

PHYE 281 - Applied Kinesiology

Lecture 7

The Wrist and Hand

Kevin Petti, Ph.D.
Department of Natural Sciences
Health, Exercise Science and Nutrition
San Diego Miramar College

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Objectives

Identify the bones of the wrist and hand

Identify specific anatomic landmarks on these bones

List the movements of the wrist and hand

Identify the muscles of the wrist and hand

Know the origin, insertion and action for each of the wrist and hand muscles

Understand the mechanism of injury and involved anatomy in specific injuries to the wrist and hand

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Bones of Wrist and Hand

29 bones including radius and ulna

Each hand has:

Eight carpals in two rows of four bones

Five metacarpals numbered I-V starting from the thumb side

The fingers have a total of 14 phalanges - each finger has three, the thumb has two

Sesamoid bones of fingers are common but not counted in this total

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Bones of Wrist and Hand

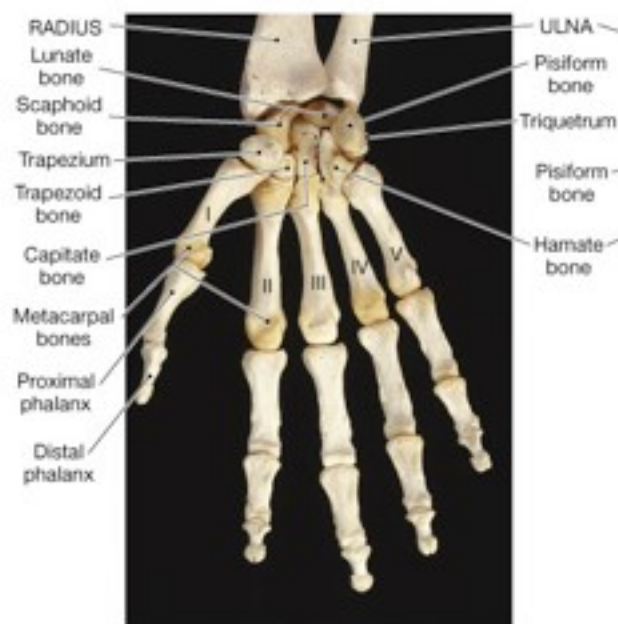
Eight carpal bones

Count two rows of four

Count proximal row first

First row: scaphoid, lunate, triquetrum, pisiform

Second row: trapezium, trapezoid, capitate, hamate



(a) Anterior view

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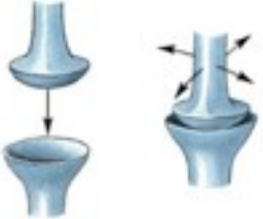
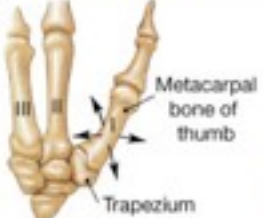
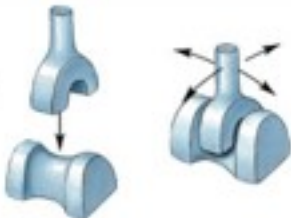
The Wrist Joint

Ellipsoidal joint (also called condyloid)

Radiocarpal joint: an articulation between the radius and the first two carpals (scaphoid and lunate)

Biaxial joint moving in two plans allowing for flexion/extension and abduction/adduction

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<p>Ellipsoidal joint</p> 		<p>Biaxial</p> <ul style="list-style-type: none"> • Radiocarpal joint • Metacarpophalangeal joints 2-5 • Metatarsophalangeal joints
<p>Saddle joint</p> 		<p>Biaxial</p> <ul style="list-style-type: none"> • First carpometacarpal joint

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Wrist Joint Movements

Flexion
Extension



Wrist flexion

A



Wrist extension

B

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Wrist Joint Movements

Abduction
Adduction



Wrist abduction
(radial deviation)

C



Wrist adduction
(ulnar deviation)

D

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The Finger Joints

Each finger has three joints
(except thumb)

Metacarpophalangeal joint

Between metacarpal and proximal phalanx (knuckle)

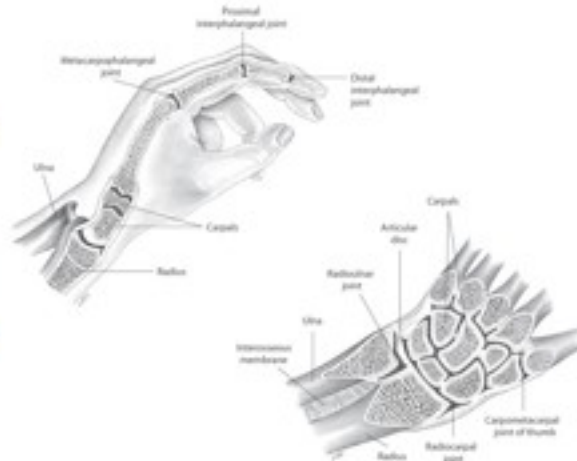
1st MC joint is a saddle joint between trapezium and metacarpal I - allows for thumb/finger opposition

