

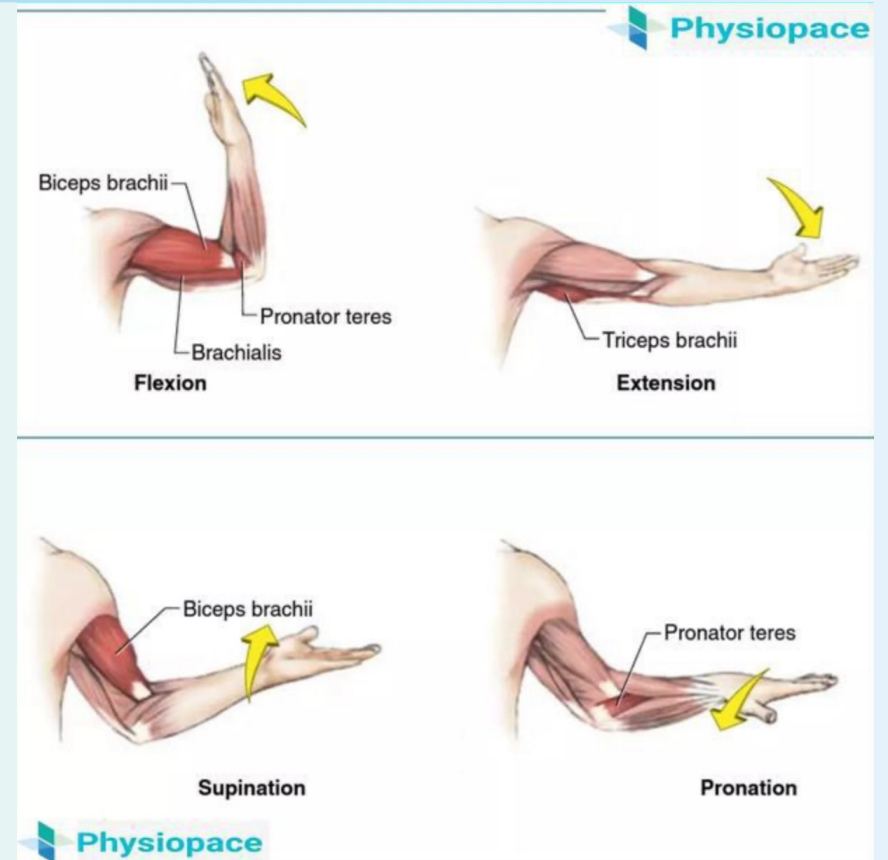
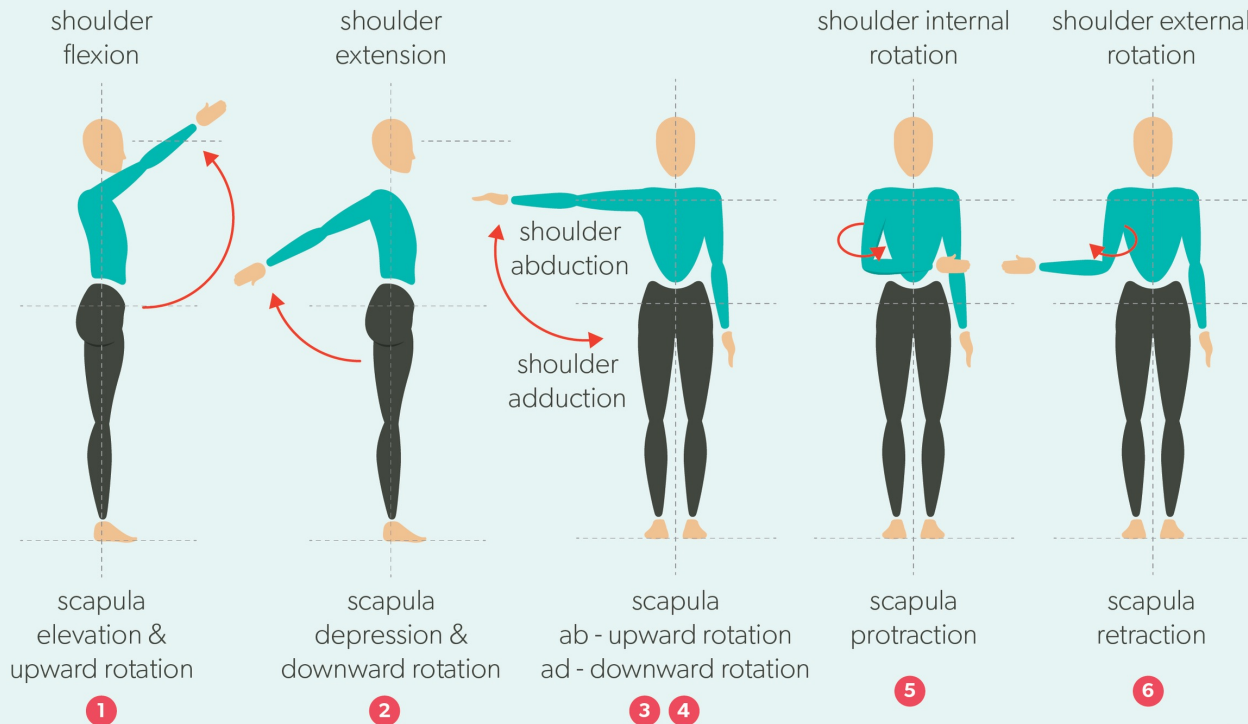
Muscles and Bones of the shoulder, upper arm, forearm

