

# 4/04/14 Today's Agenda:

**U3 EQ: What are the anatomical structures and common athletic injuries of the elbow?**

1. Students will complete Daily Cerebral Exrs.
2. Students will take notes over three boney injuries to the elbow.
3. Hand out coloring sheet for Forearm bones and movers of the elbow. This will be pages 4 – 7 of your Anatomy Coloring Book Project.

**TO: What are 3 boney injuries to the elbow?**

1:3 Identify major bones in the body.

1:5 Describe general injury causations and/or mechanisms.



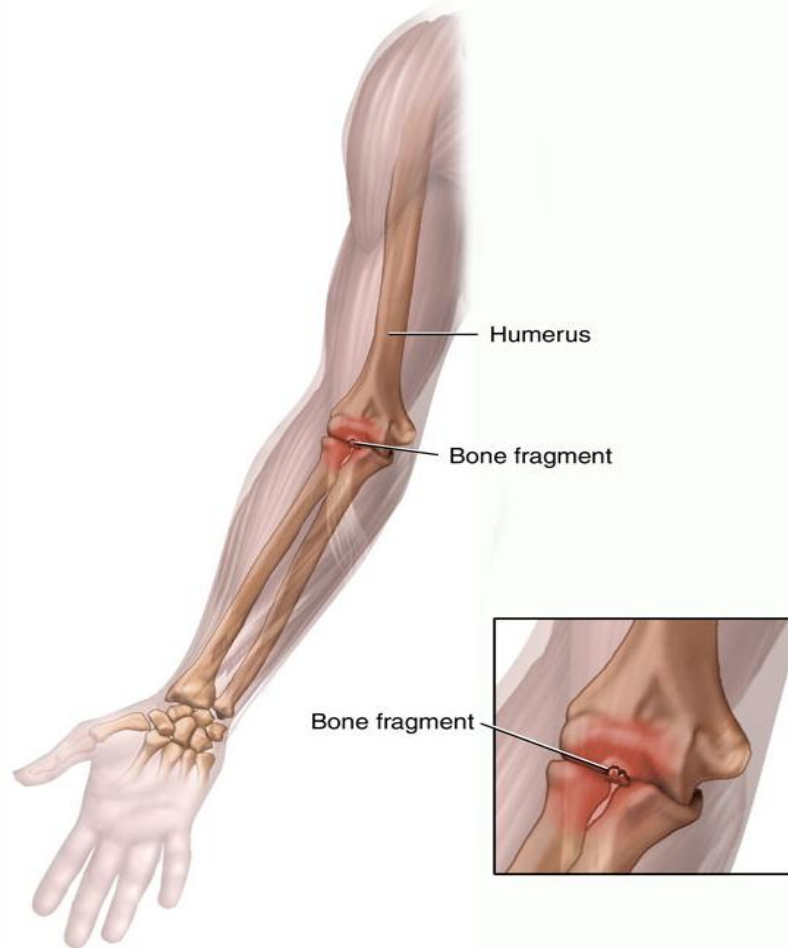
# 3/31/14: Daily Cerebral Exercise

1. Which muscles of the shoulder contribute to shoulder external rotation?
2. Shoulder internal rotation?
3. What is the purpose of the subacromial bursa?
4. How does the subacromial bursa become impinged?
5. What is the function of the labrum? A torn labrum could lead to what other injury?

