

Radial and Ulnar Nerves

Anatomy Team 434

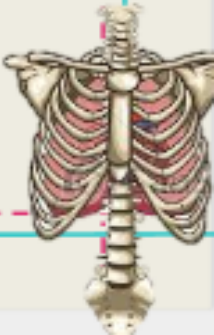
Color Index:

- **Important Points**
- Helping notes
- **Explanation**

If you have any complaint or suggestion please don't hesitate to contact us on:
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objectives

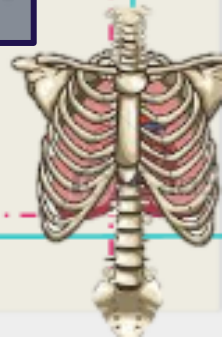
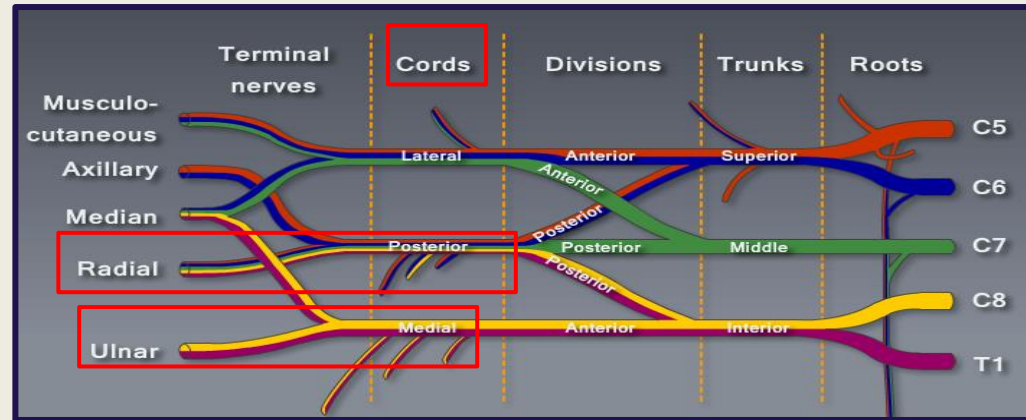
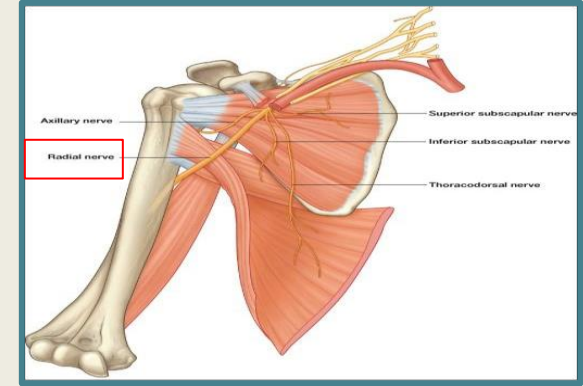
- Describe the anatomy of the radial & ulnar nerves regarding: origin, course & distribution.
- List the branches of the nerves.
- Describe the causes and manifestations of nerve injury.



Radial Nerve:

generally, any nerve which passes a joint will supply it .so the **Radial nerve** is going to supply the **elbow & the wrist joints**.

origin of radial nerve: from the **POSTERIOR CORD** of the **BRACHIAL PLEXUS**, found in the **Axilla**. **Radial nerve is the largest branch of BP.** (all the **CORDS & terminal nerves**, found in the **axilla**). it originates from the **POSTERIOR CORD** of BP, so its **function** is to supply all the muscles of the posterior compartments of the Arm & Forearm.



radial nerve course's in Arm & Forearm:

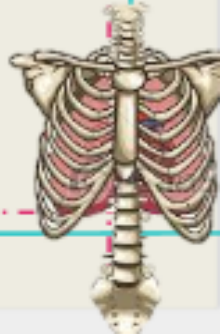
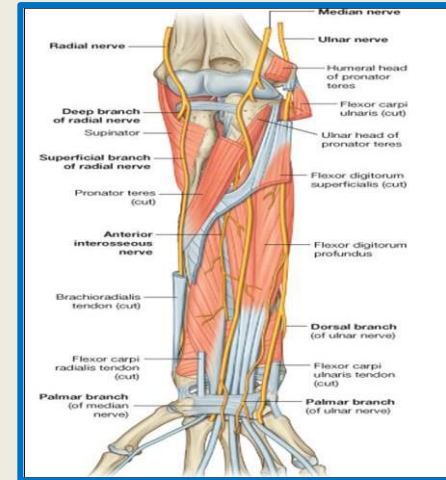
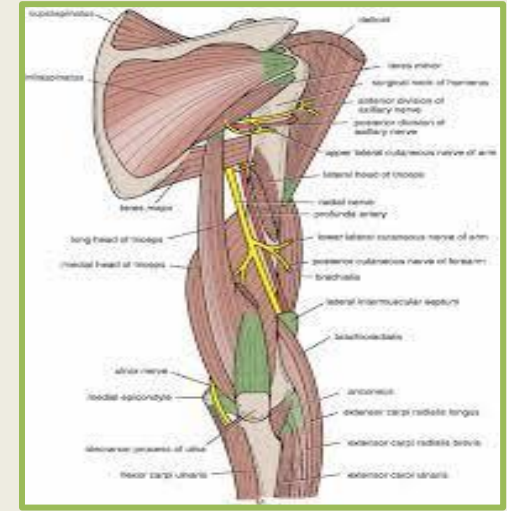
in the Arm :

Radial N. as said before it originates from the posterior cord of the BP., so it wants to continue posteriorly to supply the posterior muscles of the Arm & Forearm, for that reason it winds around the back of the Arm → becomes in the SPIRAL(radial) GROOVE; on the posterior aspect (posterior surface of the humerus shaft). in the spiral groove the radial nerve accompanied by the profunda vessels

position of R.N. in the Arm: because it lies directly in contact with shaft of humerus, so any injury or fracture happens for the humerus it may injure the Radial nerve (dangerous position).

