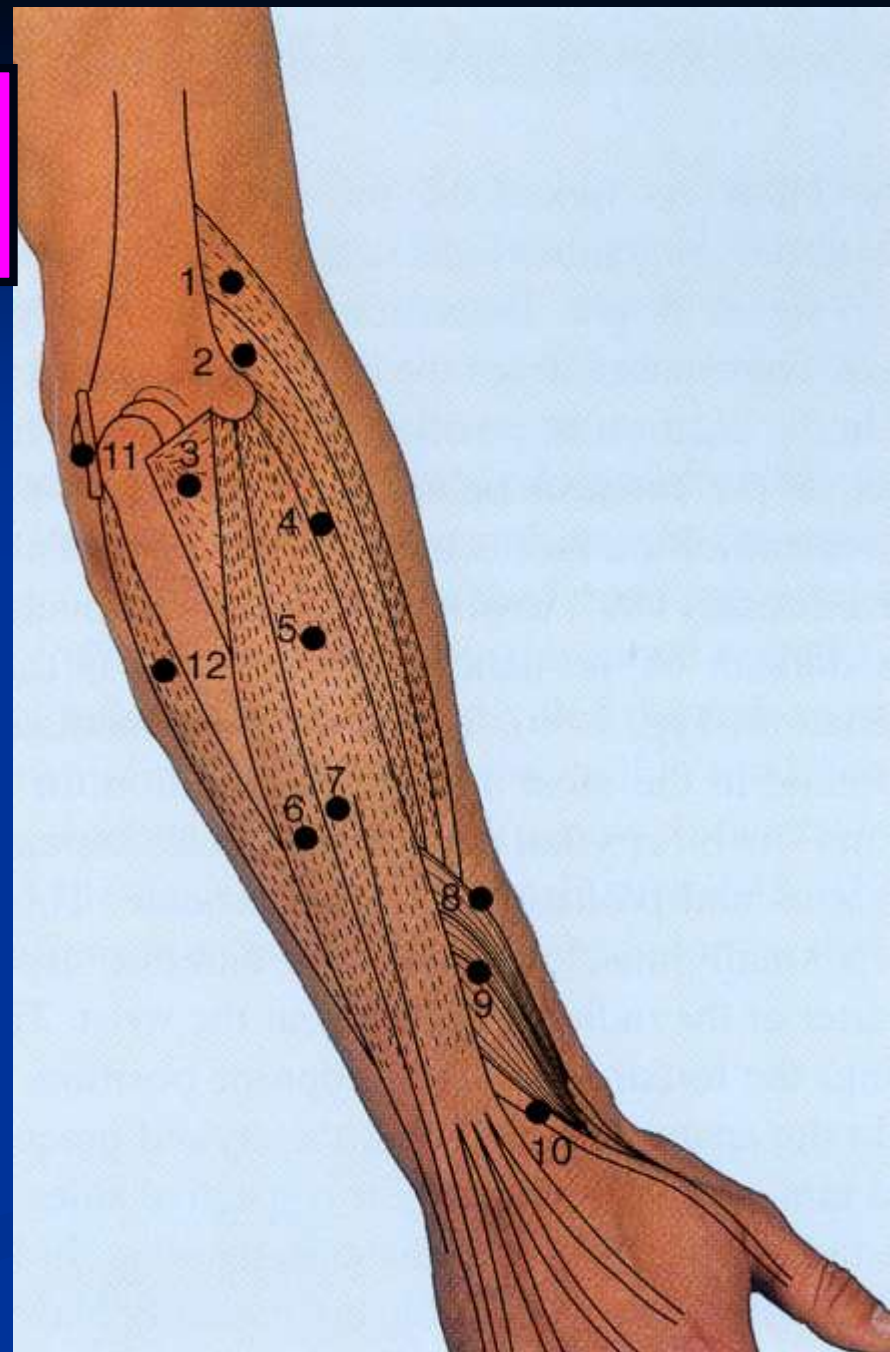


FOREARM



Dr. ESSAM SALAMA

OBJECTIVES

- At the end of this lecture, the student should be able to :
- List the names of the Flexors Group of Forearm (superficial & deep muscles).
- Identify the common flexor origin of flexor muscles and their innervation & movements.

OBJECTIVES

- Identify supination & pronation and list the muscles produced these 2 movements.
- List the names of the Extensor Group of Forearm (superficial & deep muscles).
- Identify the common extensor origin of extensor muscles and their innervation & movements.

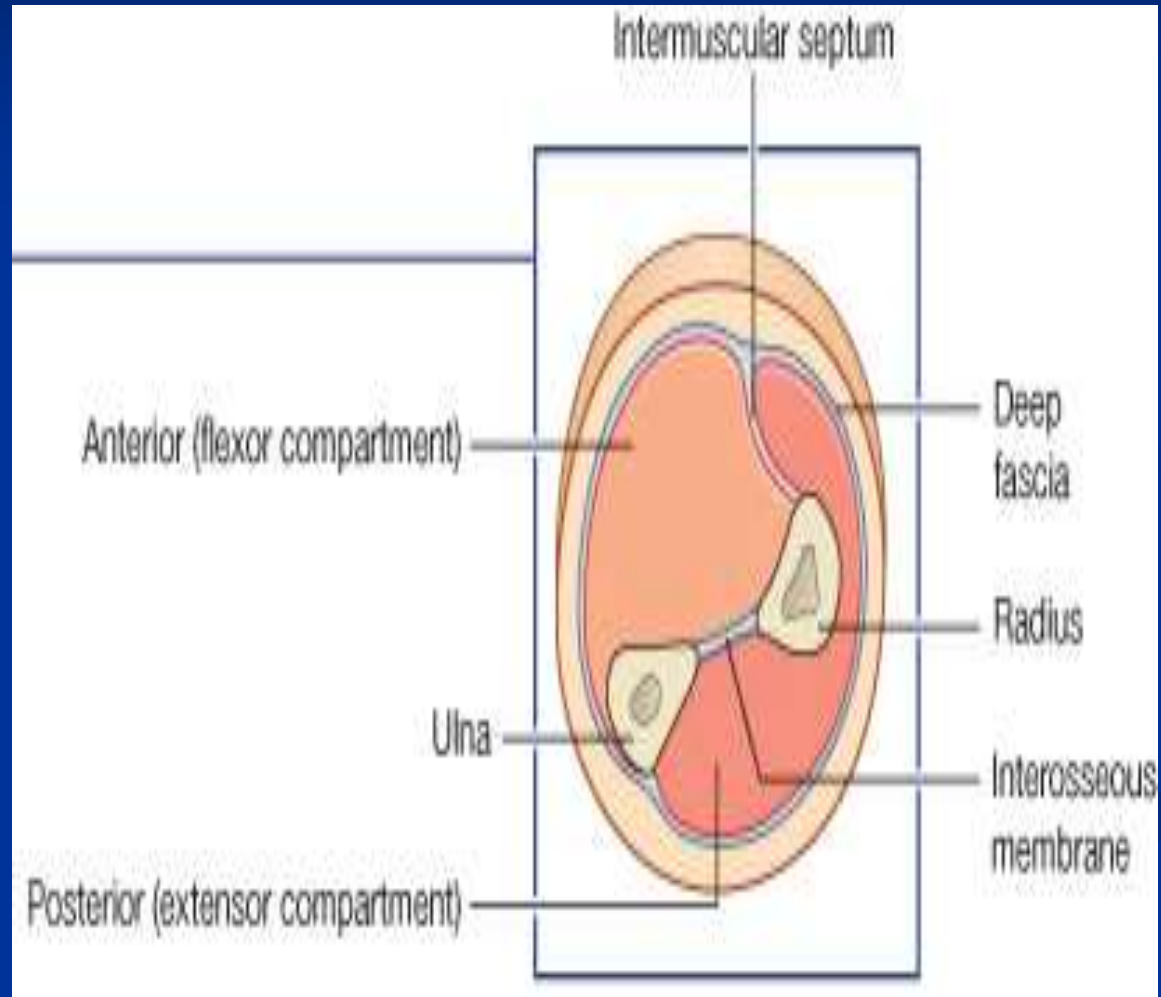
THE FOREARM

- **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.



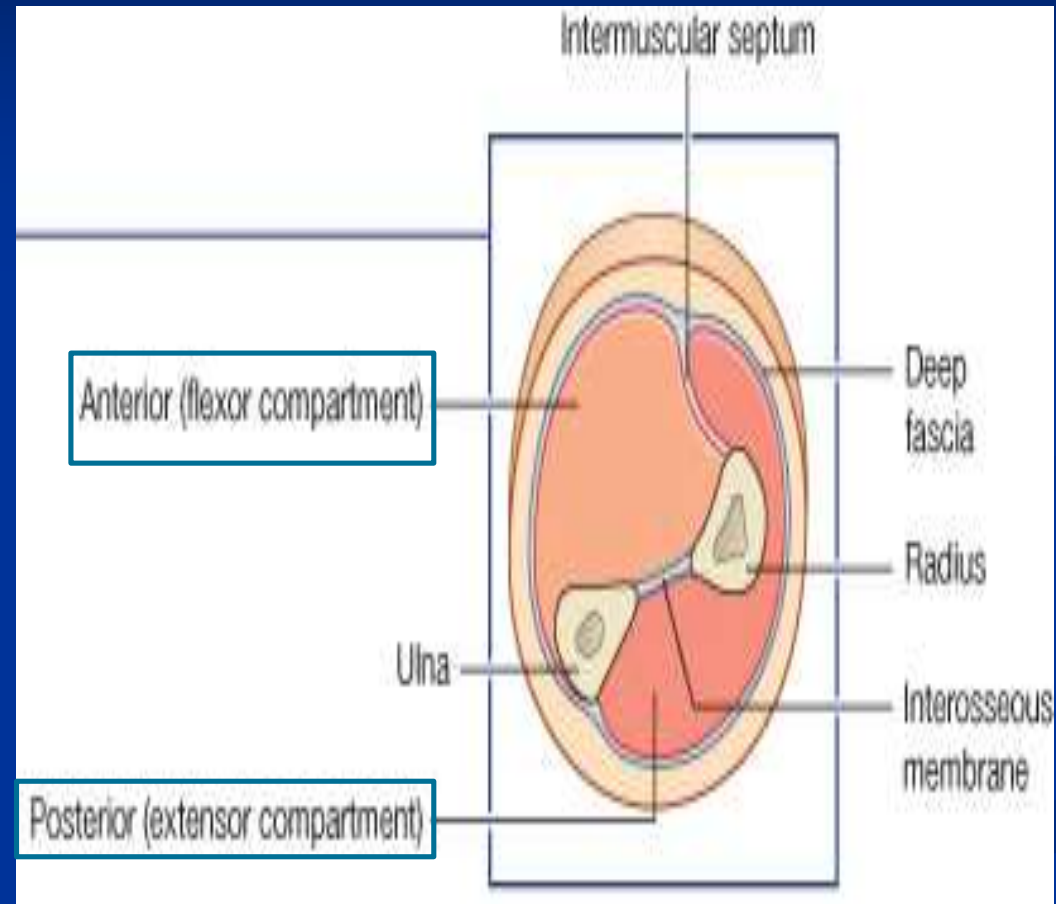
Fascial Compartments of the Forearm

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



Fascial Compartments of the Forearm

- This fascial sheath, together with the interosseous membrane & fibrous intermuscular septa, divided the forearm into
 - Anterior compartment
 - Posterior compartment,
 - Each having its own muscles, nerves, and blood supply.



