

MED439
KING SAUD UNIVERSITY

Anatomy of the forearm

Musculoskeletal Block - Lecture 9

Objective:

- ✓ List the names of the Flexors and Extensor 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.
- ✓ Describe the effect of injury of the muscle or its origin
- ✓ Identify the common extensor origin of extensor muscles and their innervation & movements.

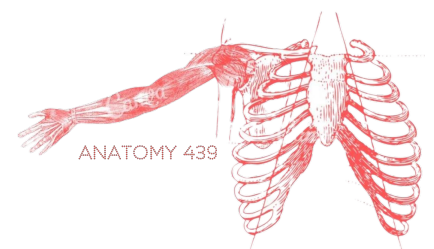
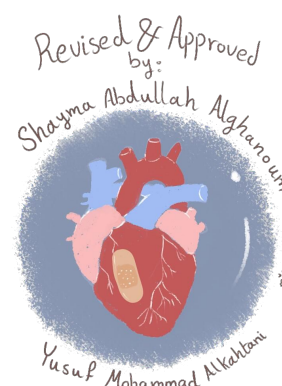
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Important

In male's slides only

In female's slides only

Extra information, explanation



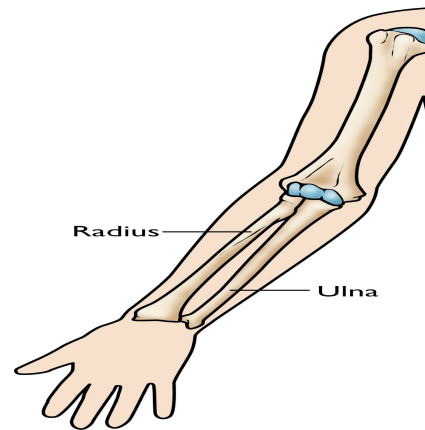
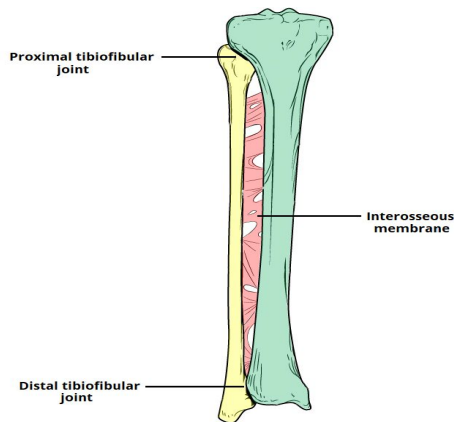
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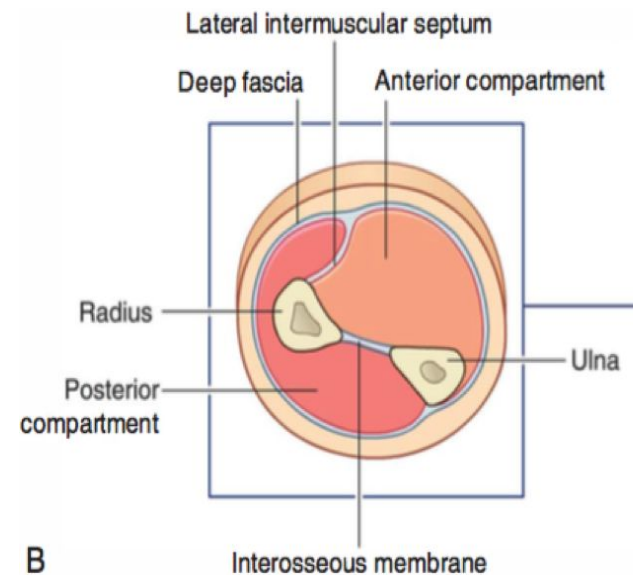
Forearm

- 1- The forearm extends from the **elbow** to **wrist**.
- 2- It possesses two bones **radius** laterally and **ulna** medially.
- 3- The two bones are connected to each other by **interosseous membrane**.
- 4- This membrane allows movement of **pronation** and **supination** while the two bones are connected together.
- 5- also it gives origin to the deep muscles.



Fascial compartment of the forearm

- 1- The forearm is enclosed in a sheath of deep fascia, which is attached to the posterior border of ulna (it encircle the forearm completely **(Without touching the radius)** and return again to the posterior border of the ulna)
- 2- This fascial sheath together with the **interosseous membrane** and **fibrous intermuscular septa** divides the forearm into (**anterior and posterior**) 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).



