OSTEOLOGY OF HANDS

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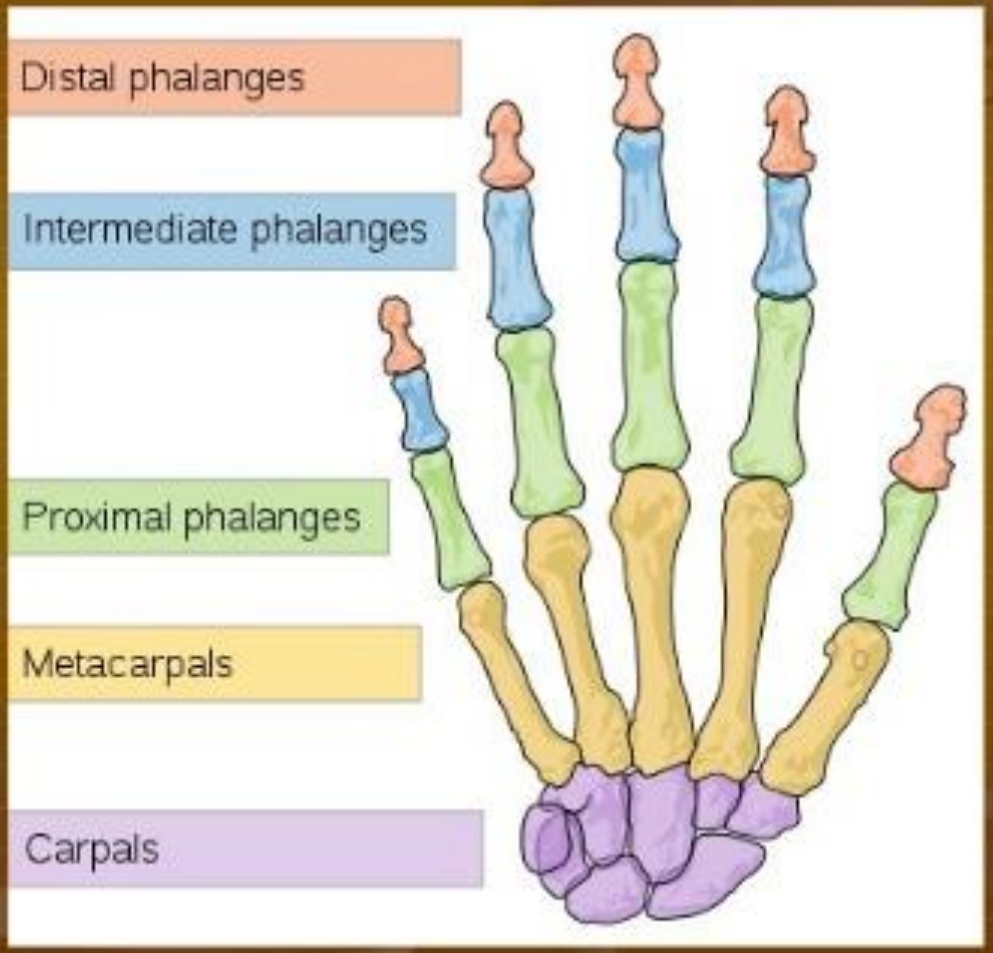
HAND

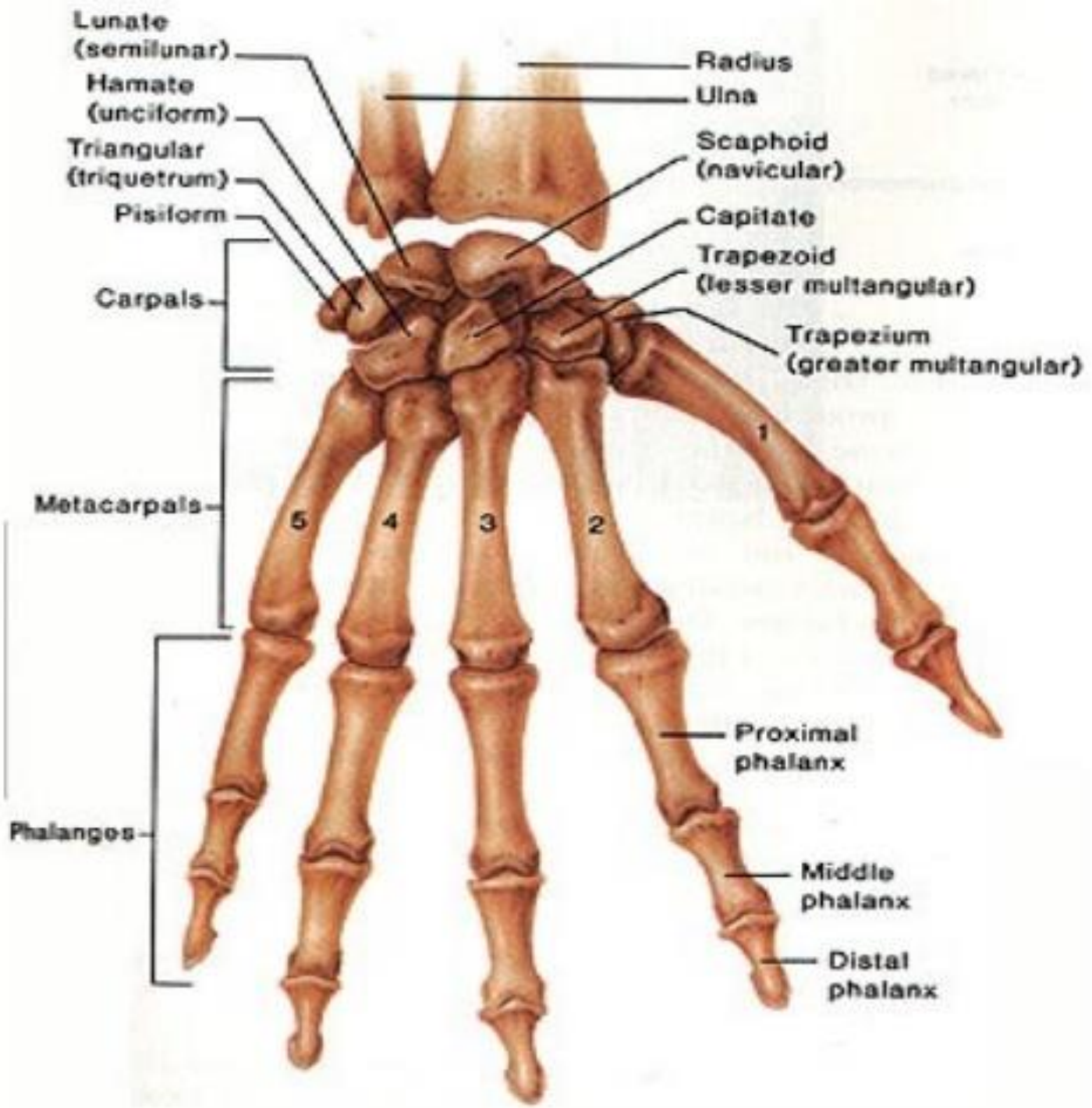
Introduction

- Gross motor skills and fine motor skills.
- 5 Digits / fingers
  - Thumb – pollex
  - Index finger – digitus indicis
  - Middle finger – digitus tertius
  - Ring finger – digitus annulus
  - Little finger – digitus minimi

