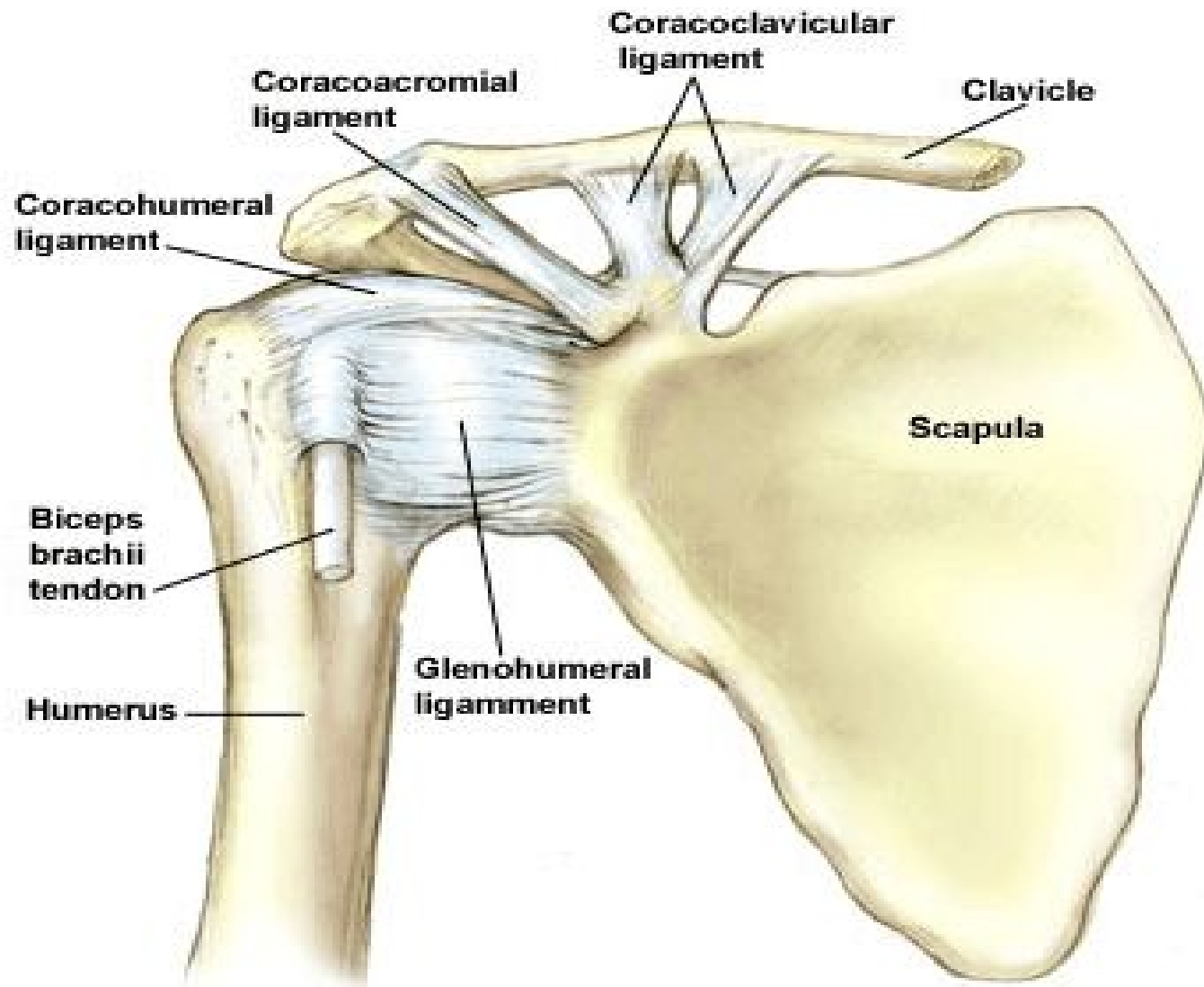
## ◉ Reinforced by tendons of rotator cuff

## ◉ Glenoid Labrum -

- fibrocartilaginous ring seals the joint



## Front view

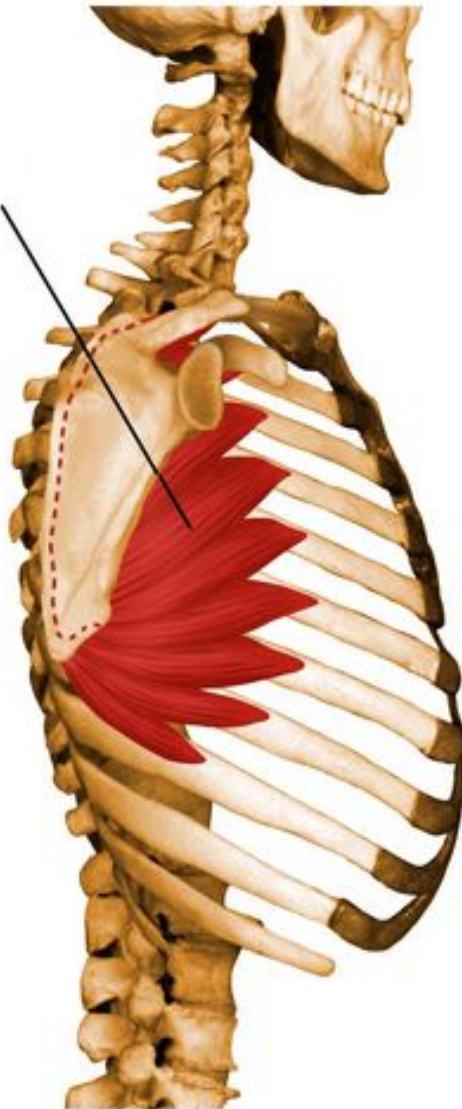


# SHOULDER MUSCLES

# SERRATUS ANTERIOR

- ◉ Origin: Upper 8 or 9 ribs
- ◉ Insertion: Medial border of scapula
- ◉ Action:
  - Fixes scapula in place
  - Abduction and upward rotation of scapula
  - Inspiration by elevation of ribs

**Serratus anterior**



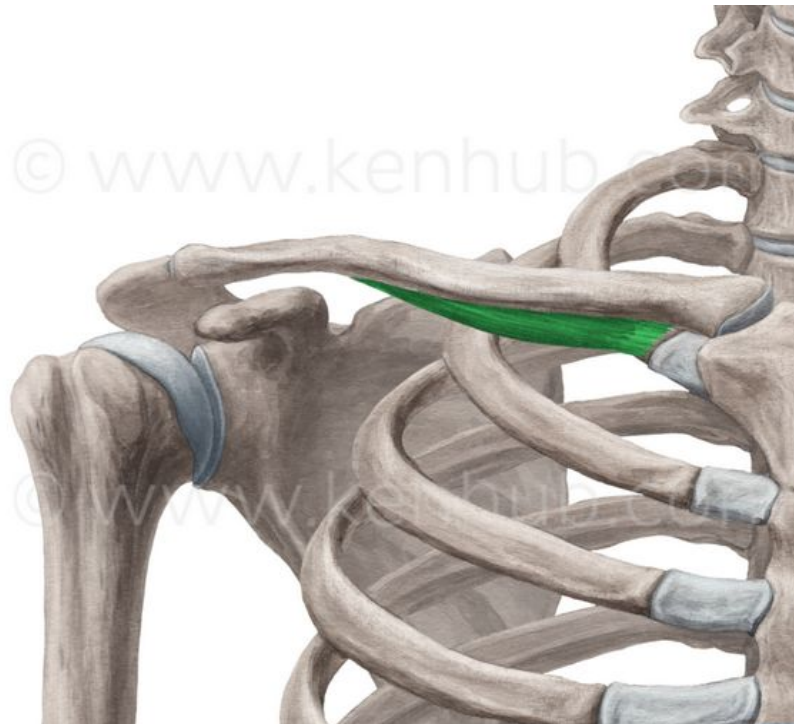
# PECTORALIS MINOR

- ◉ Origin: Ribs 3-5
- ◉ Insertion: Coracoid process
- ◉ Action:
  - Pulls scapula down and forward
  - Assists inspiration by elevating ribs



# SUBCLAVIUS

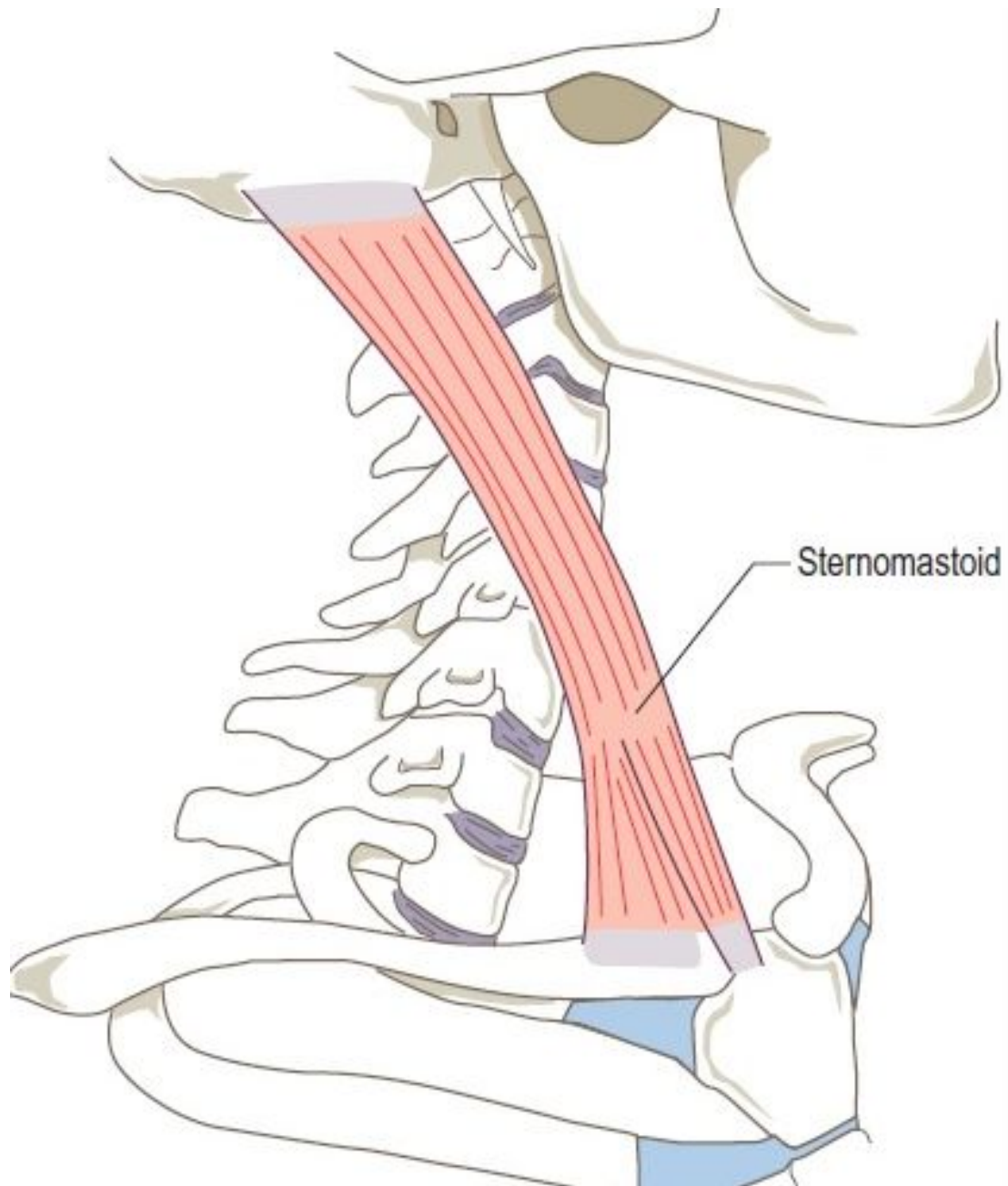
- Origin: Rib 1 and cartilage
- Insertion: Underside of clavicle
- Action:
  - Depresses clavicle



# STERNOCLEIDOMASTOID

- ◉ Origin: Sternum and Clavicle
- ◉ Insertion: Mastoid Process
- ◉ Action:
  - Elevates area where sternum and clavicle meet to assist inspiration

