Anatomy of the Forearm

Musculoskeletal block- Anatomy-lecture 8

Editing file

Objectives

- ✓ List the names of the Flexors Group of Forearm (superficial & deep muscles).
- ✓ Identify the common flexor origin of flexor muscles and their innervation & movements.
- ✓ 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.

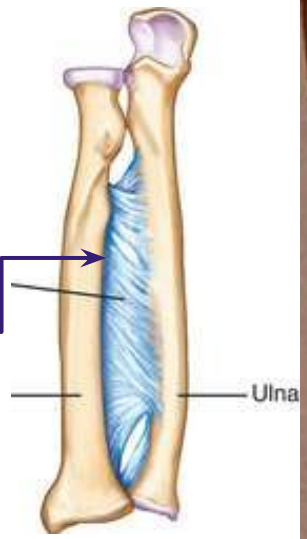
Color guide :
Only in boys slides in **Blue**
Only in girls slides in **Purple**
important in **Red**
Doctor note in **Green**
Extra information in **Grey**

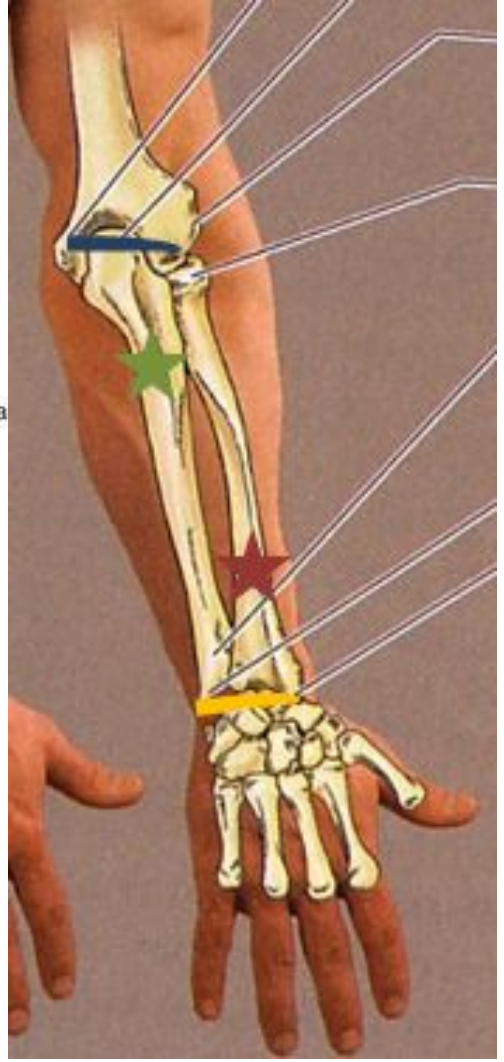
Forearm

- - The forearm extends from **elbow** to **wrist**
- - It posses **two bones** **radius** laterally & **Ulna** medially.
- **The two bones** are connected together by the **interosseous membrane.**

This membrane:

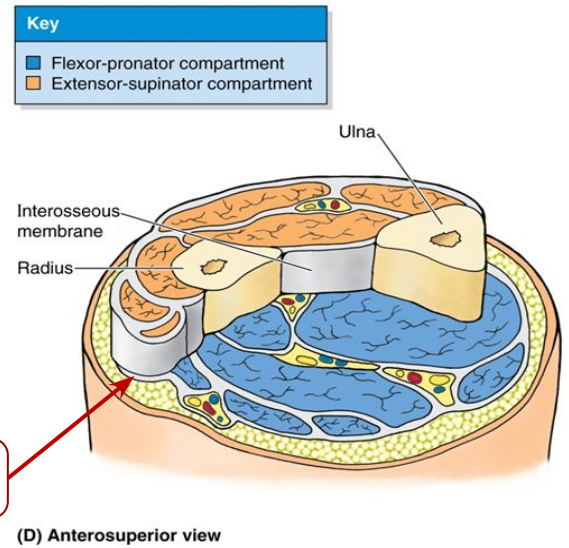
1. allows movement of **Pronation** and **Supination** while the two bones are connected together.
2. it gives origin for the deep muscles.





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.



