Posterior compartment of Forearm

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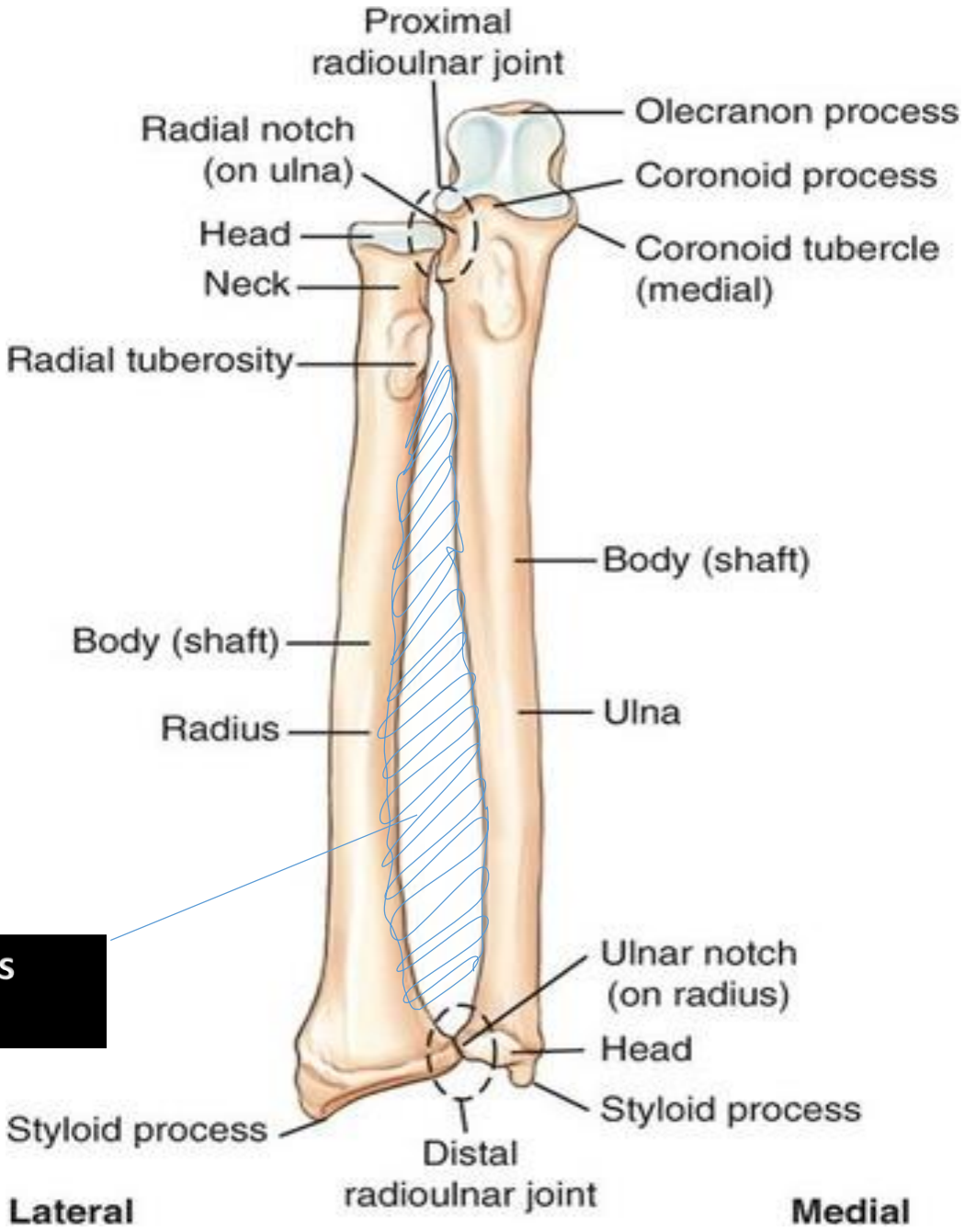
Learning objectives

- ***At end of this session, students should be able to:***
- DESCRIBE
- Attachments, actions & innervations of – groups of muscles of posterior compartment of forearm
- Contents of post compartment of forearm , their anatomical Relations and clinical importance
- Nerve of post compartment and applied anatomy.


Proximal
radioulnar joint
Radial notch
(on ulna)
Olecranon process
Coronoid process
Head
Coronoid tubercle
(medial)
Neck
Radial tuberosity
Body (shaft)
Body (shaft)
Ulna
Radius
Interosseous
mebrane
Ulnar notch
(on radius)
Head
Styloid process
Styloid process
Distal
radioulnar joint
Lateral
Medial

Forearm

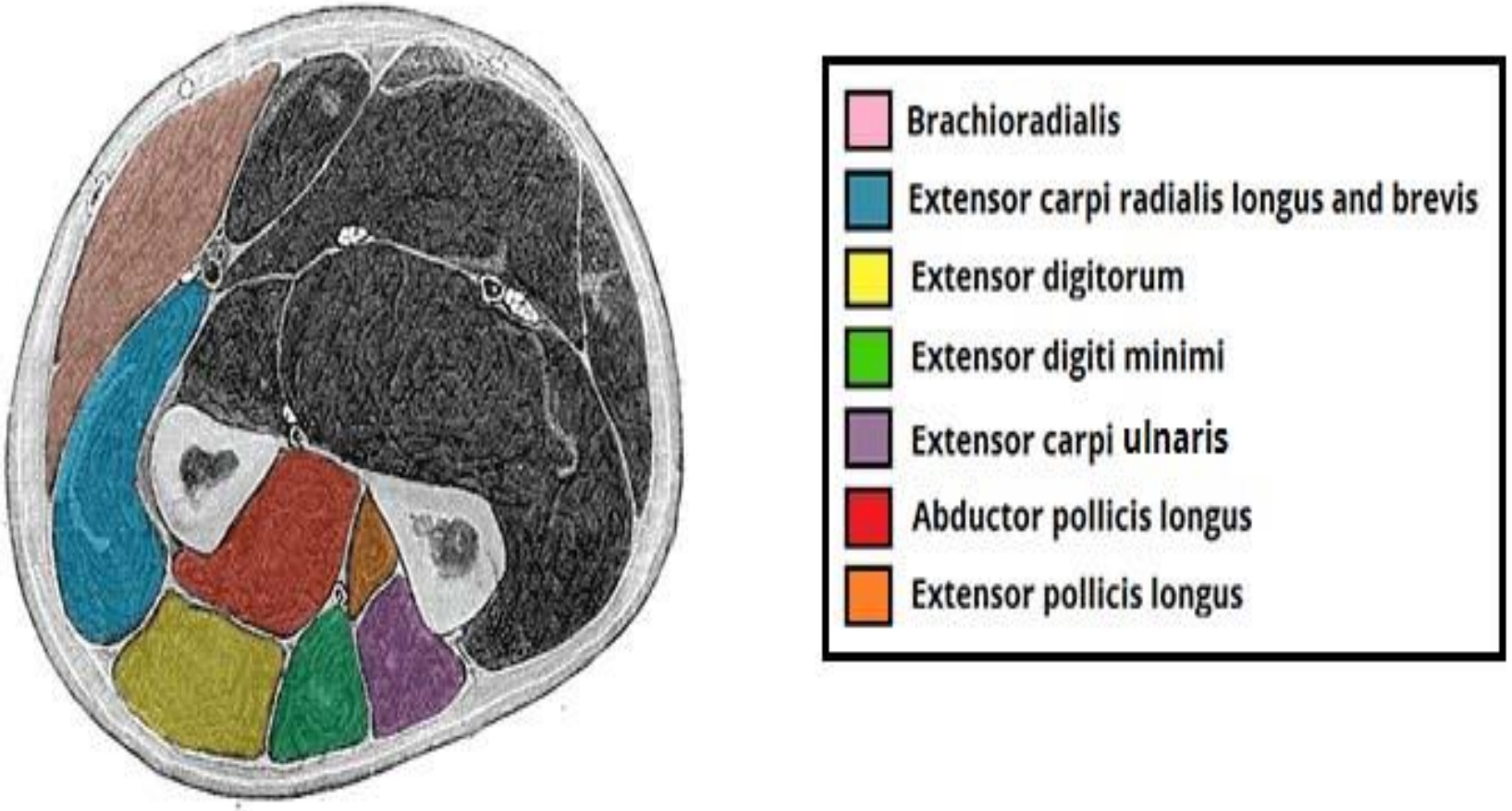
In general, muscles in the anterior compartment of the forearm perform flexion at the wrist and fingers, and pronation of forearm.

- ***anterior compartment***, muscles are split into three categories –
- superficial,
- intemediate &
- deep.

Forearm

- Muscles of the forearm are mainly extrinsic muscles of hand
- are principle flexors and extensors of hand
- as well as pronators and supinators of forearm.
- Forearm is divided into two muscular compartments;
- Anterior or flexor/pronator &
- Posterior or extensor/supinator compartments.

- A crross-section of the forearm to show the muscular compartments



Forearm Extensors - 3 functional groups

Muscles - **extend & abduct /adduct hand** at wrist
extensor carpi radialis longus, extensor carpi radialis brevis & extensor carpi ulnaris

Muscles- **extend medial four digits** – Ext digitorum, ext indices & extensor digiti minimi

Muscles - **extend or abduct thumb**
Abductor pollicis longus / brevis & extensor pollicis longus/brevis

Anconeus Supinator & Brachioradialis

Posterior facial compartment

Superficial group

1. extensor carpi radialis brevis
2. extensor digitorum
3. extensor digiti minimi
4. extensor carpi ulnaris
5. anconeus

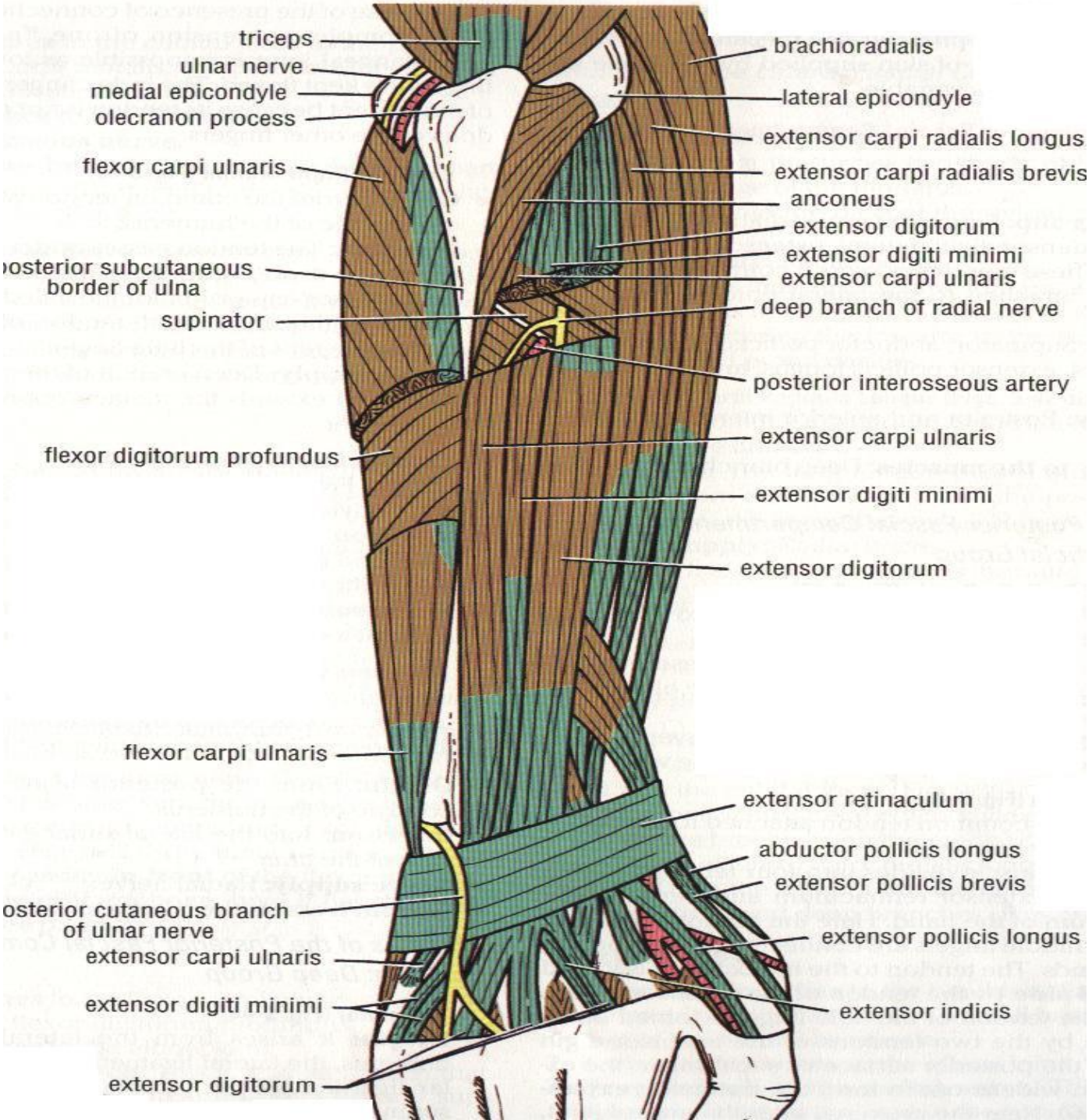
Common Extensor Tendon

Deep group

Supinator,
abductor pollicis longus
extensor pollicis brevis
extensor pollicis longus
extensor indices

Lateral facial compartment

Brachioradialis
Exten. Carpi radialis longus


triceps
ulnar nerve
medial epicondyle
olecranon process
flexor carpi ulnaris
posterior subcutaneous border of ulna
supinator
flexor digitorum profundus
flexor carpi ulnaris
posterior cutaneous branch of ulnar nerve
extensor carpi ulnaris
extensor digiti minimi
extensor digitorum
brachioradialis
lateral epicondyle
extensor carpi radialis longus
extensor carpi radialis brevis
anconeus
extensor digitorum
extensor digiti minimi
extensor carpi ulnaris
deep branch of radial nerve
posterior interosseous artery
extensor carpi ulnaris
extensor digiti minimi
extensor digitorum
extensor retinaculum
abductor pollicis longus
extensor pollicis brevis
extensor pollicis longus
extensor indicis

Posterior Compartment of Forearm

- commonly known as **extensor & supinator group of muscles**.
- general action - is extension at wrist & fingers
- and supination of forearm.
- innervated by **radial nerve**.
- Anatomically, muscles can be divided into two layers;
- **deep** and **superficial**.
- These two layers are separated by a layer of fascia.