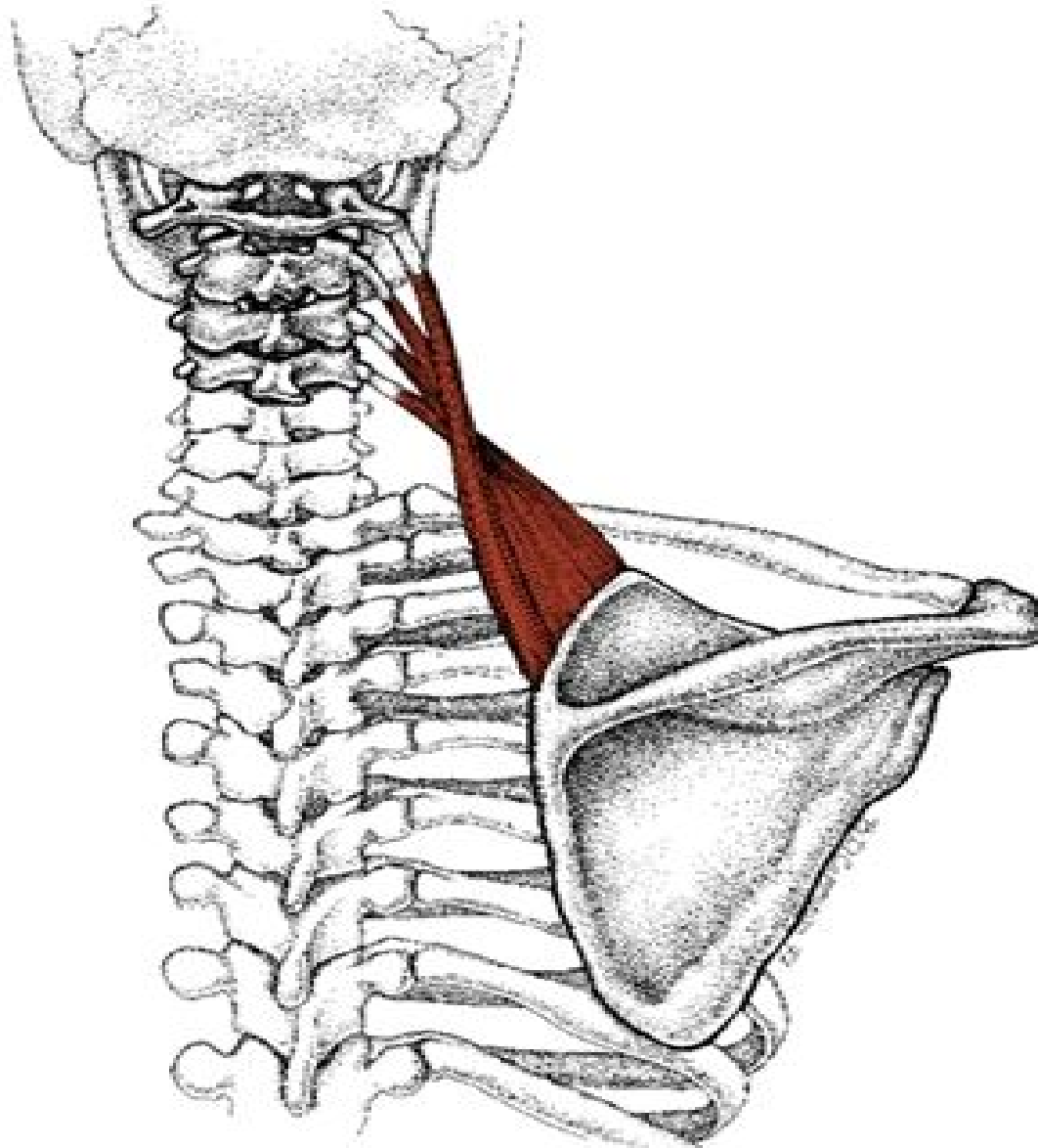




# LEVATOR SCAPULAE

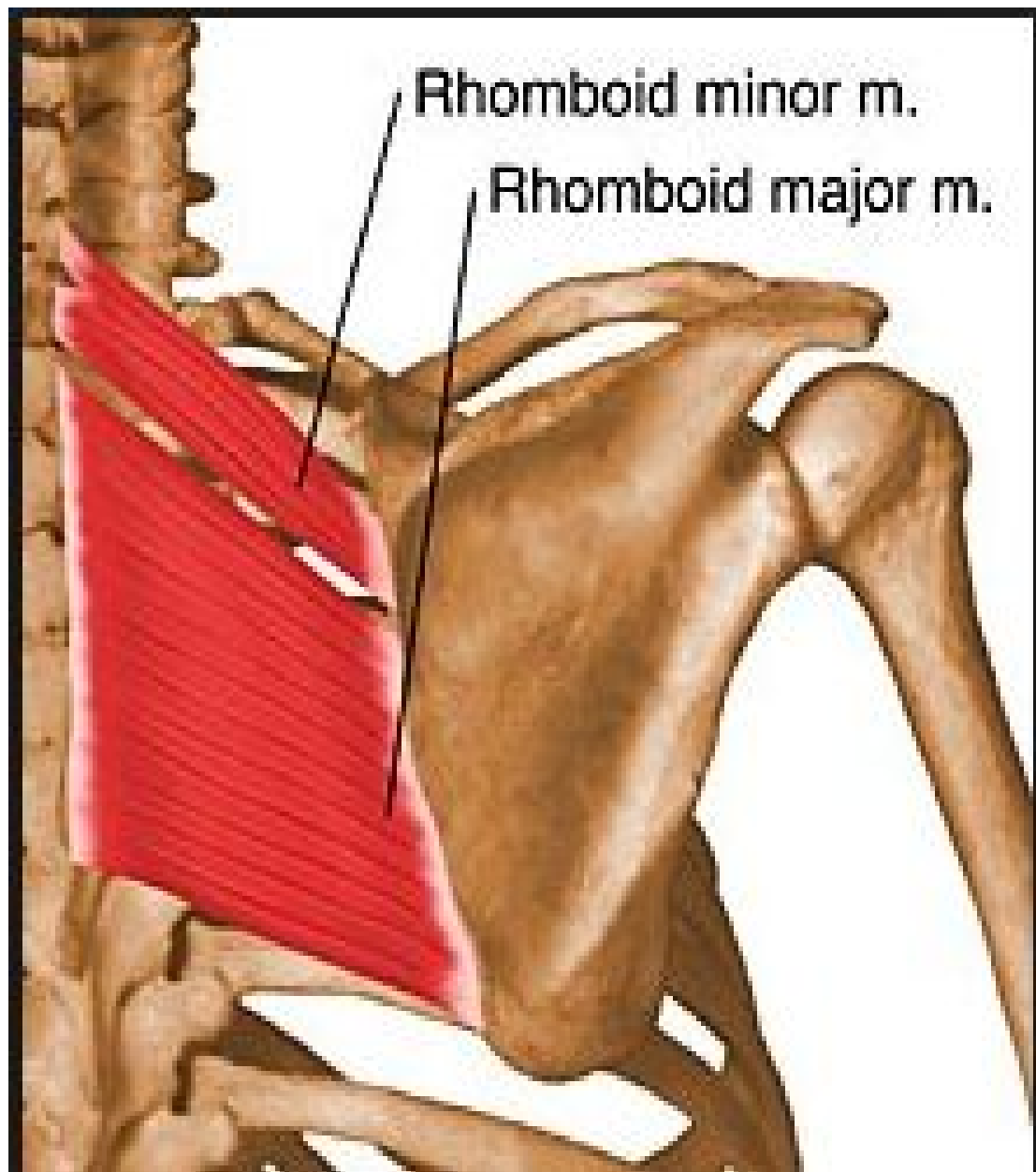
- ◉ Origin: Transverse process of C1-C4
- ◉ Insertion: Superior angle of scapula
- ◉ Action
  - Elevation of scapula
  - Downward rotation of scapula

# Levator Scapulae



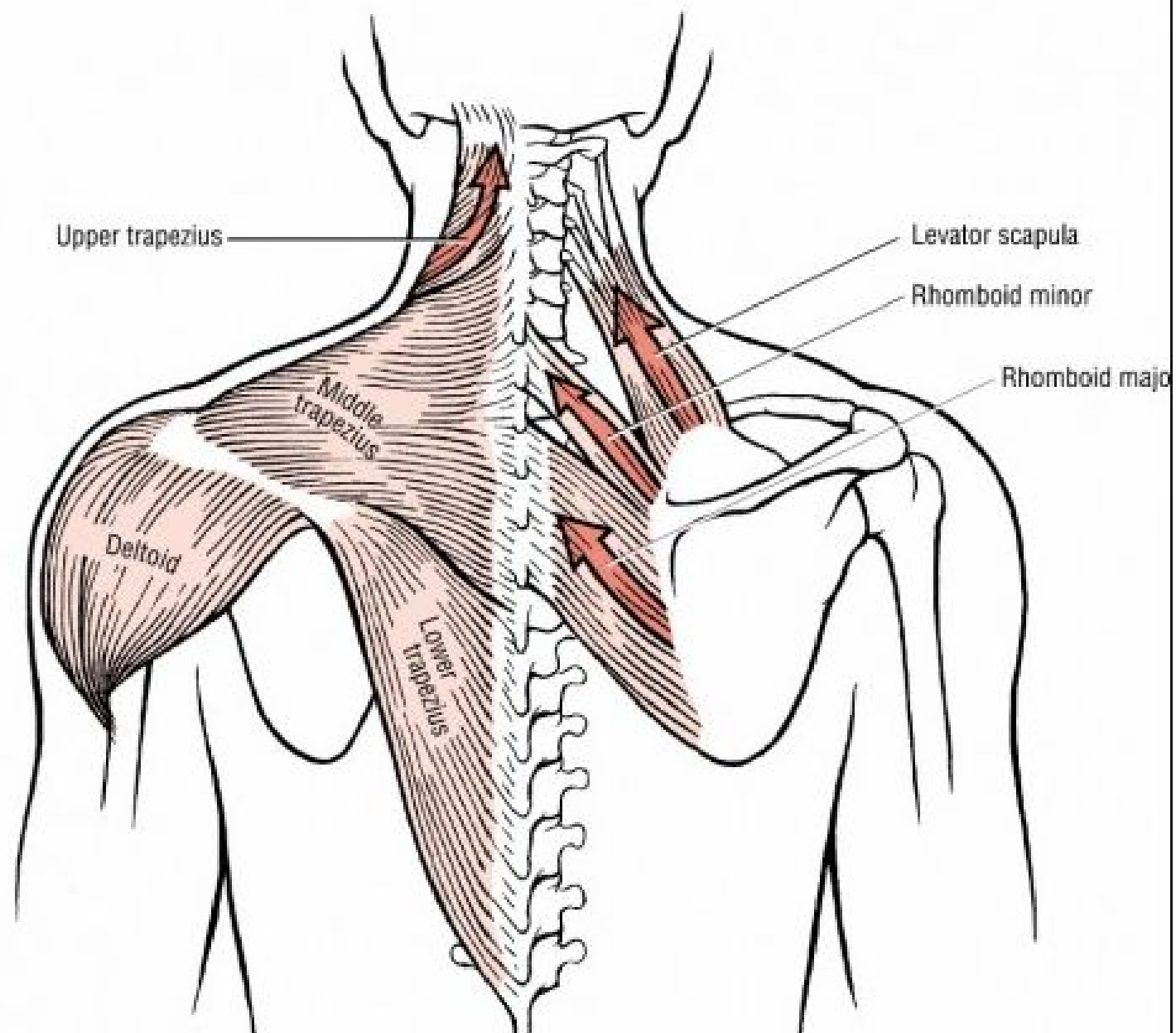
# RHOMBOIDS

- ◉ Minor and Major
- ◉ Origin: Spinous process C7-T5
- ◉ Insertion: Medial border of scapula
- ◉ Action:
  - Retraction of scapula
  - Downward rotation of scapula



# TRAPEZIUS

- Origin: Occiput, nuchal ligament, spinous process of C7-T12
- Insertion:
  - Lateral 1/3 of clavicle (upper)
  - Acromion process and scapular spine (middle)
  - Trapezius tubercle and medial end of scapular spine (lower)
- Action:
  - Retraction of scapula (all 3)
  - Elevation, upward rotation of scapula, and elevation of clavicle (upper)
  - Depression and upward rotation of scapula (lower)

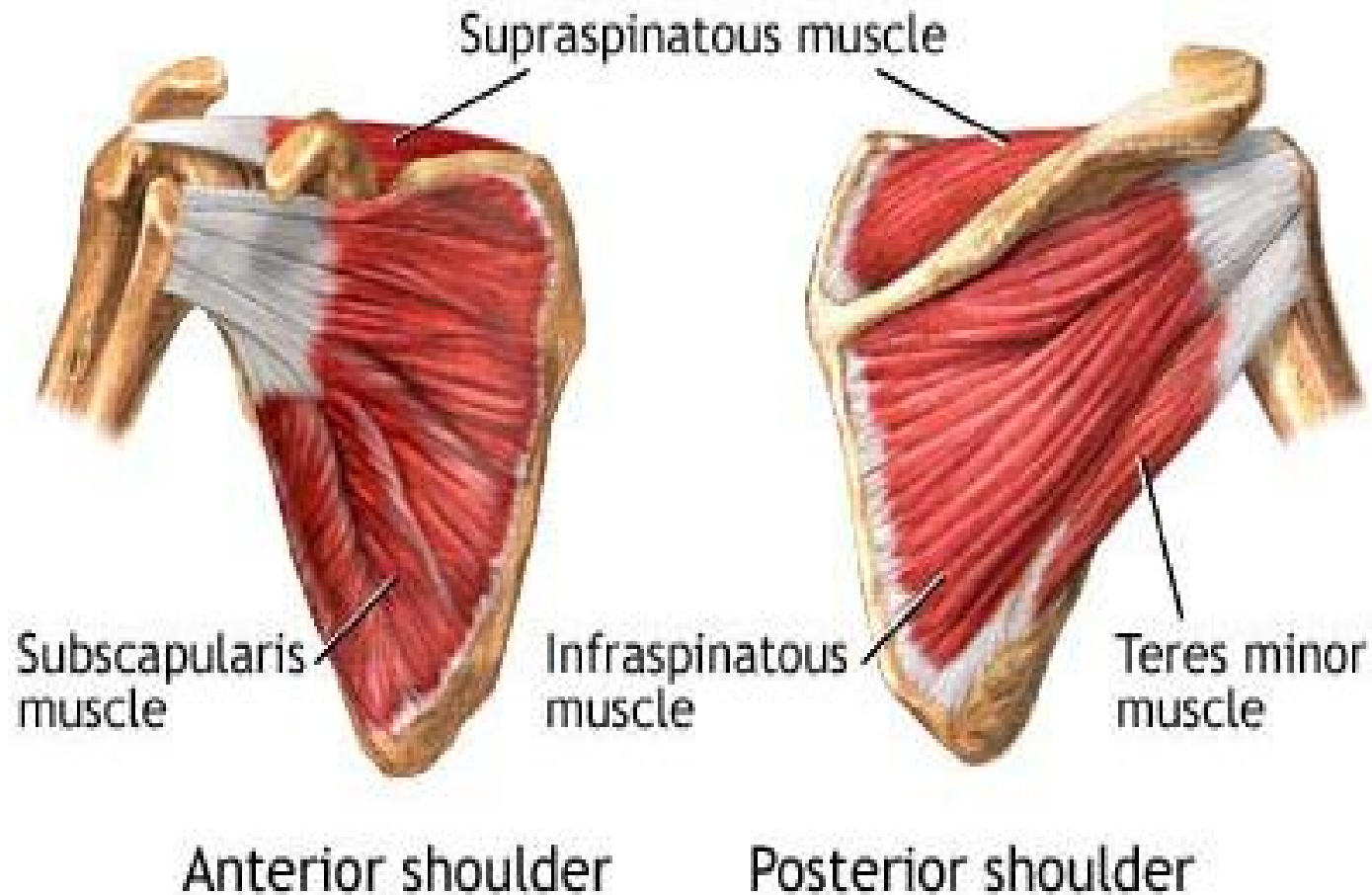


# ROTATOR CUFF MUSCLES

- Subscapularis
- Supraspinatus
- Infraspinatus
- Teres Minor



## Rotator cuff muscles



# SUBSCAPULARIS

- Origin: Anterior Surface of scapula
- Insertion: Lesser Tubercle of humerus
- Action:
  - Medial rotation of arm
  - Adduction of arm