in relation to joint movements - overview

By Peter Wikiera

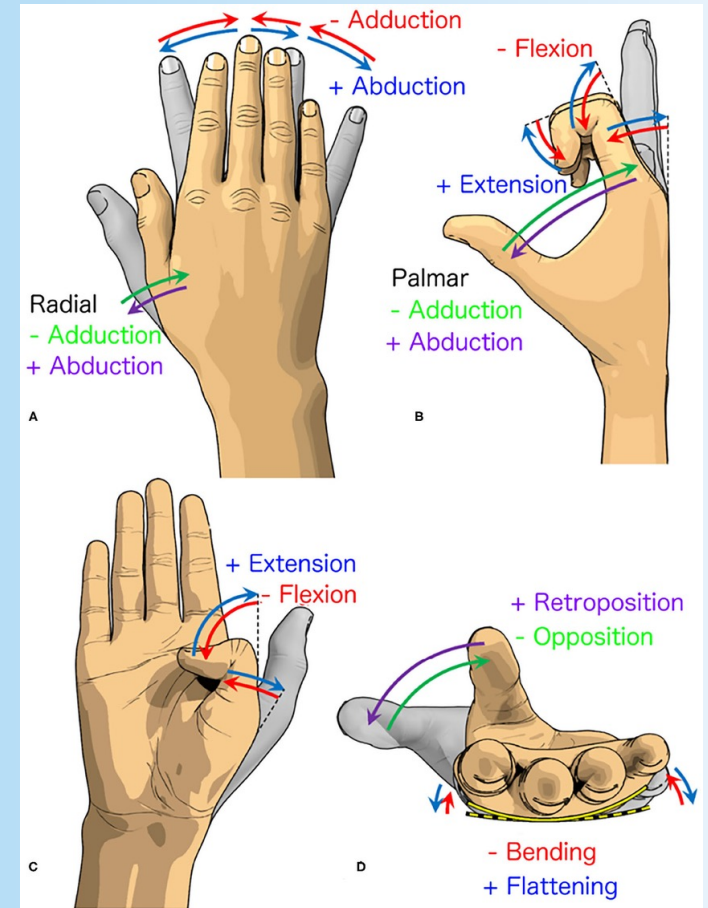
Types of Movements

ANATOMY 101 | SHOULDER & SCAPULA MOVEMENTS



Note About Hand Movements!

- The thumb works differently to other fingers!
- Flexion/extension and abduction/adduction are flipped!

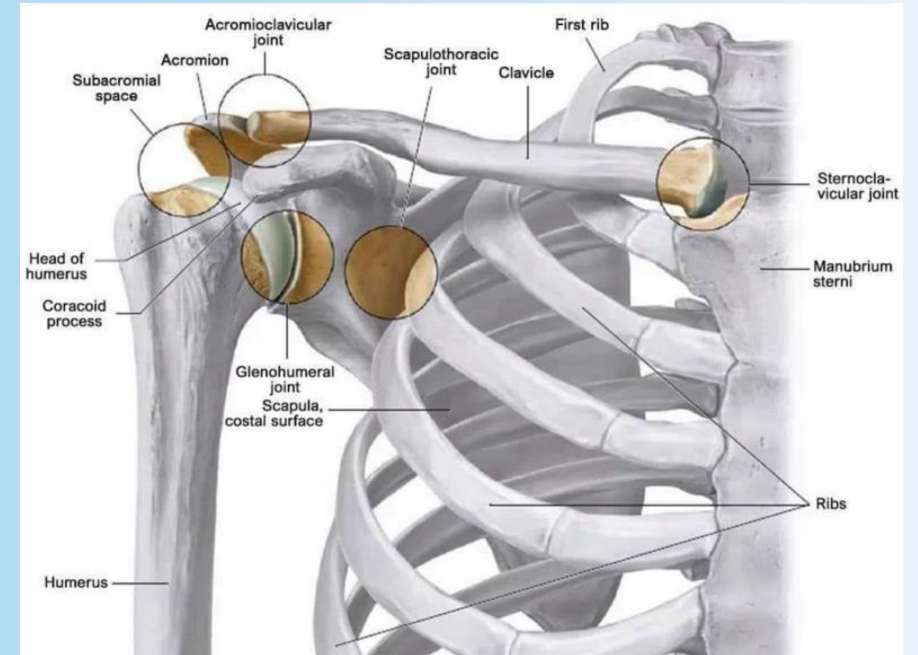


Shoulder Girdle and Articulations

- Glenohumeral (GH)/Shoulder joint- ball-and-socket joint
- Acromioclavicular (AC) joint- synovial plane/gliding joint
- Sternoclavicular (SC) joint- synovial saddle joint
- Scapulothoracic joint- (not a true joint)

Key Structures:

- Humerus
- Scapula (shoulder blade)
- Clavicle (collarbone)
- Glenoid cavity (cavity in the scapula, where head of humerus sits)



Muscles of The Shoulder

Primary Functions of Muscles of Shoulder

Abduction:

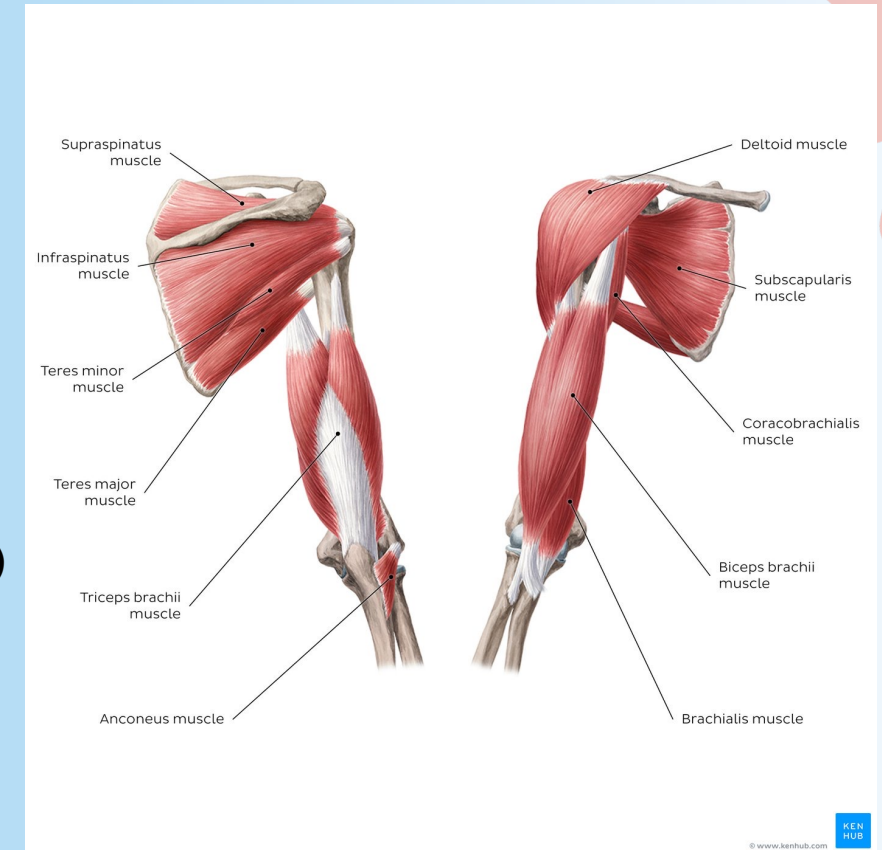
- **Infraspinatus** - Abduction of the arm 0-15 degrees
 - Initiates the movement of the shoulder
- **Deltoid** - Abduction of the arm 15-90 degrees
 - Primary abductor
- **Scapular Muscles** - Abduction of the arm 90-180 degrees
 - Upper trapezius - elevates scapula
 - Lower trapezius - rotates scapula
 - Serratus anterior - holds scapula to thorax + rotates laterally
 - Damage to the nerve supplying this will cause “scapular winging” (long thoracic)

