

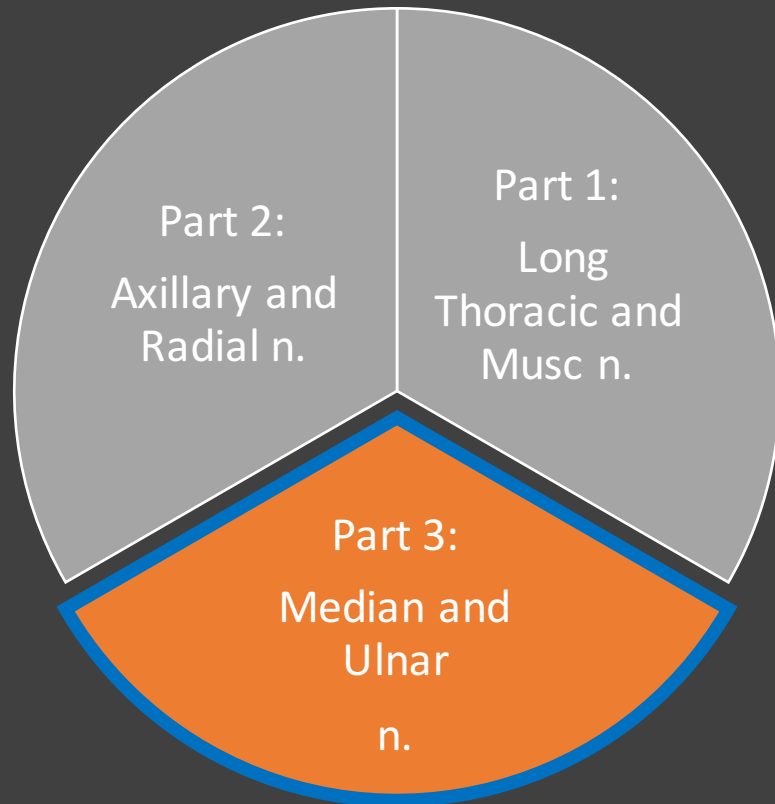
Nerves of the Upper Extremity: The Brachial Plexus, Part 3 of 3

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University of Massachusetts Medical School, Class of 2019

12DaysinMarch.com

Today's Focus



①

Long Thoracic (*Winged Scapula*)
Musculocutaneous (*↓ Arm Flexion*)

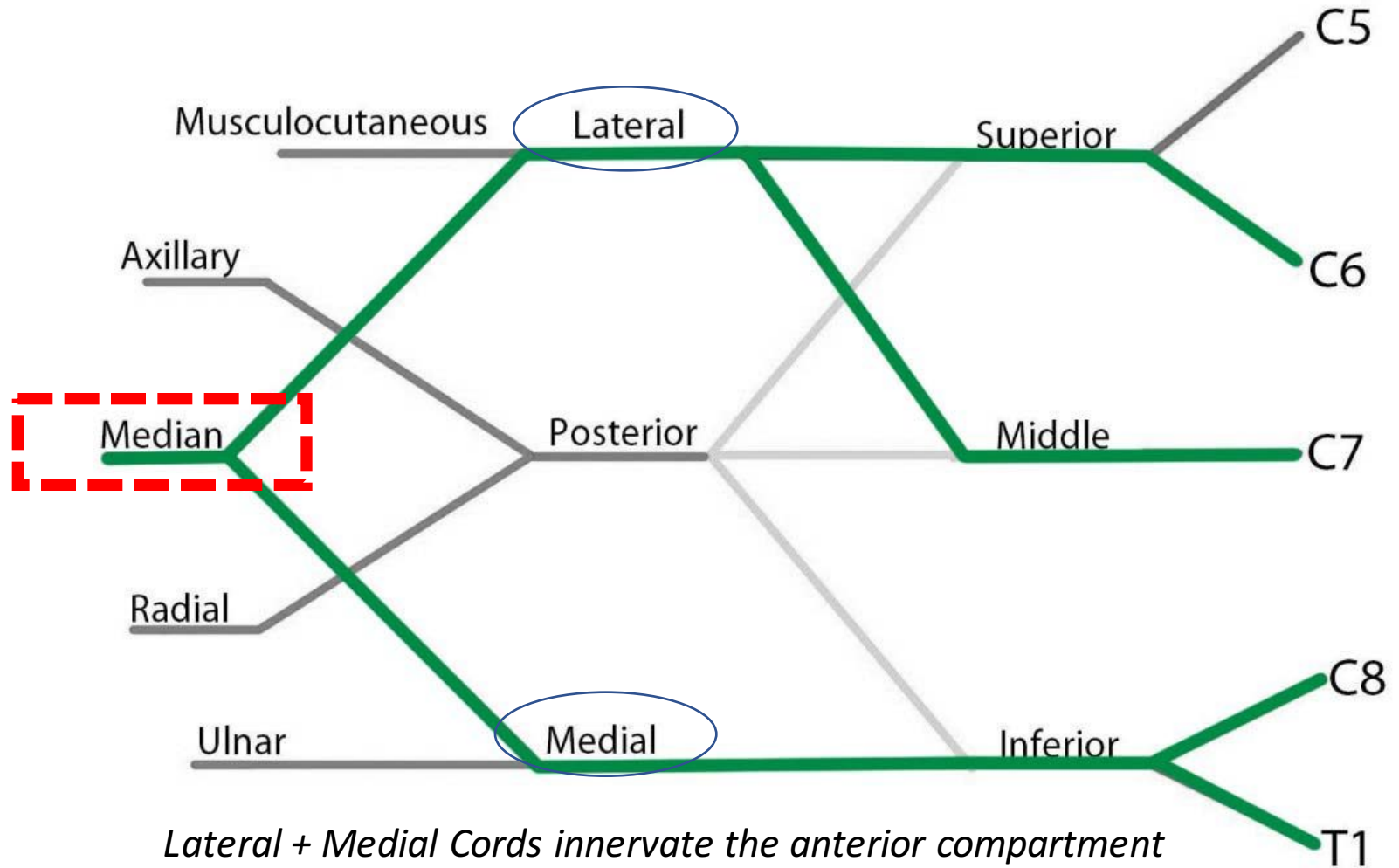
②

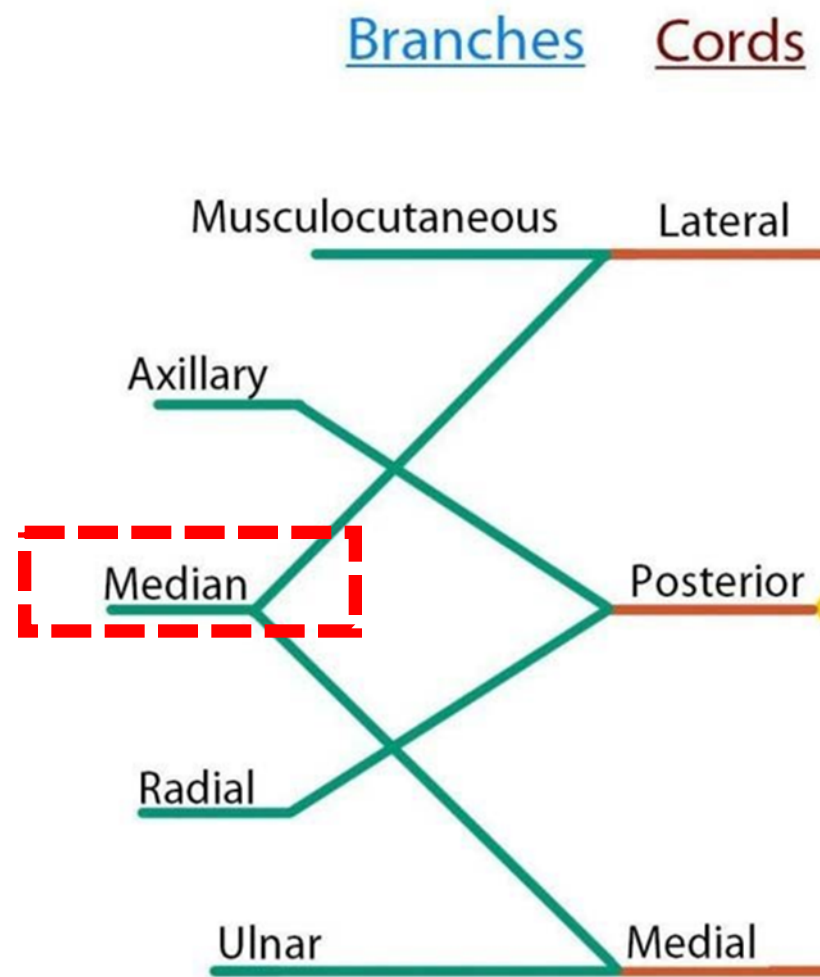
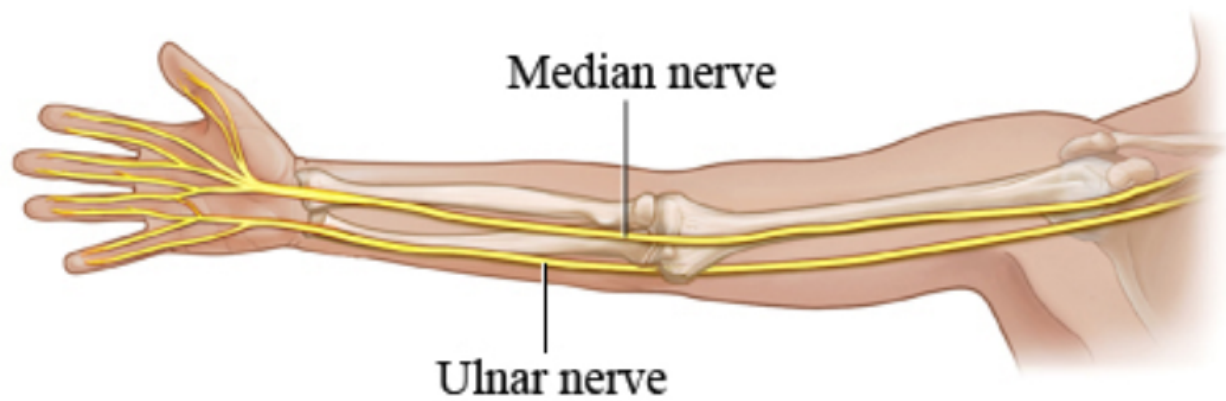
Axillary (*Flat deltoid with ↓ Abduction*)
Radial (*Wrist drop, ↓ Elbow Extension*)

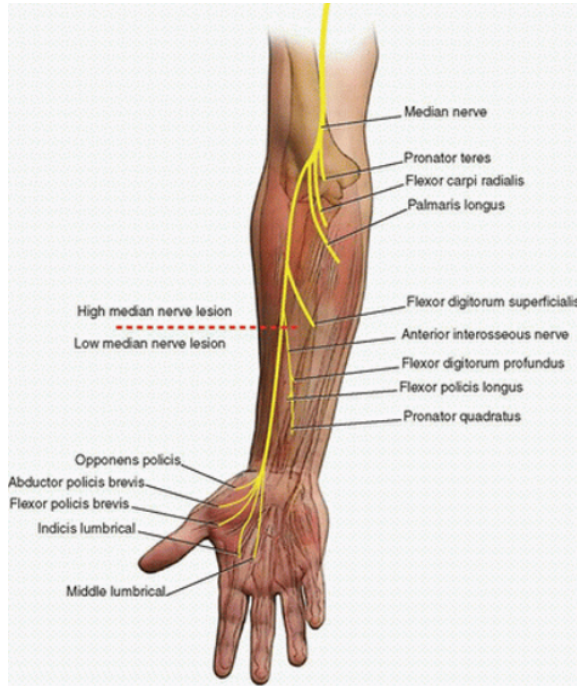
③

Median and Ulnar n.

