Muscles of the Forearm

Lecture 13

تمت المراجعة
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&
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Please check our Editing File.

هذا العمل لا يغني عن المصدر الأساسي للمذاكرة

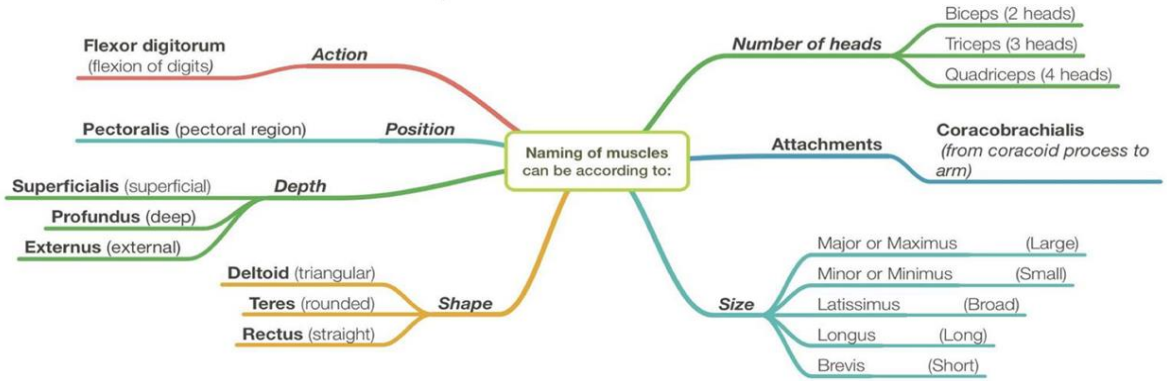
{وَمَنْ يَتَوَكَّلْ عَلَى اللَّهِ فَهُوَ حَسْبُهُ}

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.

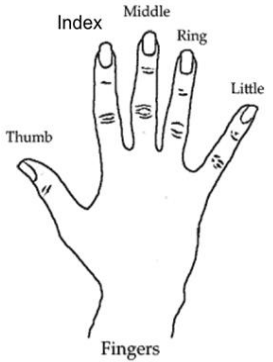
- **Text in BLUE was found only in the boys' slides**
- **Text in PINK was found only in the girls' slides**
- **Text in RED is considered important**
- Text in GREY is considered extra notes

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)

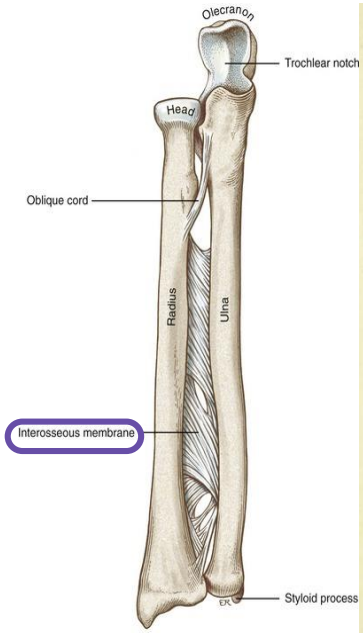


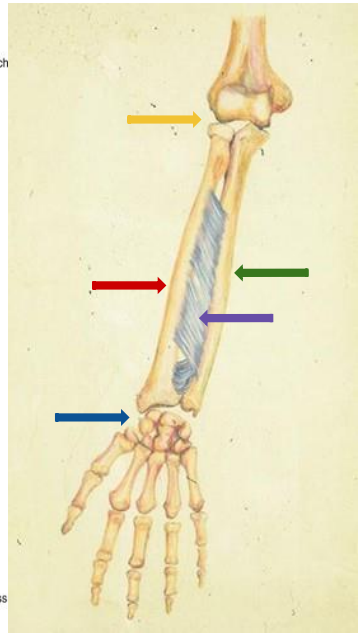
<u>The fingers:</u>

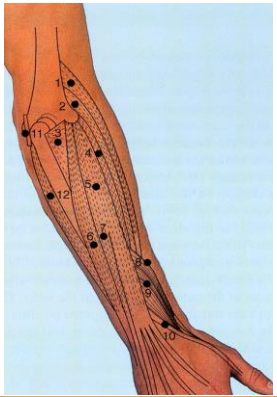
Digitorum = has 4 tendons each attached to a finger
Pollicis = the thumb
Indices = index finger السبابه
Digiti minimi = pinkie

Forearm

- The forearm extends from elbow to wrist.
- It passes 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. (تسمح لها تسوي الحركه لكن ما تسوي الحركة نفسها)
  - ➢ Also it gives origin for the deep muscles.







