"Our greatest weakness lies in giving up. The most certain way to succeed is always to try just one more time."

Musculoskeletal Block

ANATOMY

team 435

COLOR CODES

- IMPORTANT NOTES
- EXTRA NOTES
- DEFINITION

Objectives:

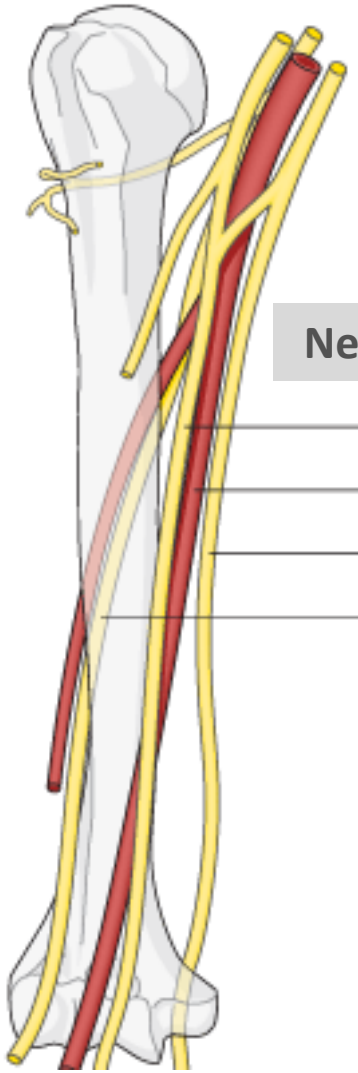
At the end of the lecture, students should be able to:

- 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

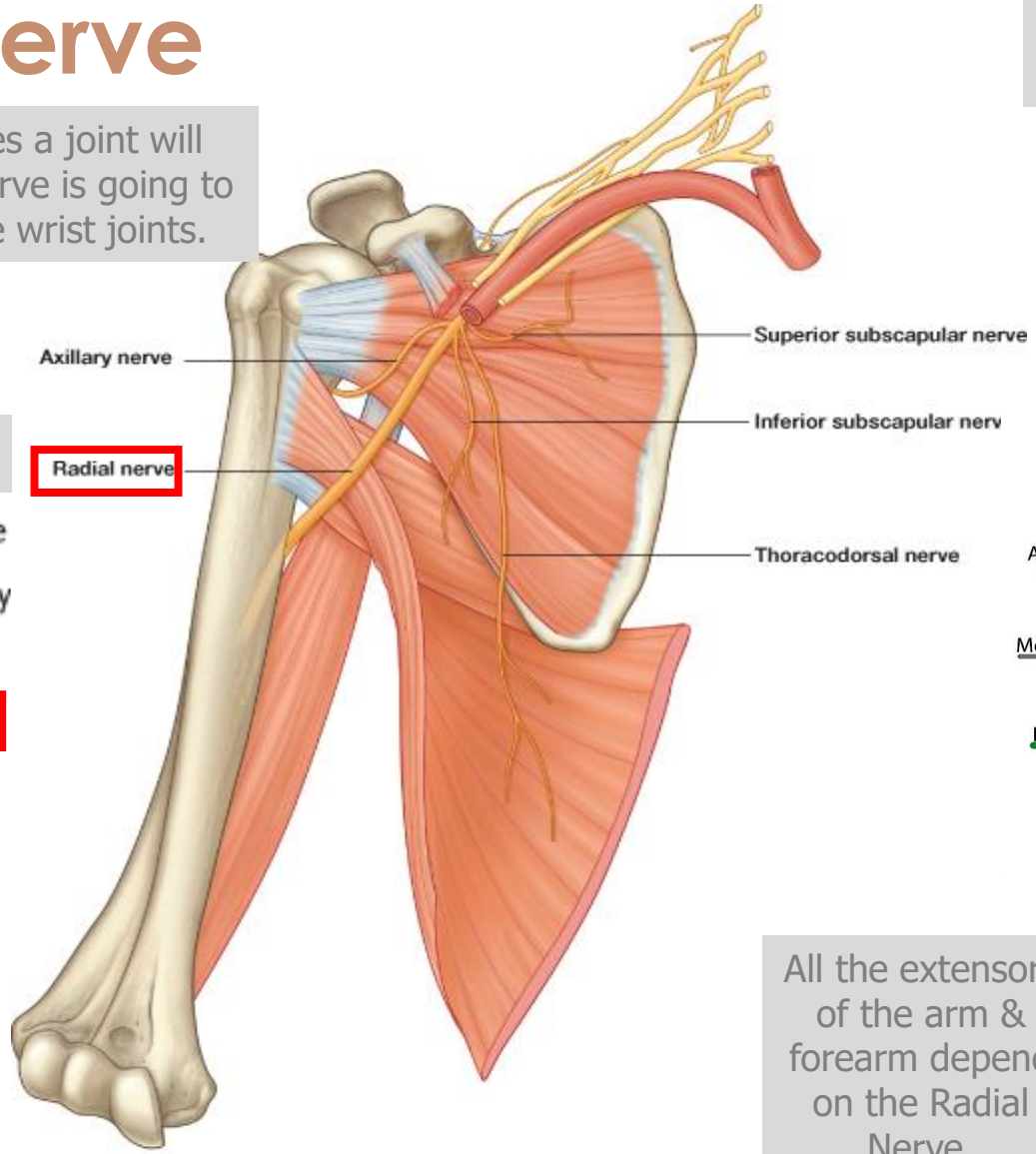
Origin means "**Root Value**"
Root Value = from which segments the nerve takes origin.

Any nerve which passes a joint will supply it . The Radial nerve is going to supply the elbow & the wrist joints.



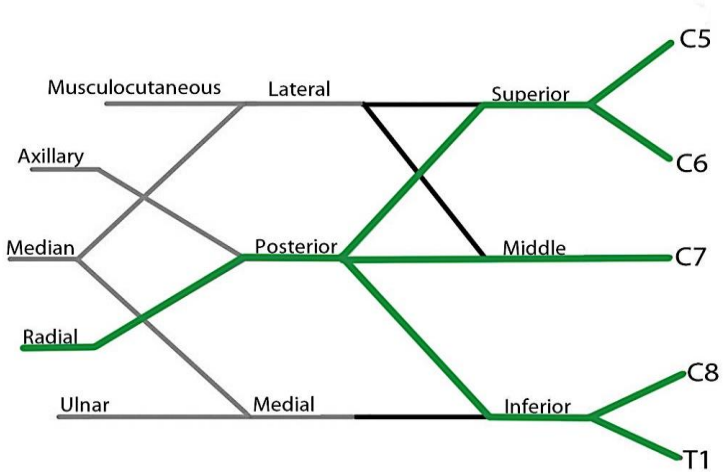
Nerves of the Upper Arm

- Median nerve
- Brachial artery
- Ulnar nerve
- Radial nerve



***Origin:**

Posterior cord of the **brachial plexus** in the axilla (the **largest** branch)



*It takes from all segments (C5,C6,C7,C8) except T1 fibers

All the extensors of the arm & forearm depend on the Radial Nerve.

Supplies:

All **Muscles** of the **posterior** compartment of the arm & forearm .

