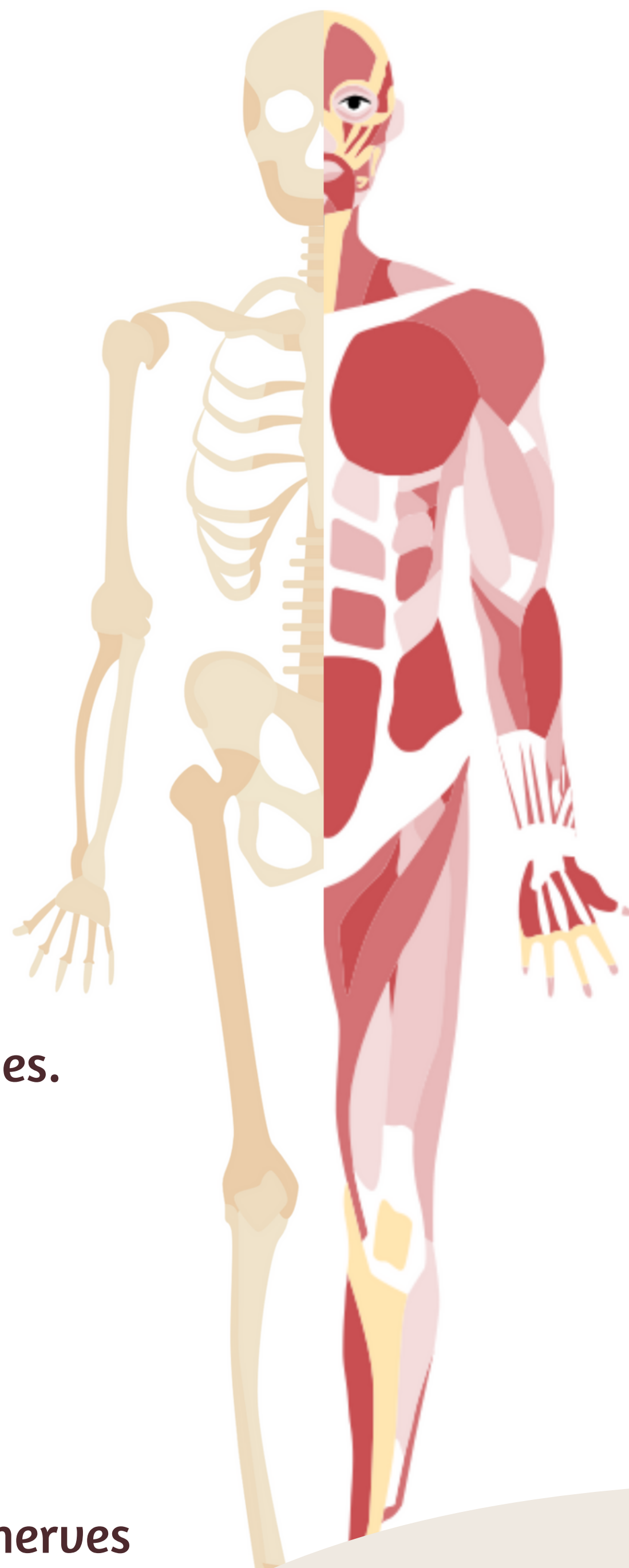


Lecture 11

RADIAL & ULNAR NERVES

OBJECTIVES

- Explain the formation of radial and ulnar nerves.
- Describe the causes of the injuries of radial and ulnar nerves.
- List the Branches of radial and ulnar nerves.
- Describe the anatomy of the radial and ulnar nerves regarding origin, Course and Distribution.



Color Index:

- Main text
- Boys' Slides
- Girls' Slides
- Important
- Dr's Notes
- Extra

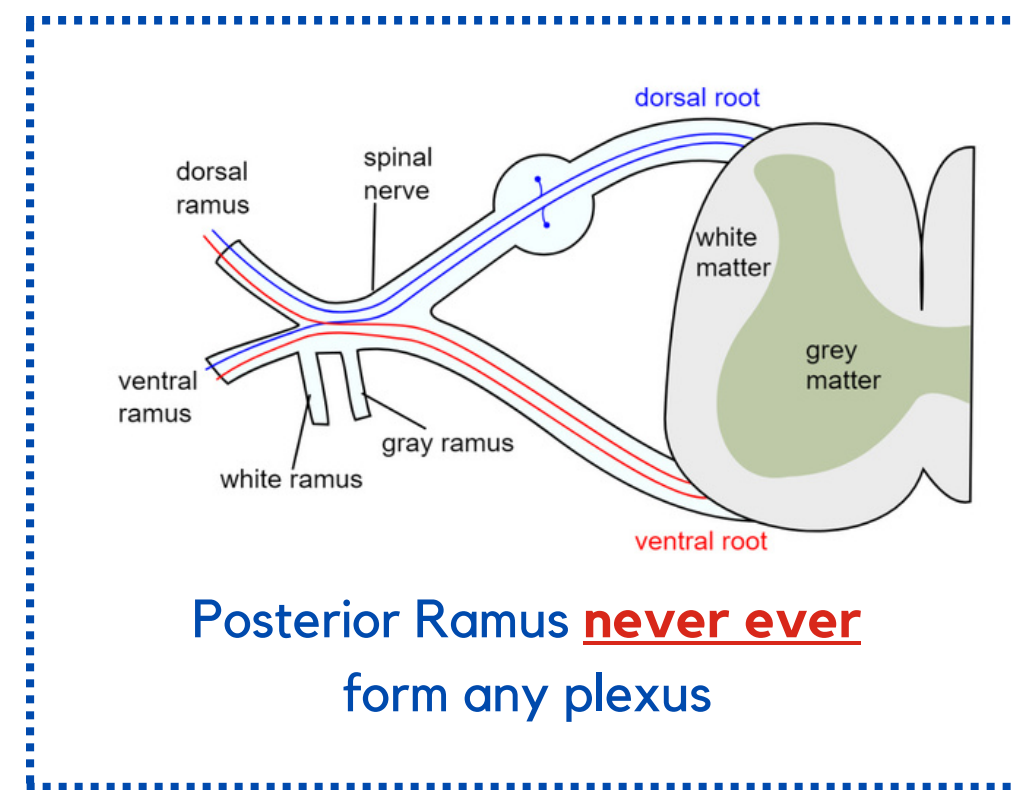


Editing File

Introduction



There are five main nerves leaving the brachial plexus, which with their branches supply the muscles and skin of the arms and hand.

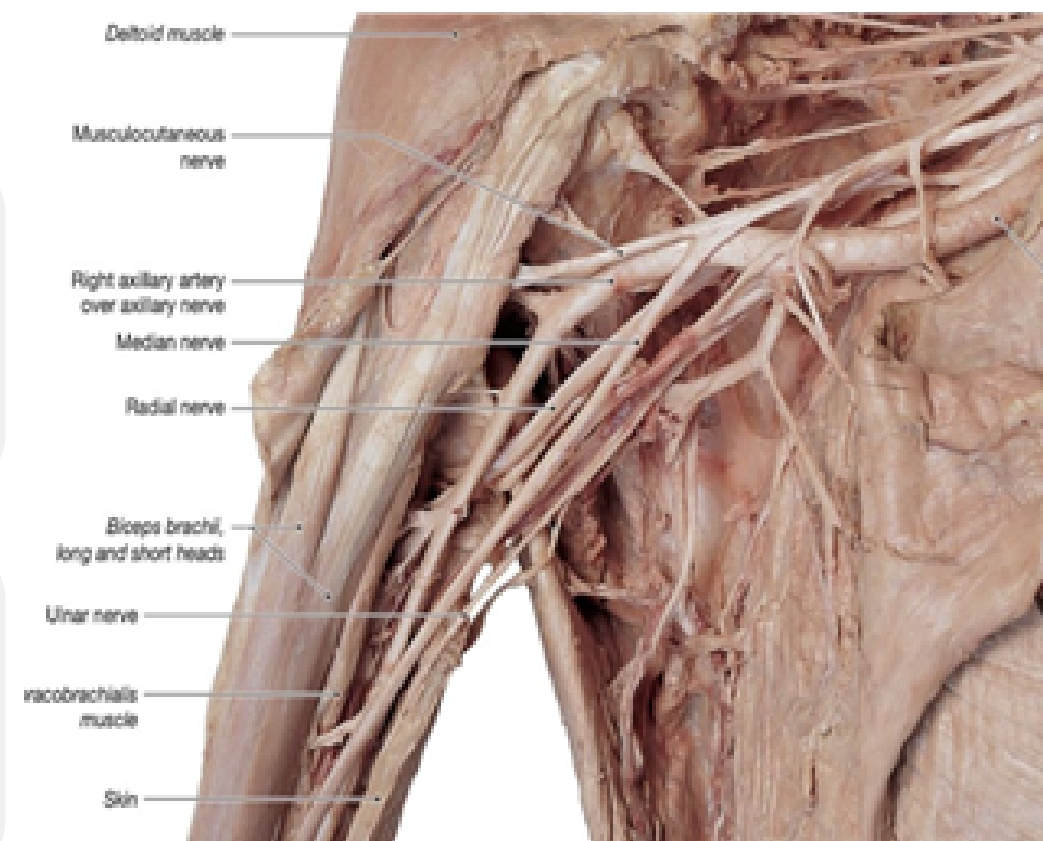


Radial Nerve

Is one of the terminal branches of the posterior cord and supplies the extensor muscles and the skin of part of the arm and hand.

Ulnar Nerve

Is the continuation of the medial cord and supplies the small muscles of the hand.