Posterior compartment: 3 groups

Superficial group 5

- Extensor carpi radialis brevis
- Extensor digitorum
- Extensor digiti minimi
- Extensor carpi ulnaris
- Anconeus (posterior of lateral epicondyle).

Origin: Common Extensor Origin , front of lateral epicondyle of Humerus.

- Lateral group 2
- Brachioradialis
- Extensor carpi radialis longus - (2 muscles originate from *lateral supracondylar ridge).*

Deep group 5 (3 to thumb+ 1 to index + supinator).

- Supinator.
- Abductor pollicis longus.
- Extensor pollicis brevis.
- Extensor pollicis longus.
- Extensor indices.

- **Superficial**

  The superficial muscles in the anterior compartment are the flexor carpi ulnaris, palmaris longus, flexor carpi radialis and pronator teres. They all originate from a common tendon called the ***common flexor origin***. This arises from the medial epicondyle of the humerus.

- **Intermediate**

  The flexor digitorum superficialis is the only muscle of the intermediate compartment. It can sometimes be classed as a superficial muscle, but in most cadavers it lies between the deep and superficial muscle layers.

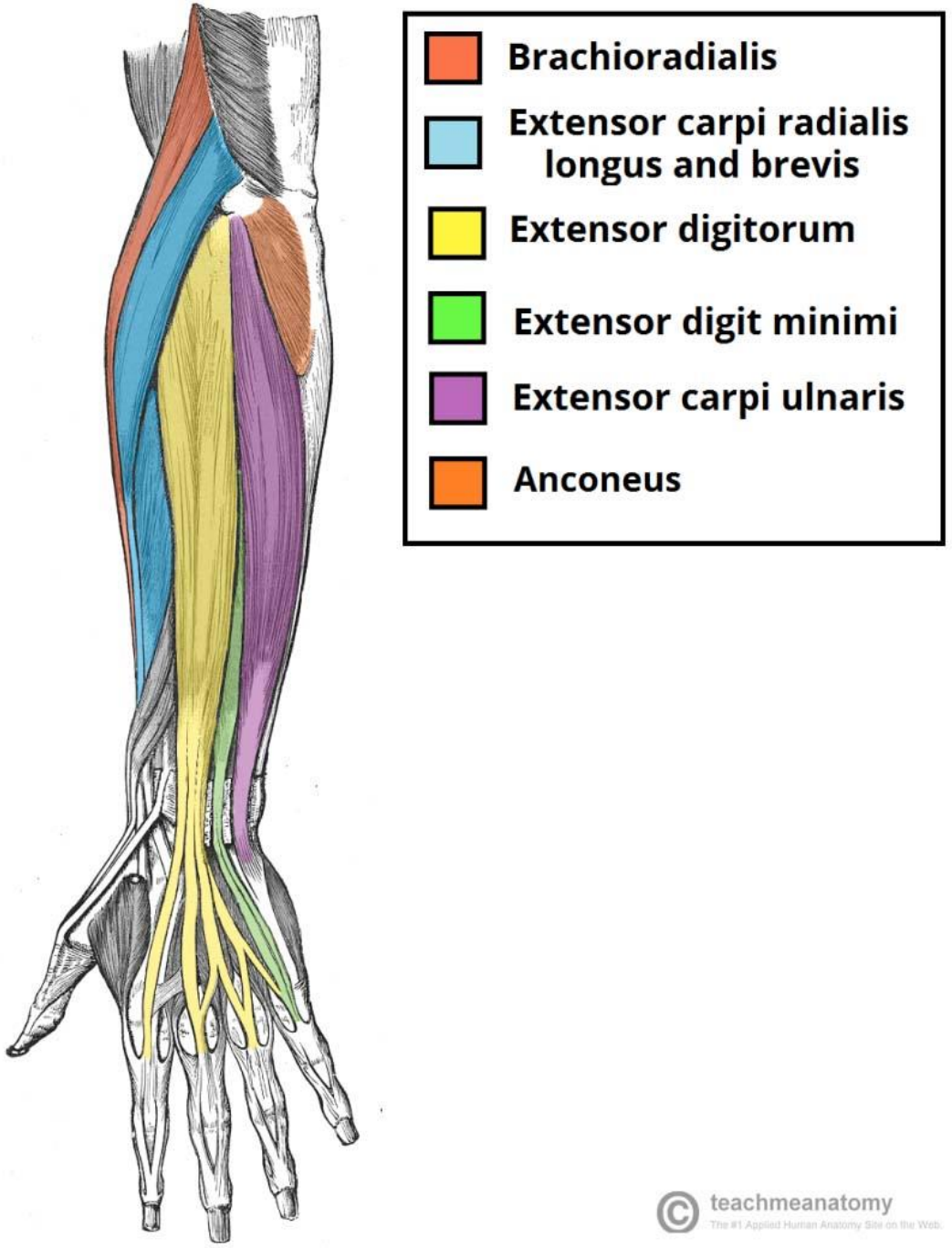
- **Deep**

  There are three muscles in the deep anterior forearm; flexor digitorum profundus, flexor pollicis longus, and pronator quadratus.

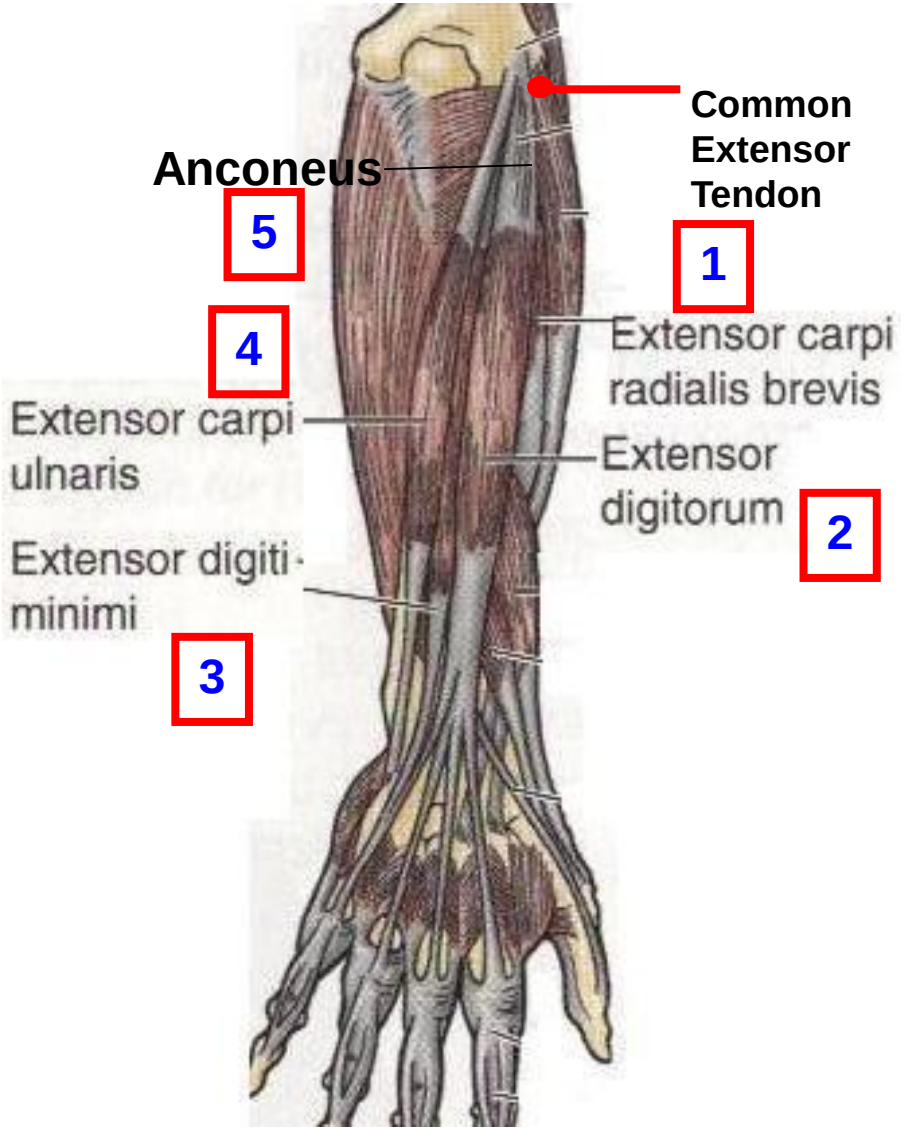
Superficial layer:

- contains seven muscles.
- Four of these muscles –
- extensor carpi radialis brevis ECRB,
- extensor digitorum ED,
- extensor carpi ulnaris ECU
- extensor digiti minimi EDM
- common tendinous origin fromlateral epicondyle. ***common extensor origin***

