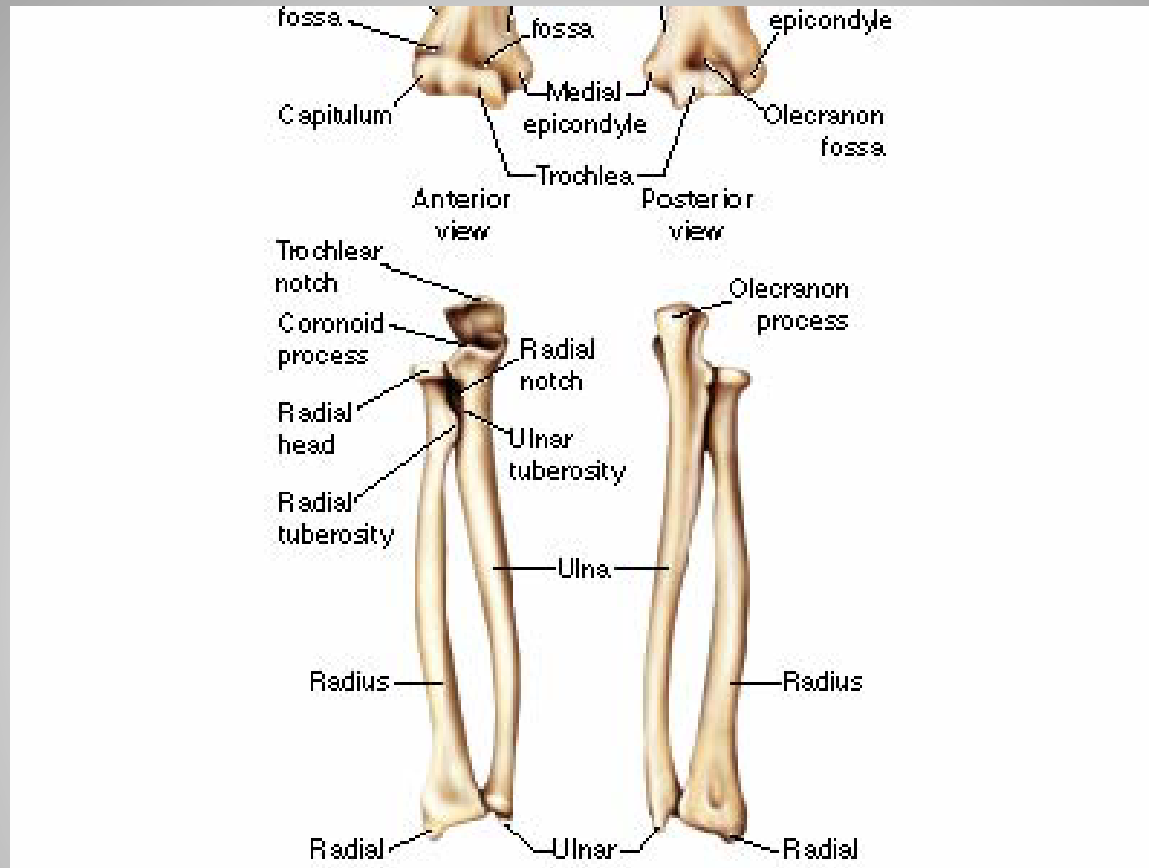


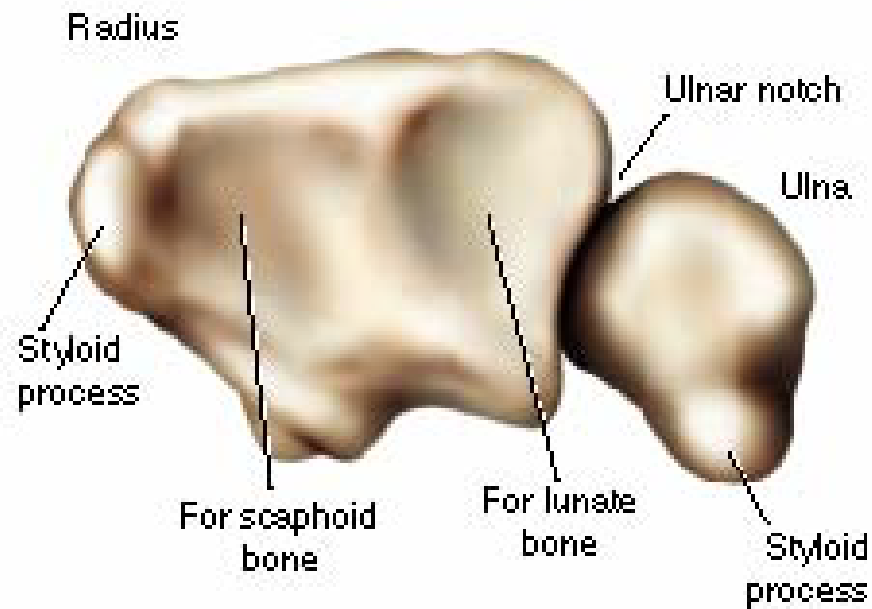
# KINES 80

## Chapter 4



## Bones of the Elbow and Forearm

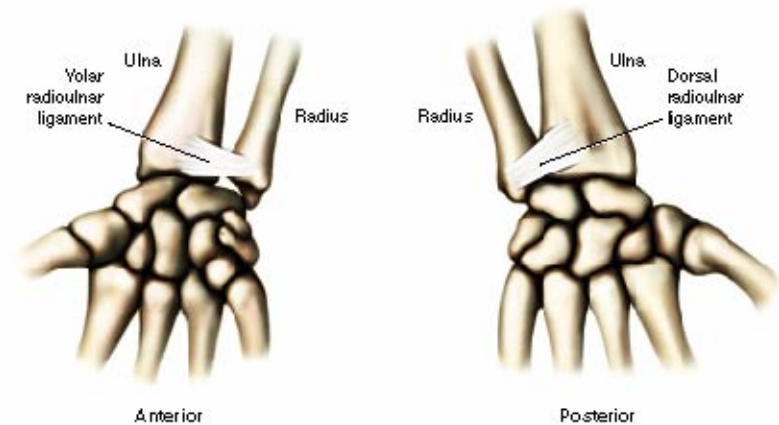
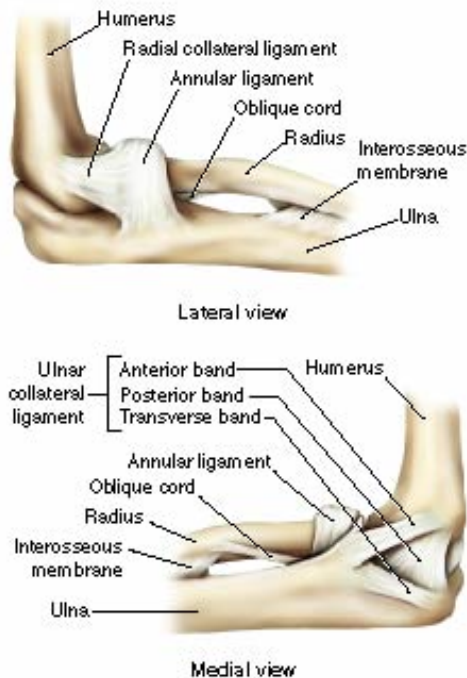
Bony landmarks for the radius, ulna and humerus. Yes, you need to know these. Looks like a lot, but it is slightly repetitive.



