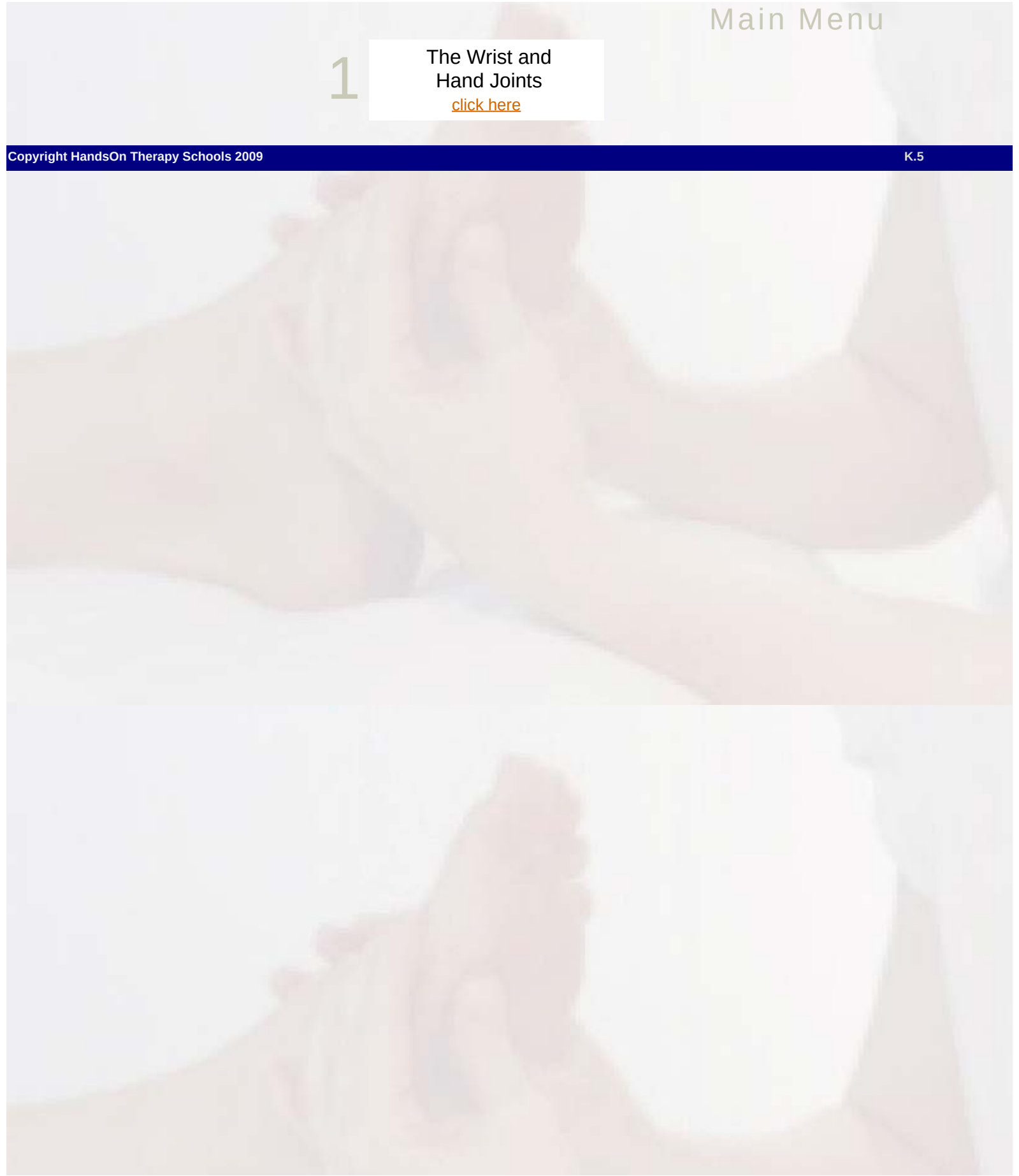






1

The Wrist and Hand Joints

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Main Menu

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K.5

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

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Bones

Eight carpal bones

Proximal row from radial to ulnar side

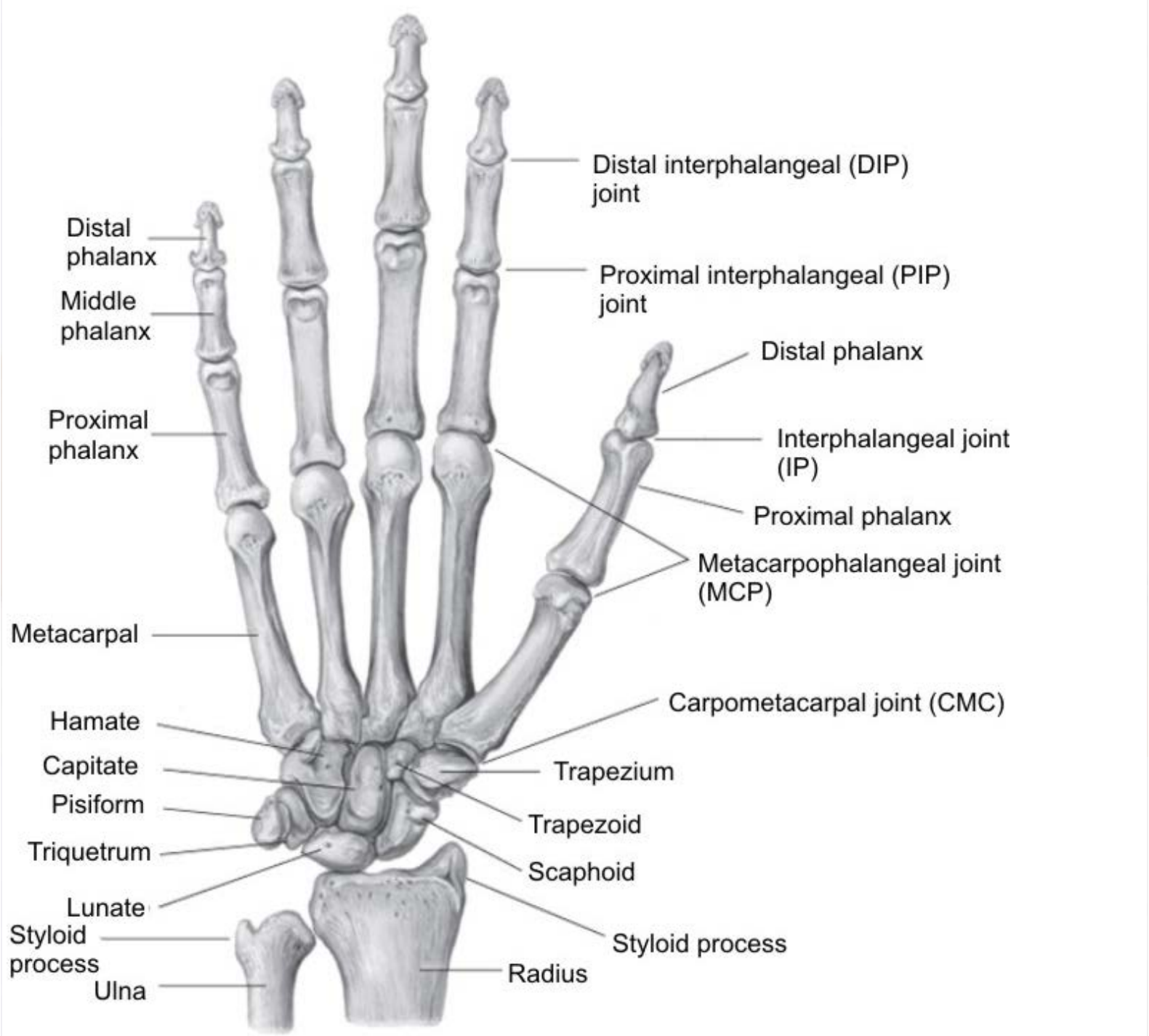
- scaphoid (boat-shaped) or navicular
- lunate (moon-shaped)
- triquetrum (three-cornered)
- pisiform (pea-shaped)

Distal row, from the radial to ulnar side

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



Bones



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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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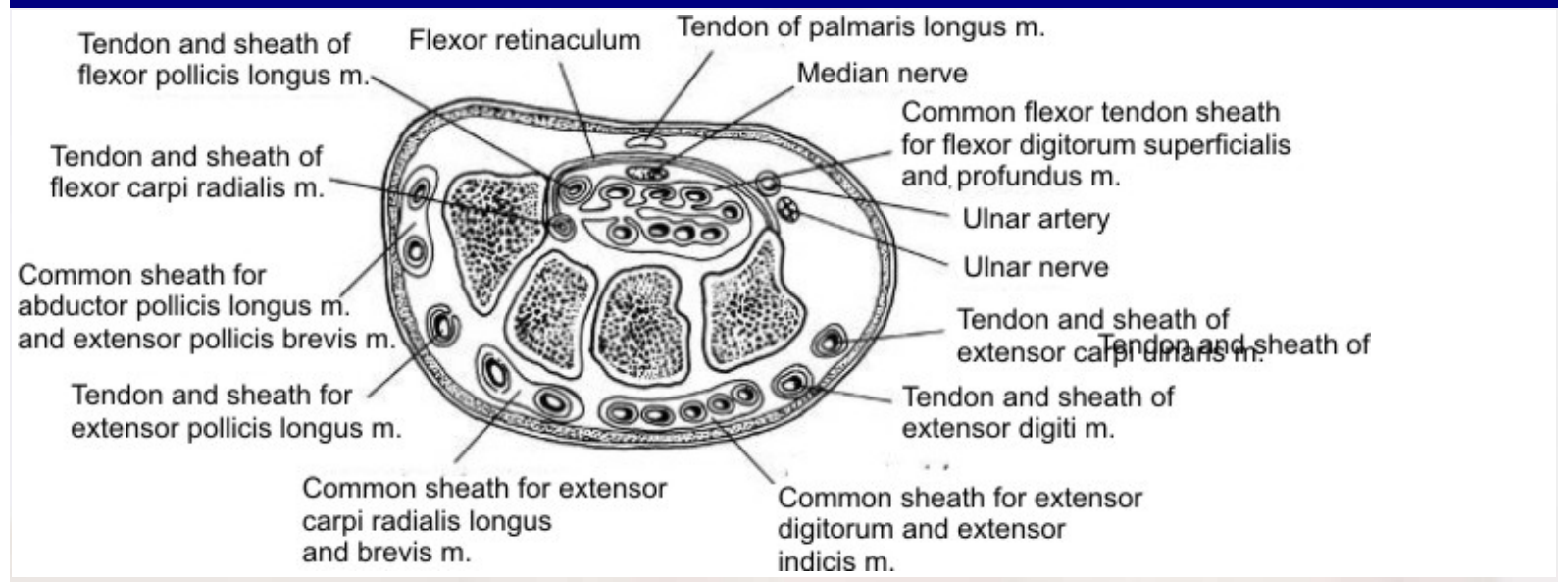


Bones

- 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



Bones



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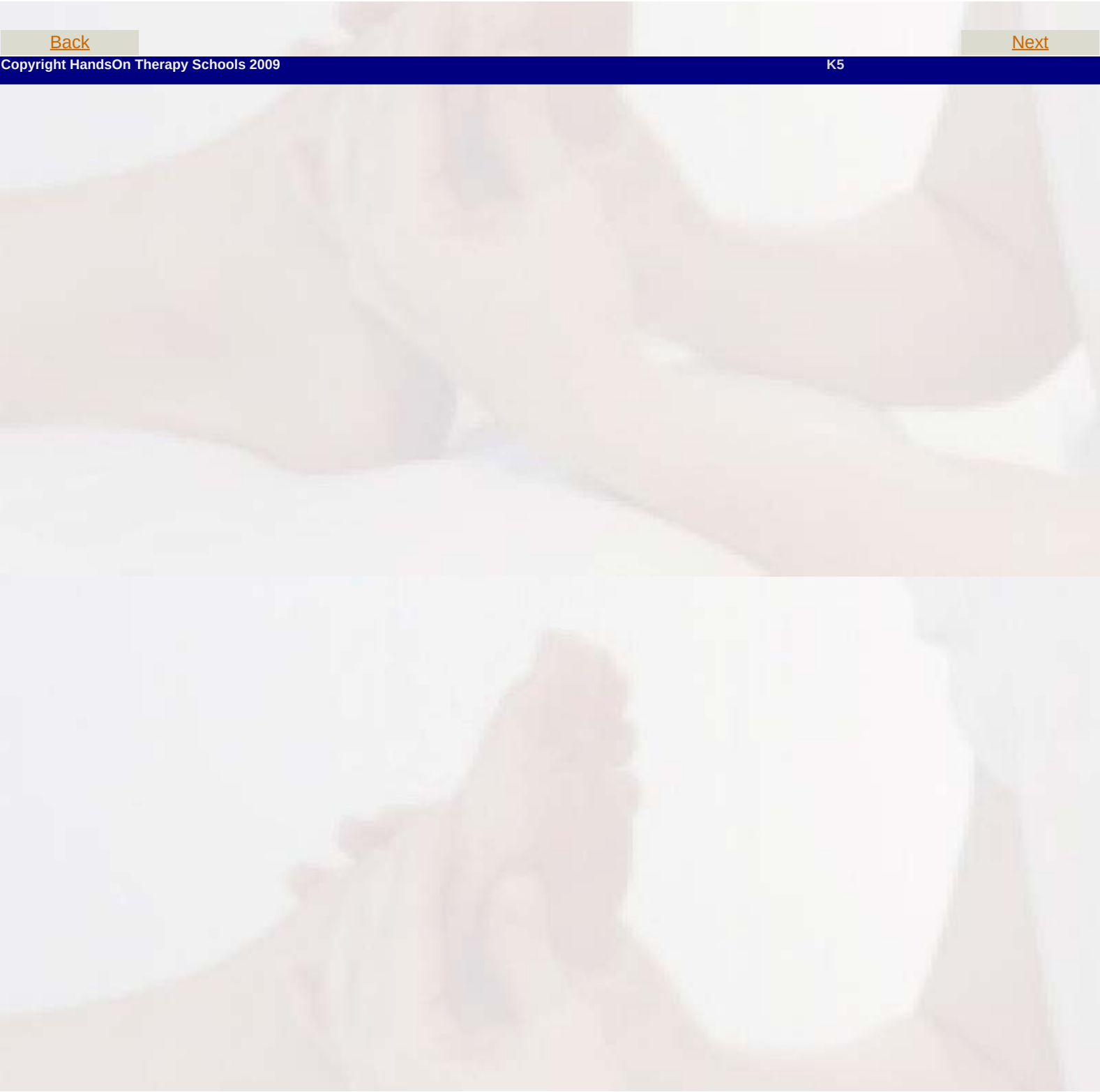
Bones

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

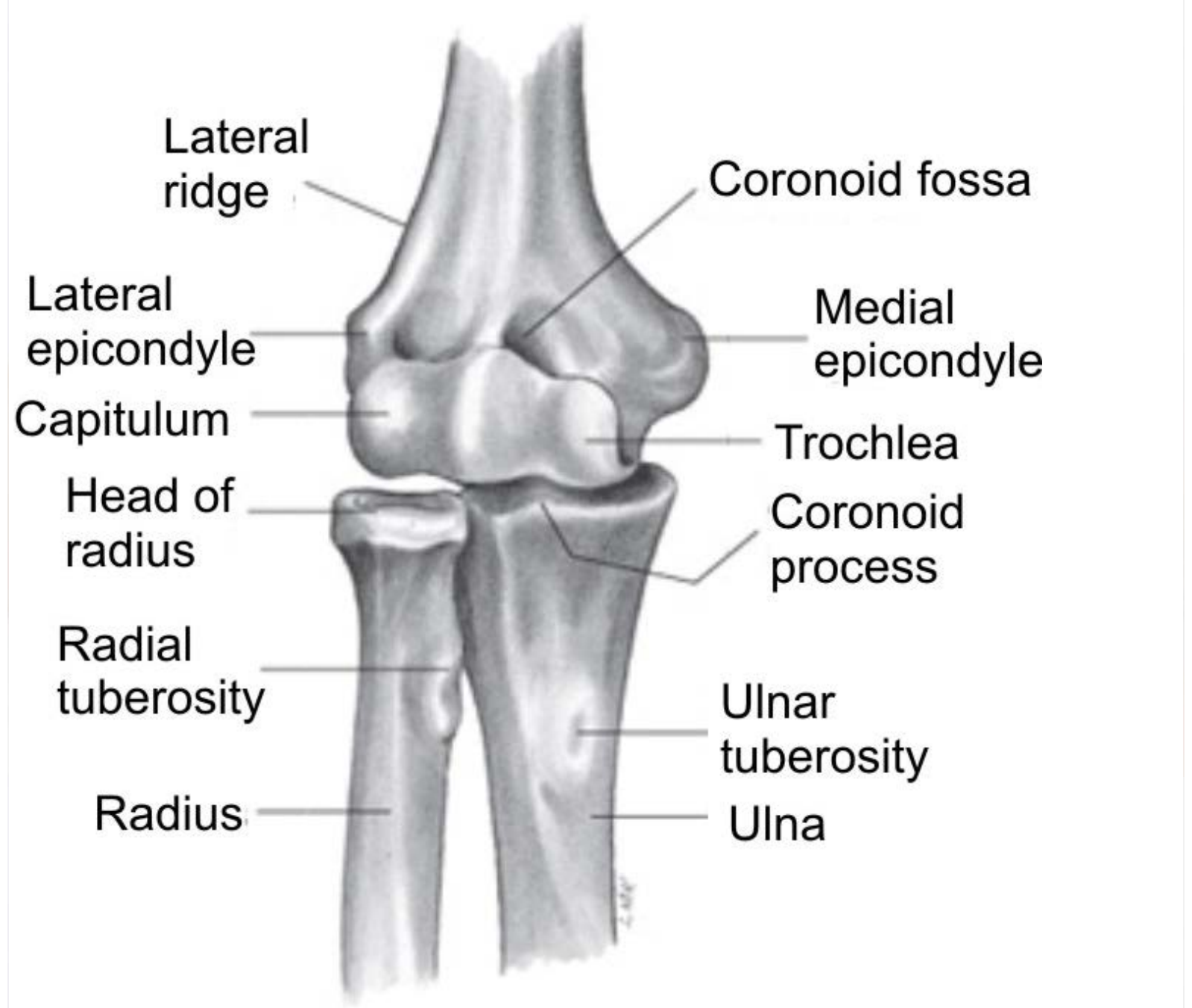
Lateral epicondyle and lateral supracondylar ridge - origin for many wrist and finger extensors

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Bones



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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

