

CHAPTER 5

THE WRIST AND HAND



OBJECTIVES

- List the bones of the wrist and hand and the significant anatomical landmarks for attachment
- Identify the joints formed as a result of the ligamentous structures that join the bones together
- Explain the movements possible by the wrist, fingers and thumb
- Identify the muscles originating within (intrinsic) the wrist, hand and thumb involved in movement
- Identify the muscles originating outside of (extrinsic) the wrist, hand and thumb involved in movement

WRIST & HAND

- Many sports require precise functioning of wrist and hand.
- Archery, bowling, golf, baseball, tennis, basketball, volleyball, etc.
- Joint actions

- Flexion, extension, abduction, adduction, opposition reposition

29 bones (including radius and ulna)

8 carpals, 5 metacarpals, 14 phalanges

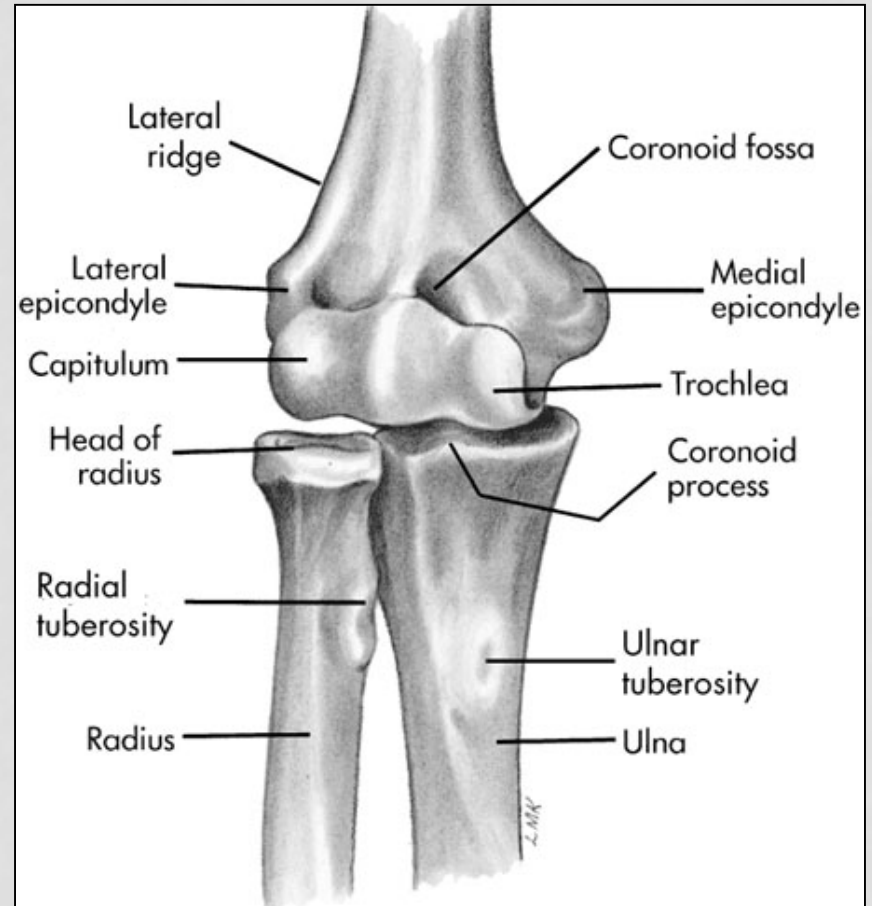
25 joints

30 muscles

18 intrinsic

BONES

- Medial epicondyle, medial condyloid ridge, & coronoid process - origin for many wrist & finger flexors
- Lateral epicondyle & lateral supracondylar ridge - origin for many wrist & finger extensors