Proximal interphalangeal joint

Between proximal and middle phalanges

Distal interphalangeal joint

Between middle and distal phalanges



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Finger Joint Movements

Flexion

Extension



Flexion of fingers and thumb, opposition

E



Extension of fingers and thumb, reposition

F

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Finger Joint Movements

Adduction

Abduction



Adduction of metacarpophalangeal joints and the thumb

G



Abduction of metacarpophalangeal joints and the thumb

H

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Muscles of Wrist and Hand

Flexors of the wrist and fingers

Generally have their origins on anteriomedial aspect of humerus and ulna

Generally have their insertions on palmar aspect of carpals and metacarpals

Extensors

Generally have their origins on the posteriolateral aspect of humerus and ulna

Generally have their insertions on dorsal aspect of carpals and metacarpals

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Muscles of Wrist and Hand

Flexors:

Flexor carpi radialis

Palmaris longus

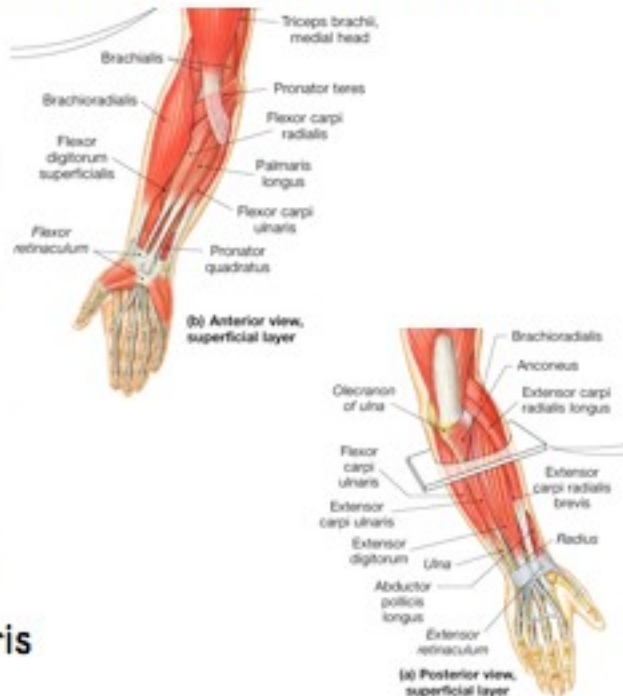
Flexor carpi ulnaris

Extensors

Extensor carpi radialis longus

Extensor digitorum

Extensor carpi ulnaris



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Flexor Carpi Radialis

Origin

Medial epicondyle of humerus

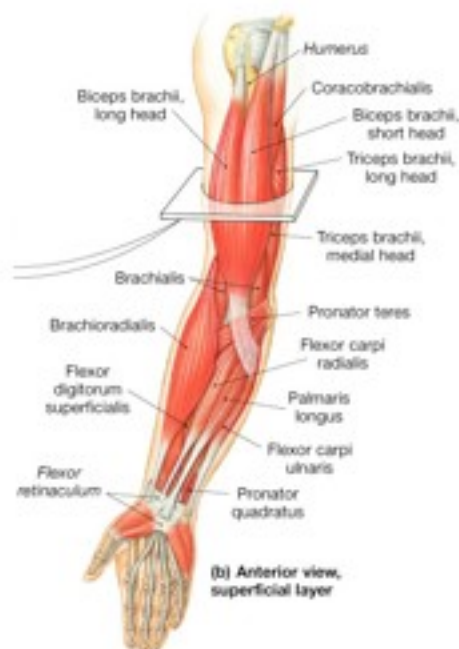
Insertion

Palmar surface of second and third metacarpal

Action

Wrist flexion

Wrist abduction



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Palmaris Longus

Origin

