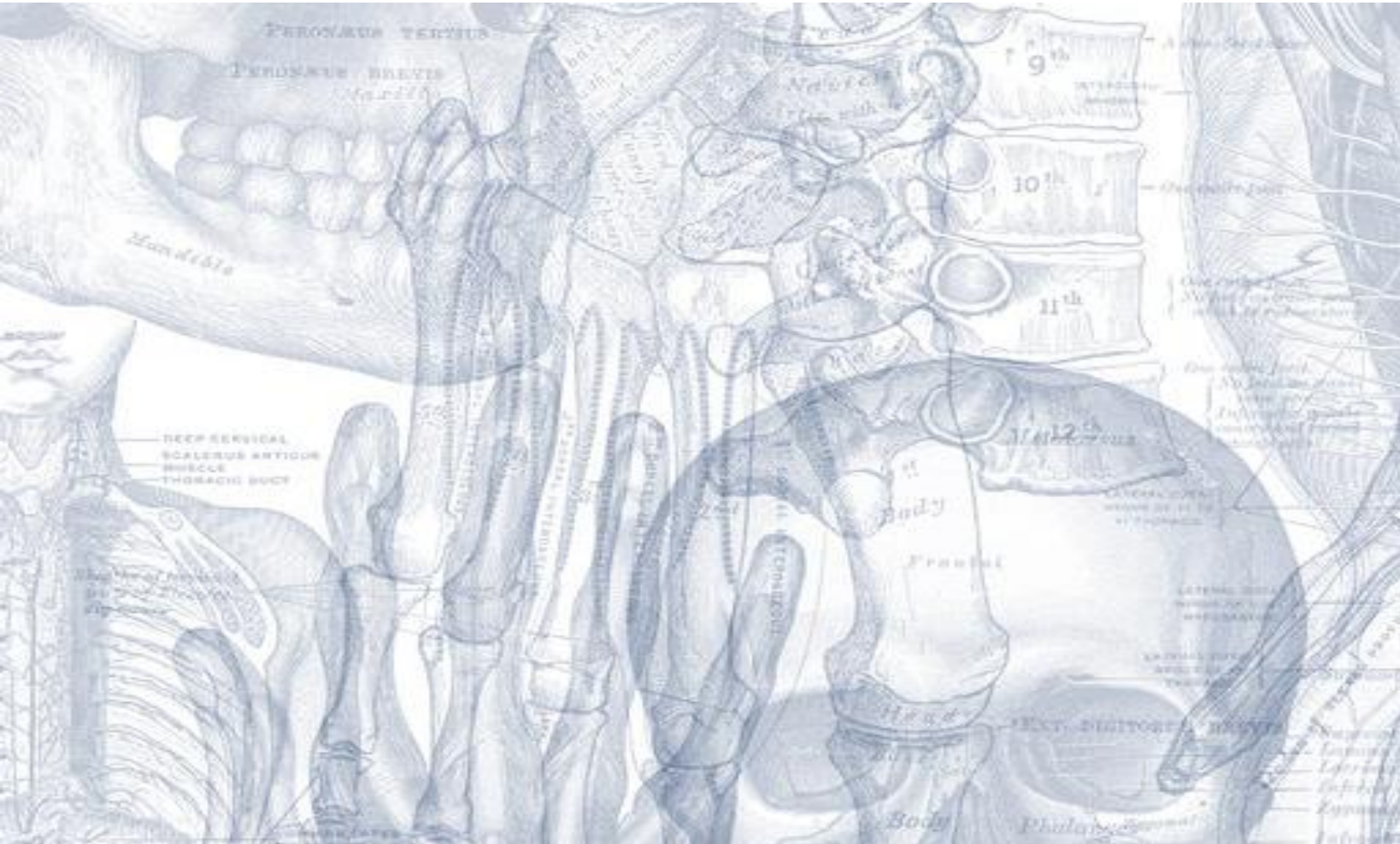


بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



**MEDICINE**  
KING SAUD UNIVERSITY



# Radial and Ulnar Nerves

[Editing File](#)

**Color Code**

- **Important**
- **Doctors Notes**
- **Notes/Extra explanation**

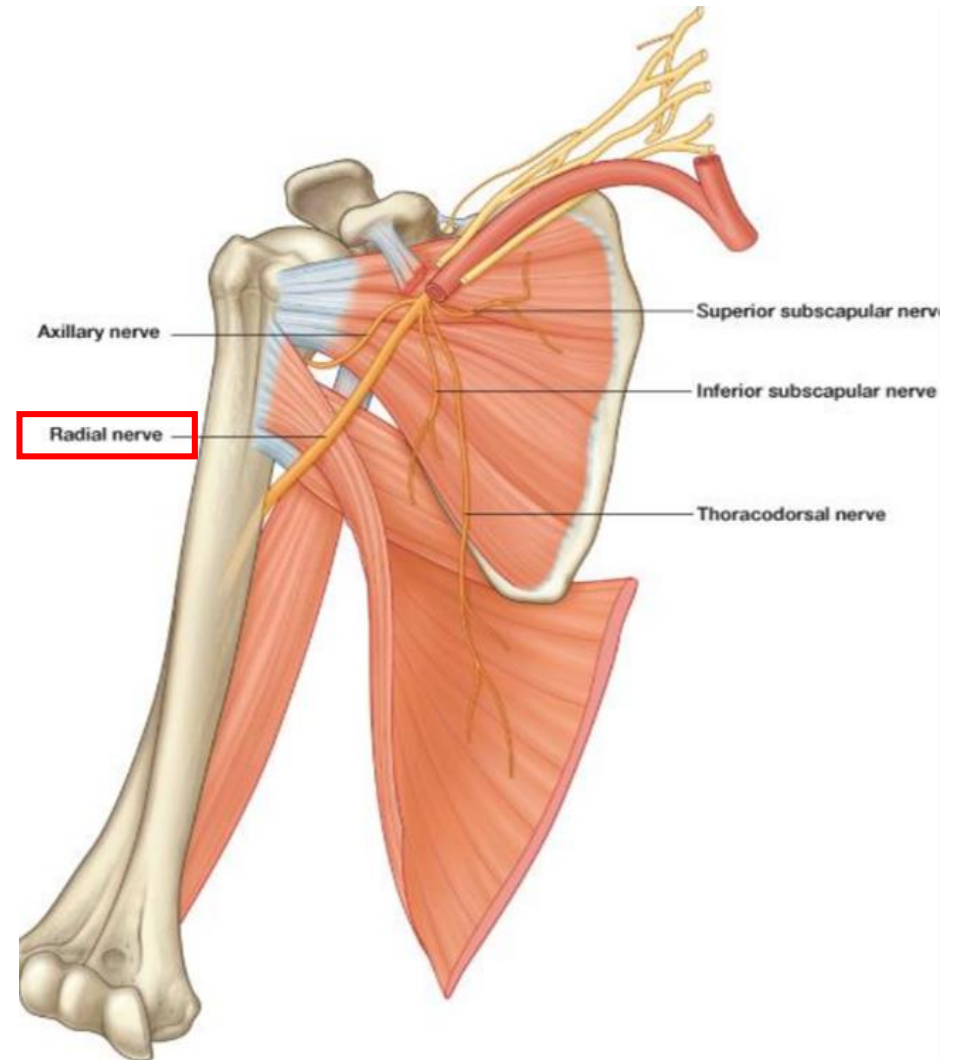
# *Objectives*

- ✓ Describe the anatomy of the radial & ulnar nerves regarding: origin, course & distribution.
- ✓ List the branches of the nerves.
- ✓ Describe the causes and manifestations of nerve injury.