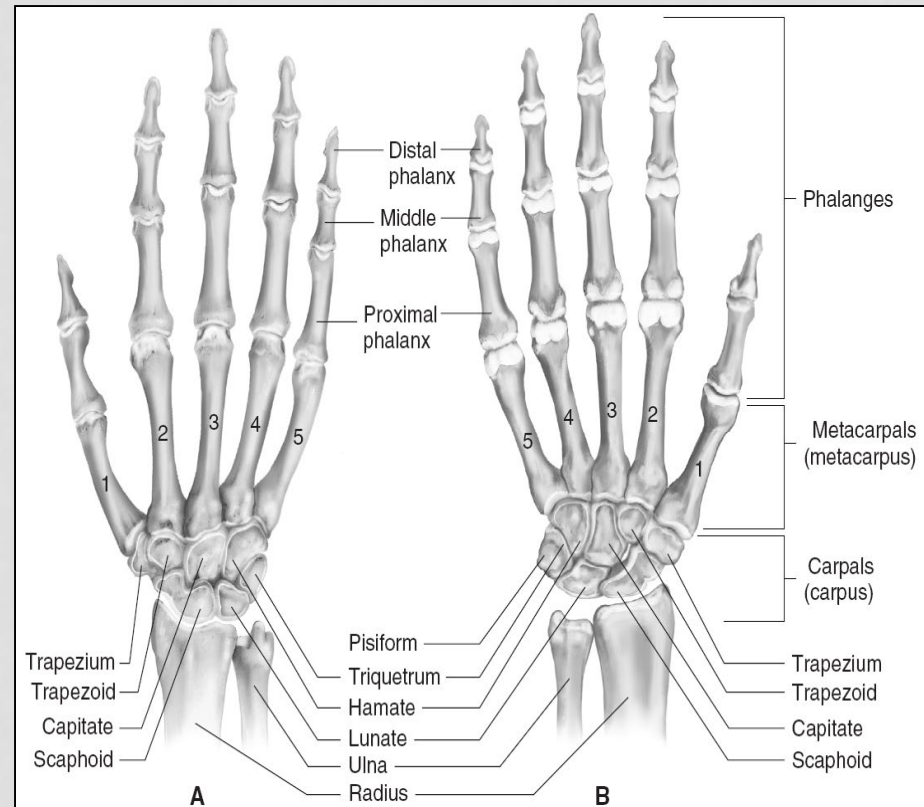


CARPALS

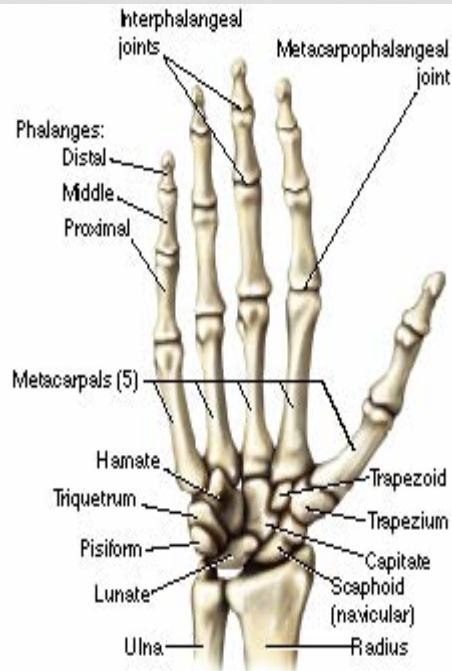
Eight carpal bones

- scaphoid (boat-shaped) or navicular

Scaphoid most often injured
From falling on
outstretched hand
Often dismissed as a
sprain. Significant
problem if not recognized
& treated properly.
Usually long period of
precise immobilization or
surgery



BONES OF THE HAND



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

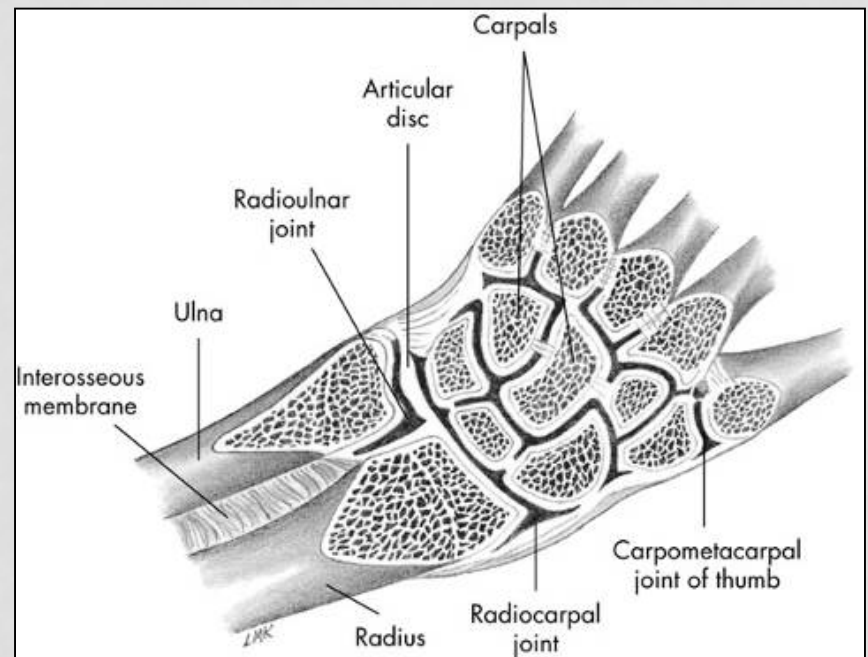


From *Kinetic Anatomy, Second Edition*, by Robert S. Behnke, 2006, Champaign, IL: Human Kinetics.