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

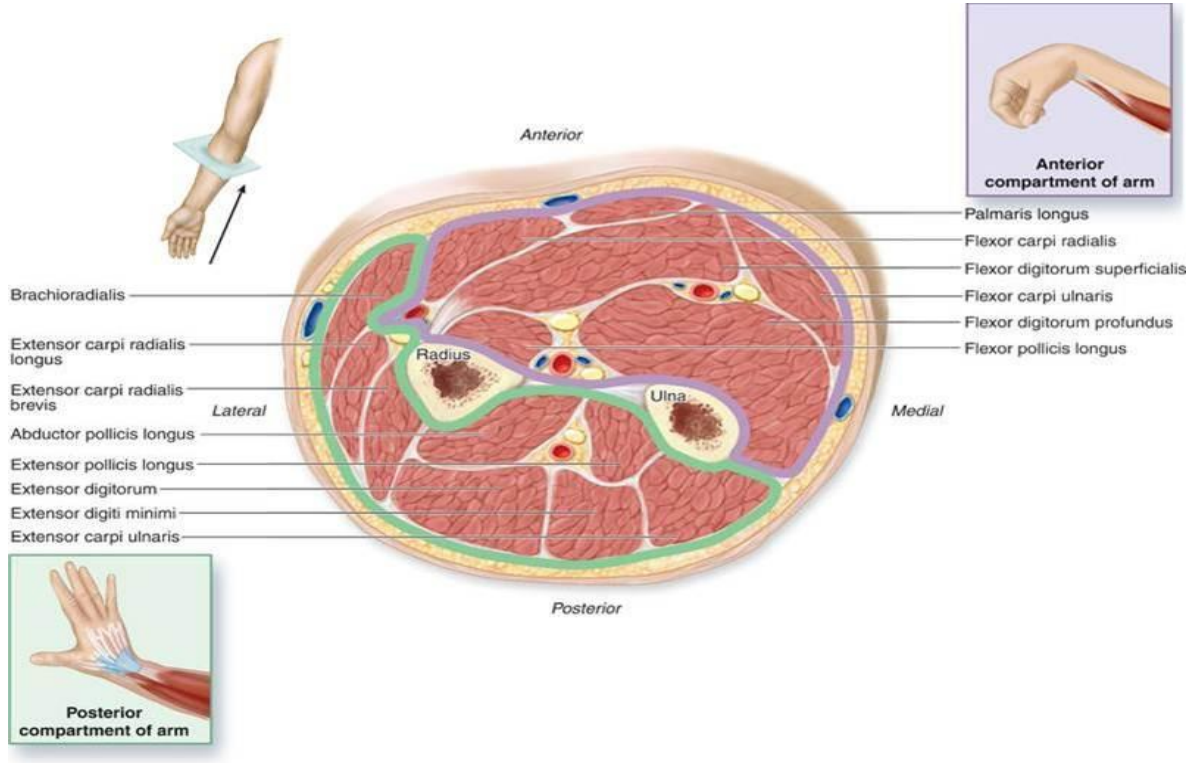
- An interosseous membrane is a broad and thin plane of fibrous tissue that separates many of the bones of the body.

Flexor group

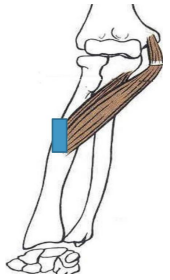
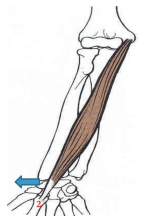
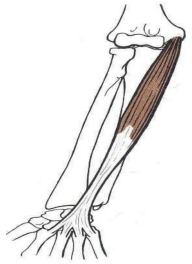
Number of muscles: 8

- 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.