Adduction:

- **Latissimus Dorsi + Pectoralis Major** (0-30 anatomical, 0-70 functional)

Rotator Cuff (SITS)

- Supraspinatus
- Infraspinatus
- Teres Minor
- Subscapularis



Question Time!

Which muscle initiates shoulder abduction?

Which muscle continues shoulder abduction? (15-90 degrees)

What muscle is paralyzed during “scapular winging”?

Elbow Joint and Articulations

Humeroulnar Joint

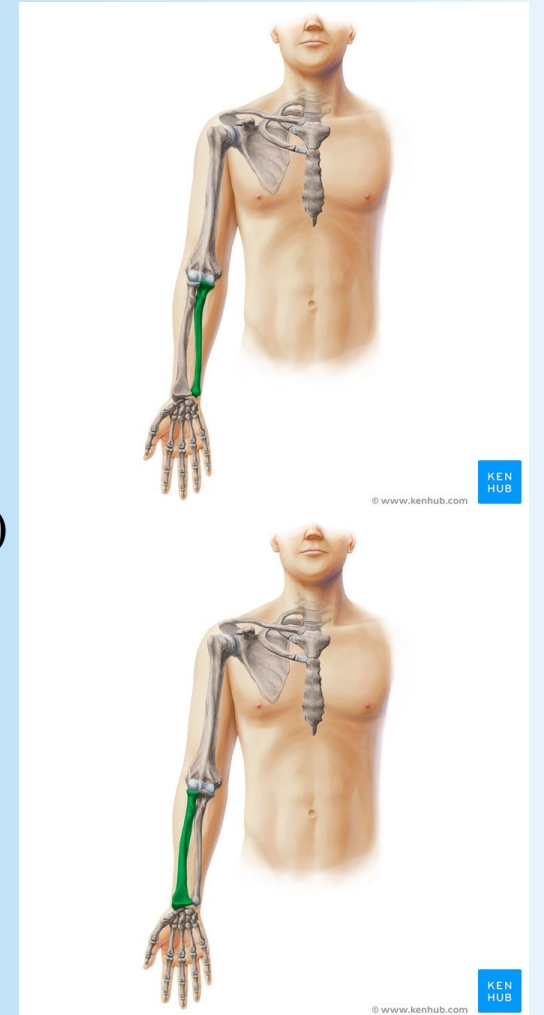
- Articulation: Trochlea of humerus + trochlear notch of ulna
- Joint type: hinge
- Movement: flexion + extension
- High Yield - medial collateral ligament is especially strong here

Humeroradial Joint

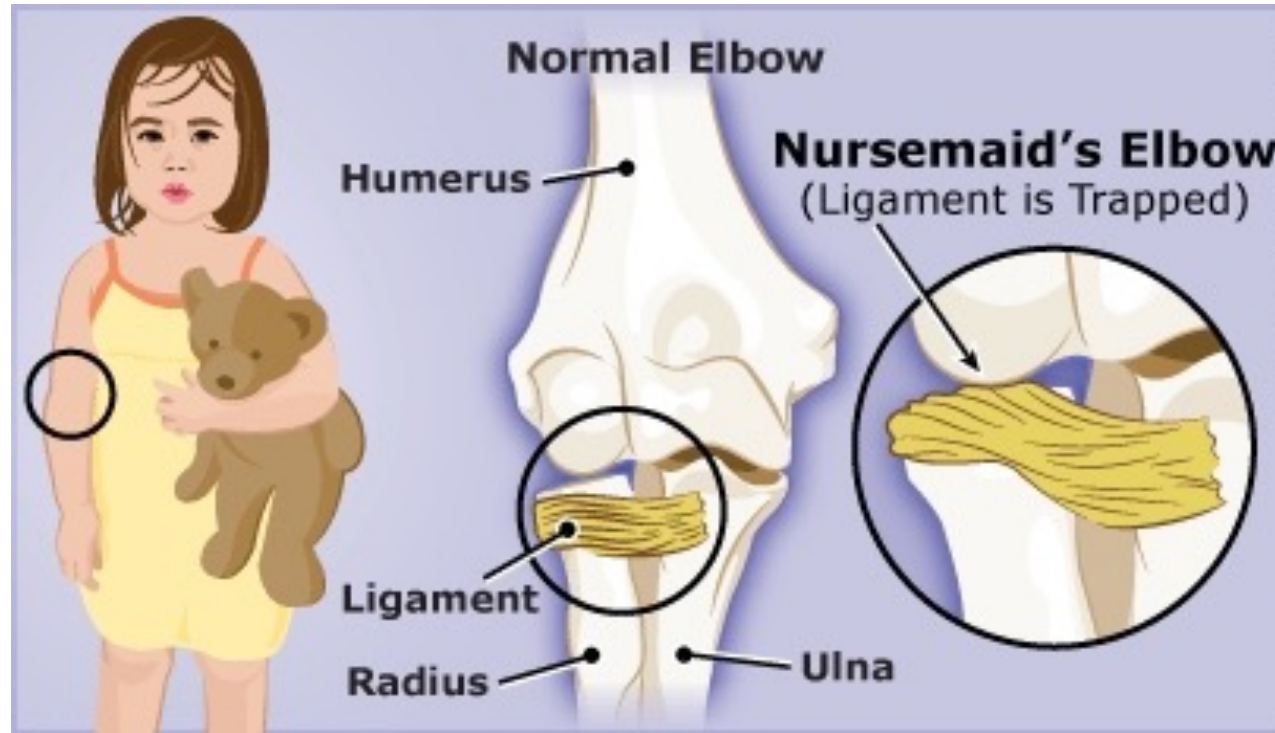
- Articulation: Capitulum of humerus + fovea of radial head
- Joint type: atypical ball and socket
- Movement: flexion + extension along with rotation (due to supination of humerus)

