HAND THERAPY:

Practically Preparing for Fieldwork II

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LEARNING OBJECTIVES

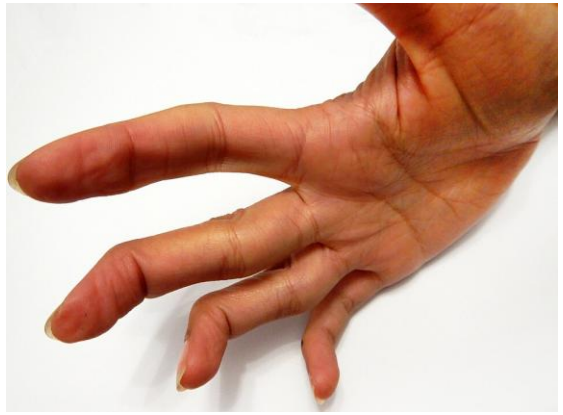
- Identify basic components of an initial evaluation
- Identify basic anatomy and neuroanatomy of the upper extremity (reference)
- Identify and palpate surface anatomy of the upper extremity
- Demonstrate use of goniometers for the elbow, wrist, and digits
- Demonstrate common provocative tests
- Identify applicable orthoses for common diagnoses

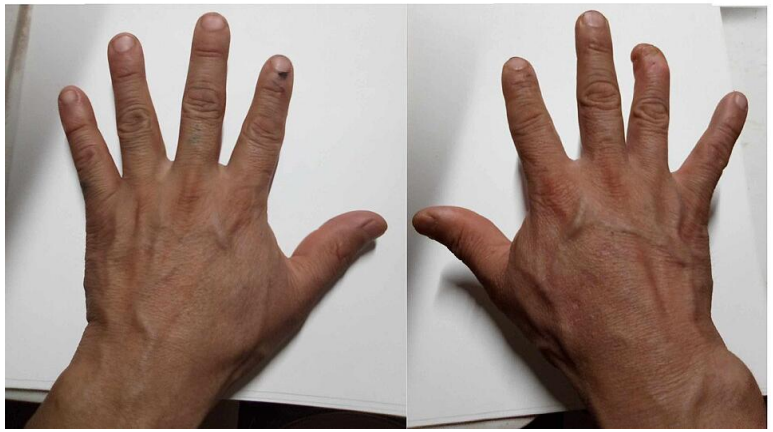
* Disclaimer: Information presented is to be taken as introductory only and is **not** exhaustive. Clinics and clinicians have different ways of doing things, so the information you see here may not be how it is done at a particular fieldwork site. Always defer to your CI or FWE.

EVALUATION

BASIC COMPONENTS

- Demographic information
- History of injury or condition
- Clinical observation
- Edema
- Range of motion (ROM)
- Strength
- Sensation
- Coordination and manual dexterity
- Provocative testing





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DEMOGRAPHIC INFORMATION

- Name
- Age
- Referral source
- Diagnosis
- Hand dominance
- Date of injury/onset & date of surgery (if applicable)
- Meaningful occupations
- Medical history – co-morbidities, medications, previous injuries/surgeries
- Social history – living situation, support system, substance use, daily habits, personal factors

HISTORY OF INJURY OR CONDITION

- Mechanism of injury OR history related to condition
- Initial treatment for injury/condition
  - Diagnostic tests
  - Medications
  - Orthosis
  - Surgery
  - Previous therapy
- Patient-centered outcome measures
  - e.g. Quick-DASH
- Subjective report
  - Pain, symptoms, goal of therapy

THE QuickDASH OUTCOME MEASURE

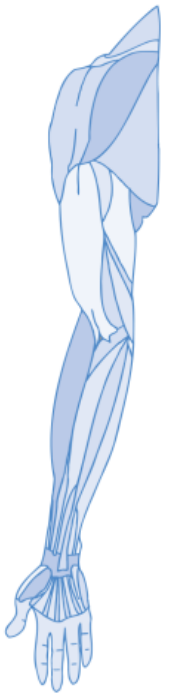
INSTRUCTIONS

This questionnaire asks about your symptoms as well as your ability to perform certain activities.

Please answer *every question*, based on your condition in the last week, by circling the appropriate number.

If you did not have the opportunity to perform an activity in the past week, please make your *best estimate* of which response would be the most accurate.

It doesn't matter which hand or arm you use to perform the activity; please answer based on your ability regardless of how you perform the task.



QuickDASH

Please rate your ability to do the following activities in the last week by circling the number below the appropriate response.

	NO DIFFICULTY	MILD DIFFICULTY	MODERATE DIFFICULTY	SEVERE DIFFICULTY	UNABLE
1. Open a tight or new jar.	1	2	3	4	5
2. Do heavy household chores (e.g., wash walls, floors).	1	2	3	4	5
3. Carry a shopping bag or briefcase.	1	2	3	4	5
4. Wash your back.	1	2	3	4	5
5. Use a knife to cut food.	1	2	3	4	5
6. Recreational activities in which you take some force or impact through your arm, shoulder or hand (e.g., golf, hammering, tennis, etc.).	1	2	3	4	5

	NOT AT ALL	SLIGHTLY	MODERATELY	QUITE A BIT	EXTREMELY
7. During the past week, *to what extent* has your arm, shoulder or hand problem interfered with your normal social activities with family, friends, neighbours or groups?	1	2	3	4	5

	NOT LIMITED AT ALL	SLIGHTLY LIMITED	MODERATELY LIMITED	VERY LIMITED	UNABLE
8. During the past week, were you limited in your work or other regular daily activities as a result of your arm, shoulder or hand problem?	1	2	3	4	5

Please rate the severity of the following symptoms in the last week. *(circle number)*	NONE	MILD	MODERATE	SEVERE	EXTREME
9. Arm, shoulder or hand pain.	1	2	3	4	5
10. Tingling (pins and needles) in your arm, shoulder or hand.	1	2	3	4	5

	NO DIFFICULTY	MILD DIFFICULTY	MODERATE DIFFICULTY	SEVERE DIFFICULTY	SO MUCH DIFFICULTY THAT I CAN'T SLEEP
11. During the past week, how much difficulty have you had sleeping because of the pain in your arm, shoulder or hand? *(circle number)*	1	2	3	4	5

QuickDASH DISABILITY/SYMPTOM SCORE = $\left(\left[\frac{\text{sum of n responses}}{n}\right] - 1\right) \times 25$, where n is equal to the number of completed responses.

A QuickDASH score may not be calculated if there is greater than 1 missing item.

CLINICAL OBSERVATION

- Guarding, posturing, substitution patterns with movement
- Inspection
  - Atrophy; edema; congruency of bony prominences and musculoskeletal architecture; nodules; wrinkles; calluses; contractures; cascade of metacarpals; skin changes
- Wounds/Scar conditions
  - Location, size/dimensions, color, odor, drainage, scar appearance
- Trophic changes – any visible abnormalities in tissue nourishment
  - Skin, fingertips, nails and hair growth
- Vasomotor – any abnormalities with blood vessel constriction or dilation
  - Capillary refill
- Sudomotor
  - Sweat patterns: hyperhidrosis, hypohidrosis, anhidrosis



EDEMA

- Description
  - Pitting, brawny, severity (mild/moderate/severe)
  - Note loss of wrinkles/creases
- Measurement – should always be taken on both sides
  - Volumeter
  - Circumferential
  - Figure of eight



Finger circumference gauge


Circumferential


Volumeter



Figure of eight

RANGE OF MOTION (ROM)

- Active range of motion (AROM) – Movement of a joint created entirely by your own muscle contraction
- Passive range of motion (PROM) – Movement of a joint created by external force like a therapist, gravity, or a strap, with muscles relaxed
- Goniometrics
  - Acceptable to round to the nearest 5 degrees (varies by location)
  - ASHT recommendations for ROM: "0" is neutral, "+" is hyperextension, "-" is extensor lag



STRENGTH

- Manual muscle testing
  - Gross – measures the strength of a muscle group (e.g. elbow flexors)
  - Isolated – measures the strength of an individual muscle (e.g. biceps brachii)
  - Scale – 0 to 5 numerical scale
- Grip strength
  - Dynamometer
- Pinch strength
  - Pinch gauge dynamometer – assess lateral (key) pinch, two- point (tip-to-tip) and three-point (three-jaw-chuck/palmar) pinch





STRENGTH

MANUAL MUSCLE TESTING PROCEDURES

Key to Muscle Grading

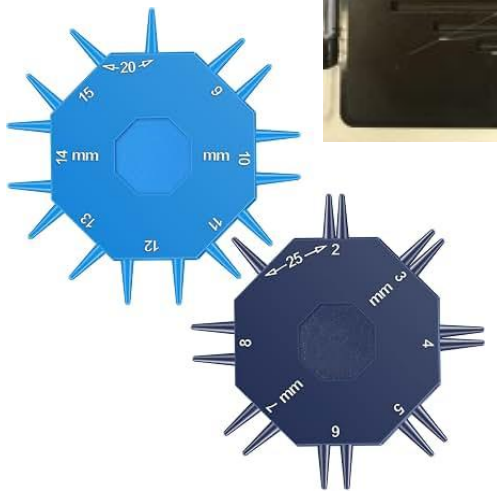
	Function of the Muscle	Grade		
No Movement	No contractions felt in the muscle	0	0	Zero
	Tendon becomes prominent or feeble contraction felt in the muscle, but no visible movement of the part	T	1	Trace
Test Movement	**MOVEMENT IN HORIZONTAL PLANE**			
	Moves through partial range of motion	1	2-	Poor-
	Moves through complete range of motion	2	2	Poor
	ANTIGRAVITY POSITION	3	2+	
	Moves through partial range of motion			
Test Position	*Gradual* release from test position	4	3-	Fair-
	Holds test position (no added pressure)	5	3	Fair
	Holds test position against slight pressure	6	3+	Fair+
	Holds test position against slight to moderate pressure	7	4-	Good-
	Holds test position against moderate pressure	8	4	Good
	Holds test position against moderate to strong pressure	9	4+	Good+
	Holds test position against strong pressure	10	5	Normal

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SENSATION

- Semmes-Weinstein monofilament testing – standardized test using nylon monofilaments
  - Correlates to the ability to functionally discriminate light touch to deep pressure
  - Indicated for assessing nerve compression or mapping nerve recovery
  - Safety implications depending on deficit of protective sensation
- Two-point discrimination: static and moving – performed using a two-point discriminator
  - Tests the ability to perceive two close objects as separate points of touch
  - Indicated following a nerve repair/graft or assessing nerve recovery after a surgical release
  - Some studies have found it to not be the best in producing consistent and repeatable findings
- Tests: O'Riain's Wrinkle test, Ninhydrin test, Moberg's Pick-Up test (site dependent)





COORDINATION AND DEXTERITY

a. Nine-Hole Peg Test

b. Box and Block Test

c. Purdue Pegboard Test

d. Minnesota Manual Dexterity Text

e. O'Connor Finger Dexterity Test



a.



b.



c.



d.



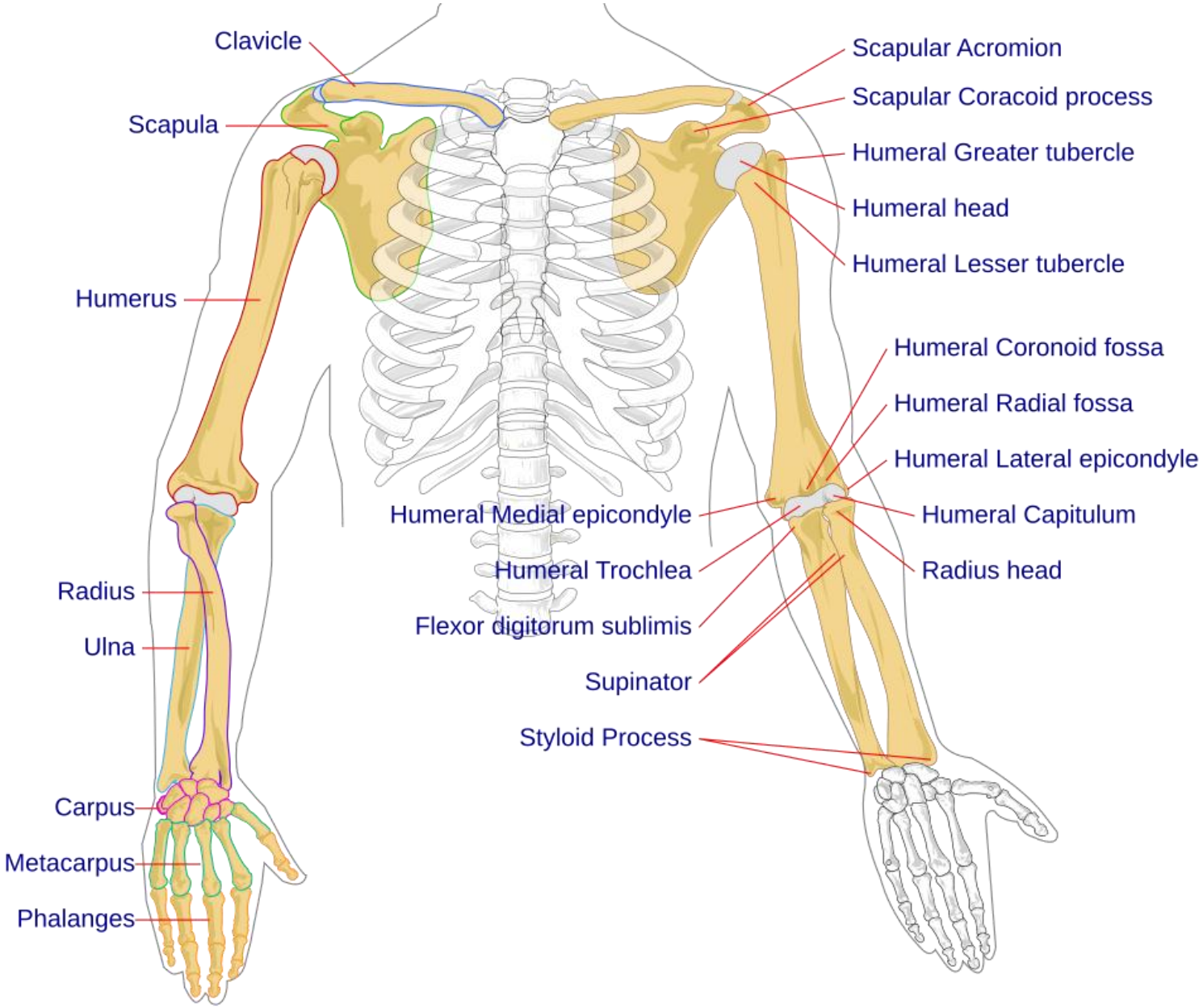
e.

PROVOCATIVE TESTS

- Helpful with the diagnostic process by ruling symptoms in or out
- Use clinical reasoning to select appropriate provocative tests based on patient symptoms and clinical observation
- To be discussed in more detail