- **Muscles of the Posterior/extenso Compartment of the forearm**



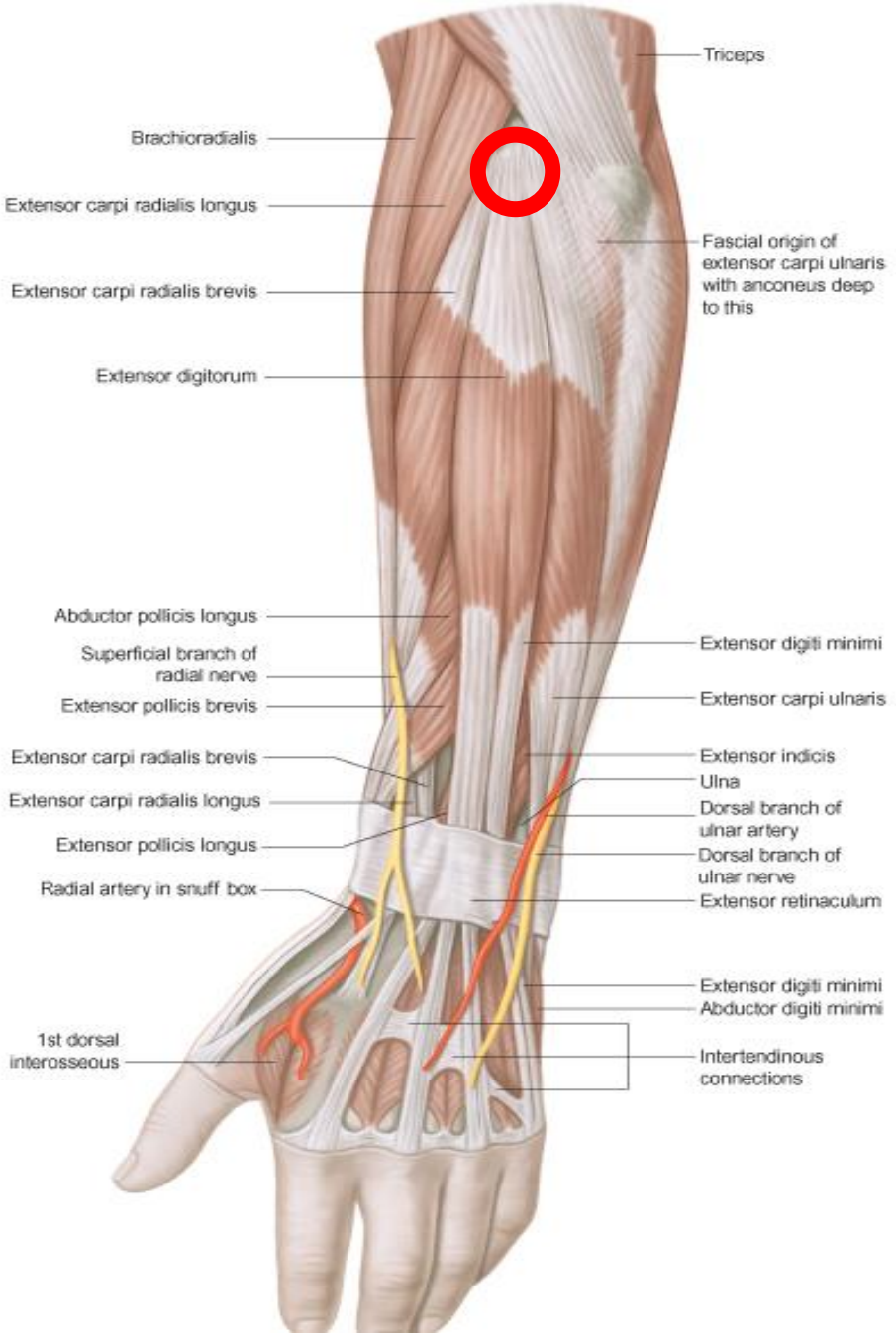
Superficial group



Superficial : 7 muscles

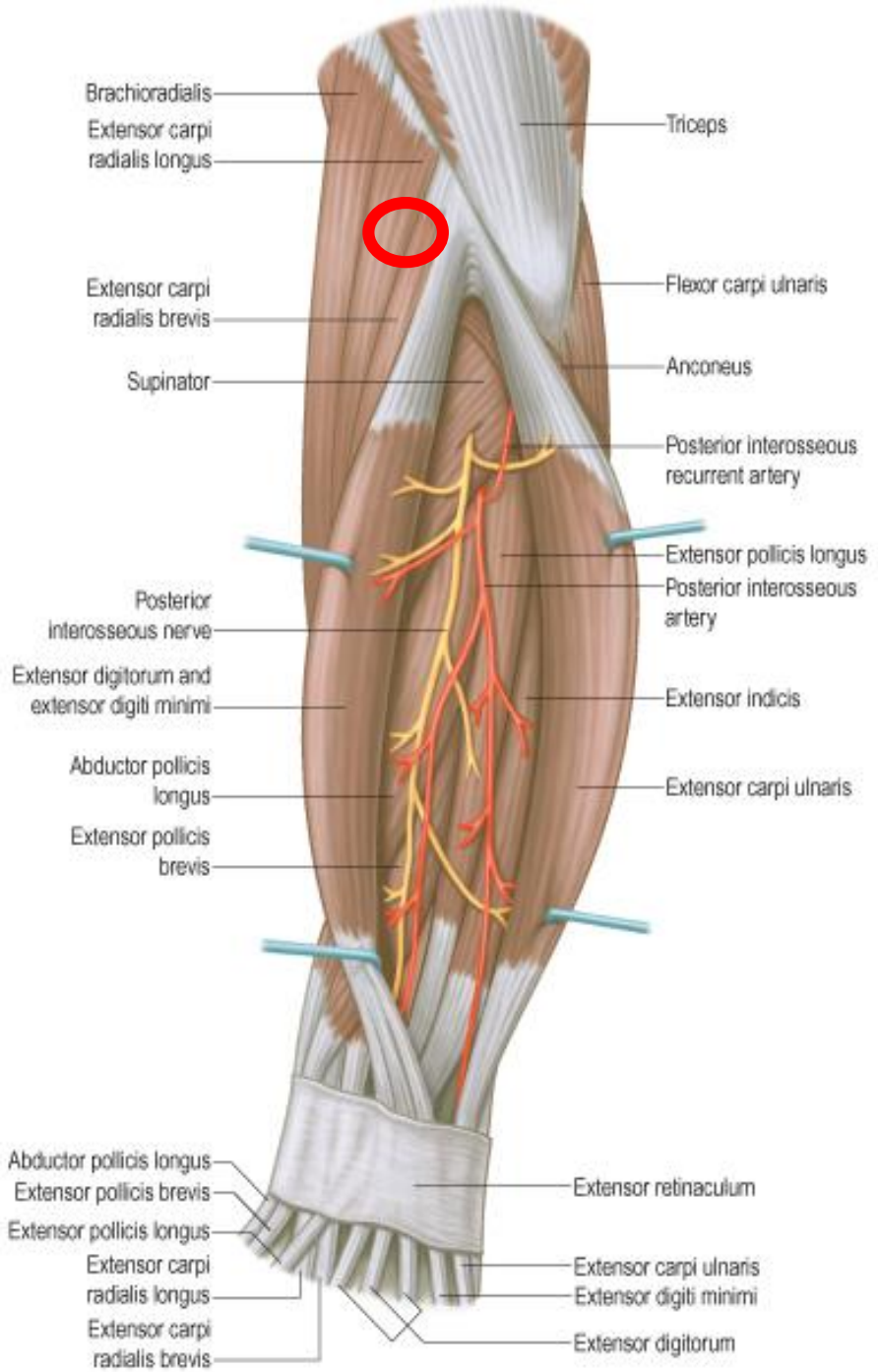
lateral to medial -

- Brachioradialis.
- Extensor carpi radialis longus, (ECRL).
- Extensor carpi radialis brevis, (ECRB).
- Extensor digitorum.
- Extensor digiti minimi .
- Extensor carpi ulnaris.
- Anconeus (An).

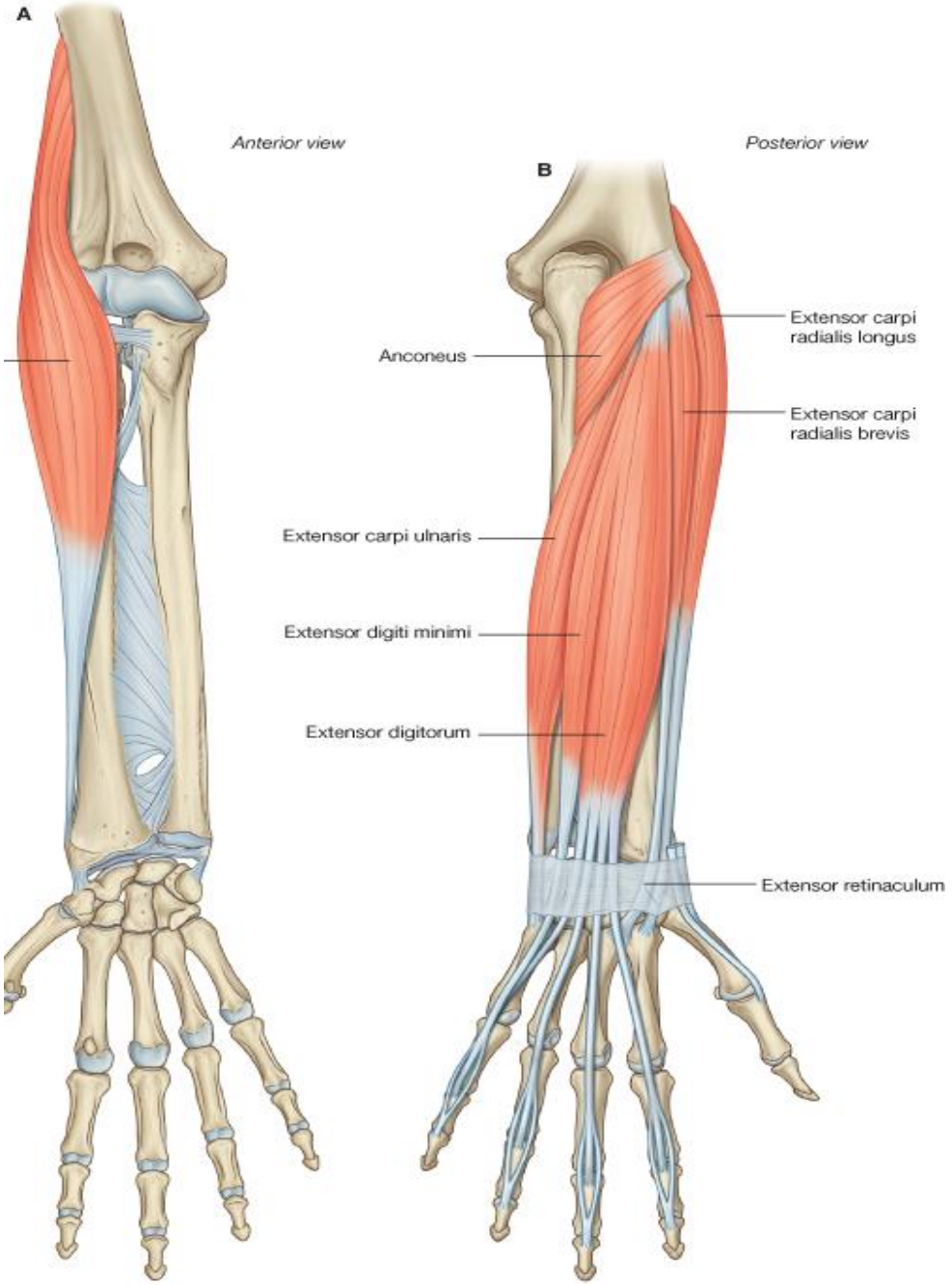


Superficial extensor

- Arises - common extensor origin, front of lateral epicondyle of humerus, **Except, 2** (BR & ECRL).
- All cross wrist **Except, 1** brachioradialis.
- **All supplied - deep branch of radial nerve, Except ABE**
- **Anconeus**
- **Brachioradialis**
- **Extensor carpi radialis longus**
- **These 3 by radial nerve .**



- **Brachioradialis**
- **Origin:**
- Lateral supracondylar ridge of humerus
- **Insertion:**
- Base of styloid process of radius
- **Action:**
- Flexes forearm; (elbow).
- Rotates forearm to midprone position



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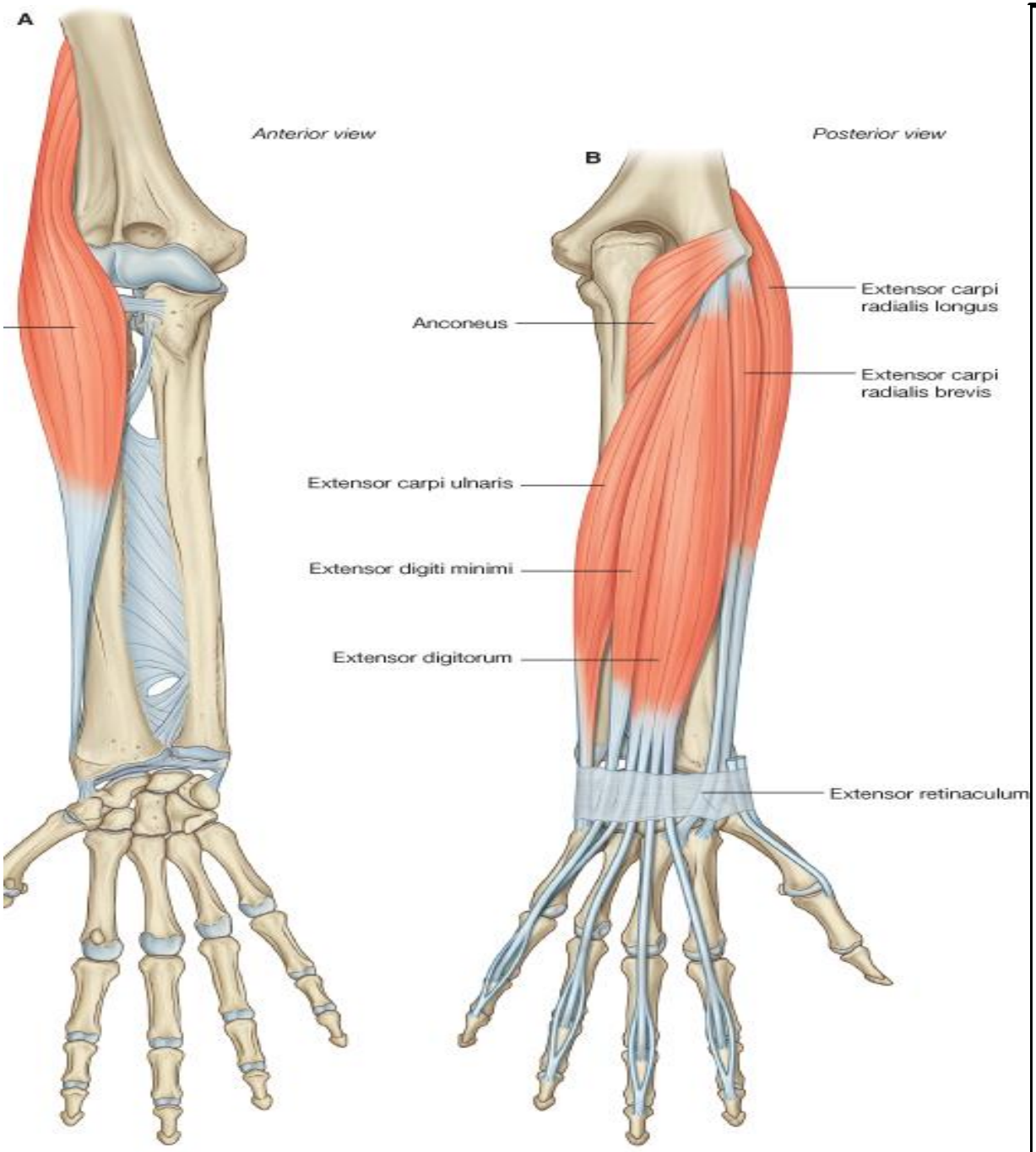