FLEXOR GROUP

These muscles: 8

- Act on the elbow, wrist and joints of the fingers.
- Form fleshy masses in the proximal part and become tendinous in the distal part of the forearm.
- Arranged in three groups:



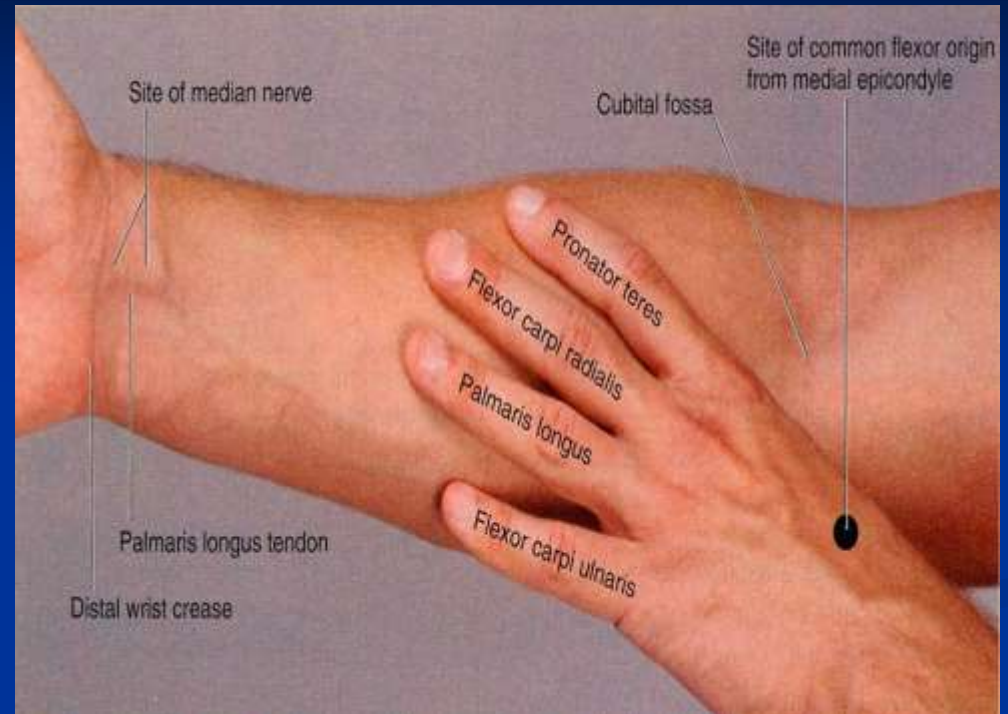
FLEXOR GROUP

I-Superficial: 4

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

II-Intermediate: 1

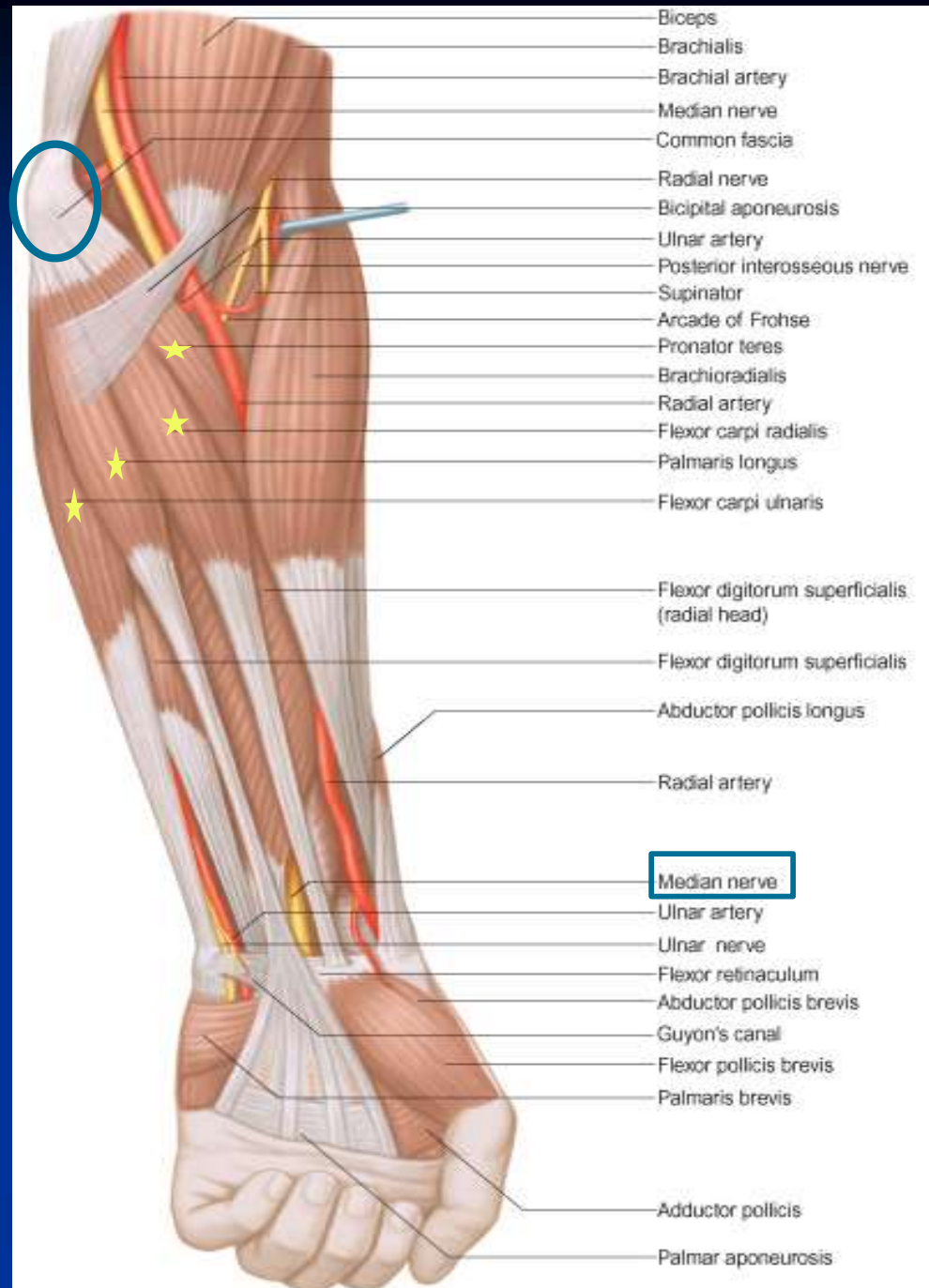
- Flexor digitorum superficialis



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, flexor carpi ulnaris, FCU (ulnar).
- All cross the wrist joint except one, pronator teres, (PT).



Pronator teres.

Origin:

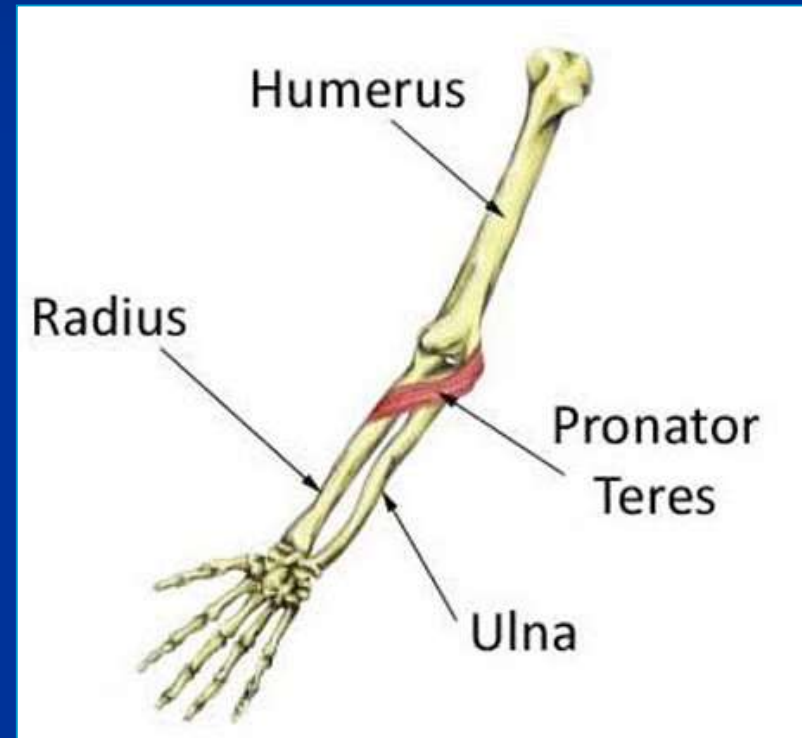
Superficial head (humeral):
lower part of the medial
supracondylar line.

Deep head (ulnar): medial
border of the coronoid process.

Insertion: Impression on the
middle of the lateral surface of
the shaft of the radius.

Nerve supply: Median nerve.

Action: Pronation of the
forearm.



Flexor carpi radialis.