in the Forearm :

R.N. pierces (يخترق) the lateral intermuscular septum → descends in front of the lateral epicondyle → passes forward into the cubital fossa ▶ then it divides into deep & superficial branches ,



Branches of the Radial nerve

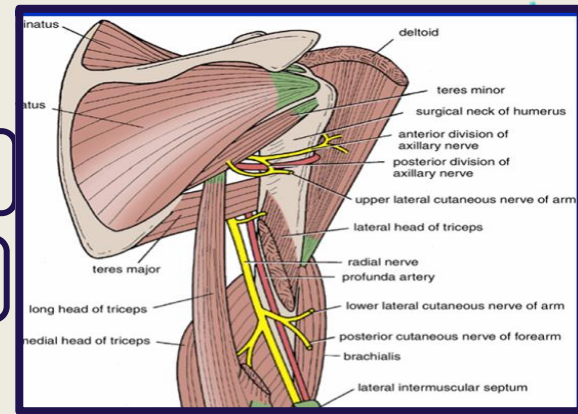
in the Axilla

(any injury to the Radial nerve here in this region will affect all the extending nerves).



cutaneous (sensory): which is the **posterior cutaneous nerve of the arm.**

muscular(motor): supplies the **medial & long head of triceps muscle.**



in the Spiral groove

THIS MUSCULAR branch is gracious, so it supplies the triceps' neighbor which is anconeus muscle

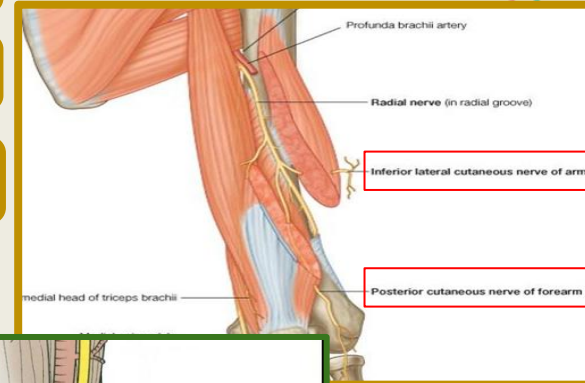


cutaneous branch (sensory): which is divided also into **2 branches:**

Lower lateral cutaneous nerve of the Arm.

posterior cutaneous nerve of the Forearm.

muscular branch(motor): supplies the **medial & lateral heads of the triceps muscle & anconeus muscle.**

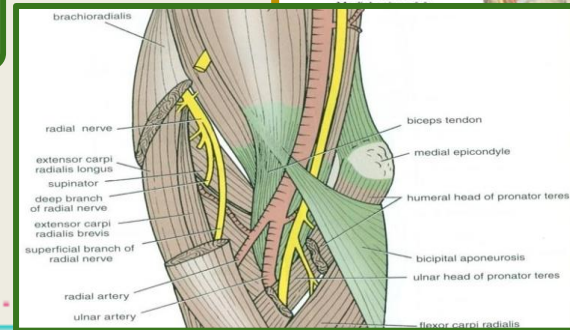


close to the lateral epicondyle



Articular: supplies the **elbow joint** as it passes through it

muscular(motor): supplies **Brachialis & Brachioradialis & Extensor carpi radialis longus**



Superficial Branch of the Radial nerve:

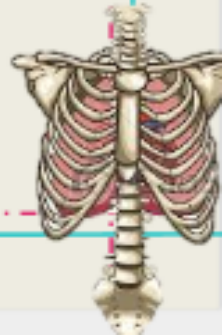
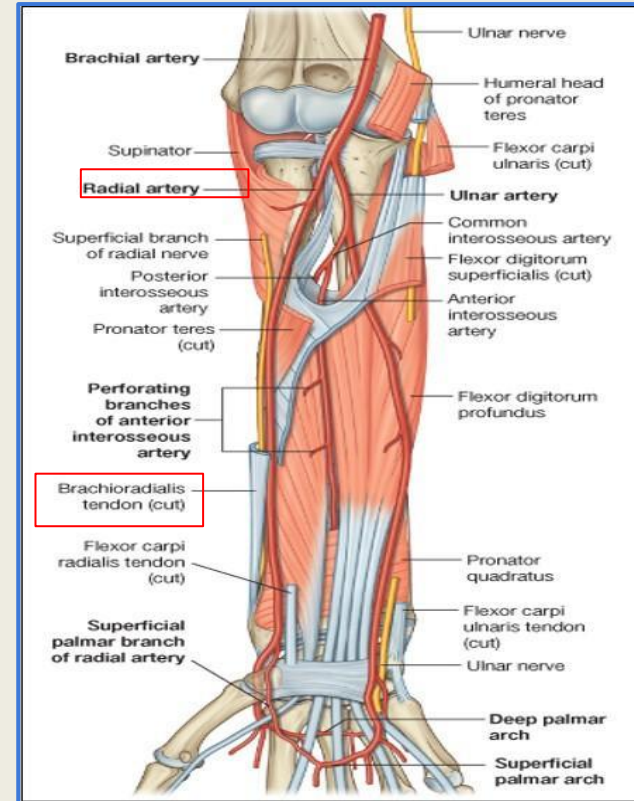
we said that: in the Forearm: R.N. pierces (يخترق) the lateral intermuscular septum → descends in front of of the lateral epicondyle passes forward into the cubital fossa → then it divides into deep & superficial branches.

superficial branch: (in the forearm)

it descends under cover (تعبّر فوق) Brachioradialis muscle.

lateral to the Radial Artery .

it emerges beneath (تحت) the Brachioradialis tendon.