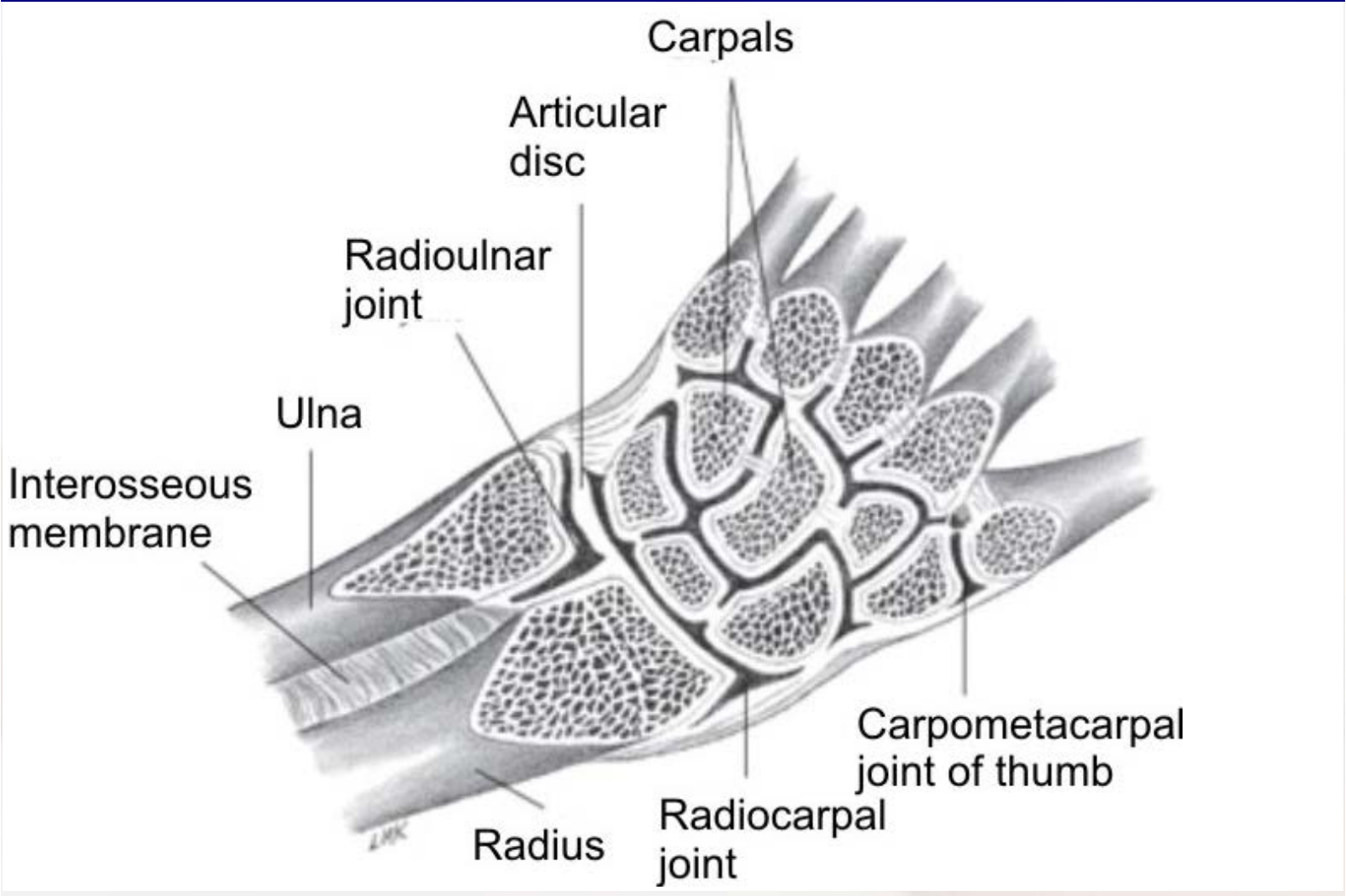
motion occurs primarily between distal radius & proximal carpal row (scaphoid, lunate, & triquetrum)

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Joints



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Joints

Each finger has 3 joints

Metacarpophalangeal (MCP) joints

Proximal interphalangeal (PIP) joints

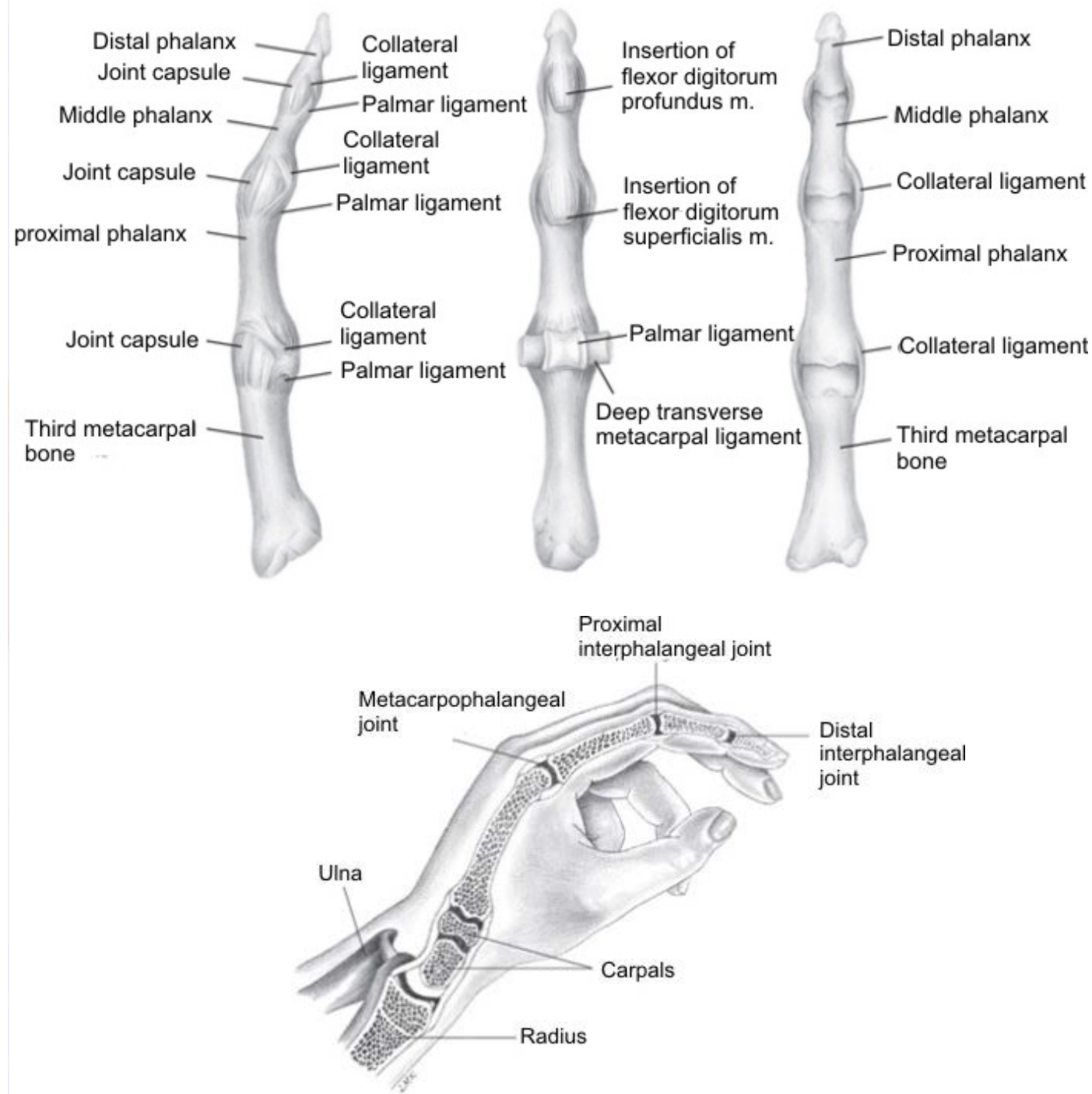
Distal interphalangeal (DIP) joints

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Joints



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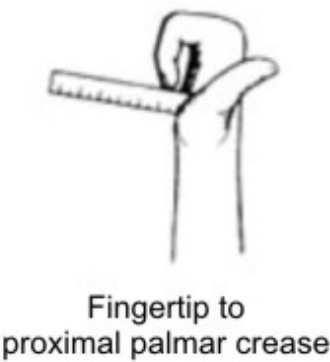
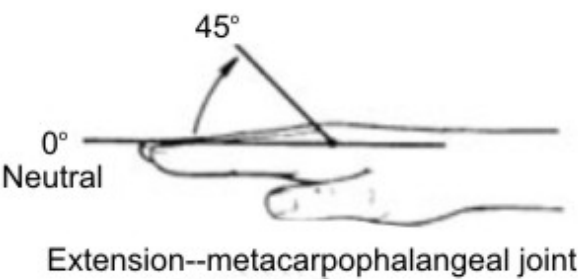
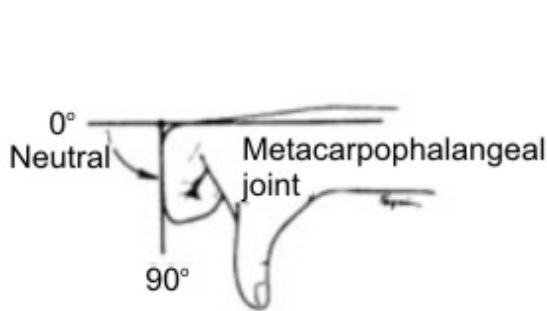
Joints

Metacarpophalangeal (MCP) joints

Condylloid

0 to 40 degrees of extension

85 to 100 degrees of flexion



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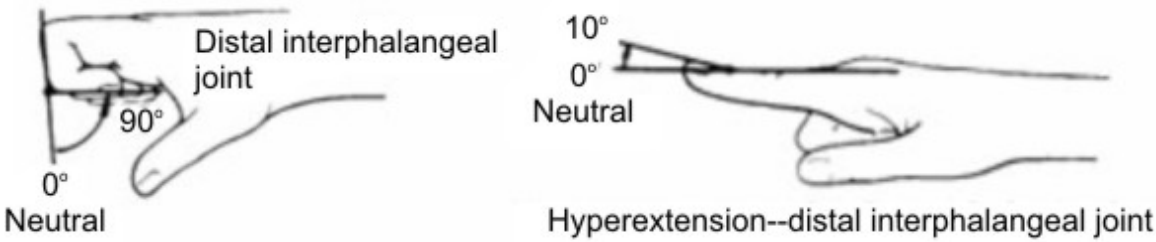


Joints

Distal interphalangeal (DIP) joints

Ginglymus

Flex 80 to 90 degrees from full extension



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Joints

Thumb has 2 joints

Metacarpophalangeal (MCP) joints

Interphalangeal (IP) joints

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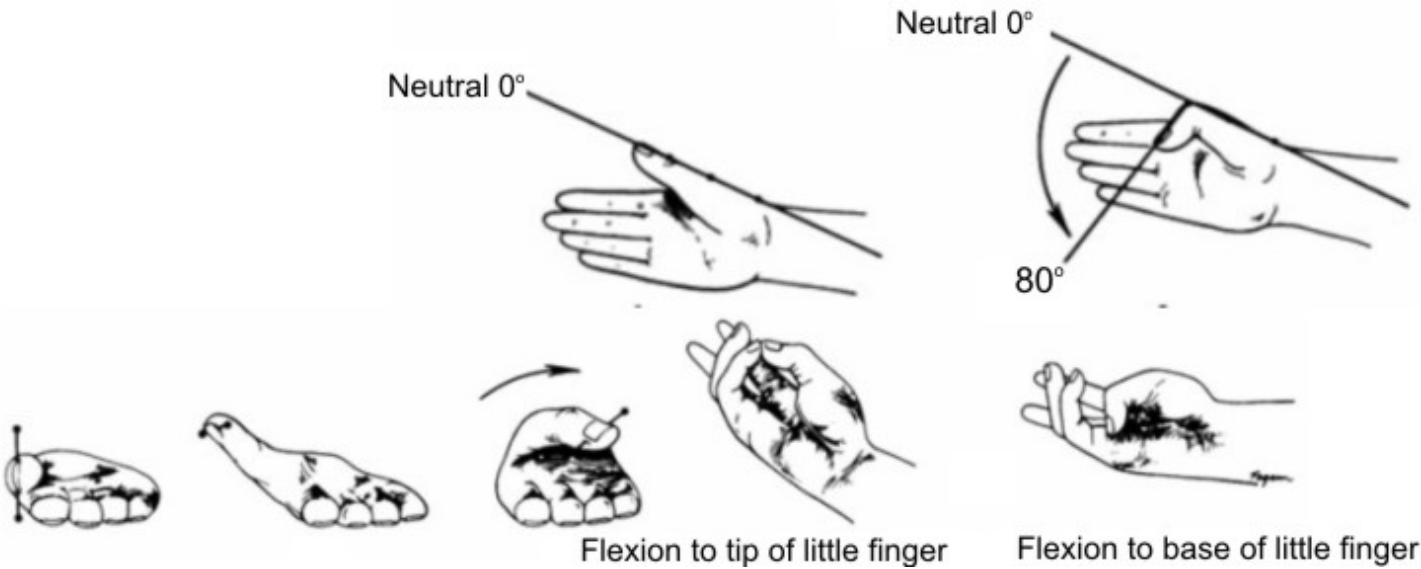


Joints

Interphalangeal (IP) joint

Flex 80 to 90 degrees

Ginglymus



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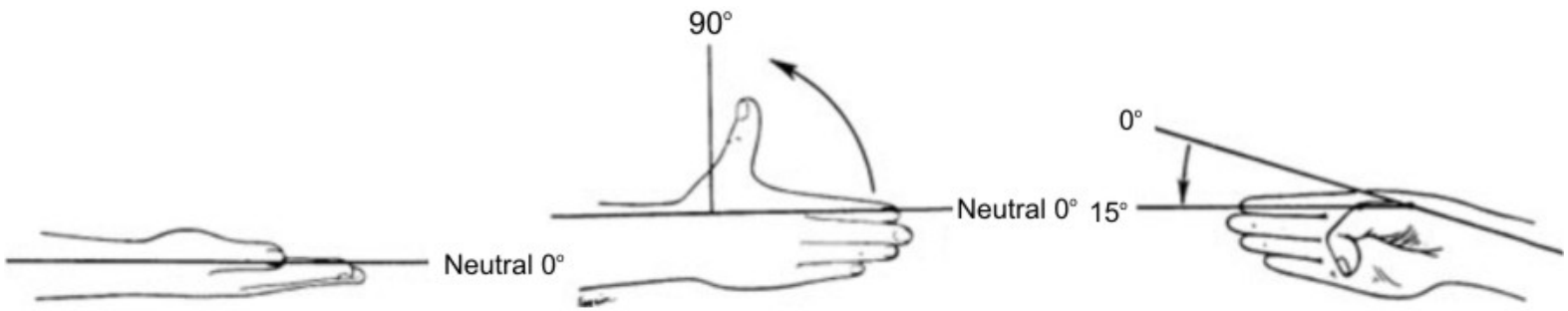
Joints

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



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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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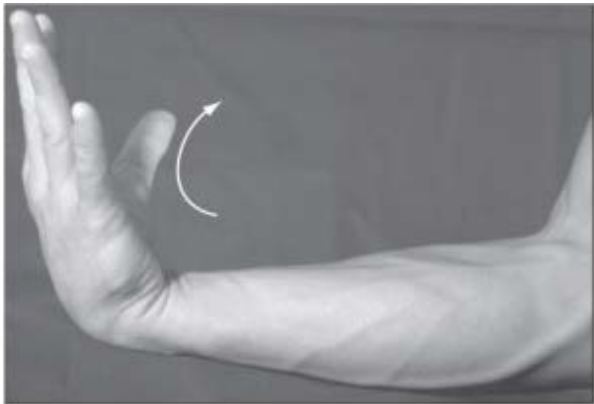
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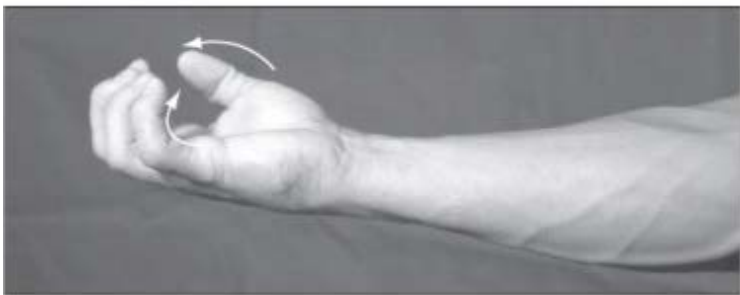
Movements

Flexion

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



Wrist flexion



Flexion of fingers and thumb, opposition

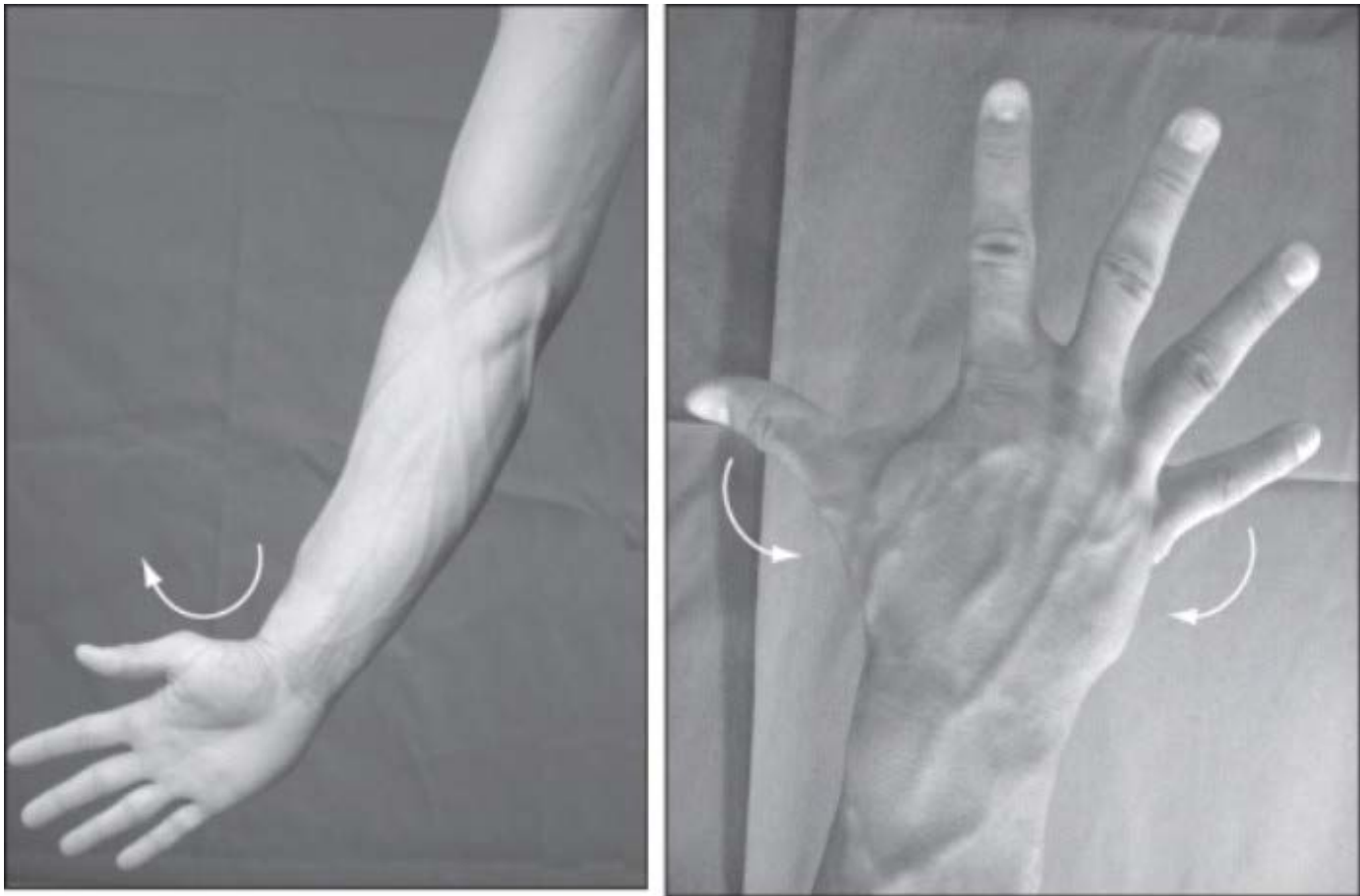
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Movements