: Anatomy, Second Edition, by Robert S. Behnke, 2006, Champaign, IL: Human

## Facets on the distal surface of the radius

# Major ligaments of elbow and distal radioulnar joint



From *Kinetic Anatomy, Second Edition*, by Robert S. Behnke, 2006, Champaign, IL: Human Kinetics.

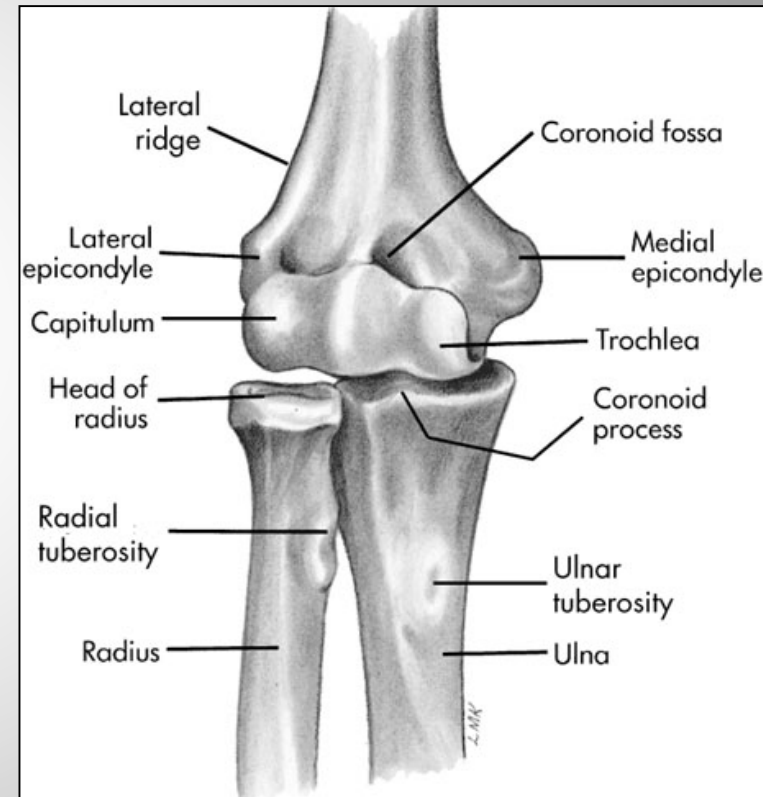
From *Kinetic Anatomy, Second Edition*, by Robert S. Behnke, 2006, Champaign, IL: Human Kinetics.