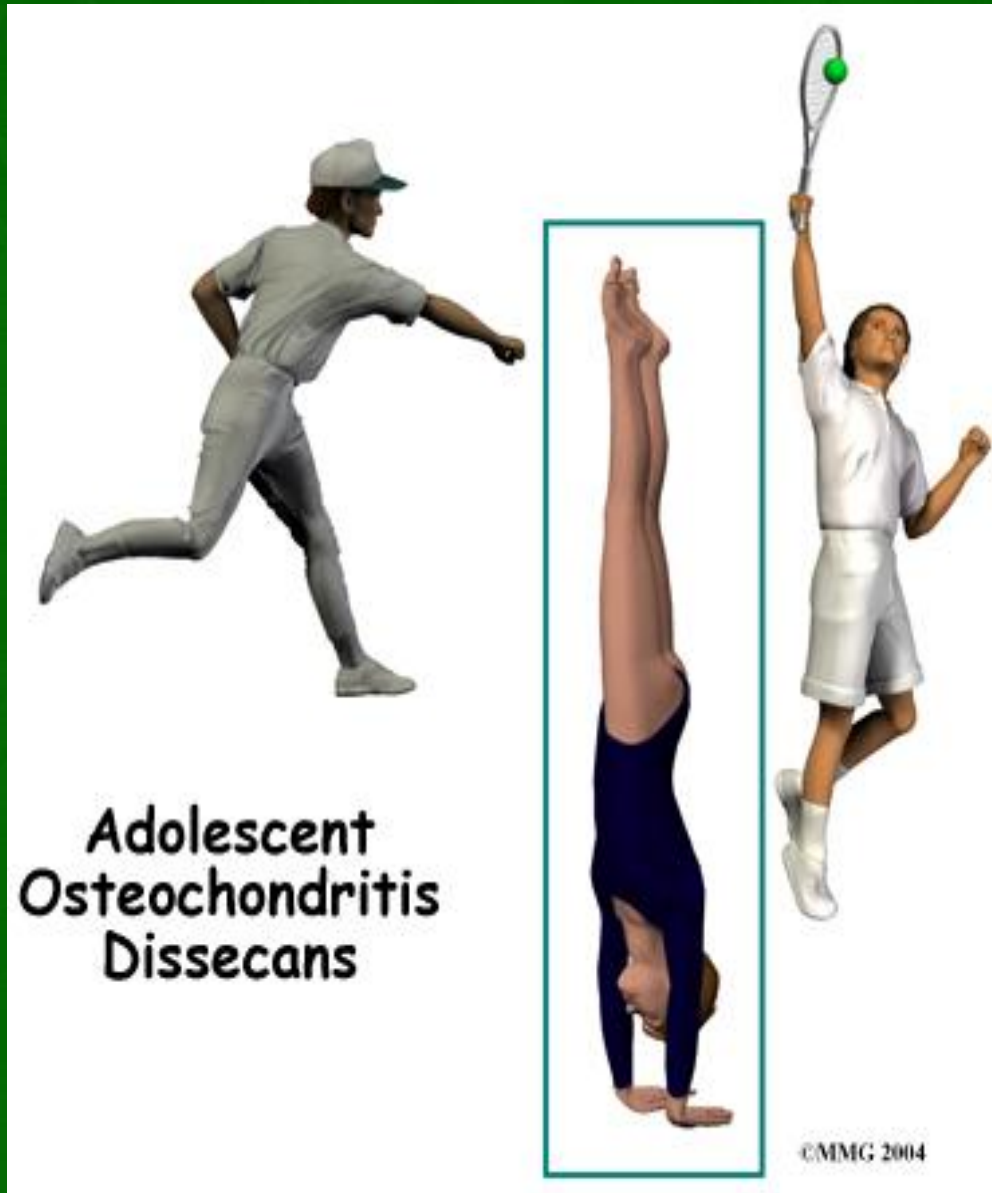


# 1. Elbow Osteochondritis Dissecans

## Osteochondritis Dissecans (Bone Chips) of the Elbow



© 2007 RelayHealth and/or its affiliates. All rights reserved.



# Elbow Osteochondritis Dissecans

MOI: Unknown... Impairment of bld supply to articular cartilage can lead to bone chips.

S&S: Sudden p!, locking of the elbow, swelling, crepitus (crunch).