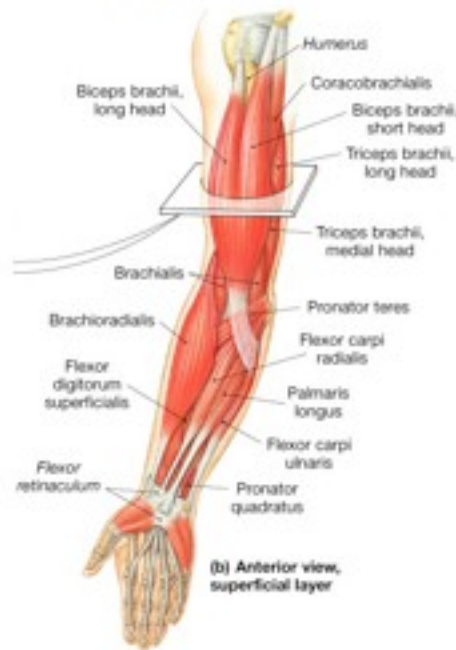
Medial epicondyle
of humerus

Insertion

Palmar aponeurosis

Action

Wrist flexion



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Flexor Carpi Ulnaris

Origin

Medial epicondyle
of humerus

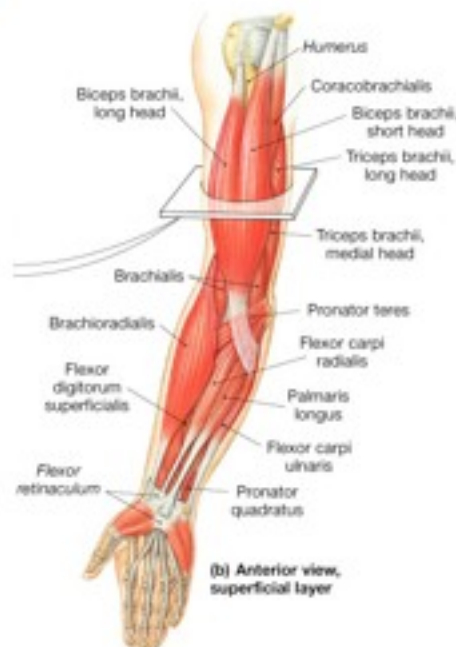
Insertion

Palmar surface of
pisiform, hamate
and base of fifth
metacarpal

Action

Wrist flexion

Wrist adduction



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Extensor Carpi Radialis Longus

Origin

Lateral epicondyle of humerus, posterior ulna

Insertion

Dorsal surface of second metacarpal

Action

Wrist extension
Wrist abduction



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Extensor Digitorum

Origin

Lateral epicondyle of humerus

Insertion

Dorsal surface of phalanges 2-4

Action

Wrist extension
Extension of fingers 2-4



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Extensor Carpi Ulnaris

Origin

Lateral epicondyle of humerus, posterior ulna

Insertion

Dorsal surface fifth metacarpal

Action

Wrist extension
Wrist adduction



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Broken Wrist

Scaphoid and then lunate are the most often broken carpal bones in the wrist

The radius can break as well

Caused by falling on an outstretched hand

Often dismissed as a sprain



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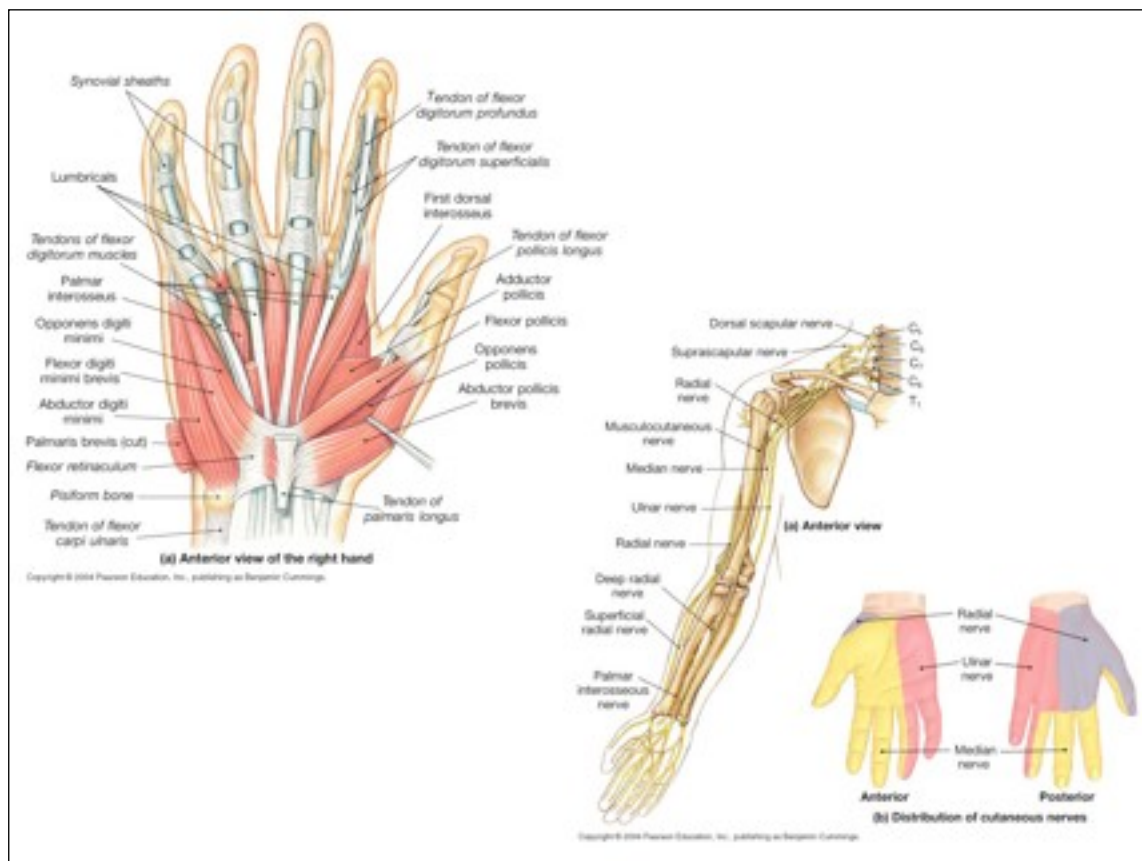
Carpal Tunnel Syndrome

Compression of median nerve against the flexor retinaculum

Common with repetitive use of hand and wrist such as keyboarding



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