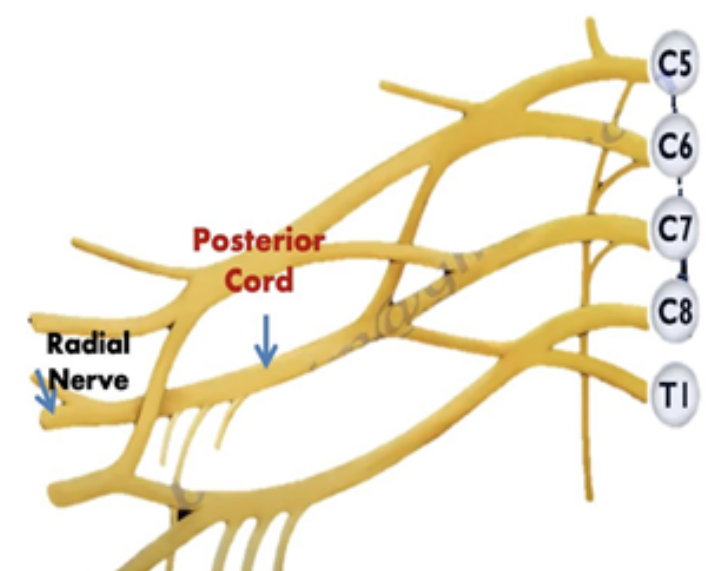
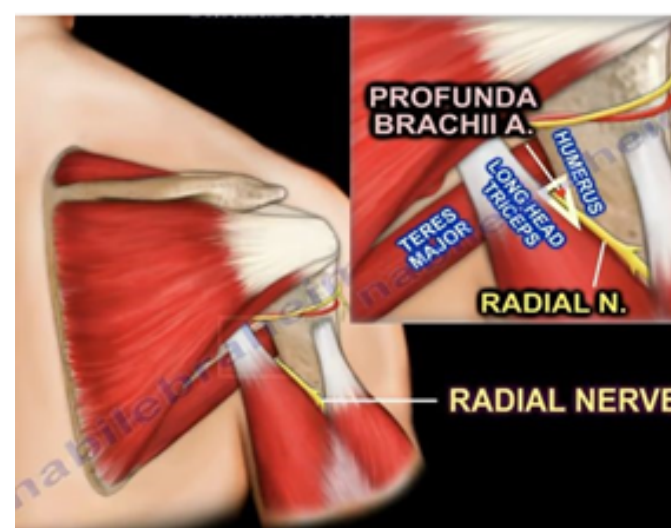
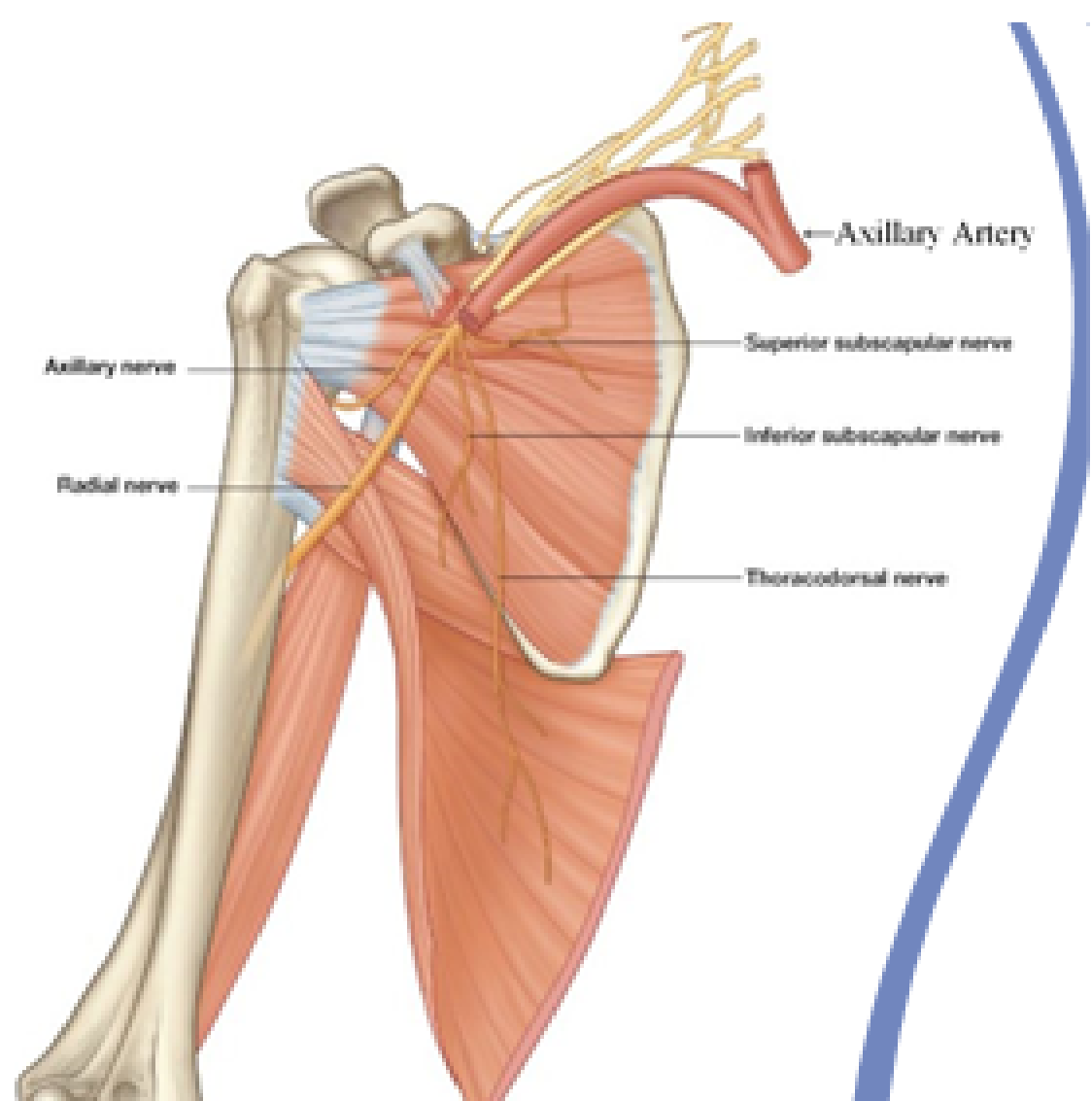
Radial Nerve

Origin:

- The largest of the five branches of the **posterior cord** of brachial plexus (C5, 6, 7, 8, T1)
- **Begins in the axilla**

Supply:

- Nerves of the **extensor** compartment: Muscles of the **posterior** compartment of the arm & the forearm (supplies the posterior portion of the upper limb)



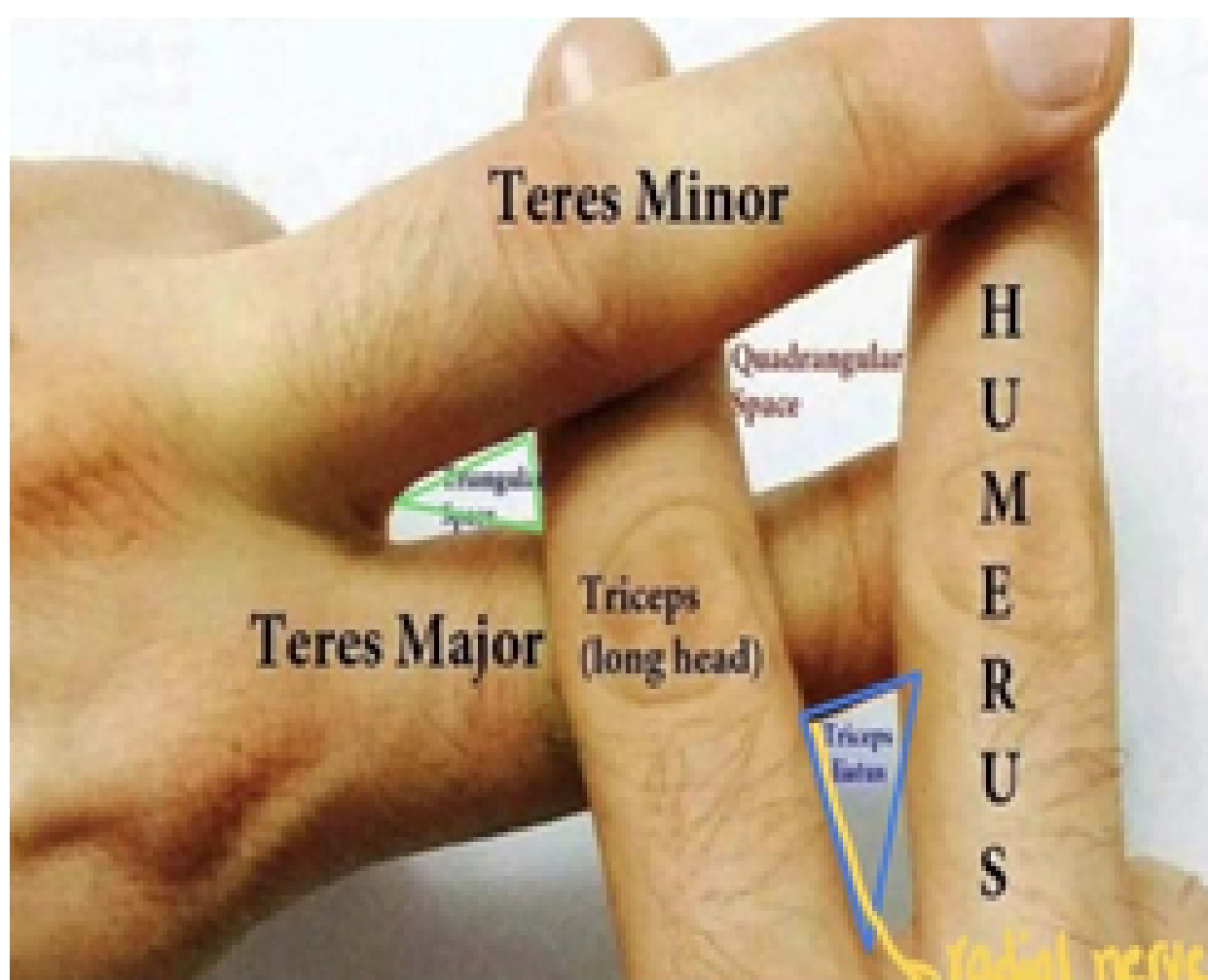
Radial Nerve Branches in:

Axilla

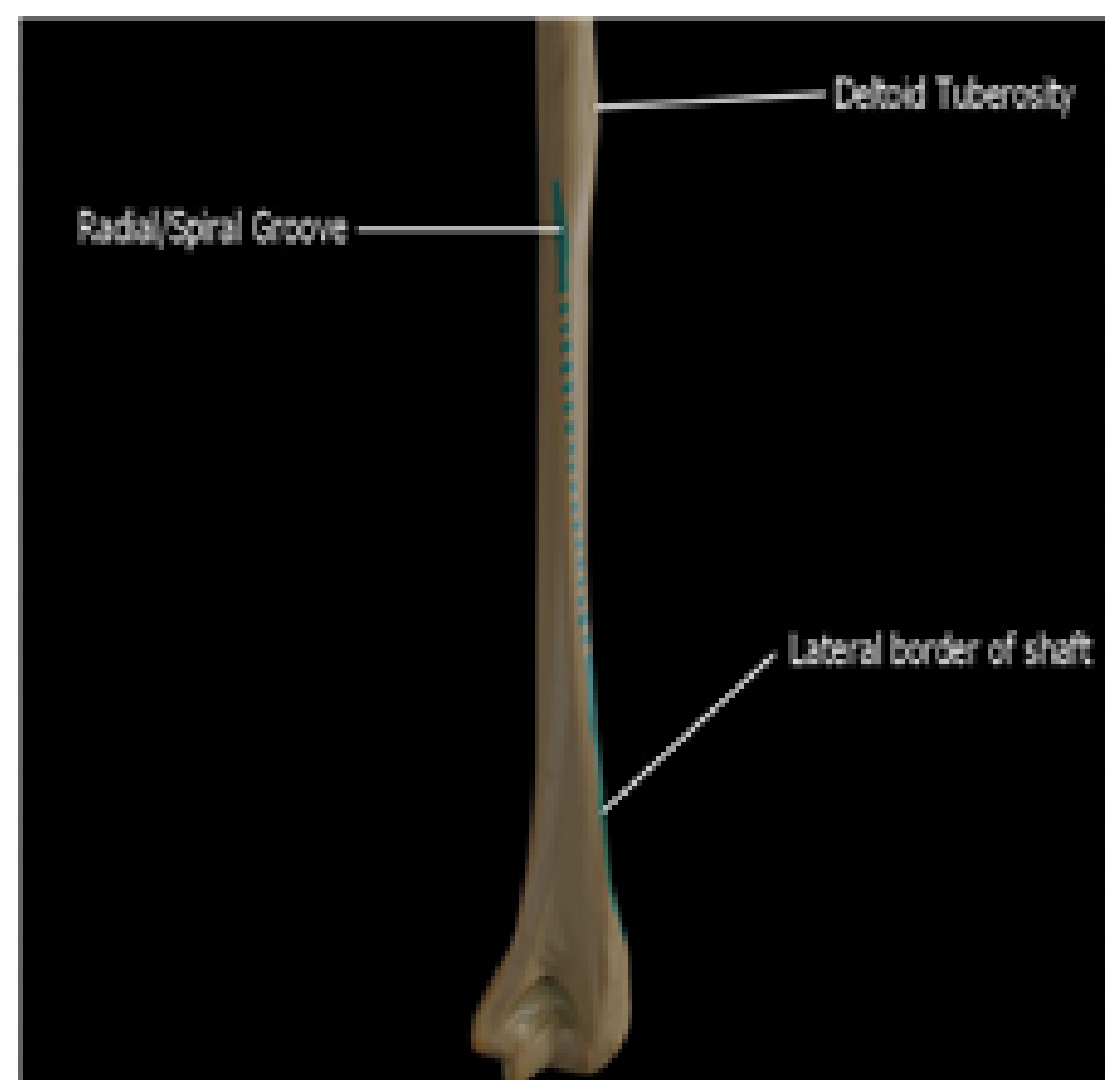
- The radial nerve arises from the posterior cord of the brachial plexus
- It descends **behind the 3rd part of axillary artery**, and crosses the lower border of the posterior axillary wall (in front of the **subscapularis**, the **teres major**, and the **latissimus dorsi** muscles)
- Lies on the glistening tendon of latissimus dorsi
- passes through triangular space
- Triangular space boundaries: **Teres major (proximal)**, **Latissimus Dorsi (medial)**, **shaft of humerus (lateral)**.

Arm

- The radial nerve then deviates posteriorly to pass through the triangular space with the **profunda brachii artery** to enter the upper arm
- Then, winds around the back of the arm and passes in the **Spiral Groove** of the humerus obliquely downwards and laterally between the lateral and medial heads of the triceps.
- In the spiral groove, the nerve is accompanied by the Profunda Vessels and it lies directly in contact with the shaft of the humerus (**a Dangerous Position**).



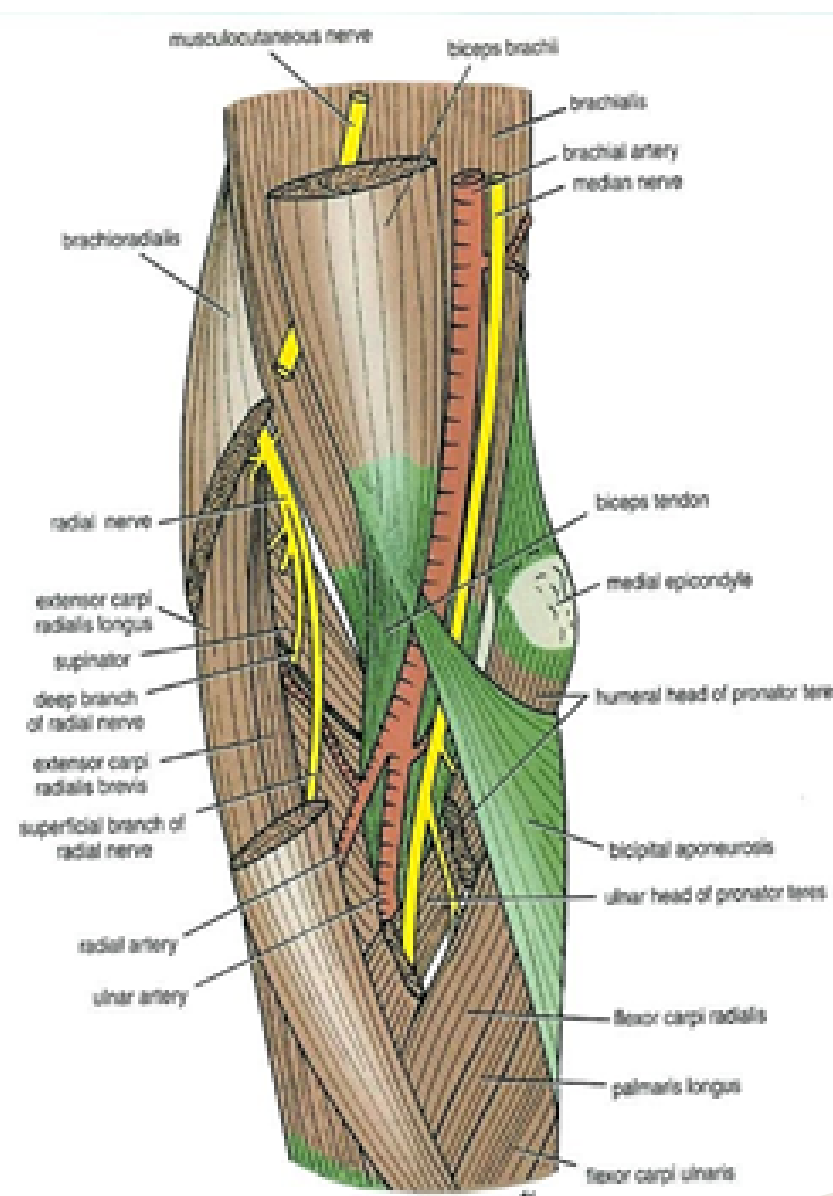
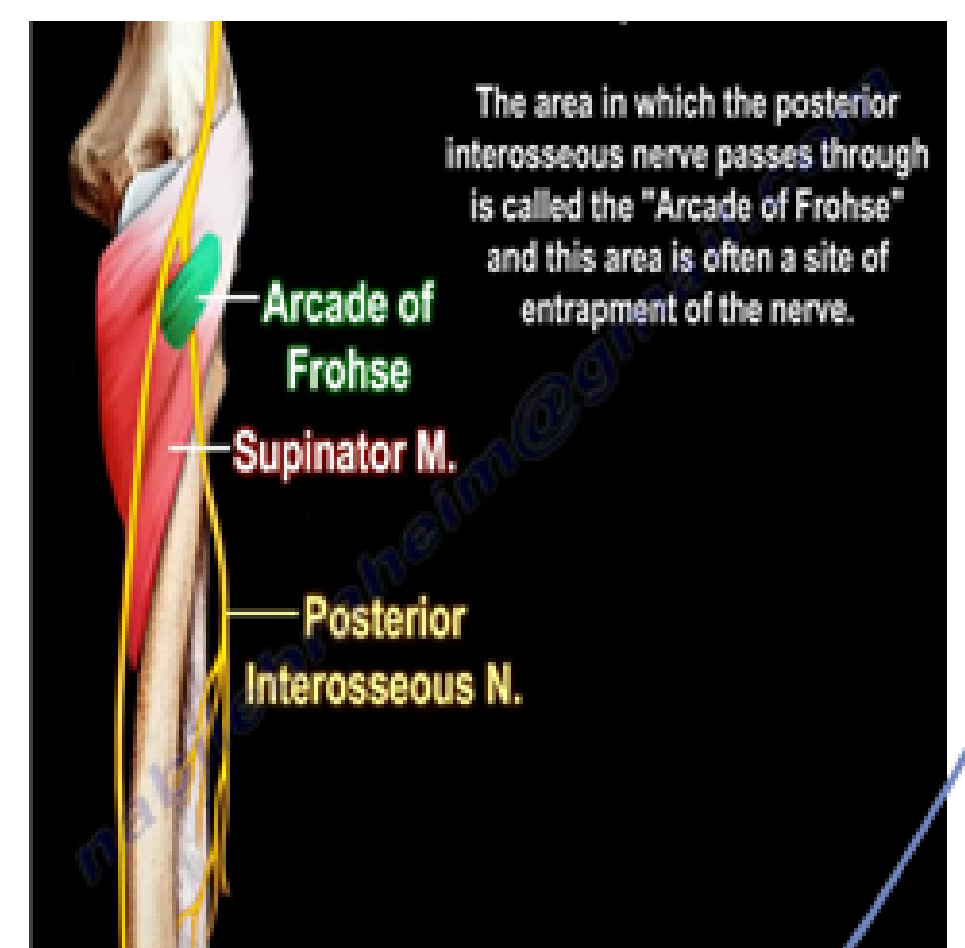
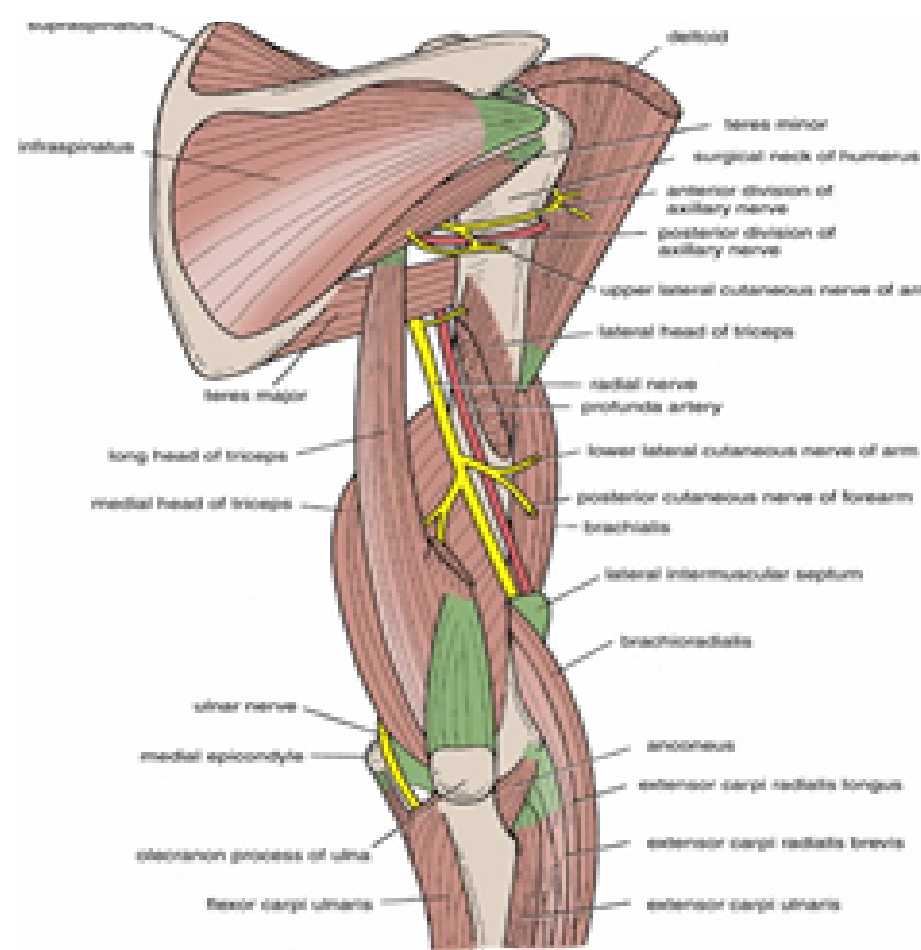
Triangular space