Median Nerve C5-T1

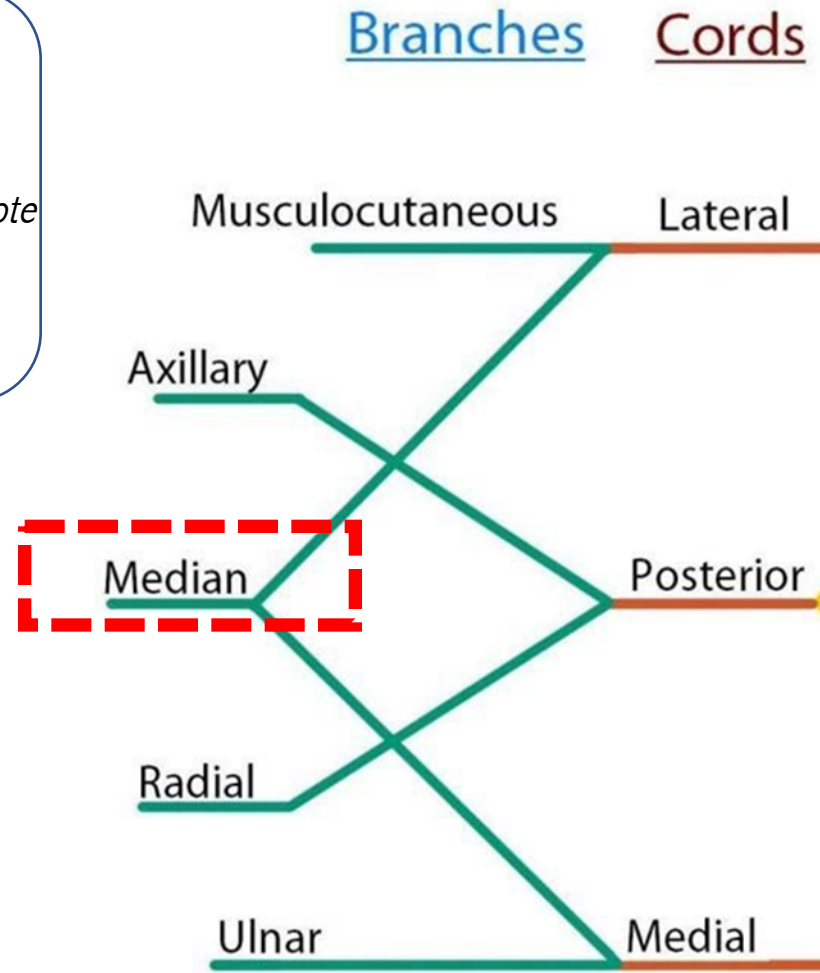






Motor innervation:

- ALL flexor and pronator muscles in **anterior** compartment of forearm (*note exceptions*)

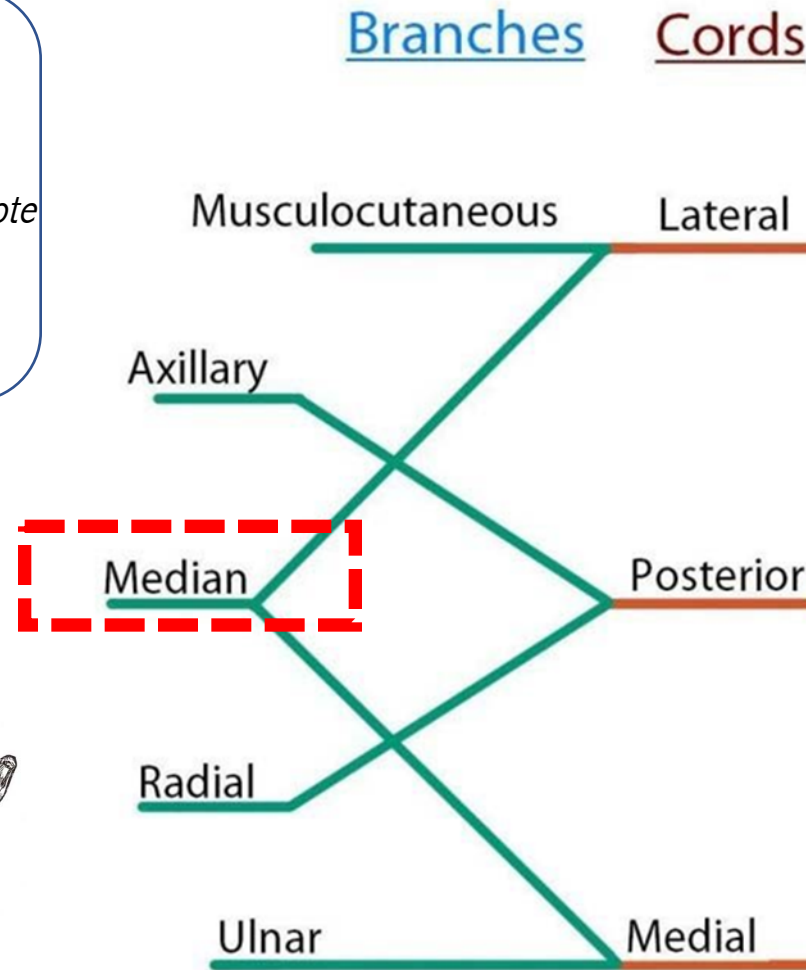
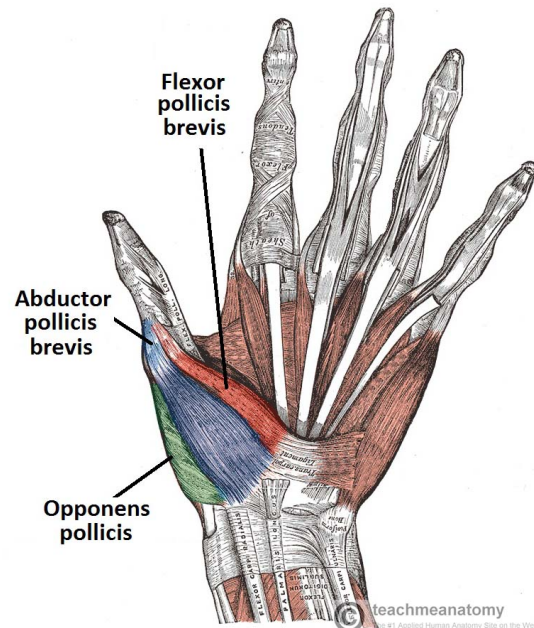


Wrist curls

Motor innervation:

- ALL flexor and pronator muscles in **anterior** compartment of forearm (*note exceptions*)
- **LOAF**: Thenar muscles + lateral two lumbricals

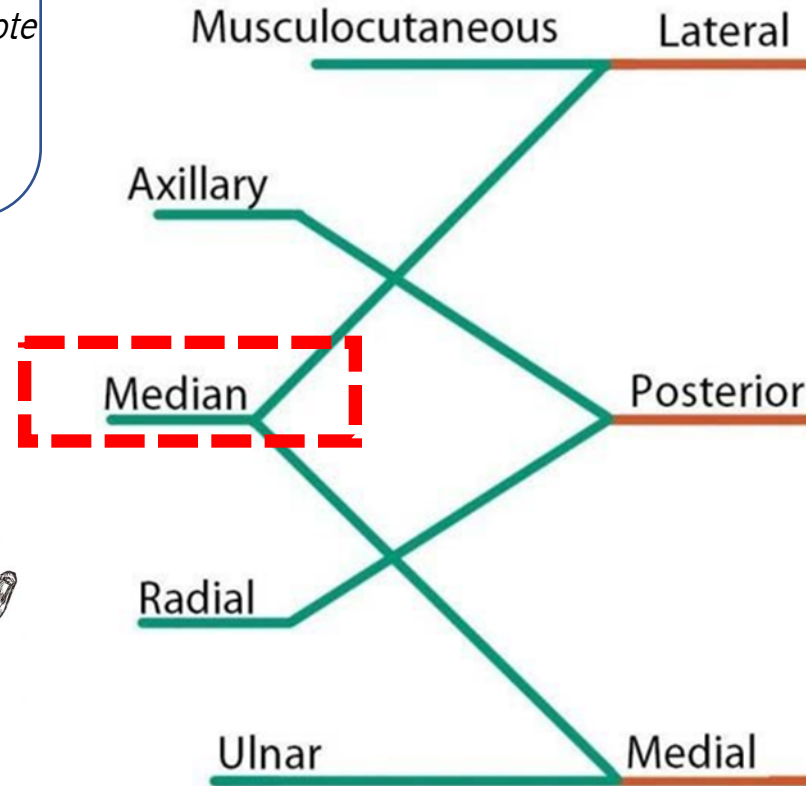
L: lateral two lumbricals
O: opponens pollicis
A: Abductor pollicis brevis
F: flexor pollicis brevis



Motor innervation:

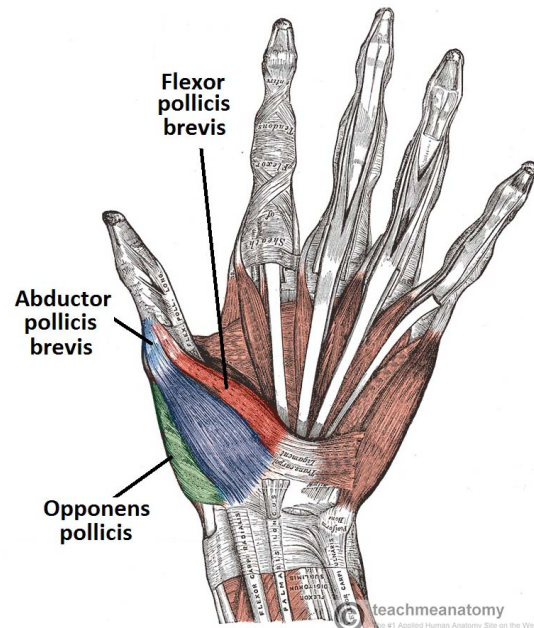
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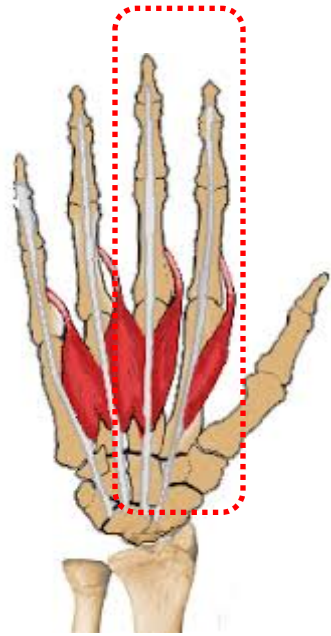
Branches Cords



