

# **Systemic Module**

## **MSS**

### **“Anatomy”**

## **Muscles of Hand**

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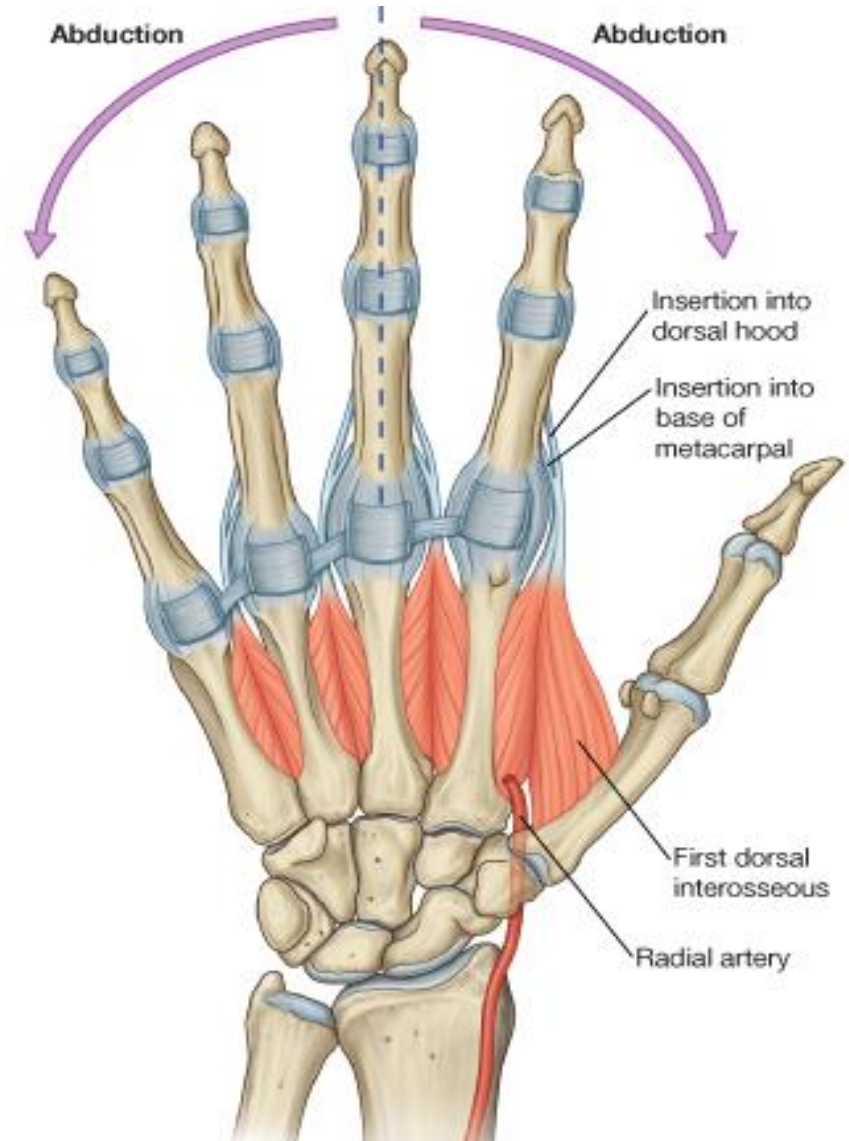
# Intrinsic Muscles of the Hand

- **The intrinsic muscles of the hand are located in five compartments:**
  1. The **interossei** (4 Palmar and 4 Dorsal) in separate ***interosseous compartments*** between the metacarpals.
  2. **Adductor pollicis** in the ***adductor compartment***.
  3. **Thenar muscles** in the ***thenar compartment***:
    - Abductor pollicis brevis
    - Flexor pollicis brevis
    - Opponens pollicis
  4. **Hypothenar muscles** in the ***hypothenar compartment***:
    - Abductor digiti minimi
    - Flexor digiti minimi
    - Opponens digiti minimi
  5. Short muscles of the hand, **the Lumbricals (4)** in the ***central compartment*** with the long flexor tendons

All of the intrinsic muscles of the hand are innervated by the **ulnar nerve** *EXCEPT* for the **three thenar** and **two lateral lumbrical muscles** which are innervated by the **median nerve**.

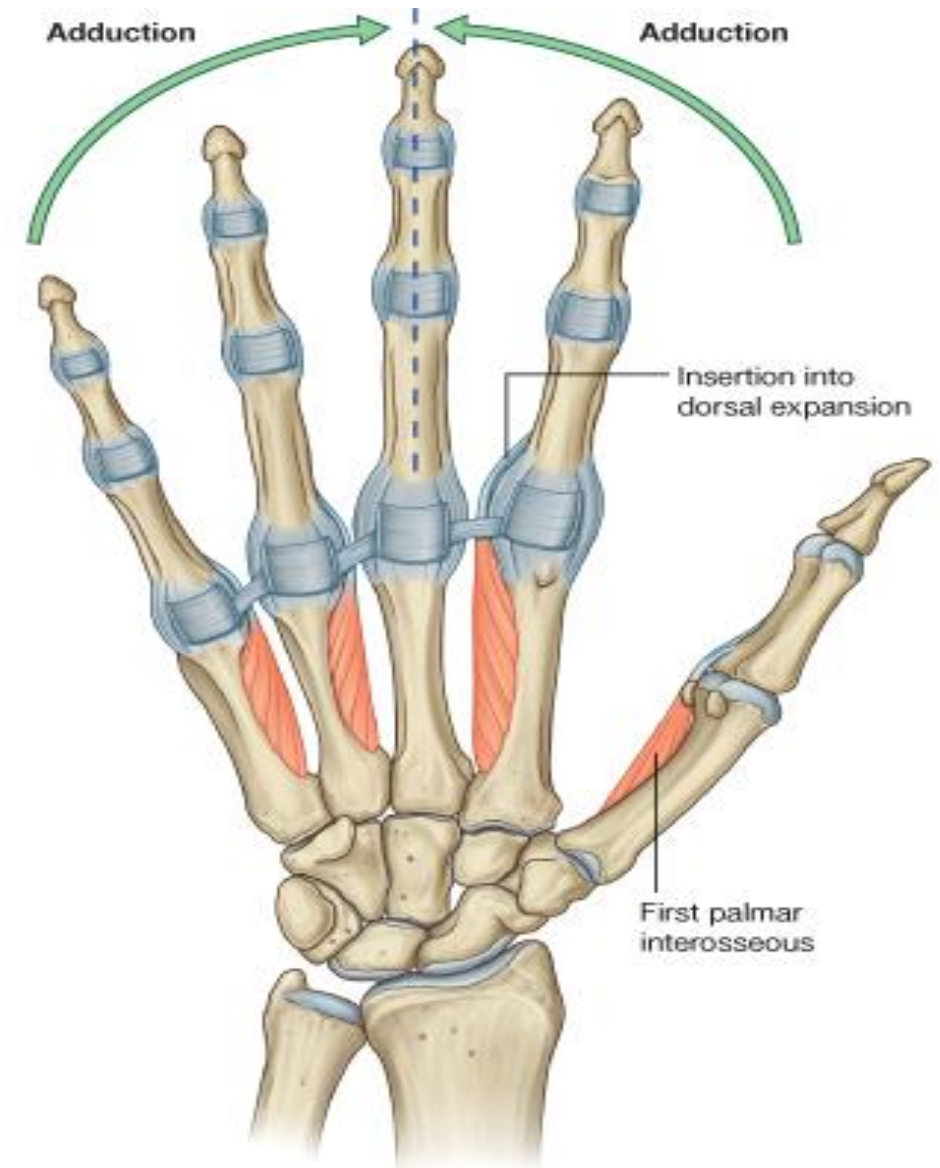
## Dorsal interossei

- The dorsal interossei (4) are the most dorsally situated of all of the intrinsic muscles and can be palpated through the skin on the dorsal aspect of the hand.
- **Origin:** Adjacent sides of metacarpals
- **Insertion:** The extensor expansion and base of proximal phalanges of **index, middle, and ring** fingers
- **Action:** Abduct fingers from the center of third finger.
- **Nerve supply:** Deep branch of ulnar nerve.



## Palmar interossei

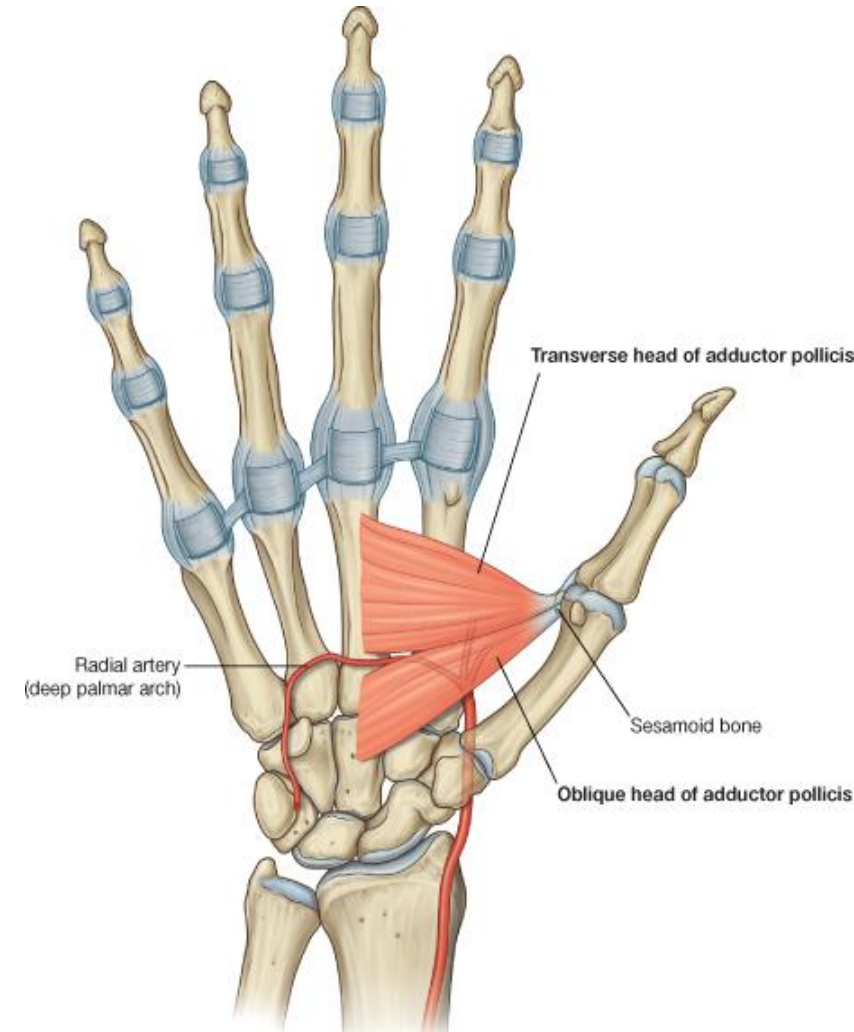
- The palmar interossei (4) are anterior to the dorsal interossei.
- **Origin:** Anterior surface of 1<sup>st</sup>, 2<sup>nd</sup>, 4<sup>th</sup> and 5<sup>th</sup> metacarpals
- **Insertion:** The extensor expansion and base of proximal phalanges of thumb, index, ring, and little fingers.
- **Action:** Adduct fingers toward center of third finger.
- **Nerve supply:** Deep branch of ulnar nerve.