Hand

- Hand composed by a bony framework :
- 8 carpals bones
- 5 metacarpals
- 14 phalanges

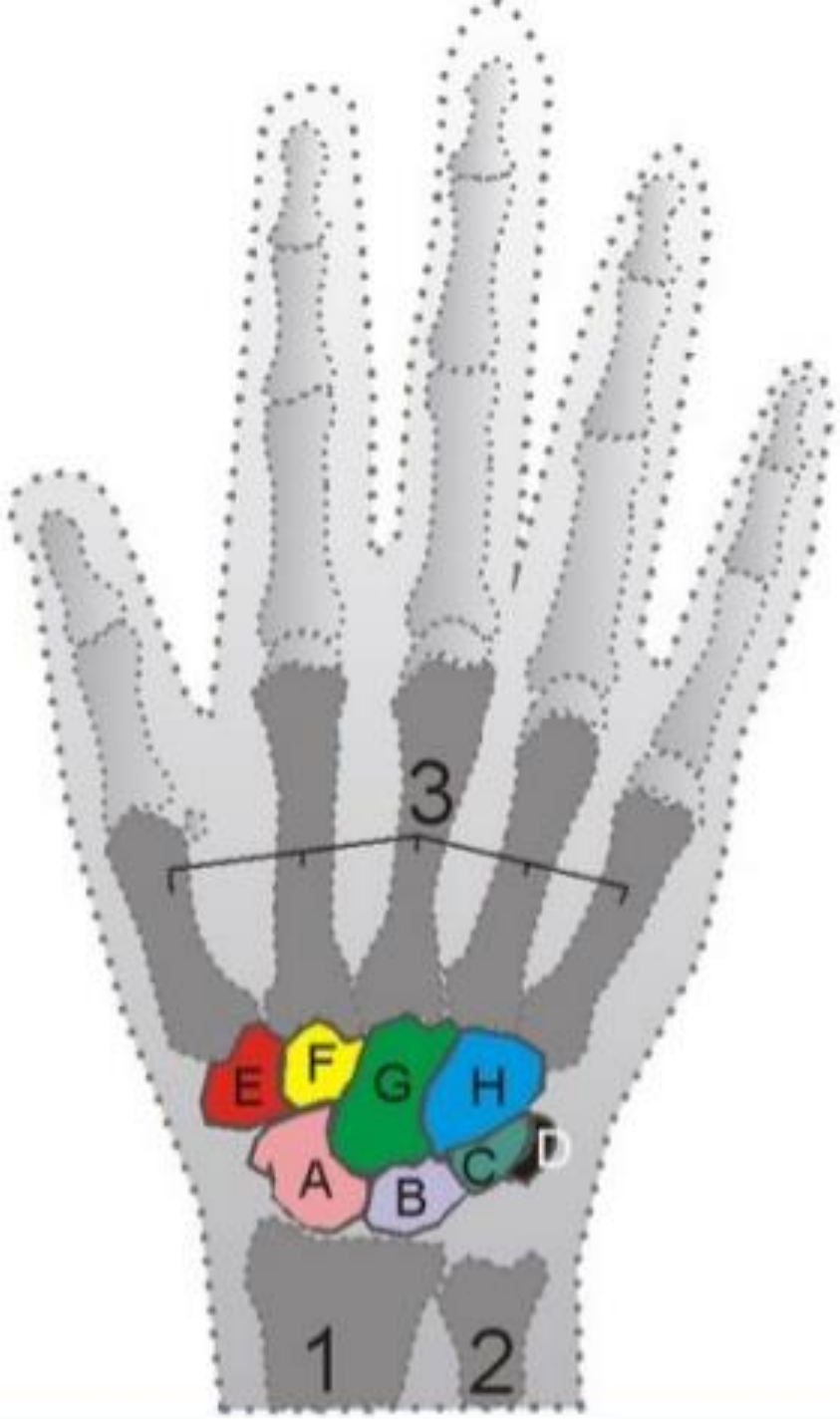


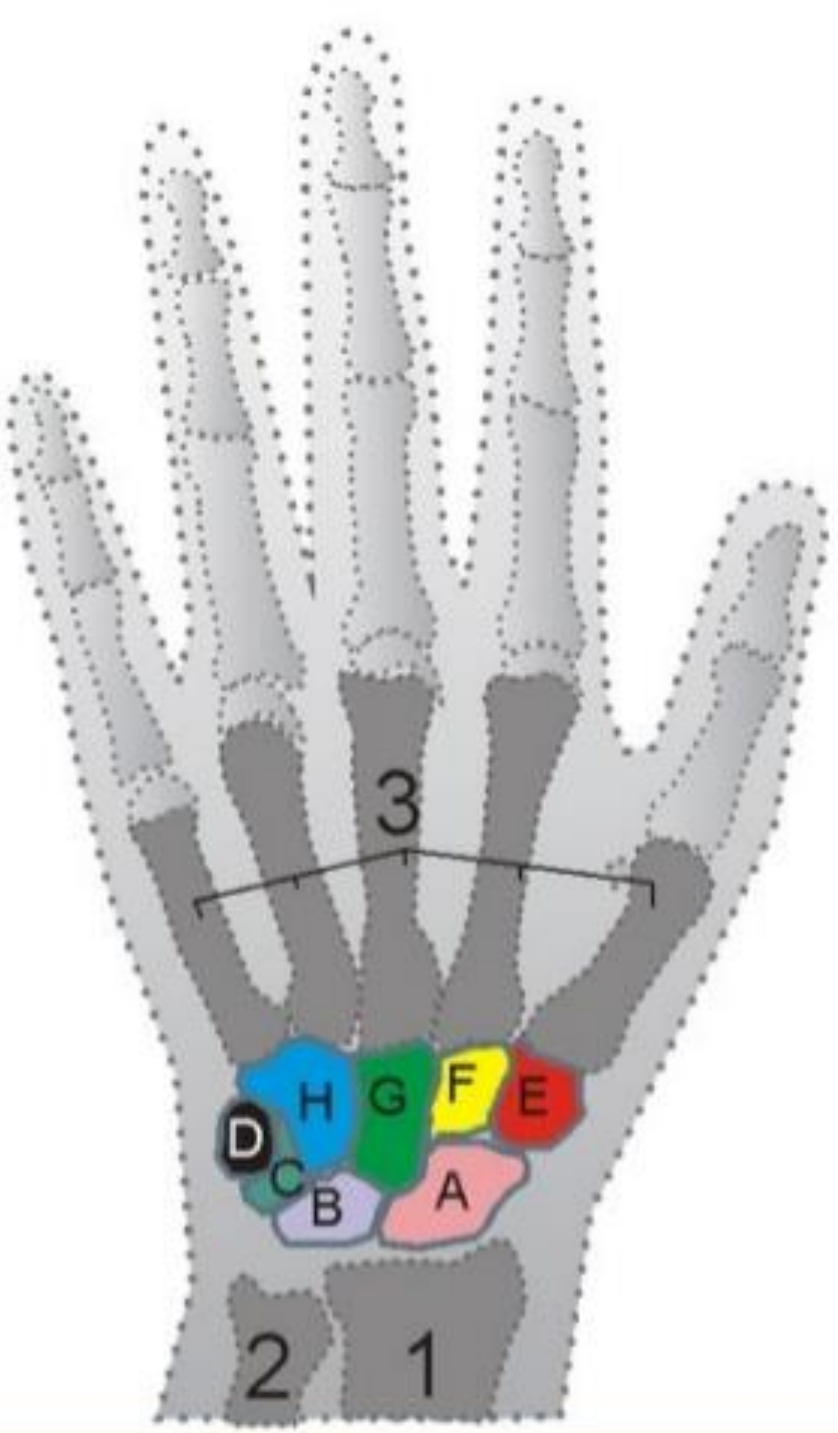

Lunate
(semilunar)
Hamate
(unciform)
Triangular
(triquetrum)
Pisiform
Carpals
Metacarpals
Phalanges
Radius
Ulna
Scaphoid
(navicular)
Capitate
Trapezoid
(lesser multangular)
Trapezium
(greater multangular)
1
2
3
4
5
Proximal
phalanx
Middle
phalanx
Distal
phalanx

Carpal Bones

- The names reflect on their shape
- Divide in two rows; proximal and distal row
- Proximal row:
  - From lateral to medial
  - Scaphoid, lunate, triquetrum and pisiform
- Distal row
  - From lateral to medial
  - Trapezium, trapezoid, capitate and hamate

Anatomy of wrist & carpal bones

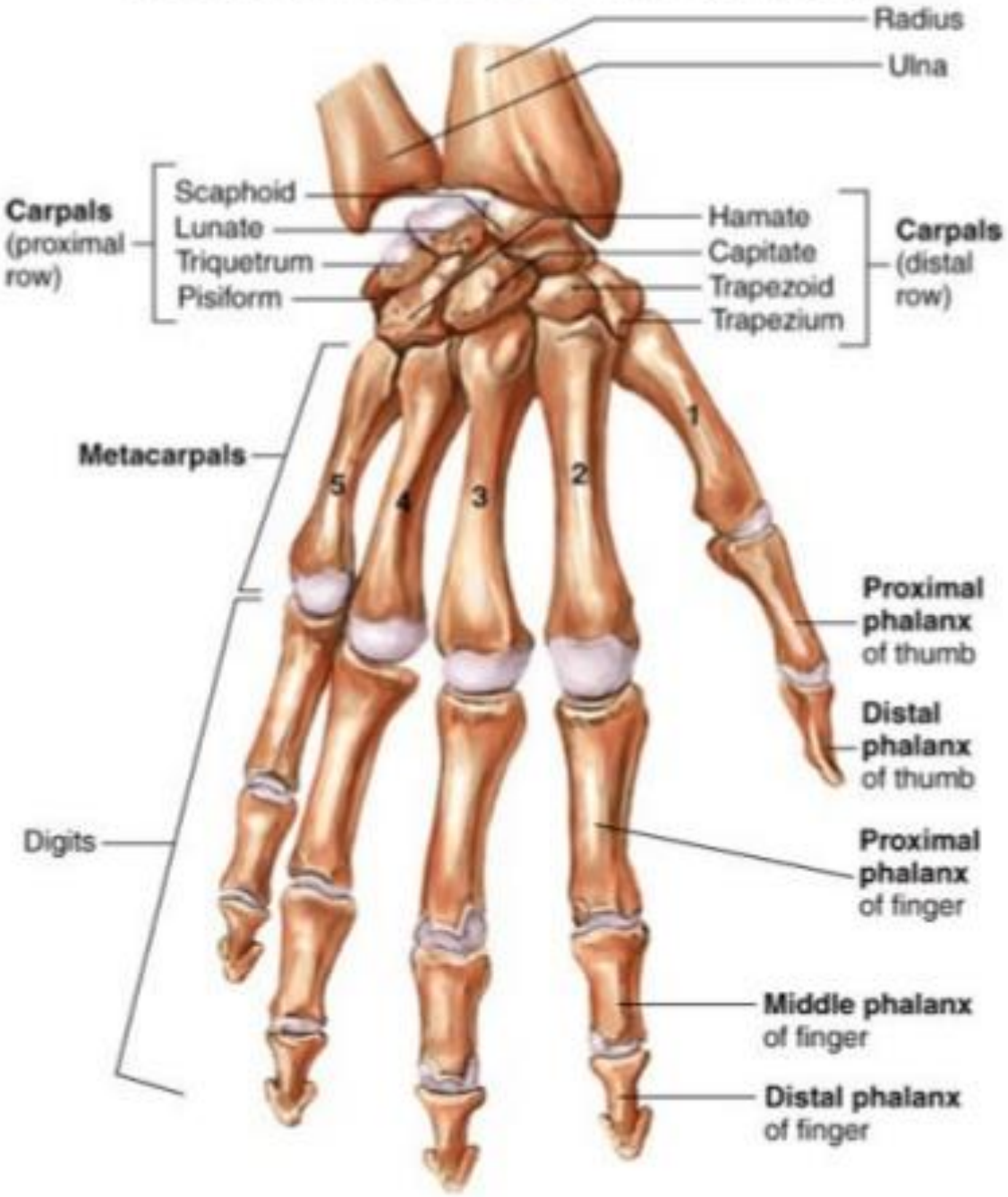

3
E
F
G
H
A
B
C
D
1
2


3
H
G
F
E
D
C
B
A
2
1

8 bones of Carpals

- A – Scaphoid (boatlike)
- B – Lunate (moon-shaped)
- C – Triquatrum (three-cornered)
- D – Pisiform (pea-shaped)
- E – Trapezium (four sided figure)
- F – Trapezoid
- G – Capitate (head-shaped)
- H – Hamate (hooked)

Try this pneumonic!!: She Look Too Pretty, Try To Catch Her



Posterior view

CARPAL BONES

Carpal bones are arranged in two rows

From lateral to medial and when viewed from anteriorly

- **PROXIMAL ROW**

1. the boat-shaped **scaphoid**;
2. the **lunate**, which has a 'crescent shape';
3. the three-sided **triquetrum** bone;
4. the pea-shaped **pisiform**

- **DISTAL ROW**

1. the irregular four-sided **trapezium** bone;
2. the four-sided **trapezoid**;
3. the **capitate**, which has a head;
4. the **hamate**, which has a hook