# SUPRASPINATUS

- Origin: Supraspinous Fossa
- Insertion: Greater Tubercle
- Action: Abduction of arm

# INFRASPINATUS

- Origin: Infraspinous Fossa
- Insertion: Greater Tubercle below Supraspinatus
- Action:
  - Lateral Rotation of arm
  - Abduction of arm

## TERES MINOR

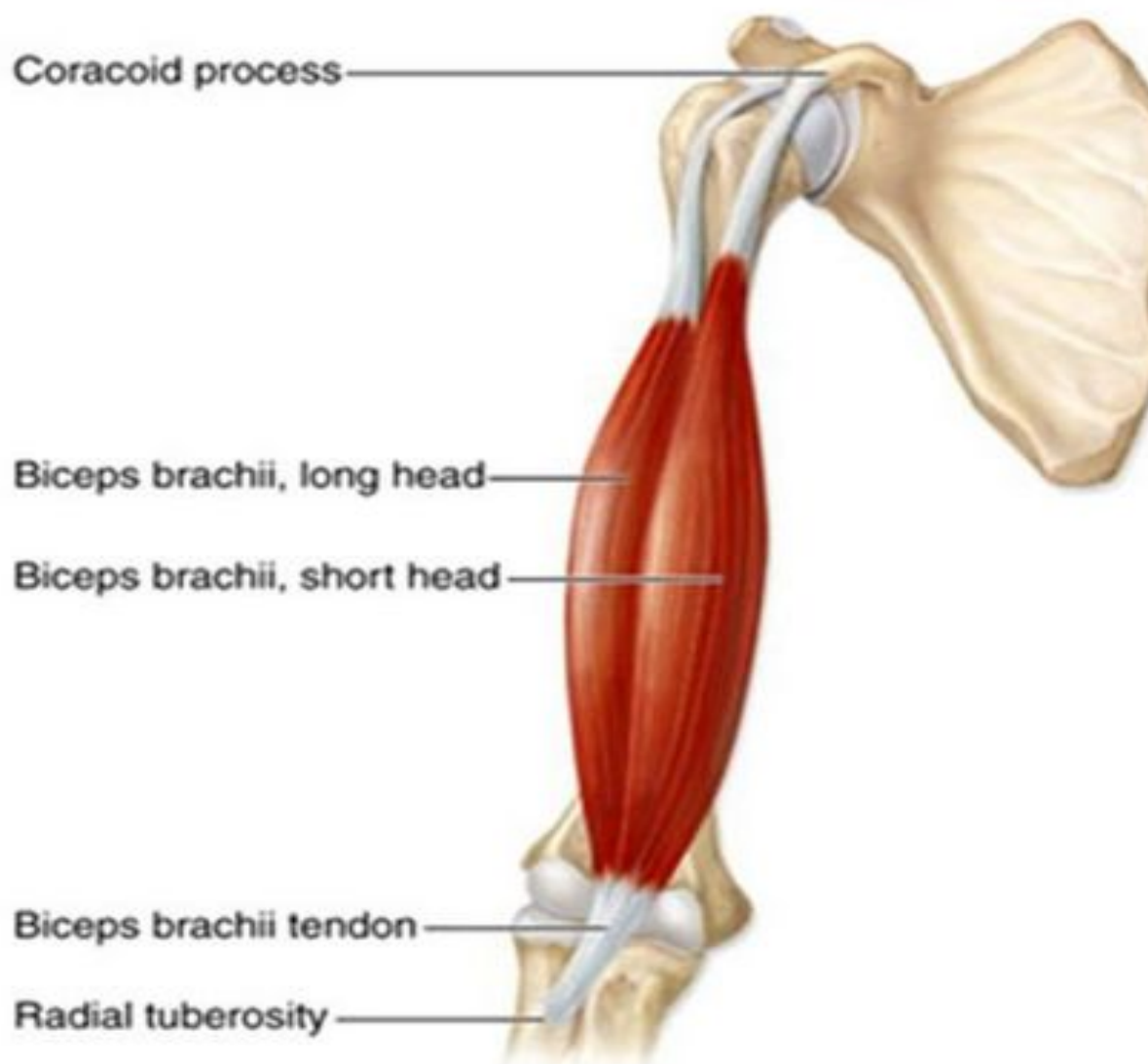
- Origin: Lateral Border of Scapula
- Insertion: Greater Tubercle  
(below Infraspinatus)
- Action: Lateral Rotation of arm



# CORACOBRACHIALIS

- Origin: Coracoid Process
- Insertion: Medial Surface of humeral shaft near middle
- Action:
  - Flexes arm
  - Adducts Arm

***Superficial***





# BICEPS BRACHII

- Origin:

- Shorthead - coracoid process
- Longhead - tubercle above glenoid cavity

- Insertion: Radial Tuberosity

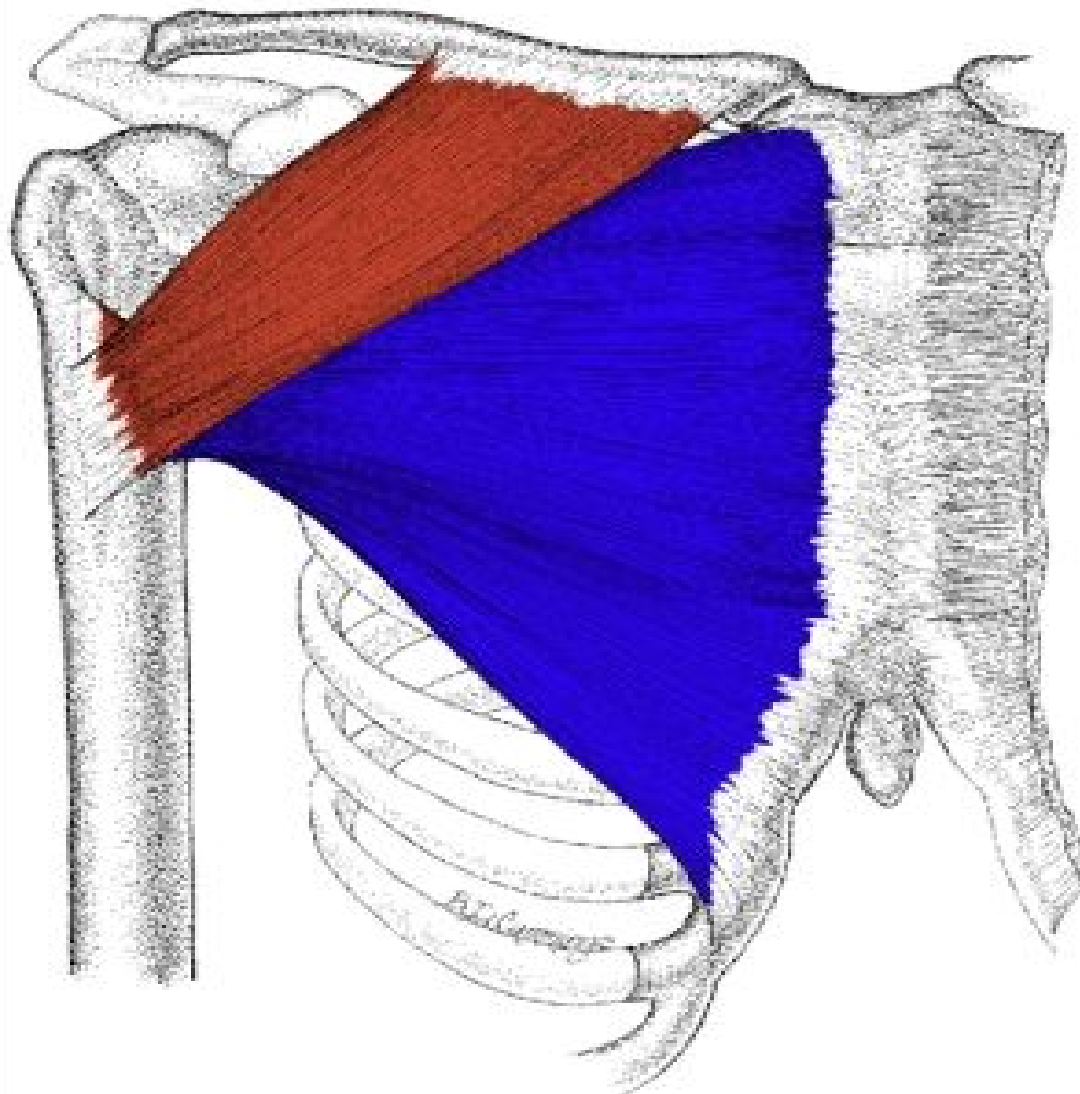
- Action (of arm):

- Shorthead - adduction
- Longhead - abduction

# PECTORALIS MAJOR

**Clavicular Head**

**Sternocostal Head**



# PECTORALIS MAJOR

## ● Origin:

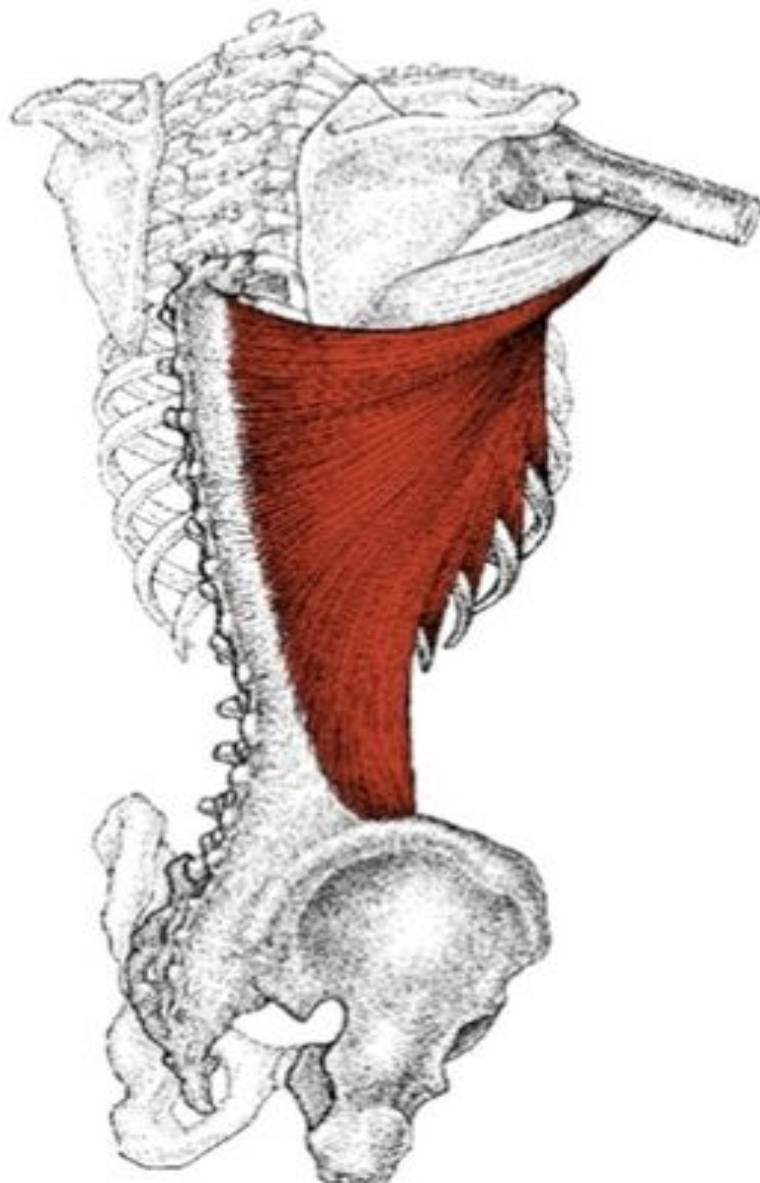
- Clavicular head - Anterior and medial clavicle
- Sternocostal head - Sternum and costal cartilage

## ● Insertion: Lateral aspect of Bicipital groove

## ● Action:

- Both heads -Adduction and Medial rotation of arm
- Clavicular head - flexes shoulder when it is extended
- Sternocostal head - extends shoulder when it is flexed