Carpals, Metacarpals, Phalanges

JOINTS

- Wrist joint
 - condyloid-type joint
 - allows flexion, extension, abduction, & adduction
 - motion occurs primarily between distal radius & proximal carpal row (scaphoid, lunate, & triquetrum)
 - known as radiocarpal jt.

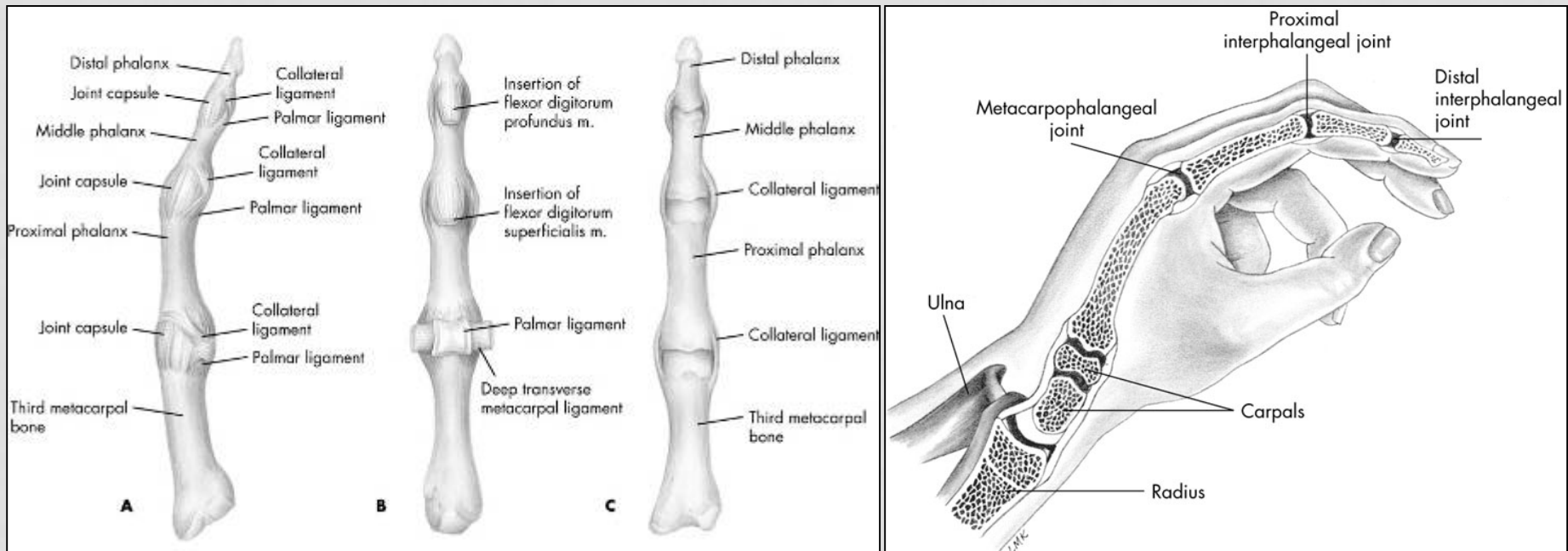


JOINTS

- Radioulnar
- Radiocarpals
- Midcarpals
- Intercarpals
- Carpometacarpals - CMC
- Metacarpalphalangeal - MCP
- Interphalangeal – IP, DIP. PIP

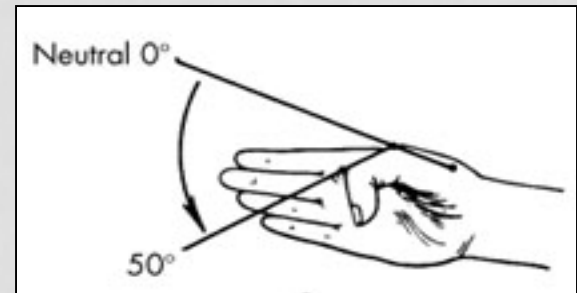
JOINTS

- Each finger has 3 joints
 - Metacarpophalangeal (MCP) joints
 - Proximal interphalangeal (PIP) joints
 - Distal interphalangeal (DIP) joints



JOINTS

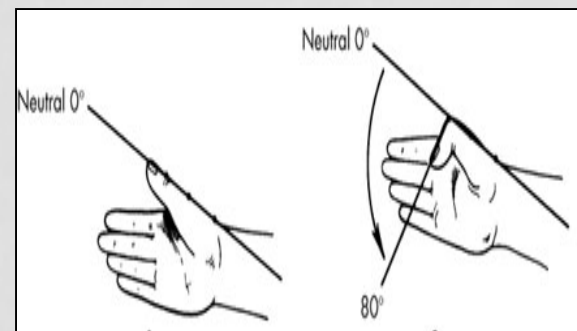
- Thumb has 2 joints
 - Metacarpophalangeal (MCP) joint
- Full extension into 40 to 90 degrees of flexion
 - Ginglymus