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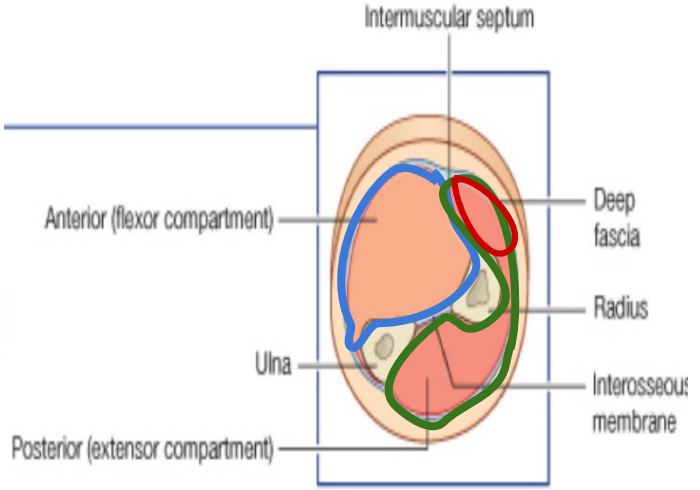
- The radius and ulna are connected by 3 structures: the interosseous membrane, superior radioulnar joint and inferior radioulnar joint.
- An interosseous membrane is a broad and thin plane of fibrous tissue that separates many of the bones of the body.

***Supination & Pronation:**
Happen only at Radio-ulnar joint.

The Radius moves over ulna.

Fascial Compartment of Forearm

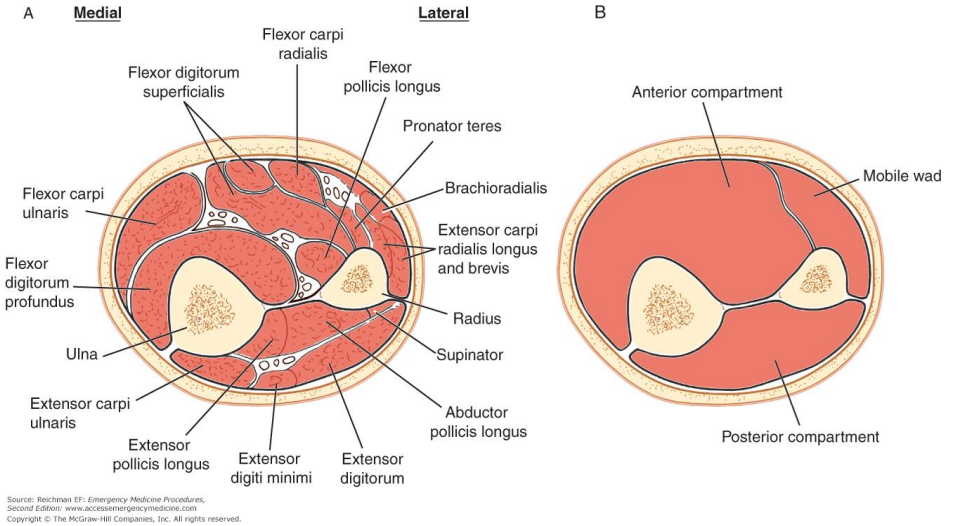
- The forearm is enclosed in a sheath of deep fascia, which is attached to the posterior border of the ulna (it's not attached to radius).
- This fascial sheath, together with the interosseous membrane and intermuscular septum, divides the forearm into 2 compartments (anterior & posterior), each having its own muscles, nerves, and blood supply.



We can say that it has A **Lateral** compartment in the lateral of **Posterior** compartment.
We also have **Anterior** compartment

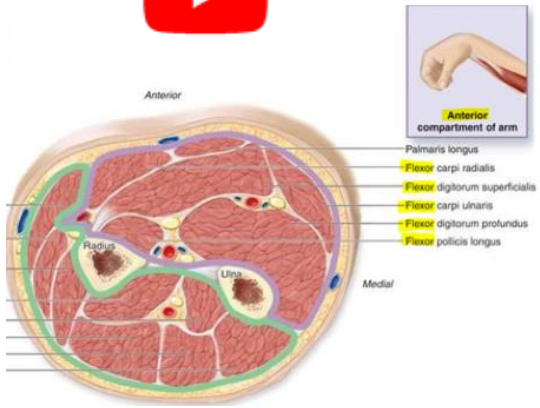
The forearm in general has 20 muscles (8 anterior & 12 posterior)

The posterior compartment can be divided to lateral(3 muscles) and posterior (9 muscles)



Anterior Compartment (Flexor group)

- **These 8 muscles**:
  - Act on the elbow, wrist joints and the fingers.
  - Form fleshy masses in the proximal part and become tendinous in the distal part of the forearm.