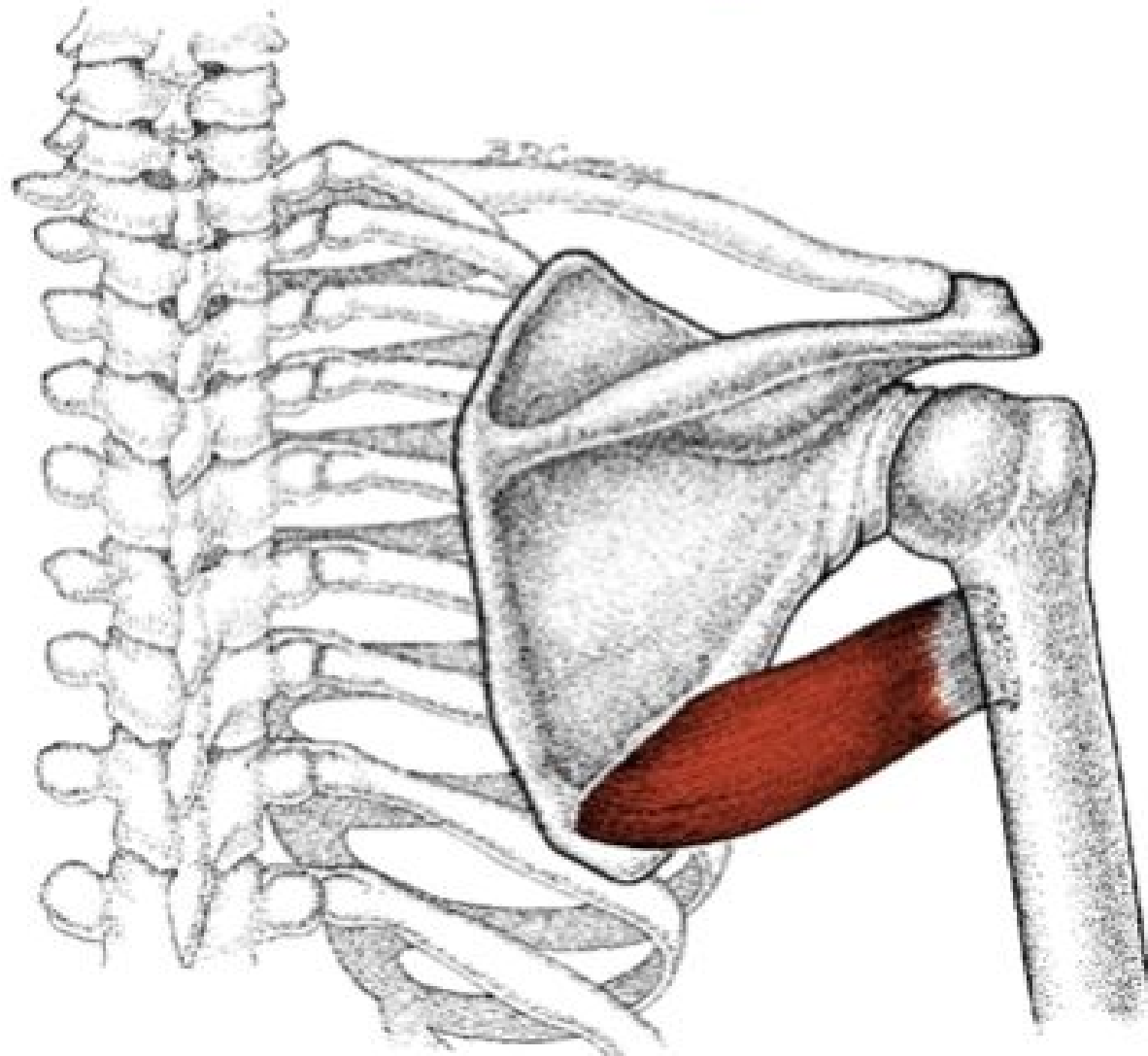
## Latissimus Dorsi



# LATISSIMUS DORSI

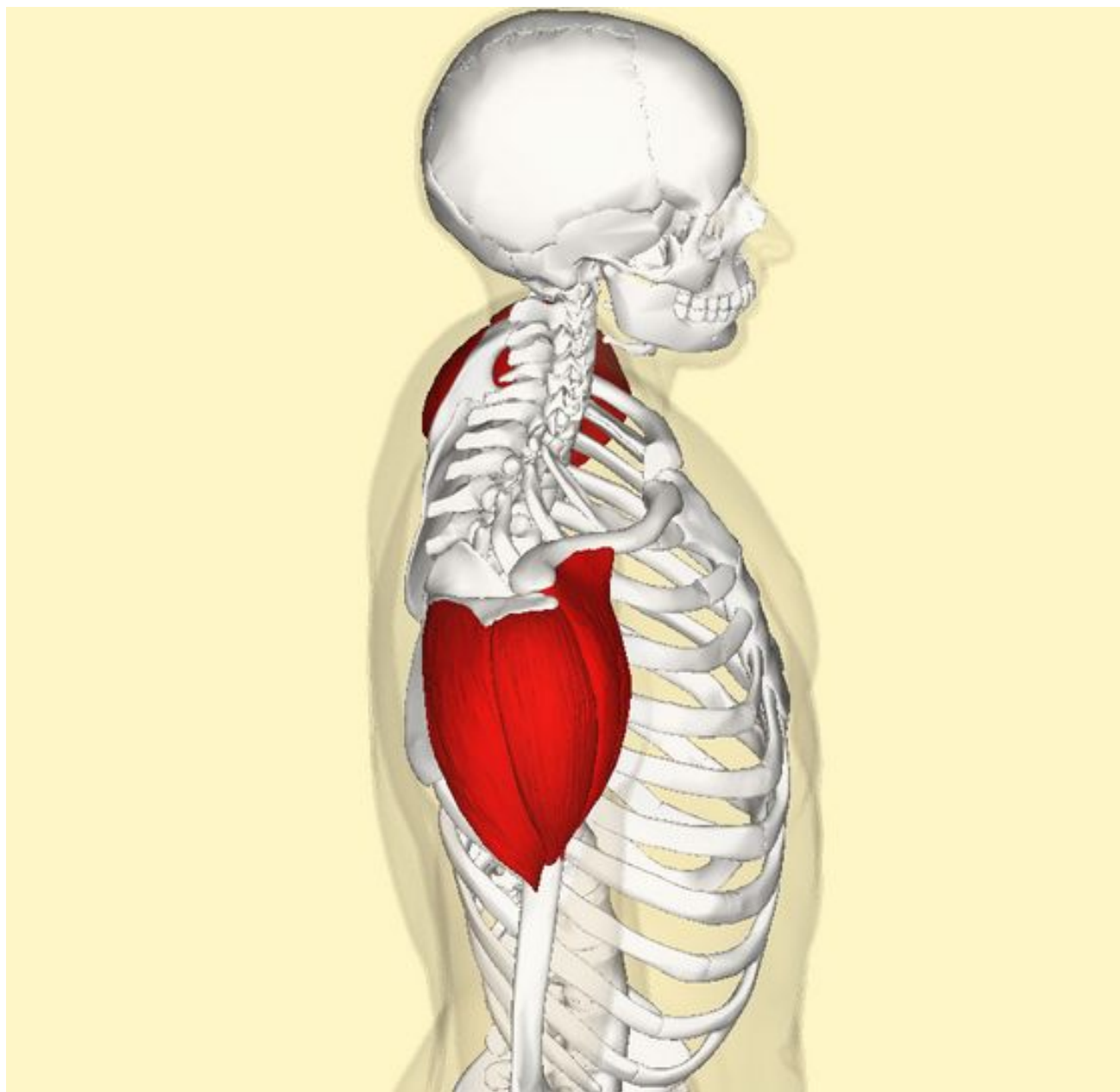
- Origin: Sacral and Iliac Crest, Thoracolumbar fascia, spinous process of T7-T12, posterior surface of lower ribs
- Insertion: Bicipital groove
- Action:
  - Extension of arm
  - Adduction of arm
  - Medial rotation of arm

# Teres Major



# TERES MAJOR

- Origin: posterior surface of inferior angle
- Insertion: Medial aspect of bicipital groove next to latissimus dorsi
- Action:
  - Extension of arm
  - Adduction of arm
  - Medial rotation of arm





# DELTOID

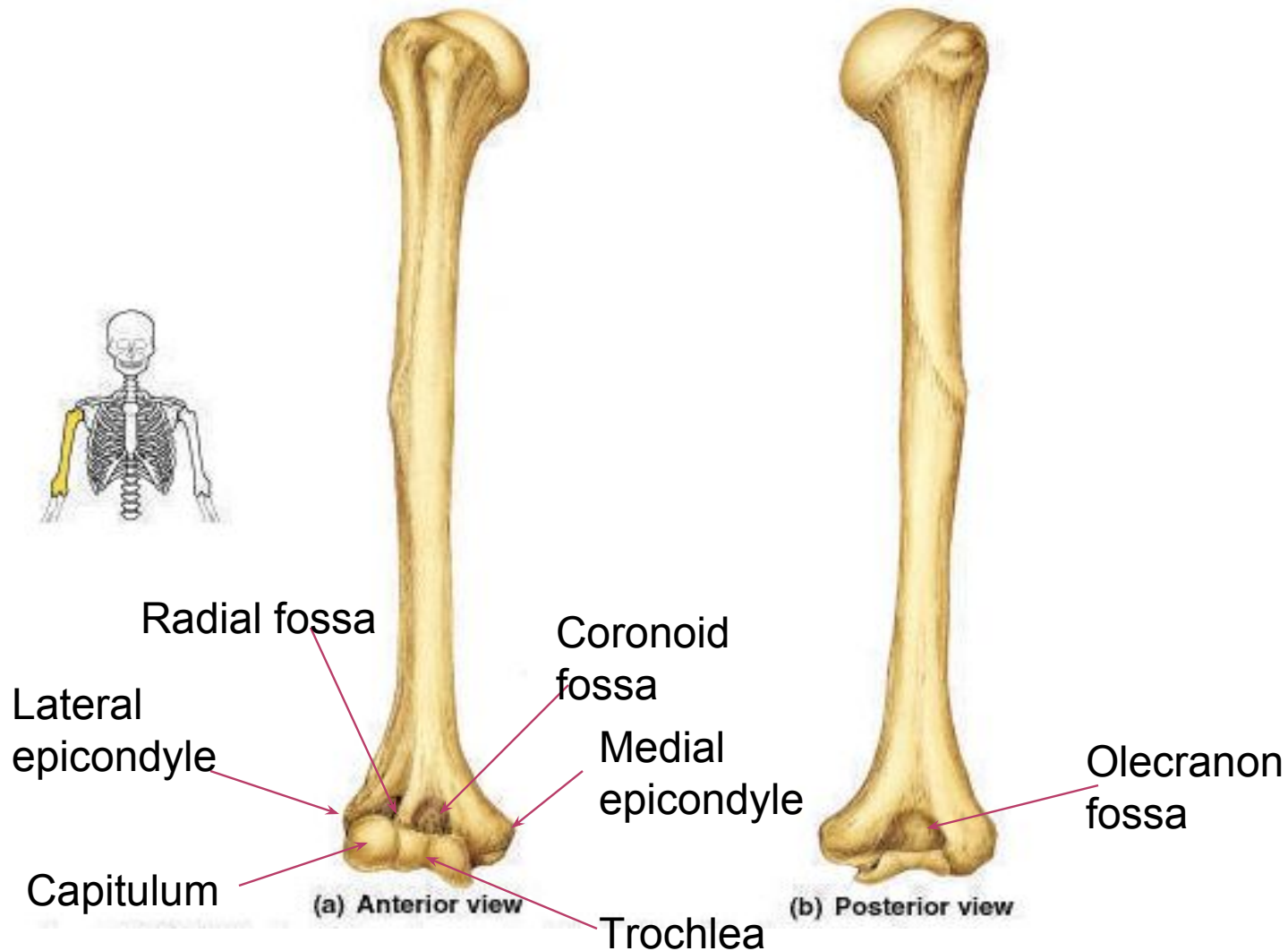
- Origin: Scapular spine and acromion process of scapula, lateral 1/3 of clavicle
- Insertion: Deltoid Tuberosity
- Action:
  - Abduction of arm
  - Anterior fibers - act in flexion and medial rotation of arm
  - Posterior fibers - act in extension and lateral rotation of arm

# THE ELBOW

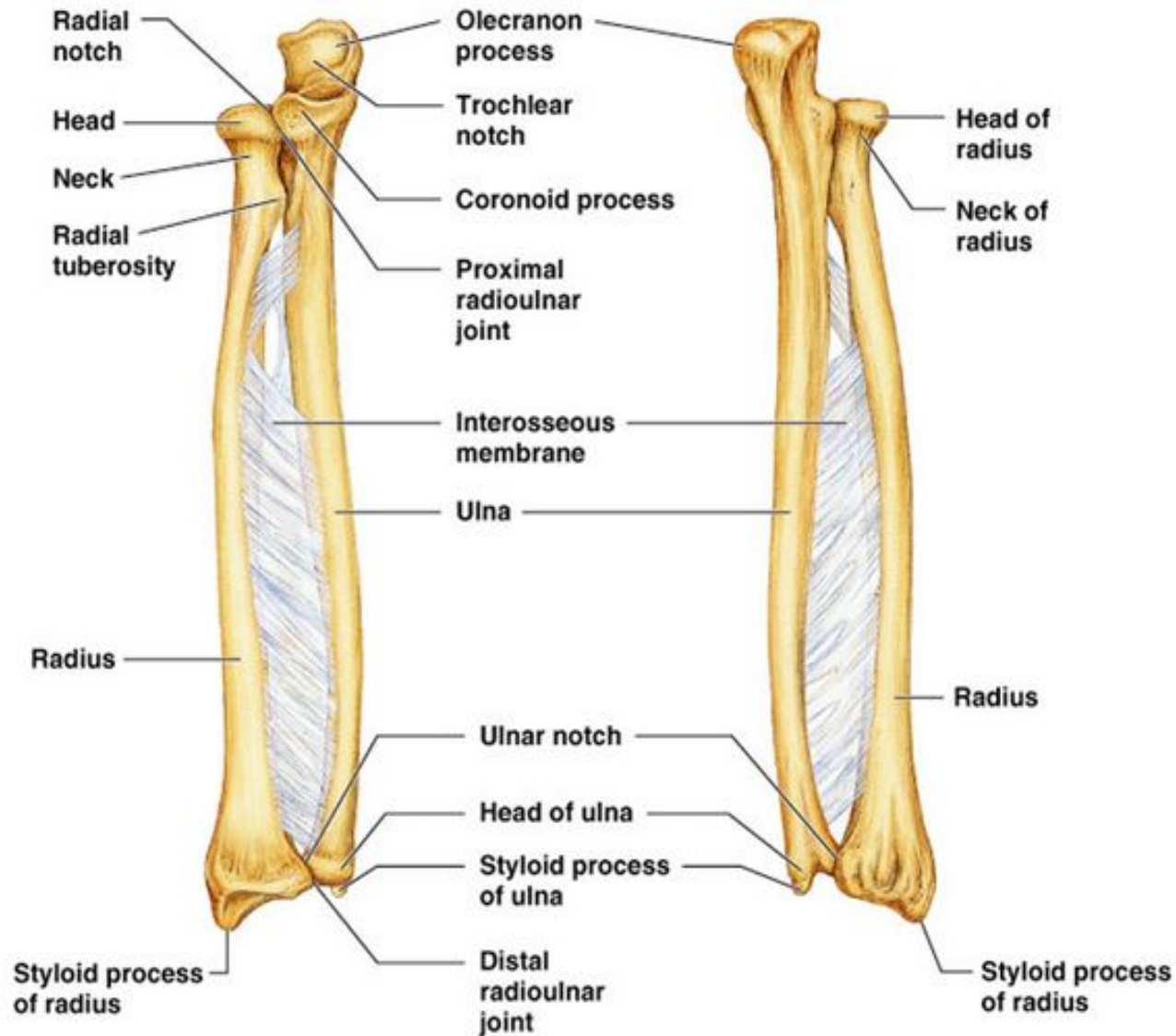
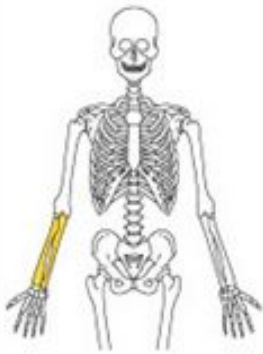
# ELBOW