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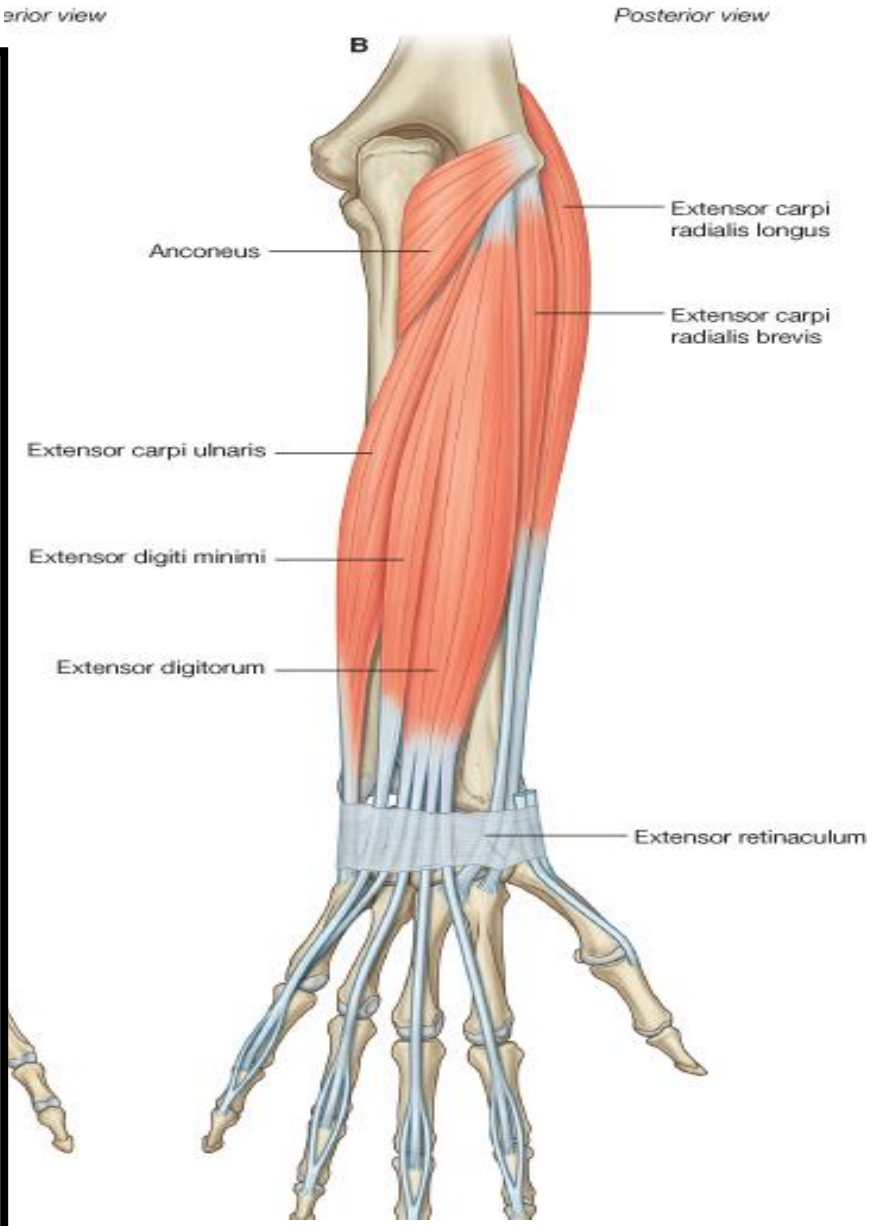
- **Extensor Carpi radialis longus**
- **Origin:** Lateral supracondylar ridge of humerus
- **Insertion:**
- Posterior surface of base of second metacarpal bone
- **Action:**
- Extends and abducts hand at wrist joint

Extensor carpi radialis brevis: base of 3rd metacarpal bone.

Extensor digitorum: Extensor expansion of medial 4 fingers.

Extensor digiti minimi: Extensor expansion of little finger.

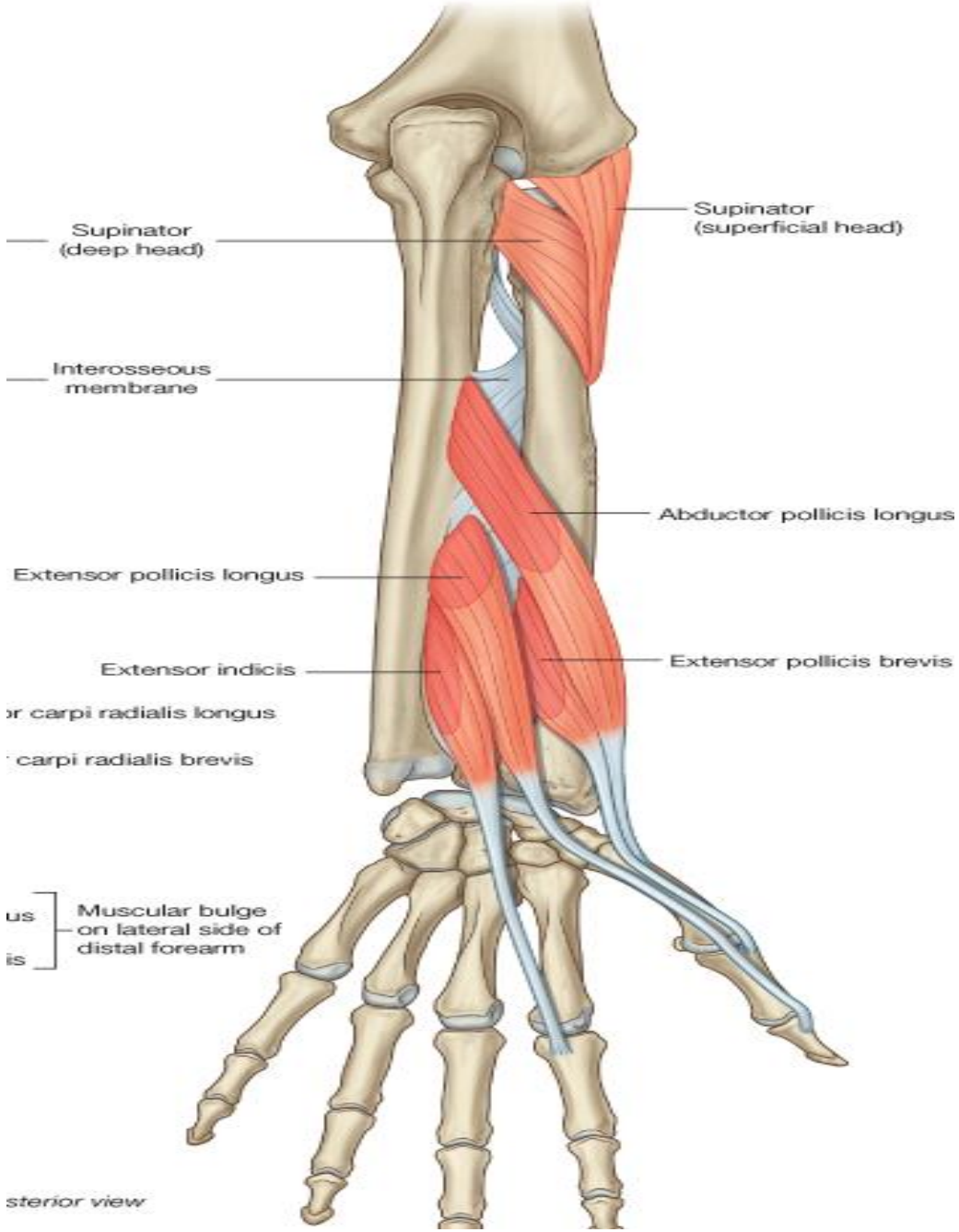
Extensor carpi ulnaris: Base of 5th metacarpal bone.



- Brachioradialis is a paradoxical muscle.
- Origin and innervation are characteristic of a extensor muscle,
- But it is actually a flexor at elbow.
- Muscle is most visible when forearm is half pronated, and flexing at the elbow against resistance.

Deep Muscles – five muscles

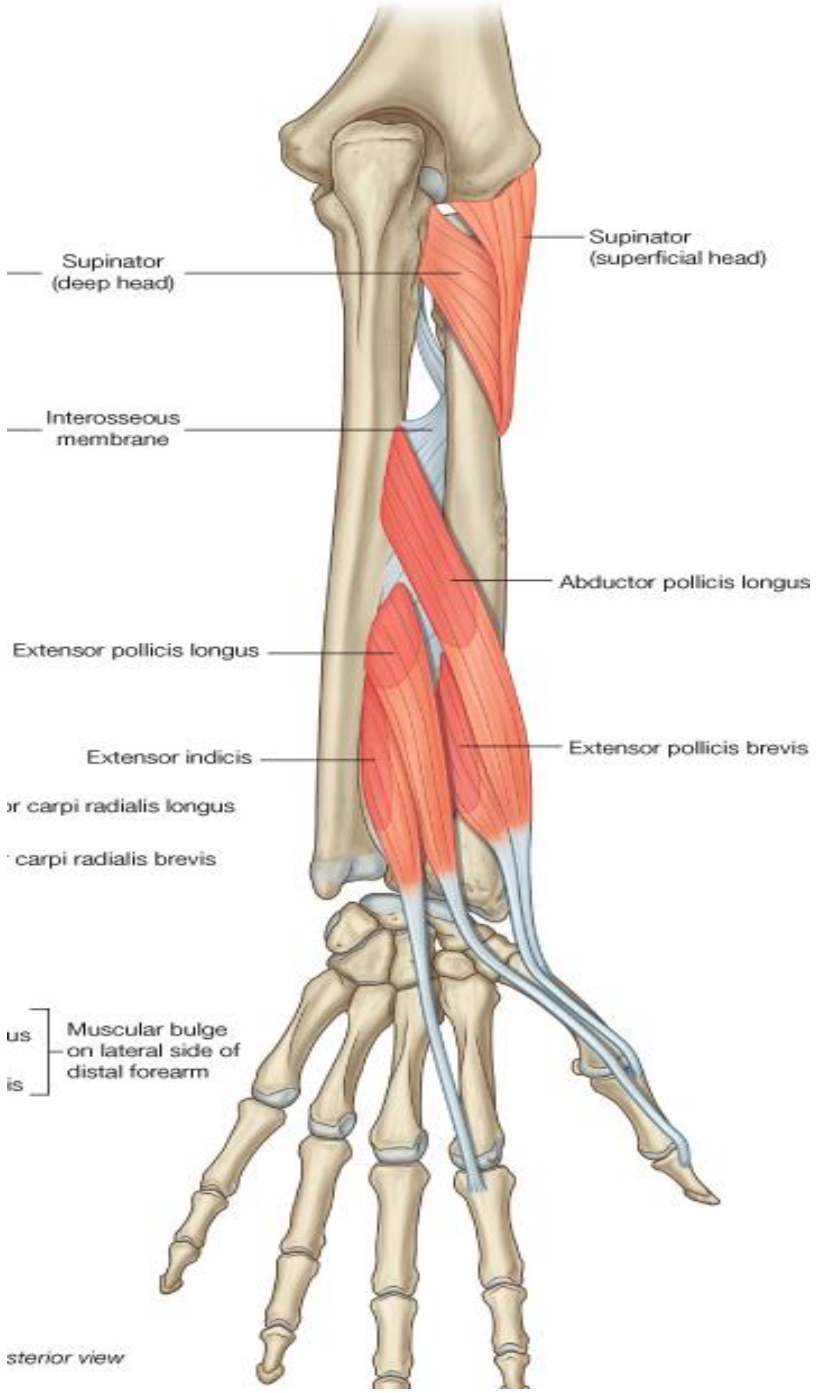
- supinator,
- abductor pollicis longus,
- extensor pollicis brevis,
- extensor pollicis longus
- extensor indicis.
- all these muscles act on thumb and the index finger.
- exception of supinator.