# The Elbow & Radioulnar Joints

- Most upper extremity movements involve the elbow & radioulnar joints
- Usually grouped together due to close anatomical relationship
- Elbow joint movements may be clearly distinguished from those of the radioulnar joints
- Radioulnar joint movements may be distinguished from those of the wrist

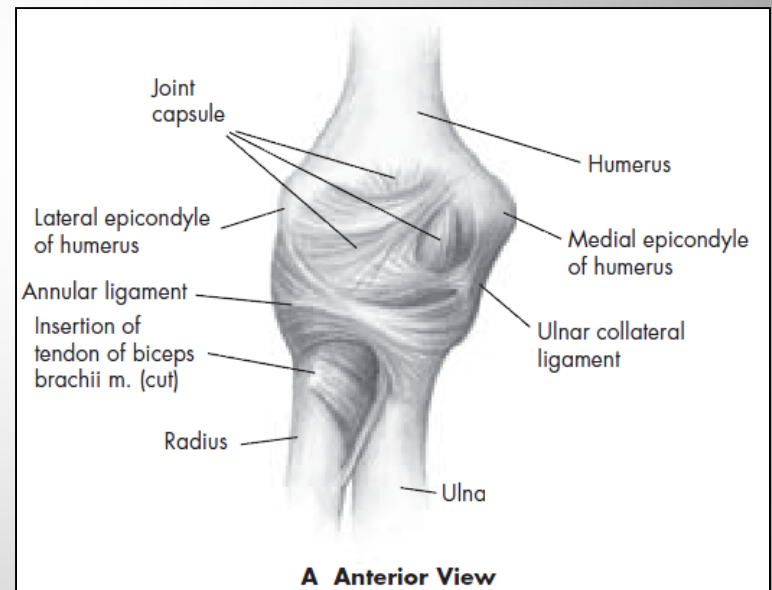
# Bones

- Ulna is much larger proximally than radius
- Radius is much larger distally than ulna
- Scapula & humerus serve as proximal attachments for muscles that flex & extend the elbow
- Ulna & radius serve as distal attachments for these same muscles



# Joints

- Ginglymus or hinge-type joint
- Allows only flexion & extension
- 2 interrelated joints
  - humeroulnar joint
  - radiohumeral joints