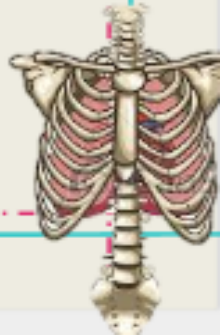
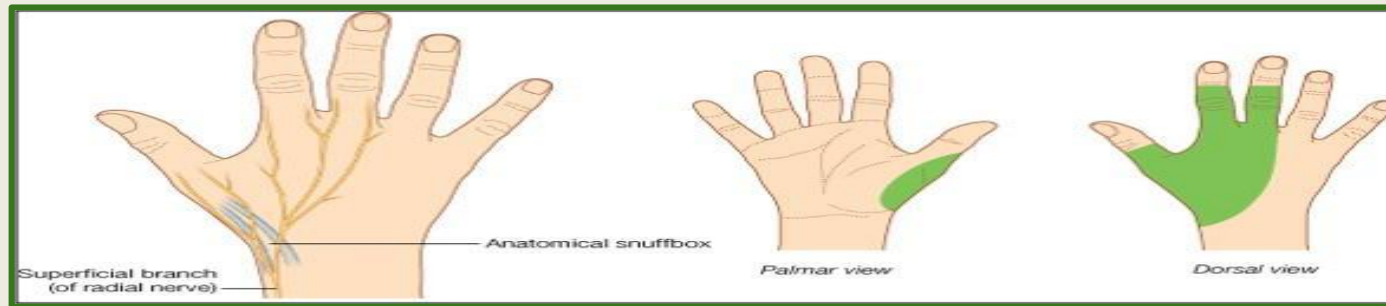


termination of superficial branches:

when superficial branch of Radial nerve reaches the posterior surface of the wrist it then divides into terminal branches that supply the skin (sensory) of the lateral $\frac{2}{3}$ (two thirds) of the posterior surface of the hand & also the terminal branches supply the posterior surfaces over the proximal phalanges of the lateral 3 & $\frac{1}{2}$ fingers.

Note :

The area of skin supplied by the nerve on the dorsum of the hand is variable, that means the posterior surface of the hand (dorsum) is supplied by different nerves.

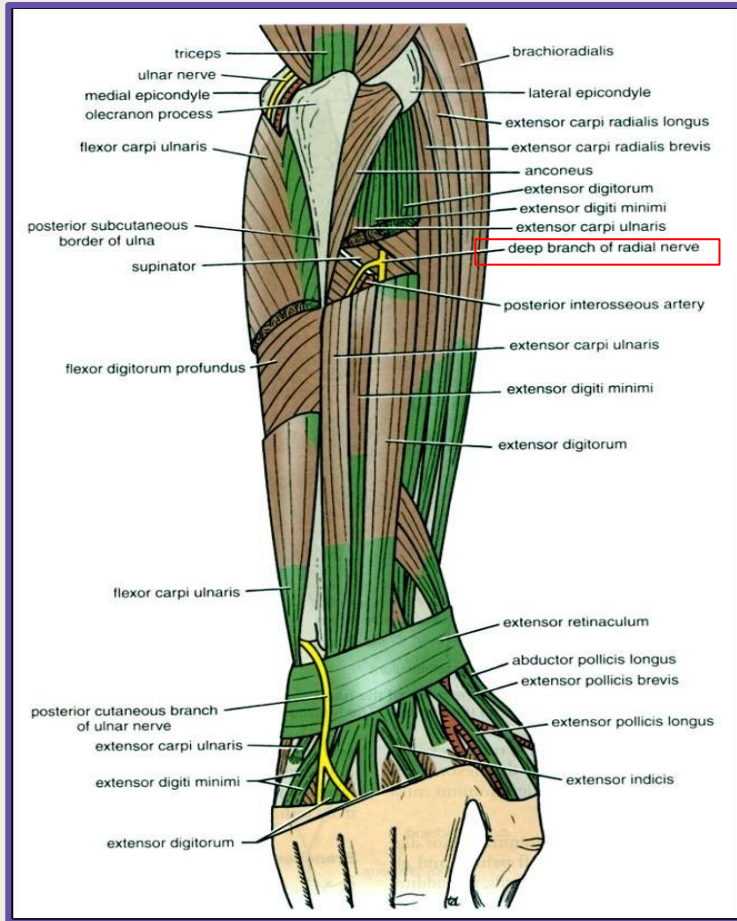


Deep Branch of the Radial nerve:(in forearm)

