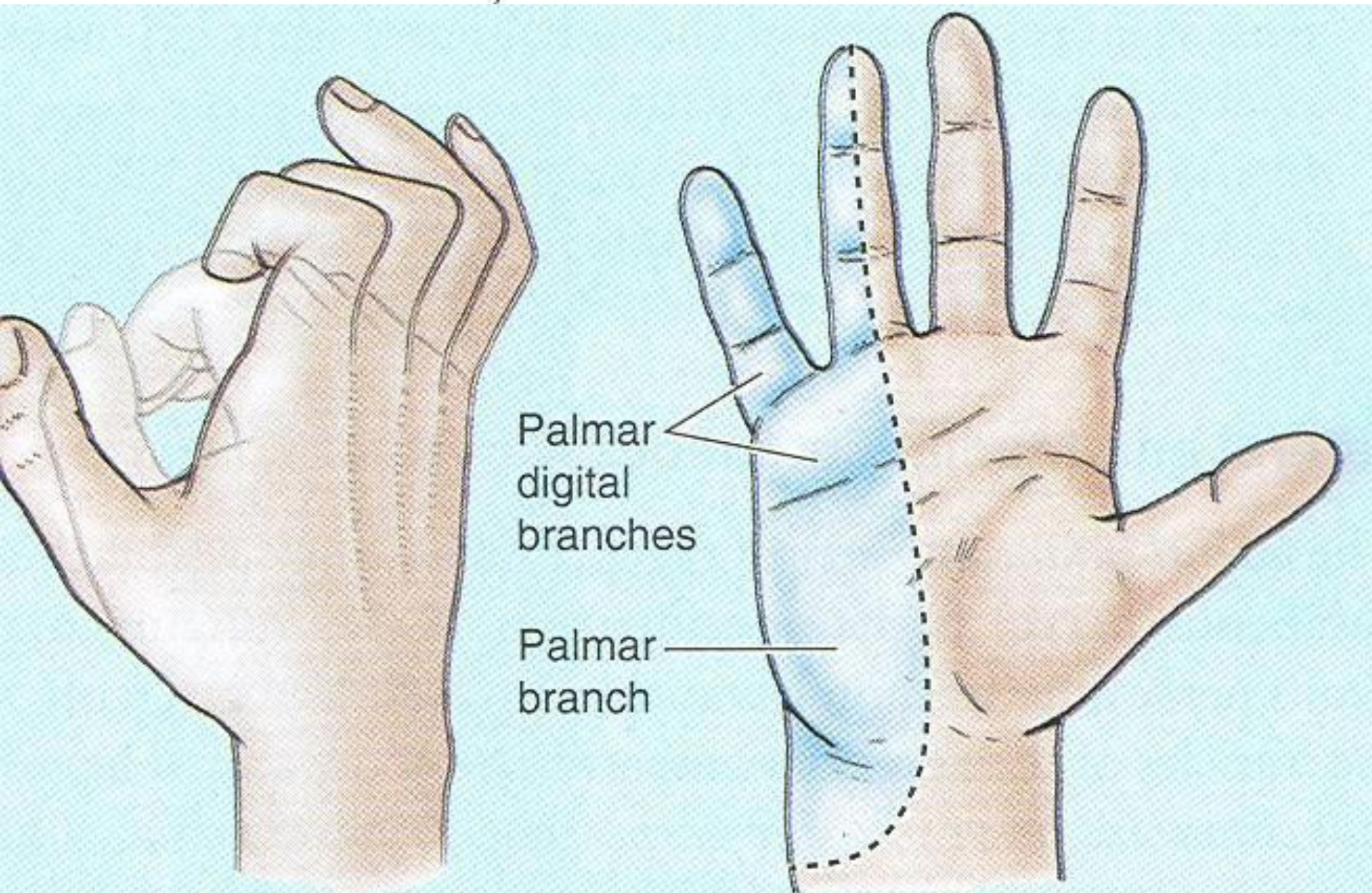


Learning objectives

- Formation of brachial plexus
- Components – roots, trunks, divisions & branches
- Relations – cervical & axillary part
- Main nerves of arm, forearm & hand
- Nerve course, injuries & applied aspects

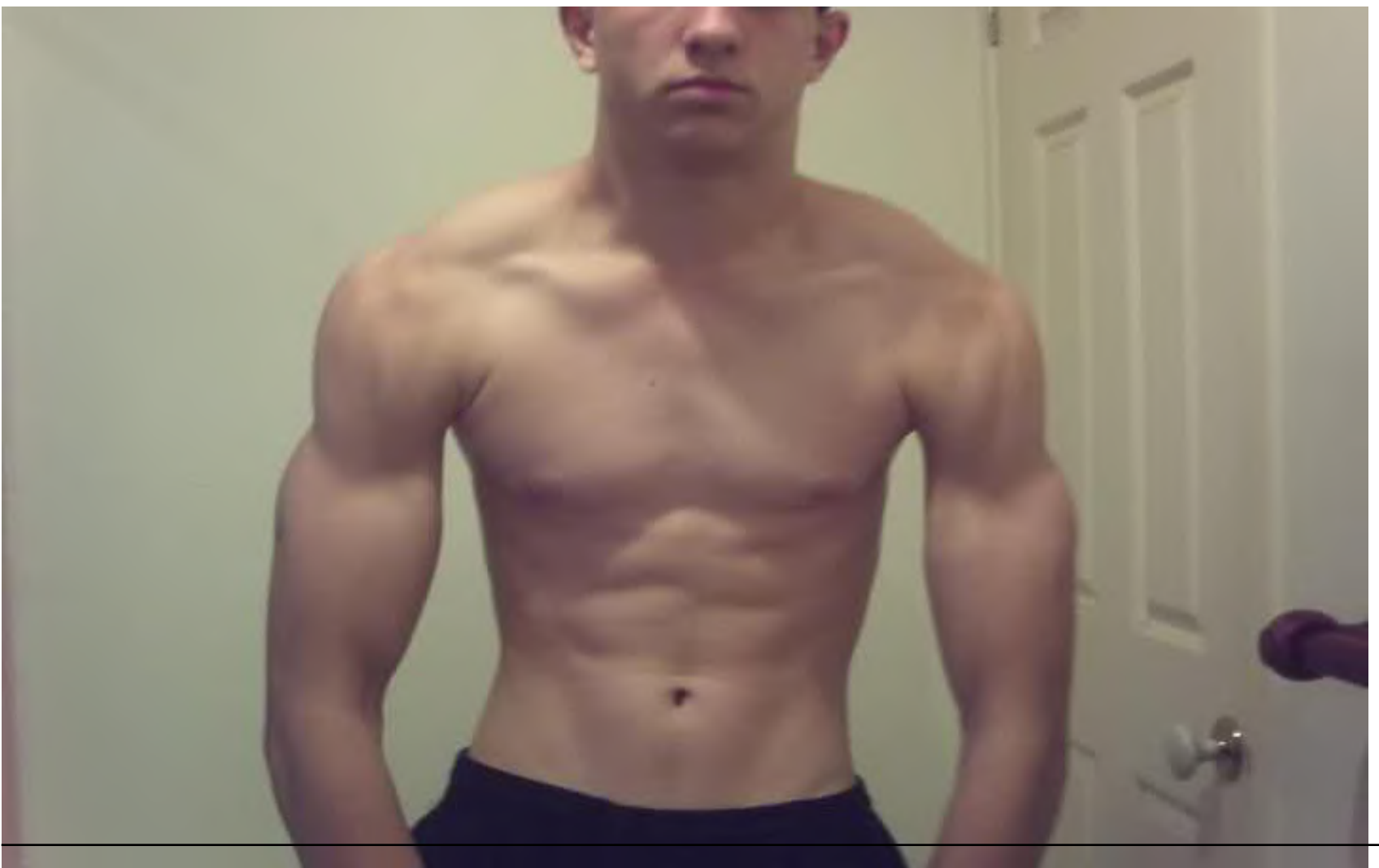
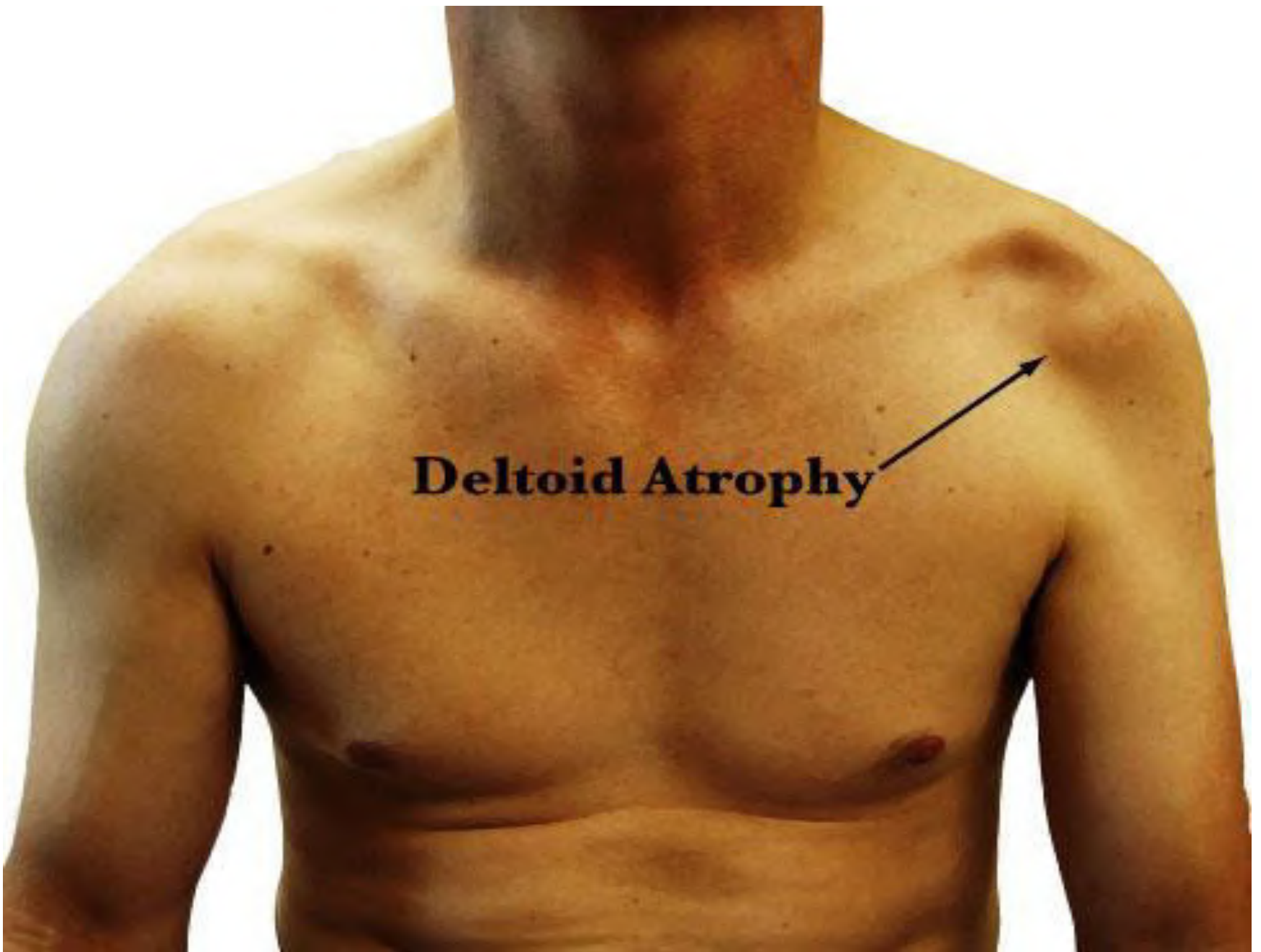




