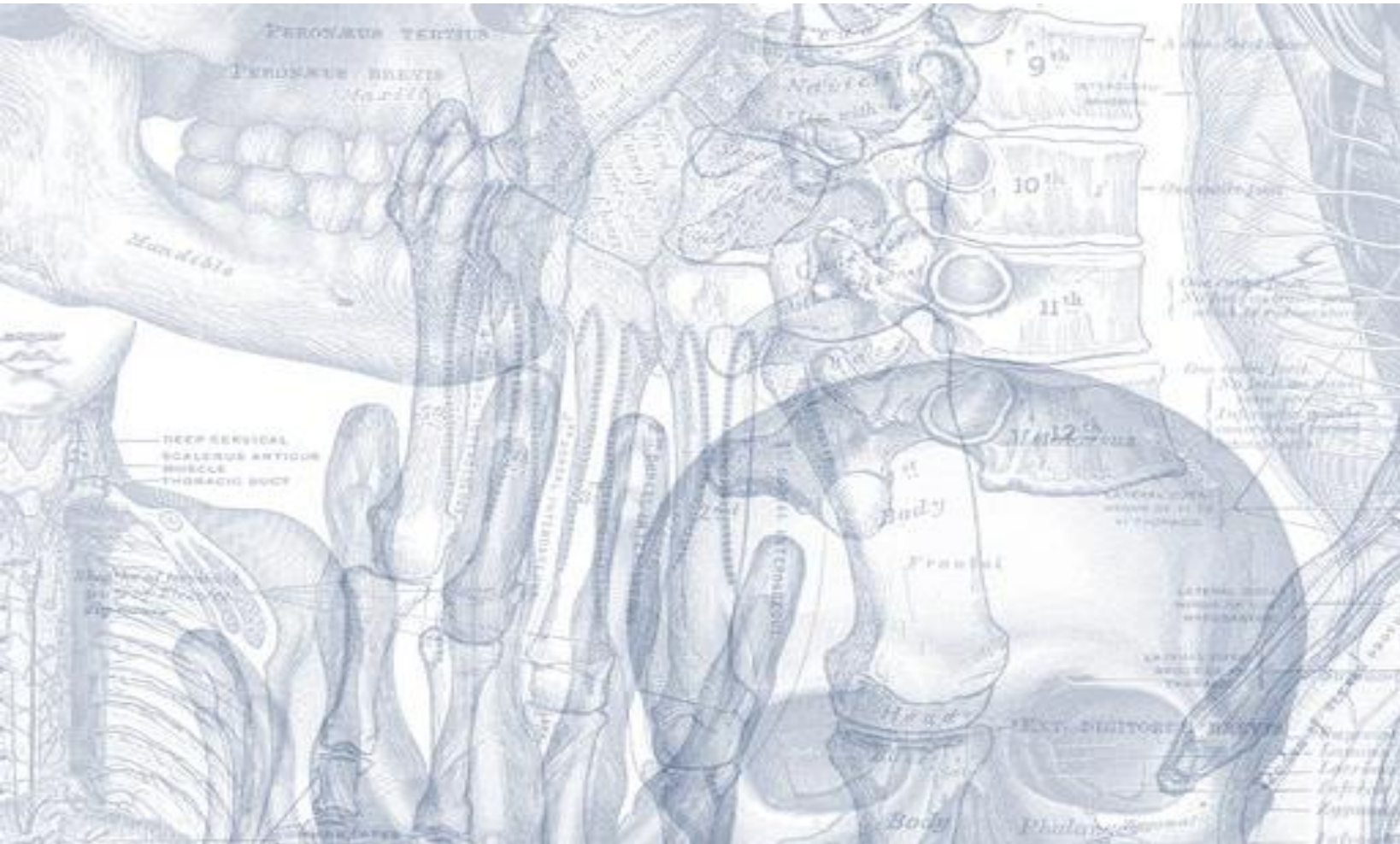


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Anatomy of Forearm

[Editing File](#)

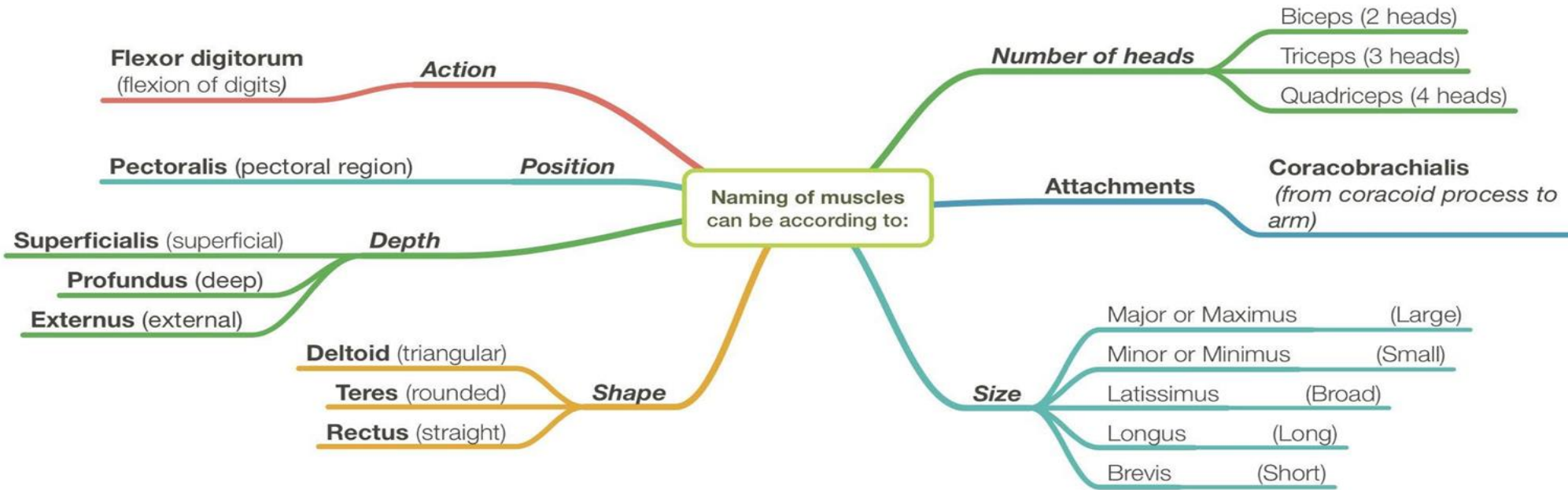
Color Code

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

Objectives

- At the end of this lecture, the student should be able to:
 1. List the names of the Flexors Group of Forearm (superficial & deep muscles).
 2. Identify the common flexor origin of flexor muscles and their innervation & movements.
 3. Identify supination & pronation and list the muscles produced these 2 movements.
 4. List the names of the Extensor Group of Forearm (superficial & deep muscles).
 5. Identify the common extensor origin of extensor muscles and their innervation & movements.

Recall what we took in foundation:



The following pairs always come together (they counter each other so if one is present so is the other)

- Flexor & Extensor (flexor carpi ulnaris & extensor carpi ulnaris)
- Longus & Brevis (extensor carpi radialis longus & extensor carpi radialis brevis)
- Superficialis & Profundus (flexor digitorum superficialis & flexor digitorum profundus)
- Major & Minor (pectoralis major & pectoralis minor)

The fingers:

Digitorum = has 4 tendons each attached to a finger

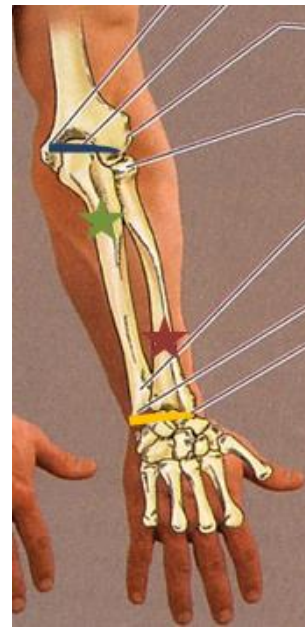
Pollicis = the thumb

Indices = index finger السبابه

Digiti minimi = pinkie

FOREARM

- - 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.**

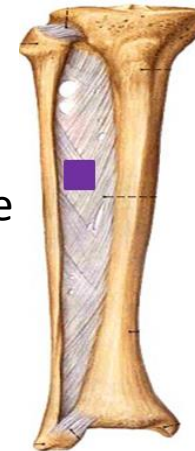


- The radius and ulna are connected by 3 structures: the interosseous membrane, superior radioulnar joint and inferior radioulnar joint

- An interosseous membrane is a broad and thin plane of fibrous tissue that separates many of the bones of the body.

