Main Menu

1 The Wrist and Hand Joints

click here

Bones

29 bones, including radius and 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
- Other sesamoids may occur in joints of fingers

Back Next

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)

Distal row, from the radial to ulnar side

- trapezium (greater multangular)
- trapezoid (lesser multangular)
- capitate (head-shaped)
- hamate (hooked)

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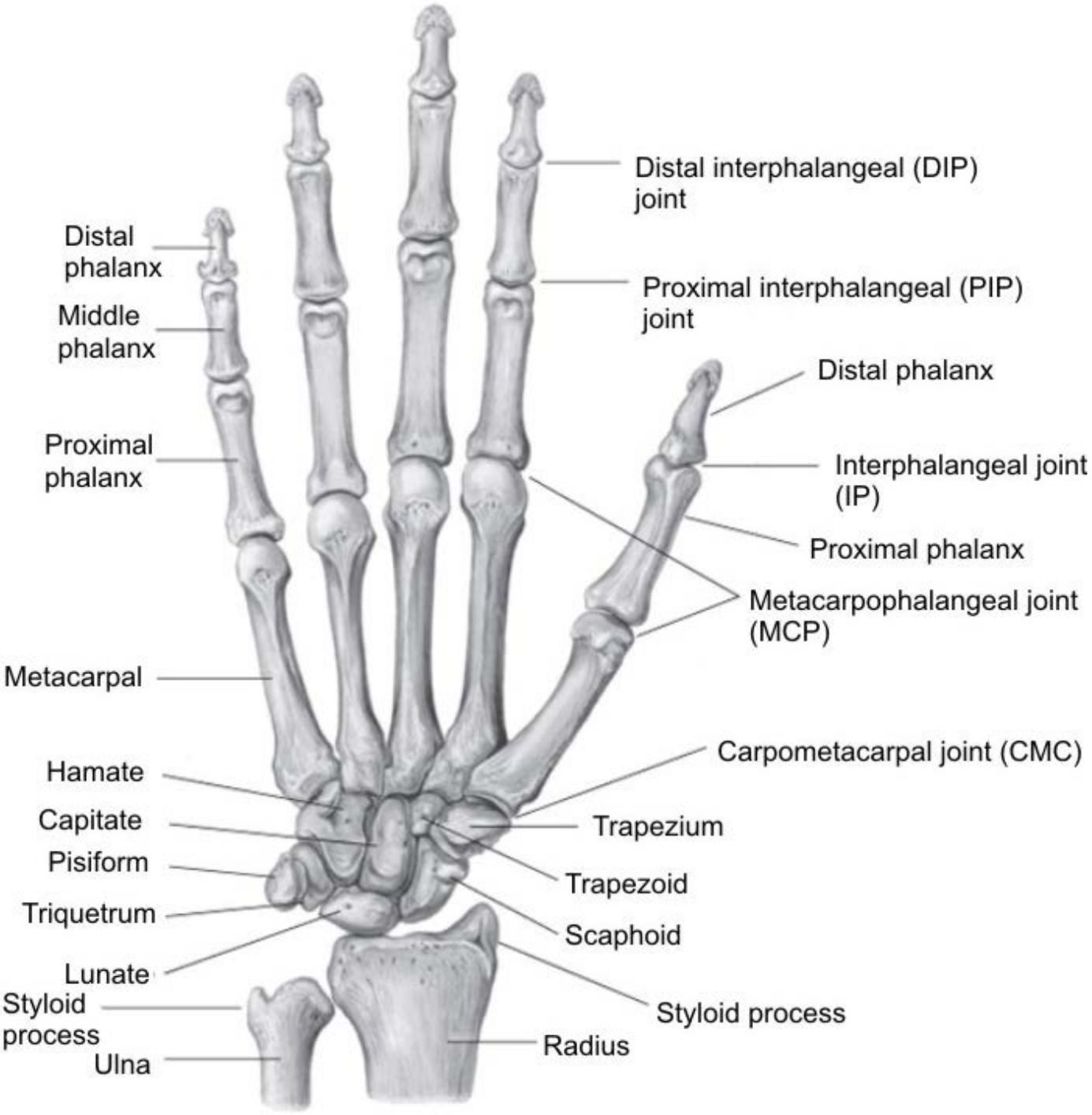
Bones



Bones

Scaphoid most often injured

- From falling on outstretched hand
- Often dismissed as a sprain
- Significant problem if not recognized and treated properly
- Usually long period of precise immobilization or surgery

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Bones

Carpal bones form a three-sided arch

- concave on palmar side
- bony arch is spanned by transverse carpal and volar carpal ligaments
- creates the carpal tunnel
- frequently a source of problems known as carpal tunnel syndrome

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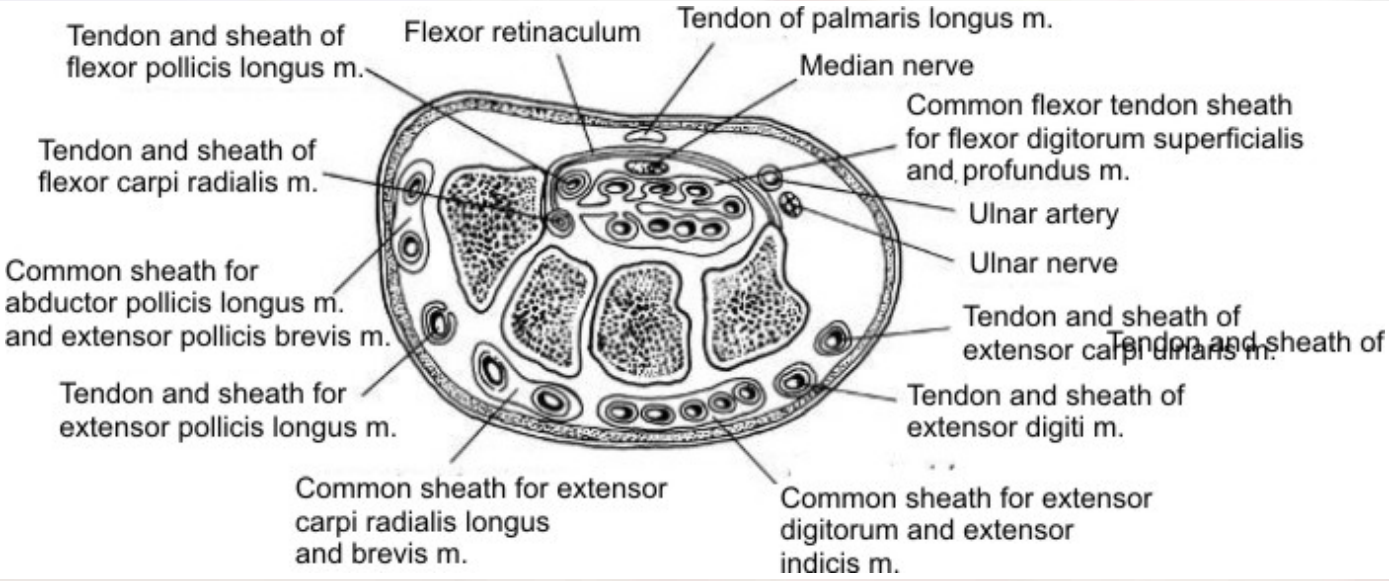
Bones



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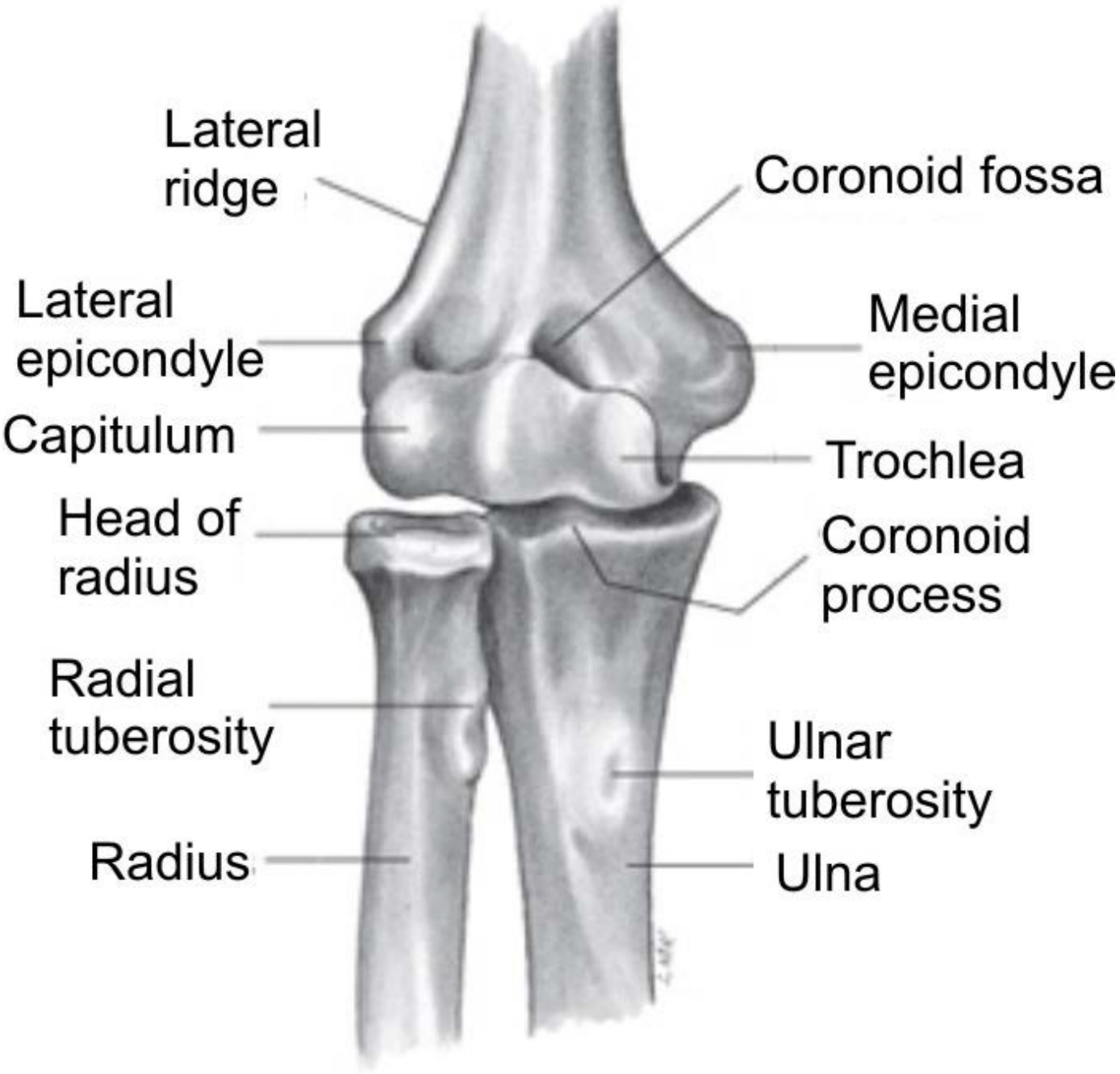
Bones

Medial epicondyle, medial condyloid ridge, & coranoid process - origin for many wrist and finger flexors

Lateral epicondyle and lateral supracondylar ridge - origin for many wrist and finger extensors

Back Next

Bones



Joints

Key distal bony landmarks for muscles involved in wrist motion

base of 2nd, 3rd, and 5th metacarpals, pisiform, and hamate

Key bony landmarks for finger muscles

base of proximal, middle, and distal phalanxes

base of 1st metacarpal, proximal and distal phalanxes of thumb

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Joints

Wrist joint

- condyloid-type joint
- allows flexion, extension, abduction, & adduction
- motion occurs primarily between distal radius & proximal carpal row (scaphoid, lunate, & triquetrum)

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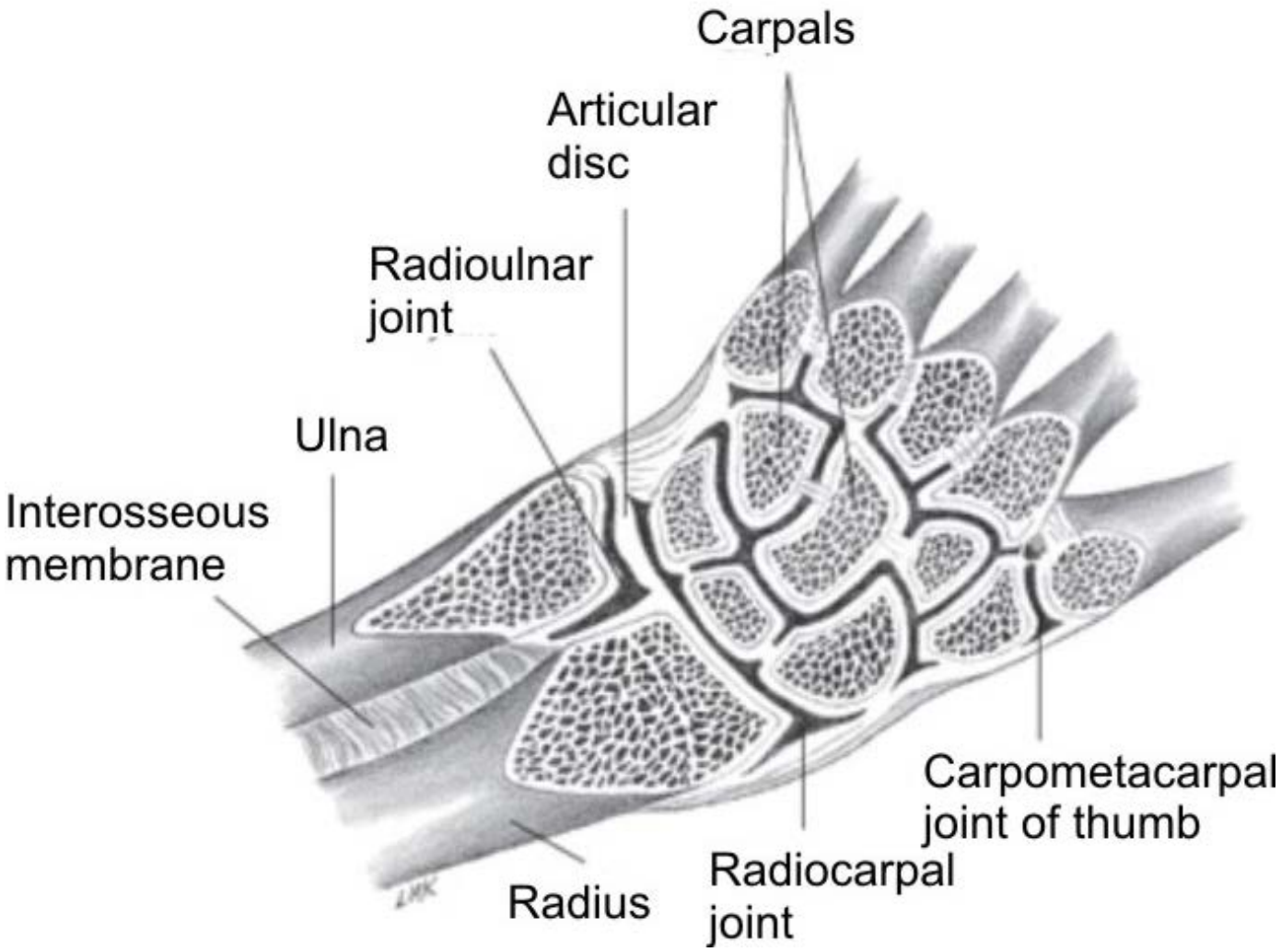
Joints



Joints

Each finger has 3 joints

- Metacarpophalangeal (MCP) joints
- Proximal interphalangeal (PIP) joints
- Distal interphalangeal (DIP) joints

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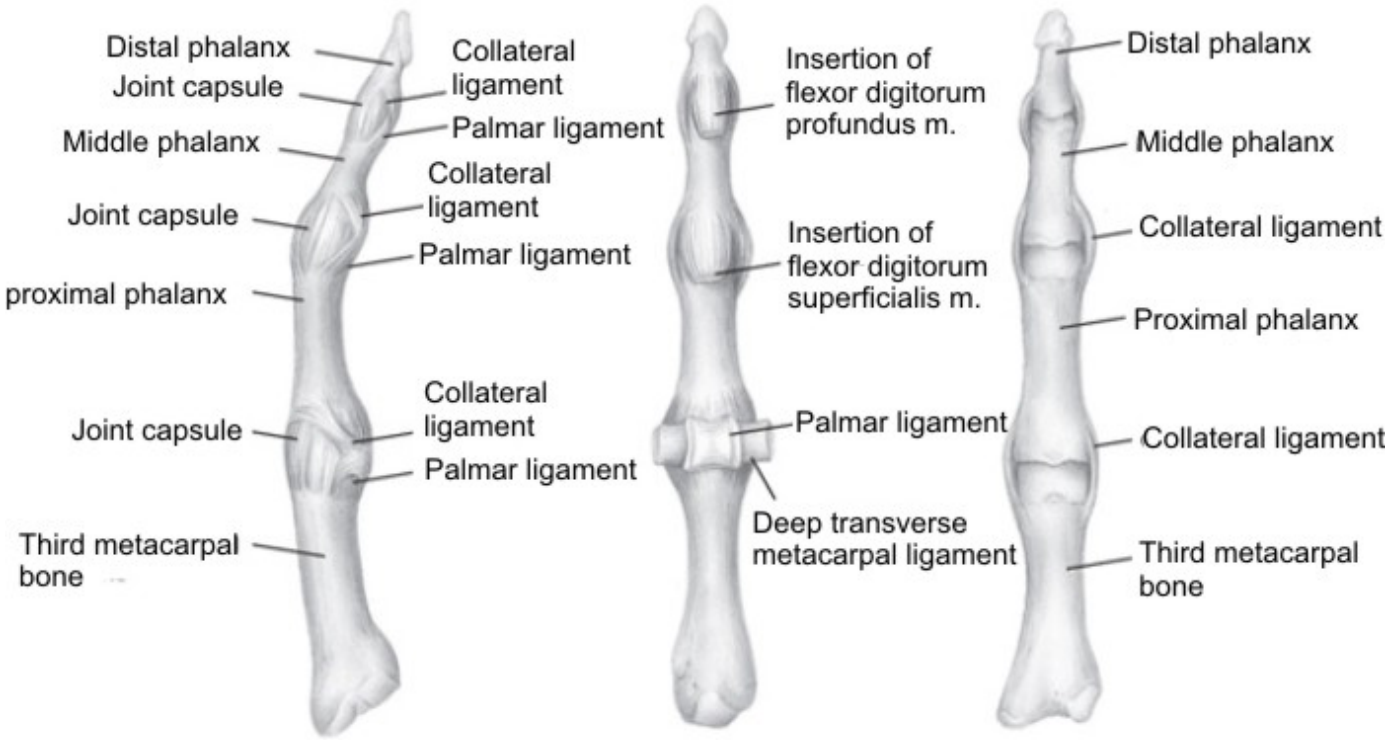
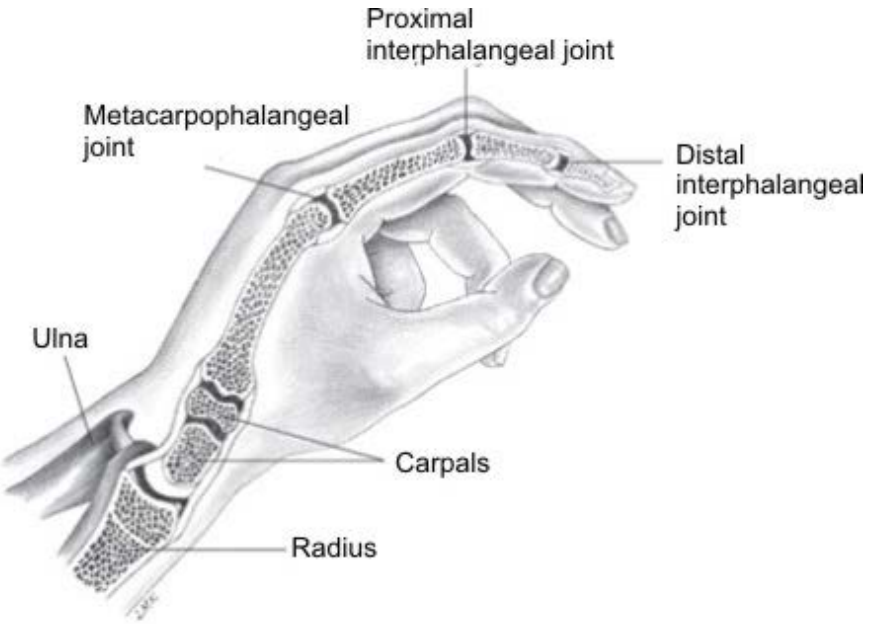
Joints