Capitate

- Largest carpal bone
- Rounded projection
- Head articulate with lunate bone

Lunate

- Large hook-projection on its anterior surface

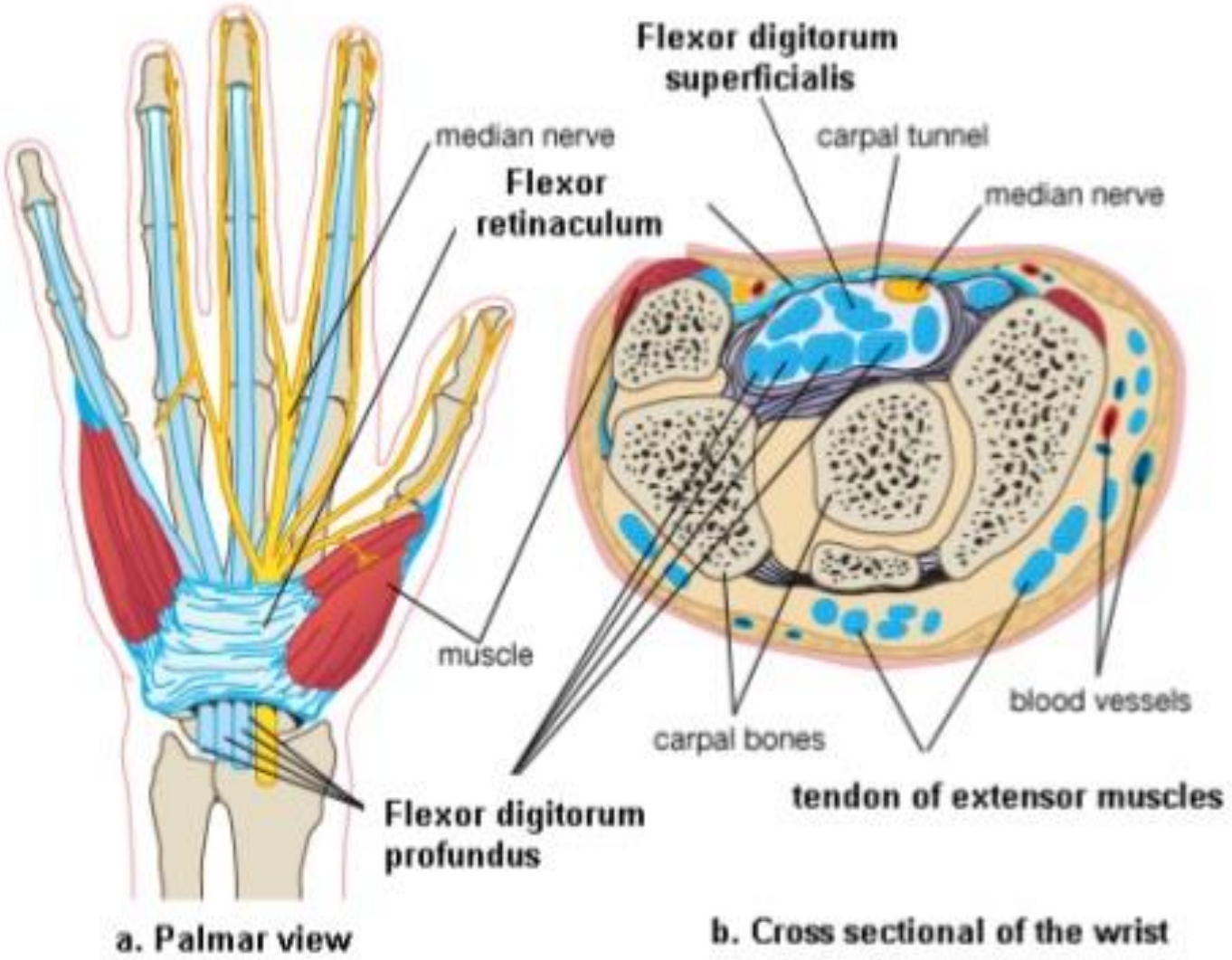
Scaphoid

- 70 % fractures involve the scaphoid
- Fall on outstretched hand – force is transmitted from the capitate through the scaphoid to the radius

Carpal Tunnel

- Concave space formed by the pisiform and hamate (on the ulnar side), and the scaphoid and trapezium (on the radial side) plus the flexor retinaculum (deep fascia)
- Long flexor tendons of the digits and thumb (flexor digitorum superficialis, flexor digitorum profundus, flexor pollicis longus) and the median nerve pass through the carpel tunnel
- Narrowing of the carpel tunnel may give rise to a condition called **carpal tunnel syndrome**.

