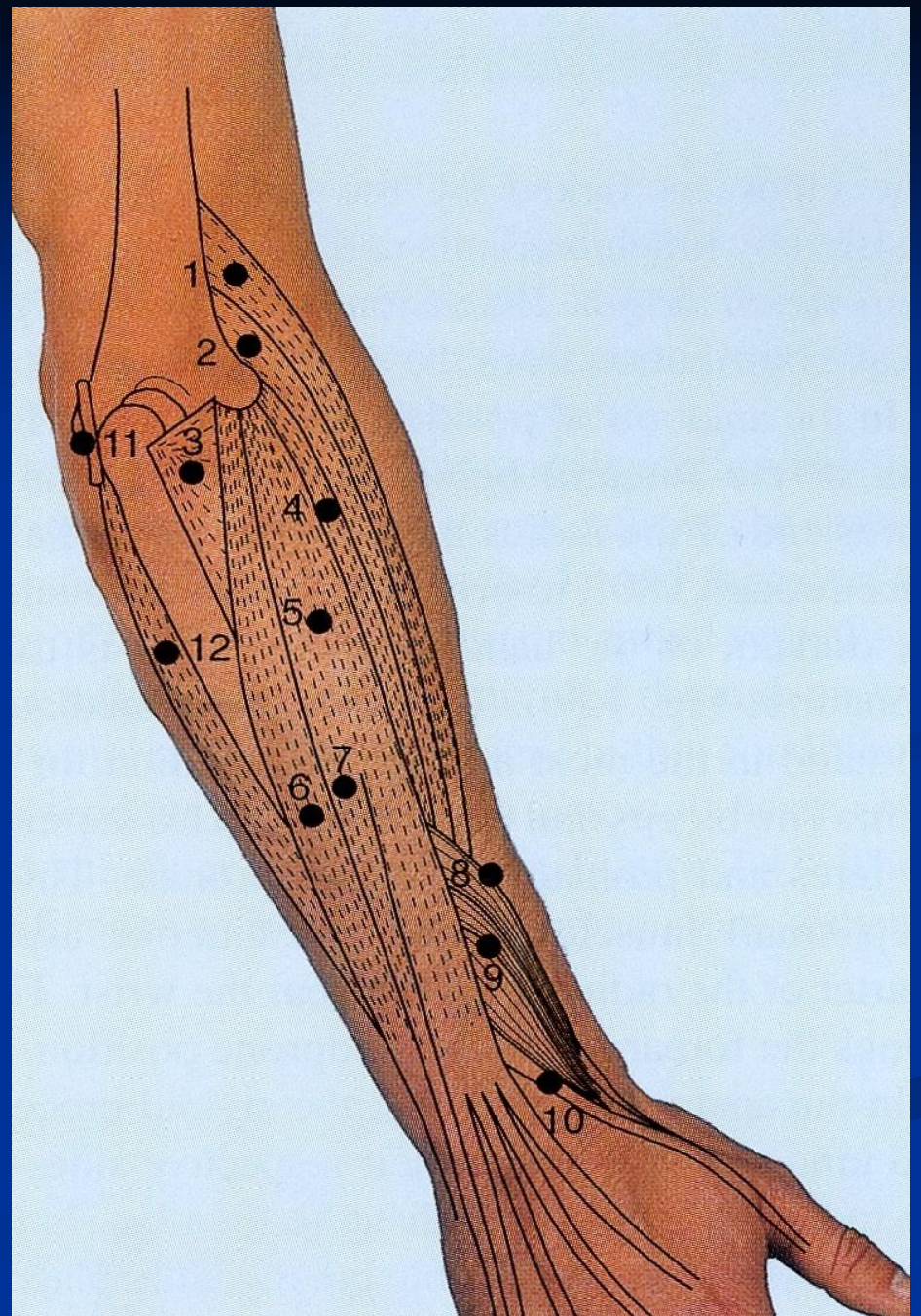


# FOREARM

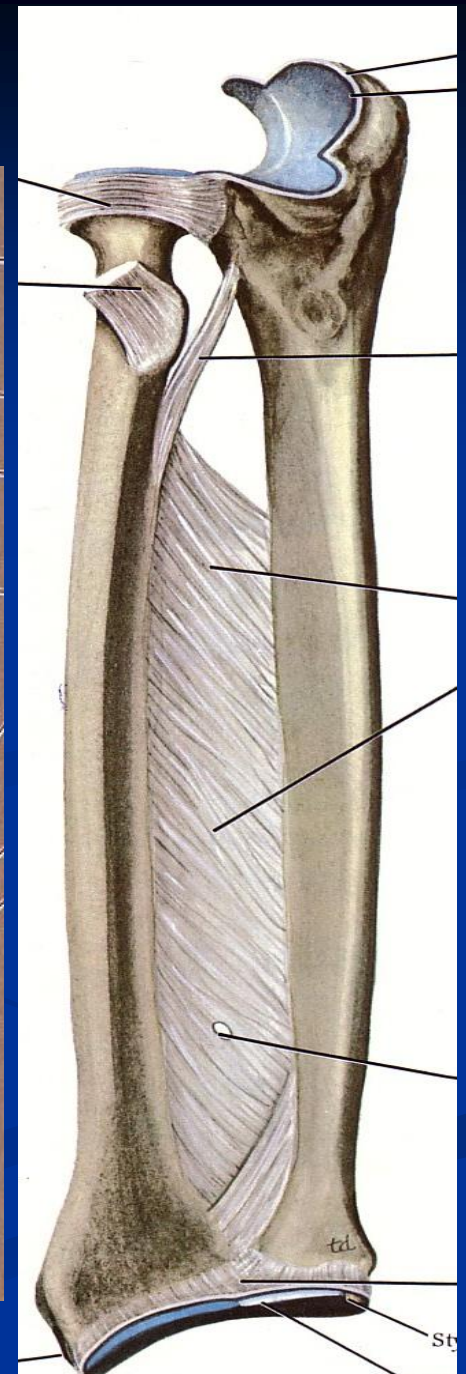
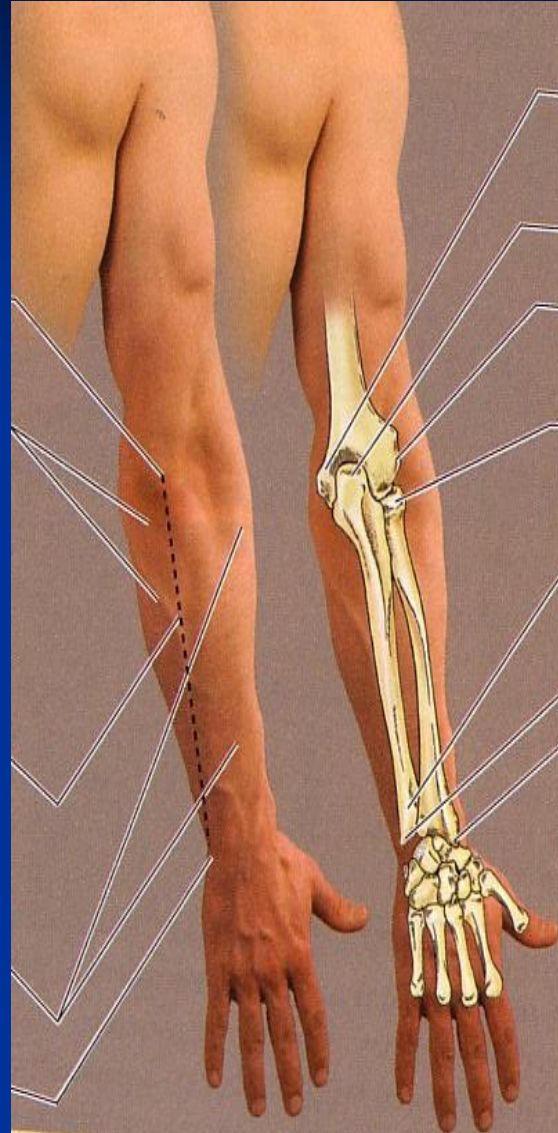


Prof. Saeed Abuel Makarem

# Objectives

- **By the end of the lecture, you should be able to:**
- Describe the arrangement of the muscles of the anterior and posterior compartments of the forearm.
- Describe the, origin, insertion, action nerve supply of each of these muscles.
- Describe the effect of injury of the muscle or its nerve supply.