Interphalangeal (IP) joint

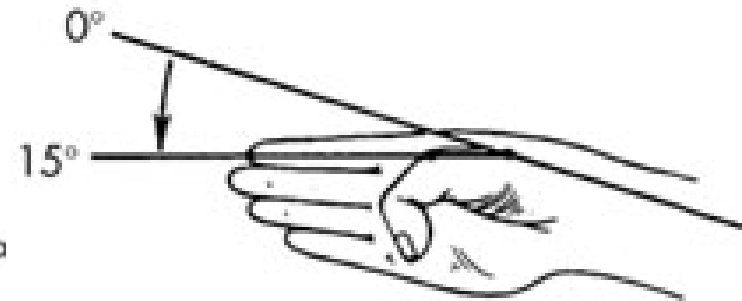
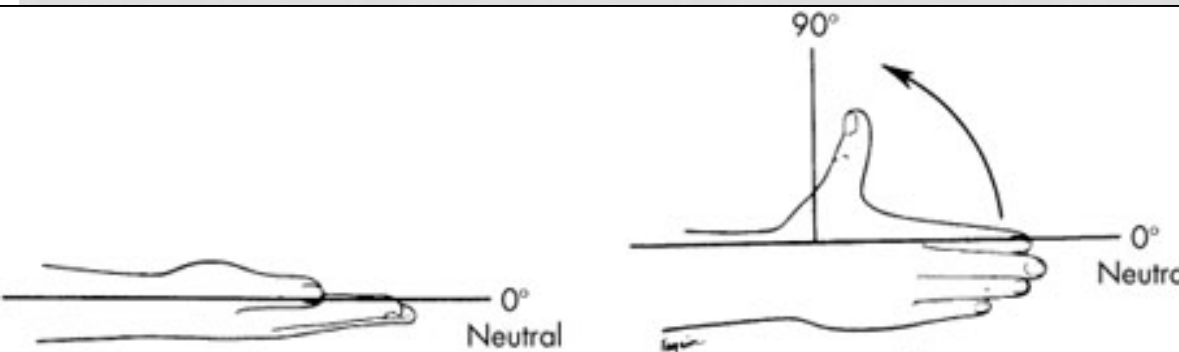
Flex 80 to 90 degrees

Ginglymus



JOINTS

- Thumb has 2 joints
 - Carpometacarpal (CMC) joint of thumb
 - Unique saddle-type joint
 - 50 to 70 degrees of abduction
 - Flex 15 to 45 degrees & extend 0 to 20 degrees

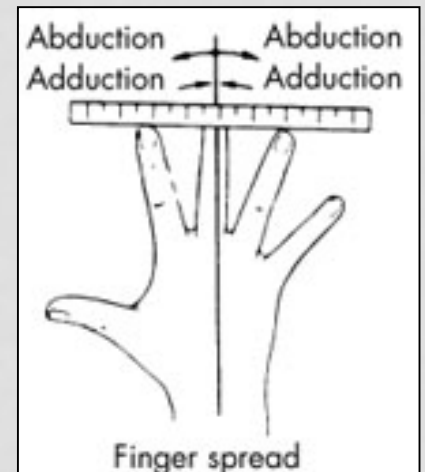
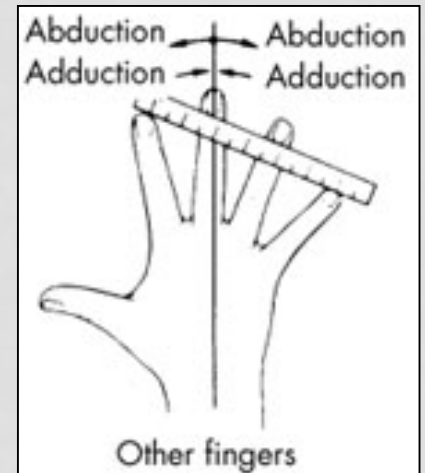


MOVEMENTS

- Wrist
 - Flexion & extension
 - Abduction & adduction
- Fingers
 - Flex & extend
 - MCP joints also abduct & adduct