*Teres: مبرومة

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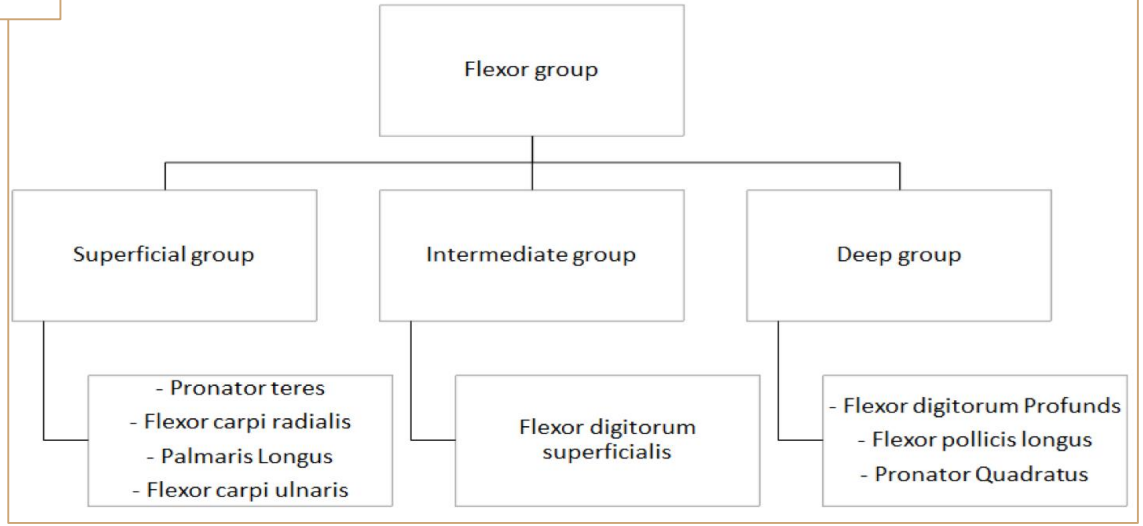
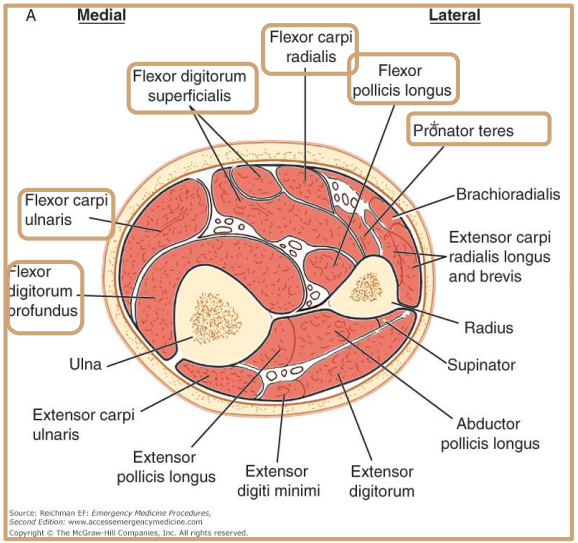
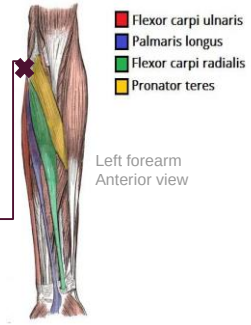




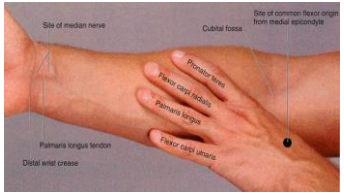
Superficial Flexors



Left forearm
Anterior view

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

*FCU supplied by Ulnar nerve



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Note:
Radialis always inserts at either 2nd or 3rd metacarpal since they are lateral.
Ulnaris always inserts at 5th metacarpal because it is medial.

- Flexor Carpi Ulnaris:
- Insertion: Pisiform, hook of hamate & base of 5th metacarpal bone
- Action: Flexion and Adduction of the hand (wrist).

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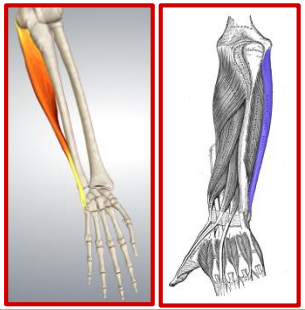
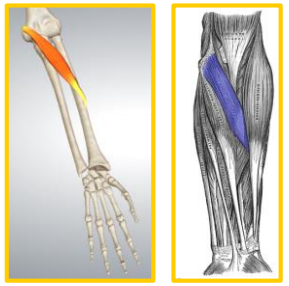
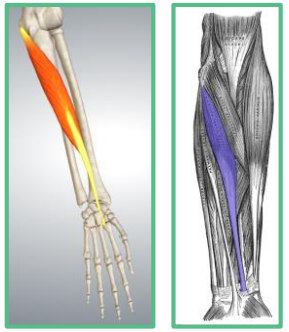


- Pronator Teres:
- **Insertion**: Middle of lateral surface of radius.
- **Action**: Pronation & Flexion of forearm (elbow).