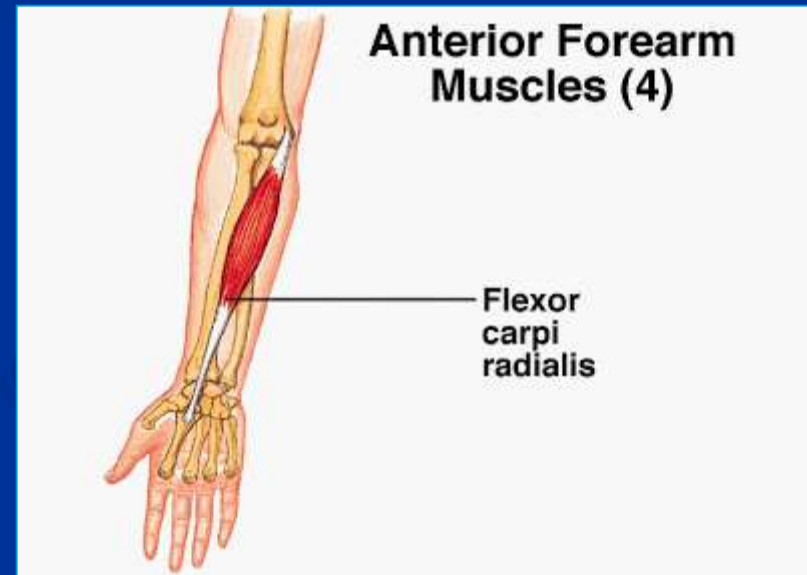
Origin: Common flexor origin (front of the medial epicondyle).

Insertion: Deep to flexor retinaculum in to the base of the 2nd metacarpal bone.

Nerve supply: Median nerve.

Action: Flexion of the wrist.

Helps in abduction of the hand.



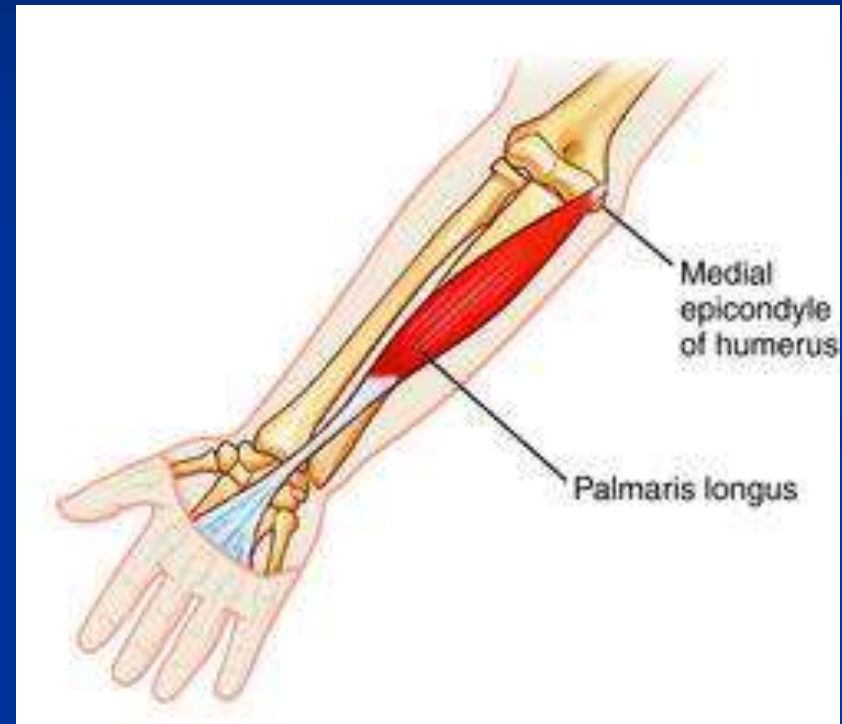
Palmaris longus

Origin: Common flexor origin.

Insertion: Superficial to flexor retinaculum in to the apex of the palmar aponeurosis.

Nerve supply: Median nerve.

Action: Flexion of the wrist.



Flexor digitorum superficialis

Origin: Humeroulnar head: Common flexor origin, and medial border of coronoid process.

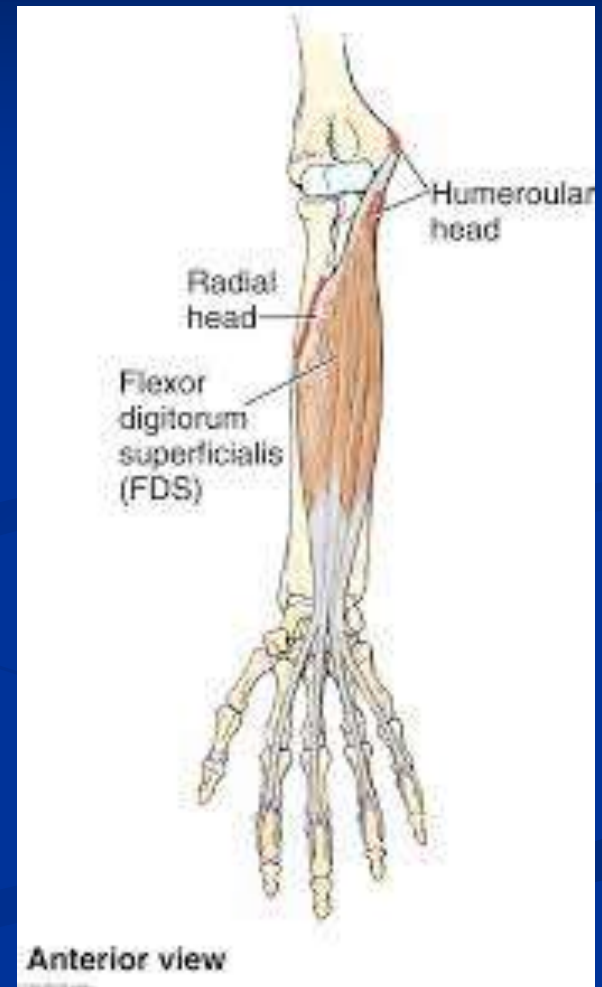
Radial head: Anterior oblique line of radius

Insertion: Four tendons, deep to flexor retinaculum in to the middle phalanges of the medial four fingers.

Nerve supply: Median nerve.

Action: Flexion of the wrist

Flexion of interphalangeal and metacarpophalangeal joints of the medial four fingers.



Flexor carpi ulnaris.

Origin: Humeral head: Common flexor origin.

Ulnar head: Olecranon and posterior border of ulna

Insertion: Pisiform bone.

Nerve supply: ulnar nerve.

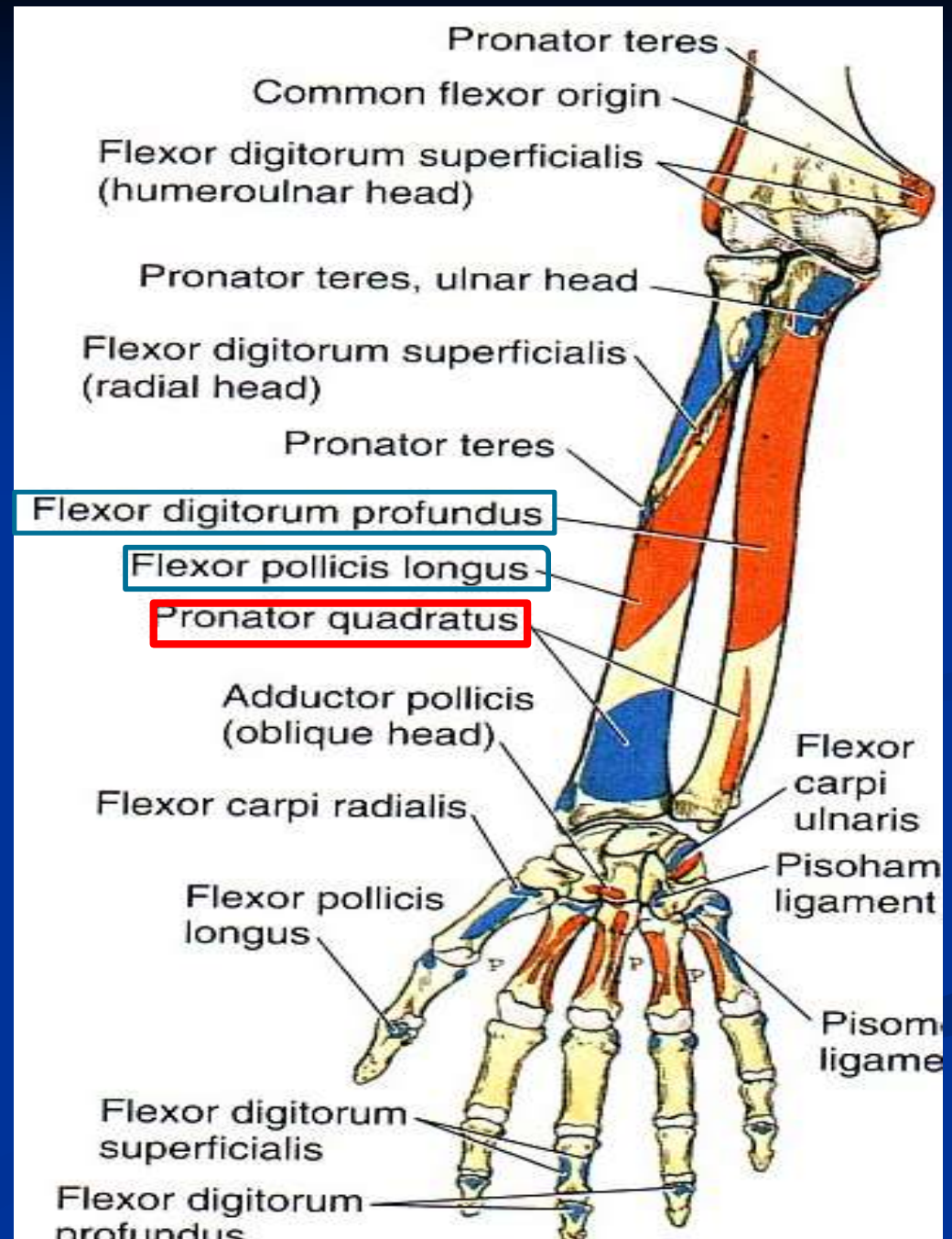
Action: Flexion of the wrist (with flexor carpi radialis).