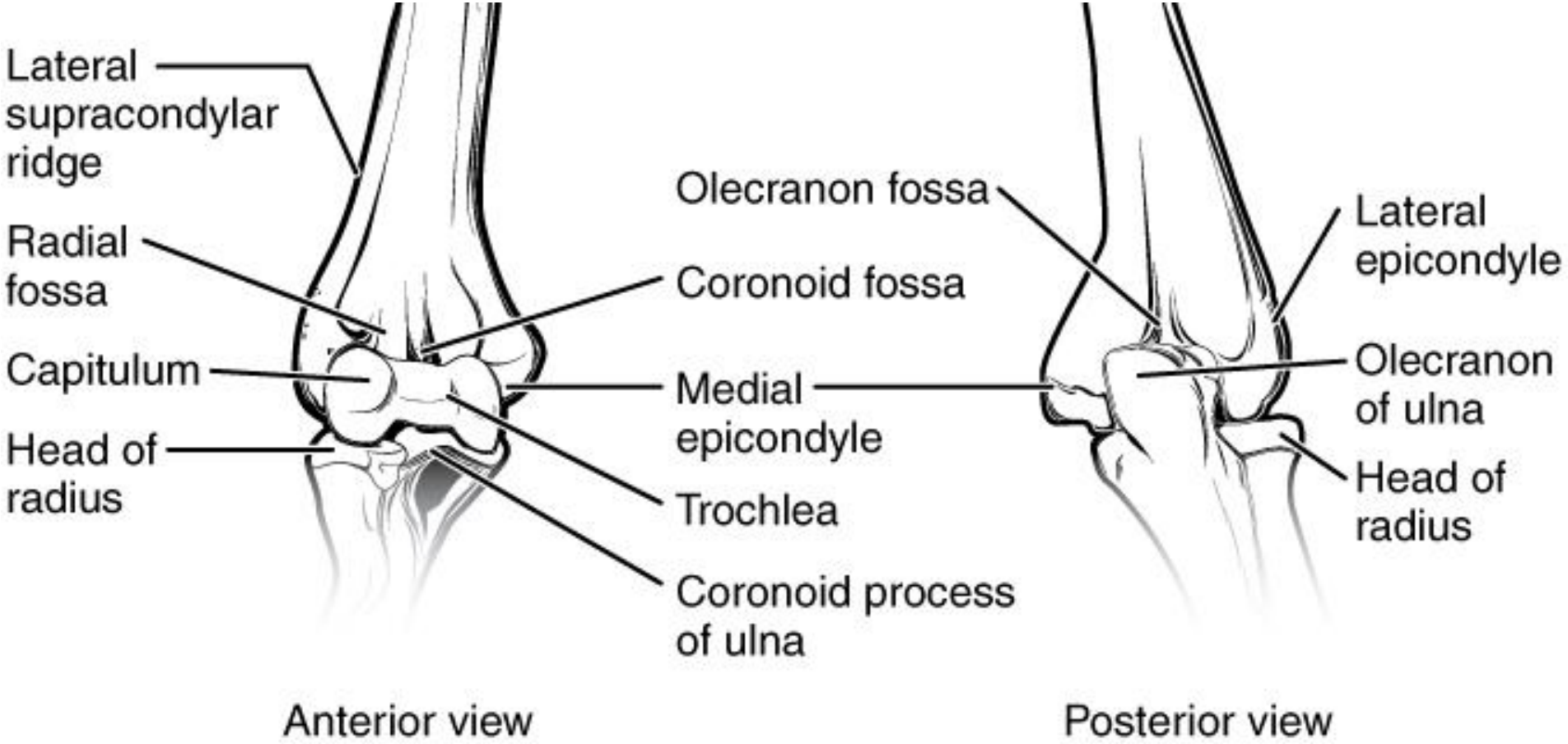
BONY ANATOMY

For your reference



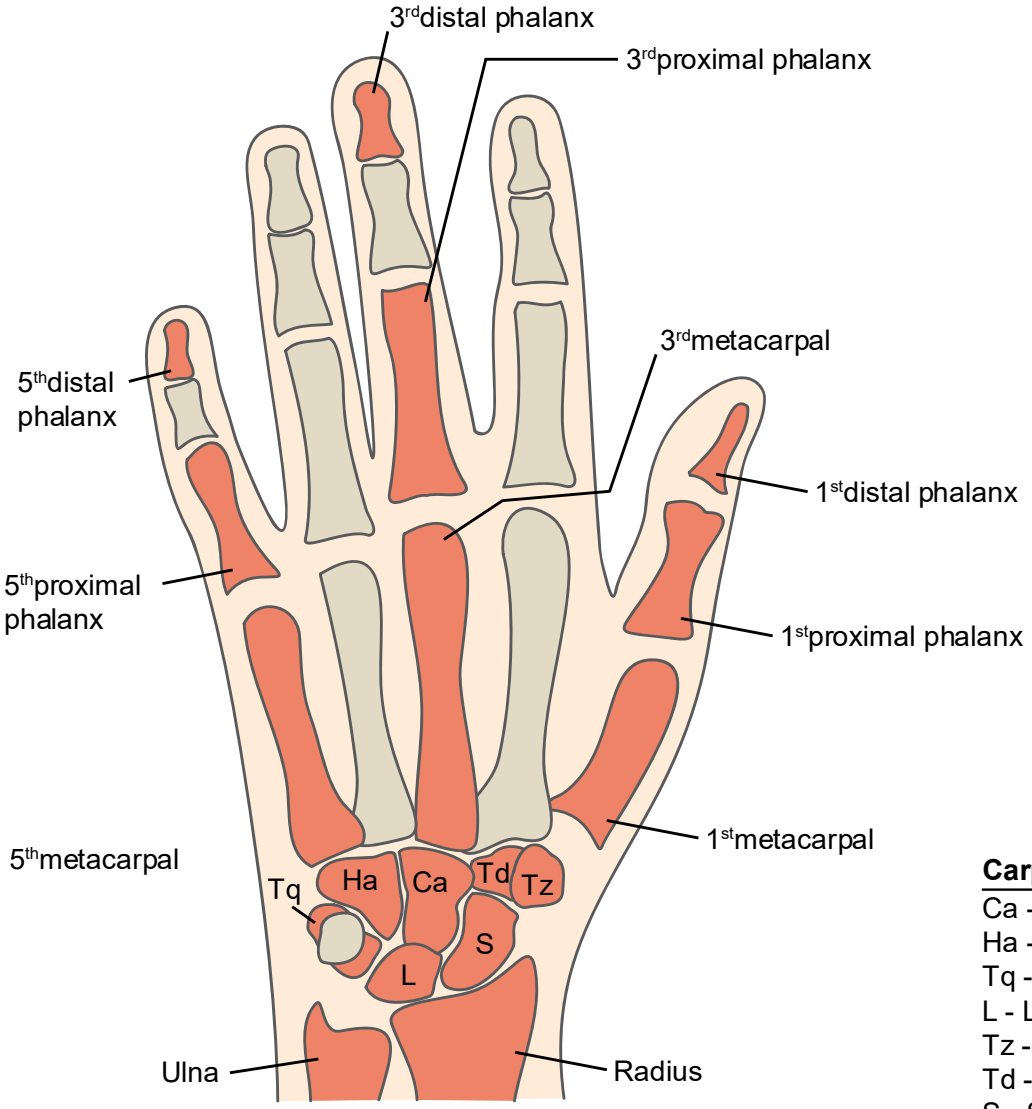
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ELBOW



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HAND



Carpal bones

Ca - Capitate
Ha - Hamate
Tq - Triquetrum
L - Lunate
Tz - Trapezium
Td - Trapezoid
S - Scaphoid

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MUSCLE ANATOMY

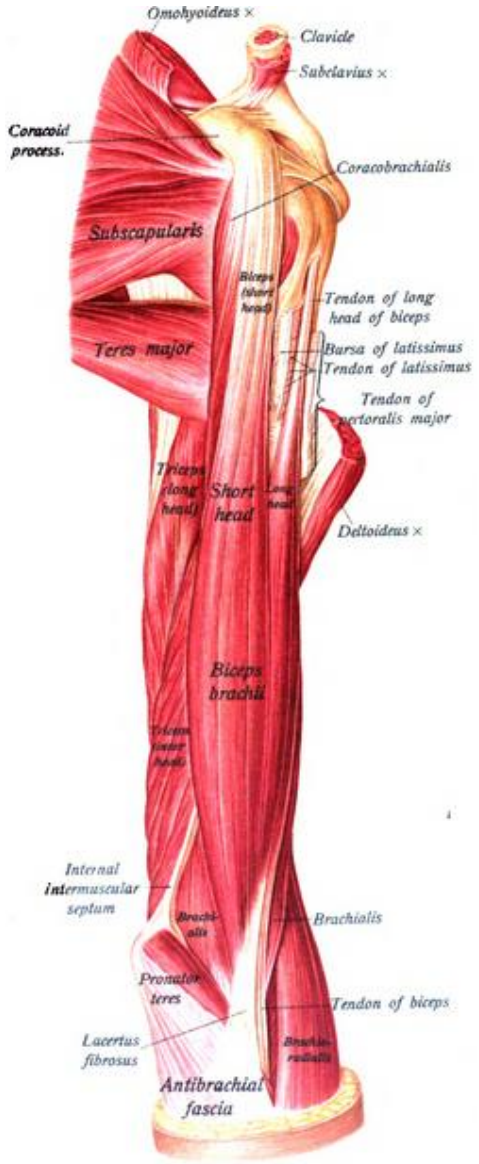
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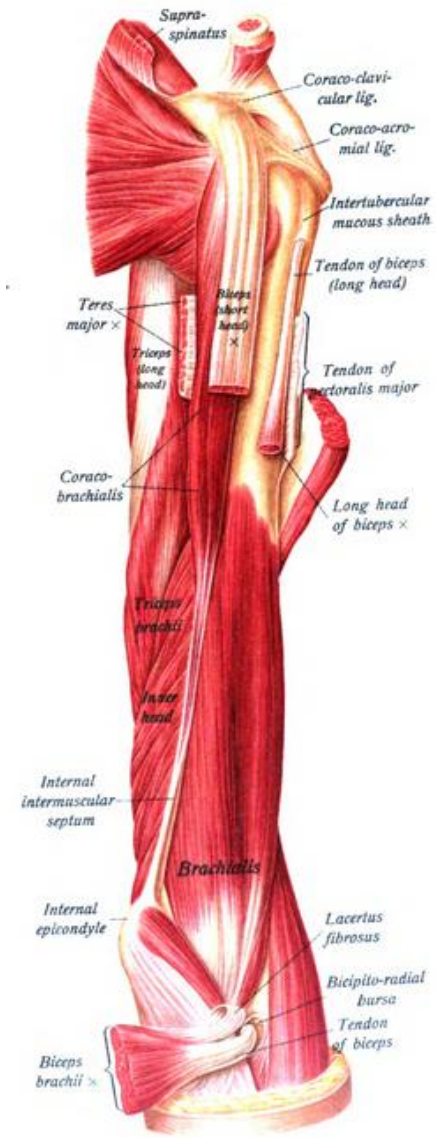
Tip: look up and add origin and insertion points

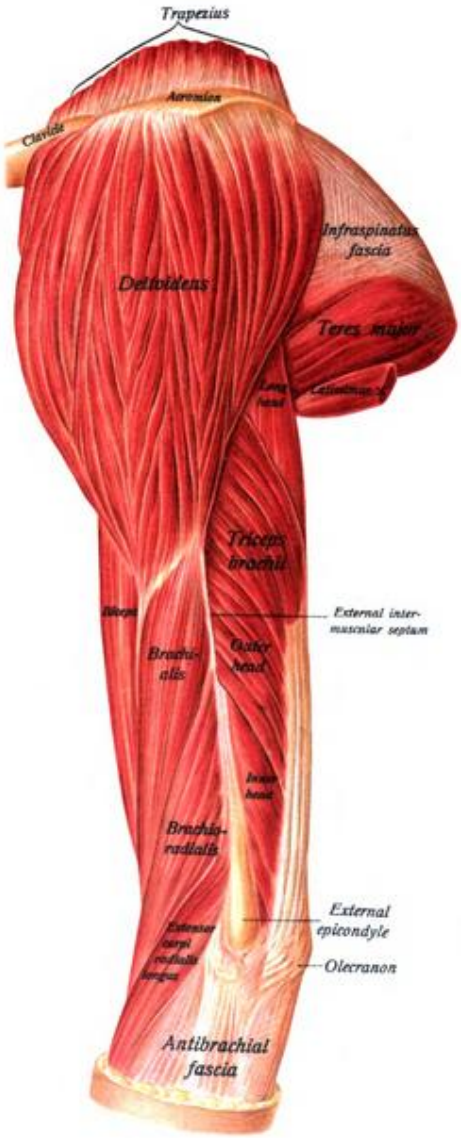
MUSCLES OF UPPER ARM

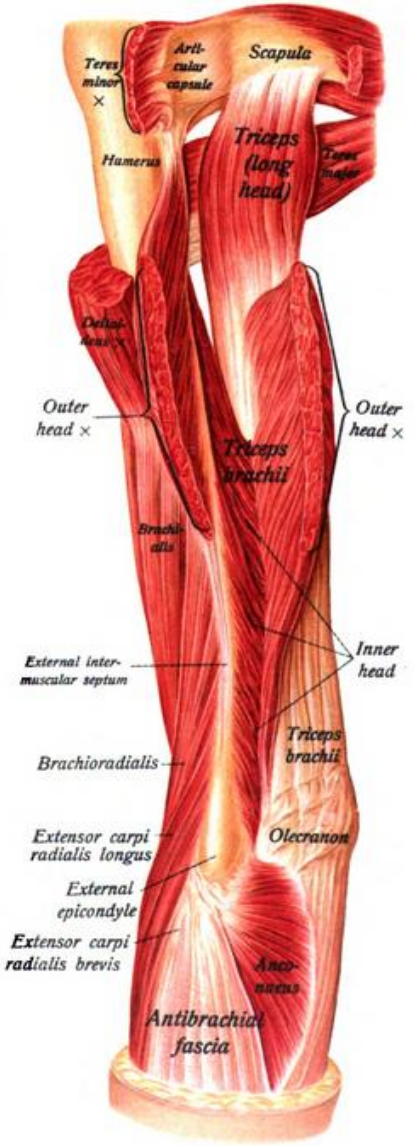
- **Muscles in the Front (Anterior Compartment)**
  - **Biceps brachii:** A large, two-headed muscle near the skin surface that flexes the elbow and supinates the forearm
  - **Brachialis:** A deep muscle sitting under the lower portion of the biceps that acts as a strong elbow flexor
  - **Coracobrachialis:** A deep muscle near the shoulder that helps flex the shoulder and adduct the arm

- **Muscles in the Back (Posterior Compartment)**
  - **Triceps brachii:** A large, three-headed muscle covering the back of the arm that extends the elbow joint





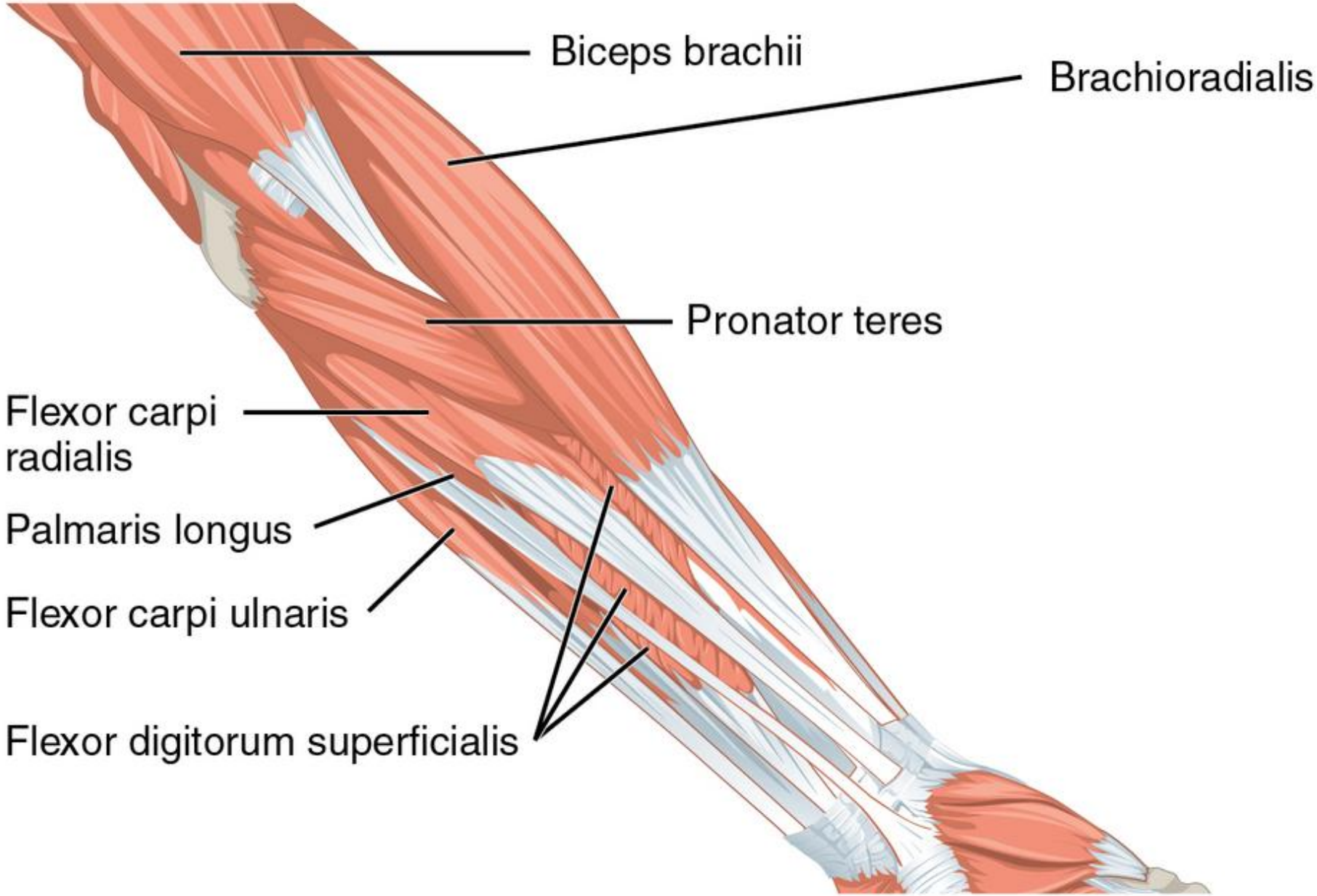




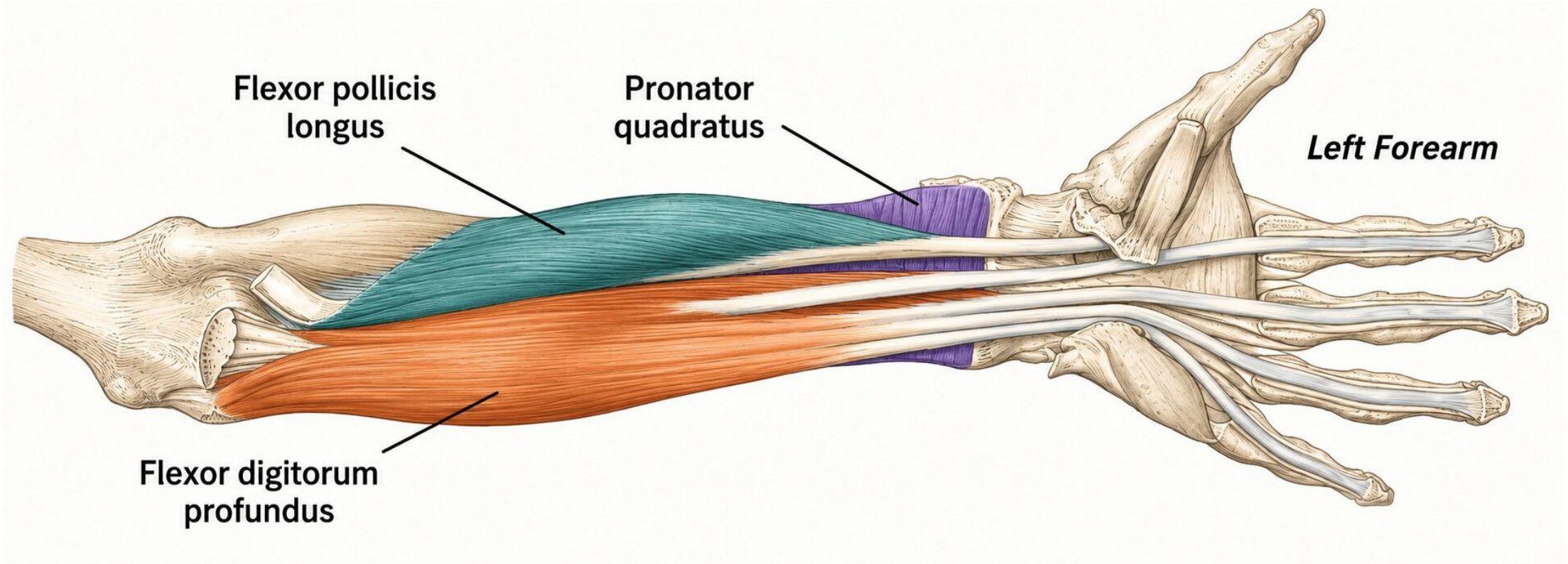
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MUSCLES OF THE FOREARM

- **Muscles in the Front (Anterior Compartment)**
  - **Superficial layer (4 muscles)**
    - **Pronator Teres (PT):** Pronates forearm (turns palm down)
    - **Flexor carpi radialis (FCR):** Flexes and radially deviates the wrist
    - **Palmaris longus (PL):** Absent in some people, assists in wrist flexion
    - **Flexor carpi ulnaris (FCU):** Flexes wrist and ulnarly deviates the wrist
  - **Intermediate layer (1 muscle)**
    - **Flexor digitorum superficialis (FDS):** Flexes digits at PIP, assists with MCP and wrist flexion
  - **Deep layer (3 muscles)**
    - **Flexor digitorum profundus (FDP):** Flexes digits at DIP, assists with PIP, MCP, and wrist flexion
    - **Flexor pollicis longus (FPL):** Flexes the thumb at IP, assists with MP and CMC flexion
    - **Pronator quadratus (PQ):** Deep square muscle that assists in pronation