Tx: Sx





**Humerus**

This is an anteroposterior (AP) radiograph of the elbow joint. The humerus is the large bone at the top of the image. The radius and ulna are the two bones of the forearm. A red arrow points to the radial head of the radius, which articulates with the capitulum of the humerus. The ulna is the bone on the right side of the image, and its olecranon process is visible at the bottom right. The joint space between the bones is clearly visible.

**Ulna**

**Radius**

## 2. Elbow Dislocation

www.radiology.com



# Elbow Dislocation

**MOI:** A fall on the outstretched arm (FOOSA) c elbow in hyperextension or a severe twist while the elbow is flexed.

**S&S:** Deformity, severe p!, swelling, LOF.

**Tx:** Immobilize, RICE, reduction, PT.



**In what direction is the humerus dislocated?**









GETTY IMAGES

# 3. FRACTURE OF THE ELBOW



# FRACTURE OF THE ELBOW

**MOI:** A FOOSH (hand) or the flexed elbow or a direct blow to the elbow.

**S&S:** Deformity, swelling, p!, mm spasm.

**Tx:** Immobilize, RICE, PT.





R  
cp

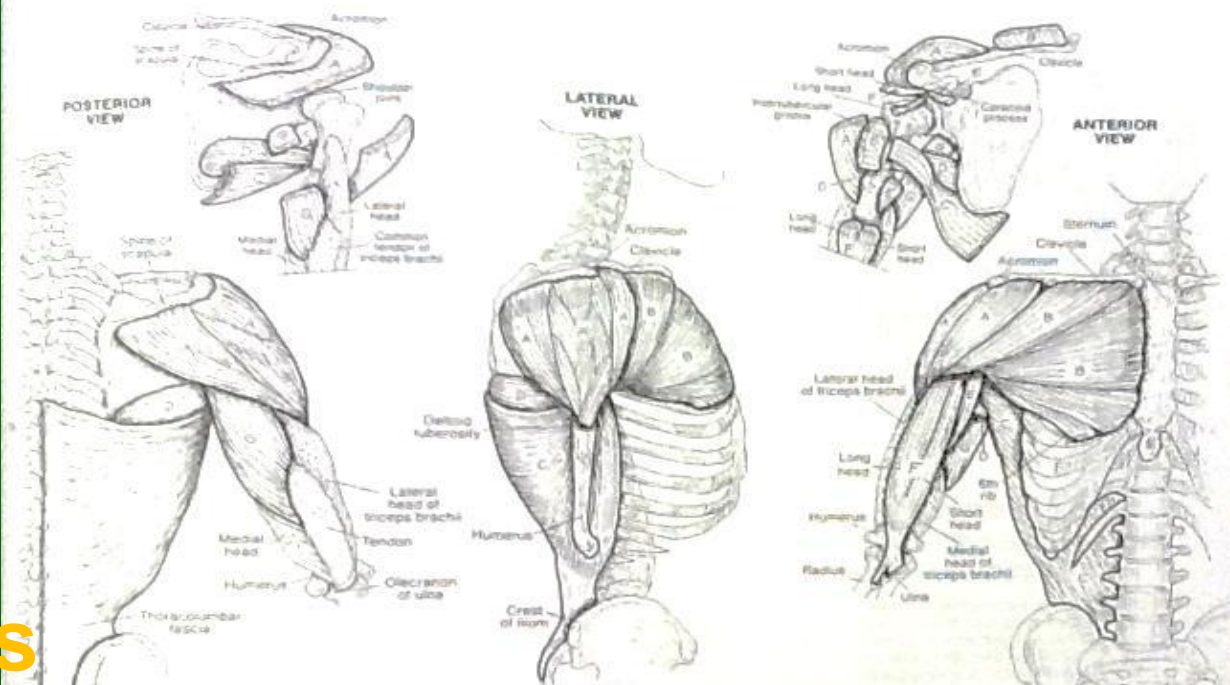
# Movers of the Shoulder – page 4

- Deltoid “A”**
- Pec Major “B”**
- Lat Dorsi “C”**
- Teres Major “D”**
- Coracobrachialis “E”**
- Biceps Brachii “F”**
- Triceps Brachii “G”**