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



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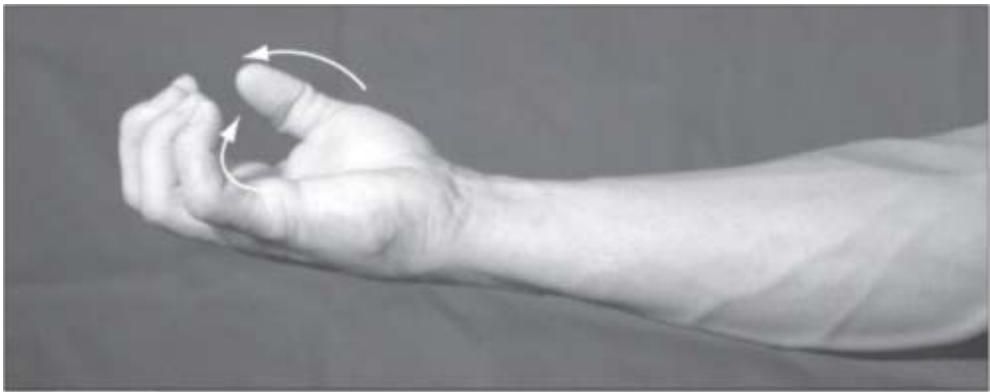
Movements

Opposition

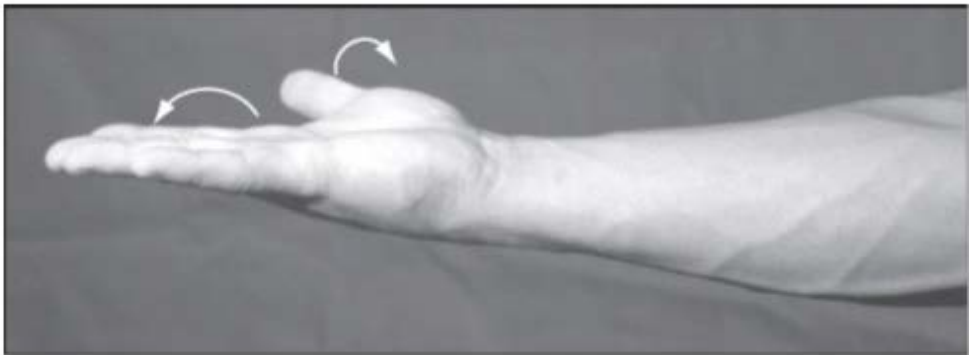
movement of thumb across palmar aspect to oppose any or all of the phalanges

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

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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

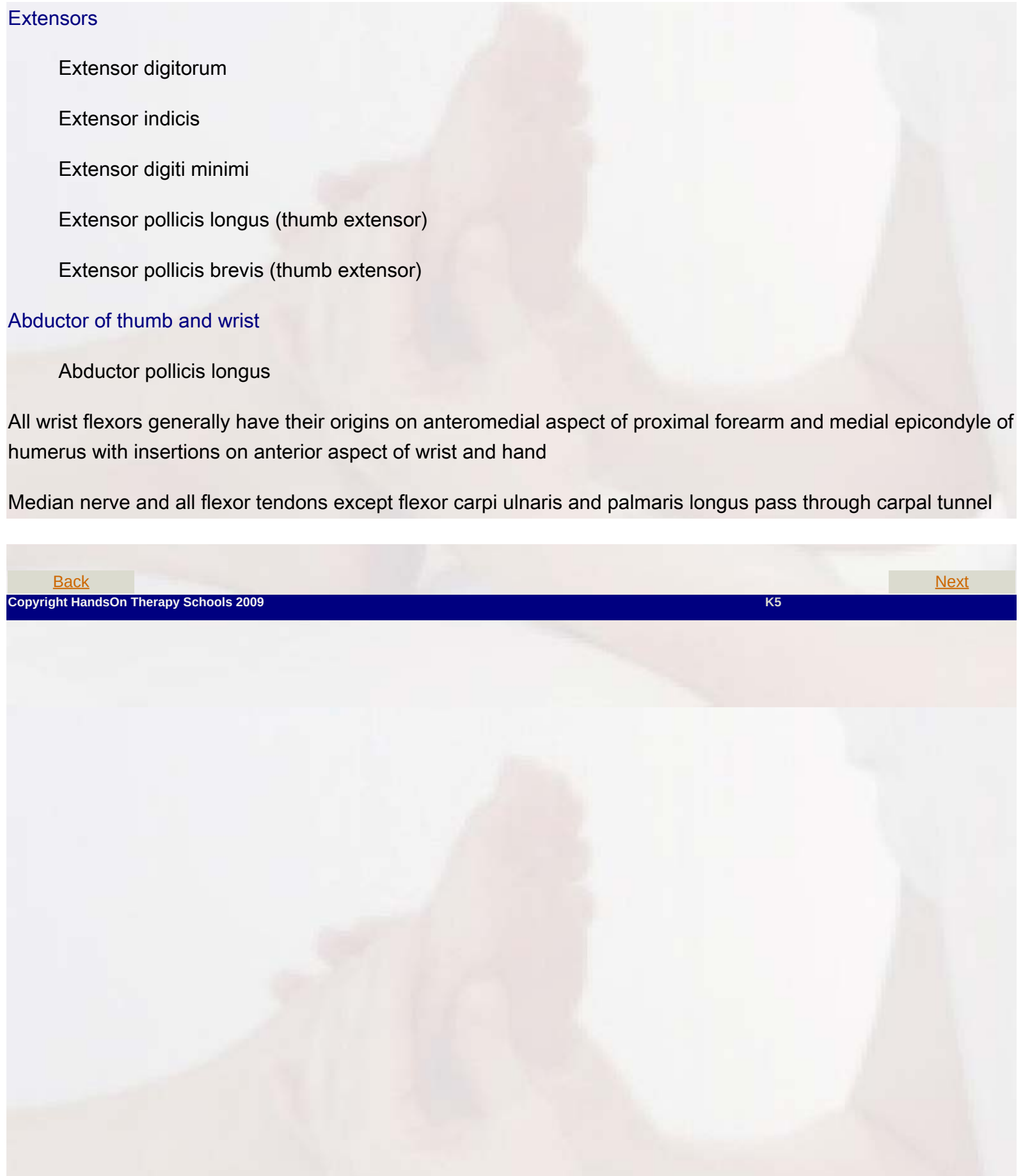
Generally weaker in their wrist actions

Flexors

Flexor digitorum superficialis

Flexor digitorum profundus

Flexor pollicis longus (thumb flexor)

A large, faint, light-colored image of a human hand, palm facing forward, serves as the background for the main content area. The hand is positioned centrally, with fingers slightly spread. The image is semi-transparent, allowing the text to be overlaid clearly.

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

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



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

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K5

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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K5

Muscles

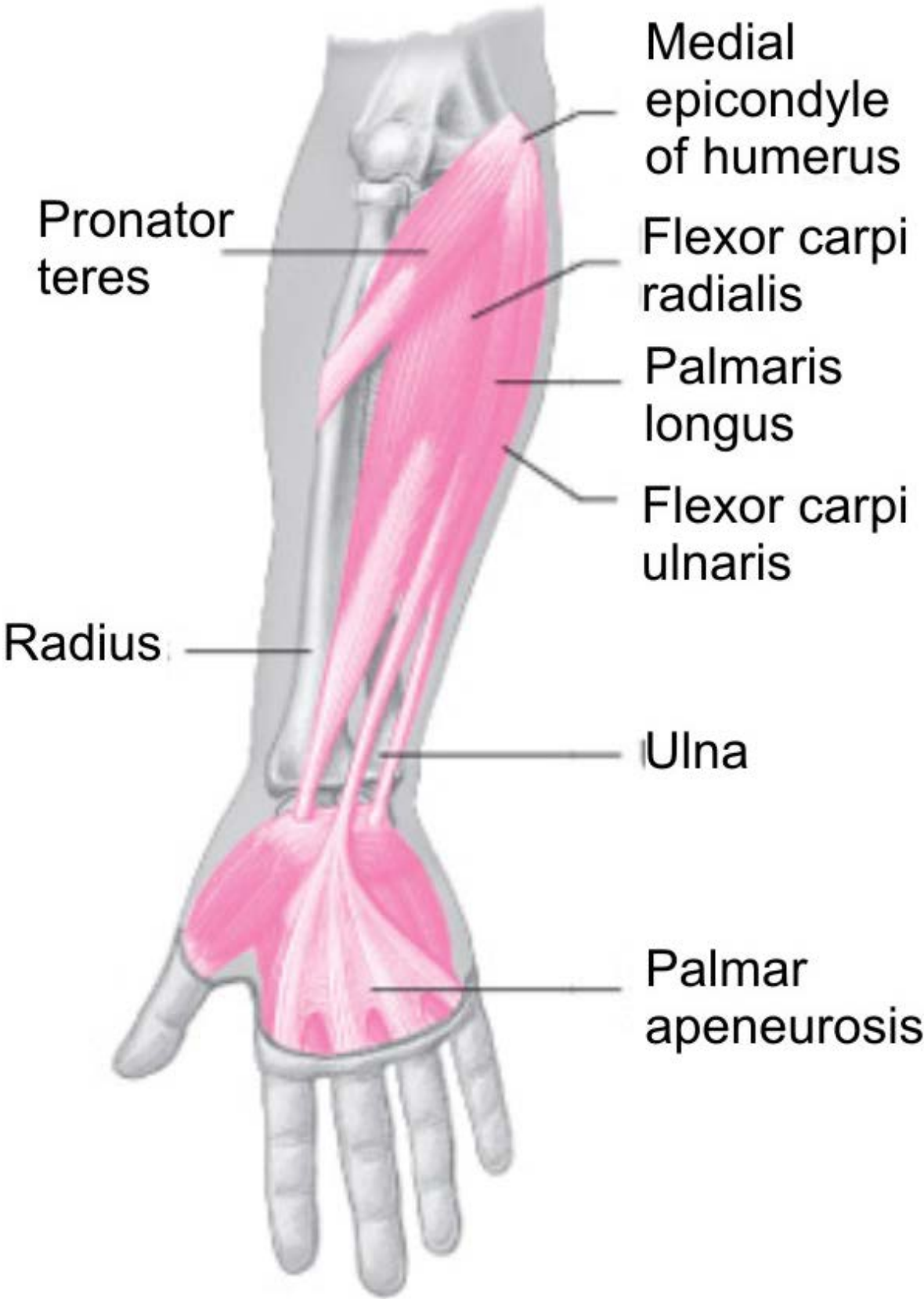
Anteromedially at elbow and forearm and anterior at hand

Primarily wrist flexion

Flexor carpi radialis

Flexor carpi ulnaris

Palmaris longus



Muscles

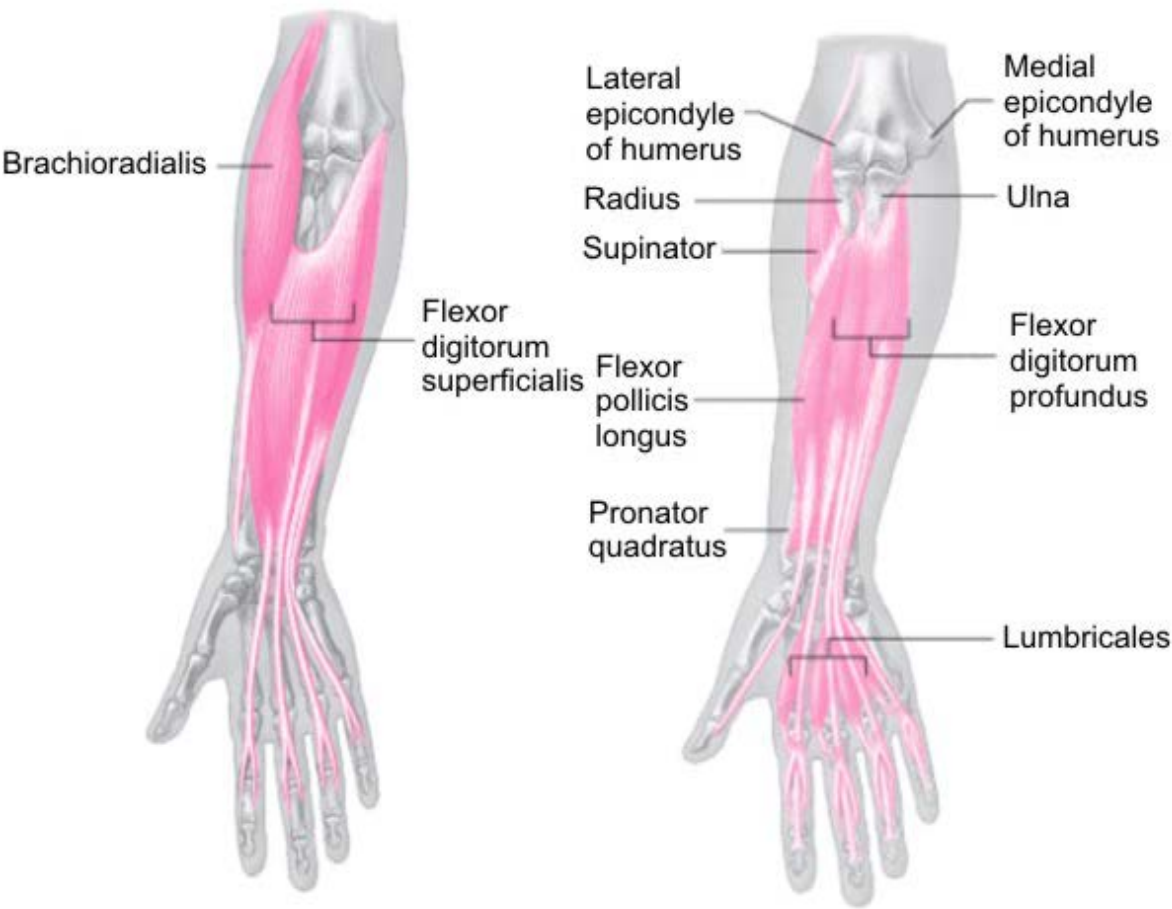
Anteromedially at elbow and forearm and anterior at hand

Primarily wrist and phalangeal flexion

Flexor digitorum superficialis

Flexor digitorum profundus

Flexor pollicis longus



Muscles

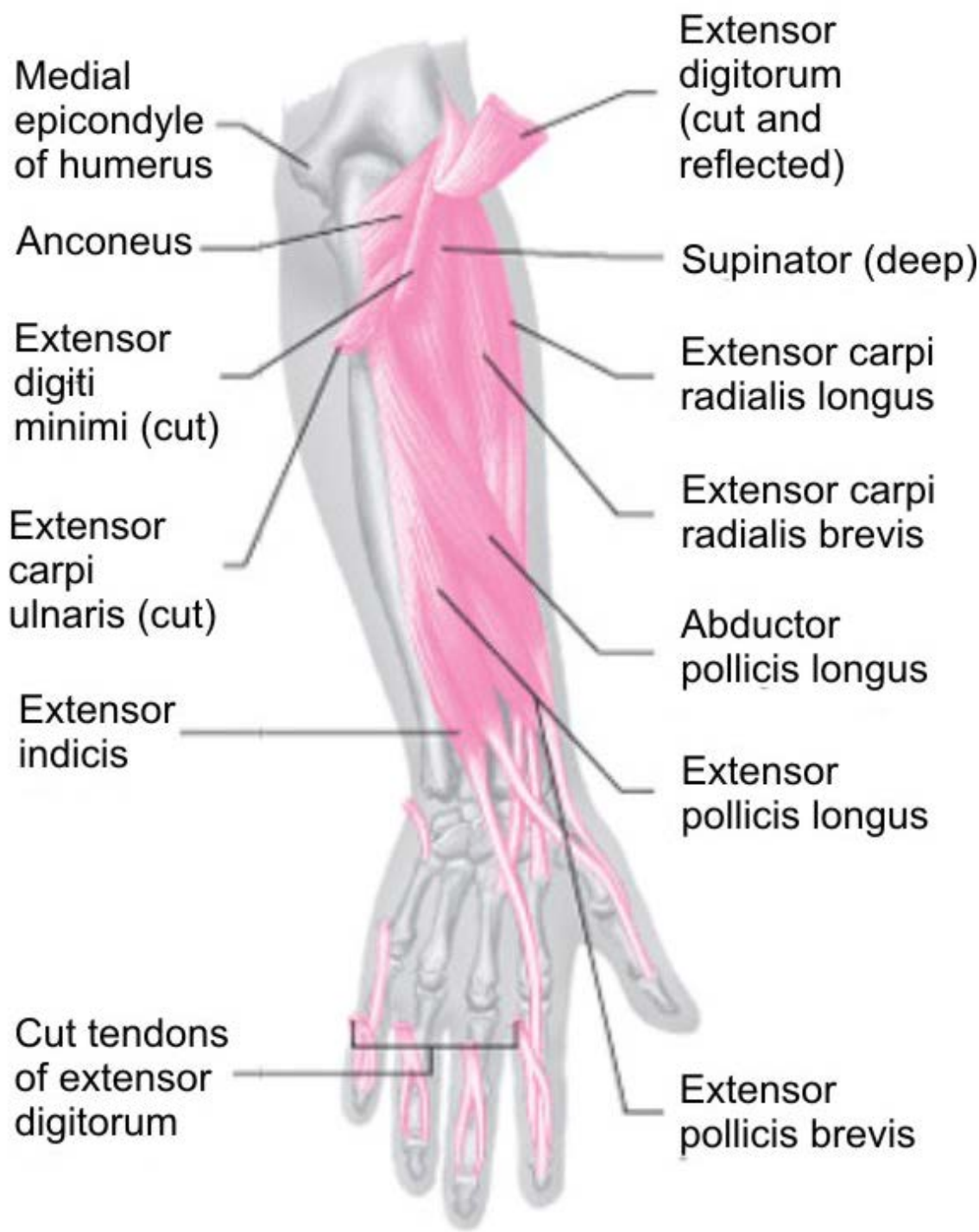
Posterolaterally at elbow and forearm and posterior at hand

