BACK OF FOREARM AND BACK OF HAND:

- All 'long muscles' – arising from back of forearm and passing into the wrist and hand
- No 'short' muscles arising in the back of the hand itself.

- As in the front of the forearm; **superficial** and **deep groups**

- **Superficial group** arises from the **lateral epicondyle of the humerus**
- **Deep group** arises from the **forearm bones and interosseous membrane**

- Muscles on the back of the forearm are **supinators and extensors**
- (those on the front of the forearm are pronators and flexors)

Superficial (origin lateral epicondyle)

- **Anconeus (olecranon)**
- **Extensor carpi radialis longus (2nd MC)**
- **Extensor carpi radialis brevis (3rd MC)**
- **Extensor digitorum**
- **Extensor carpi ulnaris (5th MC)**
- **Extensor digiti minimi (5th extensor hood)**

Deep (origin back or radius/ulnar/IO membrane)

- **Supinator**
- **Extensor indicis**
- **Extensor pollicis brevis**
- **Extensor pollicis longus**
- **Abductor policis longus**

SUPERFICIAL STRATUM:

Anconeus:

- Small triangular sheet
- Origin: lateral epicondyle
- Insertion: olecranon
- Pulls upper end of ulna during pronation / supination
- Supplied by **radial nerve** branch.

NATURE OF TENDONS PASSING THROUGH THE BACK OF THE WRIST:

- Tendons on the back of the wrist are held in place by thickening of deep fascia – **extensor retinaculum.**
- Extensor retinaculum spreads from:
  - Styloid region of ulna and triquetrum
  - → lower end of the radius
- This extensor osseofascial tunnel is, unlike the flexor tunnel, divided by 5 septa which pass onto the radius and ulna – **creating 6 individual tunnels**.
- Tendons pass through these tunnels as a single row, surrounded by SM.

RADIAL EXTENSORS OF THE WRIST:

- There are **2** muscles which are radial extensors of the wrist:
    - **Extensor carpi radialis longus**
    - **Extensor carpi radialis brevis**
- **Extend** and **aBduct** the wrist.

- Both arise from lateral epicondyle
- Both pass through a tunnel underneath extensor retinaculum
- **Longus**:
    - gains insertion into the base of 2nd metacarpal (like flexor carpi radialis)
    - Supplied by **radial nerve** itself
- **Brevis** is inserted into base of 3rd metacarpal.
    - Supplied by **deep branch of radial nerve**

ULNAR EXTENSOR OF THE WRIST:

- **Extensor carpi ulnaris**

- **Extends** and **adducts** the wrist
- Arises from lateral epicondyle
- Its tendon passes over distal end of ulna → through most medial compartment of extensor retinaculum.
- Inserts into base of the 5th metacarpal (little finger).
- Supplied by **posterior interosseous branch of the radial nerve**.

EXTENSOR MUSCLES OF THE FINGER:

- **Extensor digitorum**
- Arises from lateral epicondyle
- Passes beneath the extensor retinaculum
- Divides into 4 tendons which pass to the 4 fingers
- These tendons often linked by oblique bands which limit extension of individual fingers.
- Little finger and index finger have their own additional tendons (extensor digiti minimi, extensor indicis)

Extensor expansions

- Tendon gives a small slip to the proximal phalynx of the finger
- Extensor tendon then flattens out on the proximal phalanx – called the **extensor expansion**.
- Each extensor expansion splits into 3 slips:
    - Two collateral slips pass into the terminal phalanx
    - Middle slip runs to base of middle phalanx.
- **Interossei and lumbrical muscles** insert into this extensor expansion
- The interosseous tendons insert fibres into the extensor expansion which are both transverse and in line with the extensor tendon:
    - Transverse fibres: adduction / abduction (ulnar / radial deviation)
    - Straight fibres: flex a straight finger (flex MCP, extend IP)