- Thenar muscles {
- L**: lateral two lumbricals
 - O**: opponens pollicis
 - A**: Abductor pollicis brevis
 - F**: flexor pollicis brevis

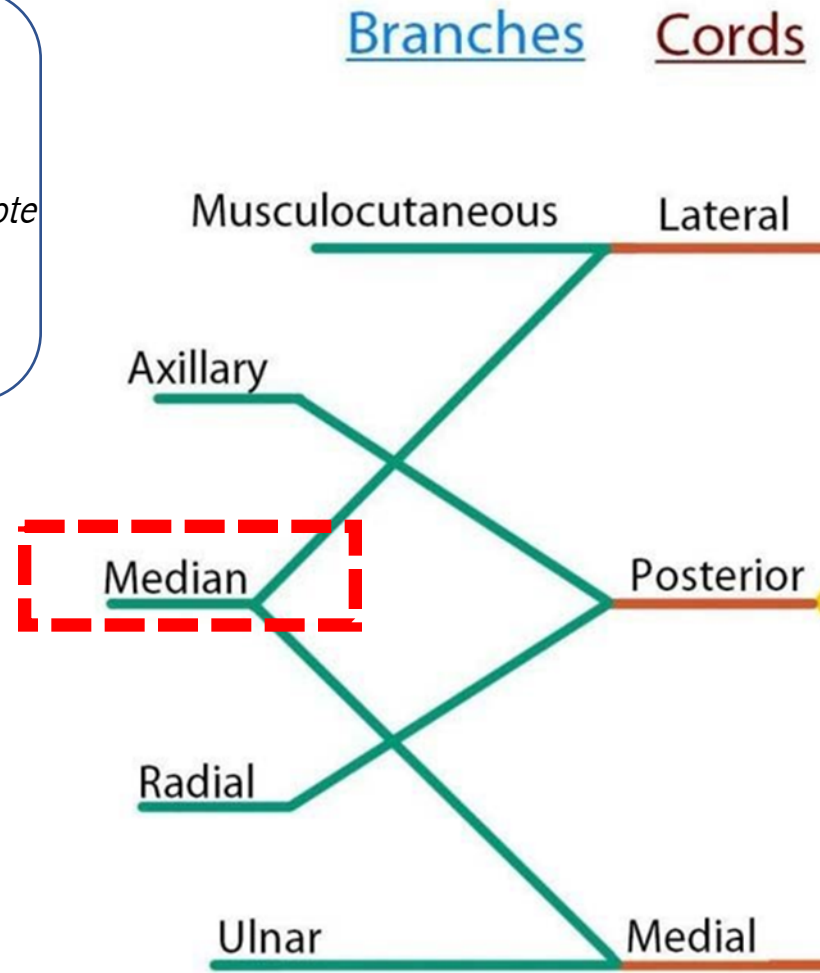
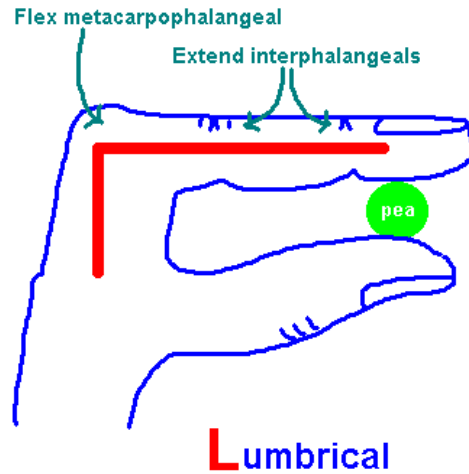
OAF (thumb): **O**ppose, **A**bduct, **F**lex

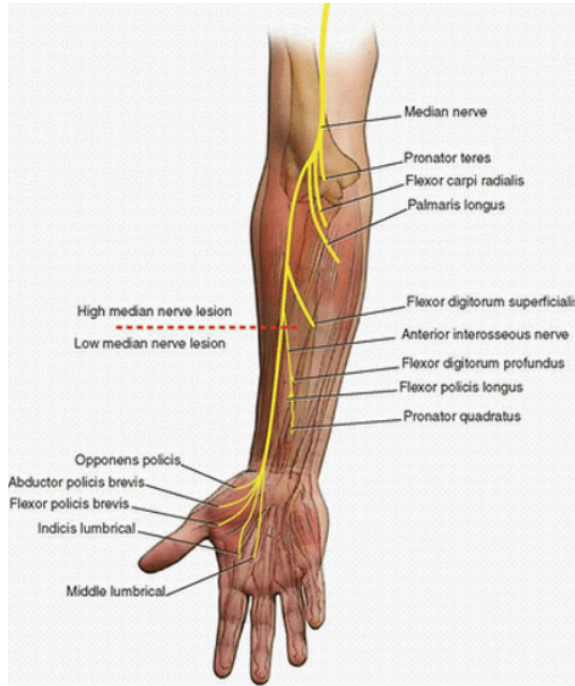




Motor innervation:

- ALL flexor and pronator muscles in **anterior** compartment of forearm (*note exceptions*)
- **LOAF**: Thenar muscles + lateral two lumbricals





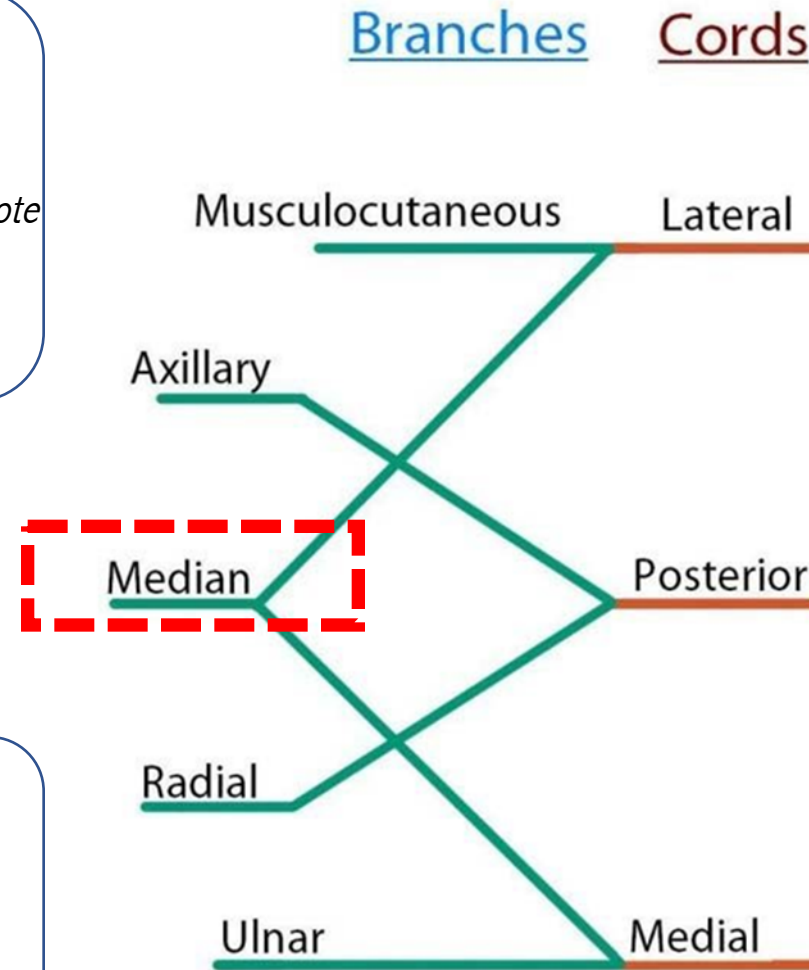
Motor innervation:

- ALL flexor and pronator muscles in **anterior** compartment of forearm (*note exceptions*)
- Thenar muscles + first two lumbricals



Sensory innervation:

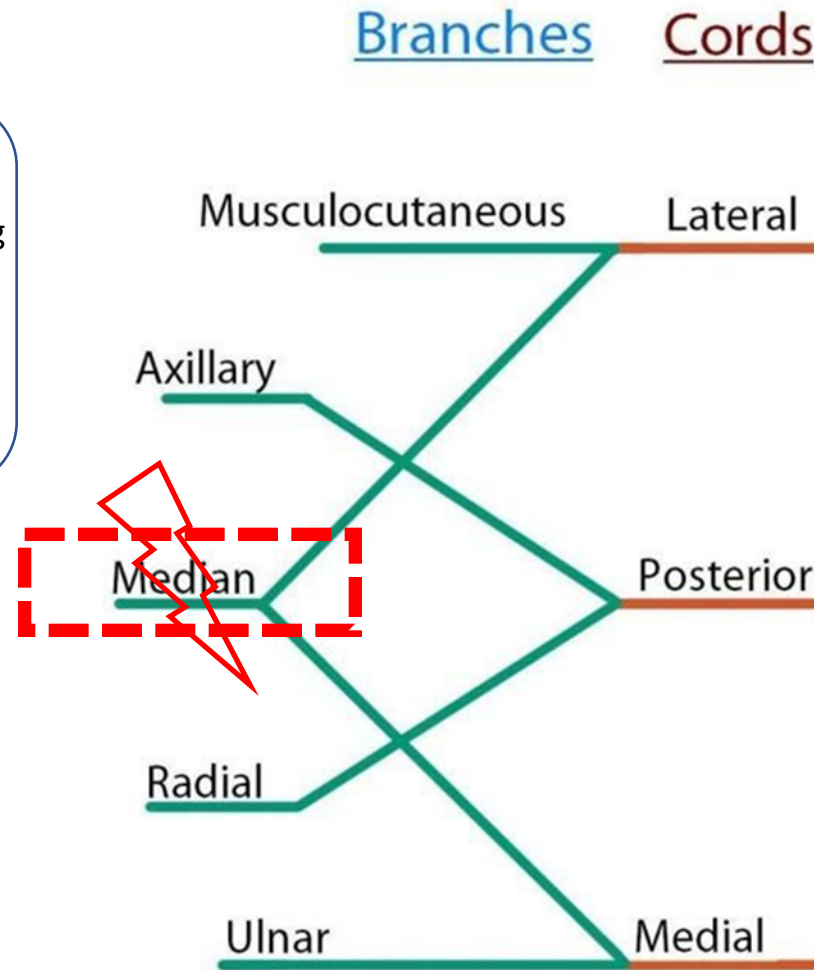
- **Lateral** 3 ½ fingers on palmar surface
- **Thenar** eminence