Anterior compartment - FLEXOR GROUP

- 1- 8 muscles..
- 2- They act on the **elbow** and **wrist joints** and the **fingers**.
- 3- They form fleshy masses in the proximal part and become tendinous in the distal part of the forearm.
- 4- They are arranged in Three groups which are :
Superficial - Intermediate - Deep

Flexor group

Superficial : 4 muscles.

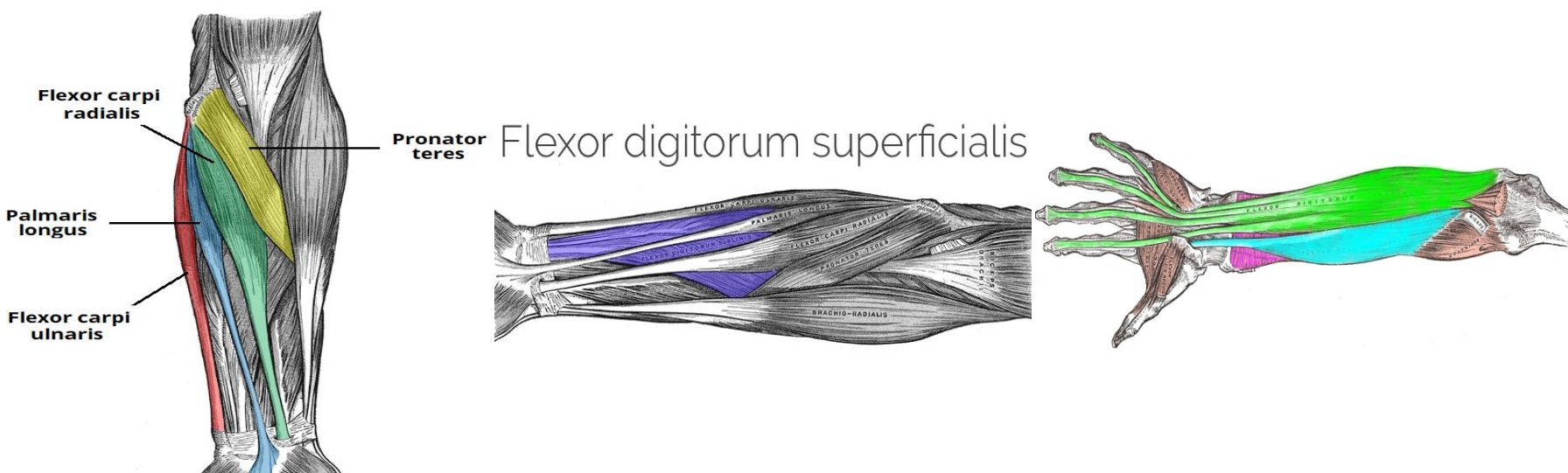
- Pronator teres.
- Flexor carpi radialis.
- Palmaris longus
- Flexor carpi ulnaris.

Intermediate : 1 muscle.

- Flexor digitorum superficialis.

Deep 3 muscles.

- Flexor digitorum profundus.
- Flexor pollicis longus.
- Pronator quadratus.