Superficial	Intermediate	Deep
Flexor carpi radialis	Flexor digitorum superficialis	Flexor digitorum profundus above the ulna
Flexor carpi ulnaris		Flexor pollicis longus above the radius
Pronator teres		Pronator quadratus above both
Palmaris longus		

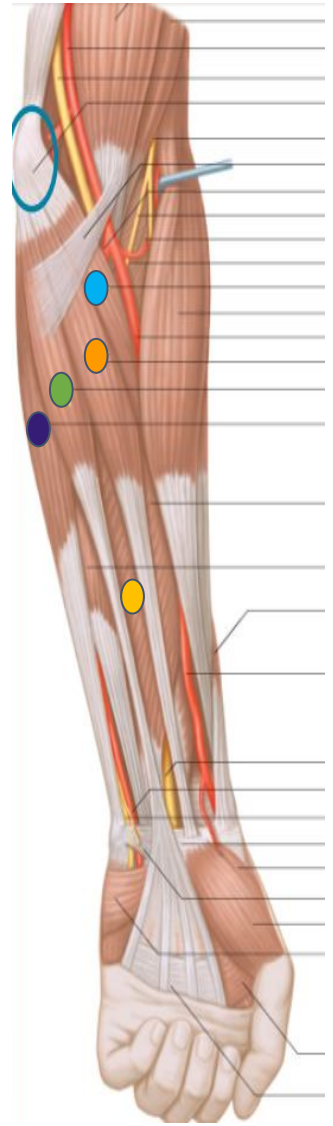


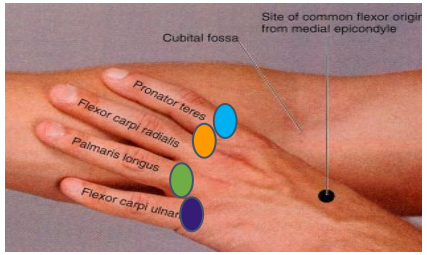
FLEXOR GROUP: Superficial flexors

Muscle	1) Pronator teres*	2) Flexor Carpi Radialis	3) Palmaris Longus**	4) Flexor Carpi Ulnaris	Flexor Digitorum Superficialis
Origin	Common flexor origin (front of medial epicondyle) more or less				
Insertion	middle of lateral surface of radius. (does not cross wrist)	Base of 2nd metacarpal bone.	flexor retinaculum & palmar aponeurosis.	Pisiform - Hook of hamate - 5th metacarpal bone	Base of middle phalanges of medial 4 fingers.
Nerve supply	Median nerve			Ulnar nerve	Median nerve
Action	pronation & flexion of forearm (elbow)	Flexion & abduction of the hand. (wrist)	Flexes hand & tightens palmar aponeurosis	Flexion and adduction of the hand.	Flexion of: the middle and proximal phalanges of medial 4 fingers + the hand.
Picture					

*Median nerve passes between the two heads

**May be absent and the only one across superficial of flexor of Retinacula





FLEXOR GROUP: Deep flexors

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 all joints of the thumb.

- **Innervation:**
anterior interosseous nerve branch of the median nerve

Pronator Quadratus

- **Origin:**
Above the 2 bones
Lower 1/4th of front of Ulna.

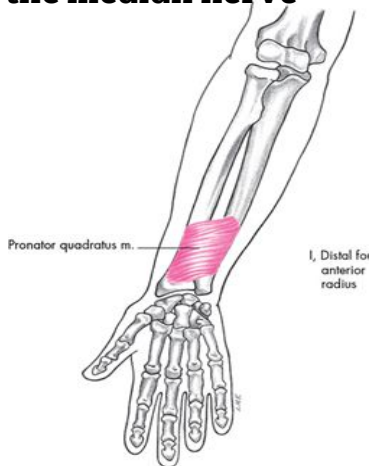
- **Insertion:**
Distal 1/4th of ant. surface of Radius