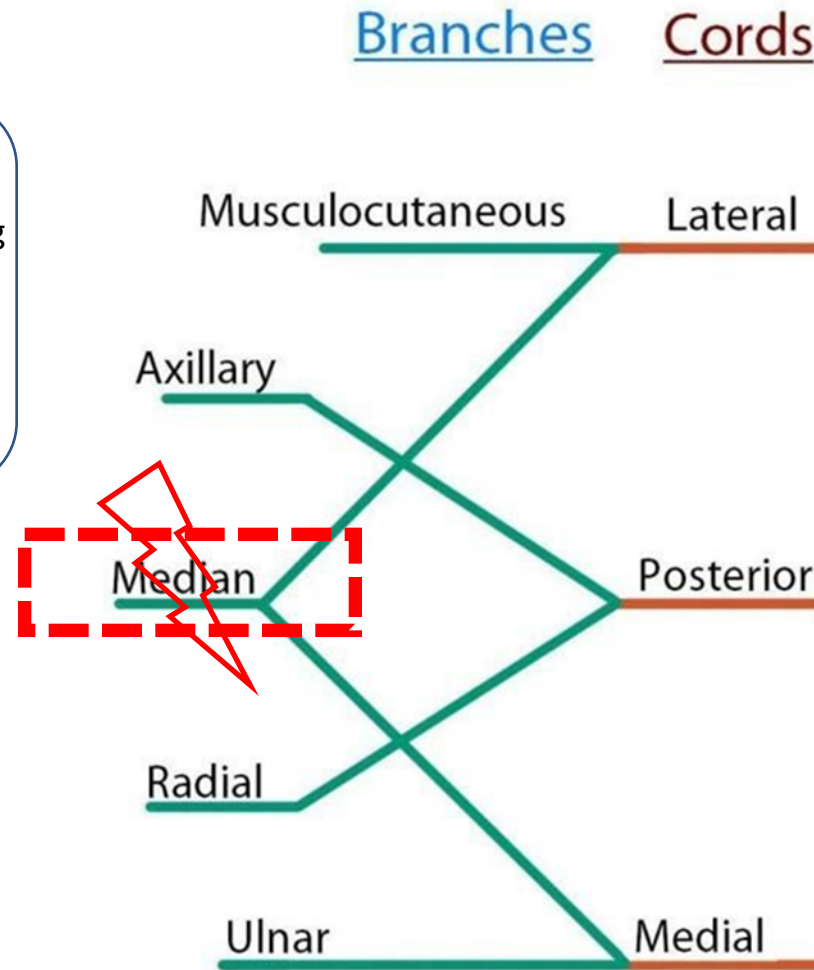
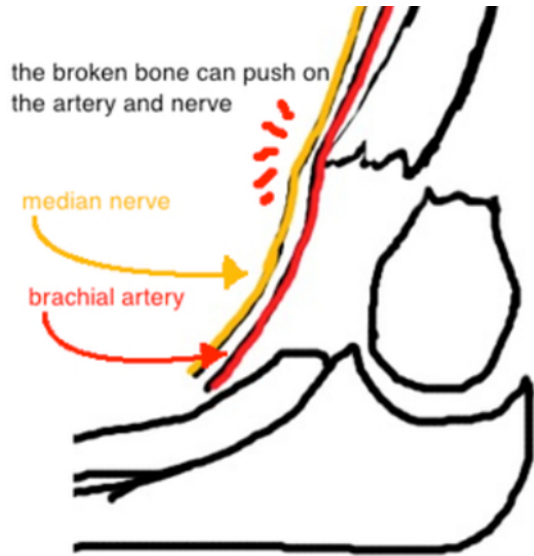
Injury Proximal:

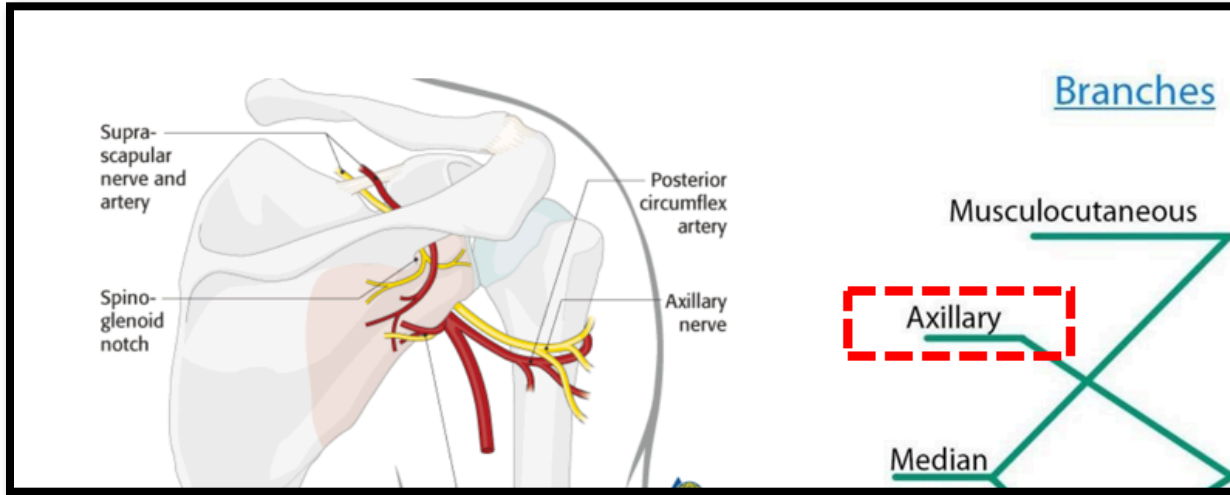
- “Hand of Benediction” making fist
- Weakness w/ flexion of wrist, 2nd, 3rd digits
- *Weakness with thumb opposition (Ape’s hand)*



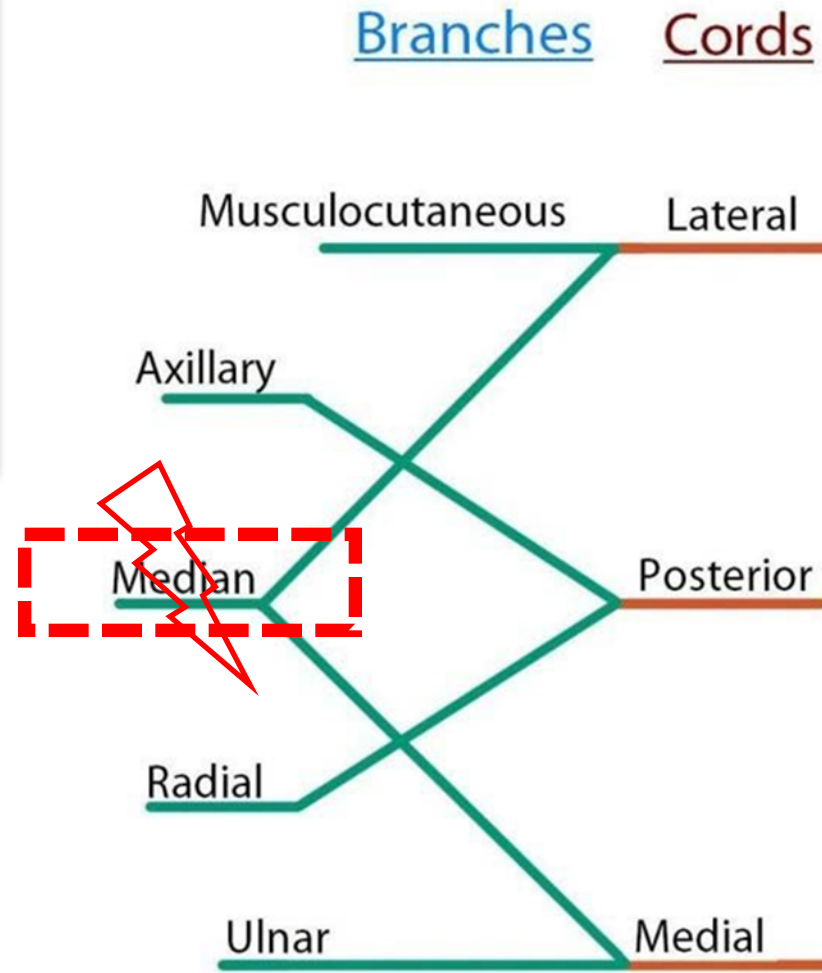
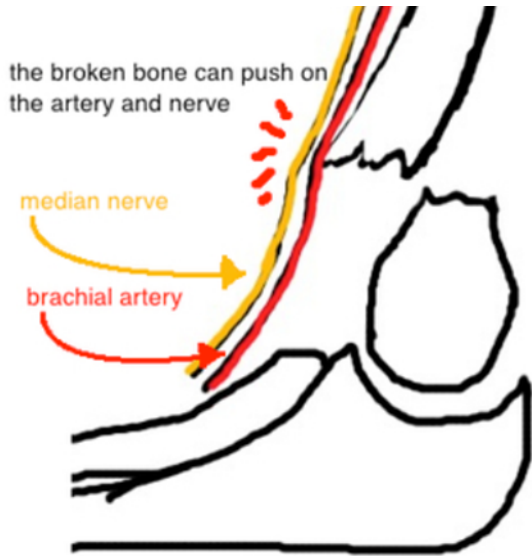
Injury Proximal:

- “Hand of Benediction” making fist
- Weakness w/ flexion of wrist, 2nd, 3rd digits
- Weakness with thumb opposition (Ape’s hand)





Damaged vessel (overlap) with the branches of the brachial plexus



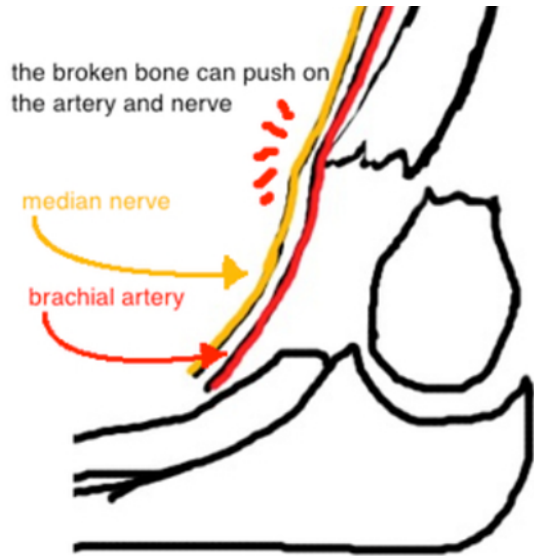
OAF (thumb): Oppose, Abduct, Flex



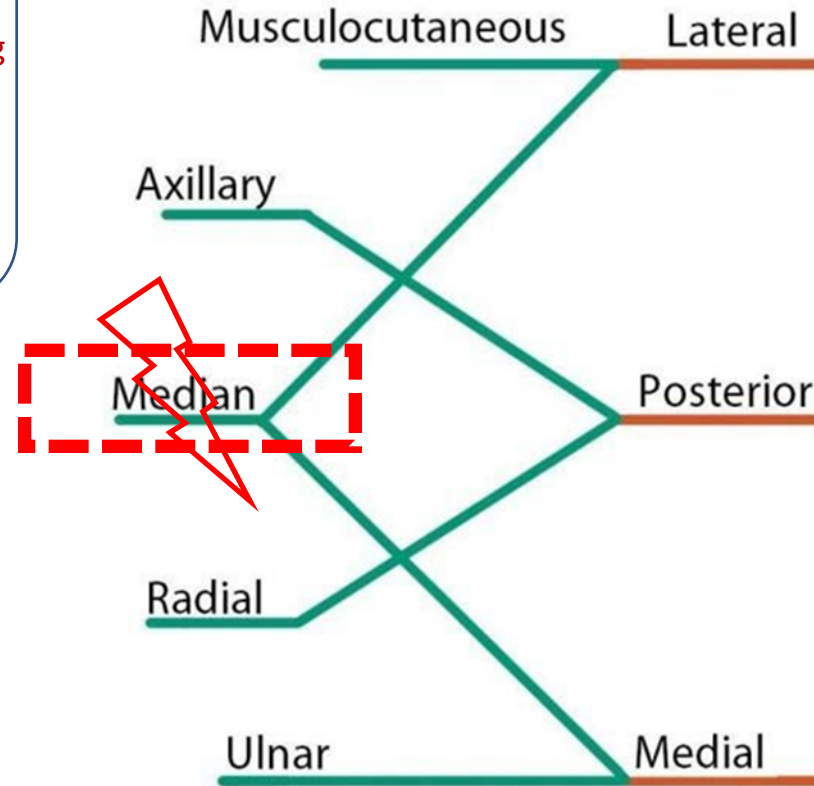
Proximal Median N. Injury - can't FLEX 2nd and 3rd fingers