TEAM Anatomy

Course & Distribution in the Arm

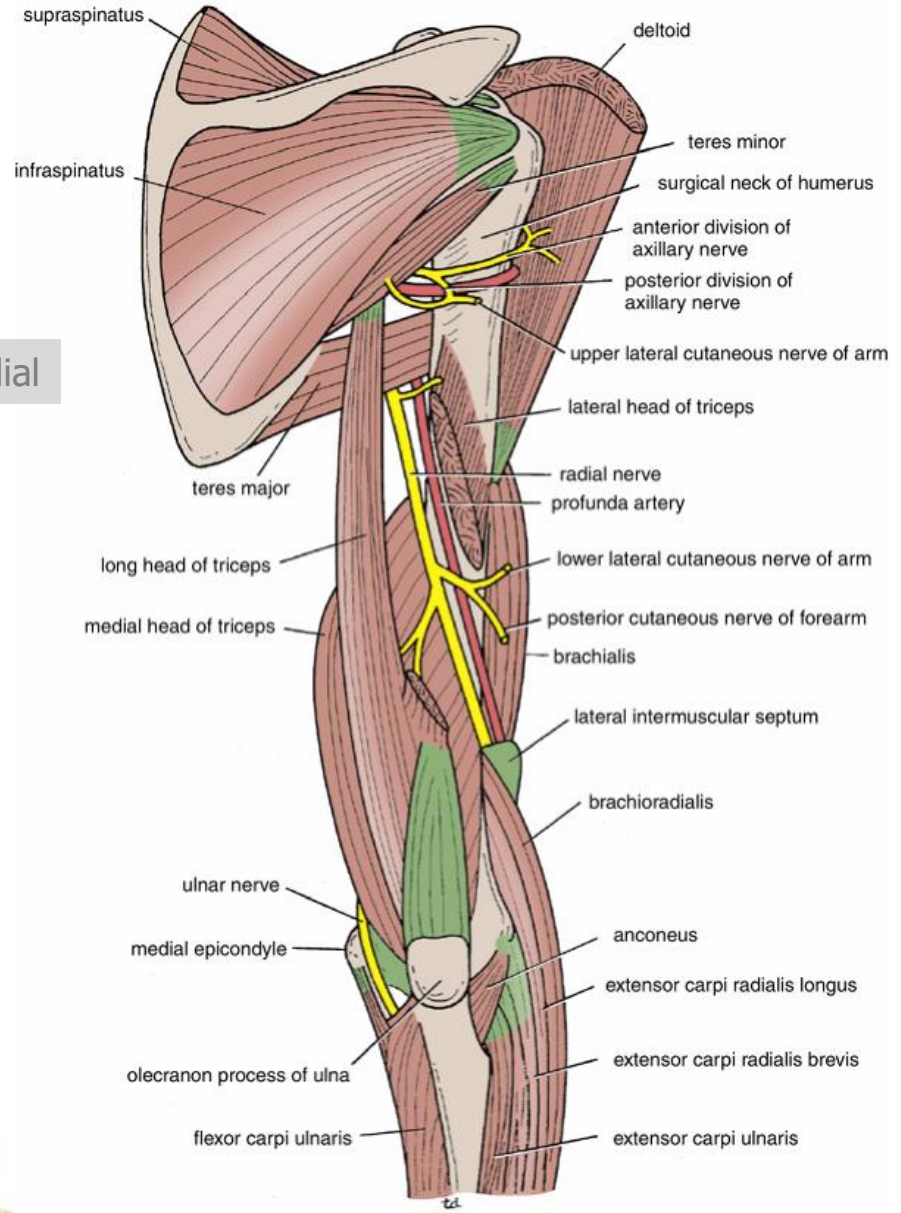
- It winds around the back of the arm in the **Spiral Groove** on the **back** of the humerus between the heads of the triceps.

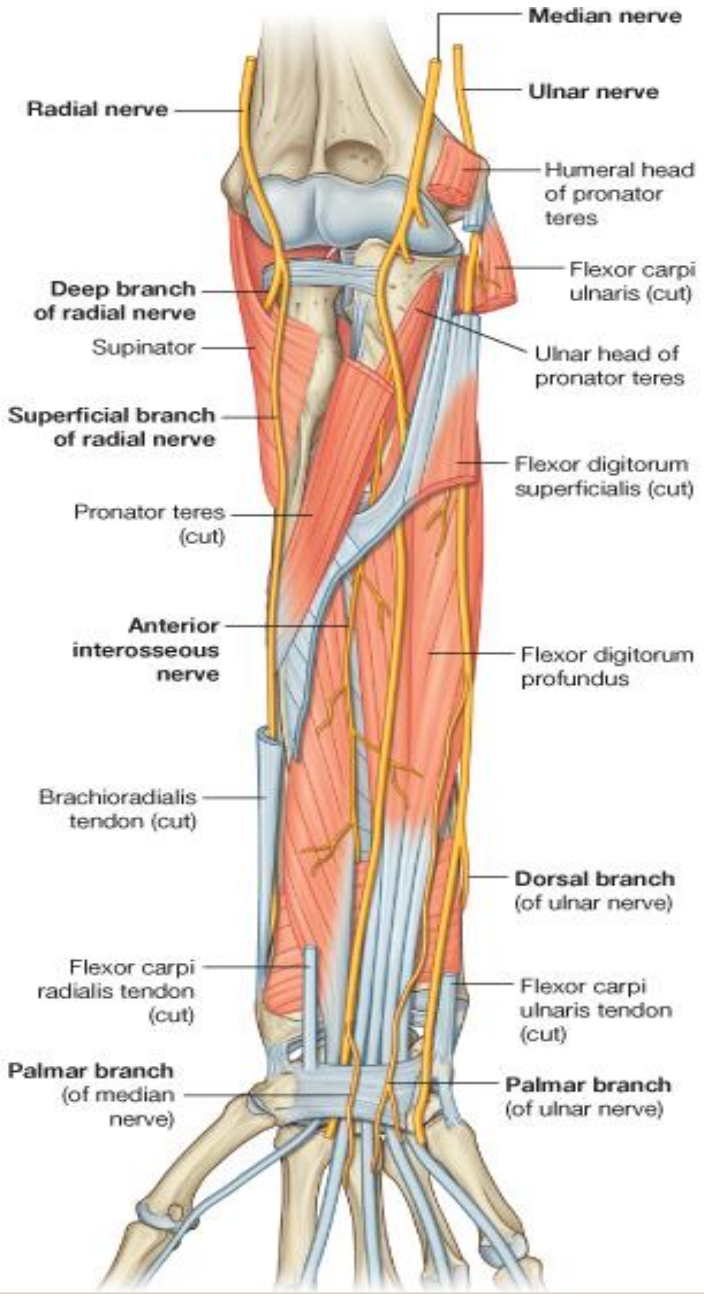
Or Radial

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

Because it's directly on the bone

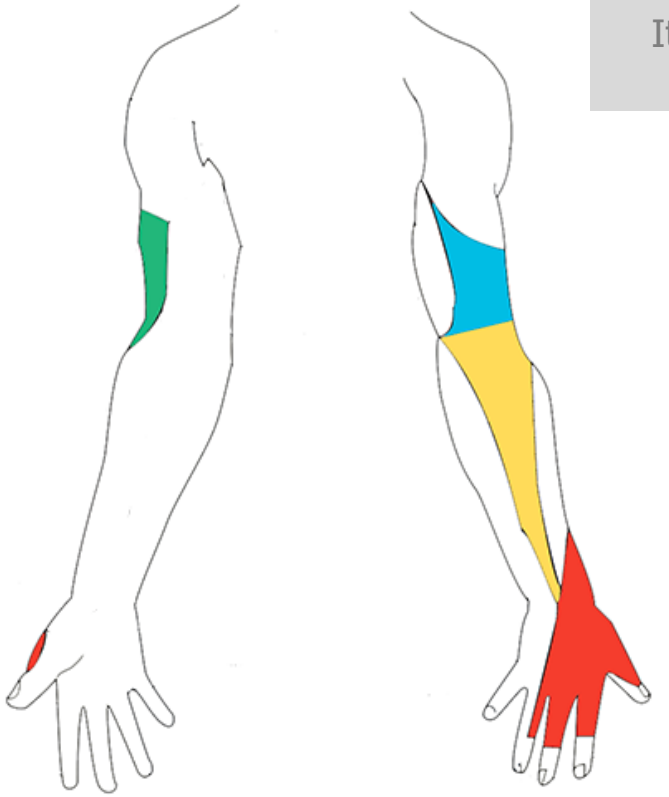
Posterior view of the upper arm





Course in the Forearm

- It pierces the **Lateral Intermuscular septum**.
  - Fibrous septa
- **Descends** in front of the **Lateral Epicondyle**.
  - In the humerus
- Passes **forward** into the **Cubital Fossa.**
- Divides into **Superficial** & **Deep** branches.