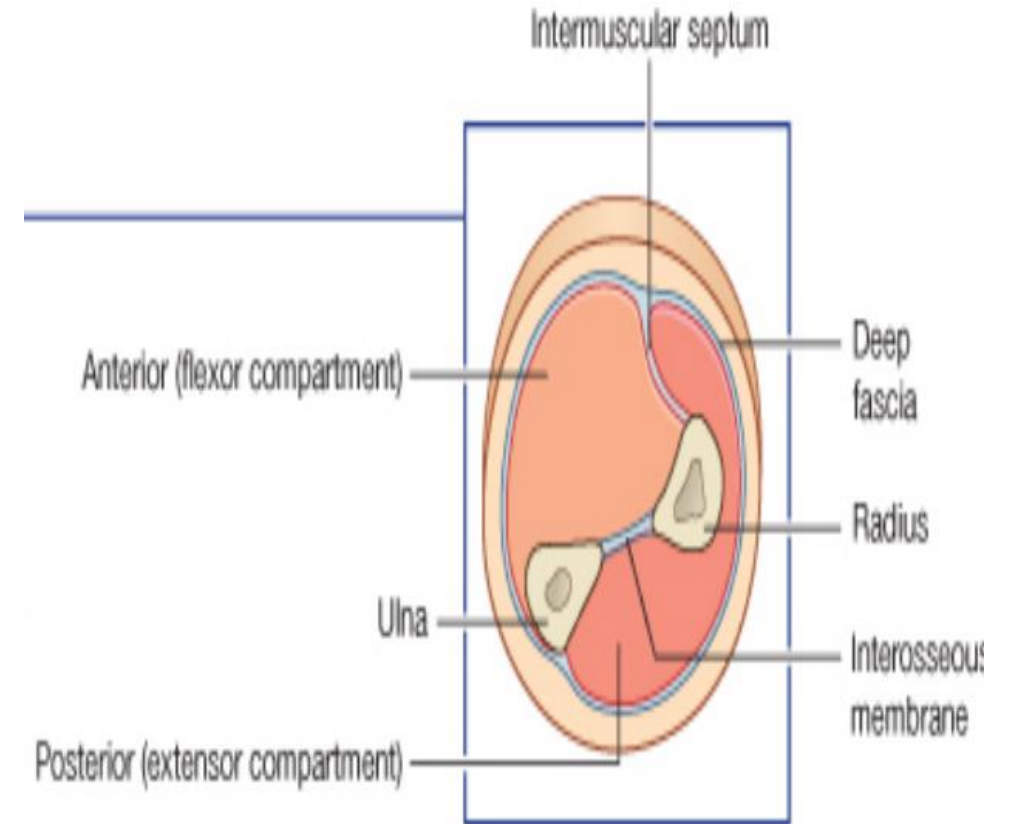
This membrane:

- 1- allows movement of **Pronation** and **Supination** while the two bones are connected together.
- 2- it gives origin for the deep muscles.

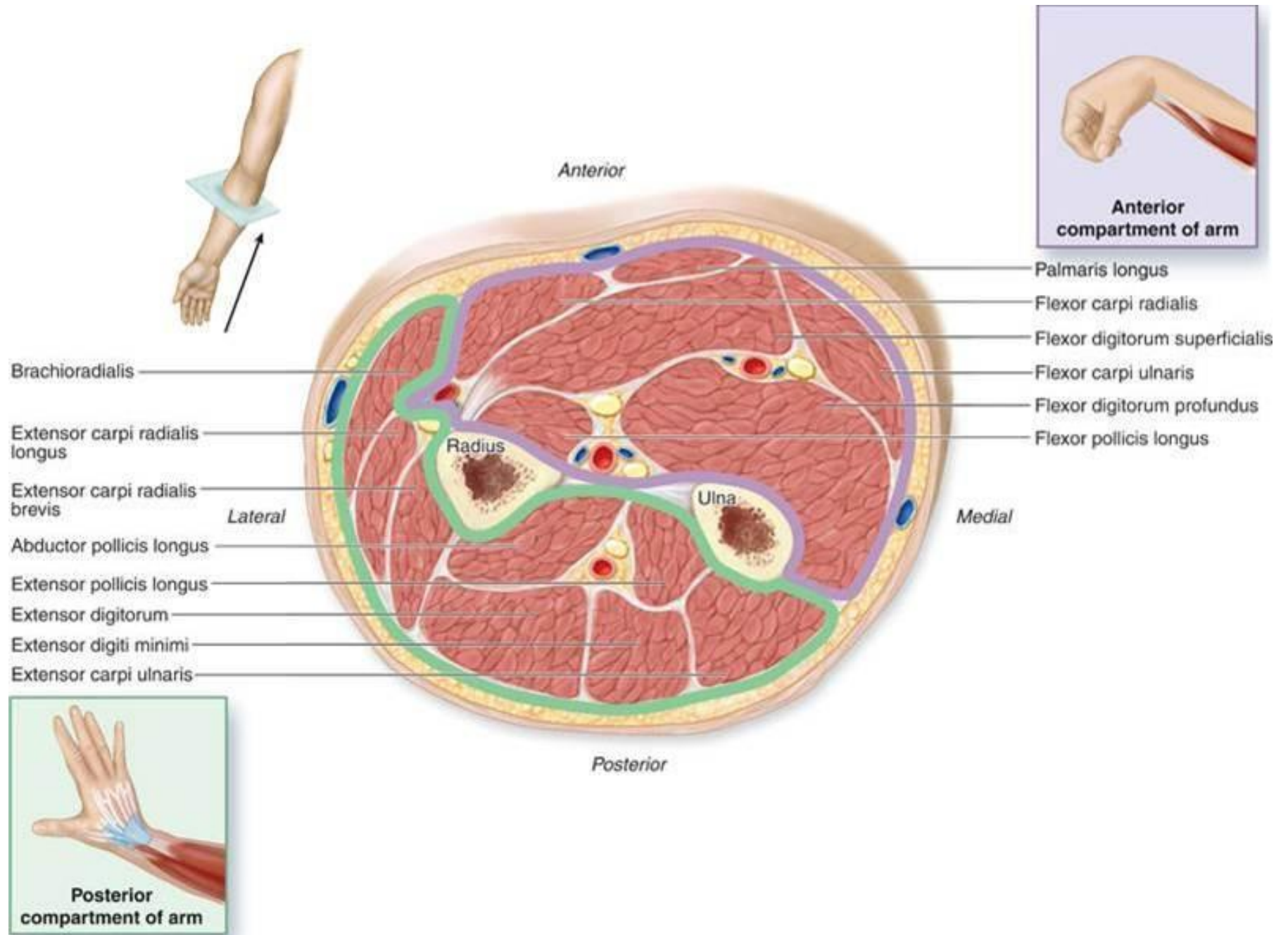


Fascial Compartments of the Forearm

- 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**.