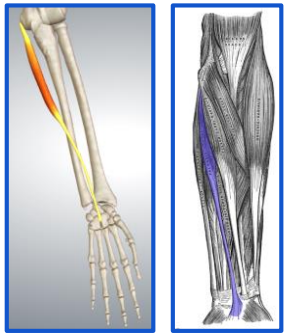
Does not cross the wrist



- Flexor Carpi Radialis:
- **Insertion**: Base of 2nd metacarpal bone.
- **Action**: Flexion & Abduction of the hand.

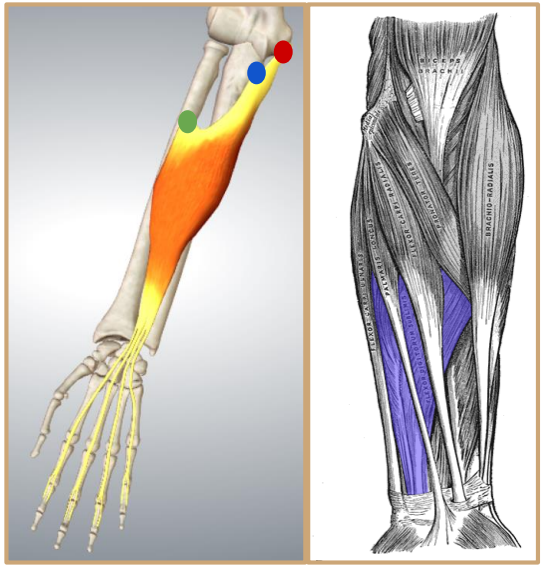


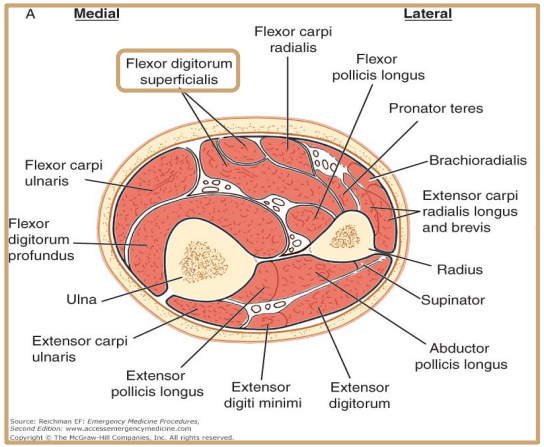
- Palmaris Longus:
- Insertion: Into the Flexor retinaculum & Palmar aponeurosis.
- Action: Flexes hand & tightens palmar aponeurosis.



Intermediate Flexor

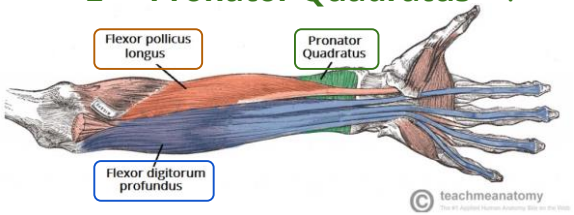
- **Flexor Digitorum Superficialis**:
- **Origin**:
  - Common flexor origin (front of medial epicondyle).
  - Coronoid process of ulna.
  - Anterior surface of radius.
- **Insertion**:
  - Base of middle phalanges of medial 4 fingers.
- **Action**:
  - Flexes middle and proximal phalanges of medial 4 fingers, and the hand (wrist).





Deep Flexors

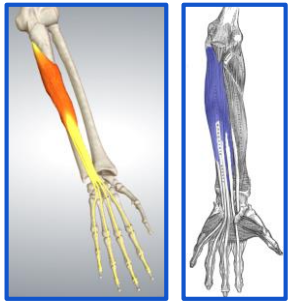
- Deep Flexors Based on **Origin***:
  - Front (above) of radius:
    - **Flexor pollicis longus**.
  - Front (above) of ulna:
    - **Flexor Digitorum Profundus**.
  - Front of lower 4th of ulna (above the two bones (ulna & radius)):
    - **Pronator Quadratus****.



*They all originate from Interosseous.
**مكانها مثل مكان الساعة

- **Flexor Digitorum Profundus**:
- **Insertion:** bases of distal phalanges of medial 4 digits.
- **Action**: Flexes distal phalanges of medial 4 digits.

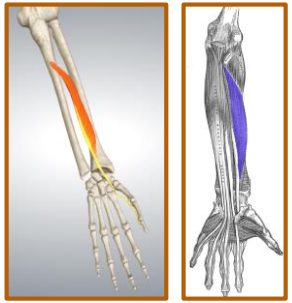
- The medial half of the muscle is supplied by the ulnar nerve, while the lateral half is supplied by anterior interosseous nerve (a branch of median nerve).



- **Flexor Pollicis Longus**:
- **Insertion**: Base of distal phalanx of thumb.
- **Action**: Flexes (interphalangeal, metacarpophalangeal & carpometacarpal)* joints of thumb.