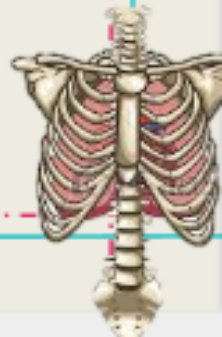
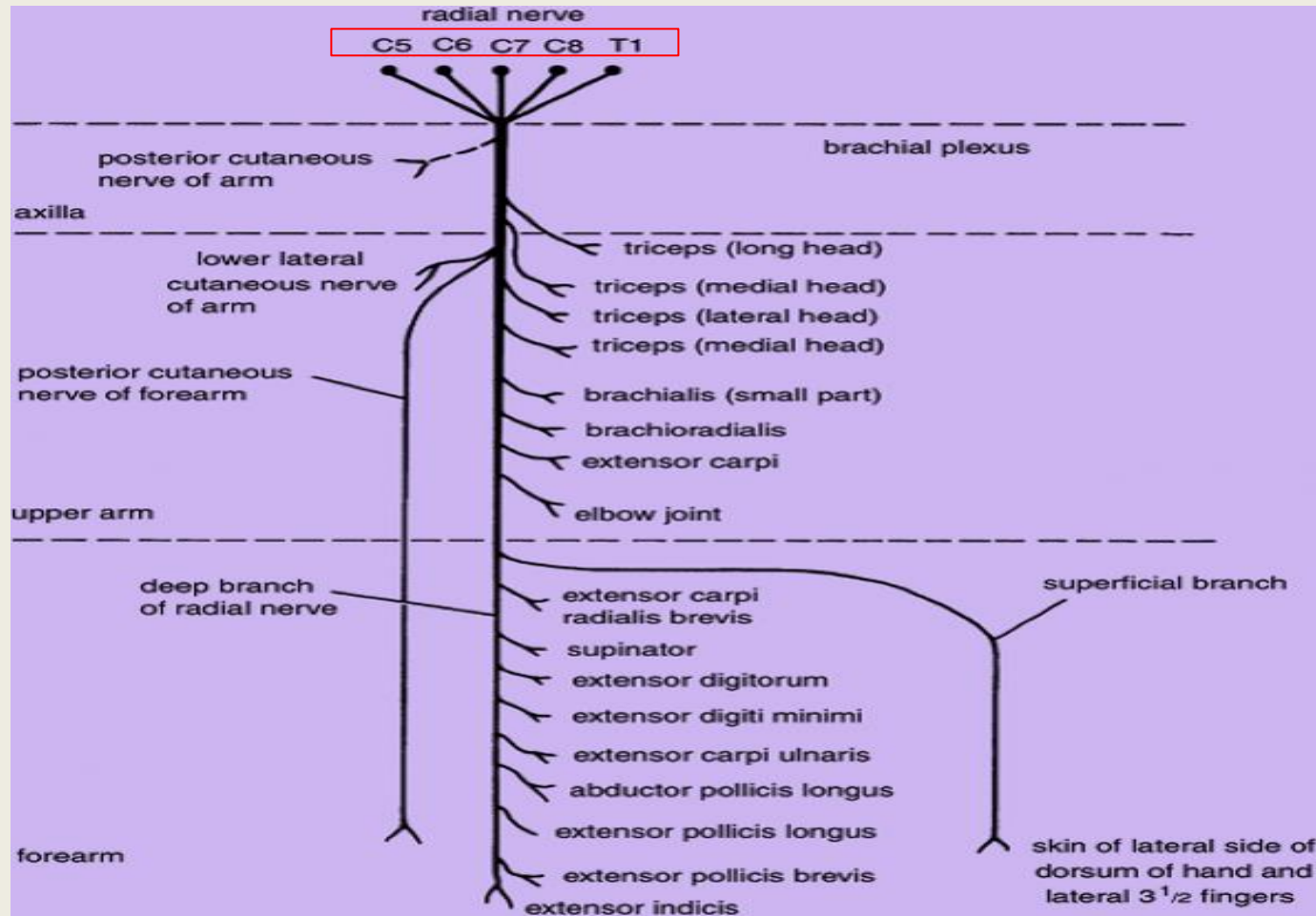
It winds around the neck of the radius, within the supinator muscle, and enters the posterior compartment of the forearm.

the deep branch(motor) supplies these muscles:

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



Summary of Branches of Radial Nerve



Radial Nerve Injuries

injury of the radial nerve in the Axilla:

The nerve can be injured by a drunkard falling asleep with one arm over the back of a chair, also by fractures and dislocations of the proximal end of the humerus .

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

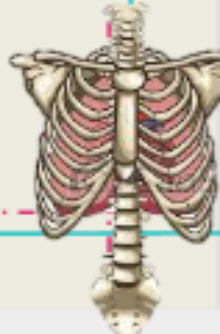
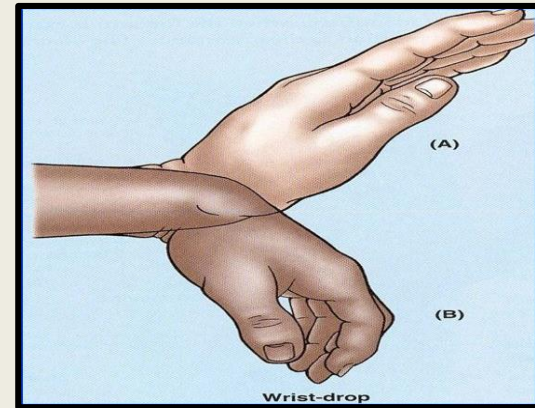
The patient is unable to extend the elbow & the wrist joints, and the fingers (Wrist Drop).

injury of the radial nerve in the 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) .

it's called:saturday

injury, العمال يوم السبت هو يوم اجازتهم الوحيد فيروحون يشربون ويعربدون ليلة السبت ومن كثر الشرب ينامون واقفين ساندين يدينهم ع ظهر الكرسي ومع الوقت وتزايد الضغط ع العصب يحصل injury .

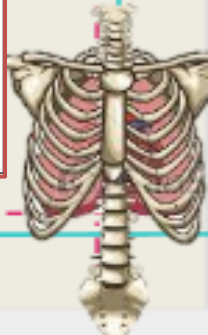
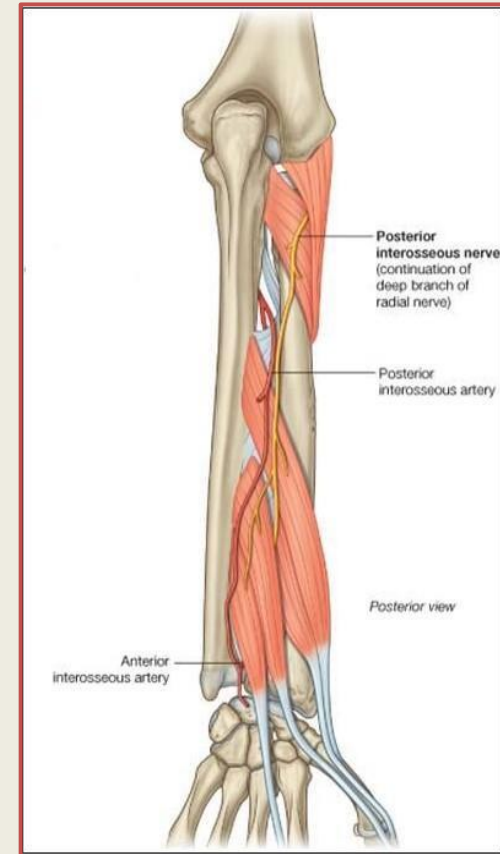