## SKELETAL MUSCULAR SYSTEM / UPPER LIMB MOVERS OF SHOULDER JOINT

**DELTOID. PECTORALIS MAJOR. LATISSIMUS DORSI. TERES MAJOR. CORACOBRACHIALIS. BICEPS BRACHII. TRICEPS BRACHII (LONG HEAD).**

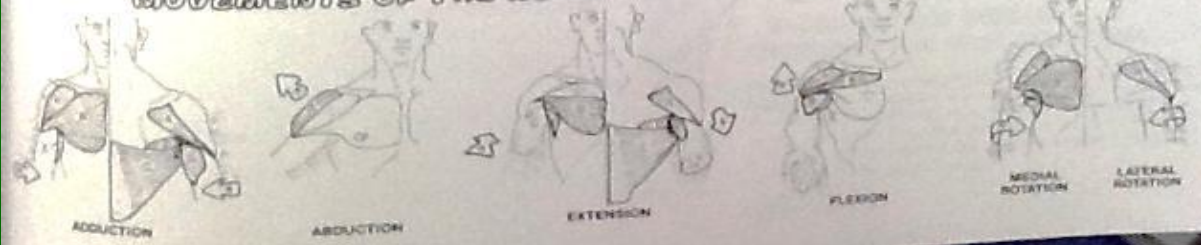
CN: (1) Begin with both posterior views, note that the biceps and triceps are not shown on the lateral view. (2) When coloring the muscles below, note the actions of different parts of the deltoid (A) and pectoralis major (B).



The principal movers of the freely movable shoulder (glenohumeral) joint, shown here, work in conjunction with the rotator cuff muscles to powerfully move the humerus in lifting, pushing, pulling, and twisting loads. *Deltoid*, characterized by a multipennate form of construction, a broad origin, and a remarkably short lever arm, is a powerful mover of the humerus in flexion, extension, and abduction. The clavicular (upper) fibers of *pectoralis major* are effective in flexing the shoulder joint, the sternal/abdominal (lower) fibers extend the flexed joint. Both are effective medial rotators as well.

*Teres major*, a muscle of the posterior shoulder, is a major medial rotator of the shoulder joint because its tendon of insertion is on the anterior aspect of the humerus, and therefore has an excellent mechanical advantage for this movement. For the same reason, *latissimus dorsi* is also a medial rotator of the joint in addition to being a major extensor. Both heads of *biceps brachii* are active in resisted flexion. *Coracobrachialis* is not a significant mover in either flexion or adduction, and the long head of *triceps brachii* is not a major mover in extension of the shoulder joint.

### MOVEMENTS OF THE HUMERUS AT THE SHOULDER JOINT.



# ELBOW JOINTS

Use the same colors for the three bones as were used on 32 and 33 - use light blue for H. (1) Begin with the three joints of the elbow region. Note that each articulating surface (boxed) receives the color of its bone - in the lower, boxed illustration and in the sagittal view, most surfaces (H) are colored light blue. Color K, yellow. (2) Color the remaining views of the joint capsule and ligaments.