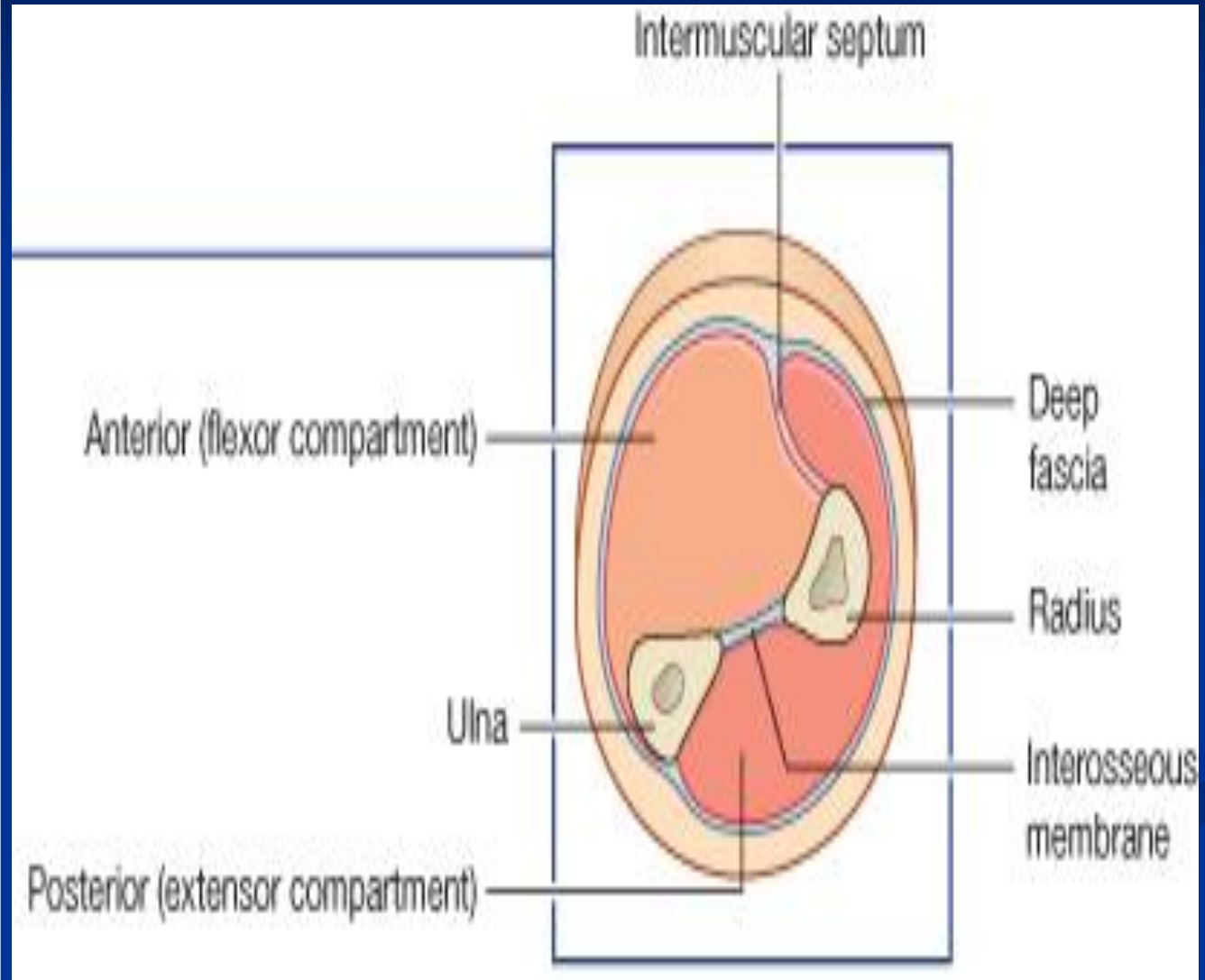
- **The forearm** extends from elbow to wrist.
- It possesses two bones: radius laterally & Ulna medially.
- The two bones are connected together by the interosseous membrane.
- This membrane allows movement of **Pronation** and **Supination** while the two bones are connected together.
- Also, it gives origin for the deep muscles.



# Fascial Compartments of the Forearm

The forearm is enclosed in a sheath of deep fascia, which is attached to the posterior border of the ulna .

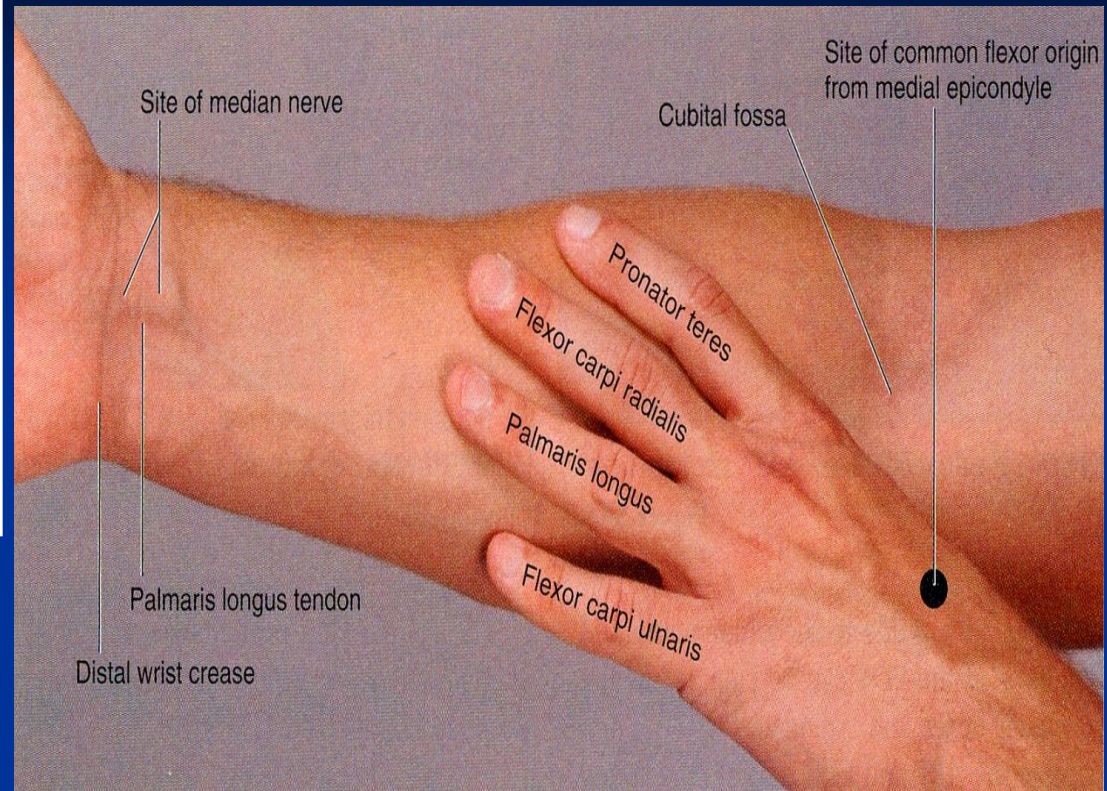
This fascial sheath, together with the interosseous membrane & fibrous intermuscular septa, divides the forearm into several compartments, each having its own muscles, nerves, and blood supply.



## These muscles: are (8)

- They act on the elbow & wrist joints and the fingers.
- They form fleshy masses in the proximal part and become tendinous in the distal part of the forearm.
- They are arranged in three groups:

## Anterior compartment -FLEXOR GROUP



### I-Superficial: 4

- Pronator teres
- Flexor carpi radialis
- Palmaris longus
- Flexor carpi ulnaris