Adduction of the hand,
(with extensor carpi ulnaris).



Deep Flexors

- One above ulna:
Flexor Digitorum profundus
- One above radius:
Flexor pollicis longus
- One above the 2 bones:
Pronator Quadratus.



Flexor pollicis longus.

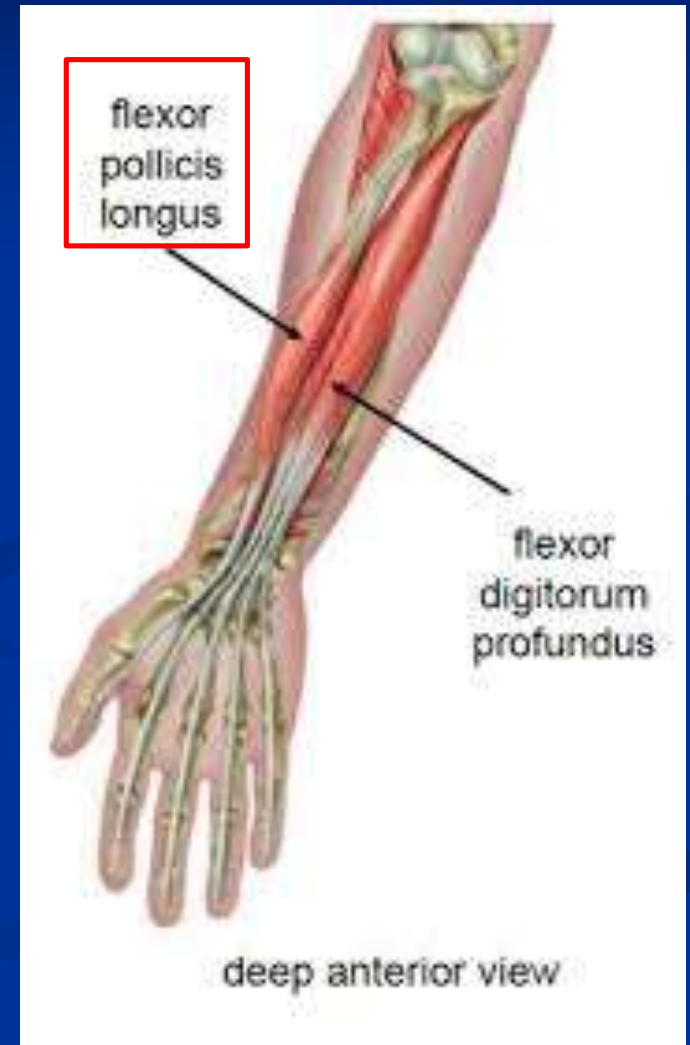
Origin: Upper 2/3 anterior surface of radius.

Insertion: Deep to flexor retinaculum in to the base of the terminal phalanx of the thumb.

Nerve supply: Anterior interosseous nerve.

Action: Flexion of interphalangeal and metacarpophalangeal joints of the thumb

Flexion of the wrist.



Flexor digitorum profundus

Origin: Upper 3/4 anterior and medial surfaces of the shaft of ulna.

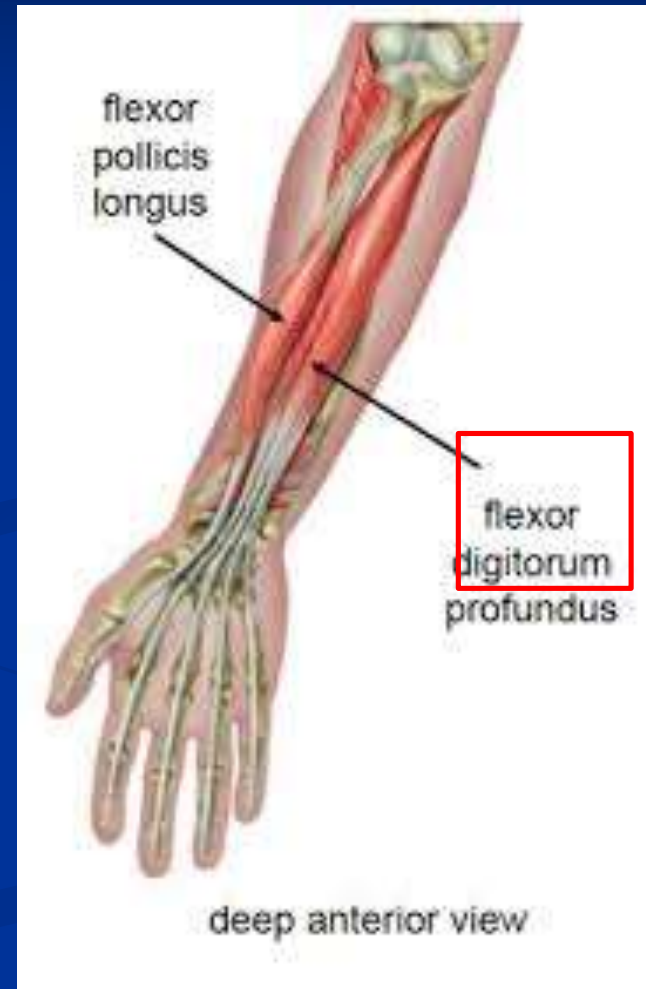
Insertion: Deep to flexor retinaculum in to the terminal phalanx of the medial four fingers.

Nerve supply:

Lateral half by the Anterior interosseous nerve.

Medial half by the ulnar nerve

Action: Flexion of interphalangeal and metacarpophalangeal joints of the medial four fingers.



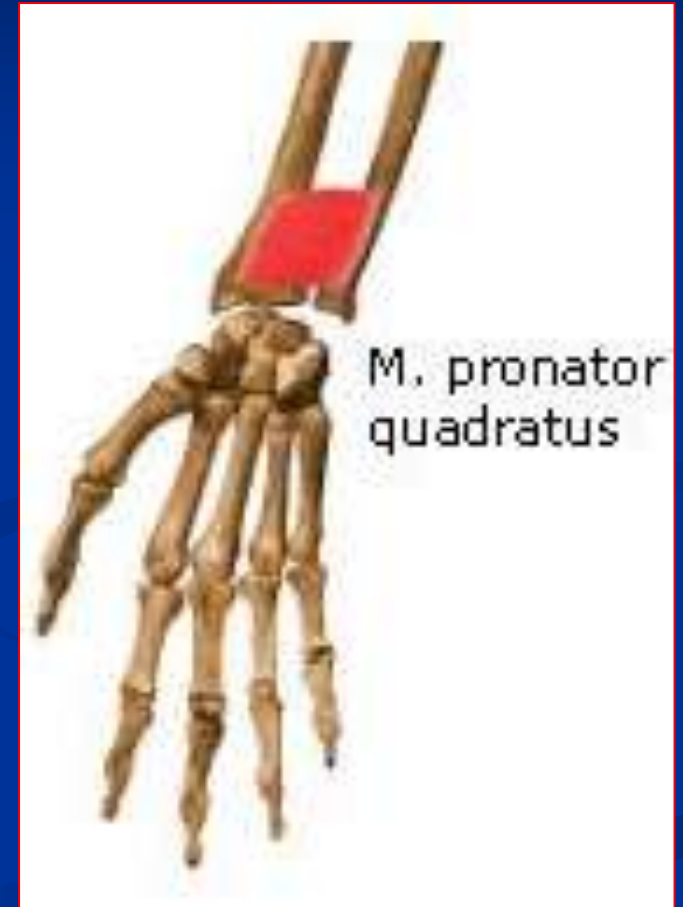
Pronator quadratus.

Origin: Oblique strip front of the lower part of shaft of ulna.

Insertion: lower part anterior surface of shaft of radius

Nerve supply: Anterior interosseous nerve.

Action: pronation of the forearm



Supination and pronation

It occurs in the superior and inferior radioulnar joints;

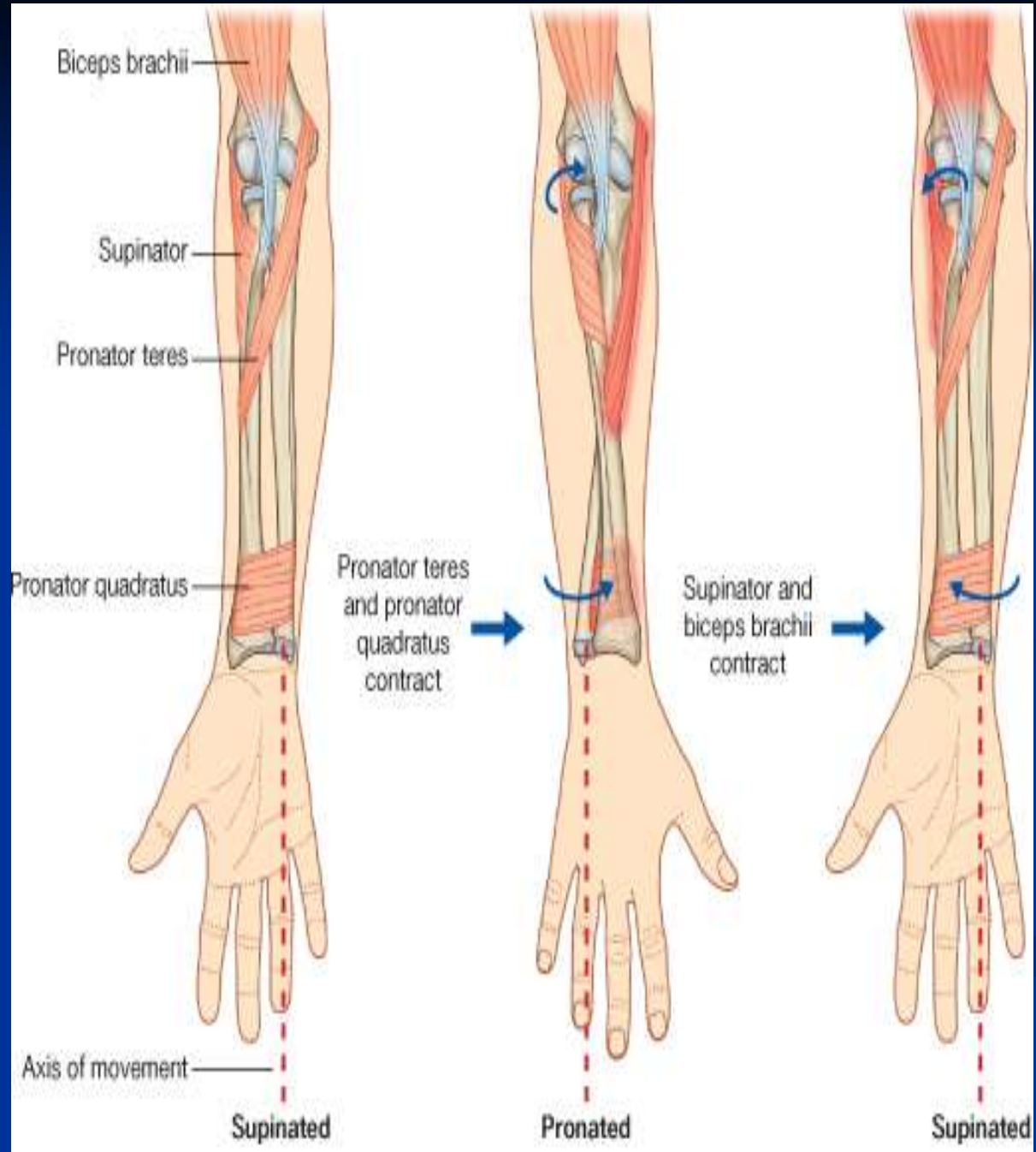
Muscles produce supination

- Biceps brachii.
- Supinator.