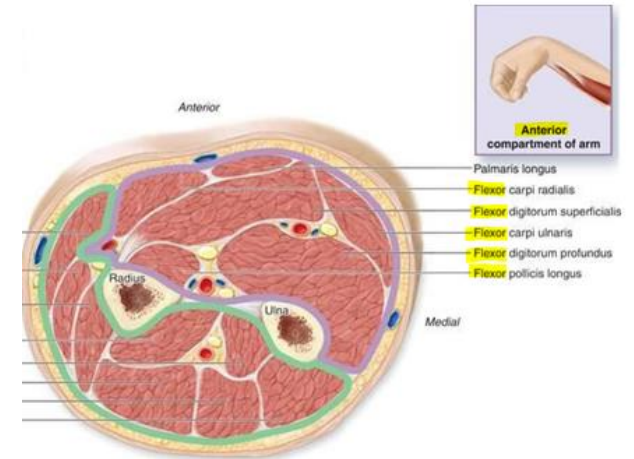
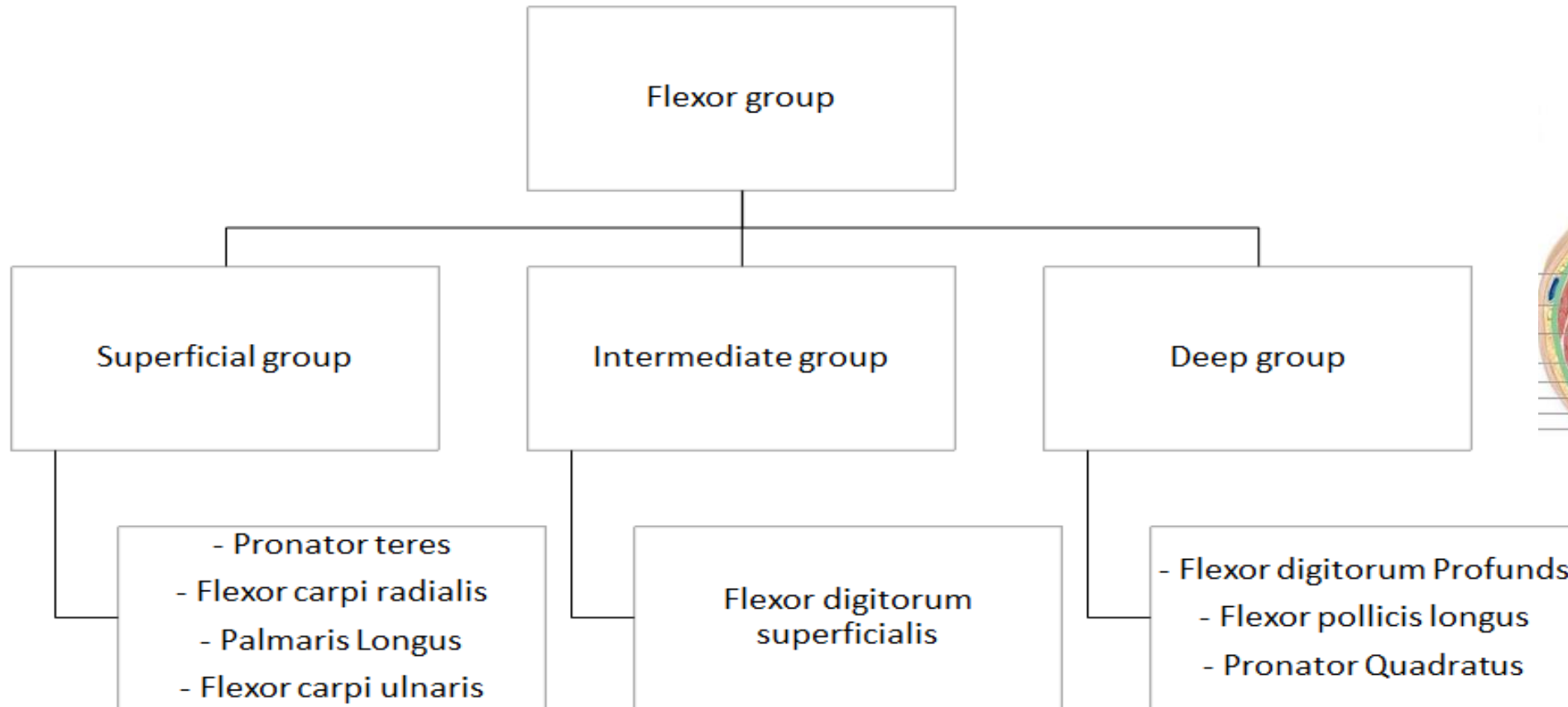
EXTRA



FLEXOR GROUP

These muscles: 8

- Act on the elbow & wrist joints and those of the fingers
- Form **fleshy** masses in the **proximal** part and become **tendinous** in the **distal** part of the forearm.



FLEXOR GROUP

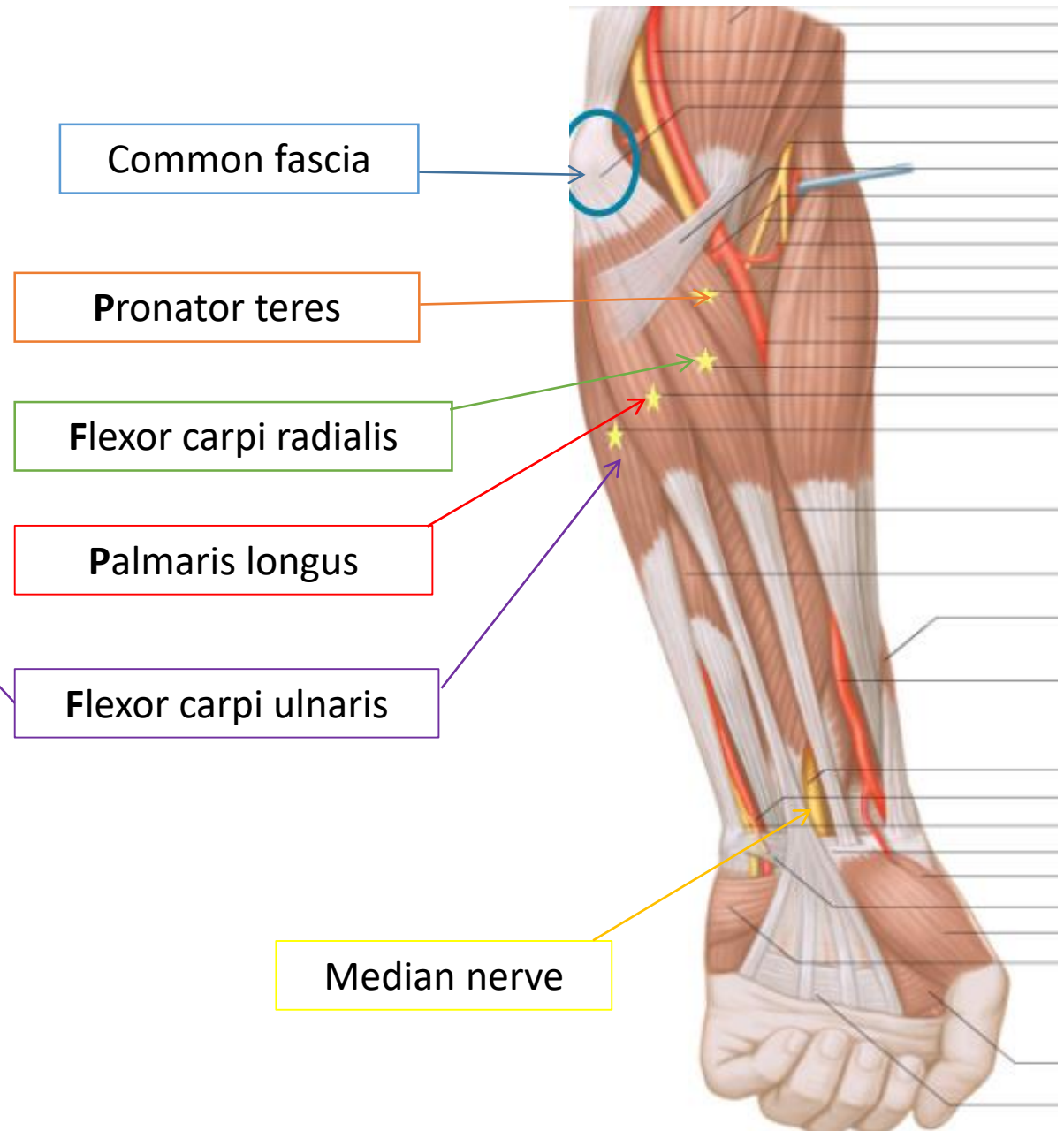
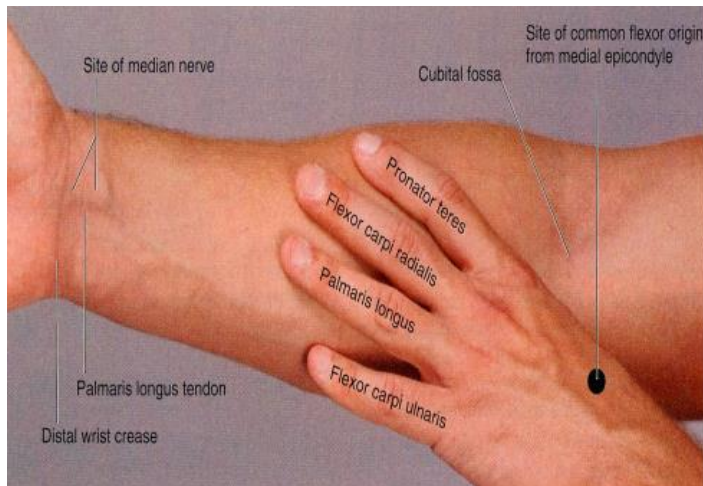
Superficial flexors:

*All Arise(originate) from the **common flexor origin** (front of medial epicondyle)

*All are supplied by the **Median nerve** Except One > (FCU).

*(FCU): supplied by the **Ulnar nerve**.

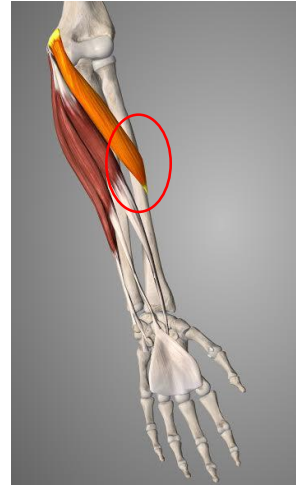
*All cross the wrist joint Except one > **Pronator teres** (it is short)



1) Pronator teres

Insertion: middle of lateral surface of radius.

Action: pronation & flexion of forearm.