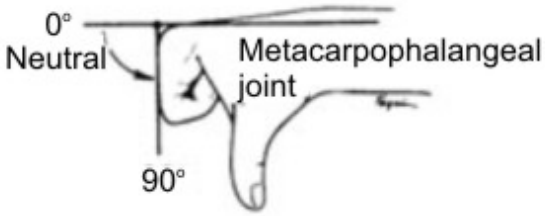
Joints

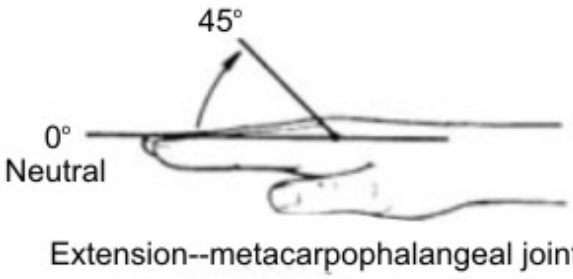
Metacarpophalangeal (MCP) joints

Condyloid

0 to 40 degrees of extension

85 to 100 degrees of flexion





Extension--metacarpophalangeal joint

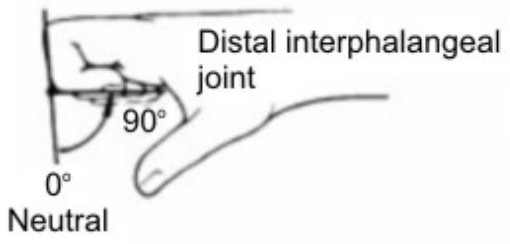
Fingertip to proximal palmar crease

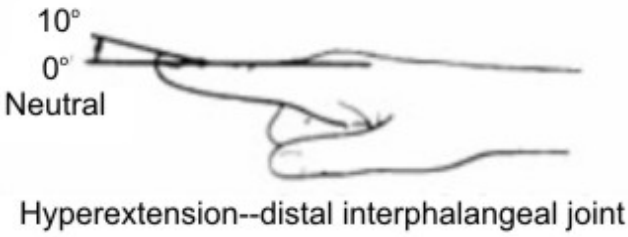
Joints

Distal interphalangeal (DIP) joints

Ginglymus

Flex 80 to 90 degrees from full extension





Hyperextension--distal interphalangeal joint

Joints

Thumb has 2 joints

- Metacarpophalangeal (MCP) joints
- Interphalangeal (IP) joints

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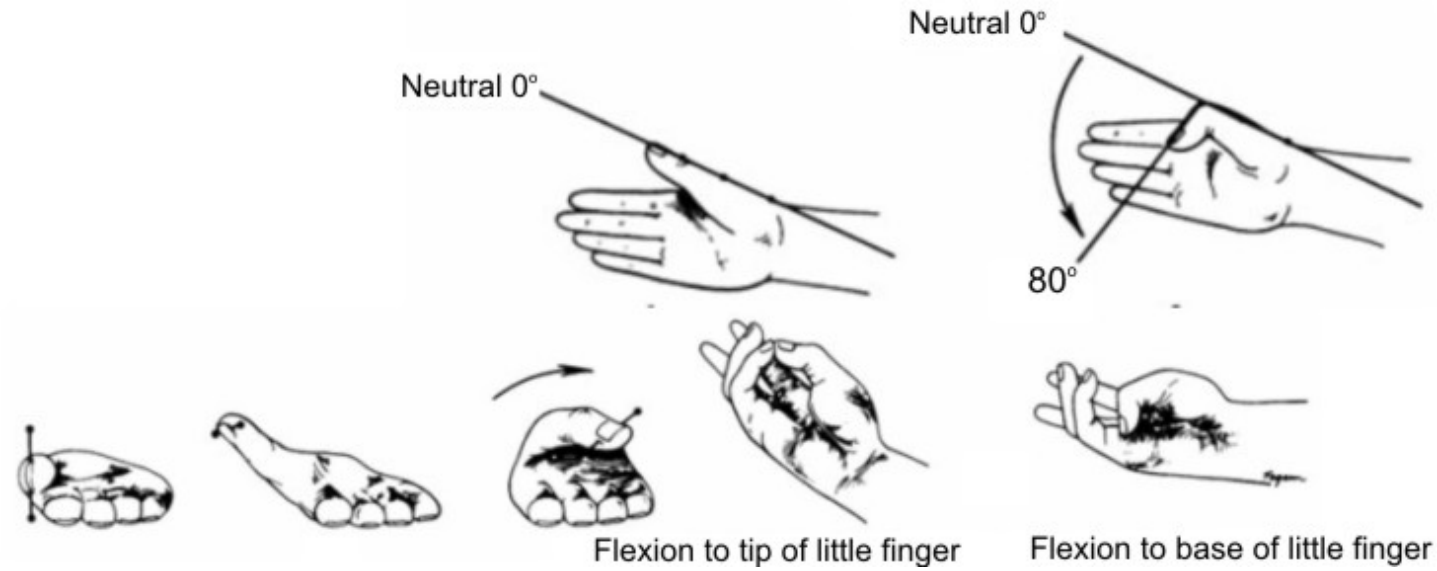
Joints

Interphalangeal (IP) joint

Flex 80 to 90 degrees

Ginglymus



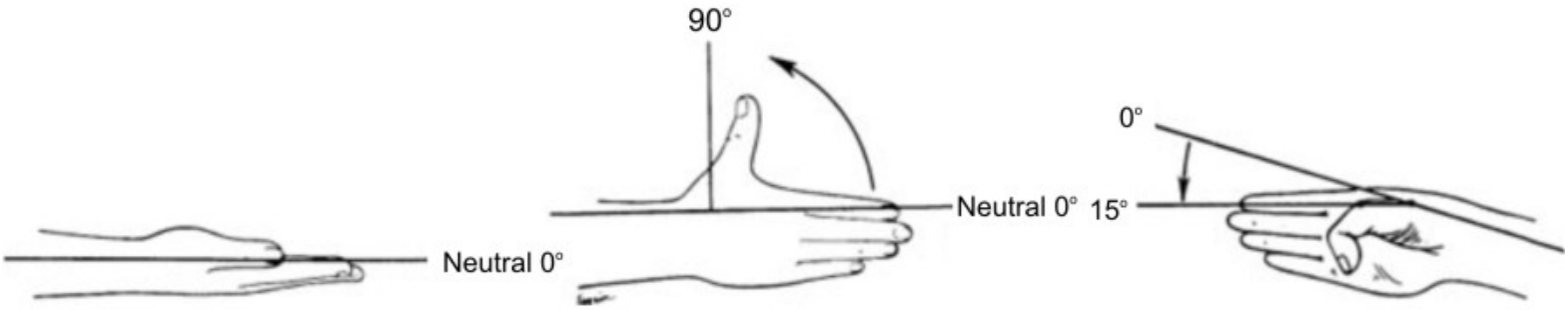
Joints

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 and extension

Abduction and adduction

Fingers

Flex and extend

MCP joints also abduct and adduct

Middle phalange is reference point to differentiate abduction & adduction

- Thumb, index and middle fingers abduct when they move laterally toward radial side of hand
- Ring and little fingers adduction when they move medially toward ulnar side of hand
- Medial movement of thumb, index and middle fingers toward ulnar side of hand is adduction
- Lateral movement of ring and little finger toward radial side of hand is abduction

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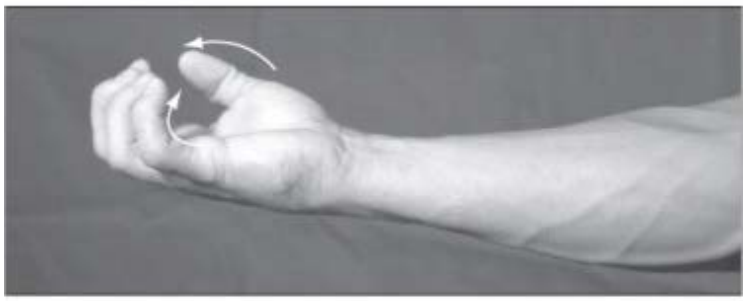
Movements

Flexion

movement of palm of hand and/or phalanges toward anterior or volar aspect of forearm

Wrist flexion



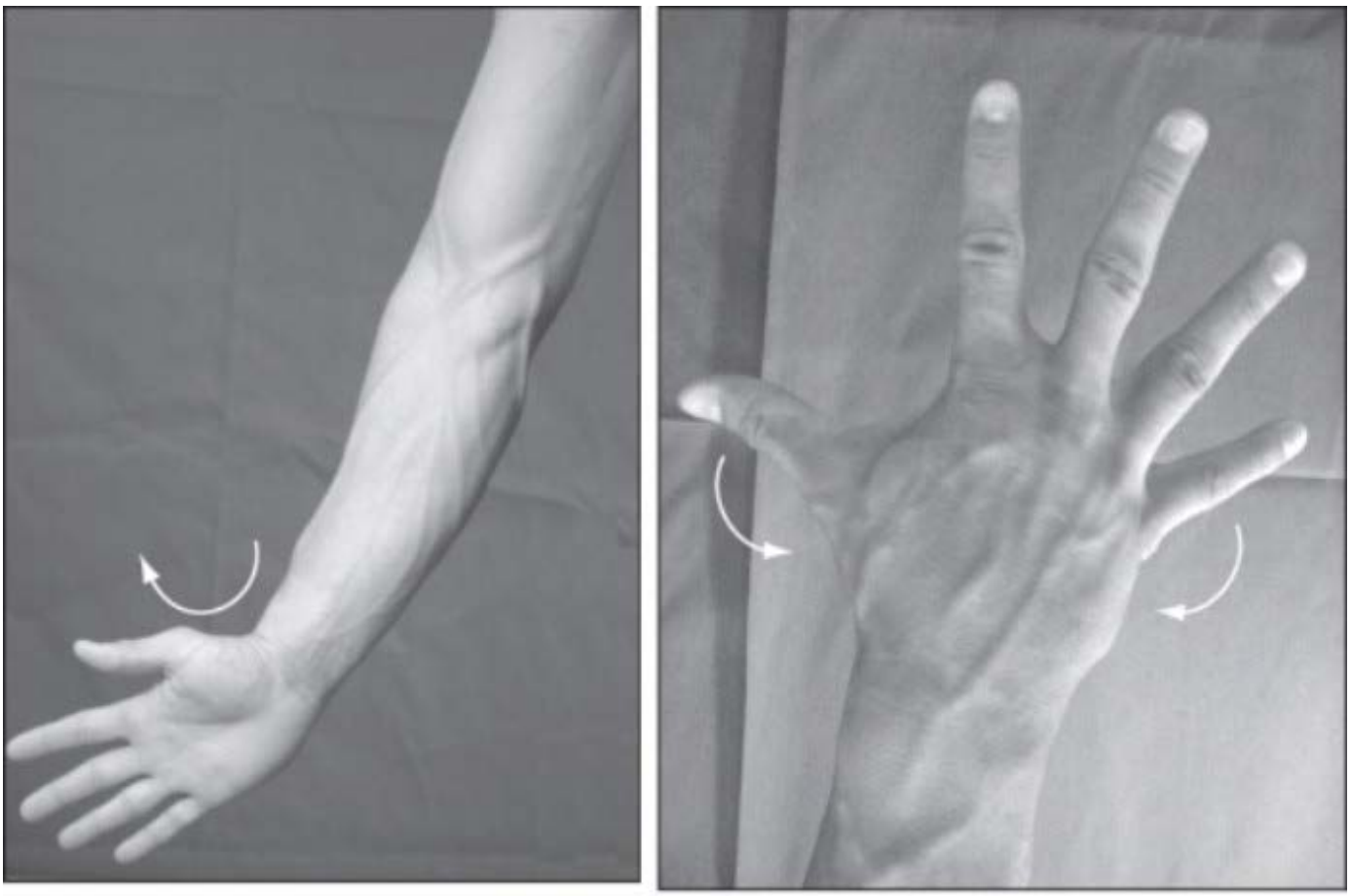
Flexion of fingers and thumb, opposition

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



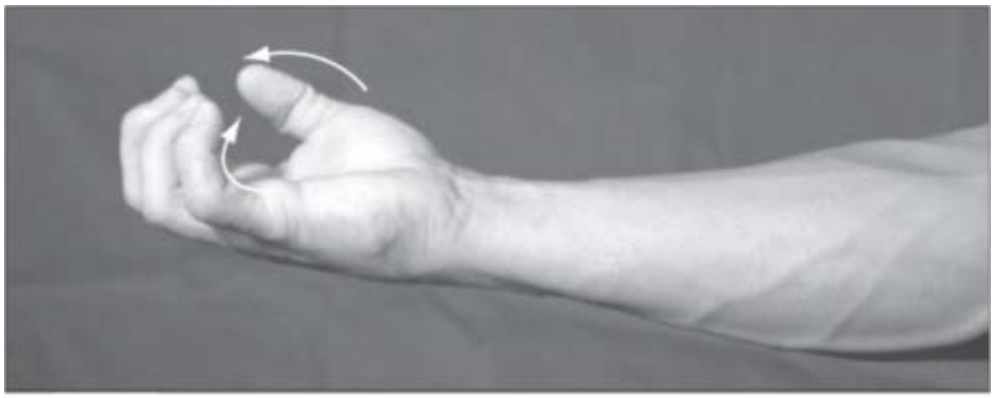
Movements

Opposition

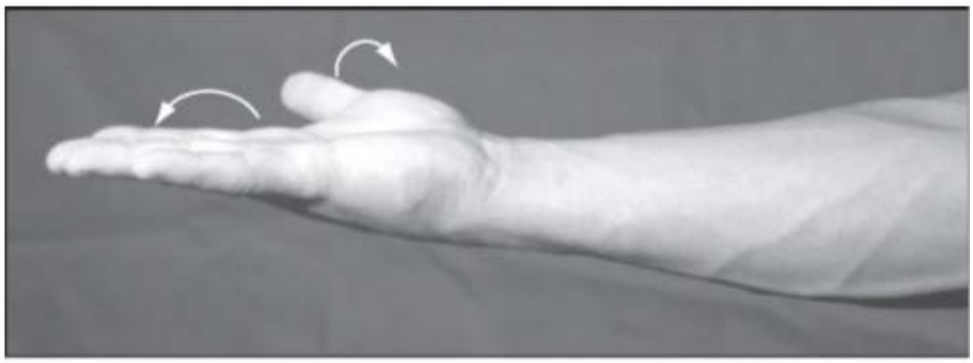
movement of thumb across palmar aspect to oppose any or all of the phalanges

Reposition

movement of thumb as it returns to anatomical position from opposition with hand and/or fingers



Flexion of fingers and thumb, opposition



Extension of fingers and thumb, reposition

Muscles

Extrinsic muscles of wrist & hand grouped according to function & location

6 muscles move wrist but not fingers and thumb

3 wrist flexors

- flexor carpi radialis
- flexor carpi ulnaris
- palmaris longus

3 wrist extensors

- extensor carpi radialis longus
- extensor carpi radialis brevis
- extensor carpi ulnaris

9 muscles primary movers of phalanges

- Also involved in wrist joint actions
- Generally weaker in their wrist actions
- Flexors
  - Flexor digitorum superficialis
  - Flexor digitorum profundus
  - Flexor pollicis longus (thumb flexor)

Extensors

- Extensor digitorum
- Extensor indicis
- Extensor digiti minimi
- Extensor pollicis longus (thumb extensor)
- Extensor pollicis brevis (thumb extensor)

Abductor of thumb and wrist

- Abductor pollicis longus

All wrist flexors generally have their origins on anteromedial aspect of proximal forearm and medial epicondyle of humerus with insertions on anterior aspect of wrist and hand

Median nerve and all flexor tendons except flexor carpi ulnaris and palmaris longus pass through carpal tunnel

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Carpal tunnel syndrome

Swelling and inflammation can cause increased pressure in carpal tunnel resulting in decreased function of median nerve leading to reduced motor and sensation function in its distribution

Particularly common with repetitive use of the hand and wrist in manual labor and clerical work such as typing and keyboarding

Often, slight modifications in work habits and hand and wrist positions during these activities can be preventative

Flexibility exercises for the wrist and finger flexors may be helpful

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Wrist extensors generally have their origins on posterolateral aspect of proximal forearm and lateral humeral epicondyle with insertions located on posterior aspect of wrist and hand

Flexor and extensor tendons immediately proximal to wrist are held in place on palmar and dorsal aspects by transverse bands of tissue known as flexor and extensor retinaculum to prevent the tendons from bowstringing during flexion and extension

Wrist abductors : Generally cross wrist joint anterolaterally and posterolaterally to insert on radial side of hand

- Flexor carpi radialis
- Extensor carpi radialis longus
- Extensor carpi radialis brevis
- Abductor pollicis longus
- Extensor pollicis longus
- Extensor pollicis brevis

Wrist adductors : cross wrist joint anteromedially and posteromedially to insert on ulnar side of hand

- Flexor carpi ulnaris
- Extensor carpi ulnaris

Intrinsic hand muscles have origins and insertions on bones of hand

- Radial side - four muscles of thumb
  - opponens pollicis
  - abductor pollicis brevis
  - flexor pollicis brevis
  - adductor pollicis
- Ulnar side - three muscles of little finger
  - opponens digiti minimi
  - abductor digiti minimi
  - flexor digiti minimi brevis
- Remainder of hand - 11 different muscles
  - 4 lumbricals
  - 3 palmar interossei
  - 4 dorsal interossei