Claw hand and sensory distribution

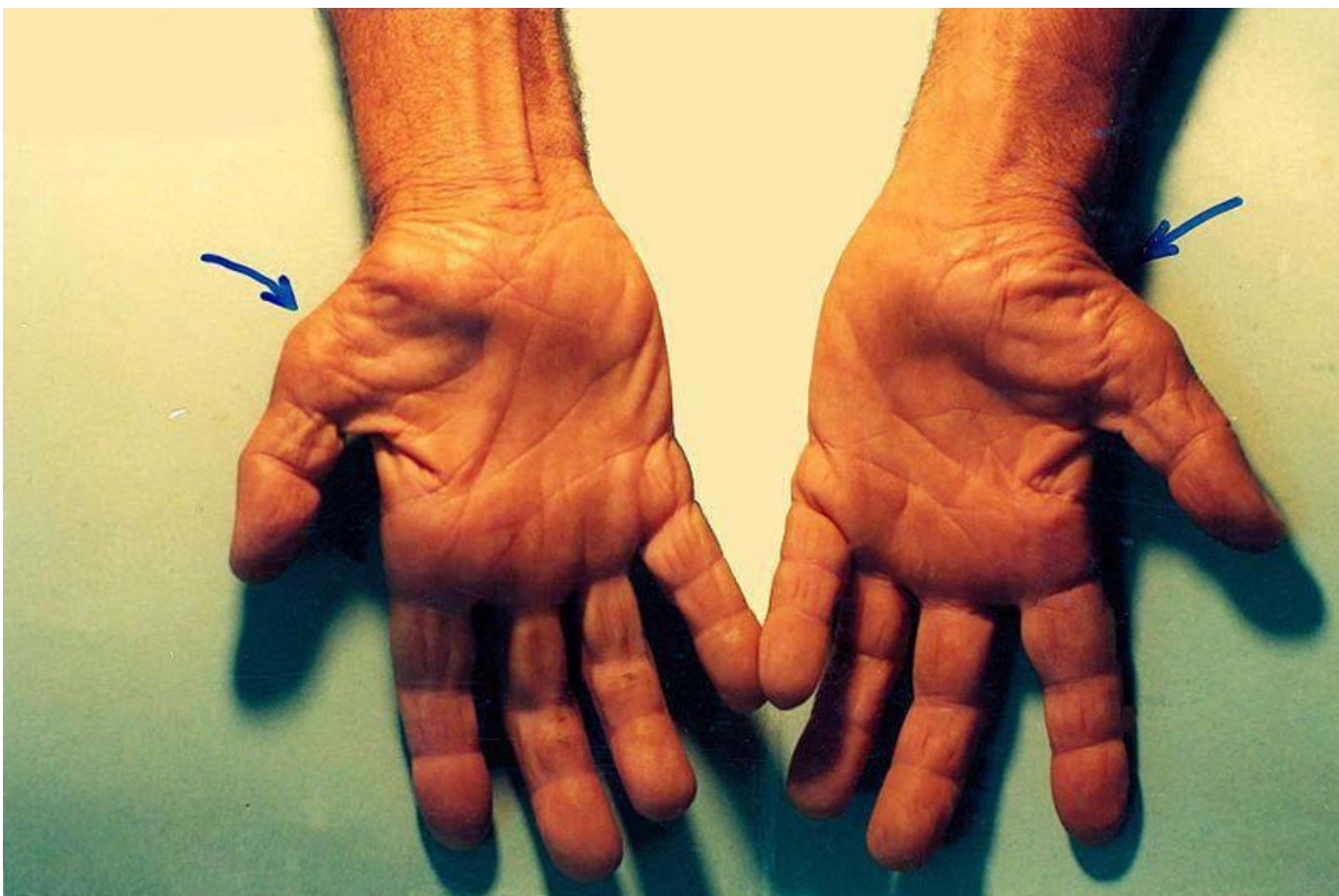


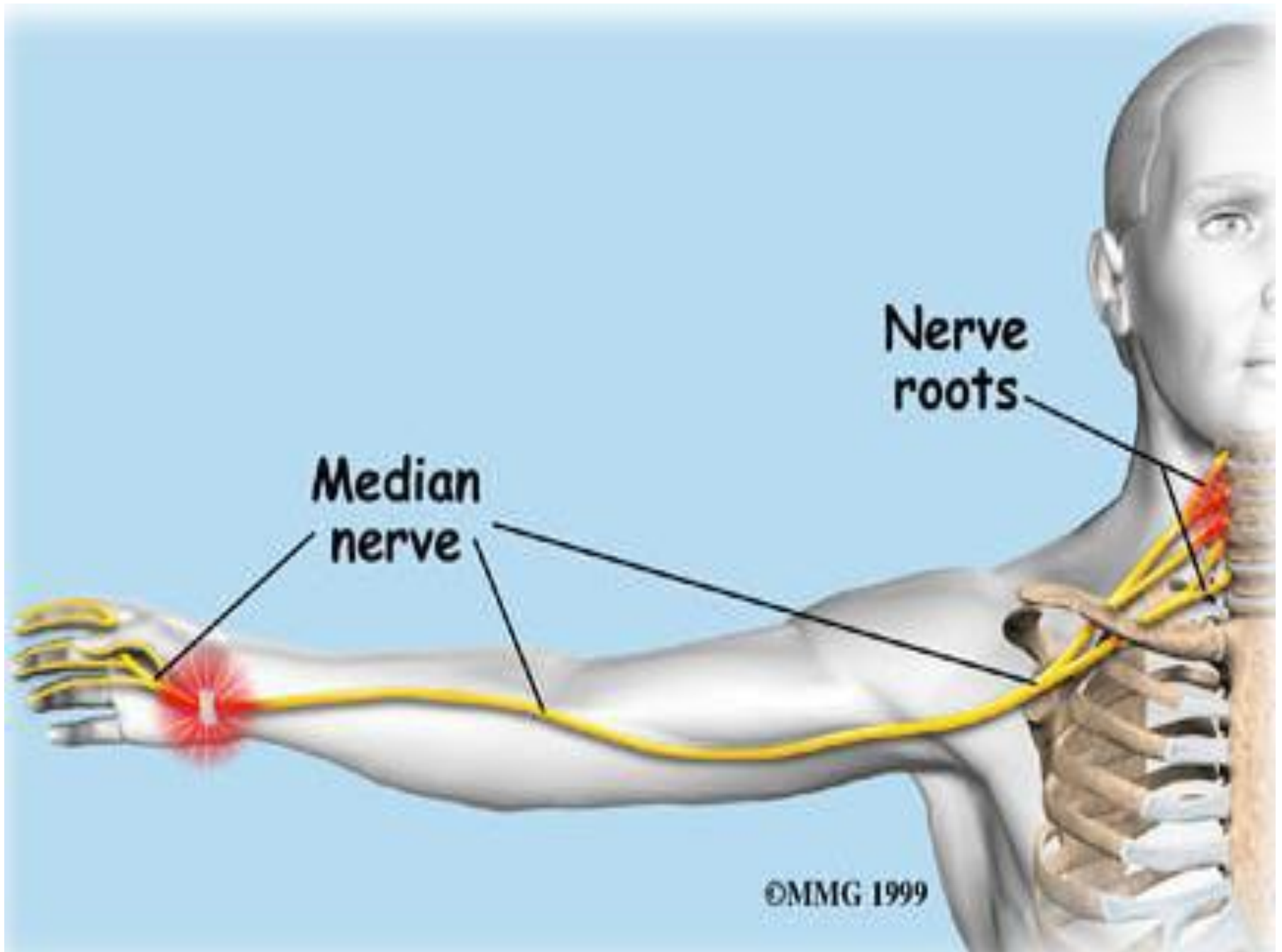




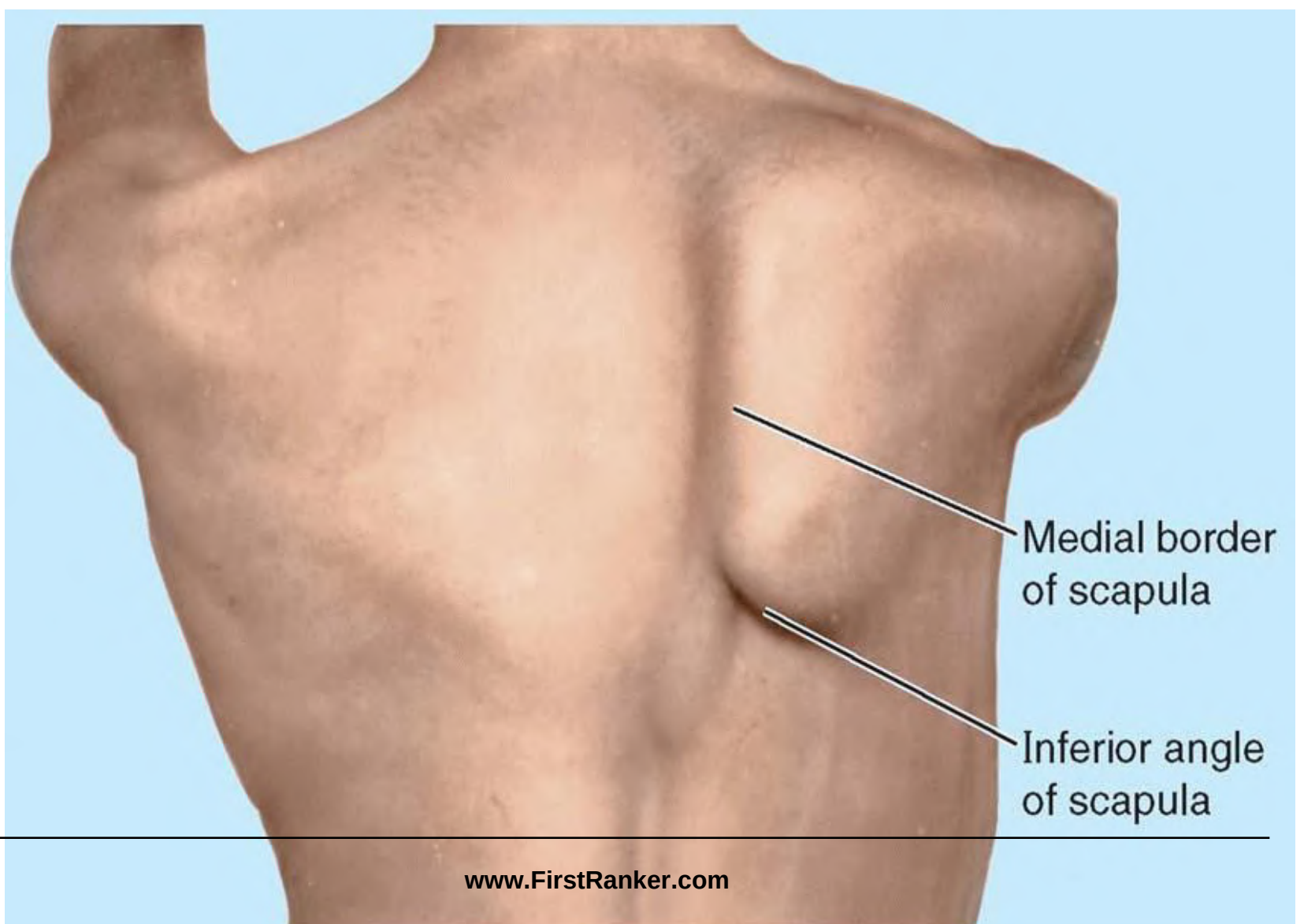


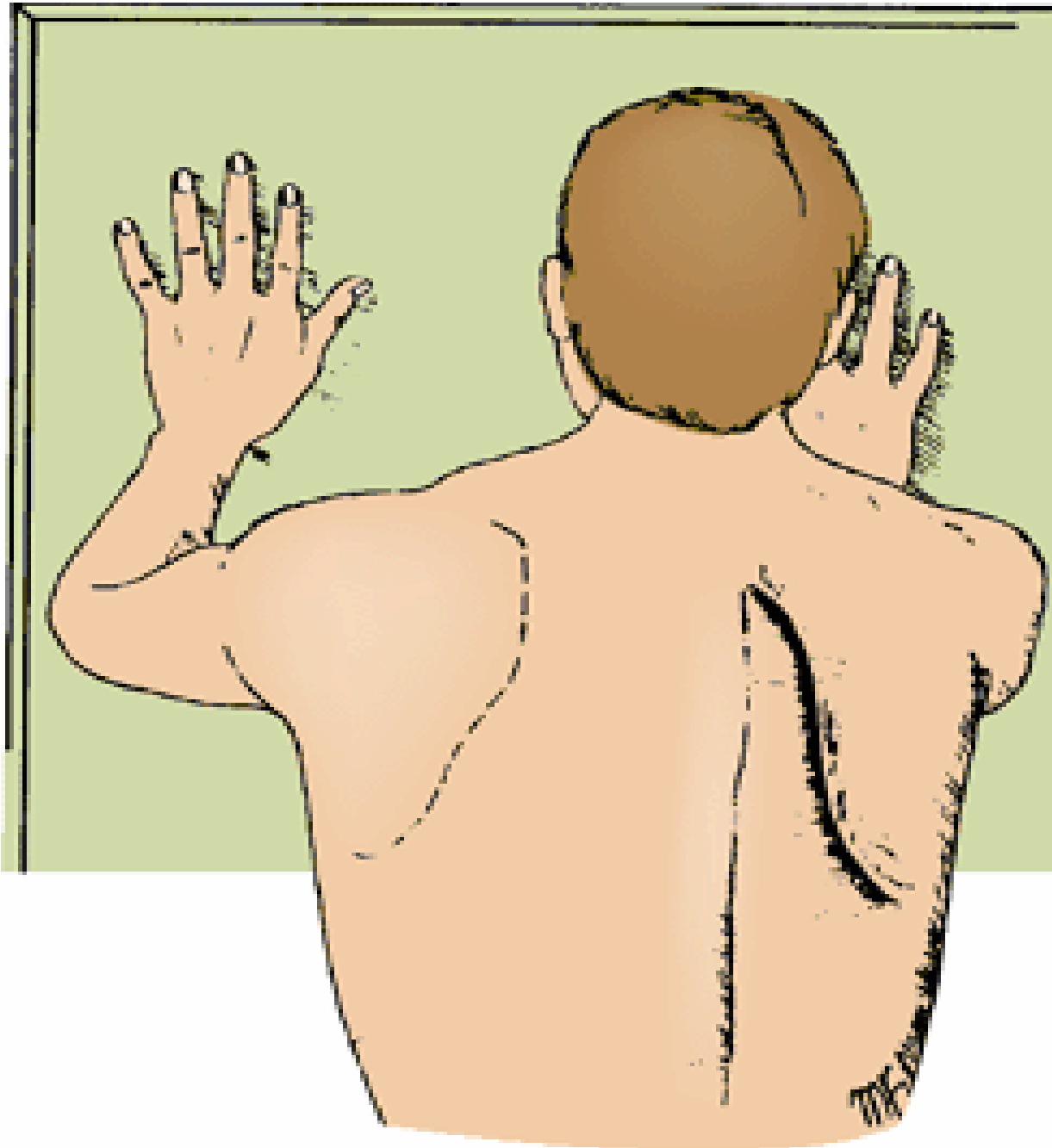
Wasted Thenar Muscles



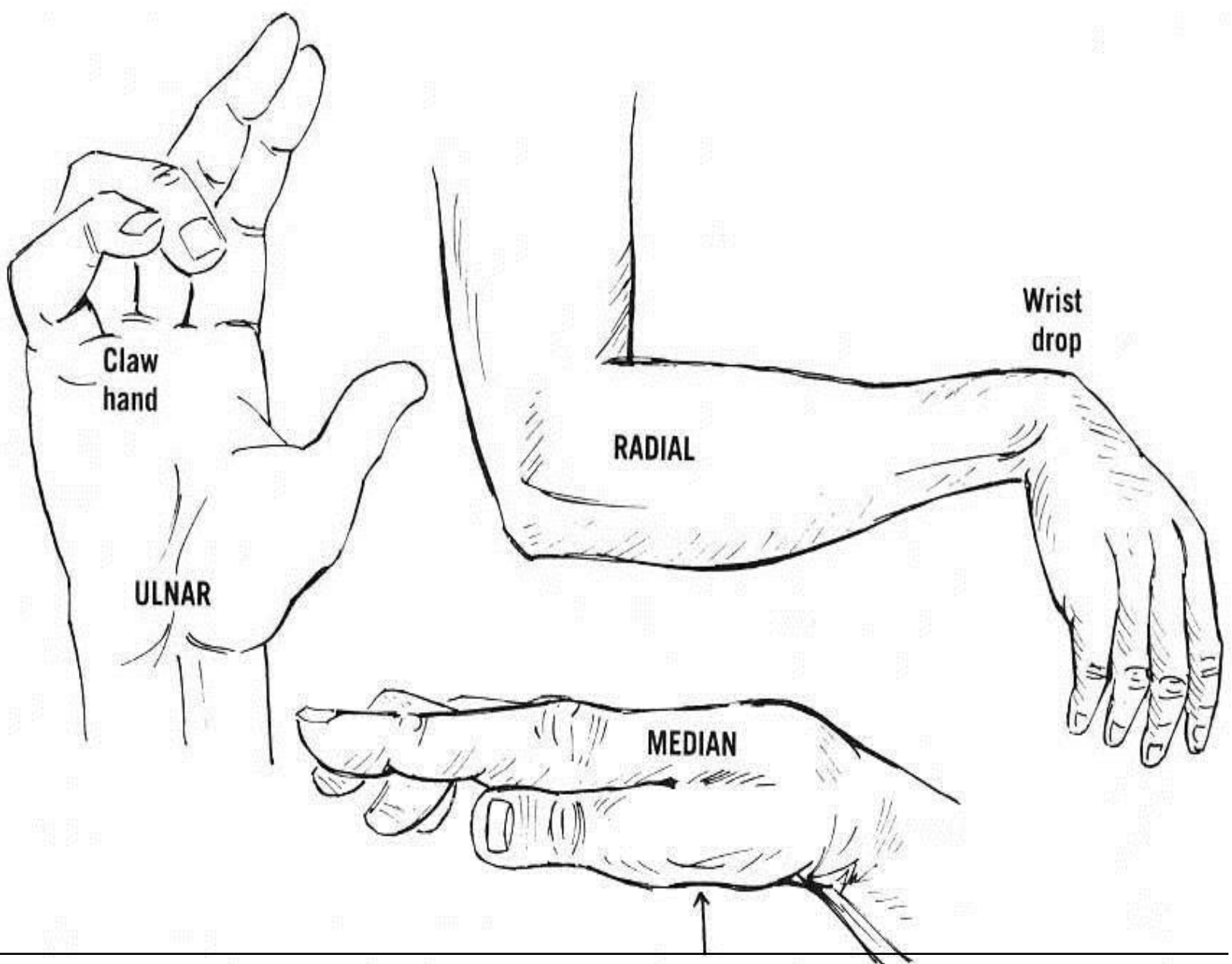


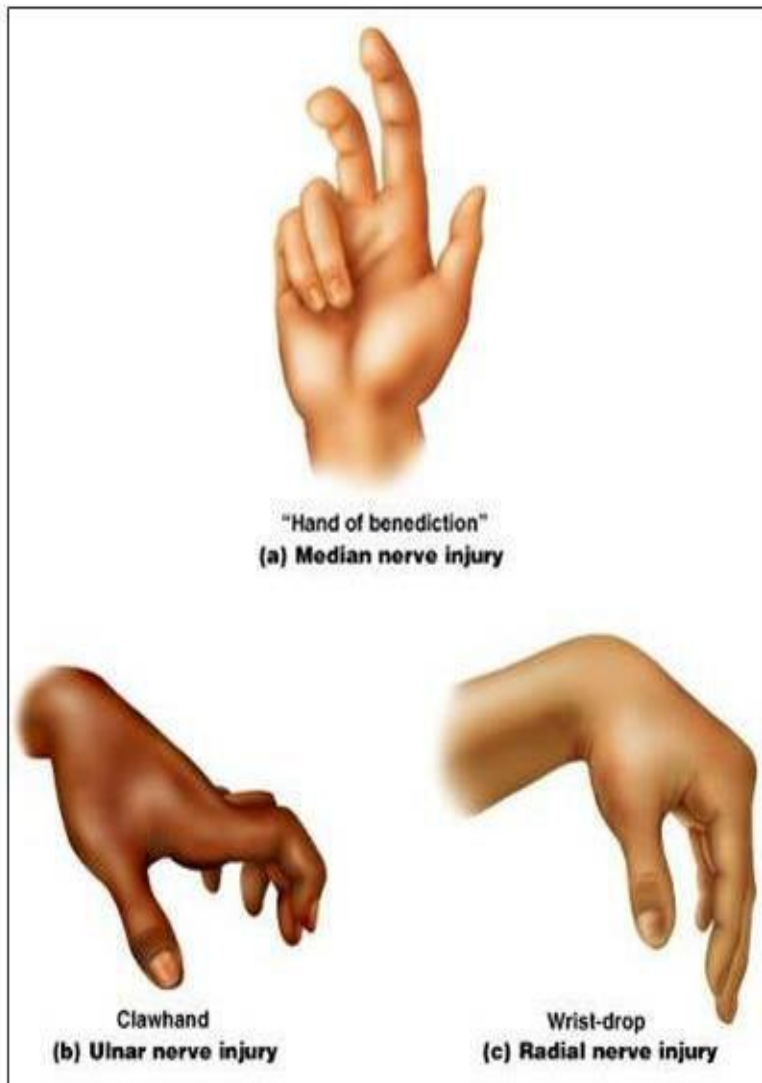
Winging of scapula





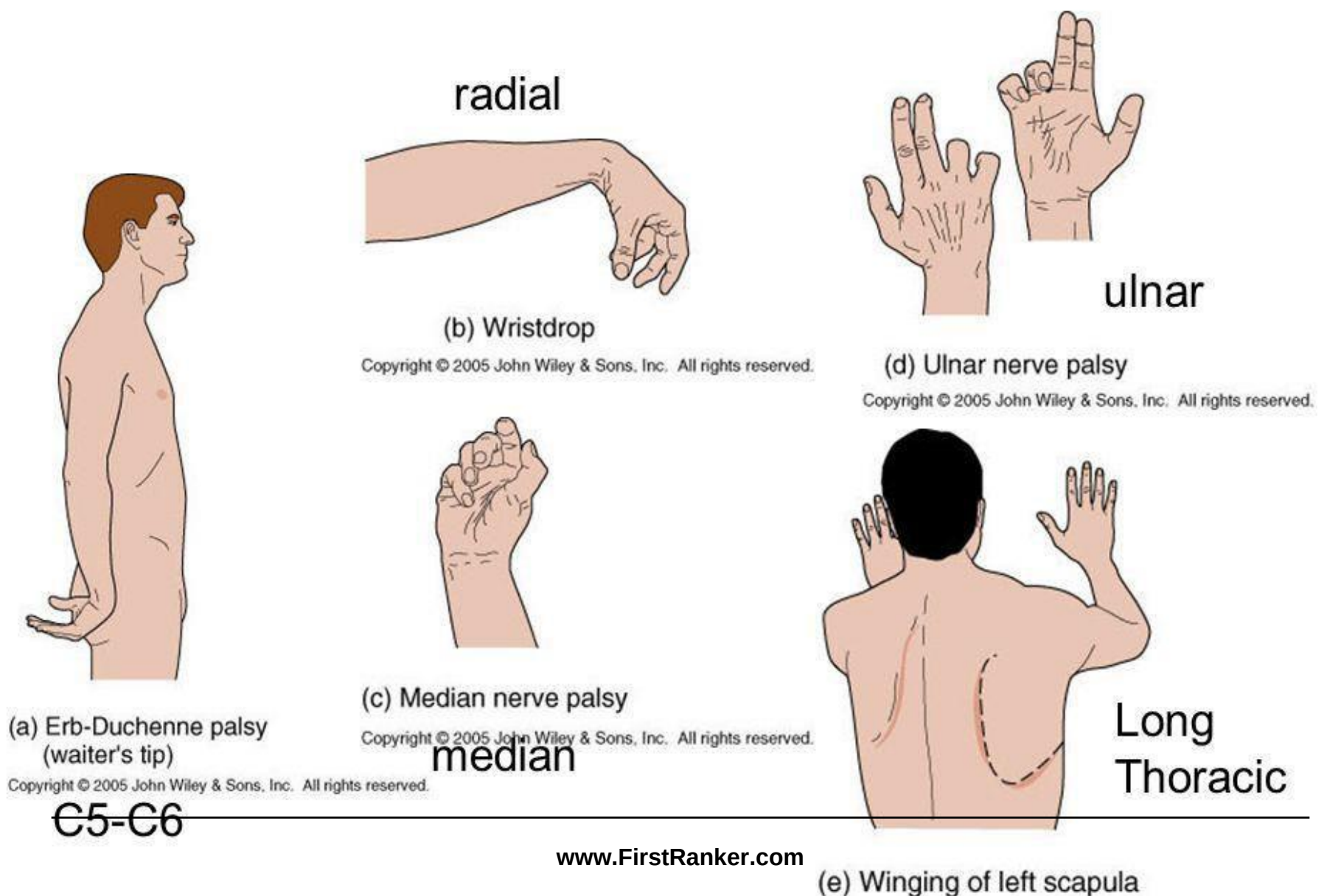