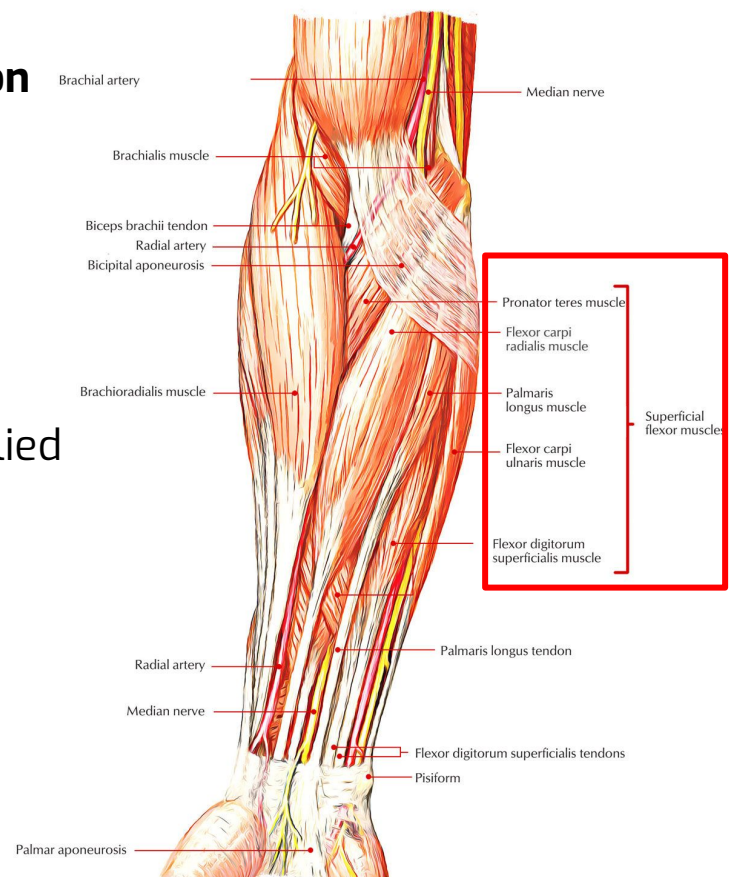


Superficial Flexors :

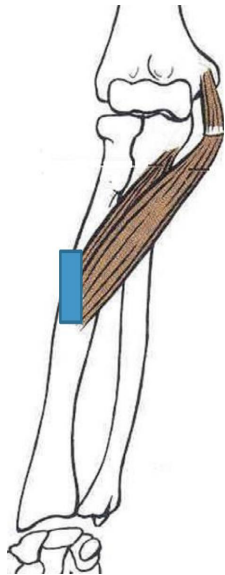
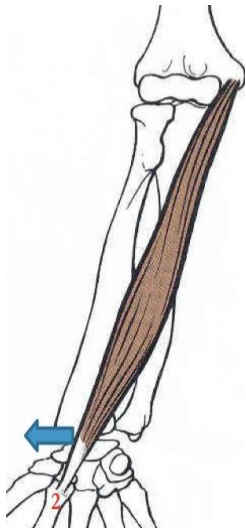
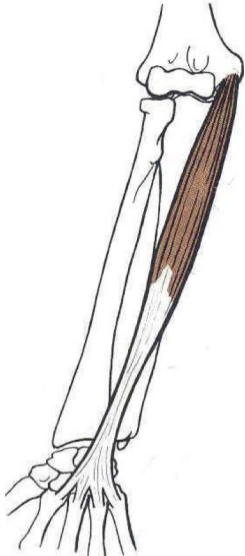
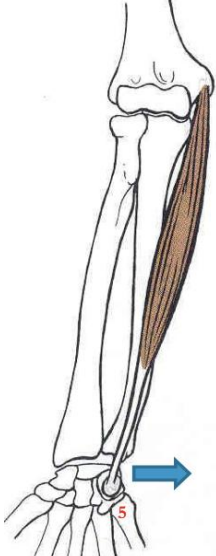
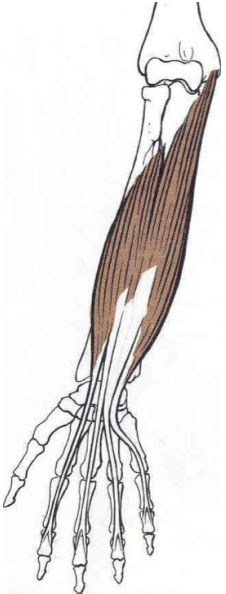
1-They arise - more or less - from the **common flexor origin** (front of medial epicondyle).

2-All are supplied by **median** nerve EXCEPT one, **flexor carpi ulnaris** (FCU) which is supplied by the **ulnar** nerve.

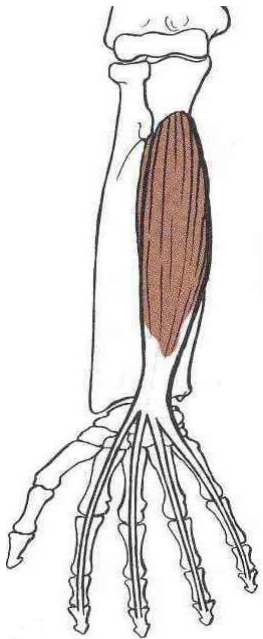
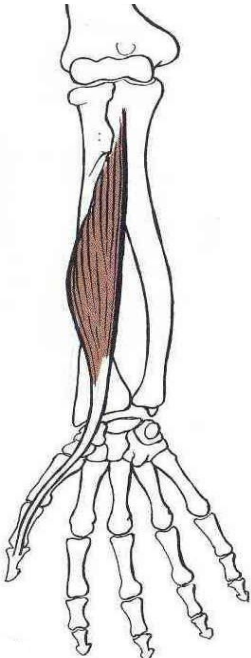
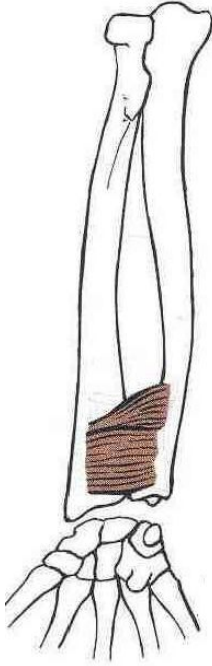
3-All cross the wrist joint EXCEPT one, **pronator teres** (PT).