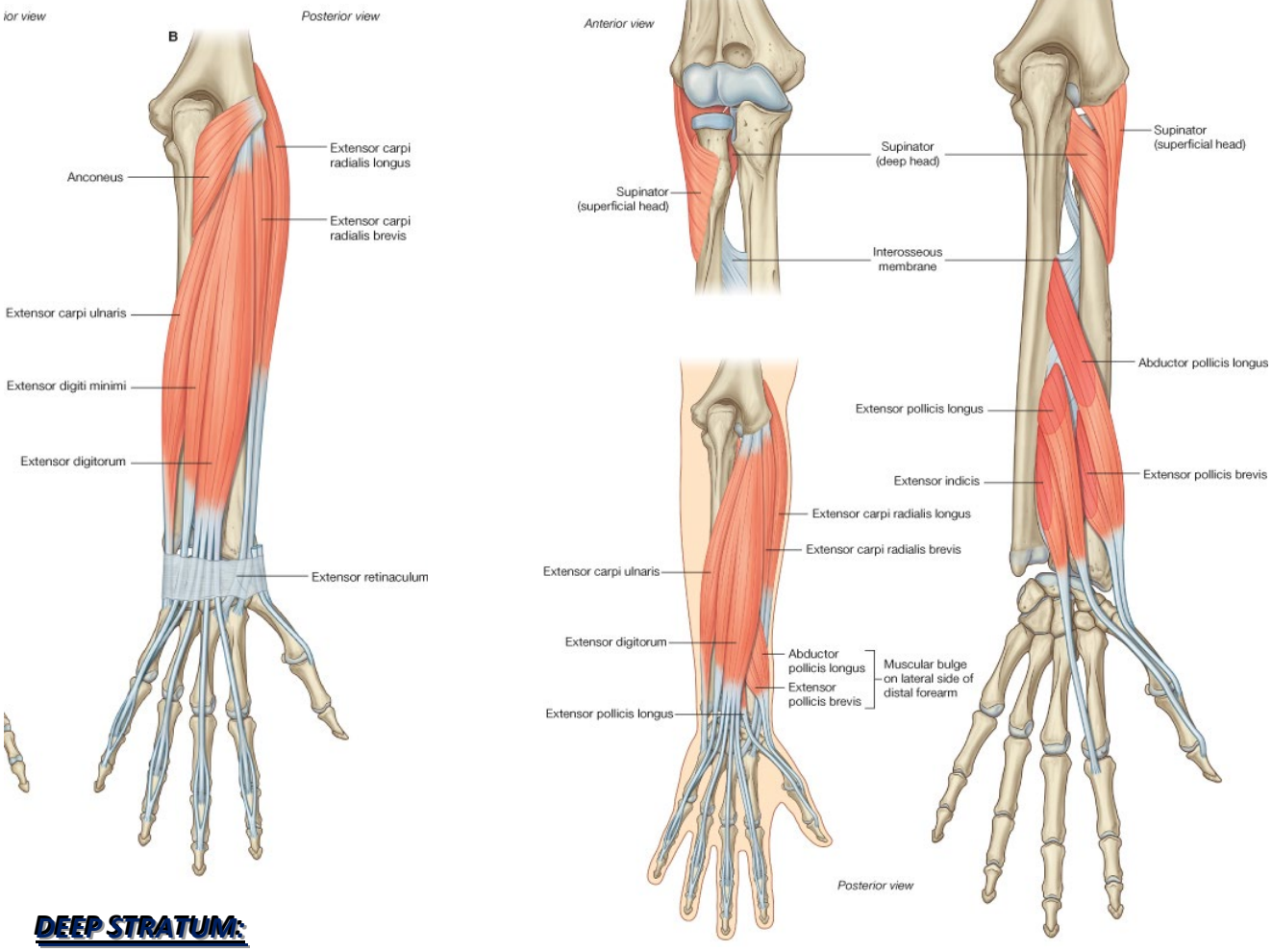
Little finger additional extensor tendon:

- **Extensor digiti minimi**
- Arises from lateral epicondyle

- Passes through its <u>own osseofascial tunnel compartment</u> with its own synovial sheath on back of hand.
- Joins the extensor digitorum tendon to the little finger at the MCP joint.

Superficial stratum

Deep stratum



DEEP STRATUM:

- Arise from posterior surface of forearm bones, and from interosseous membrane.

Extensor indicis

- *Index finger additional extensor tendon*
- Actually one of the **<u>deep stratum</u>** <u>of muscles</u>.
- Origin: posterior ulnar + interosseous membrane
- Passes through the <u>same</u> osseofascial tunnel as the extensor digitorum tendons.
- Joins extensor digitorum tendon of index finger.

MUSCLES WHICH ACT ON THE **THUMB**:

Extensor pollicis longus

- ***Extends MCP & IP joints of thumb***
- Arises from:
    - <u>Posterior surface of **ulna**</u>
    - <u>Interosseous membrane</u>

- Passes over distal end of radius → through an osseofascial compartment → runs around tubercule on end of radius
- Inserts into distal phalanx of the thumb
- Like all extensors, supplied by the **posterior interosseous branch of the radial nerve**

Extensor pollicis brevis
- ***Extends only MCP joint of thumb***
- Arises from
    - **Radius**
    - Interosseous membrane
- Passes through an osseofascial compartment
- Inserts into base of proximal phalanx of the thumb
- Supplied by the posterior interosseous branch of the radial nerve

Abductor pollicis longus:
- ***Abducts (radially deviates) the thumb***
- Arises from:
    - Both forearm bones
    - Interosseous membrane
- Accompanies extensor pollicis brevis through a compartment of osseofascial tunnel.
- Inserts into the **base of thumb metacarpal (I)**
- Supplied by posterior interosseous branch of radial nerve.