Proximal Radioulnar Joint

- Radial head + radial notch of ulna
- Joint type: pivot joint
- Movement: pronation + supination
- High yield:
 - Annular ligament stabilizes this joint
 - NURSE MAID ELBOW: typically, due to being picked up by the hand as a child, dislodges radial head from humerus



NURSE MAID ELBOW



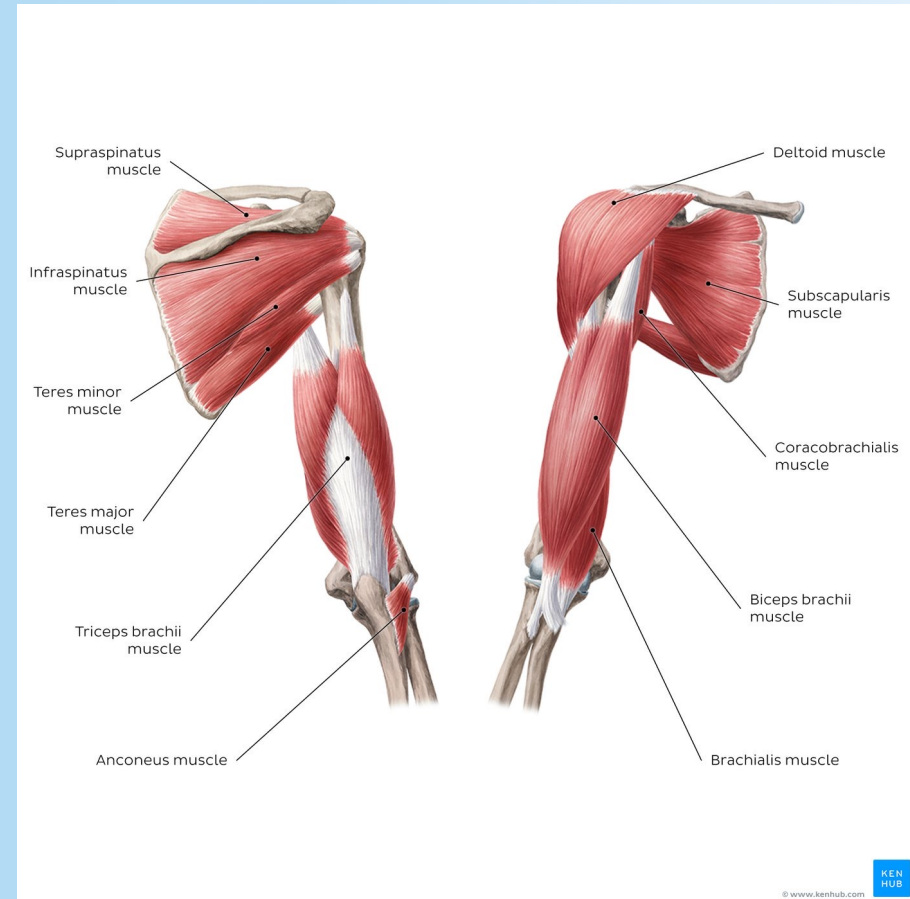
Muscles of the Elbow Joint

Flexion

- Brachialis
 - Primary flexor
- Biceps Brachii
 - Best flexor when arm is supinated
- Brachioradialis
 - Best in mid-prone

Extension

- Triceps Brachii
 - Main extensor
- Anconeus
 - Assists the triceps



Muscles of the Elbow Joint - Continued

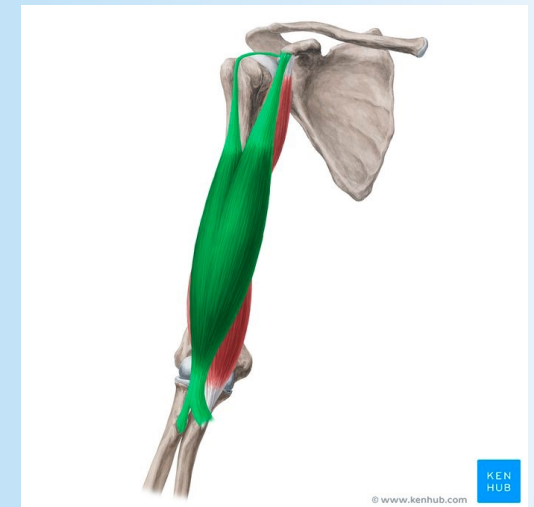
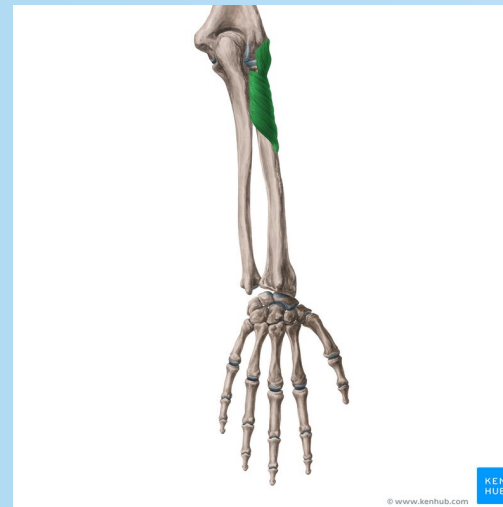
Pronation

- Pronator Teres (left)
 - Also, a flexor
- Pronator Quadratus (right)
 - Prime pronator



Supination

- Supinator (left)
 - Works when elbow extended
- Biceps Brachii (right)
 - Strongest when elbow flexed



Question Time!

What type of joint is the humeroradial joint?