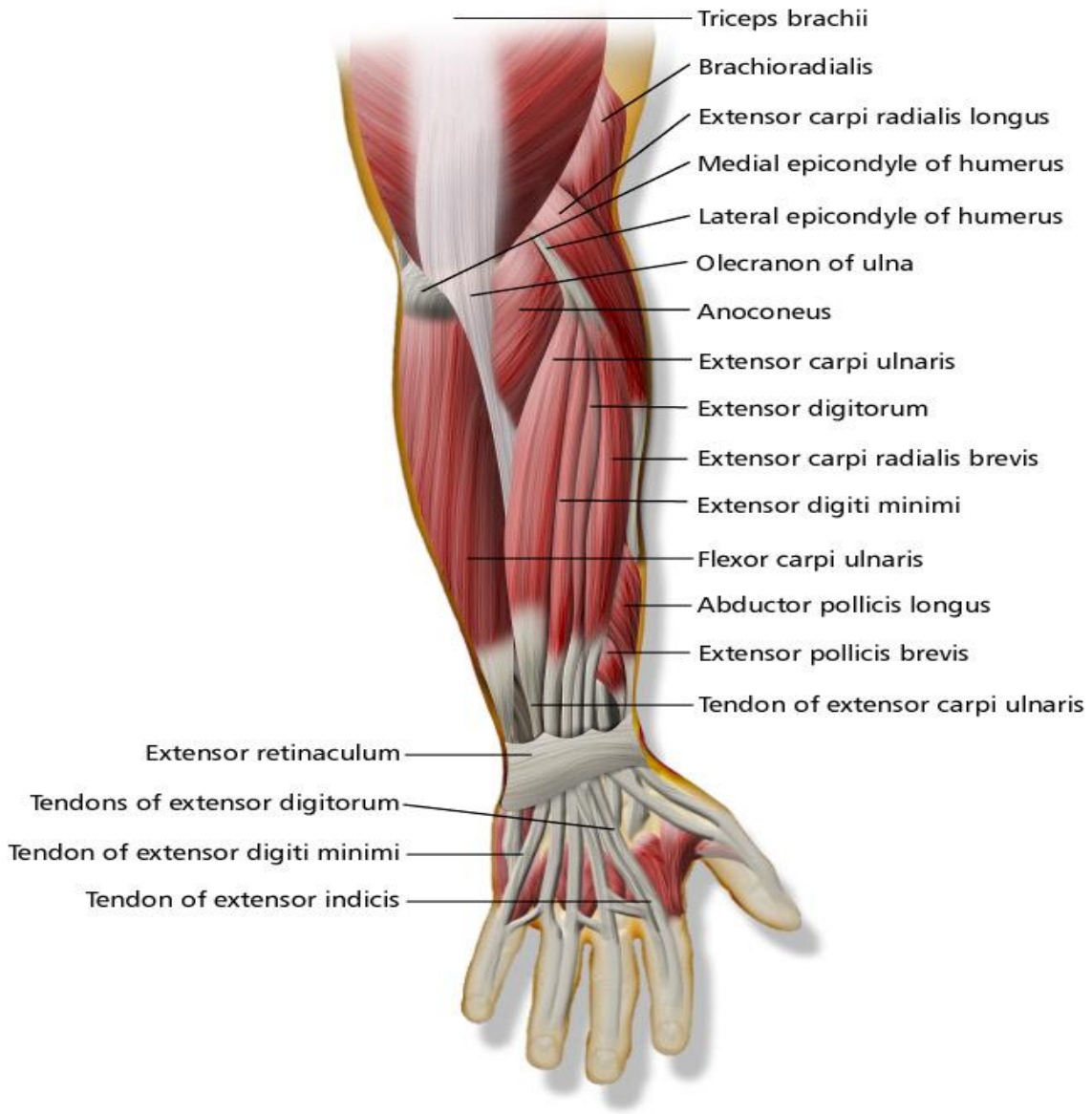
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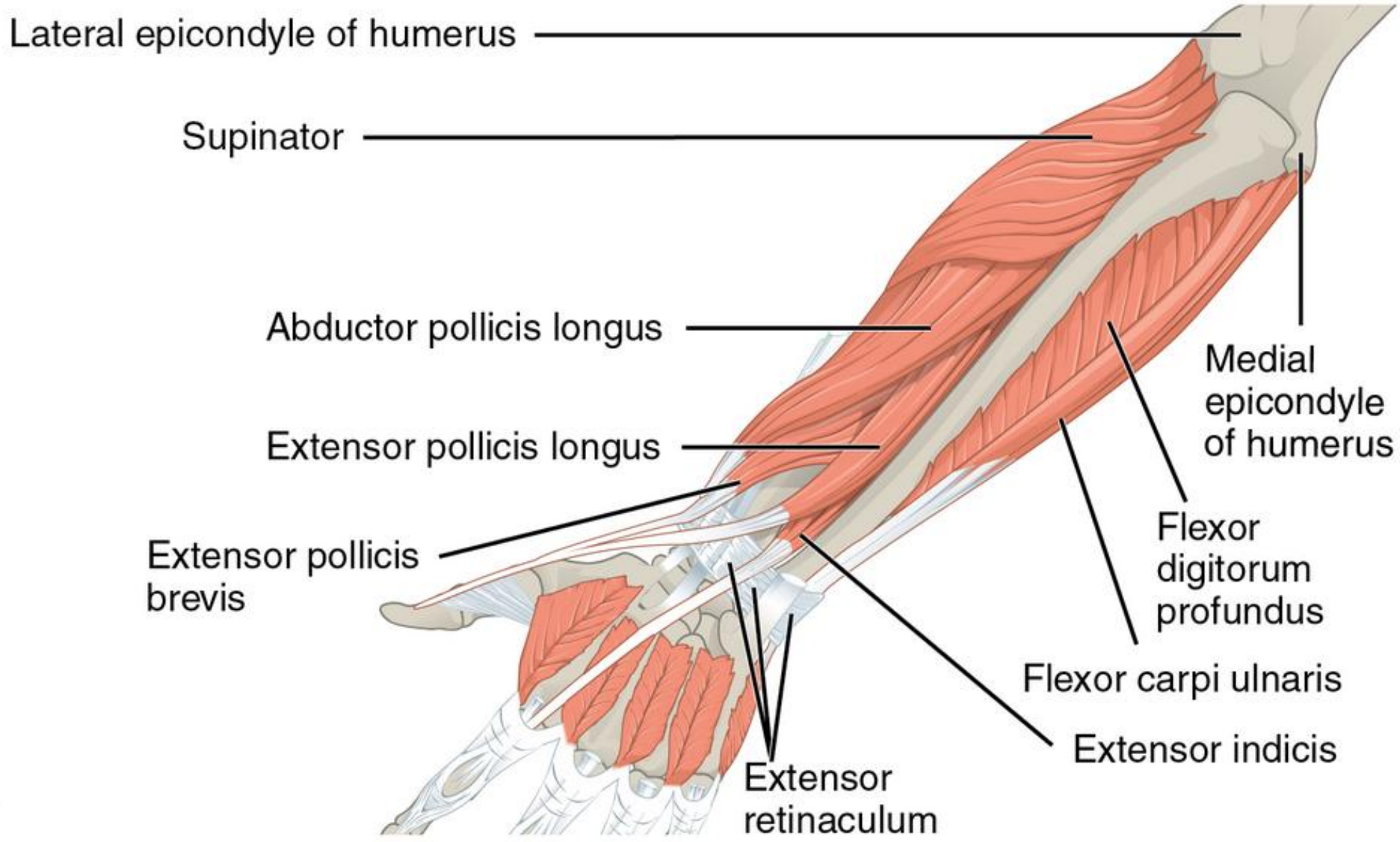
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MUSCLES OF THE FOREARM

- **Muscles in the Back (Posterior Compartment)**
  - **Superficial layer (7 muscles)**
    - **Brachioradialis (BR):** Flexes the elbow with forearm in neutral
    - **Extensor carpi radialis longus (ECRL):** Assists in wrist extension and radially deviates the wrist
    - **Extensor carpi radialis brevis (ECRB):** Primary wrist extensor
    - **Extensor digitorum communis (EDC):** Extends the four fingers
    - **Extensor digiti minimi/quinti (EDM/EDQ):** Extends the small finger
    - **Extensor carpi ulnaris (ECU):** Extends and deviates the wrist ulnarly
    - **Anconeus:** Stabilizes the elbow and assists in extension
  - **Deep layer (5 muscles)**
    - **Supinator:** Turns the palm upward
    - **Abductor pollicis longus (APL):** Abducts thumb away from palm (radial abduction)
    - **Extensor pollicis brevis (EPB):** Extends the thumb's short base bone
    - **Extensor pollicis longus (EPL):** Extends the tip of the thumb
    - **Extensor indicis proprius (EIP):** Extends the index finger



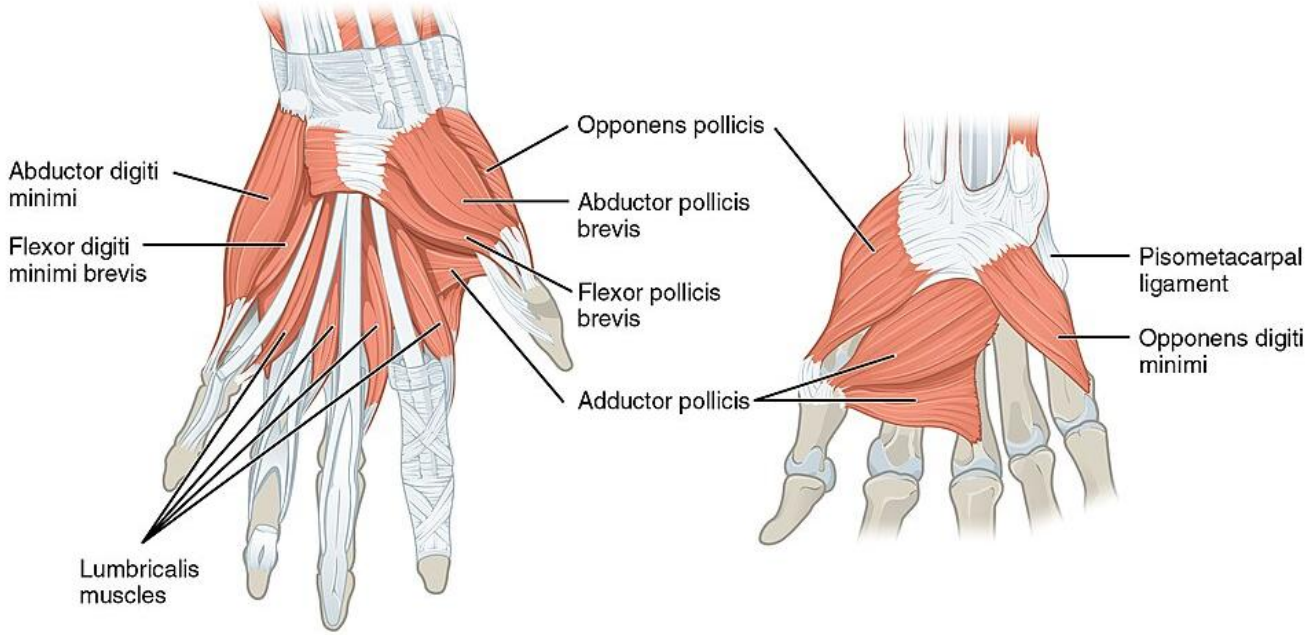
"RCSI - Drawing Superficial extensor muscles and tendons of forearm - English labels" at AnatomyTOOL.org by Royal College of Surgeons of Ireland, license: Creative Commons Attribution-NonCommercial-ShareAlike



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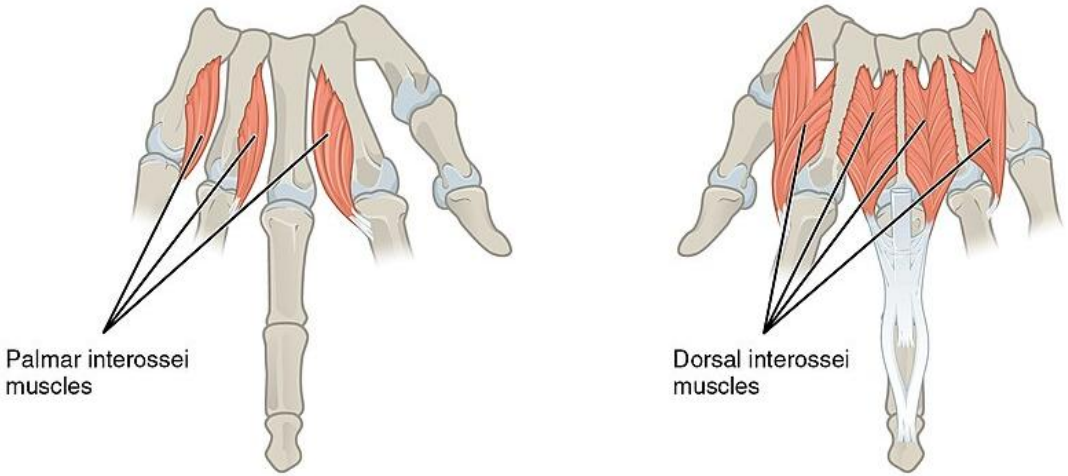
MUSCLES OF THE HAND

- **Thenar**
  - **Opponens pollicis (OP):** Draws 1st metacarpal (thumb) forward and medially
  - **Abductor pollicis brevis (APB):** Abducts and assists opposition of the thumb (palmar abduction)
  - **Flexor pollicis brevis (FPB):** Flexes proximal phalanx of thumb
  - **Adductor pollicis (ADP):** Adducts thumb towards index finger
- **Hypothenar**
  - **Opponens digiti minimi (ODM):** Flexes and laterally rotates 5th metacarpal at carpometacarpal joint
  - **Abductor digiti minimi (ADM):** Abducts small finger from ring finger
  - **Flexor digiti minimi brevis (FDM):** Flexes small finger at MCP joint
- **Intrinsics**
  - **Lumbricals:** Flexes MCP joints while simultaneously extending PIP and DIP joints
  - **Dorsal interossei (DI):** Abducts index, middle, ring fingers from middle of the palm
  - **Palmar interossei (PI):** Adducts index, ring fingers towards middle finger
  - **Palmaris brevis (PB):** Tightens palmar aponeurosis, wrinkles skin on ulnar side of palm, deepens hollow of the hand



Superficial muscles of left hand (palmar)

Deep muscles of left hand: (dorsal view)



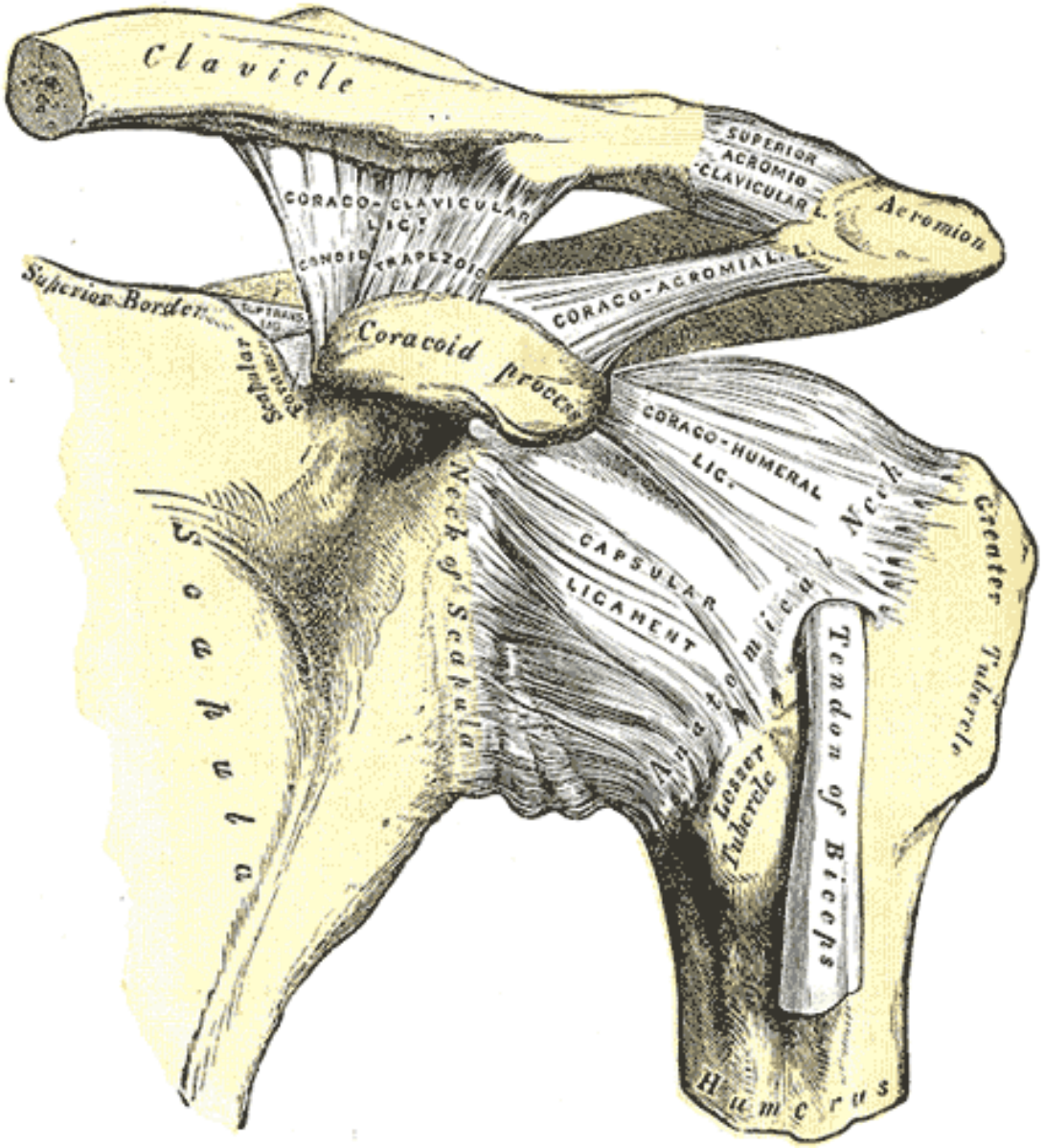
Interossei muscles of left hand (palmar view)