Winging of scapula



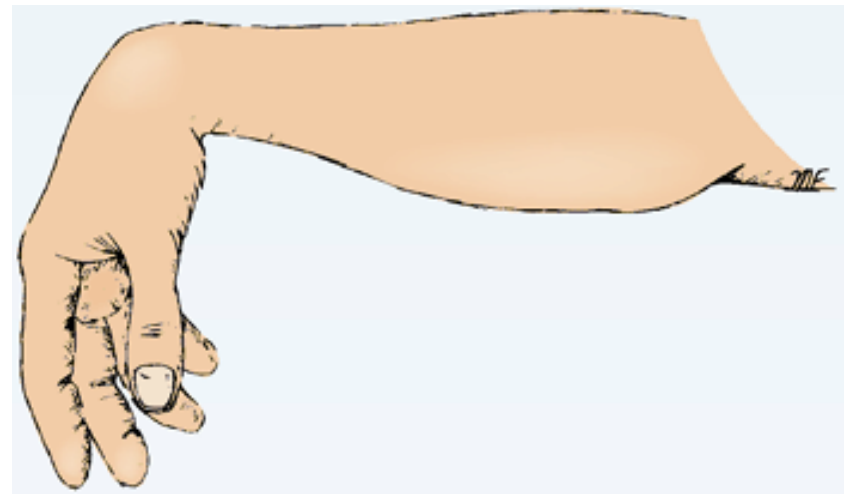
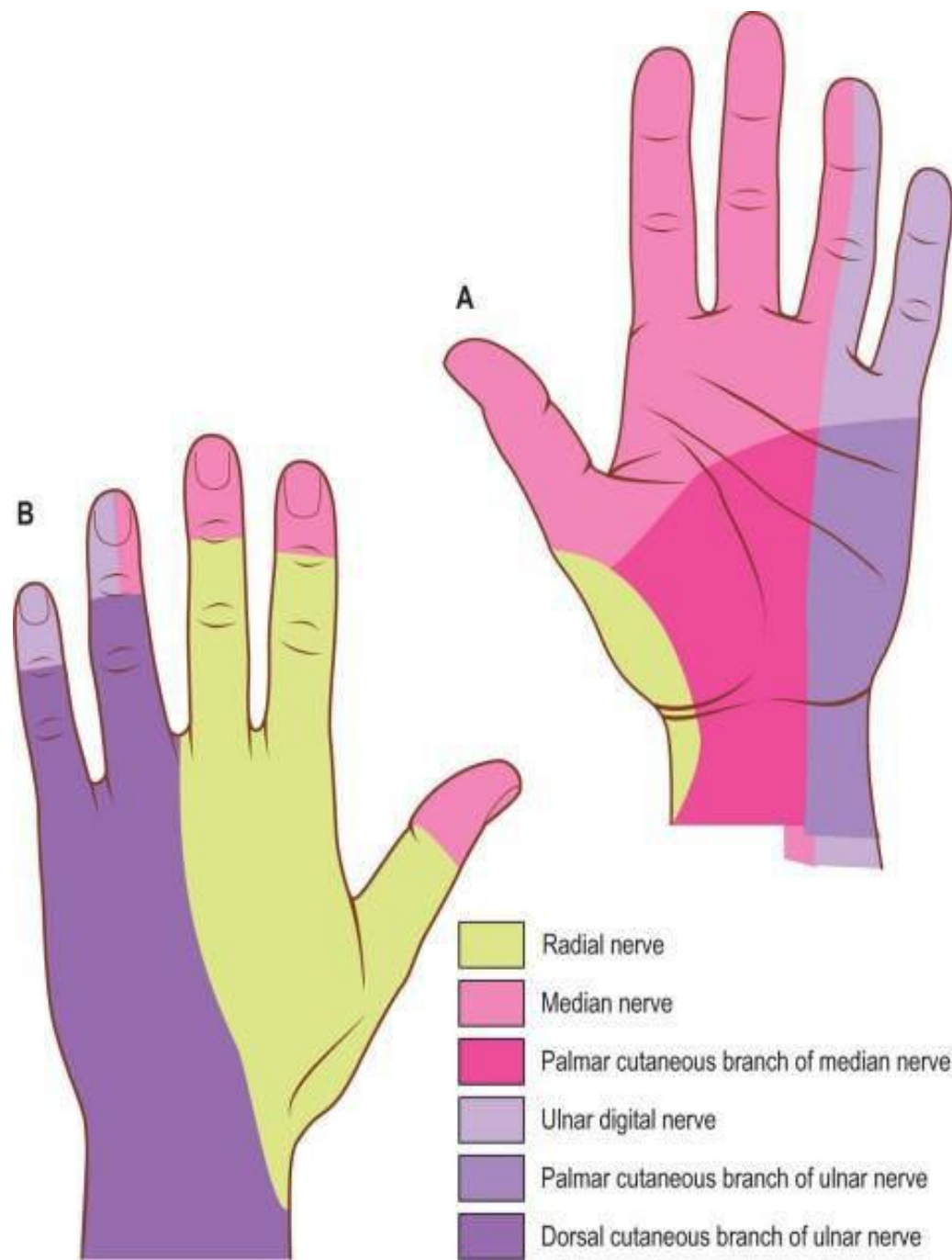


- Ulnar nerve
 - "Claw hand"
 - Inability to extend fingers at interphalangeal joints, results in permanent flexion = claw
- Median nerve
 - "Ape hand"
 - Inability to oppose thumb
- Radial nerve
 - "Wrist drop"
 - Inability to extend the hand, inability to fully extend forearm