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

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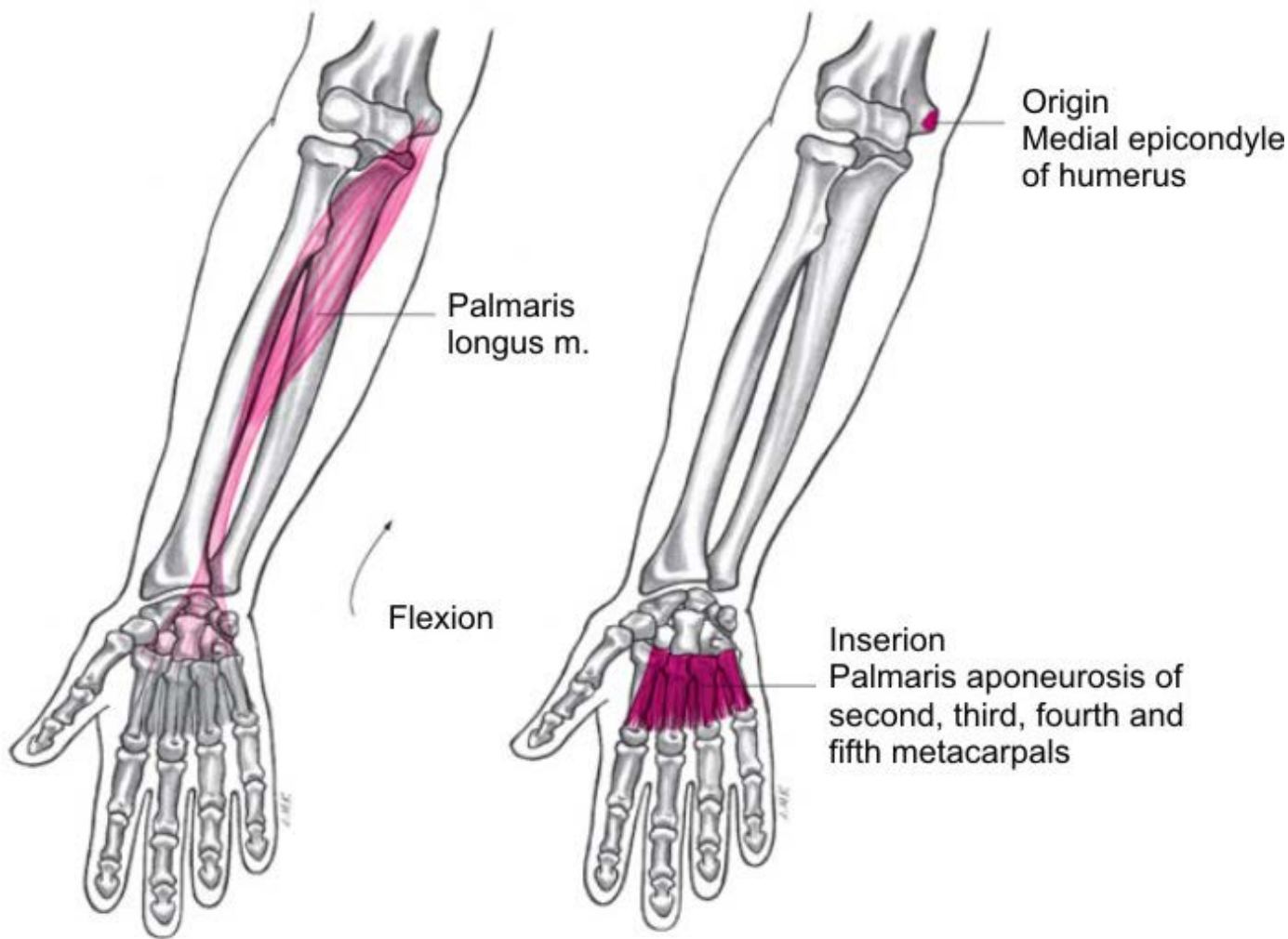
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Muscles

Palmaris Longus Muscle

Flexion of wrist

Weak flexion of elbow



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Muscles

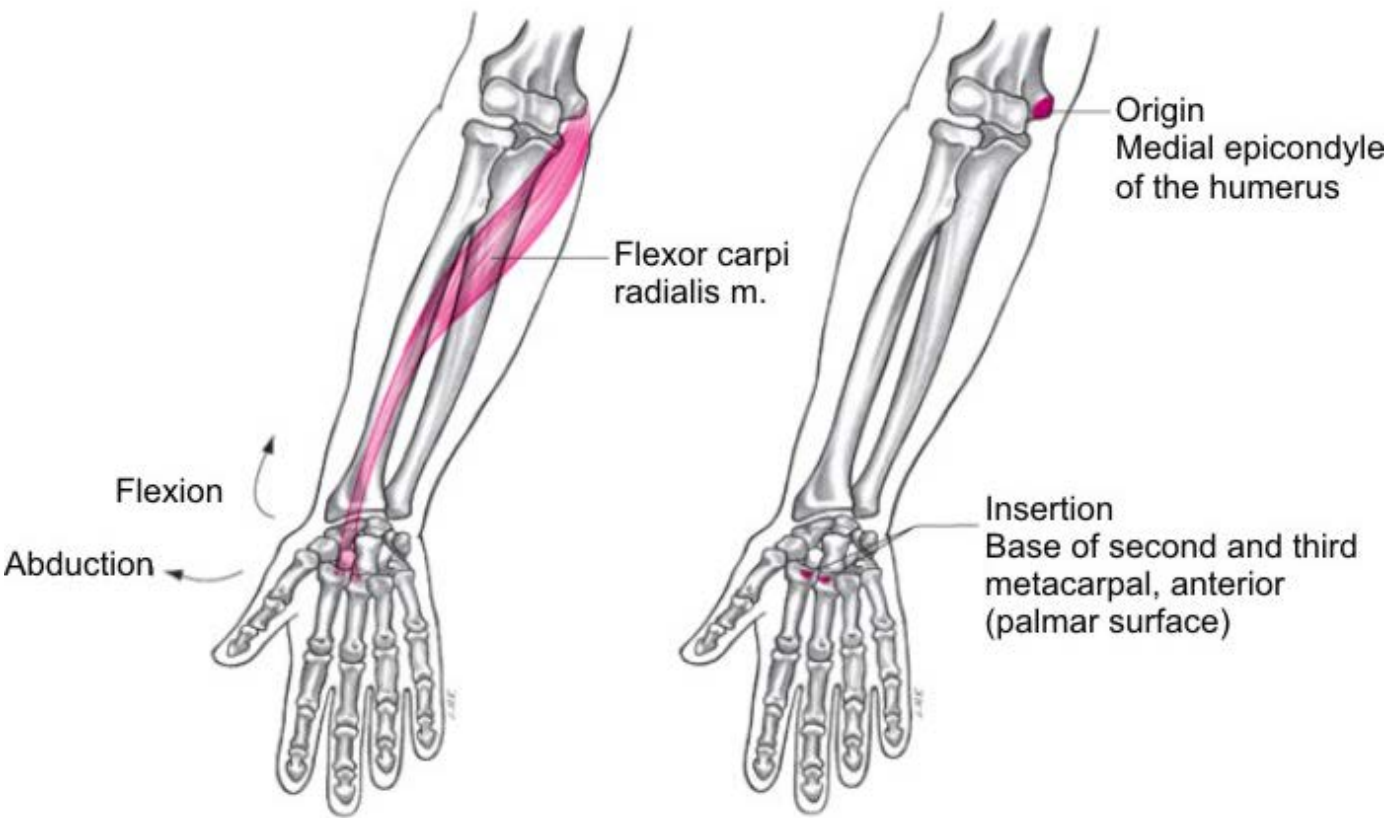
Flexor Carpi Radialis Muscle

Flexion of wrist

Abduction of wrist

Weak flexion of elbow

Weak pronation of forearm



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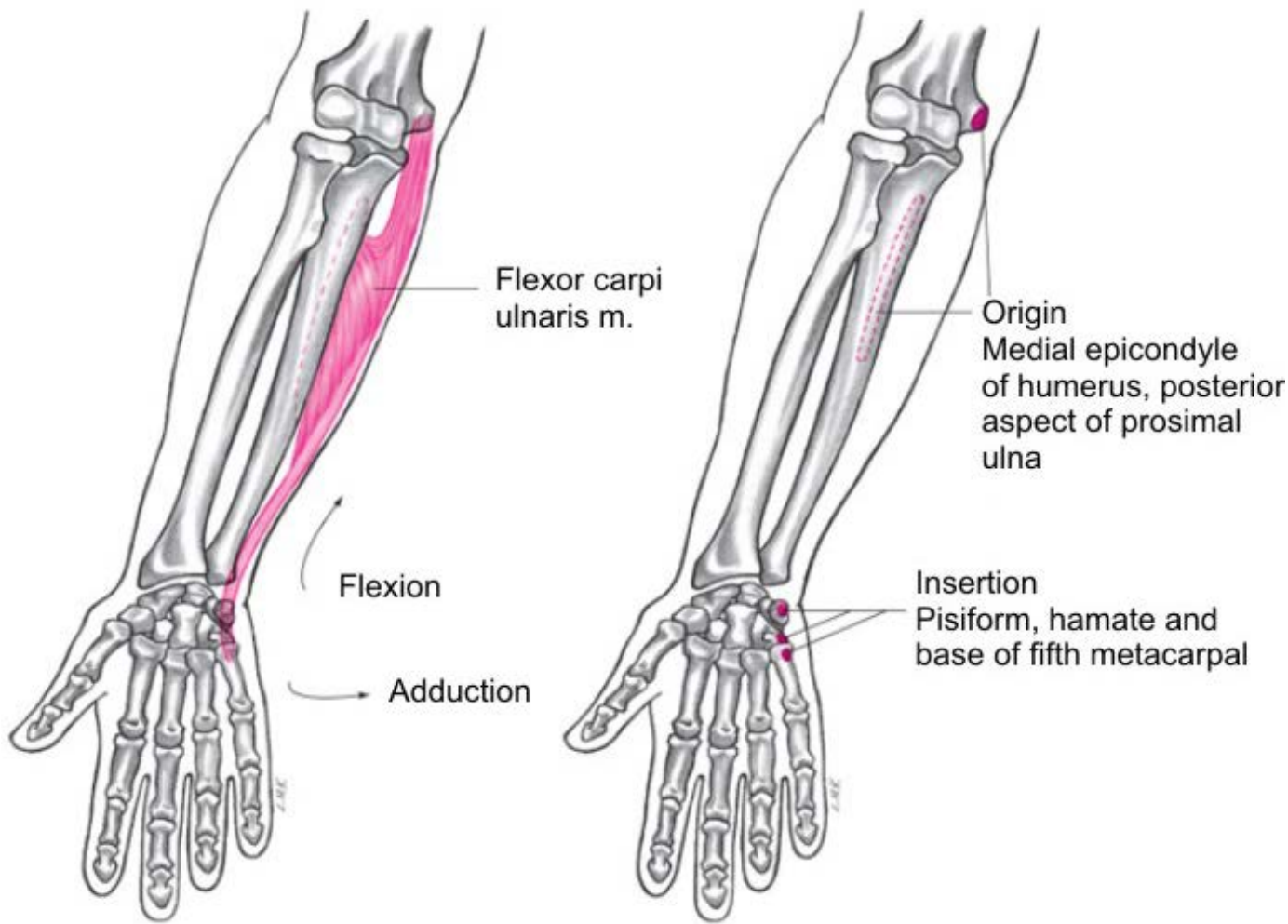
Muscles

Flexor Carpi Ulnaris Muscle

Flexion of wrist

Adduction of wrist

Weak flexion of elbow



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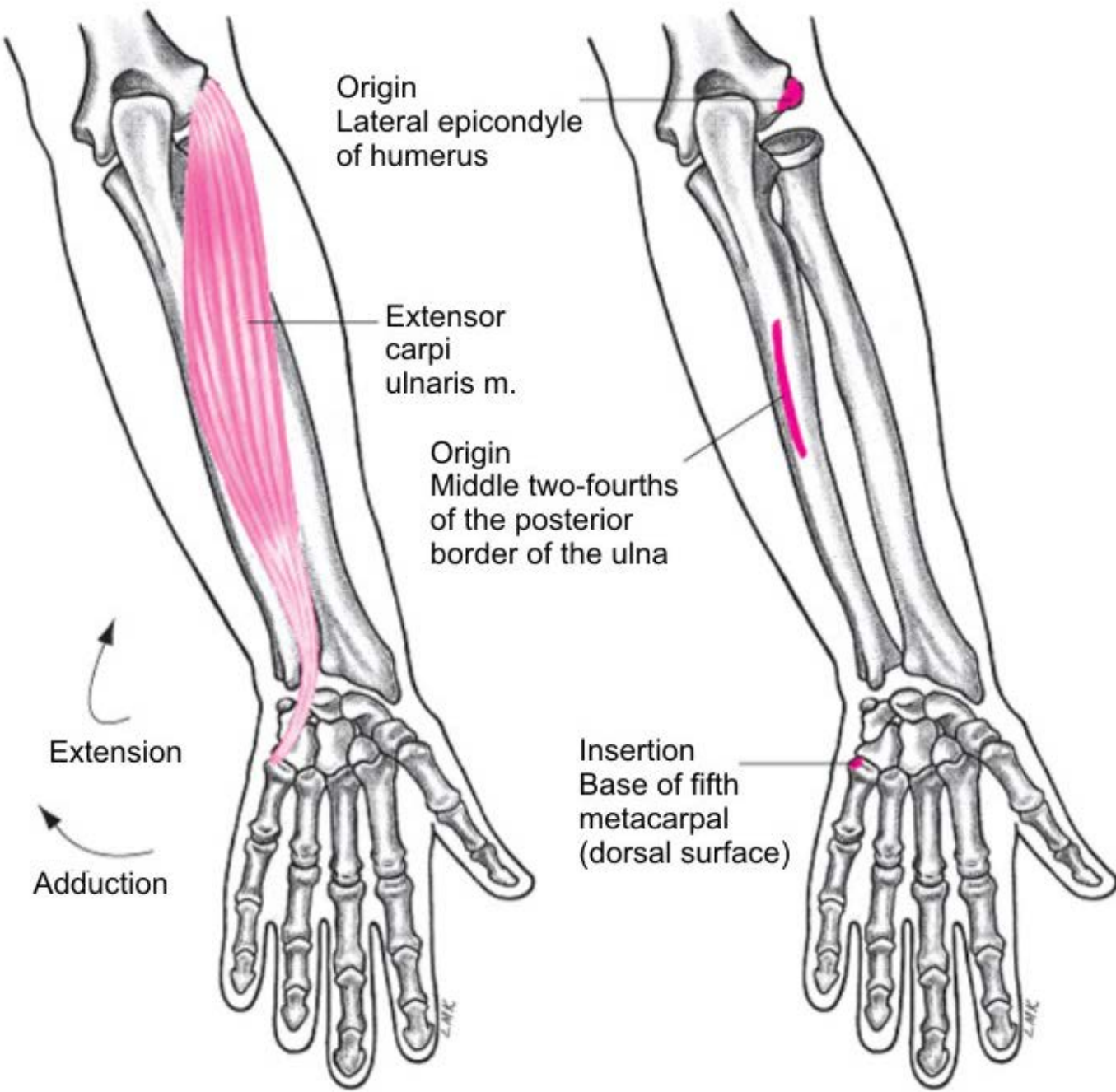
Muscles