Interossei muscles of left hand (dorsal view)

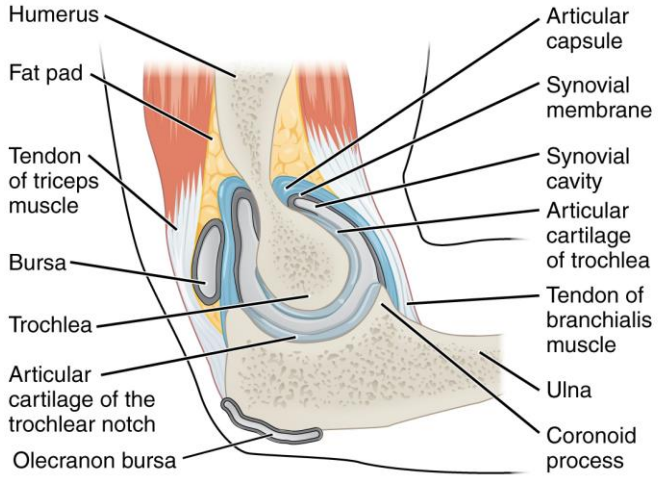
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LIGAMENTS

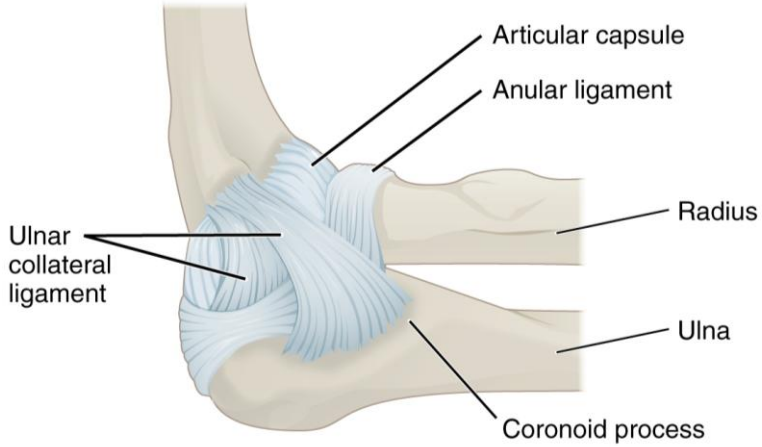
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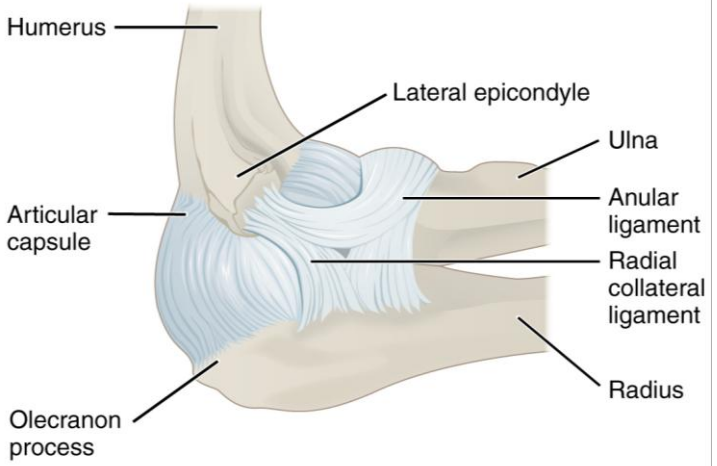
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(a) Medial sagittal section through right elbow (lateral view)

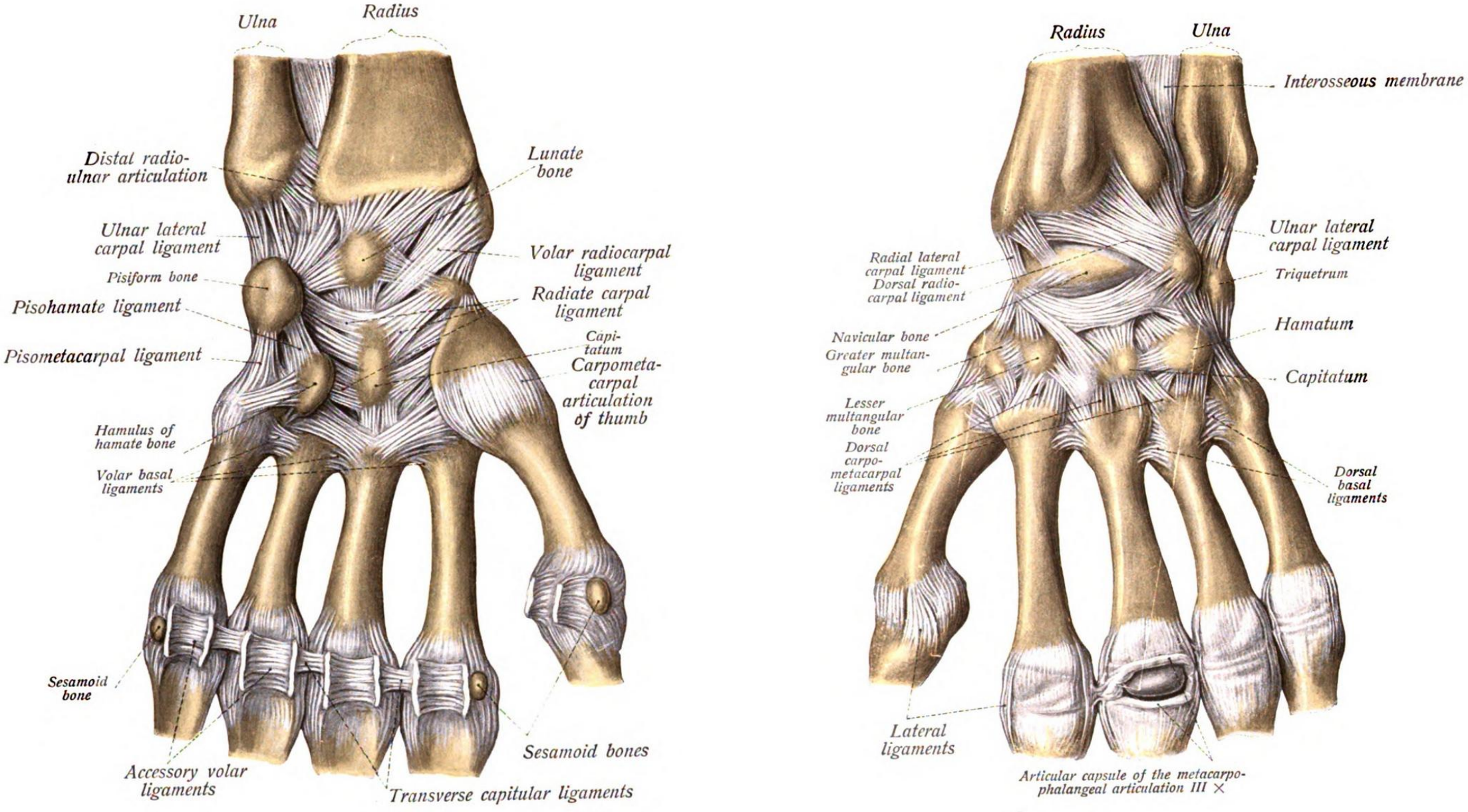


(c) Medial view of right elbow joint

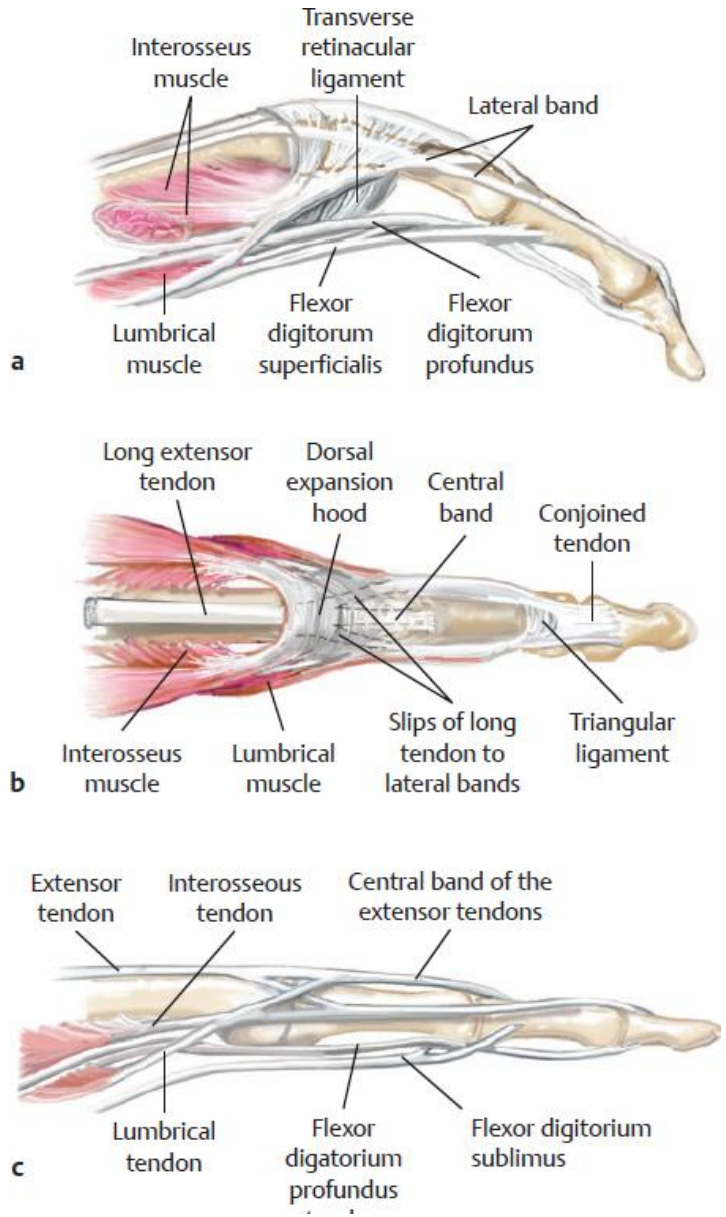


(b) Lateral view of right elbow joint

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Dr. Johannes Sobotta, Public domain, via Wikimedia Commons



Anatomy of the extensor mechanism of the finger.

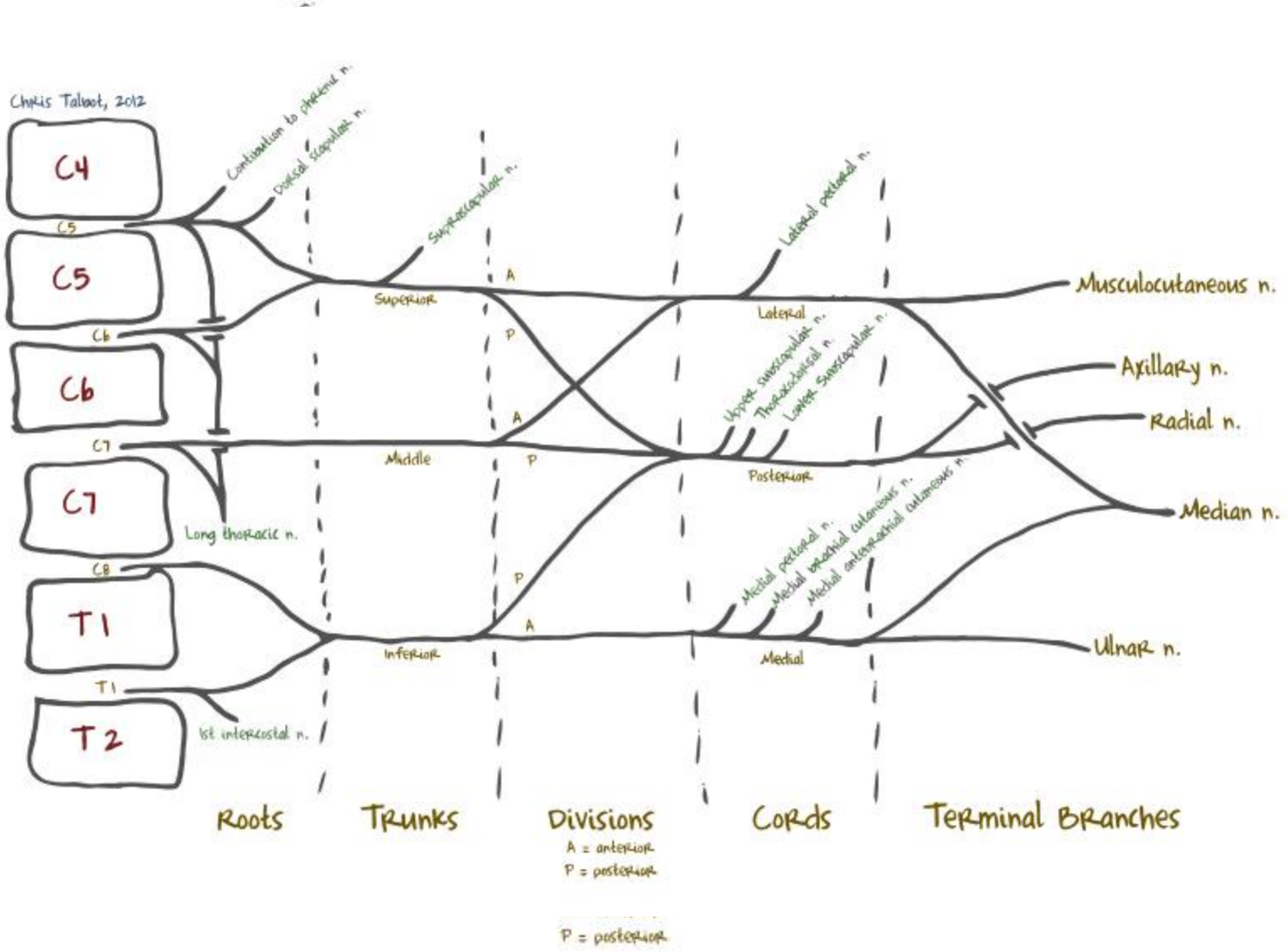
(a, b) The "restraining ligaments": the triangular ligament, transverse retinacular ligament, and oblique retinacular ligament.

(c) The delicate interweaving of the contributions of both intrinsic and extrinsic systems, showing the extensor digitorum communis lateral slip contribution into the intrinsic system.

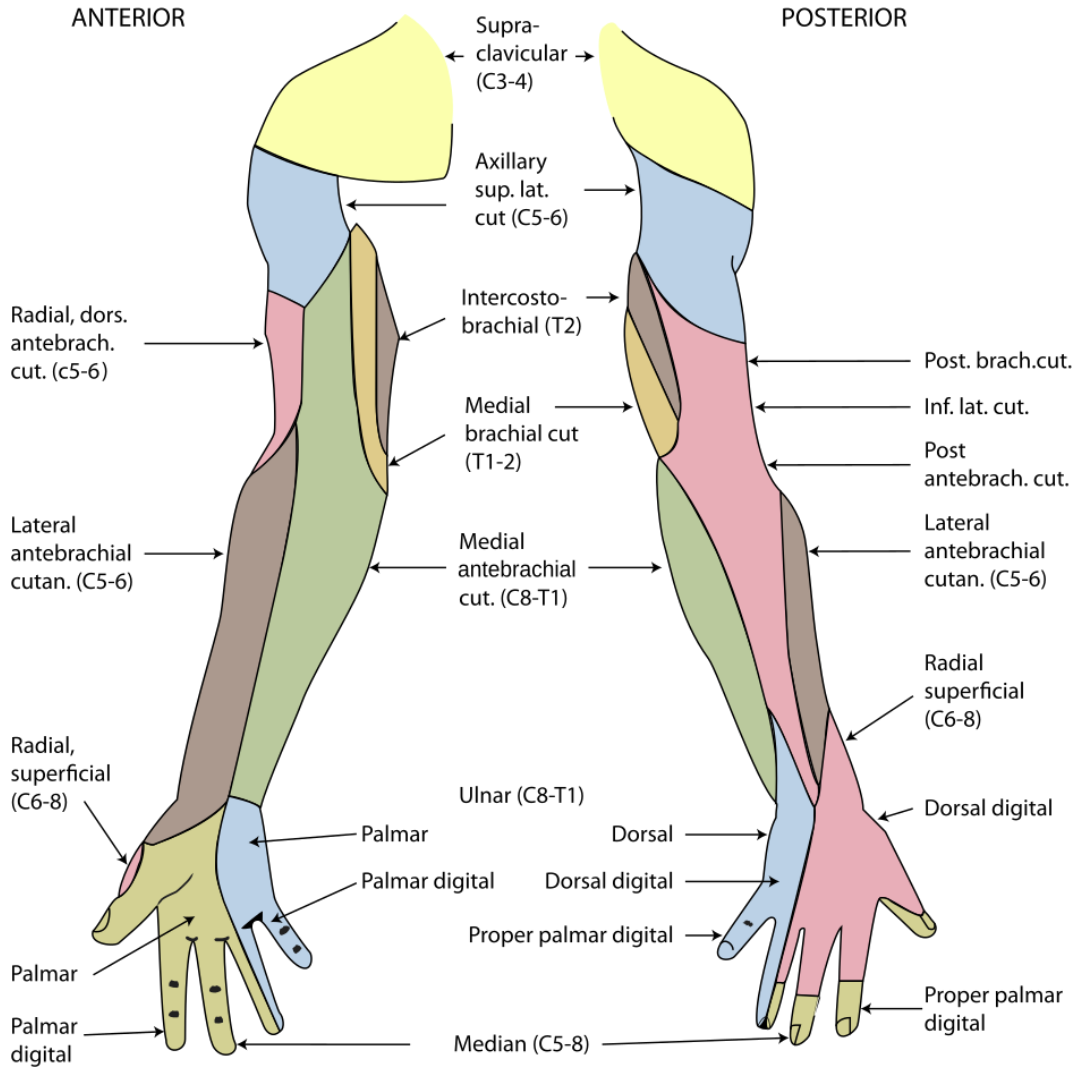
Themes, U. (n.d.). Plastic surgery key. https://plasticsurgerykey.com/extensor-tendon-injuries-2/

NEUROANATOMY

For your reference



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BRACHIAL PLEXUS INNERVATIONS

Level	Nerve	Origin	Motor	Sensory
Root	Long thoracic nerve	C_5, C6, C_7	Serratus anterior	
	Dorsal scapular nerve	C_4, C_5	Levator scapulae and rhomboids	
	Branch to phrenic nerve	C_5	Diaphragm	
Trunk	Suprascapular	C_5, C6	Supraspinatus and infraspinatus	
	Nerve to subclavius	C_5, C6	Subclavius	
Cord	Lateral pectoral	C_5, C6, C_7	Pec major (clavicular)	
	Medial pectoral	C8, T1	Pec major (sternal/lower) and minor	
	Thoracodorsal	C6, C_7, C8	Latissimus dorsi	
	Subscapular	C_5, C6	Subscapularis and teres major	
Branch	Axillary	C_5, C6	Deltoid and teres minor	Deltoid and superior posterior arm
	Musculocutaneous	C_5, C6, C_7	Biceps, brachialis, coracobrachialis	Lateral forearm

BRACHIAL PLEXUS INNERVATIONS

Level	Nerve	Origin	Motor	Sensory
Branch	Radial	C5, C6, C7, C8, T1	Triceps, anconeus, brachioradialis, ECRL, ECRB, supinator, EDC, EDM, ECU, APL, EPB, EPL, EIP	Posterior arm and forearm, lateral 2/3 of dorsum of hand and fingers
	Median	C5, C6, C7, C8, T1	Pronator teres, palmaris longus, FCR, FDS, FPL, IF/MF FDP, pronator quadratus, APB, FPB, OP, 1st and 2nd lumbricals	Palmar and dorsal thumb, IF, MF, radial half of RF; skin over thenar eminence
	Ulnar	C8, T1	FCU, RF/SF FDP, ADM, FDM, ODM, 3rd and 4th lumbricals, all interossei, adductor pollicis, deep head of FPB, palmaris brevis	Medial forearm, medial third of the palm, and the medial one and one-half digits (little finger and ulnar side of the ring finger), including the dorsal/palmar surfaces of these digits.