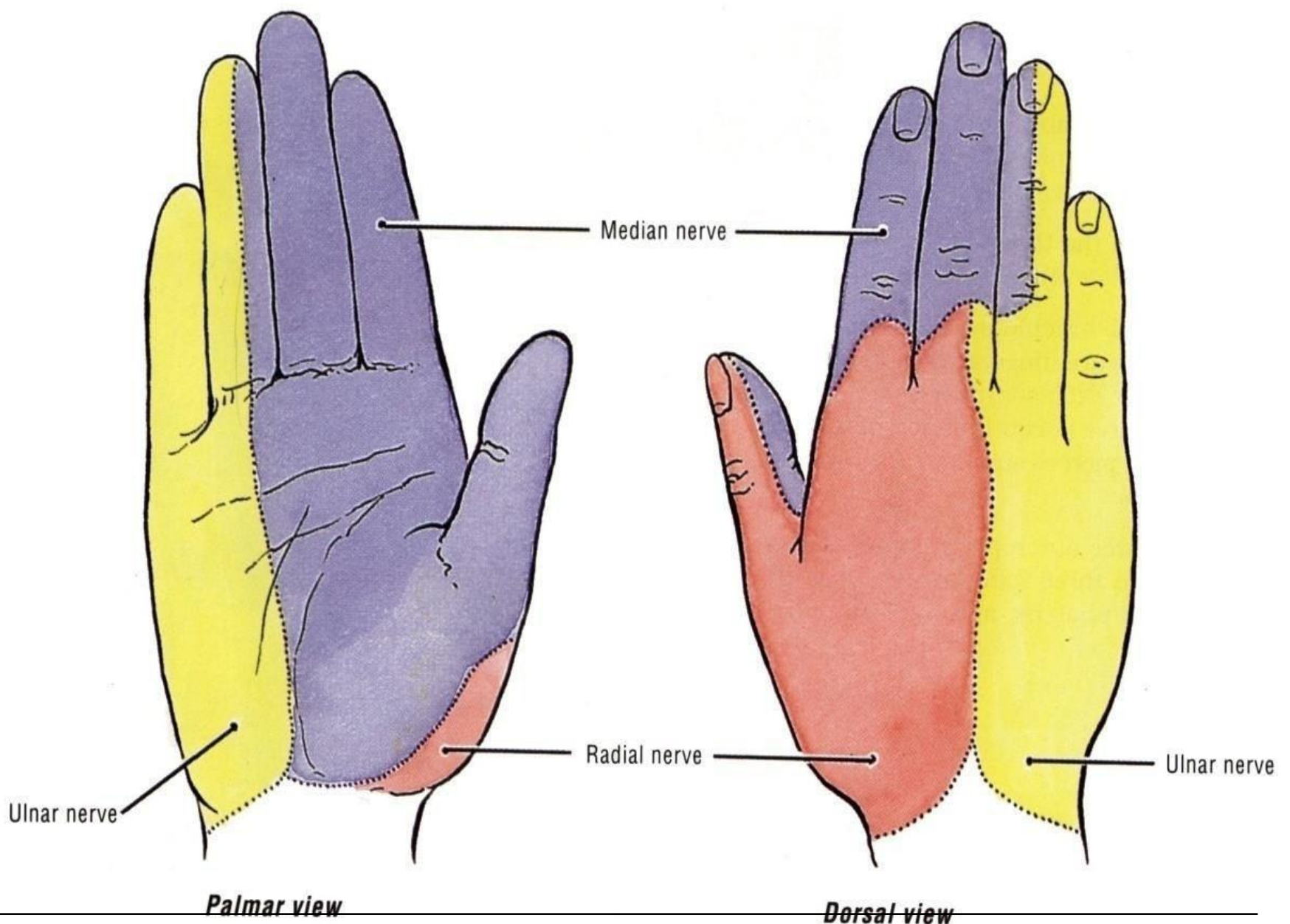
Injuries to the brachial plexus

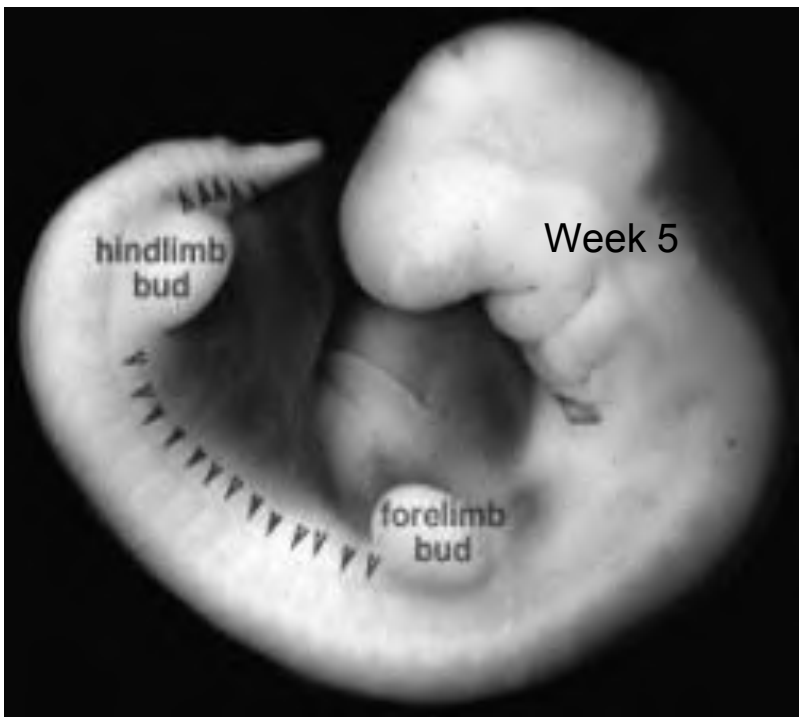


C5-C6

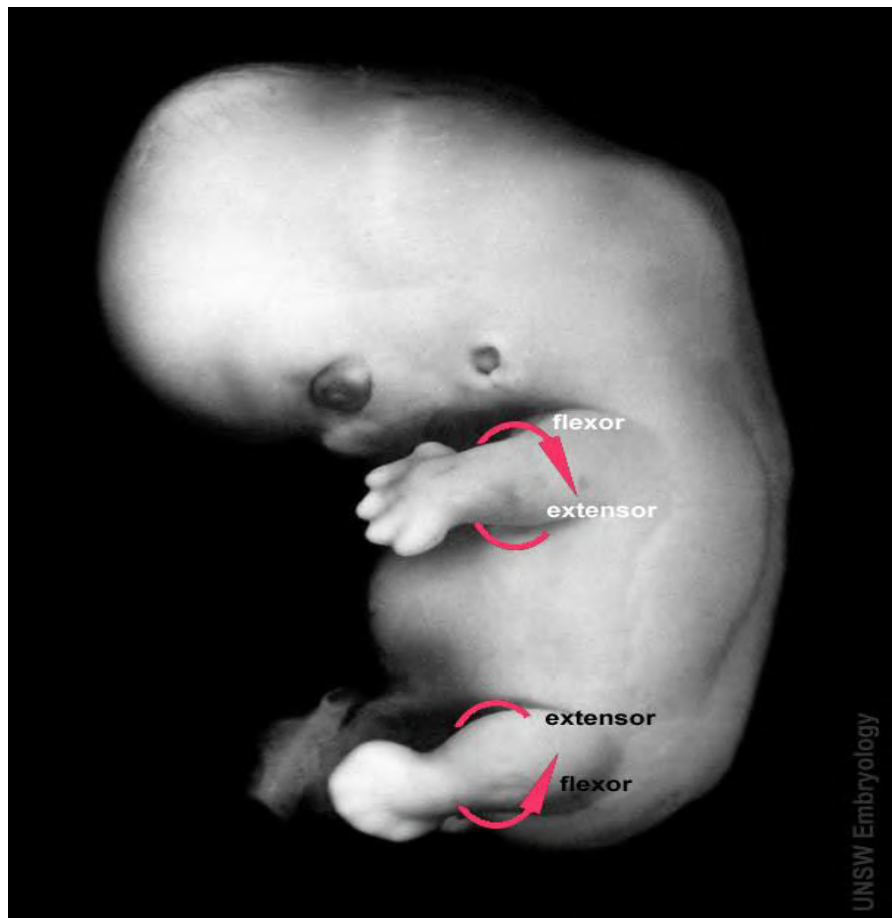


Wrist drop



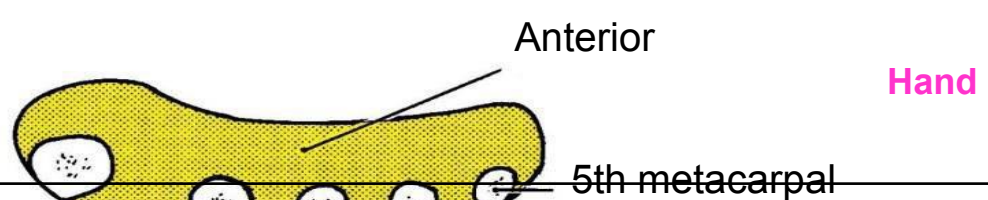
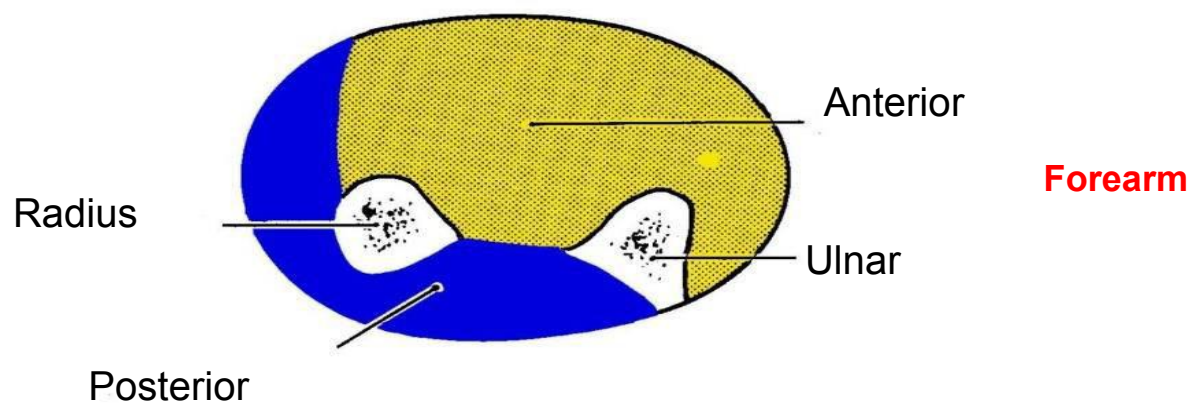
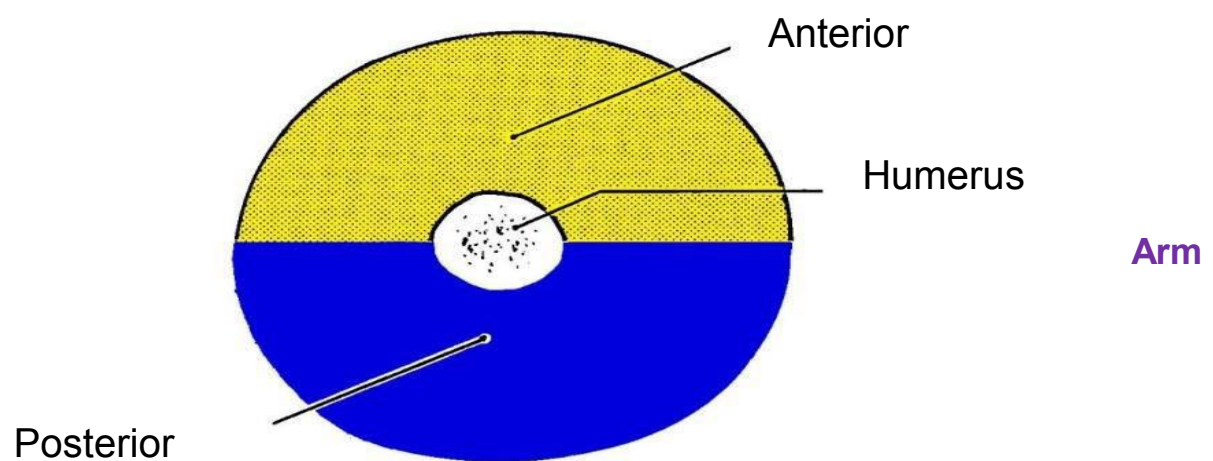


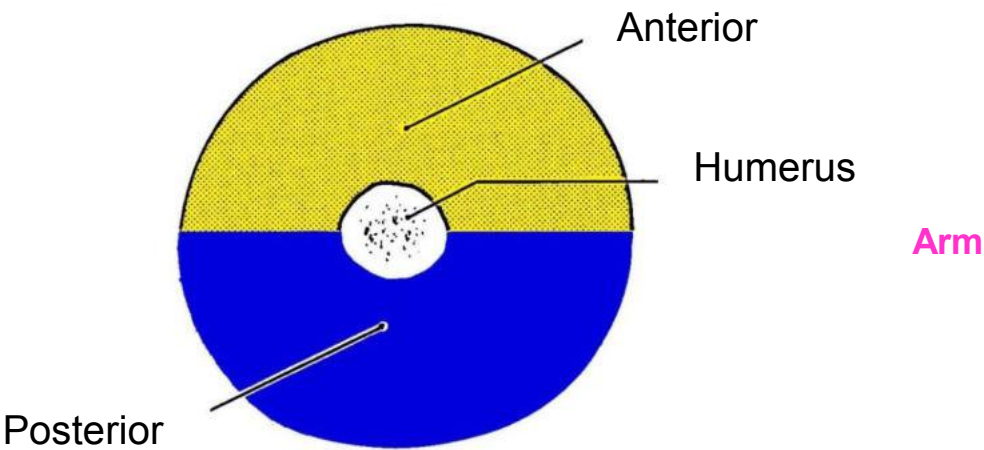
RULE -
 Limbs are outgrowths of ventral body wall that undergo distal growth and differentiation...5th Week



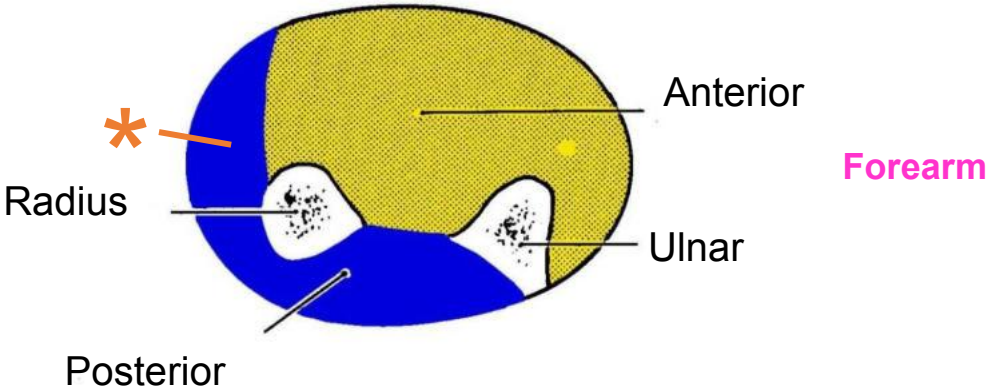
and rotation...7th week

Upper Limb Muscle Compartments

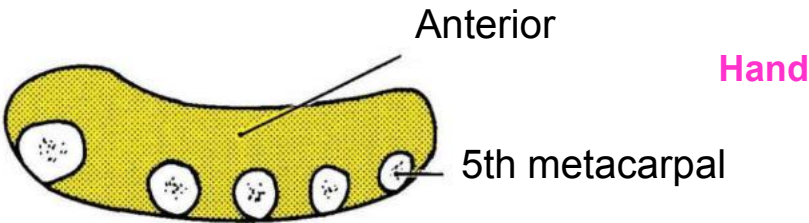




Few muscles of posterior compartment are present in anterolateral aspect of forearm (*brachioradialis, supinator)

