Notes: Wrist & Hand - Part 2

Lecture Slides A.D.A.M.© Interactive Anatomy

Lab Slides

Keep in mind when studying the hand that:

- The thumb's most freely moveable joint is the carpometacarpal (CMC) joint exhibiting flexion/extension, ab/adduction and rotation ("pronation") of the first metacarpal in the movement called opposition.
- Digits 2-5 are most freely moveable at the MCP joint (metacarpophalangeal) exhibiting flexion/extension and ab/adduction. (The thumb MCP exhibits only flexion/extension - similar to the IP joints of all the fingers.)
- Generally, tendons or muscles passing the joints on the palmar side act as flexors and on the dorsal side as extensors.
- The thumb flexes along the palm (never leaving its surface) and extends away from but in the plan of the palm.
- The thumb abducts away from the palm pointing upward if the palm is supinated and adducts to a position in which the first metacarpal and proximal and distal phalanges are overlying the second metacarpal and proximal phalanx.
- Thumb opposition occurs anytime the thumb pad is held opposite the other finger pads or the palm. It is a combination of abduction, flexion and rotation of the thumb occurring at the CMC of the thumb. (MCP and IP flexion help to complete opposition when opposing the thumb to touch its tip to the tip of the little finger.

<table>
<thead>
<tr>
<th>Joint</th>
<th>Classification</th>
<th>Movements Possible &amp; Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCP 2-5</td>
<td>synovial - condyloid</td>
<td>flexion/extension (s-s axis/sagittal plane), ab/adduction (f-b axis/frontal plane)</td>
</tr>
<tr>
<td>IP (PIP &amp; DIP 2-5 and MCP &amp; IP #1)</td>
<td>synovial - hinge</td>
<td>flexion/extension (s-s axis/sagittal plane for 2-5; f-b axis plane of the palm for IP #1)</td>
</tr>
<tr>
<td>CMC #1</td>
<td>synovial - saddle joint</td>
<td>flexion/extension (f-b axis plane of the palm); ab/adduction (s-s axis/sagittal plane); rotation (pronation/supination) - following the outline of a cone, its point at the base of the thumb.</td>
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</tbody>
</table>
### Flexor Digitorum Profundus

**Prox Attachment:** Ulna (anterior)

**Distal Attachment:** Distal phalanges 2-5

**Action:** Flexion of MCP, PIP & DIP 2-5

**Innervation:** Median n. to portion for digits 2 & 3; Ulnar n. for portions to digits 4 & 5

**Note:** Fibers arise in forearm, tendons pass through carpal tunnel and serve as proximal attachment for lumbricals; only muscle to flex DIP 2-5

### Lumbricals (#1 to second finger in red)

**Prox Attachment:** Tendons of FDP at the level of the proximal metacarpal shaft

**Distal Attachment:** Tendons of Extensor Digitorum at the level of the mid-proximal phalanx, distal to the MCP joint

**Action:** Flex the MCP or prevent hyperextension; extend the PIP and DIP joints

**Innervation:** Median n. to lumbricals 1 & 2 (to digits 2 & 3); Ulnar n. to lumbricals 3 & 4 (to digits 4 & 5)

**Note:** Lumbricals "carry" the innervation of the FDP slips from which they derive their proximal attachments.

### Flexor Pollicis Longus

**Prox Attachment:** Radius (prox to distal)

**Distal Attachment:** Distal phalanx of thumb

**Action:** Thumb flexion

**Innervation:** Median n.

**Note:** Only muscle to flex IP of thumb
### Adductor Pollicis (transverse head in red)

**Prox Attachment:** Third metacarpal and capitate  
**Distal Attachment:** Ulnar side of base of proximal phalanx of thumb  
**Action:** Thumb Adduction (and stabilization in pinch)  
**Innervation:** Ulnar n.  
**Note:** FPB (median n) and opponens (median n) from trapezium proximally and to radial edge of 1st metacarpal (opponens) and radial side of base of proximal phalanx (FPB)

![Adductor Pollicis](https://via.placeholder.com/150)

### Flexor Digitorum Superficialis (Sublimis)

**Prox Attachment:** Radius and medial epicondyle  
**Distal Attachment:** middle phalanges digits 2 - 5  
**Action:** MCP and PIP flexion  
**Innervation:** Median n.  
**Note:** Abductor brevis (median n) and Median nerve as it passes deep to the flexor retinaculum (transverse carpal ligament)

![Flexor Digitorum Superficialis](https://via.placeholder.com/150)

### Lumbrical Distal Attachment to ED

**Note:** Also see Adductor Pollicis from radial/dorsal view and 1st dorsal interosseus - with similar attachment to ED as lumbrical but more proximal
**First Dorsal Interosseus**

**Prox Attachment:** Metacarpal shafts

**Distal Attachment:** side of base of proximal phalanx (shown here; *attachment to ED tendon with lumbrical* shown above)

**Action:** Attachment to proximal phalanx allows abduction of index (other interossei ab or adduct digits depending on the side to which they attach); **more important action is with lumbrical to prevent hyperextension of MCP by ED**

**Innervation:** Ulnar n.

**Note:** "Abductor" pollicis longus, extensor pollicis longus, extensor pollicis brevis all radial nerve

**Extensor Digitorum (Communis)**

**Prox Attachment:** Ulna and lateral epicondyle

**Distal Attachment:** Through Extensor apparatus to proximal, middle and distal phalanges - dorsal sides

**Action:** Extension of MCP and IP joints; **must be balanced by lumbricals and interossei to prevent hyperextension of MCP**

**Innervation:** Radial n.

**Lab**

<table>
<thead>
<tr>
<th>A</th>
<th>Adductor Pollicis - Ulnar n. (deep muscle)</th>
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<tbody>
<tr>
<td>B</td>
<td>Flexor Pollicis Brevis (FPB) - Median n. (thenar muscle)</td>
</tr>
<tr>
<td>C</td>
<td>Abductor Pollicis Brevis (APB) - Median n. (thenar muscle)</td>
</tr>
<tr>
<td>D</td>
<td>Opponens Pollicis (OP) - Median n. (thenar muscle)</td>
</tr>
</tbody>
</table>
Arrow shows first lumbral running to dorsum from palmar side, attaching to extensor digitorum tendon distal to MCP. Also in picture is the ECU as well as adductor pollicis showing through from palmar side.

Arrow A shows FDP; Arrow B shows connection of first lumbral. MCP, PIP and DIP axes are in red. Notice lumbral is palmar (anterior) to MCP F/E axis and by way of connection to ED, posterior to PIP and DIP axes.

Volar (palmar) view of lumbral #1 (lumbral #1 goes to digit #2)

Review:
A - Supinator (radial n.)
B - Pronator (median n.)

Also shown are:
biceps brachii (musculocutaneous n.)
ECRL (radial n.; off of lateral epicondyle)
FCU (ulnar n.; off of medial epicondyle)
FDP (slip to index finger - median n)
Flexor Carpi Ulnaris (ulnar n) inserting onto fifth metacarpal base and pisiform bone (which is on volar side of triquetrum); also shown, FCR (median n.)