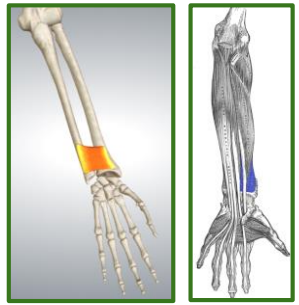
- This muscle is supplied by anterior interosseous nerve (a branch of median nerve).

*All the joints of the thumb



- **Pronator Quadratus**:
- **Insertion**: distal fourth of anterior surface of radius.
- **Action**: pronates forearm (prime mover), helps to hold the 2 bones together (radius and ulna)

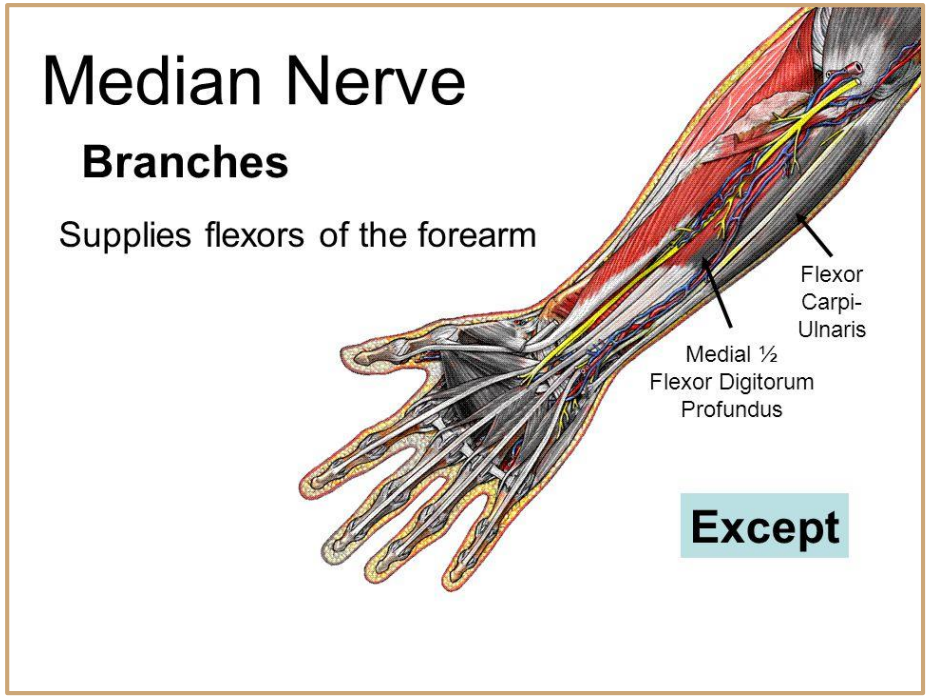
- This muscle is supplied by anterior interosseous nerve (a branch of median nerve).



This Slide was in males' slides only

Nerve Supply of the Deep Flexors

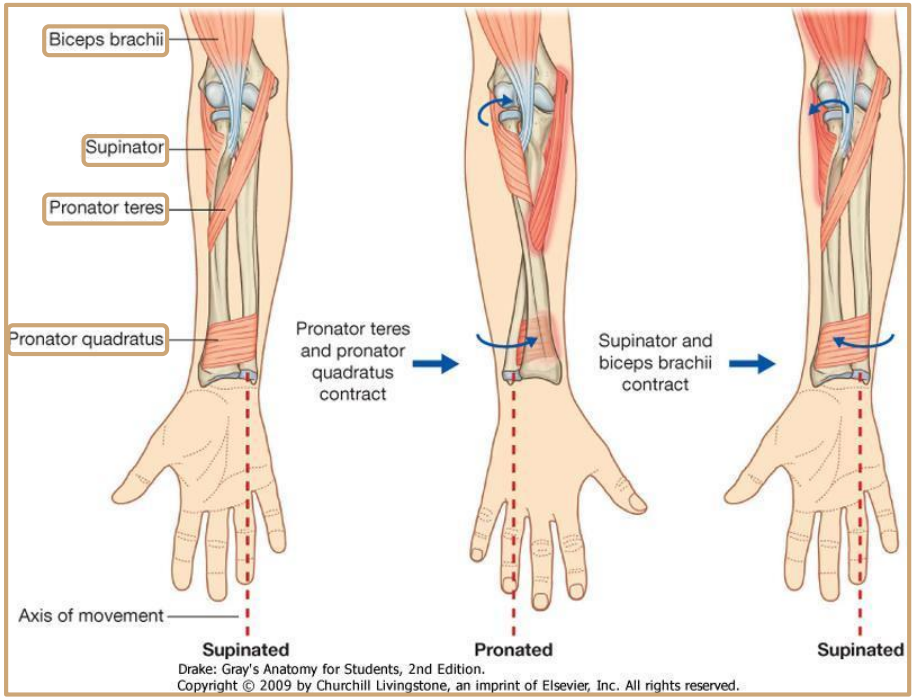
- All are supplied by the **anterior interosseous** nerve (branch of the median nerve).
- **Except** the medial half of the Flexor Digitorum Profundus by the Ulnar Nerve.