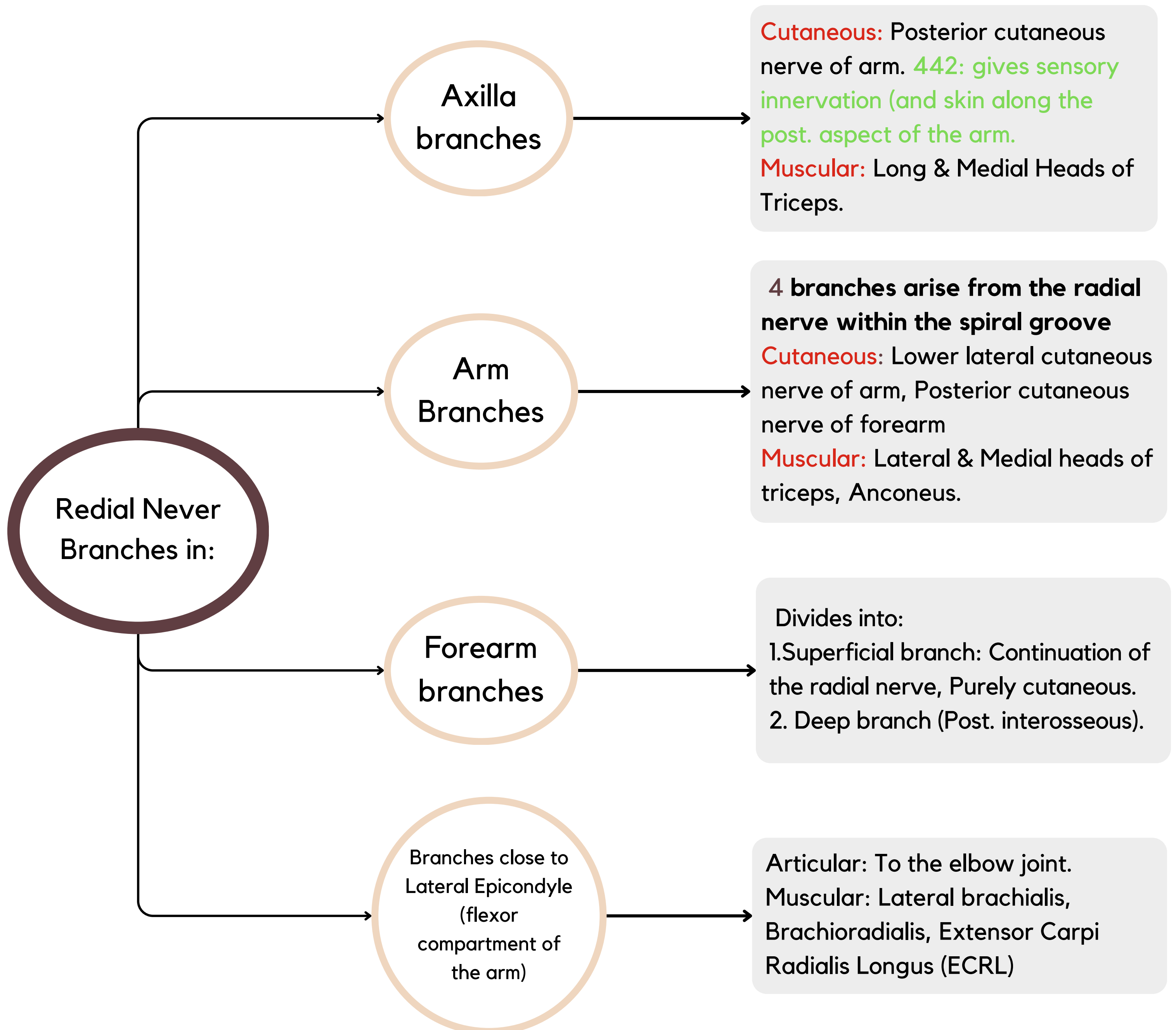
Radial Nerve Branches in:

Forearm

- It pierces the Lateral Intermuscular septum to enter the anterior compartment of the arm (7.5 cm) above elbow joint.
- Anteriorly, it descends in deep groove between the brachialis and brachioradialis muscles anterior to the Lateral Epicondyle.
- Descends in front of the Lateral Epicondyle.
- Passes forward into the Cubital Fossa. At about the level of the lateral epicondyle, the radial nerve terminates by dividing into superficial & deep terminal branches



Radial Nerve



Terminal Branches of Radial Nerve

Deep branch

(Post. interosseous): (Supplies these muscles on the radial side and dorsal surface of the forearm)

Course:

It winds around the neck of the radius, within the supinator muscle (by piercing the supinator muscle) and enters the posterior compartment of the forearm

Superficial branch

- Continuation of Radial nerve, purely cutaneous
- Runs down the **flexor** part of the forearm
- Winds around the lower end of the radius deep to brachioradialis
- Then crosses the pollicis muscles (ABL.EPL.EPB) to reach the back of the hand. **Towards snuff box**

Muscular:

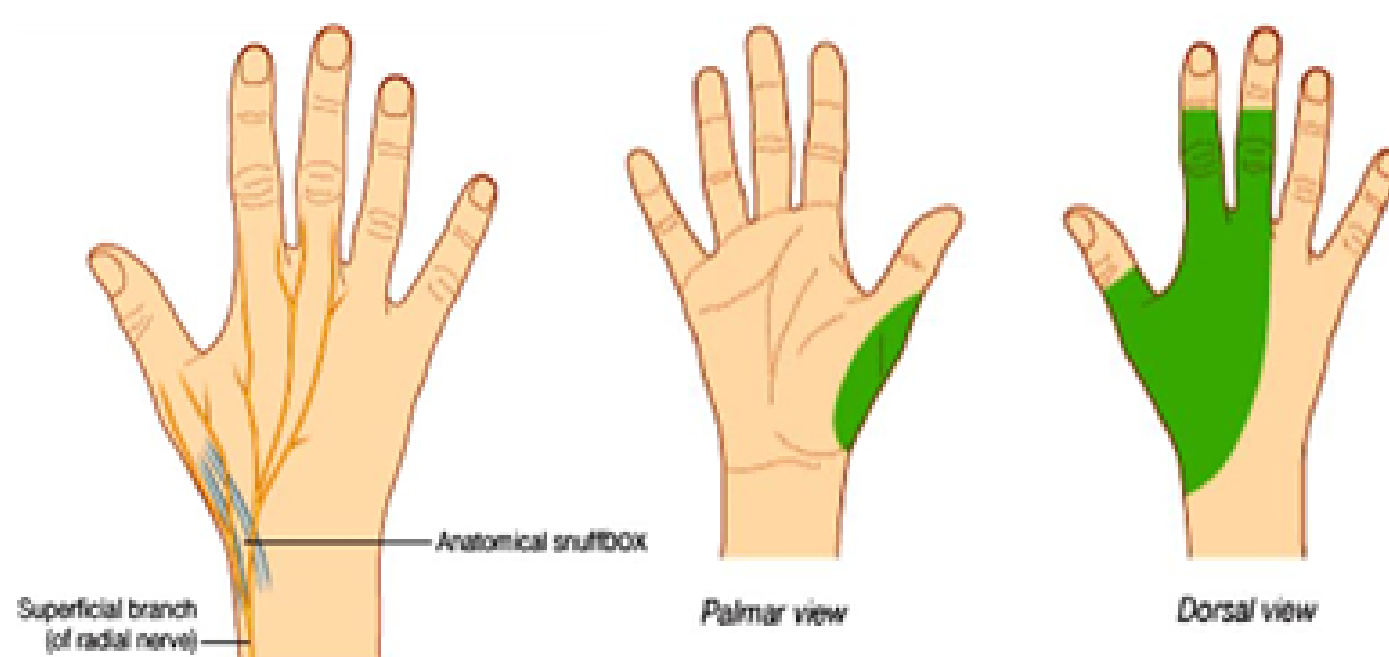
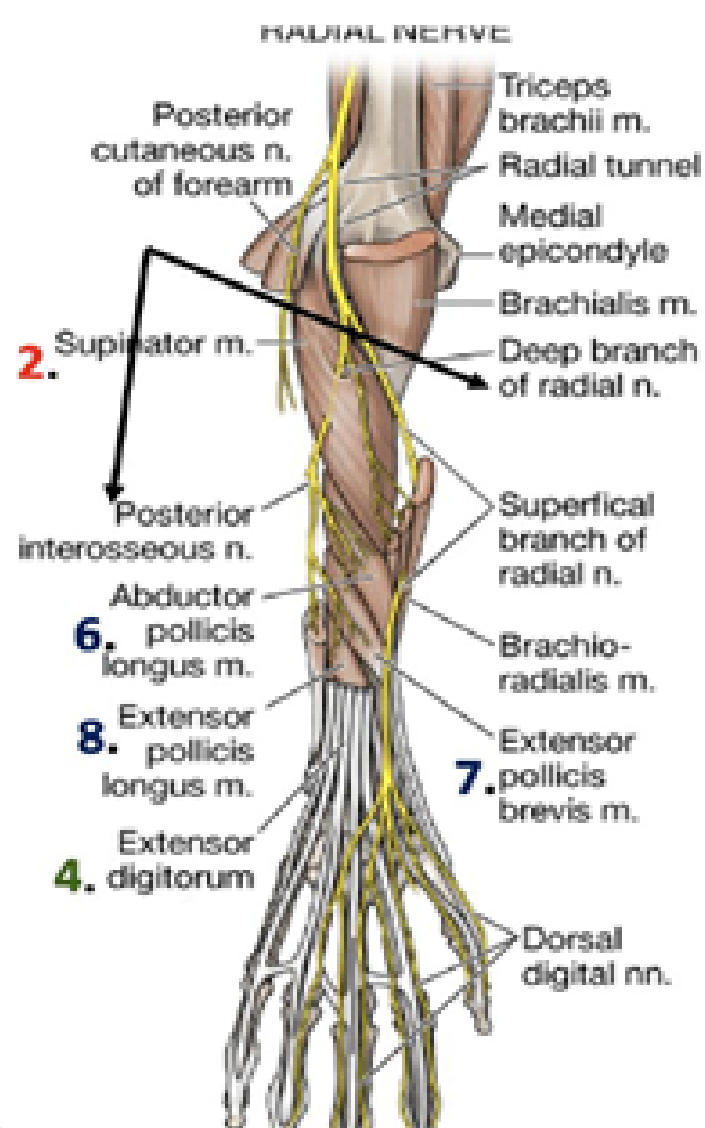
- 1 Extensor carpi radialis brevis.
- 2 Supinator.
- 3 Extensor carpi ulnaris.
- 4 Extensor digitorum
- 5 Extensor digiti mini
- 6 Abductor pollicis longus.
- 7 Extensor pollicis brevis.
- 8 Extensor pollicis longus
- . 9 Extensor indicis.