# Adductor compartment:

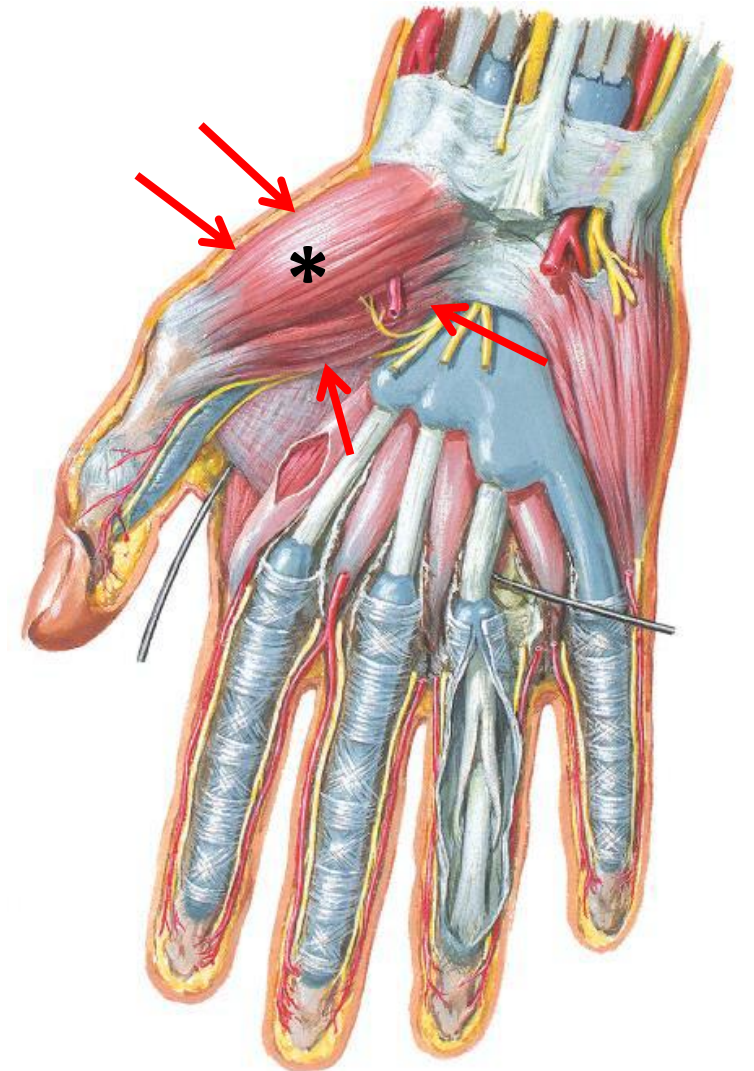
## Adductor pollicis

- **Origin:**
  - **Oblique head** from the capitate and adjacent bases of 2<sup>nd</sup> and 3<sup>rd</sup> metacarpals
  - **Transverse head** from the 3<sup>rd</sup> metacarpal bones
- **Insertion:** Base of proximal phalanx of thumb
- **Action:** Adduction of thumb
- **Nerve supply:** Deep branch of ulnar nerve.



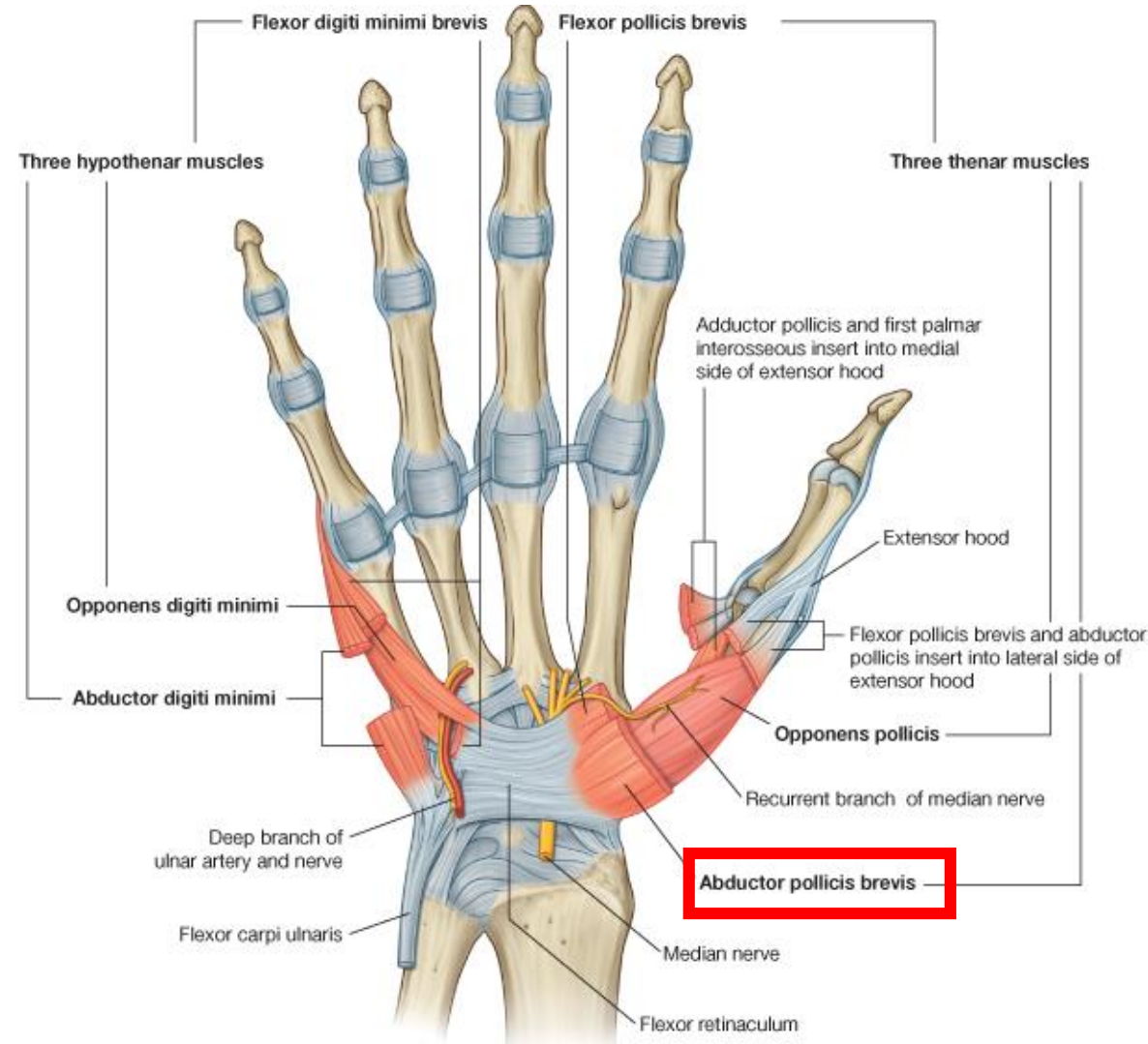
# Thenar Compartment:

- The thenar muscles **form the thenar eminence on the lateral surface of the palm** and are chiefly responsible for opposition the thumb.
- Three muscles:
  1. **Abductor pollicis brevis**
  2. **Flexor pollicis brevis**
  3. **Opponens pollicis**



## Abductor Pollicis Brevis

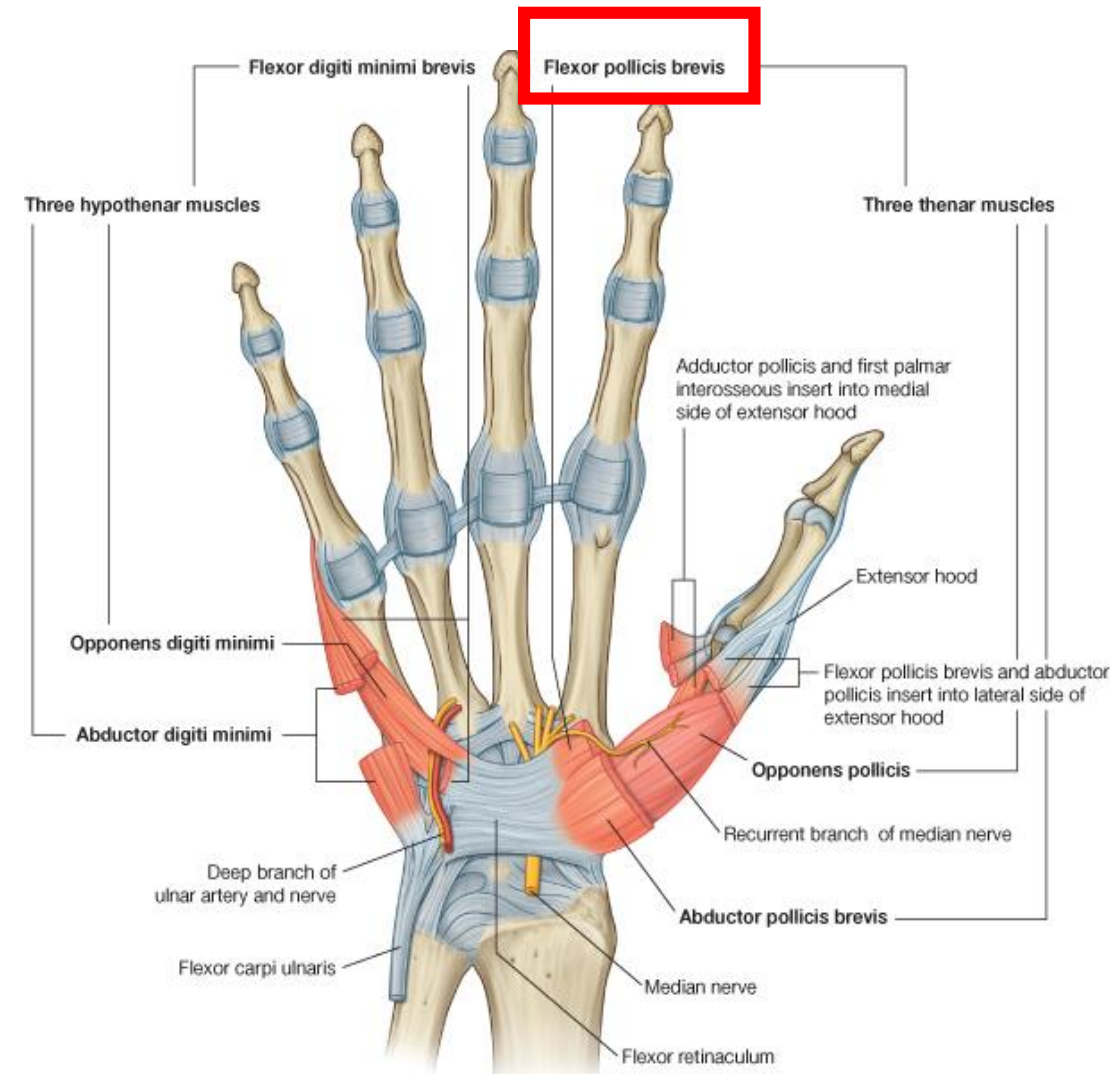
- **Origin:** Scaphoid, trapezium, and flexor retinaculum
- **Insertion:** Base of proximal phalanx of thumb
- **Action:** Abduction of thumb
- **Nerve supply:** Median nerve