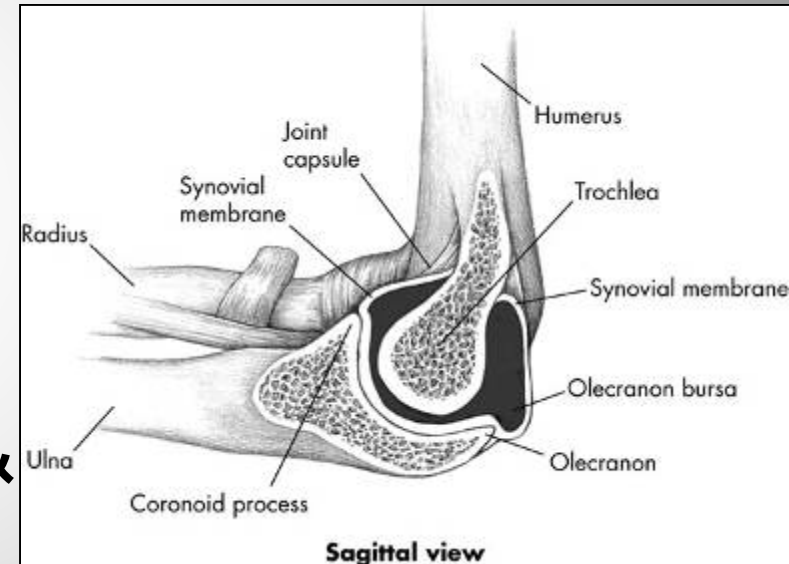


# Joints

- Elbow motions
  - primarily involve movement between articular surfaces of humerus & ulna
  - specifically humeral trochlear fitting into ulna trochlear notch
  - radial head has a relatively small amount of contact with capitulum of humerus
  - As elbow reaches full extension, olecranon process is received by olecranon fossa
    - increased joint stability when fully extended

# Joints

- As elbow flexes 20 degrees or more, its bony stability is unlocked, allowing for more side-to-side laxity
- Stability in flexion is more dependent on the lateral (radial collateral ligament) & the medial or (ulnar collateral ligament)



# Joints

- Radioulnar joint
  - Joint between shafts of radius & ulna held tightly together between proximal & distal articulations by an interosseus membrane (syndesmosis)
    - substantial rotary motion between the bones

# Joints

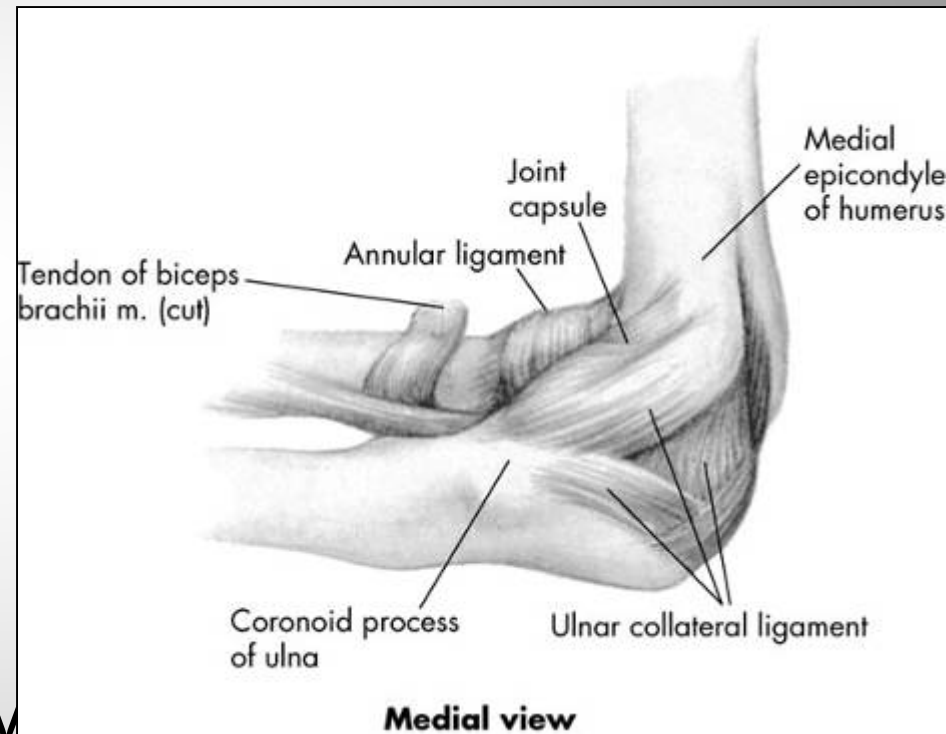
- Synergy between glenohumeral, elbow, & radioulnar joint muscles
  - As the radioulnar joint goes through its ROM, glenohumeral & elbow muscles contract to stabilize or assist in the effectiveness of movement at the radioulnar joints
  - Ex. when tightening a screw with a screwdriver which involves radioulnar supination, we tend to externally rotate & flex the glenohumeral & elbow joints, respectfully

# Joints

- Synergy between glenohumeral, elbow, & radioulnar joint muscles
  - Conversely, when loosening a tight screw with pronation, we tend to internally rotate & extend the elbow & glenohumeral joints, respectfully
  - we depend on both the agonists and antagonists in the surrounding joints to assist in an appropriate amount of stabilization & assistance with the required task

# Joints

- Ulnar collateral ligament is critical in providing medial support to prevent elbow from abducting when stressed in physical activity
  - Many contact sports & throwing activities place stress on medial aspect of joint, resulting in injury