# Radial Nerve

**Origin:** Posterior cord of the brachial plexus in the axilla  
(the **largest** branch of nerves in the upper limb)

**Supplies:** All muscles of the **posterior** compartment of the arm (triceps) & forearm (3 groups)



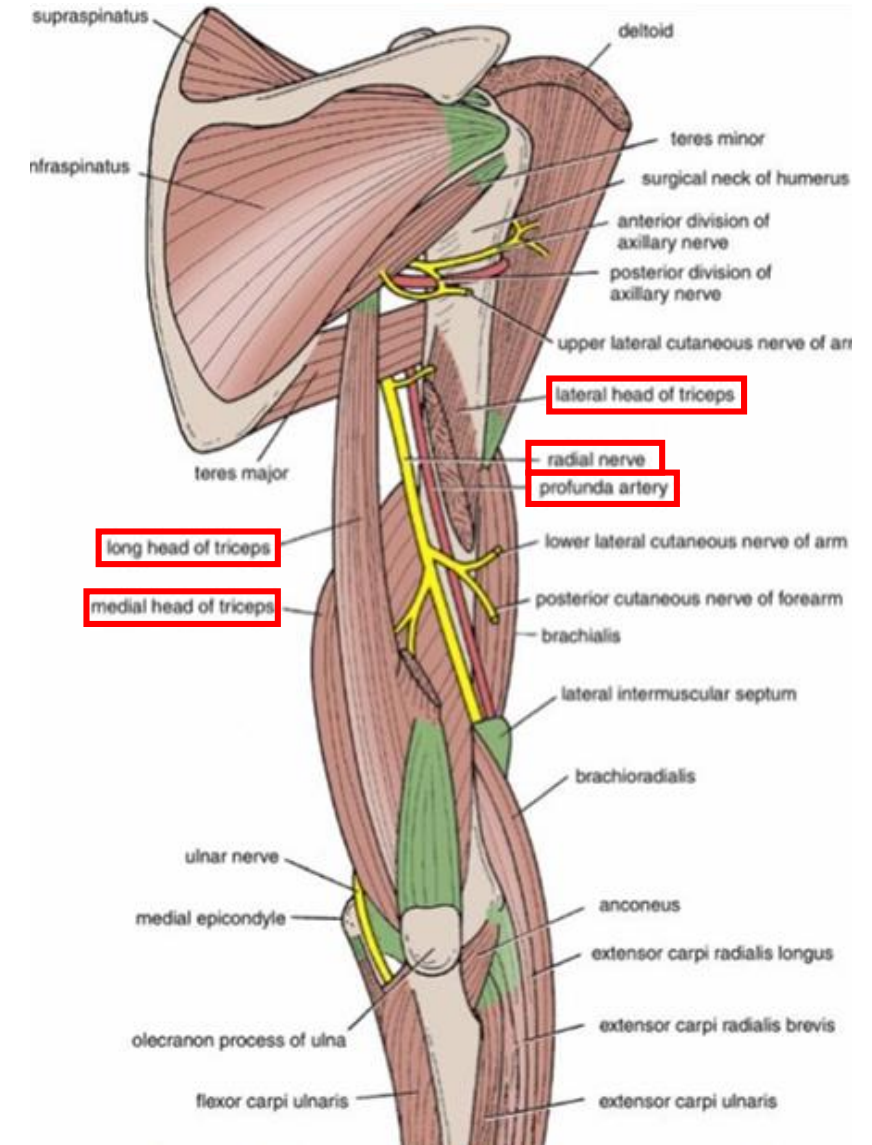
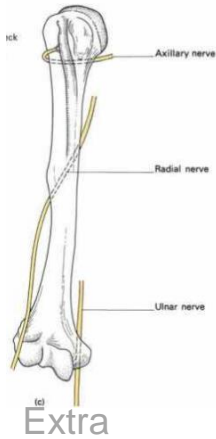
# Radial Nerve

## Course & Distribution In the Arm

It **winds** (تلف) around the back of the arm in the Spiral Groove (radial groove) on the back of the humerus between the heads of the triceps.

In the spiral groove, the nerve is accompanied by (with) the **Profunda** Vessels, and it lies directly in contact with the shaft of the humerus (**Dangerous** Position).

Any fracture of humerus specifically the spiral groove leads to injury of the radial nerve



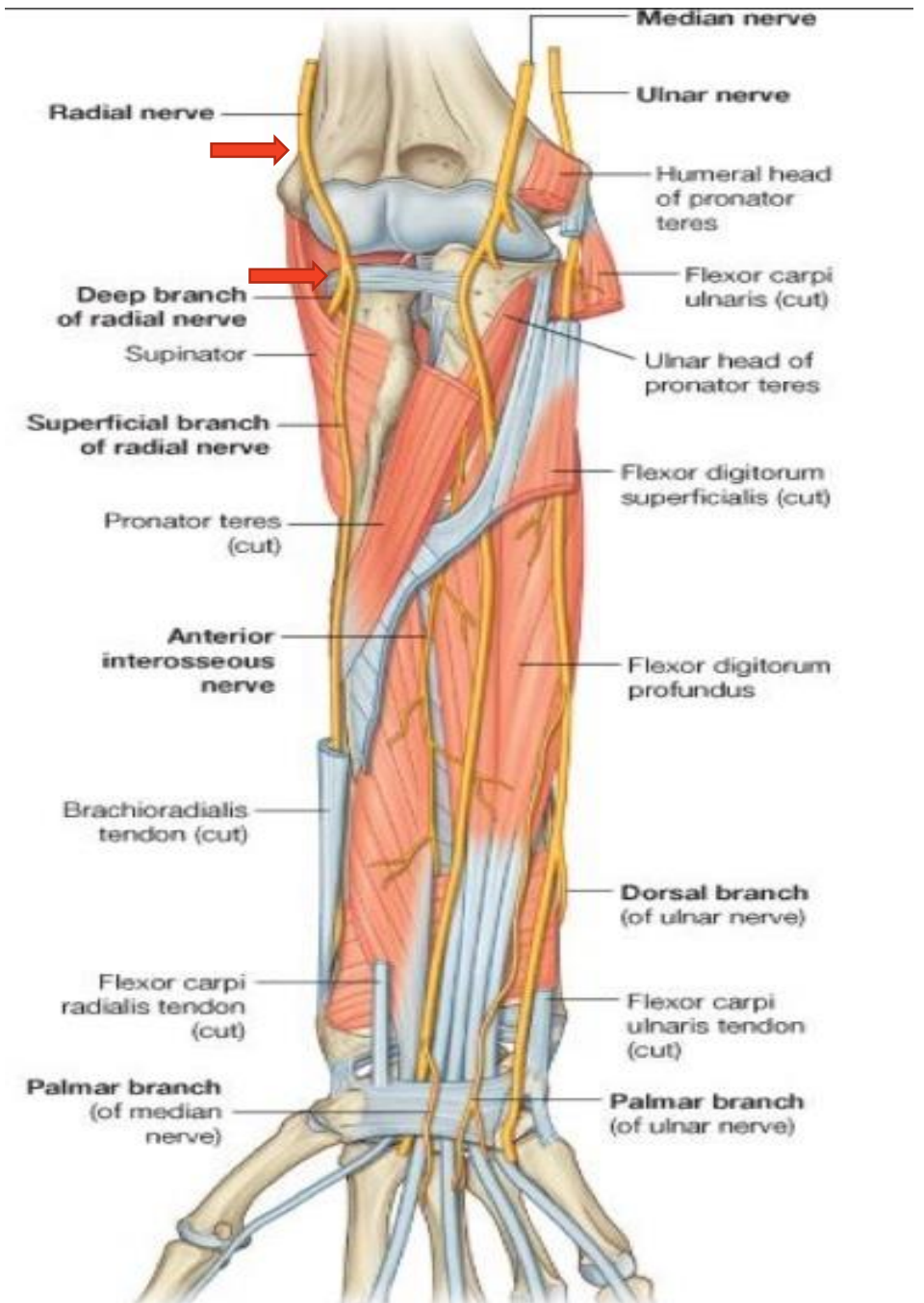
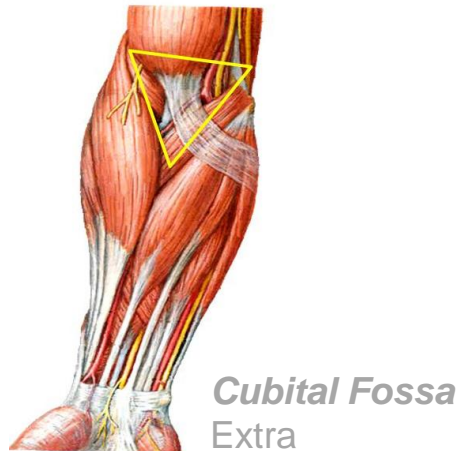
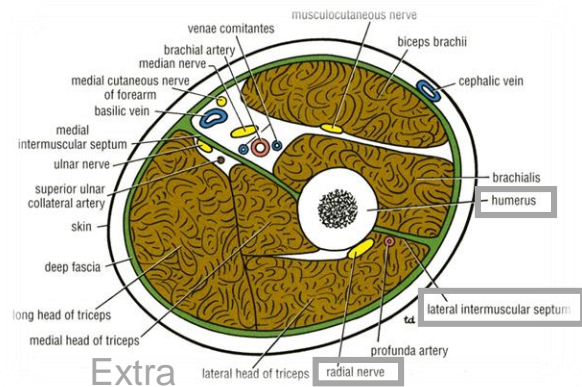
Posterior view of upper arm

# Radial Nerve

## Course In the Forearm

It pierces the Lateral Intermuscular septum.  
 (the nerve is behind the humerus **عشان يجي** ،  
**the intermuscular septum** )

Descends in front of the **Lateral Epicondyle**.  
 Passes forward into the **Cubital Fossa**  
 Divides into **Superficial & Deep** branches.