Muscles produce pronation

- Pronator teres.
- Pronator quadratus.

NB. Brachioradialis put the forearm in midprone-position.



Posterior compartment Extensor group

Superficial Lateral group (2)

- ❖ Brachioradialis
- ❖ Extensor carpi radialis longus

Common Extensor
Origin .
(front of lateral epicondyle).

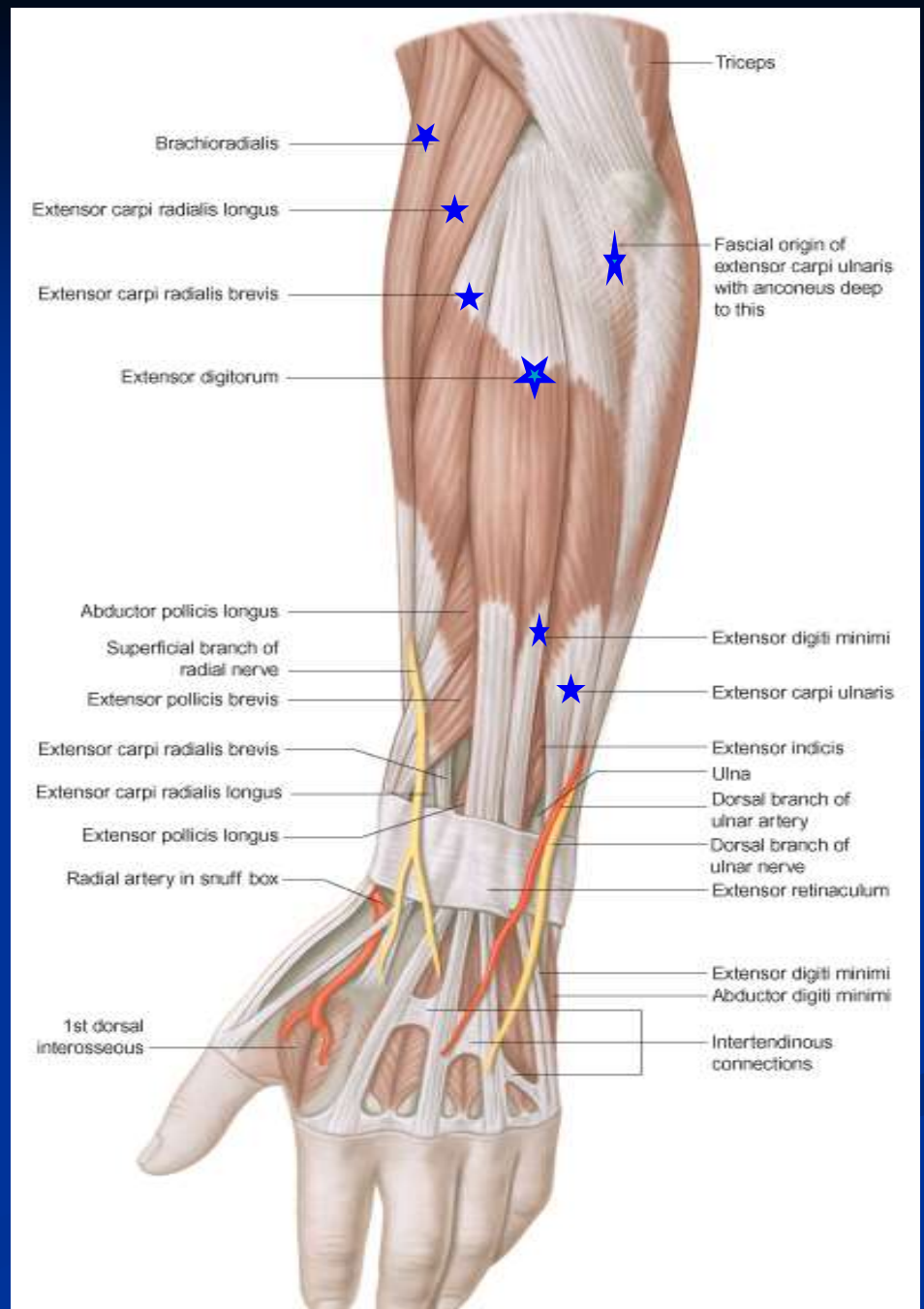
Superficial group (5)

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

Deep group (5)

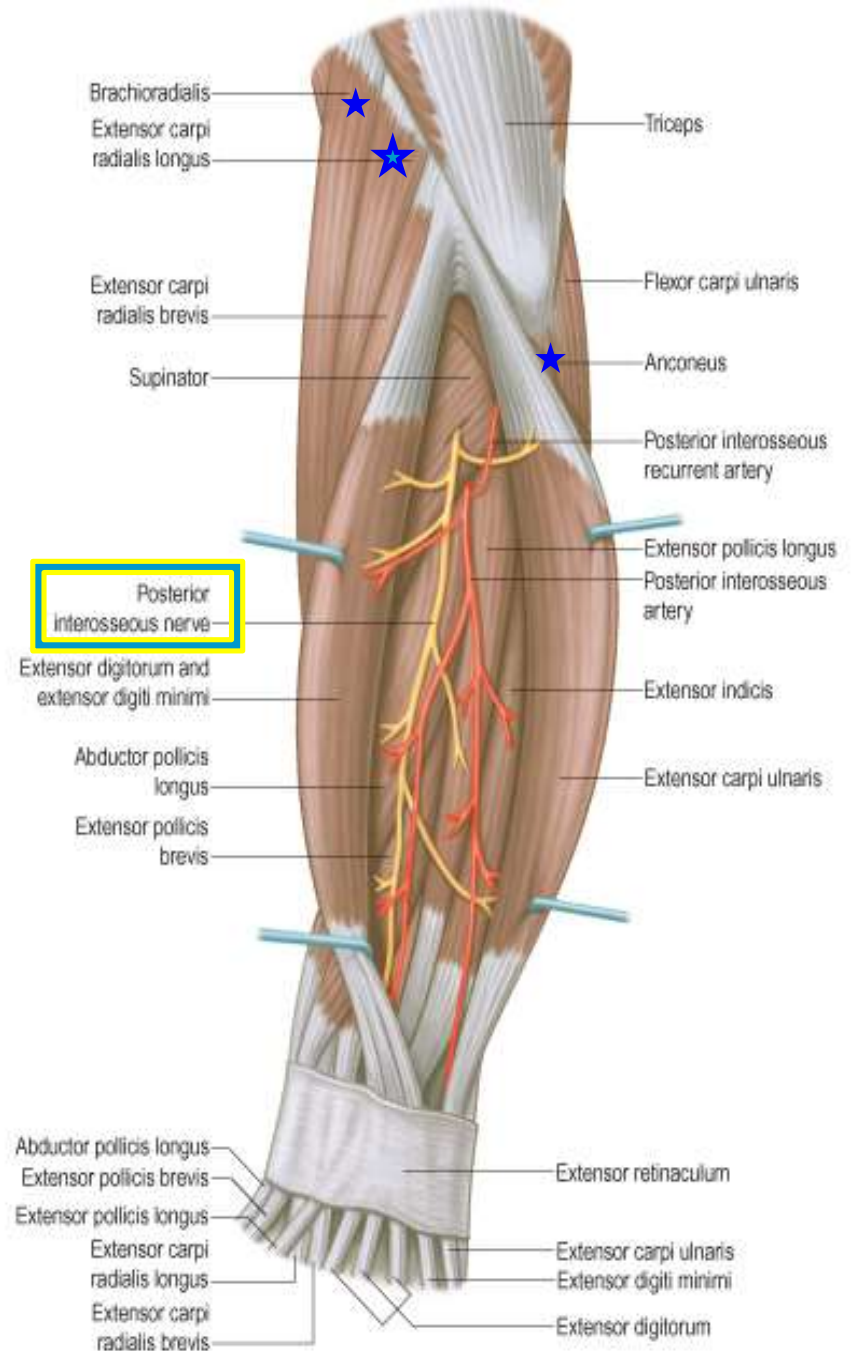
- (3 to thumb+ 1 to index + supinator).
- Supinator.
 - Abductor pollicis longus.
 - Extensor pollicis brevis.
 - Extensor pollicis longus.
 - Extensor indices.

- **Posterior compartment:**
- **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 extensors

- All arise from the common extensor origin, (front of lateral epicondyle of the humerus), EXCEPT 2 (BR & ECRL).
- All cross the wrist EXCEPT, one, brachioradialis.
- 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.