Injury Proximal:

- “Hand of Benediction” making fist
- Weakness w/ flexion of wrist, 2nd, 3rd digits
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Branches Cords

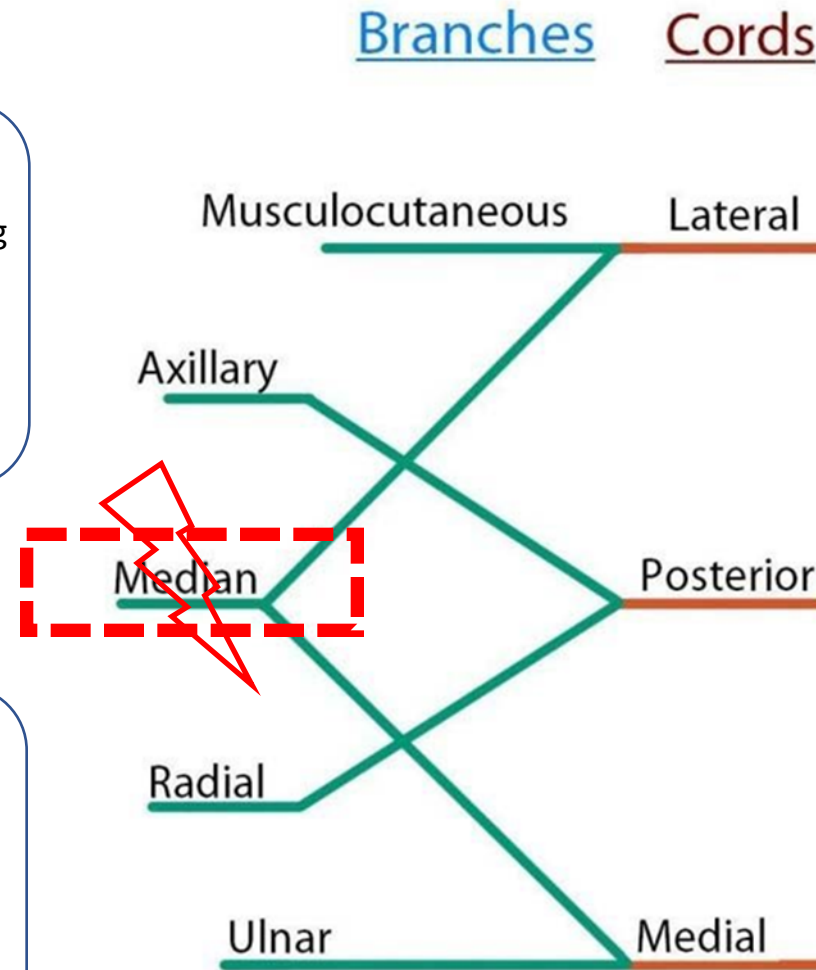


Injury Proximal:

- “Hand of Benediction” making fist
- Weakness w/ flexion of wrist, 2nd, 3rd digits
- Weakness with thumb opposition (Ape’s hand)

Injury Distal:

- *Median Claw Hand @ REST*
- *Weakness with thumb opposition*
- *Thenar atrophy*
- **Wrist flexion NORMAL**





Proximal **Median N.** Injury - can't **FLEX** 2nd and 3rd fingers

Injury Proximal:

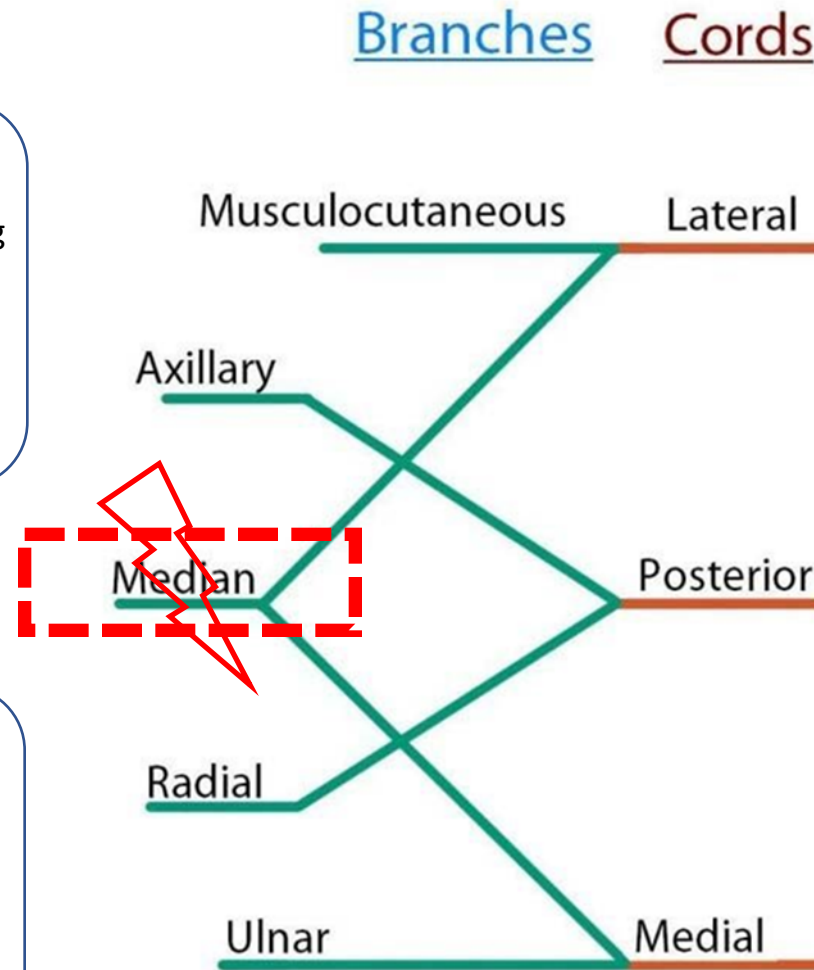
- “Hand of Benediction” making fist
- Weakness w/ flexion of wrist, 2nd, 3rd digits
- Weakness with thumb opposition (Ape’s Hand)

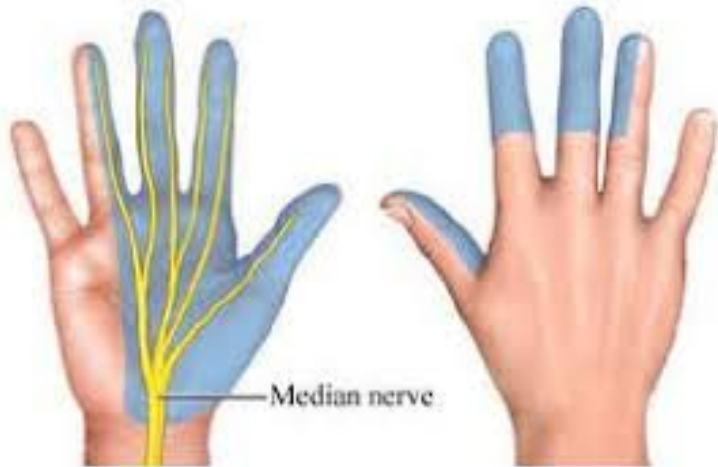
Injury Distal:

- **Median Claw Hand @ REST**
- Weakness with thumb opposition
- Thenar atrophy
- *Wrist flexion* **NORMAL**



Distal **Median N.** Injury - can't **EXTEND** 2nd and 3rd fingers





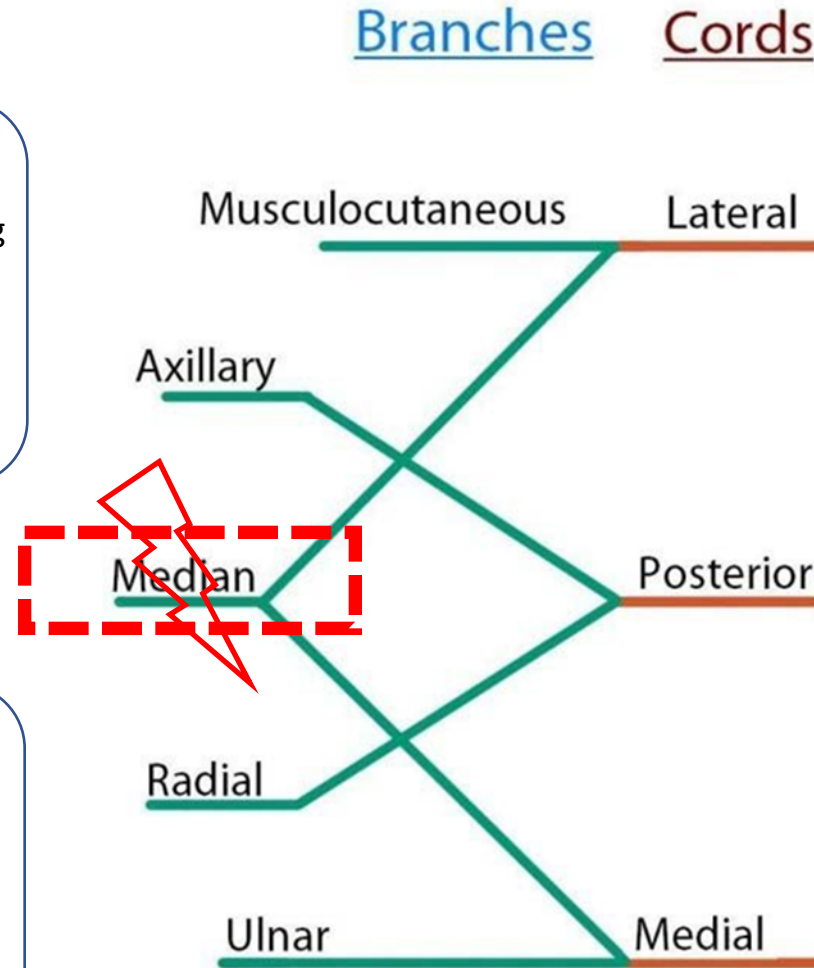
Median nerve

Injury Proximal:

