Structure and Function of the Wrist

2 joints and 10 different bones
Combine to create wrist motion
Anatomical Terms: Wrist/Hand

- **Palmar** = anterior aspect of the wrist and hand
- **Dorsal** = posterior aspect of the wrist and hand
The Wrist

- Articulations of the wrist:
  - The radiocarpal joint
  - The midcarpal joint

Lippert pg 162
Radiocarpal Joint

- Condyloid joint
  - Articulation of distal radius (concave) and articular disk with the proximal row of carpals (convex)
  - Proximal row of carpals move in a direction that is opposite to the hand during movement

- Motions:
  - Flexion & Extension
  - Radial & Ulnar Deviation
  - Circumduction
Midcarpal Joint

- Located between the 2 rows of carpals (intercarpal joints)
- Plane joint
- Allow gliding motions, which contribute to radiocarpal joint motions
Osteology of the Wrist

- Distal radius, distal ulna, and 8 carpal bones
- Carpal bones are arranged in 2 rows (4 bones in each row)
  - Proximal row (lateral to medial):
    - Scaphoid, lunate, triquetrum, pisiform
  - Distal row (lateral to medial):
    - Trapezium, trapezoid, capitate, hamate
Osteology: Distal Ulna & Radius

- Ulna
- Radius

- Head
- Styloid Process

- Styloid Processes
Osteology: Carpals

- Capitate
- Trapezoid
- Hamate
- Pisiform
- Trapezium
- Scaphoid
- Triquetrum
- Lunate
Osteology of the Wrist

• Other important bony landmarks:
  • Medial epicondyle of humerus
  • Lateral epicondyle of humerus
  • Supracondylar ridge of humerus
Arthrology of the Wrist

- Radiocarpal Joint
  - Accepts approximately 80% of the force that crosses the wrist
- Midcarpal
Supporting Structures of the Wrist Joint

- **Intrinsic Ligaments**
  - Originate and insert within the carpal bones

- **Extrinsic Ligaments**
  - Originate outside the carpal bones and insert within the carpal bones

*Triangular fibrocartilage (TFC)*

*Lunotriquetral Ligament (L T Lig)*

*Scaphoid Lunate (S L Lig)*
Extrinsic Ligaments

- Radial collateral ligament
  - Crosses wrist laterally to connect radius and carpals
- Ulnar collateral ligament
  - Crosses wrist medially to connect ulna and carpals
- Palmar radiocarpal ligament
  - Crosses wrist anteriorly to connect radius/ulna to carpals
- Dorsal radiocarpal ligament
  - Crosses wrist posteriorly to connect radius to carpals
Carpal Tunnel Syndrome

- The Transverse Carpal Ligament
Myology of the Wrist

- **Anterior muscles:**
  - Flexor carpi ulnaris
  - Flexor carpi radialis
  - Palmaris longus

- **Posterior muscles:**
  - Extensor carpi radialis longus
  - Extensor carpi radialis brevis
  - Extensor carpi ulnaris
# Myology of the Wrist

**Extensor Carpi Radialis Brevis**

<table>
<thead>
<tr>
<th><strong>Origin</strong></th>
<th>Lateral epicondyle of the humerus-common extensor tendon</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Insertion</strong></td>
<td>Base of the 3rd metacarpal-dorsal aspect</td>
</tr>
<tr>
<td><strong>Innervation</strong></td>
<td>Radial n.</td>
</tr>
<tr>
<td><strong>Action</strong></td>
<td>Wrist extension, radial deviation</td>
</tr>
<tr>
<td><strong>“tidbit”</strong></td>
<td>What’s in a name? Common origin?</td>
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</table>
### Extensor Carpi Radialis Longus

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<thead>
<tr>
<th><strong>Origin</strong></th>
<th>Lateral epicondyle of the humerus, common extensor tendon</th>
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<tbody>
<tr>
<td><strong>Insertion</strong></td>
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# Myology of the Wrist

### Extensor Carpi Ulnaris

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<td><strong>Origin</strong></td>
<td>Lateral epicondyle of the humerus-common extensor tendon <em>and</em> posterior border of the middle 1/3 of the ulna</td>
</tr>
<tr>
<td><strong>Insertion</strong></td>
<td>Base of the 5(^{th}) metacarpal-dorsal surface</td>
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### Myology of the Wrist

#### Flexor Carpi Radialis

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<td><strong>Insertion</strong></td>
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<td><strong>Innervation</strong></td>
<td>Median n.</td>
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Identify!

- Wrist extensors
- Wrist flexors
- Radial deviators
- Ulnar deviators
Identify!

- Flexor Carpi Ulnaris
- Palmaris Longus
- Flexor Carpi Radials
- Wrist extensor muscles
  - How do you stretch the wrist extensors?
  - How do you strengthen the wrist extensors?
    - Concentrically?
    - Isometrically?

- Wrist flexor muscles
  - How do you stretch the wrist flexors?
  - How do you strengthen the wrist flexors?
    - Eccentrically?
    - Isometrically?