Extensor Carpi Ulnaris Muscle

Extension of wrist

Adduction of wrist

Weak flexion of elbow



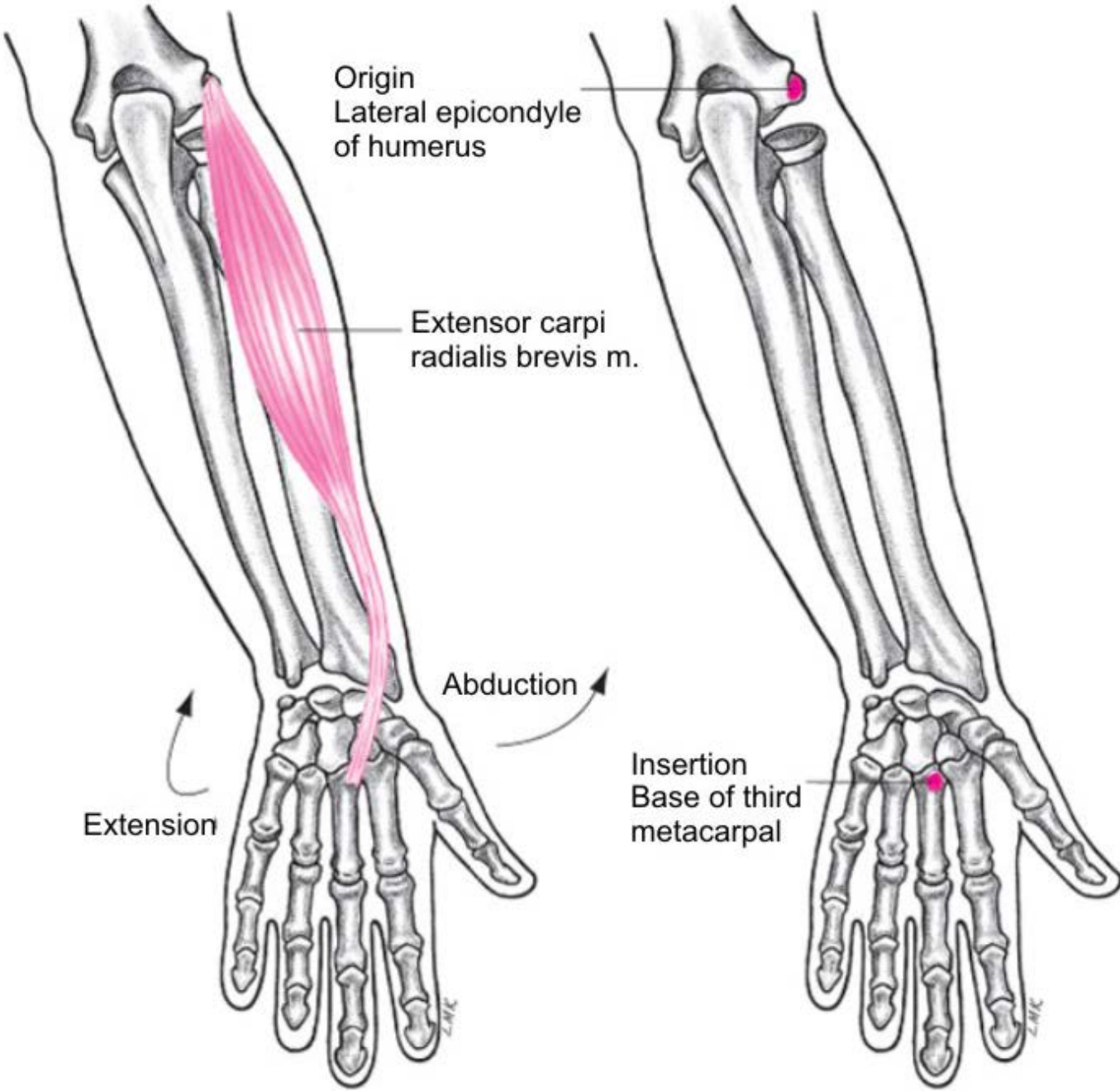
Muscles

Extensor Carpi Radialis Brevis Muscle

Extension of wrist

Abduction of wrist

Weak flexion of elbow



Muscles

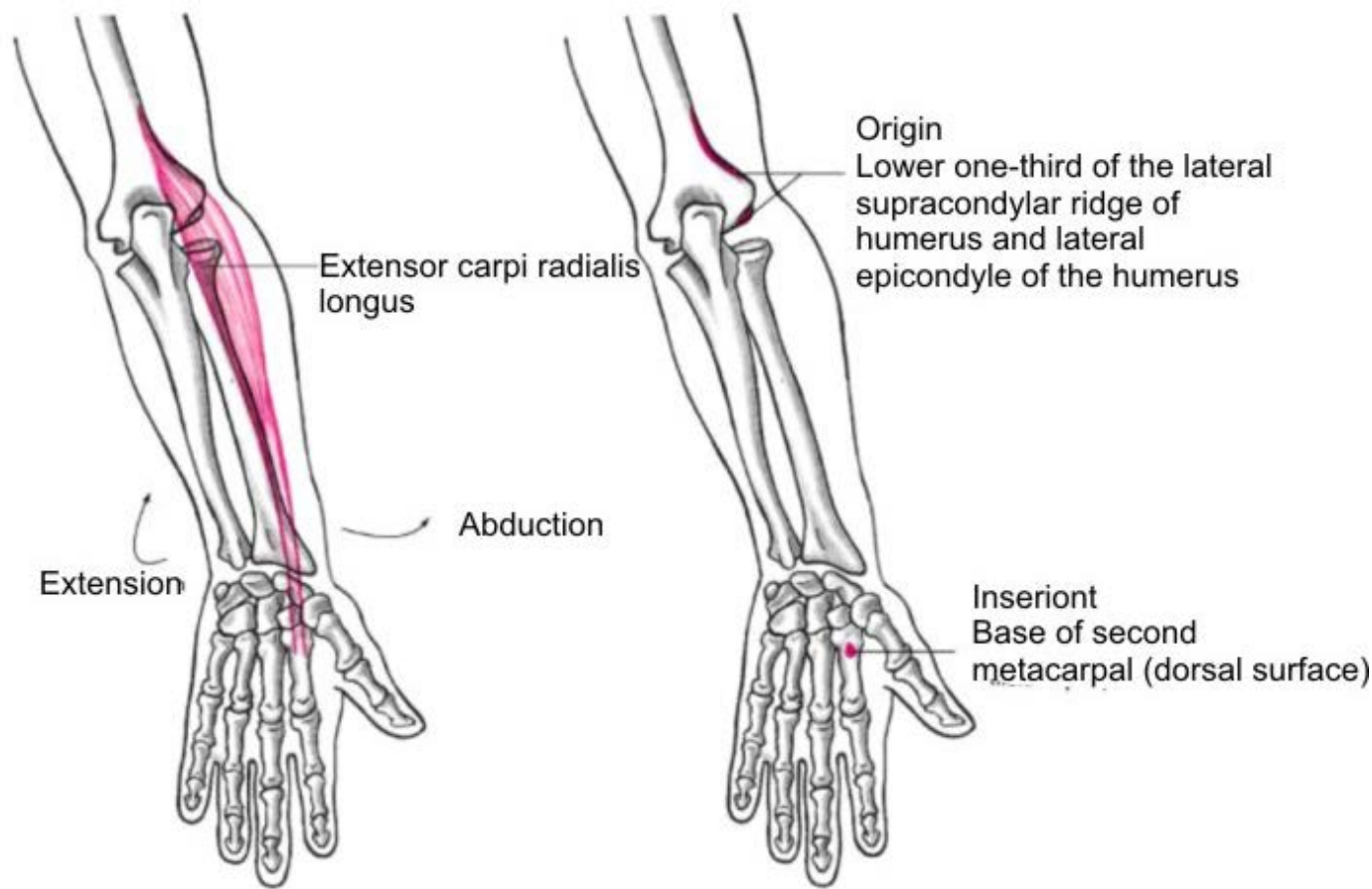
Extensor Carpi Radialis Longus Muscle

Extension of wrist

Abduction of wrist

Weak flexion of elbow

Weak pronation to neutral from a fully supinated position



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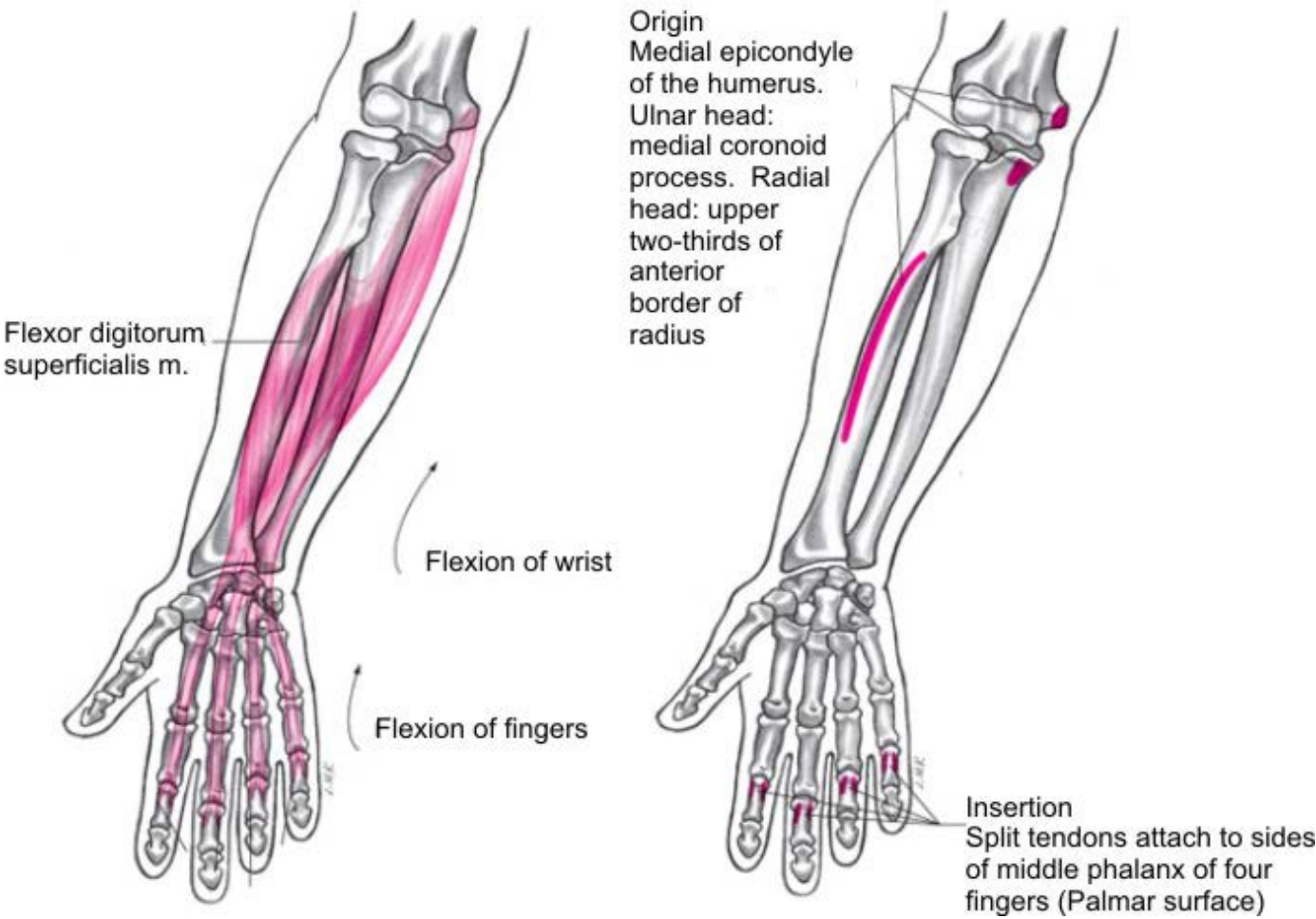
Muscles

Flexor Digitorum Superficialis Muscle

Flexion of fingers at metacarpophalangeal and proximal interphalangeal joints

Flexion of wrist

Weak flexion of elbow



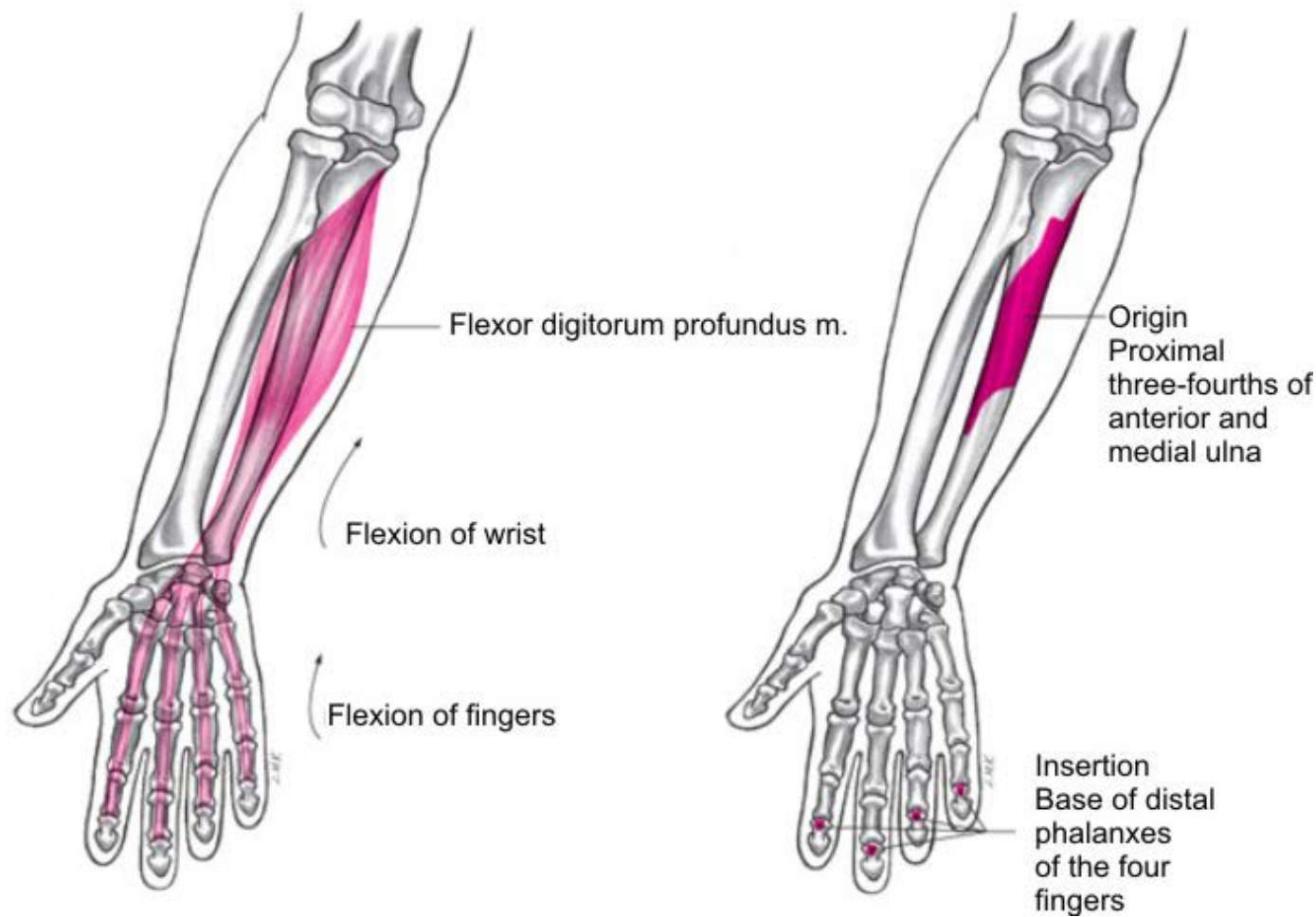
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Muscles

Flexor Digitorum Profundus Muscle

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

Flexion of wrist



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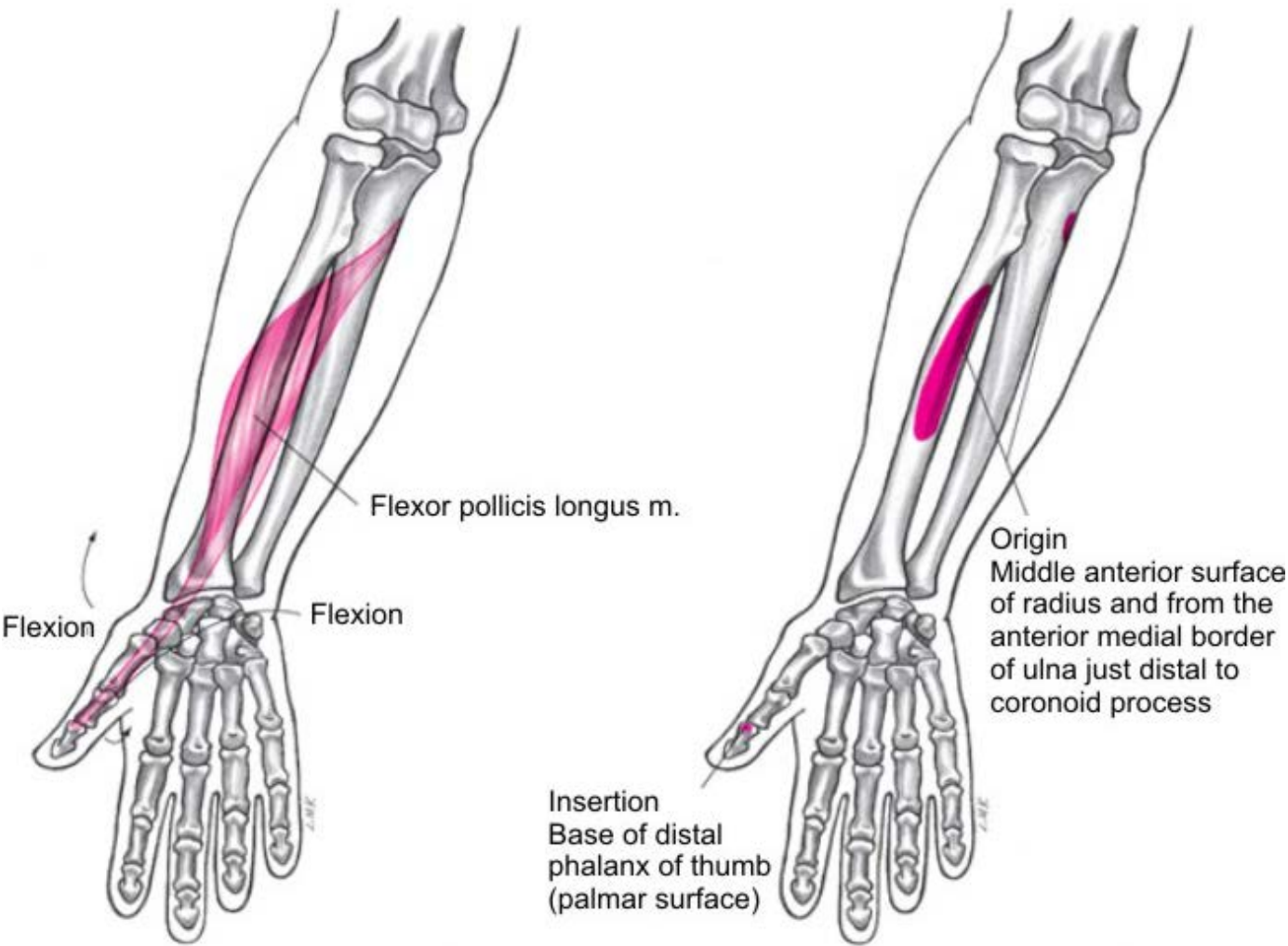
Muscles

Flexor Pollicis Longus Muscle

Flexion of thumb carpometacarpal, metacarpophalangeal, and interphalangeal joints

Flexion of wrist

Abduction of wrist



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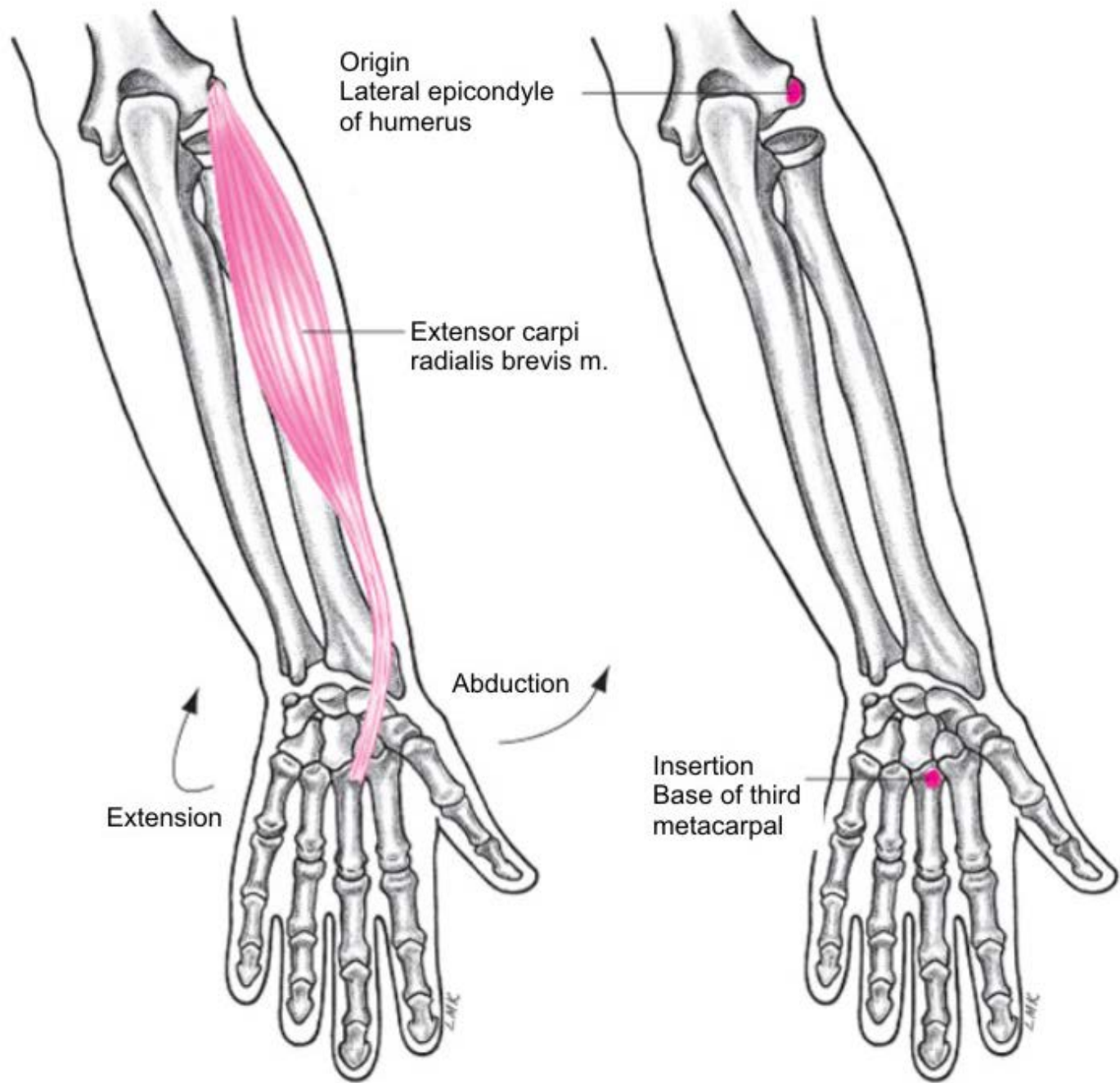
Muscles