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Muscles

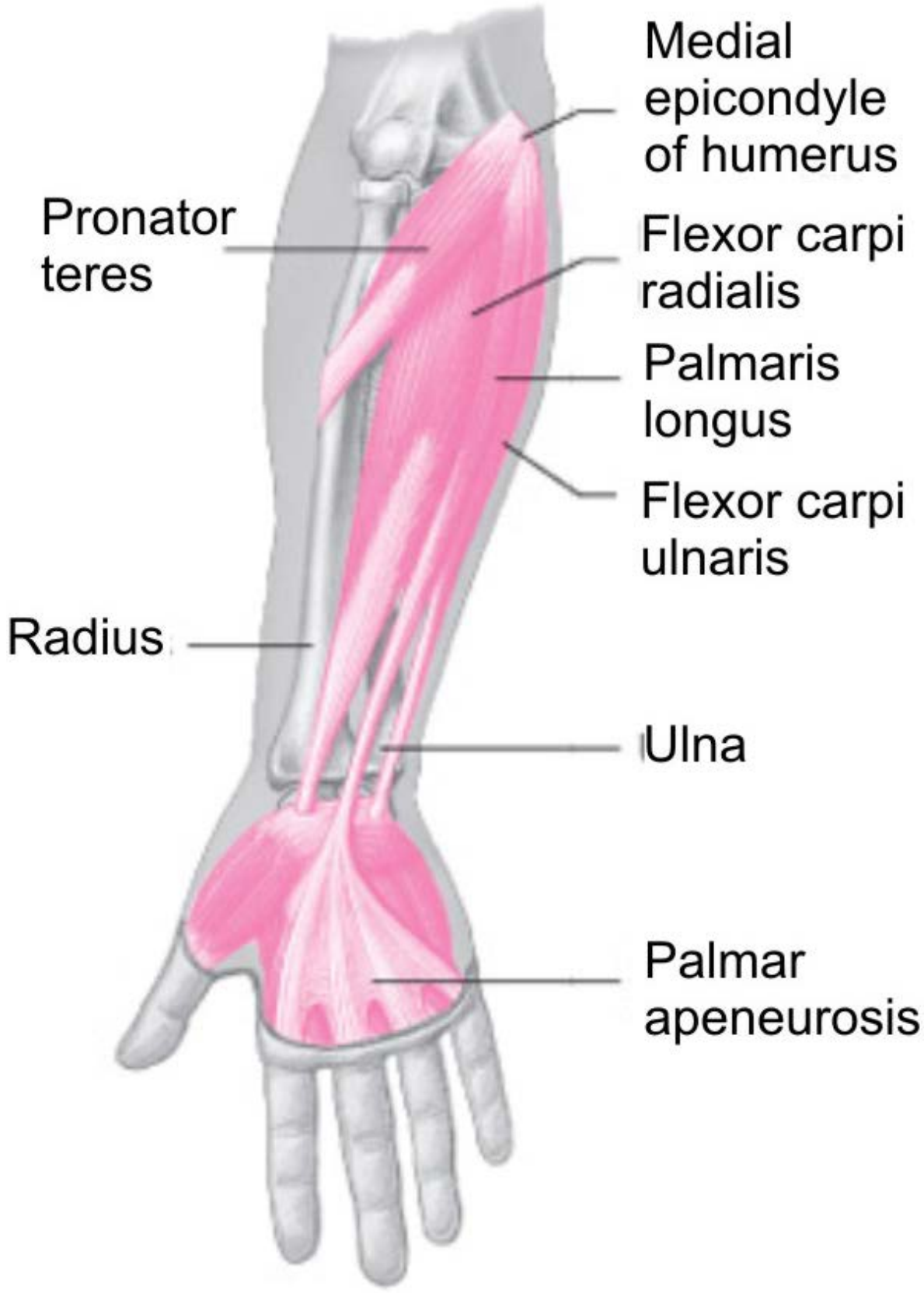
Anteromedially at elbow and forearm and anterior at hand

Primarily wrist flexion

Flexor carpi radialis

Flexor carpi ulnaris

Palmaris longus


Medial epicondyle of humerus
Pronator teres
Flexor carpi radialis
Palmaris longus
Flexor carpi ulnaris
Radius
Ulna
Palmar apeneurosis

Muscles

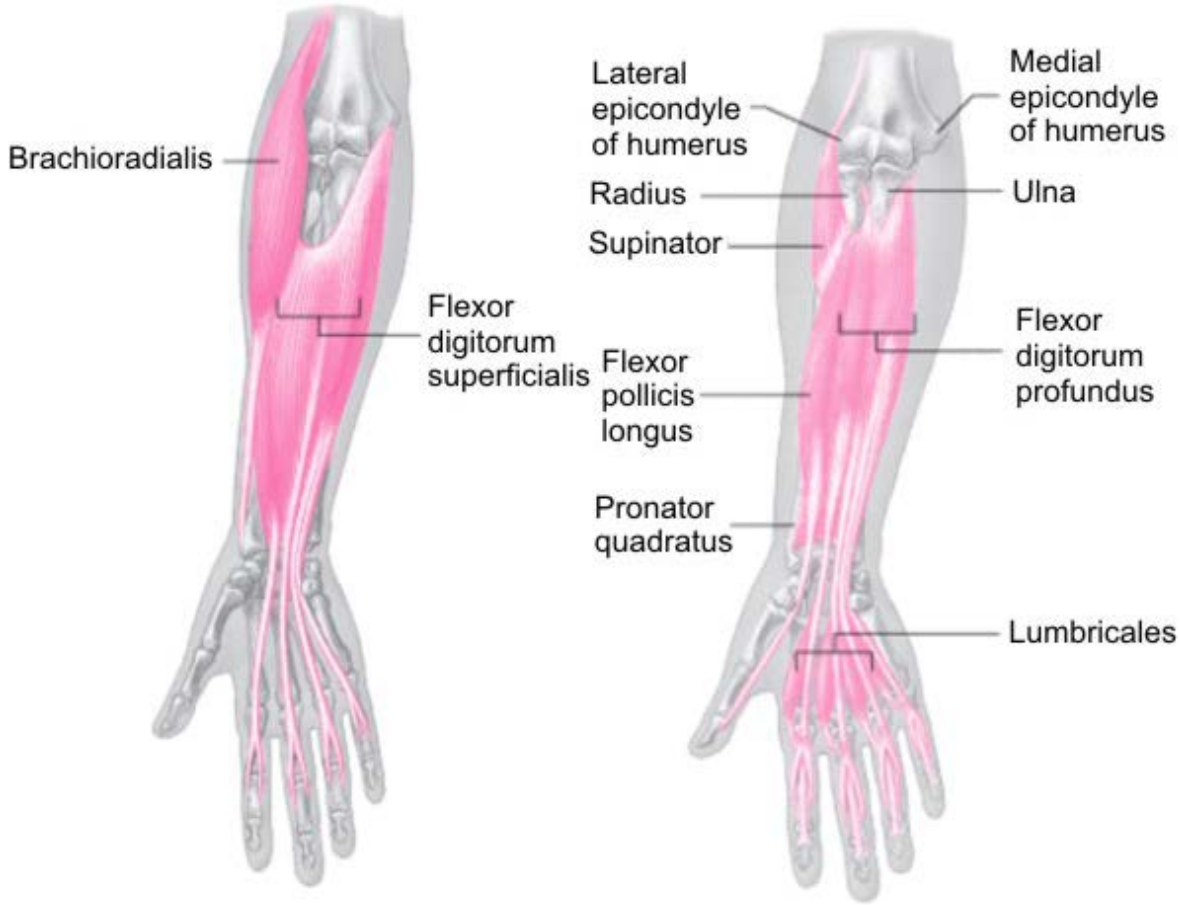
Anteromedially at elbow and forearm and anterior at hand

Primarily wrist and phalangeal flexion

Flexor digitorum superficialis

Flexor digitorum profundus

Flexor pollicis longus



Muscles

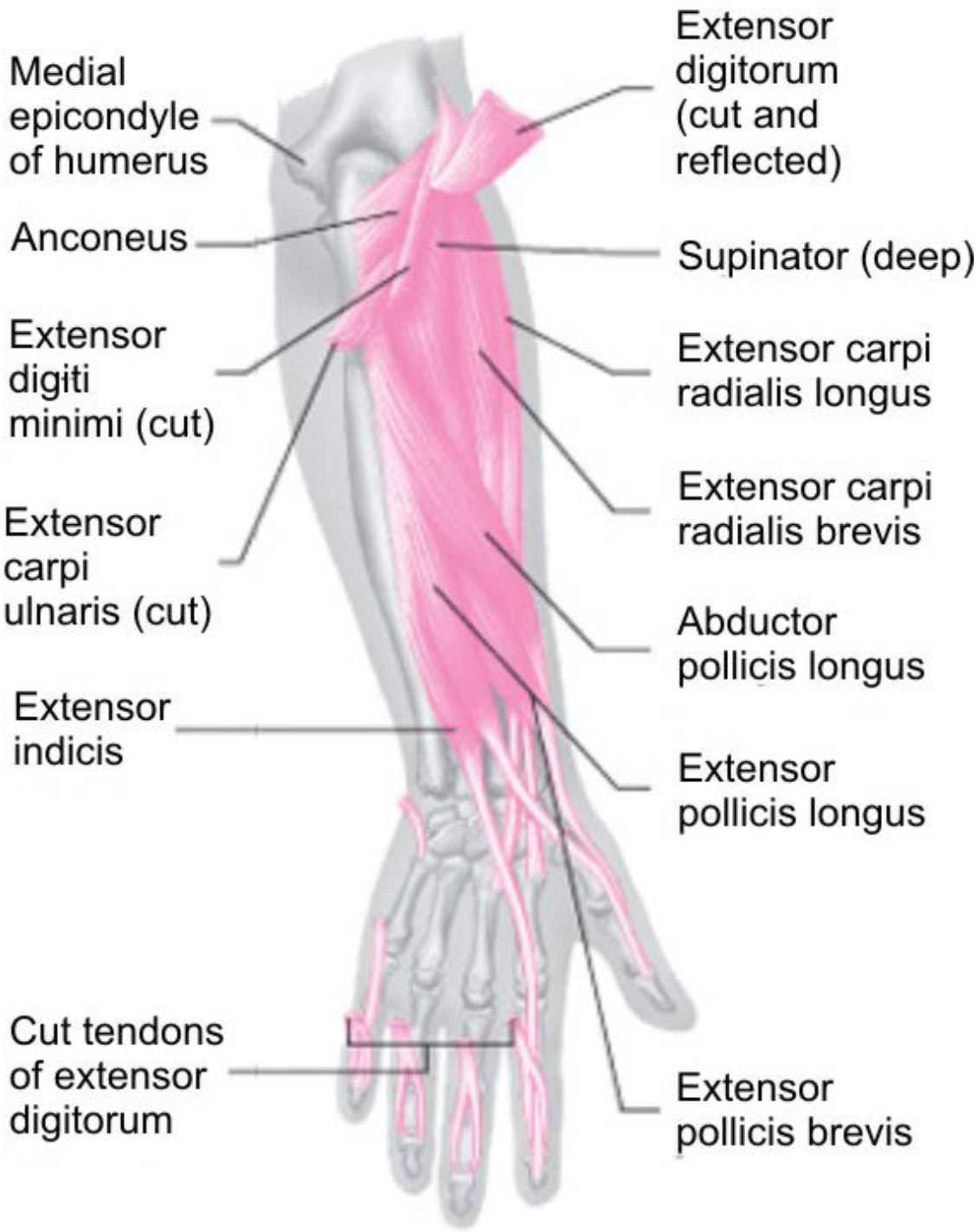
Posterolaterally at elbow and forearm and posterior at hand