### II-Intermediate: 1

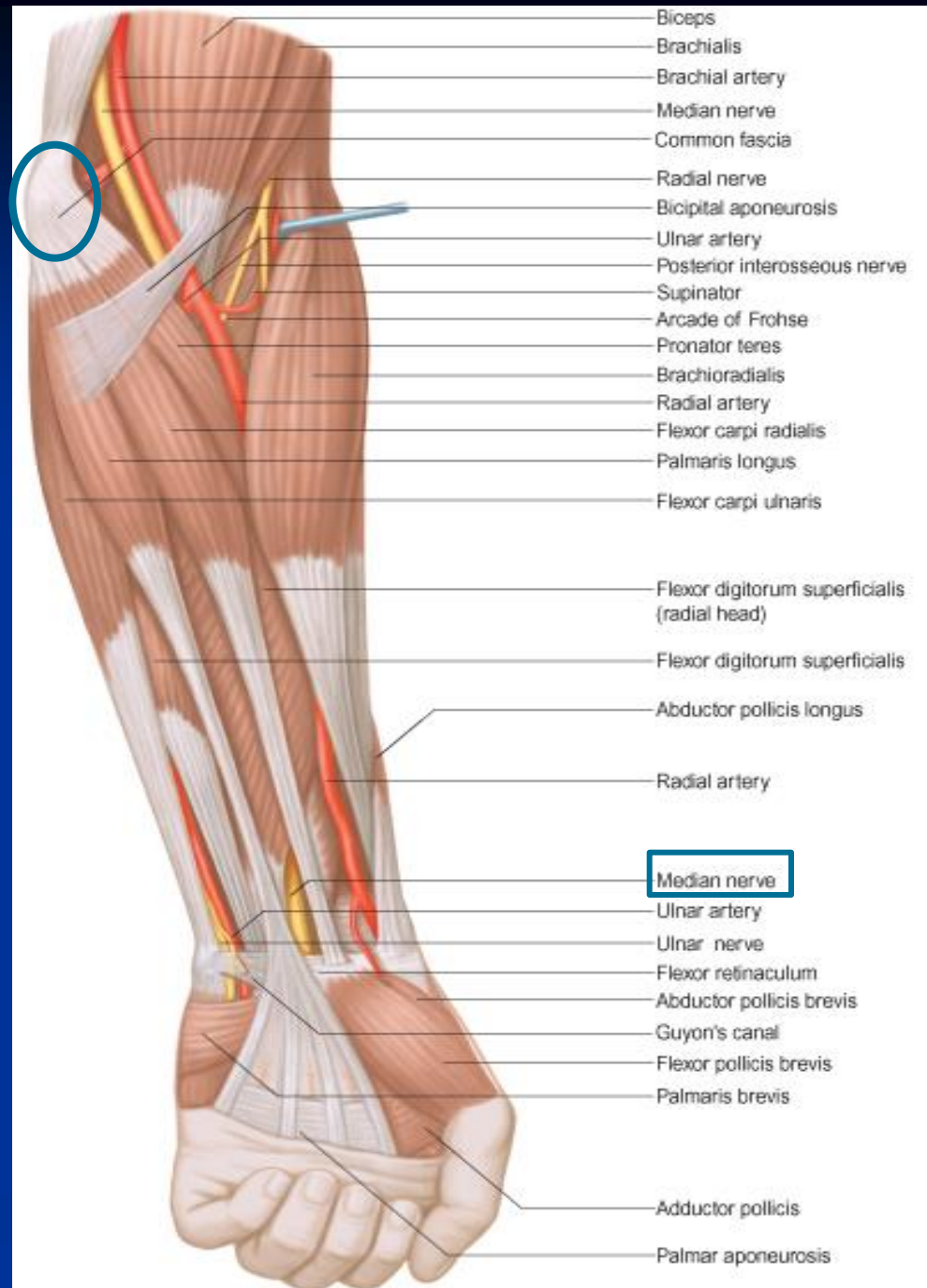
- Flexor digitorum superficialis

### III- Deep: 3

- Flexor digitorum profundus
- Flexor pollicis longus
- Pronator quadratus

## Superficial Flexors

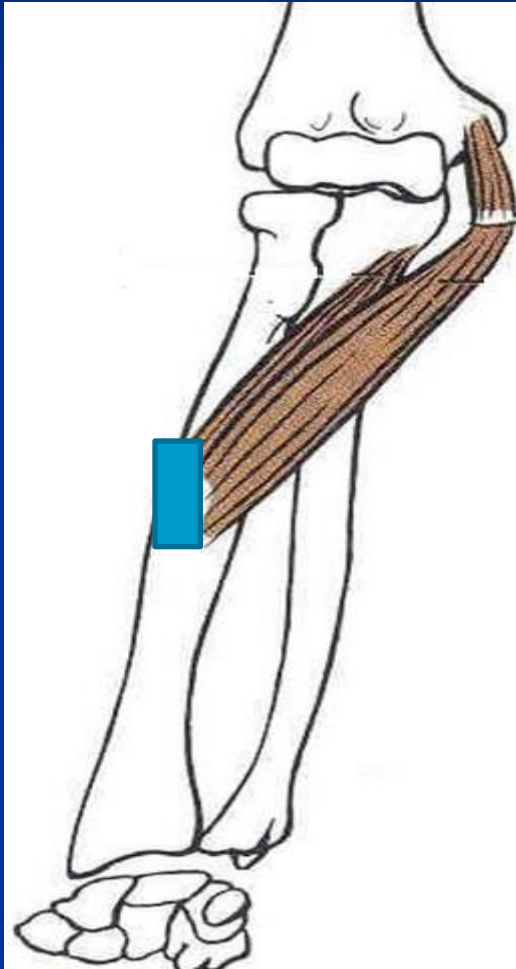
- They arise - more or less- from the common flexor origin (front of **medial epicondyle**).
- All are supplied by **median** nerve except one, flexor carpi ulnaris, FCU (ulnar n.).
- All cross the wrist joint except one, pronator teres, (PT).



## ■ Pronator teres

Insertion: middle of lat. surface of radius

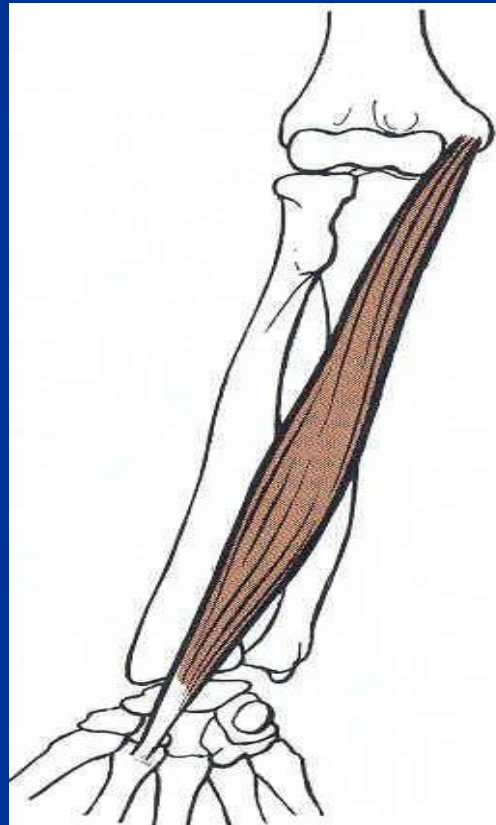
- Action: pronation & flexion of forearm .



## ■ Flexor Carpi Radialis

- Insertion: Base of 2<sup>nd</sup> metacarpal bone

- Action: Flexion & abduction of the wrist.

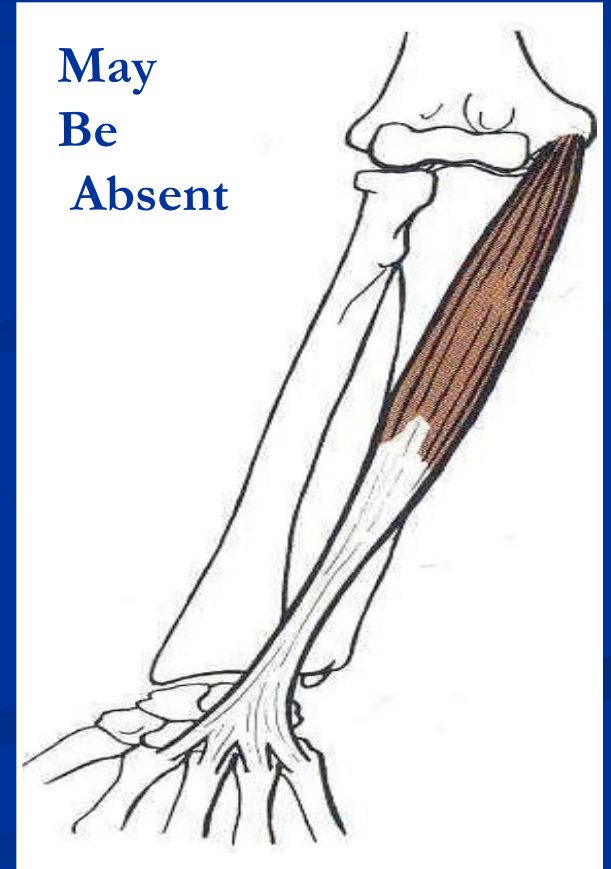


## ■ Palmaris Longus

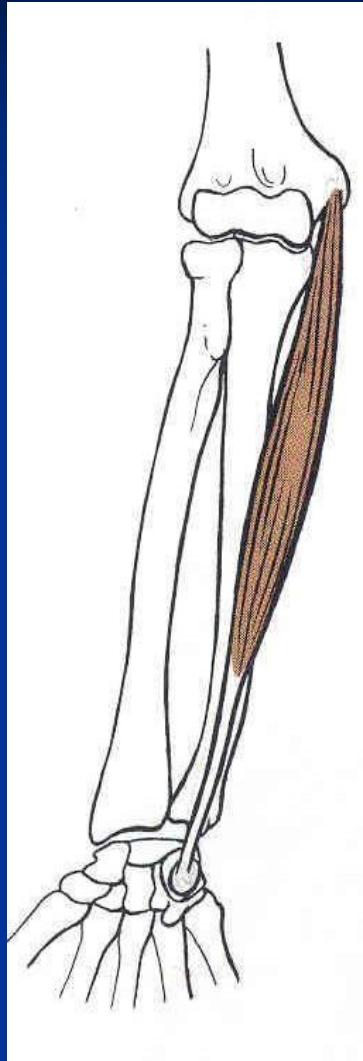
Insertion: into the flexor retinaculum & palmer aponeurosis.