2) Flexor Carpi Radialis

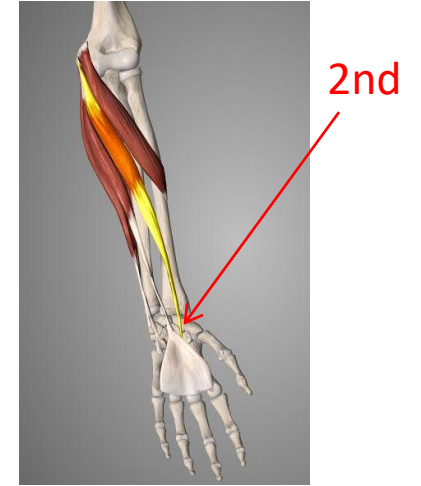
Insertion: Base of 2nd metacarpal bone.

Action: Flexion & abduction of the Hand.

Note:

Radialis always inserts at either 2/3 metacarpal since they are lateral.

Ulnaris always inserts at 5th metacarpal because it is medial.



3) Palmaris Longus

Insertion: flexor retinaculum & palmar aponeurosis.

(thickening of deep fascia at the wrist gives flexor retinaculum. And thickening of deep fascia at palm gives the palmar aponeurosis)

Action: Flexes hand & tightens palmar aponeurosis



4) Flexor Carpi Ulnaris

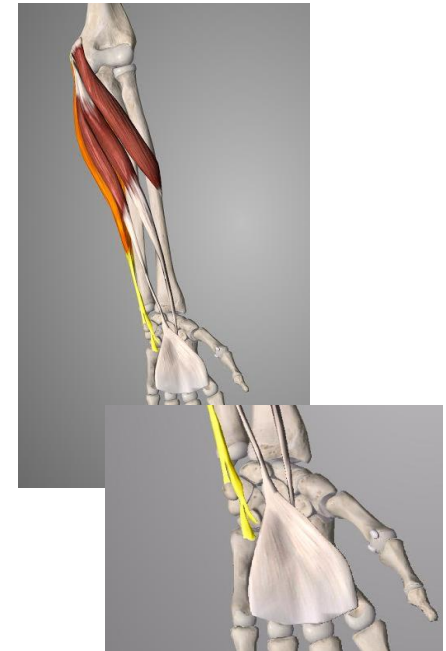
Insertion:

*Pisiform

*Hook of hamate

*5th metacarpal bone

Action: Flexion and adduction of the hand.



All have the Same origin in front of medial epicondyle

FLEXOR GROUP

Intermediate flexors:

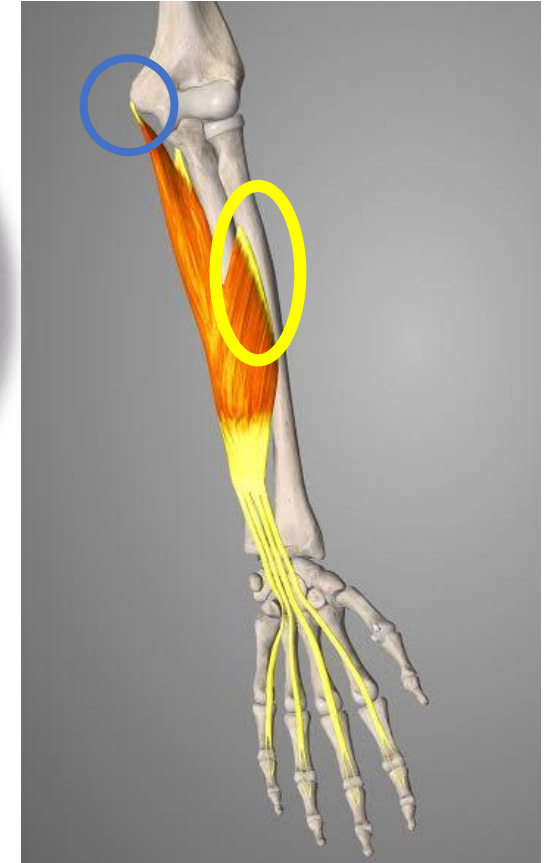
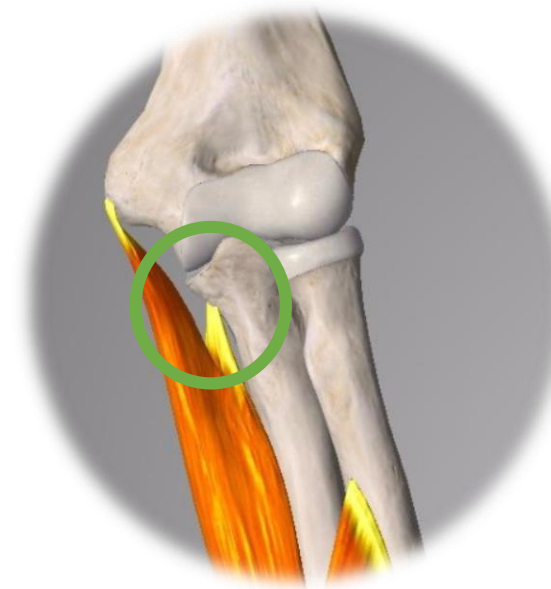
Flexor Digitorum Superficialis

Origin:

- (Common flexor origin "medial epicondyle")
- (Coronoid process of ulna)
- (Anterior surface of radius)

Insertion: Base of middle phalanges of medial 4 fingers.

Action: Flexes **middle** and **proximal phalanges** of medial 4 fingers, and the hand.



FLEXOR GROUP

Deep Flexors:

Note: The anterior interosseous nerve is a branch of the median nerve
Where as the posterior interosseous nerve is the deep branch of the radial nerve

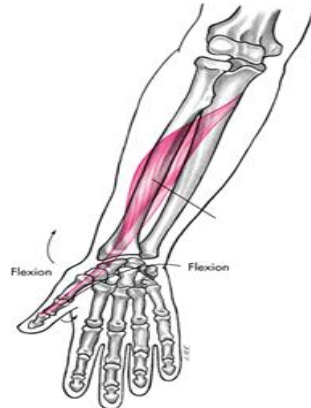
Flexor Digitorum profundus:

- **Origin:** Above / in front of Ulna
- **Insertion:** bases of distal phalanges of medial 4 digits
- **Action:** Flexes distal phalanges of medial 4 digits.
- **Innervation:** (medial) ulnar nerve
(lateral) anterior interosseous nerve



Flexor pollicis longus

- **Origin:** Above/in front of Radius
- **Insertion:** Base of distal phalanx of thumb
- **Action:** flexes interphalangeal, metacarpophalangeal & carpometacarpal joints of thumb. (all thumb joints)
- **Innervation:** anterior interosseous nerve



Note:

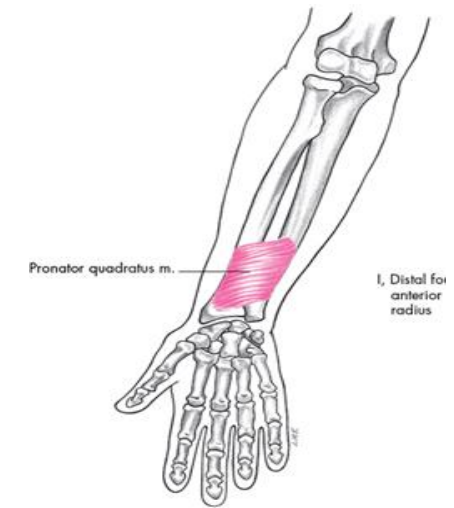
Interphalangeal = between 2 phalanges

Metacarpophalangeal = between metacarpal and phalange

Carpometacarpal = between the carpals and metacarpals

Pronator Quadratus.

- **Origin:** Above the 2 bones
Boys Slides: Lower 1/4th of front of Ulna.
- **Insertion:** distal 1/4th of ant. surface of Radius
- **Action:** pronates forearm (prime mover), and helps to hold the bones together
- **Innervation:** anterior interosseous nerve



Supination and pronation

It occurs in the superior and inferior radioulnar joints;