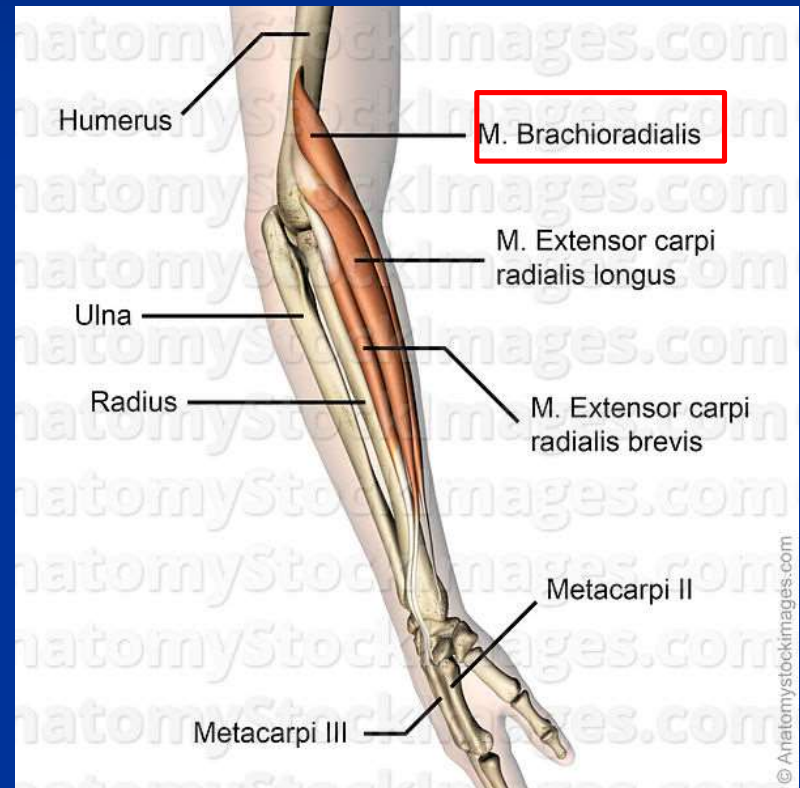
Origin: Upper 2/3 of the lateral supracondylar ridge of the humerus.

Insertion: Lateral side distal end radius at the base of the styloid process.

Nerve supply: Radial nerve.

Action: Flexion of the elbow joint

Brings the forearm in the mid prone position i.e. helps in initiation of pronation and supination



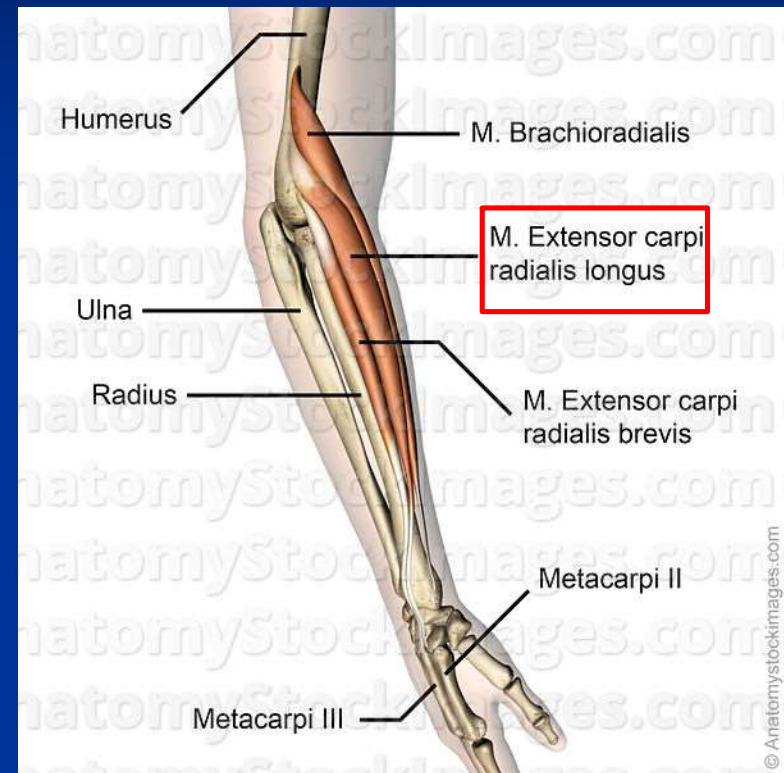
Extensor carpi radialis longus

Origin: Lower 1/3 of the lateral supracondylar ridge of the humerus.

Insertion: Dorsum of the base of 2nd metacarpal bone.

Nerve supply: Radial nerve.

Action: Extension of the wrist



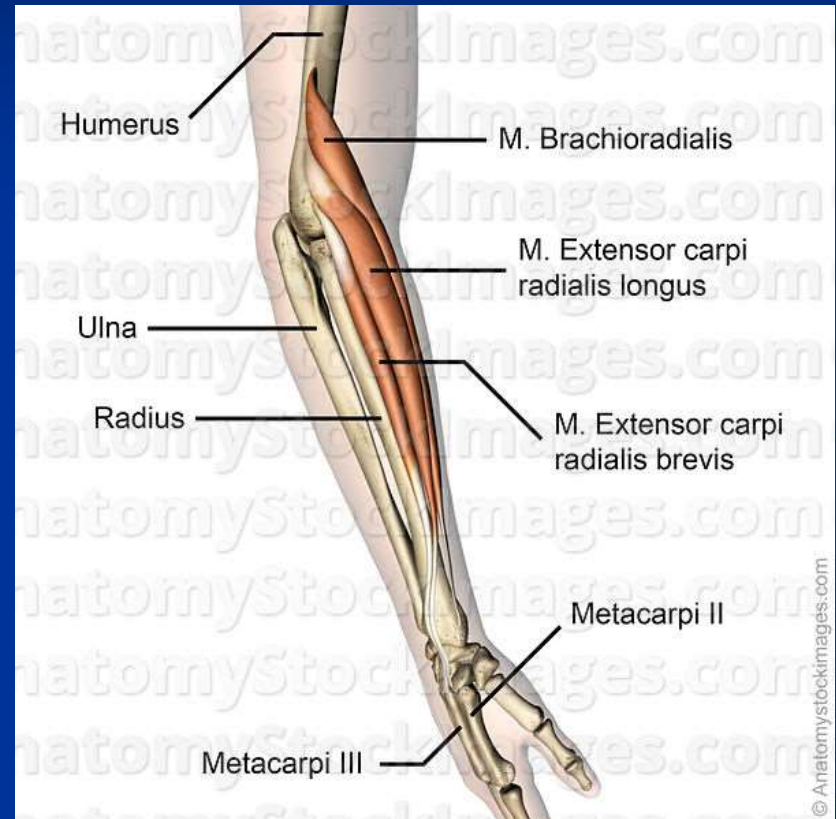
Extensor carpi radialis brevis

Origin: Common extensor origin (front of the lateral epicondyle of the humerus).

Insertion: Dorsum of the base of 3rd metacarpal bone.

Nerve supply: Posterior interosseous nerve.

Action: Extension of the wrist



Extensor digitorum

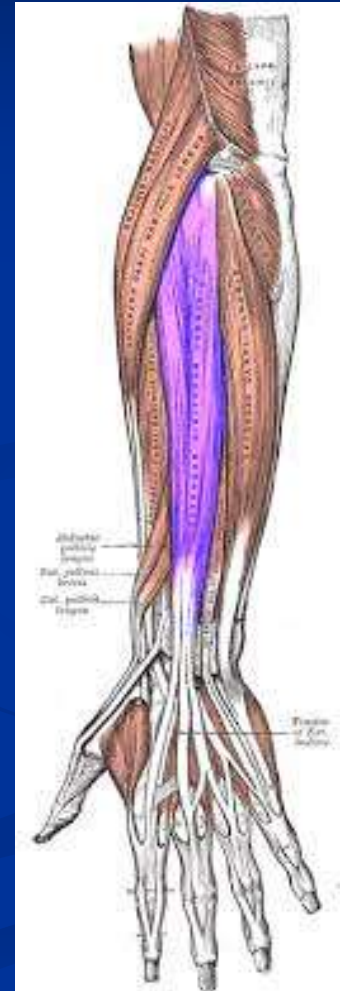
Origin: Common extensor origin.

Insertion: Four tendons into the medial four fingers through extensor expansion.

Nerve supply: Posterior interosseous nerve.

Action: Extension of interphalangeal and metacarpophalangeal joints of the medial four fingers.

Extension of the wrist



Extensor digiti minimi.

Origin: Common extensor origin (front of the lateral epicondyle of the humerus).

Insertion: Into the little finger through extensor expansion.

Nerve supply: Posterior interosseous nerve.

Action: Extension of interphalangeal and metacarpophalangeal joints of the little finger.

Extension of the wrist



Extensor carpi ulnaris

Origin: Common extensor origin

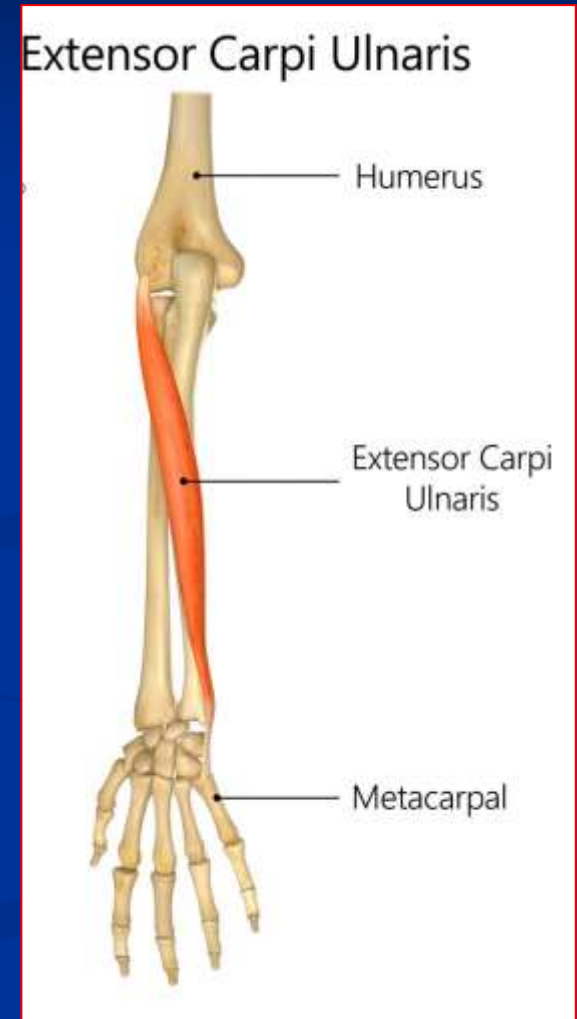
Posterior border of the ulna
(aponeurosis)

Insertion: Dorsum of the base of
the 5th metacarpal bone.