# Fundamental Movements and Muscles of the Elbow and Forearm

## ❖ Flexion (anterior muscles)

Brachialis, brachioradialis, biceps brachii

## ❖ Extension (posterior muscles)

Triceps brachii, anconeus

## ❖ Supination

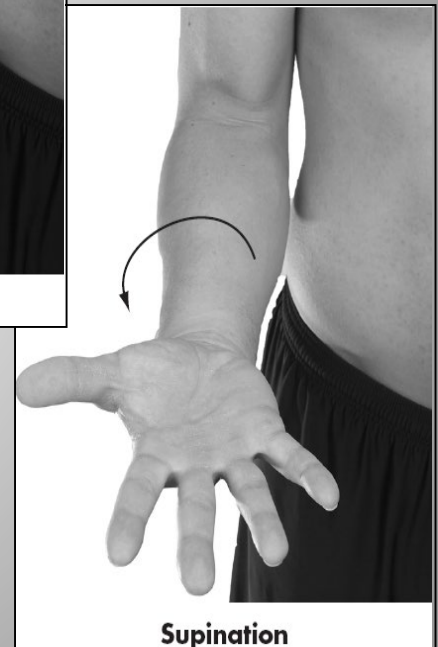
Biceps brachii, supinator

## ❖ Pronation

Pronator quadratus, pronator teres

# Movements

- Pronation
  - internal rotary movement of radius on ulna that results in hand moving from palm-up to palm-down position
- Supination
  - external rotary movement of radius on ulna that results in hand moving from palm-down to palm-up position



# Muscles of the elbow

## Anterior:

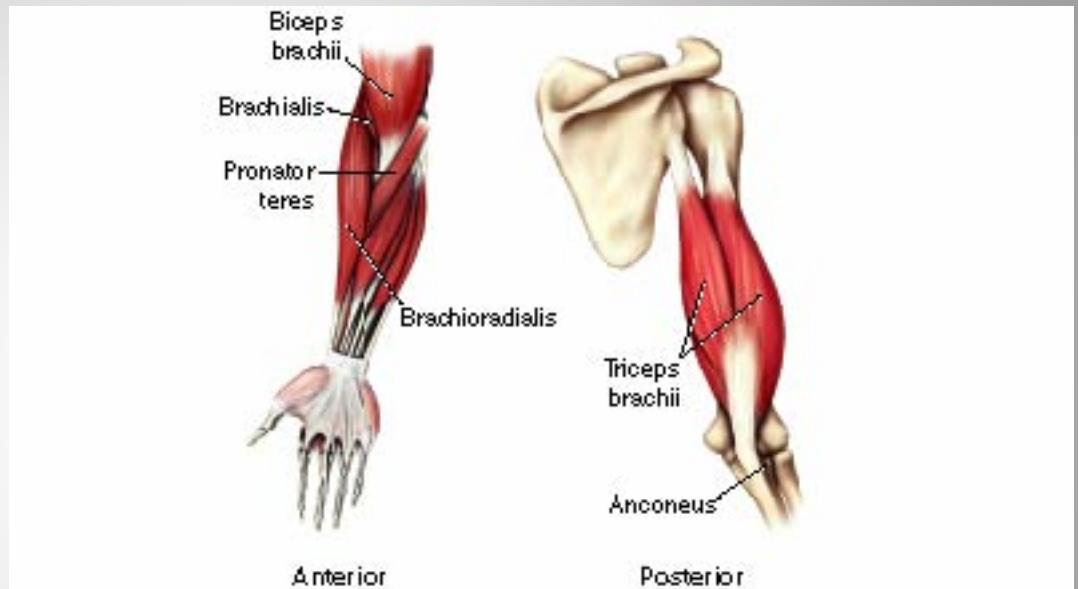
Brachialis, brachioradialis – 1 joint movement