Lower lateral cutaneous nerve of arm

Posterior cutaneous nerve of arm

Posterior cutaneous nerve of forearm

Superficial branch

It is very **important** to know all the branches so that when the nerve is injured we know exactly where. Any injury to the Radial nerve here in this region will affect all the extending nerves.

Radial Nerve is the most nerve that gives branches.

Branches

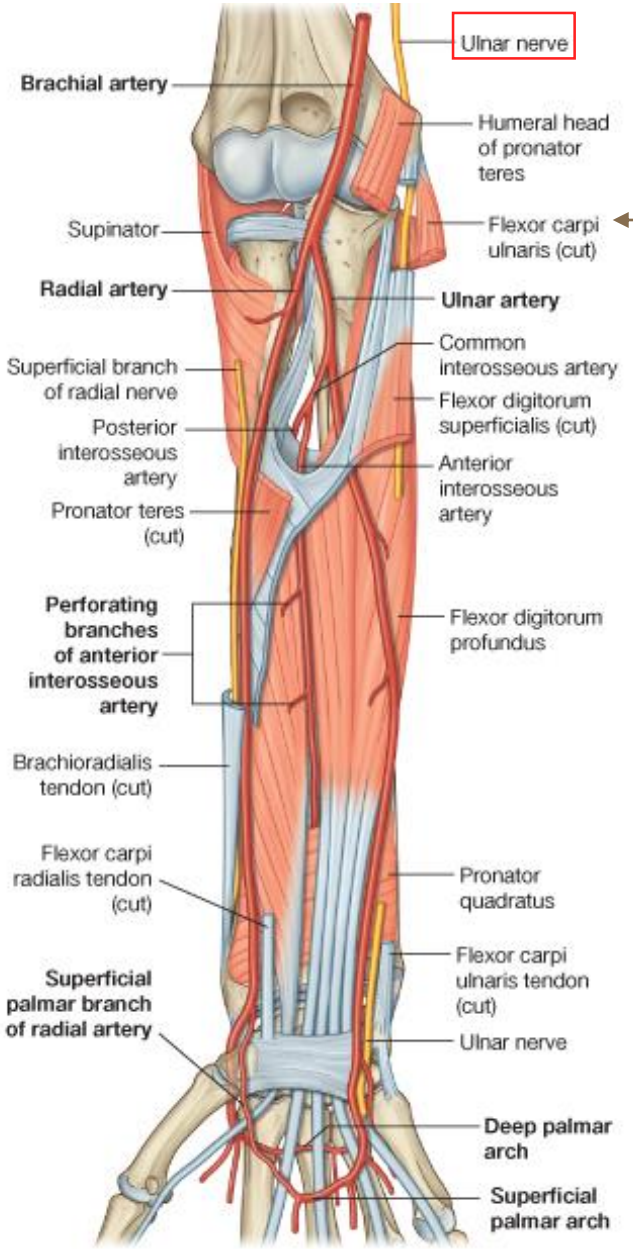
Arising in the…

**Lateral part of brachialis

Axilla		Spiral Groove		Close to Lateral Epicondyle
Cutaneous: Posterior cutaneous nerve of arm. Skin of the back of the arm.	**Muscular** to: Long & Medial Heads of Triceps	**Cutaneous:** 1. Lower lateral cutaneous nerve of arm.* 2. Posterior cutaneous nerve of forearm.	**Muscular** to: *Lateral & Medial heads of triceps. *Anconeus Small muscle	1. **Muscular** to : *Brachioradialis. *Extensor carpi radialis longus. Brachialis**. (muscles of the forearm) 2. **Articular** to: Elbow joint

Video!

*Upper lateral cutaneous nerve of the arm comes from the axillary nerve.



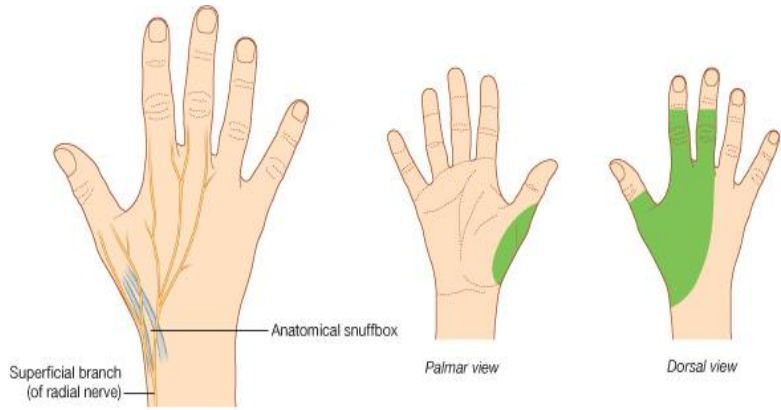
SUPERFICIAL BRANCH → Purely sensory

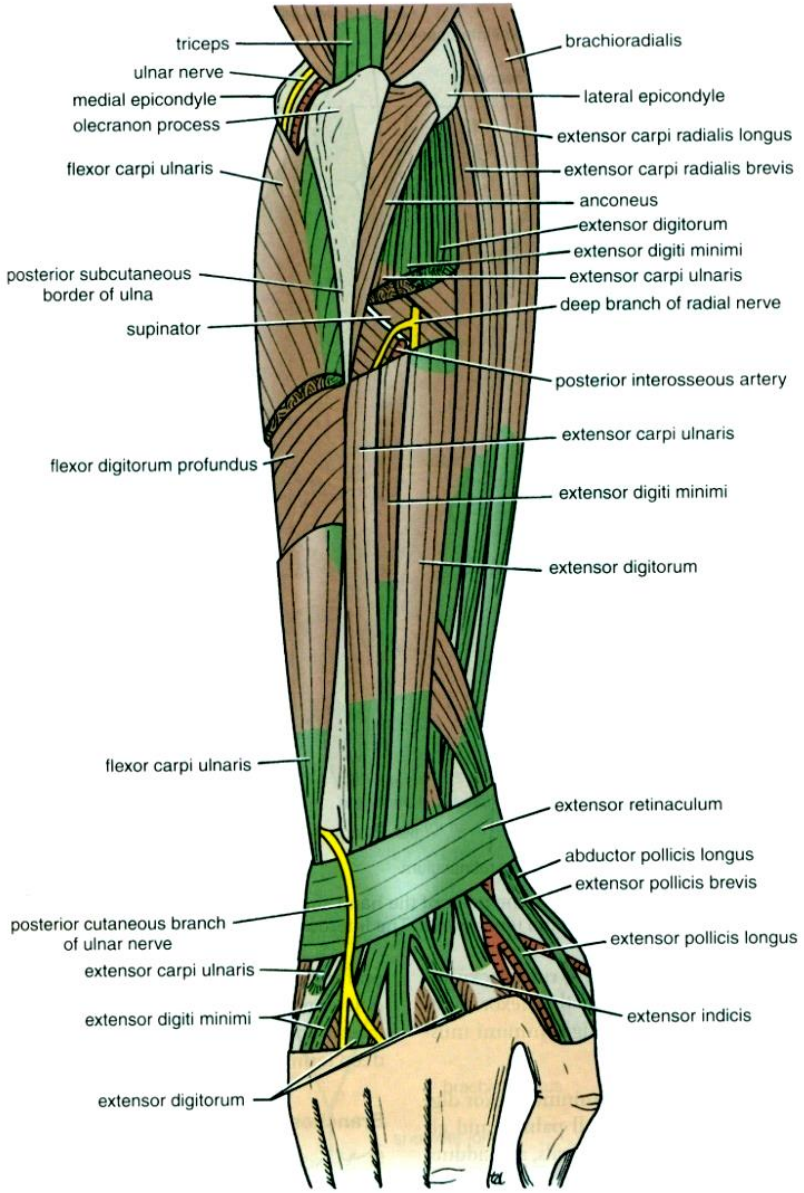
- It descends under cover of Brachioradialis
- Lateral to radial artery.
- It emerges beneath the brachioradialis tendon.