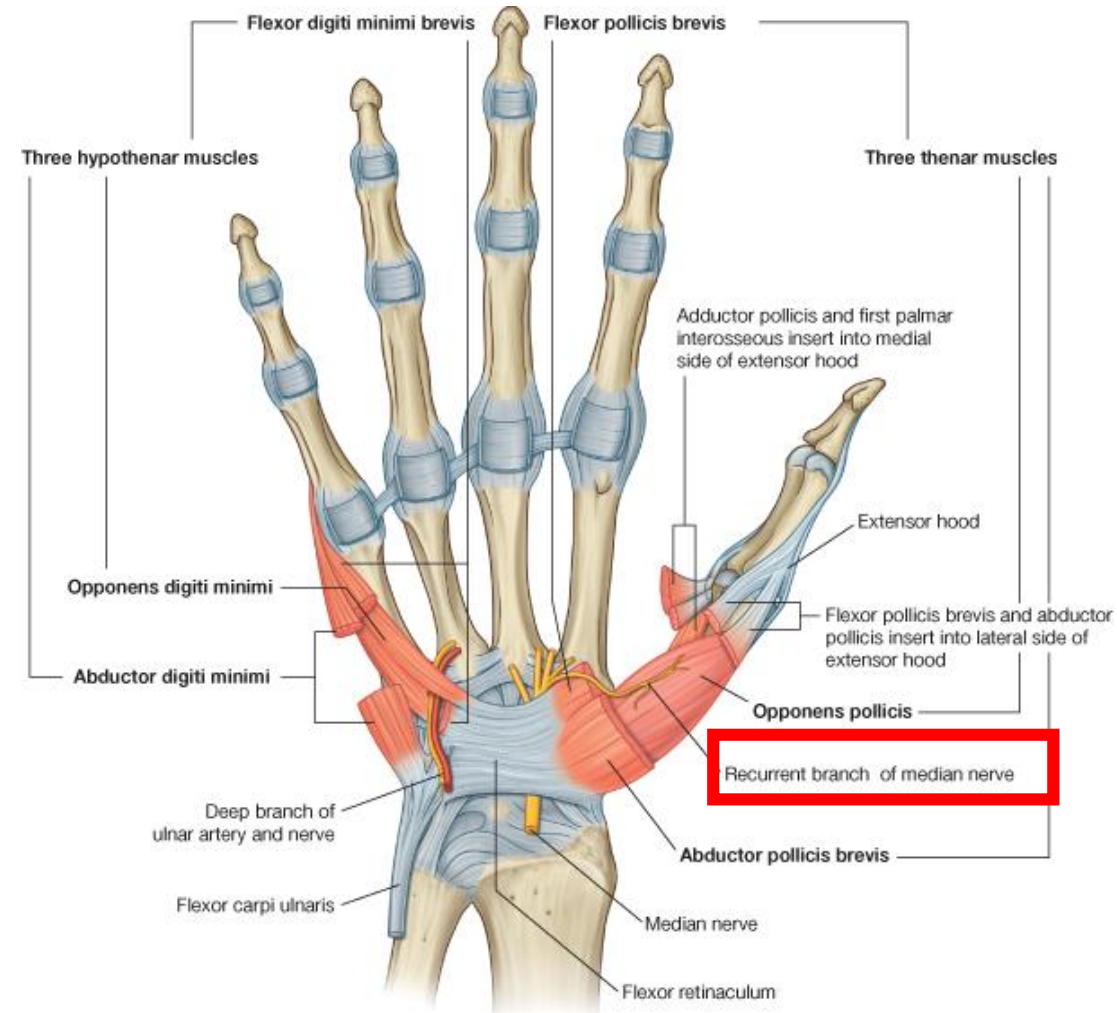
# Flexor Pollicis Brevis

- This muscle lies distal to abductor pollicis brevis.
- **Origin:** Flexor retinaculum
- **Insertion:** Base of proximal phalanx of thumb
- **Action:** Flexion of thumb
- **Nerve supply:** Median nerve



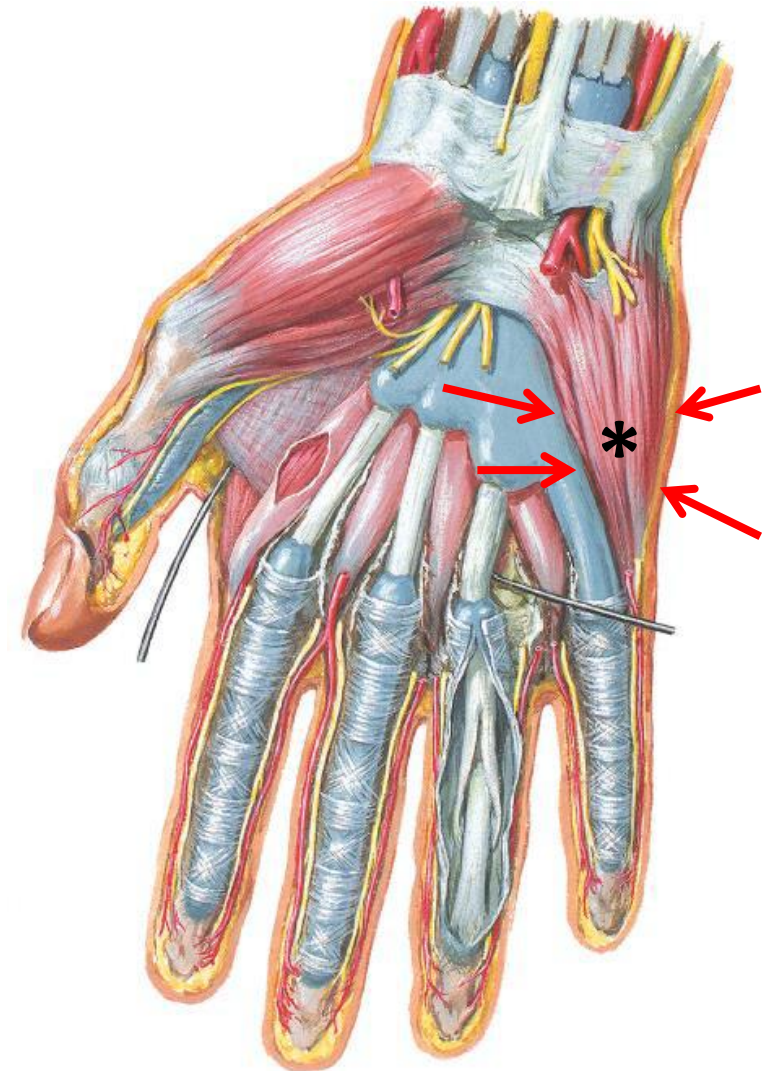
# Opponens Pollicis

- This muscle is the largest of the thenar muscles and lies deep to the other two.
- **Origin:** Flexor retinaculum
- **Insertion:** Shaft of metacarpal bone of thumb
- **Action:** Pull thumb medially and forward across the palm
- **Nerve supply:** Median nerve