BASIC HANDLING

Lecture and lab

PRINCIPLES OF HANDLING

Infection control

Communicate what you will be touching

Use circumferential and broad pressure

Pay attention to your own body position

Pay attention to the patient’s body position

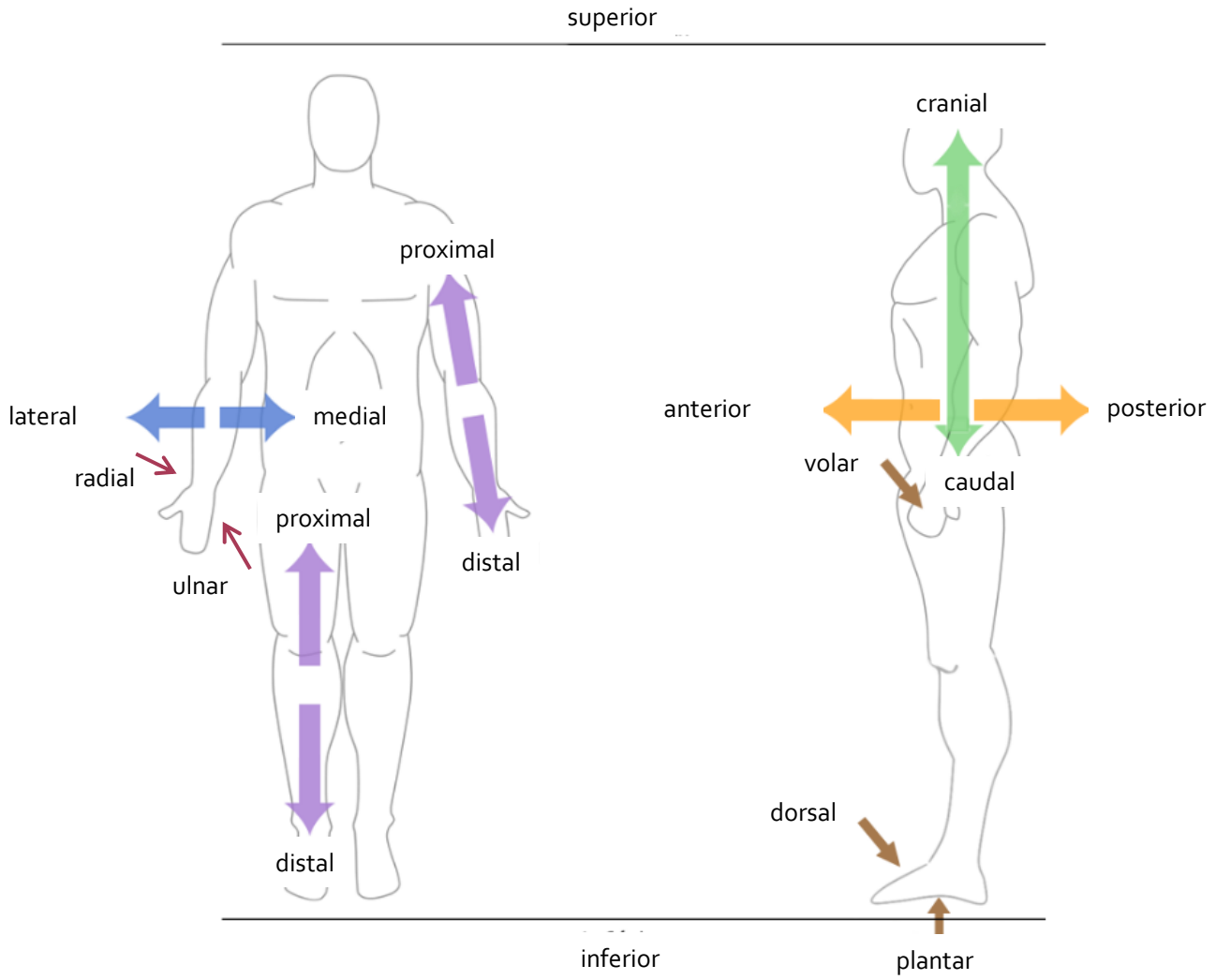
SURFACE ANATOMY

Lab

Find one or two partners to practice with

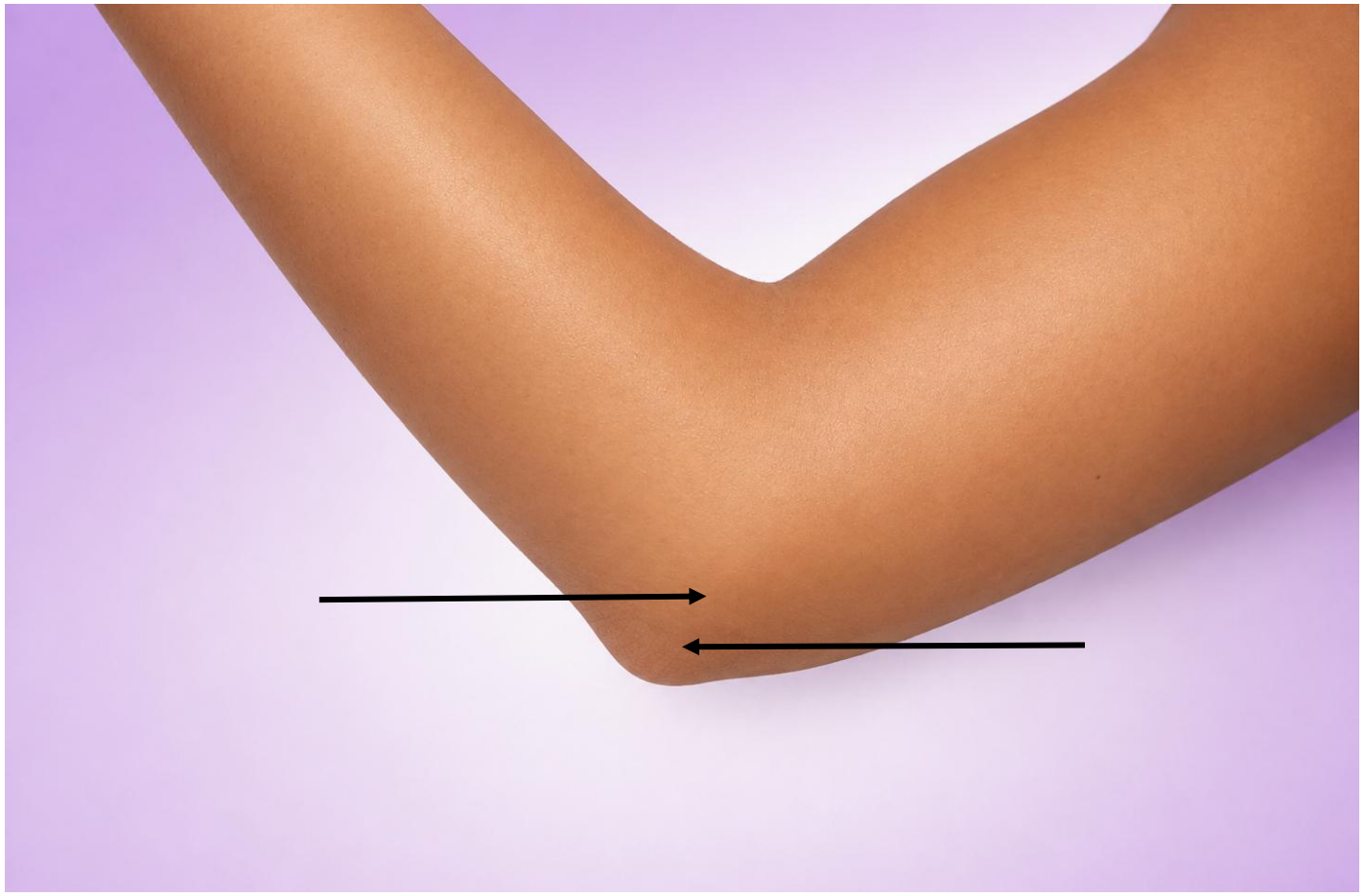
ANATOMICAL TERMS OF LOCATION

- Anatomical position
- Lateral/medial
- Anterior/posterior
- Volar/dorsal
- Radial/ulnar
- Proximal/distal



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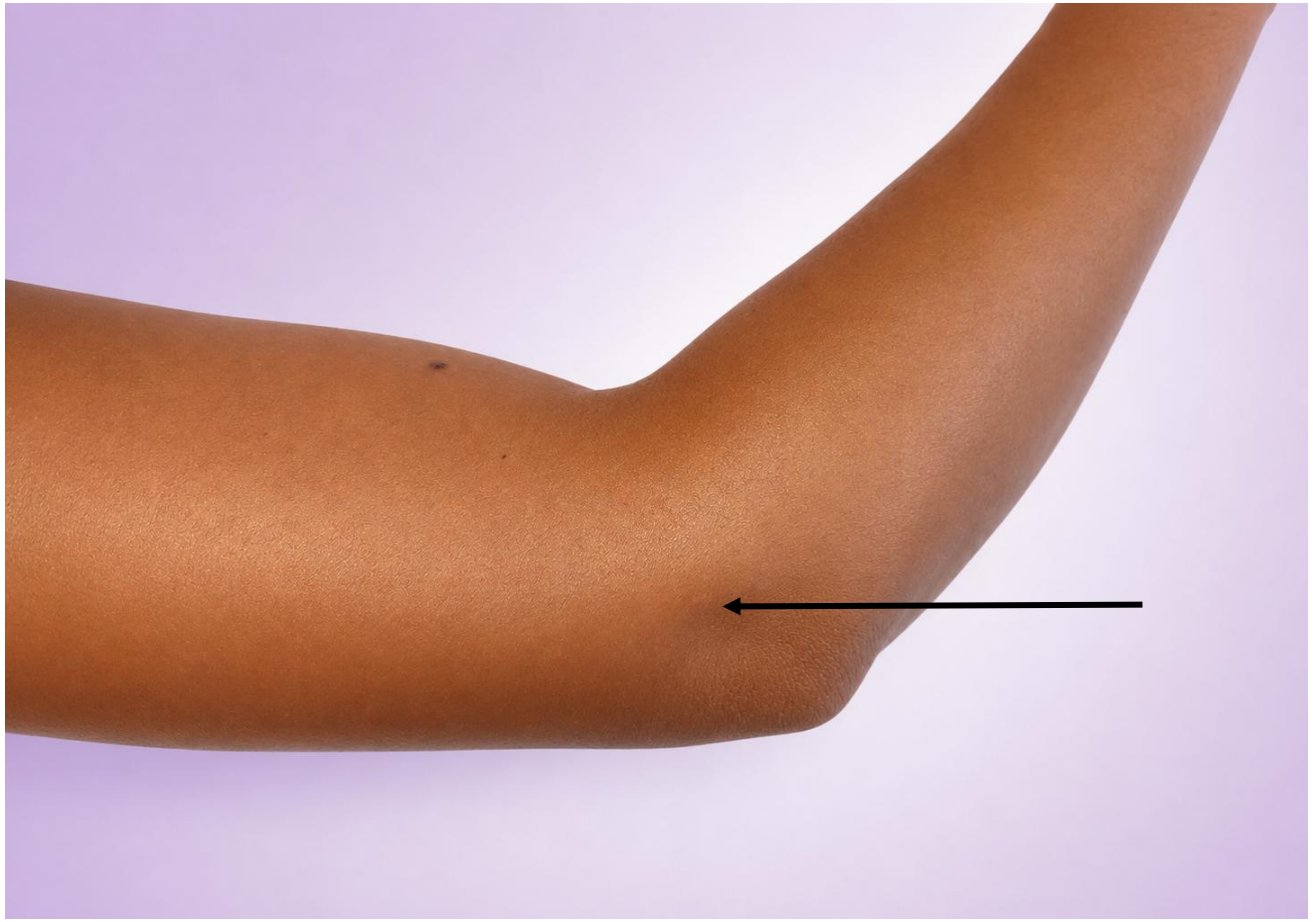
PALPATE AND LABEL



Medial epicondyle – the most outward bony projection on the medial (inner) aspect of the distal humerus

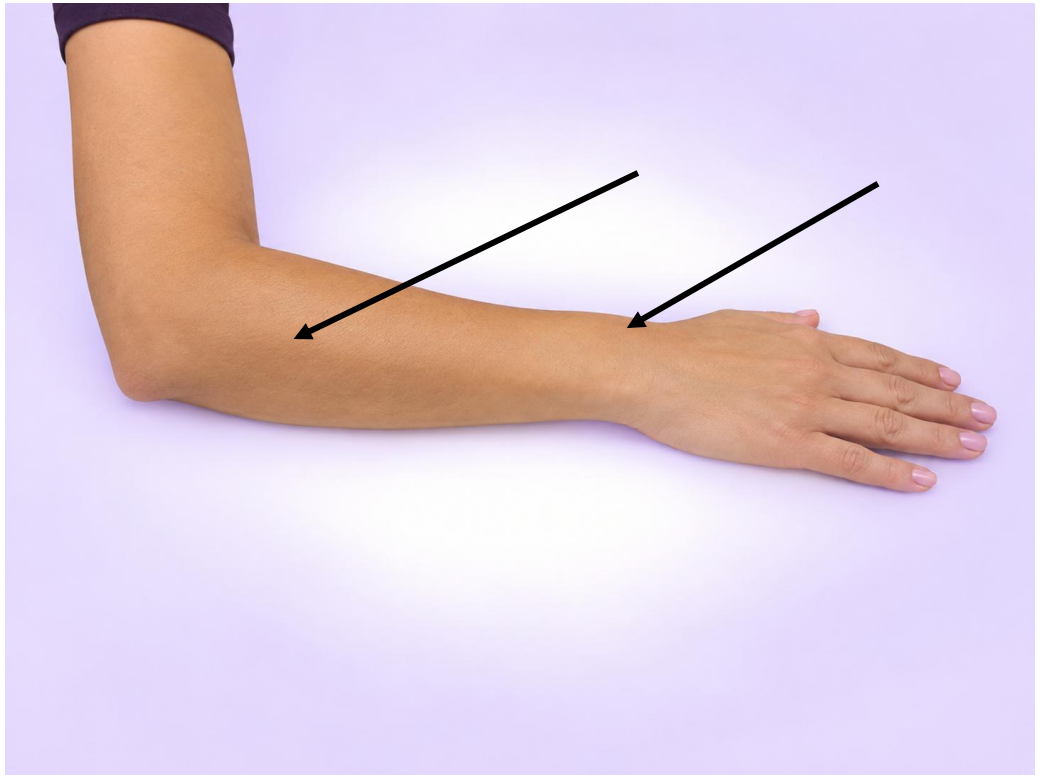
Cubital tunnel – the groove between the medial epicondyle and the olecranon; * Palpate very gently! *

PALPATE AND LABEL



Lateral epicondyle – the most outward bony projection on the lateral (outer) aspect of the distal humerus

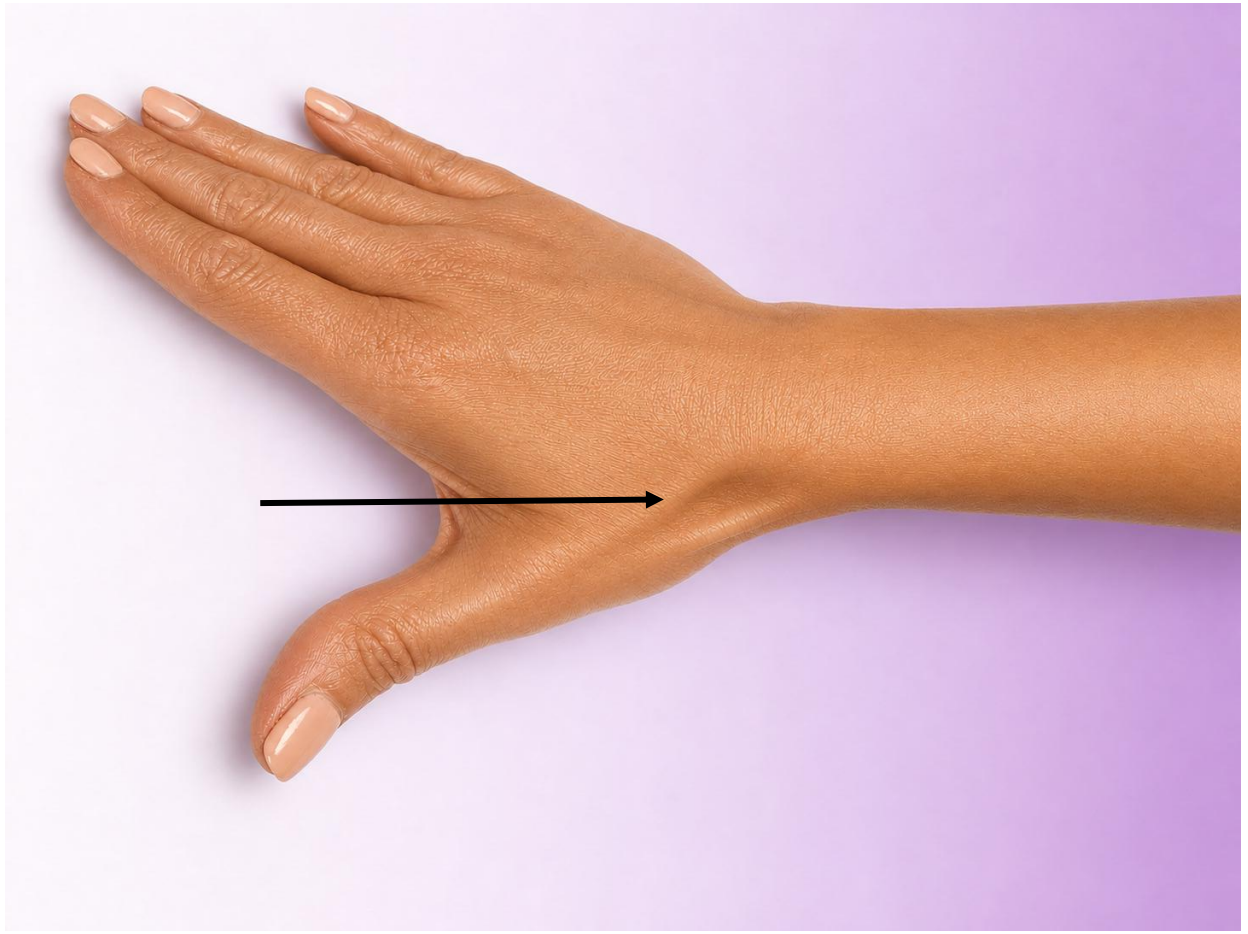
PALPATE AND LABEL



Radial tunnel – from the lateral epicondyle, measure roughly 3 fingers width (3-5 cm) distally over the extensor muscle mass