Who continues to the distal phalanges?
Median nerve

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.
The area of skin supplied by the nerve on the dorsum of the hand is variable.





DEEP BRANCH

→ Purely motor

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

It supplies :

It supplies all the extensor muscles except Extensor carpi radialis longus

- Extensor carpi radialis brevis.
- Extensor carpi ulnaris.
- Supinator.
- Abductor pollicis longus.
- Extensor pollicis brevis.
- Extensor pollicis longus.
- Extensor indicis.
- Extensor digitorum.
- Extensor digiti minimi.

Injuries to

the Radial Nerve

In axilla

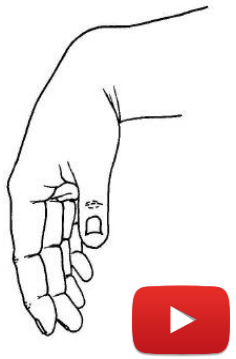
- nerve can be injured by a drunkard falling asleep with one arm over the back of a chair "Saturday night palsy".
- Nerve can also be injured by fractures and dislocations of the proximal end of the humerus.
- The triceps + the anconeus + the long extensors of the wrist are paralyzed.
- The patient is unable to extend the elbow & the wrist joints, and the fingers (Wrist Drop)

In spiral groove

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

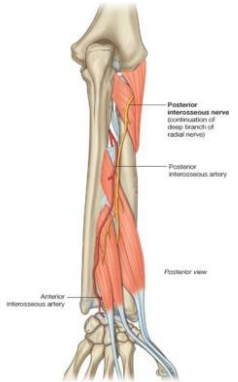
سواء كان الinjury بالaxilla أو بالspiral groove
النتيجة "wrist drop"
طيب ايش الفرق؟

- If the nerve was injured in the axilla
  → the patient is unable to extend the elbow, wrist and fingers "we lost everything"
- If the nerve was injured in the spiral groove
  → The patient is able to extend the elbow (weak extension)
  "the nerve branches in the axilla are not lost"

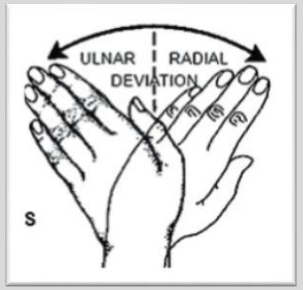


the Deep Branch of the Radial nerve

- PURELY Motor nerve
  "It supplies the extensor muscles in the posterior compartment of the forearm"
- 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 "powerful muscles" → the wrist joint will be extended
- (*No wrist Drop)
- No sensory loss

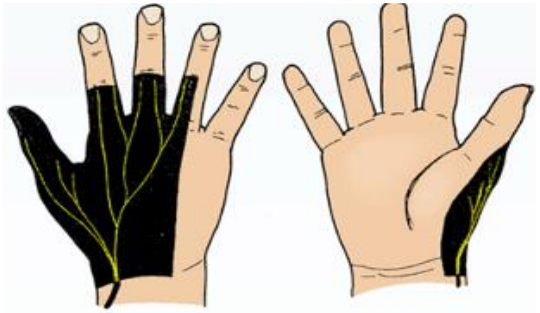


The result is radial deviation



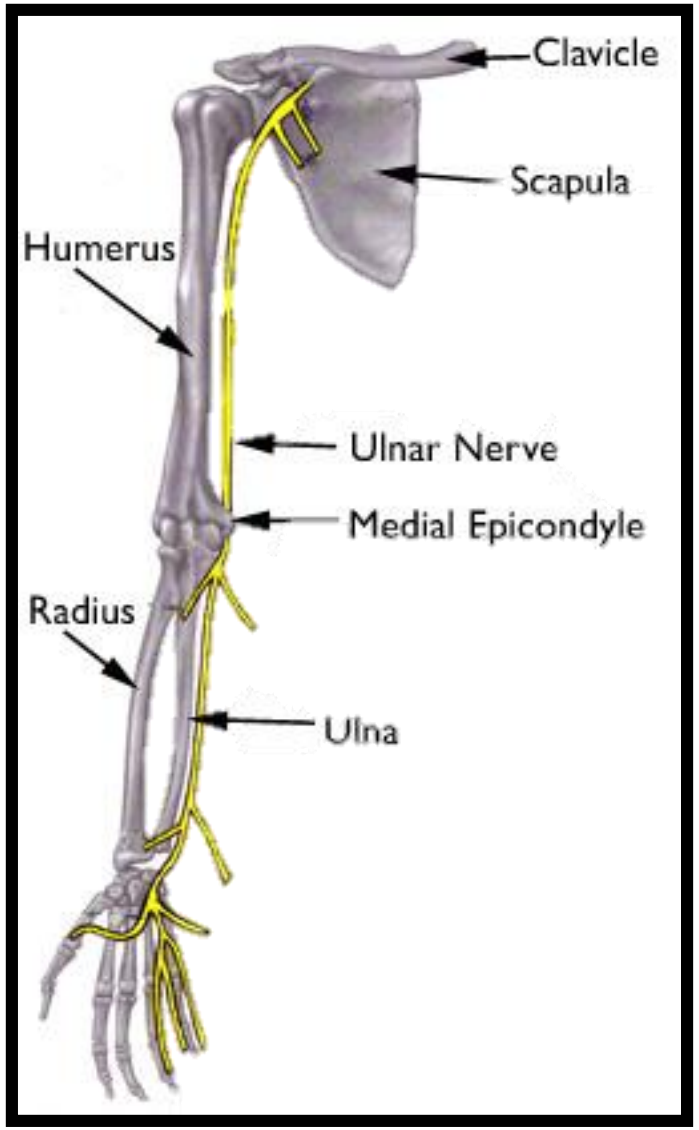
the superficial Branch of the Radial nerve

- 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 proximal phalanges



*Why no wrist drop? Because deep branch of radial nerve doesn't supply extensor carpi radialis longus → the end result will be the actions of extensor carpi radialis longus (extension of the wrist with radial deviation (abduction))

Ulnar Nerve



Origin

- Medial cord of Brachial Plexus.

Course

- Descends along the medial side of the:
  .Axillary Artery
  .Brachial Artery
  → The continuation of axillary artery is brachial artery
- Pierces the Medial Intermuscular Septum
- Passes Behind the Medial Epicondyle of the humerus.