Injury to the Deep Branch of the Radial Nerve:

The deep branch of the radial nerve is **PURELY Motor** (It supplies the extensor muscles in the posterior compartment of the forearm). for that reason when injury occurred there will be NO loss of sensation.

when 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, and because the latter muscle is powerful, it will keep the wrist joint extended, so there will be No Wrist Drop.



Injury to the Superficial Branch of the Radial Nerve:

Superficial Branch of the Radial Nerve is a sensory nerve. Injury like a stab wound, results in a variable small area of anesthesia (تخدير) over the dorsum of the hand and lateral three and half fingers up to the base of their proximal phalanges.

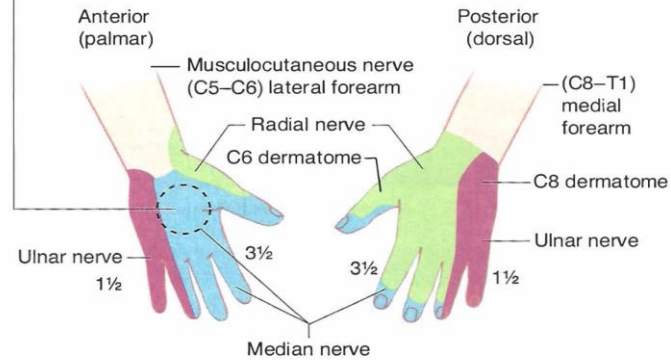
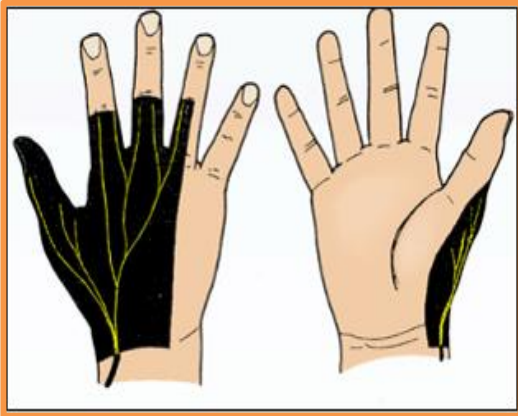
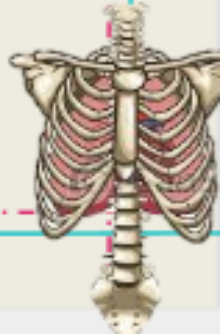


Figure III-4-2. Sensory Innervation of the Hand and Forearm

NERVE INJURIES

Remember: Follow clues in the questions as to the location of the injury. An

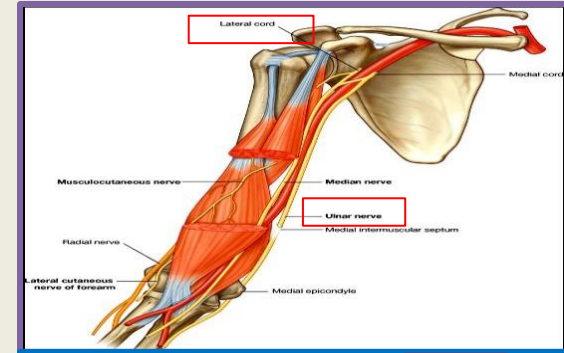


Ulnar Nerve & its course in the Arm ,forearm and at wrist :

origin:

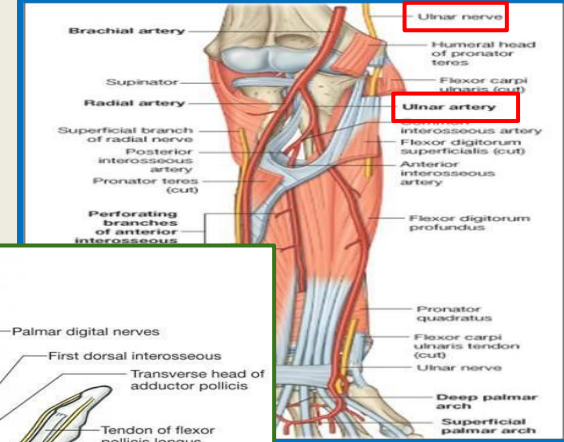
it originates from the medial cord of the Brachial Plexus.

course in the Arm: Descends along the medial side of the Axillary & the Brachial arteries → Pierces the Medial Intermuscular Septum → Passes Behind the Medial Epicondyle of the humerus.



course in the Forearm:

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

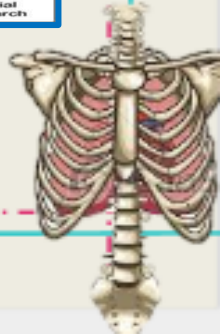
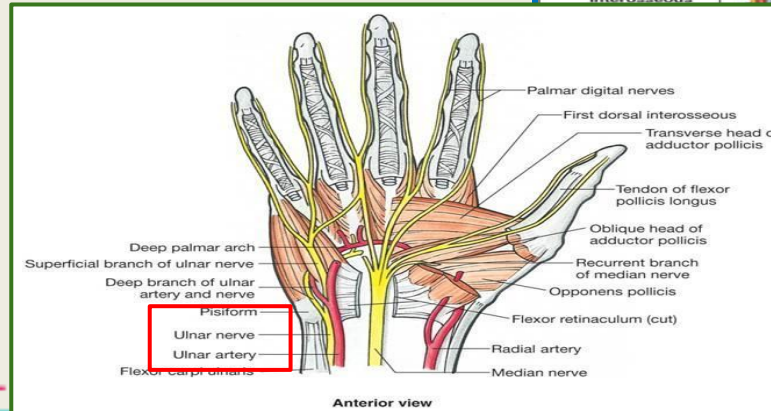


passes anterior to the Flexor Retinaculum.

lateral to pisiform bone.

medial to ulnar artery.

then it divides into superficial & deep branches.