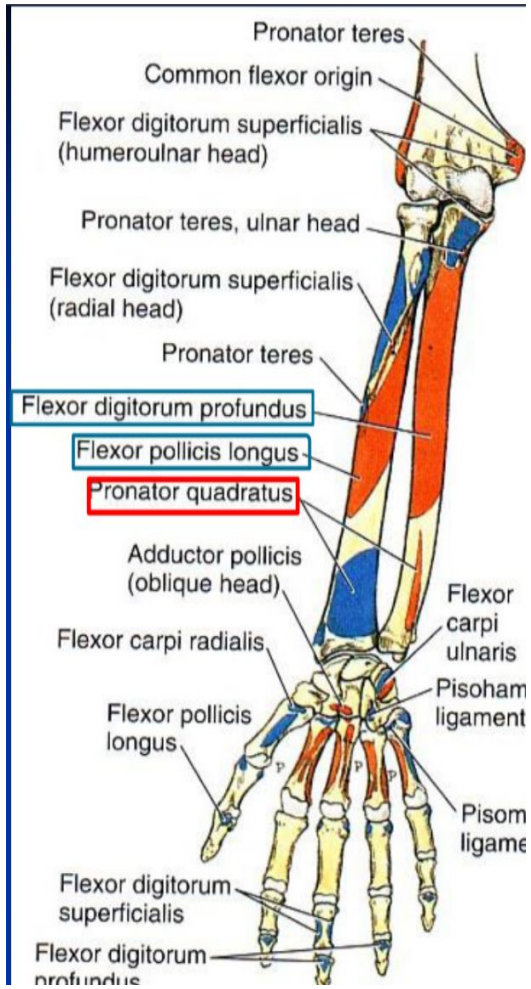
- **Action:**
pronates the forearm

(primover).

- Hold the 2 bones together .

- **Innervation:**
anterior interosseous nerve branch of the median nerve





Note:
Interphalangeal = between 2 phalanges
Metacarpophalangeal = between metacarpal and phalange
Carpometacarpal = between the carpals and metacarpals

Supination and pronation

It occurs in the superior and inferior radioulnar joints: (Pivot Uniaxial Synovial Joint.)

- **Muscles that produce <u>supination</u>:**

▪ Biceps brachii.

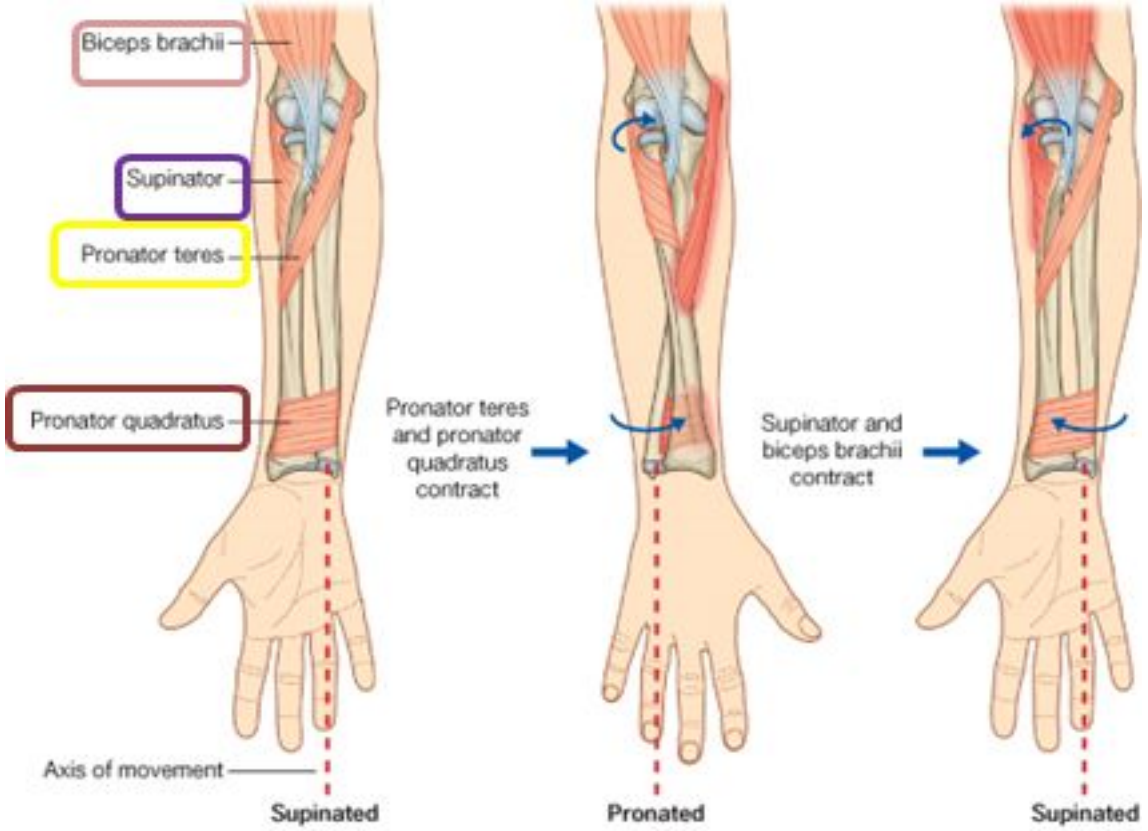
▪ Supinator.