Cubital fossa

Extensor part

Supplies:

- The Superficial branch is a terminal division of Rn & a **sensory nerve supplying the majority of the dorsum of the hand**
- The skin on the lateral (radial two and half digits or three and a half of proximal phalanges (fingers)
- The skin of half/two third the dorsum of hand



Radial Nerve Injury

Note: most of the text of this topic is from Girls' slides since it covers more information

<p>Radial nerve compression or injury may occur at any point along the course of the nerve.</p>	<p>Most common fracture of the shaft of the humerus</p> <p>Stab wounds in cubital fossa, forearm or wrist.</p> <p>Pressure of crutches on armpits "crutch palsy"</p>
<p>Manifestations</p>	<ul style="list-style-type: none">• Wasting of triceps and posterior compartment of forearm• "Wrist Drop" deformity at rest and on attempted wrist extension• The forearm is also pronated, the fingers are flexed and the thumb adducted.
<p>Radial nerve Injury in the axilla</p>	<ul style="list-style-type: none">• Post. dislocation of the shoulder joint, or axillary wounds.• All motor and sensory function below the axilla will be affected. <p>It results in:</p> <ol style="list-style-type: none">1- Loss of elbow extension due to paralysis of the triceps.2- Inability to extend wrist and fingers due to paralysis of all carpal extensors and paralysis of all digital extensors.3- Inability to supinate the extended forearm due to paralysis of supinator4- Wrist (hand) drop: this is the characteristics deformity in the hand following radial nerve injury, manifested by:<ul style="list-style-type: none">• flexion of the fingers due to paralysis of the digital extensors.5- loss of cutaneous sensations over a small area on the lateral side of the dorsum of the hand <p>Why? Due to Overlapping by the median and ulnar nerves</p>

Radial Nerve Injury

Boys' Slides

Transient paralysis

- Improper use of crutch (pressing the nerve in the axilla) "**CRUCH PALSY**"
- **Saturday night palsy** (drooping the arm over the chair in a state of diminished consciousness)



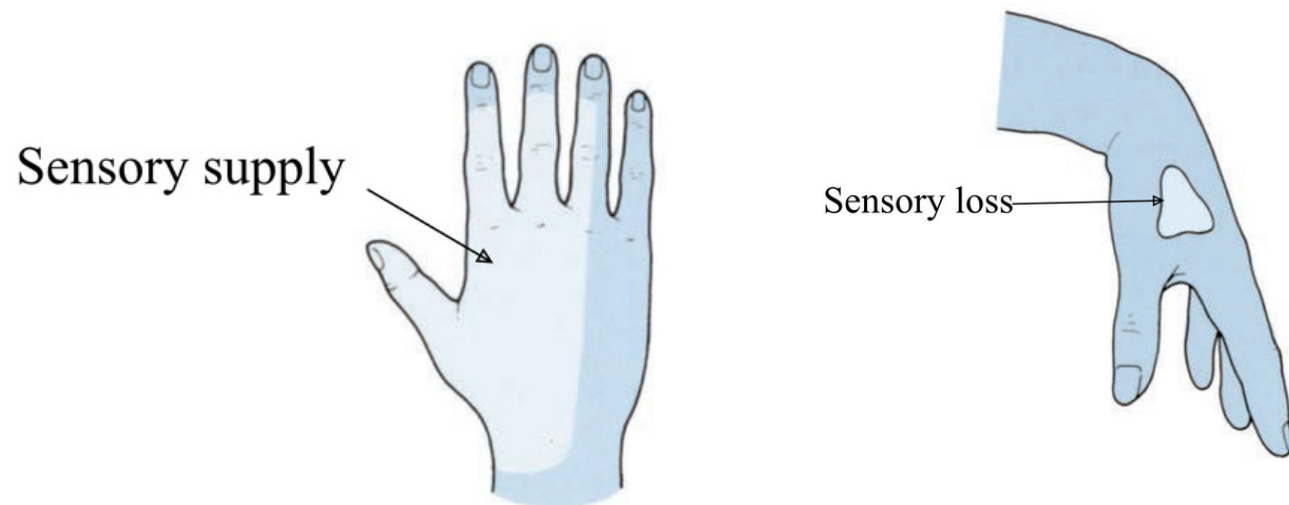
Improper use of crutch



Saturday's night palsy

Sensory loss is minimal over the 1st dorsal interosseous, why?

Due to Overlapping by the median and ulnar nerves



Injury of the deep branch (Post. interosseous)

Majority of the muscles in posterior forearm are affected & the patient will experience weakness of finger extension.

"**Wrist Drop does not occur**" Bc: The nerve supply to the **extensor carpi radialis longus** & **supinator**, will be unaffected + lateral muscle is powerful therefore it will keep the wrist joint extended. (No wrist Drop)


Occurs due to:

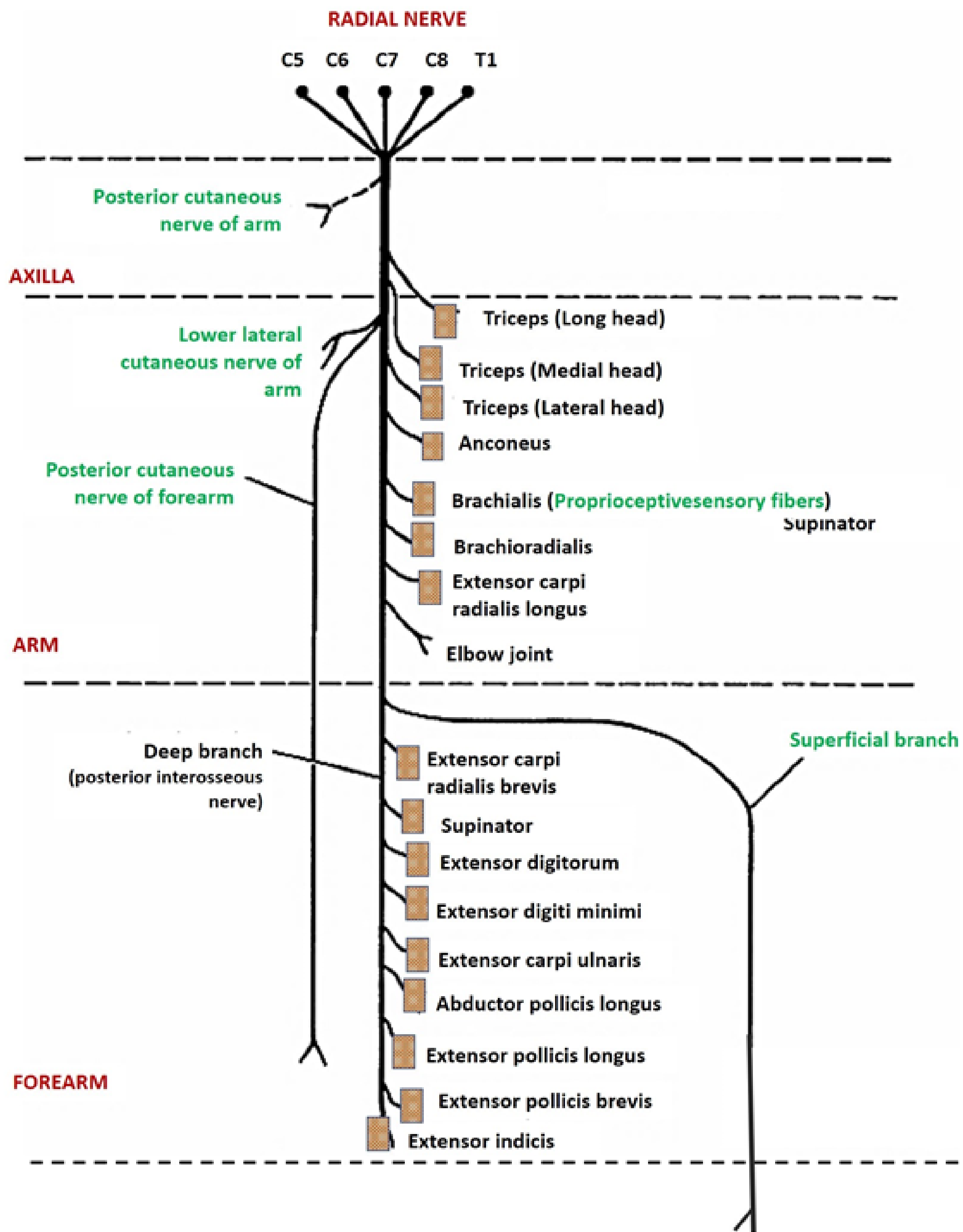
- Fractures of the proximal end of the radius (radial head).
- Posterior dislocation of the radius (head).

Sensory loss → None

Due to Overlapping by the median and ulnar nerves.

Summary Of Radial Nerve

 Green is cutaneous



HAND

Skin over lateral part of dorsum of hand and lateral 3 ½ digits till the middle phalanx.

Team 438: Injury like a stab wound, results in a variable small area of anesthesia over the dorsum of the hand and lateral three and half fingers up to the base of their distal phalanges. (or distal interphalangeal joint).