Which muscle is the primary supinator/flexor of the arm when flexed/supinated?

Muscles of the Forearm

Anterior Compartment (flexors/pronators)

- Superficial Layer (4 muscles)
- Intermediate Layer (1 muscle)
- Deep Layer (3 muscles)

Posterior Compartment (extensors/supinators)

- Superficial Layer (7 muscles)
- Deep Layer (5 muscles)



Anterior Compartment - Superficial + Intermediate

Pronator Teres

- Action: pronation + weak elbow flexion
- High yield: median nerve passes between the two heads

Flexor Carpi Ulnaris

- Action: wrist flexion + ulnar deviation

Palmaris Longus

- Action: wrist flexion, tightens palmar aponeurosis
- Not always present

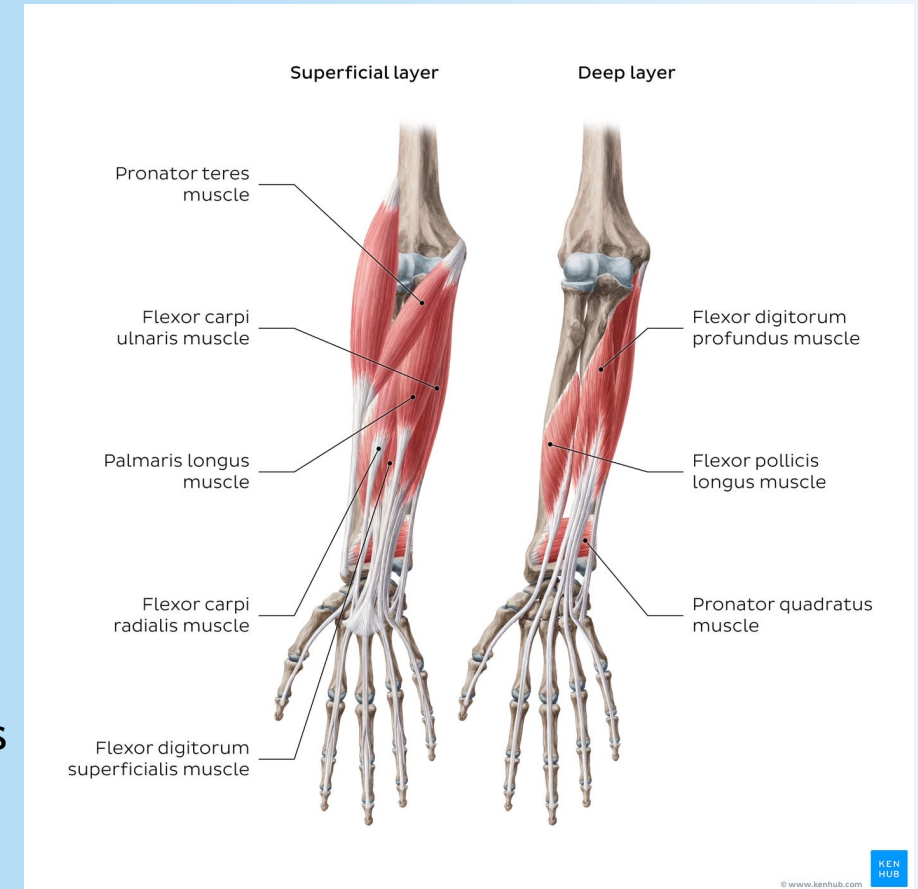
Flexor Carpi Radialis (FCR)

- Action: Wrist Flexion
- **CLINICAL AND VERY HIGH YIELD:**

Radial pulse can be felt between this tendon AND the brachioradialis

Flexor Digitorum Superficialis (Intermediate Layer)

- Flexes PIP (proximal interphalangeal) joints of digits 2-5
- Note: may be taught/in textbooks as part of the superficial layer



Anterior Compartment - Deep

Flexor Digitorum Profundus (profundus = deep)

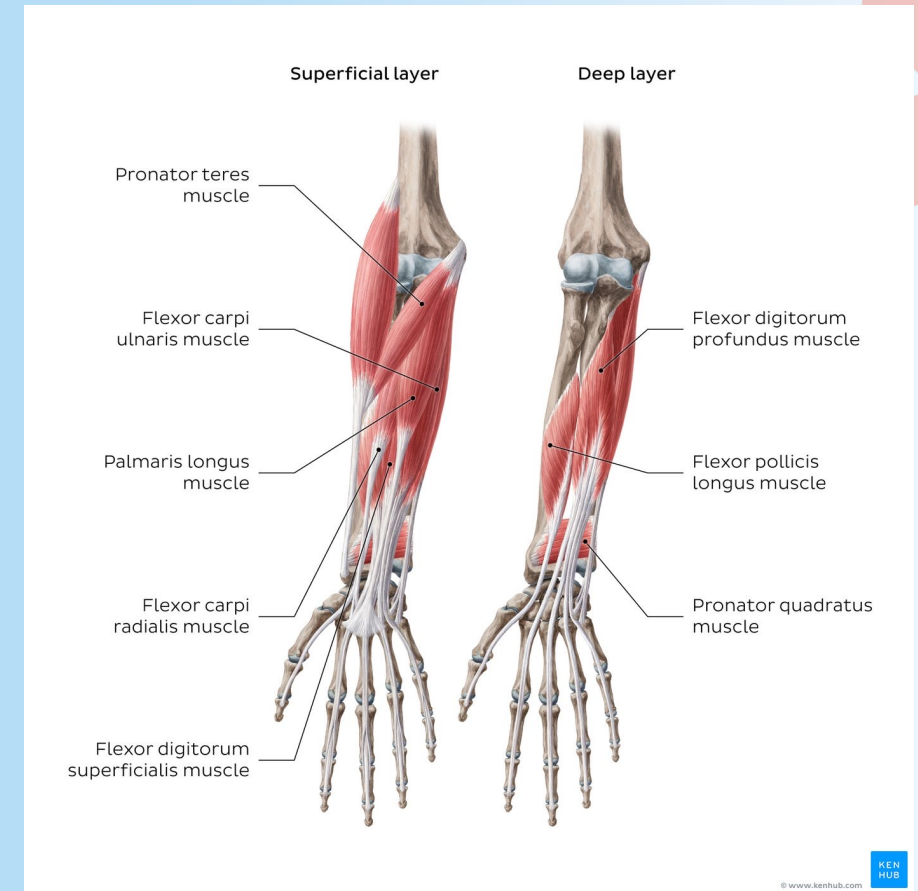
- Action: Flexes DIP (distal interphalangeal) joints of fingers 2-5