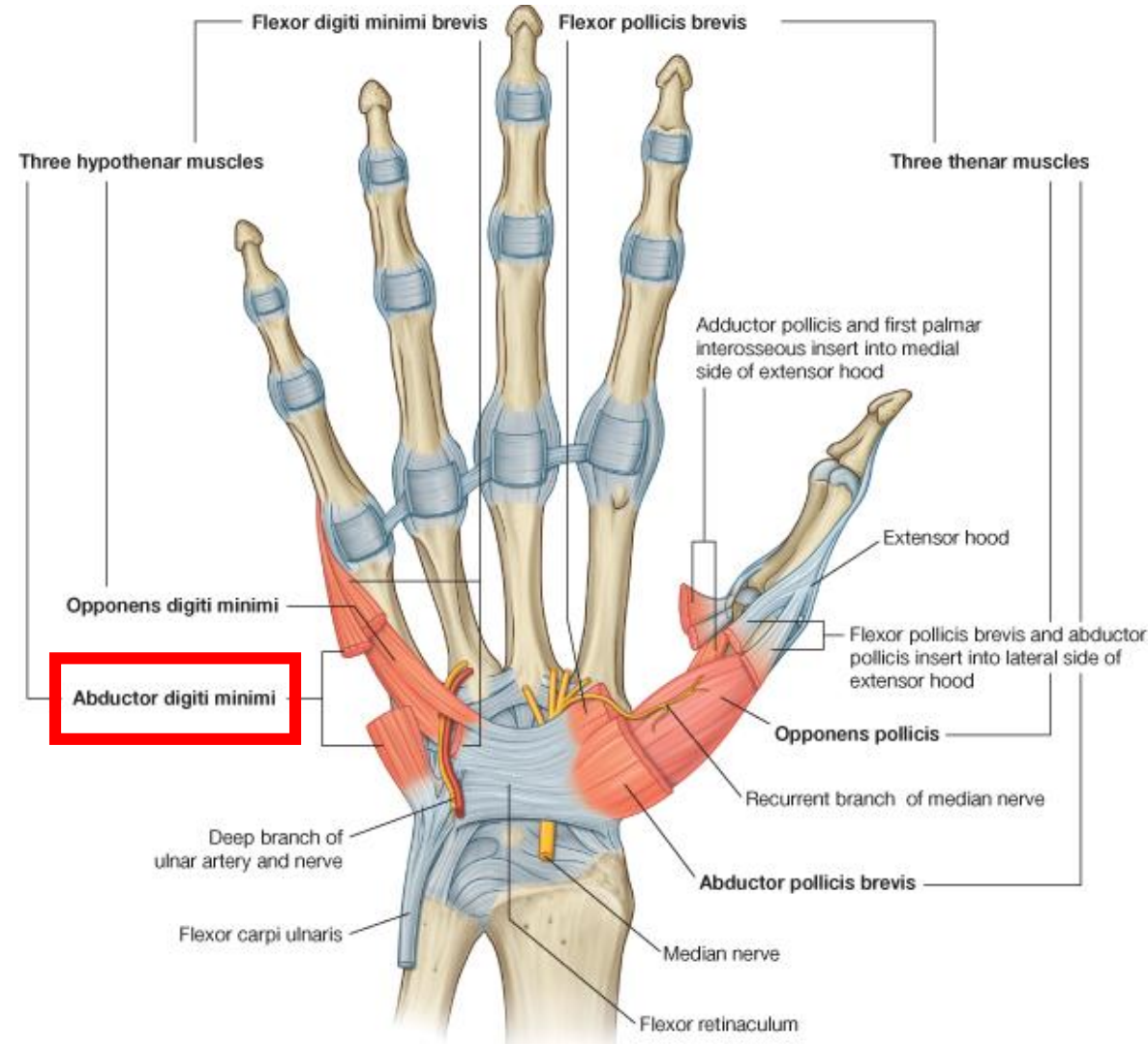
# Hypothenar Compartment:

- The hypothenar muscles form the **hypothenar eminence on the medial surface of the palm** and move the little finger.
- Three muscles :
  1. **Abductor digiti minimi**
  2. **Flexor digiti minimi**
  3. **Opponens digiti minimi**



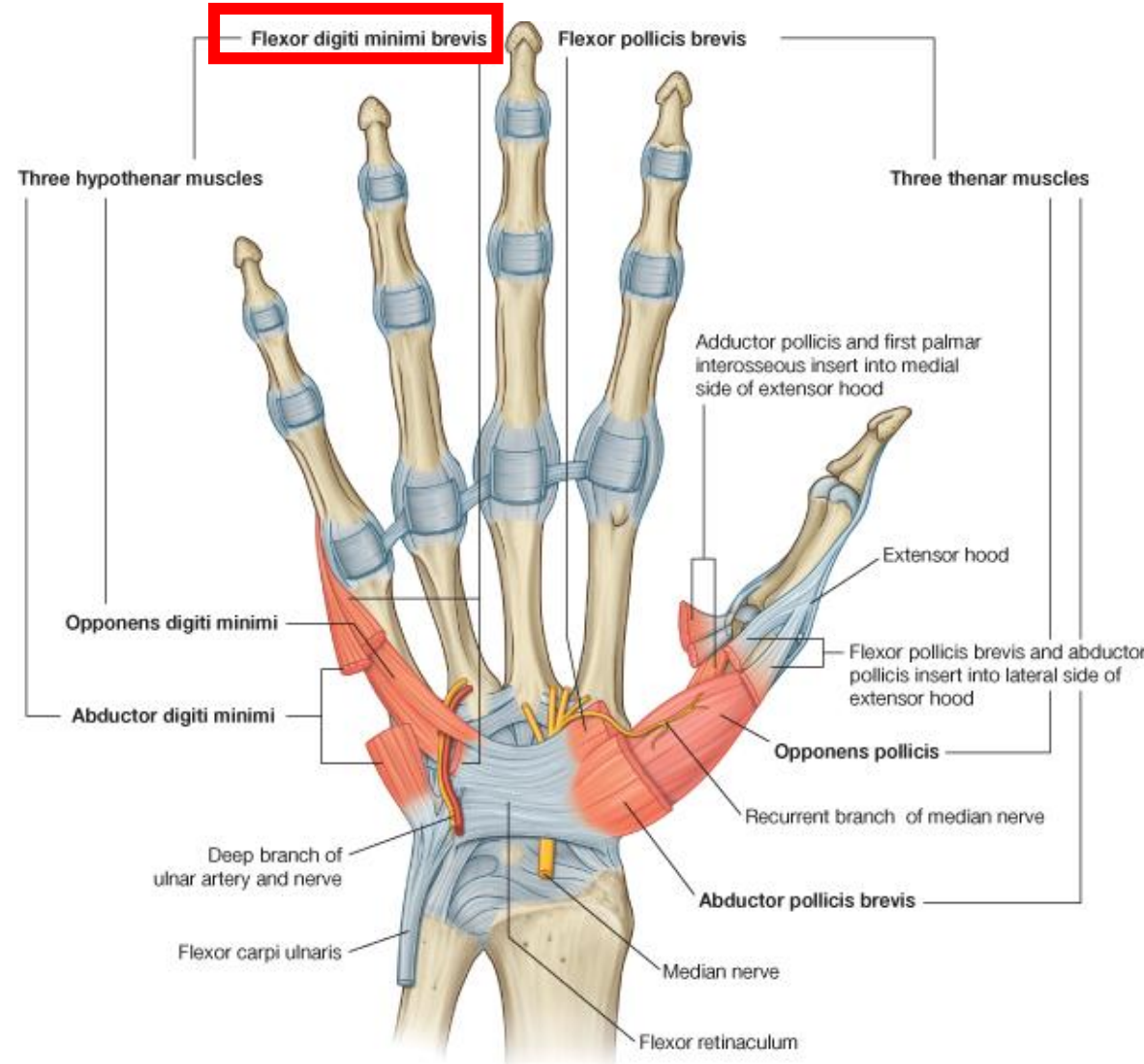
# Abductor Digiti Minimi

- **Origin:** Pisiform bone
- **Insertion:** Base of proximal phalanges of little fingers.
- **Action:** Abduct little finger.
- **Nerve supply:** Deep branch of ulnar nerve.



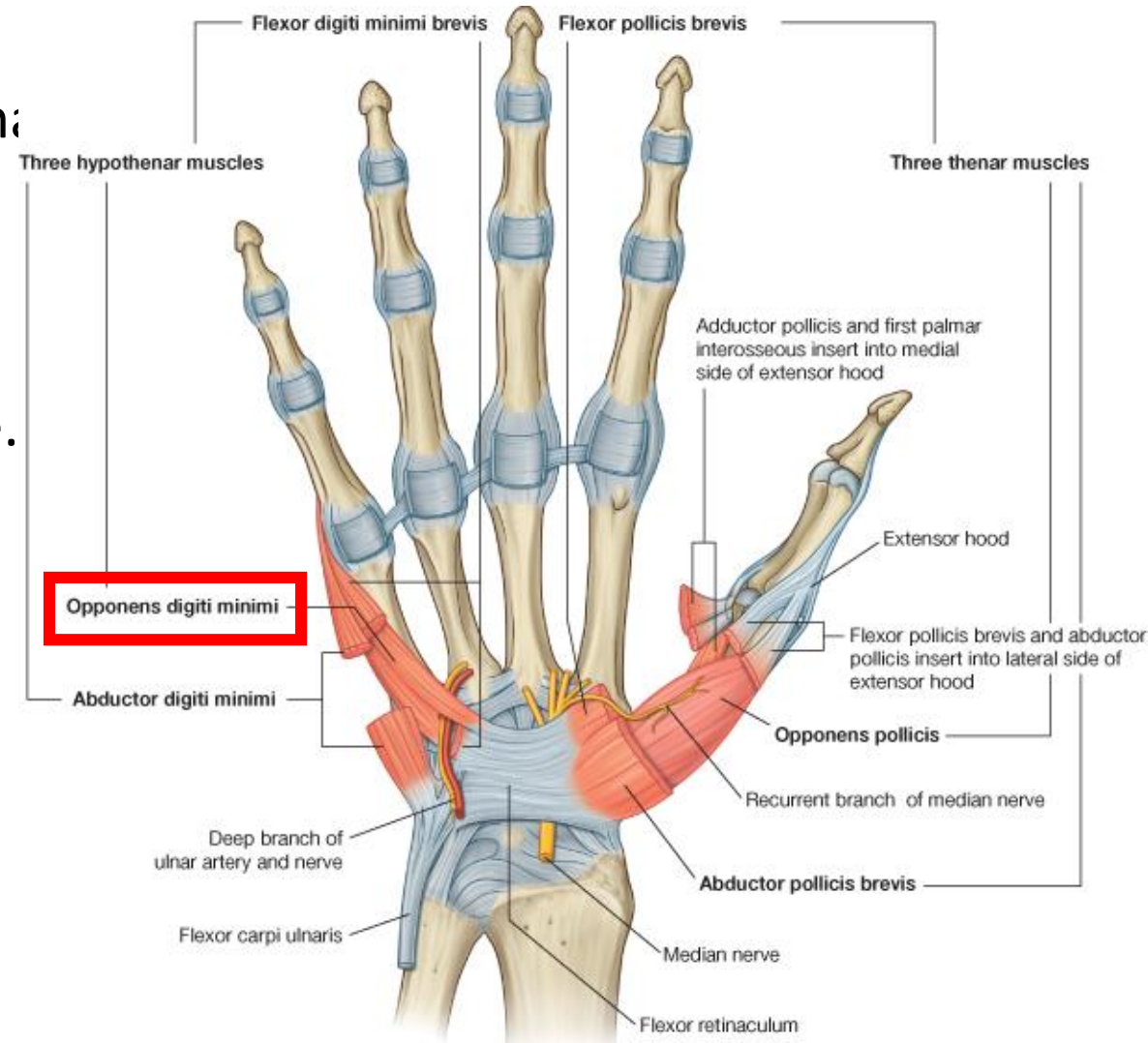
# Flexor Digiti Minimi

- This muscle lies lateral to abductor digiti minimi
- **Origin:** Flexor retinaculum
- **Insertion:** Base of proximal phalanges of little fingers.
- **Action:** Flex little finger.
- **Nerve supply:** Deep branch of ulnar nerve.