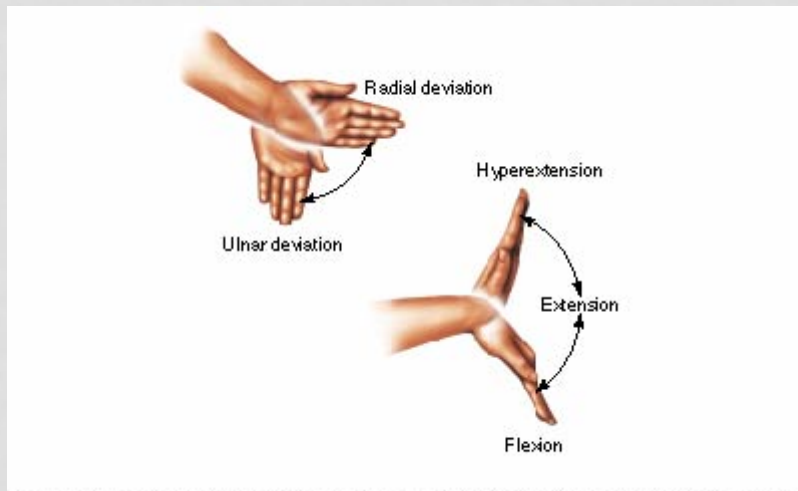
MOVEMENTS

- Middle phalange is reference point to differentiate abduction & adduction
 - Thumb, index & middle fingers abduct when they move laterally toward radial side of hand
 - Ring & little fingers adduction when they move medially toward ulnar side of hand
 - Medial movement of thumb, index & middle fingers toward ulnar side of hand is adduction
 - Lateral movement of ring & little finger toward radial side of hand is abduction



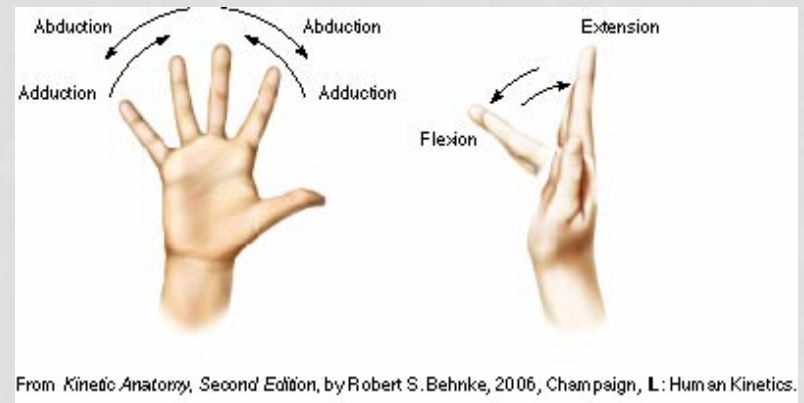
MOVEMENTS

- Which Plane?



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

- Where is medial?



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MUSCLES

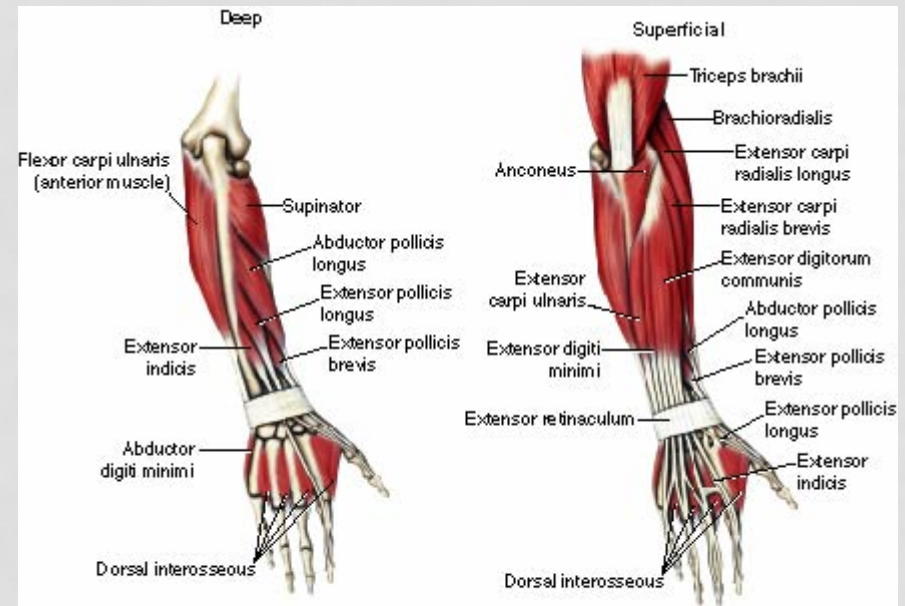
Extrinsic muscles of wrist & hand grouped according to function & location

- 6 muscles move wrist but not fingers & thumb
 - 3 wrist flexors
 - flexor carpi radialis
 - flexor carpi ulnaris
 - palmaris longus
 - 3 wrist extensors
 - extensor carpi radialis longus
 - extensor carpi radialis brevis
 - extensor carpi ulnaris