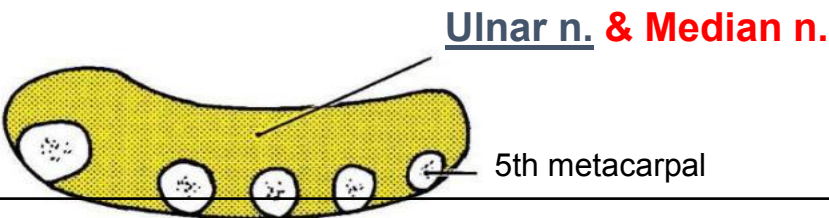
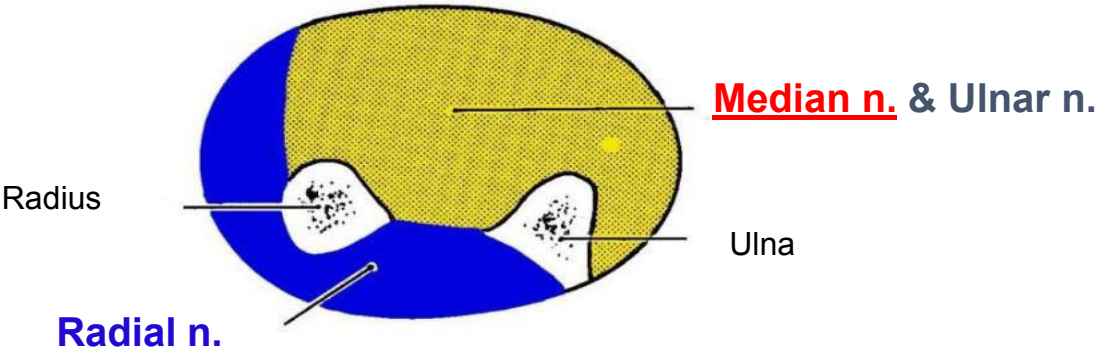
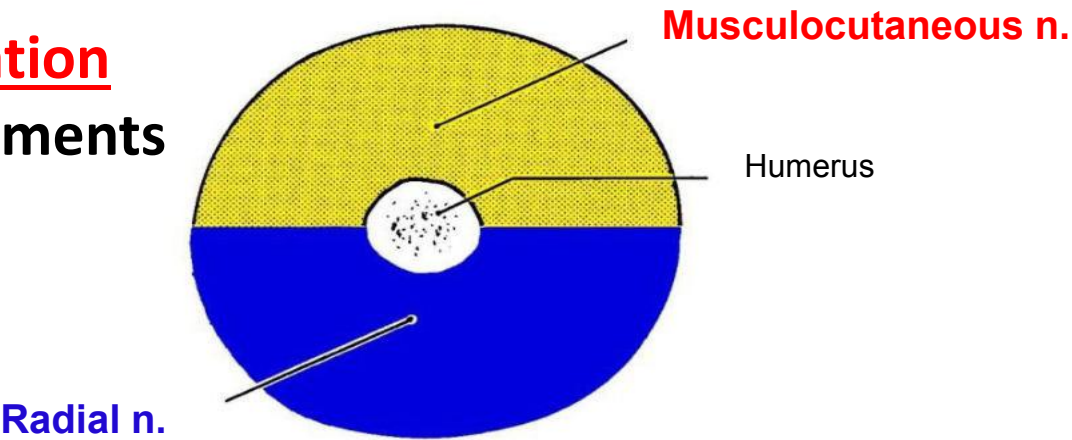


No posterior compartment in the hand



Motor innervation

Muscle Compartments



Muscles of Arm: Cross elbow → Move forearm

- Two compartments – Anterior & posterior
- 1. **Anterior: Flexors of forearm**
- 2. **Posterior: Extensors of forearm**

Anterior Compartment – MCN + Axillary A & Brachial A

- Biceps brachii = Musculocutaneous nerve
- Brachialis = Musculocutaneous nerve
- Coracobrachialis = Musculocutaneous nerve
- Brachioradialis = Radial nerve

Posterior Compartment – RN + Profunda Brachii Artery

- Triceps brachii = Radial nerve
- Anconeus = Radial nerve

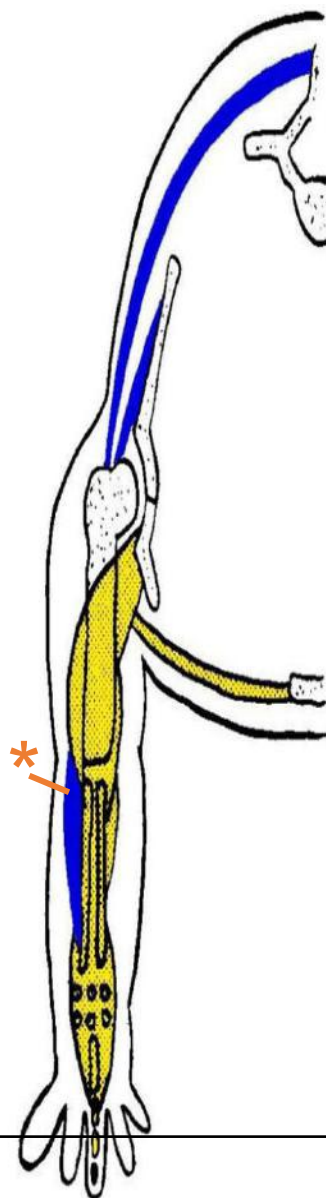
RULE : Ventral vs. dorsal limb mm.

Developmentally-dorsal muscles:

- Lie posterior to the long bones in anatomical position (* exceptions)

Developmentally-ventral muscles:

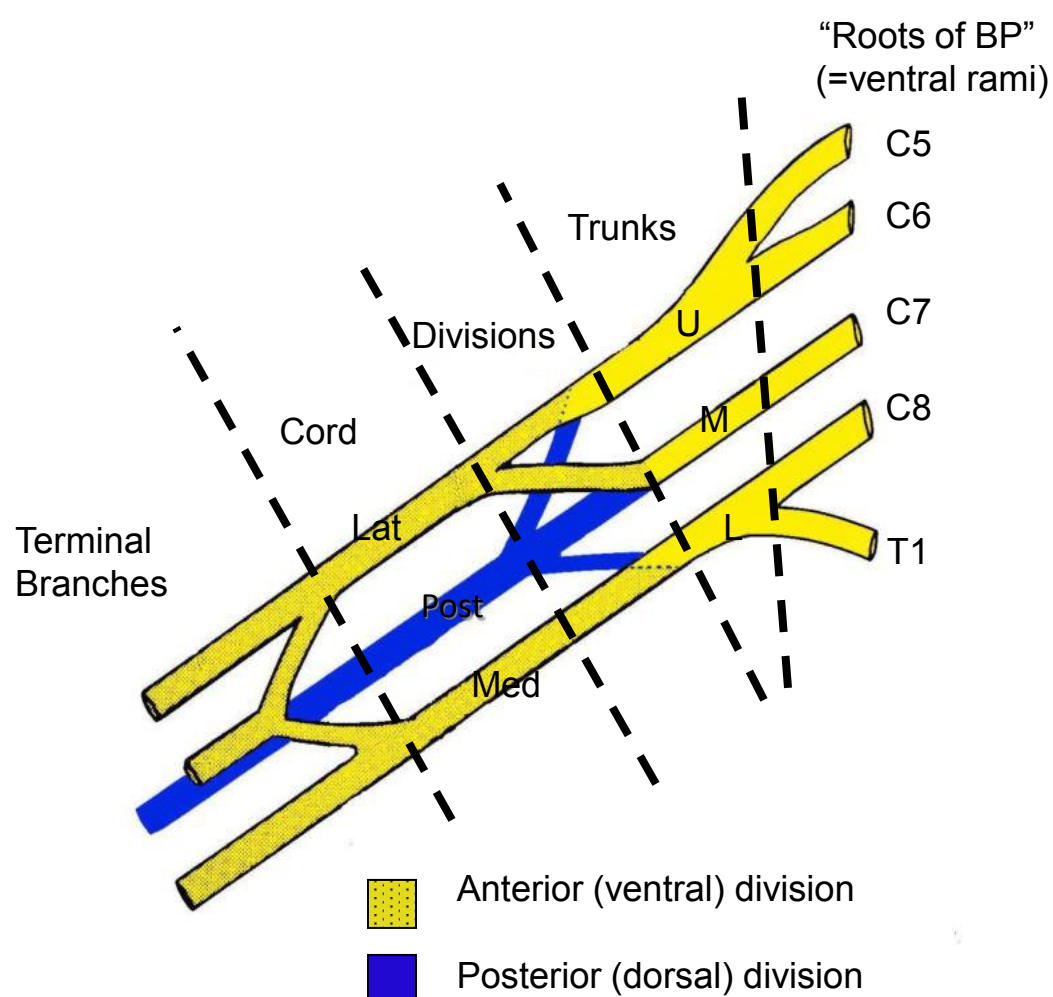
- Lie anterior to the long bones in anatomical position



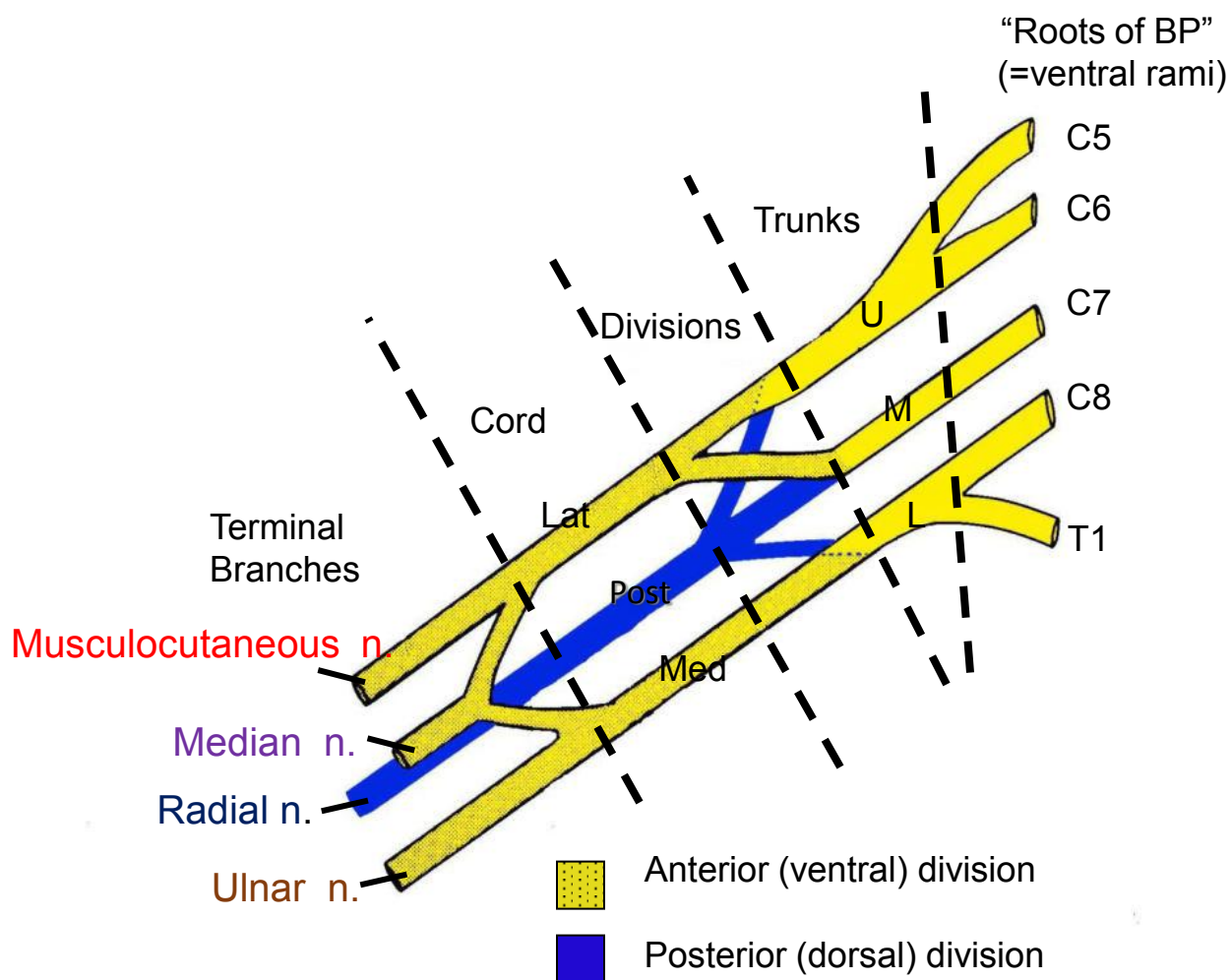
Brachial plexus

- **Supraclavicular part** – neck – posterior triangle b/w scleaneus anterior & scleaneus medius – roots & trunks
- **Infraclavicular part** – axilla – divisions /cords & branches
- Cords – named as per relation to **second part of axillary artery** – deep to pectoral minor
- Lateral cord – lateral , posterior cord – posterior & medial cord –medial to **2nd part of axillary artery**

Brachial Plexus (right side; simplified)



Brachial Plexus (right side; simplified)



Brachial plexus - cords

- ▶ **Lateral cord – LML** – Lateral Pectoral n, Musculocutaneous n, lateral root of Median n
- ▶ **Medial cord – MMMMU** – Medial pectoral n, Medial cutaneous n of forearm, Medial cutaneous n of arm, Ulnar n & Medial root of median n.
- ▶ **Posterior cord – LUNAR** – Lower subscapular n, Upper subscapular n, Nerve to latissimus dorsi, Axillary n & Radial n.