Biceps brachii – name movements at 3 joints

## Posterior:

Triceps brachii – movements at which joints

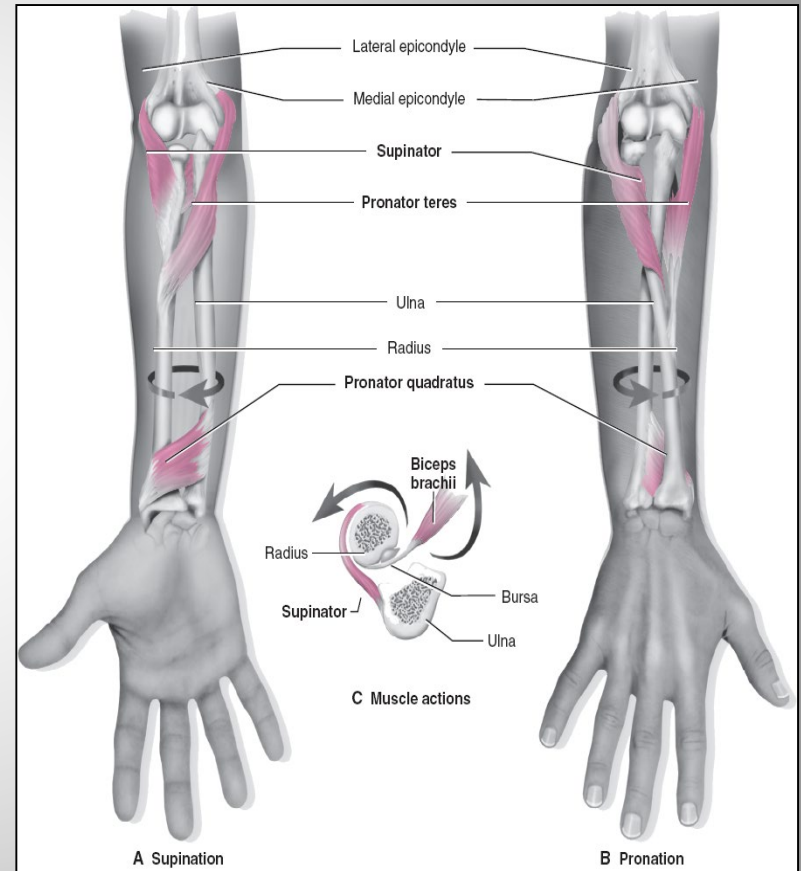
Anconeus – elbow joint only



From *Kinetic Anatomy, Second Edition*, by Robert S. Behnke, 2006, Champaign, IL: Human Kinetics.

# Muscles

- Radioulnar pronators
  - Pronator teres
  - Pronator quadratus
  - Brachioradialis
- Radioulnar supinators
  - Biceps brachii
  - Supinator muscle
  - Brachioradialis