Primarily wrist extension

Extensor carpi radialis longus

Extensor carpi radialis brevis

Extensor carpi ulnaris



Posterolaterally at elbow and forearm and posterior at hand

Primarily wrist and phalangeal extension

Extensor digitorum

Extensor indicis

Extensor digiti minimi

Extensor pollicis longus

Extensor pollicis brevis

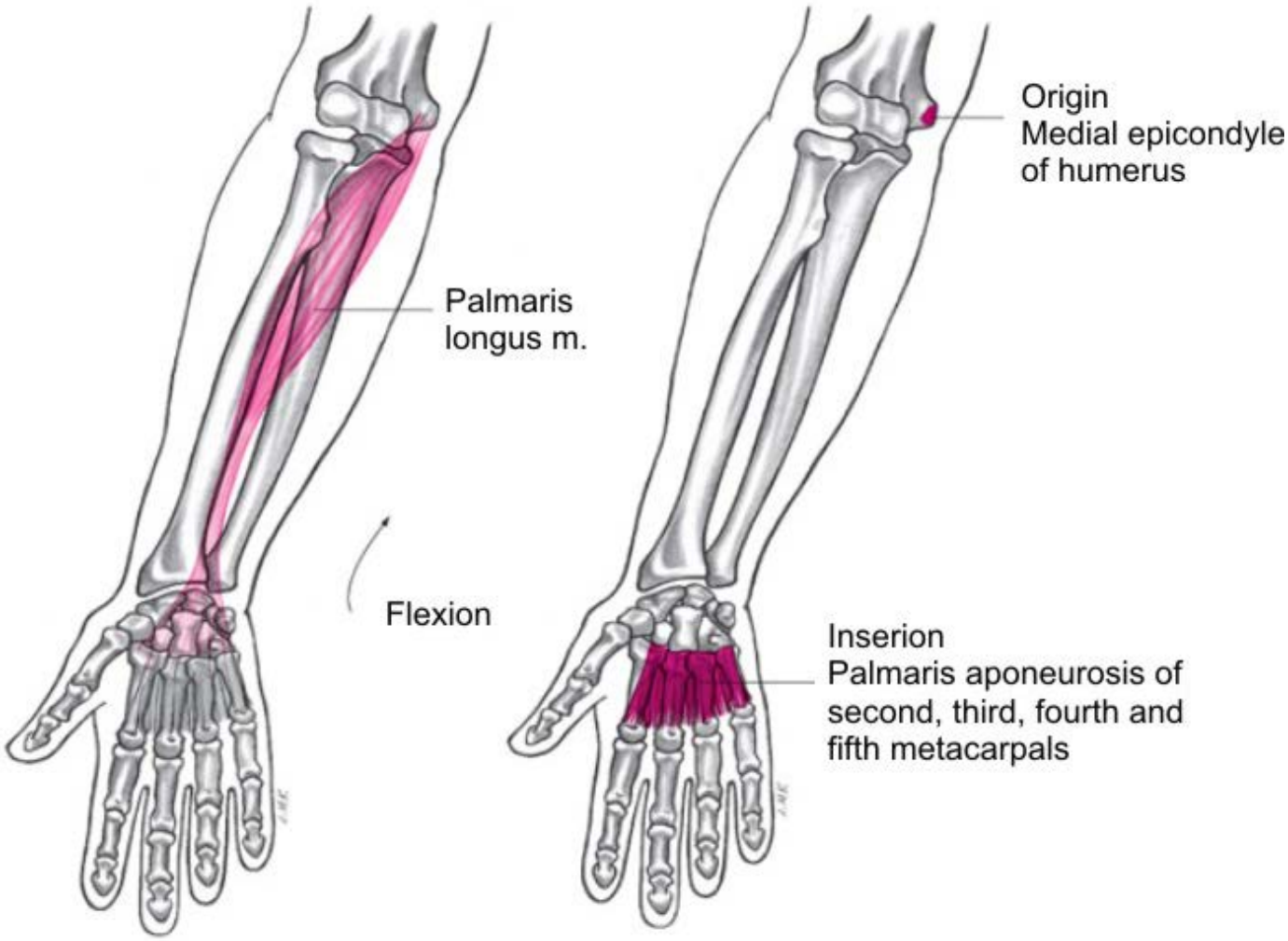
Abductor pollicis longus

Muscles

Palmaris Longus Muscle

Flexion of wrist

Weak flexion of elbow



Muscles

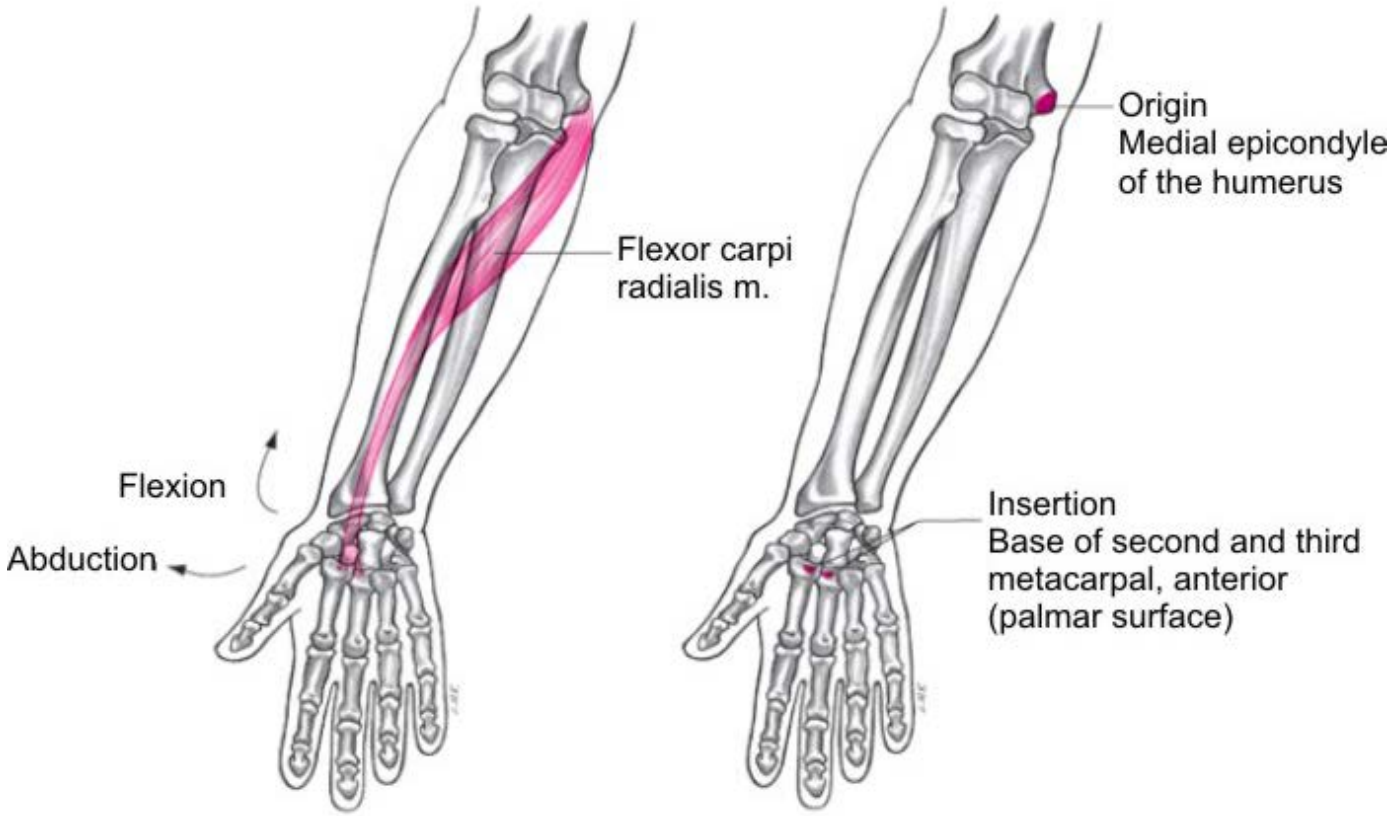
Flexor Carpi Radialis Muscle

Flexion of wrist

Abduction of wrist

Weak flexion of elbow

Weak pronation of forearm



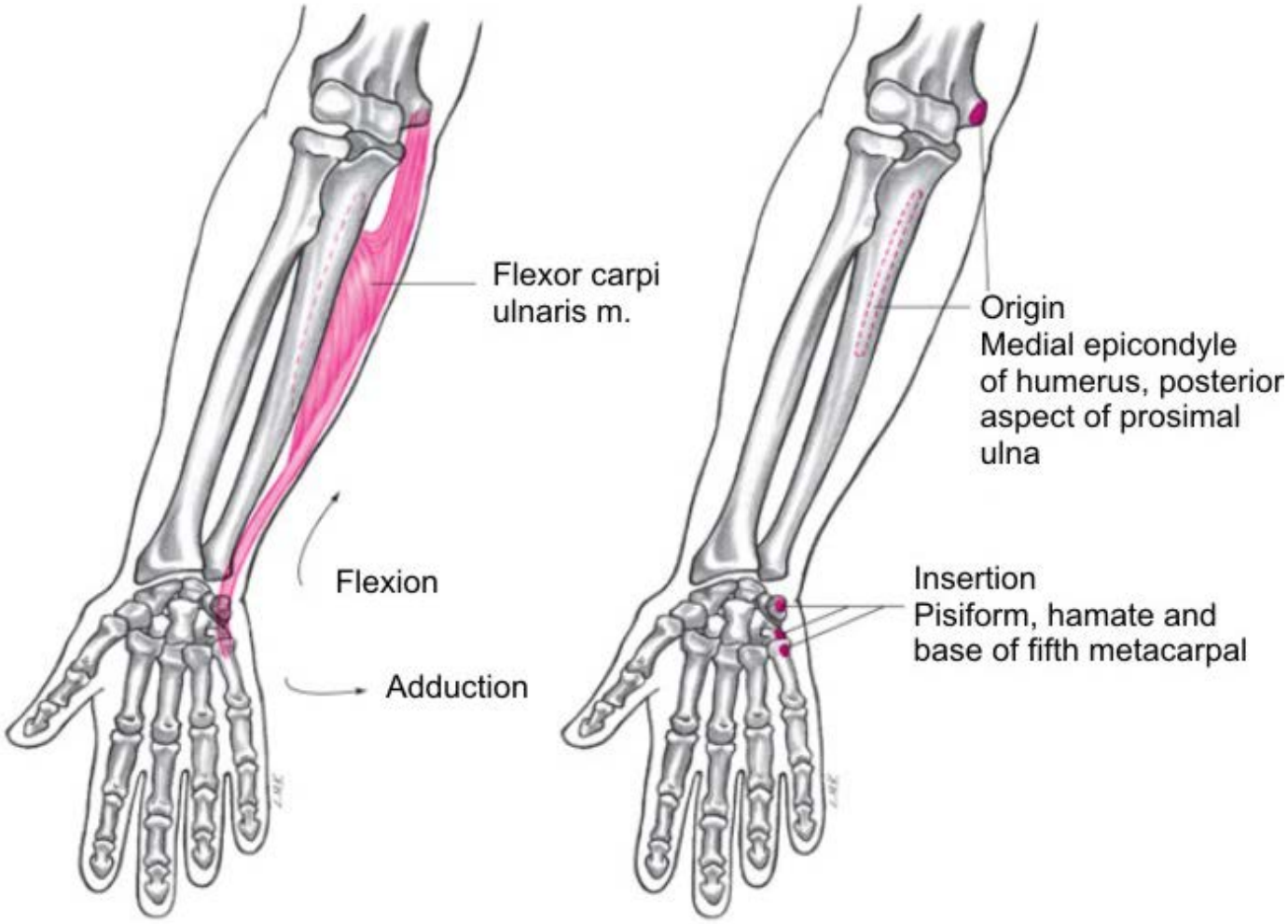
Muscles

Flexor Carpi Ulnaris Muscle

Flexion of wrist

Adduction of wrist

Weak flexion of elbow



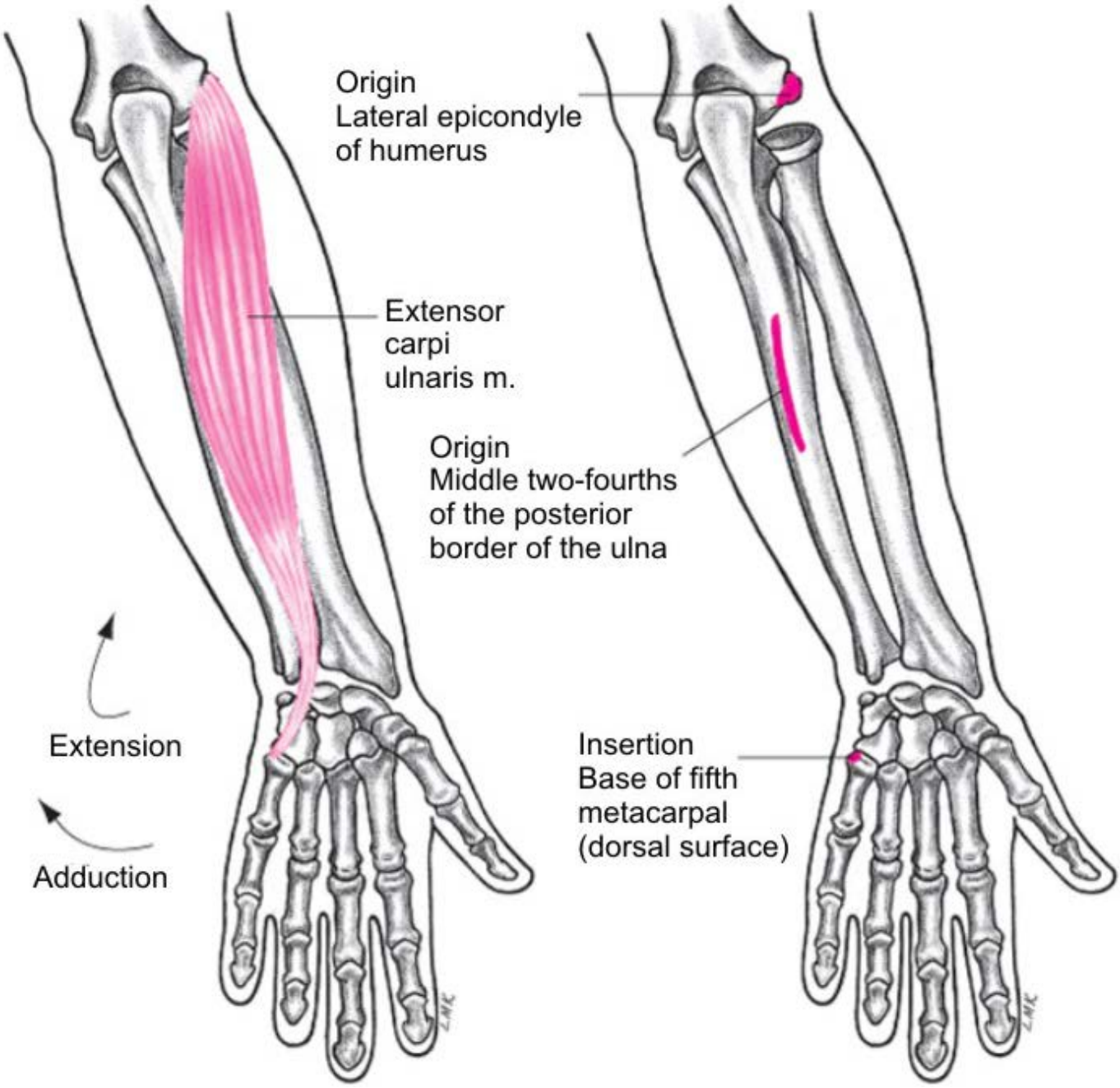
Muscles

Extensor Carpi Ulnaris Muscle

Extension of wrist

Adduction of wrist

Weak flexion of elbow