Brachial plexus - cords

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Brachial plexus – supraclavicular branches - roots & trunks

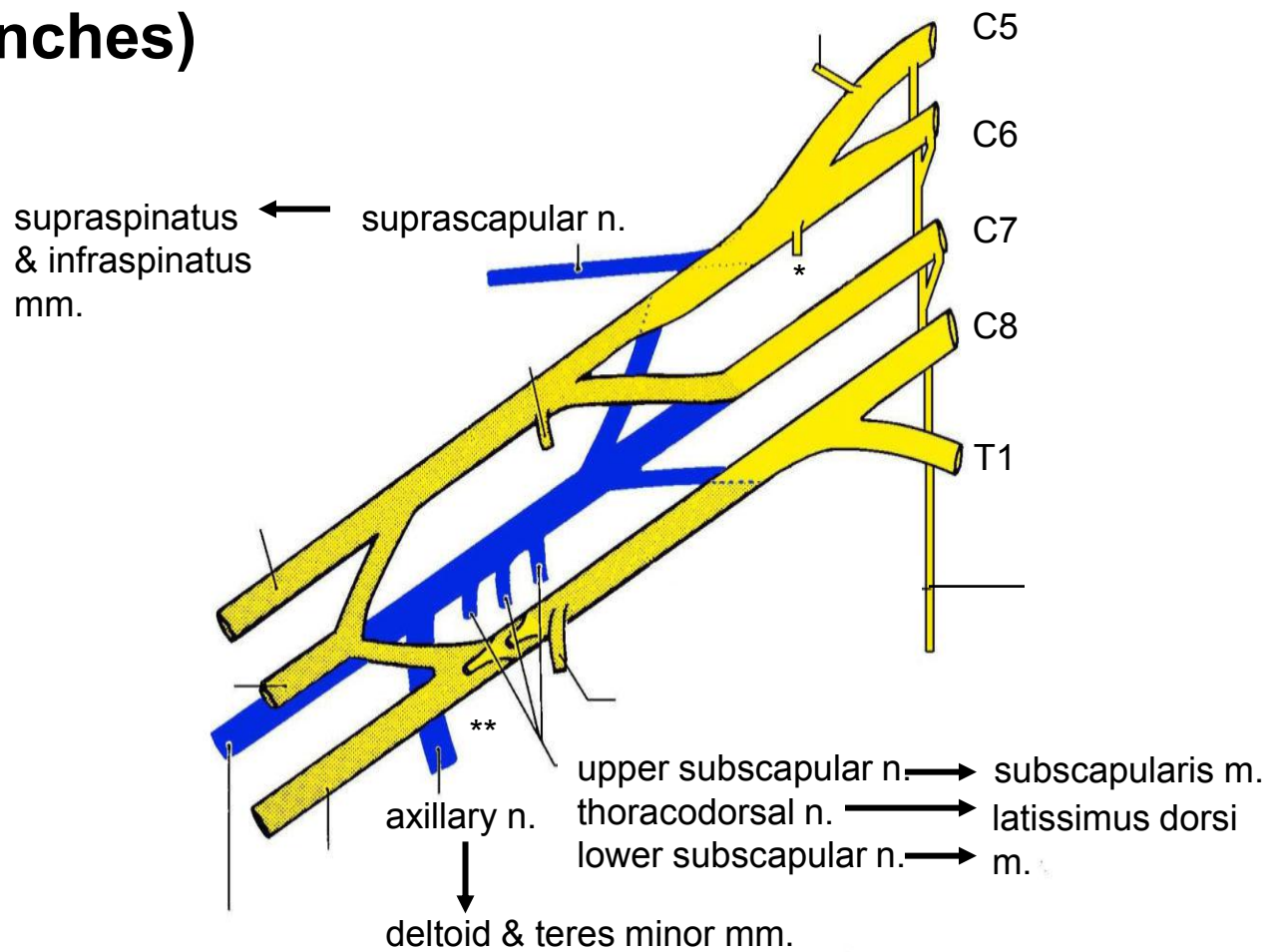
- **Branch to Phrenic nerve** –C5 –anterior to scaleneus anterior
- **Dorsal scapular n** – C5 – pierces scaleneus medius, supplies rhomboids & levator scapulae
- **Long thoracic n** – C5C6C7 – (C7 – may be absent) upper two roots C5C6 pierce scaleneus medius, runs b/w scaleneus ant & medius – Supply - serratus anterior.
- **TRUNKS – Upper**
- **Nerve to subclavius** – Erb's Point - C5 C6 –subclavius (gives - accessory phrenic nerve –C5)
- **Suprascapular n-** C5C6 – supra & infraspinatus, articular – shoulder, acromioclavicular,

34

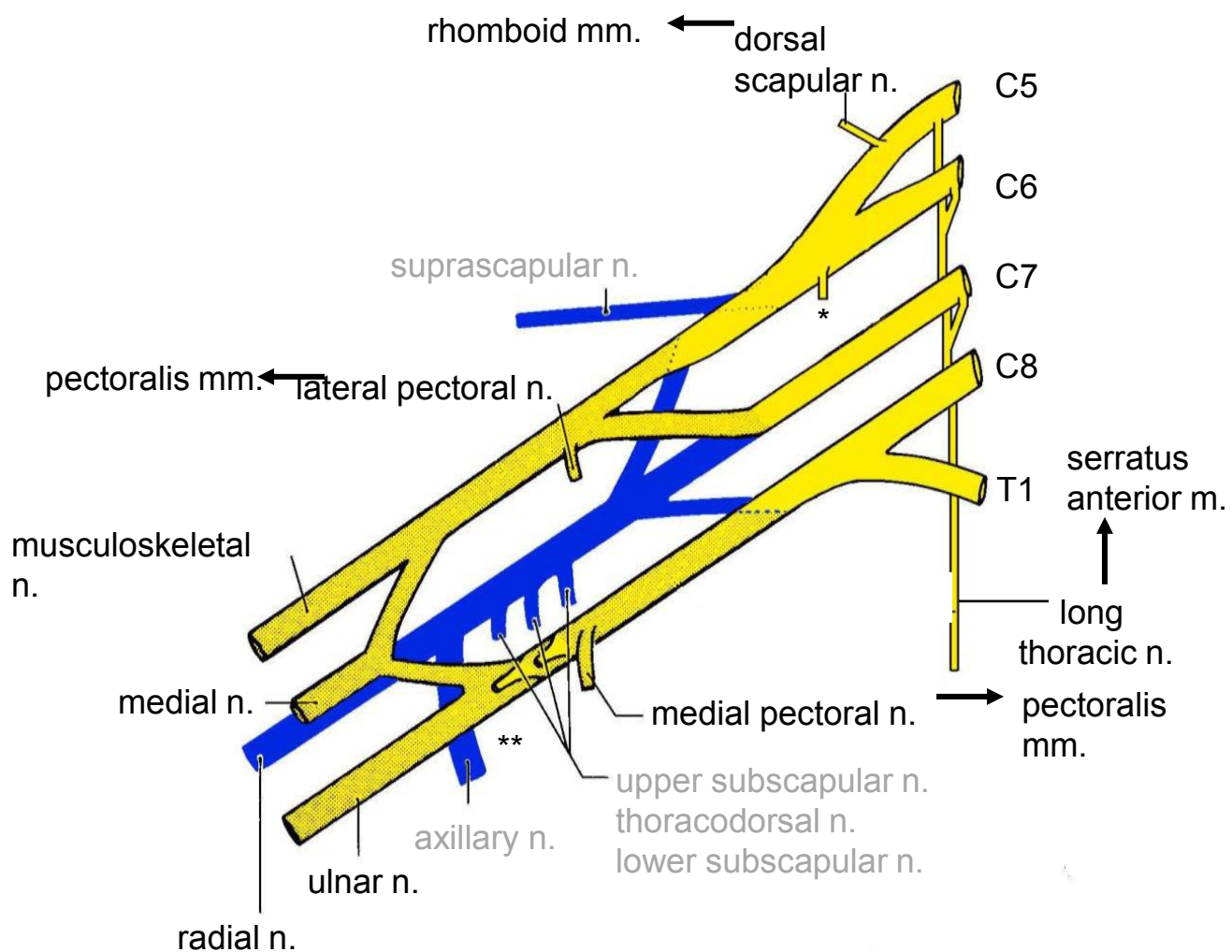
Brachial plexus-

- **Lateral pectoral n-** C5C6C7 – LC -larger, pierces clavipectoral fascia, ant to axillary art- pectoralis major & minor.
- **Medial pectoral n-** C8T1-MC- , pierces pectoralis minor & supplies both pectoralis major & minor.
- **Upper sub scapular n-** smaller – frequently double.
- **Lower sub scapular n-** subscapularis & teres major.
- **Axillary n-** ant branch –deltoid & post branch- has pseudoganglion supplies teres minor, cutaneous – as- upper lateral cutaneous nerve of arm .

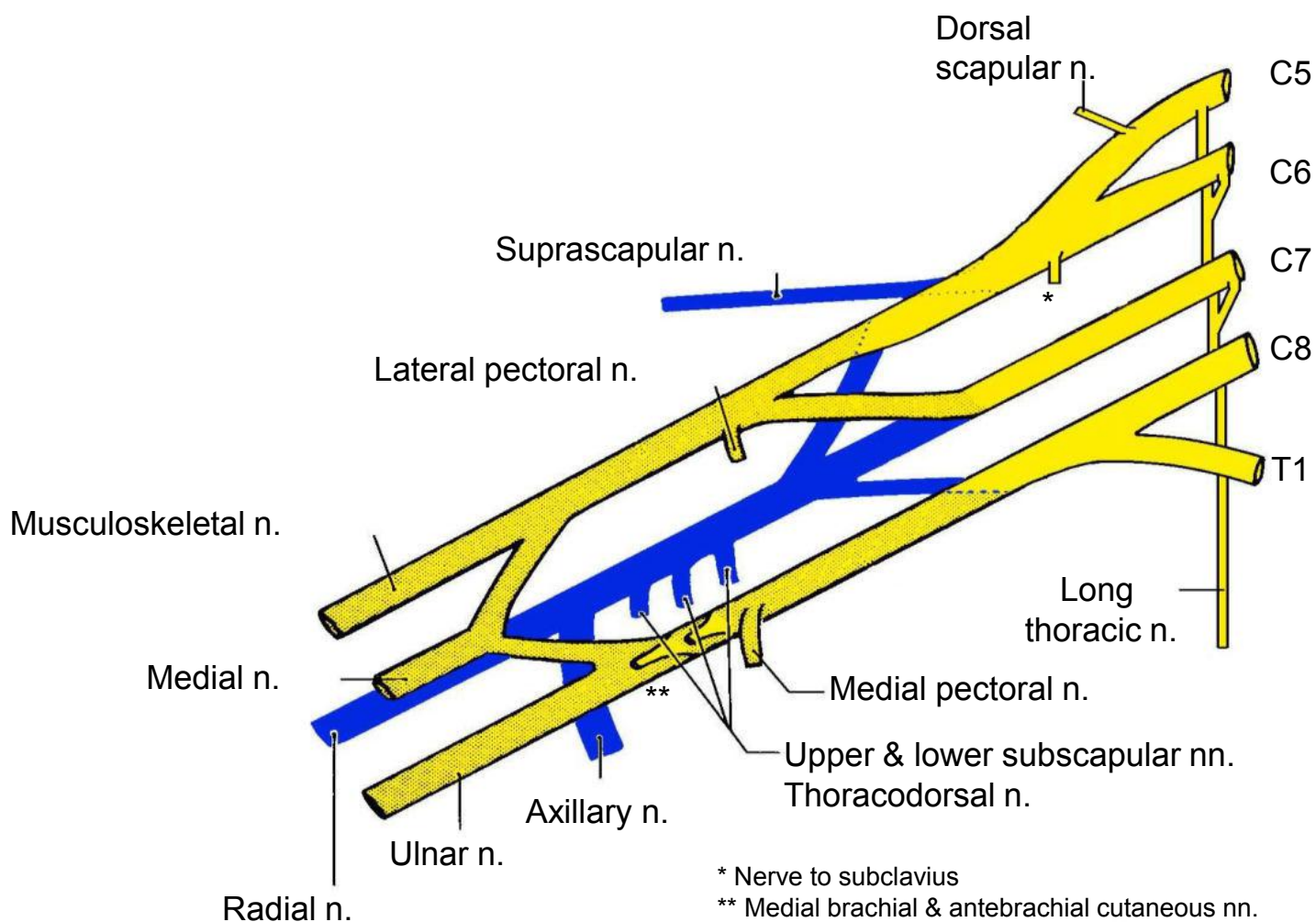
Brachial Plexus (branches)



Brachial Plexus (branches)



Brachial Plexus (all branches)



Brachial plexus - cords

- ▶ **Lateral cord – LML** – Lateral Pectoral n, Musculocutaneous n, lateral root of Median n
- ▶ **Medial cord – MMMMU** – Medial pectoral n, Medial cutaneous n of forearm, Medial cutaneous n of arm, Ulnar n & Medial root of median n.
- ▶ **Posterior cord – LUNAR** – Lower subscapular n, Upper subscapular n, Nerve to latissimus dorsi, Axillary n & Radial n.