- Wrist and Hand

POSTERIOR MUSCLES

Superficial & Deep



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

ANTERIOR MUSCLES

Common Flexor Tendon

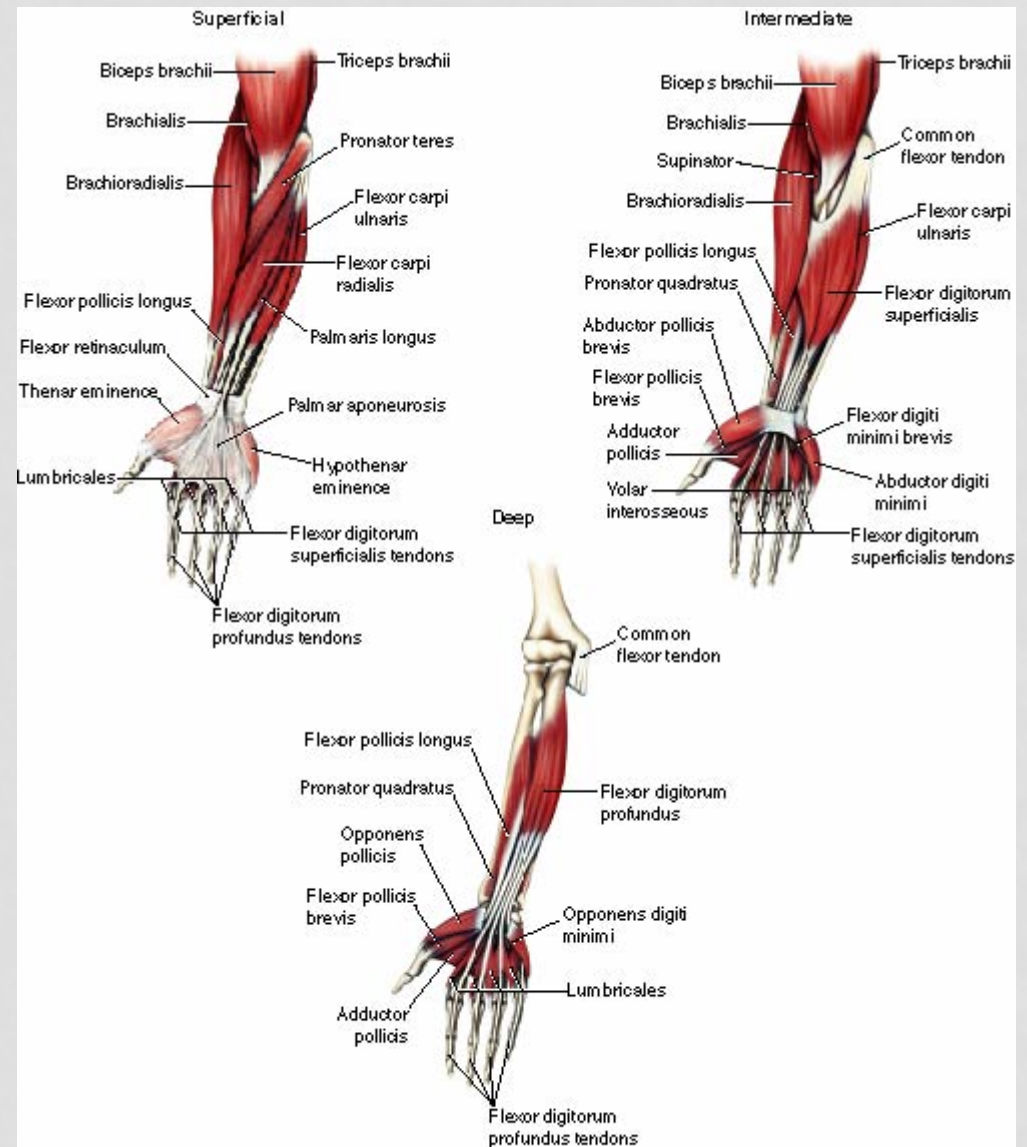
Flexor Carpi Radialis

Flexor Carpi Ulnaris

Flexor Digitorum Superficialis

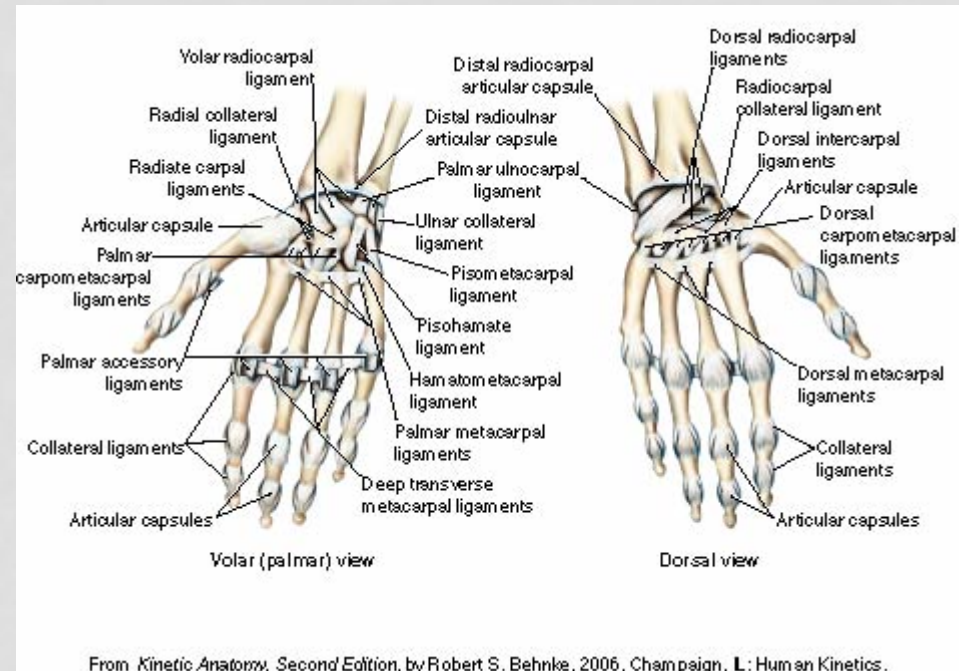
Palmaris Longus

Flexor Digitorum Profundus

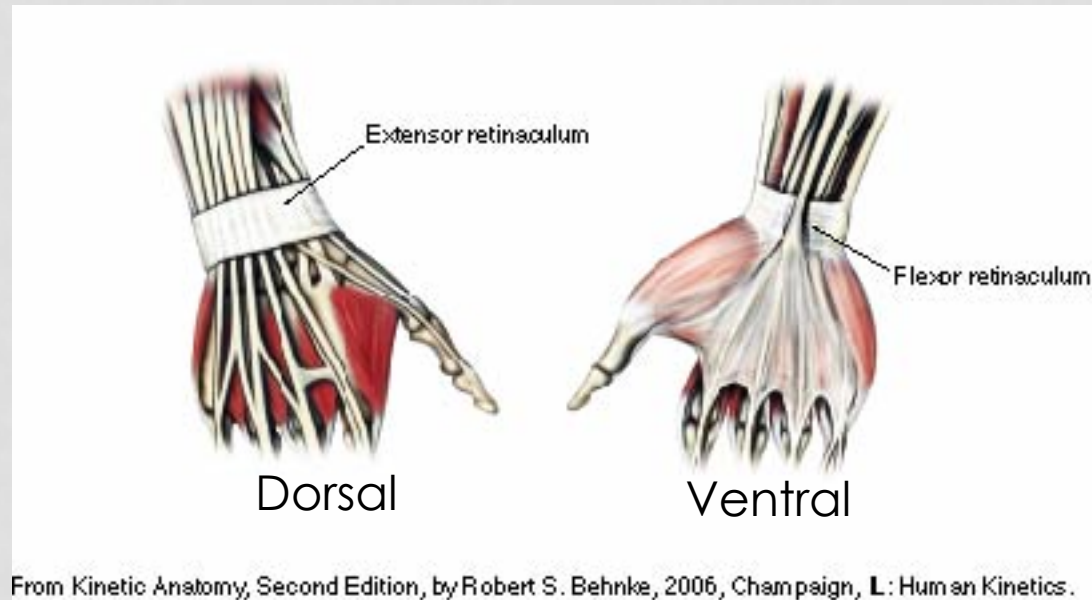


LIGAMENTS

- Capsular
- Volar Radiocarpal
- Dorsal Radiocarpa
- Collateral