# Opponens Digiti Minimi

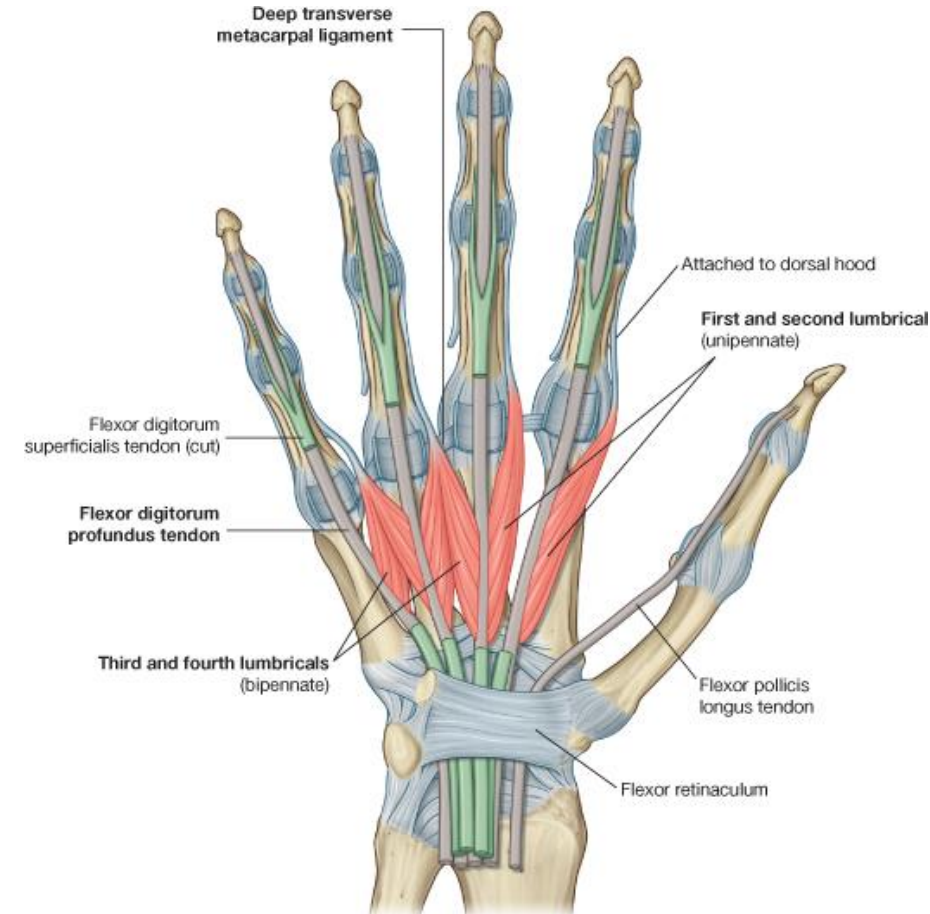
- This muscle lies deep to the other two hypothenar muscles.
- **Origin:** Flexor retinaculum
- **Insertion:** Medial border of 5<sup>th</sup> metacarpal bone.
- **Action:** Draw the 5<sup>th</sup> metacarpal anterior as in cupping the hand
- **Nerve supply:** Deep branch of ulnar nerve

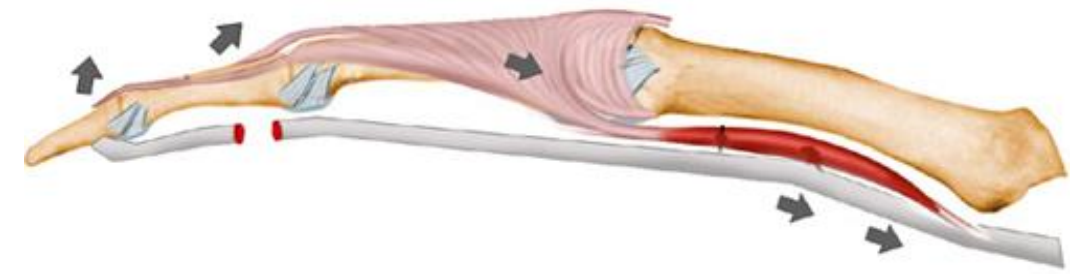
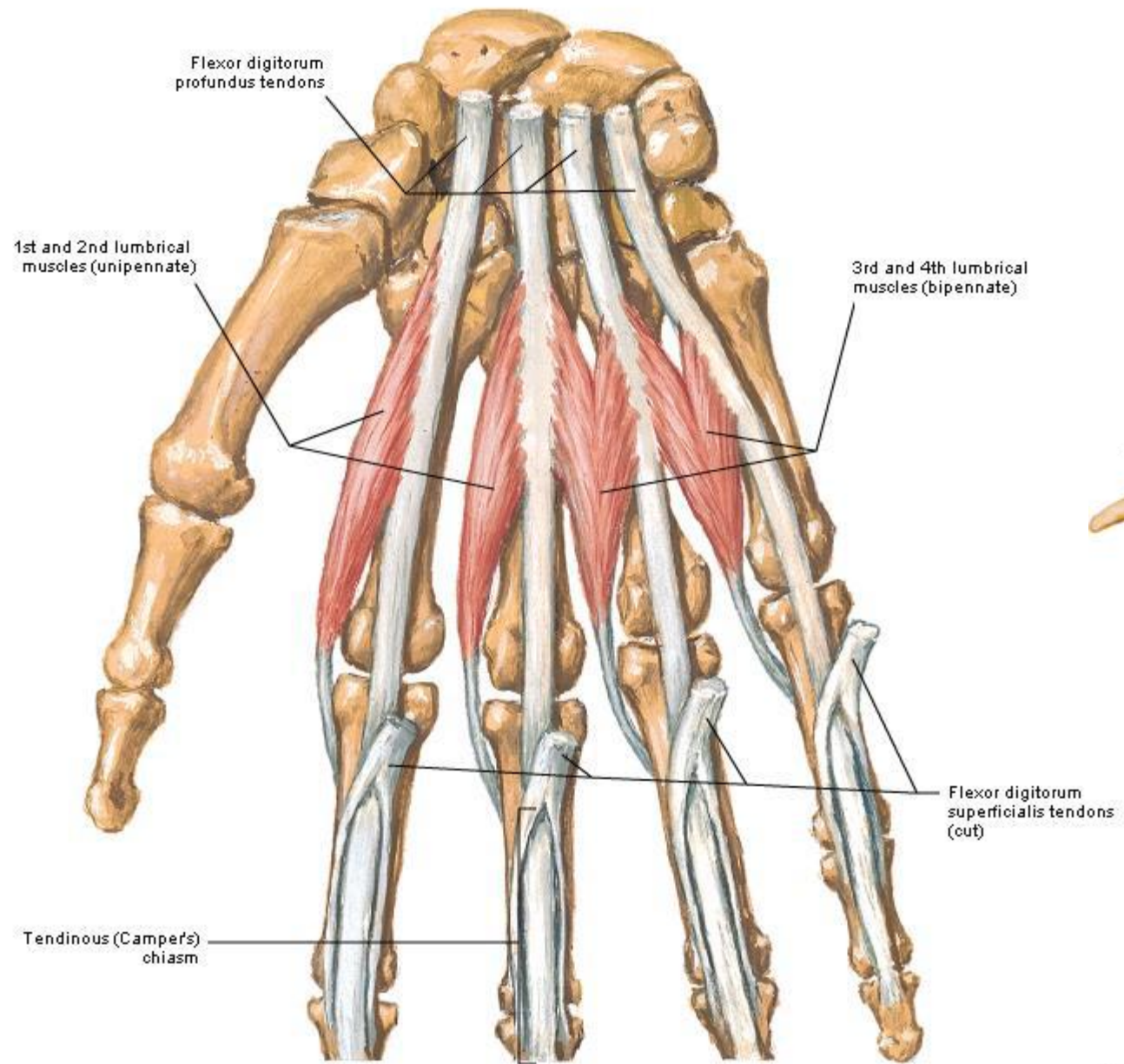


# Central Compartment:

## Lumbrical muscles

- There are four lumbrical (worm-like) muscles, each of which is associated with one of the fingers.
- **Origin:** Tendons of flexor digitorum profundus
- **Insertion:** Extensor expansion of medial four fingers
- **Action:** Flex metacarpophalangeal joints while extending interphalangeal joints
- **Nerve supply:**
  - Lateral two (first and second): **Median nerve**
  - Medial two (third and fourth): **Ulnar nerve**