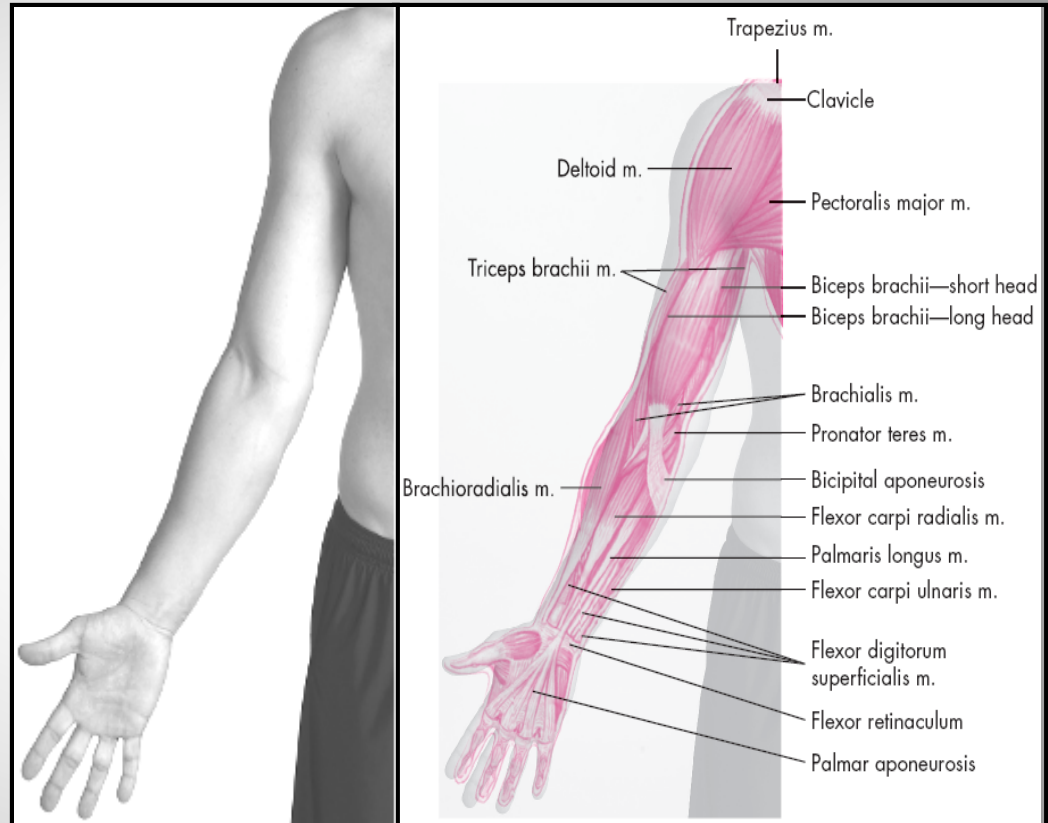


# Muscles

- “Tennis elbow” - common problem usually involving extensor digitorum muscle near its origin on lateral epicondyle
  - known lateral epicondylitis
  - associated with gripping & lifting activities
- Medial epicondylitis
  - somewhat less common
  - known as golfer's elbow
  - associated with medial wrist flexor & pronator group near their origin on medial epicondyle
  - Both conditions involve muscles which cross elbow but act primarily on wrist & hand

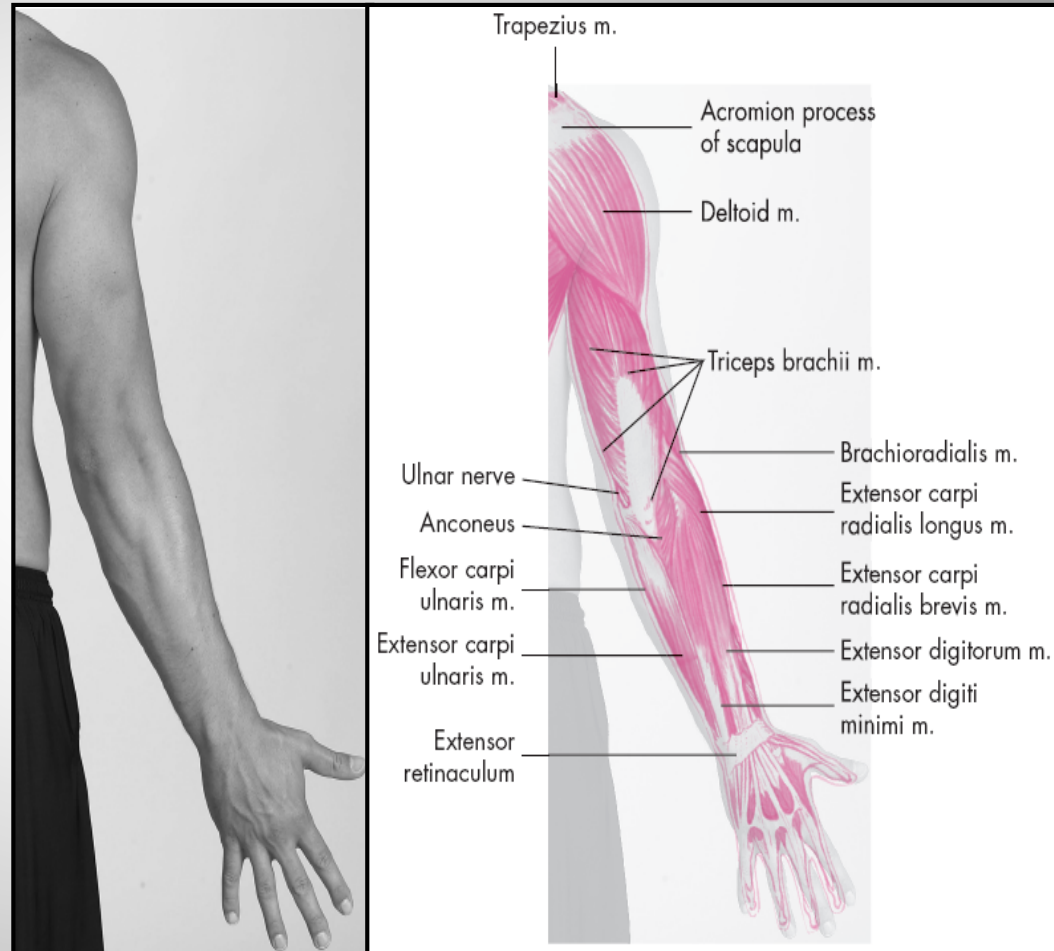
# Muscles

- **Anterior**
  - Primarily flexion & pronation
    - Biceps brachii
    - Brachialis
    - Brachioradialis
    - Pronator teres
    - Pronator quadratus