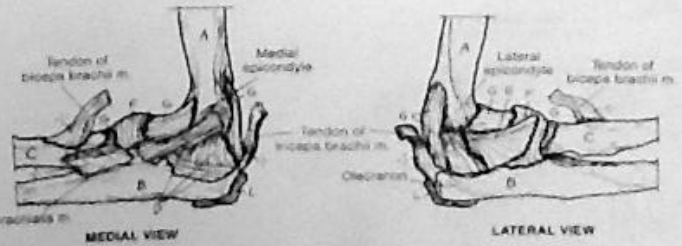
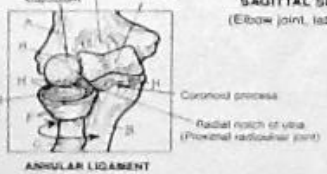
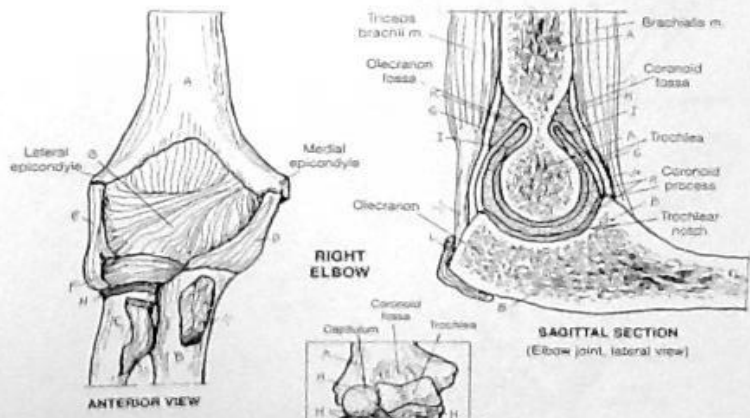
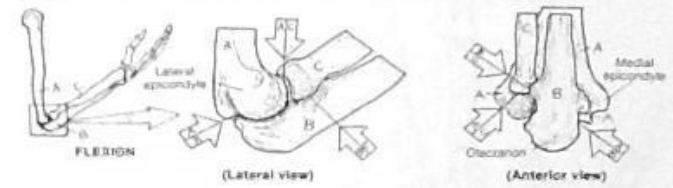
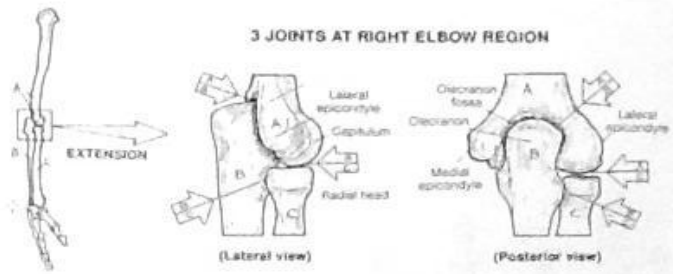
**ELBOW JOINT:**  
HUMERO-ULNAR,  
RADIO-HUMERAL,  
RADIO-ULNAR.

**ULNA:**  
ULNAR COLLATERAL LIG.,  
NUMERUS,  
RADIAL COLLATERAL LIG.,  
RADIUS:

**JOINT CAPSULE:**  
ARTICULAR CARTILAGE,  
SYNOVIAL MEMBRANE,  
SYNOVIAL CAVITY,  
PIF FOLD,  
BURSA:

The elbow joint consists of two separate articulations with the humerus, the humero-ulnar and radiohumeral joints (synovial hinge type). Movements of this joint are limited to flexion and extension. Note that the C-shaped, articular cartilage-lined trochlear notch of the ulna rotates around the pulley-shaped trochlea of the humerus during these movements. In extension, the upper part of the trochlear notch fits into the olecranon fossa of the humerus. In flexion, the coronoid process of the ulna fits into the coronoid fossa of the humerus (see Plate 33). The ligaments of the elbow joint—essentially, the radial and ulnar collateral ligaments—reinforce the fibrous joint capsule.

The joint between the radius and the ulna (proximal radioulnar joint) permits the radial head to pivot within the radial notch of the ulna. The ulna cannot pivot around anything because of the shape of the humero-ulnar joint. Though the proximal radioulnar joint is not considered part of the elbow joint, its synovial cavity and fibrous joint capsule is continuous with that of the elbow joint, and it is secured by both radial and ulnar collateral ligaments. The annular ligament is attached at both ends to the sides of the radial notch of the ulna. It is more narrow below than above (i.e., it is beveled). It surrounds and secures the head (above) and the neck (below) of the radius and resists its displacement when the hand is pulled away from the shoulder. The lower part of the articular ligament is lined with synovial membrane; the upper part is fibrocartilaginous and is associated with the rotation of the radius at the proximal radioulnar joint. The joint capsule and the radial collateral ligament reinforce the retaining function of the annular ligament.