Supinator
(deep head)
Supinator
(superficial head)
Interosseous
membrane
Abductor pollicis longus
Extensor pollicis longus
Extensor indicis
Extensor pollicis brevis
r carpi radialis longus
carpi radialis brevis
us
is
Muscular bulge
on lateral side of
distal forearm
sterior view

II- Deep group: 5 muscles

- Abductor pollicis longus, (APL).
- Extensor pollicis brevis, (EPB).
- Extensor pollicis longus, (EPL).
- Extensor indicis (EI).
- Supinator.

All back muscles of forearm are supplied by posterior interosseous nerve except , ABE by Radial nerve.

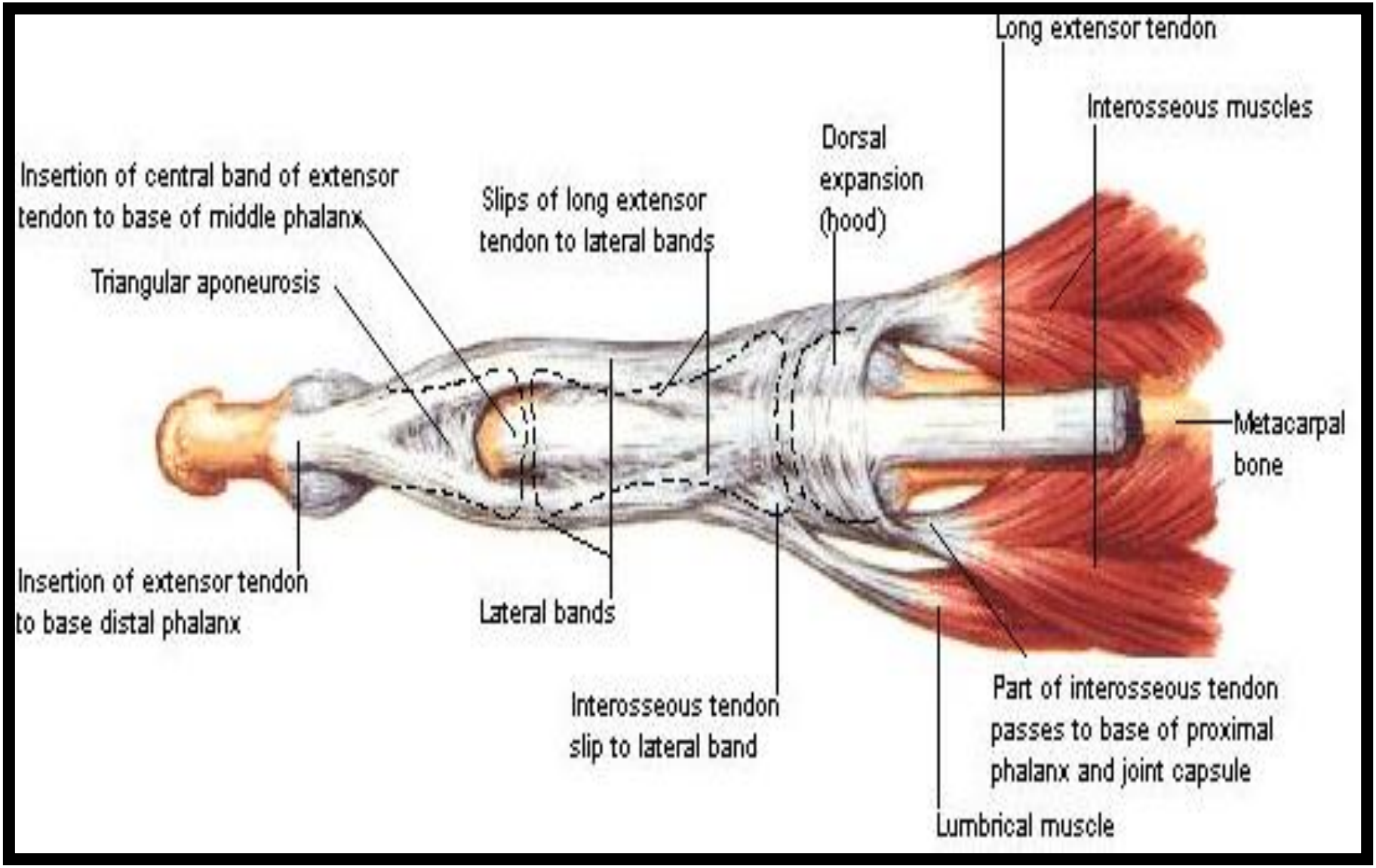


Dorsal Extensor Expansion

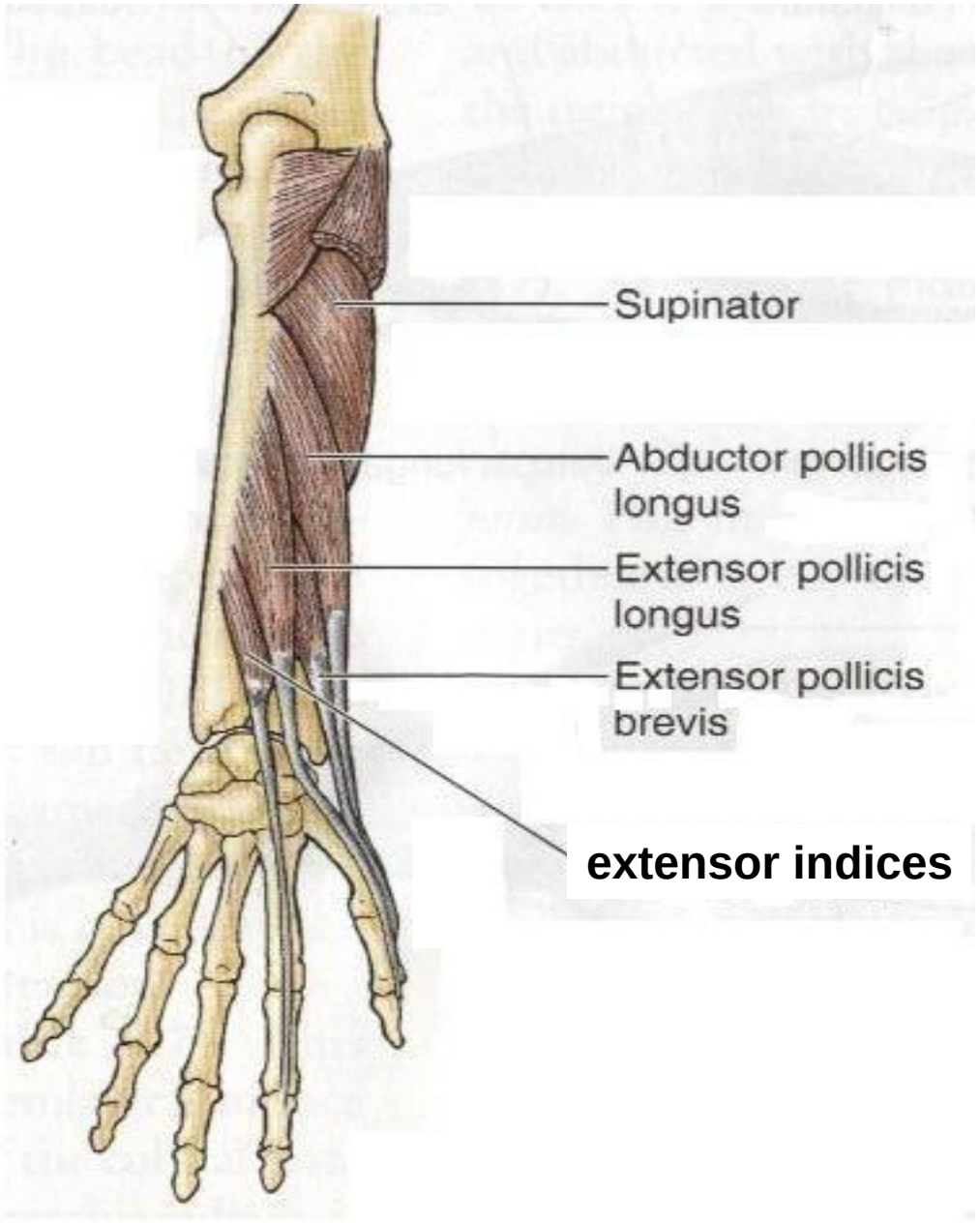
It is formed by union of tendons :
Extensor digitorum, Extensor indicis, Extensor digiti minimi, palmar, dorsal interossei & lumbricals muscles.

- All these tendons unite to form one tendon which divides into 3 slips,
- median one attached to middle phalanges &
- 2 lateral attached to terminal phalanges.