Branches of the ulnar nerve

It has No branches in the arm
In the Forearm:

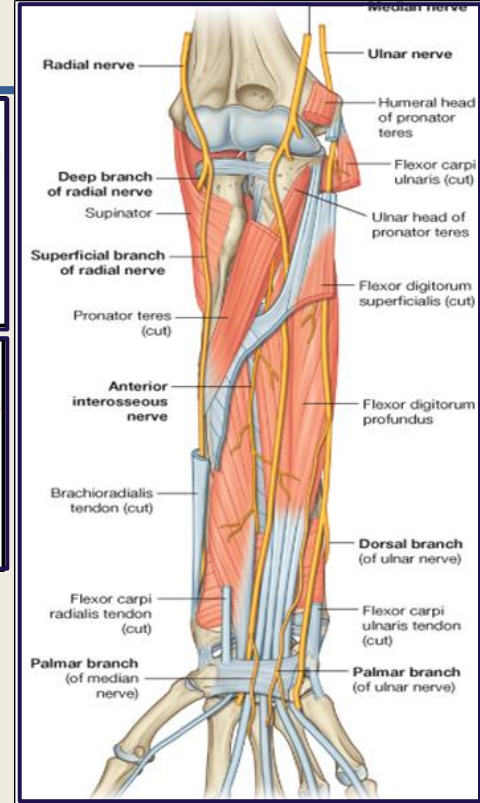
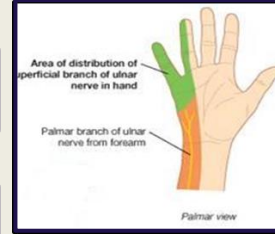
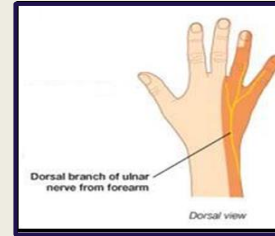
Muscular TO : (1 & 1/2 muscles). **Flexor Carpi Ulnaris.**
Medial 1/2 of Flexor Digitorum Profundus.

Articular TO: Elbow joint.

Cutaneous: which is divided also into 2 branches:

Dorsal (posterior) cutaneous: Supplies the skin over the back of Medial side of the hand & Medial 1+1/2 fingers

Palmar cutaneous: Supplies the skin over the Medial part of the palm.



IN THE HAND:

Branches of Superficial Terminal Branch:

Muscular: Palmaris Brevis.

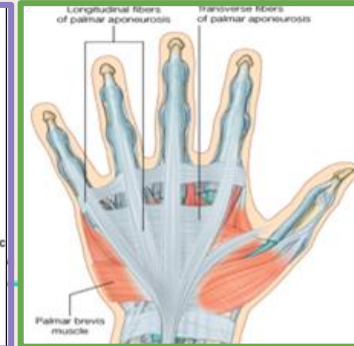
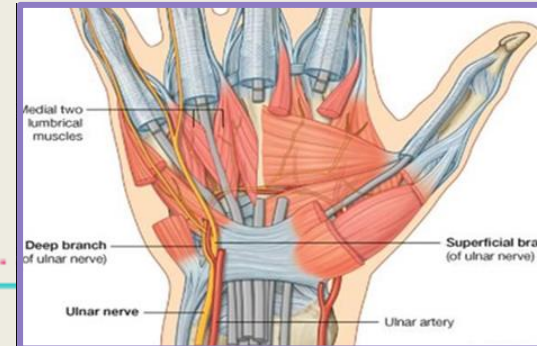
Cutaneous: Skin over the Palmar aspect of the medial 1+ 1/2 fingers (including nail beds).

Branches of deep Terminal Branch:

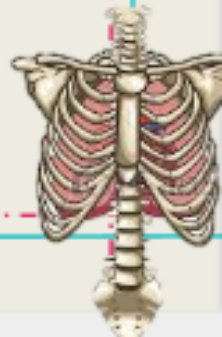
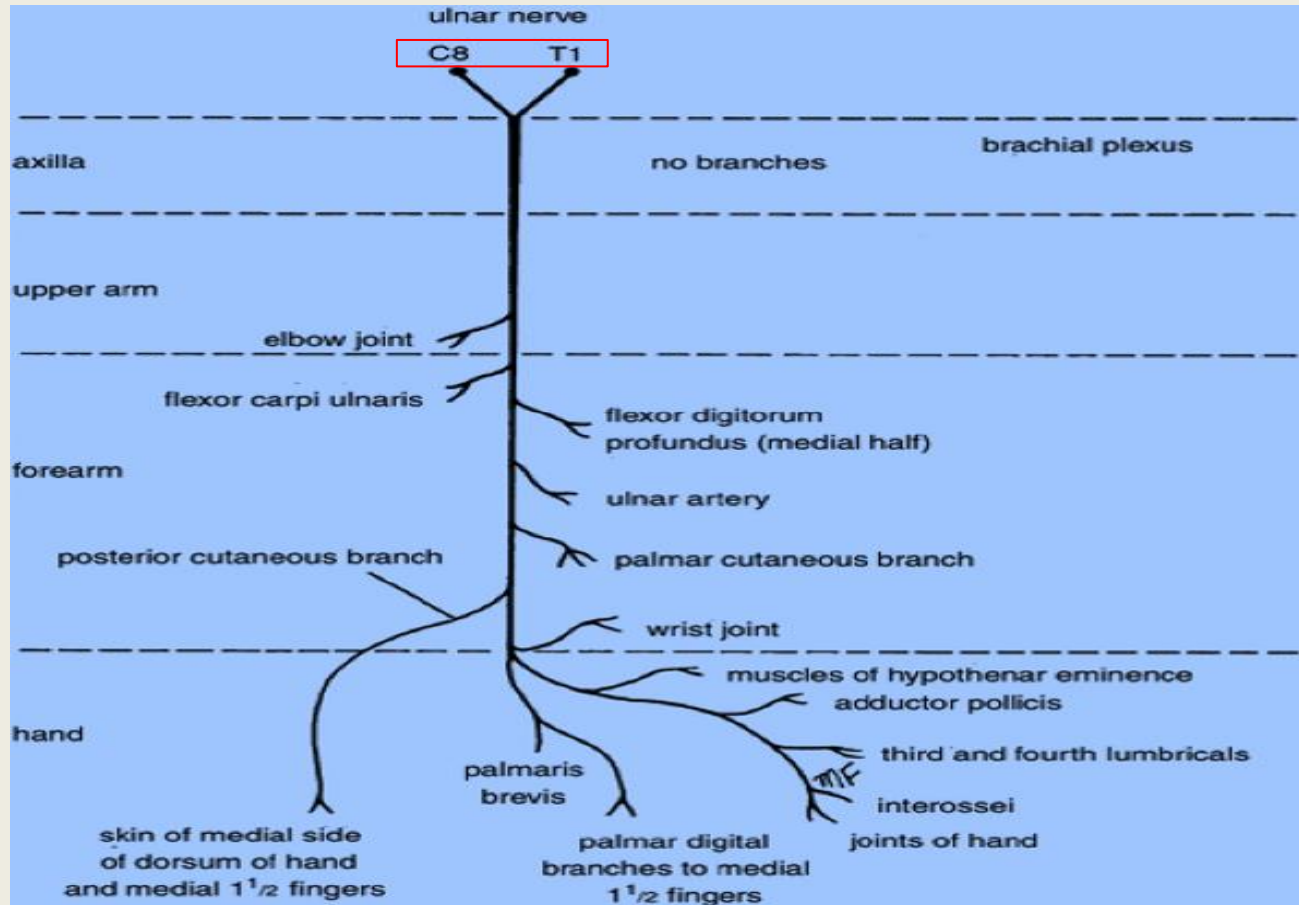
Muscular branches :

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

Articular: Carpal joints.



Summary of branches of Ulnar Nerve



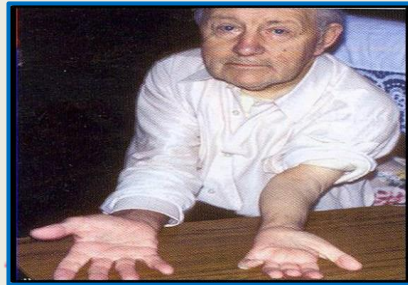
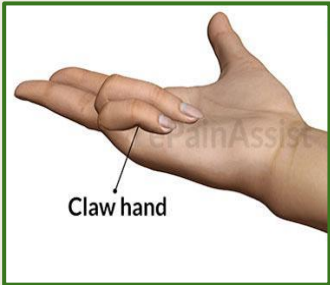
Ulnar Nerve Injury

injury at the elbow:

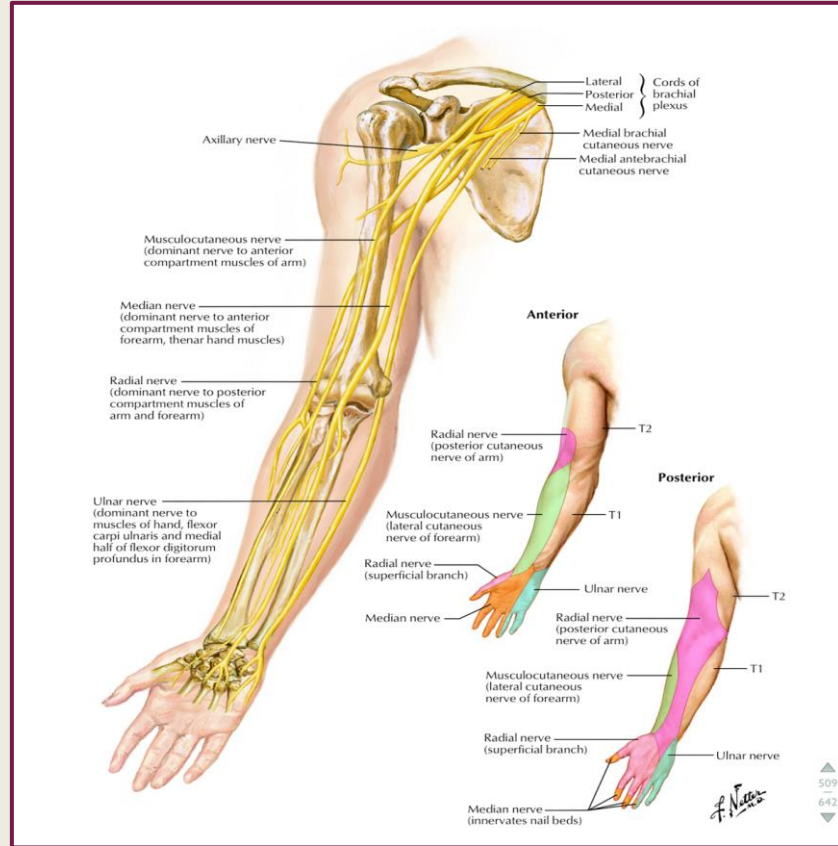
- Atrophy for ulnar side of the forearm.
- flexion of the wrist with abduction.**
- claw hand
- wasting of the hypothenar eminence.