- “Hand of Benediction” making fist
- Weakness w/ flexion of wrist, 2nd, 3rd digits
- Weakness with thumb opposition (Ape’s Hand)

Injury Distal:

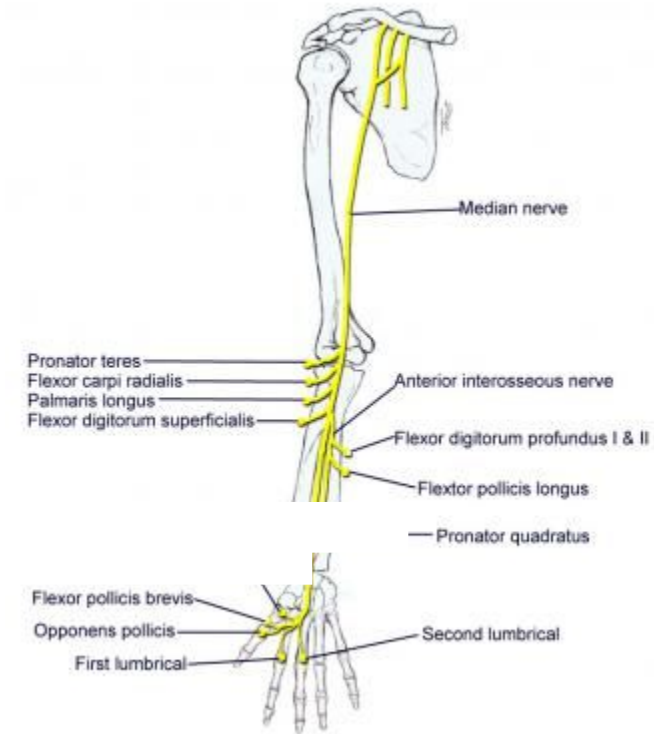
- **Median Claw Hand @ REST**
- Weakness with thumb opposition
- Thenar atrophy
- Wrist flexion NORMAL



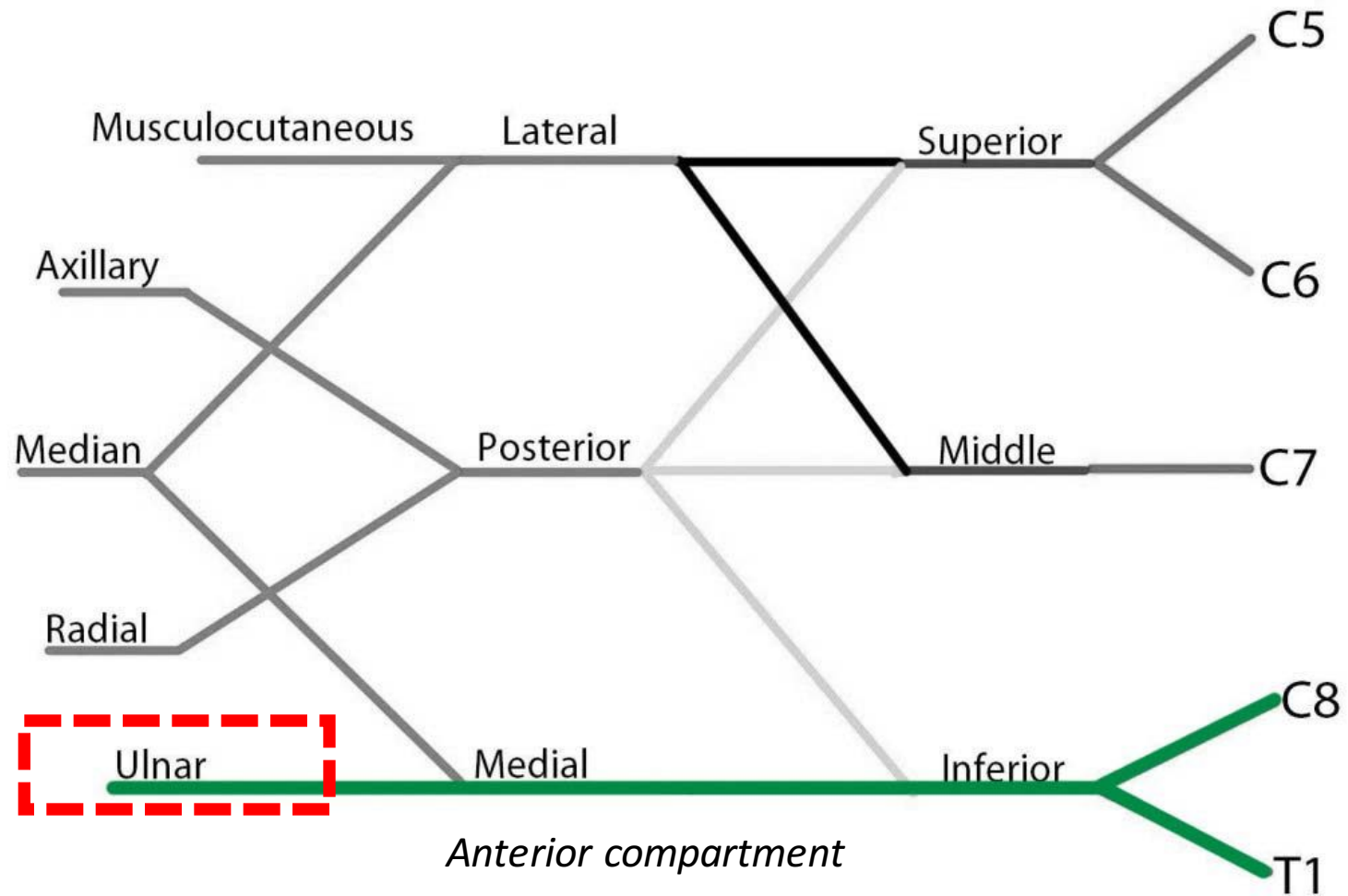
SUMMARY

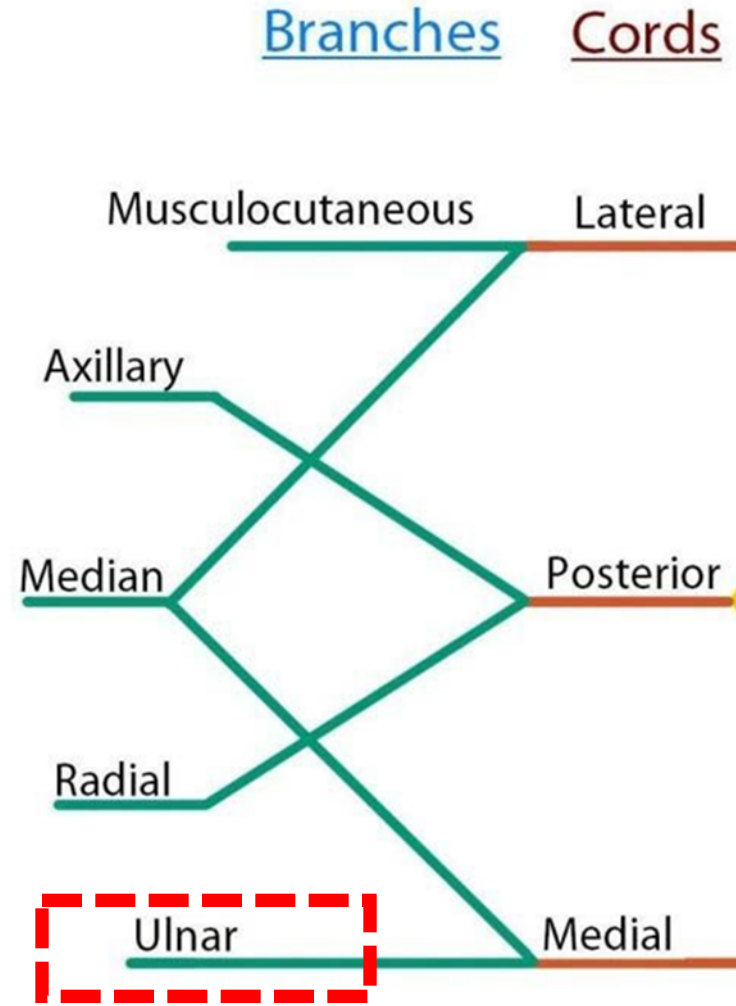
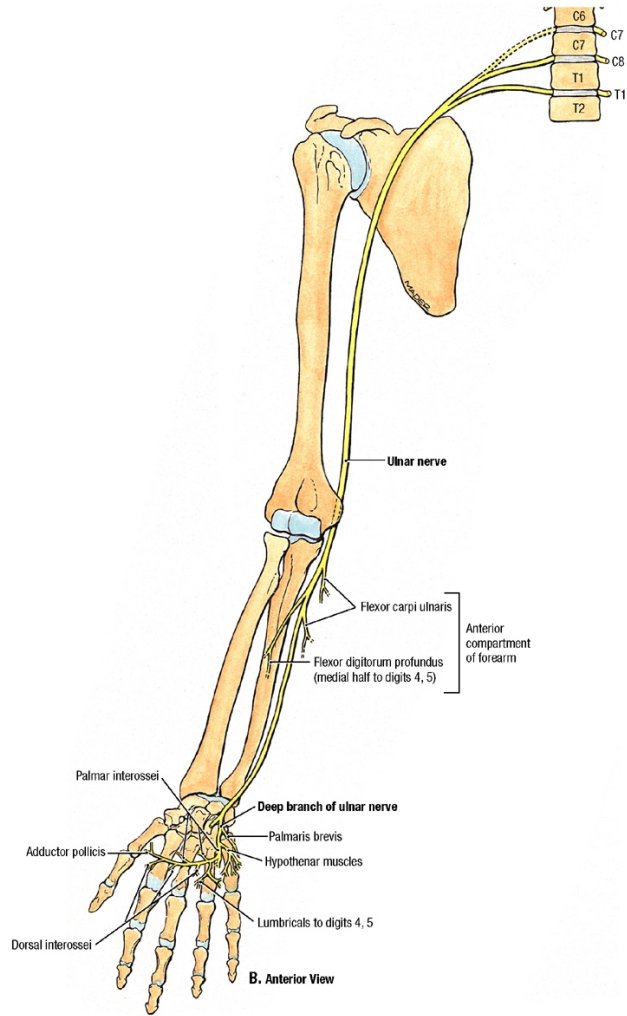
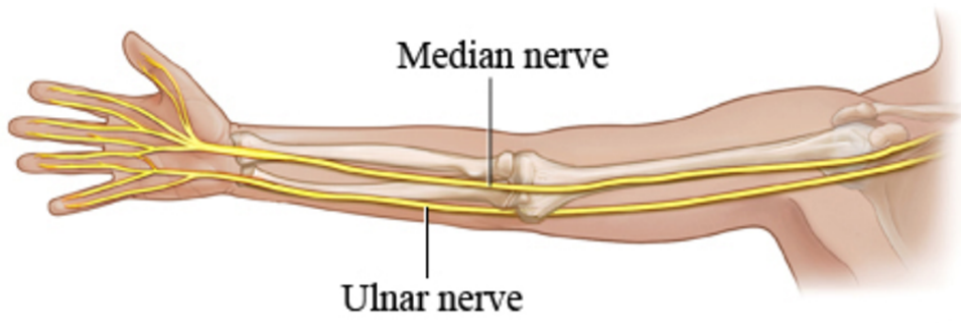
Median Nerve C5-T1