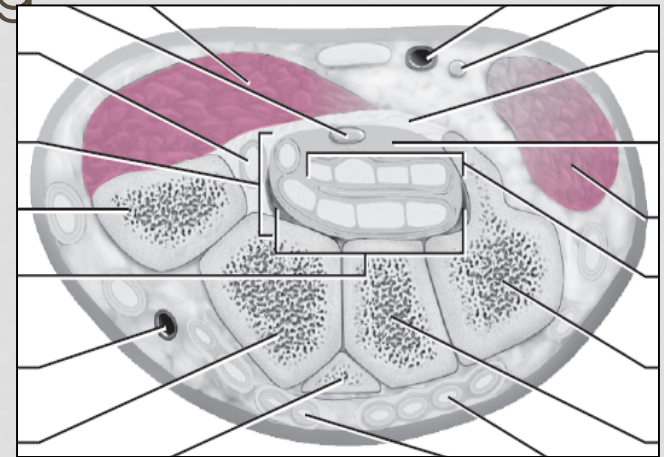
FLEXOR & EXTENSOR RETINACULA



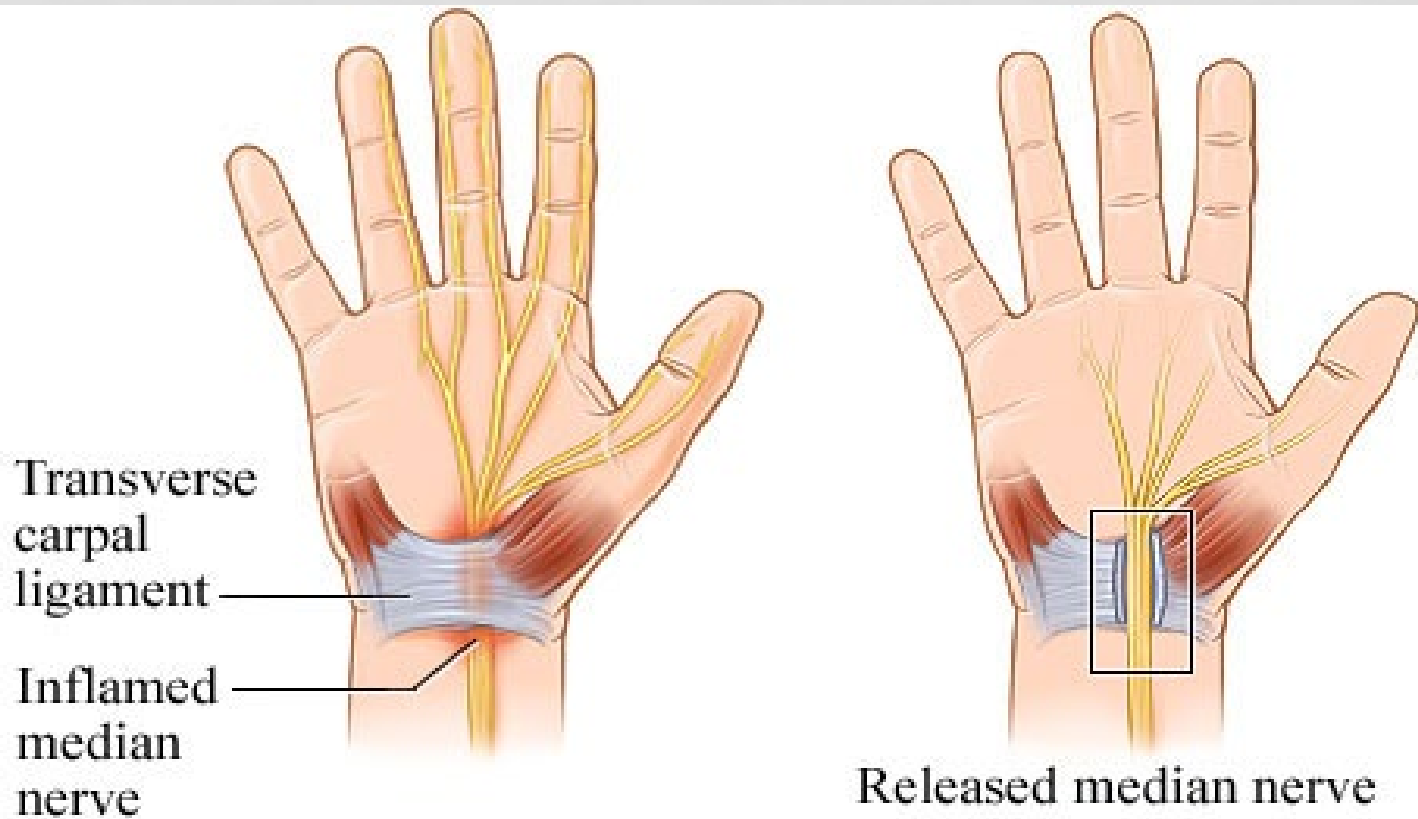
Carpal Tunnel Syndrome

CARPAL TUNNEL

- Carpal tunnel syndrome
 - Swelling & inflammation can cause increased pressure in carpal tunnel resulting in decreased function of median nerve leading to reduced motor & sensation function in its distribution
 - Particularly common with repetitive use of the hand and wrist in manual labor and clerical work such as typing and keyboarding
 - Often, slight modifications in work habits and hand & wrist positions during these activities can be preventative
 - Flexibility exercises for the wrist & finger flexors may be helpful



CARPAL TUNNEL SURGERY



ACTIVITY

- Holding your hand in the anatomical position, spread your fingers apart. What movements occurred at the
 - A. index finger MP joint (by what muscle)?
 - B. middle finger MP joint (by what muscle)?
 - C. ring finger MP joint (by what muscle)?
 - D. little finger MP joint (by what muscle)?