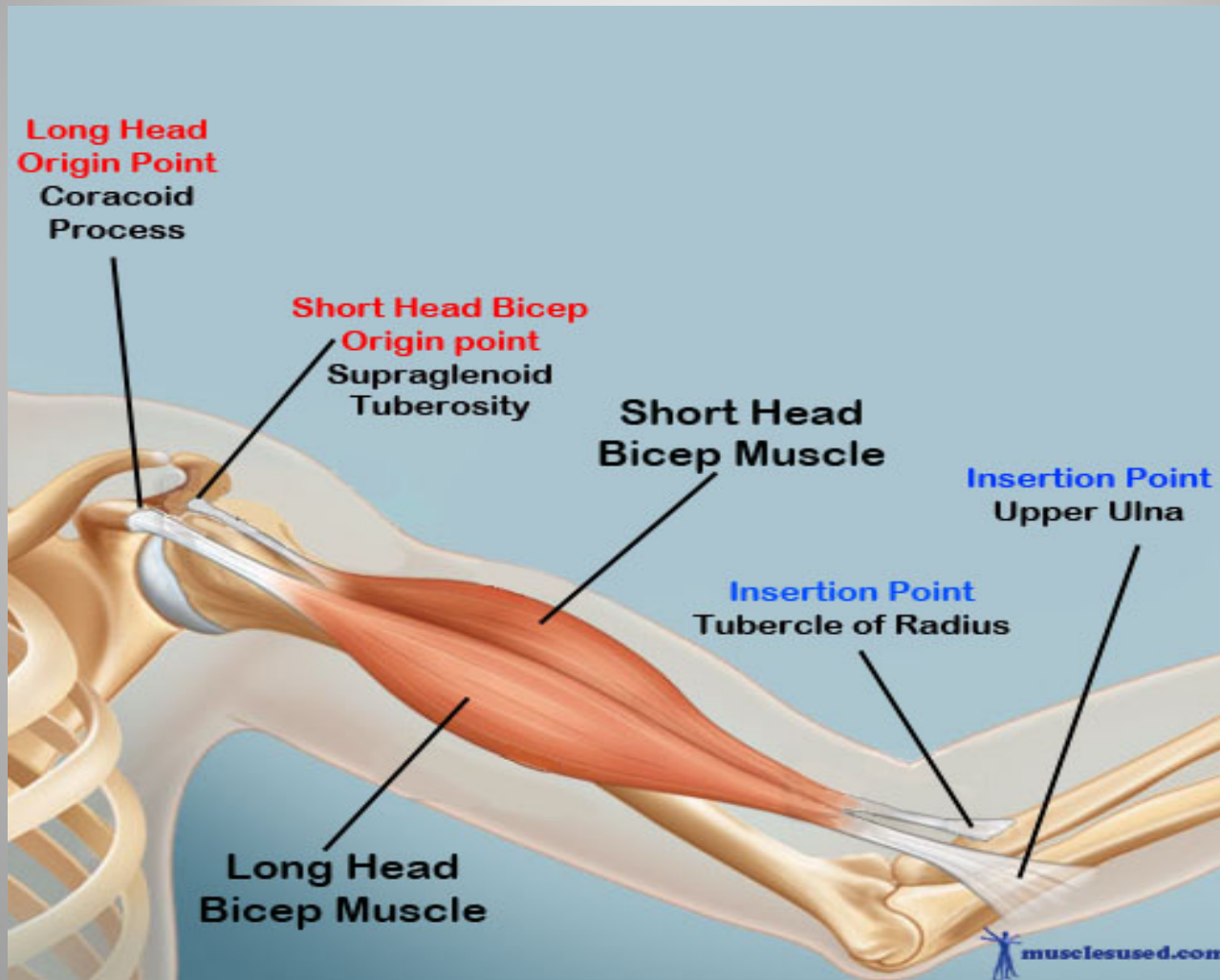


# Muscles

- **Posterior**
  - Primarily extension & supination
    - Triceps brachii
    - Anconeus
    - Supinator



# Bicep Brachii Origin and Insertion



# Triceps Brachii Origin and Insertion

## Triceps Brachii

- **Origin**
- **Long head:** infraglenoid tubercle of scapula
- **Lateral head:** posterior surface of humerus, superior to radial groove
- **Medial head:** posterior surface of humerus, inferior to radial groove
- **Insertion** Olecranon process of ulna and fascia of forearm
- **Action** Chief extensor of elbow
- **Innervation** Radial nerve (C6, C7 and C8)