Ulnar Nerve

Originates

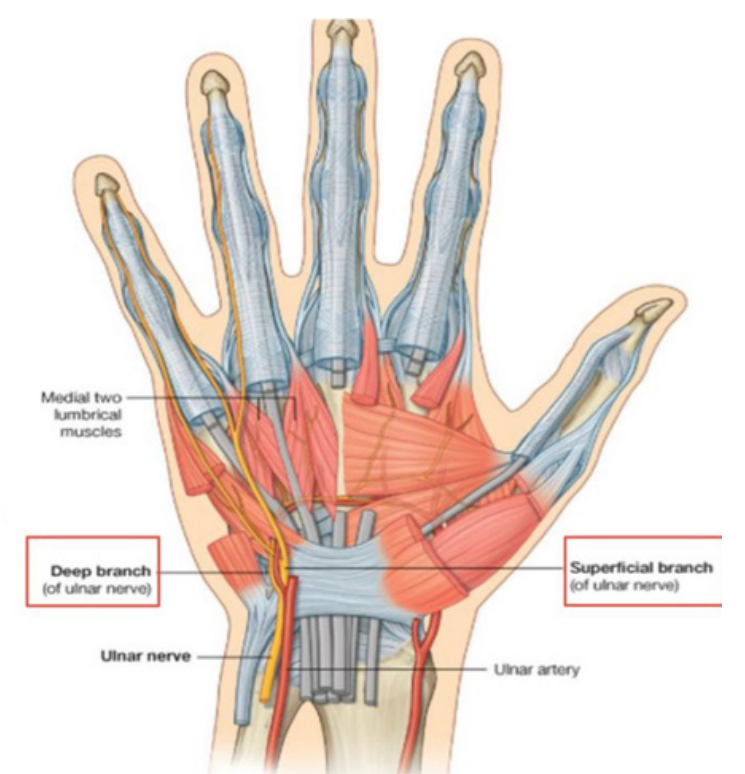
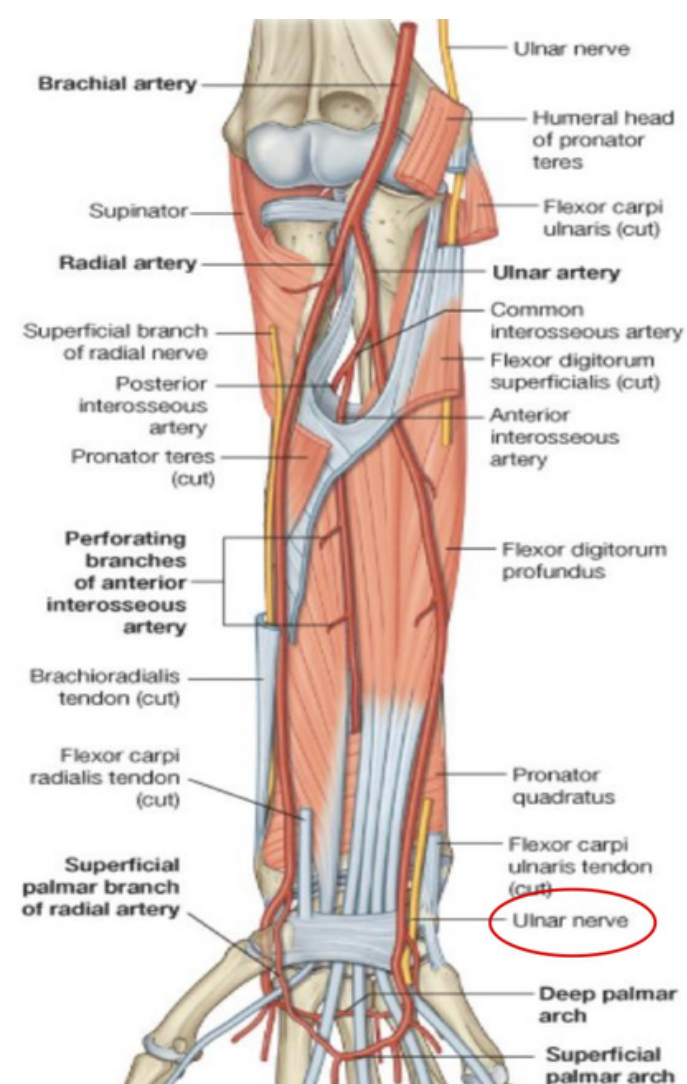
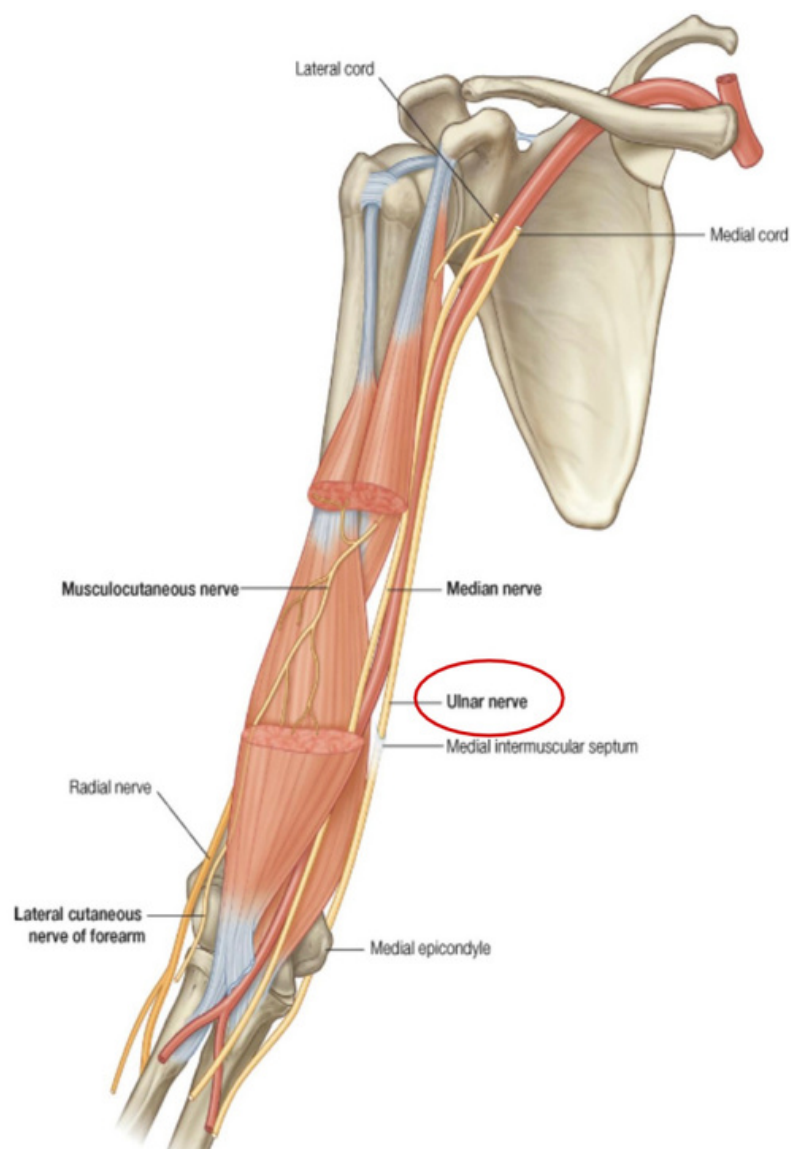
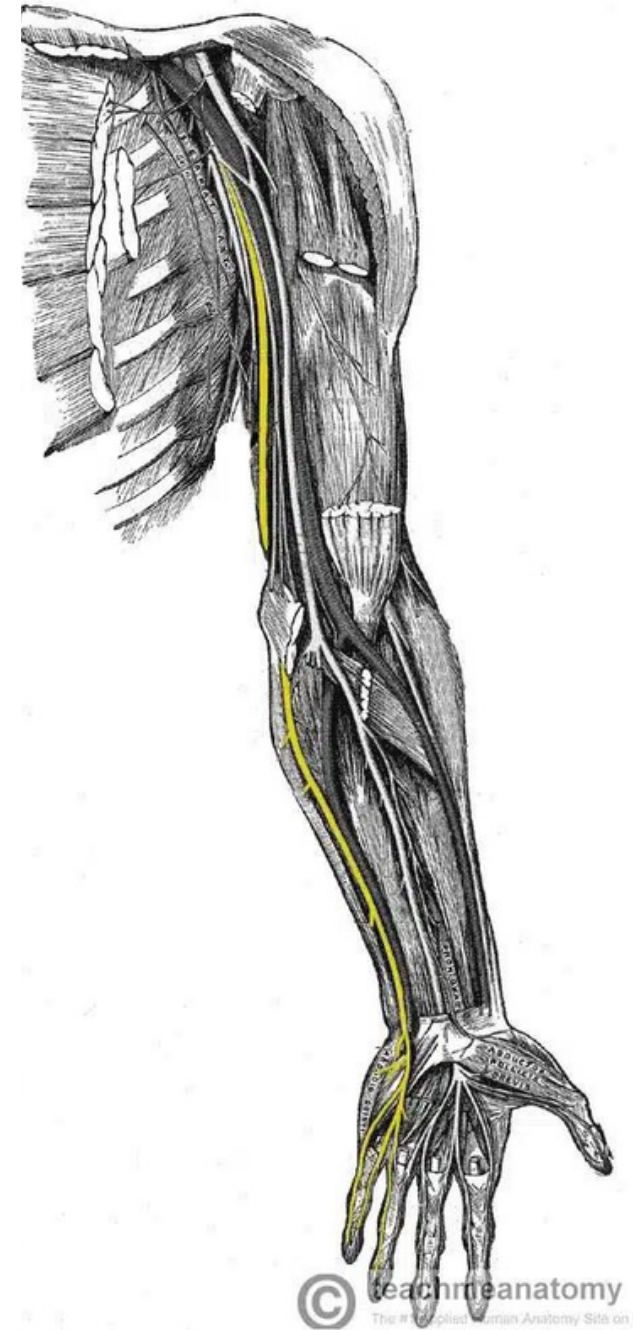
From the **C8-T1** nerve roots which form the medial cord of the brachial plexus.

Origin

- Begins in the axilla.
- Continuation of the medial cord.