Action: Flexes hand & tightens the palmer aponeurosis

May  
Be  
Absent

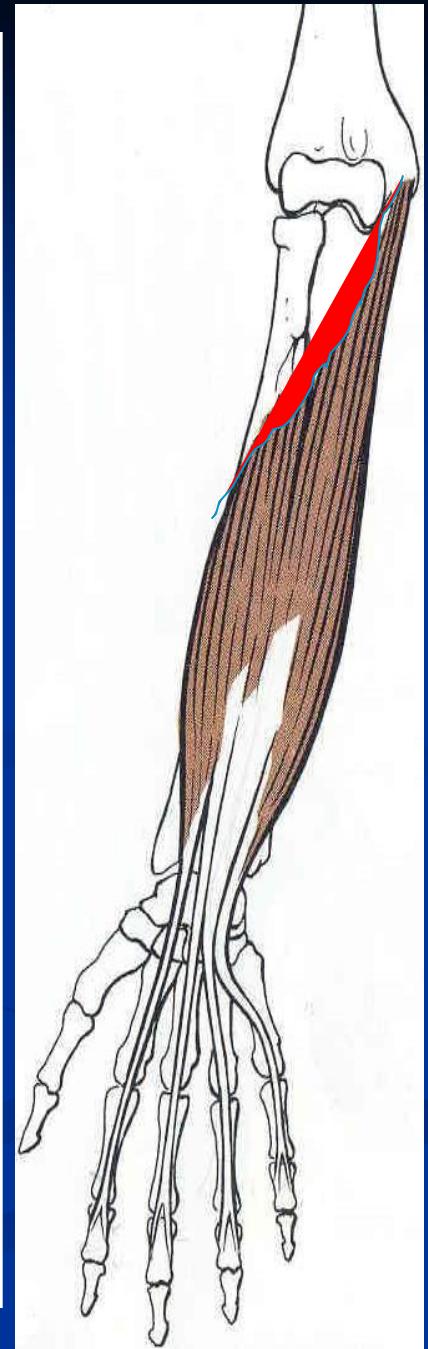


- **Flexor Carpi Ulnaris**
- **Insertion:**
- Pisiform,
- hook of hamate
- 5<sup>th</sup> metacarpal bone
- **Action:**
- Flexion and adduction of the hand (wrist)



## ■ **Flexor Digitorum Superficialis**

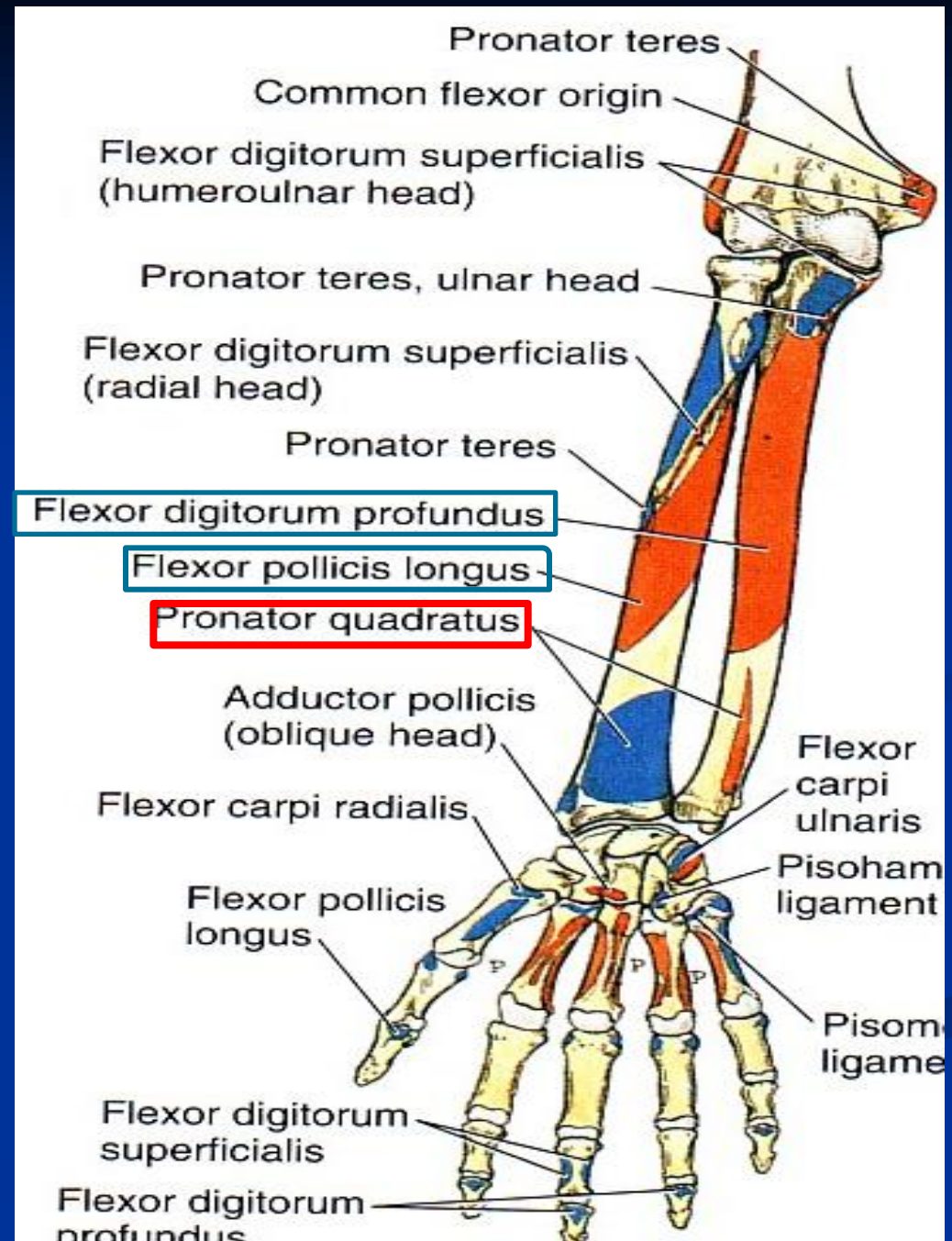
- **Origin:**
- Common flexor origin,
- Coronoid process of ulna;
- Anterior surface of radius
- **Insertion:**
- base of middle phalanges of the medial 4 fingers.
- **Action:**
- Flexes middle and proximal phalanges of medial 4 fingers, and the hand (wrist).





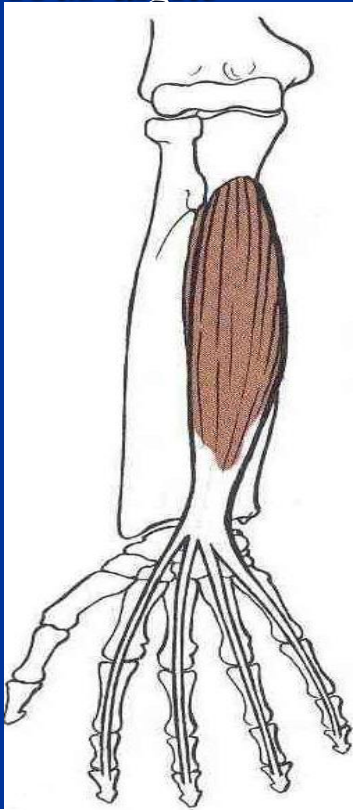
# Origin of the Deep Flexors

- Front of radius:  
Flexor pollicis longus
- Front of ulna:  
Flexor Digitorum profundus
- Front of lower 4<sup>th</sup> of ulna .  
Pronator Quadratus.