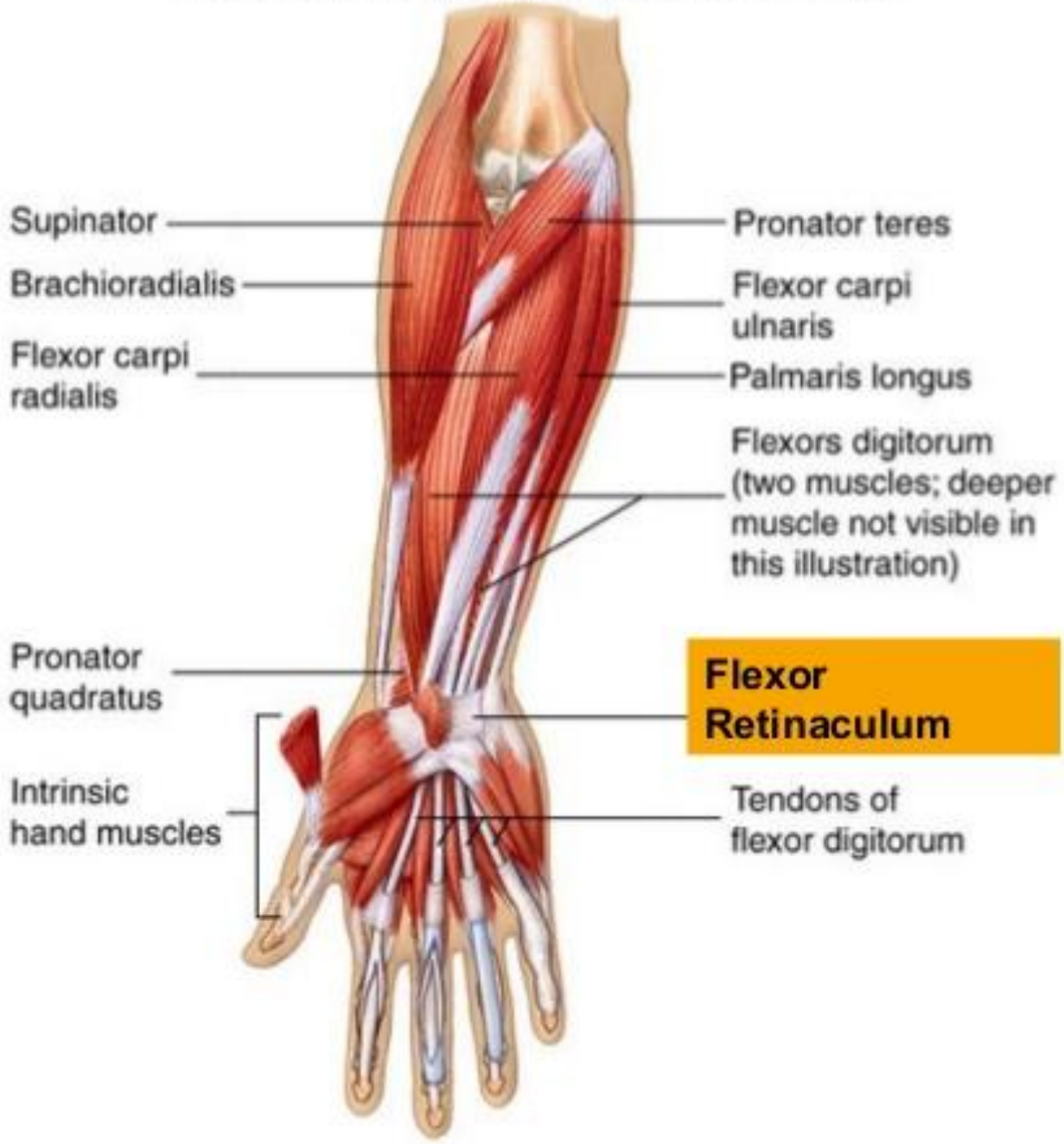
Anatomy of Carpal Tunnel



Carpal Turnel Syndrome

Flexor Retinaculum

- The **flexor retinaculum** (**transverse carpal ligament**, or **anterior annular ligament**) is a strong, fibrous band, which arches over the carpus.
- Converting the deep groove on the front of the carpal bones into a tunnel, the **carpal tunnel**
- Flexor tendons of the digits and the median nerve pass.



(a) **Anterior view**

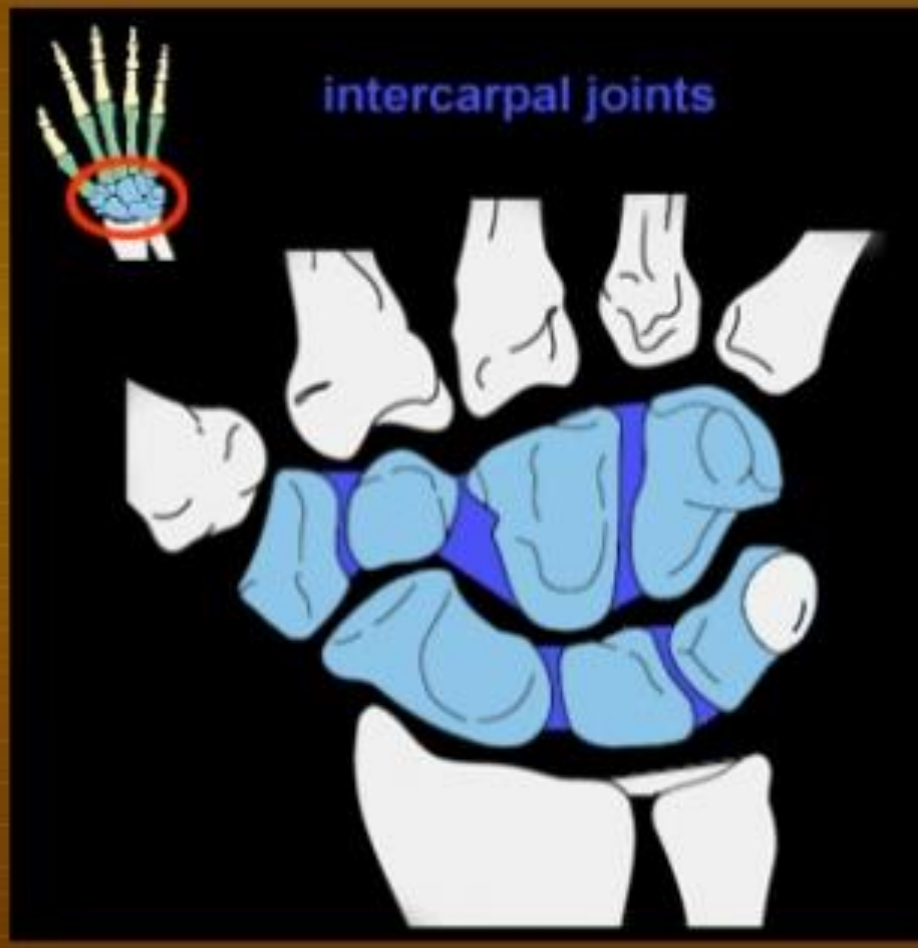
Extensor Retinaculum

- The **extensor retinaculum** (**dorsal carpal ligament**) is an anatomical term for the fascia that holds the tendons of the extensor muscles in place.
- It is located on the back of the forearm, just proximal to the hand.

(b) **Posterior view**

Joints of the Carpal Bones

- **Intercarpal /midcarpal joint**
  - Articulation between carpals bone.
  - Planar joint
  - Biaxial movement – gliding movement(back – forth , side – side)