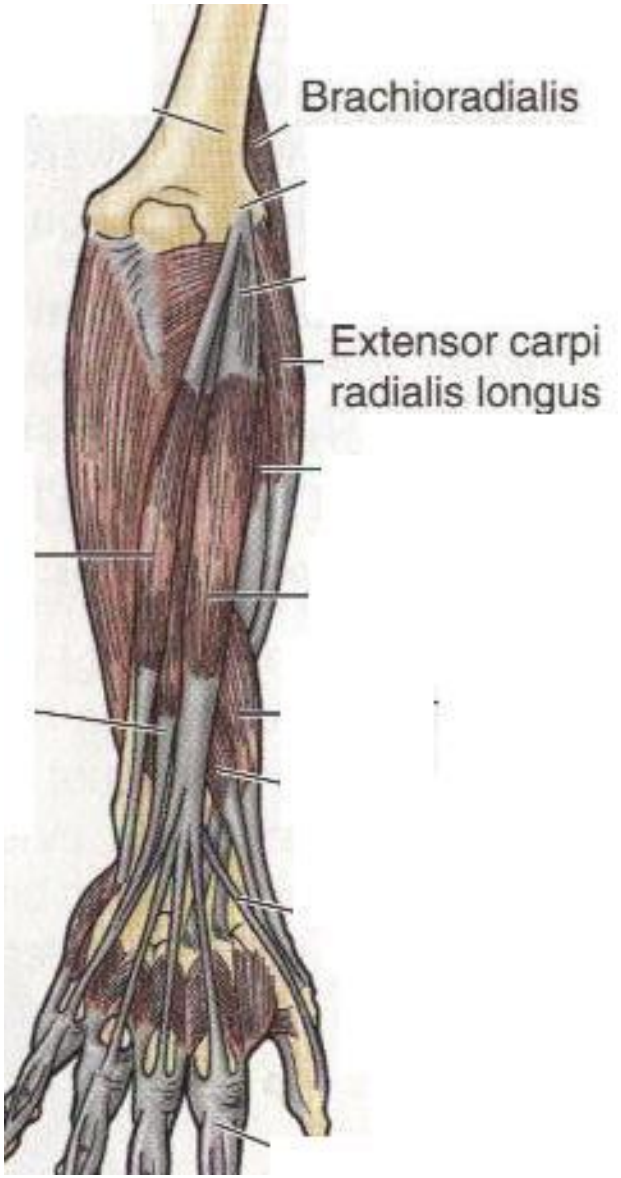
Dorsal Extensor Expansion



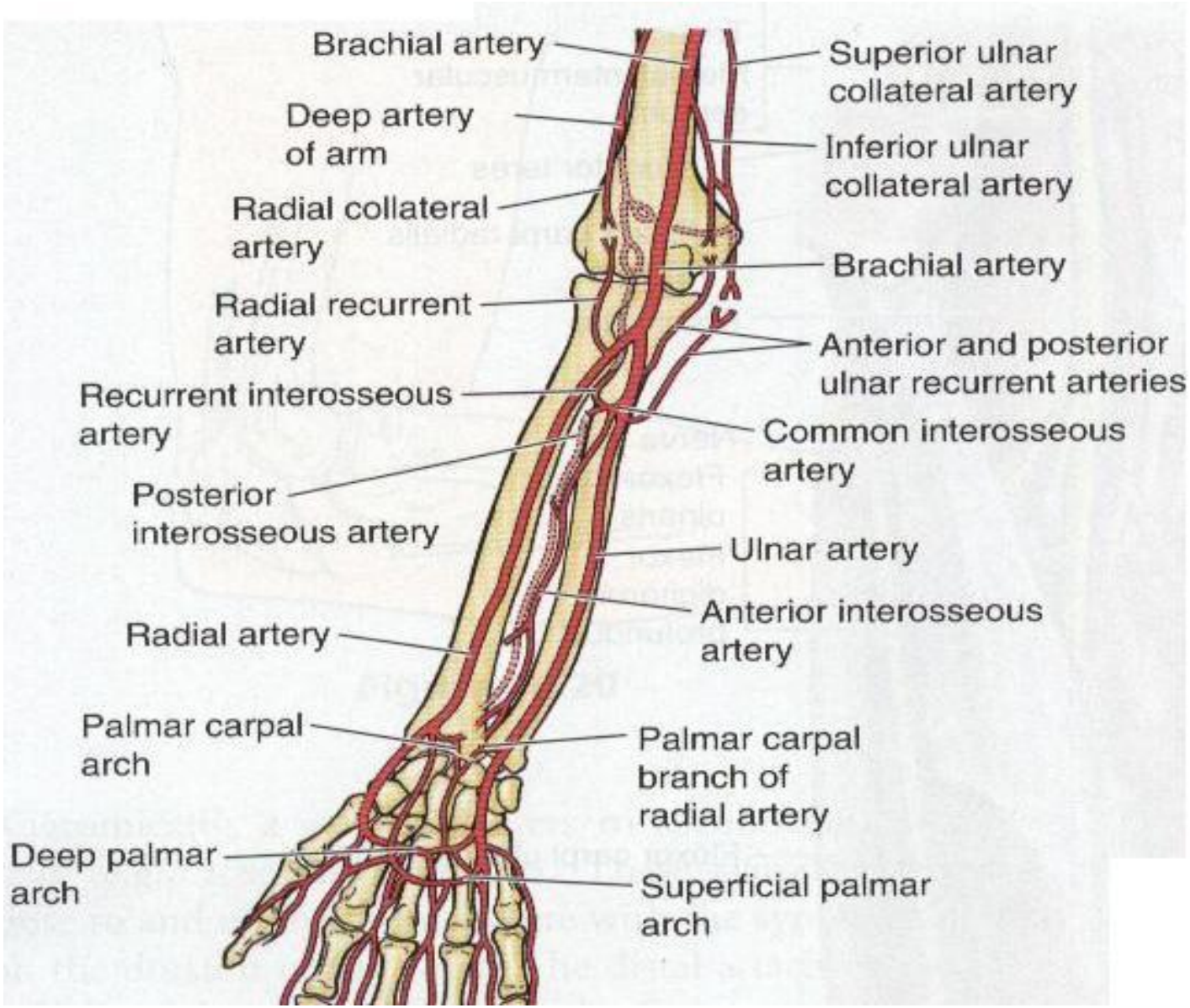
Deep group


Supinator
Abductor pollicis longus
Extensor pollicis longus
Extensor pollicis brevis
extensor indices