- Elbow - where ulna, radius and humerus meet
- Forearm
  - 2 bones
    - Radius - wrist
    - Ulna - elbow
- Hinge Joint
  - Flexion and Extension

# HUMERUS CONTINUED



# FOREARM

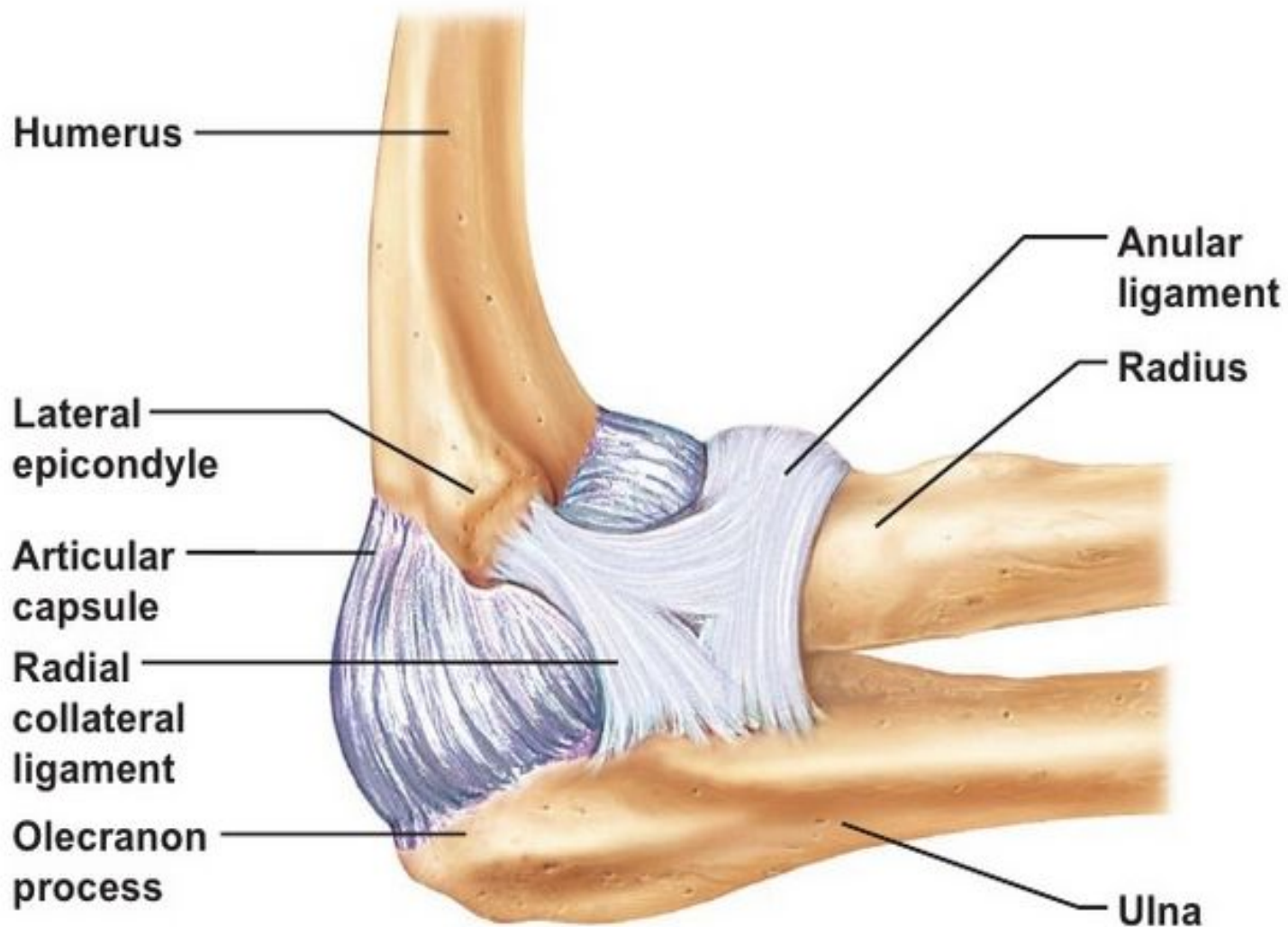


**(a) Anterior view**

**(b) Posterior view**

# JOINT CAPSULE OF ELBOW

- Attachments:
  - Above radial and coronoid fossae
  - Above olecranon fossa
  - Neck of radius
  - Coronoid process
  - Medial surface of ulna
  - Olecranon
- Loose in back to facilitate flexion
- Capsule encloses humeroulnar joint, radiohumeral joint, and radioulnar joint



**(b) Lateral view of right elbow joint**



# LIGAMENTS

- Annular ligament

- U-shaped - wraps around head of radius and attaches to front and back of ulna
- Surrounds and secures head and neck of radius

- Radial collateral ligament

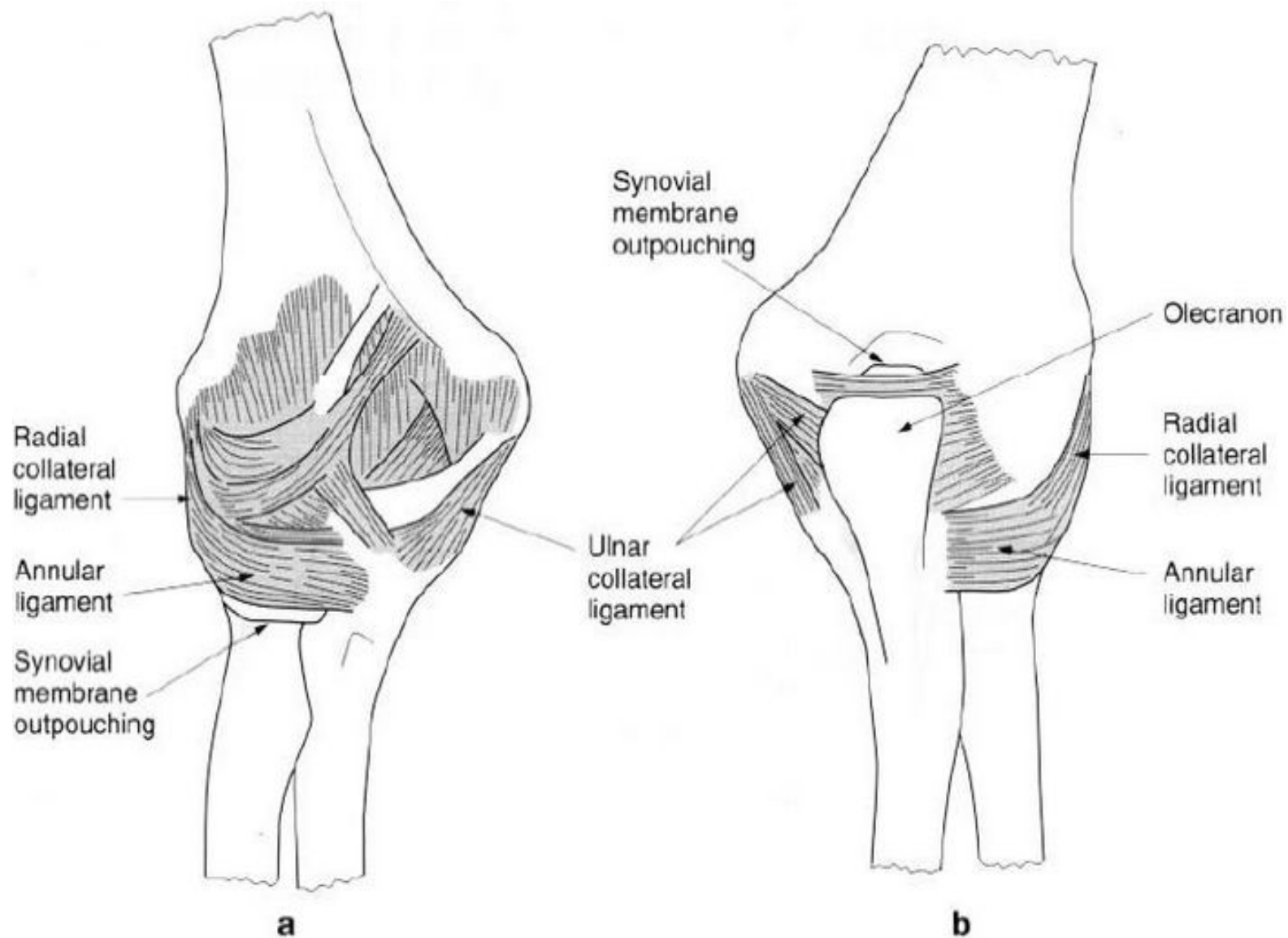
- Lateral epicondyle and inserts on annular ligament and lateral olecranon
- Reinforces function of annular ligament

- Ulnar collateral ligament

- Medial epicondyle and attaches below medial coronoid process and olecranon

- Collaterals allow flexion and extension but prevent lateral movement of elbow





**Fig. 3.78** The elbow joint capsule: **a)** anterior view; **b)** posterior view.

# FLEXION AND EXTENSION

- Flexion - movement that decreases angle between anterior surfaces of arm and forearm
  - Active flexion - limited by contact between bodies of muscles
  - Passive flexion - more range because muscles are more compressible
  - Extreme flexion - radial head and coronoid process fix against fossae
- Extension - Return from flexion to anatomical position or an increase in the angle between arm and forearm
  - Olecranon fits against fossa

# MUSCLES OF FLEXION/EXTENSION

## ◉ Flexion

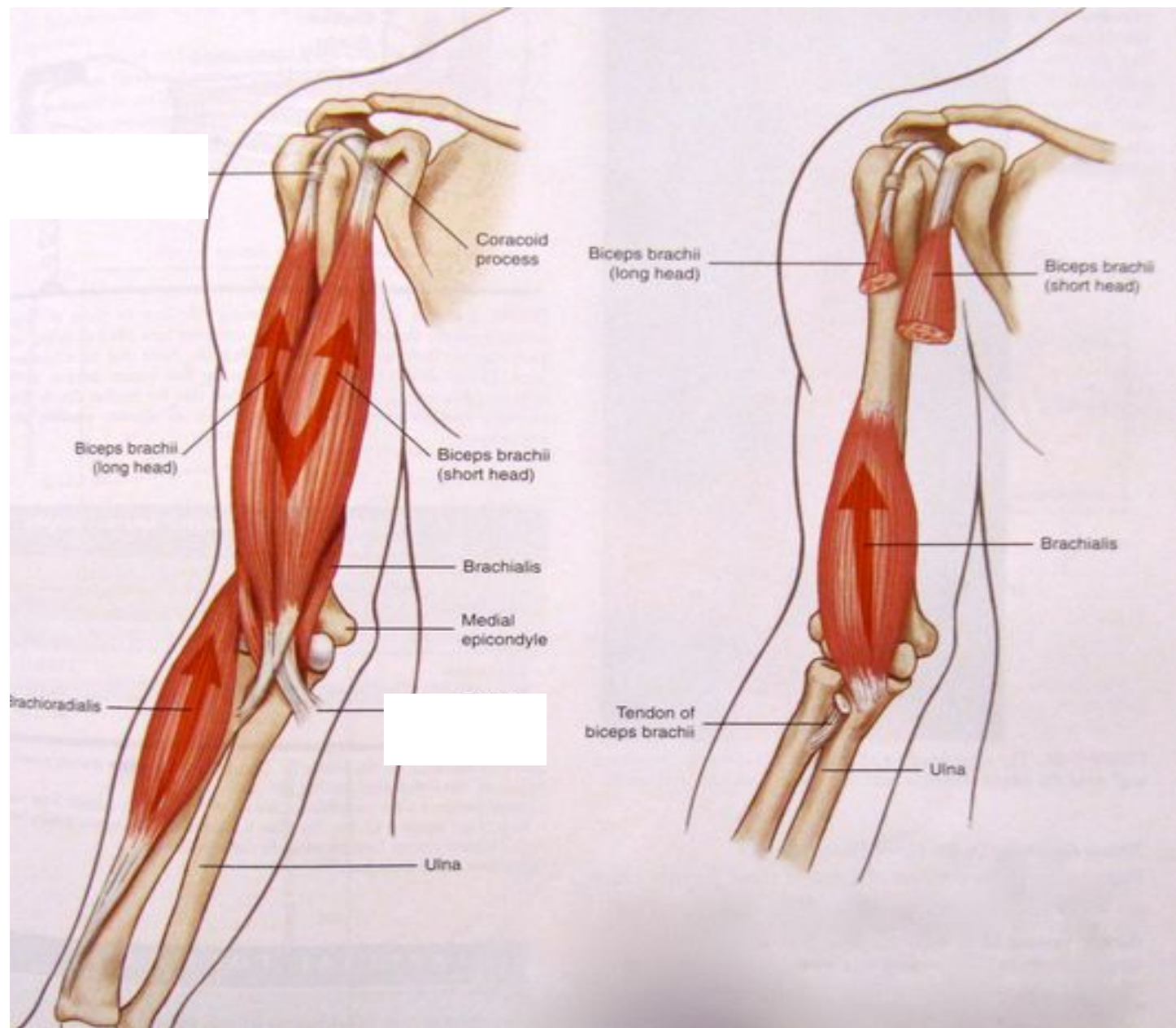
- Brachialis
- Brachioradialis
- Biceps Brachii