Tendon of flexor digitorum profundus

Tendon of flexor digitorum superficialis

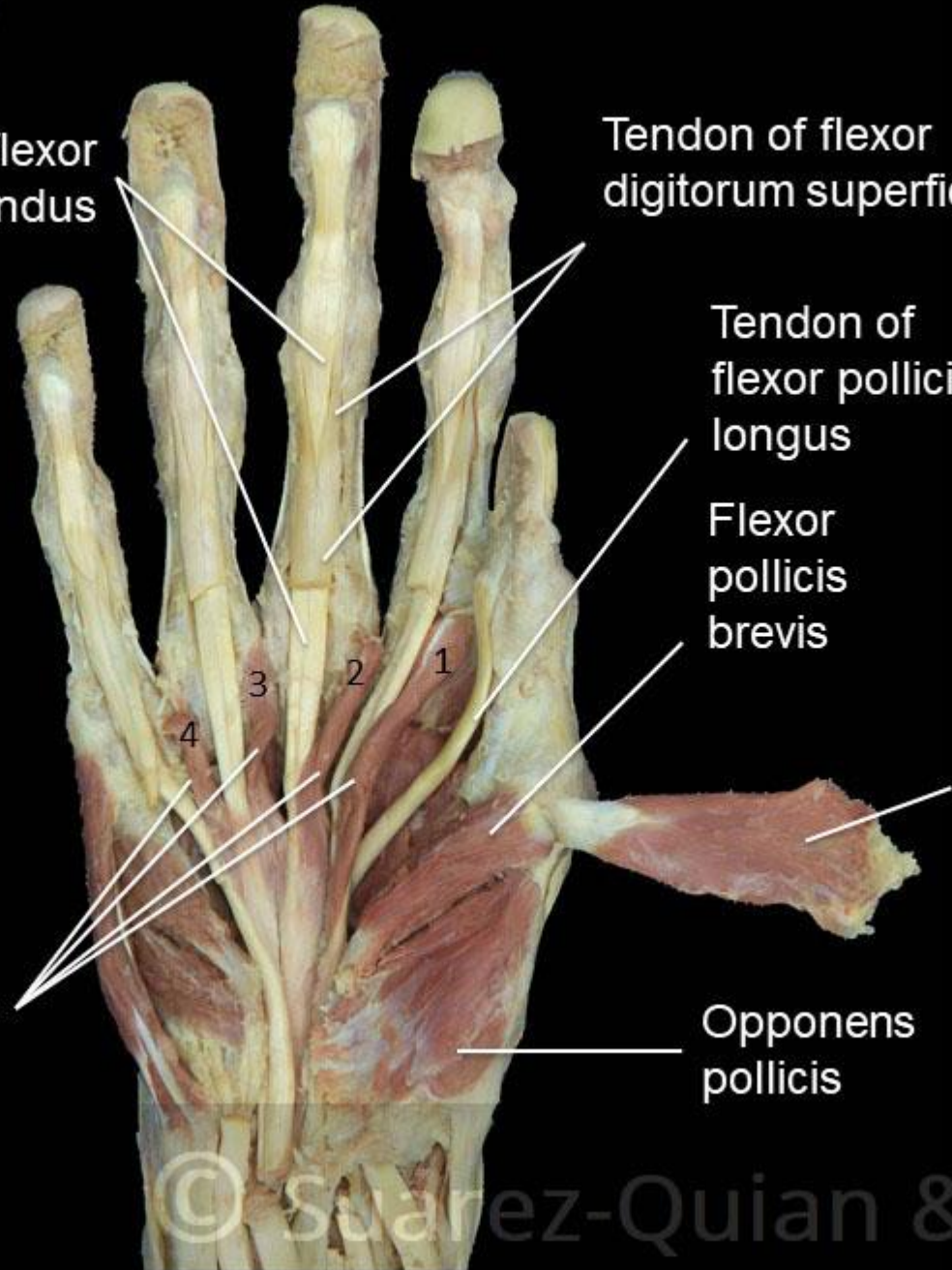
Tendon of flexor pollicis longus

Flexor pollicis brevis

Abductor pollicis brevis

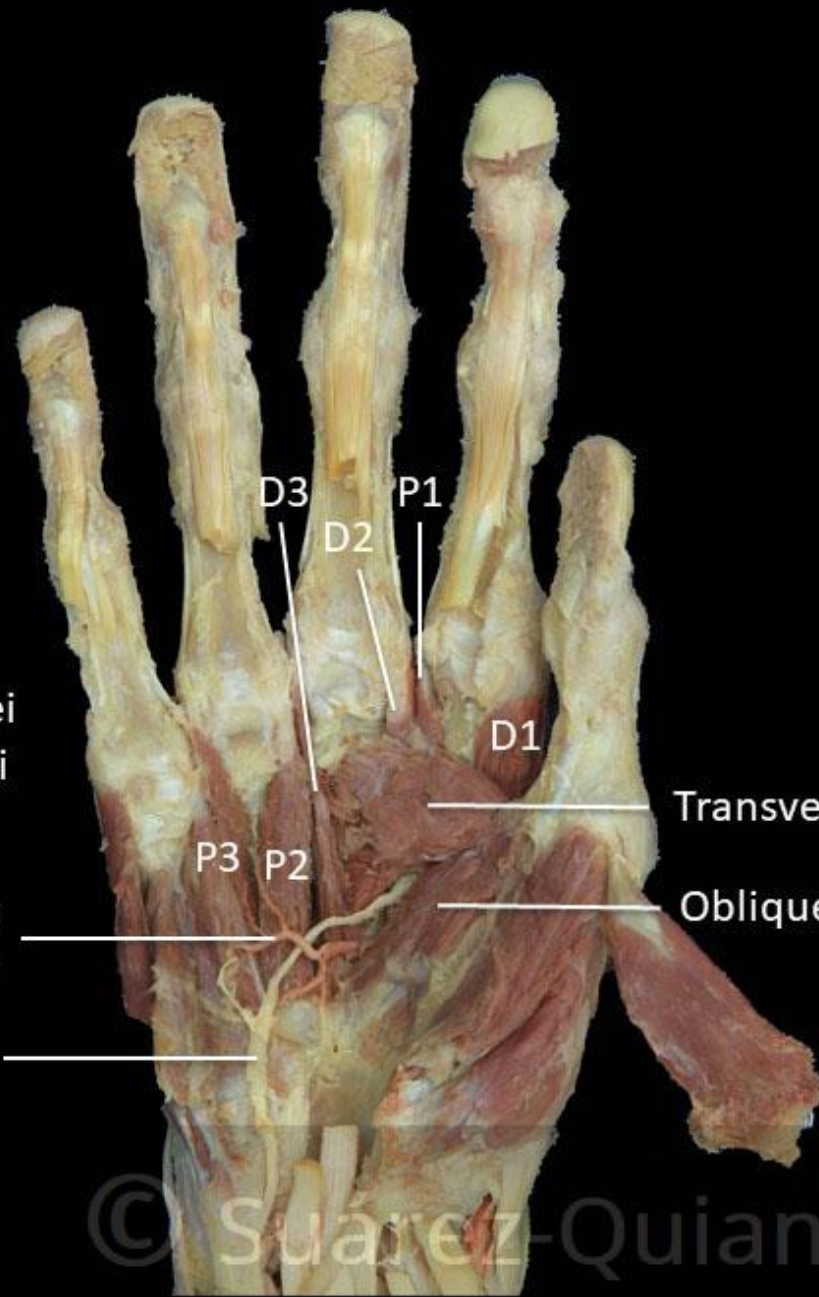
Lumbricals

Opponens pollicis



P = Palmar interossei  
D = Dorsal interossei

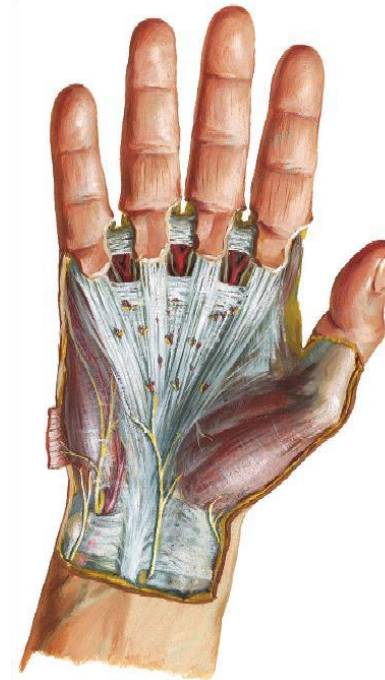
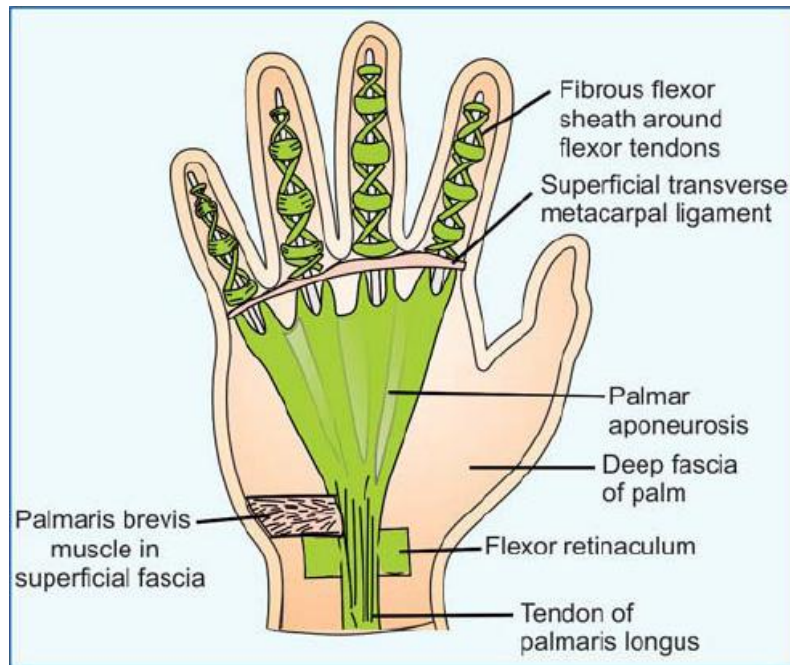
Deep palmar arch  
Deep branch  
ulnar nerve