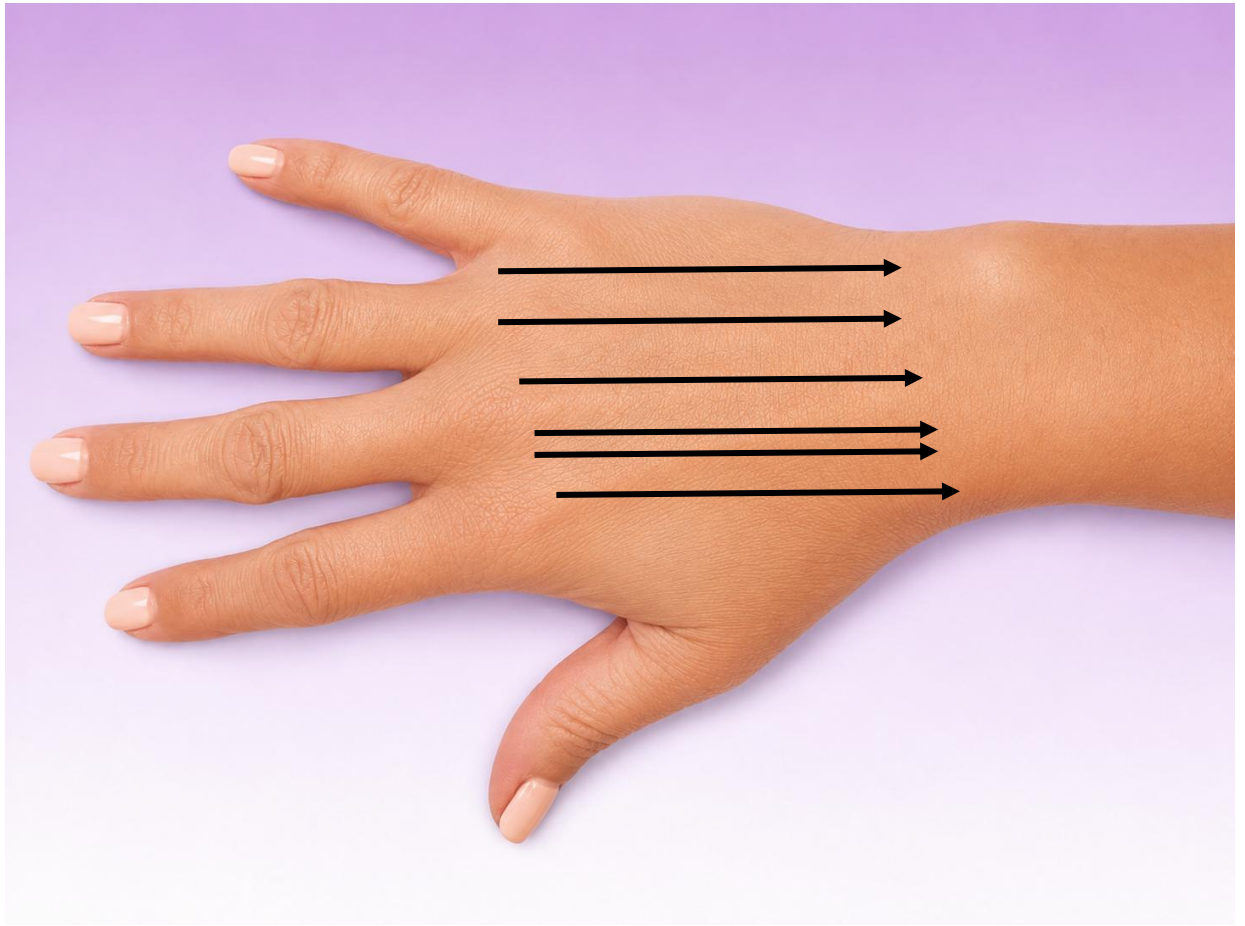
Radial styloid – with the forearm in neutral, slide your finger along the lateral aspect of the distal radius until you feel a prominent, bony projection at the end of the radius

PALPATE AND LABEL



Scaphoid – **Anatomical Snuffbox:** Found on the dorsal-radial side of the wrist, it is the triangular space that appears when you extend your thumb. Tenderness here is a classic sign of a scaphoid fracture.

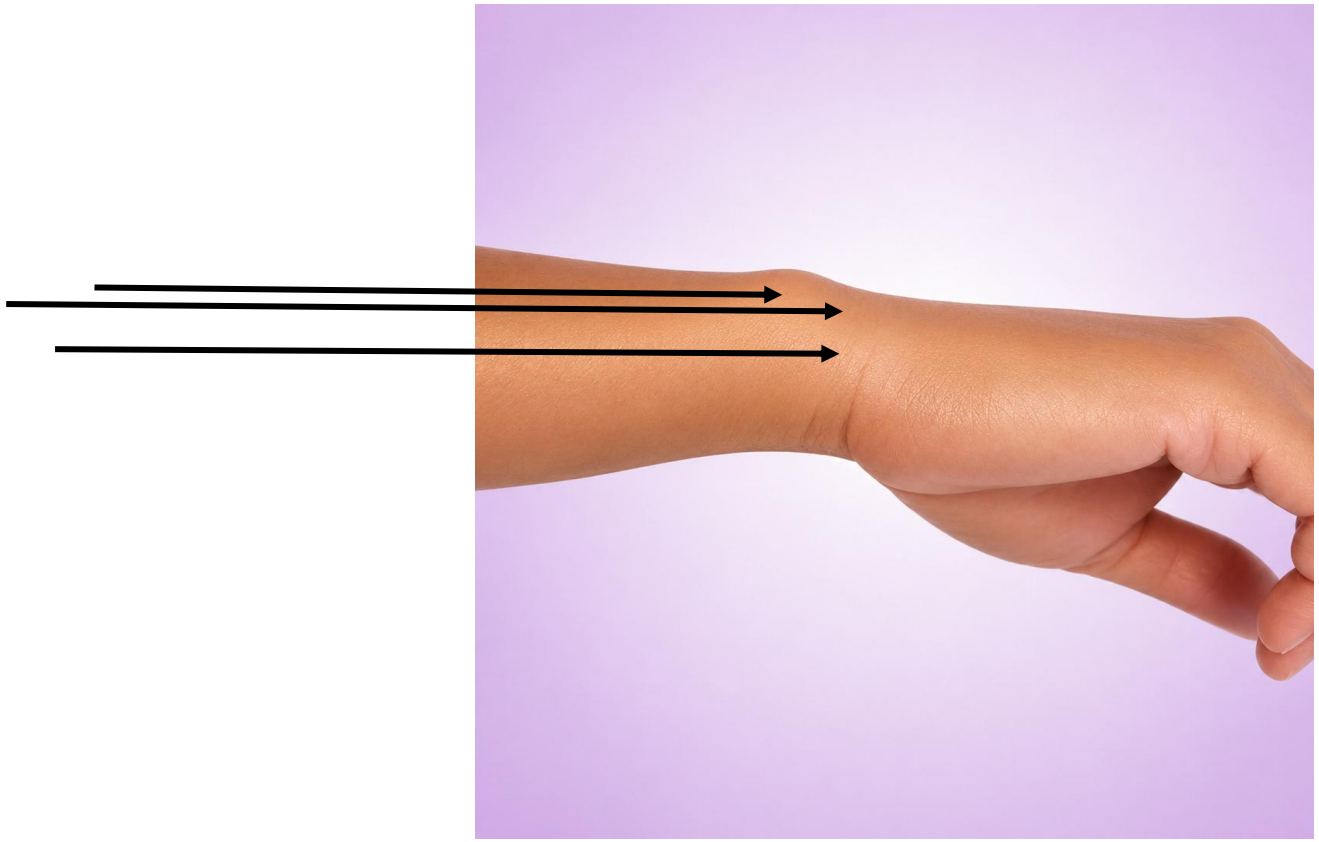
PALPATE AND LABEL



Dorsal compartments

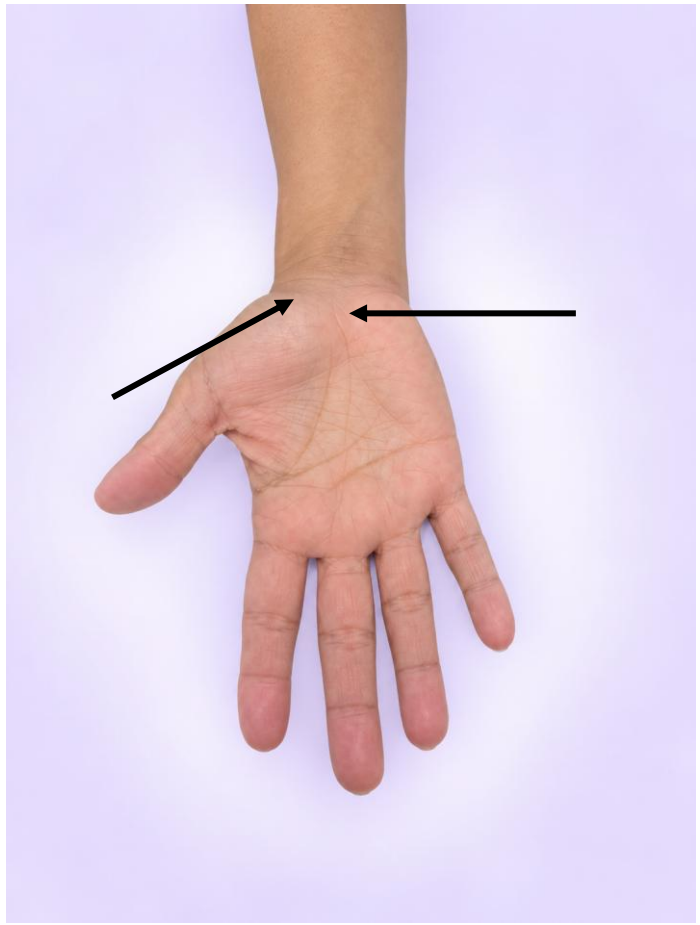
- 1st – EPB & APL
- 2nd – ECRL & ECRB
- 3rd – EPL
- 4th – EDC & EIP
- 5th – EDM
- 6th – ECU

PALPATE AND LABEL



Ulnar head – moving distally down the ulna, locate the prominent, rounded area on the posterior aspect of the wrist
Ulnar styloid – from the ulnar head, slide your finger distally until you feel a small, bony projection
Triangular Fibrocartilage Complex (TFCC) – with the forearm in pronation, locate the ulnar styloid and move your finger distally to find the soft spot (fovea) distal to the ulnar head

PALPATE AND LABEL



1st Carpometacarpal (CMC) Joint – at the distal palmar border of the anatomical snuffbox, locate the groove between the first metacarpal and the trapezium

Carpal tunnel – at the base of the hand where the thenar and hypothenar eminences come together

GONIOMETRY

Lecture and lab

*** Special thanks to Performance Health for providing goniometers ***

PRINCIPLES OF GONIOMETRY

Standardized positioning

Stabilize the proximal joint

Palpate the bony landmarks

Align the goniometer (fulcrum, stationary arm, moving arm)

Measure AROM or PROM

Elbow and Forearm	
Flexion	
Extension	
Supination	
Pronation	

PRACTICE ON A PARTNER

ELBOW EXTENSION

- Patient Position: seated or standing with arm hanging loosely at side
- Goniometer Placement
  - **Axis**: at the lateral epicondyle
  - **Stationary arm**: at the midline of the humerus
  - **Moving arm**: at the midline of the radius
- Measure: ask patient to straighten their arm as much as possible. Record measurements beyond 0 as hyperextension.





ELBOW FLEXION

- Patient Position: seated with upper arm resting on the table in supination (towel roll under distal humerus), or standing with arm at side
- Goniometer Placement
  - **Axis**: at the lateral epicondyle
  - **Stationary arm**: at the midline of the humerus
  - **Moving arm**: at the midline of the radius
- Measure: ask patient to bend their arm as much as possible.





FOREARM SUPINATION

- Patient Position: seated or standing with shoulder adducted, elbow flexed to 90 and forearm neutral. (Option to have patient hold a pen/pencil in a tightly closed fist to prevent the wrist and hand from compensating.)
- Goniometer Placement
  - **Axis**: just proximal to the ulnar styloid process on the volar "IN-side" aspect of the wrist
  - **Stationary arm**: perpendicular to the floor or humerus
  - **Moving arm**: across the volar aspect of the distal forearm
- Measure: ask patient to turn their hand into the palm up position





FOREARM PRONATION

- Patient Position: seated or standing with shoulder adducted, elbow flexed to 90 and forearm neutral. (Option to have patient hold a pen/pencil in a tightly closed fist to prevent the wrist and hand from compensating)
- Goniometer Placement
  - **Axis**: just proximal to the ulnar styloid process on the dorsal "outside" aspect of the wrist
  - **Stationary arm**: perpendicular to the floor or humerus
  - **Moving arm**: across the dorsal aspect of the distal forearm
- Measure: ask patient to turn their hand into the palm down position





Wrist	
Flexion	
Extension	
Radial deviation	
Ulnar deviation	

PRACTICE ON A PARTNER

WRIST EXTENSION

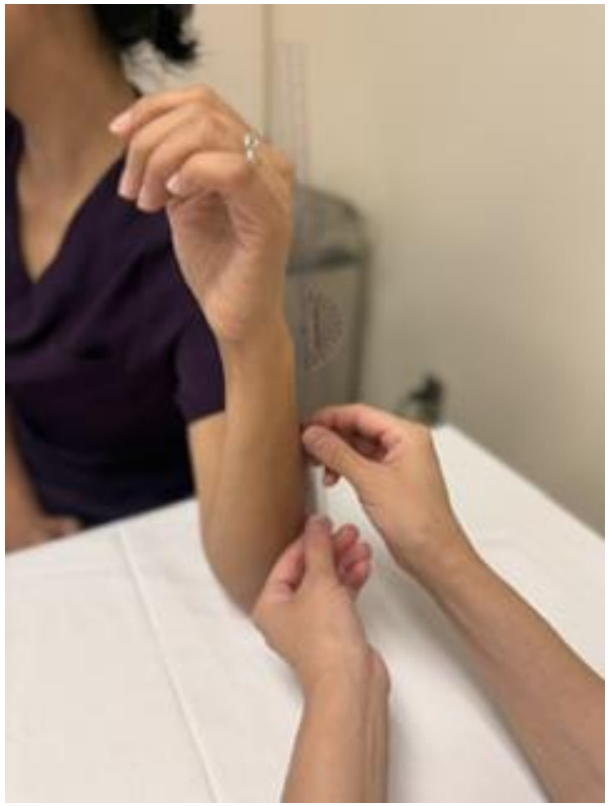
- Patient Position: Seated with elbow flexed to 90 and forearm resting on table in neutral
- Goniometer Placement
  - **Axis**: over the volar aspect of the wrist at the capitate
  - **Stationary arm**: parallel to the radius
  - **Moving arm**: parallel to the 3rd metacarpal
- Measure: Ask the patient to move their hand backward as far as possible





WRIST FLEXION

- Patient Position: Seated with elbow flexed to 90 degrees and forearm resting on table in neutral
- Goniometer Placement
  - **Axis**: over the dorsal aspect of the wrist at the capitate
  - **Stationary arm**: parallel to the radius
  - **Moving arm**: parallel to the 3rd metacarpal
- Measure: Ask the patient to bend their wrist forward as much as possible





WRIST RADIAL DEVIATION

- Patient Position: Seated with elbow flexed to 90 degrees and forearm resting on table in pronation
- Goniometer Placement
  - **Axis**: at base of the 3rd metacarpal, over the capitate
  - **Stationary arm**: midline of the forearm
  - **Moving arm**: midline of the 3rd metacarpal
- Measure: Ask patient to move their wrist as much as possible toward the thumb





WRIST ULNAR DEVIATION

- Patient Position: Seated with elbow flexed to 90 degrees and forearm resting on table in pronation
- Goniometer Placement
  - **Axis**: at base of the 3rd metacarpal, over the capitate
  - **Stationary arm**: midline of the forearm
  - **Moving arm**: midline of the 3rd metacarpal
- Measure: Ask patient to move their wrist as much as possible toward the small finger





Digits	
MP flexion / extension	
PIP flexion / extension	
DIP flexion / extension	

Thumb	
MP flexion / extension	
IP flexion / extension	
Palmar abduction	
Radial abduction	

PRACTICE ON A PARTNER

DIGIT MEASUREMENTS

- Patient Position: Seated with elbow flexed and resting on table
- Goniometer Placement
  - **Axis:** Center the axis/hinge of the goniometer directly over the dorsal (top) aspect of the specific joint being tested.
  - **Stationary arm:** Align this arm along the midline of the bone *above* (proximal to) the joint.
  - **Moving Arm:** Align this arm along the midline of the bone *below* (distal to) the joint.
- Measure: ask patient to either flex or extend their digits as much as possible



MCP



PIP



DIP

THUMB MEASUREMENTS

- MP, IP flexion and extension
- Patient Position:
- Goniometer Placement
  - **Axis**: Center the axis/hinge of the goniometer directly over the dorsal (top) aspect of the specific joint being tested.
  - **Stationary arm**: Align this arm along the midline of the bone *above* (proximal to) the joint.
  - **Moving arm**: Align this arm along the midline of the bone *below* (distal to) the joint.
- Measure: ask patient to either flex or extend their thumb as much as possible.