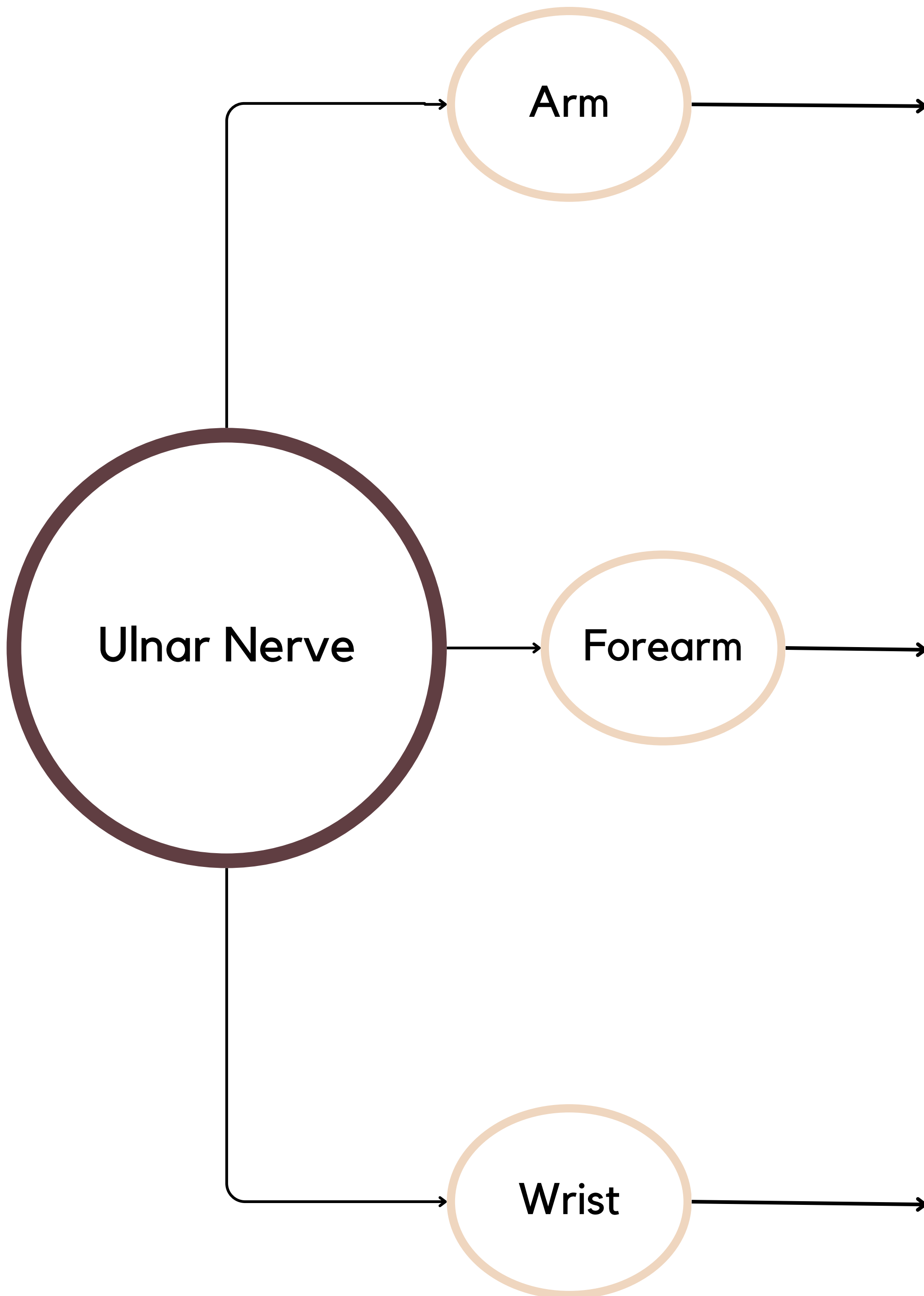
Supplies

- Some flexors muscles on ulnar side of the forearm.
- Most of the intrinsic muscles of the hand.
- Skin of the the ulnar one and half digits.





Helpful Video



- Descends along the medial side of the following arteries:

- Axillary
- Brachial

- At the level of coracobrachialis insertion, it pierces the medial Intermuscular Septum to reach the post-Comp.

-Leaves the arm behind the medial Epicondyle of the humerus at the elbow (funny bone).

- Enters the forearm between the two heads of the flexor carpi Ulnaris muscle.

- Descends on the anteromedial aspects of flexor digitorum profundus between it and flexor carpi ulnaris

- Lies deep to the flexor carpi Ulnaris (Lateral).

- It is medial to Ulnar Artery

- It enters the hand (palm), passes anterior to flexor retinaculum.

At wrist it passes:

- Anterior to flexor Retinaculum.

- Lateral to Pisiform Bone and Hook of hamate.

- Medial to the Ulnar artery

- Divides into superficial and deep divisions

- Articular with the wrist

Ulnar Nerve Branches

✦ Both **Arm, Axilla, and Cubital fossa** have no Branches.

✦ **In Forearm :**

Supplies some flexors muscles on ulnar side of the forearm.

Muscular to:
(1 and 0,5 muscles)

- 1- Flexor Carpi Ulnaris.
- 2- Medial half of Flexor Digitorum profundus.

Articular to:

Articular to : **Elbow joint.**

(-The ulnar nerve then travels alongside the Ulna bone of the forearm into the wrist.
- in the lower part of the forearm the ulnar nerve Lies lateral to the FCU and medial to ulnar Artery.)

Cutaneous to:

- 1- Dorsal (posterior) cutaneous : Supplies the skin over the back of the Medial of the hand and Medial 1+½ fingers.
- 2- Palmar cutaneous : Supplies the skin over the medial third of the palm.

✦ **Terminal Branches (**Wrist**) :**

✦ **Deep branches:**

Muscular to:

- Hypothenar Eminence.
- All interossei (Palmar and Dorsal).
- 3rd and 4th (Radial) Lumbricals.
- Adductor pollicis (ends by supplying it).

✦ **Superficial Branches :**

Muscler to:

Palmaris Brevis.

Cutaneous to:

Supplies the skin over the Palmar aspect of the medial 1+½ fingers(including nail beds).

Applied Anatomy : Ulnar Nerve injury



Nerve compression or injury at any point at its course

★ Most common sites are:

- Elbow
- At the wrist

★ Manifestations:

- Deformity
- Motor loss
- Sensory loss

Deformity: Claw hand

- The **ring** and **little** fingers are **flexed**.
- **Hyperextension** of **MP** joints & **flexion** of **IP** Joints of the ring and little fingers.
- Atrophy of the dorsal interosseous spaces and hypothenar eminence.
- Cannot adduct the thumb.
- **If combined with median nerve injury will result in complete claw**

Injury at Elbow:

Muscles of the front of the forearm:

- FCU and medial ½ of FDP: **weak** flexion of the wrist and cannot adduct the hand: radial deviation

Muscles of the hand:

- Interossei and medial 2 lumbricals:
- Weak adduction and abduction of the fingers
- Extension of MP joints and flexion of IP joints of 4th and 5th fingers.
- Adductor policis: loss of thumb adduction.

SENSORY: Loss of sensations from palmar and dorsal aspects of the medial 1/3 of the hand and medial 1 ½ fingers.

Injury at Wrist:

- Muscles of the front of the forearm: spared
- Muscles of the hand: affected.
- The deformity is severe: ulnar paradox (synonym for claw hand)

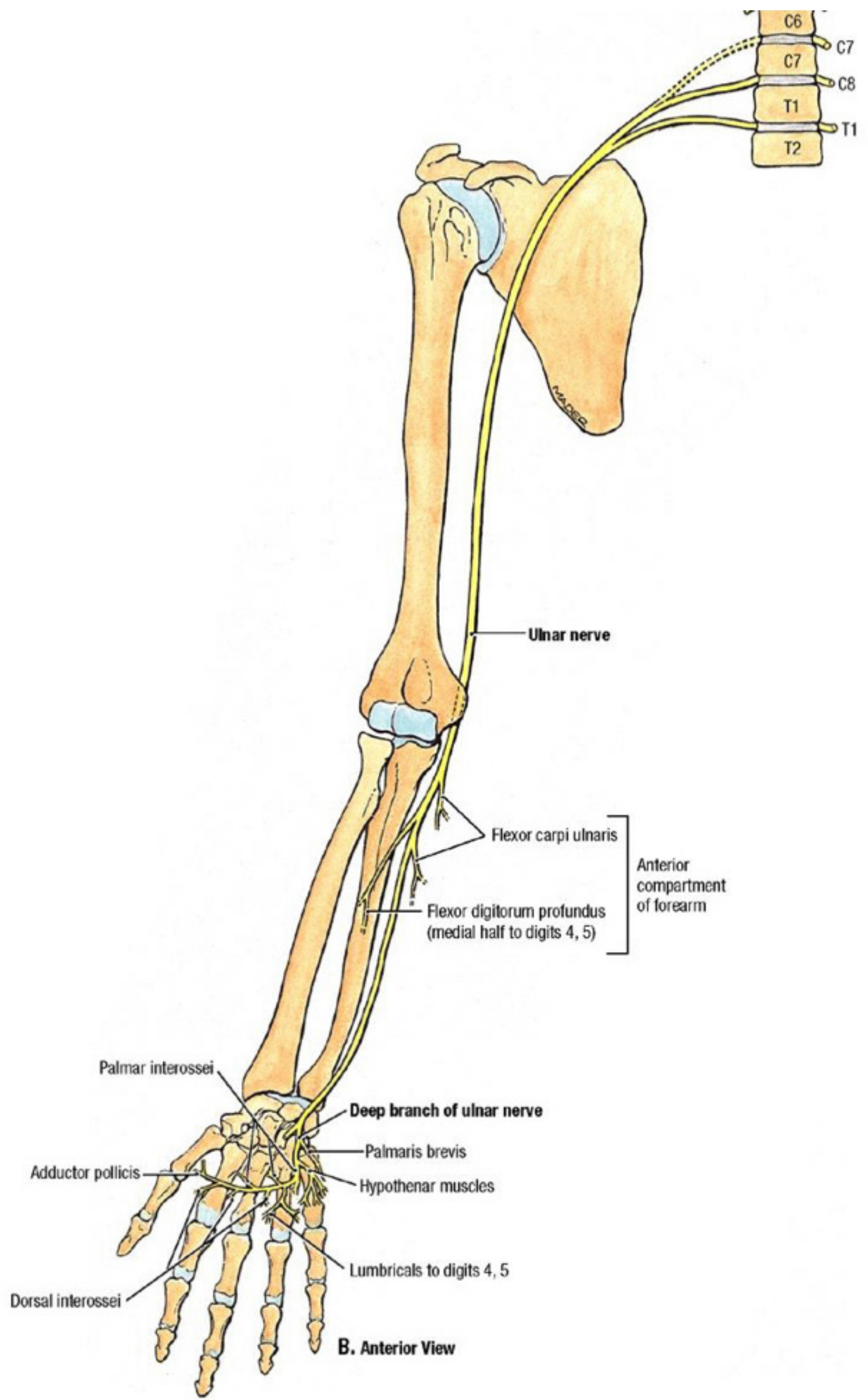
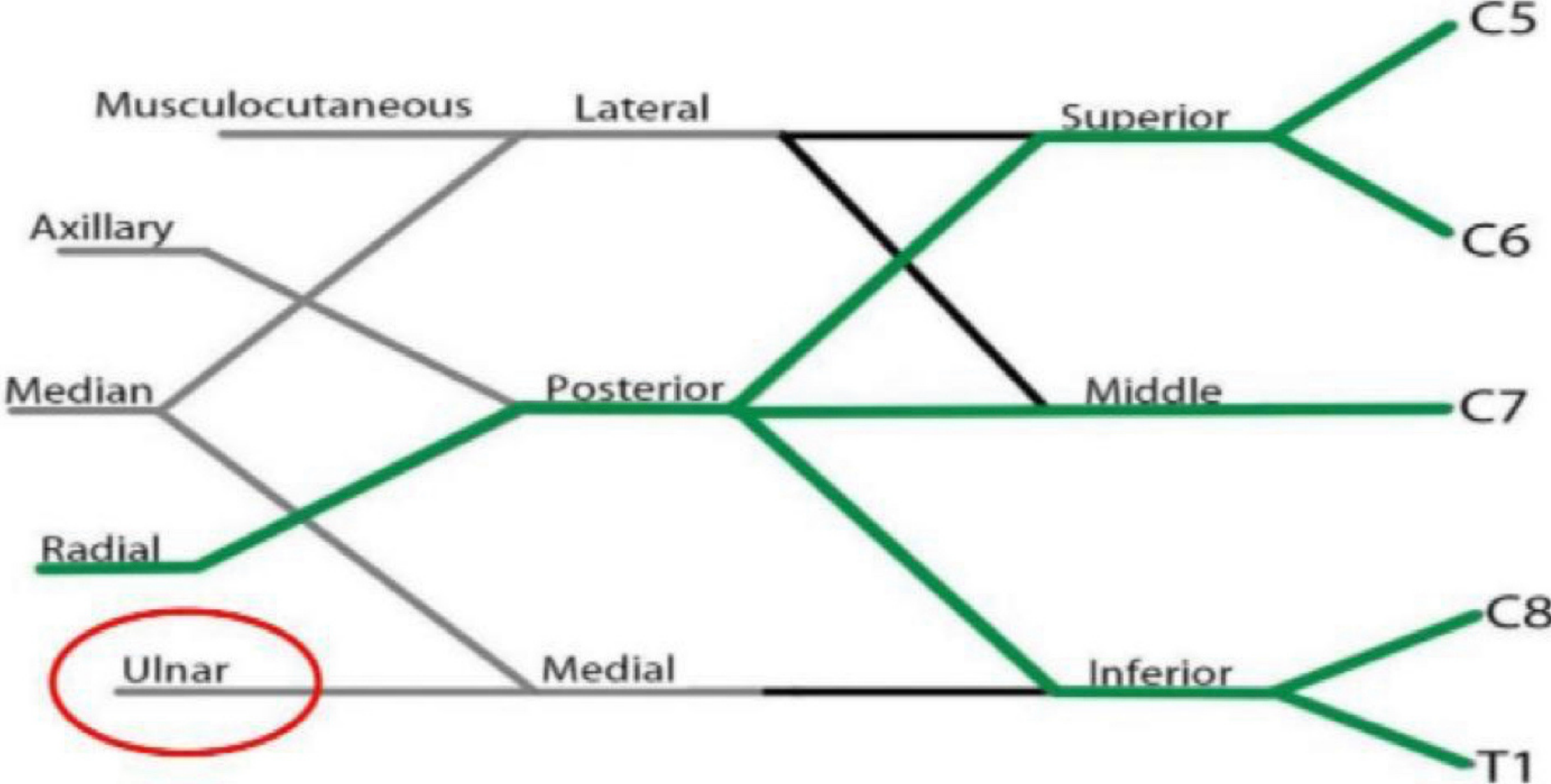
The higher the lesion the less the claw, while the lower the lesion the more the claw