Transverse head  
Oblique head } Adductor pollicis

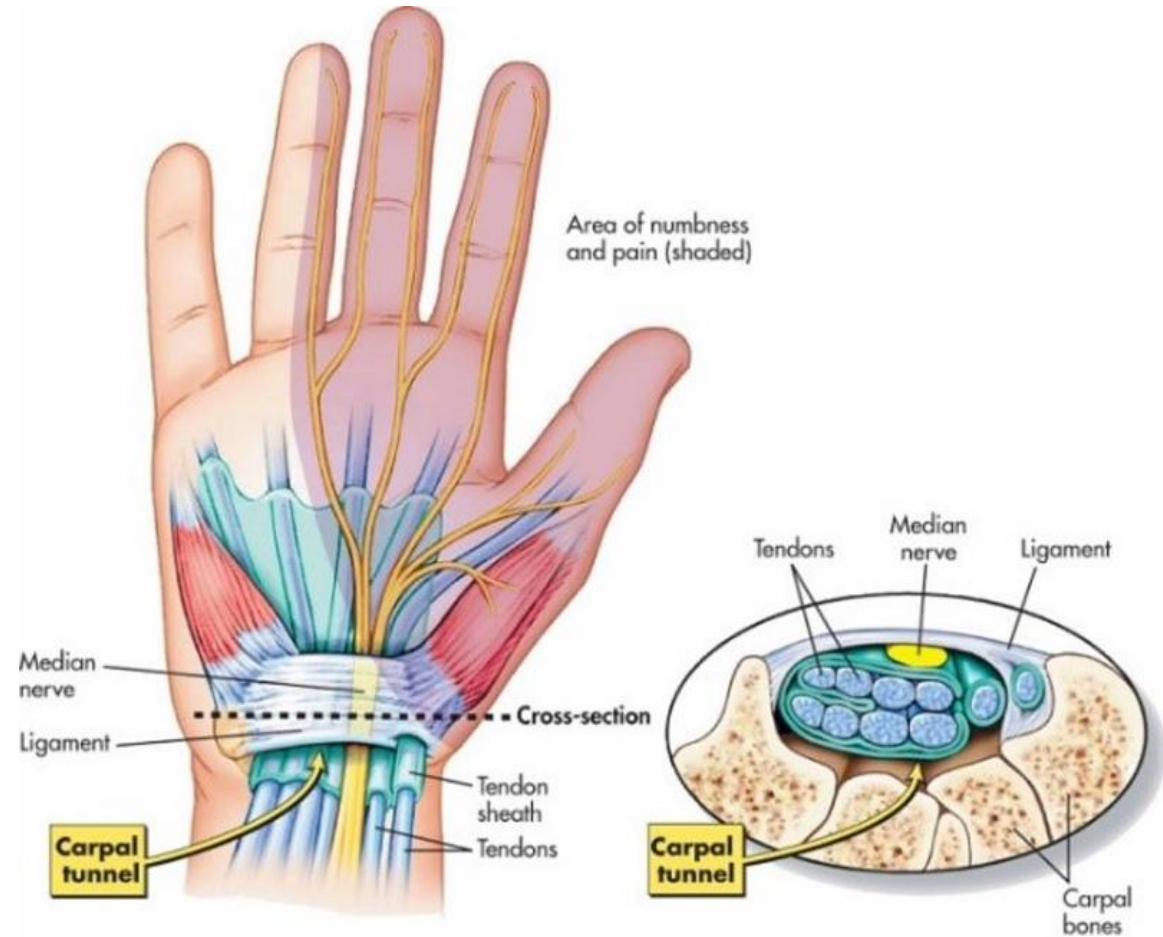
# Deep Fascia of Palm

- It is modified (thickened):
  1. Over the wrist to form the **flexor retinaculum**.
  2. In the middle of the palm to form the **palmar aponeurosis**.
  3. In the fingers to form the **fibrous flexor sheaths**.



# Carpal Tunnel

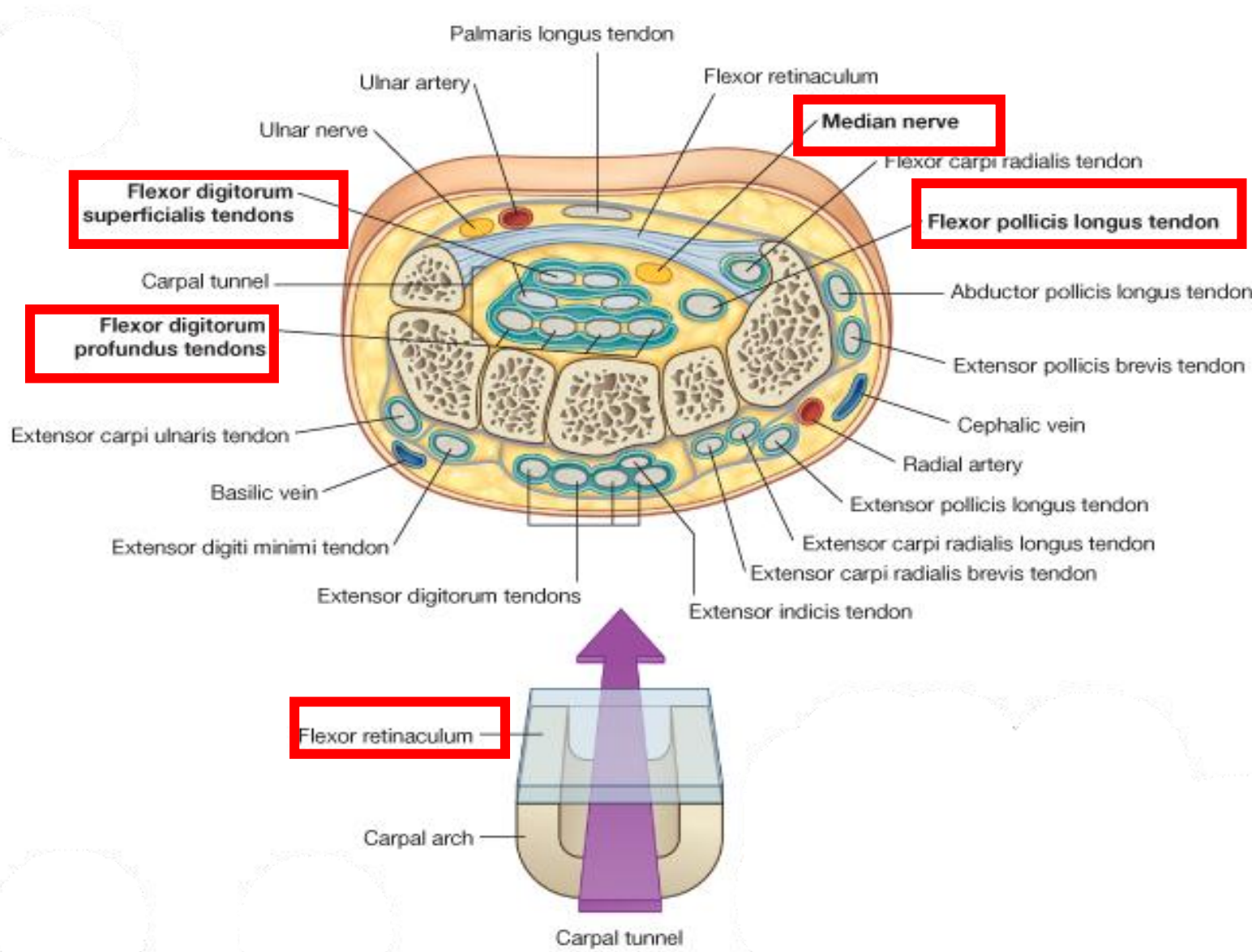
- Formed in front the wrist by a **deep arch formed by the carpal bones** and the **flexor retinaculum**.
- The sides of the carpal arch is formed medially by the pisiform and the hook of the hamate and laterally by the tubercles of the scaphoid and trapezium.
- The carpal arch is converted into the carpal tunnel by the flexor retinaculum.





- Structures pass through the carpal tunnel:

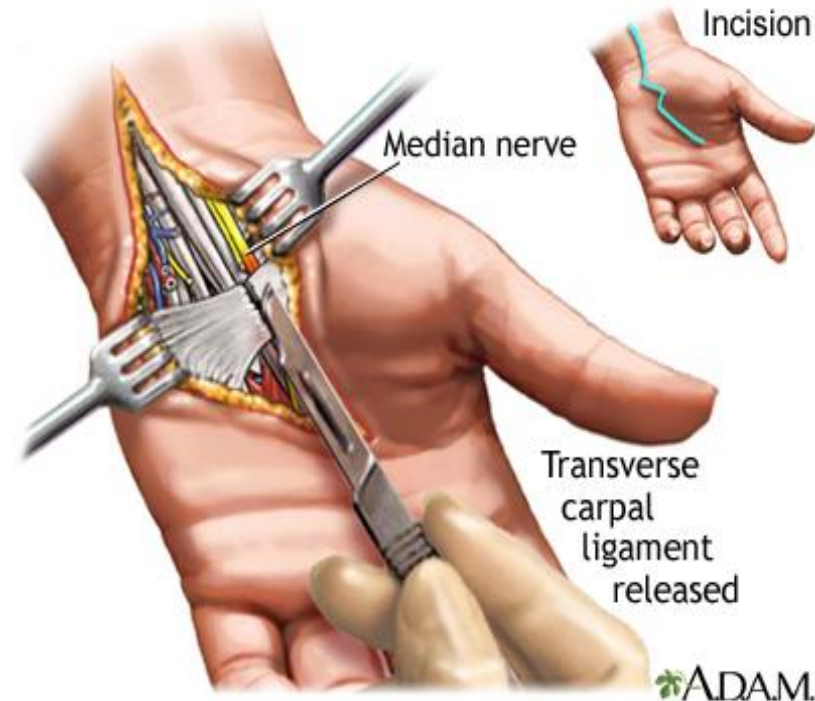
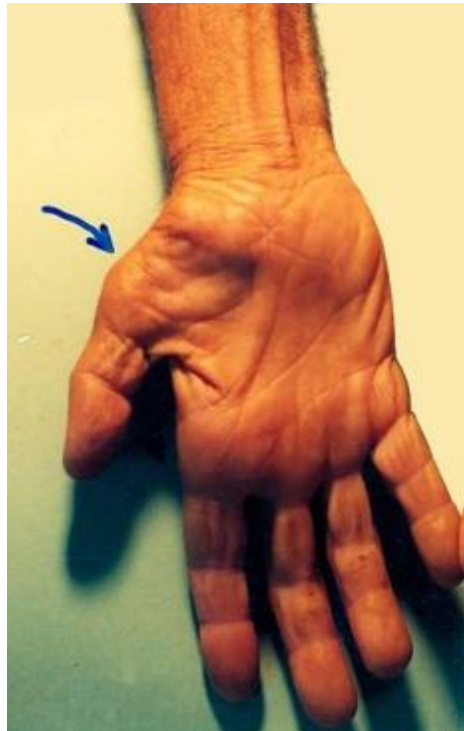
- The four tendons of the flexor digitorum profundus**
- The four tendons of the flexor digitorum superficialis**
- The tendon of the flexor pollicis longus**
- The MEDIAN NERVE**



- The flexor retinaculum holds the tendons to the bony plane at the wrist and prevents them from “bowing.”

# Carpal Tunnel Syndrome

- Carpal tunnel syndrome is caused **by pressure on the median nerve within the carpal tunnel.**
- Patient will experience **numbness, tingling, or burning sensation at the thumb, index, middle and radial half of the ring finger.** If untreated, weakness or **atrophy of the thenar muscles.** Surgical decompression of the flexor retinaculum may be required for treatment.