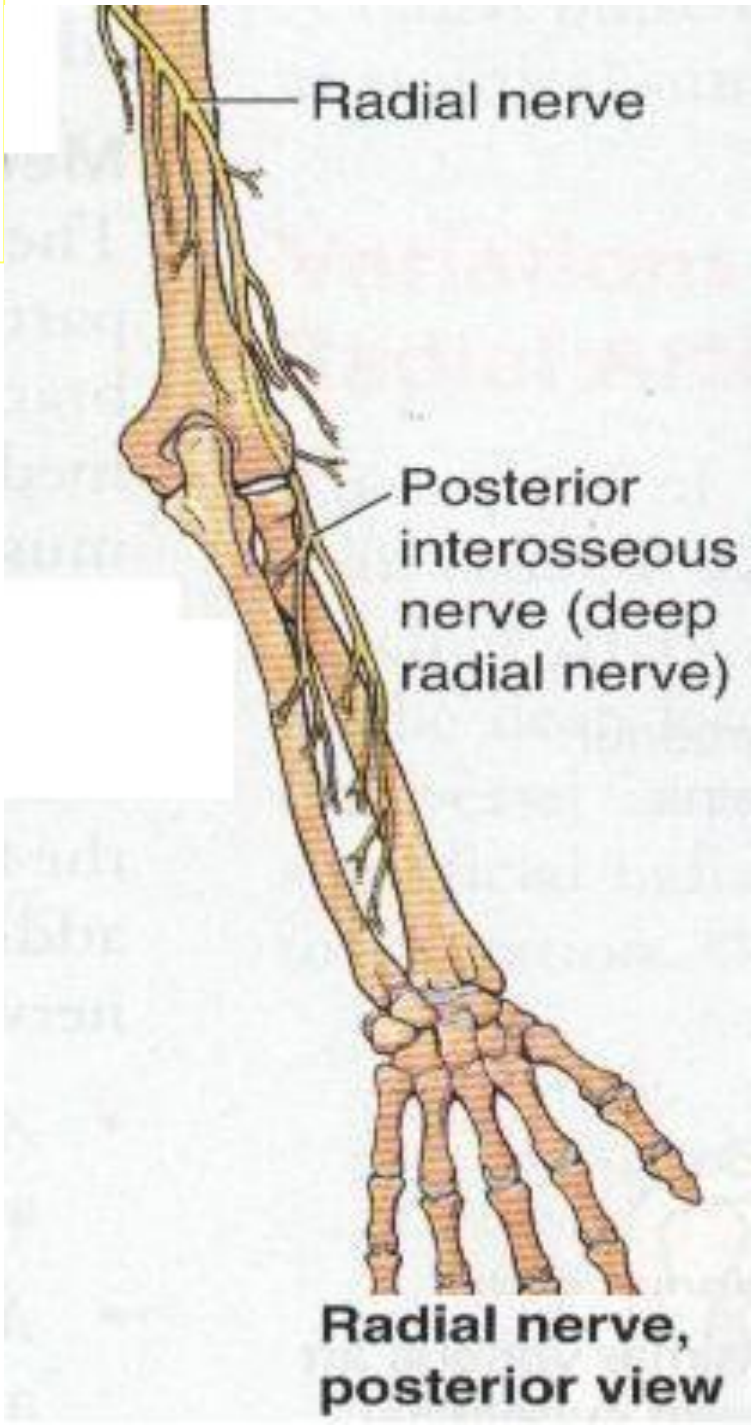
Lateral Compartment



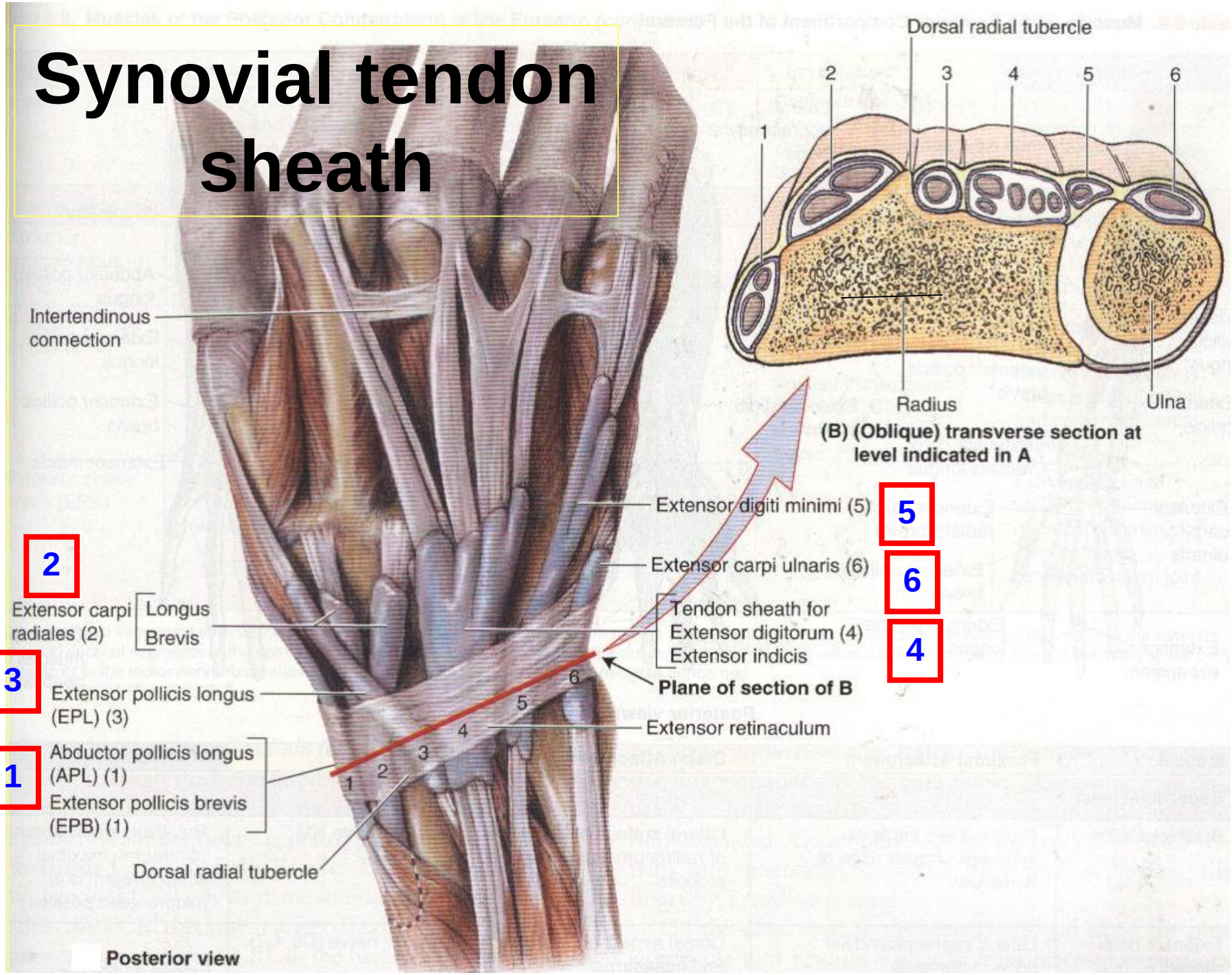
Arteries of Posterior Compartment



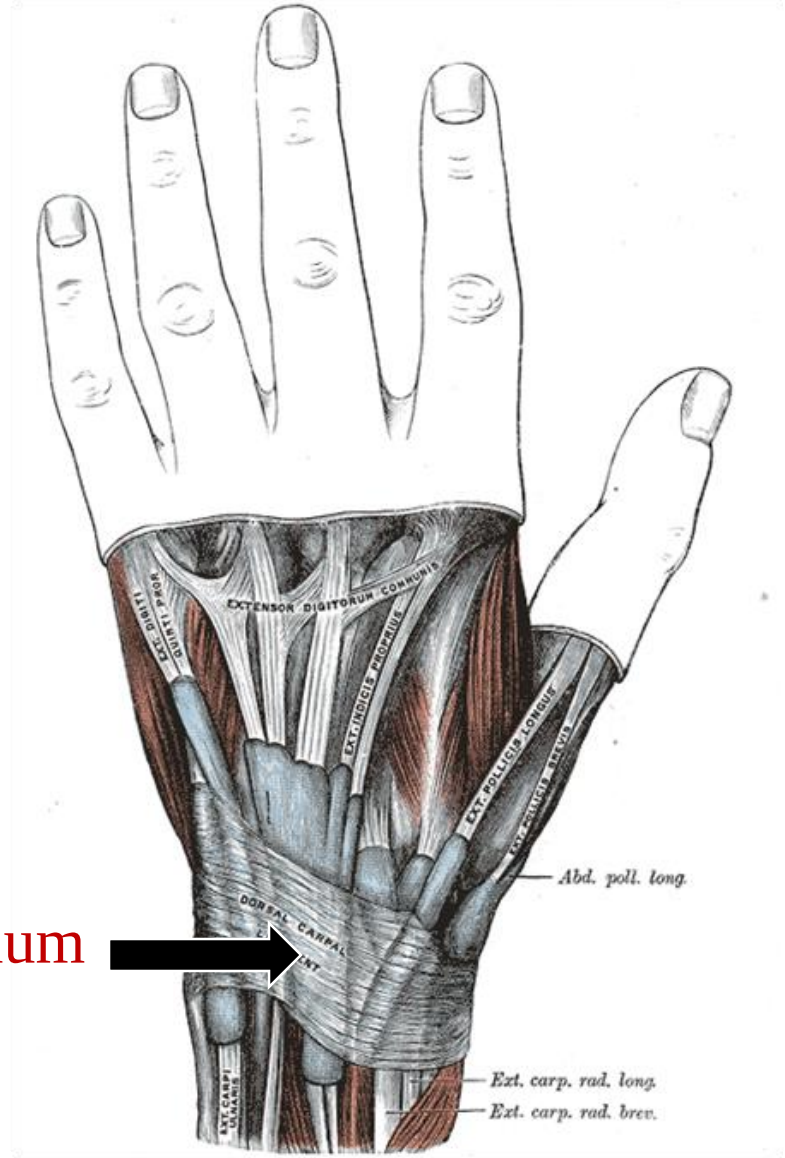
Nerves of Posterior Compartment



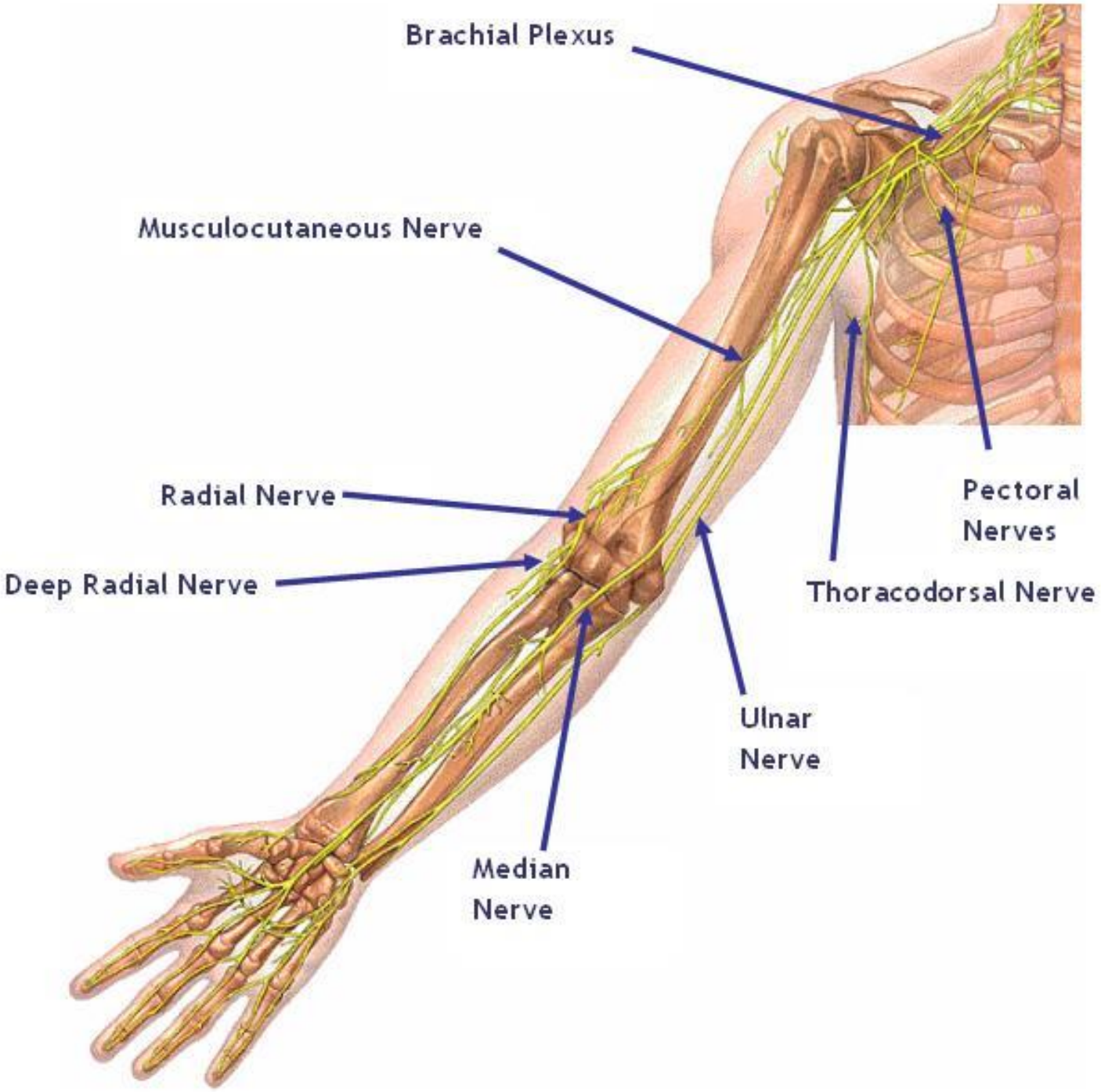
Synovial tendon sheath



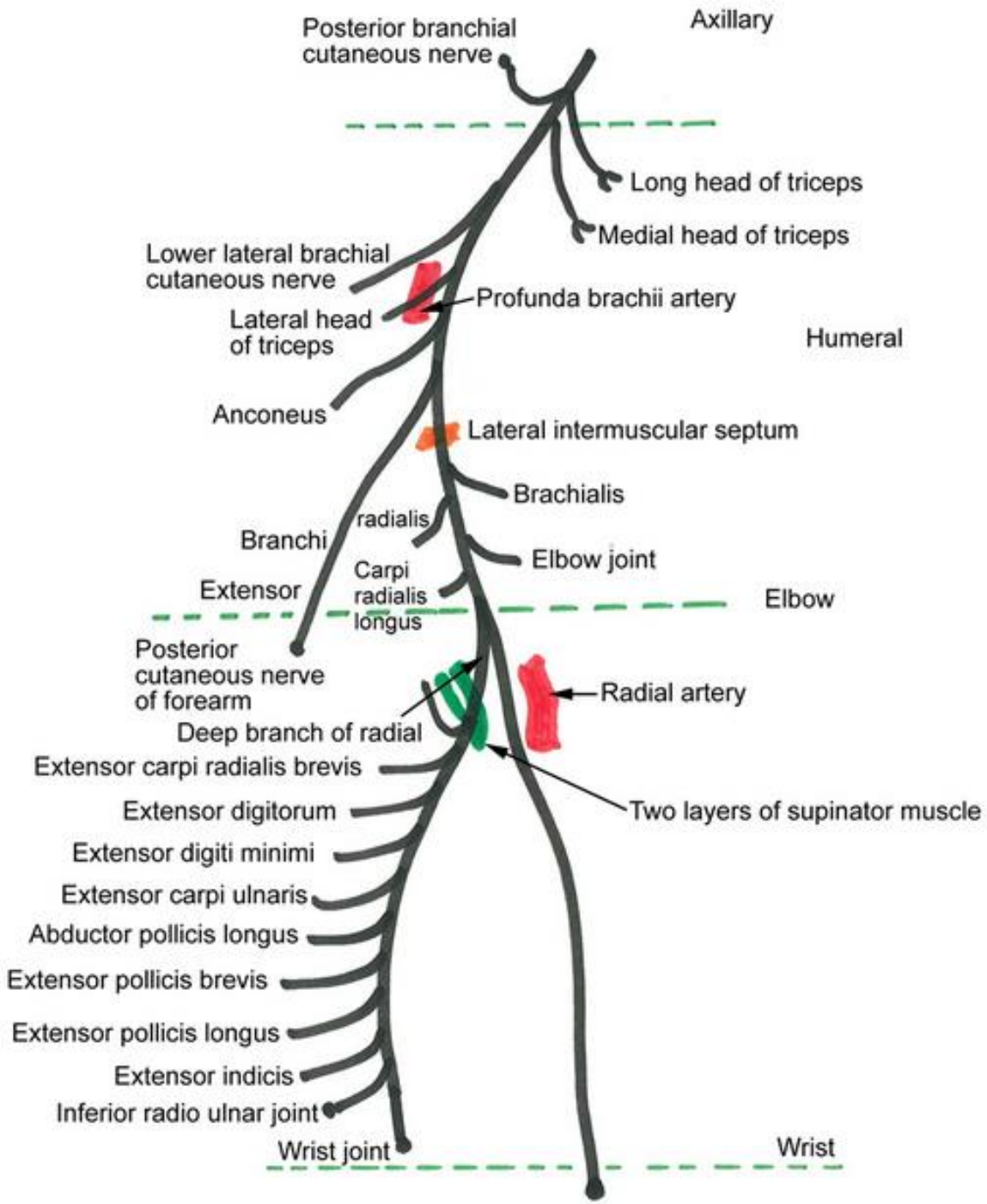
Extensor retinaculum



Extensor retinaculum


Brachial Plexus
Musculocutaneous Nerve
Radial Nerve
Deep Radial Nerve
Median Nerve
Ulnar Nerve
Thoracodorsal Nerve
Pectoral Nerves

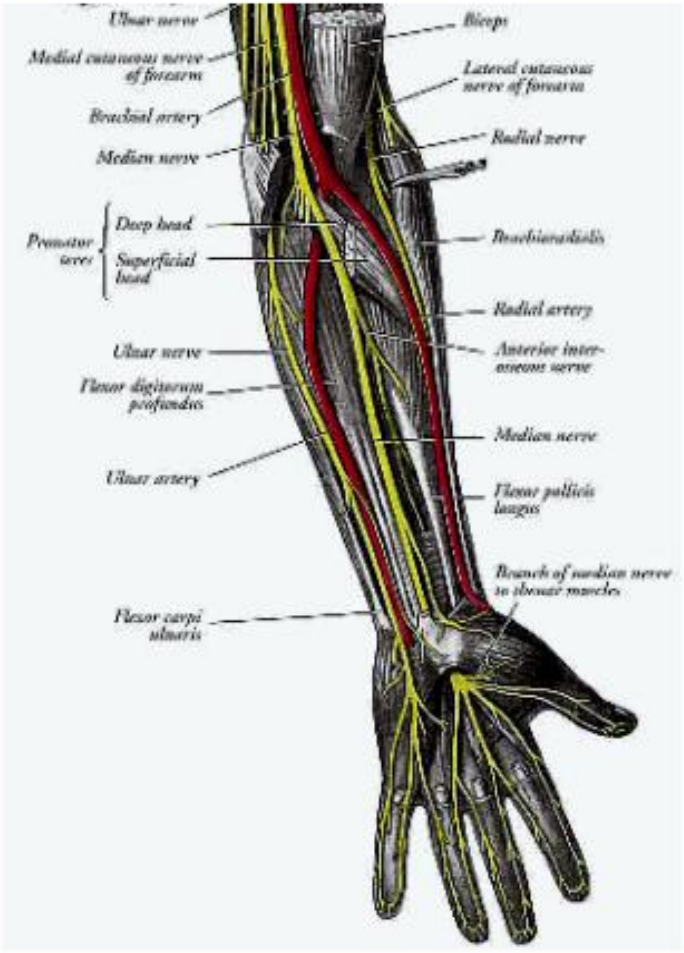
RADIAL NERVE PALSY


Posterior branchial cutaneous nerve
Axillary
Long head of triceps
Medial head of triceps
Lower lateral brachial cutaneous nerve
Profunda brachii artery
Lateral head of triceps
Humeral
Anconeus
Lateral intermuscular septum
Brachialis
Branchi
radialis
Elbow joint
Carpi radialis longus
Extensor
Elbow
Posterior cutaneous nerve of forearm
Radial artery
Deep branch of radial
Extensor carpi radialis brevis
Two layers of supinator muscle
Extensor digitorum
Extensor digiti minimi
Extensor carpi ulnaris
Abductor pollicis longus
Extensor pollicis brevis
Extensor pollicis longus
Extensor indicis
Inferior radio ulnar joint
Wrist joint
Wrist