Flexor Pollicis Longus

- Action: Flexes thumb IP joint
- Note: anything that says **pollicis** indicates the **THUMB**

Pronator Quadratus:

- Action: Primary pronator
- Note: Stabilizes distal radioulnar joint



Posterior Compartment - Superficial

Brachioradialis

- Action: Flexes elbow (best in neutral)

Extensor Carpi Radialis Longus (long tendon)

- Action: Wrist extension + radial deviation

Extensor Carpi Radialis Brevis (short tendon)

- Action: Wrist extension + radial deviation

Extensor Digitorum

- Action: Extension of digits 2-5

Extensor Digiti Minimi

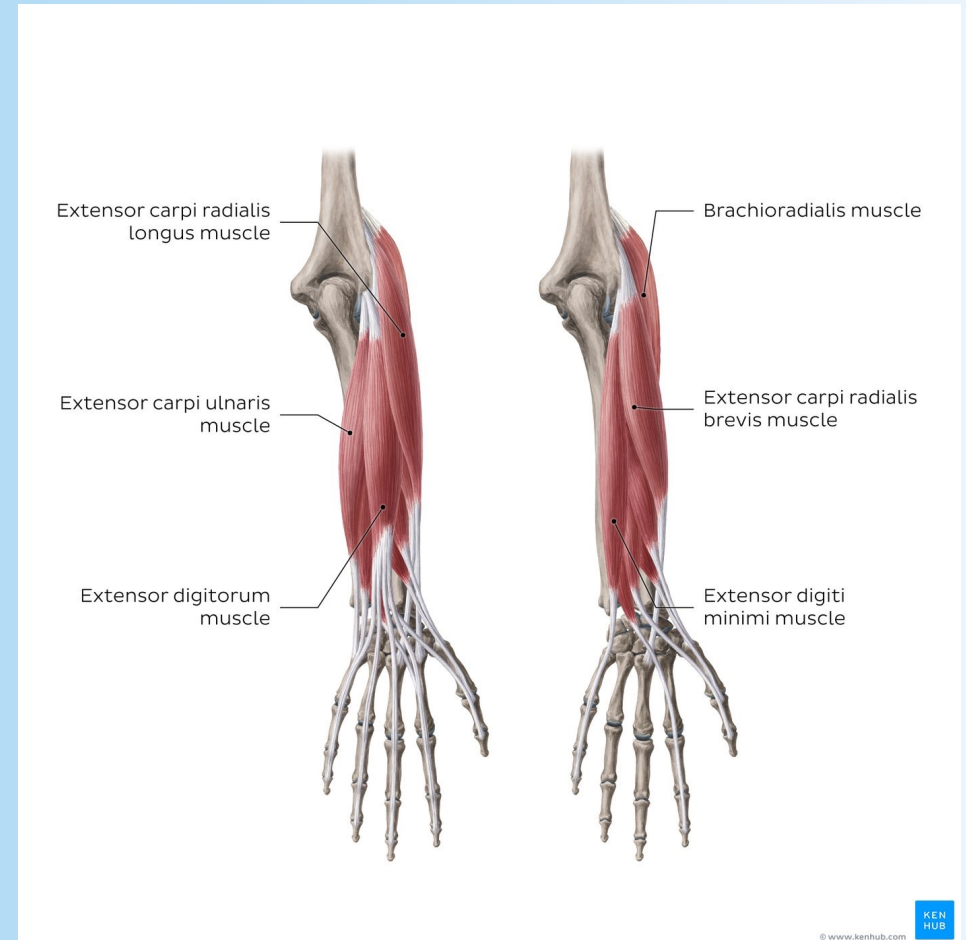
- Action: Extends digit 5 (pinkie)

Extensor Carpi Ulnaris

- Action: Wrist extension + ulnar deviation

Anconeus

- Action: Assists triceps and stabilizes ulna



Posterior Compartment - Deep

Supinator

- Action: supination (duh)