- **Course:** Medial + Lateral Cord. Medially along upper arm and travels next to **brachial artery**. Passes through carpal tunnel.
- **Motor Innervation:** All **flexor** compartment muscles of **forearm except** FCU and ½ FDP. LOAF muscles: three muscles of thenar eminence responsible for thumb abduction, flexion, and opposition + two lateral lumbricals.
- **Sensory Innervation:** Palmar and superior dorsal sensation for lateral 3½ fingers
- **Injury:** Carpal tunnel syndrome, Supracondylar fx of humerus, wrist lac
 - 1) *Proximal* Median Nerve Injury: **Hand of Benediction when making fist**
 - 2) *Distal* Median Nerve Injury: Median **“Claw” @ rest** + Thenar atrophy



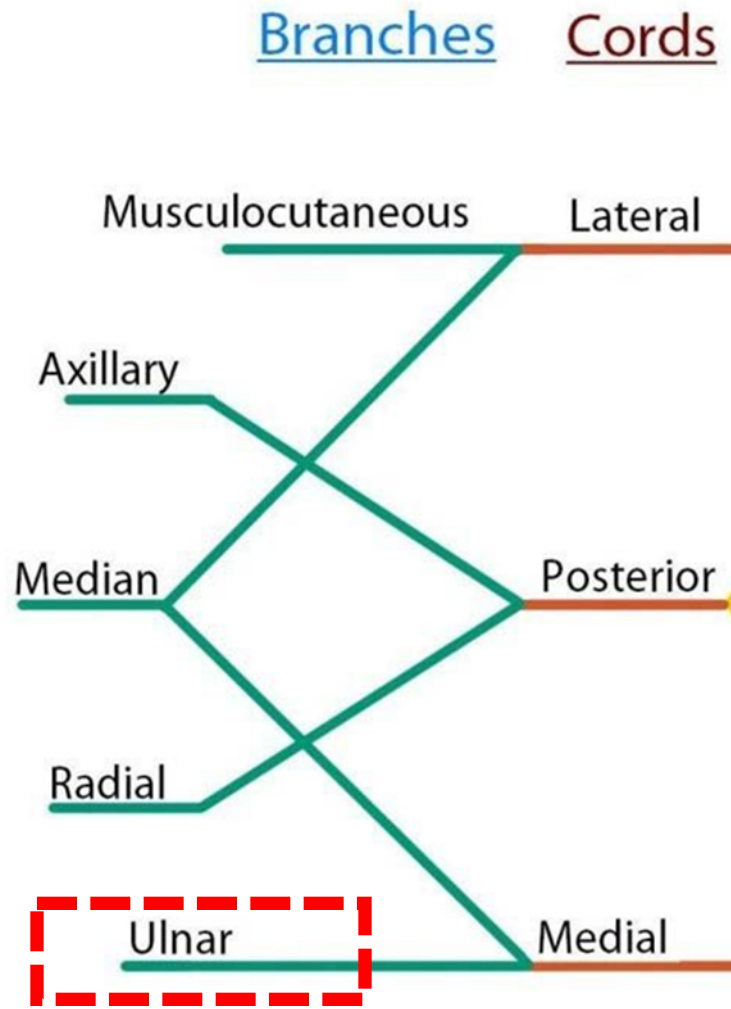
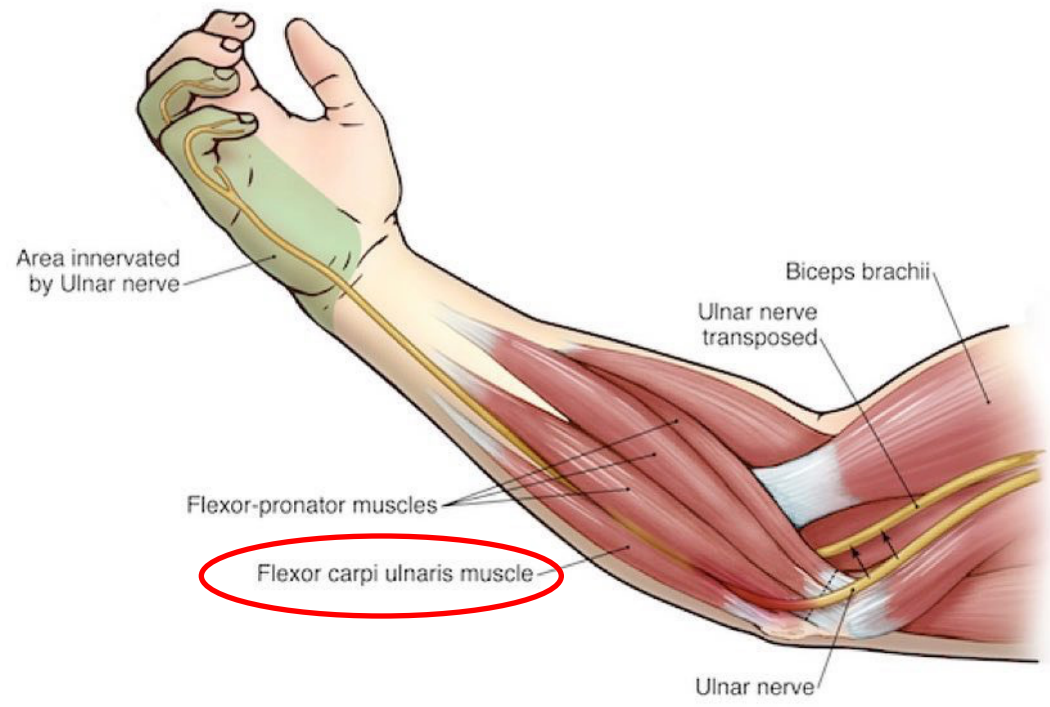
Ulnar Nerve C8-T1



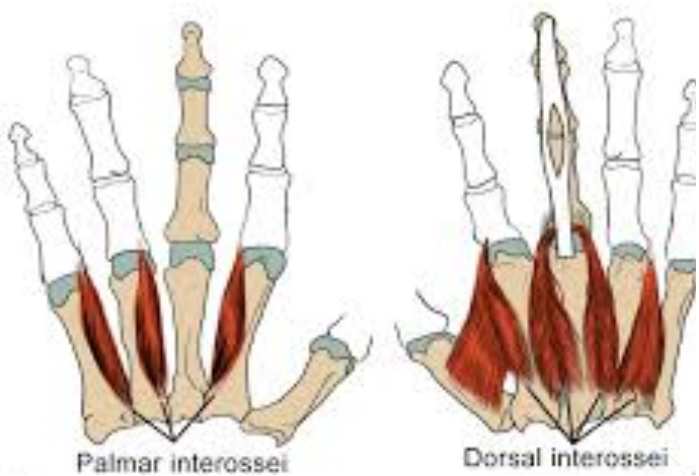


Motor innervation:

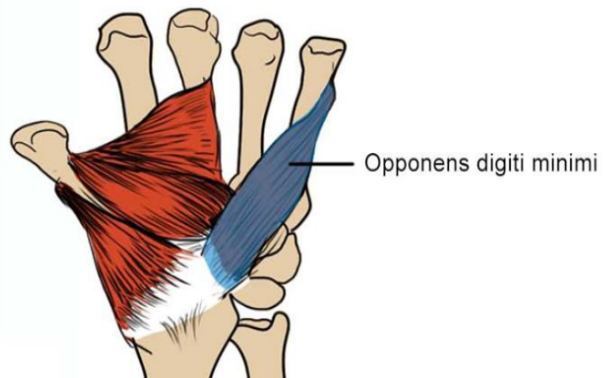
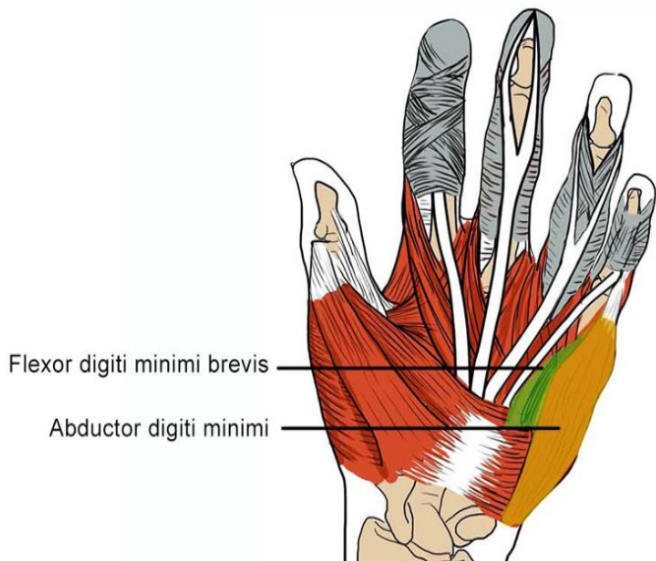
- **medial** forearm flexors



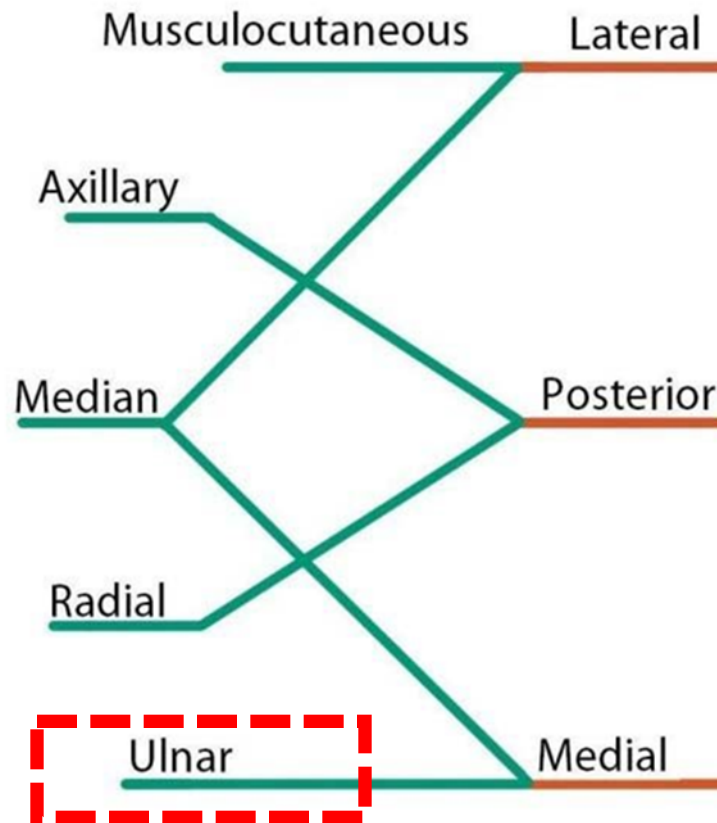
Interossei of the Hand



- Motor innervation:
- **medial** forearm flexors
 - **hyp**othenar muscles,
 - 3rd and 4th Lumbricals
 - interosseous muscles of hand



