The Wrist and Hand Joints
The Wrist & Hand Joints

• Many sports require precise functioning of wrist & hand

• Archery, bowling, golf, baseball, tennis, etc. require combined use of wrist & hand joints

• Relate functional anatomy to joint actions
  – flexion, extension, abduction, & adduction of wrist & hand
  – 29 bones
  – More than 25 joints
  – More than 30 muscles
    • 18 are intrinsic
Bones

- 29 bones, including radius & ulna
  - 8 carpal bones in 2 rows of 4 bones form wrist
  - 5 metacarpal bones, numbered 1 to 5 from thumb to little finger, join the wrist bones
  - 14 phalanges (digits), 3 for each phalange except the thumb, which has only 2
    • Proximal, middle, & distal
  - Thumb has a sesamoid bone in its flexor tendon
Bones

Eight carpal bones

- Proximal row from radial to ulnar side
  - scaphoid (boat-shaped) or navicular
  - lunate (moon-shaped)
  - triquetrum (three-cornered)
  - pisiform (pea-shaped)

Joints

- **Wrist joint**
  - 70 to 90 degrees of flexion
  - 65 to 85 degrees of extension
  - 15 to 25 degrees of abduction
  - 25 to 40 degrees of adduction

![Diagram of wrist joint movements](image)
Joints

- Each finger has 3 joints
  - Metacarpophalangeal (MCP) joints
  - Proximal interphalangeal (PIP) joints
  - Distal interphalangeal (DIP) joints
Joints

- Thumb has 2 joints
  - Metacarpophalangeal (MCP) joint
    - Full extension into 40 to 90 degrees of flexion
    - Ginglymus
Joints

- Thumb has 2 joints
  - Interphalangeal (IP) joint
    - Flex 80 to 90 degrees
  - Ginglumus

[Diagram showing various joint movements]
Joints

- Thumb has 2 joints
  - Carpometacarpal (CMC) joint of thumb
    - Unique saddle-type joint
    - 50 to 70 degrees of abduction
    - Flex 15 to 45 degrees & extend 0 to 20 degrees
Movements

• Wrist
  – Flexion & extension
  – Abduction & adduction

• Fingers
  – Flex & extend
  – MCP joints also abduct & adduct
Movements

• Middle phalange is reference point to differentiate abduction & adduction
  – Thumb, index & middle fingers abduct when they move laterally toward radial side of hand
  – Ring & little fingers adduction when they move medially toward ulnar side of hand
  – Medial movement of thumb, index & middle fingers toward ulnar side of hand is adduction
  – Lateral movement of ring & little finger toward radial side of hand is abduction
Movements

• **Extension**
  – movement of back of hand and/or phalanges toward posterior or dorsal aspect of forearm
Movements

• Abduction (radial flexion)
  – movement of thumb side of hand toward lateral aspect or radial side of forearm
  – Also, movement of fingers away from middle finger
Movements

• Adduction (ulnar flexion)
  – movement of little finger side of hand toward medial aspect or ulnar side of forearm
  – Also, movement of fingers toward middle finger
Movements

• Opposition
  – movement of thumb across palmar aspect to oppose any or all of the phalanges

• Reposition
  – movement of thumb as it returns to anatomical position from opposition with hand and/or fingers
Flexor Carpi Radialis Muscle

- Flexion of wrist
- Abduction of wrist
- Weak flexion of elbow
- Weak pronation of forearm
Palmaris Longus Muscle

- Flexion of wrist
- Weak flexion of elbow
Flexor Carpi Ulnaris Muscle

- Flexion of wrist
- Adduction of wrist, together with extensor carpi ulnaris muscle
- Weak flexion of elbow
**Extensor Carpi Ulnaris Muscle**

- **Extension of wrist**
- **Adduction of wrist together with flexor carpi ulnaris muscle**
- **Weak extension of elbow**
Extensor Carpi Radialis Brevis Muscle

- Extension of wrist
- Abduction of wrist
- Weak flexion of elbow
Extensor Carpi Radialis Longus Muscle

- Extension of wrist
- Abduction of wrist
- Weak flexion of elbow
- Weak pronation to neutral from a fully supinated position
Flexor Digitorum Superficialis Muscle

- Flexion of fingers at metacarpophalangeal & proximal interphalangeal joints
- Flexion of wrist
- Weak flexion of elbow
Flexor Digitorum Profundus Muscle

Flexion of 4 fingers at metacarpophalangeal, proximal interphalangeal, & distal interphalangeal joints

Flexion of wrist
Flexor Pollicis Longus Muscle

Flexion of thumb carpometacarpal, metacarpophalangeal, & interphalangeal joints

Flexion of wrist

Abduction of wrist
Extensor Digitorum Muscle

Extension of 2\textsuperscript{nd}, 3\textsuperscript{rd}, 4\textsuperscript{th}, & 5\textsuperscript{th} phalanges at metacarpophalangeal joints

Extension of wrist

Weak extension of elbow

Origin:
Posteriolateral humeral epicondyle

Insertion:
Base of dorsal aspect of middle & distal phalanxes
**Extensor Indicis Muscle**

- Extension of index finger at metacarpophalangeal joint
- Weak wrist extension
- Weak supination of forearm from a pronated position
Extensor Digiti Minimi Muscle

Extension of little finger at metacarpophalangeal joint

Weak wrist extension

Weak elbow extension
Extensor Pollicis Longus Muscle

Extension of thumb at carpometacarpal, metacarpophalangeal, & interphalangeal joint

Extension of wrist
Abduction of wrist
Weak supination of forearm from a pronated position
Extensor Pollicis Brevis Muscle

- Extension of thumb at carpometacarpal & metacarpophalangeal joints
- Weak wrist extension
- Wrist abduction

- Extension of thumb at carpometacarpal & metacarpophalangeal joints
- Weak wrist extension
- Wrist abduction
Abductor Pollicis Longus Muscle

- Abduction of thumb at carpometacarpal joint
- Abduction of wrist
- Extension of thumb at carpometacarpal joint
- Weak supination of forearm from a pronated position
- Weak flexion of wrist