# Radial Nerve Branches

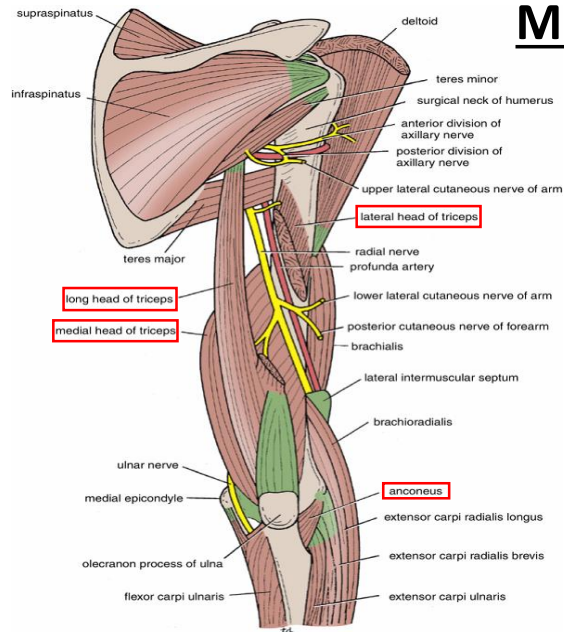
## I. Arising in the Axilla

### Cutaneous to:

1. Posterior cutaneous nerve of arm

### Muscular to:

1. Long & Medial heads of Triceps



## II. Arising in the Spiral Groove

### Cutaneous to:

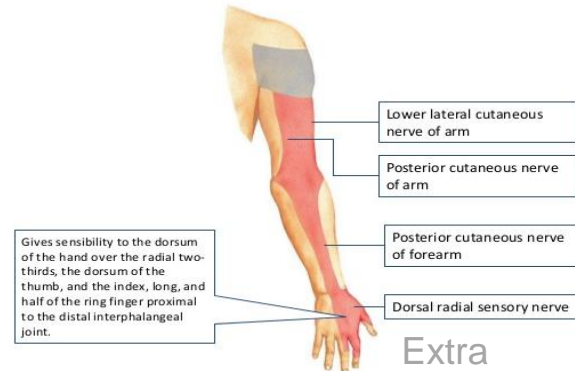
1. Lower lateral cutaneous nerve of arm
2. Posterior cutaneous nerve of forearm

### Muscular to:

1. Lateral & Medial heads of Triceps
2. Anconeus

Note the medial head of triceps is innervated twice

Cutaneous innervation from radial nerve



## III. Arising close to lateral epicondyle:

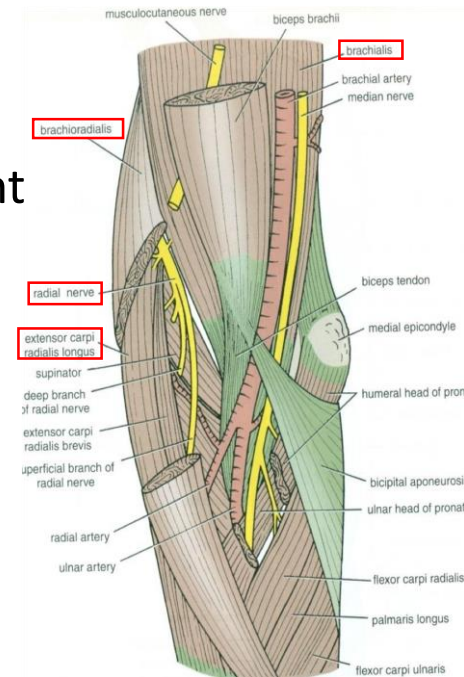
### Muscular to:

1. Brachioradialis
2. Extensor carpi radialis longus
3. Brachialis



### Articular to:

1. Elbow joint



# Radial Nerve

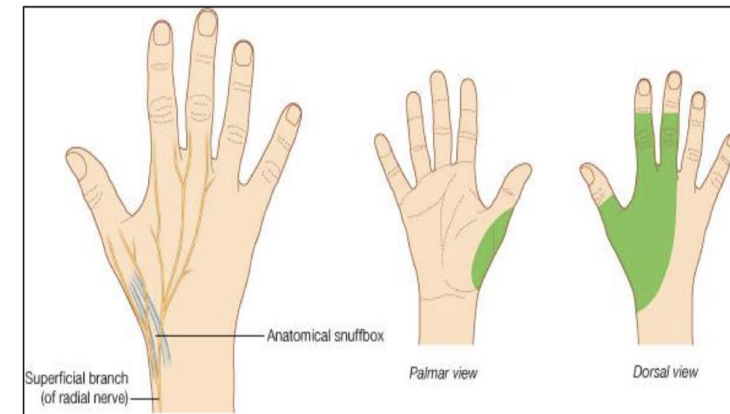
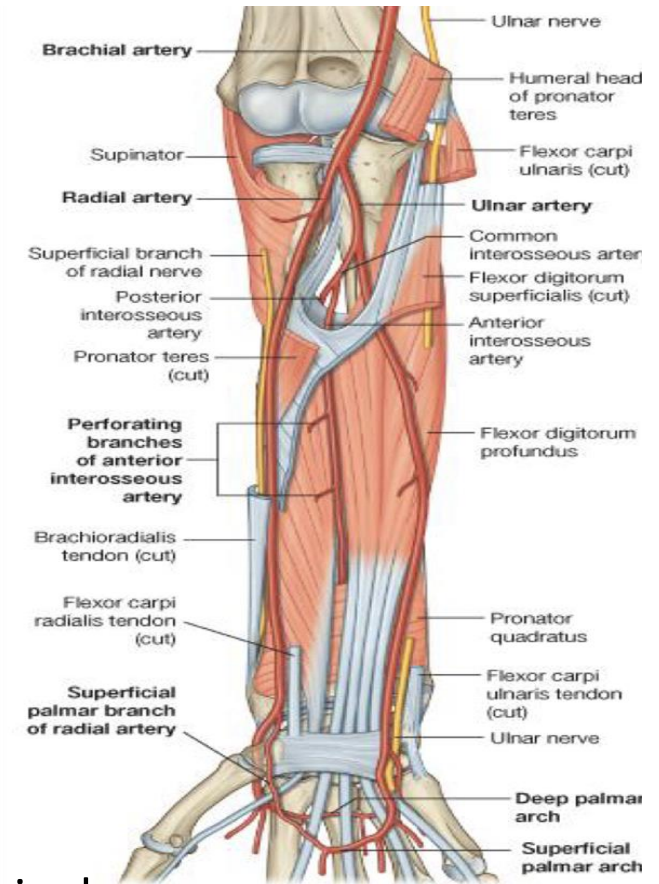
## Superficial Branch

- 1- It descends **تنحدر** under cover of (covered by) Brachioradialis
- 2- **Lateral** to radial artery
- 3- It emerges beneath the Brachioradialis tendon.

## Termination Of Superficial Branch

It reaches the **posterior surface** of the wrist ,where it divides into terminal branches that supply the **skin** on the **lateral two thirds of the posterior surface of the hand** and the **posterior surface** over the proximal phalanges of the lateral three and half fingers. **Anatomical position** كل الاتجاهات بنسبه لل

The area of skin supplied by the nerve on the dorsum **ظهر** of the hand is **variable**.  
(Don't confuse between the cutaneous/sensory supply and the motor supply)



# Radial Nerve

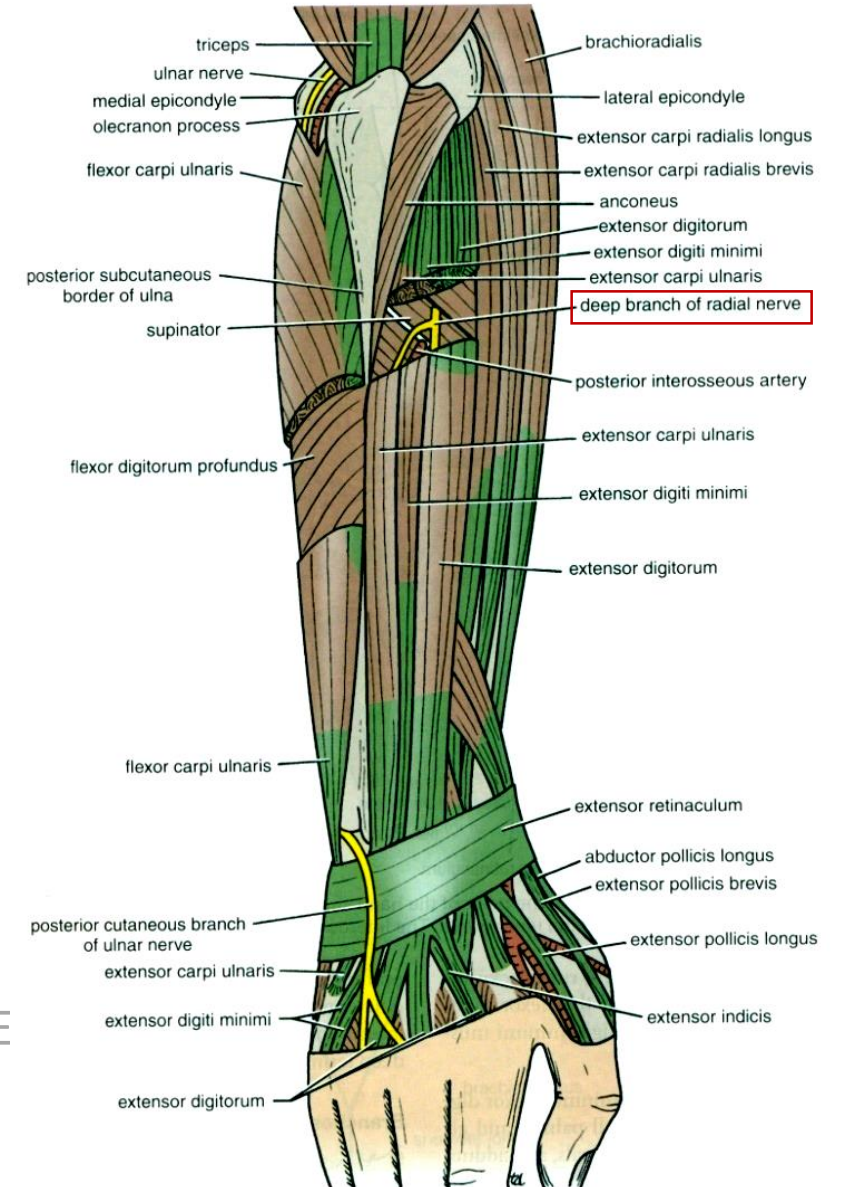
## Deep Branch

It winds around the neck of the radius, within the supinator muscle, and enters the posterior compartment of the forearm.