Anatomical "snuff-box":
- Concavity produced by the above 3 thumb tendons:
    - **Extensor pollicus longus**
    - **Extensor pollicus brevis**
    - **Abductor pollicis longus**
- **Scaphoid bone** (proximal carpal) can be palpated in base of snuff-box.
- Tenderness in snuff-box usually means fracture of the scaphoid bone.

Summary of thumb movements:
- Thumb metacarpal moves on trapezium in special way – **'saddle joint'**
- Saddle joint allows rotational movement of the thumb metacarpal.
- Loss of thumb movement (muscular / nervous damage) = 40% disability of hand.

- Amount of deviation (abduction/adduction) of the thumb MCP is considerably **less** than the MCP joints of the fingers.
- **Most of the movement of the thumb metacarpal takes place at the synovial joint at the base of the thumb metacarpal.**

Flexion of the the thumb MCP:
- Flexor pollicis longus
- Flexor pollicis brevis

Extensor of the thumb MCP:
- Extensor pollicis longus
- Extensor pollicis brevis

Flexion of thumb IP:

- Flexor pollicis longus

Extension of thumb IP:
- Extensor pollicis longus

Radial deviation (abduction) of thumb MCP:
- Abductor pollicis brevis

Ulnar deviation (adduction) of thumb MCP:
- 1st palmar interossei
- Adductor pollicis

SUPINATORS OF DEEP STRATUM:

Supinator:
- Arises from stable bones – **ulna** (supinator crest) **and humerus** (lateral epicondyle)
- Inserts into the mobile **radius**
  (Remember, all supinators and pronators arise from stable bones, and insert into mobile bones)
- Supplied by the **radial nerve**.

- Supinator actually arises as 2 heads:
- **Ulnar head:**
  - Arises from ulna – supinator crest - just below radial notch.
  - Sweeps round to insert into the anterior aspect of the radius.
- **Humeral head:**
  - Arise from lateral epicondyle of humerus
  - Inserts into lateral aspect of proximal 1/3 of radius.

- The **biceps muscle** is the other great supinator – but it cannot supinate when the arm is straight.
- The **supinator** can supinate in any postion.

Biceps can only supinate when the arm is bent

SUMMARY OF MUSCLES ACTING ON THE WRIST:

Ulnar side:
- Flexor**: flexor carpi ulnaris**
- Extensor**: extensor carpi ulnaris**
- Tend to adduct the wrist.

Radial side:
- Flexor: **flexor carpi radialis**
- Extensor: **extensor carpi radialis longus & brevis**
- Tend to abduct the wrist

- NOTE, when the wrist is fully flexed, there is too much slack in the flexor tendons for a strong grip to be made.
- The wrist must be partly extended in ofter to tighten these flexor tendons sufficiently to form a strong grip.
- Immobilising the arm in a cast, the wrist should be immobilised in a position of slight extension.

SUMMARY OF MUSCLES ACTING ON THE FINGERS:

***Flexion* of MCP joints:**

- **Flexor digitorum superficialis**
- **Flexor digitorum profundus**
- **Felxor pollicis longus (thumb)**
- **Flexor pollicis brevis (thumb)**
- **Flexor digiti minimi (little finger V)**

***Extension* of MCP joints:**

*All supplied by **posterior interosseous branch** of the **radial nerve***

- **Extensor digitorum**
- **Extensor digiti minimi (V)**
- **Extensor indicis (II)**
- **Extensor pollicis longus**
- **Extensor pollicis brevis**

- **Lumbricals** link the flexor digiorum profudus tendons, and the extensor expansion tendon
- Δ allow changes in tension in these tendons which allows delicate movements.

***Radial / ulnar deviation*:**

Radial deviation:

- **Dorsal interossei**
- **Abductor pollicis brevis** (abducts the thumb away from palm)
- **Abductor pollicis longus**

Ulnar deviation:

- **Palmar interossei**
- **Abductor digiti minimi** (abduction of the little finger away from midline of hand)
- **Adductor policis** (adducts the thumb towards the palm)

Opposition of the thumb and little finger:

- **Opponens pollicis (thumb)**
- **Opponens digiti minimi (little finger)**