-*It passes between the 2 heads of flexor carpi ulnaris
-flexor carpi ulnaris is supplied by ulnar nerve
-ulnar nerve supplies 1 and half of muscles of anterior compartment of forearm (the rest are supplied by median nerve)

Course

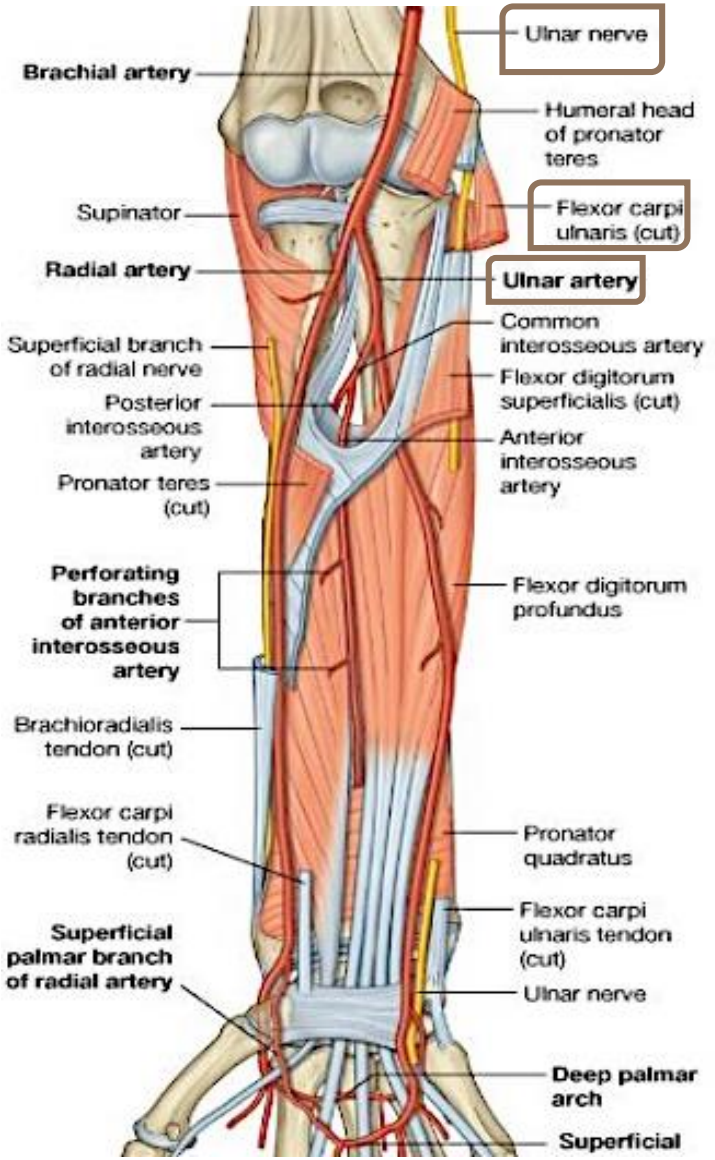
In the forearm

- Enters the anterior compartment through the *flexor carpi ulnaris.
- Descends Behind the Flexor Carpi Ulnaris. Medial to Ulnar Artery.

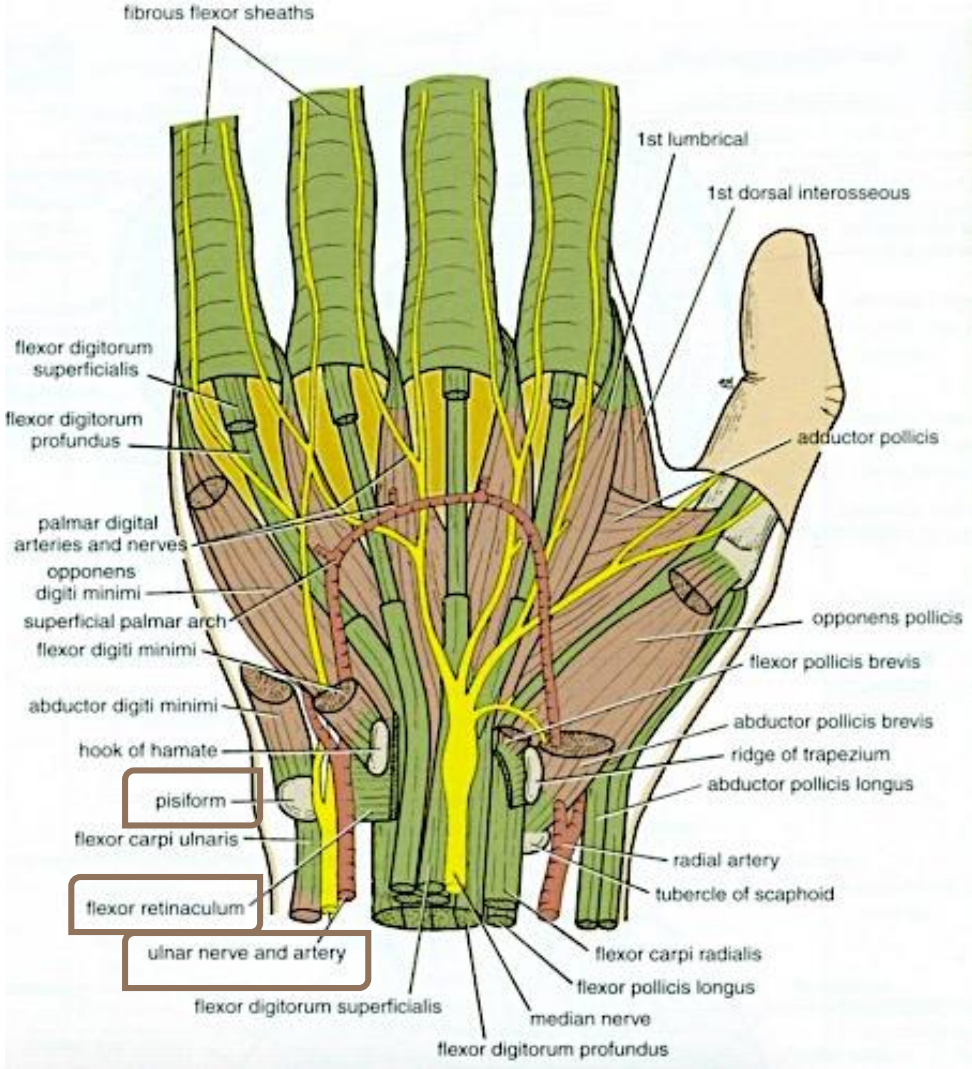
At the wrist

- Passes
  Anterior to Flexor Retinaculum.
  Lateral to Pisiform bone.
  Medial to Ulnar artery.
- Divides into : Superficial & Deep branches.

In the forearm



At the wrist



It has no branches in the arm

Branches

In the formarm

Muscular to : (1 & ½ muscles):

-Flexor Carpi Ulnaris.

-Medial ½ of Flexor Digitorum Profundus.

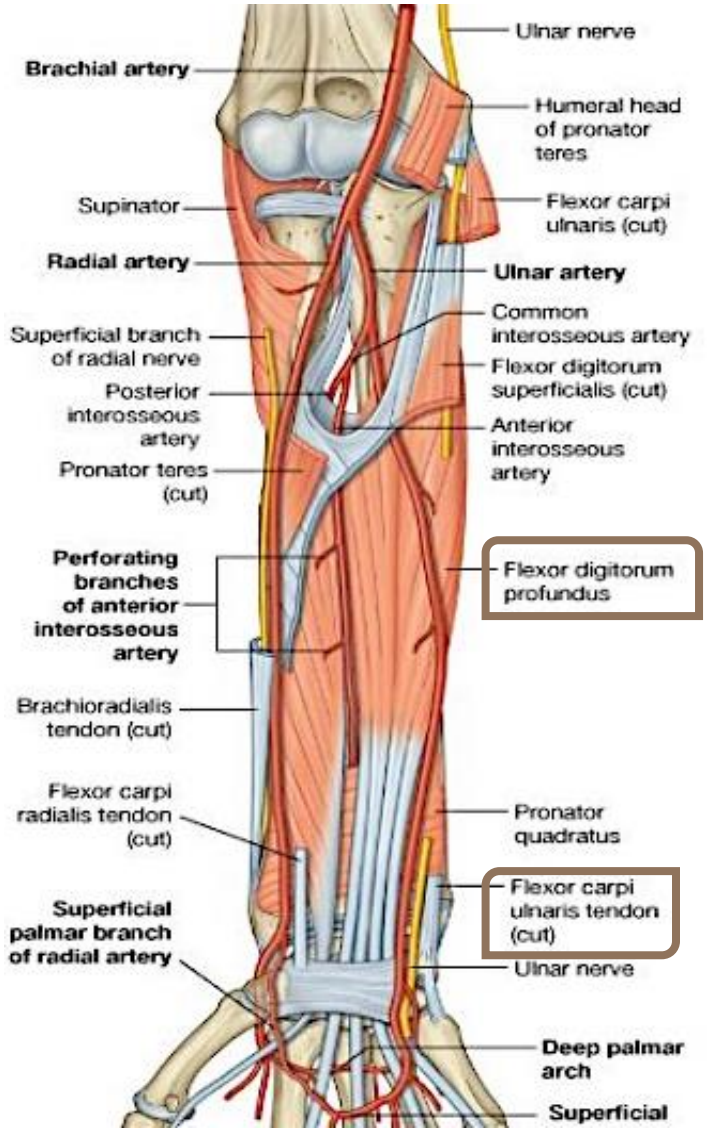
Articular to:

Elbow joint

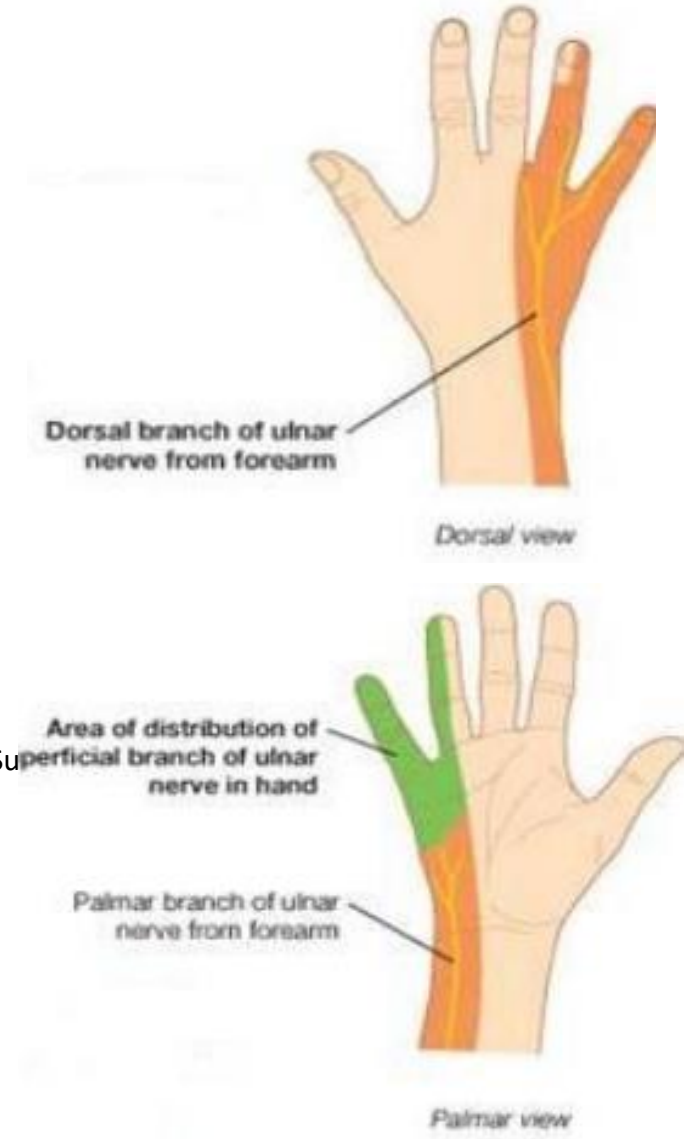
Cutaneous:

1. Dorsal (posterior) cutaneous: Supplies the skin over the back of Medial side of the hand & Medial 1+½ fingers
2. Palmar cutaneous: Supplies the skin over the Medial part of the palm.

In the forearm: muscular to



In the forearm: cutanous



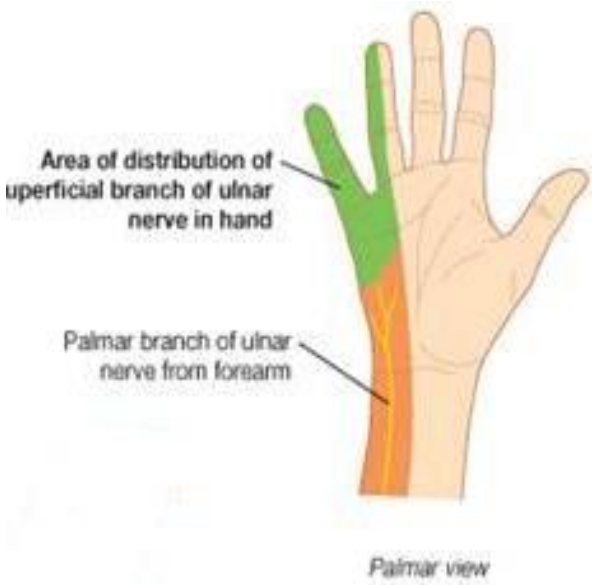
Branches of Superficial Terminal Branch:

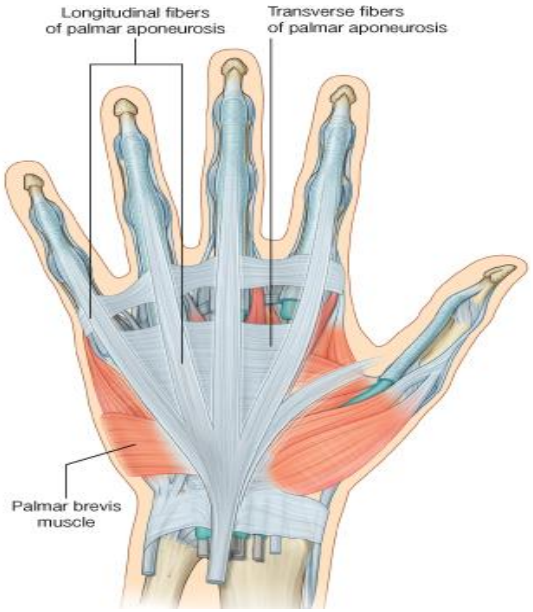
A-Muscular:

-Palmaris Brevis.

B-Cutaneous:

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





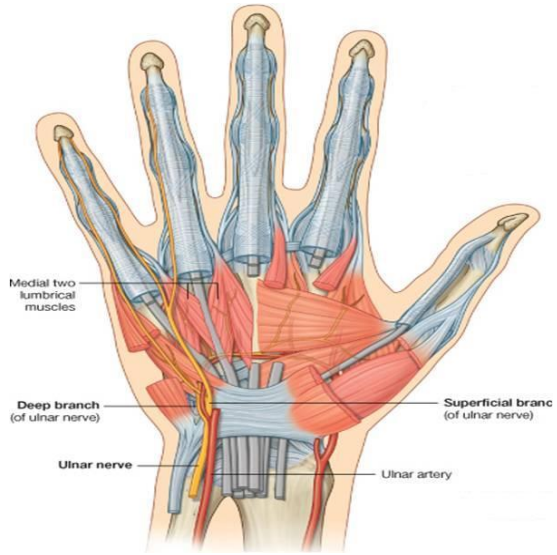
Branches of Deep Terminal Branch:

A-Muscular branches :

1. Hypothenar Eminence.
2. All Interossei (Palmar & Dorsal).
3. 3rd & 4th Lumbricals.
4. Adductor pollicis.

B-Articular:

-Carpal joints.