# Elbow Joint – page 5

Humerus "A"  
Ulna "B"  
Radius "C"  
Bursa "L"  
Ulnar Collateral Ligament "D"  
Radial Collateral Ligament "E"  
Articular Cartilage "H"

# Forearm Bones – page 6

Humerus “C”

Ulna “A”

Radius “B”

Highlight Olecranon

Highlight Medial  
epicondyle

Highlight Lateral  
Epicondyle

## FOREARM BONES

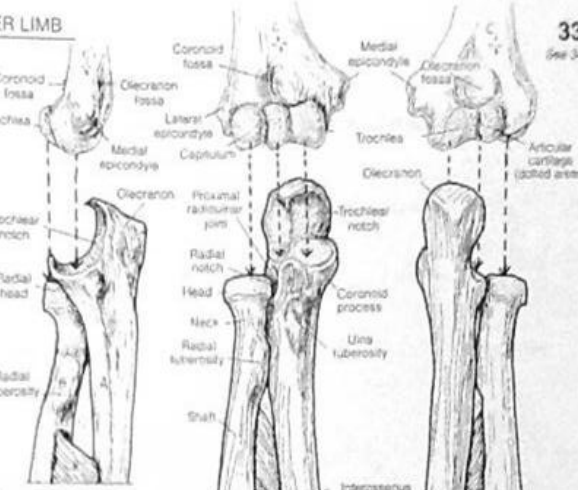
ULNA-  
RADIUS.

HUMERUS.

OR: Use very light colors for A and B and the same color for the humerus (C) that was used on the preceding plate. Note that the distal humerus and carpal bones are left uncolored in the large numbers. (1) Color the forearm bones in the three views, taking careful note of the callouts referring to surface anatomy. (2) In the supination/pronation diagram, the thumb and little finger of the hand receive the same colors as the forearm bones to which they relate, regardless of hand position.

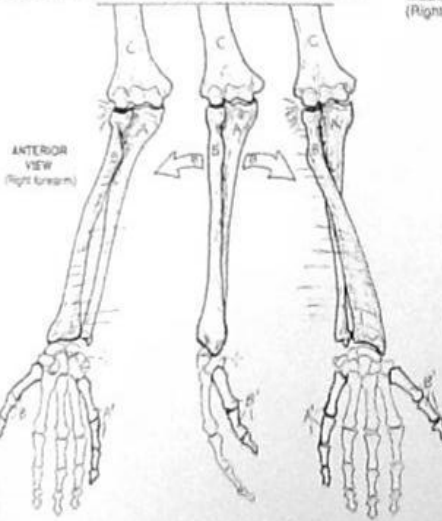


THREE JOINTS (Diagrammatic)

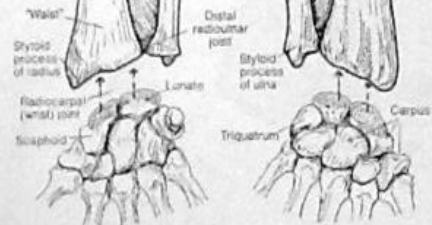


RADIUS, THUMB SIDE.  
ULNA, LITTLE FINGER SIDE.