Extensor Digitorum Muscle

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

Extension of wrist

Weak extension of elbow



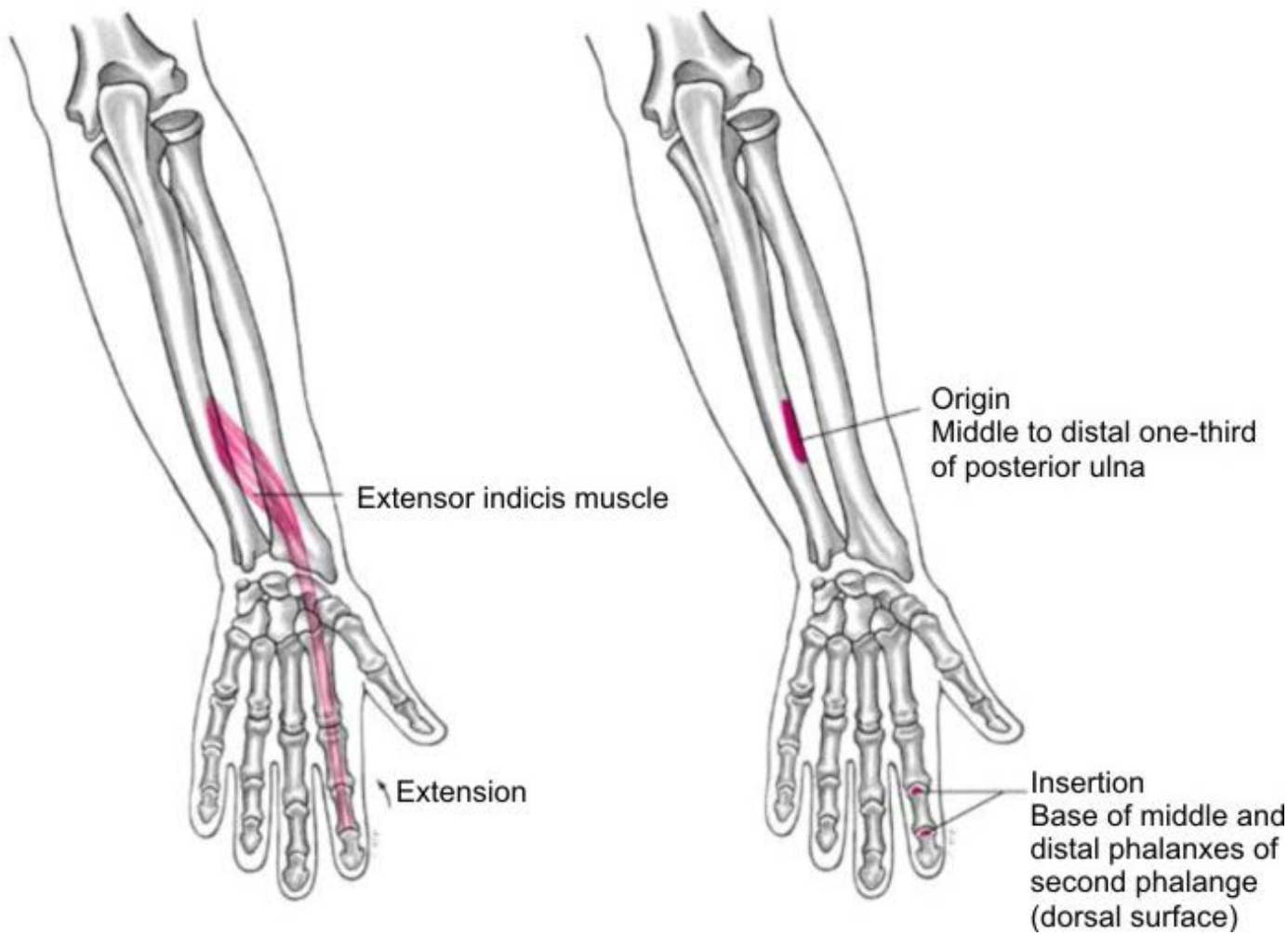
Muscles

Extensor Indicis Muscle

Expansion of index finger at metacarpophalangeal joint

Weak wrist extension

Weak supination of forearm from pronated position



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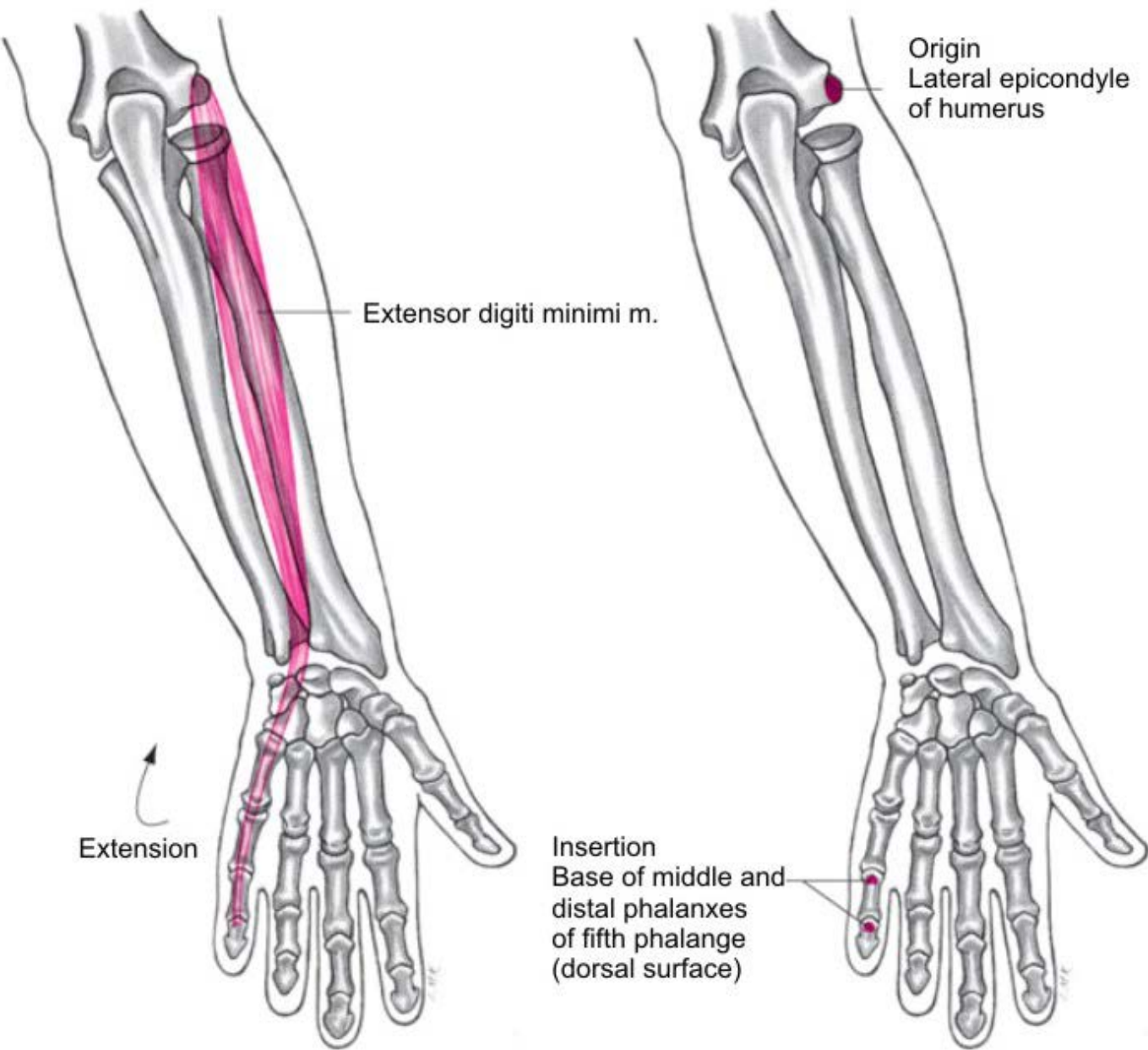
Muscles

Extensor Digiti Minimi Muscle

Expansion of little finger at metacarpophalangeal joint

Weak wrist extension

Weak elbow extension



Muscles

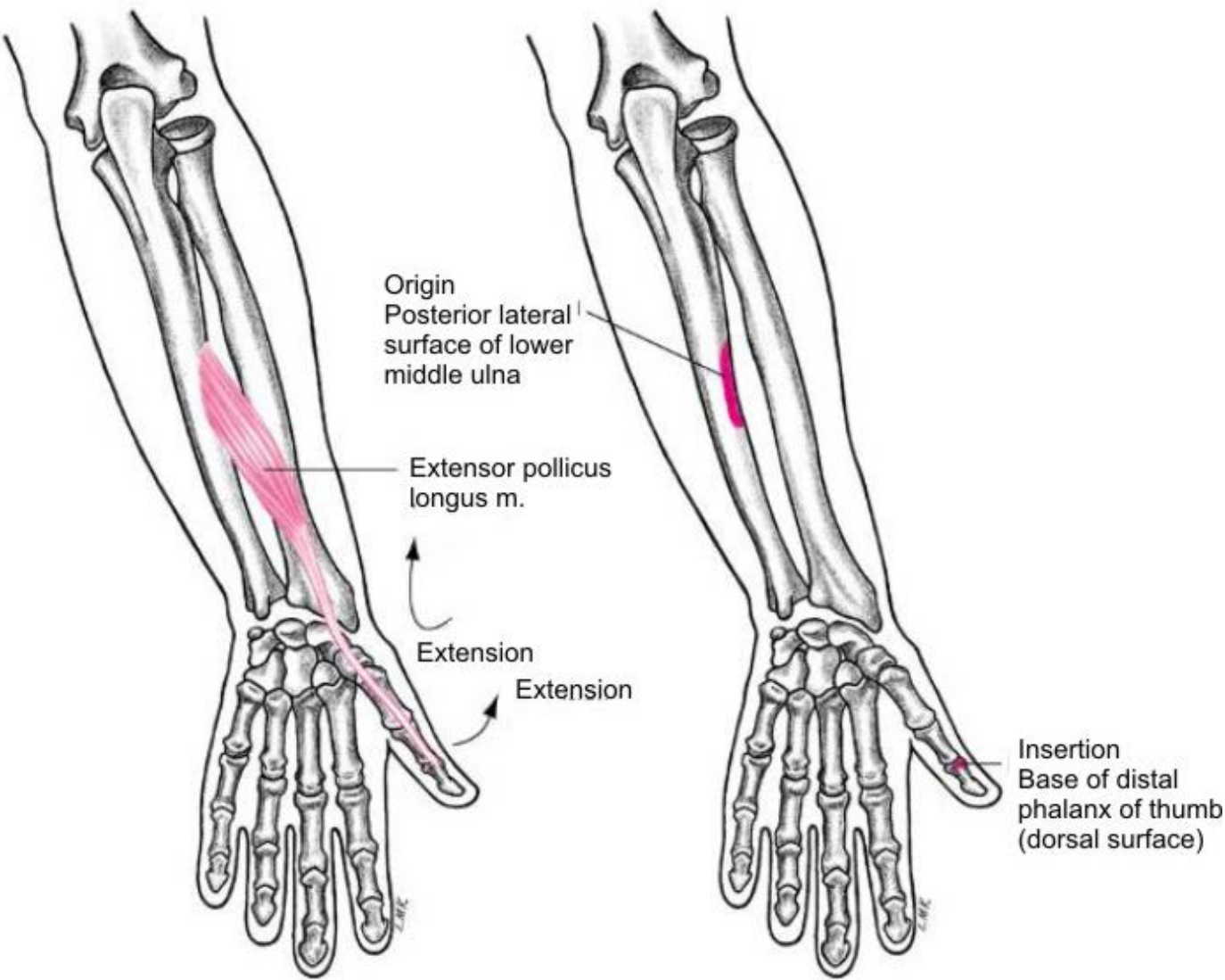
Extensor Pollicis Longus Muscle

Expansion of thumb at carpometacarpal, metacarpophalangeal, and interphalangeal joint

Extension of wrist

Abduction of wrist

Weak supination of forearm from a pronated position



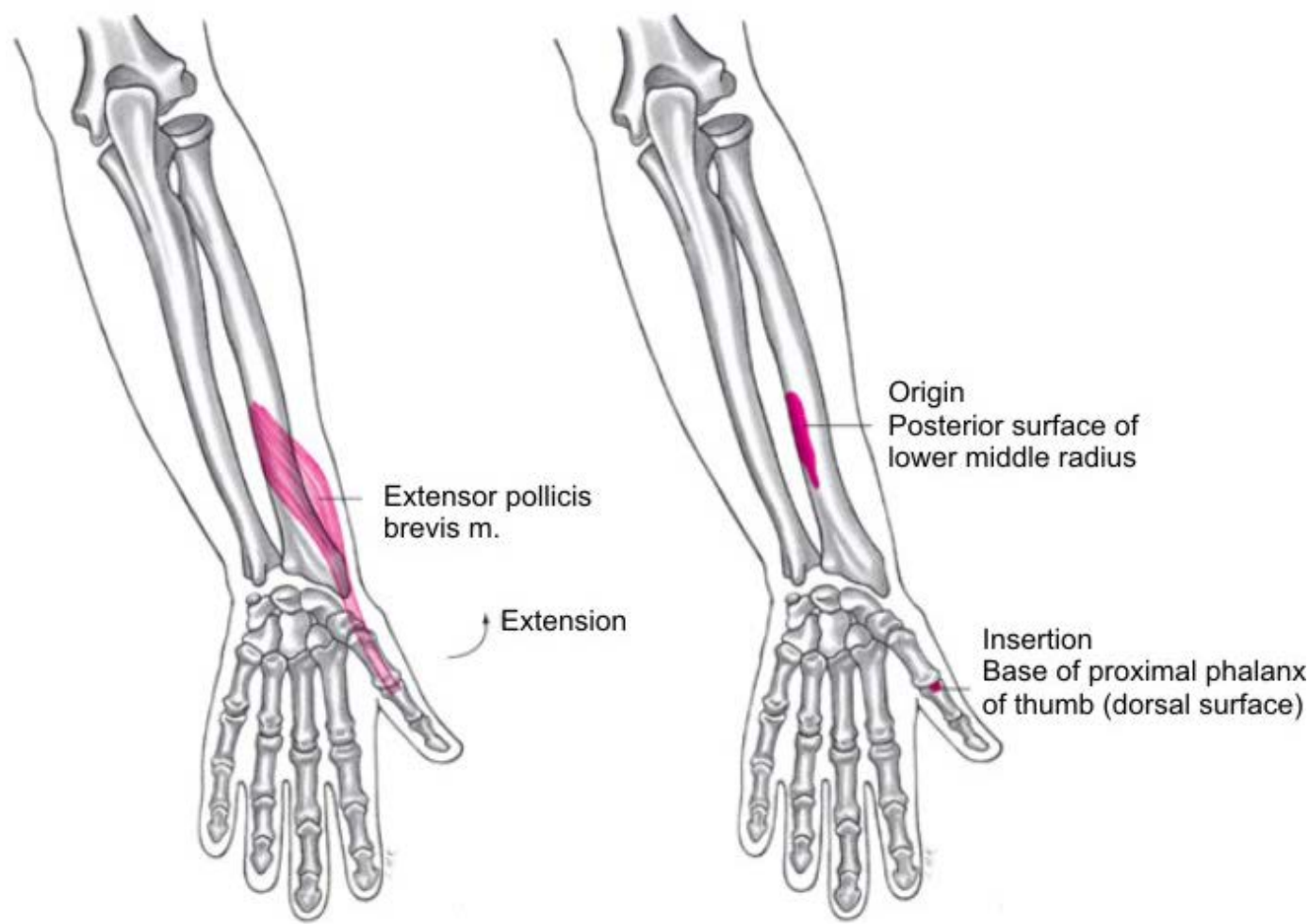
Muscles

Extensor Brevis Muscle

Expansion of thumb at carpometacarpal, and metacarpophalangeal, joint

Weak wrist extension

Abduction of wrist



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Muscles

Abductor Pollicis Longus Muscle

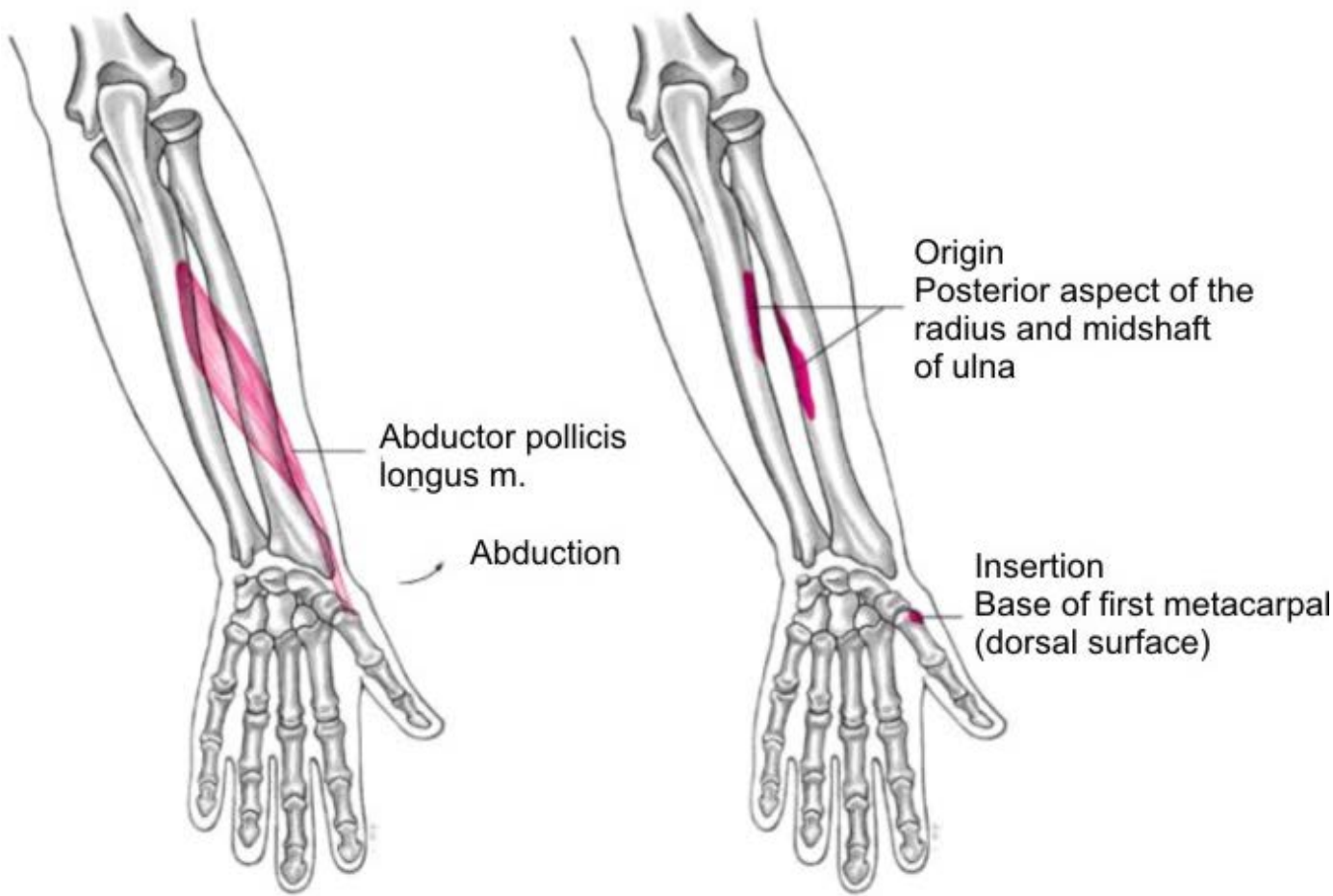
Abduction of thumb at carpometacarpal joint