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 puts the forearm in mid-prone* position**.



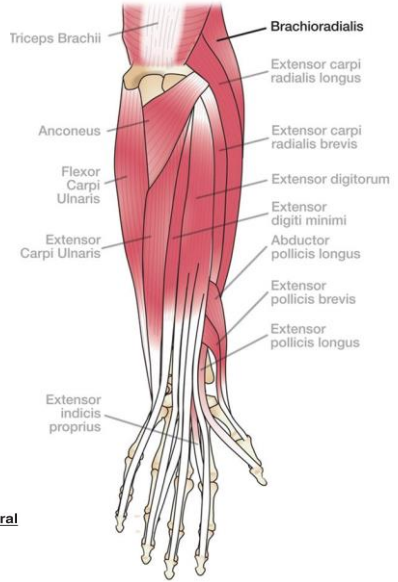
*Put the forearm in a position between Supine and Prone (مثل ما تمد يدك عشان تسلّم)

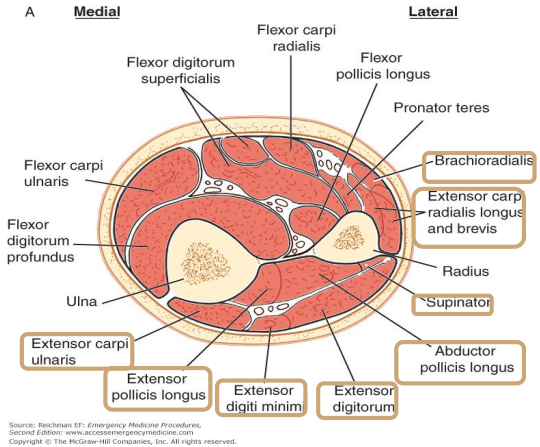
**Brachioradialis initiates Supination and Pronation.

***When the elbow is flexed both muscles are acting
When it is extended only the supinator is active

Posterior Compartment (3 Groups)

		Posterior Compartment (3 Groups)		
		Muscle		**Origin**
Superficial Group (7 Muscles)	*Lateral*	Extensor Carpi Radialis Longus (ECRL)		lateral Supracondylar Ridge
		Brachioradialis (BR)		
	Medial	Anconeous (AN)		Back of Lateral Epicondyle (In boys Slides Only)
		Extensor Carpi Radialis Brevis (ECRB)		**Common Extensor Origin** (Front of Lateral Epicondyle)
		Extensor Digitorum (ED)		
		Extensor Digiti Minimi (EDM)		
		Extensor Carpi Ulnaris (ECU)		
Deep Group (5 Muscles)		To Thumb (Pollicis)	Abductor Pollicis Longus (APL)	Extra Details...
			Extensor Pollicis Brevis (EPB)	
			Extensor Pollicis Longus (EPL)	
		To Index	Extensor Indices (EI)	
		Supinator		



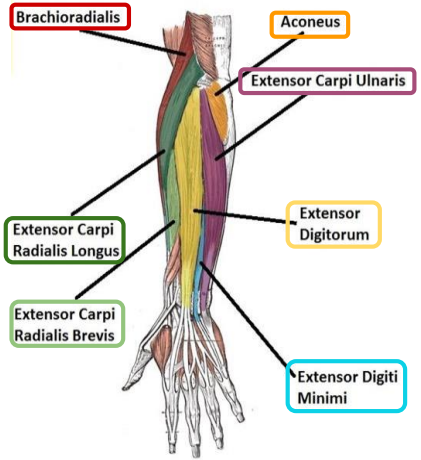


Posterior Compartment

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

باسل كسر كرسي دلال و دلال كسرت أسواره

و بس :)

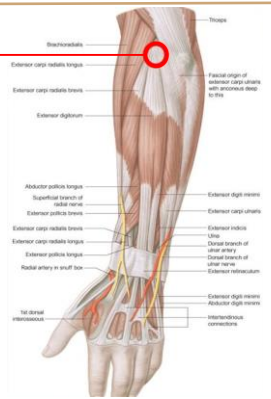


Insertion

- **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 (Superior Posterior) of shaft of Ulna