Extensor Pollicis Longus

- Action: extends thumb IP joint

Abductor Pollicis Longus

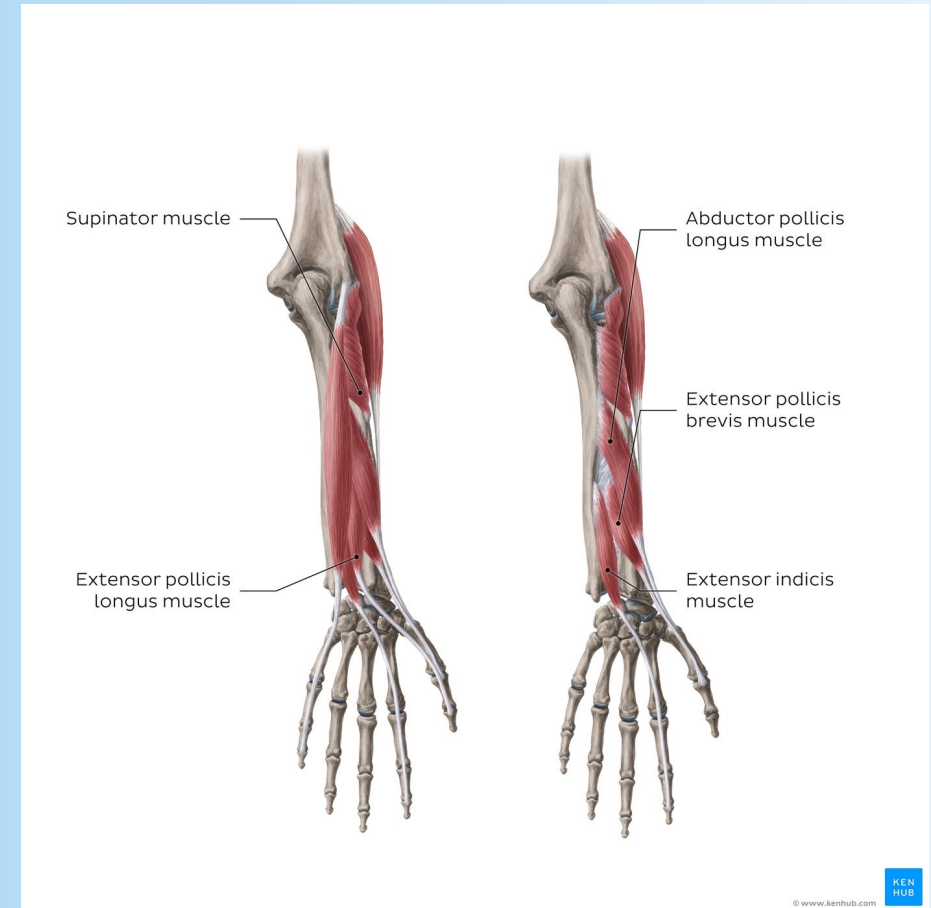
- Action: Abducts thumb

Extensor Pollicis Brevis

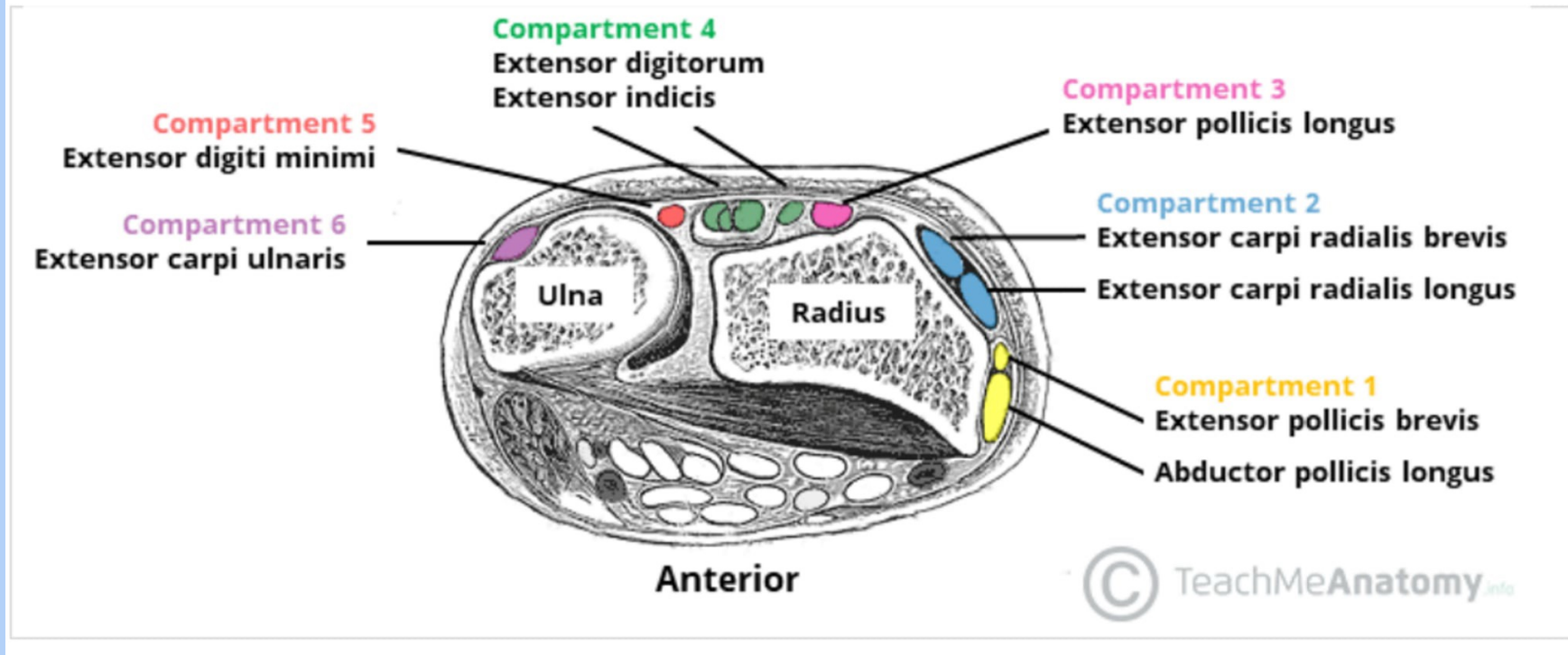
- Action: Extends thumb MCP

Extensor Indicis

- Action: extends finger 2 independently



Compartments of the retinaculum in hand



Question Time!

Trick question: What muscle in the anterior compartment receives dual innervation from both the ulnar and median nerve (via AIN)?

Acronym!

Minor BBC On The Coracoid

Pectoralis **M**inor, **B**iceps **B**rachii, and **C**oracobrachialis
attach to the coracoid process

t a b l e 7.2 Muscles of the Shoulder

Muscle	Origin	Insertion	Nerve	Action
Deltoid	Lateral third of clavicle, acromion, and spine of scapula	Deltoid tuberosity of humerus	Axillary	Abducts, adducts, flexes, extends, and rotates arm medially and laterally
Supraspinatus	Supraspinous fossa of scapula	Superior facet of greater tubercle of humerus	Suprascapular	Abducts arm
Infraspinatus	Infraspinous fossa	Middle facet of greater tubercle of humerus	Suprascapular	Rotates arm laterally
Subscapularis	Subscapular fossa	Lesser tubercle of humerus	Upper and lower subscapular	Adducts and rotates arm medially
Teres major	Dorsal surface of inferior angle of scapula	Medial lip of intertubercular groove of humerus	Lower subscapular	Adducts and rotates arm medially
Teres minor	Upper portion of lateral border of scapula	Lower facet of greater tubercle of humerus	Axillary	Rotates arm laterally
Latissimus dorsi	Spines of T7–T12 thoracolumbar fascia, iliac crest, ribs 9–12	Floor of bicipital groove of humerus	Thoracodorsal	Adducts, extends, and rotates arm medially