- **Muscles produce <u>pronation</u>:**

▪ Pronator teres.

▪ Pronator quadratus.

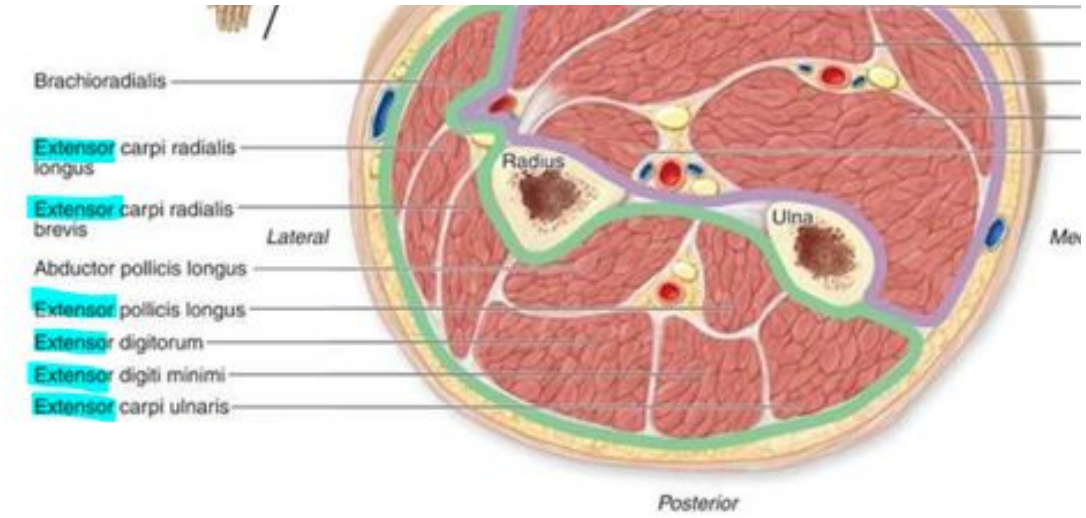
★ Brachioradialis puts the forearm in mid prone – position.



Posterior compartment: 3 groups 12 muscle

- **Common Extensor Origin (front of lateral epicondyle).**

except the muscles of superficial lateral group (which: originate from lateral supracondylar ridge)



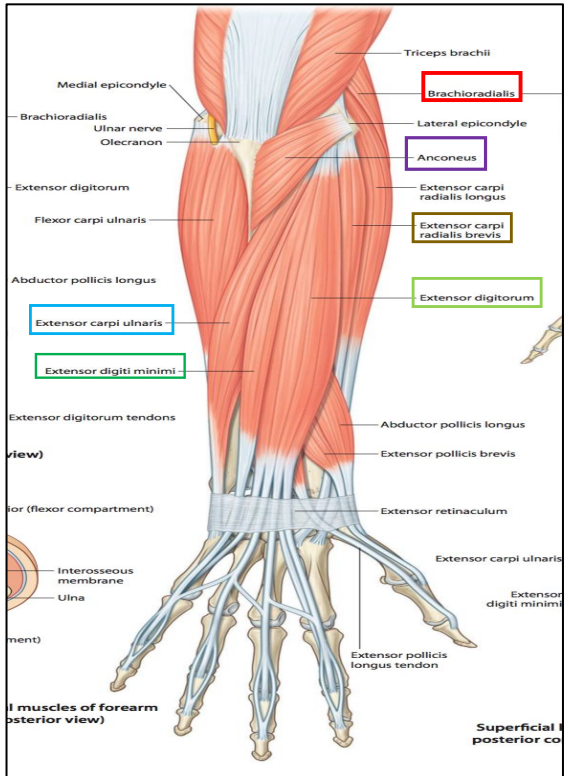
Posterior compartment: 3 groups 12 muscle