Nerve supply: Posterior
interosseous nerve.

Action: Extension of the wrist.

Adduction of the wrist (with
flexor carpi ulnaris)



Anconeus.

Origin: Back of the lateral epicondyle.

Insertion: Lateral side of the olecranon process and upper part of the back of the shaft of ulna

Nerve supply: Radial nerve (nerve to anconeus) and posterior interosseous nerve

Action: Extension of the elbow joint



II- Deep group:

5 muscles

1- Abductor pollicis longus, (APL).

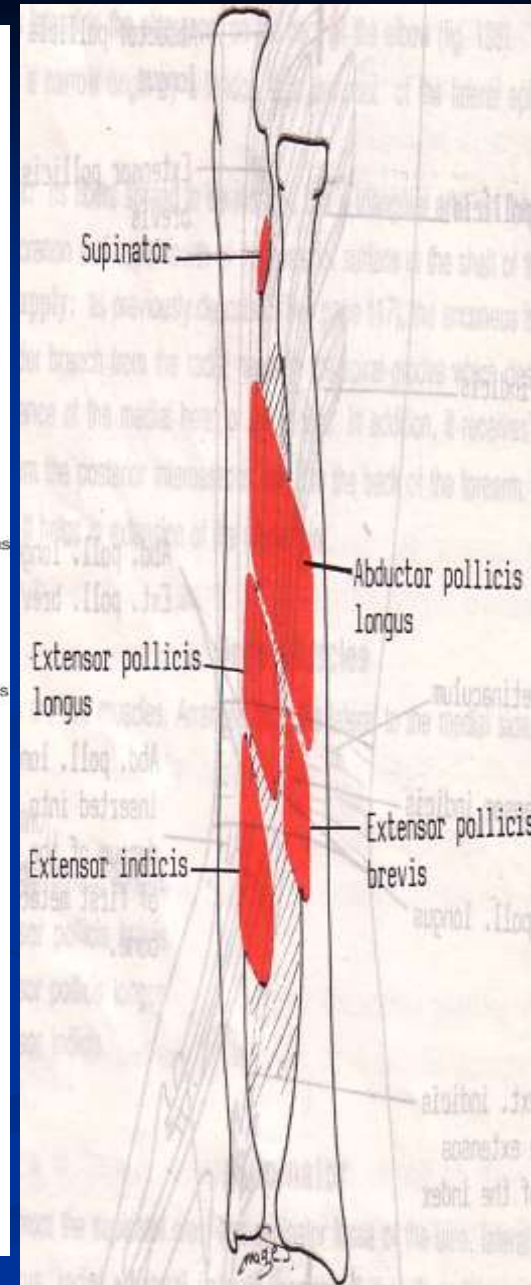
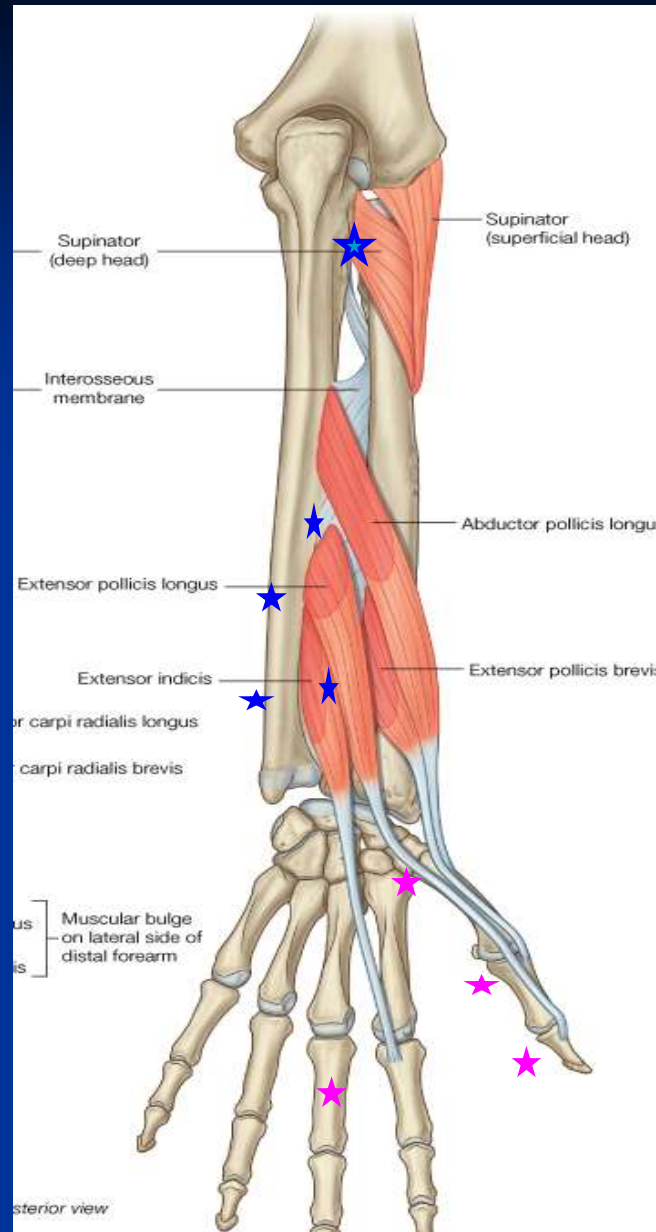
2- Extensor pollicis brevis, (EPB).

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.



Abductor pollicis longus.

Origin: Upper part of the posterior surface of the ulna

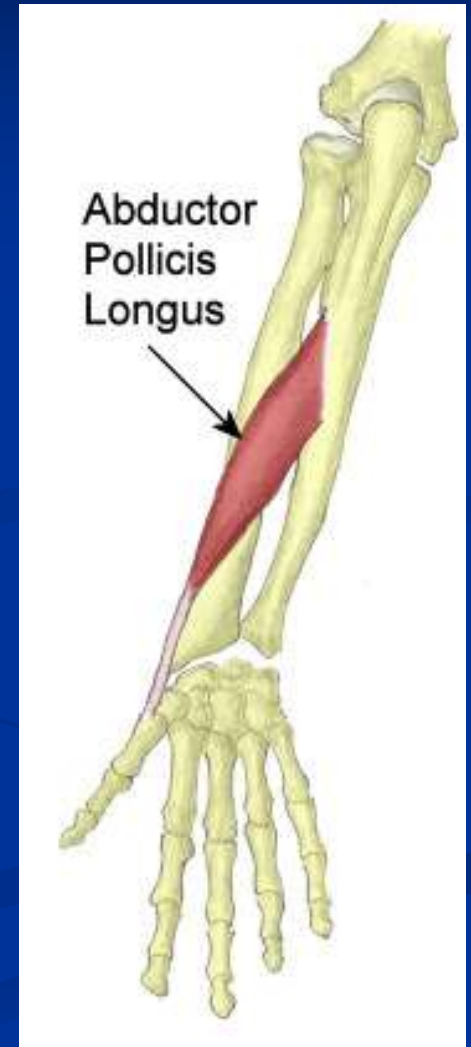
Upper part of the posterior surface of the radius

Back of the interosseous membrane

Insertion: Dorsum of the base of the 1st metacarpal bone.

Nerve supply: Posterior interosseous nerve.

Action: Abduction of the thumb
Abduction of the wrist



Extensor pollicis brevis.

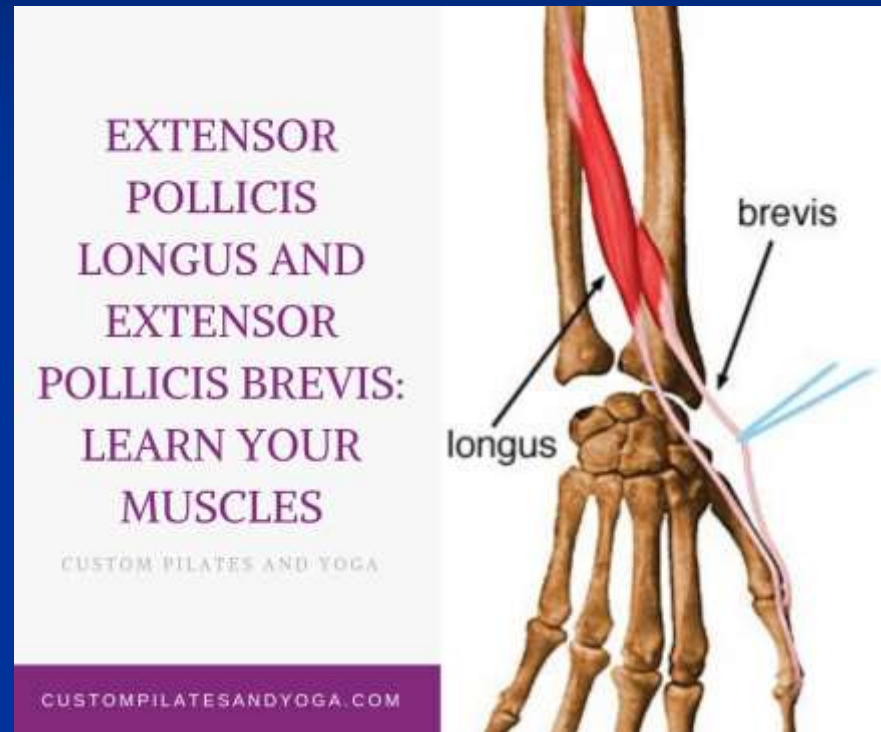
Origin: Lower part of the posterior surface of the radius

Insertion: Dorsum of the base of the 1st phalanx of the thumb.

Nerve supply: Posterior interosseous nerve.

Action: Extension of metacarpo-phalangeal joint of the thumb

Helps abduction of the wrist



Extensor pollicis longus.