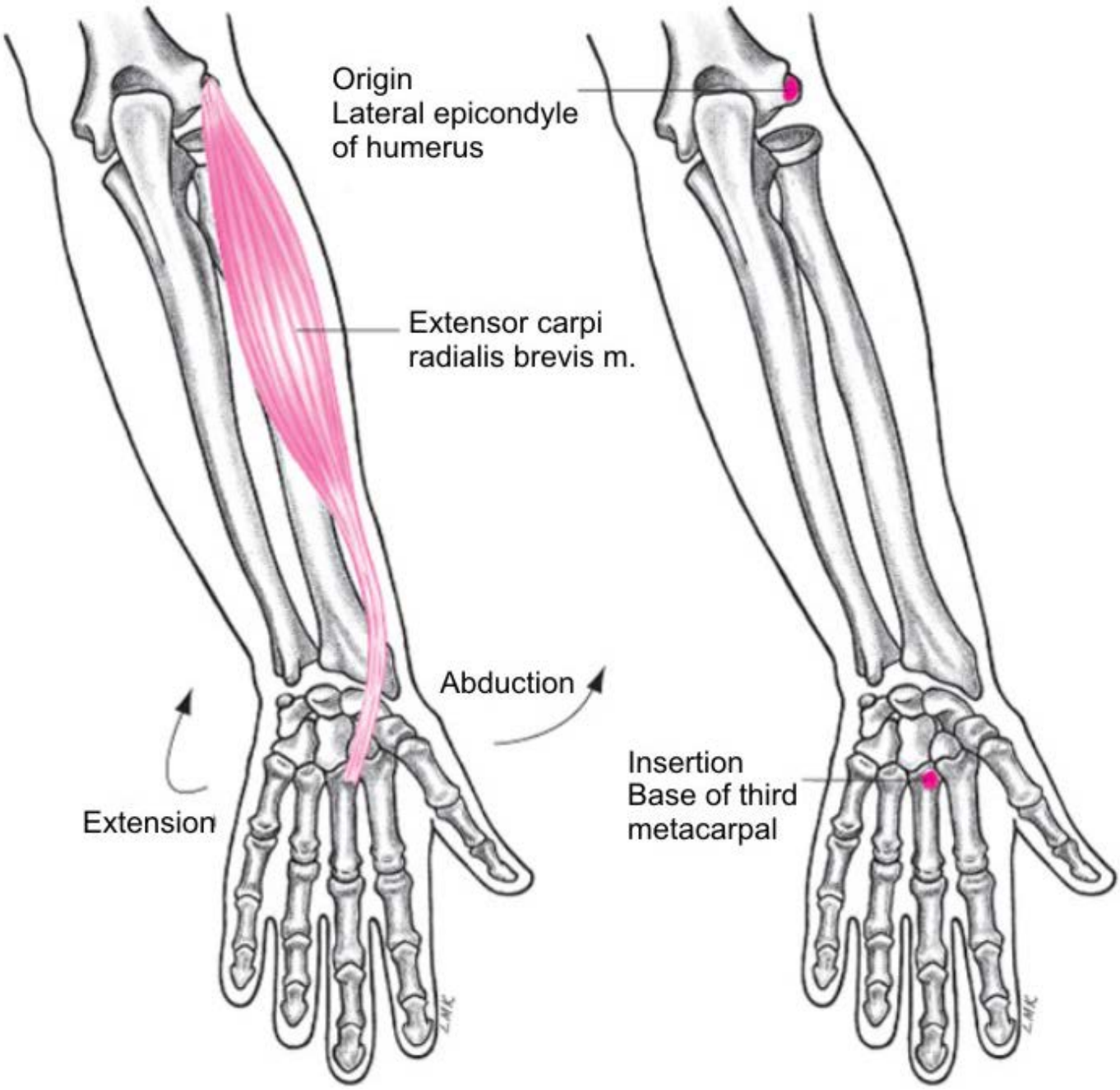
Muscles

Extensor Carpi Radialis Brevis Muscle

Extension of wrist

Abduction of wrist

Weak flexion of elbow



Muscles

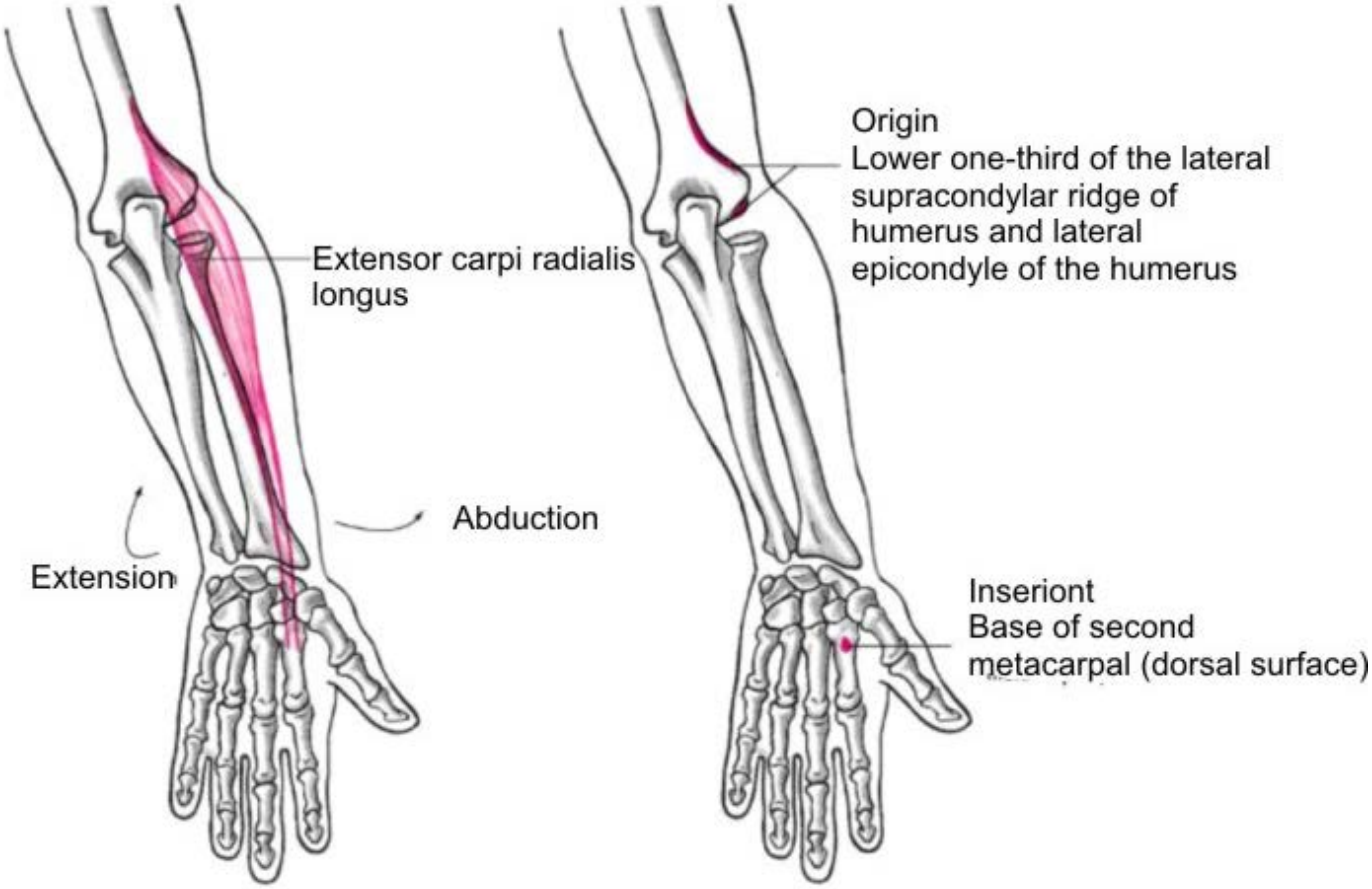
Extensor Carpi Radialis Longus Muscle

Extension of wrist

Abduction of wrist

Weak flexion of elbow

Weak pronation to neutral from a fully supinated position



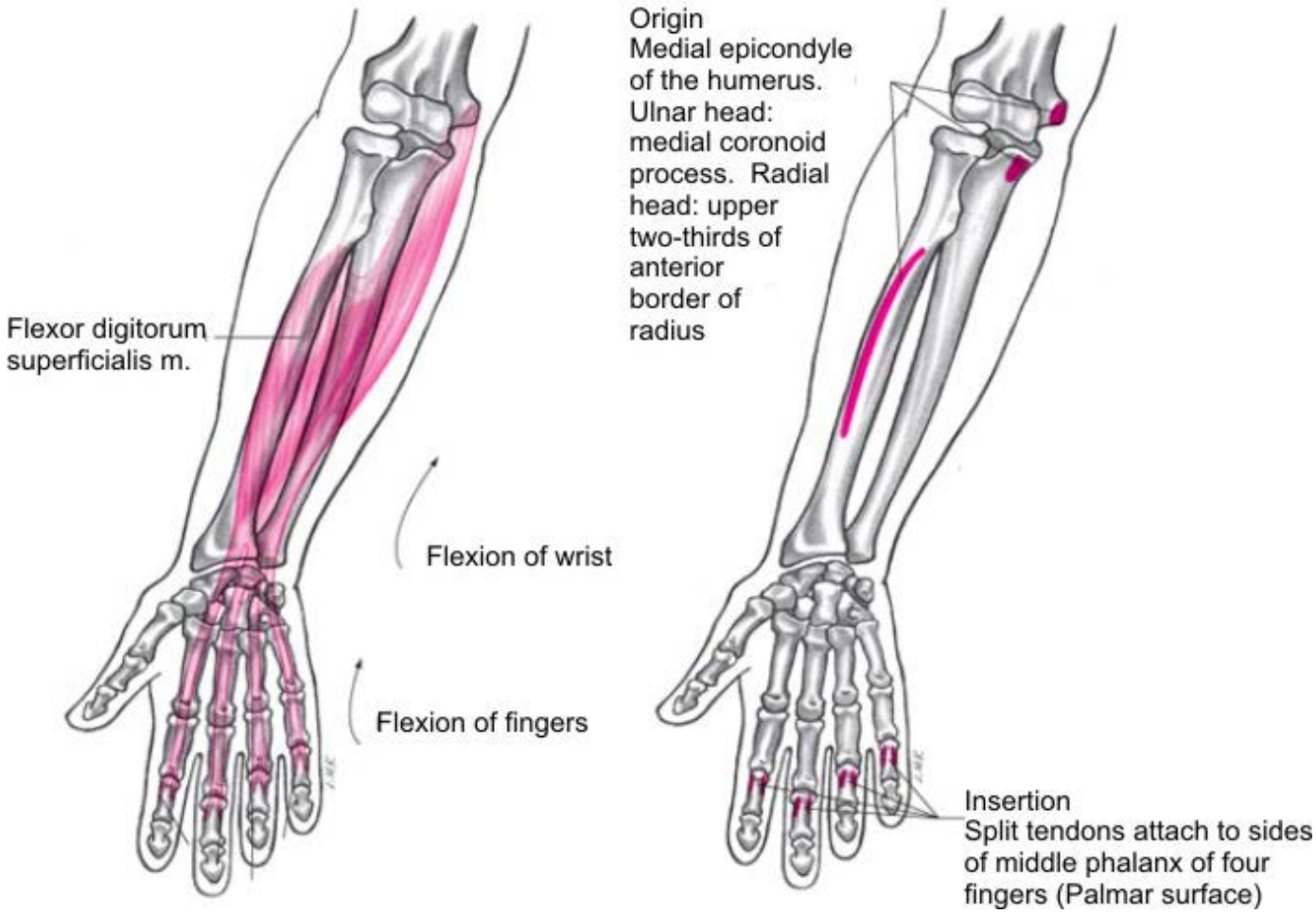
Muscles

Flexor Digitorum Superficialis Muscle

Flexion of fingers at metacarpophalangeal and proximal interphalangeal joints

Flexion of wrist

Weak flexion of elbow

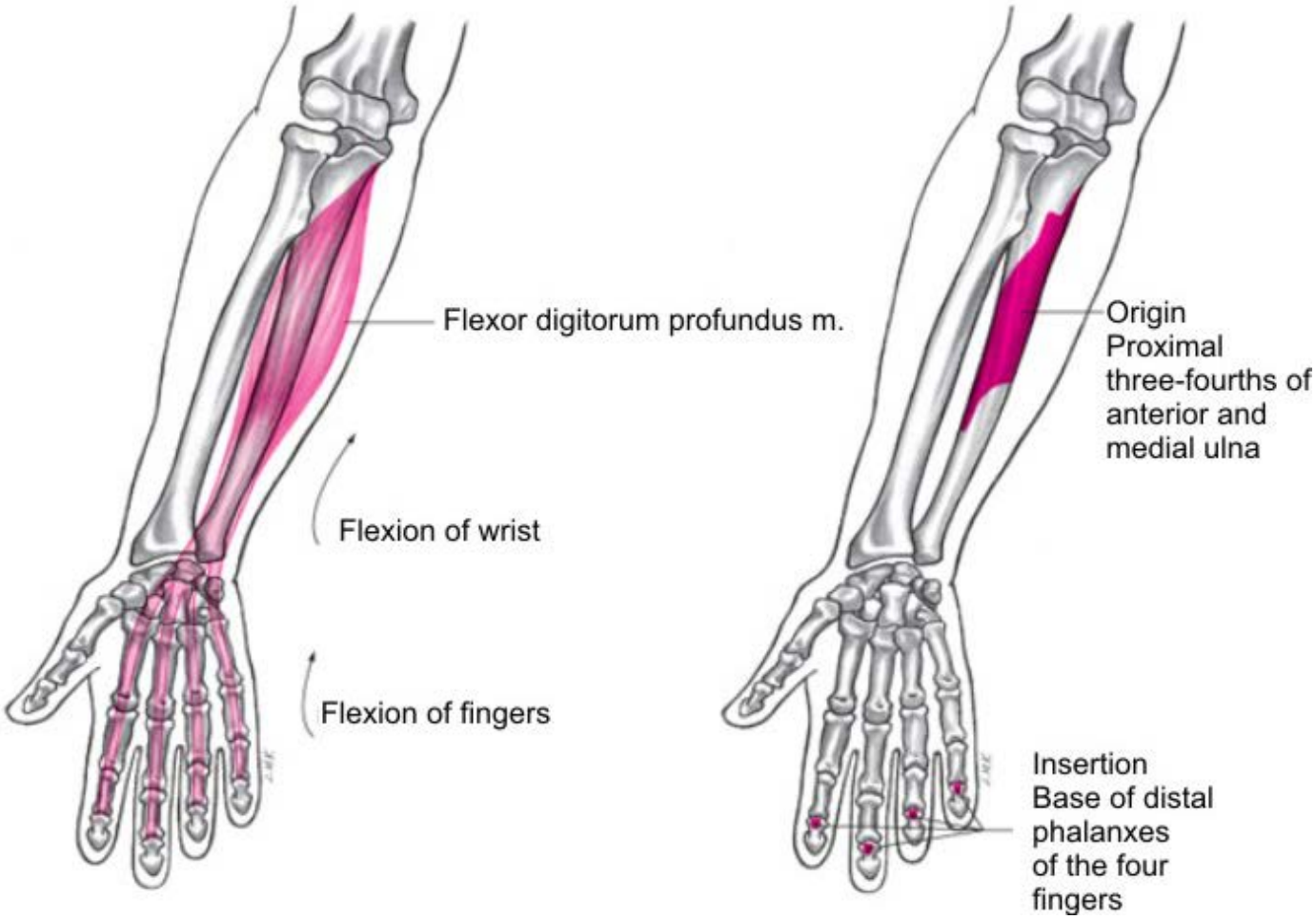


Muscles

Flexor Digitorum Profundus Muscle

Flexion of 4 fingers at metacarpophalangeal, proximal interphalangeal, and distal interphalangeal join

Flexion of wrist



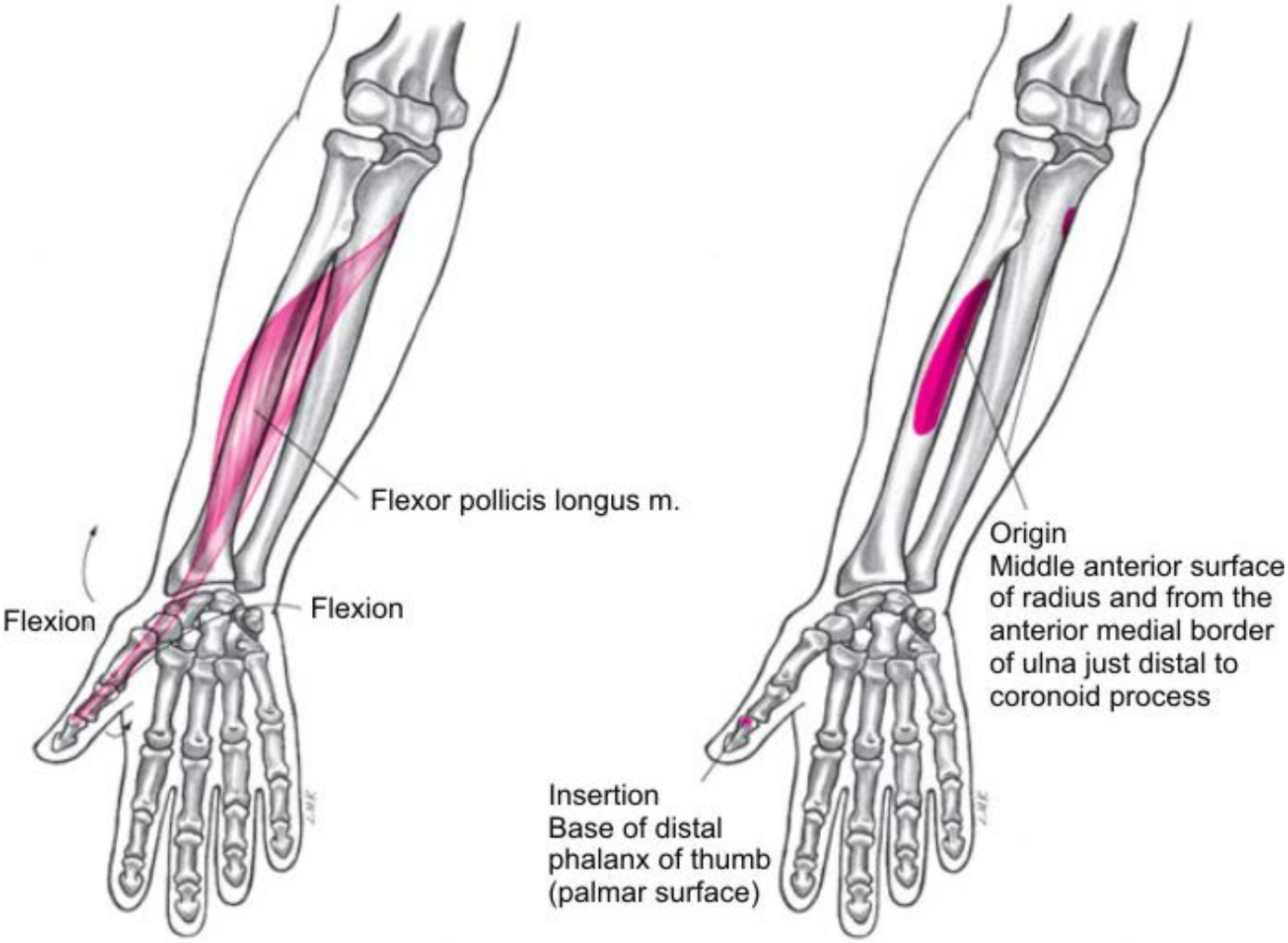
Muscles

Flexor Pollicis Longus Muscle

Flexion of thumb carpometacarpal, metacarpophalangeal, and interphalangeal joints