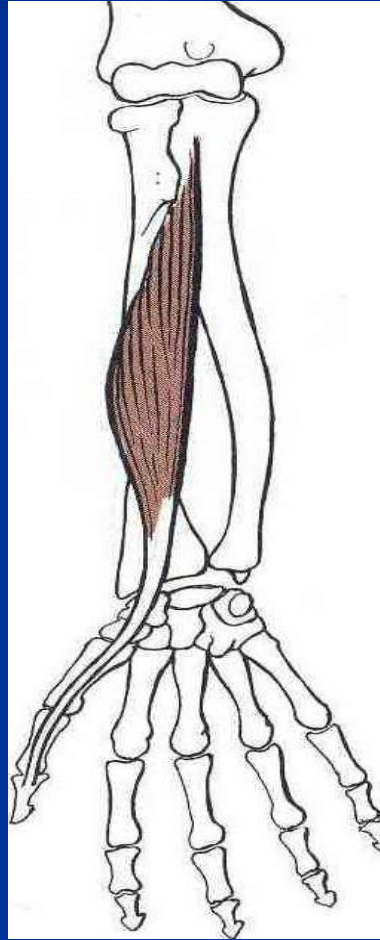
## ■ Flexor Digitorum Profundus

- **Insertion:** bases of distal phalanges of the medial four digits
- **Action:** Flexes distal phalanges of medial four digits



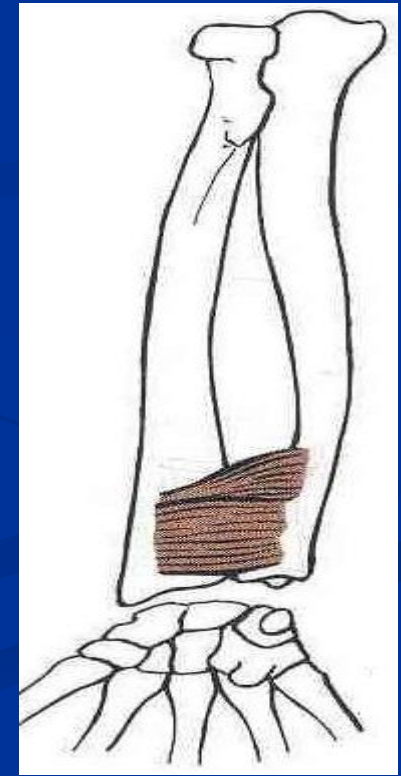
## ■ Flexor Pollicis Longus

- **Insertion:** Base of distal phalanx of thumb.
- **Action:** flexes all joints of the thumb.



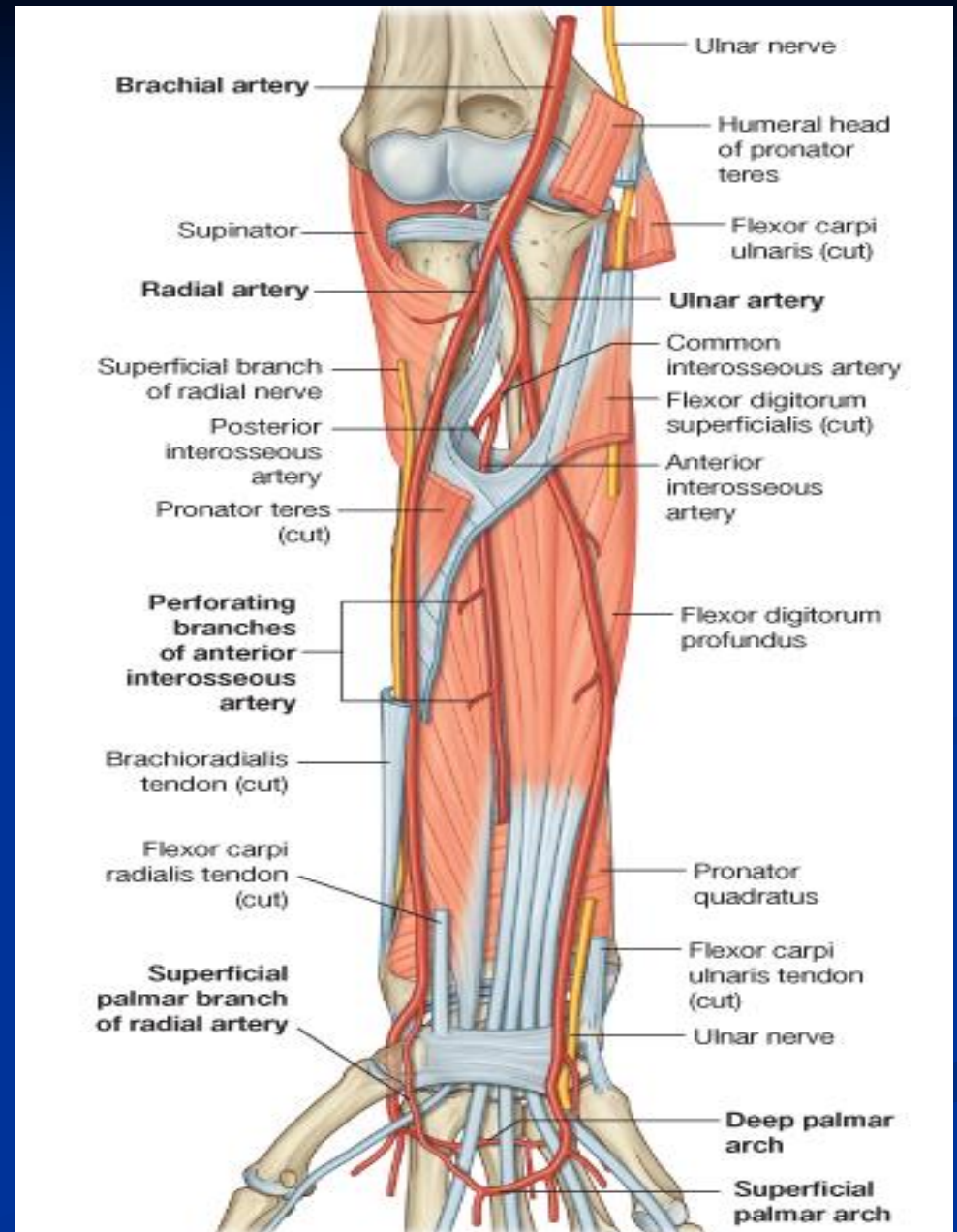
## ■ Pronator Quadratus

- **Insertion:** distal fourth of ant. surface of radius
- **Action:** pronates forearm (primover).
- Hold the 2 bones together .



# Nerve supply of the deep flexors

All are supplied by the anterior interosseous nerve (branch of the median nerve), Except the medial half of the flexor digitorum profundus by the ulnar nerve.



# Supination and pronation

It occurs in the superior and inferior radioulnar joints;  
(Pivot Uniaxial synovial joint)

## Muscles produce supination

Biceps brachii.

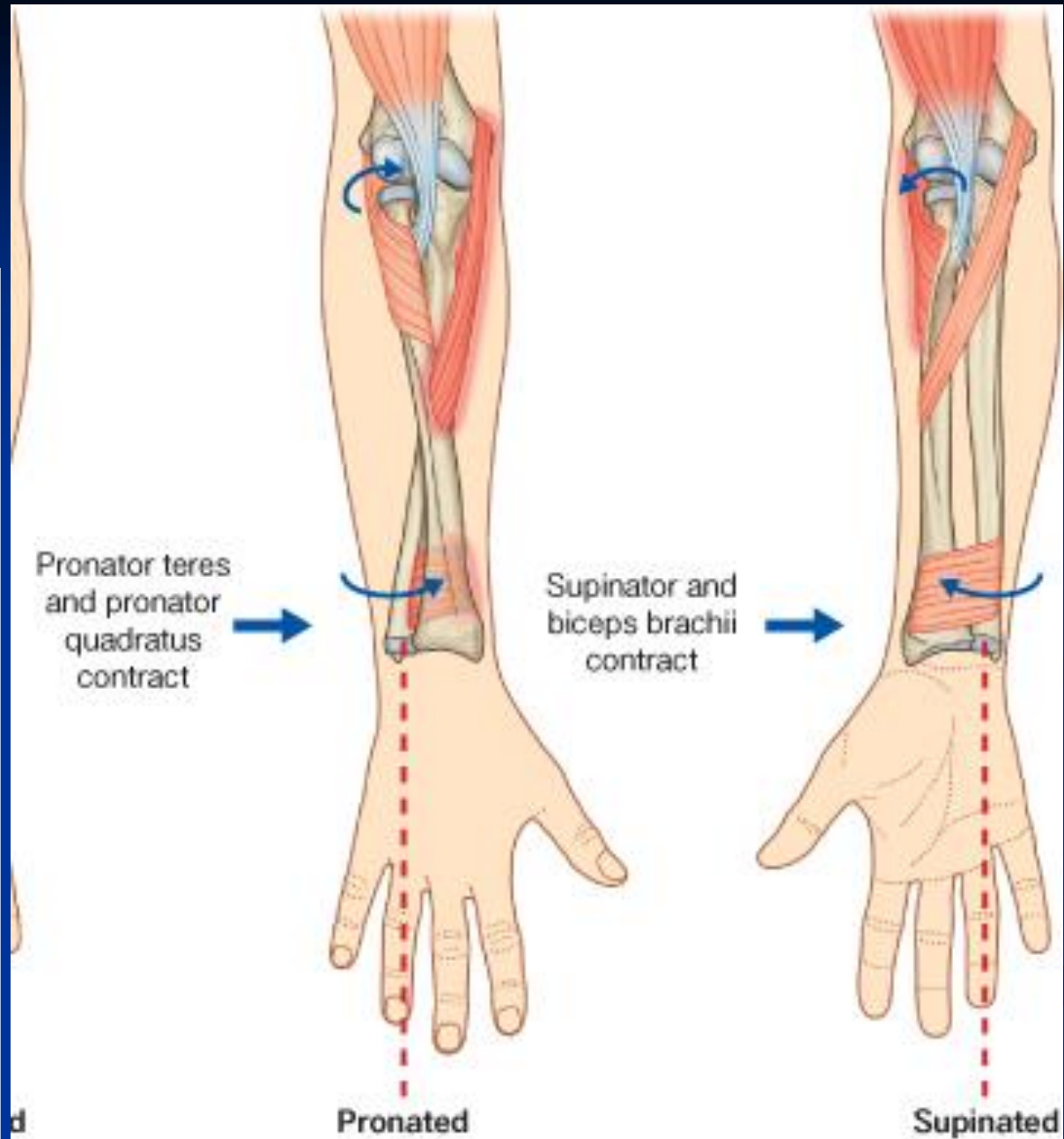
Supinator.