MEDIAL VIEW (Right forearm)



SUPINATION (Anatomical position)      NEUTRAL      PRONATION



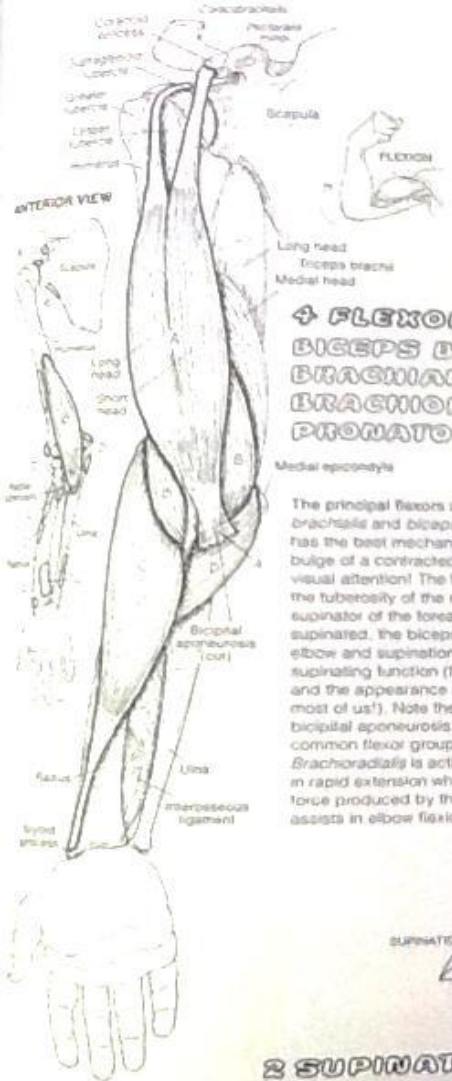
ANTERIOR VIEW (Right forearm)      POSTERIOR VIEW (Right forearm)

The two bones of the forearm are quite different from one another. The proximal aspect of the proximal extremity of the ulna is characterized by a rather massive bone mass called the olecranon. You can feel it easily at the back of your elbow. On the anterior side of the olecranon is the trochlear notch, which articulates with the trochlea of the humerus at the proximal radioulnar joint (synovial, hinge). A part of this surface forms the radial notch (the radial head); this is the radial notch, which contributes to the proximal radioulnar joint (synovial, pivot). The ulnar shaft narrows distally to terminate as the head of the ulna. The head forms a pivot joint, synovial joint with the radius (distal radioulnar joint). This joint shares an articular disc that fits between the ulnar head and the lunate and triquetrum bones of the wrist. This disc contributes to the radioulnar (wrist) joint, but the ulnar head does not. The shaft of the ulna forms a movable, fibrous joint (syndesmosis) with the shaft of the radius by means of the interosseous membrane.

the capitulum of the humerus (radiohumeral joint; synovial; pivot) and the radial notch of the ulna (proximal radioulnar joint). The shaft of the radius fuses distally to form a broad wrist joint with the scaphoid and lunate bones of the carpus. Falls on the hands load the wrist joint and can cause a fracture of the radius at the relatively weak "wrist" between the shaft and the bared distal extremity (Colles fracture; Smith fracture). After coloring and studying the supination/pronation movements, put the palm of your right hand out in front of you, palm down (prone); in this position, the radius and ulna are in parallel. Place the fingers of the left hand on your right olecranon. Now supinate your right hand (to palm up). Notice the olecranon did not move. Thus, the ulna does not move during supination/pronation of the hand. Now find and observe the styloid process of the radius at the right wrist (on the thumb side) as you supinate/pronate the right hand. Note that the styloid process moves with the thumb. You have now demonstrated how the radius moves around the ulna during pronation and supination of the hand.