Metacarpals

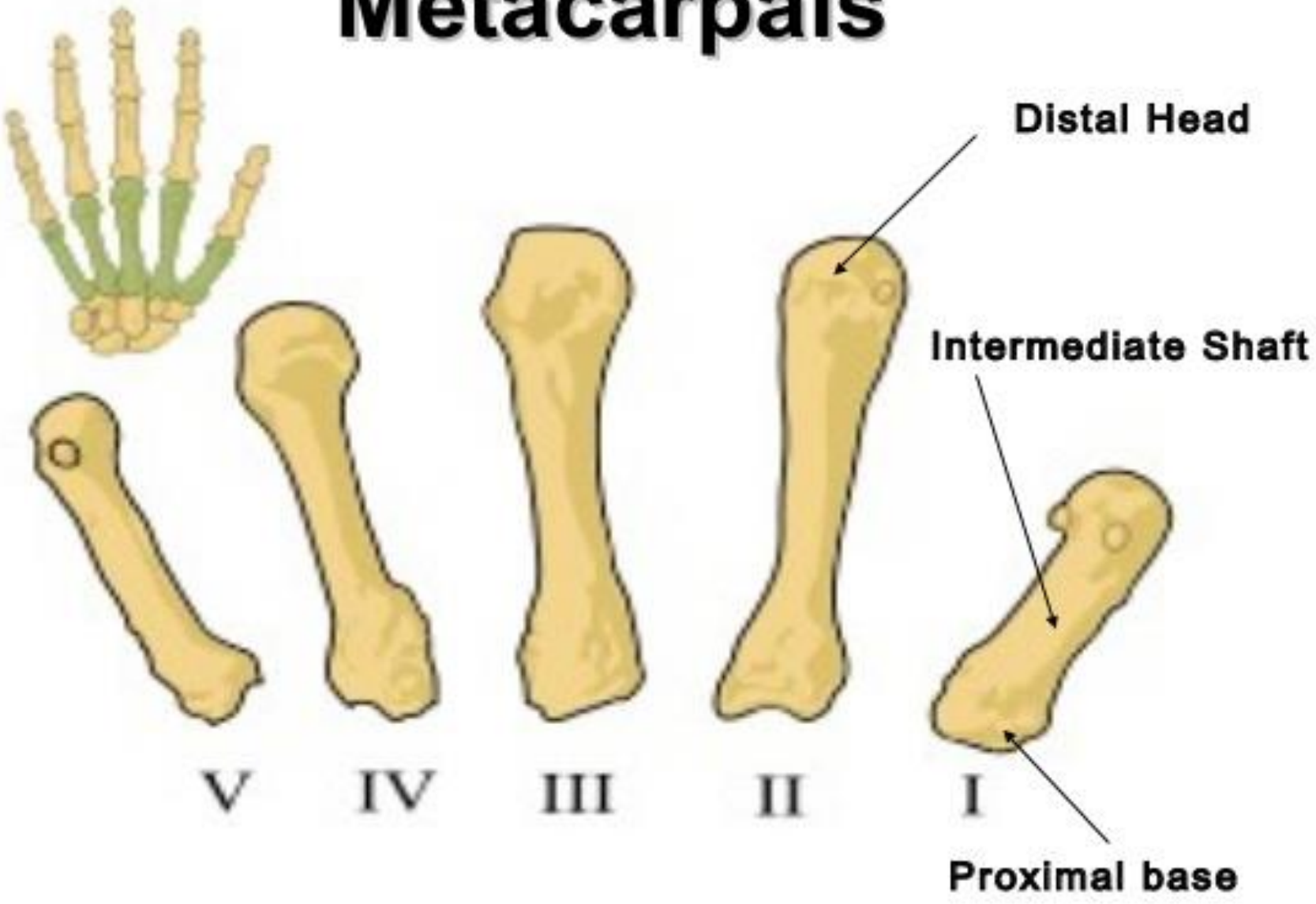
- Divide into:
  - Proximal base
  - Intermediate shaft
  - Distal head

Metacarpals

- It consists of five cylindrical bones which are numbered from the radial (lateral) to the ulnar (medial) side.

1. First metacarpal bone
2. Second metacarpal bone
3. Third metacarpal bone
4. Fourth metacarpal bone
5. Fifth metacarpal bone

Metacarpals



Joints of the Metacarpals

- **Carpometacarpal joints**
  - Proximal based of metacarpals articulate with distal row of carpal bones.
  - 1st metacarpal articulate with trapezium bones
  - The second metacarpal articulates primarily with the trapezoid and secondarily with the trapezium and capitate.
  - The third metacarpal articulates primarily with the capitate,
  - The fourth metacarpal articulates with the capitate and hamate.
  - The fifth metacarpal articulates with the hamate.

Joints of the Metacarpals

- Carpometacarpal
  - The 1st CMC (between trapezium and 1st metacarpal) is a saddle joint
  - Also known as a trapeziometacarpal joint (TMC)
  - Produce triaxial diarthrosis
  - The rest CMC – condyloid joint
  - Produce biaxial diarthrosis

Joints of the Metacarpals

- **Metacarpophalangeal joint**
  - Distal head of metacarpals articulate with proximal phalanges.
  - Condyloid joint
  - Produce biaxial diarthrosis ; flexion – extension / abduction - adduction

Phalanges

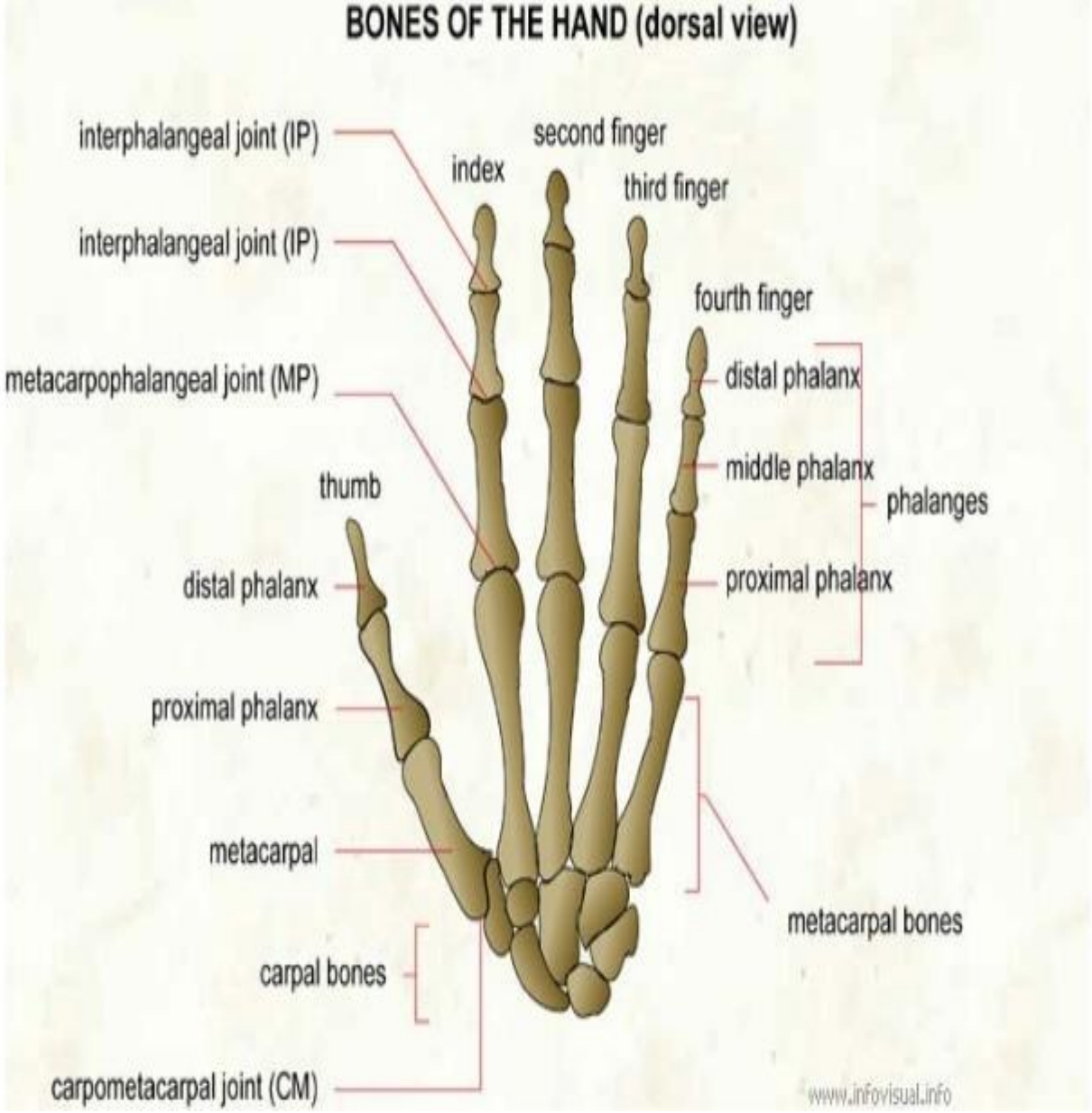
- 14 bones
- Numbered 1-5 same with metacarpals
- Each phalanx consist:
  - Proximal base
  - Intermediate shaft
  - Distal head
- 2 phalanges in thumb, 3 the other fingers.