## Muscles produce pronation

Pronator teres.

pronator quadratus.

NB. Brachioradialis put the forearm in midprone-supine position.



# Posterior compartment: 3 groups

## Superficial group 5

- Extensor carpi radialis brevis
- Extensor digitorum
- Extensor digiti minimi
- Extensor carpi ulnaris
- Anconeus

### **Origin:**

Common Extensor Origin.

(front of lateral epicondyle).

## Lateral group 2 muscles

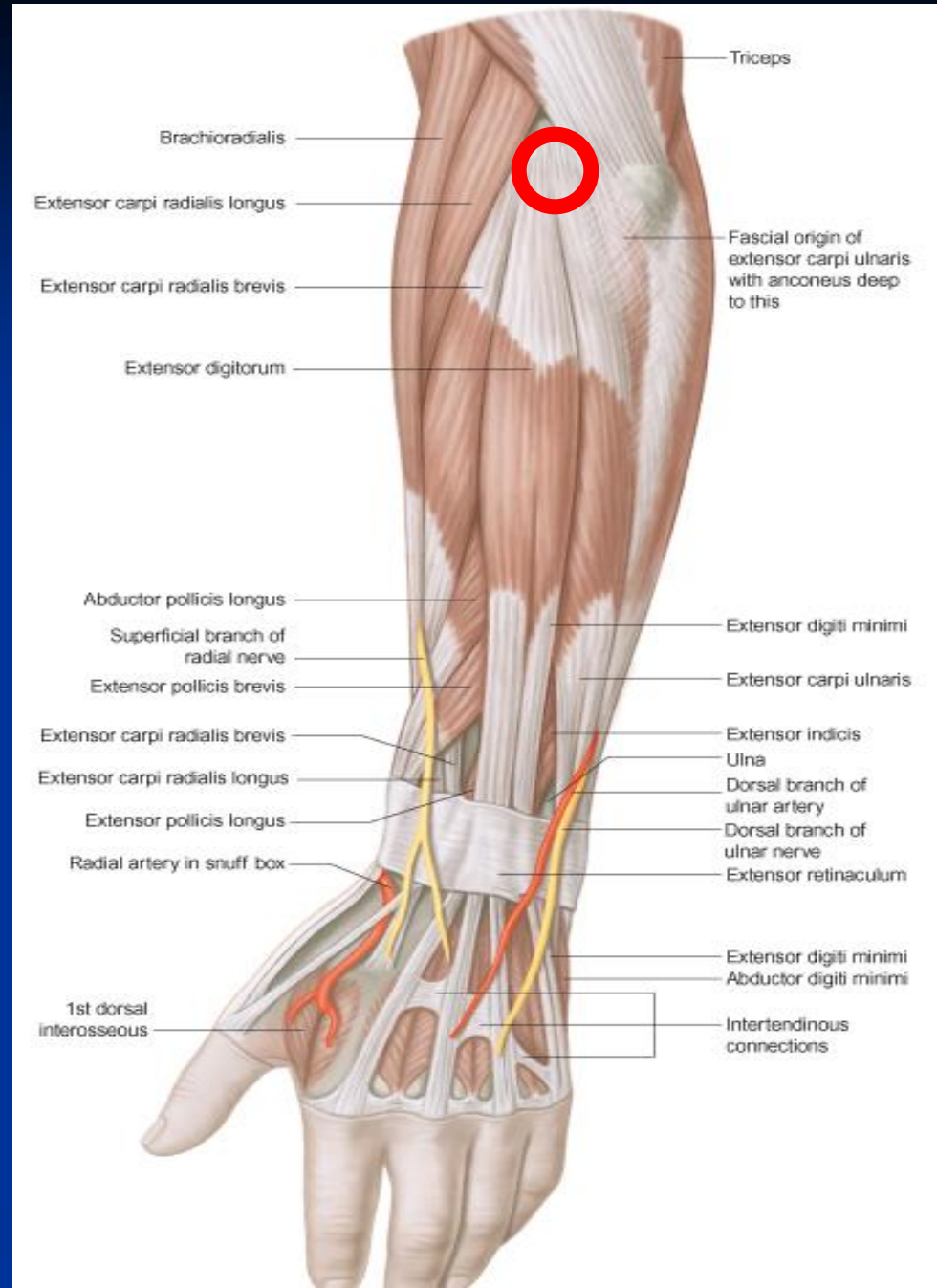
- ❖ Brachioradialis
  - ❖ Extensor carpi radialis longus
- (The 2 muscles originate from the *lateral supracondylar ridge*).

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

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

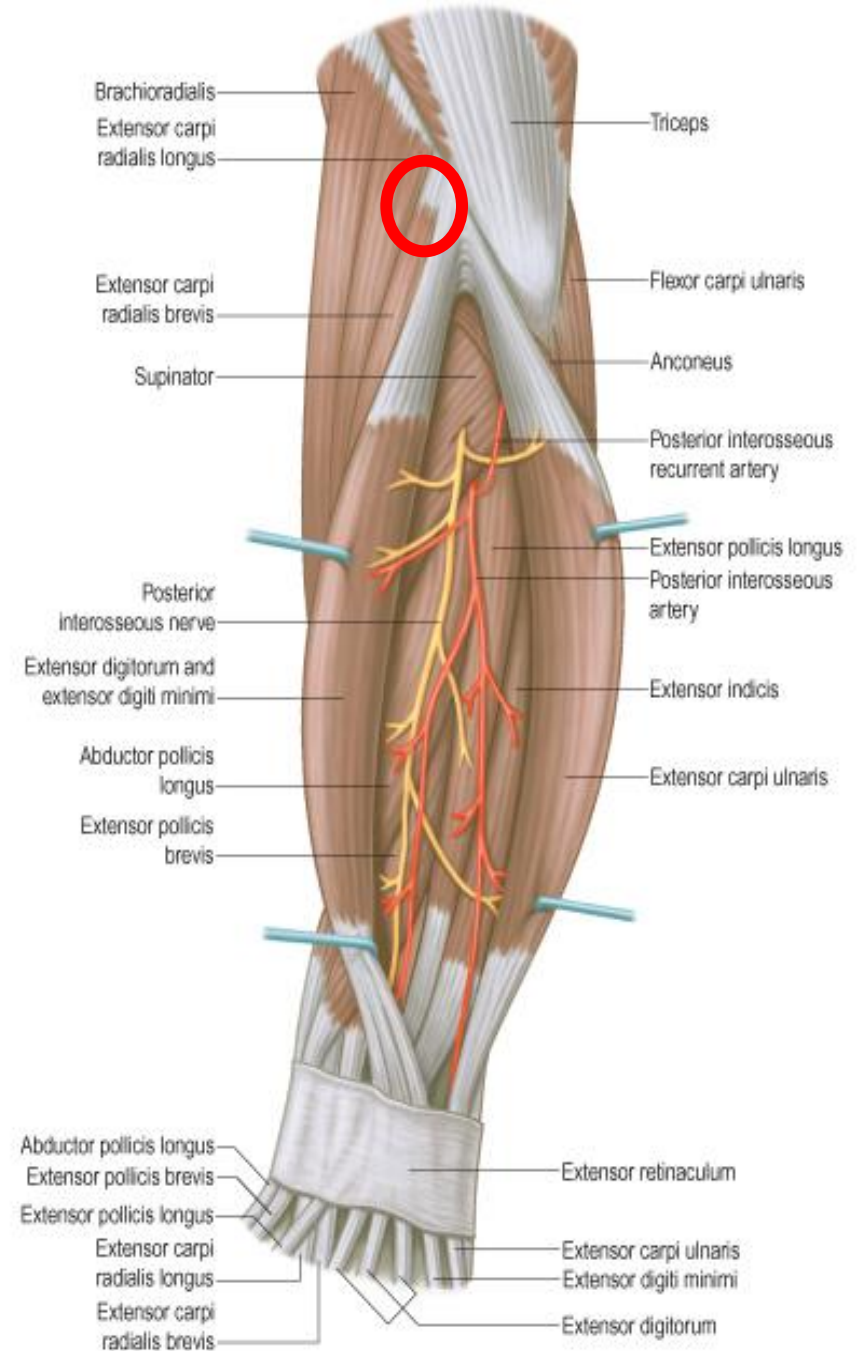
# Posterior compartment

- I- Superficial group:
- **7 muscles** ( from lateral to medial)
- Brachioradialis, (BR).
- Extensor carpi radialis longus, (ECRL).
- Extensor carpi radialis brevis, (ECRB).
- Extensor digitorum, (ED).
- Extensor digiti minimi, (EDM).
- Extensor carpi ulnaris, (ECU).
- Anconeus. (An).