Flexion of wrist

Abduction of wrist



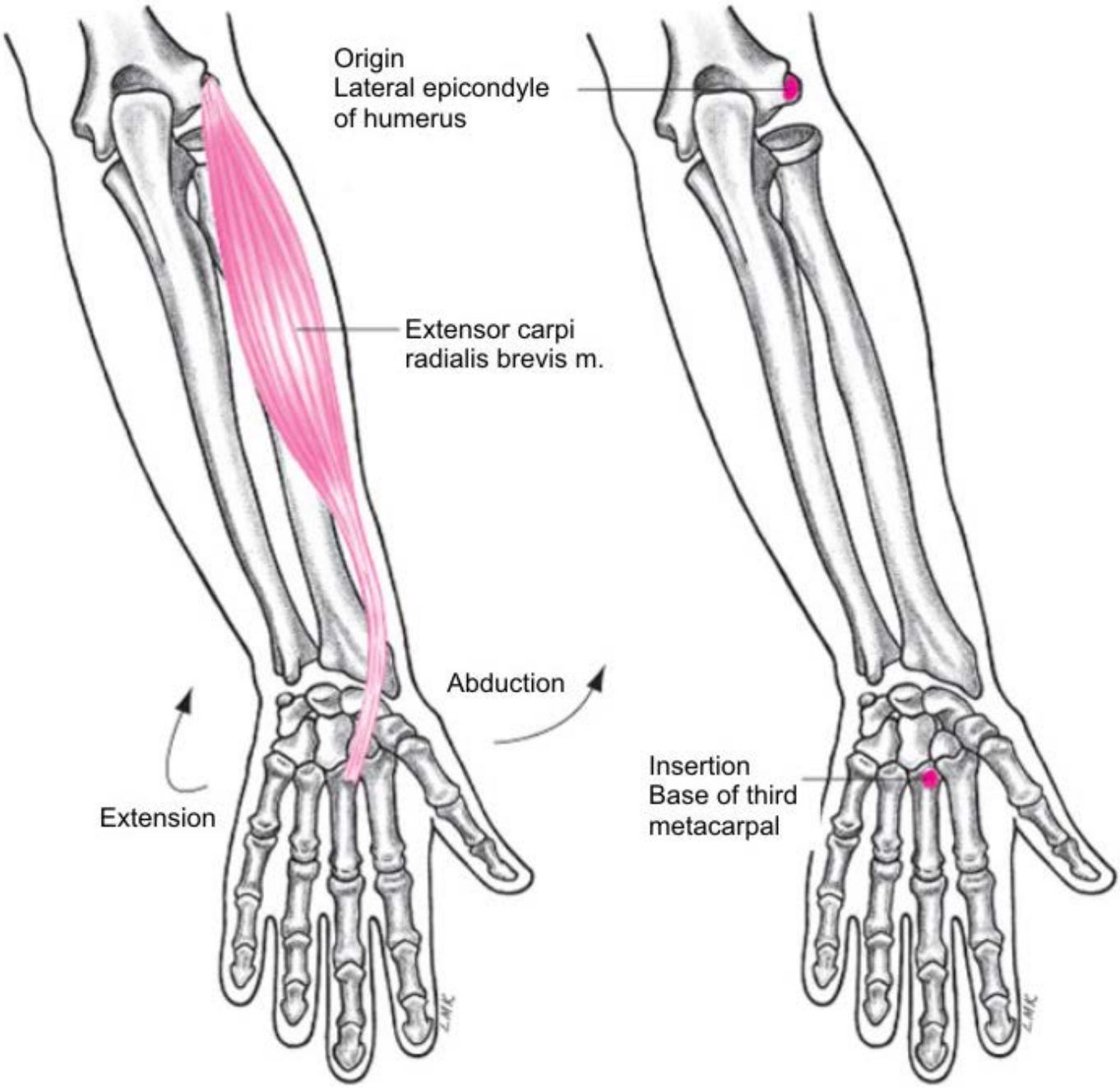
Muscles

Extensor Digitorum Muscle

Extension of 2nd, 3rd, 4th, and 5th phalanges at metacarpophalangeal joints

Extension of wrist

Weak extension of elbow



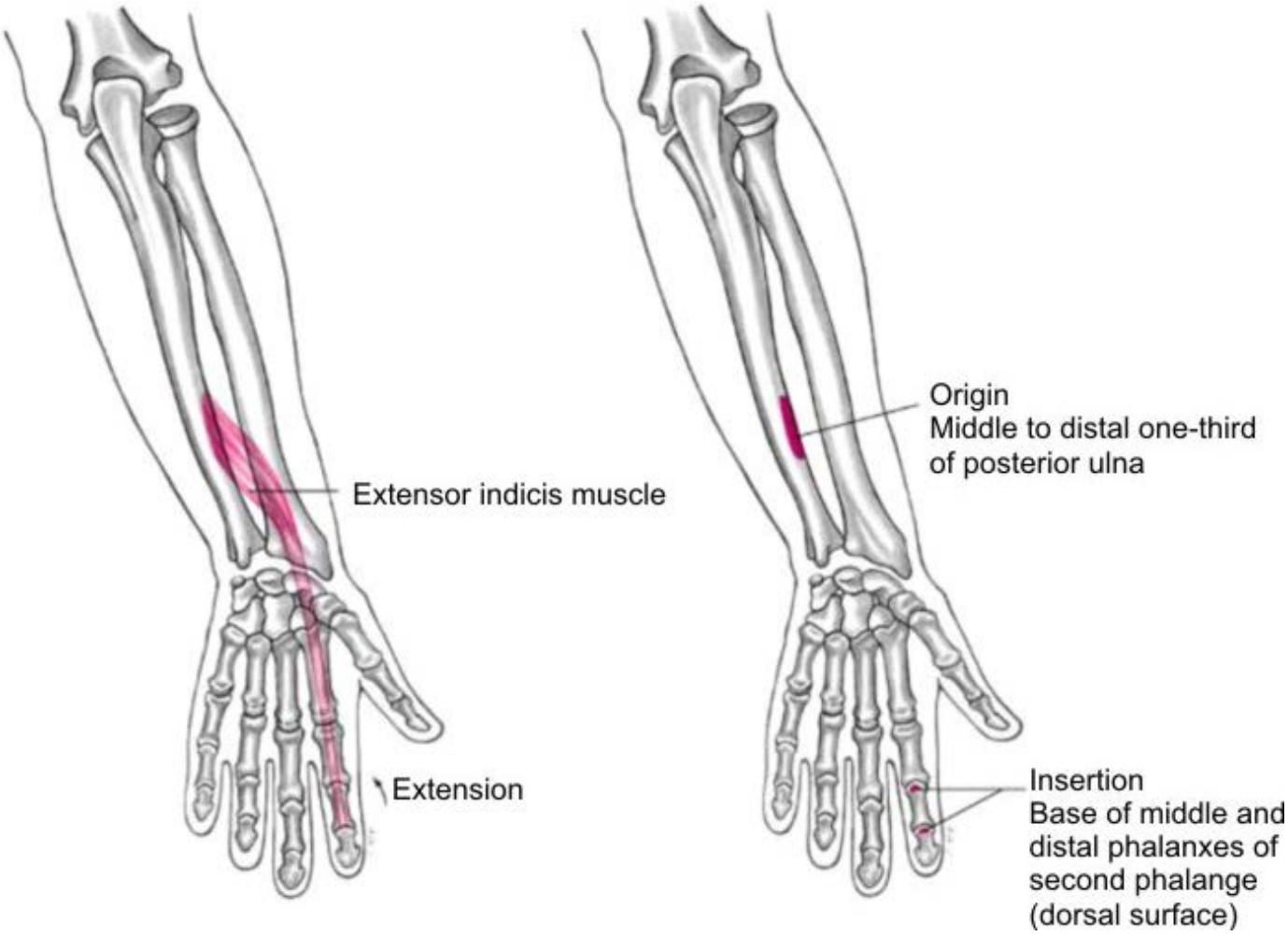
Muscles

Extensor Indicis Muscle

Expansion of index finger at metacarpophalangeal joint

Weak wrist extension

Weak supination of forearm from pronated position



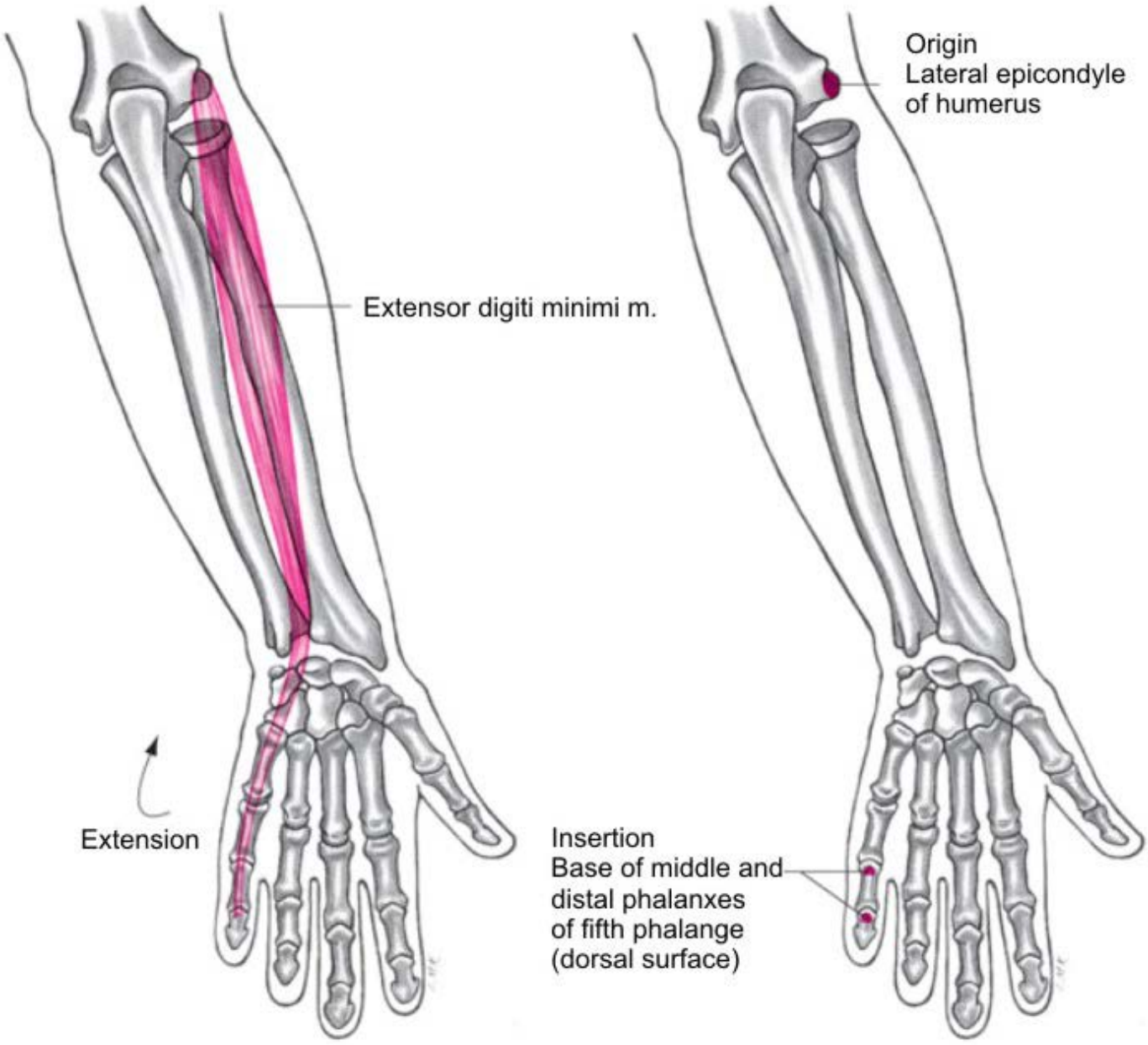
Muscles

Extensor Digiti Minimi Muscle

Expansion of little finger at metacarpophalangeal joint

Weak wrist extension

Weak elbow extension



Muscles

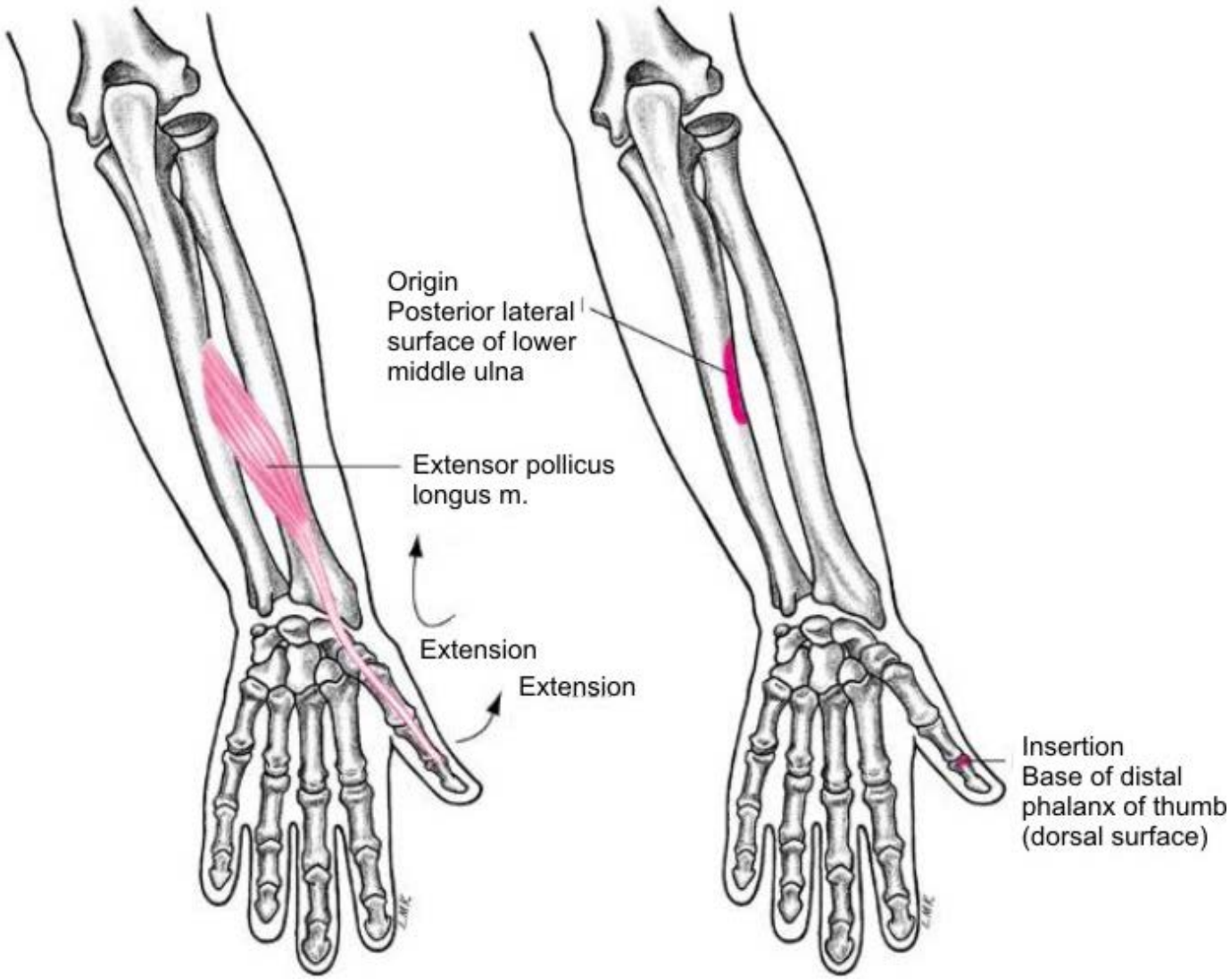
Extensor Pollicis Longus Muscle

Expansion of thumb at carpometacarpal, metacarpophalangeal, and interphalangeal joint

Extension of wrist

Abduction of wrist

Weak supination of forearm from a pronated position



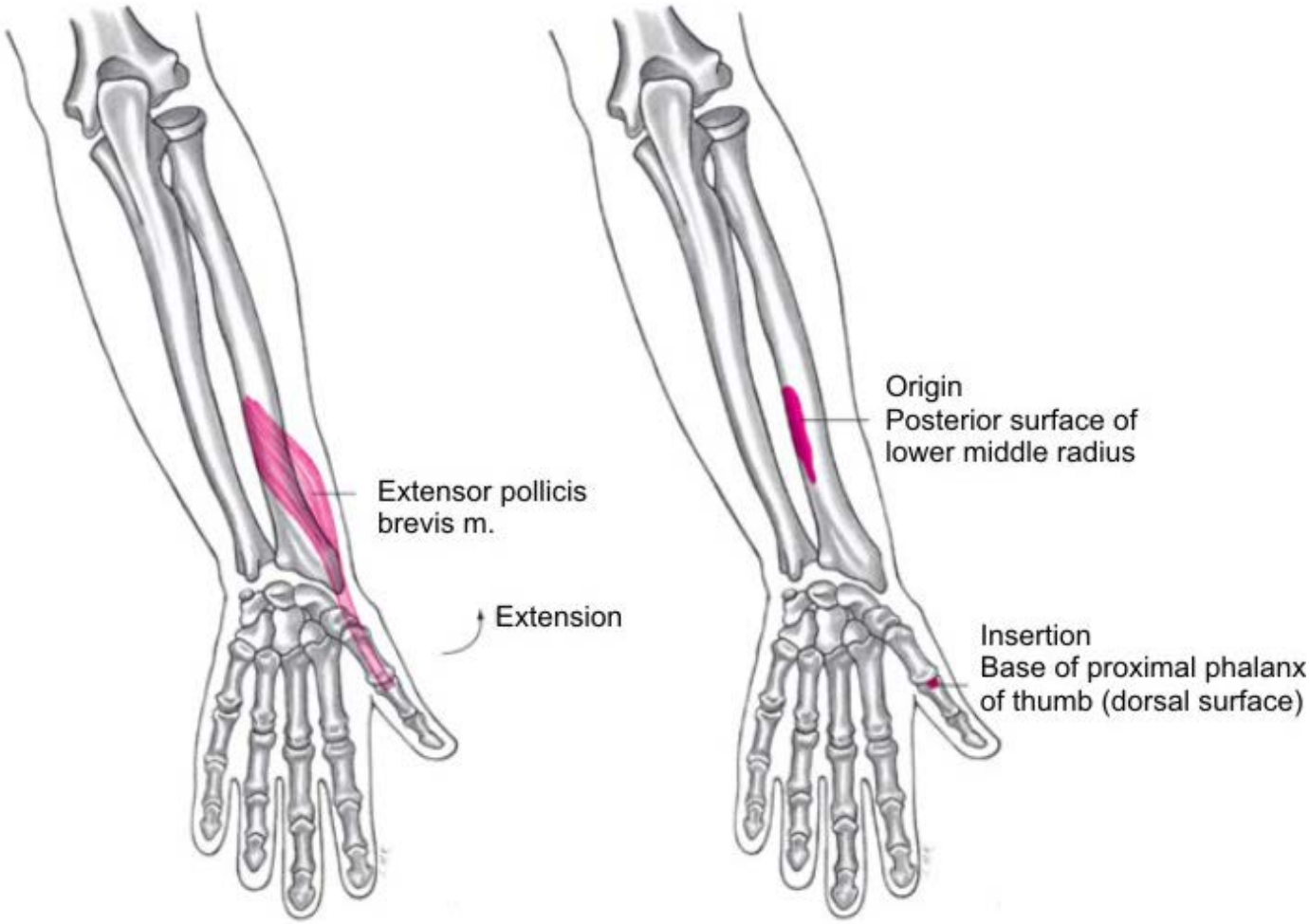
Muscles

Extensor Brevis Muscle

Expansion of thumb at carpometacarpal, and metacarpophalangeal, joint

Weak wrist extension

Abduction of wrist



Muscles

Abductor Pollicis Longus Muscle

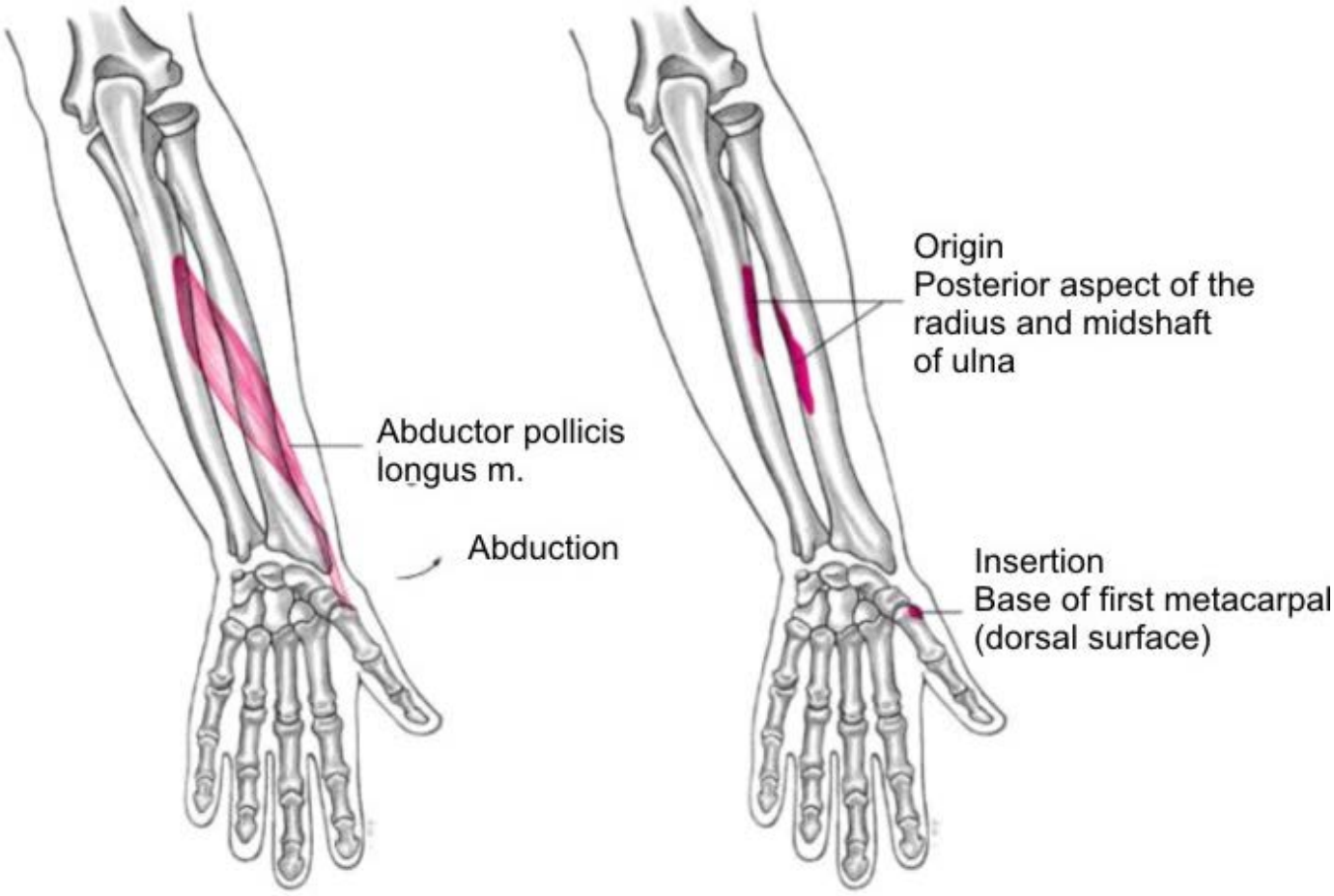
Abduction of thumb at carpometacarpal joint

Abduction of wrist

Extension of thumb at carpometacarpal joint

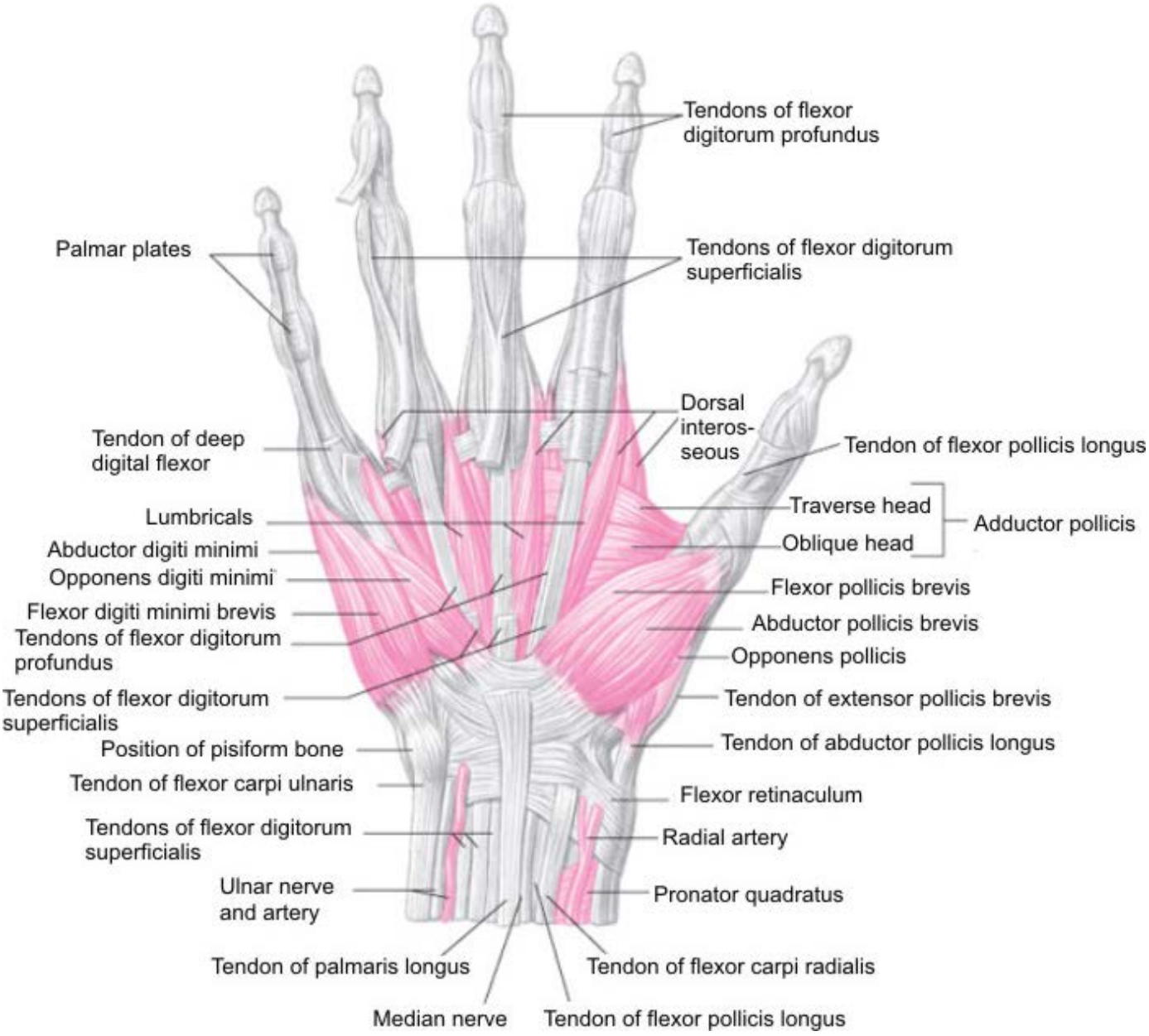
Weak supination of forearm from a pronated position

Weak flexion of wrist



Muscles

Intrinsic Muscles of the Hand



Intrinsic Muscles of the Hand

Thenar eminence - muscular pad on palmar surface of 1st metacarpal

- abductor pollicis brevis
- opponens pollicis
- flexor pollicis brevis
- adductor pollicis

Hypothenar eminence - muscular pad that forms ulnar border on palmar surface

- abductor digiti minimi
- flexor digiti minimi brevis
- opponens digiti minimi

Intermediate muscles

- three palmar interossei
- four dorsal interossei
- four lumbrical muscles

Four muscles act on CMC of thumb

- opponens pollicis - opposition in thumb metacarpal
- abductor pollicis brevis and flexor pollicis brevis abduct thumb metacarpal
- flexor pollicis brevis flexes thumb metacarpal
- adductor pollicis adducts thumb metacarpal
- flexor pollicis brevis and adductor pollicis flex proximal phalanx of thumb

Three palmar interossei

- adduct the 2nd, 4th, and 5th phalanges

Four dorsal interossei

flex and abduct index, middle, and ring proximal phalanxes

assist with extension of middle and distal phalanxes of index, middle, & ring fingers

Third dorsal interossei

adducts middle finger

Four lumbricales

flex index, middle, ring, and little proximal phalanxes

extend middle and distal phalanxes of index, middle, ring, & little fingers.

