THE ELBOW & RADIOULNAR JOINT

I. Major Bones

A. ULNA

B. RADIUS

C. HUMERUS

II. Bony Landmarks

A. HUMERUS

1. Trochlea (**A** p. 105 #5)

   a. *medial anterior surface of distal humerus*

   b. *hourglass shaped*
2. Trochlear groove*: skinny part of hourglass*

3. Medial and lateral epicondyles (**A** p. 105 #7 & 2): *medial is more pronounced*

4. Capitulum (**A** p. 105 #3)

   a. *lateral, anterior surface of humerus*

   b. *circular (ball)*

5. Capitulotrochlear groove (**A** p. 105 between # 3 & 5): *between capitulum and trochlea*
6. Radial Fossa (**A** p. 105 #4): *anterior surface, above capitulum, lateral humerus*
7. Coranoid Fossa (**A** p. 105 #6): *anterior surface, above trochlea, medial humerus*
8. Olecranon Fossa (A p. 105 #11): *posterior surface*

9. Medial and lateral supracondylar ridges (**A** p. 105 #8 & 1)

B. ULNA (anterior, posterior, medial, lateral surfaces)

1. Trochlear (semilunar) notch (**A** p. 108D #2)

2. Trochlear Ridge

3. Olecranon Process (**A** p. 108D #1)*: superior to trochlear notch*

4. Coranoid Process (**A** p. 108D #3)*: distal to trochlear notch*

5. Radial Notch (**A** p. 108D #5)*: lateral ulna, point of radial contact*

6. Styloid Process (**A** p. 108H #6*): distal end of ulna*

7. Head (**A** p. 108H #3*): medial to styloid process*

8. Interosseous border (**A** p. 108E #1*): straight down from radial notch, lateral*

9. Supinator crest (**A** p. 108D #6)*: lateral, proximal ulna*

10. Groove for extensor carpi ulnaris (**A** p. 108F #5*): between styloid process and ulnar head*

C. RADIUS

1. Head (**A** p. 109A #7)

2. Rim*: wraps around head of radius*

3. Radial (biceps) tuberosity (**A** p. 107A #3 & p. 109A #5)*: proximal surface*

4. Ulnar Notch (**A** p. 107G #3)*: lateral, distal surface, articulates with ulna*

5. Styloid Process (**A** p. 107E #4)*: point at distal end of medial ulnar surface*

6. Grooves for extensor carpi radialis brevis and longus (**A** p. 107F #10 & 11)*: groove for ECR brevis is lateral to groove for ECR longus*

III. Joints

A. HUMEROULNAR JOINT

1. CLASSIFICATION: *diarthrodial true hinge*

2. ARTICULATING SURFACES

Proximal: *trochlea and trochlear groove of humerus*

Distal: *trochlear (semilunar) notch of ulna and trochlear ridge*

3. MOVEMENTS: *flexion/extension*

Plane: *sagittal*

Axis: *medial/lateral*

(1.) *During extension the olecranon process of the ulna articulates with the olecranon fossa of the humerus.*
(2.) *During flexion the coranoid process of the ulna articulates with the coranoid fossa of the humerus.*

- *The ability to hyperextend the elbow indicates a smaller olecranon process or a larger olecranon fossa.*
- *Due to trochlear assymetry, in the extended position an angle is created laterally between the ulna and humerus ("Carrying Angle") which normally disappears when the forearm is pronated while extended. (Men @10°-15°; Women @20°-25°)*

B. HUMERORADIAL JOINT

1. CLASSIFICATION: *non-axial, gliding*

2. ARTICULATING SURFACES

Proximal: *capitulum and capitulotrochlear groove of humerus*

Distal: *concave head of radius and small portion of the rim of the radius*

3. MOVEMENTS: *flexion/extension*

Plane: *sagittal*

Axis: *medial/lateral*

(1.) *In full extension there is no contact between the capitulum and the radial head.*
(2.) *In full flexion the rim of the radial head slides into the capitulotrochlear groove and touches the radial fossa.*

C. RADIOULNAR JOINTS

1. Proximal Radioulnar Joint

a. CLASSIFICATION: *diarthrodial, pivot*

b. ARTICULATING SURFACES
Proximal: *radial notch of ulna on lateral ulna and annular ligament*

Distal: *radial head and rim*

c. MOVEMENTS: *supination (palm down to palm up)/pronation (palm up to palm down)*
Plane: *horizontal*

Axis: *longitudinal*

(1.) *Radial head spins in radial notch of ulna*
(2.) *ROM: 90 supination/90 pronation*

** In supination, the radius & ulna lie parallel to one another. During pronation, the radius crosses over the ulna at the superior radioulnar joint.*