# Superficial extensor

- All arises from the **common extensor origin**, (front of lateral epicondyle) of the humerus, **EXCEPT**, 3 (BR, EXRL & anconeus).
- All cross the wrist **EXCEPT**, 2, (brachioradialis & anconeus).
- All supplied by deep branch of radial nerve, **EXCEPT** **ABE**
- **A, anconeus**
- **B, Brachioradialis**
- **E, Extensor carpi radialis longus**
- **These 3 muscles are supplied by the radial nerve itself**



## ■ **Brachioradialis**

### ■ Origin:

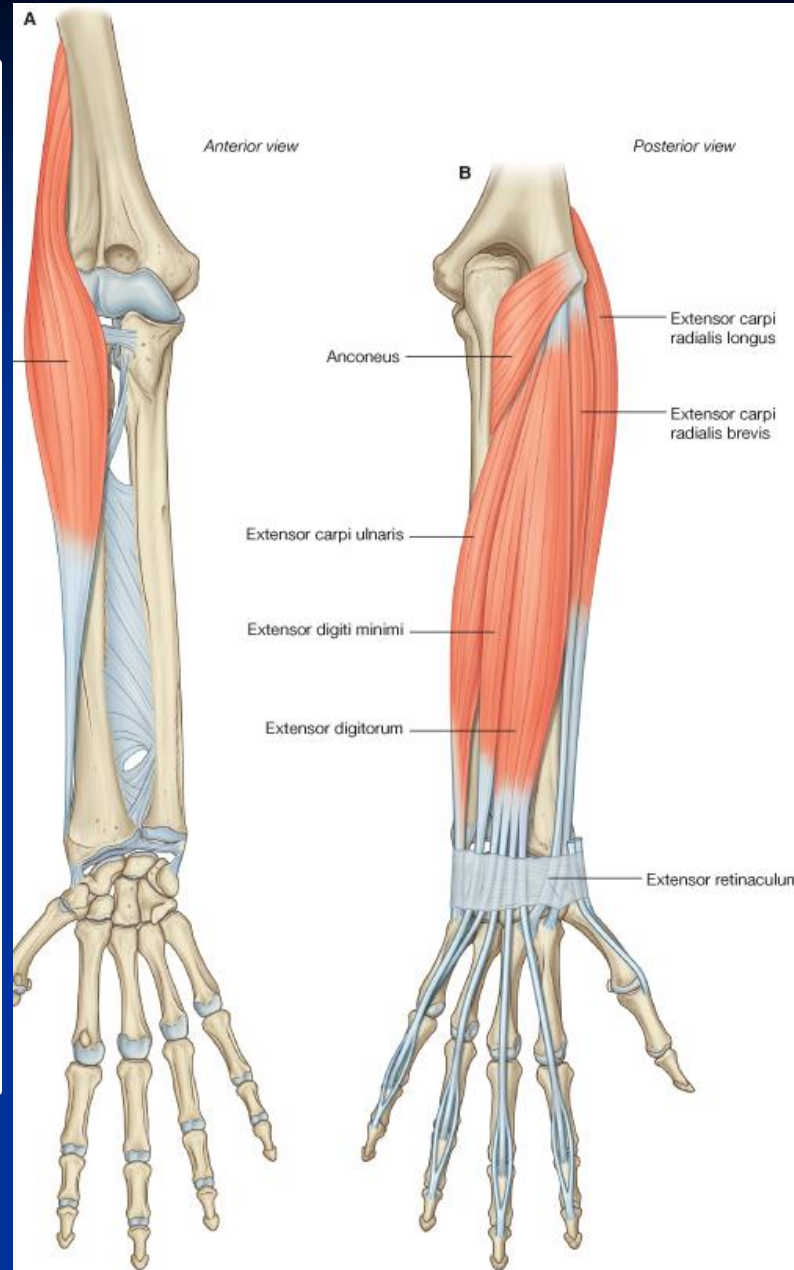
- Lateral supracondylar ridge of humerus.

### ■ Insertion:

- Base of styloid process of radius.

### ■ Action:

- Flexes forearm; (elbow).
- Rotates forearm to the midprone position



Elsevier. Drake et al: Gray's Anatomy for Students - www.studentconsult.com

## ■ **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



# INSERTION

## Extensor carpi radialis brevis:

base of 3<sup>rd</sup> metacarpal bone.

## Extensor digitorum:

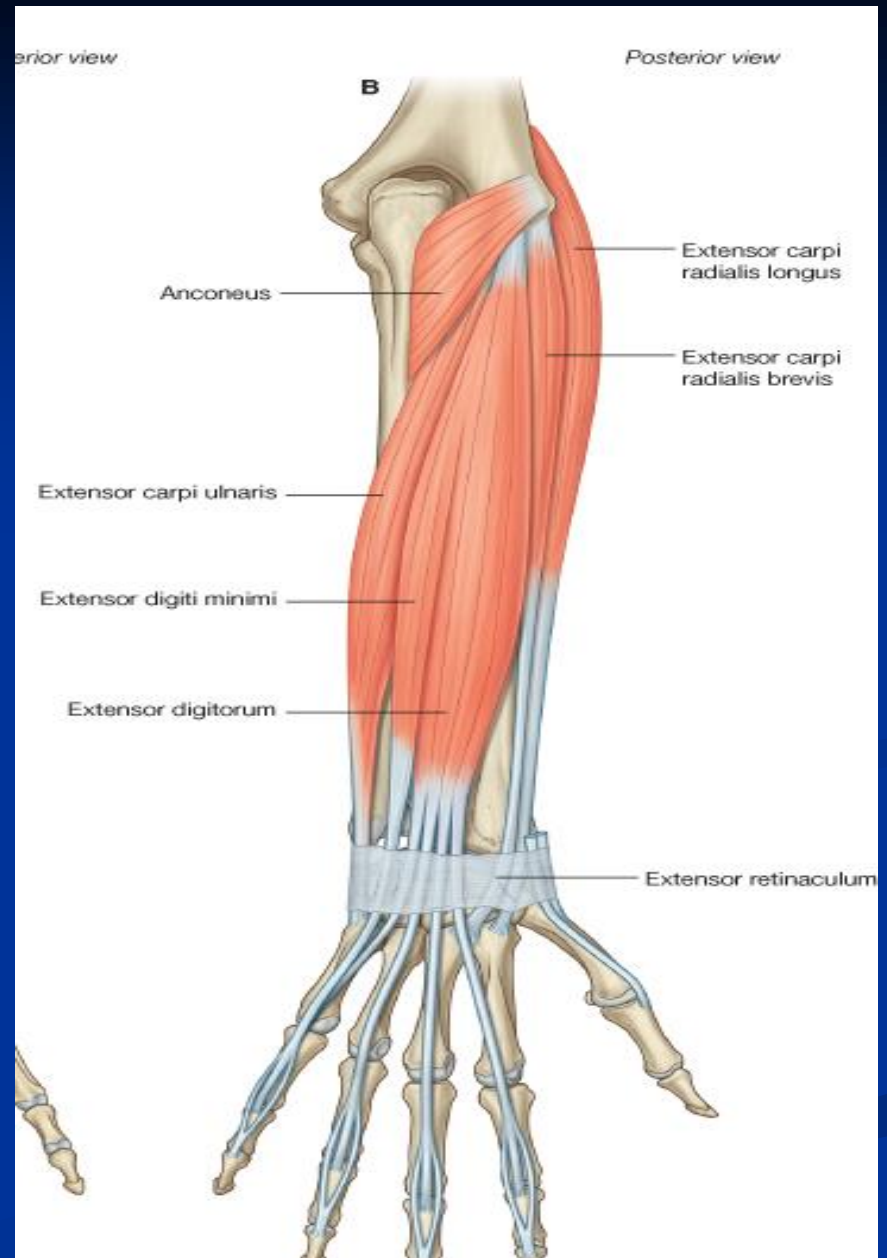
Extensor expansion of the medial 4 fingers.

## Extensor digiti minimi:

Extensor expansion of the little finger.