## ◉ Extension

- Triceps brachii
- Anconeus

# BRACHIALIS

- Origin: Anterior surface of distal humerus
- Insertion: Coronoid process
- Action: Flexion of elbow



# BRACHIORADIALIS

- ◉ Origin: Lateral ridge on distal humerus
- ◉ Insertion: Radial styloid process
- ◉ Action:
  - Flexion of elbow especially if radius is partially pronated
  - Initial stages of pronation and supination
    - Assists in pronation from a supinated position
    - Assists in supination from a pronated position

# Brachioradialis



*Origin: Humerus*

*Action: Elbow flexion*

*Insertion: Radius*

# BICEPS BRAHCHII

## ● Origin:

- Shorthead - coracoid process
- Longhead - tubercle above glenoid cavity

## ● Insertion: Radial Tuberosity

## ● Action :

- Flexion of elbow
- Supinator of radius (inserts on posterior aspect of radial tuberosity)
  - Uncrosses upper radius from pronated position



***Superficial***

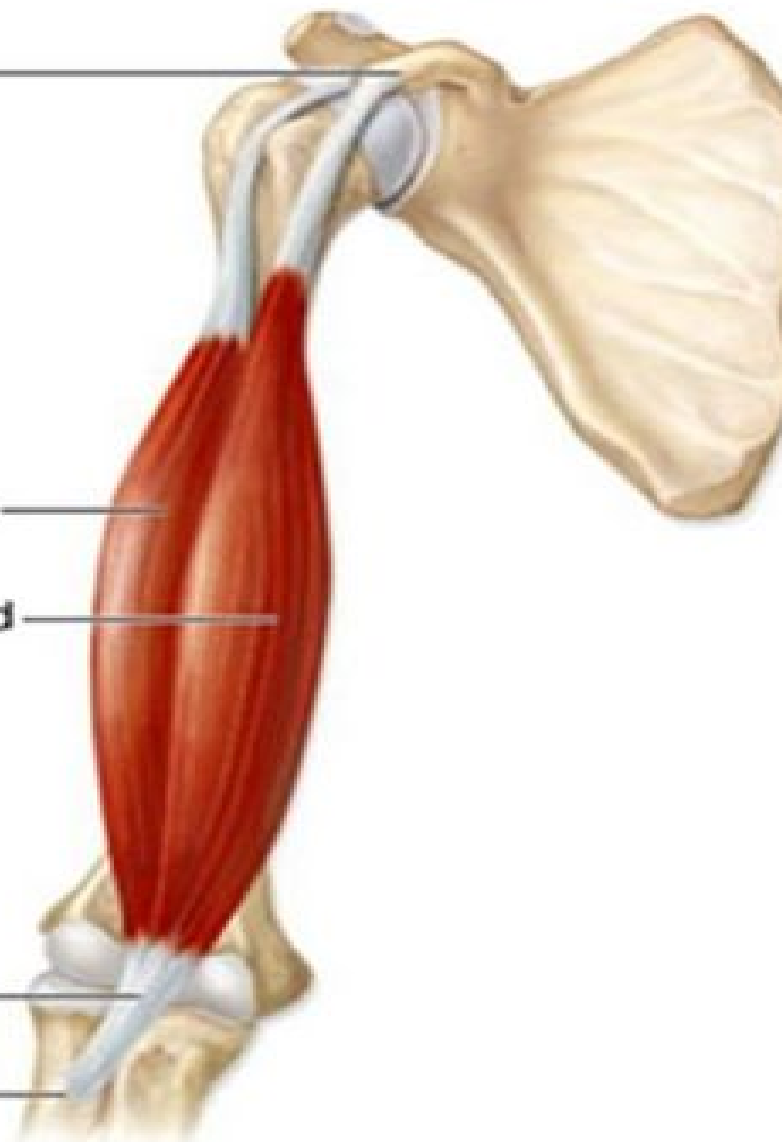
Coracoid process

Biceps brachii, long head

Biceps brachii, short head

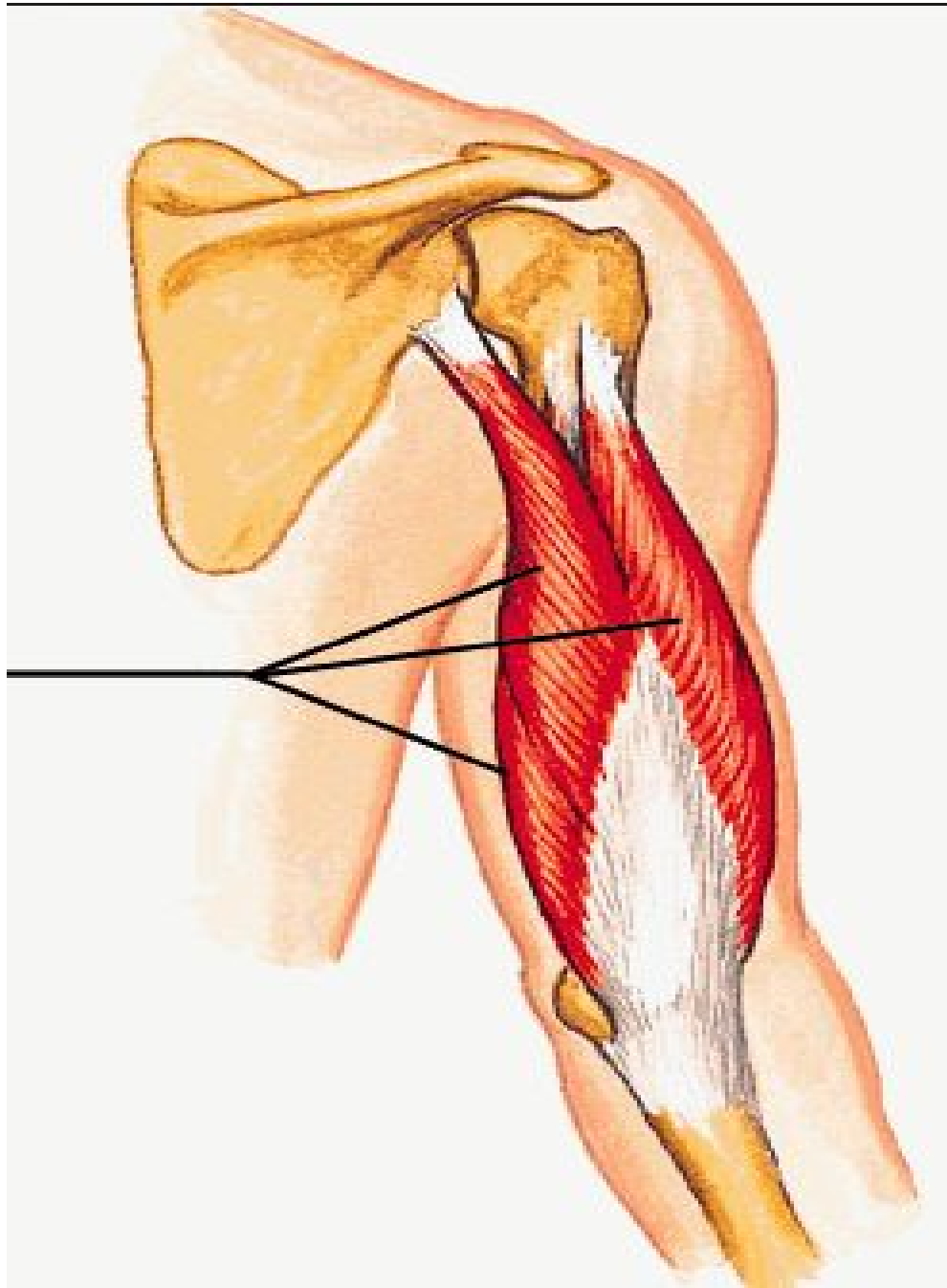
Biceps brachii tendon

Radial tuberosity



# TRICEPS BRACHII

- Origin (3) :
  - Longhead - Tubercle below glenoid cavity
  - Lateral head - Humerus (back, upper, lateral shaft)
  - Medial head - Humerus (back, lower shaft)
- Insertion: Olecranon
- Action: Extension of elbow



# ANCONEUS

- ◉ Origin: Lateral epicondyle
- ◉ Insertion: Lateral olecranon and upper ulna
- ◉ Action: Assists triceps in extension

# Anconeus Muscle



# PRONATION AND SUPINATION

- Supination - Radius and Ulna parallel and palm faces anteriorly
- Pronation - Radius crosses over Ulna and palm faces posteriorly

Supination

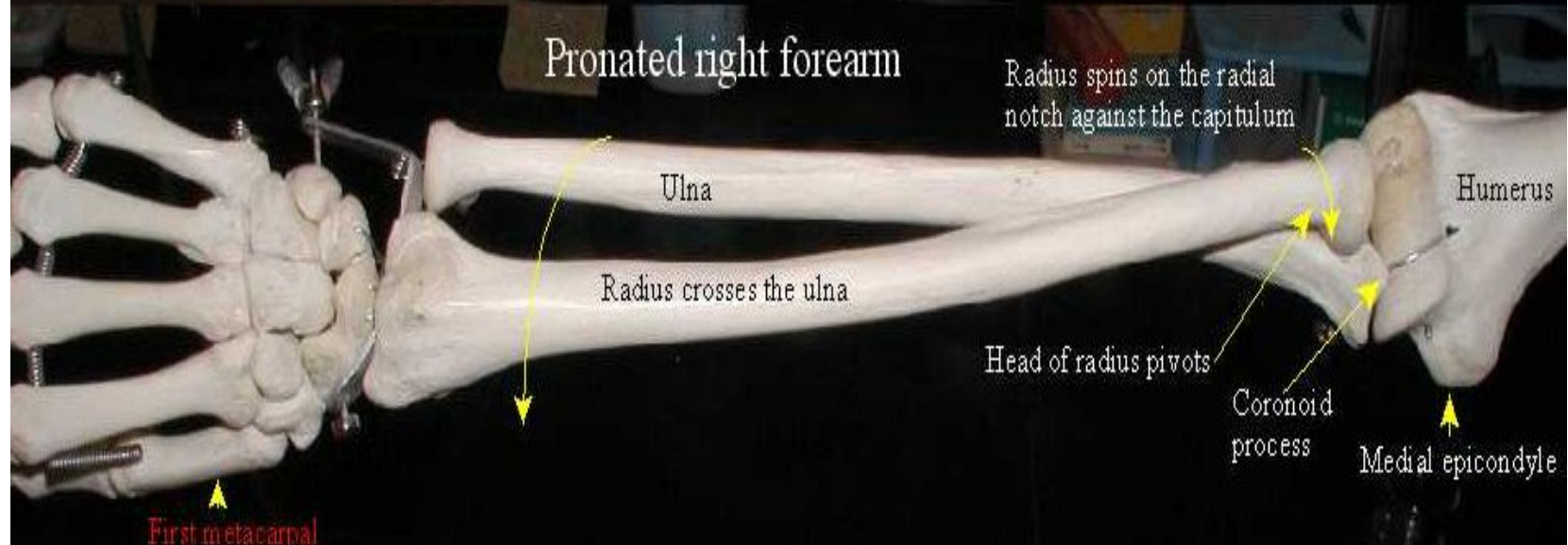
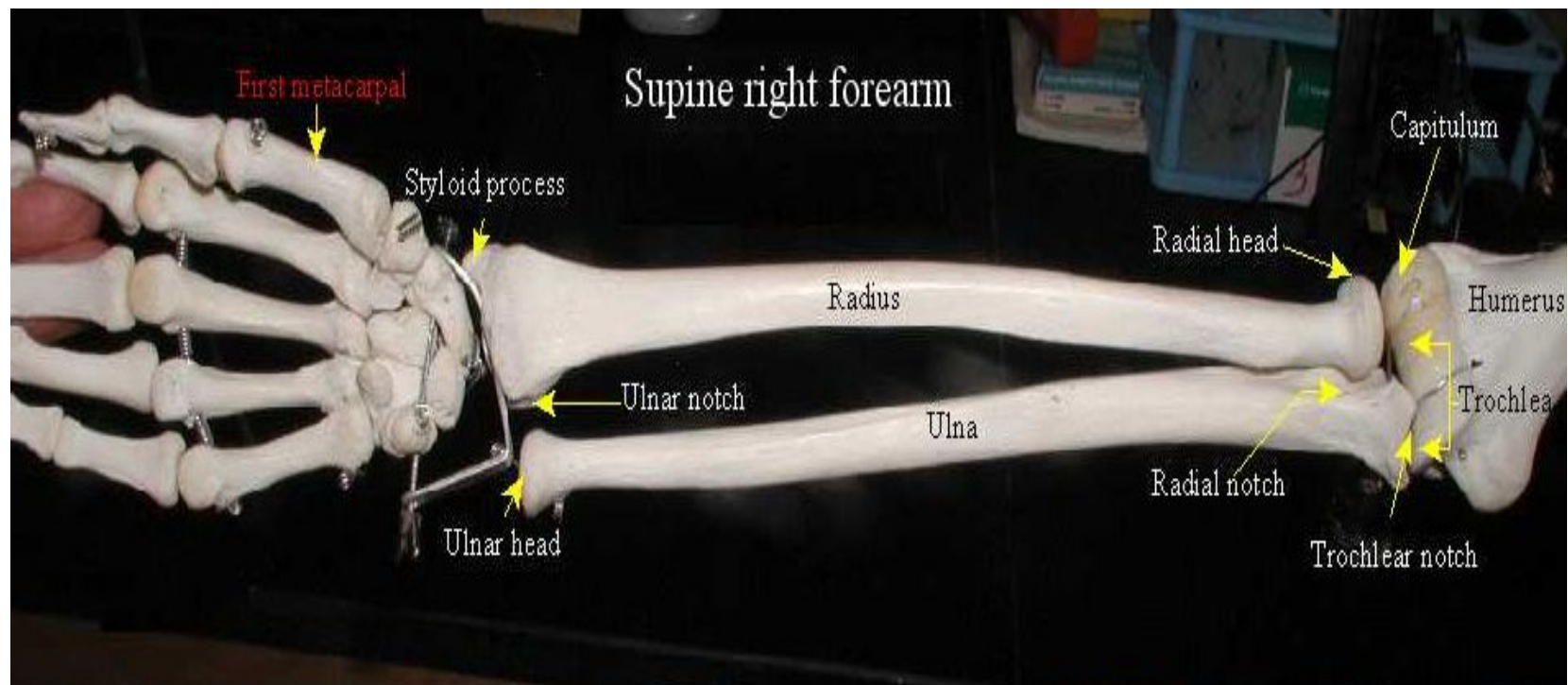