### It supplies :

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

Note: All muscles of the posterior/extensor compartment except ABE





# Injuries to Radial Nerve

**\*Amazing video**

<https://www.youtube.com/watch?v=Cu6ttAhe8Y>

## In the Axilla

## In the Spiral Groove (in the arm)

## In the forearm

*\*the next slide*

The nerve can be injured by a drunkard falling asleep with one arm over the back of a chair (they call it **saturday night paralysis**), also by fractures and dislocations of the proximal end of the humerus.

أو مثلاً واحد تعرض لطلق ناربي أو إصابة بسكينة

**The triceps, the anconeus, and the long extensors of the wrist are paralyzed.**

**The patient is unable to extend the elbow & the wrist joints, and the fingers flexed always (Wrist Drop)**



Injury or fracture of the spiral groove of the humerus, **the patient is unable to extend the wrist and the fingers (Wrist Drop).**

All the branches from this point will be affected, while the branches from axilla (posterior of the forearm, long and medial head of triceps) are intact. The 2 heads of triceps are working therefor patient **can extend the elbow joint.**



### Keep in mind!

The difference between injury to the radial nerve in the axilla and spiral groove is that in the spiral groove injury the patient **can extend the elbow joint.**

**\*Important note :**

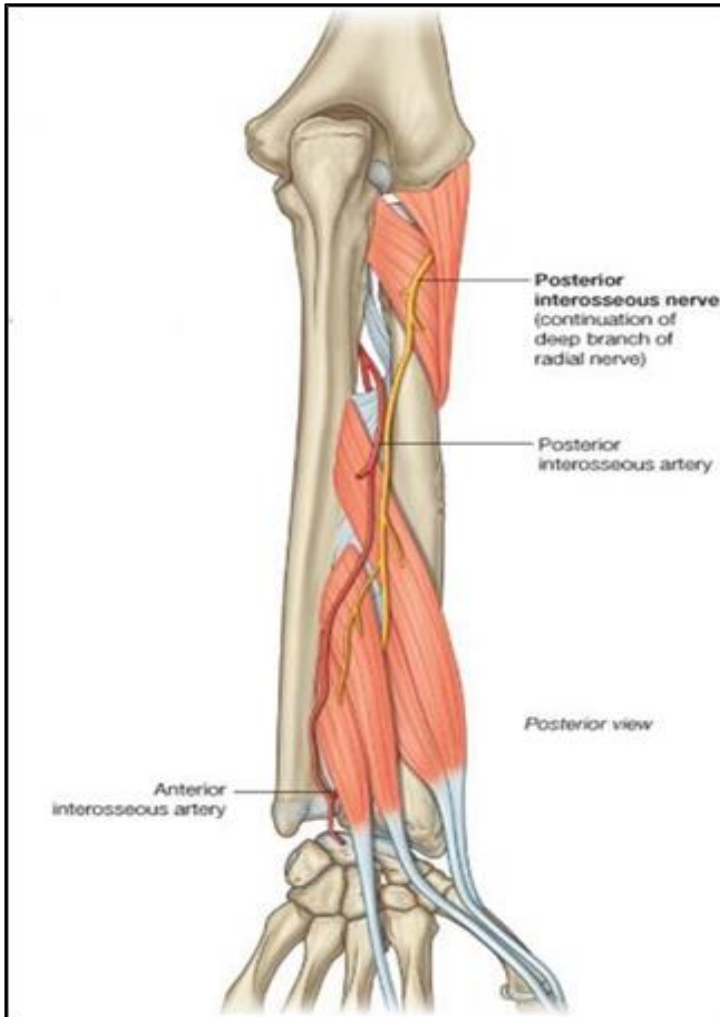
When the radial nerve injured **at the axilla** for any reason all the muscles and skin supplied by it will be affected.

# Injuries to Radial Nerve

In the Axilla

In the Spiral Groove  
(in the arm)

In the forearm



## ***Injuries to the Deep Branch of the Radial Nerve***

- The deep branch of the radial nerve is **PURELY Motor** (It supplies the extensor muscles in the posterior compartment of the forearm ex. Extensor carpi ulnaris).

- It can be damaged in fractures of the proximal end of the radius or during dislocation of the radial head.

- The nerve that supply the supinator and the extensor carpi radialis longus will be undamaged (they are supplied by radial nerve itself before it got branched)**, and because the latter muscle is powerful, it will keep the wrist joint extended with lateral deviation because the extensor carpi ulnaris cannot work (supplied by deep branch)

- since patient can extend the wrist (**No wrist Drop**)

Patient can do extension for elbow joint, skin that is supplied by radial nerve arising from the spiral groove region is intact (**No loss of sensation**).

## ***Injuries to the Superficial Branch of the Radial Nerve***

Superficial radial nerve is **Sensory nerve**.

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

**Origin :** Medial cord of **brachial plexus**

**Course :**

In the axilla & arm

- Descends along the medial side of the following arteries:

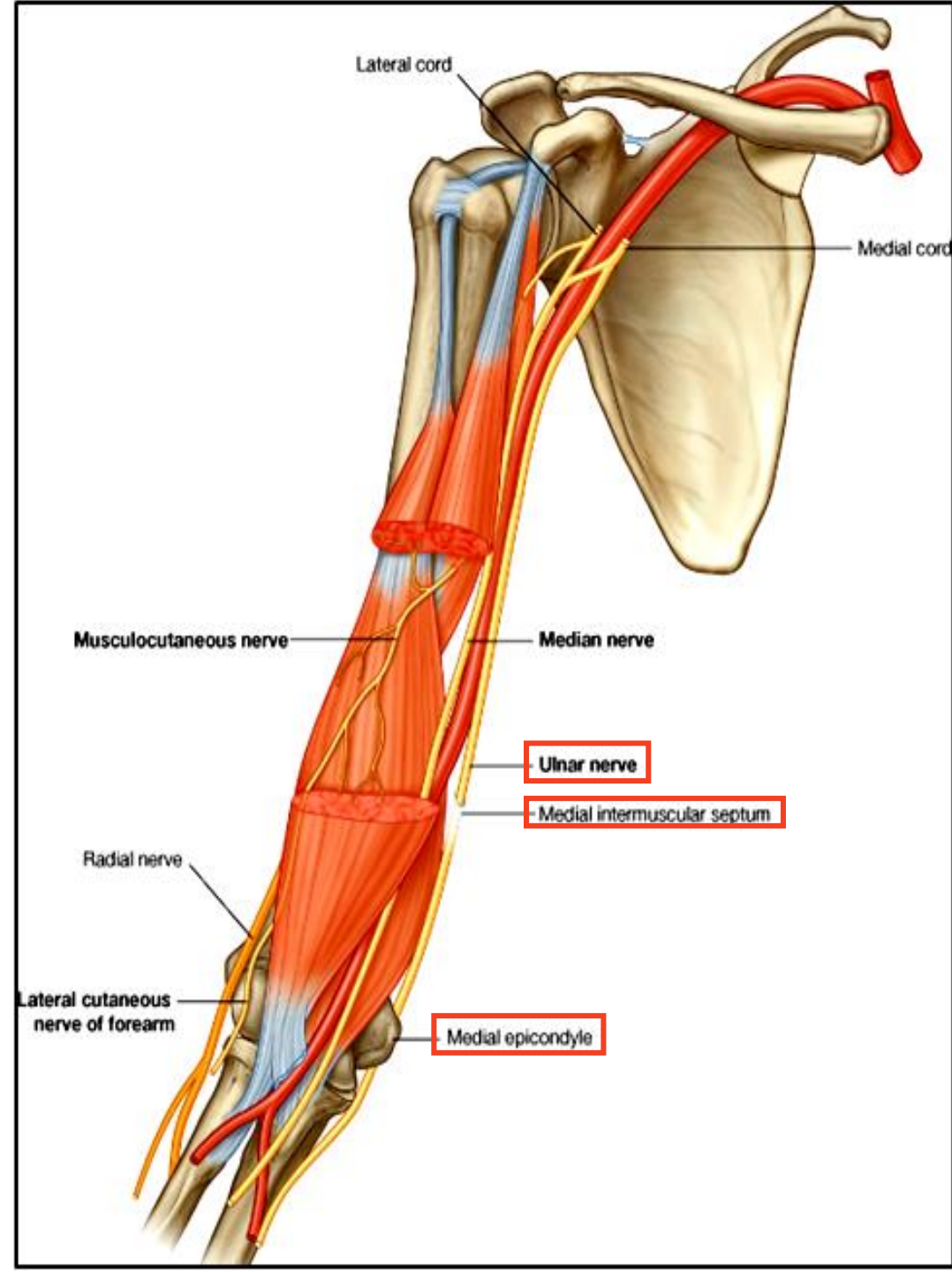
**Axillary & Brachial**

(Axillary artery continues as the brachial artery)

- Pierces the medial intramuscular septum .