Nerve supply of Scapular Muscles

- **Origin on Scapula:**

- Latissimus dorsi = Thoracodorsal nerve /N to latissimus dorsi
- Subscapularis & Teres Major = Subscapular nerves
- Supraspinatus & Infraspinatus = Suprascapular nerves
- Deltoid & Teres Minor = Axillary nerve

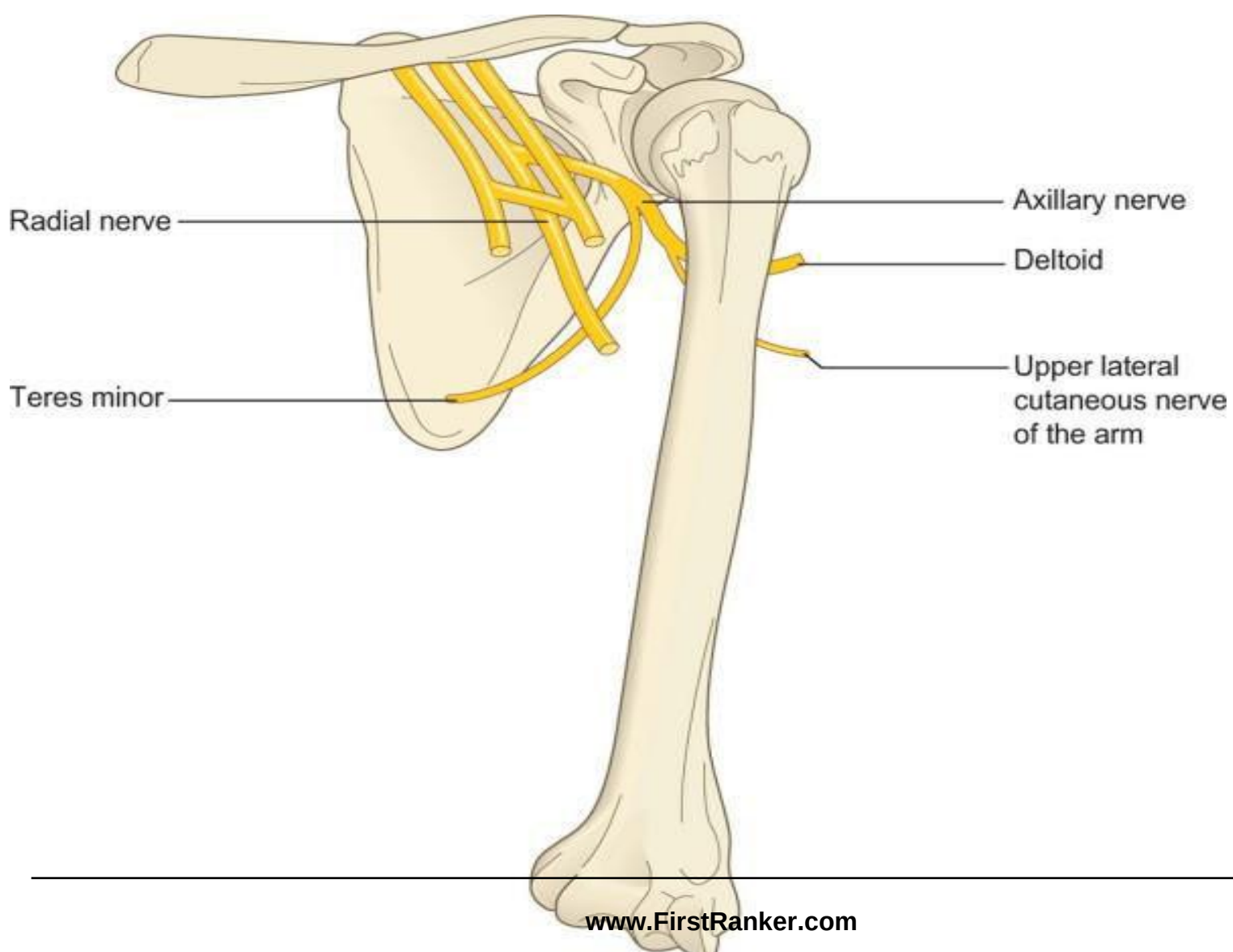
- **Insertion on Scapula**

- Levator Scapularis & Rhomboids = Dorsal Scapular nerve
- Pectoralis Minor = lat & medial Pectoral nn.
- Serratus anterior = Long Thoracic n/nerve of bell
- Trapezius = Accessory spinal n.

Branches - Posterior Cord

- Axillary Nerve (w . Circumflex vs..)
 - Supplies:
 - Deltoid & Teres minor (motor supply)
 - Capsule of shoulder
 - skin of lower part covering deltoid (sensory supply)
- Subscapular Nerves {C5,C6} : Subscapularis & Teres major
- Thoracodorsal Nerve : Latissimus dorsi

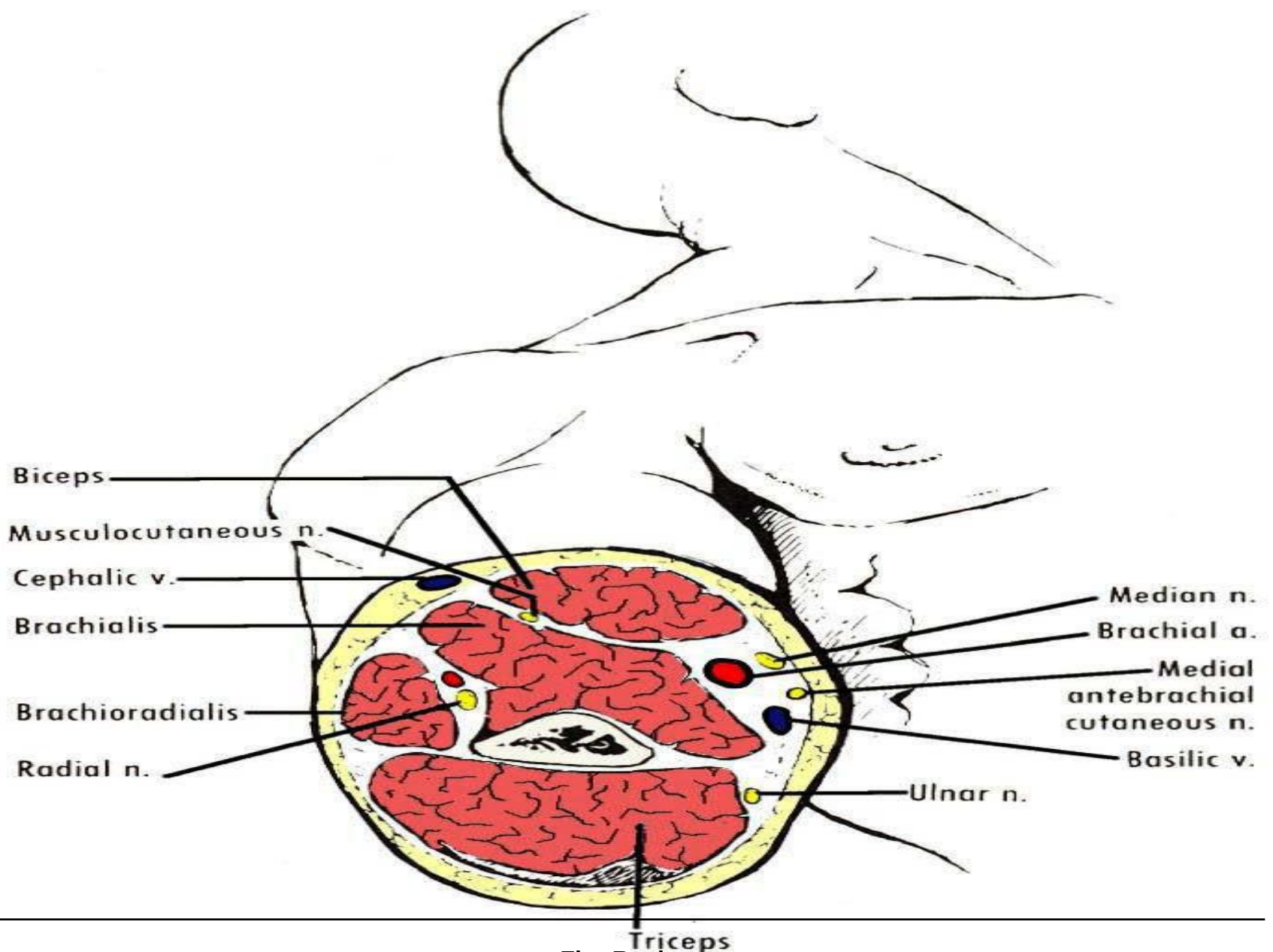
Injury to axillary nerve

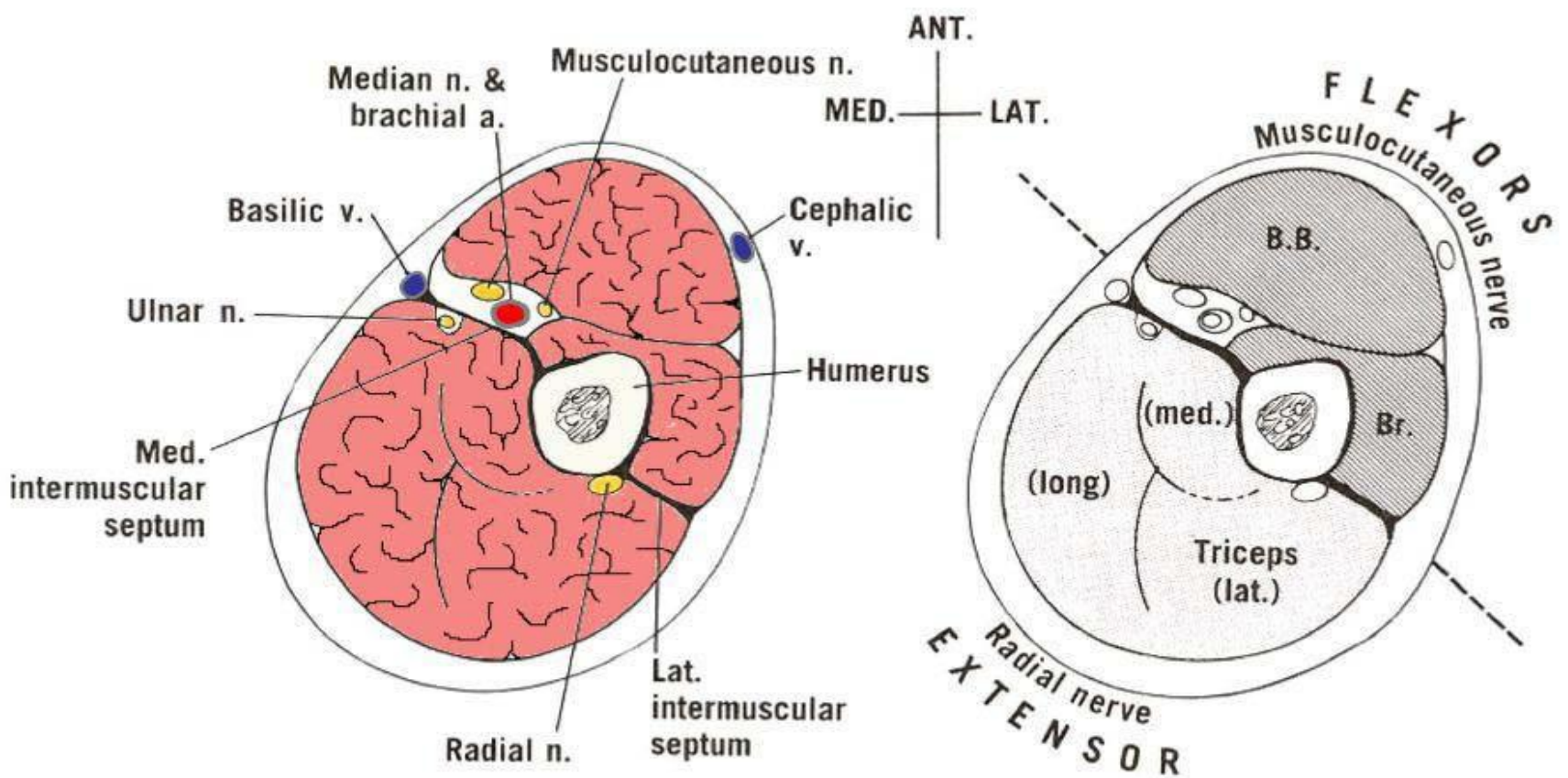


Winging of the Scapula

Waisting of shoulder

Combined Axillary and Long Thoracic Nerve Injuries





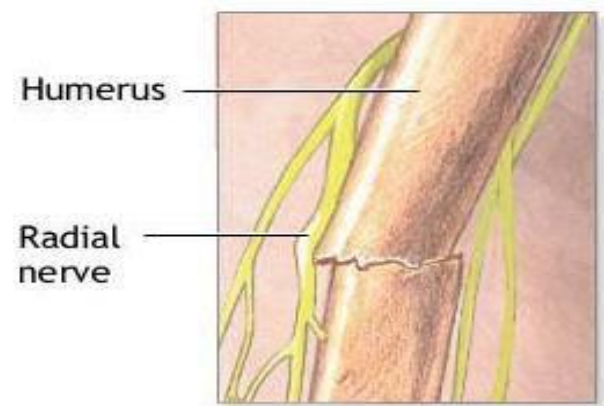
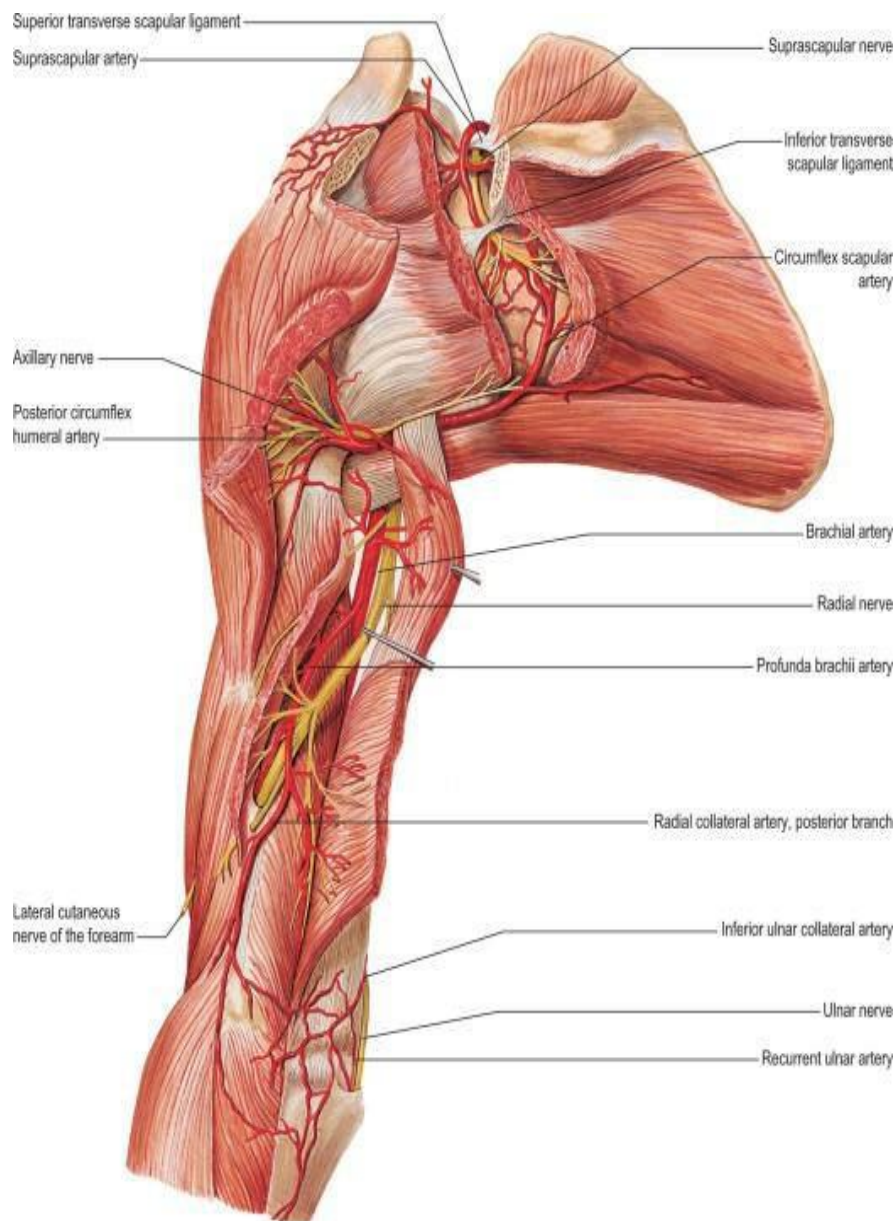
Fore arm –muscles