Ulnar Nerve Injury:

-At the Elbow (fracture of medial epicondyle of humerus):

1-Atrophy of Ulnar side of forearm.

2-*Flexion of the wrist with Abduction.

3-**Claw hand.

4-Wasting of Hypothenar Eminence.

Explanations in the next slide

Ulnar Nerve Injury:

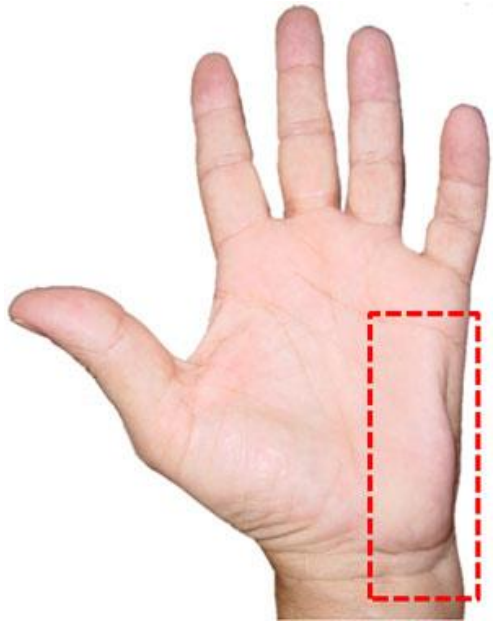
-At the wrist:

1-Claw Hand.

2-Wasting of Hypothenar Eminence.

Why we don't have 'flexion of the wrist with abduction?
-Because flexor carpi ulnaris takes innervation before it enters the wrist joint

Claw hand



Atrophy of Ulnar side of forearm.

Wasting of Hypothenar Eminence.

Extra slide for your understanding

Flexion of the wrist with Abduction

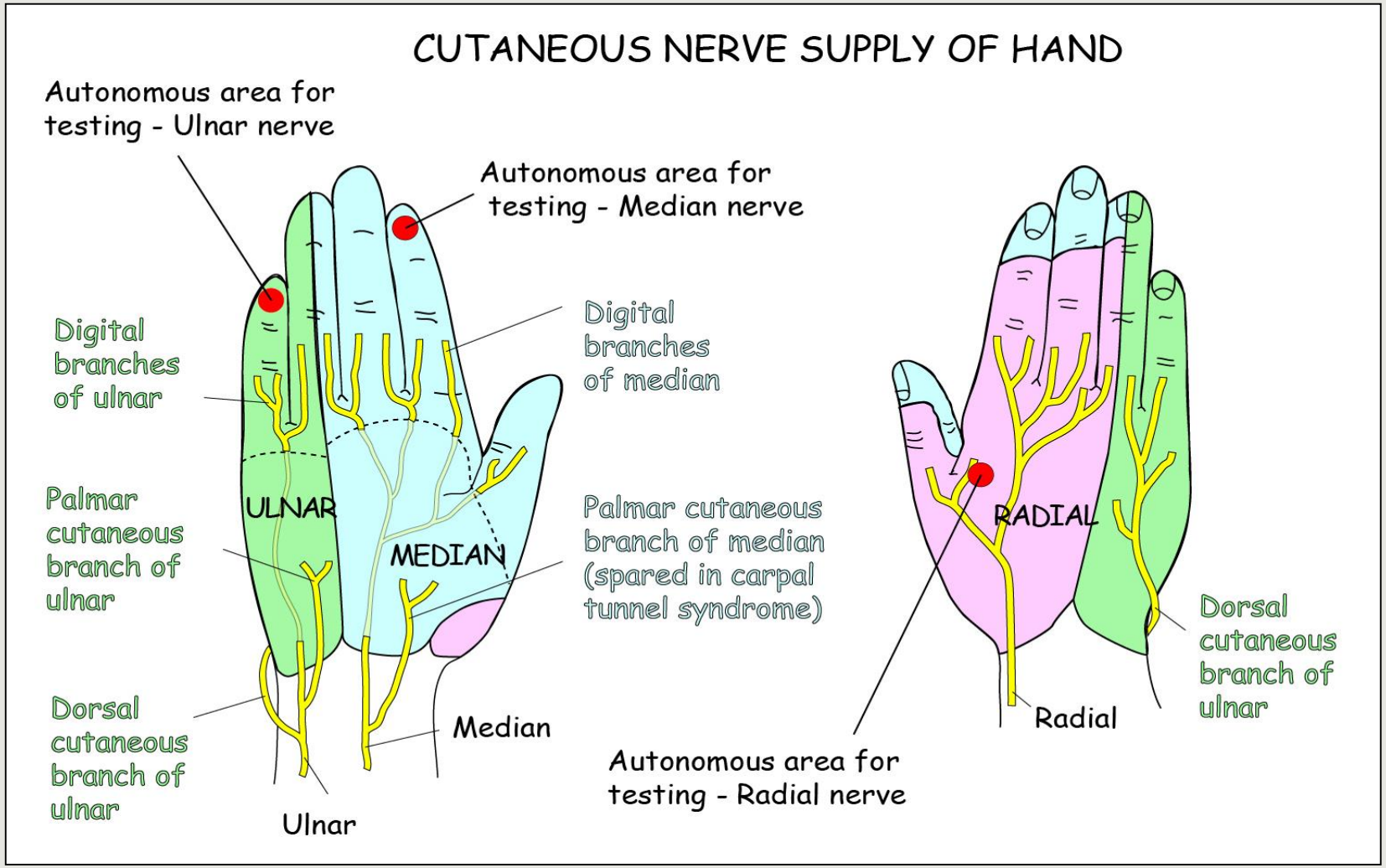
*In the normal case of flexion of wrist both flexor carpi ulnaris and flexor carpi radialis will work.
-The action of flexor carpi ulnaris → flexion of wrist with adduction
-The action of flexor carpi radialis → flexion of wrist with abduction
so both of them assist in flexion of the wrist, but they cancel each other out abduction and adduction.
In the case of ulnar nerve injury, the flexor carpi ulnaris will stop working resulting in flexion of wrist with abduction "because flexor carpi ulnaris doesn't cancel the act of abduction by adduction" (the action of flexor carpi radialis)