Superficial Extensors

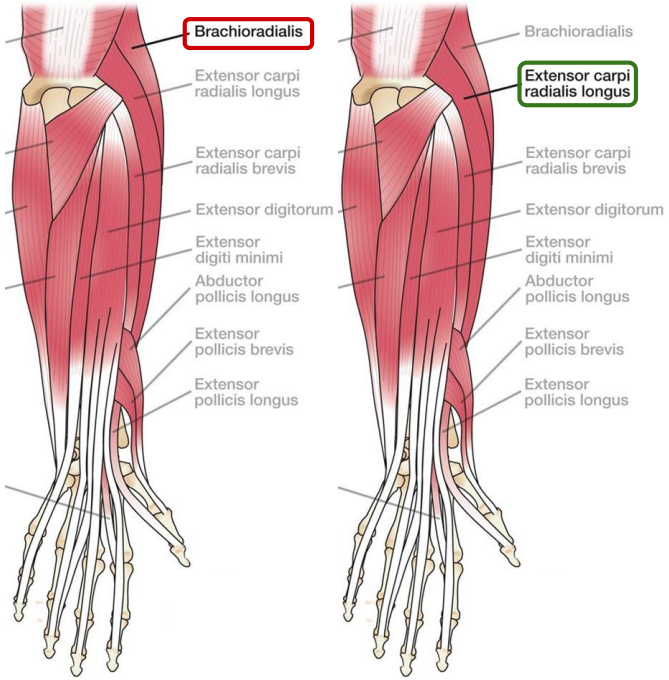
- **Origin:**
  - All arises from
    - Common Extensor Origin (front of lateral epicondyle of the humerus).
  - EXCEPT **3 (In girls slides 2)**
    - **BR & ECRL**: Lateral Supracondyle
    - (**Anconeus**: Back of lateral epicondyle of humerus).



- All cross the wrist
  - EXCEPT **2 (In girls slides 1)**
    - (Brachioradialis & Anconeus).
- **Nerve Supply:**
  - All supplied by deep branch of radial nerve (also called posterior interosseous 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 mid-prone position.



Extensor Carpi Radialis Longus

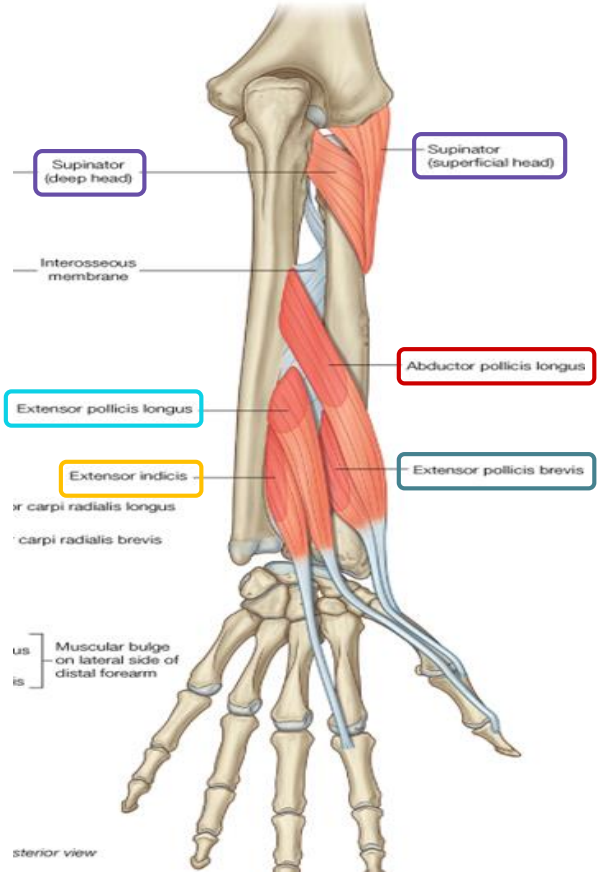
- **Origin:**
  - Lateral Supracondylar ridge of humerus.
- **Insertion:**
  - Posterior surface of base of 2nd metacarpal bone
- **Action:**
  - Extends and abducts hand at wrist joint.

radius تسحب اليد جهة ال

Deep Group

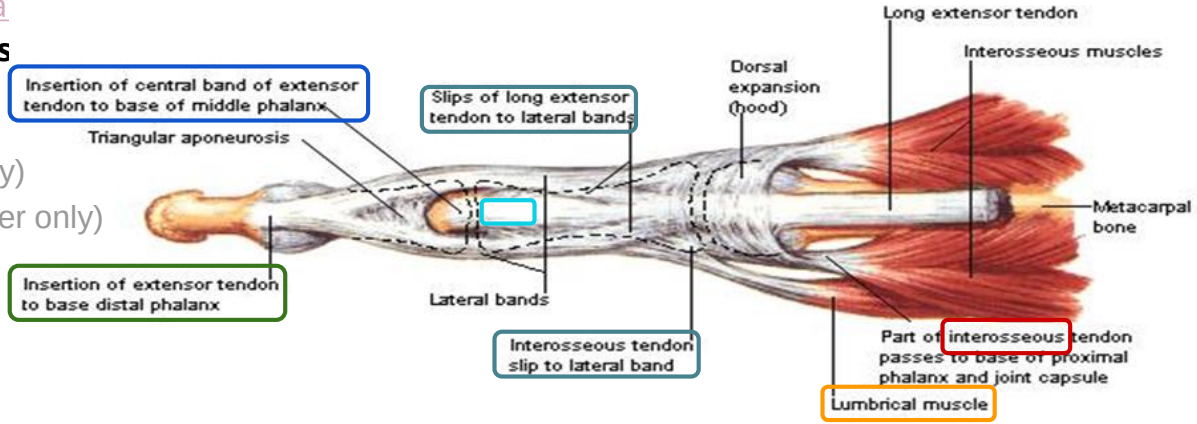
- **Deep Group:**
  - **5 muscles:**
    - Abductor pollicis longus (APL)
    - Extensor pollicis brevis (EPB)
    - Extensor pollicis longus (EPL)
    - Extensor indicis (EI)
    - Supinator