MCP



IP

THUMB MEASUREMENTS

- **Palmar abduction**
- Ulnar side of patient's hand is flat on the table. Patient abducts thumb in an "L" shape away from second metacarpal.
- Goniometer Placement
  - **Axis:** Center the axis/hinge of the goniometer directly over the CMC joint (near snuff box).
  - **Stationary arm:** Align this arm along the second metacarpal.
  - **Moving arm:** Align this arm along the midline of the first metacarpal.
- Measure: ask patient to move thumb away from index finger.



- **Radial abduction**
- Patient's hand is flat on the table, volar side down. Patient abducts thumb away from second finger as far as possible.
- Goniometer Placement
  - **Axis:** Center the axis/hinge of the goniometer directly over the CMC joint (near snuff box).
  - **Stationary arm:** Align this arm along the second metacarpal.
  - **Moving arm:** Align this arm along the midline of the first metacarpal.
- Measure: ask patient to mov e thumb away from index finger.



Elbow and Forearm	
Flexion	140
Extension	0
Supination	80
Pronation	80
Wrist	
Flexion	80
Extension	65
Radial deviation	20
Ulnar deviation	40

Digit extension/flexion	
MP	0 / 90
PIP	0 / 100
DIP	0/ 70
Thumb	
MP	0 /60
IP	0 / 80
Radial abduction	0 / 60
Palmar abduction	0 / 45

"NORMAL" ROM

PROVOCATIVE TESTS

Lecture and Lab

PROVOCATIVE TESTS

Physical maneuvers that place stress on a specific structure to reproduce symptoms

Used to rule in or rule out a diagnosis

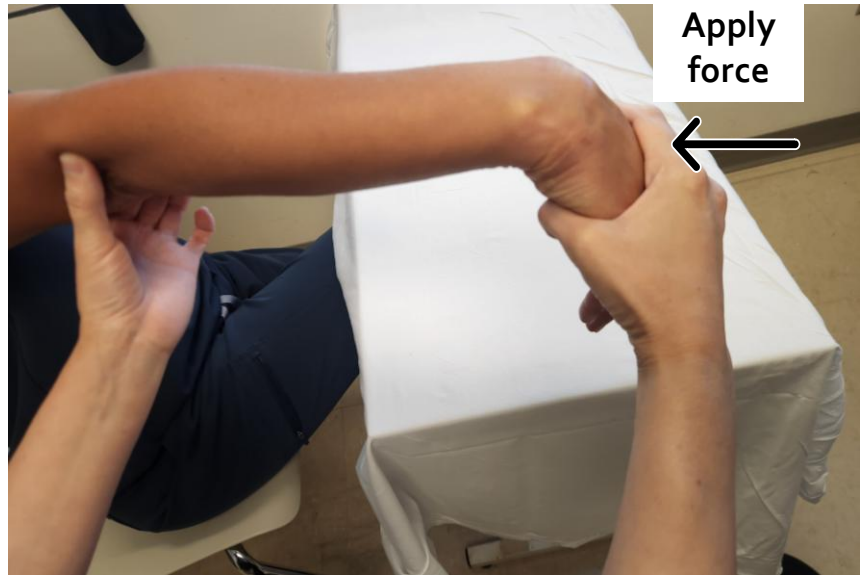
Used to localize source of injury or pain, assess severity of condition

Think about the anatomy behind the test to figure out why it may be indicated

LATERAL EPICONDYLITIS: MILL'S TEST

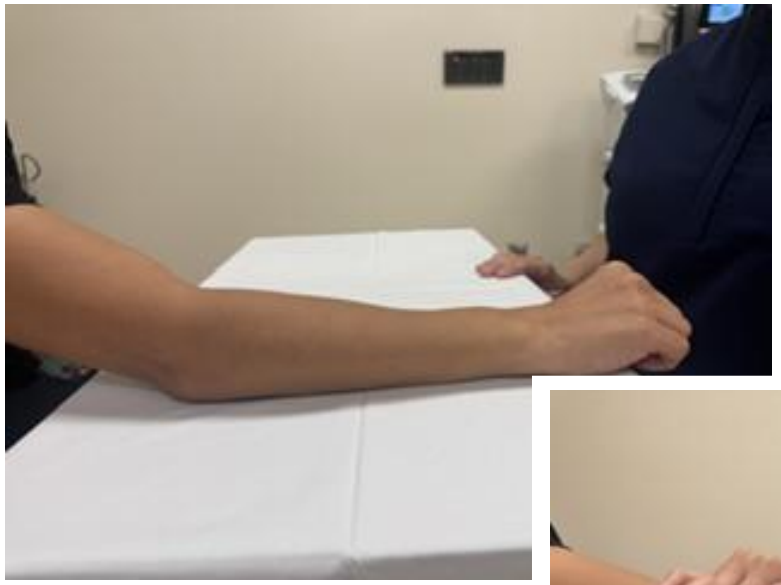
1. **Positioning:** Patient seated, clinician standing beside them.
2. **Stabilization:** Stabilize the forearm with one hand, placing a thumb on the lateral epicondyle.
3. **Maneuver:** Pass the arm through the following motions:
    - **Flex** the elbow to 90°.
    - **Pronate** the forearm.
    - **Flex** the wrist completely.
    - **Extend** the elbow fully.
4. **Result:** Considered positive if the patient feels sharp or familiar pain at the lateral epicondyle.

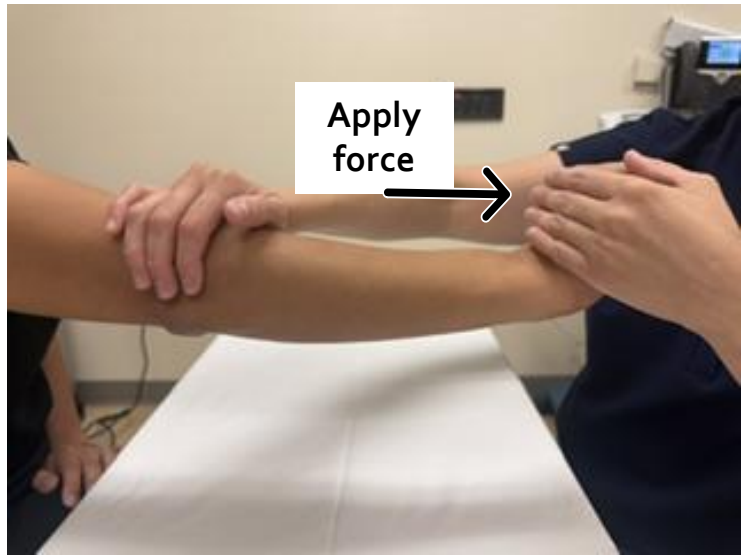




LATERAL EPICONDYLITIS: COZEN'S TEST

1. **Positioning:** Patient seated with arm supported on the table with elbow extended, forearm pronated and wrist in slight radial deviation.
2. **Palpation :** Over the lateral epicondyle.
3. **Maneuver:** Patient makes a fist and extends the wrist against resistance applied by the clinician.
4. **Result:** Considered positive if the patient feels sharp or familiar pain at the lateral epicondyle.



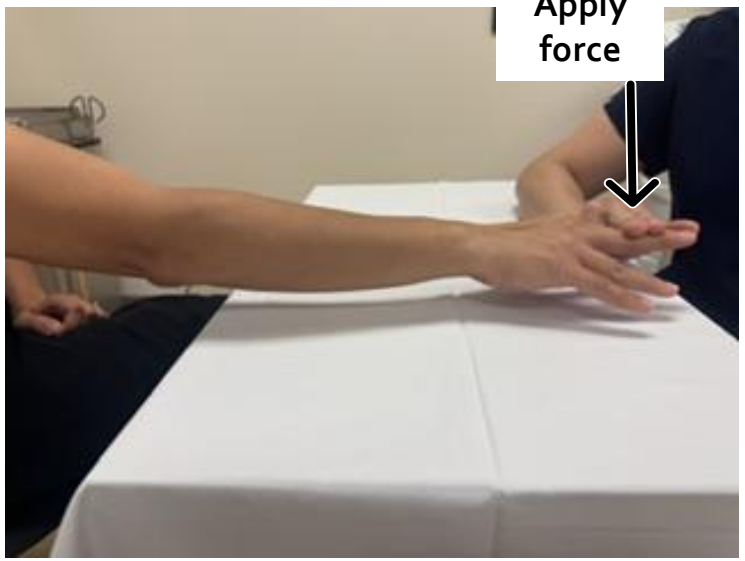


LATERAL EPICONDYLITIS: MAUDSLEY'S TEST

1. **Positioning:** Patient seated with elbow extended and forearm in pronation.
2. **Maneuver:** Patient extends the middle finger and attempts to lift it off the table while examiner applies resistance to the middle finger.
3. **Result:** Considered positive if the patient feels sharp or familiar pain at the lateral epicondyle.

* Differential diagnosis: radial tunnel syndrome with achiness, fatigue, or burning felt at radial tunnel.





MEDIAL EPICONDYLITIS: REVERSE COZEN'S TEST

1. **Positioning:** Patient seated with elbow in flexion (approximately 90°), forearm in supination and wrist in slight ulnar deviation.
2. **Palpation:** Over the medial epicondyle.
3. **Maneuver:** Patient makes a fist and flexes the wrist against resistance applied by the clinician.
4. **Result:** Considered positive if the patient feels sharp or familiar pain at the medial epicondyle.





DE QUERVAIN'S: EICHOFF'S TEST

1. **Positioning:** Patient seated with forearm in neutral.
2. **Maneuver:** Patient bends the thumb into the palm, closes the fingers tightly over it to make a fist, and then moves the wrist into ulnar deviation.
3. **Result:** Considered positive if the patient feels pain along the radial side of the wrist (1st dorsal compartment).





* Often referred to as Finkelstein's

Differential diagnoses:

- CMC arthritis
- Scaphoid fracture

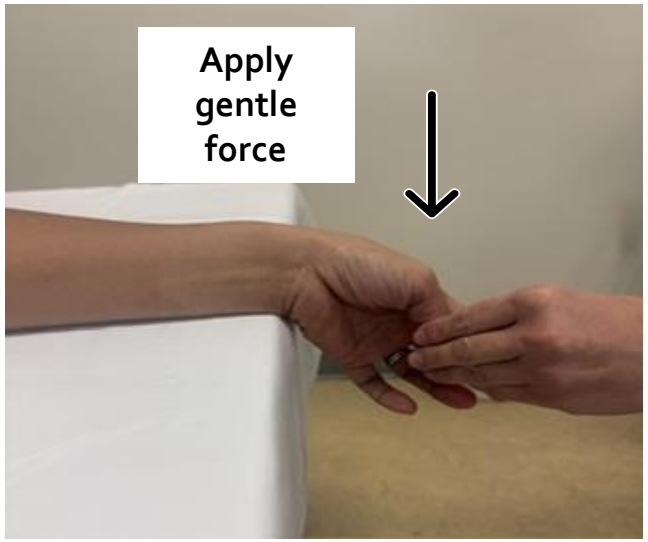
DE QUERVAIN'S: FINKELSTEIN'S TEST

1. **Positioning:** Patient seated with forearm in neutral and hand hanging off the edge of the table.
2. **Maneuver:** Done in a step-wise sequence:
   - Patient actively moves the wrist into ulnar deviation.
   - If no pain occurs in Step 1, the examiner then applies gentle **passive** ulnar deviation.
   - If no pain occurs in Step 2, the examiner then **passively** bends the thumb across the palm.
3. **Result:** Considered positive if the patient feels sharp, localized pain over the radial side of the wrist (1st dorsal compartment).

* Differential diagnoses:

- CMC arthritis
- Scaphoid fracture





TFCC: TFCC LOAD TEST

1. **Positioning:** The patient is seated, elbow on table, arm pointed toward ceiling, and the clinician stands beside them.
2. **Stabilization:** The clinician stabilizes the patient's forearm with one hand near the wrist.
3. **Maneuver:** The clinician applies a gentle push (axial load) to the ulnar side of the wrist, moves the wrist into ulnar deviation and rotation.
4. **Result:** The test is considered positive if the patient feels pain, grinding, or a clicking sensation.

* Differential diagnoses:

ECU tendinitis

DRUJ instability



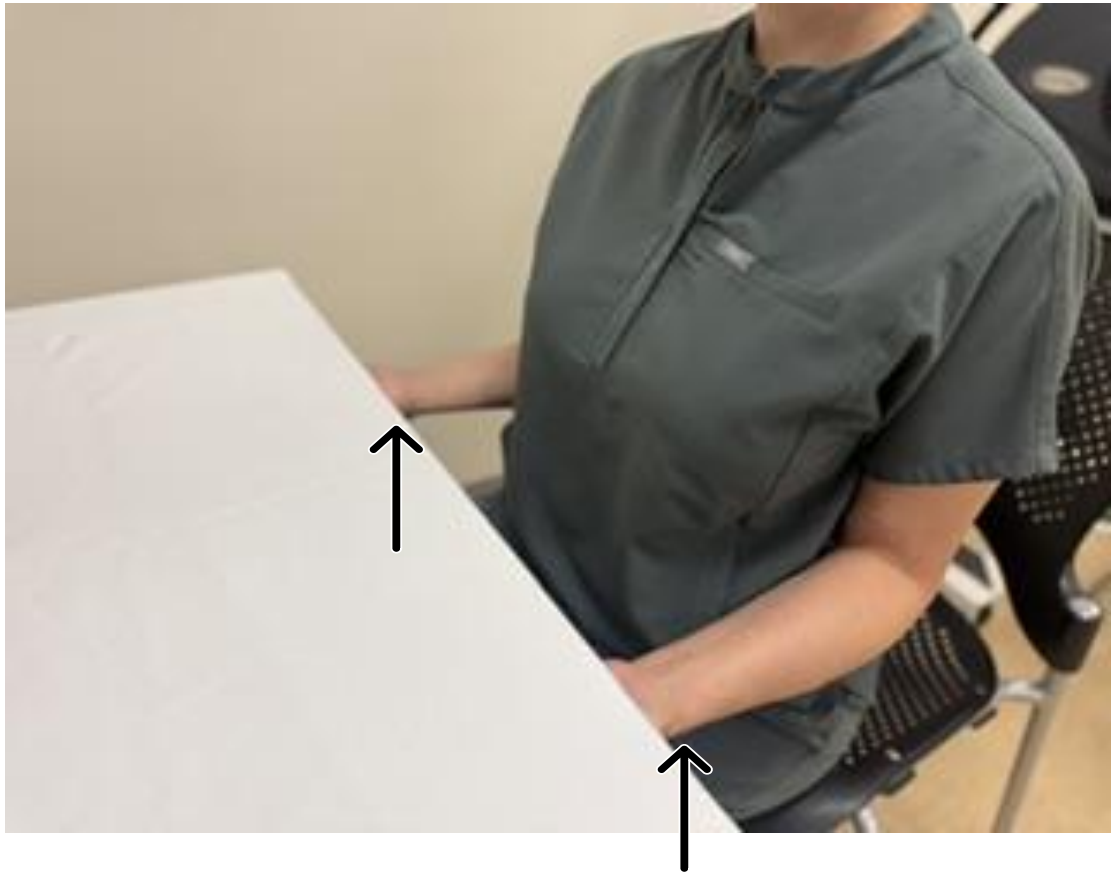


TFCC, DRUJ INSTABILITY: SUPINATION LIFT OFF TEST

1. **Positioning:** The patient is seated, hands supinated under the table in front of them, elbows at 90°.
2. **Stabilization:** Patient is seated.
3. **Maneuver:** Patient pushes upwards against the bottom of an immovable table, as if trying to lift it.
4. **Result:** The test is considered positive if pain is concentrated on the ulnar side of the wrist, or if there is a clicking sound or sensation, or noticeable weakness while lifting.

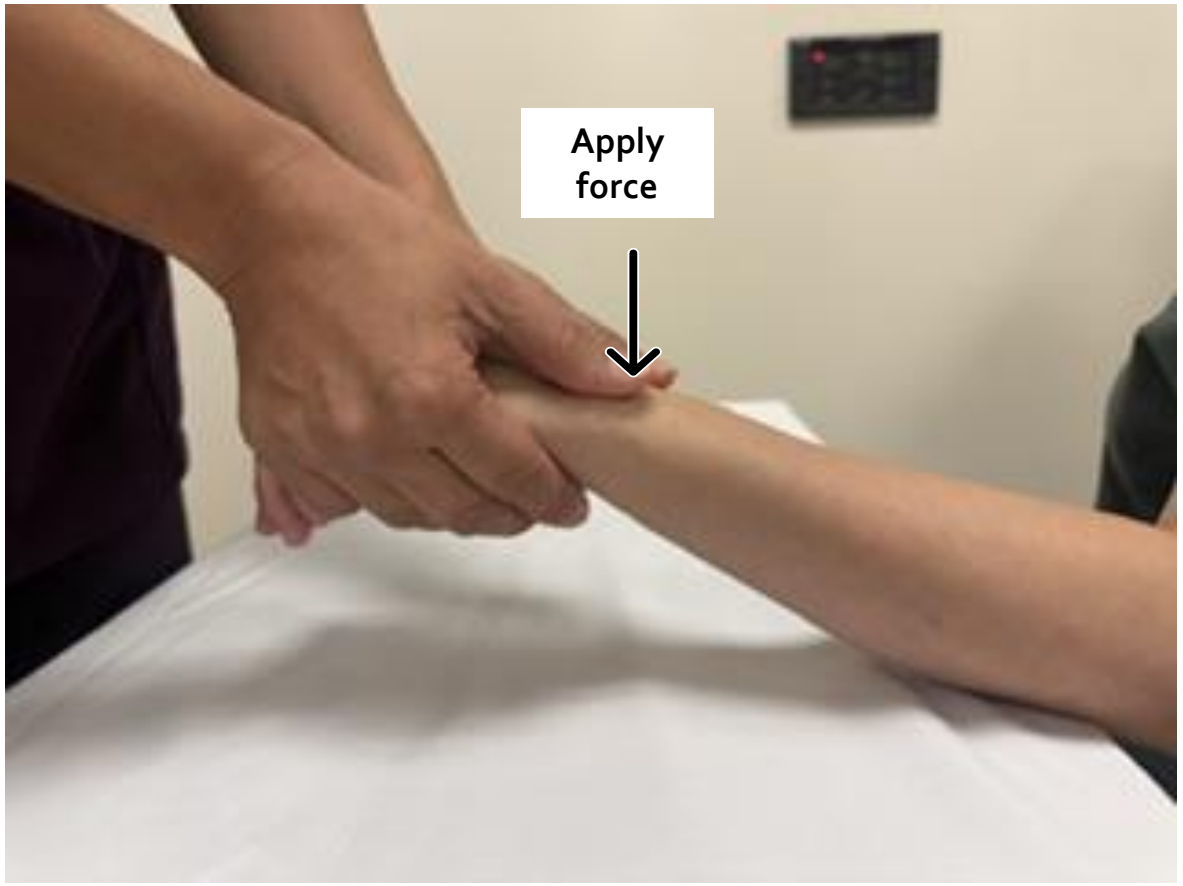
* Differential diagnoses:

ECU tendinitis



TFCC, DRUJ INSTABILITY: PIANO KEYS TEST

1. **Positioning:** The patient is seated, pronated arm supported by table, and the clinician in front of them.
2. **Stabilization:** The clinician stabilizes the patient's radius and hand with one hand.
3. **Maneuver:** The clinician uses thumb and index of other hand to grasp head of ulna. Push down the distal ulna in a palmar/dorsal direction.
4. **Result:** The test is considered positive if excessive laxity, or a springing rebound is observed.