- **Muscles that produce supination:**

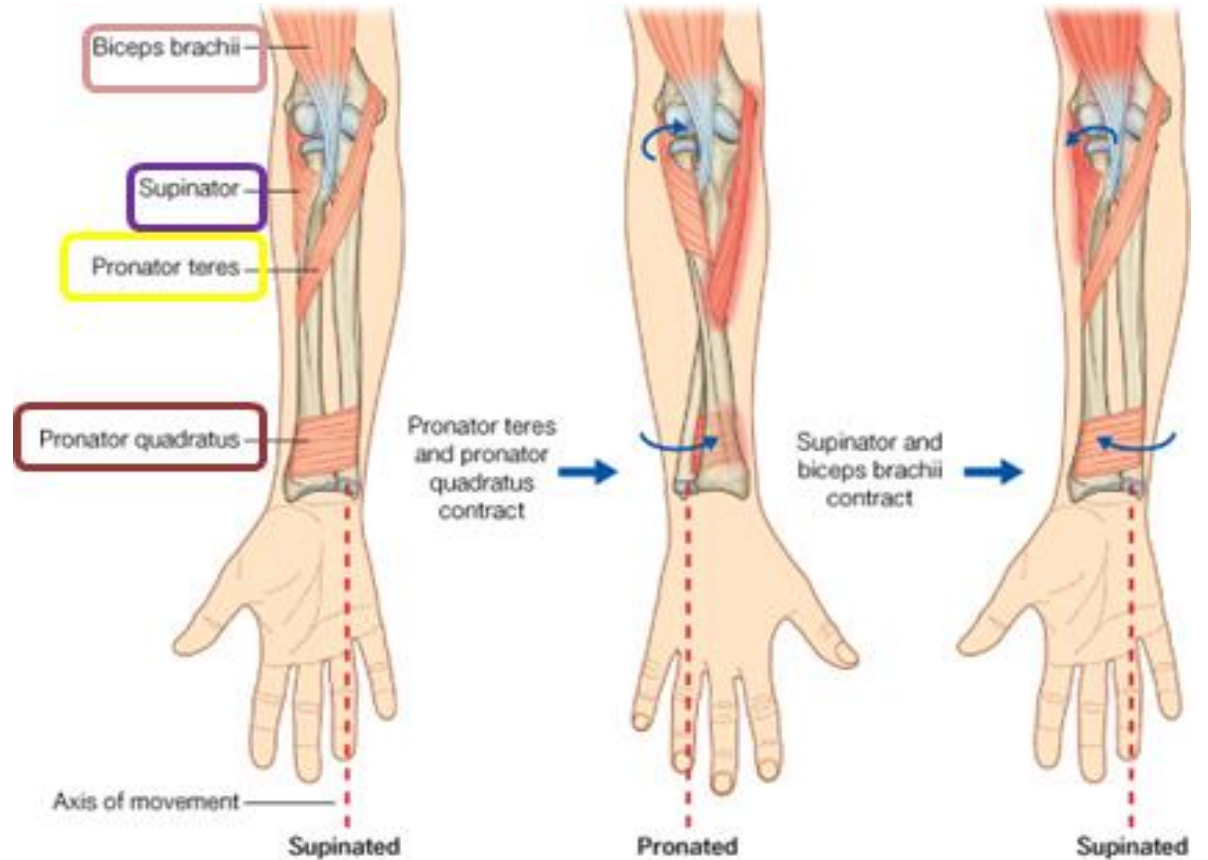
- Biceps brachii.
- Supinator.

- **Muscles produce pronation:**

- Pronator teres.
- Pronator quadratus.

Brachioradialis puts the forearm in midprone – position*.

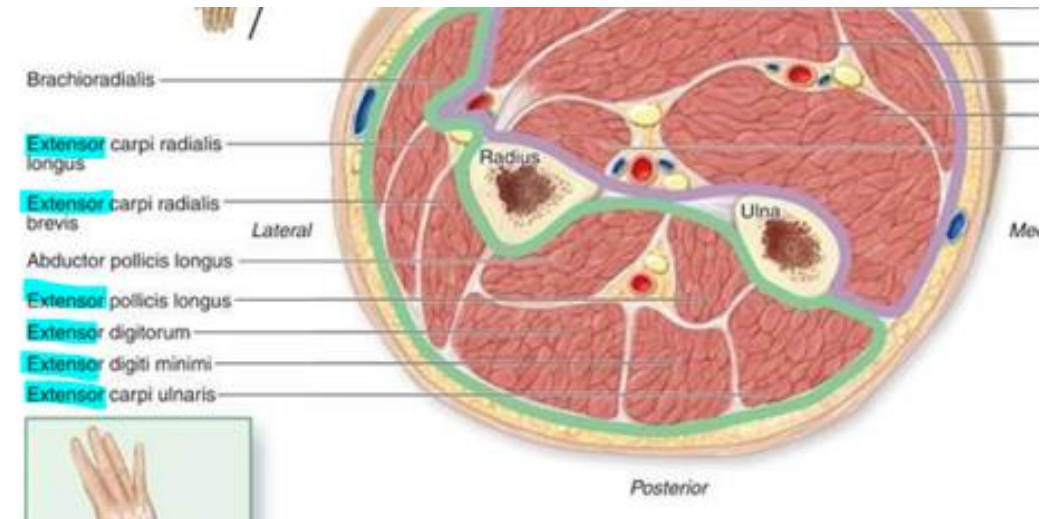
(لما تكون اليد نفس السكين، الوضعية اللي بالنص بين السوبابنيشن والبرونيشن) *



Posterior compartment:

3 groups
12 muscle

- Common Extensor Origin (front of lateral epicondyle).



Superficial group (5):

- 1-Extensor carpi radialis brevis
- 2- Extensor digitorum
- 3- Extensor digiti minimi
- 4-Extensor carpi ulnaris
- 5-Anconeus

Superficial Lateral group (2):

- (originate from lateral Supracondylar Ridge)
- 1-Brachioradialis
 - 2-Extensor carpi radialis longus

Deep group (5):

- (3 to thumb+ 1 to index + supinator).
- 1-Supinator.
 - 2-Abductor pollicis longus.
 - 3-Extensor pollicis brevis.
 - 4-Extensor pollicis longus.
 - 5-Extensor indices.

Note: The total number of superficial muscles is 7

Pollicis = إبهام

Posterior compartment:

1) Superficial Group

These muscles make up the superficial group of the posterior compartment of the forearm (7 muscles):

Brachioradialis (BR).

Extensor Carpi radialis longus (ECRL).

Extensor Carpi radialis brevis (ECRB).

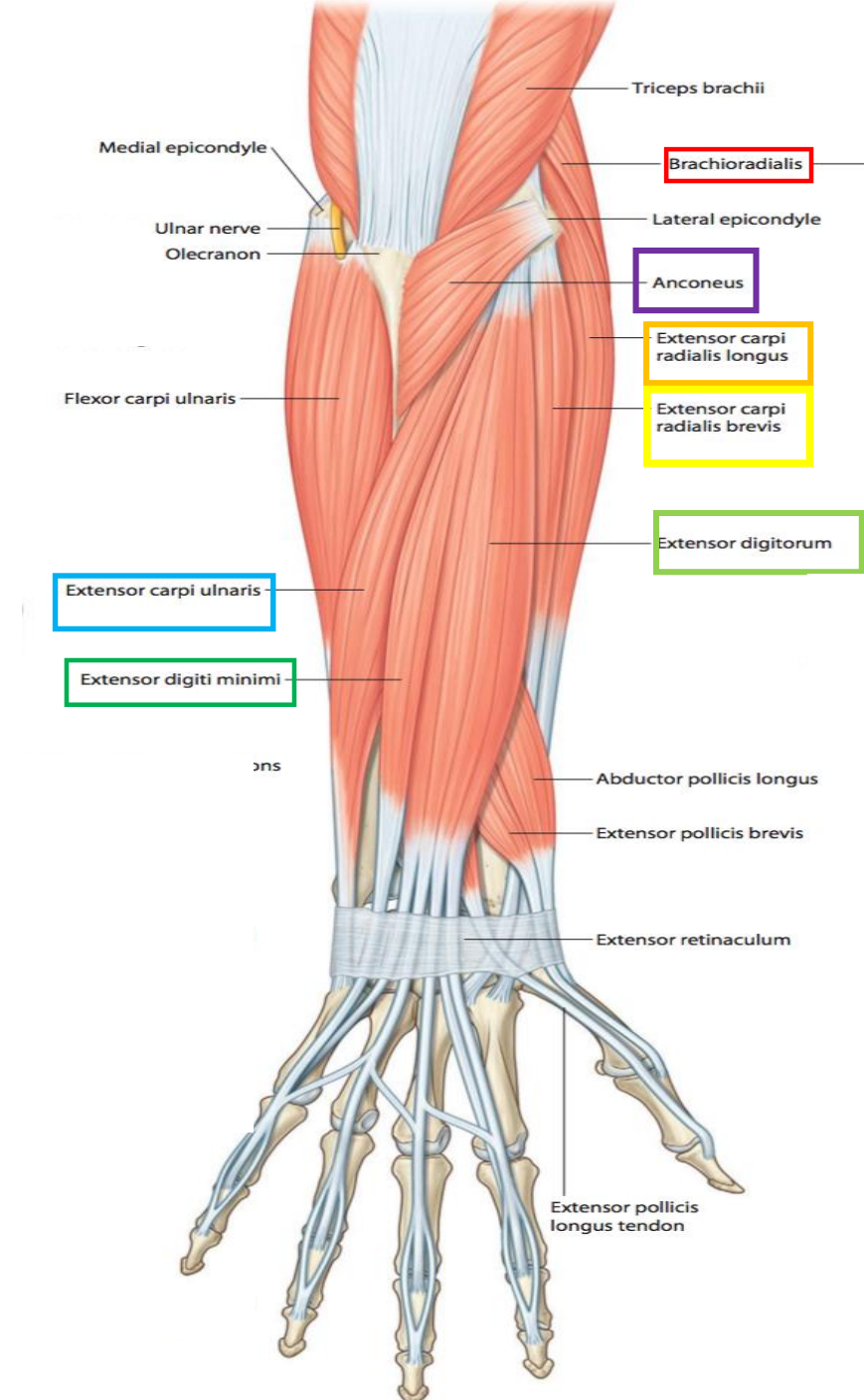
Extensor Digitorum (ED).