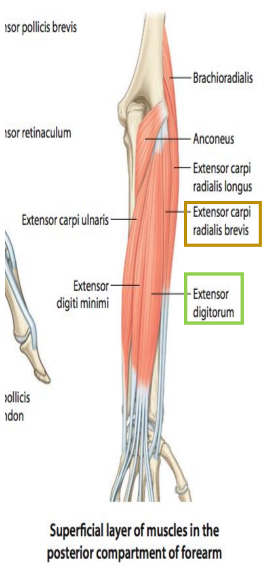
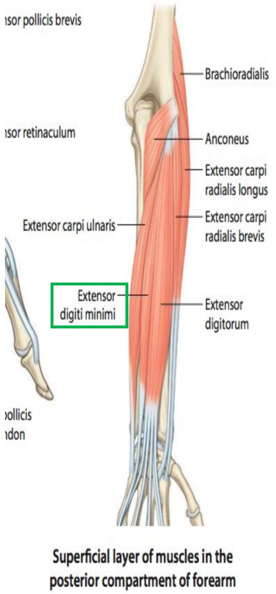
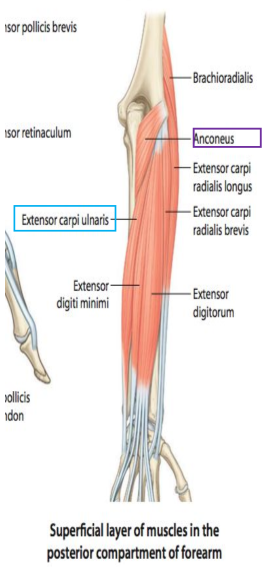
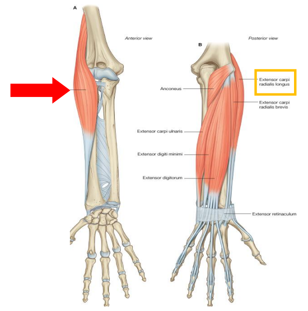
Superficial group (5):	Superficial Lateral group (2):	Deep group (5):
1-Extensor carpi radialis brevis 2- Extensor digitorum 3- Extensor digiti minimi 4-Extensor carpi ulnaris 5-Anconeus	(originate from lateral Supracondylar Ridge) 1-Brachioradialis 2-Extensor carpi radialis longus	(3 to thumb 1 to index + supinator). 1-Supinator. 2-Abductor pollicis longus. 3-Extensor pollicis brevis. 4-Extensor pollicis longus. 5-Extensor indicis.

Posterior Compartment: 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).



	Superficial Lateral Group		Superficial Group				
Muscle	Brachioradialis	Extensor Carpi radialis longus	Extensor carpi radialis brevis	Extensor digitorum	Extensor digiti minimi	Extensor carpi ulnaris	Anconeus
Origin:	Lateral supracondylar ridge of humerus		Common extensor origin (front of lateral epicondyle of humerus)				
Insertion:	Base of <u>styloid process of radius</u>	Posterior surface of <u>base of 2nd metacarpal bone</u>	Base of 3rd metacarpal bone.	Extensor expansion of the medial 4 fingers.	Extensor expansion of the little finger.	Base of the 5th metacarpal bone.	Superior part of the posterior (back) of Ulna shaft. (Lateral side of the olecranon)
Action:	Flexes forearm; (elbow). Rotates forearm to midprone position	Extends and abducts hand at wrist joint					
Pictures:							

Important:

-All arises from the common extensor origin, (front of lateral epicondyle) of the humerus
, EXCEPT, 3 (BR, EXRL & anconeus (back of lateral epicondyle)

-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.