- **Nerve Supply:**
  - All back muscles of the forearm are supplied by Posterior Interosseous Nerve Except, (**ABE**) by Radial Nerve itself.



Dorsal Extensor Expansion

- It is formed on the dorsum of media fingers by the **union of the tendons** of:
  - Extensor digitorum
  - Extensor indicis (In index finger only)
  - Extensor digiti minimi (In little finger only)
  - Lumbricals
  - Palmar & Dorsal:
    - Interossei



- All these tendons unite to form one tendon which divides into 3 Slips:
  - Median one attached to:
    - Middle phalanges
  - 2 Lateral attached to:
    - Terminal phalanges

Summary of Posterior Compartment of Forearm

		Posterior Compartment (3 Groups)				
		Muscle		**Nerve Supply**	**Origin**	**Insertion**
Superficial Group (7 Muscles)	*Lateral*	Extensor Carpi Radialis Longus (ECRL)		ABE: Supplied by **Radial Nerve** itself	lateral Supracondylar Ridge	Posterior Surface of Base of 2nd Metacarpal Bone
		Brachioradialis (BR)				Base of Styloid Process of Radius
	Medial	Anconeus (AN)			Back of Lateral Epicondyle (In boys Slides Only)	Superior Part of The Posterior (Upper Back) Of Ulna Shaft (Lateral Side of The Olecranon)
		Extensor Carpi Radialis Brevis (ECRB)		**Posterior Interosseous Nerve** (Deep branch of Radial Nerve)	**Common Extensor Origin** (Front of Lateral Epicondyle)	Base Of 3rd 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
Deep Group (5 Muscles)		To Thumb (Pollicis)	Abductor Pollicis Longus (APL)		Extra Details...	
			Extensor Pollicis Brevis (EPB)			
			Extensor Pollicis Longus (EPL)			
		To Index	Extensor Indices (EI)			
		Supinator				

Do Not cross the Wrist

MCQ:

Flash cards test :)

1-All Superficial Flexors are supplied by median nerve except:

A- Pronator teres

B- Flexor Carpi Radialis

C- Palmaris Longus

D- Flexor Carpi Ulnaris

2- All Superficial Flexors cross the wrist joint except:

A- Pronator teres

B- Flexor Carpi Radialis

C- Palmaris Longus

D- Flexor Carpi Ulnaris

3- What is the common extensor origin?

A- Back of lateral epicondyle of humerus

B- Front of lateral epicondyle of humerus

C- Back of medial epicondyle of humerus

D- Front of medial epicondyle of humerus

4- Which one of the following is a superficial muscle of the posterior compartment of the forearm?

A- Coracobrachialis

B- Brachialis

C- Brachioradialis

D- Biceps brachii

5-which one of the following does not cross the wrist?

A- Extensor carpi radialis brevis

B- Brachioradialis

C- Anconeus

D- B&C

6- A man standing up and fixing a lamp in the ceiling (His hand extended), which muscle is used for the supination?

A- Supinator

B-Trapezius

C-Flexor digitorum

D-Brachioradialis

7-which of these muscles supplied by posterior interosseous nerve ?

A-supinator.

B-Extensor indicis.

C-Extensor pollicis brevis.

D-all the above.

8- A man screwing a painting on the wall, while his hand is flexed, which muscle is used for the supination?

A- Triceps brachii.

B- Biceps brachii.

C-Extensor pollicis longus

D-Lumbricals muscles

9- The deep muscles of the posterior compartment are:

A-3 muscles

b-2 muscles

C-5 muscles

d-6 muscles

10- The insertion of Pronator Quadratus is:

A-distal 1/4th of anterior surface of Radius

B- interosseus membrane

C-base of 2th metacarpal

D-superior intertochintar

11-Which of the following is most accurate about Posterior Interosseous Nerve?

A- it's the deep branch of Ulnar nerve.

B-it's innervate the posterior compartment of the shoulder.

C-it's supply ABE.

D- it's supply index deep muscle .

12-Action of Flexor Digitorum Profundus is?

A-Flexes distal phalanges of medial 4 digits.

B- abduction of the thumb

C-Flexes the forearm

D-opposition of thumb

1-D

2-A

3-B

4-C

5-D

6-A

7-D

8-B

9-C

10-A

11-D

12-A

Team Members

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