t a b l e

7.3

Muscles of the Arm

Muscle	Origin	Insertion	Nerve	Action
Coracobrachialis	Coracoid process	Middle third of medial surface of humerus	Musculocutaneous	Flexes and adducts arm
Biceps brachii	Long head, supraglenoid tubercle; short head, coracoid process	Radial tuberosity of radius	Musculocutaneous	Flexes arm and forearm, supinates forearm
Brachialis	Lower anterior surface of humerus	Coronoid process of ulna and ulnar tuberosity	Musculocutaneous	Flexes forearm
Triceps	Long head, infraglenoid tubercle; lateral head, superior to radial groove of humerus; medial head, inferior to radial groove	Posterior surface of olecranon process of ulna	Radial	Extends forearm
Anconeus	Lateral epicondyle of humerus	Olecranon and upper posterior surface of ulna	Radial	Extends forearm

table 7.4 Muscles of the Anterior Forearm

Muscle	Origin	Insertion	Nerve	Action
Pronator teres	Medial epicondyle and coronoid process of ulna	Middle of lateral side of radius	Median	Pronates and flexes forearm
Flexor carpi radialis	Medial epicondyle of humerus	Bases of second and third metacarpals	Median	Flexes forearm, flexes and abducts hand
Palmaris longus	Medial epicondyle of humerus	Flexor retinaculum, palmar aponeurosis	Median	Flexes forearm and hand
Flexor carpi ulnaris	Medial epicondyle (humeral head), medial olecranon, and posterior border of ulna (ulnar head)	Pisiform, hook of hamate, and base of fifth metacarpal	Ulnar	Flexes forearm, flexes and adducts hand
Flexor digitorum superficialis	Medial epicondyle, coronoid process, oblique line of radius	Middle phalanges of finger	Median	Flexes proximal interphalangeal joints, flexes hand and forearm
Flexor digitorum profundus	Anteromedial surface of ulna, interosseous membrane	Bases of distal phalanges of fingers	Ulnar and median	Flexes distal interphalangeal joints and hand
Flexor pollicis longus	Anterior surface of radius, interosseous membrane, and coronoid process	Base of distal phalanx of thumb	Median	Flexes thumb
Pronator quadratus	Anterior surface of distal ulna	Anterior surface of distal radius	Median	Pronates forearm

table 7.5 Muscles of the Posterior Forearm

Muscle	Origin	Insertion	Nerve	Action
Brachioradialis	Lateral supracondylar ridge of humerus	Base of radial styloid process	Radial	Flexes forearm
Extensor carpi radialis longus	Lateral supracondylar ridge of humerus	Dorsum of base of second metacarpal	Radial	Extends and abducts hand
Extensor carpi radialis brevis	Lateral epicondyle of humerus	Posterior base of third metacarpal	Radial	Extends and abducts hands
Extensor digitorum	Lateral epicondyle of humerus	Extensor expansion, base of middle and digital phalanges	Radial	Extends fingers and hand
Extensor digiti minimi	Common extensor tendon and interosseous membrane	Extensor expansion, base of middle and distal phalanges	Radial	Extends little finger
Extensor carpi ulnaris	Lateral epicondyle and posterior surface of ulna	Base of fifth metacarpal	Radial	Extends and adducts hand
Supinator	Lateral epicondyle, radial collateral and annular ligaments, supinator fossa and crest of ulna	Lateral side of upper part of radius	Radial	Supinates forearm
Abductor pollicis longus	Interosseous membrane, middle third of posterior surfaces of radius and ulna	Lateral surface of base of first metacarpal	Radial	Abducts thumb and hand
Extensor pollicis longus	Interosseous membrane and middle third of posterior surface of ulna	Base of distal phalanx of thumb	Radial	Extends distal phalanx of thumb and abducts hand
Extensor pollicis brevis	Interosseous membrane and posterior surface of middle third of radius	Base of proximal phalanx of thumb	Radial	Extends proximal phalanx of thumb and abducts hand
Extensor indicis	Posterior surface of ulna and interosseous membrane	Extensor expansion of index finger	Radial	Extends index finger

t a b l e 7.6 Muscles of the Hand

Muscle	Origin	Insertion	Nerve	Action
Abductor pollicis brevis	Flexor retinaculum, scaphoid, trapezium	Lateral side of base of proximal phalanx of thumb	Median	Abducts thumb
Flexor pollicis brevis	Flexor retinaculum and trapezium	Base of proximal phalanx of thumb	Median	Flexes thumb
Opponens pollicis	Flexor retinaculum and trapezium	Lateral side of first metacarpal	Median	Opposes thumb to other digits
Adductor pollicis	Capitate and bases of second and third metacarpals (oblique head), palmar surface of third metacarpal (transverse head)	Medial side of base of proximal phalanx of the thumb	Ulnar	Adducts thumb
Palmaris brevis	Medial side of flexor retinaculum, palmar aponeurosis	Skin of medial side of palm	Ulnar	Wrinkles skin on medial side of palm
Abductor digiti minimi	Pisiform and tendon of flexor carpi ulnaris	Medial side of base of proximal phalanx of little finger	Ulnar	Abducts little finger
Flexor digiti minimi brevis	Flexor retinaculum and hook of hamate	Medial side of base of proximal phalanx of little finger	Ulnar	Flexes proximal phalanx of little finger
Opponens digiti minimi	Flexor retinaculum and hook of hamate	Medial side of fifth metacarpal	Ulnar	Opposes little finger
Lumbricals (4)	Lateral side of tendons of flexor digitorum profundus	Lateral side of extensor expansion	Median (two lateral) and ulnar (two medial)	Flex metacarpophalangeal joints and extend interphalangeal joints
Dorsal interossei (4) (bipennate)	Adjacent sides of metacarpal bones	Lateral sides of bases of proximal phalanges, extensor expansion	Ulnar	Abduct fingers, flex metacarpophalangeal joints, extend interphalangeal joints
Palmar interossei (3) (unipennate)	Medial side of second metacarpal, lateral sides of fourth and fifth metacarpals	Bases of proximal phalanges in same sides as their origins, extensor expansion	Ulnar	Adduct fingers, flex metacarpophalangeal joints, extend interphalangeal joints

Wooclap Time!

Join this Wooclap event



1 Go to wooclap.com

2 Enter the event code in the top banner

Event code
GBTMNK