Three muscles act on little finger

opponens digiti minimi causes opposition of little finger metacarpal

abductor digiti minimi abducts 5^{th} metacarpal

flexor digiti minimi brevis flexes 5^{th} metacarpal

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Muscles

Wrist Flexion

Agonists

Flexor carpi radialis

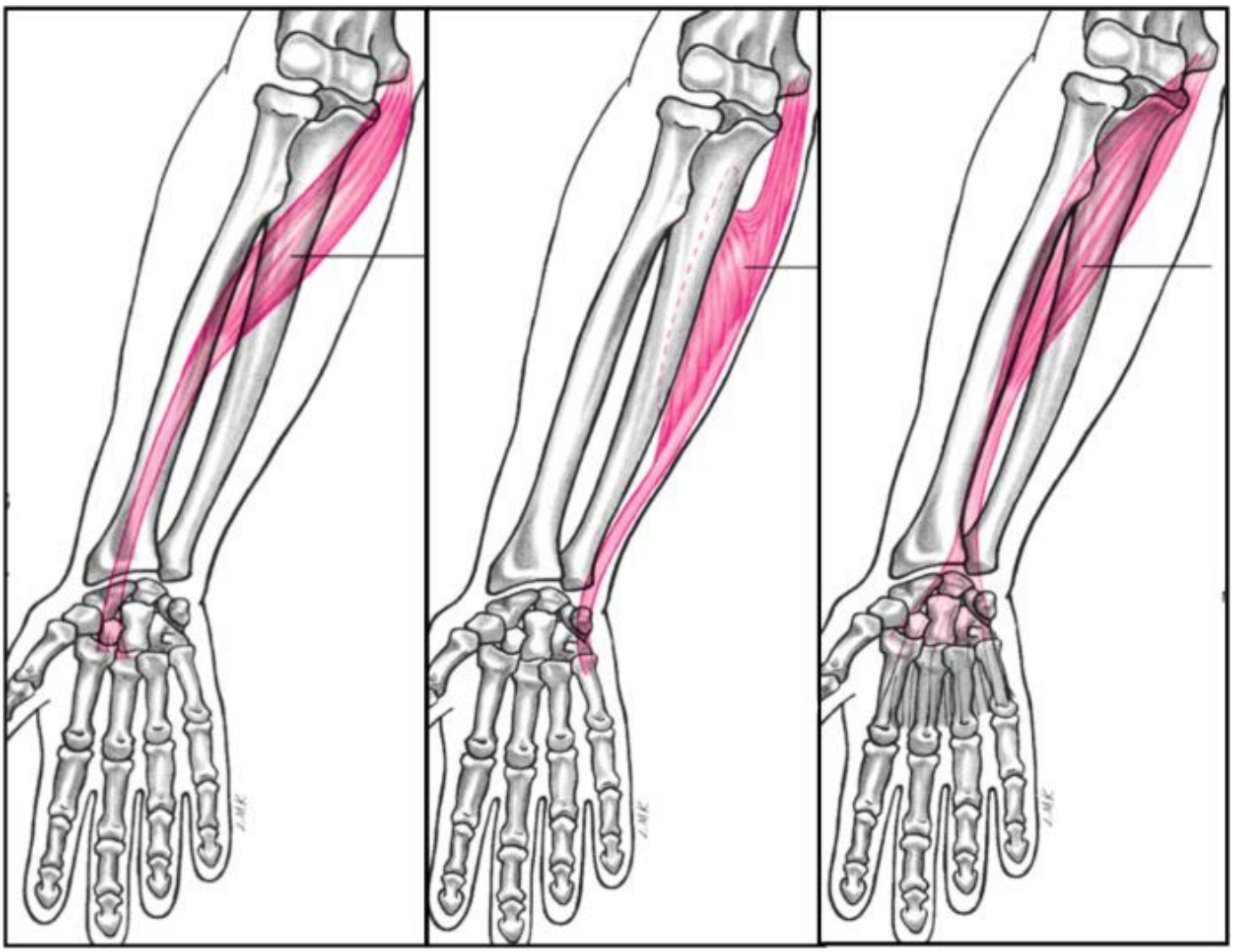
Flexor carpi ulnaris

Palmaris longus

Flexor digitorum superficialis

Flexor digitorum profundus

Flexor pollicis longus



Muscles

Wrist Flexion

Agonists

Flexor carpi radialis

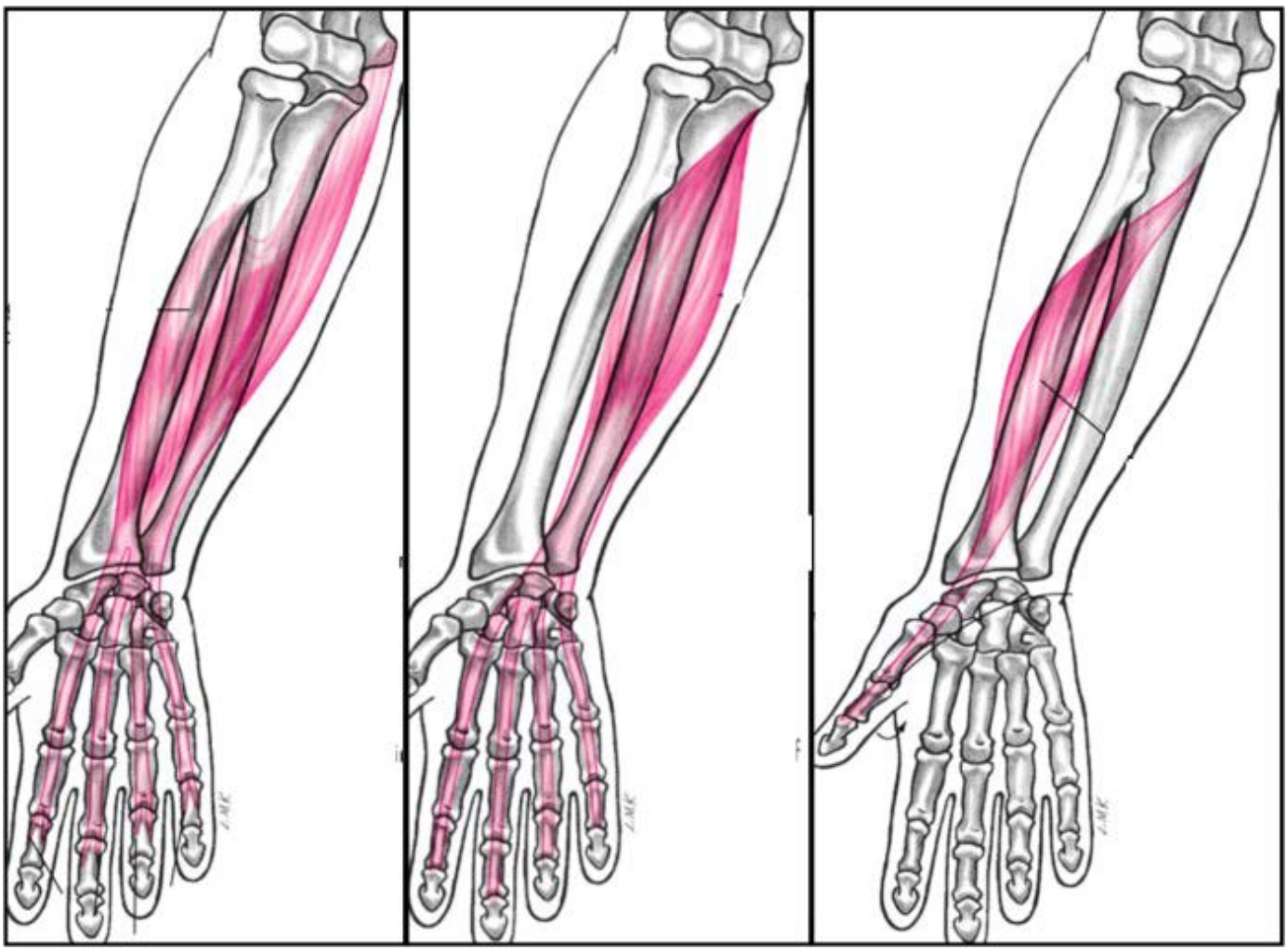
Flexor carpi ulnaris

Palmaris longus

Flexor digitorum superficialis

Flexor digitorum profundus

Flexor pollicis longus



Muscles

Wrist Extension

Extensor carpi radialis longus

Extensor carpi radialis brevis

Extensor carpi ulnaris

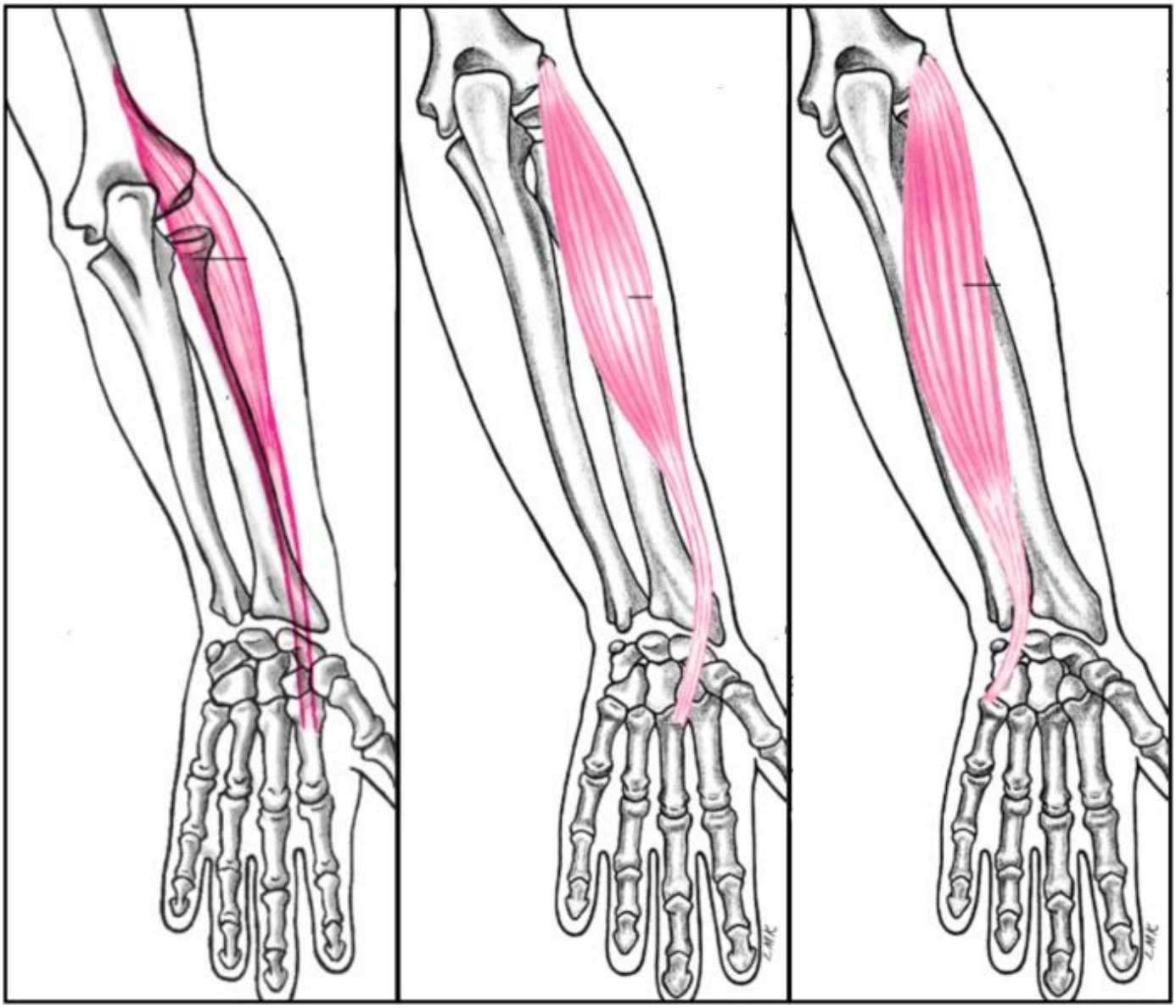
Extensor digitorum

Extensor indicis

Extensor digiti minimi

Extensor pollicis longus

Extensor pollicis brevis



Muscles

Wrist Extension

Extensor carpi radialis longus

Extensor carpi radialis brevis

Extensor carpi ulnaris

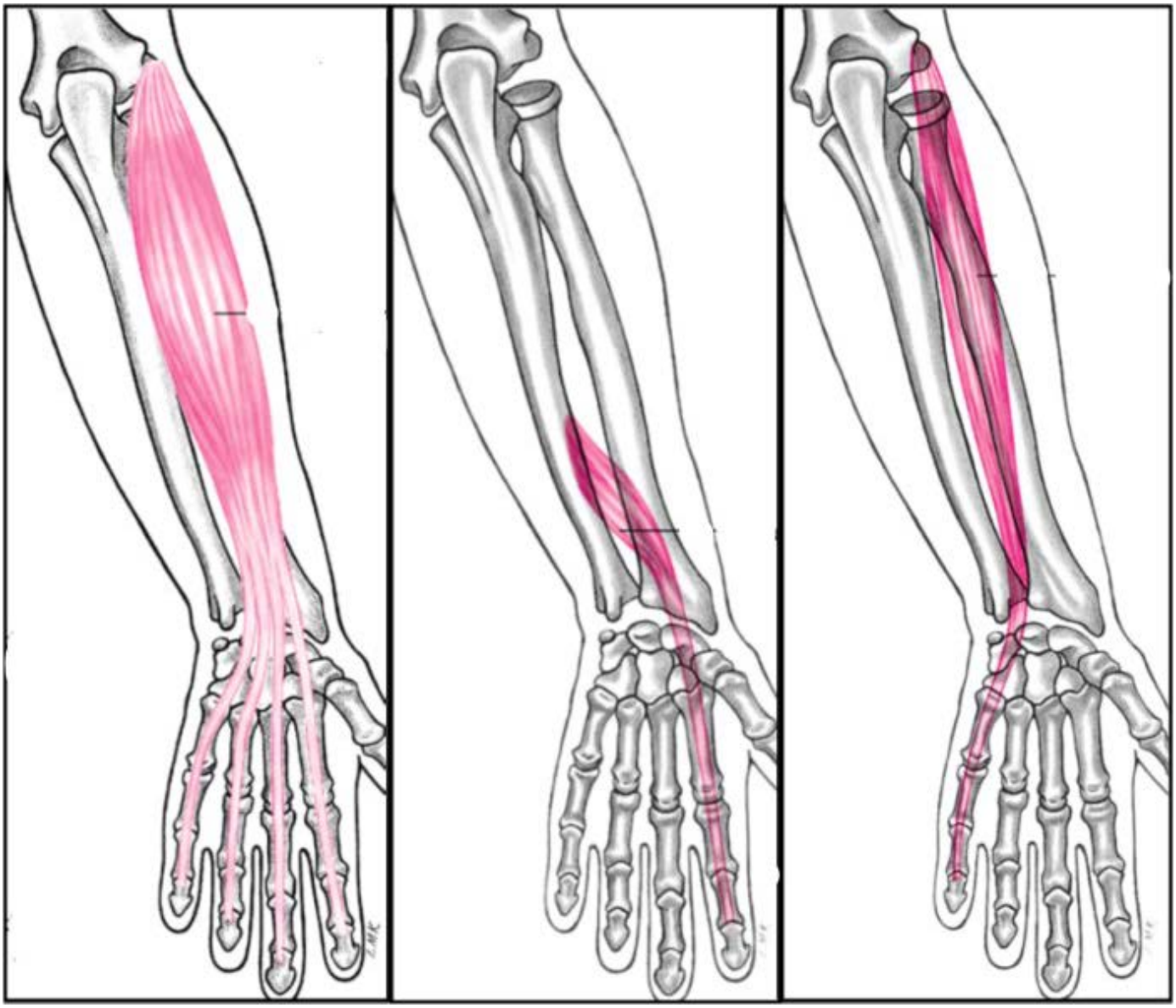
Extensor digitorum

Extensor indicis

Extensor digiti minimi

Extensor pollicis longus

Extensor pollicis brevis



Muscles

Wrist Extension

Extensor carpi radialis longus

Extensor carpi radialis brevis