- Passes **behind** the **medial epicondyle of humerus**.

(that's why when you hit the medial back of your elbow you feel کهربه)



# Ulnar Nerve Course (cont)

## In forearm :

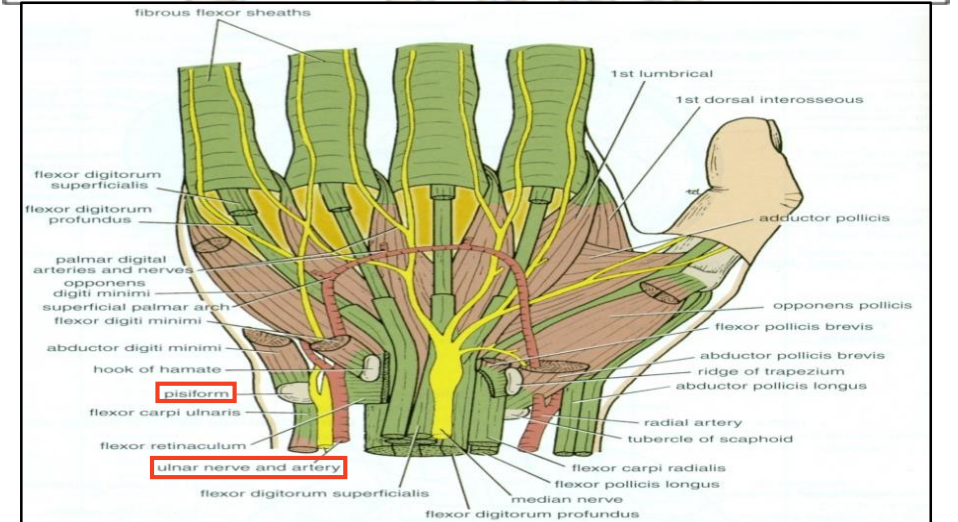
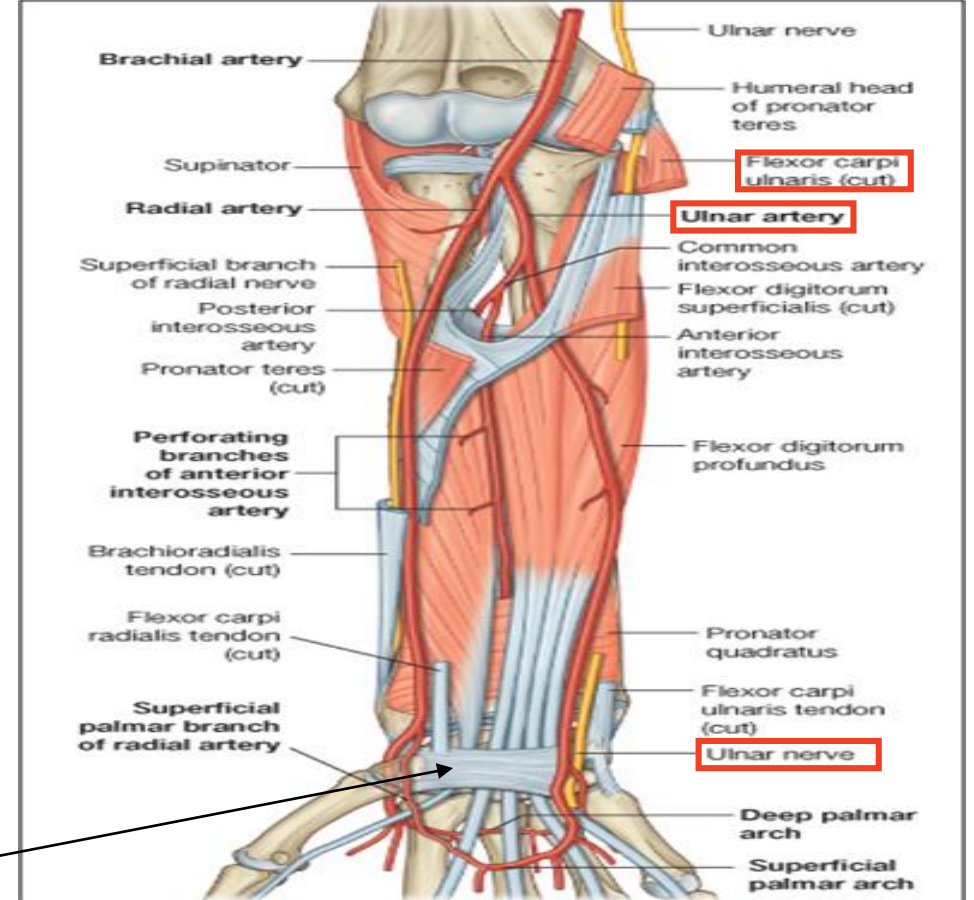
- Enters the anterior compartment of forearm through the flexor carpi ulnaris.

Ulnar nerve passes between 2 heads of flexor carpi ulnaris and supplies them .

- Descends **behind** the flexor carpi ulnaris.
- **medial** to ulnar artery .

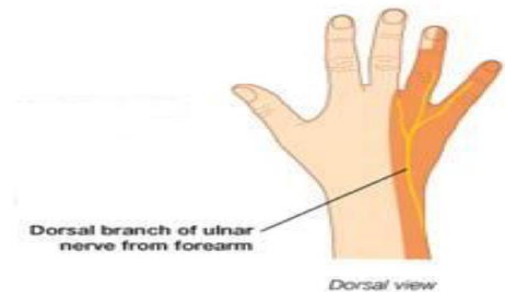
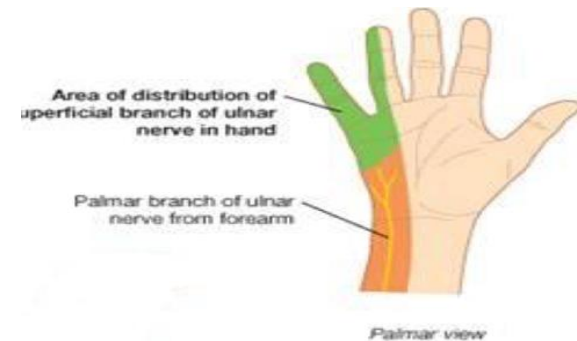
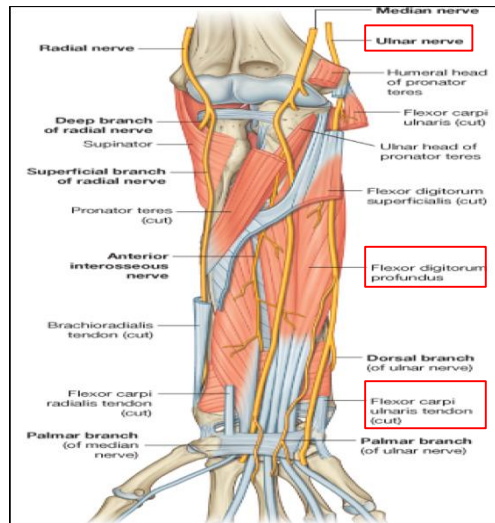
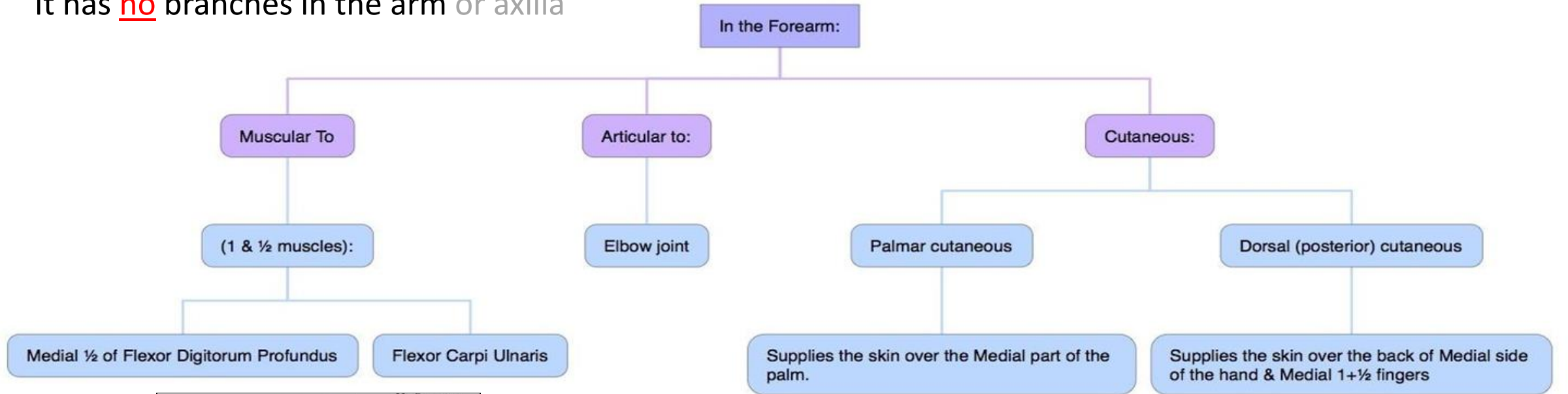
## At the wrist :

- Passes **anterior** (superficial) to flexor retinaculum
- **Lateral** to pisiform bone.
- **Medial** to ulnar artery.
- Divides into : superficial and deep branches .