Pronation



ulna



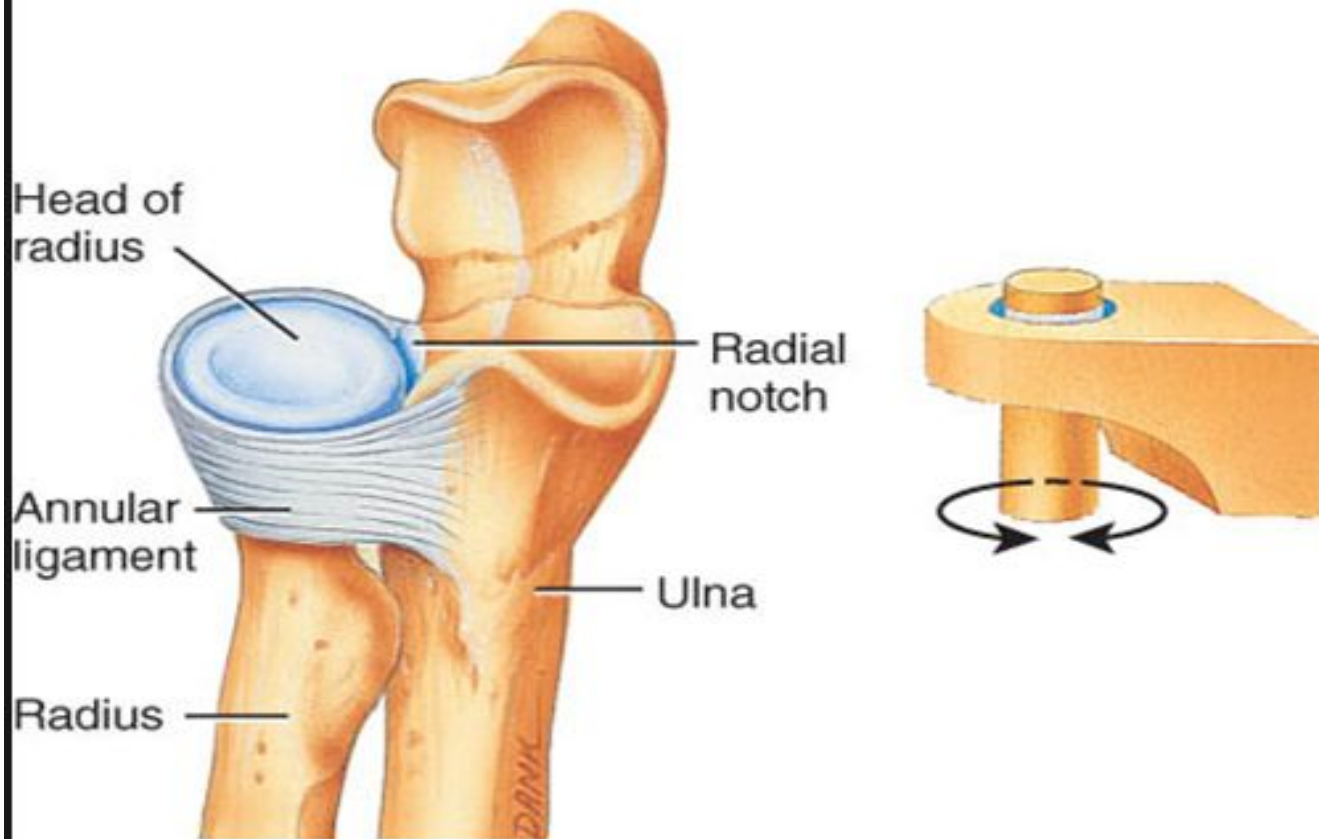




# PROXIMAL RADIOULNAR JOINT

- Radial notch and head of radius
- Pivot joint
- Radius held in place by annular ligament
- Allows pronation and supination

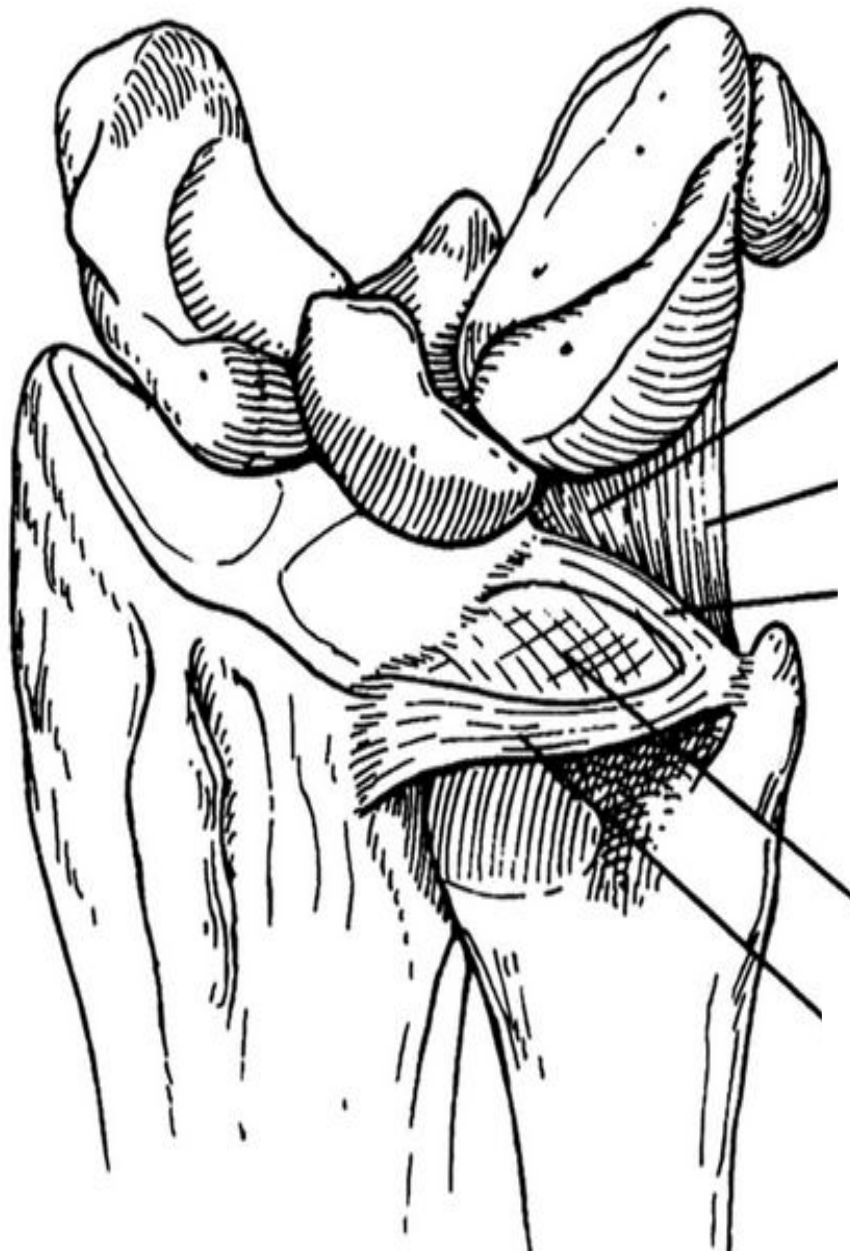
# PROXIMAL RADIOULNAR JOINT



(c) Pivot joint between head of radius and radial notch of ulna

# DISTAL RADIOULNAR JOINT

- Ulnar notch and ulnar head
- Pivot joint
- Radius anteriorly over head of ulna
- Separate synovial cavity from radiocarpal joint cavity
- Articular disk connects styloid process of ulna to ulnar notch
  - Holds radius and ulna together during movement at the joint
  - Separates distal radioulnar joint from wrist joint



Articular disc

# FOREARM CONTINUED

- Interosseous membrane - connects shafts of radius and ulna
  - Holds Ulna and Radius together during pronation and supination
  - Acts as a site of muscle attachment

# MUSCLES OF PRONATION/SUPINATION

## ● Pronation:

- Pronator teres
- Pronator quadratus
- Brachioradialis

## ● Supination:

- Biceps Brachii
- Supinator
- Brachioradialis

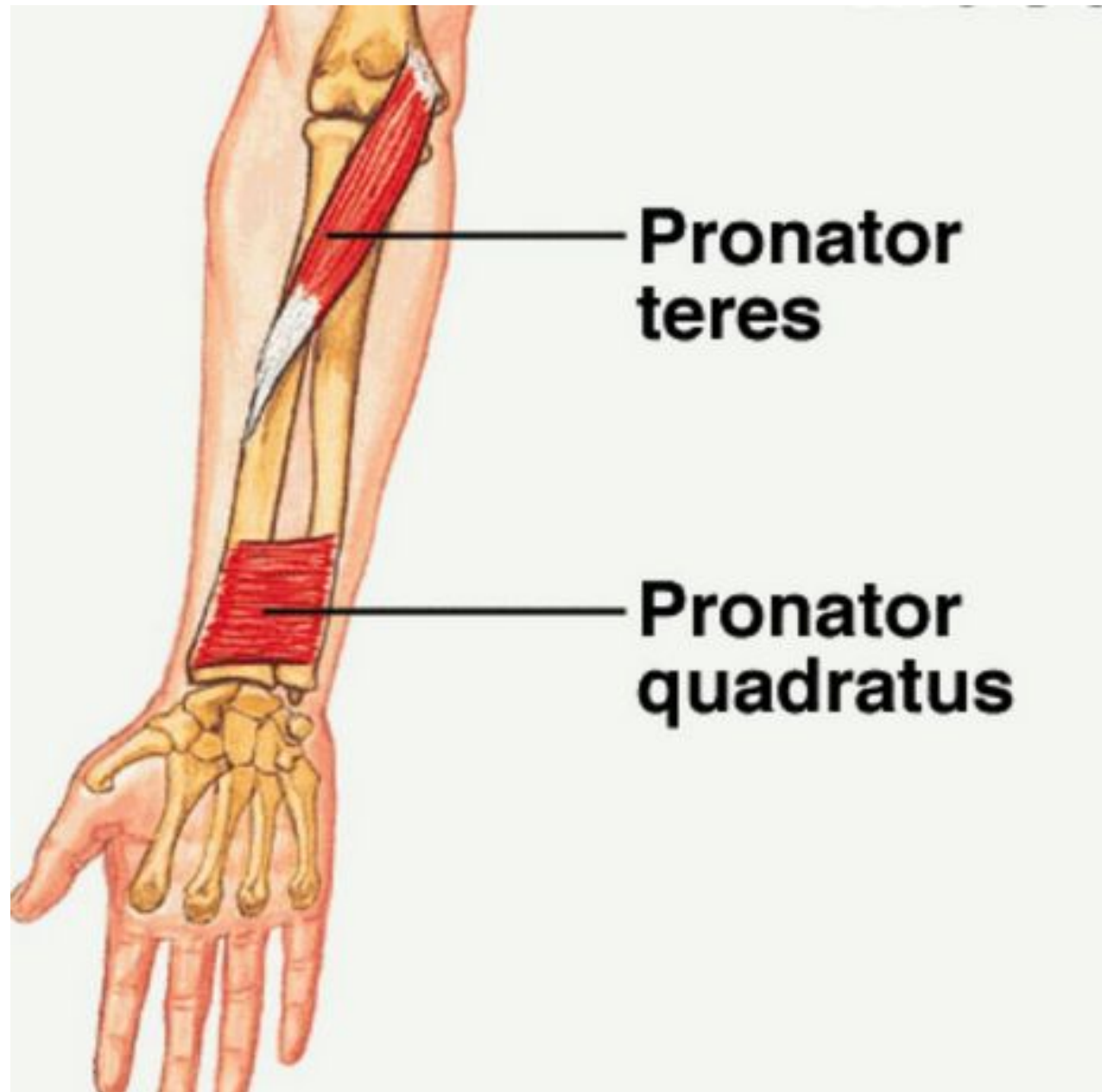
# PRONATOR TERES

- ⦿ Origin: Medial epicondyle of humerus and coronoid process of ulna
- ⦿ Insertion: Midlateral surface of radius
- ⦿ Action:
  - Pronation of arm
  - Assists in flexion of elbow