TENDINITIS: RESISTED ECU, ECRL

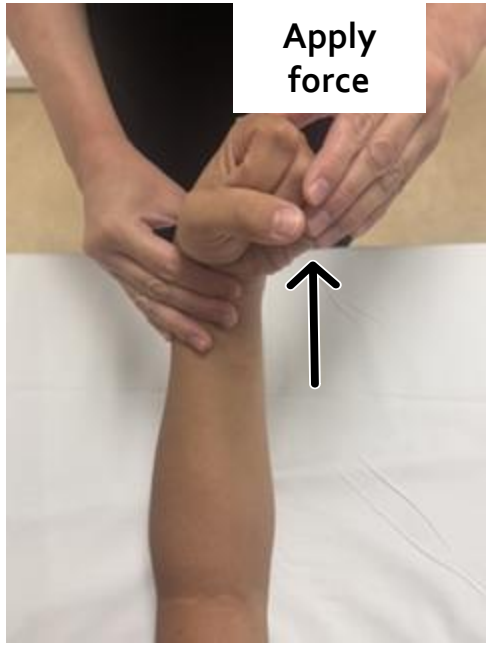
1. **Positioning:** The patient is seated, pronated arm supported by table, loose fist in wrist extension and the clinician in front of them.
2. **Stabilization:** The clinician stabilizes the patient's forearm near the wrist with one hand.
3. **Maneuver:** The clinician uses the other hand to apply flexion pressure ulnarly (ECU) or radially (ECRL) while the patient resists.
4. **Result:** The test is considered positive if there is pain ulnarly (ECU) or radially (ECRL)

- Apply direct flexion pressure to assess ECRB
- Apply flexion pressure with digits extended to assess EDC



TENDINITIS: RESISTED FCR, FCU

1. **Positioning:** The patient is seated, supinated arm supported by table, loose fist in wrist flexion and the clinician in front of them.
2. **Stabilization:** The clinician stabilizes the patient's forearm near the wrist with one hand.
3. **Maneuver:** The clinician uses the other hand to apply flexion pressure ulnarly (FCU) or radially (FCR) while the patient resists.
4. **Result:** The test is considered positive if there is pain ulnarly (FCU) or radially (FCR)



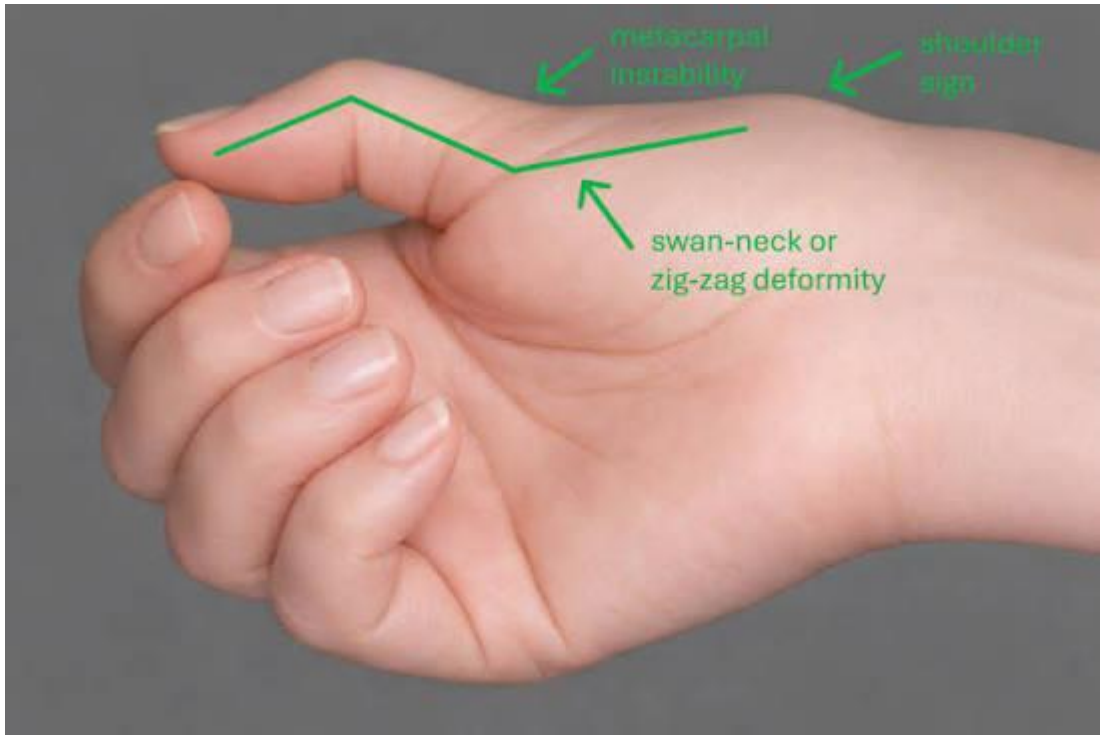


CMC ARTHRITIS: GRIND TEST

1. **Positioning:** The patient is seated, the clinician in front of them.
2. **Stabilization:** The clinician stabilizes the patient's hand and wrist with one hand.
3. **Maneuver:** The clinician uses the other hand to grasp the first metacarpal and apply gentle, downward pressure into the joint (axial load), and rotate or circumduct the thumb.
4. **Result:** The test is considered positive if there is pain or crepitus.



CMC ARTHRITIS: SHOULDER SIGN (OBSERVATION)



NEURAL: SCRATCH COLLAPSE

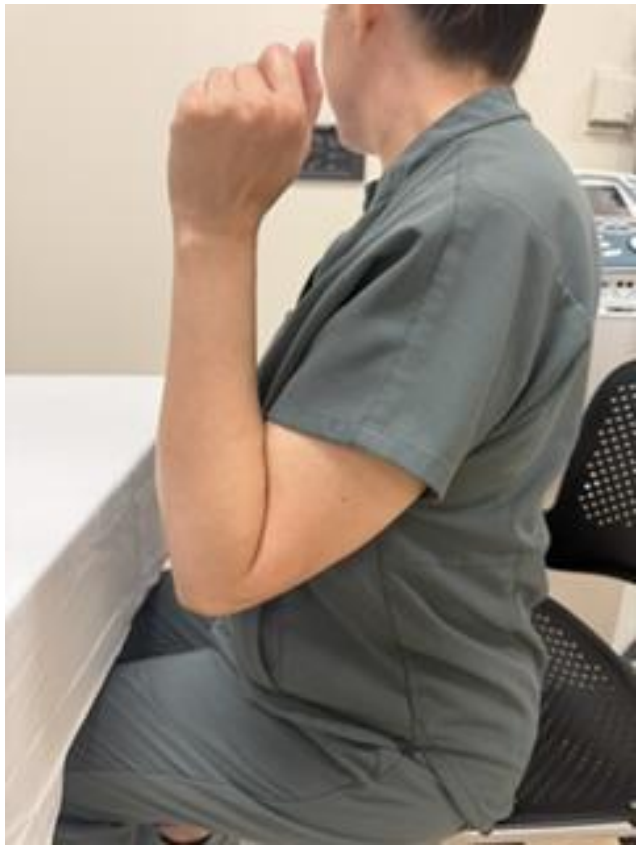
1. **Positioning:** The patient is seated or standing, arms at their sides, elbows bent at 90°, the clinician in front of them.
2. **Baseline:** Clinician applies at internal rotation force while the patient resists with external rotation.
3. **Maneuver:** Clinician lightly scratches the skin over suspected nerve site (carpal tunnel, cubital tunnel, radial tunnel) and immediately re-applies internal rotation force to test strength.
4. **Result:** A sudden, temporary loss of resistance indicates a positive test.





NEURAL: CUBITAL TUNNEL ELBOW FLEXION TEST

1. **Positioning:** The patient is seated or standing, arms at their sides.
2. **Maneuver:** Patient fully flexes elbows (wrists and digits in neutral) with clinician timing up to 6o seconds.
3. **Result:** Result is positive as soon as patient starts feeling numbness or tingling in volar SF, RF. (Record time)



NEURAL: CUBITAL TUNNEL TINEL'S

1. **Positioning:** The patient sits with the arm supported and the elbow slightly bent.
2. **Maneuver:** The clinician uses two fingers or a reflex hammer to lightly tap 4 to 6 times over the ulnar nerve (directly in the groove behind the medial epicondyle).
3. **Result:** The test is positive if tapping reproduces familiar symptoms like tingling, a "pins and needles" sensation, numbness, or a mild electric shock.



NEURAL: CARPAL TUNNEL PHALEN'S

1. **Positioning:** Sitting or standing
2. **Maneuver:** Have person place the back of their hands (dorsal side) together. Hold position for up to 60 seconds.
3. **Result:** The test is positive as soon as patient feels any tingling, numbness, or burning in thumb, index, middle, or radial half of ring finger. (Record time)



NEURAL: CARPAL TUNNEL TINEL'S

1. **Positioning:** Sit comfortably with the forearm resting on a table or treatment bench and the palm turned up.
2. **Maneuver:** Use two fingers to gently or firmly tap over the median nerve at the volar (inner) side of the wrist, right at the carpal tunnel area just above the wrist crease, for up to 6o seconds.
3. **Result:** The test is positive if patient feels a tingling, "pins and needles," or a brief electric shock sensation in their thumb, index finger, middle finger, and radial half of the ring finger.



NEURAL: CARPAL TUNNEL BERGER'S

1. **Positioning:** Patient is sitting or standing with arm relaxed.
2. **Maneuver:** Squeeze hand into a tight fist, hold a full fist, keeping wrist in neutral, for up to 60 seconds.
3. **Result:** The test is positive if patient feels a tingling, "pins and needles," or a brief electric shock sensation in their thumb, index finger, middle finger, and radial half of the ring finger. (Record time)



COMMON ORTHOSES

For your reference

PURPOSE

- What are you trying to achieve with your orthosis?
  - Immobilization/restriction
  - Functional positioning/support
  - Mobilization
  - Stretch

ELBOW IMMOBILIZATION

- What does it do?
  - **Immobilization/restriction**: stops the elbow joint from moving to protect healing bones, ligaments, and tendons after an injury or surgery.
- What condition(s) would it help?
  - Elbow fractures, dislocations and instability
  - Severe sprains and strains: High grade tears of elbows supporting ligaments (like Ulnar collateral ligament or UCL) need structural rest to heal without permanent looseness
  - After elbow arthroplasty
  - Ulnar nerve neuropathy at cubital tunnel





COUNTERFORCE STRAP

- What does it do?
  - Supportive band worn around proximal aspect of FA just distal to elbow to reduce tension and pain on irritated tendons
  - Redistributes force reducing localized stress
- What condition(s) would it help?
  - Tennis elbow
  - Golfers elbow



WRIST COCK UP

- What does it do?
  - **Immobilization and Support:** Keeps the wrist steady to protect injured ligaments, tendons, and bones.
  - **Pain and Pressure Relief:** Reduces stress on the median nerve in the carpal tunnel and lessens strain from repetitive movements.
  - **Preventing Deformity:** Stops the wrist from dropping or forming contractures after nerve or muscle injuries.
  - **Maintaining Function:** Allows you to use your fingers and hands for daily activities while the wrist heals.
- What condition(s) would it help?
  - Carpal tunnel syndrome (median nerve)
  - Tendonitis and strains: tennis/golfer's elbow
  - Post injury recovery: Distal radius fracture
  - Neurological conditions: Wrist drop (radial nerve)





LONG THUMB SPICA

- What does it do?
  - **Immobilization/restriction**: stabilizes the thumb and wrist while letting fingers move freely
  - **Functional positioning and support**: supports CMC by positioning it in place

- What condition(s) would it help?
  - Skier's or Gamekeepers thumb
  - De Quervain's tenosynovitis
  - Fractures
  - CMC arthritis





SHORT THUMB SPICA

- What does it do?
  - **Immobilization/restriction**: stabilizes the thumb and wrist while letting fingers move freely
  - **Functional positioning and suppor**t: supports CMC by positioning it in place

- What condition(s) would it help?
  - Skier's or Gamekeepers thumb
  - De Quervain's tenosynovitis
  - Fractures
  - CMC arthritis



WRIST WIDGET

- What does it do?
  - **Immobilization/restriction**: stabilizes the radius and ulna bones to prevent them from spreading apart, allowing the TFCC tear to heal naturally without surgery
- What condition(s) would it help?
  - Ulnar sided wrist pain
  - TFCC tear
  - ECU subluxation or tendonitis
  - Distal radioulnar joint (DRUJ) instability



DORSAL BLOCKING ORTHOSIS

- What does it do?
  - **Immobilization/restriction**: A dorsal blocking orthosis is a specialized medical brace custom-molded to the back (dorsal side) of the forearm, wrist, and hand. Its primary purpose is to "block" the wrist and fingers from straightening or extending backward, keeping the hand in a safe, slightly flexed position.
- What condition(s) would it help?
  - Flexor tendon injuries
  - Digital nerve repairs





COMFY HAND RESTING SPLINT

- What does it do?
  - Contracture management
  - Helps manage spasticity and control involuntary muscle contractions
  - Minimize stress on inflamed joints from RA or OA helping with pain and further deformities
  - Features removable finger separators and antimicrobial covers to prevent moisture buildup and skin irritation in contracted hands
- What condition(s) would it help?
  - CVA/TBI induced flexor pattern
  - RA/OA



RELATIVE MOTION ORTHOSIS (YOKE SPLINT)

- What does it do?
  - Small, finger-based device that positions one or more fingers in slight flexion or extension relative to the adjacent fingers
- What condition (s) would it help?
  - Extensor tendon repairs
  - PIP Joint contractures and stiffness
  - Boutonniere and sagittal band ruptures
  - Nerve injuries





ULNAR NERVE ANTI-CLAW SPLINT

- What does it do?
  - Used to prevent small and ring MCP hyperextension, forcing PIPs into extension, and restoring functional grip
- What condition(s) would it help?
  - Ulnar nerve injury/palsy or claw hand deformity





ANTI-ULNAR DRIFT SPLINT

- What does it do?
  - Realign fingers that drift toward the pinky side and to support the MCPs at the base of the fingers
  - Provides gentle warmth and stabilization to reduce stress and discomfort during daily activities
- What condition(s) would it help?
  - Rheumatoid arthritis



ULNAR GUTTER

- What does it do?
  - Used to immobilize, support and heal injuries to the 4th and 5th digits
- What condition(s) would it help?
  - Boxers fractures (5th digit metacarpal neck fx)
  - Metacarpal and phalangeal fractures of 4th and 5th digits
  - Severe soft tissue injuries: significant sprains, torn collateral ligaments, or tendon injuries affecting 4th and 5th digits





RADIAL GUTTER

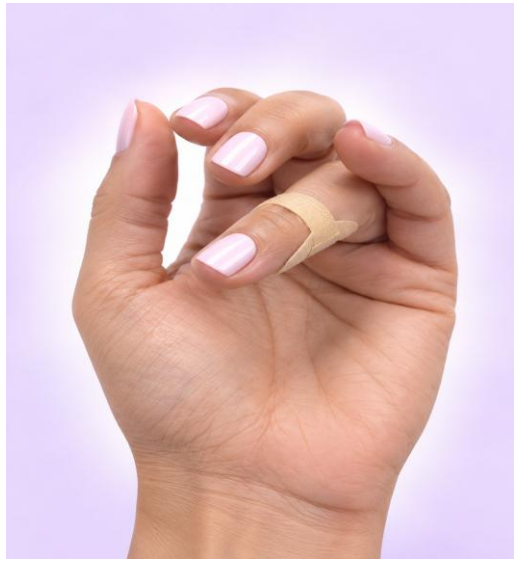
- What does it do?
  - Immobilize and support injuries to 2nd and 3rd digits, as well as corresponding MC bones in hand
- What condition(s) would it help?
  - Fractures of 2nd, 3rd MC or phalanges
  - Ligament injuries: treating severe sprains, tears, or instability in the joint of 2nd and 3rd phalanges





OVAL-8

- What does it do?
  - Used to stabilize, align, and support PIP joint without messy tape or straps
- What condition(s) would it help?
  - Mallet finger
  - Swan neck deformity
  - Boutonniere deformity
  - Trigger finger/thumb
  - Hypermobility
  - Arthritis and fractures







MALLET SPLINT

- What does it do?
  - Used to hold the end joint of a finger completely straight or in slight hyperextension so a torn or stretched tendon can heal

- What condition(s) would it help?
  - Mallet finger
  - Avulsion fractures
  - General stabilization








PIP BLOCK

- What does it do?
  - Orthosis that intentionally restricts or eliminates movement at (PIP) middle joint
- What condition(s) would it help?
  - Trigger finger
  - Tendon repair protection: like a central slip injury





MCP PADDLE

- What does it do?
  - Blocks MCP to redirect force further up the finger
  - Mobilize stiff PIP joints
  - Prevents hyperextension of MCPs
  - Alternate trigger finger management
- What condition(s) would it help?
  - Swan neck deformity
  - Trigger finger
  - Finger fracture
  - Tendon laceration





Q&A

THANK YOU