injury at the wrist:

- claw hand
- wasting of hypothenar eminence



cutaneous innervation of the upper limb



summary of brachial plexus lesions

Table III-4-4. Effects of Lesions to Branches of the Brachial Plexus

Lesioned Nerve	Axillary (C5, C6)	Musculo-cutaneous (C5, C6, C7)	Radial (C5, C6, C7, C8)	Median (C6, C7, C8, T1)	Ulnar (C8, T1)
Altered sensation	Lateral arm	Lateral forearm	Dorsum of hand over first dorsal interosseous and anatomic snuffbox	Lateral 3½ digits; lateral palm	Medial 1½ digits; medial palm
Motor weakness	Abduction at shoulder	Flexion of forearm Supination	Wrist extension Metacarpophalangeal extension Supination	Wrist flexion Finger flexion Pronation Thumb opposition	Wrist flexion Finger spreading Thumb adduction Finger extension
Common sign of lesion	—	—	Wrist drop	Ape hand Hand of benediction Ulnar deviation at wrist	Claw hand Radial deviation at wrist
Causes of lesions	Surgical neck fracture of humerus Dislocated humerus	Rarely lesioned	Saturday night palsy Midshaft fracture of humerus Subluxation of radius Dislocated humerus	Carpal tunnel compression Supracondylar fracture of humerus Pronator teres syndrome	Fracture of medial epicondyle of humerus Fracture of hook of hamate Fracture of clavicle

(taken from kaplan)

Terminal Nerves of Upper Limbs

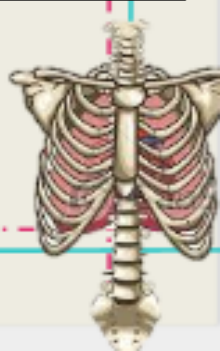
The motor innervation by the 5 terminal nerves of the arm muscles is summarized in Table III-4-1.

Table III-4-1. Major Motor Innervations by the 5 Terminal Nerves

Terminal Nerve	Muscles Innervated	Primary Actions
Musculocutaneous nerve C5-6	All the muscles of the anterior compartment of the arm	Flex elbow Supination (biceps brachii)
Median nerve C5-T1	A. Forearm <ul style="list-style-type: none"> • Anterior compartment except 1.5 muscles by ulnar nerve (flexor carpi ulnaris and the ulnar half of the flexor digitorum profundus) B. Hand <ul style="list-style-type: none"> • Thenar compartment • Central compartment Lumbricals: Digits 2 and 3 	Flex wrist and all digits Pronation Opposition of thumb Flex metacarpophalangeal (MP) and extend interphalangeal (PIP and DIP) joints of digits 2 and 3
Ulnar nerve C8-T1	A. Forearm <ul style="list-style-type: none"> • Anterior Compartment: 1 [1/2] muscles not innervated by the median nerve B. Hand <ul style="list-style-type: none"> • Hypothenar compartment • Central compartment <ul style="list-style-type: none"> – Interossei muscles: Palmar and Dorsal • Lumbricals: Digits 4 & 5 • Adductor pollicis 	Flex wrist (weak) and digits 4 and 5 <div style="display: flex; align-items: center;"> <div style="font-size: 3em; margin-right: 5px;">}</div> <div> Dorsal – Abduct digits 2-5 (DAB) Palmar – Adduct digits 2-5 (PAD) Assist Lumbricals in MP flexion and IP extension digits 2-5 Flex MP and extend PIP & DIP joints of digits 4 and 5 Adduct the thumb </div> </div>
Axillary nerve C5-6	Deltoid Teres minor	Abduct shoulder—15°–110° Lateral rotation of shoulder
Radial nerve C5-T1	Posterior compartment muscles of the arm and forearm	Extend MP, wrist, and elbow Supination (supinator muscle)

summary of nerves supply upper limb

(taken from kaplan)





Q1: In which part of the upper limb does the radial nerve give branch to supply the long and medial heads of the triceps?

- A)** spiral groove
- B)** axilla
- C)** close to the lateral epicondyle
- D)** in the cubital fossa

Q2: Which of the following aspects of the forearm is supplied by a cutaneous branch of the radial nerve?

- A)** posterior aspect
- B)** anterior aspect
- C)** lateral aspect
- D)** medial aspect

Q3: The ulnar nerve passes at the wrist medially to?

- A)** pisiform bone
- B)** flexor carpi ulnaris
- C)** ulnar artery
- D)** abductor digiti minimi

Q4: which of the following muscle is supplied by the superficial branch of the ulnar nerve in hand?

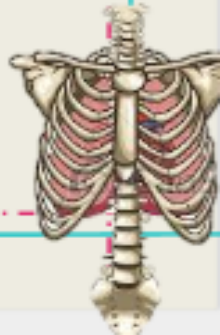
- A)** hypothenar eminence
- B)** palmar interossei
- C)** palmaris brevis
- D)** flexor pollicis brevis

Q5: Which of the following is a consequence of radial nerve injury?

- A)** flexion of the wrist with abduction
- B)** loss of ability to extend the elbow joint
- C)** claw hands

Answers :

- 1-B
- 2-A
- 3-C
- 4-C
- 5-B



Really, I'm not even a patient.
I just came in to visit my uncle!



GOOD
LUCK

Done By Anatomy Team 434 ..

Recommended videos ([there is music](#)):

[Anatomy Of The Radial Nerve](#)

[Anatomy Of The Ulnar Nerve](#)