Superficial flexors

muscle	1) Pronator teres	2) Flexor carpi radialis	3) Palmaris longus (May be absent)	4) Flexor carpi ulnaris	5) Flexor digitorum superficialis (Intermediate group)
Origin	Common flexor origin (front of medial epicondyle) more or less				-Common flexor origin. -Coronoid process of ulna. -Anterior surface of radius.
Insertion	middle of lateral surface of radius. (does not cross wrist)	Base of 2nd metacarpal bone.	into the 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 wrist	Flexes hand (wrist) and tightens palmar aponeurosis	Flexion and adduction of the hand.(wrist)	Flexion of: the middle and proximal phalanges of medial 4 fingers + the hand.
Picture					

Deep flexor group of forearm

Deep flexors of forearm	Flexor Digitorum Profundus (above, front of ulna) Double supply	Flexor Pollicis Longus (above, front of radius)	Pronator Quadratus (above both ulna and radius, front of lower 4th of ulna)
origin	front surface of ulna .	above the radius .	lower part of anterior surface of ulna. Front of the lower 4th of ulna.
insertion	bases of distal phalanges of medial 4 digits.	Base of distal phalanx of thumb .	distal One fourth of anterior surface of radius
action	-Flexes distal phalanges of medial 4 digits. -flexes the hand (wrist).	flexes all joints of the thumb (interphalangeal, metacarpophalangeal, carpometacarpal).	-pronates the forearm (prime mover). -helps to hold the 2 bones together (ulna and radius)
nerve supply -all by anterior interosseous nerve <u>EXCEPT</u> medial half of flexor digitorum profundus.	-Medial 1/2 : by ulnar Nerve. -Lateral 1/2 : by anterior interosseous nerve (branch of median N.)	anterior interosseous nerve (branch of median N.)	anterior interosseous nerve (branch of median N.)
			

supination and pronation (position of forearm)

It occurs in the **superior** (proximal) and **inferior** (distal) **radioulnar joints** (pivot uniaxial synovial joint)

Muscles produce supination:

- Biceps brachii (strong supinator).
- Supinator.

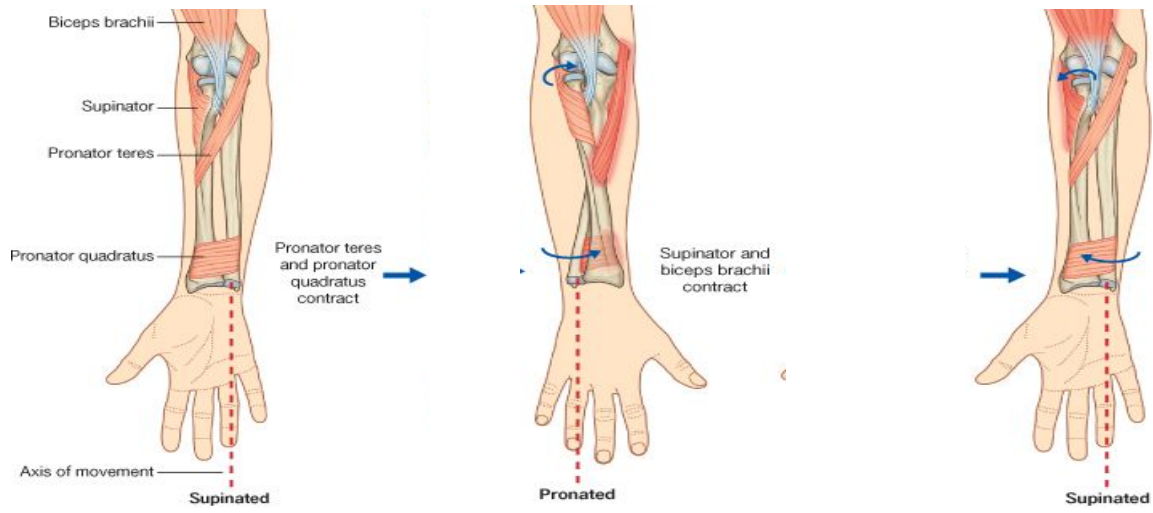
midprone (midprone supine) position (initiates pronation and supination)

Brachioradialis.