# PRONATOR QUADRATUS

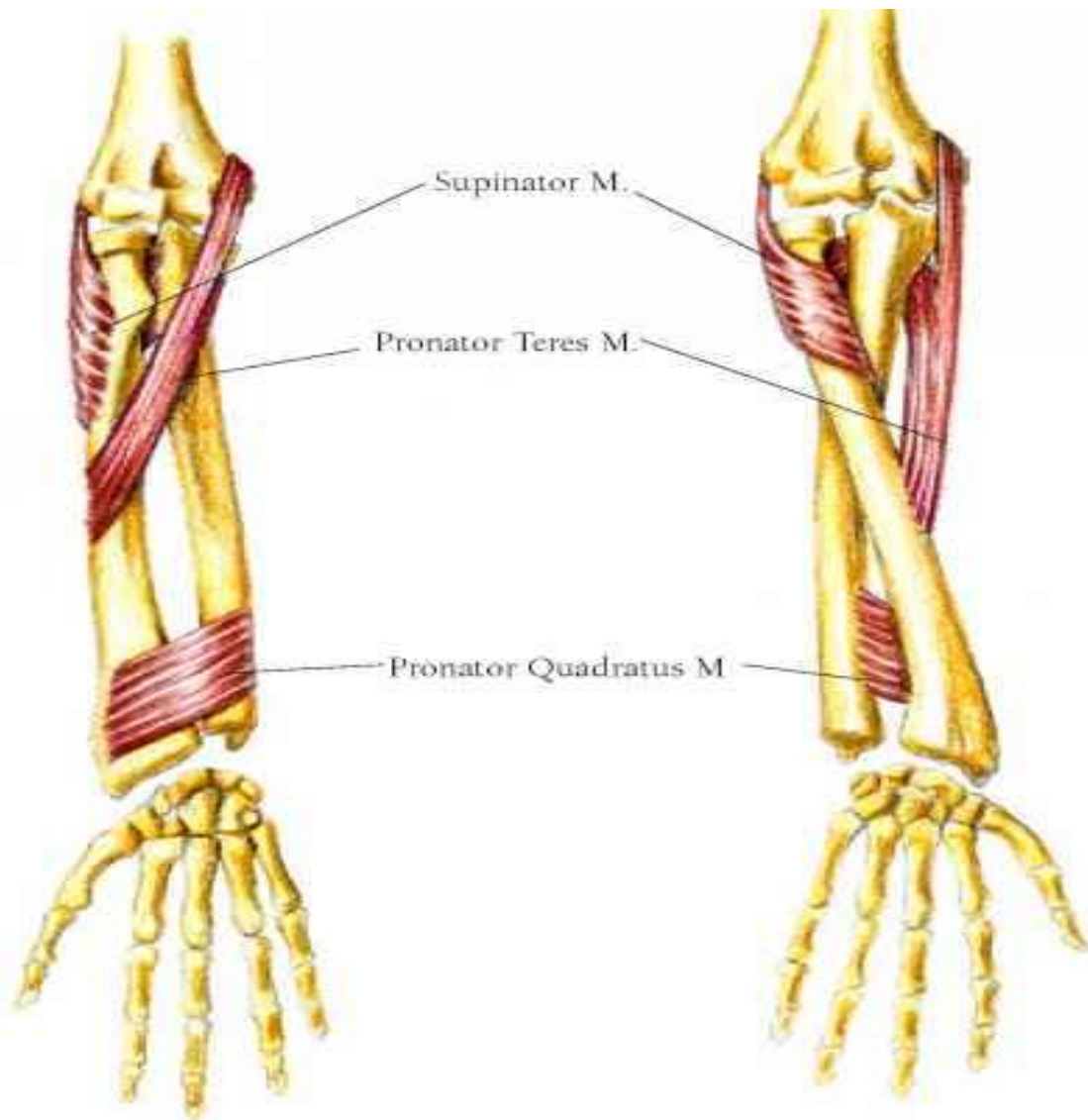
- Attachments: Anterior surface of distal ulna and radius
- Action: Pulls radius across ulna in pronation



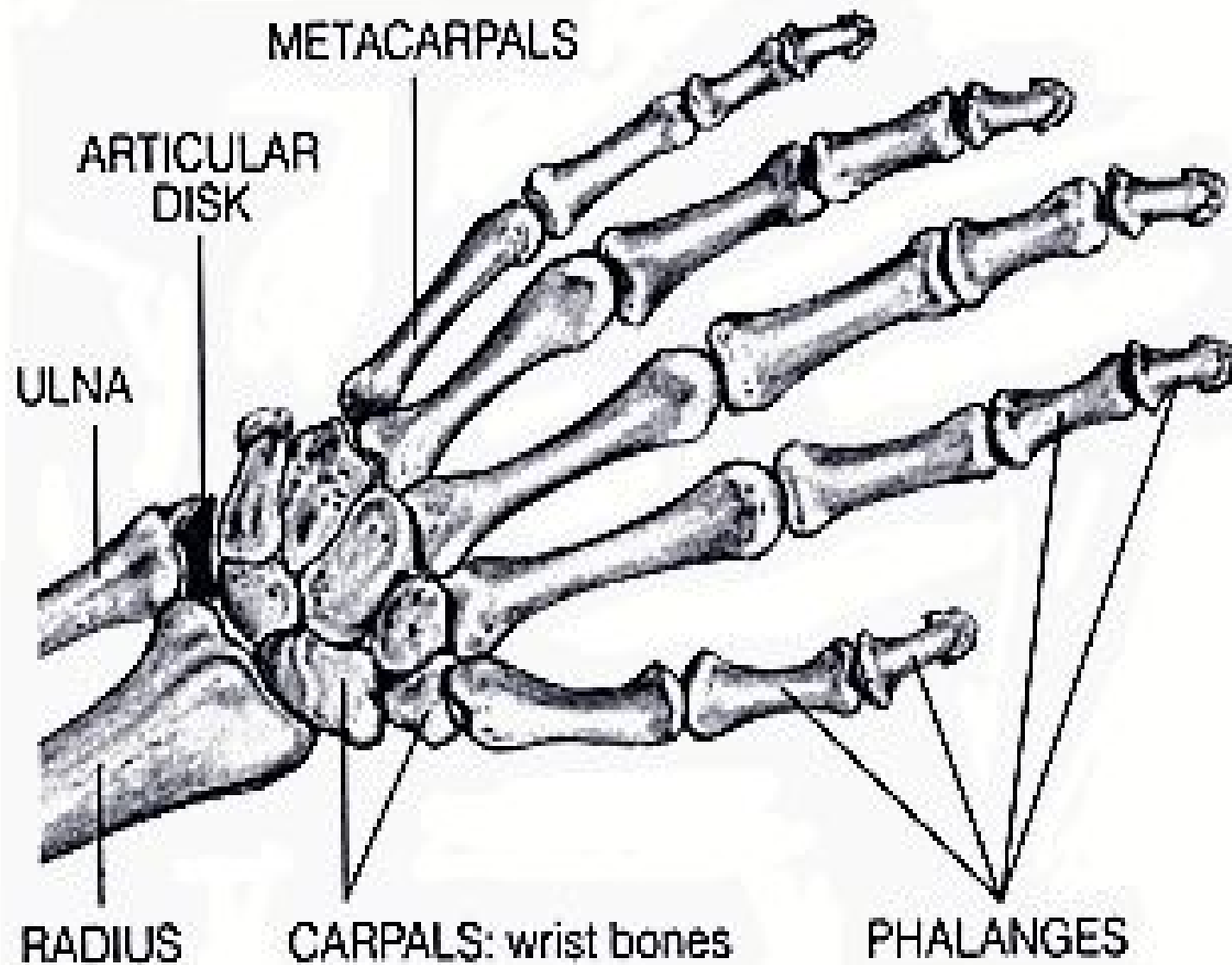


# SUPINATOR

- **Origin:**
  - Superficial layer - lateral epicondyle of humerus
  - Deep layer - Just below radial notch of ulna
- **Insertion:** Radius between neck and insertion of pronator teres
- **Action:** Supination of forearm



# HAND AND WRIST



# Bones of the wrist and hand

## **Carpal bones** (wrist)

8 small bones

2 Rows

Top 3 bones articulate with Radius and articular disk

Bottom 4 articulate with Metacarpals

## **Metacarpals**

5 - Thumb is Metacarpal I, Pinky is Metacarpal V

## Phalanges

14 - Each finger has 3 phalanges except the thumb which has 2

## Metacarpals and Phalanges

Base, Shaft and Head

# Wrist and Finger Joints

**Radiocarpal joint** - between top 3 carpal bones,  
radius and articular disk

Ellipsoid joint

Flexion/Extension

Adduction/Abduction

**Midcarpal joint** - between 2 rows of carpal bones

Gliding joint

# Wrist and Finger Joints Continued

**Carpometacarpal joints** - between distal carpal bones and metacarpals

Thumb - Saddle joint

Flexion/Extension

Adduction/Abduction

Rotation

II-V - Saddle/Gliding

Flexion/Extension and Gliding



# Wrist and Finger Joints Continued

**Metacarpophalangeal joints** - between metacarpals and phalanges

Hinge Joint

Flexion/Extension

Limited Adduction/Abduction and rotation

**Interphalangeal joints** - between phalanges

Hinge Joint

Flexion/Extension

# Muscles of Wrist

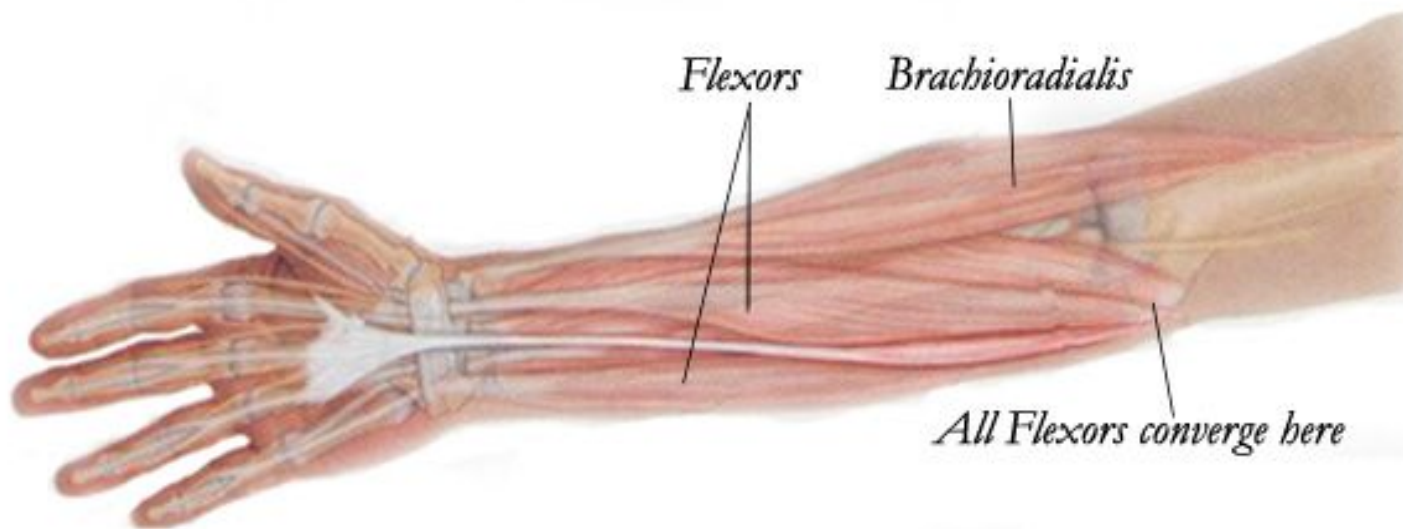
## **Flexors:**

Common Flexor Origin - Medial Epicondyle of Humerus

Flexor Carpi Radialis - Flexes and abducts the wrist

Palmaris Longus - Flexes the wrist

Flexor Carpi Ulnaris - Flexes and adducts the wrist



# Muscles of Wrist

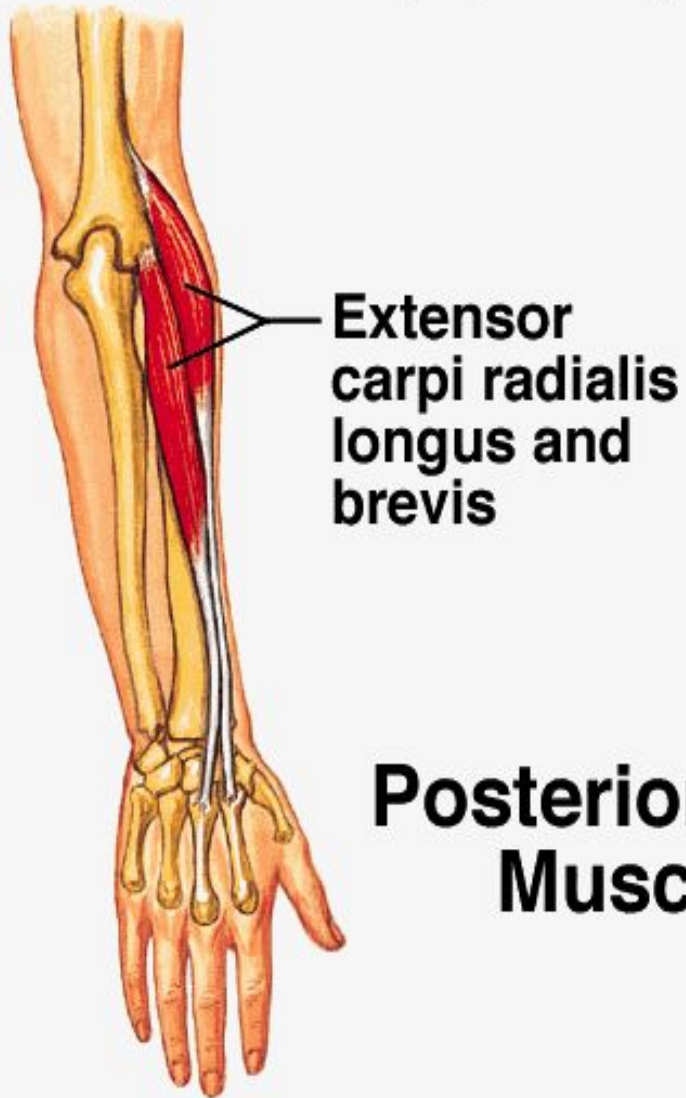
## Extensors:

Common Extensor Origin - Lateral Epicondyle of Humerus

Extensor Carpi Radialis Longus - Extends and abducts the wrist

Extensor Carpi Radialis Brevis - Extends and abducts the wrist

Extensor Carpi Ulnaris - Extends and adducts the wrist



## **Posterior Forearm Muscles (2)**