# Palmar Aponeurosis

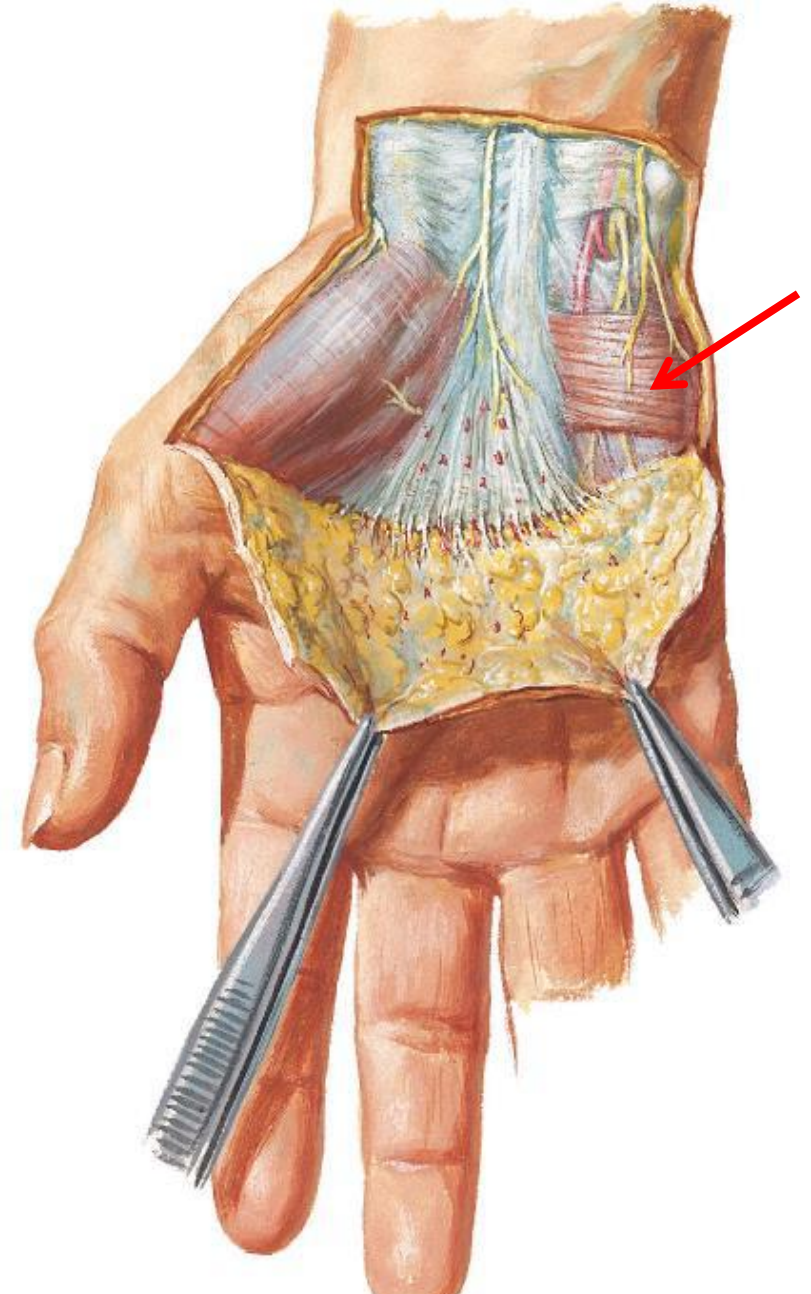
- The palmar aponeurosis is a triangular-shape condensation of deep fascia that ***covers the palm and protects the underlying tendons***
- **Attachments:**
  - **Proximally:** Flexor retinaculum & palmaris longus tendon.
  - **Distally:** It gives 4 slips to the medial 4 fingers

**N.B.:** There is no 5<sup>th</sup> slip to the thumb to keep it freely mobile.



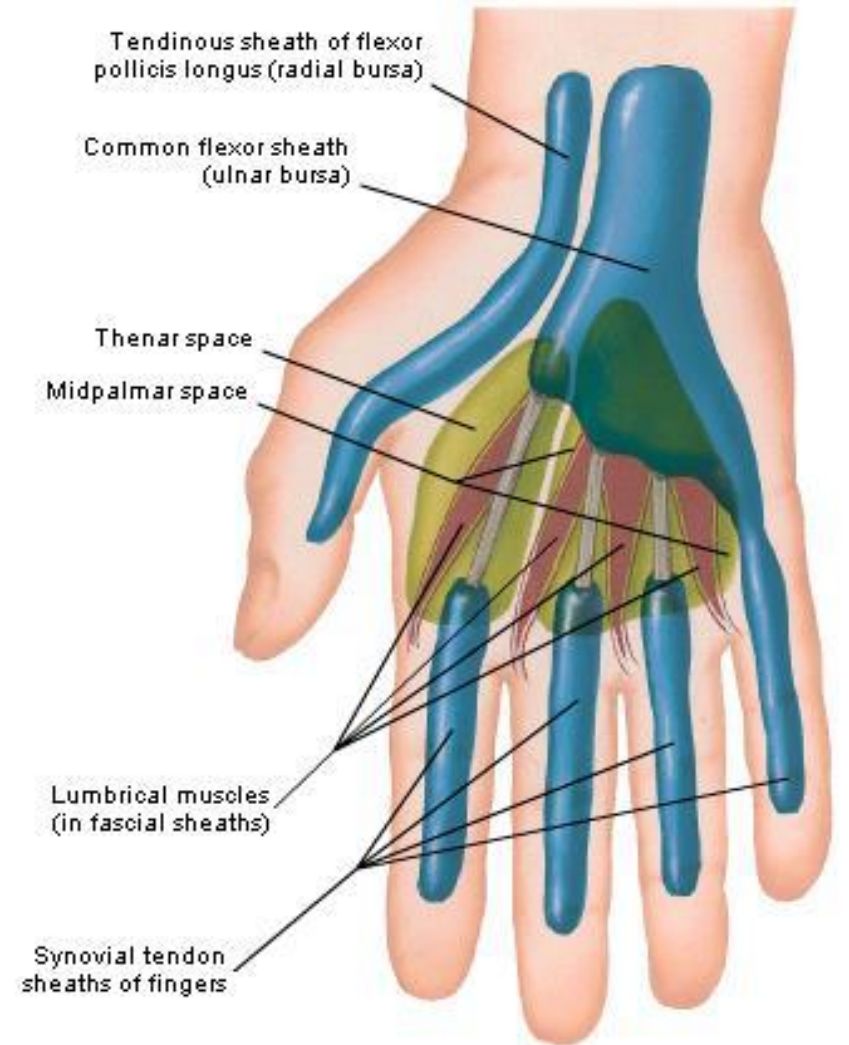
# Palmaris Brevis

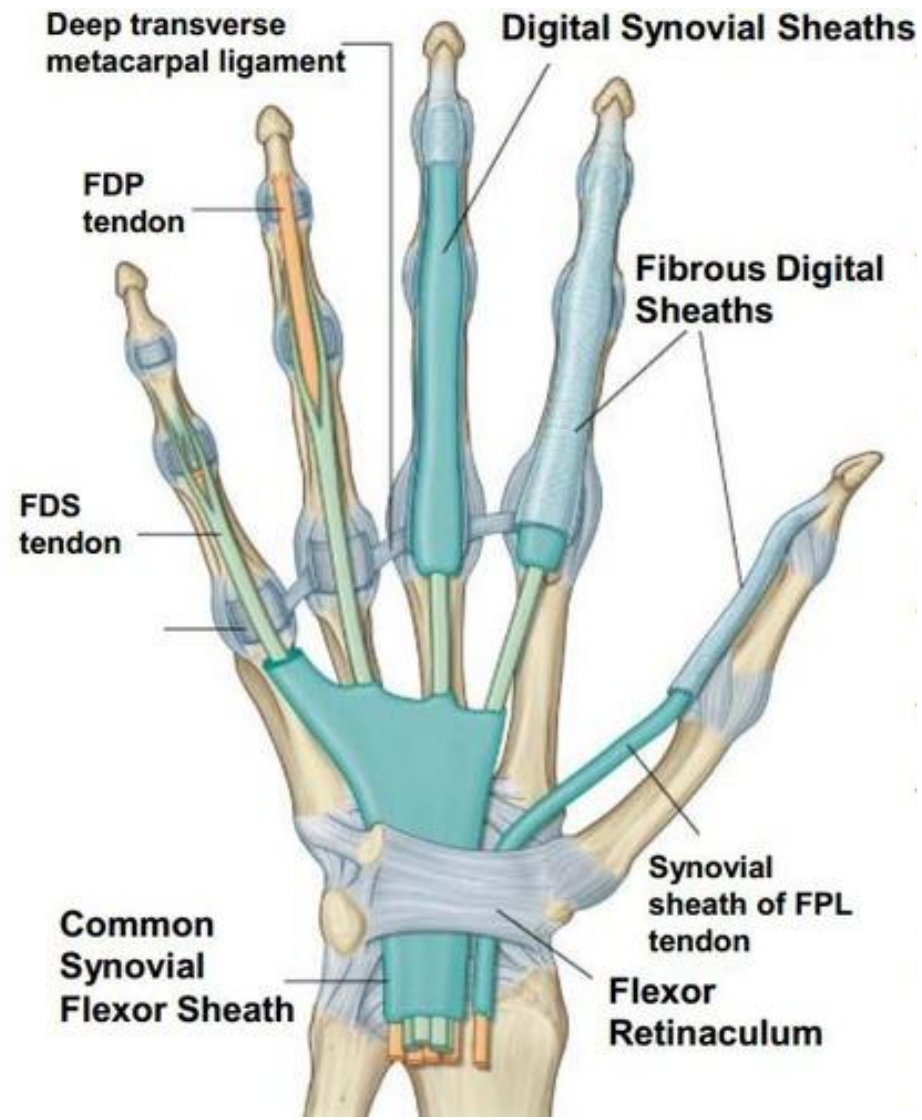
- The palmaris brevis is a small intrinsic muscle of the hand, is a quadrangular-shaped subcutaneous muscle that overlies the hypothenar muscles.
- It **originates** from the palmar aponeurosis and flexor retinaculum and **inserts** into the skin on the medial margin of the hand.
- Palmaris brevis **corrugates skin to improve grip of palm**. is innervated by the superficial branch of the **ulnar nerve**.



# Synovial Sheaths of Flexor Tendons

- Tubular sacs surround the terminal parts of the tendons before its insertion to provide a sort of lubrication for it.
- Each synovial flexor sheath is composed of 2 layers; inner & outer layers separated by a thin film of fluid to facilitate the movements of the tendons.
- There are 3 sheaths that surround the long flexors of the different digits.
- All start 1-1½ inches proximal to flexor retinaculum.





Thank you

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