# Ulnar Nerve Branches

It has no branches in the arm or axilla



# Ulnar Nerve Branches

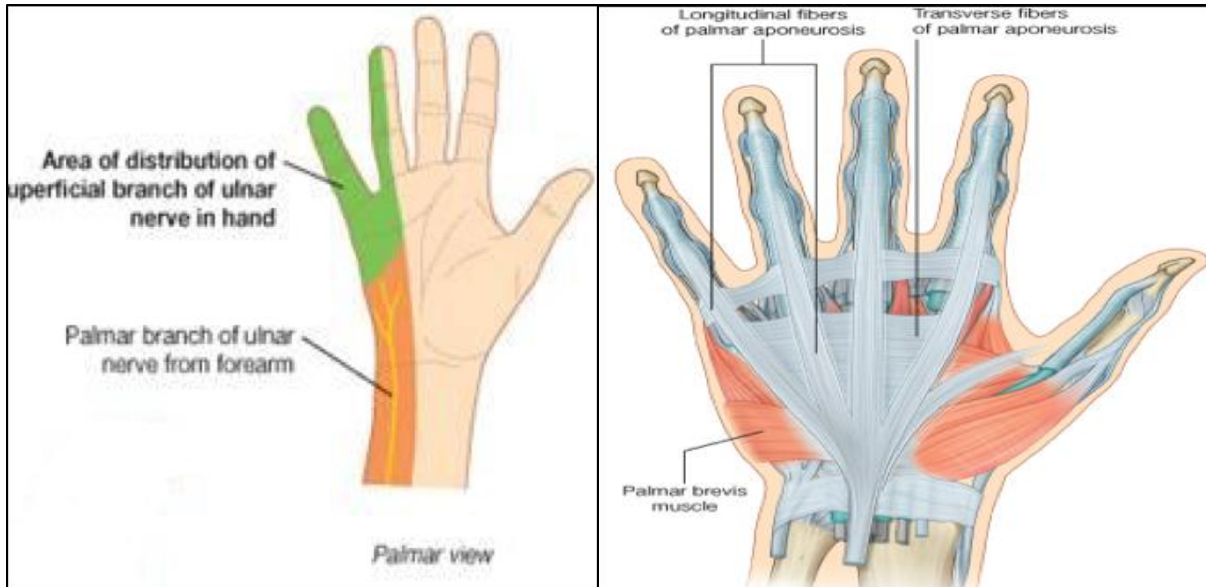
## Branches of Superficial Terminal Branch:

### 1. Muscular:

- Palmaris Brevis.

### 2. Cutaneous:

- Skin over the Palmar aspect of the **medial** 1+ ½ fingers (including nail beds).



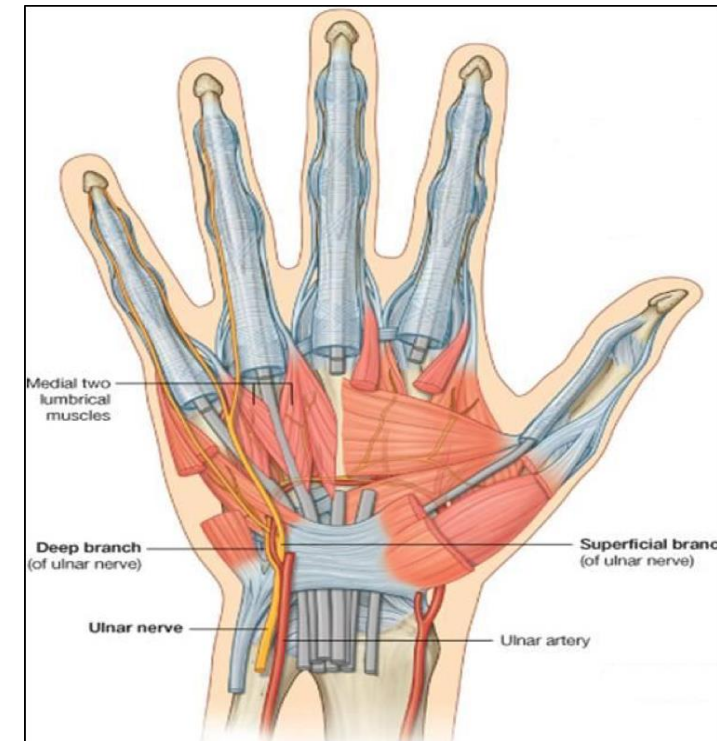
## Branches of Deep Terminal Branch:

### 1. Muscular:

- Hypothenar Eminence.
- All Interossei (Palmar & Dorsal).
- **3<sup>rd</sup>** & **4<sup>th</sup>** Lumbricals.
- Adductor pollicis.

### 2. Articular:

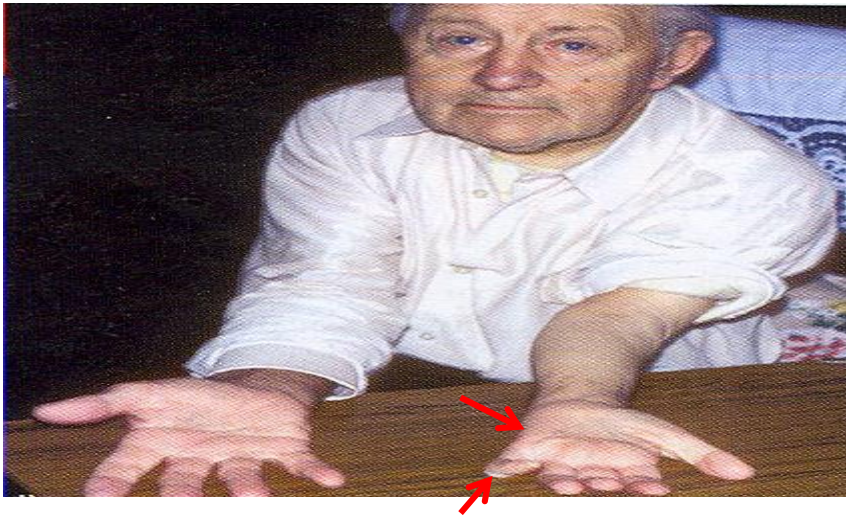
- **Carpal** joints.



# Ulnar Nerve Injury

## At the Elbow:

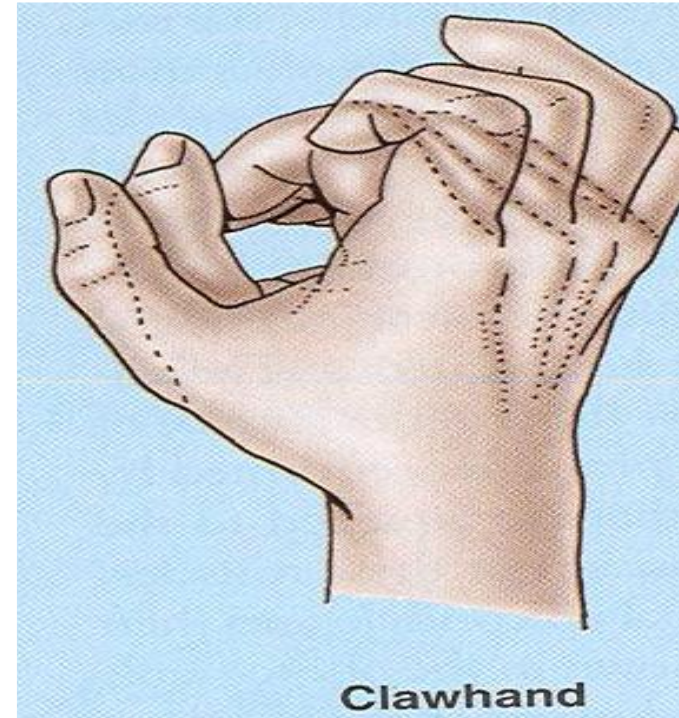
- **Atrophy** of Ulnar (medial) side of forearm.
- Flexion of the wrist with **Abduction**\*.
- Claw hand.
- Wasting of **Hypothenar Eminence**.