Claw hand

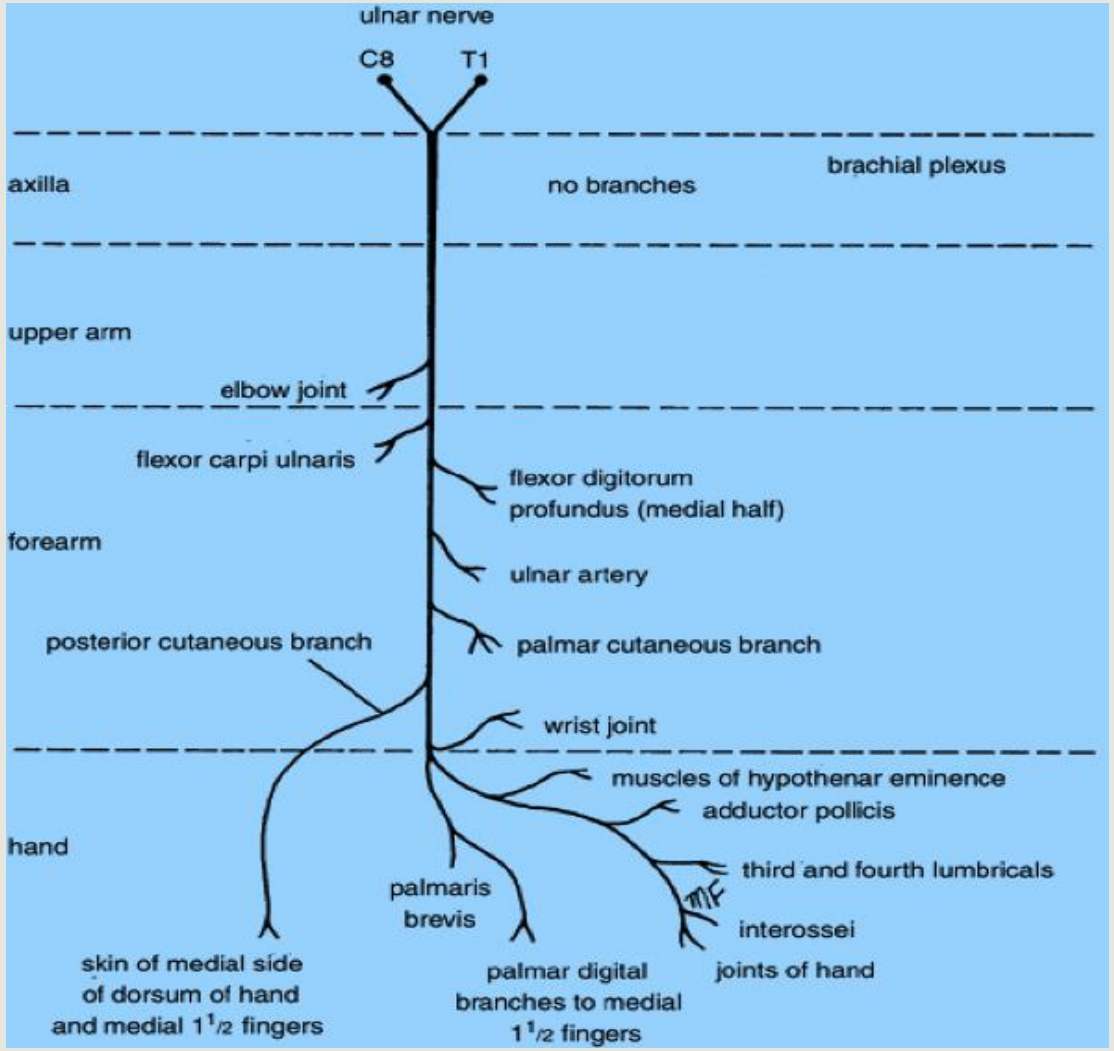
** In the normal position (writing position) there are:
1/ flexion in the carpometacarpal joints
2/ extension of interphalangeal joints
In the case of ulnar nerve injury, the little and ring fingers will do the opposite:
1/ extension of the carpometacarpal joints
2/ flexion of interphalangeal joints
Producing what we call "partial claw hand"
In the case of median nerve injury, the index and middle fingers will also do the opposite of normal position (same as ulnar injury):
1/ extension of the carpometacarpal joints
2/ flexion of interphalangeal joints
Producing what we call "partial claw hand"

- If we have injury in both median and ulnar nerves we gain what we call "complete claw hand"

Cutaneous Nerves of Hand

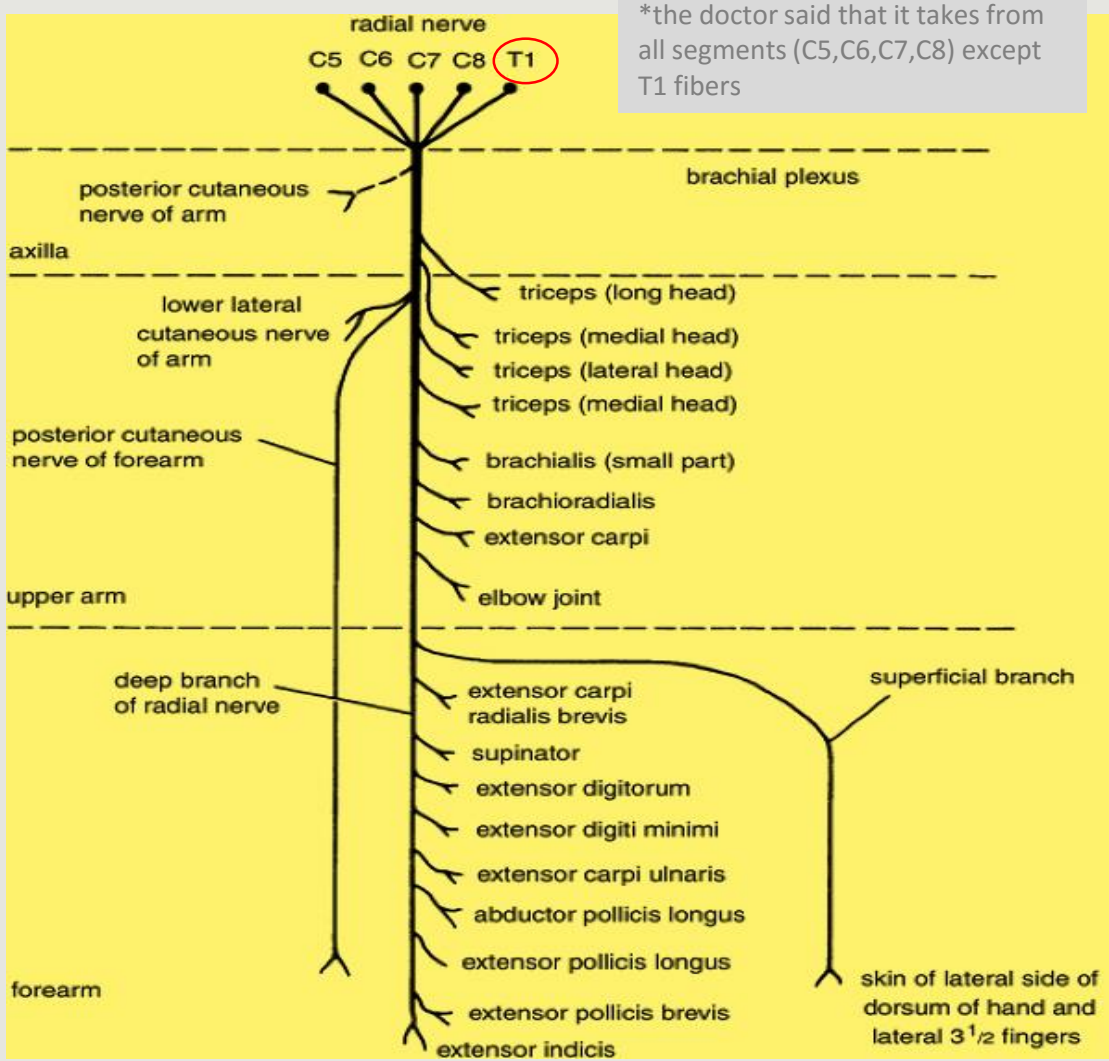


Summary of branches of Ulnar Nerve



Summary of branches of radial nerve

*the doctor said that it takes from all segments (C5,C6,C7,C8) except T1 fibers



https://www.youtube.com/watch?v=98ozvPC1434

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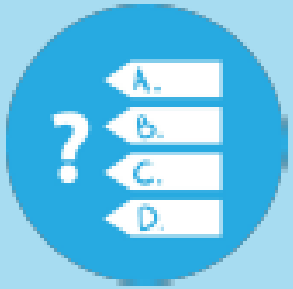
https://www.youtube.com/watch?v=KNklIKz41_U



https://www.onlineexambuilder.com/radial-ulnar-nerves/exam-52368

هذا العمل إجتهاد من طلاب و طالبات

إن أصبنا فمن الله و إن أخطأنا فمن أنفسنا و من الشيطان

TEAM MEMBERS:

Lamya Alsaghan

Nouf Alabdulkarim

Ola Alnuhayer

Johara Almalki

Nora AlRomaih

TEAM LEADERS:

Bodour julaidan

Elham Alzahrani

Abdullah Alfuraih

- For questions and suggestions you can contact us on Anatomy435@gmial.com