2. Middle Radioulnar Joint

a. CLASSIFICATION: *synarthrodial, ligamentous*

b. ARTICULATING SURFACES: *shaft of radius articulates with shaft of ulna and the interosseous membrane supports it*

c. MOVEMENTS: *no movement*
Plane: *X*

Axis: *X*

3. Distal Radioulnar Joint

a. CLASSIFICATION: *diarthrodial, pivot*

b. ARTICULATING SURFACES (**K** p. 139)
Proximal: *head of the ulna*

Distal: *ulnar notch, and the articular disc of the radius,*

which holds the two ends together

c. MOVEMENTS: *supination/pronation, ulnar notch of radius slides over ulnar head and the disc follows by twisting at the apex*

Plane: *horizontal*

Axis: *longitudinal*

D. MOVEMENT OF THE FOREARM in general - all 3 joints work together

1. Pronation- radius crosses over the ulna

2. Supination- radius and ulna are parallel

IV. Supporting Structures

A. LIGAMENTS

1. Humeroulnar Joint

a. Medial collateral (Ulnar collateral) ligament (**A** p. 130 #2-4 & **K** p. 137)

1. ATTACHMENTS: *medial epicondyle of humerus to coranoid and olecranon processes of ulna*

2. FUNCTIONS: *prevents abduction, lateral movement of proximal ulna, taut in all joint positions, supports medial side of the joint and resists medial stresses.*

3. OTHER:

a. *strongest ligament in elbow complex*

b. *triangular shape: runs posteriorly, anteriorly, and obliquely*

b. Articular capsule helps to maintain articulation

2. Humeroradial Joint

a. Lateral collateral (Radial collateral) ligament (**A** p. 130 #12 & **K** p. 138)

1. ATTACHMENTS: *lateral epicondyle of humerus to the lateral border and olecranon process of the ulna, and to the annular ligament*

2. FUNCTIONS: *prevents adduction, medial movement of proximal ulna, and provides reinforcement for the humeroradial articulation.*

3. OTHER: *fan shape*

b. Articular capsule helps to maintain articulation

3. Proximal Radioulnar Joint

a. Annular ligament (**A** p. 130 #6 & **K** p. 139 & 140)

1. ATTACHMENTS: *circles head of radius, around the rim, and attaches to anterior/posterior sides of radial notch of ulna*
2. FUNCTIONS: *holds head of radius in radial notch*

3. OTHER: *covered with articular cartilage that is continuous with the radial notch and permits rotation of radial head*

b. Oblique Cord (**A** p. 130 #9 & **K** p. 139)

1. ATTACHMENTS: *inferior radial notch to medial side of radius*

2. FUNCTIONS: *helps hold the bones together*

c. Proximal portion of the interosseous membrane (**A** p. 130 #8 & **K** p.139)

1. ATTACHMENTS: *between the radius and the ulna, proximal portion*

2. FUNCTIONS: *holds the two bones together*

4. Middle Radioulnar Joint (**K** p. 139)*: proximal and distal interosseous membrane that holds the bones together, continuous down the length of the bones*

5. Distal Radioulnar Joint (**K** p. 139)

a. Anterior/posterior radioulnar joint capsule*: key for joint function*

b. Interosseous membrane*: holds the two bones together*

B. Other Structures: ARTICULAR DISC (**K** p. 139)

1. *triangular shaped disc: base of triangle attaches to ulnar notch and apex attaches to the styloid process of the ulna*
2. *head of ulna articulates with disc as it spins with radial notch during pronation/supination*
3. *helps to hold the distal ends of the radius and ulna together*

4. *separates ulna from carpal bones, reason that ulna never articulates with carpals*

V. MUSCLES

*Know origins, insertions, function, and one example of an activity it performs

A. Triceps Brachii

***Proximal*:**
Lateral: Lateral & Posterior Surfaces of Proximal 1/2 Body of Humerus
Long: Infraglenoid Tubercle of Scapula
Medial: Distal 2/3 of Medial and Posterior Surfaces of Humerus below Radial Groove

***Distal*:** Posterior Surface of Olecranon Process of Ulna

B. Biceps Brachii

Proximal:
Long: Supraglenoid Tubercle of Scapula

Short: Apex of Coracoid Process of Scapula

***Distal*:** Tuberosity of Radius; Aponeurosis of Biceps Brachii

C. Brachioradialis

***Proximal*:** Proximal 2/3 Lateral Supracondylar Ridge of Humerus

***Distal*:** Lateral Side of Base of Styloid Process of Radius

D. Pronator Teres

***Proximal*:** Immediately Above Medial epicondyle of Humerus; Medial Side of Coronoid Process of Ulna

***Distal*:** Middle of Lateral Surface of Radius

E. Pronator Quadratus

***Proximal*:** Medial Side; Anterior Surface of Distal 1/4 of Ulna

***Distal*:** Lateral Side; Anterior Surface of Distal 1/4 Radius

F. Supinator

***Proximal*:** Lateral Epicondyle of Humerus; Radial Collateral Ligament of Elbow Joint; Annular Ligament of Radius; Supinator Crest of Ulna

***Distal*:** Lateral Surface of Upper 1/3 of Body of Radius Covering Part of Anterior and Posterior Surfaces