## Extensor carpi ulnaris:

Base of the 5<sup>th</sup> metacarpal bone.



## II- Deep group:

### 5 muscles

1- Abductor pollicis longus, (APL).

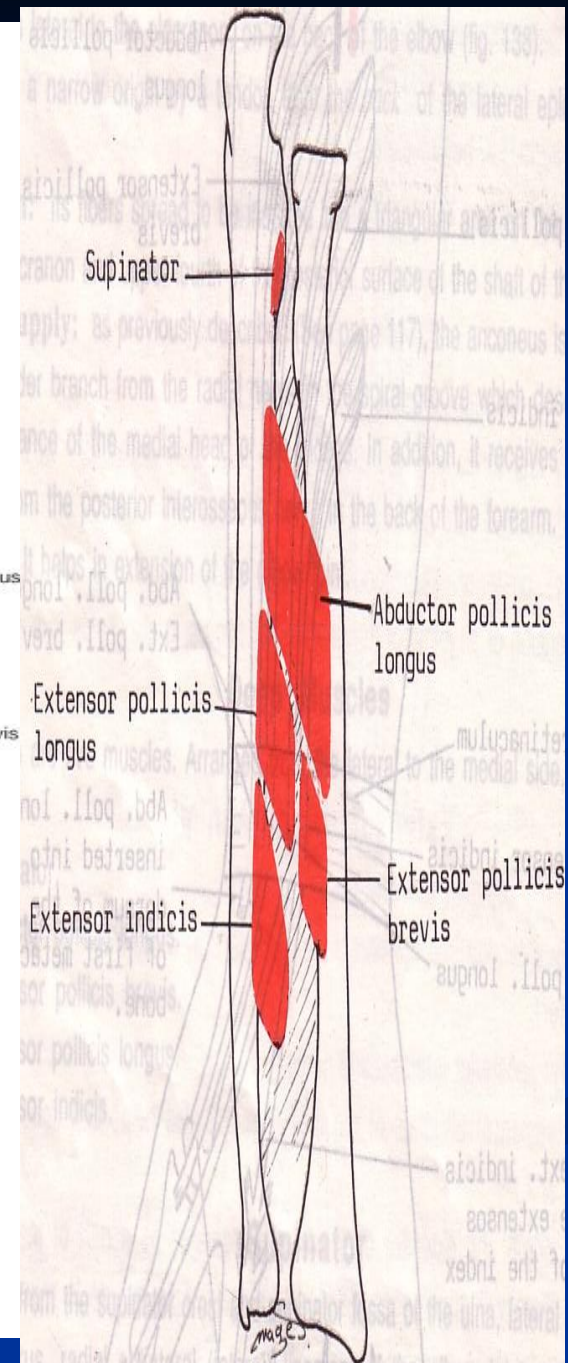
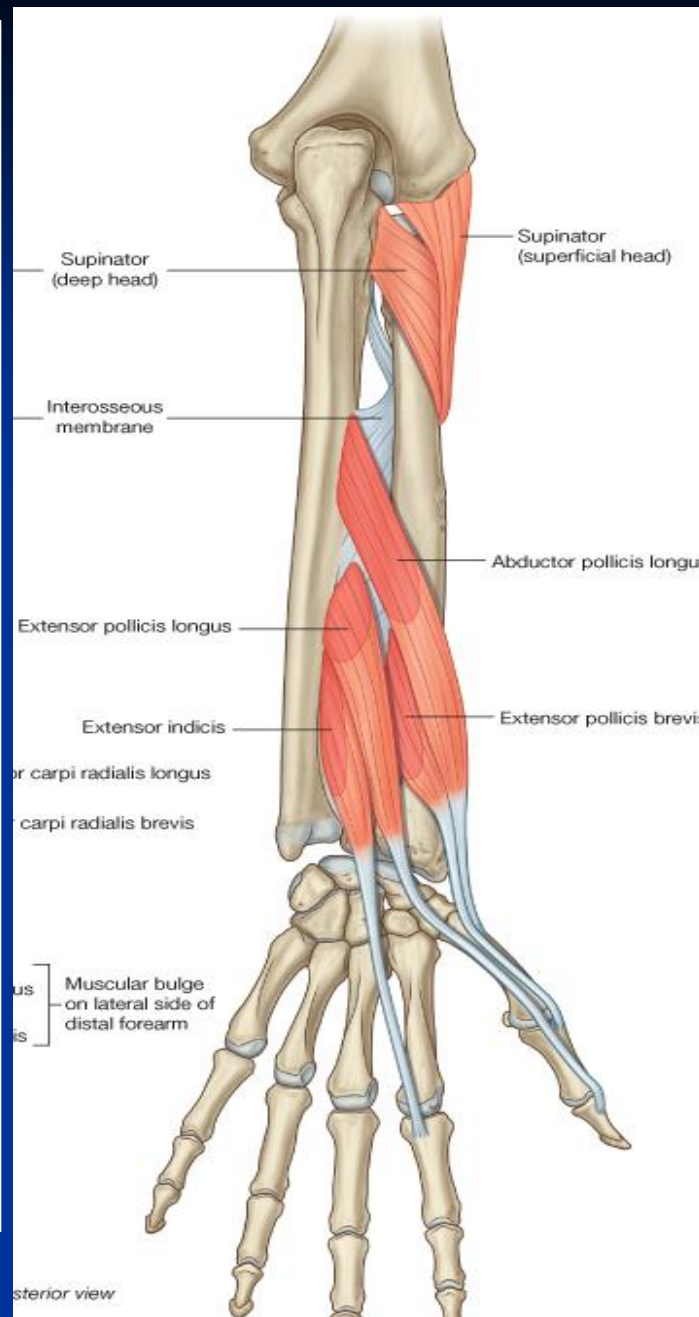
2- Extensor pollicis brevis, (EPB).

3- Extensor pollicis longus, (EPL).

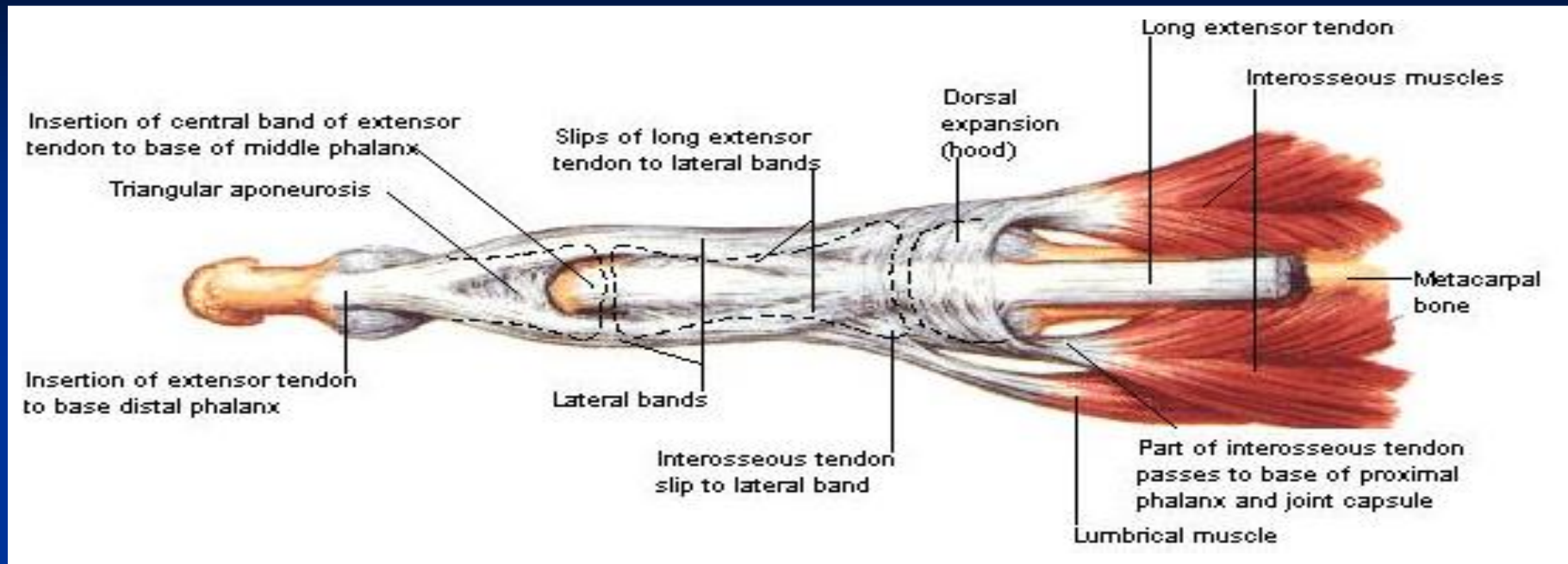
4- Extensor indicis (EI).

5- Supinator.

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



# Dorsal Extensor Expansion



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

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