SENSORY:

- Palmar and dorsal cutaneous branches: spared
- Palmar digital branches : **loss of sensations over the palmar surface of medial 1 ½ fingers only.**



Summary Of Ulnar Nerve



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Summary



Radial Nerve

Is one of the five branches of the **posterior** cord and also the largest branch of the brachial plexus. It is the nerve of the extensor compartment the arm and the forearm. In the spiral groove, the nerve lies directly in contact with the shaft of the humerus (a Dangerous position). Most commonly injured in fracture of the shaft of the humerus. The characteristic lesion is (**WRIST DROP**).

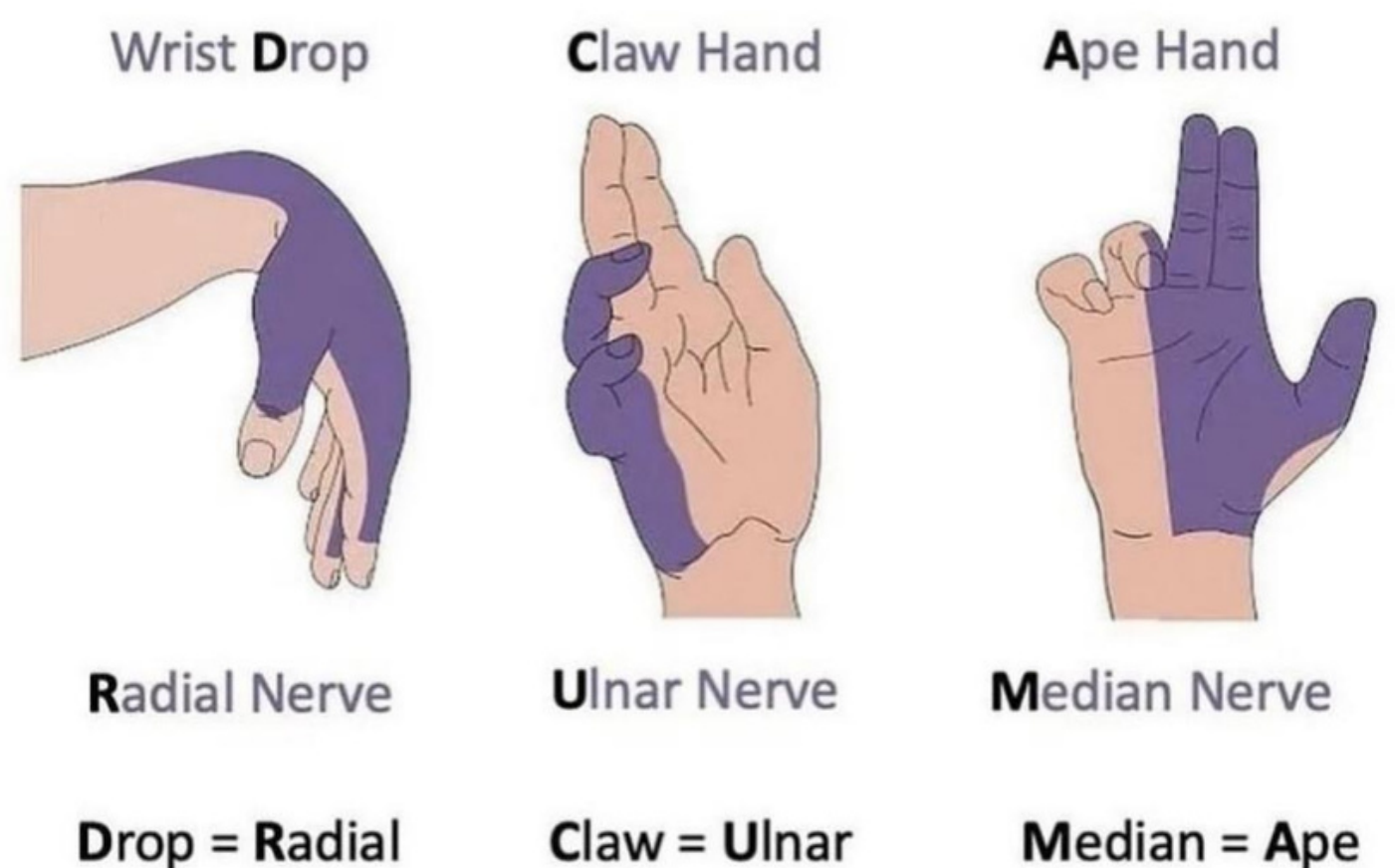
Ulnar Nerve

Is continuation of the medial cord which supplies some flexors muscles on ulnar side of the forearm, most of the intrinsic muscles of the hand and skin of the ulnar 1+½ digits. It is most commonly injured behind the elbow followed by the wrist. The classical sign of a low lesion is (**CLAW HAND**).

Helpful Images



Nerve Injuries



Mnemonic: DR. CUMA

MCQs

1

Most commonly injured nerve is?

A-Ulnar Nerve	B-Radial Nerve	C-Brachial Nerve	D-Median Nerve
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2

What cause an atrophy of Ulnar side of forearm?

A-Ulnar Nerve Activation	B-Ulnar Nerve injury	C-Radial Nerve Activation	D-Radial Nerve injury
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3

The Radial nerve enters the upper limb between?

A-Lateral and Medial Heads of triceps	B-Long and Medial Heads of triceps	C-Long and Lateral Heads of triceps	D-Heads of biceps
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4

Injury of Radial nerve at Axilla Cause:

A-Wrist dropping	B-Extension of Finger	C-Extension of Elbow	D-Flexion of shoulder
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5

Which nerve injury causes a claw hand?

A-Radial Nerve	B-Median Nerve	C-Brachial Nerve	D-Ulnar Nerve
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1-A 2-B 3-B 4-A 5-D

MCQs

6

Most commonly injured part of Ulnar nerve is?

A-at wrist	B-Behind the elbow	C-Shoulder	D-A&B
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7

Supplies the skin over the palmar aspect of the medial One + ½ fingers

A-Radial Nerve	B-Ulnar Nerve	C-Brachial Nerve	D-Median Nerve
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8

The Radial nerve arises from the ___ of the brachial plexus

A- Lateral	B-medial	C-Anterior	D-Posterior
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9

A paralysis draping the arm over the chair in a state of diminished consciousness?

A-Saturday night palsy	B-Honeymoon palsy	C-Improper use of crutch	D-Stroke
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10

The Radial nerve supplies The _____ Compartment

A-Flexors	B-Abductors	C-Extensor	D-adductors
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6-D 7-B 8-D 9-A 10-C

MCQs

11

A tennis player complains of pain and weakness in the forearm and difficulty gripping the racket. The symptoms worsen during backhand swings. Which of the following nerves could be implicated?

A-Axillary Nerve

B-Ulnar Nerve

C-Median Nerve

D-Radial Nerve

12

A data entry specialist reports numbness and tingling in the ring and little fingers of her both hands. The symptoms are more pronounced when typing. What is the most likely cause of her symptoms?

A-Radial Nerve

B-Ulnar Nerve

C-Interosseous Nerve

D-Median Nerve

13

Which of the following intrinsic hand muscles is innervated by the ulnar nerve?

A- Adductor pollicis

B-Extensor Indicis

C-Abductor pollicis
brevisD-Extensor pollicis
brevis

14

Which of the following muscles is innervated by the radial nerve in the arm?

A-Biceps brachii

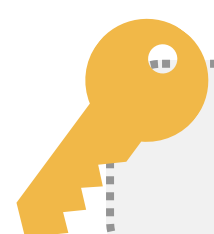
B-Brachialis

C-Triceps brachii

D-Pronator teres

15

Which of the following statements is the course of the ulnar nerve as it travels down the arm?

A-Anterior to
the humerusB-Medial to
the humerusC-Posterior to
the humerusD-Lateral to
humerus

11-D 12-B 13-A 14-C 15-B

SAQs

1

What are the two main Muscles that is supplied by the Ulnar Nerve at the forearm?

- 1- Flexor Carpi Ulnaris.
- 2- Medial half of Flexor Digitorum profundus.

2

What is the largest branch of the brachial plexus?

- The Radial Nerve

3

What is the classical sign of low lesion Ulnar nerve?

- Claw Hand

4

What does the radial nerve muscular branches Supply ?

- Brachialis , Brachioradialis , Extensor carpi radialis longus



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