1. Flexor Compartment : Anterior
(Superficial 5 + Deep 3) - supplied by
Median, Anterior Interosseous Nerve & Ulnar nerves

2. Extensor Compartment : Posterior
(Superficial + Deep)

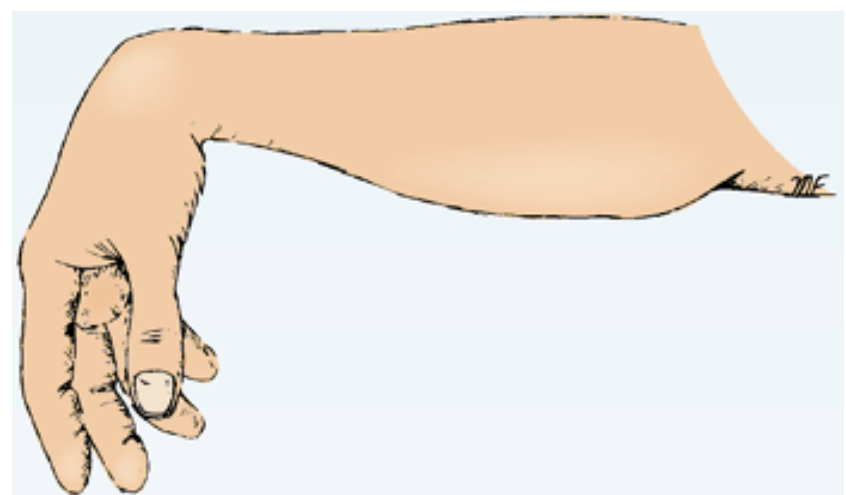
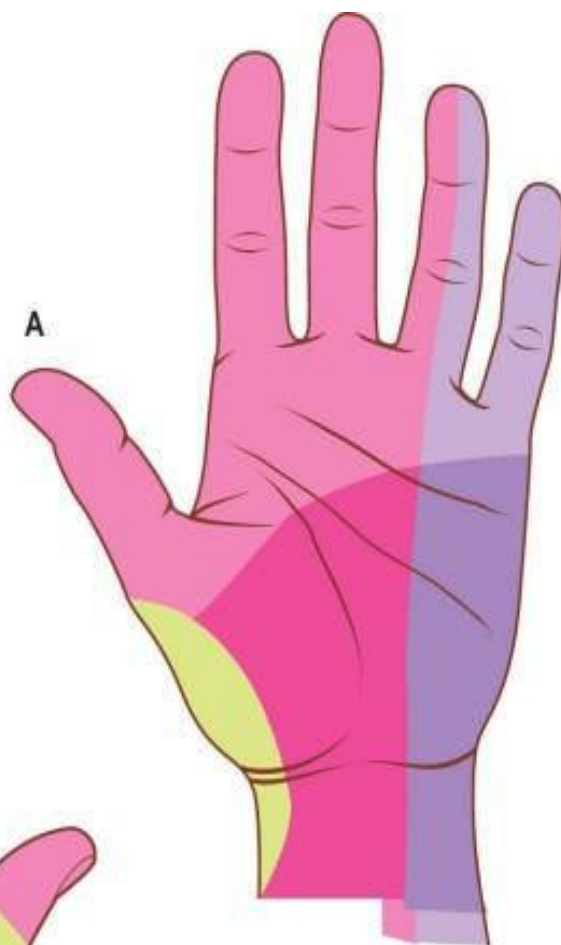
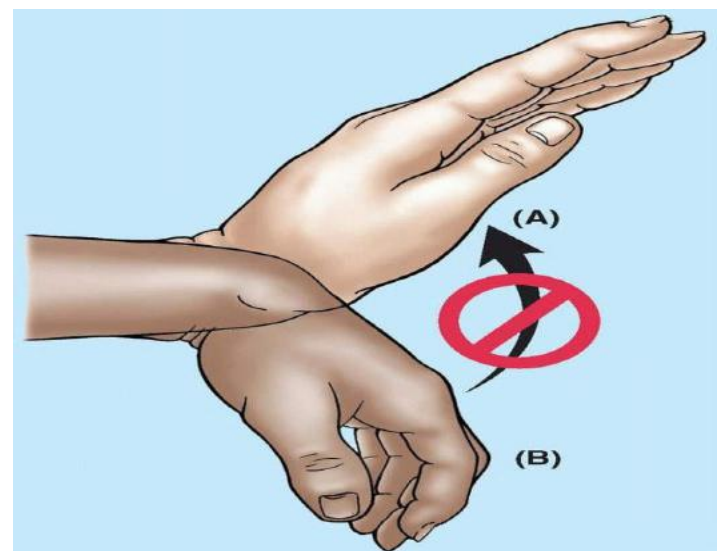
Radial & Posterior interosseous nerve.

Radial nerve injury in arm

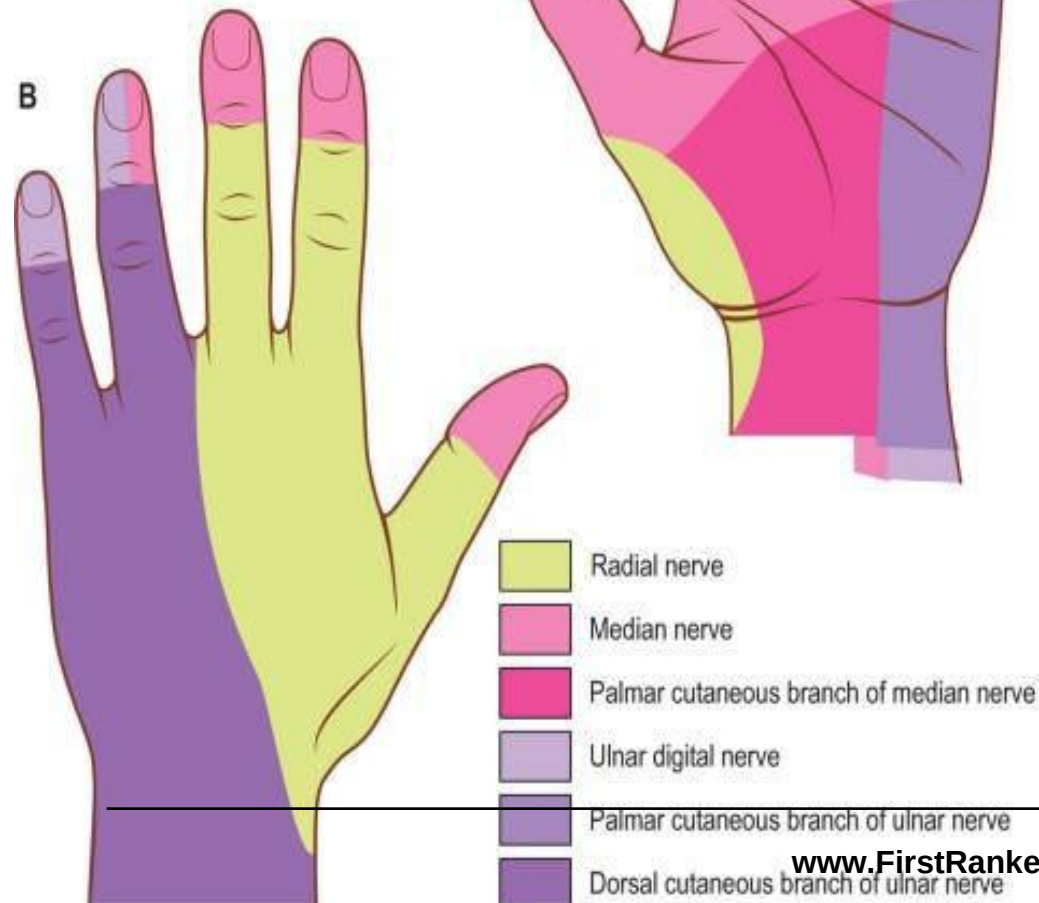


Break in humerus causes damage to radial nerve

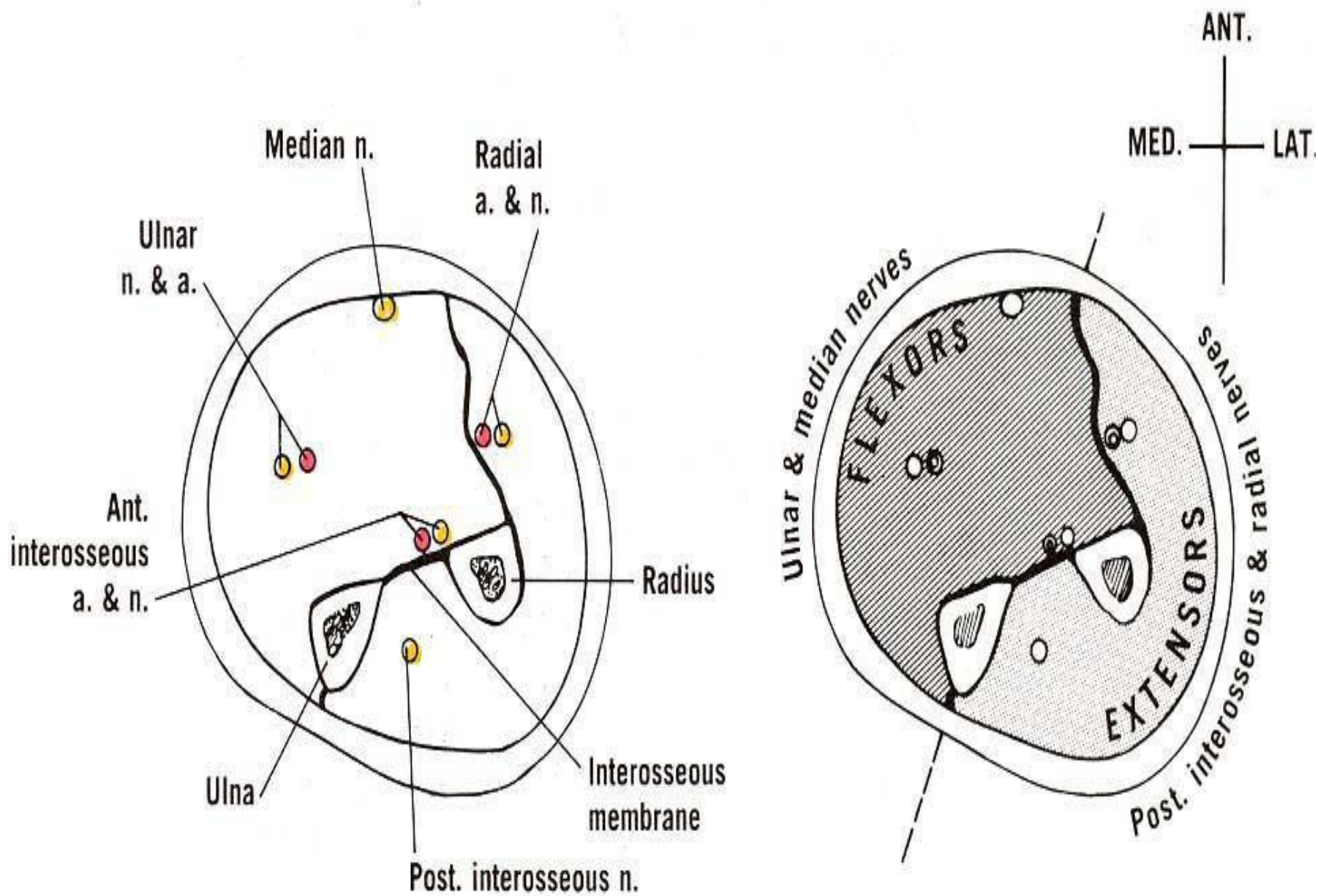
ADAM.



Wrist drop



- Radial nerve
- Median nerve
- Palmar cutaneous branch of median nerve
- Ulnar digital nerve
- Palmar cutaneous branch of ulnar nerve
- Dorsal cutaneous branch of ulnar nerve



Anterior Compartment Forearm = 5 +3

1 Pronator teres	Median n
2 Flexor digitorum superficialis	Median n
3 Flexor carpi radialis	Median n
4 Palmaris longus	Median n
5 Flexor carpi ulnaris	Ulnar nerve
1 Pronator quadratus	Anterior interosseous n-Median n
2 Flexor digitorum profundus	Anterior interosseous n-Median n & Ulnar nerve
3 Flexor pollicis longus	Anterior interosseous n- Median n

Posterior Compartment Forearm – superficial - 7

1 Anconeus	Radial n
2 Brachioradialis	Radial n
3 Extensor carpi radialis longus	Radial
4 Extensor carpi radialis brevis	Posterior interosseous– Radial n
5 Extensor digitorum	Posterior interosseous– Radial n
6 Extensor digiti minimi	Posterior interosseous– Radial n
7 Extensor carpi ulnaris	Posterior interosseous– Radial n

Posterior Compartment Forearm – deep - 5

1 Supinator	Posterior interosseous– Radial n
2 Abductor pollicis longus	Posterior interosseous– Radial n
3 Extensor pollicis brevis	Posterior interosseous– Radial n
4 Extensor pollicis longus	Posterior interosseous– Radial n
5 Extensor indicis	Posterior interosseous– Radial n

Hand – Median nerve - 5

Flexor pollicis brevis	Median n
Abductor pollicis brevis	Median n
Opponens pollicis	Median n
1 st lumbrical	Median n
2 nd lumbrical	Median n

Hand – Ulnar nerve - 15

Flexor digiti minimi	Ulnar n
Abductor digiti minimi	Ulnar n
Opponens digiti minimi	Ulnar n
Interossei – palmar & dorsal (8)	Ulnar n
3 rd & 4 th lumbricals (2)	Ulnar n
Palmaris brevis	Ulnar n – superficial branch

▪ **An inability to oppose thumb to little finger can result from injury to -**

- a) Axillary n
- b) Radial n
- c) Ulnar n
- d) Median n

▪ **Hyperextension of proximal phalanges of little and ring fingers can happen due to nerve injury of -**

- a) Ulnar
- b) Axillary
- c) Radial
- d) Median

▪ **Inability to abduction of arm can happen due to nerve injury of -**

- a) Axillary
- b) Musculocutaneous
- c) Radial
- d) Median

▪ **Wrist drop can result from damage to -**

- a) Median n
- b) Ulnar n
- c) Radial n
- d) Anterior interosseous n