Branches Cords





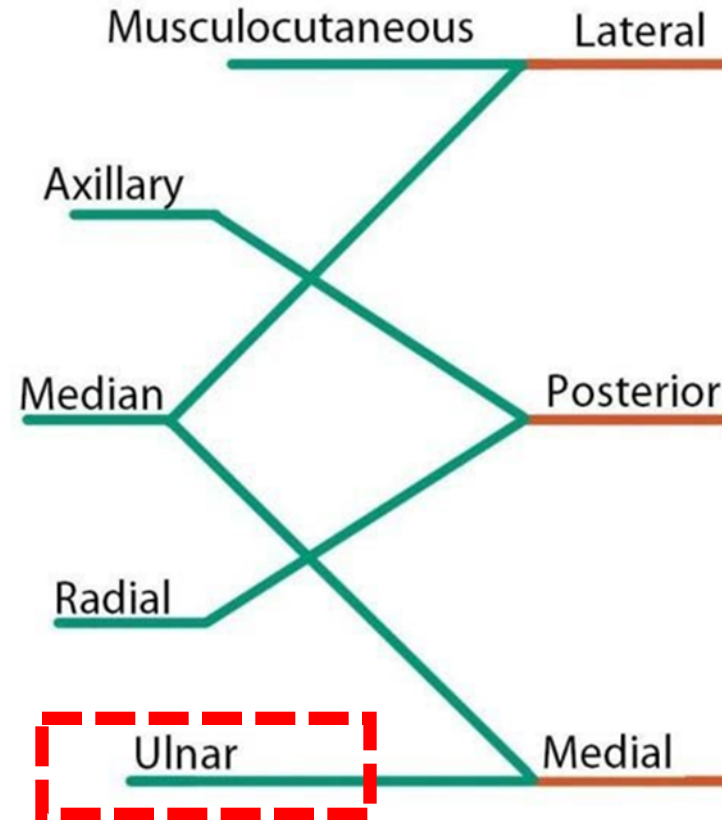
Motor innervation:

- **medial** forearm flexors
- **hyp**othenar muscles, 3rd and 4th lumbricals
- ALL **interosseous** muscles of hand

Sensory innervation:

- Dorsal and Palmar sensation for **medial 1½ fingers**

Branches Cords

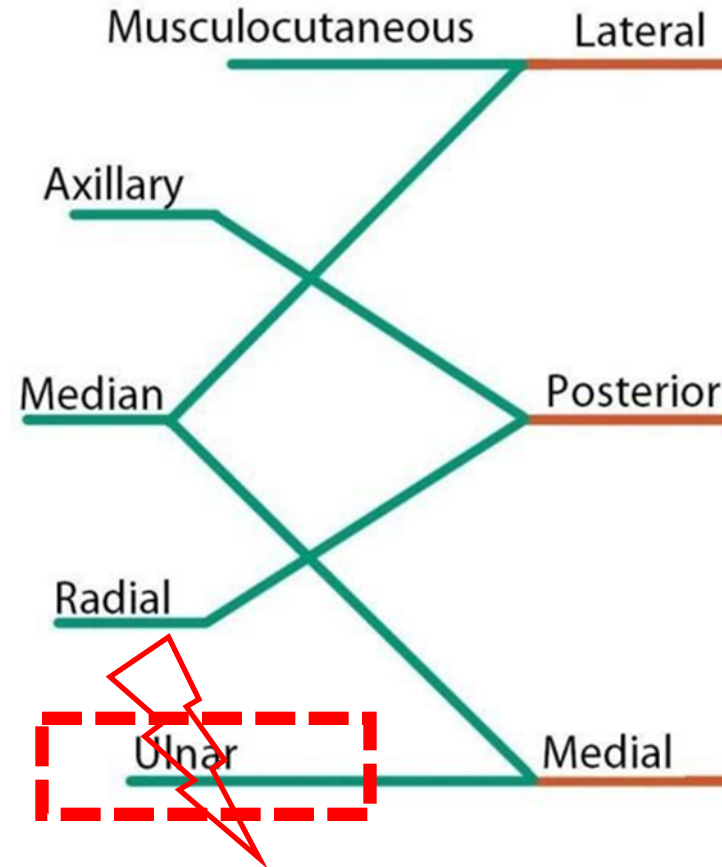




Injury Proximal:

- Weakness w/ wrist flexion and flexion of 4th and 5th digits
- Loss of adduction + abduction all fingers

Branches Cords



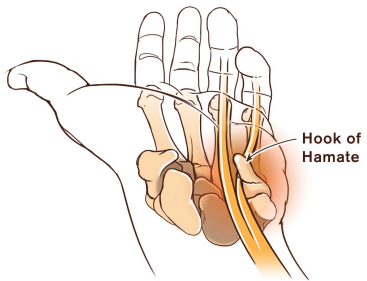


Injury Proximal:

- Weakness w/ wrist flexion and flexion of 4th and 5th digits
- Loss of adduction + abduction all fingers

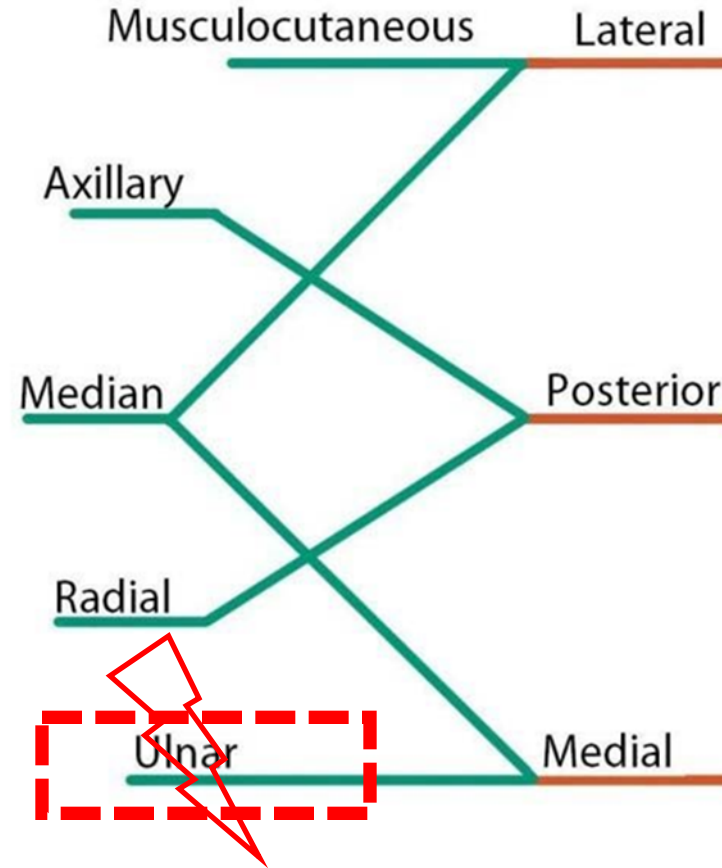
Injury Distal:

- **Claw Hand @ rest**
- Loss of adduction + abduction all fingers



Clawhand

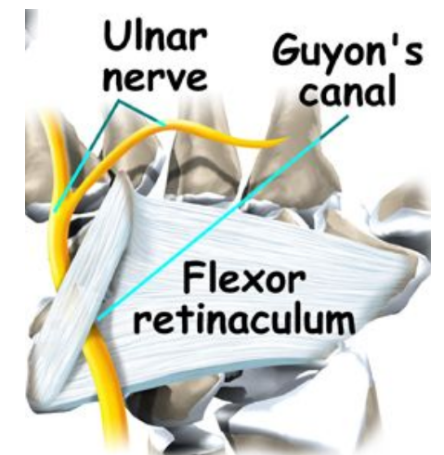
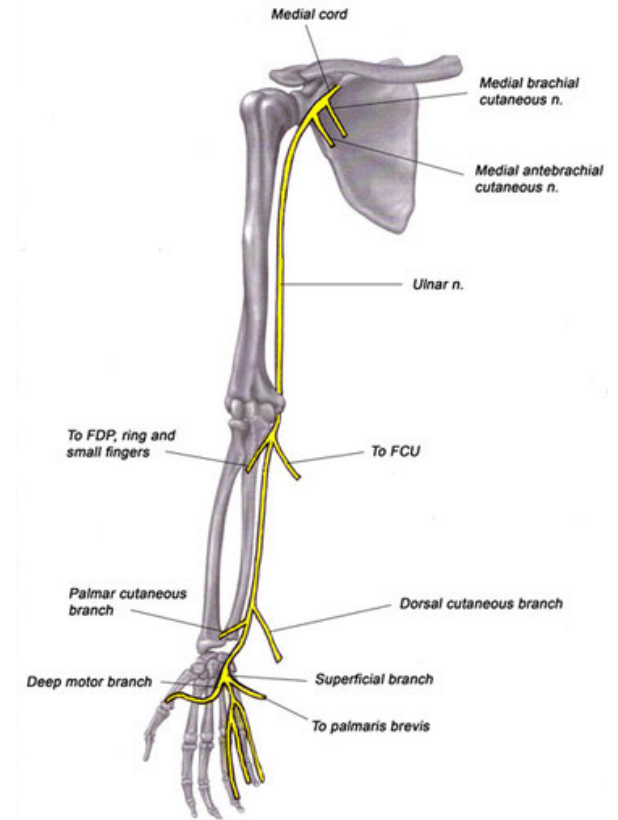
Branches Cords



SUMMARY

Ulnar Nerve C8-T1

- **Course:** Medial Cord. Travels medial then posterior to the **MEDIAL epicondyle**.
- **Motor Innervation:** 2 medial forearm flexors, hypothenar muscles, 3rd and 4th lumbricals, **ALL interosseous** muscles of hand
- **Sensory Innervation:** Dorsal and Palmar sensation for medial 1½ fingers
- **Injury:** Compression from medial epicondyle injury or hook of hamate fx
 - 1) *Proximal* Ulnar Nerve Injury: No Claw @ rest. Loss of sensation over medial 1½ digits
 - 2) *Distal* Ulnar Nerve Injury: Ulnar “**Claw Hand**”. Loss of sensation over medial 1½ digits



Let's Put it All Together