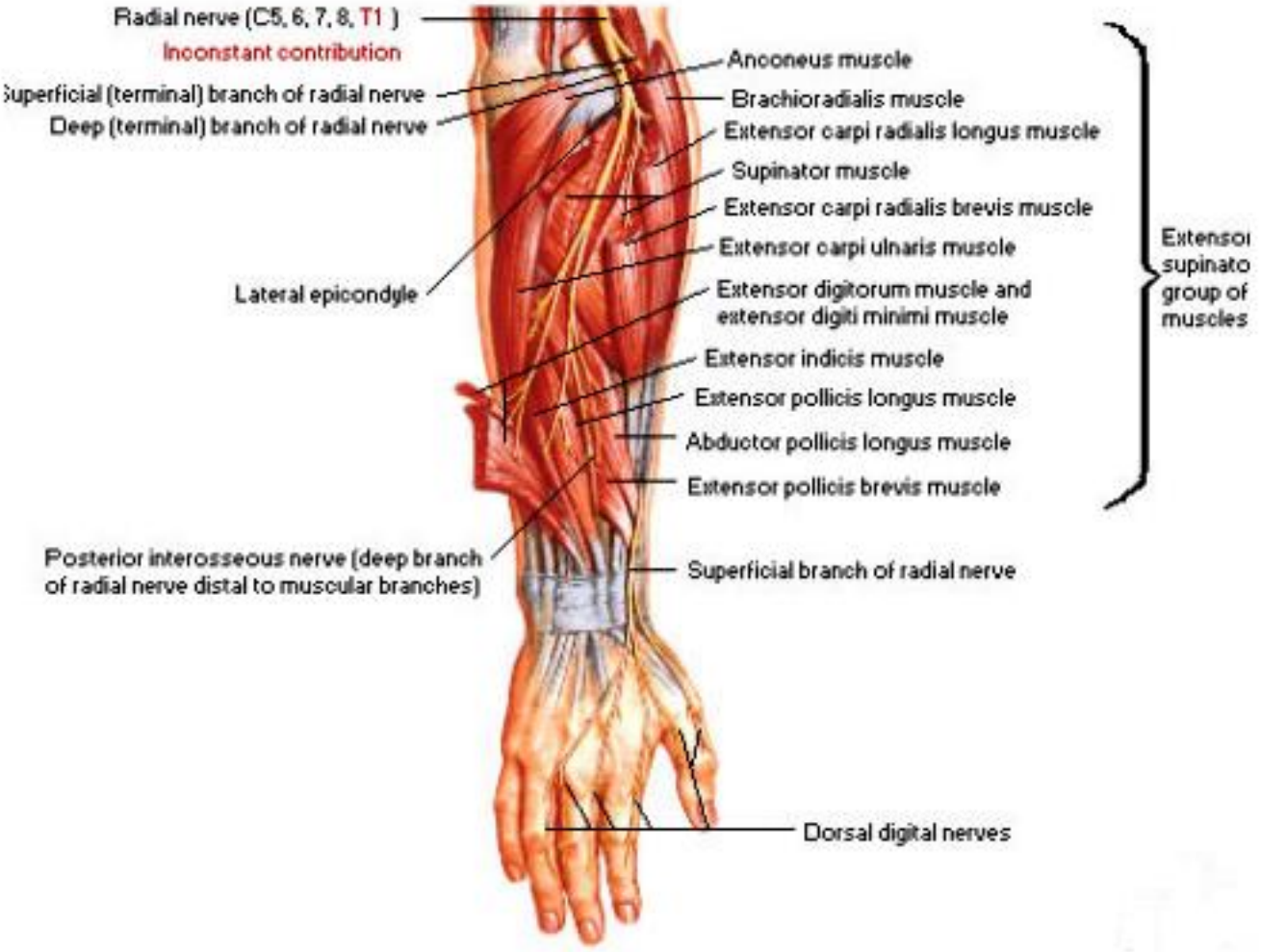
- In the anterior compartment nerve lies between brachialis (medially) and brachioradialis and extensor carpi radialis (laterally)
- Here it is accompanied by radial collateral artery

Superficial terminal branch

- In the forearm the superficial branch descend between brachioradialis anteriorly and supinator posteriorly lying lateral to radial artery
- In the middle third it lies posterior to brachioradialis, lying successively on pronator teres, FDS (radial head) and FPL and lateral to radial artery

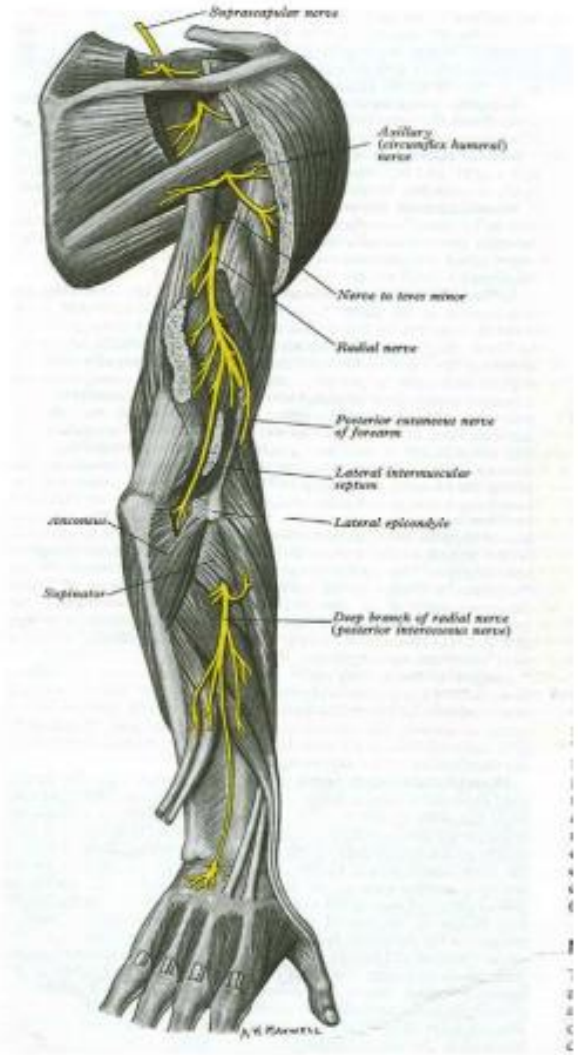


- About 7 cm proximal to the wrist nerve leaves the artery
- passes deep to the tendon of brachioradialis
- Curves around the lateral side of radius
- Pierces the deep fascia
- Divides into 4 or 5 digital nerves on the dorsum of hand. it communicates with posterior & lateral cutaneous nerves of forearm
- Supplies radial half of the dorsum of the hand, proximal part of the dorsal surface of thumb, index finger & the lateral half of the middle finger



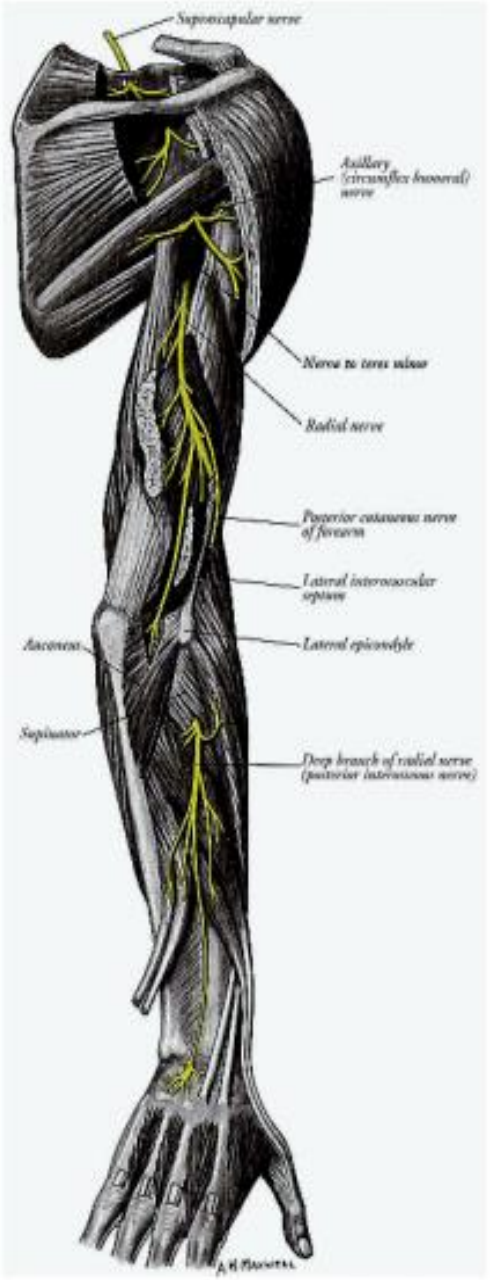
Deep branch of radial nerve

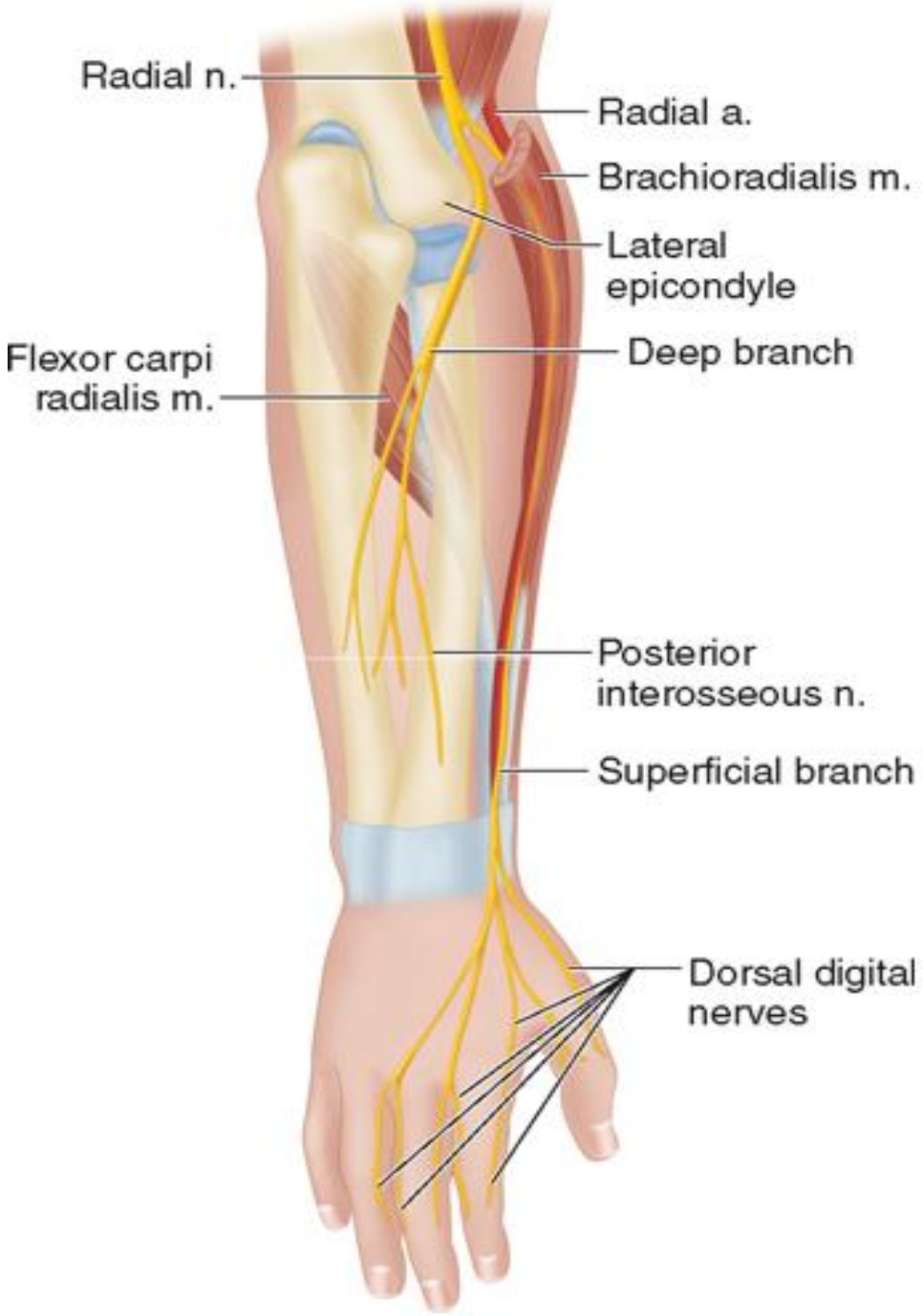
- Deep terminal branch reaches the back of forearm by passing between two heads of supinator
- before piercing supplies ECRB and supinator



Posterior interosseous nerve of forearm

- it is deep branch of radial nerve in forearm
- Reaches the back of forearm by passing between the two heads of supinator
- Descends between the superficial &and deep group of extensor muscles lying on the interosseous membrane




Radial n.
Radial a.
Brachioradialis m.
Lateral epicondyle
Flexor carpi radialis m.
Deep branch
Posterior interosseous n.
Superficial branch
Dorsal digital nerves

- The upper part of nerve is accompanied by posterior interosseous artery but the lower part is accompanied by anterior interosseous artery
- Terminates in to a pseudoganglion and ends by supplying the wrist and carpal joint
- ***Branches*** :
- Muscular –supinator

  ED,EDM &ECU

  -Divides into lateral & medial branch

- lateral branch supplies APL &EPB
- Medial branch supplies EPL& EI
- Articular branch: to wrist joint, distal radioulnar joint, some intercarpal & intermetacarpal joint
- Sensory branches :to interosseous membrane, radius & ulna

Lesion of posterior interosseous nerve

- Lesion produces wrist drop
- Produced due to paralysis of extensors & unopposed action of flexors
- Supination though not lost, is weak since it can be produced by biceps

Posterior interosseous nerve syndrome
weakness or paralysis of the wrist and digital extensors. Pain may be present, but it usually is not a primary symptom. Attempts at active wrist extension often result in weak dorsoradial deviation as a consequence of preservation of the radial wrist extensors but involvement of the extensor carpi ulnaris and extensor digitorum communis.
These patients do not have a sensory deficit.
Rarely, compression of the posterior interosseous nerve may occur after bifurcation into medial and lateral branches.

- **Clinical correlates**

1. Brachial Pulse and Blood Pressure: The brachial pulse palpation and measuring **blood pressure** can be done immediately medial to the **biceps tendon** in the cubital fossa. The stethoscope must be placed there, to hear the korotkoff sounds.

2. Venipuncture

The median cubital vein is located superficially within the roof of the cubital fossa. It connects the **basilic** and **cephalic** veins, and can be accessed easily – this makes it a common site for venipuncture.

Thank you