Phalanges

- Phalanges can divide into:
  - **Proximal phalanx**
  - **Middle phalanx**
  - **Distal phalanx**
- Except thumb; only proximal and distal part.

Joint of the Phalanges

- Interphalangeal joint
  - Joint between phalanges
  - Proximal and distal IP except thumb
  - Hinge joint
  - Permits monoaxial diarthrosis ; flexion and extension


BONES OF THE HAND (dorsal view)
interphalangeal joint (IP)
interphalangeal joint (IP)
metacarpophalangeal joint (MP)
thumb
distal phalanx
proximal phalanx
metacarpal
carpal bones
carpometacarpal joint (CM)
index
second finger
third finger
fourth finger
distal phalanx
middle phalanx
proximal phalanx
phalanges
metacarpal bones
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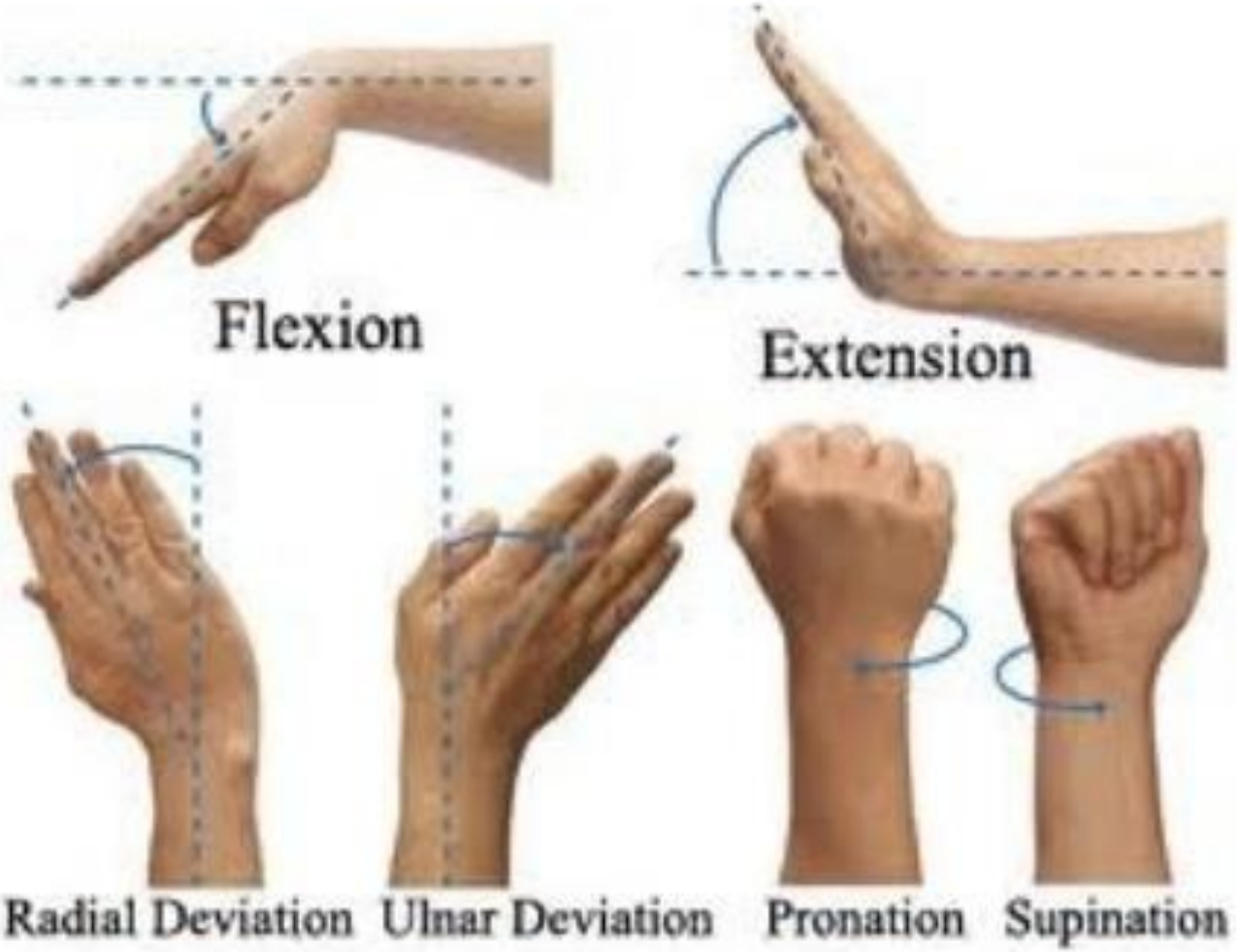
Movement of Hand and Digits

- ulnar and radial deviation at RC
- Wrist flexion and extension at RC
- Flexion and extension digit at MCP
- Abduction and adduction digits at MCP
- Abduction and adduction thumb at 1st CMC
- Opposition and reposition thumb at 1st CMC
- Flexion and extension digits at IP