\*There will be flexion with radial deviation since the flexor carpi radialis is working while the flexor carpi ulnaris is not

## At the Wrist:

- **Claw Hand**.
- Wasting of **Hypothenar Eminence**.



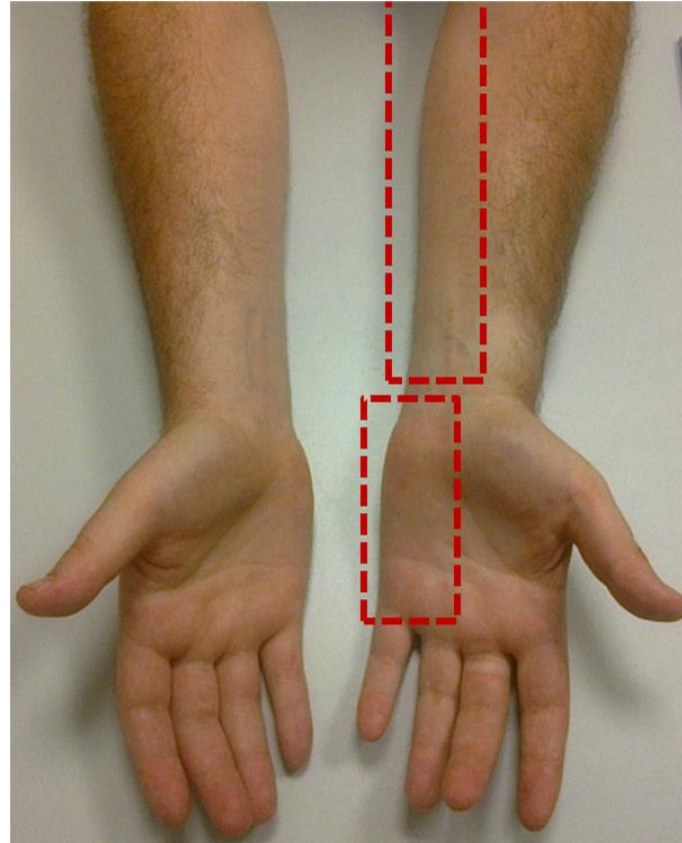
# Ulnar Nerve Injury

These pictures are extra

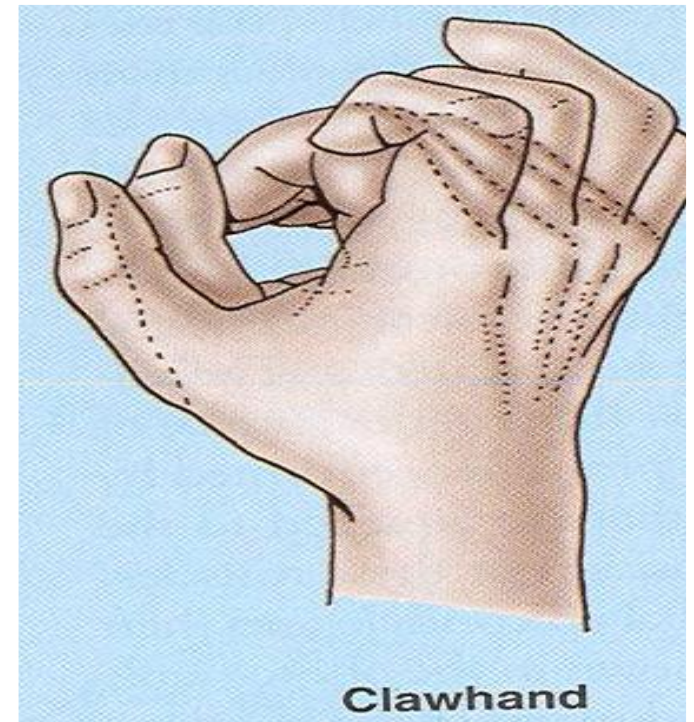
Wasting of **Hypothenar Eminence**



Atrophy of the **Forearm (Ulnar side)** and **Hypothenar** muscles

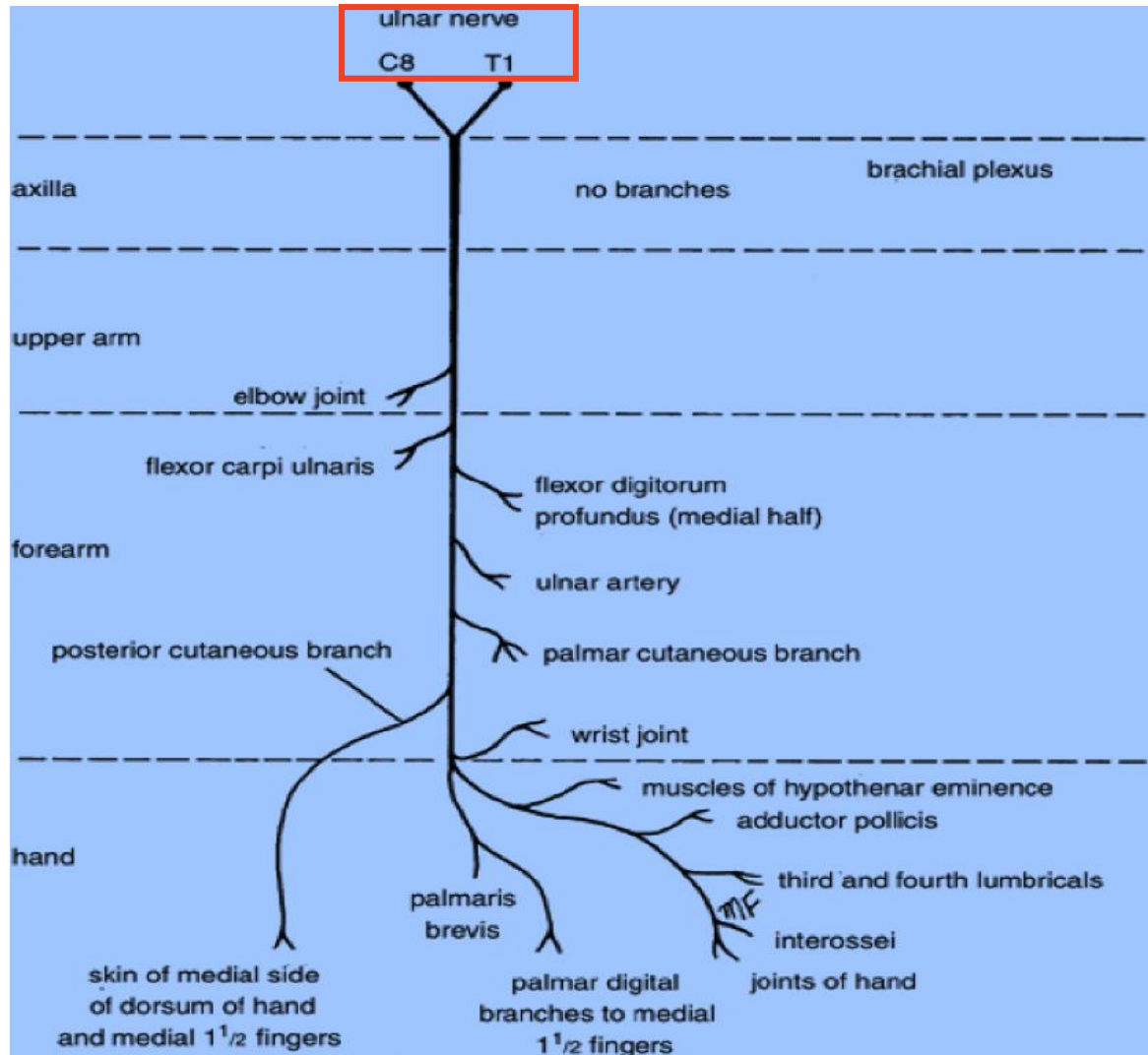


Claw hand

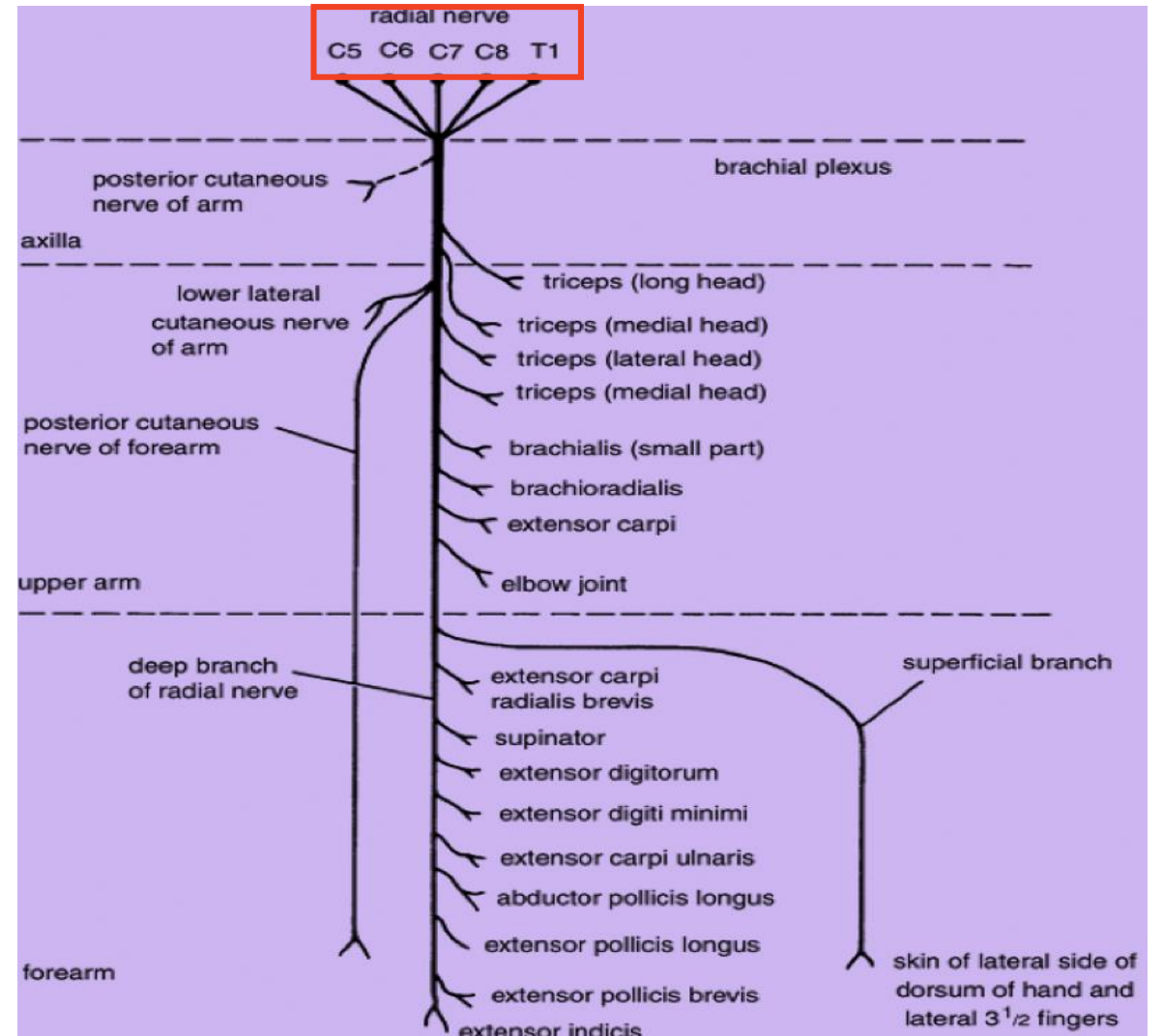




# Summary of branches of Ulnar Nerve:



# Summary of branches of Radial Nerve:



# CUTANEOUS NERVE SUPPLY OF HAND

Autonomous area for testing - Ulnar nerve

Autonomous area for testing - Median nerve

Digital branches of ulnar

Digital branches of median

Palmar cutaneous branch of ulnar

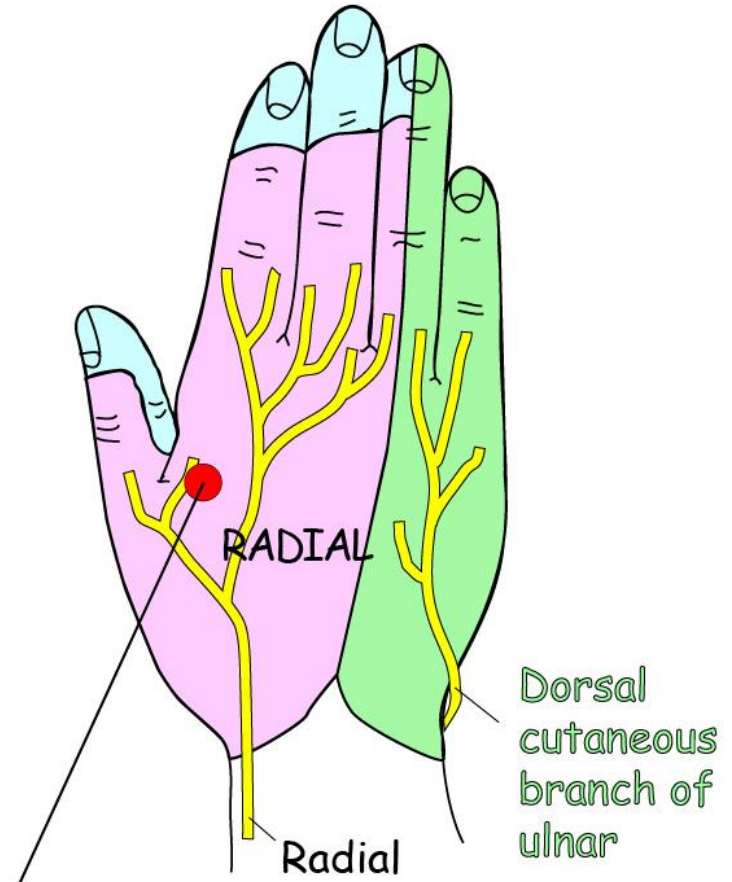
Palmar cutaneous branch of median (spared in carpal tunnel syndrome)

Dorsal cutaneous branch of ulnar

Ulnar

Median

Autonomous area for testing - Radial nerve



Its important to know the different deformities and the nerves related

To remember: DR CUMAB

DR = Wrist Drop > Radial Nerve



CU = Claw Hand > Ulnar Nerve



MAB = Median Nerve > Ape Hand > Hand of Benediction



# Questions

1- Which one is the largest nerve in the upper limb:

- A) ulnar
- B) radial
- C) axillary
- D) medial

2- Where does the radial nerve divide:

- A) spiral groove
- B) lateral epicondyle
- C) cubital fossa
- D) wrist

3- Superficial branch of radial nerve descends under cover of?

- A) Brachioradialis
- B) Brachialis
- C) Coracobrachialis

4- What are the roots of the radial nerve?

- A) C5, C6
- B) C5, C6, C7
- C) C5, C6, C7, C8
- D) C5, C6, C7, C8, T1

5- The radial nerve supplies all muscles of the anterior compartment of the arm.

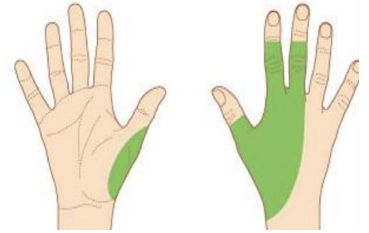
- A) True
- B) False

6- Injury to the radial nerve at which area causes wrist drop?

- A) Axilla
- B) Arm
- C) Forearm
- D) A & B

7- Which branch of the radial nerve supplies the following area?

- A) Superficial
- B) Deep
- C) Medial