Extensor Digiti minimi (EDM).

Extensor Carpi ulnaris (ECU).

Anconeus (An).

“Big Chocolate Chips, Double Dip Cherries are Amazing”



Posterior compartment:

1) Superficial Group

Origin:

- **Common extensor origin** (front of **lateral** epicondyle of humerus)

Except 2 (BR & ECRL: lateral supracondyle)

- All cross the wrist **except brachioradialis & anconeus**
- All are supplied by deep branch of radial nerve (also called posterior interosseous nerve)

Except (ABE):

- Anconeus (An).
- Brachioradialis (BR).
- Extensor carpi radialis longus (ECRL).

^These 3 are supplied by the radial nerve itself.

Note: you have to distinguish whether the innervation is from a nerve or one of its branches.

It's important to know the exceptions

Insertion:

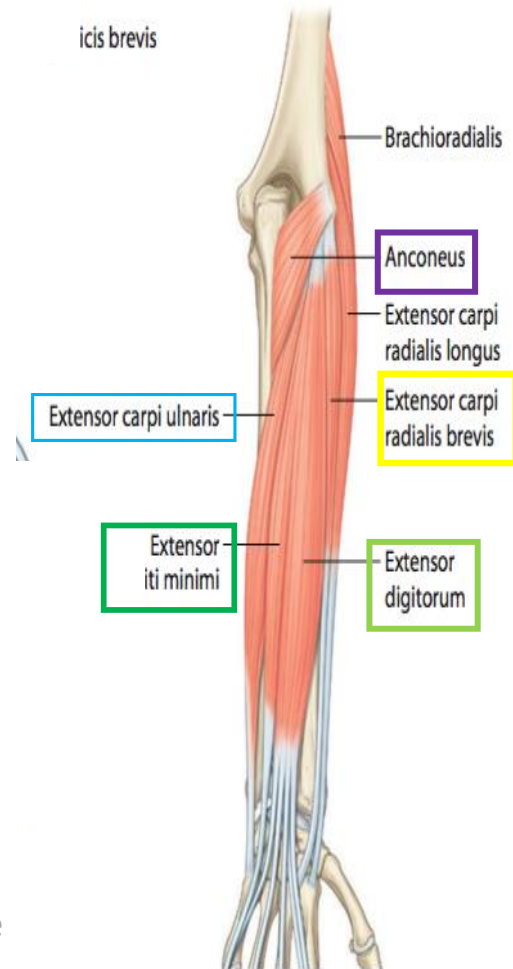
Extensor carpi radialis brevis:
base of 3rd metacarpal bone.

Extensor digitorum:
Extensor expansion of the medial 4 fingers.

Extensor digiti minimi:
Extensor expansion of the little finger.

Extensor carpi ulnaris:
Base of the 5th metacarpal bone.

Anconeus:
Lateral side of the olecranon
Superior part of the posterior (back) of Ulna shaft.



Superficial layer of muscles in the posterior compartment of forearm

Posterior compartment:

1) Superficial Group

Brachioradials

Origin:

Lateral supracondylar ridge of humerus

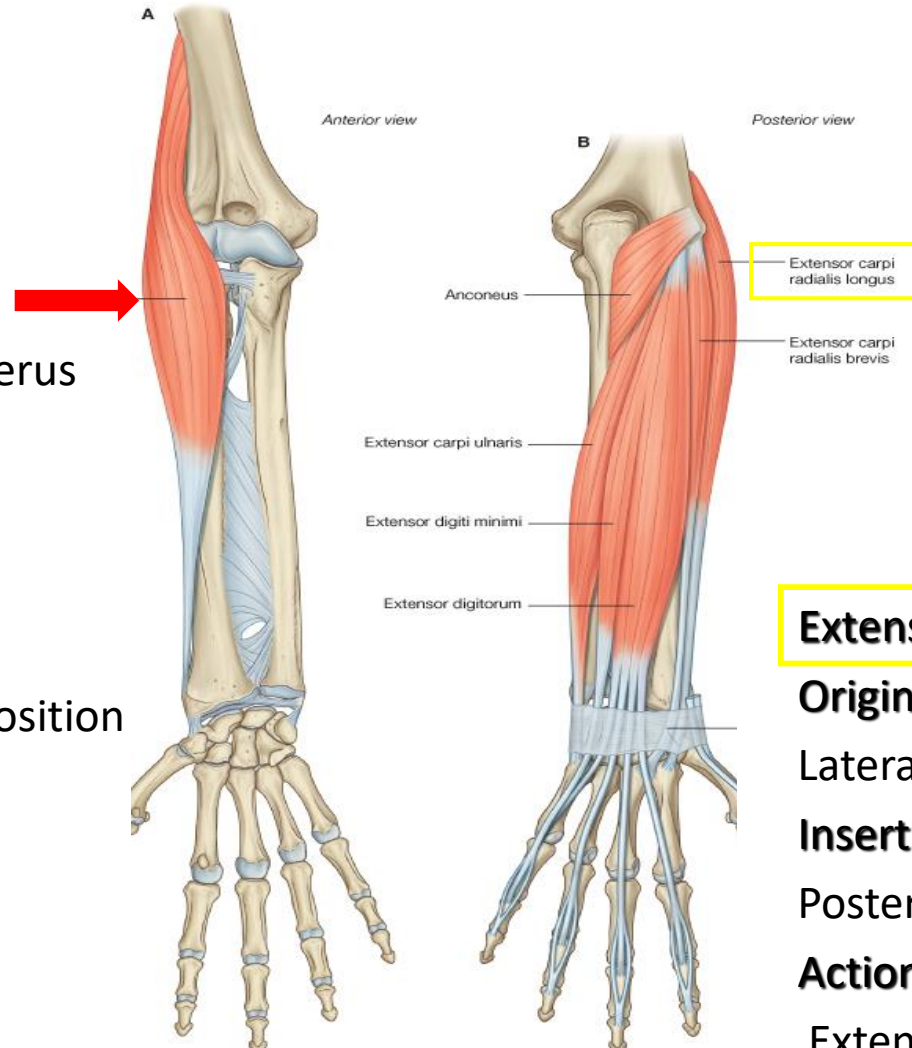
Insertion:

Base of styloid process of radius

Action:

Flexes forearm; (elbow).

Rotates forearm to the midprone position



Extensor Carpi radialis longus

Origin:

Lateral supracondylar ridge of humerus

Insertion:

Posterior surface of base of 2nd metacarpal bone

Action:

Extends and abducts hand at wrist joint

Posterior compartment:

2) Deep group:

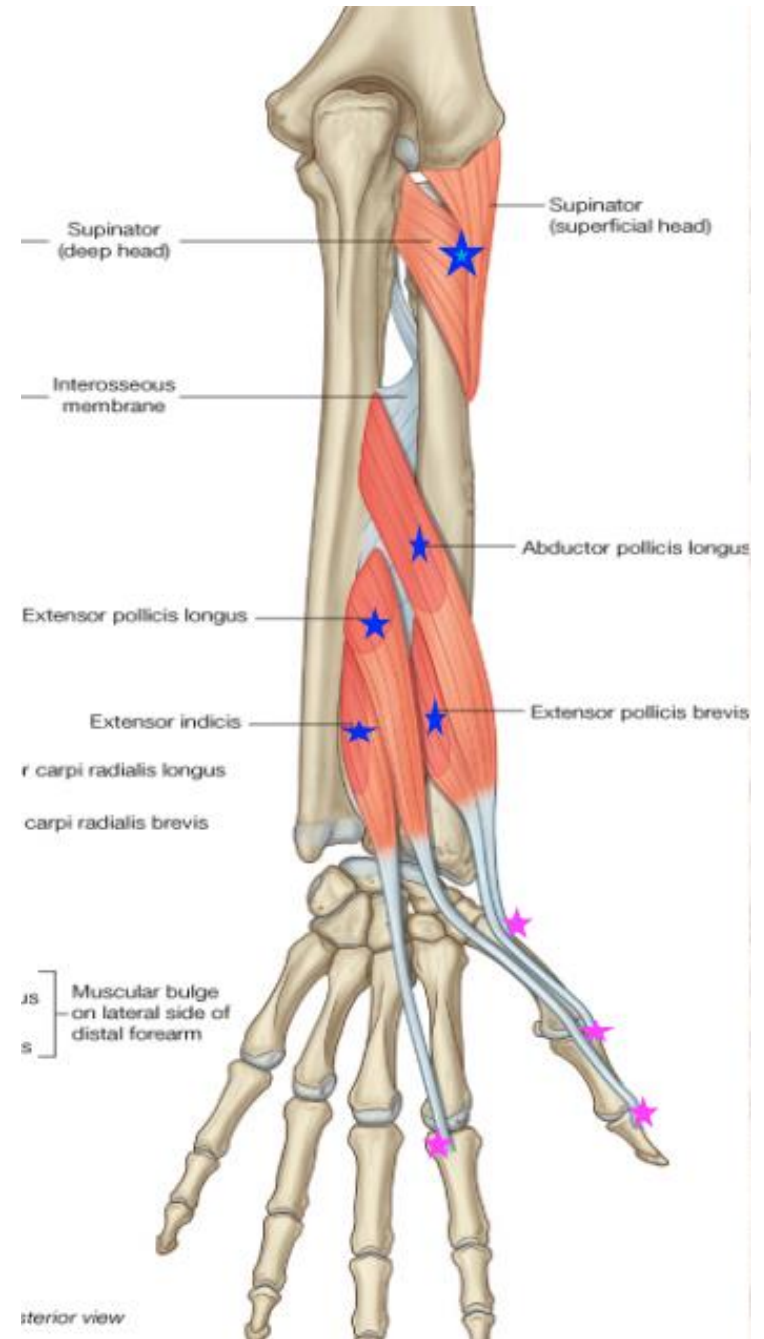
5 muscles

- 1- Abductor pollicis longus, (APL).
- 2- Extensor pollicis brevis, (EPB).
- 3- Extensor pollicis longus, (EPL).
- 4- Extensor indicis (EI).
- 5- Supinator.

These muscles are supplied by:

posterior interosseous nerve (deep branch of radial nerve).

Remember all back muscles of forearm are supplied by the posterior interosseous nerve except ABE by the radial nerve



Dorsal Extensor Expansion:

Expansion = توسيع

It is formed on the dorsum of medial 4 fingers

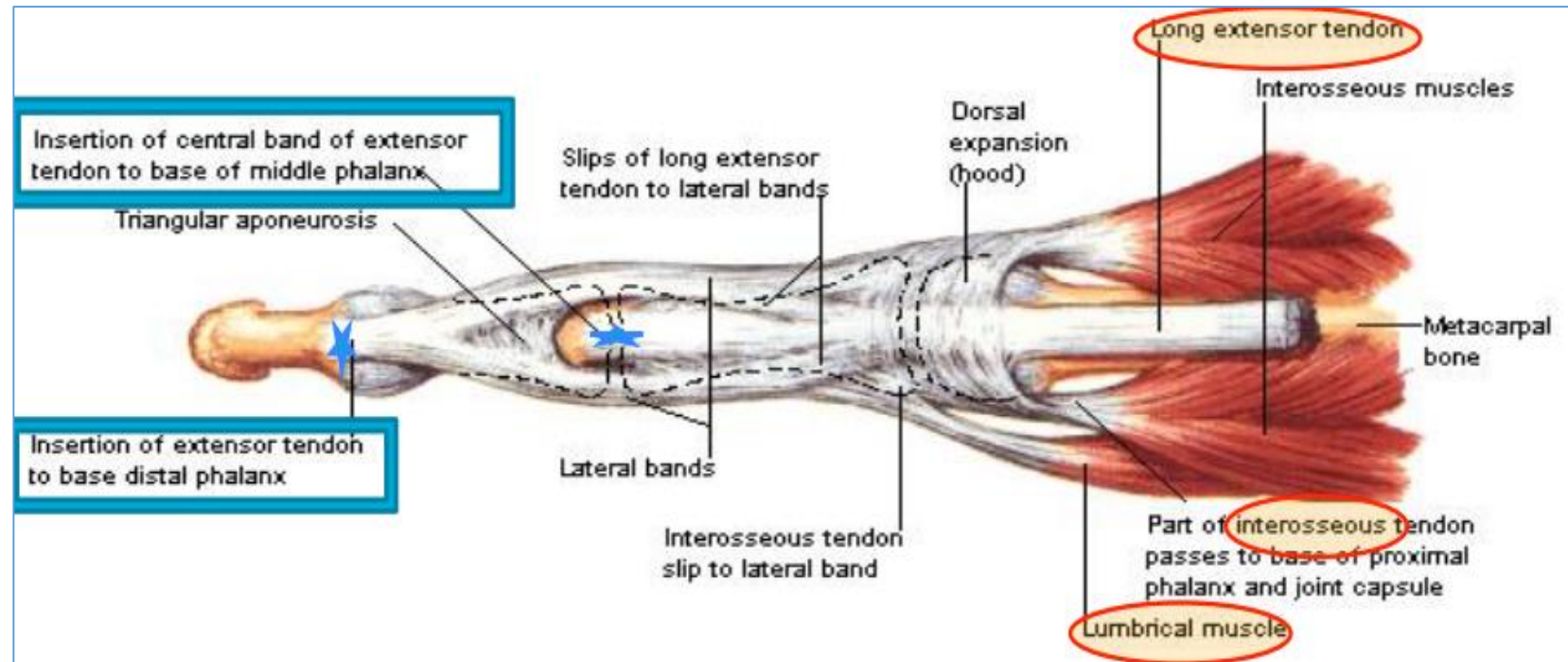
By the union of the tendons of:

1- Extensor digitorum 2- Extensor digiti minimi 3-Extensor indicis 4-Palmar and dorsal Interossei and 5- Lumbricals muscles.

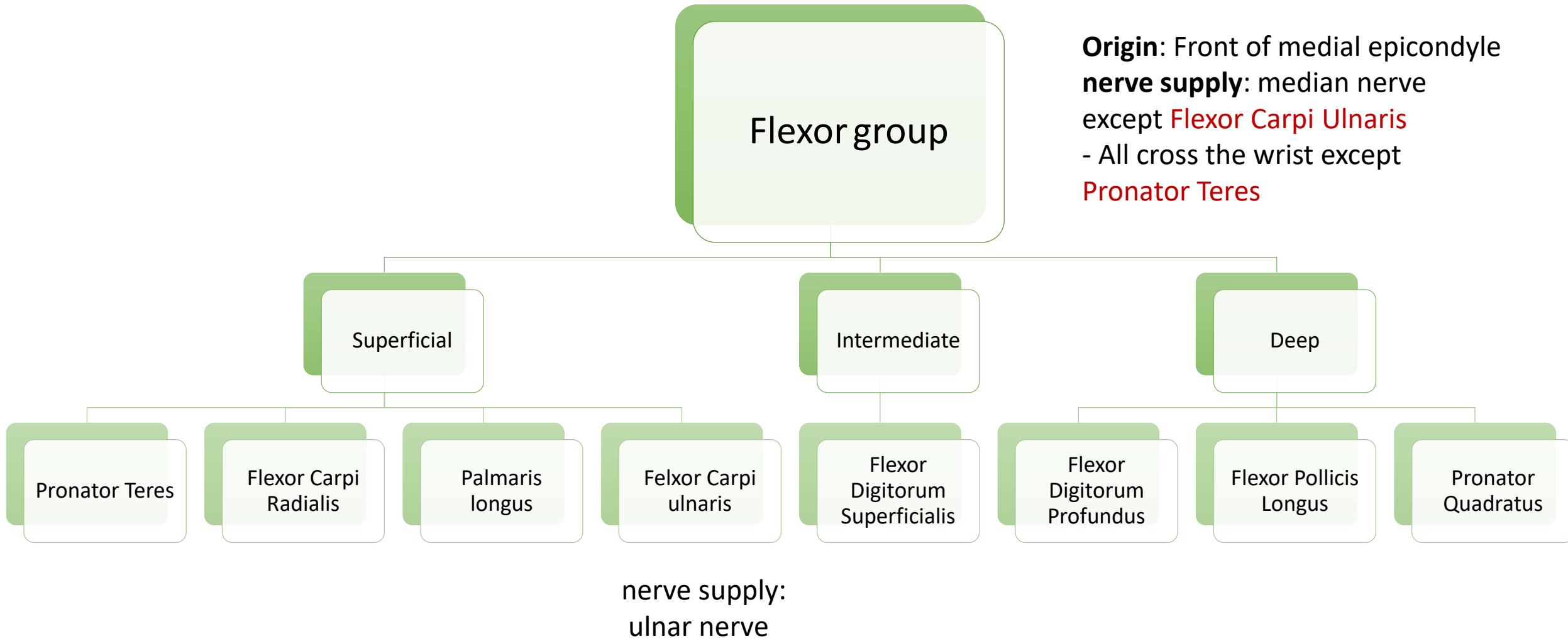
The united tendon divides into 3 slips:

2 Lateral:
attached to the terminal phalanges.

1 Median:
attached to middle phalanges

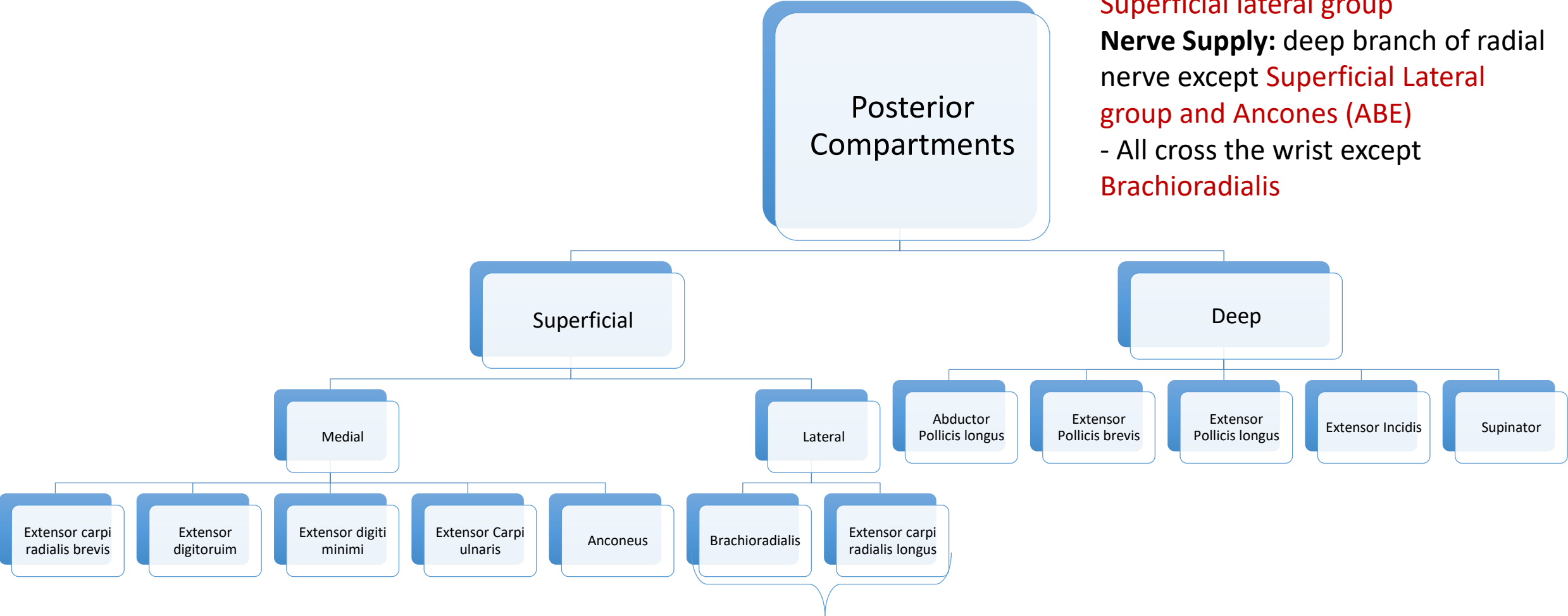


Summary



Summary

Origin: Lateral epicondyle except **Superficial lateral group**
Nerve Supply: deep branch of radial nerve except **Superficial Lateral group and Ancones (ABE)**
- All cross the wrist except **Brachioradialis**



Origin: lateral supracondyle ridge of humerus
Nerve supply: radial nerve

Summary

Muscles that flex the hand:

1- Flexor Carpi Radialis

2- Flexor Carpi Ulnaris

3- Palmaris Longus

4- Flexor Digitorum Superficialis

Muscle	compartment	Exceptions:	
Flexor Carpi Ulnaris	Flexor group	Nerve Supply	Ulnar nerve
Superficial lateral group and Anconeus (ABE)	Posterior Compartments	Nerve Supply	Radial Nerve
Pronator Teres	Flexor group	Wrist crossing	Doesn't cross
Brachioradialis	Posterior Compartments	Wrist crossing	Doesn't cross
Anconeus	Posterior Compartments	Wrist crossing	Doesn't cross
Superficial Lateral group	Posterior Compartments	origin	lateral supracondylar ridge of humerus

Summary

Posterior Compartment
(Extensor group)

Anterior Group
(Flexor group)

	Muscle	Insertion
Superficial Medial	Extensor Carpi Ulnaris	Base of 5 th metacarpal bone
	Extensor Digitorum	Extensor expansion of medial 4 fingers
	Extensor Carpi Radialis Brevis	Base of 3 rd metacarpal bone
	Extensor Digiti Minimi	Extensor expansion of little finger
	Anconeus	Superior posterior part of shaft of ulna
Superficial Lateral	Extensor Carpi Radialis Longus	Base of 2 nd metacarpal bone (posterior)
	Brachioradials	Base of styloid process of radius
Superficial	Flexor Carpi Radialis	Base of 2 nd metacarpal bone
	Pronator teres	middle of lateral surface of radius.
	Palmaris Longus	Flexor retinaculum and palmer aponeurosis
	Flexor Carpi Ulnaris	5 th metacarpal
Intermedial	Flexor Digitorum Superficialis	Middle phalanges of 4 medial fingers
deep	Flexor Digitorum Profundus	Distal phalanges of medial 4 fingers
	Flexor Pollicis Longus	Distal phalanx of thumb
	Pronator Quadratus.	distal 1/4th of ant. surface of Radius

Questions:

1- Name 3 extensor muscles from the deep group of the posterior compartment?

2- Identify the muscle?

3- Radius and ulna are connected together by:

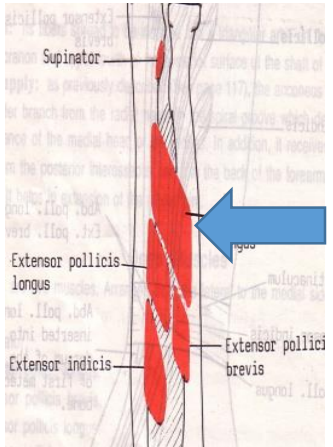
- a. interosseous membrane
- b. Thoracolumbar fascia
- c. Iliac crest

4- Fascial sheath attached to:

- a. Anterior border of the ulna.
- b. Posterior border of the ulna.
- c. Medial border of the ulna.

5- All of the following muscles produce supination Except:

- a. Biceps brachii.
- b. Supinator.
- c. Pronator teres.



6- Which of the following muscle put the forearm in midprone – position:

- a. Brachioradialis
- b. Pronator quadratus.
- c. Biceps brachii.

7-All superficial flexors of forearm muscles are supplied by.....Except FCU, its supplied from.....

- a. median nerve - axillary nerve
- b. median nerve – Ulnar nerve
- c. radial nerve – Ulnar nerve

8-Insertion of flexor carpi Ulnaris

- a. 5th metacarpal bone
- b. 2nd metacarpal bone
- c. Scaphoid bone

9-What is the common extensor origin?

- A) Frontal medial epicondyle of humerus
- B) frontal of lateral epicondyle of humerus
- C) Radial fossa
- D) Coronoid process

1) Supinator, Abductor pollicis longus, Extensor pollicis brevis
 2) Abductor pollicis longus (APL)

- 3) A
- 4) B
- 5) C
- 6) A
- 7) B
- 8) A
- 9) B

Questions:

10- Which muscle is not supplied by deep branch of radial nerve?

- A) Extensor Carpi ulnaris
- B) Extensor Digitorum
- C) Extensor Carpi radialis brevis
- D) Extensor Carpi radialis longus

11- The insertion of ECRL is :

- A) base of 2nd metacarpal bone
- B) base of 3rd metacarpal bone.
- C) Base of the 5th metacarpal bone.
- D) Extensor expansion of the medial 4 fingers.

12- Which of the following muscles contributes as powerful supinator of forearm?

- A) Palmaris longus
- B) Pronator teres
- C) Biceps brachii
- D) Supinator

13- which muscle is related to common flexor origin?

- A) Flexor digitorum profundus
- B) Flexor pollicis longus
- C) Pronator quadratus
- D) Pronator teres

14- Which one of the following forearm flexor muscles is intermediate?

- A- Flexor digitorum profundus
- B- Flexor digitorum superficialis
- C- Palmaris longus
- D- Flexor Capri ulnaris

15- What is the insertion of flexor digitorum profundus?

- A- Bases of middle phalanges of medial 4 fingers.
- B- Bases of distal phalanges of the medial 4 digits.
- C- Bases of proximal phalanges of the medial 4 digits.
- D- Middle part of distal phalanges of medial 4 fingers.

16- What is the forearm muscle that can flex the joints of the thumb?

10)D
11)A
12)C
13)D
14)B
15)B
16) Flexor Pollicis Longus



Leaders:

نواف الخضيرى

جواهر ابانمي

غادة المزروع

members:

نجد الذيب

نورة السهلي

سمية الغامدي

آمال الشيبى

رنا راسين

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