Abduction of wrist

Extension of thumb at carpometacarpal joint

Weak supination of forearm from a pronated position

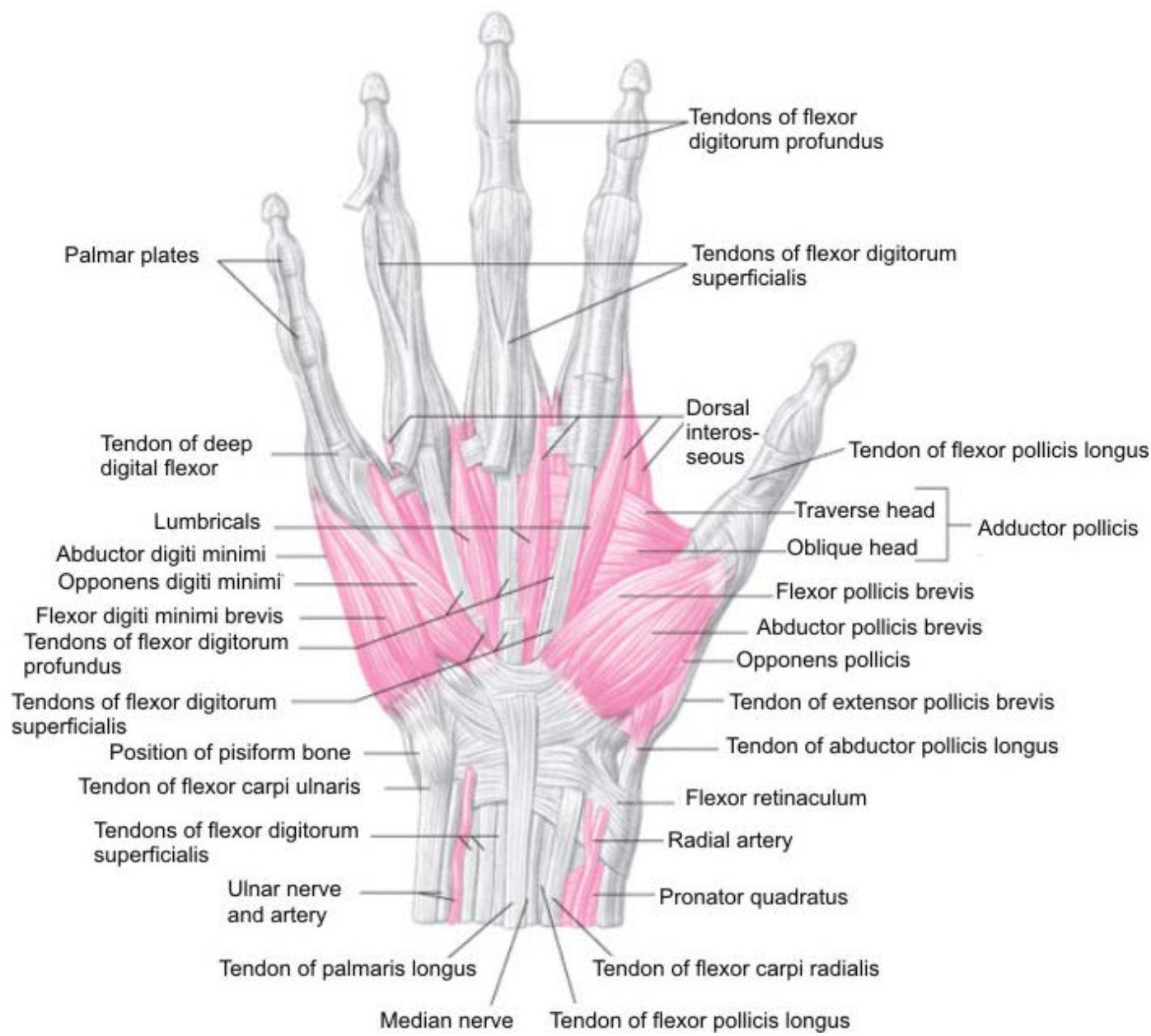
Weak flexion of wrist



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Muscles

Intrinsic Muscles of the Hand



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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 5th metacarpal