Posterior Compartment:

3) Deep Group:

5 muscles

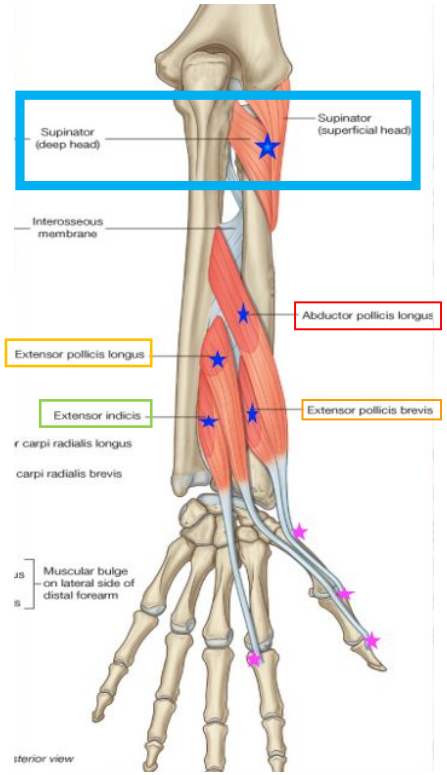
1- Abductor pollicis longus, (APL).

2- Extensor pollicis brevis, (EPB).

3- Extensor pollicis longus, (EPL).

4- Extensor indicis (EI).

5- Supinator.



All **back** muscles of the forearm are supplied by: <u>posterior interosseous nerve</u> (deep branch of radial nerve) **except** ABE, by the radial nerve.

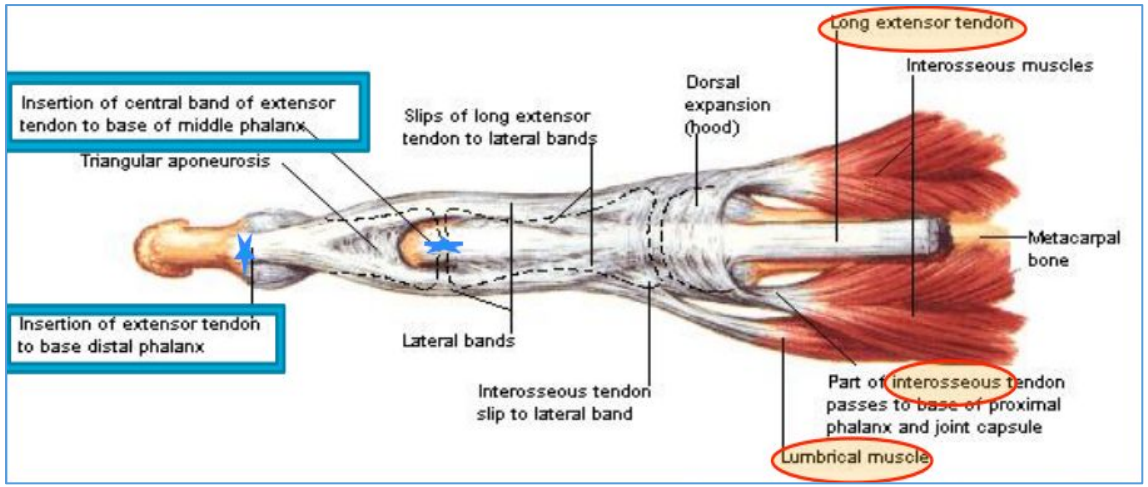
Dorsal Extensor Expansion:

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.

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



MCQ

1. Radius and ulna are connected together by:

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

2. Fascial sheath attached to:

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

3. All of the following muscles produce supination Except:

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

4. Which of the following muscle put the forearm in midprone – position:

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

5. 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

6. Insertion of flexor carpi Ulnaris

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

7. 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

SAQ

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

Supinator
, Abductor pollicis longus,
Extensor pollicis brevis

2. What is the forearm muscle that can flex the joints of the thumb?

Abductor pollicis longus (APL)

Answers: Q1.A- Q2.B -Q3.C -Q4.A- Q5.B- Q6.A-Q7.B

Team members

Boys team:

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- Suhail Basuhail
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- Omar Alammari

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★=This lecture done by

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- Renad Al Haqbani
- Nouf Al Humaidhi
- ★ Fay Al Buqami
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- Nouf Al Hussaini
- Alwateen Al Balawi
- Rahaf Al Shabri
- Danah Al Halees
- ★ Haifa Al Waily
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Special thank for Anatomy team 436

King Saud University
Med438
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Good luck

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