- D) Lateral



8- The ulnar descends \_\_\_\_\_ along the brachial and axillary artery.

- A) Anteriorly
- B) Posteriorly
- C) Medially
- D) Laterally

9- A patient presented with injury to the superficial branch of the ulnar nerve. Which muscle is affected?

- A) Palmaris Brevis
- B) Palmaris Longus
- C) Palmaris Superficialis
- D) Palmaris Profundus

Answers:

- 1- B
- 2- C
- 3- A
- 4- D
- 5- B
- 6- D
- 7- A
- 8- C
- 9- A

# Questions

10- List 4 muscles supplied by the deep branch of radial nerve.

11- A little girl injured her wrist while playing. Upon clinical examination it was determined that the ulnar nerve was injured. List 3 characteristics the physician could have seen while examining the patient.

Answers:

10- 1. Extensor carpi radialis brevis.

2. Extensor carpi ulnaris.

3. Supinator.

4. Abductor pollicis longus.

5. Extensor pollicis brevis.

11- 1. Flexion of the wrist with Abduction.

2. Claw hand.

3. Wasting of Hypothenar Eminence.

Mohammed, A 28-year-old man, was horseback riding with his partner when the horse he was riding stumbled, throwing him from the saddle. In order to break his fall, Mohammed stretched out his right hand, he felt severe pain in his arm. At the emergency room, the doctor examined the arm, patient is unable to extend the wrist. The doctor ordered X-Ray for the arm. The radiologist, who examined the X-rays, found fracture in the upper part of humerus. According to this case, please answer the following questions:

**1) Which of the following is LEAST likely to happen in this case:**

- A. Loss of sensation in the lateral side of dorsum of the hand.
- B. Extension of the medial fingers.
- C. Loss of ability of abduction of the pollicis.
- D. Extension of the elbow joint.

**2) The name of injured region of the humerus :**

- A. Intertubercular groove
- B. Bicipital groove
- C. Spiral groove
- D. Surgical neck

**3) this deformity of mandatory flexion of the wrist is known as :**

- A. Ape hand.
- B. Claw hand.
- C. Wrist drop.

Answers:

1- B

2- C

3- C



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