Muscles produce pronation:

- Pronator teres.
- Pronator quadratus. (Prime mover)

NOTE: in case of a fully extended arm the supinator muscle is the main muscle in supination, otherwise its the biceps.



Posterior compartment of forearm

posterior compartment of forearm (12 muscles- 3 groups)

superficial lateral group (2)

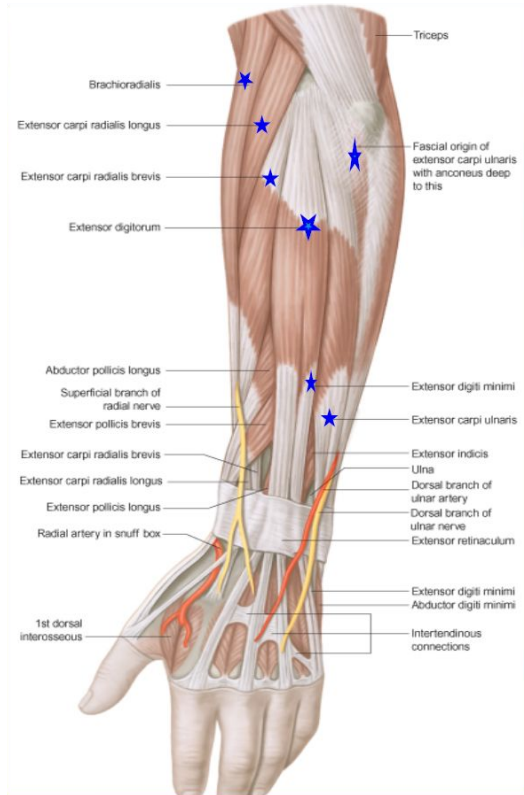
- Brachioradialis.
- Extensor carpi radialis longus.

superficial group (5)

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

deep group (5)

- Supinator.**
- **(3) to thumb:**
- Abductor pollicis longus.
- Extensor pollicis brevis.
- Extensor pollicis longus.
- **(1) to index:**
- Extensor indicis.



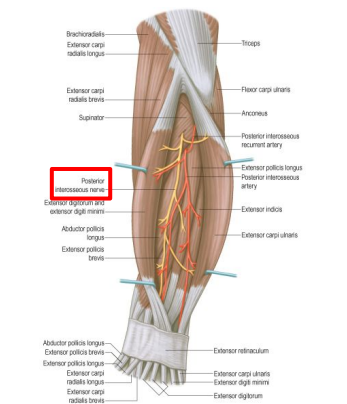
- **Common Extensor Origin** is front of **lateral epicondyle of the humerus**.
- Except the superficial lateral group which originated from the lateral supracondylar ridge

• superficial extensors (7):

from lateral to medial

	muscle	origin	insertion	action	pictures
lateral superficial group	Brachioradialis (BR)	Lateral supracondylar ridge of humerus.	Base of styloid process of the radius .	-Flexes forearm (elbow). -Rotates forearm to midprone position	
	Extensor carpi radialis longus (ECRL)		Posterior surface of base of 2nd metacarpal bone. <i>Dorsal surface</i>	-Extends and Abducts hand (radial rotation) at wrist joint.	
superficialis group	Extensor carpi radialis brevis (ECRB)	Common extensor origin (the front of lateral epicondyle).	Base of 3rd (middle finger) metacarpal bone.		
	Extensor digitorum (ED)		Extensor expansion of the medial 4 fingers.		
	Extensor digiti minimi (EDM)		Extensor expansion of the little finger.		
	Extensor carpi ulnaris (ECU)		Base of the 5th metacarpal bone.		
	Anconeus (AN)		From the <u>back</u> of lateral epicondyle of the humerus.		Superior (upper) part of the posterior (back) of ulna shaft (lateral side of the olecranon).