Extensor carpi ulnaris

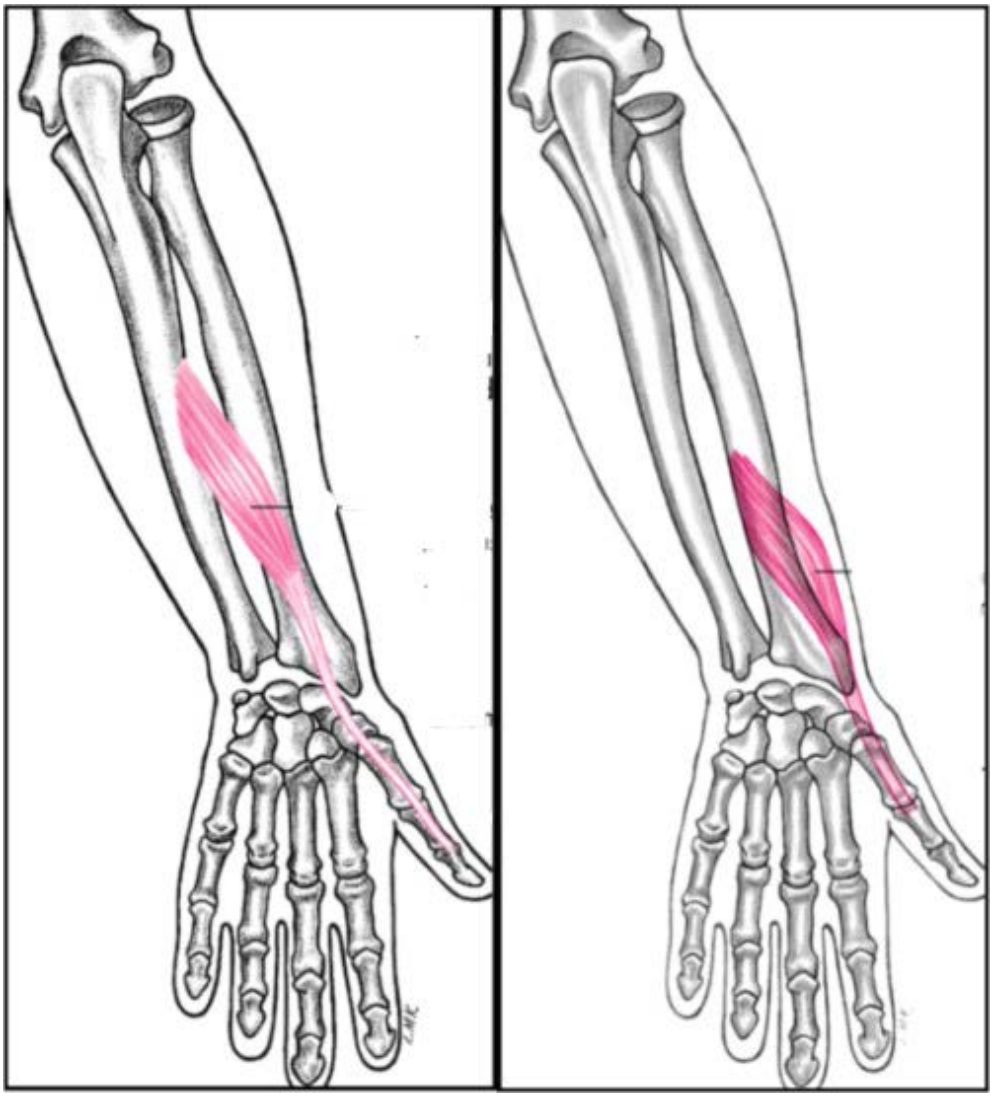
Extensor digitorum

Extensor indicis

Extensor digiti minimi

Extensor pollicis longus

Extensor pollicis brevis



Muscles

Wrist Abduction

Flexor carpi radialis

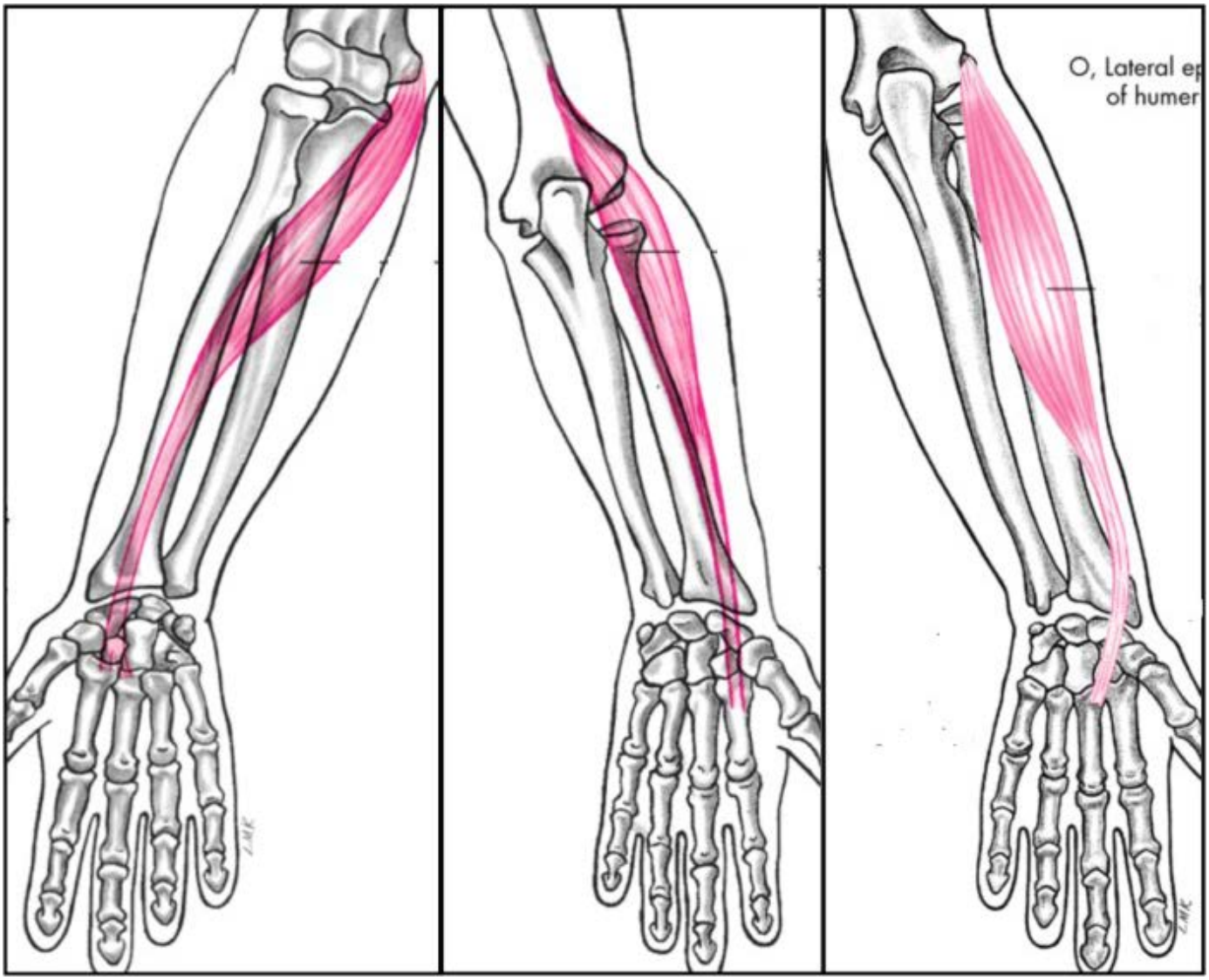
Extensor carpi radialis longus

Extensor carpi radialis brevis

Abductor pollicis longus

Extensor pollicis longus

Extensor pollicis brevis



Muscles

Wrist Abduction

Flexor carpi radialis

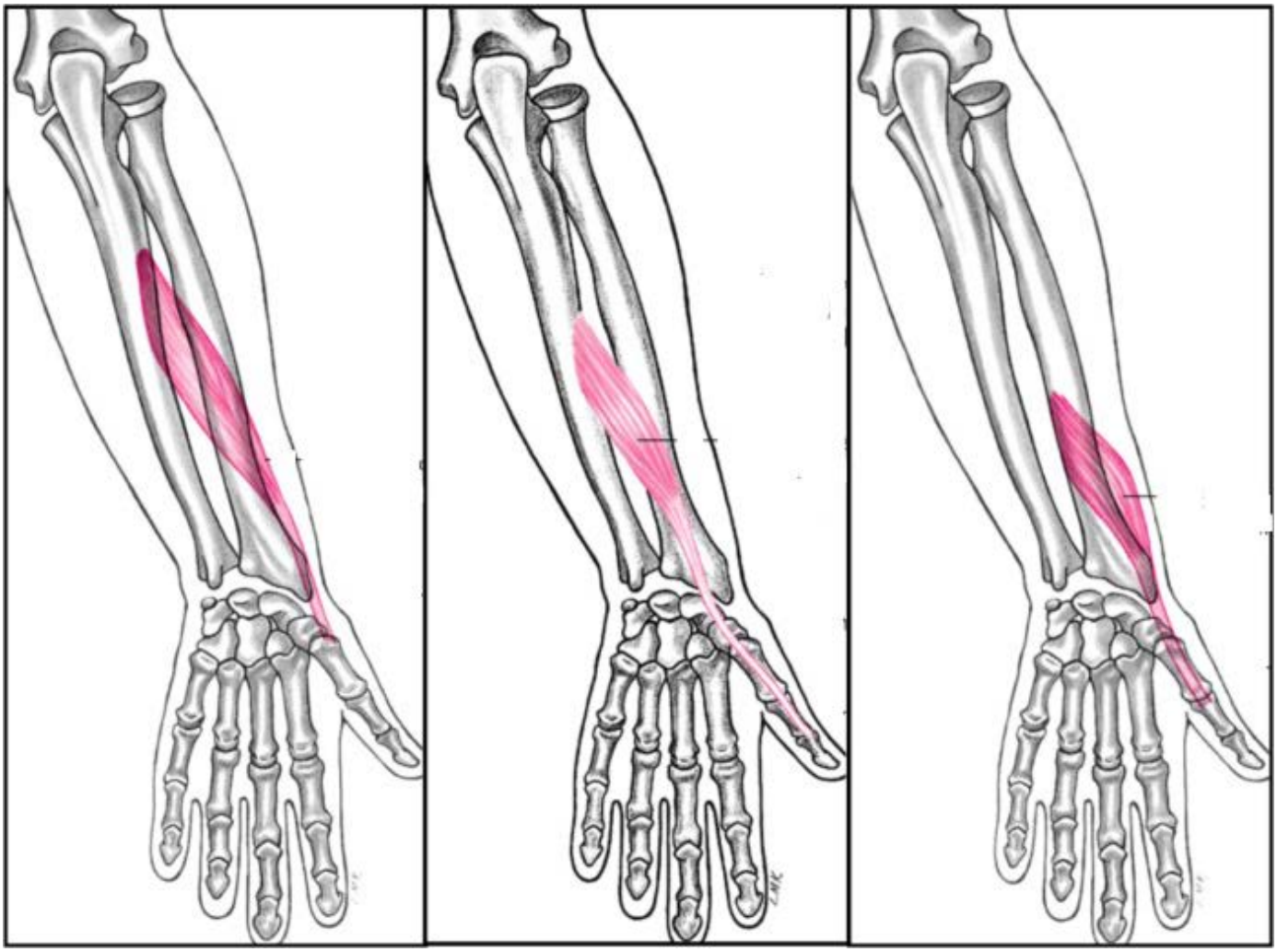
Extensor carpi radialis longus

Extensor carpi radialis brevis

Abductor pollicis longus

Extensor pollicis longus

Extensor pollicis brevis

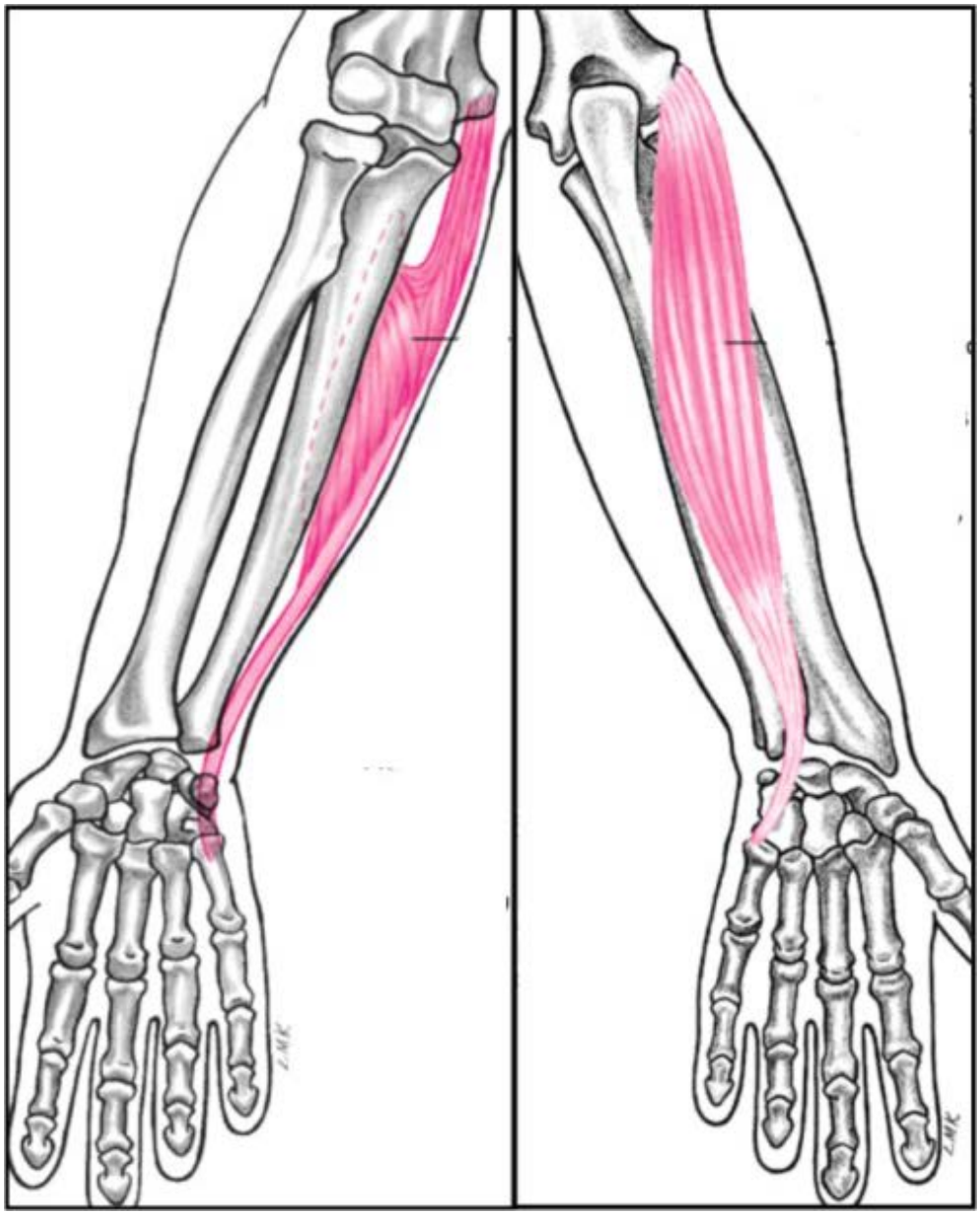


Muscles

Wrist Adduction

Flexor carpi ulnaris

Extensor carpi ulnaris



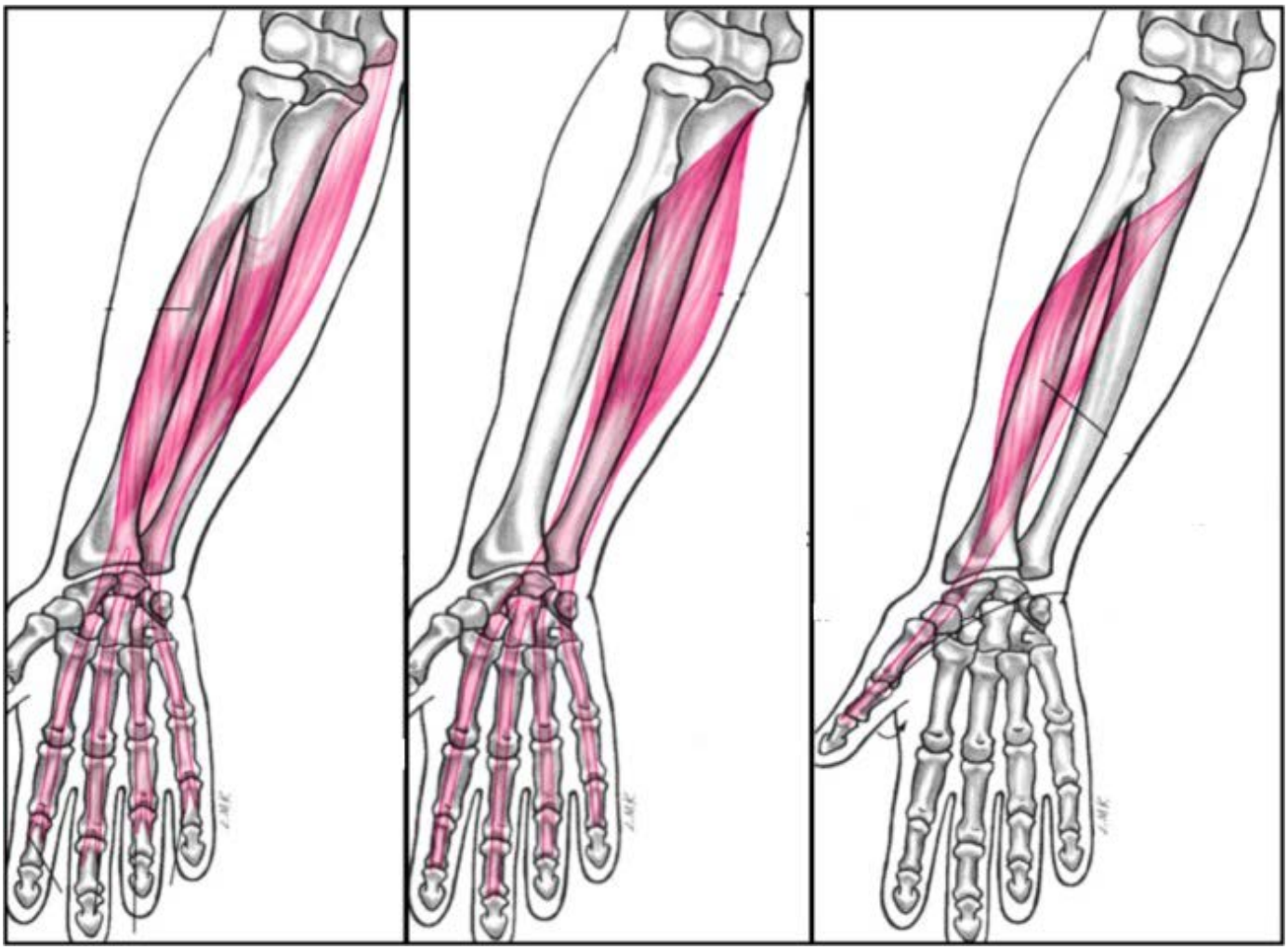
Muscles

Phalangeal Flexion

Flexor digitorum superficialis

Flexor digitorum profundus

Flexor pollicis longus



Muscles

Phalangeal Extension

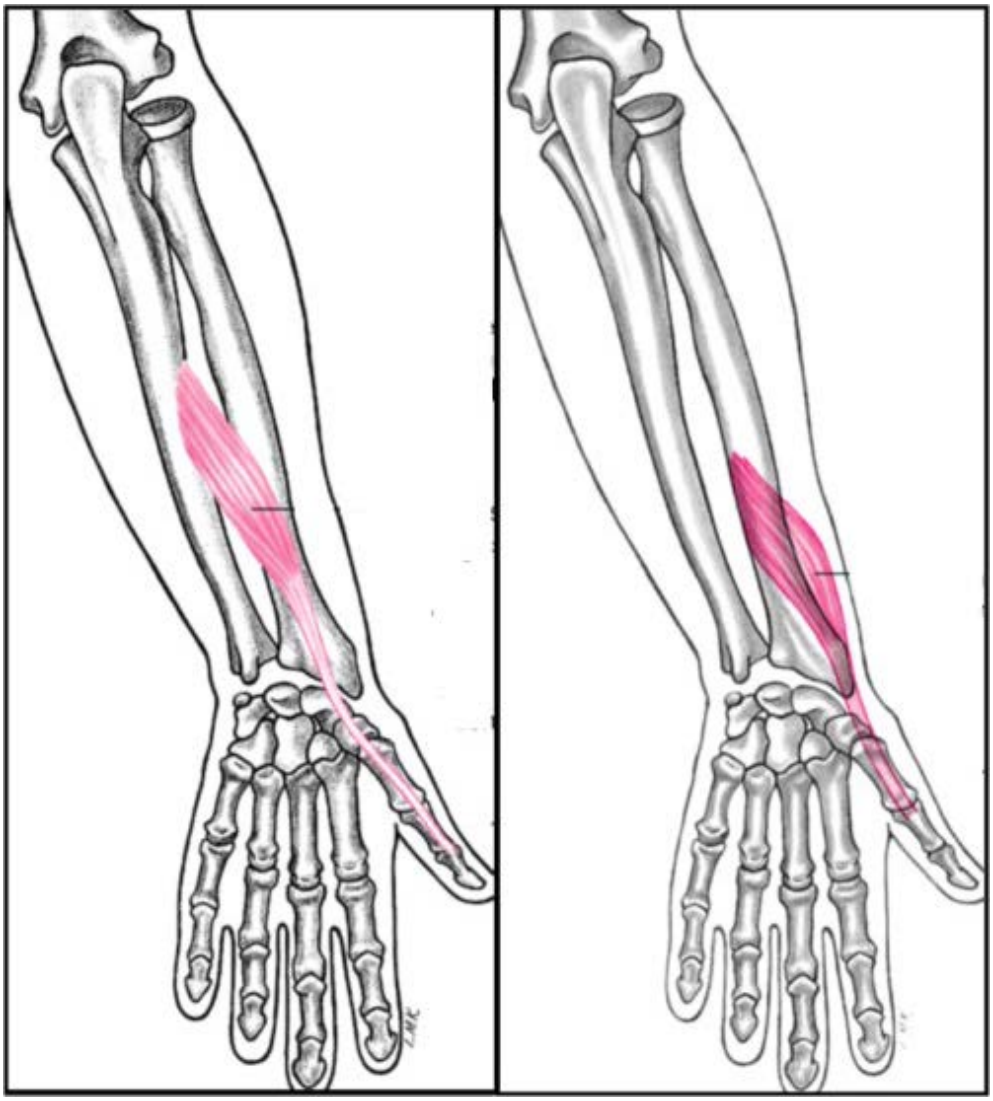
Extensor digitorum

Extensor indicis

Extensor digiti minimi

Extensor pollicis longus

Extensor pollicis brevis



To Test

Access Code: 2YMMSEX

Please write down code. You will be asked for it

Once you have successfully passed the test (70% correct), please email Kim Jackson at kim_hotschool@yahoo.com. We will email you your CE certificate within 7 business days.