Wrist Movement

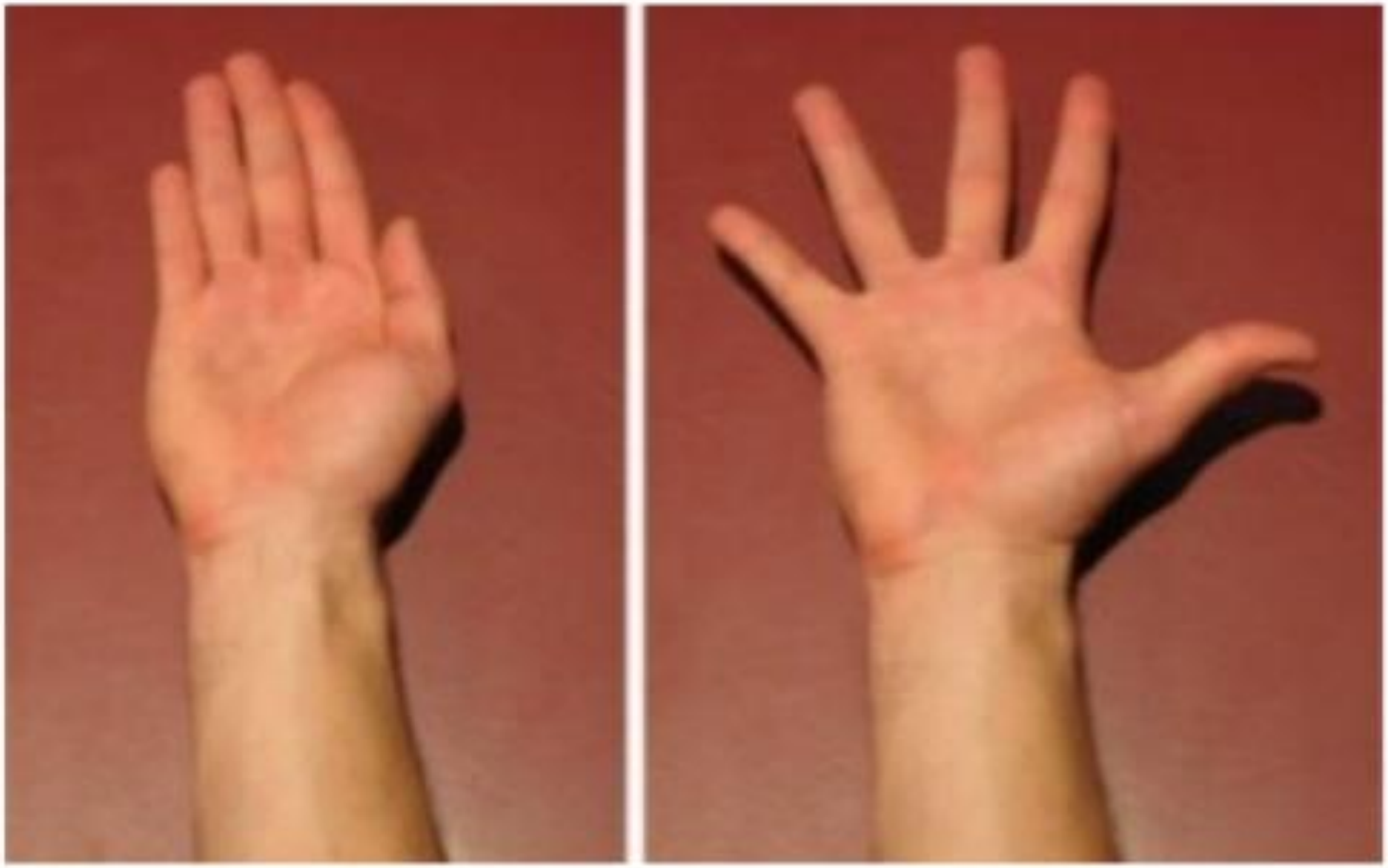


Thumb Movement

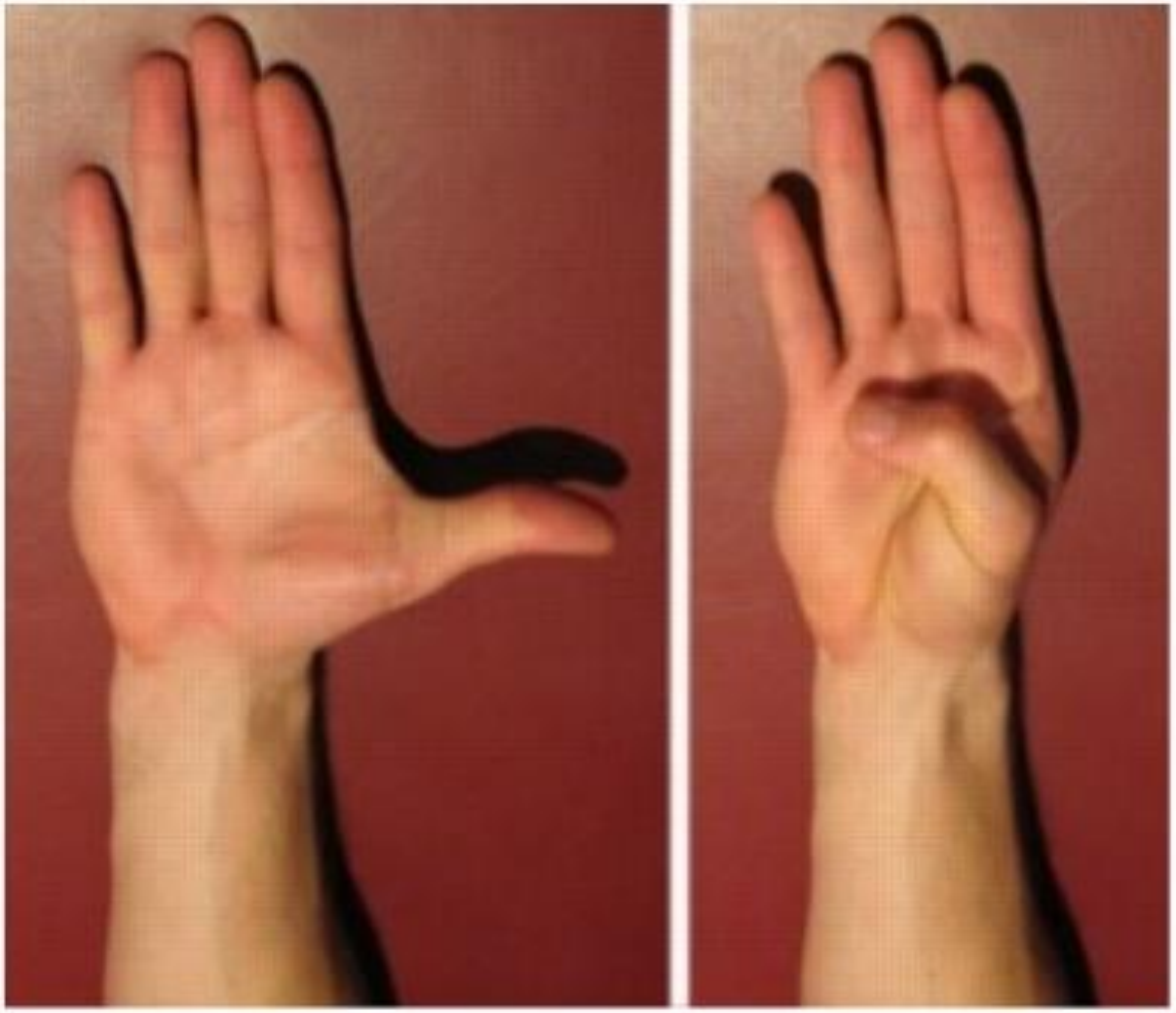
Thumb opposition

Thumb adduction Thumb abduction

Adduction / abduction digits at MCP



Thumb extension / flexion at MCP / CMC



Flexion Digit at PIP / DIP