- All cross the wrist EXCEPT two, **brachioradialis**, **anconeus**.
- **Nerve supply:** All supplied by deep branch of radial nerve (posterior interosseous nerve), EXCEPT **ABE** are supplied by the radial nerve itself.
 - **A**-> **anconeus**.
 - **B**-> **Brachioradialis**.
 - **E**-> **Extensor carpi radialis longus**.



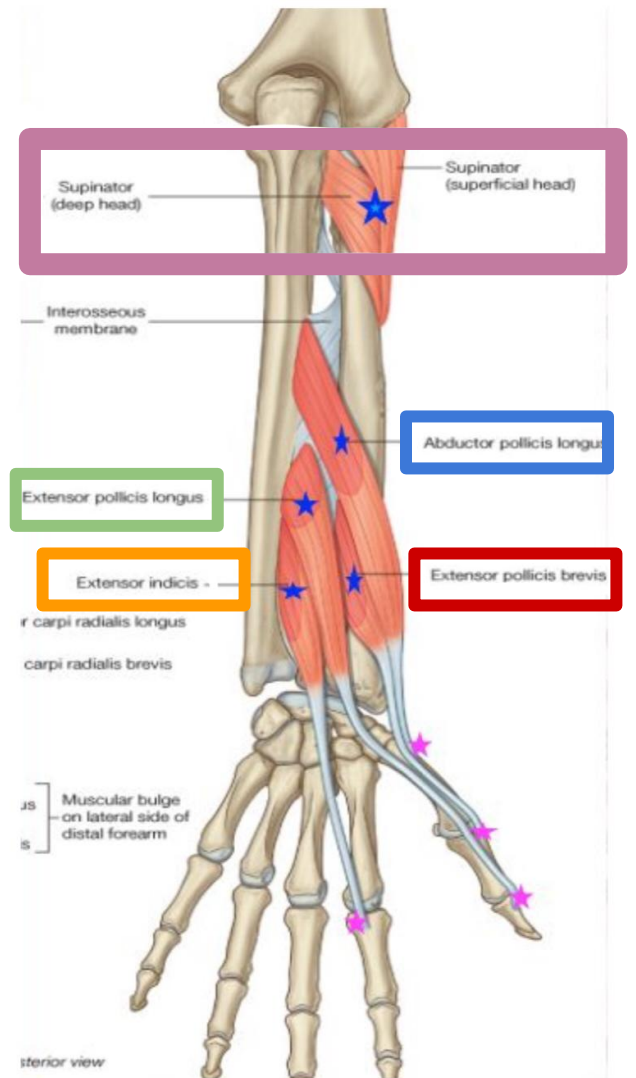
Posterior compartment: Deep group:

5 muscles: (3 to the thumb+1 to index & suinator)