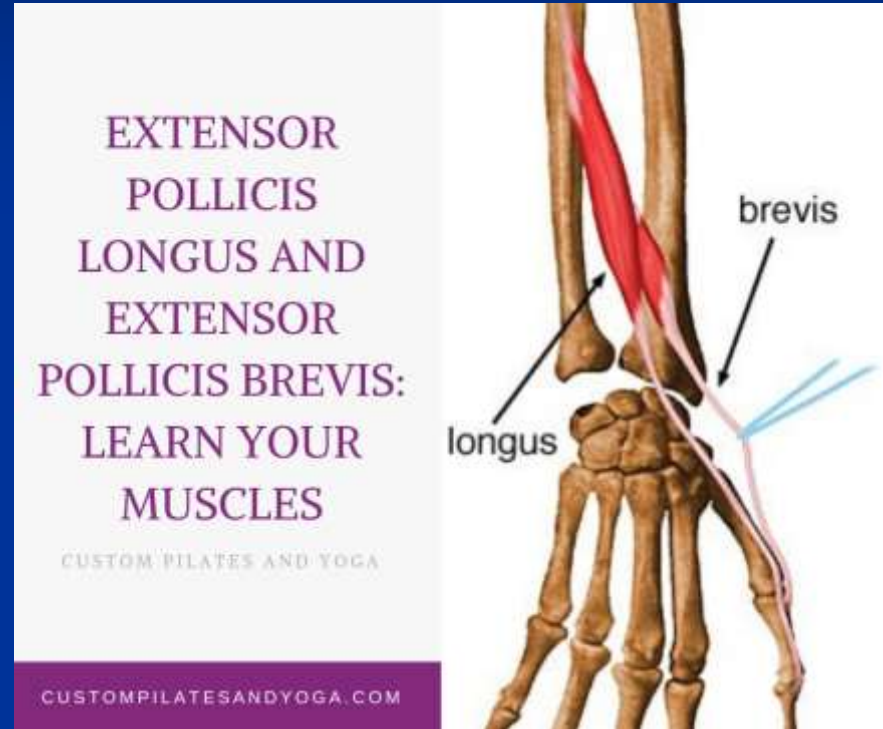
Origin: Middle part of the posterior surface of the ulna

Insertion: Base of the terminal phalanx of the thumb.

Nerve supply: Posterior interosseous nerve.

Action: Extension of all joints of the thumb

Extension of the wrist



Extensor indicis.

Origin: Lower part of the posterior surface of the ulna

Insertion: Extensor expansion of the index.

Nerve supply: Posterior interosseous nerve.

Action: Extension of all joints of the index

Extension of the wrist



Supinator.

Origin: Supinator crest and fossa of the ulna

Insertion: Upper 1/3 of front and lateral side and back of the radius .

Nerve supply: Posterior interosseous nerve.

Action: Supination of the forearm.



INSERTION

Extensor carpi radialis brevis:

base of 3rd metacarpal bone.

Extensor digitorum:

Extensor expansion of the medial 4 fingers.

Extensor digiti minimi:

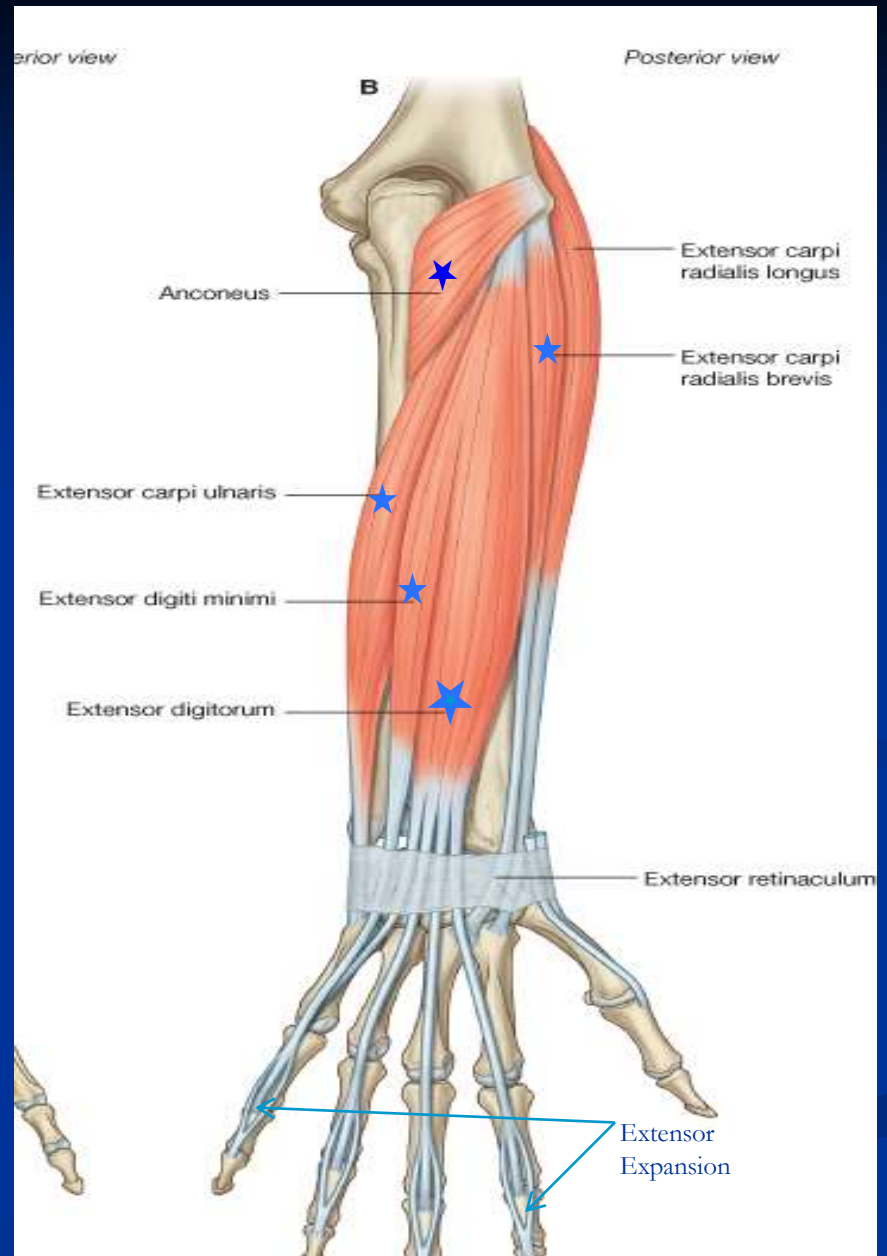
Extensor expansion of the little finger.

Extensor carpi ulnaris:

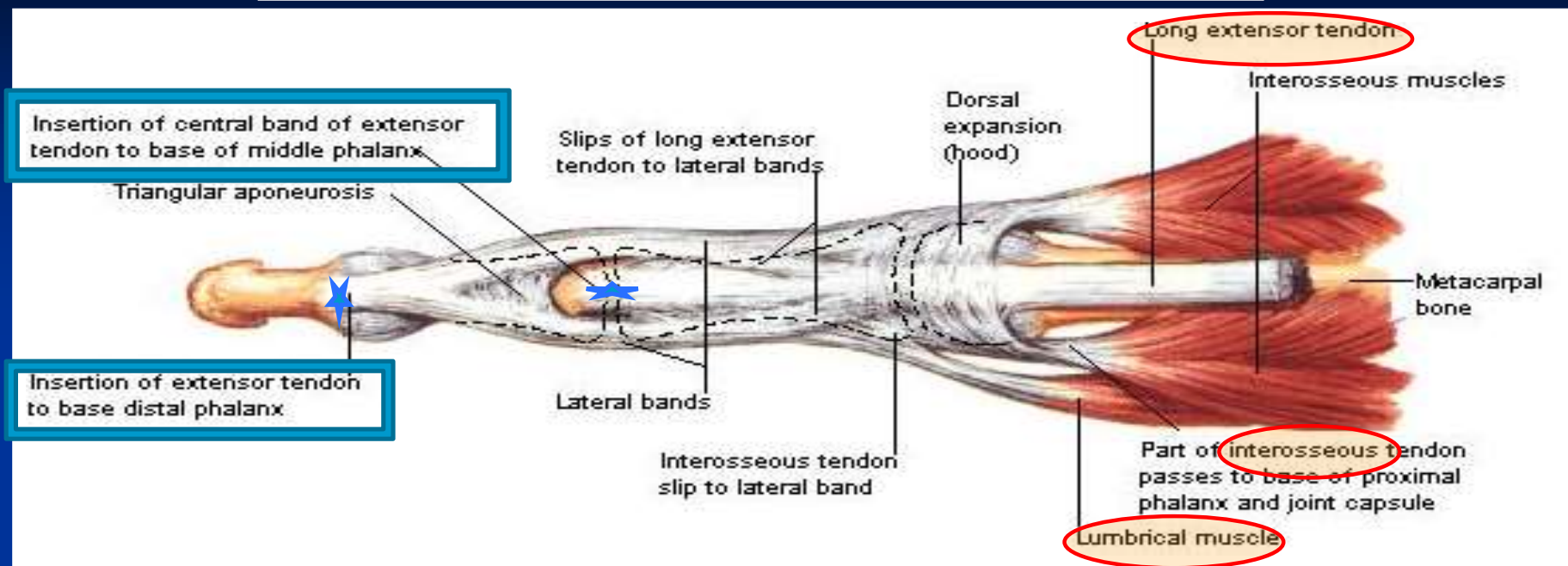
Base of the 5th metacarpal bone.

Anconeus :

Upper back of shaft of ulna.



Dorsal Extensor Expansion



- It is formed on the dorsum of medial 4 fingers by : the union of the long extensor tendons : Extensor digitorum, Extensor digiti minimi, Extensor indicis with palmar & dorsal interossei & lumbricals muscles.
- All these tendons unite to form one tendon (dorsal Extensor tendon) which divides into 3 slips, a median one attached to middle phalanges and 2 lateral attached to the terminal phalanges.

THANK YOU

1. Which one of the following muscles contributes as powerful supinator of forearm?

- a. Palmaris longus.
- b. Pronator teres.
- c. Biceps brachii.
- d. Supinator..

2. Which muscle is supplied by median nerve ?

- a. Anconeus.
- b. Brachioradialis.
- c. Extensor carpi radialis longus.
- d. Flexor digitorum superficialis.

3. Which muscle is related to common flexor origin ?

- a. Flexor digitorum profundus.
- b. Flexor pollicis longus.
- c. Pronator quadratus.
- d. Pronator teres.