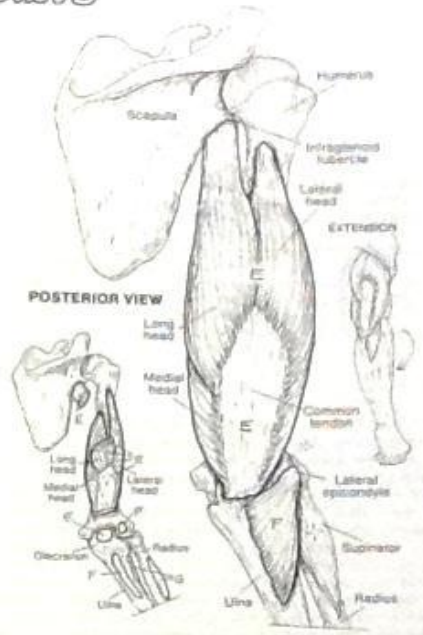
**MOVERS OF ELBOW & RADIOULNAR JOINTS**



**CA:** Use the same colors for biceps brachii (A) and triceps brachii (E) as you did for those muscles on Page 56. (1) Color the four flexors and their attachment sites on the drawings to their left. Do the same for the extensors on the right (2) Color the supinators and pronators below the arrows demonstrating their actions, and their attachment sites at upper left.

**4 FLEXORS  
BICEPS BRACHII,  
BRACHIALIS,  
BRACHIORADIALIS,  
PRONATOR TERES.**

The principal flexors of the elbow joint are brachialis and biceps brachii, of which the former has the best mechanical advantage. Yet it's the bulge of a contracted biceps that gets all the visual attention! The tendon of biceps inserts at the tuberosity of the radius, making the muscle a supinator of the forearm as well. With the limb supinated, the biceps works to fulfill flexion of the elbow and supination of the elbow. Take away the supinating function (flexing the pronated elbow), and the appearance of biceps is disappointing (in most of us!). Note the additional attachment of the bicipital aponeurosis into the deep fascia of the common flexor group (not shown) in the forearm. Brachioradialis is active in flexion of the elbow and in rapid extension where it counters the centrifugal force produced by that movement. Pronator teres assists in elbow flexion as well as pronation.



**2 EXTENSORS  
TRICEPS BRACHII,  
ANCONEUS.**

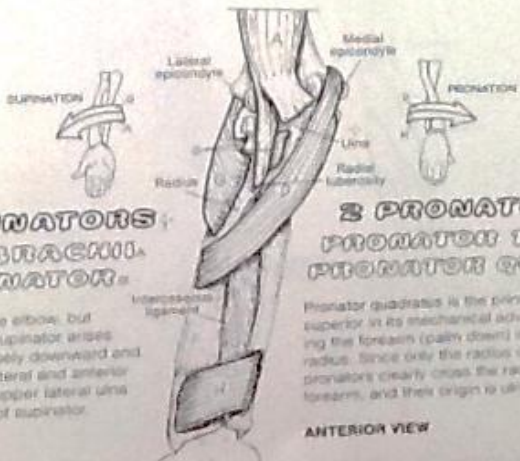
The principal extensor of the elbow joint is the three-headed triceps brachii with its massive tendon of insertion. The smaller anconeus assists in this function. Triceps is a powerful antagonist to the elbow flexors.

**2 SUPINATORS  
BICEPS BRACHII,  
SUPINATOR.**

Biceps brachii is the more powerful supinator of the elbow, but supinator is important in maintaining supination. Supinator arises from the lateral aspect of the elbow, passing obliquely downward and forward to a rather broad insertion on the upper lateral and anterior surface of the radius. A bundle of fibers from the upper lateral ulna crosses behind the radius to join the lateral fibers of supinator.

**2 PRONATORS  
PRONATOR TERES,  
PRONATOR QUADRATUS.**

Pronator quadratus is the principal pronator of the elbow joint, superior in its mechanical advantage to pronator teres. Pronating the forearm (palm down) involves medial rotation of the radius. Since only the radius can rotate in the forearm, the pronators clearly cross the radius on the anterior side of the forearm, and their origin is ulna.



ANTERIOR VIEW

**Movers of the Elbow – page 7**  
**Biceps Brachii “A”**  
**Brachialis “B”**  
**Brachioradialis “C”**  
**Pronator Teres “D”**  
**Supinator “G”**  
**Triceps Brachii “E”**  
**Pronator Quadratus “H”**