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

Female dr: just know their names

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

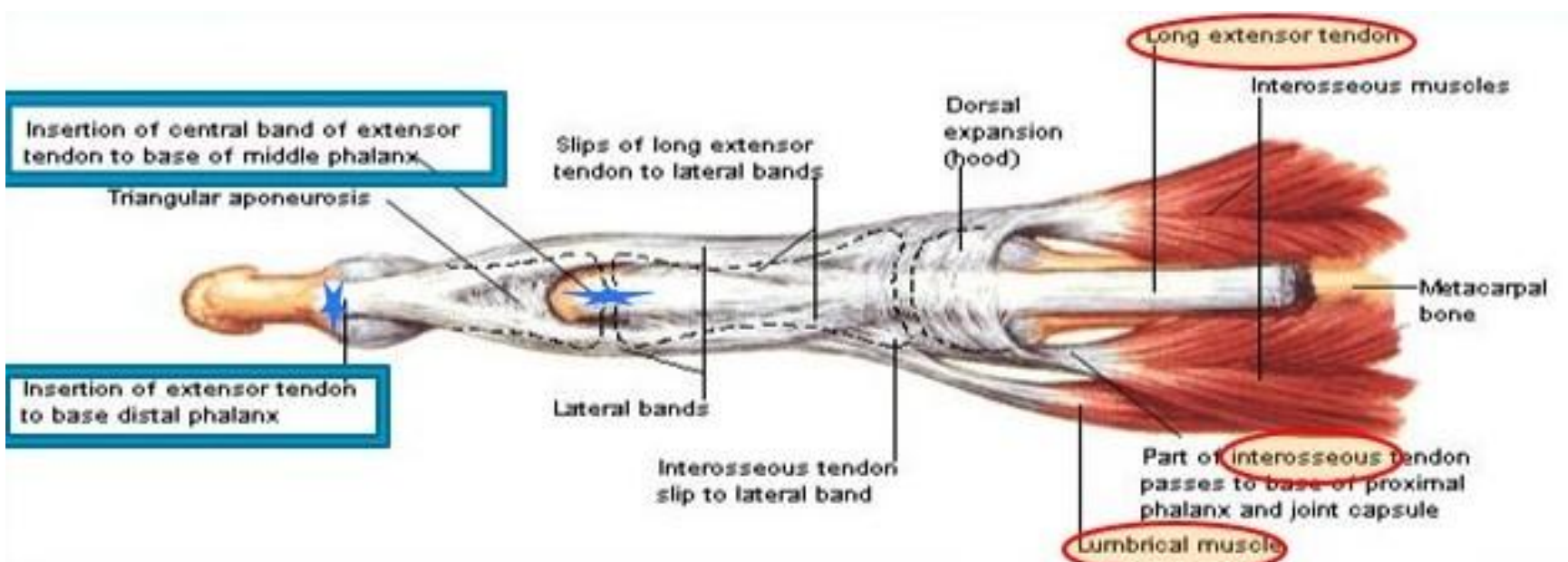


Dorsal Extensor Expansion:

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.

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.

*وحدة من الـ extensors راح تجي و تسوي الـ long tendon (حسب الإصبع)
بعدين راح ينضم لها الـ palmar & dorsal interossei و الـ lumbricals
muscles هذولا كلهم راح يسوون لي الـ dorsal extensor tendon



MCOs

Q1:Which one of the following muscles contributes as powerful supinator of forearm in case of a fully flexed arm?

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

Q2:Which muscle is supplied by median nerve?

- A.Anconeus.
- B.Brachioradialis.
- C.Extensor carpi radialis longus.
- D.Flexor digitorum superficialis.

Q3:Which muscle is related to common flexor origin?

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

Q4:The Insertion of Brachioradialis?

- A.Posterior surface of base of 2nd metacarpal bone
- B.base of 3rd metacarpal bone.
- C.Base of styloid process of radius
- D.Base of the 5th metacarpal bone.

Q5:Ulna and radius are connected together by which of the following ?

- A. interosseous membrane
- B. biceps brachii
- C. iliac crest
- D. pronator teres

Q6:Which one is a flexor superficial muscle ?

- A.pronator teres
- B.flexor digitorum superficialis
- C.flexor digitorum
- D.pronator quadratus

Q7:which of the following muscles might be absent in the upper limb?

- A.pronator teres
- B.palmaris longus
- C.flexor carpi ulnaris
- D.median nerve

Q8:flexor carpi ulnaris is supplied by which nerve ?

- A.radial nerve
- B.ulnar nerve
- C.median nerve
- D.axillary nerve

Q9:All back muscles of forearm are supplied by: posterior interosseous nerve except?

- A.EPB
- B.ABE
- C.APL
- D.EPL

Q10:The origin of Extensor Carpi radialis longus?

- A. Anterior surface of radius.
- B.Coronoid process of ulna.
- C.Lateral supracondylar ridge of humerus.
- D.A&B

Q11:which muscle is unrelated to common extensor origin:

- A.anconeus.
- B.extensor digitorum.
- C.extensor carpi ulnaris.
- D.extensor digiti minimi.

Q12: the muscle that puts forearm in midprone position:

- A.anconeus.
- B.brachioradialis.
- C.biceps brachii.
- D.pronator teres.

Q12:B
Q11:A
Q10:C
Q9:B
Q8:B
Q7:B

Q6:A
Q5:A
Q4:C
Q3:D
Q2:D
Q1:C

SAQs

Q1: Name 5 extensor muscles from the deep group of the posterior compartment?

Q2: Write the origin of all superficial flexors ?

Q3: List pronators.

Q1:
1- Abductor pollicis longus.
2- Extensor pollicis brevis.
3- Extensor pollicis longus.
4- Extensor indicis.
5- Supinator.

Q2:
Common flexor origin (front of medial epicondyle) more or less

Q3: 1-pronator teres.
2-pronator quadratus.

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SPECIAL THANKS TO THE AMAZING
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