flexor digiti minimi brevis flexes 5th metacarpal

Muscles

Wrist Flexion

Agonists

Flexor carpi radialis

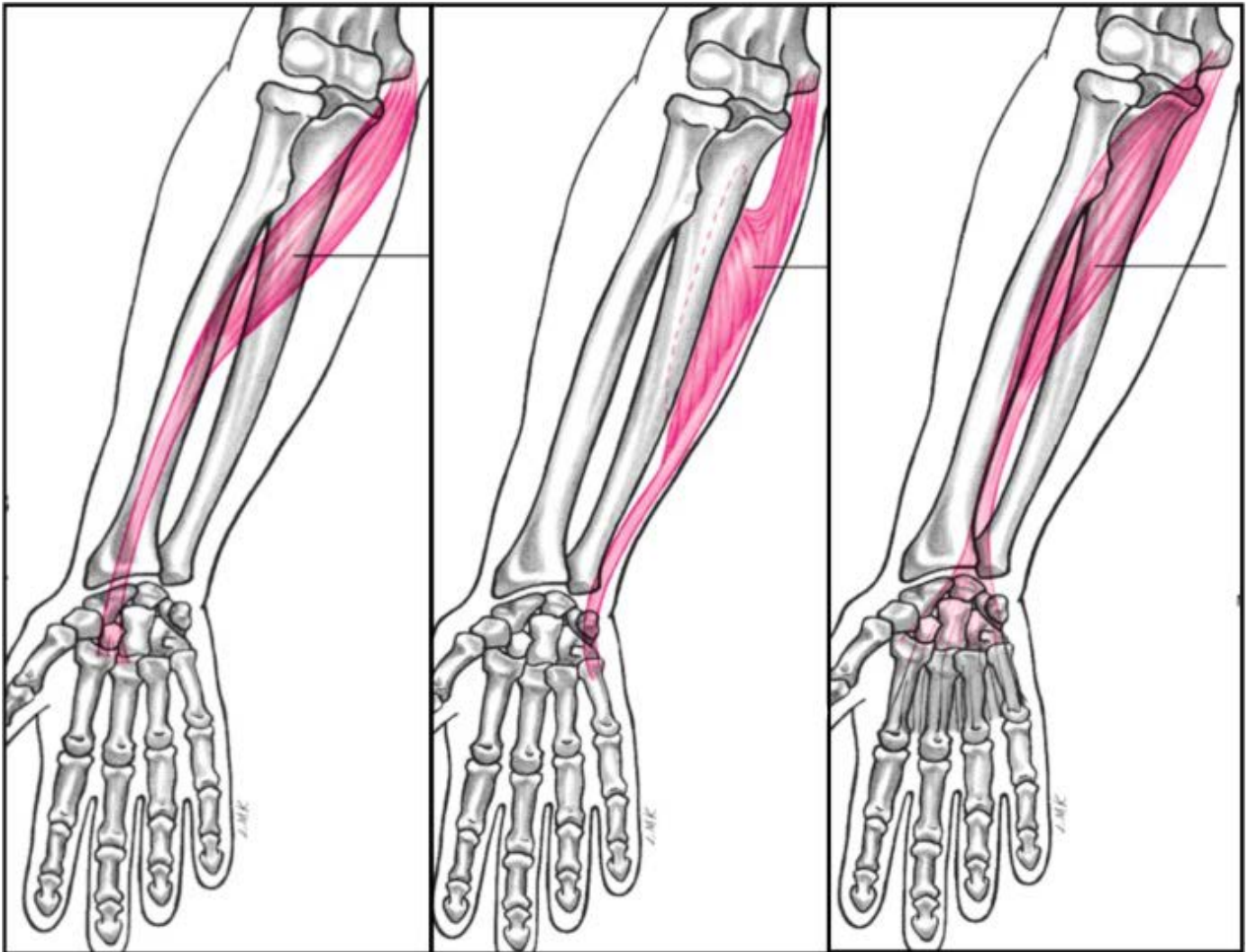
Flexor carpi ulnaris

Palmaris longus

Flexor digitorum superficialis

Flexor digitorum profundus

Flexor pollicis longus



Muscles

Wrist Flexion

Agonists

Flexor carpi radialis

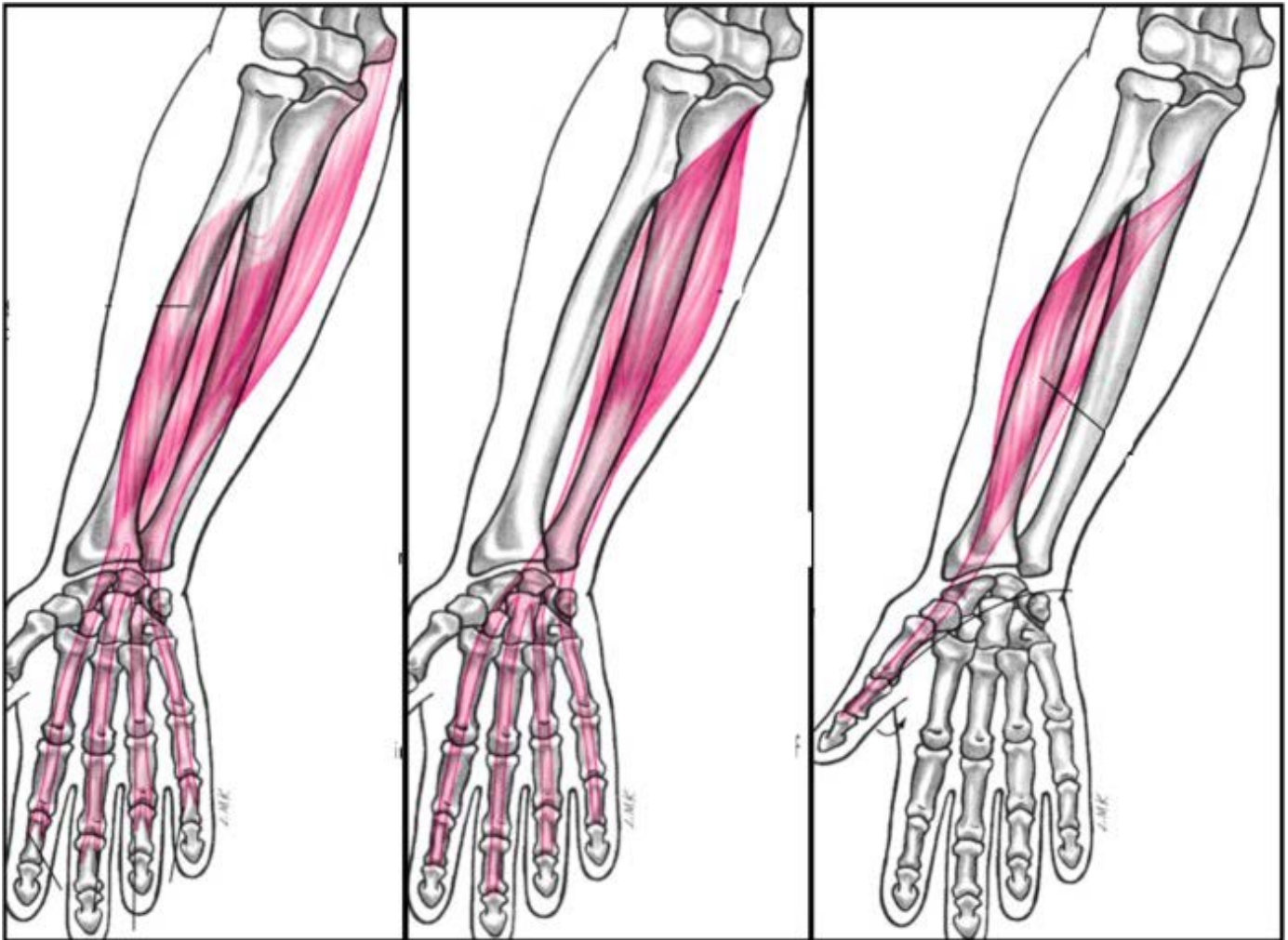
Flexor carpi ulnaris

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

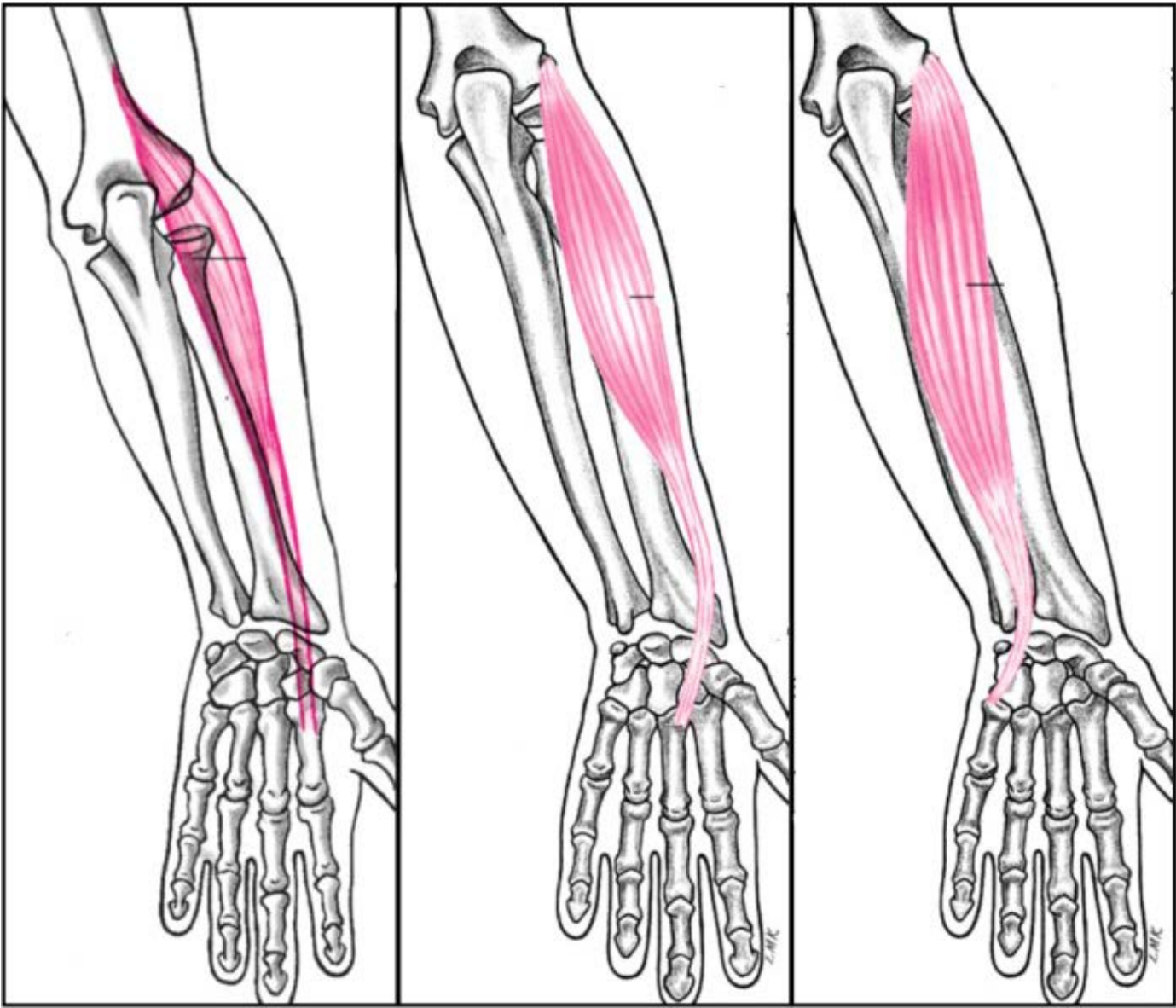
Extensor digitorum

Extensor indicis

Extensor digiti minimi

Extensor pollicis longus

Extensor pollicis brevis



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Muscles

Wrist Extension

Extensor carpi radialis longus

Extensor carpi radialis brevis

Extensor carpi ulnaris

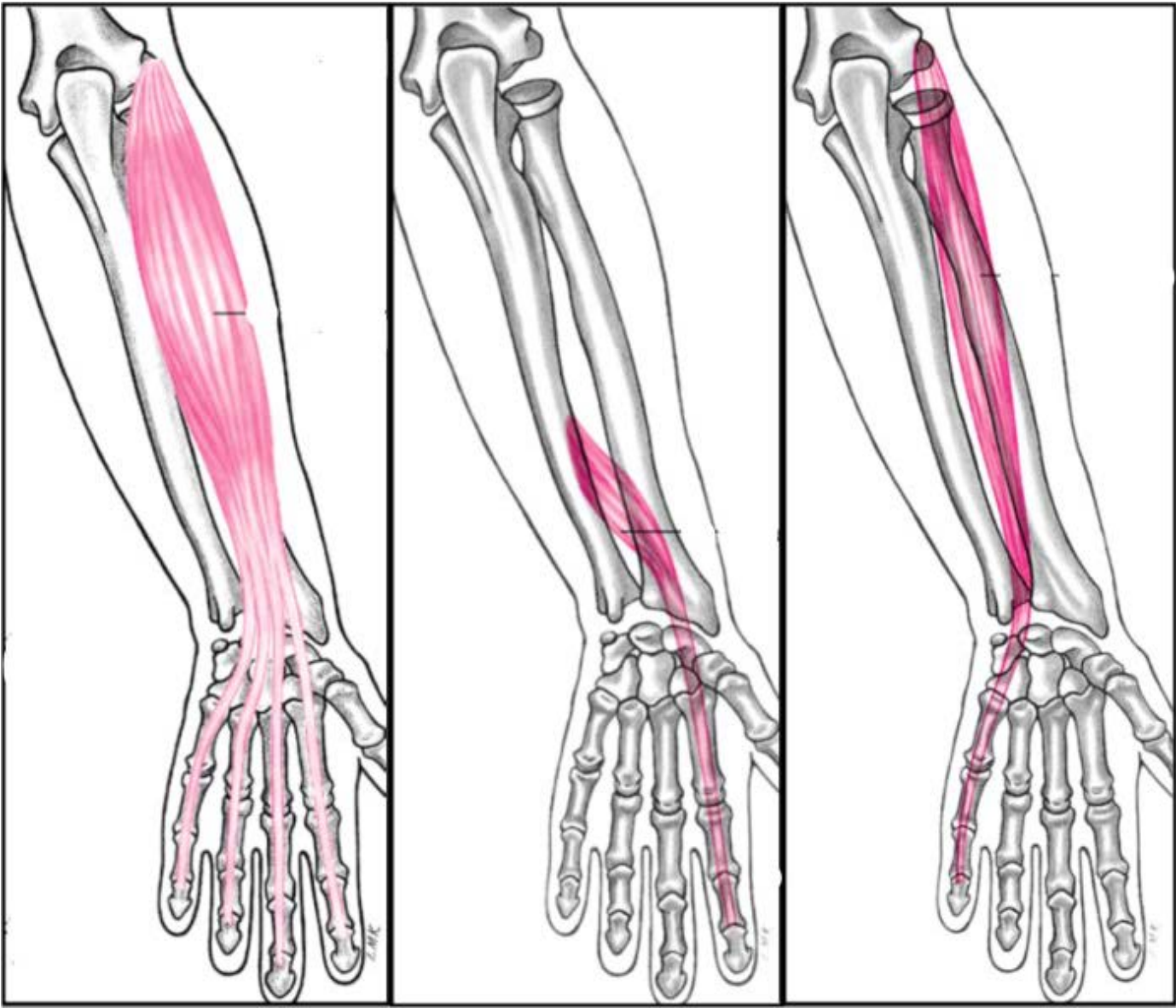
Extensor digitorum

Extensor indicis

Extensor digiti minimi

Extensor pollicis longus

Extensor pollicis brevis



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Muscles

Wrist Extension

Extensor carpi radialis longus

Extensor carpi radialis brevis

Extensor carpi ulnaris

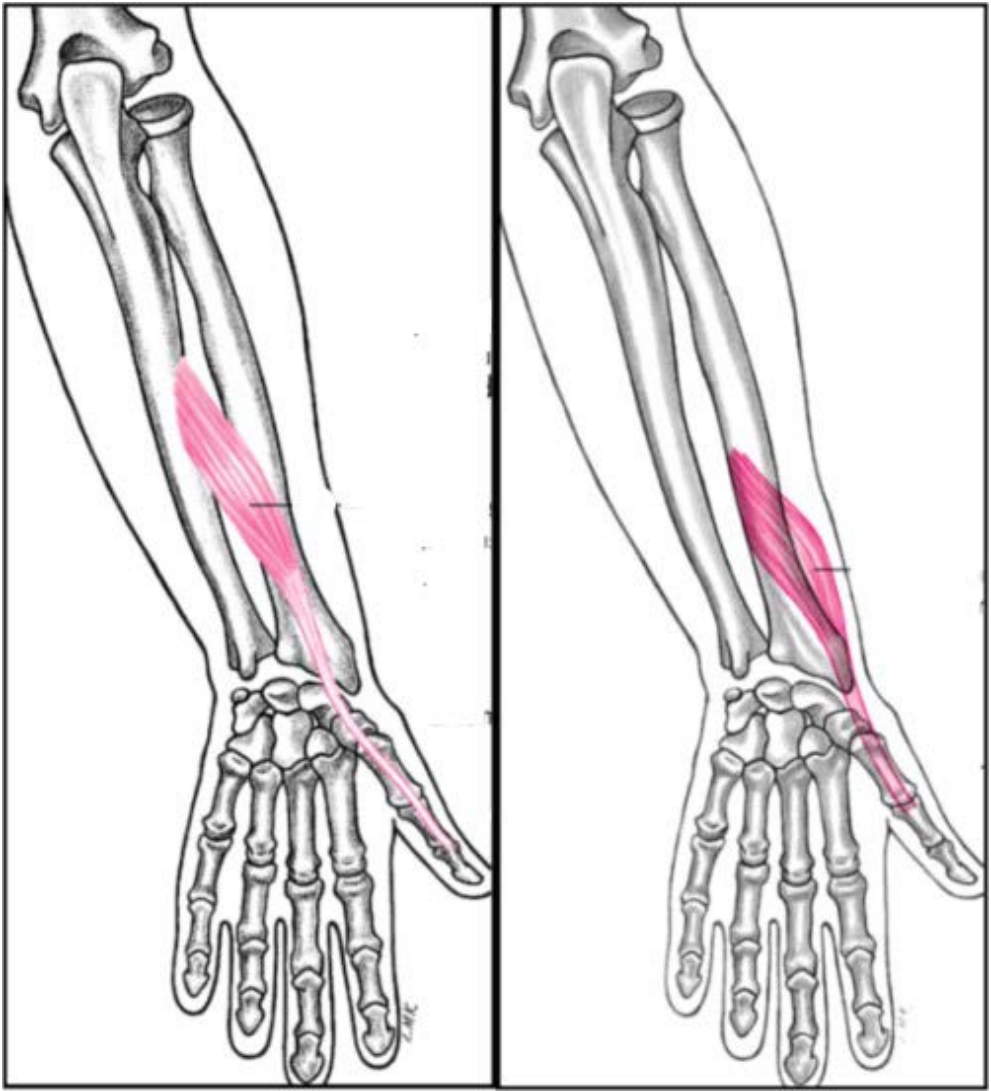
Extensor digitorum

Extensor indicis

Extensor digiti minimi

Extensor pollicis longus

Extensor pollicis brevis



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Muscles

Wrist Abduction

Flexor carpi radialis

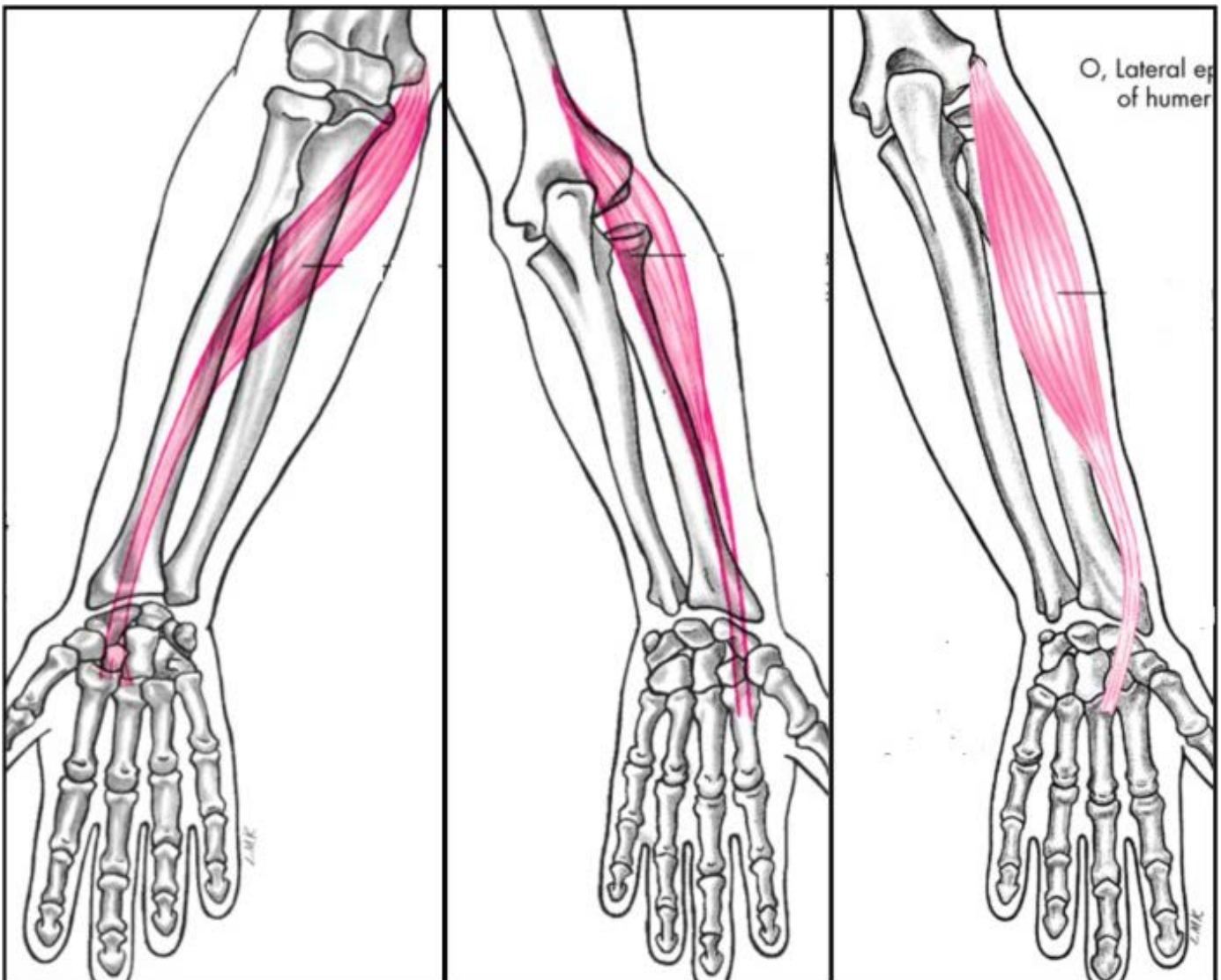
Extensor carpi radialis longus

Extensor carpi radialis brevis

Abductor pollicis longus

Extensor pollicis longus

Extensor pollicis brevis



Muscles

Wrist Abduction

Flexor carpi radialis

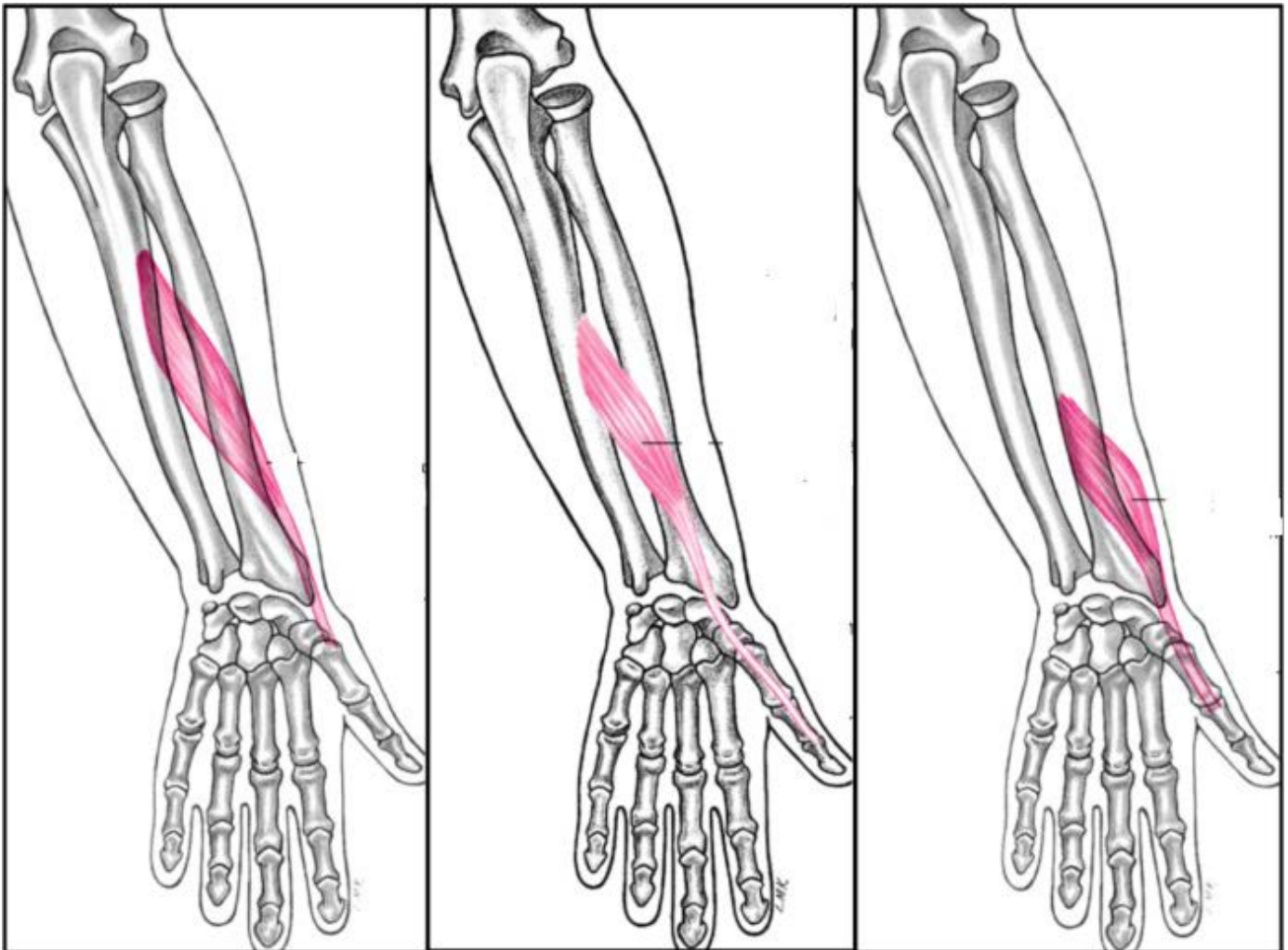
Extensor carpi radialis longus

Extensor carpi radialis brevis

Abductor pollicis longus

Extensor pollicis longus

Extensor pollicis brevis

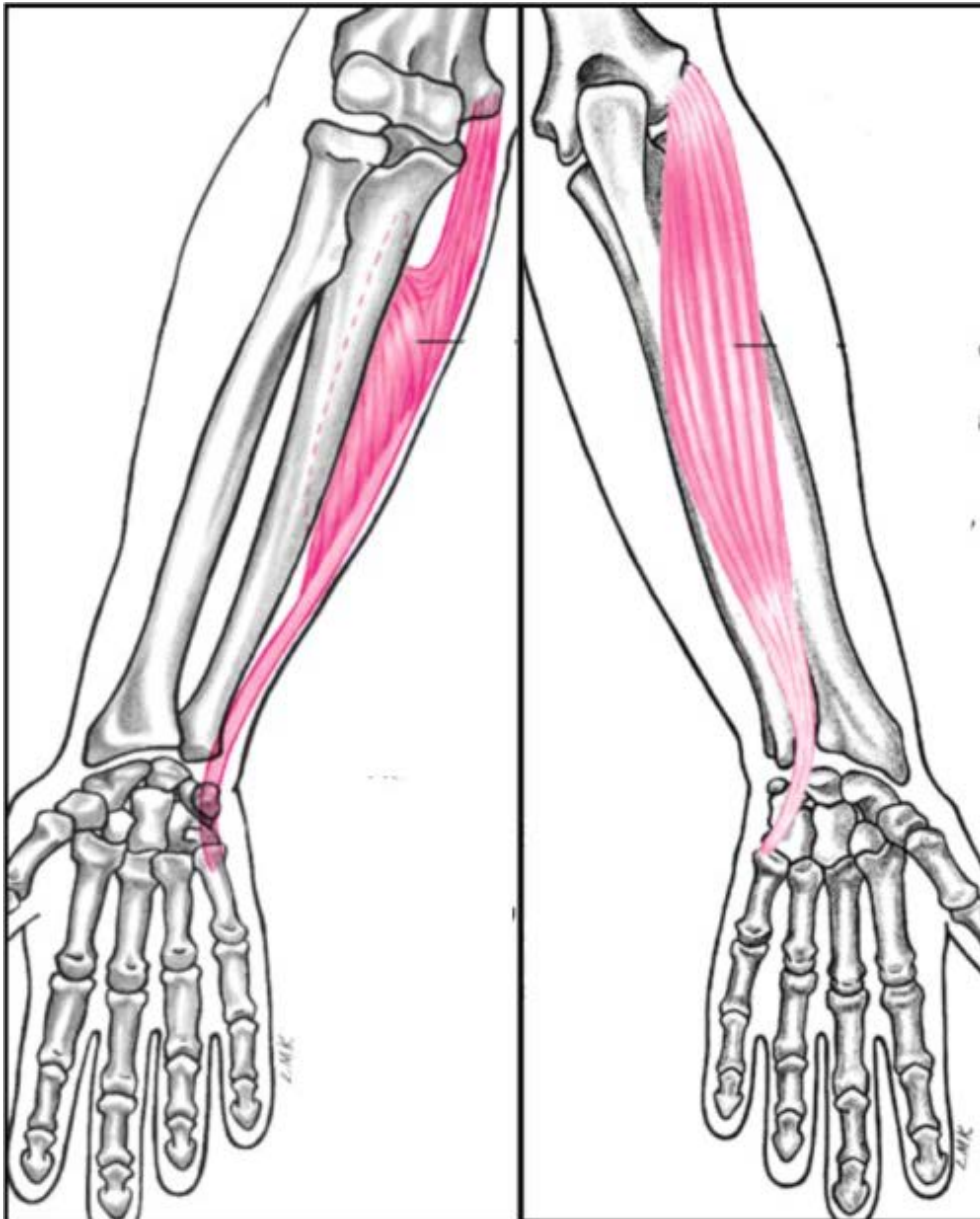


Muscles

Wrist Adduction

Flexor carpi ulnaris

Extensor carpi ulnaris



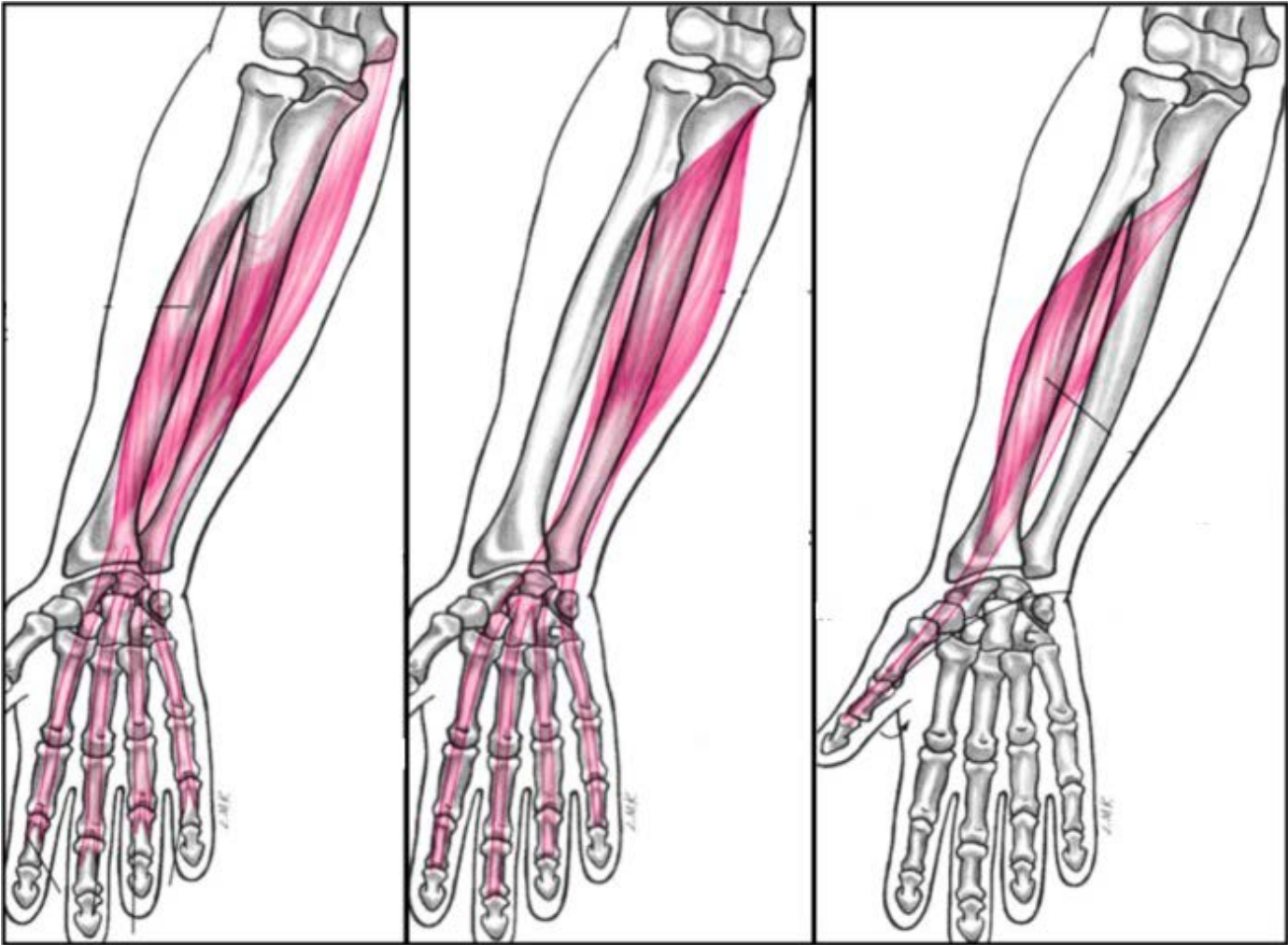
Muscles

Phalangeal Flexion

Flexor digitorum superficialis

Flexor digitorum profundus

Flexor pollicis longus



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Muscles

Phalangeal Extension

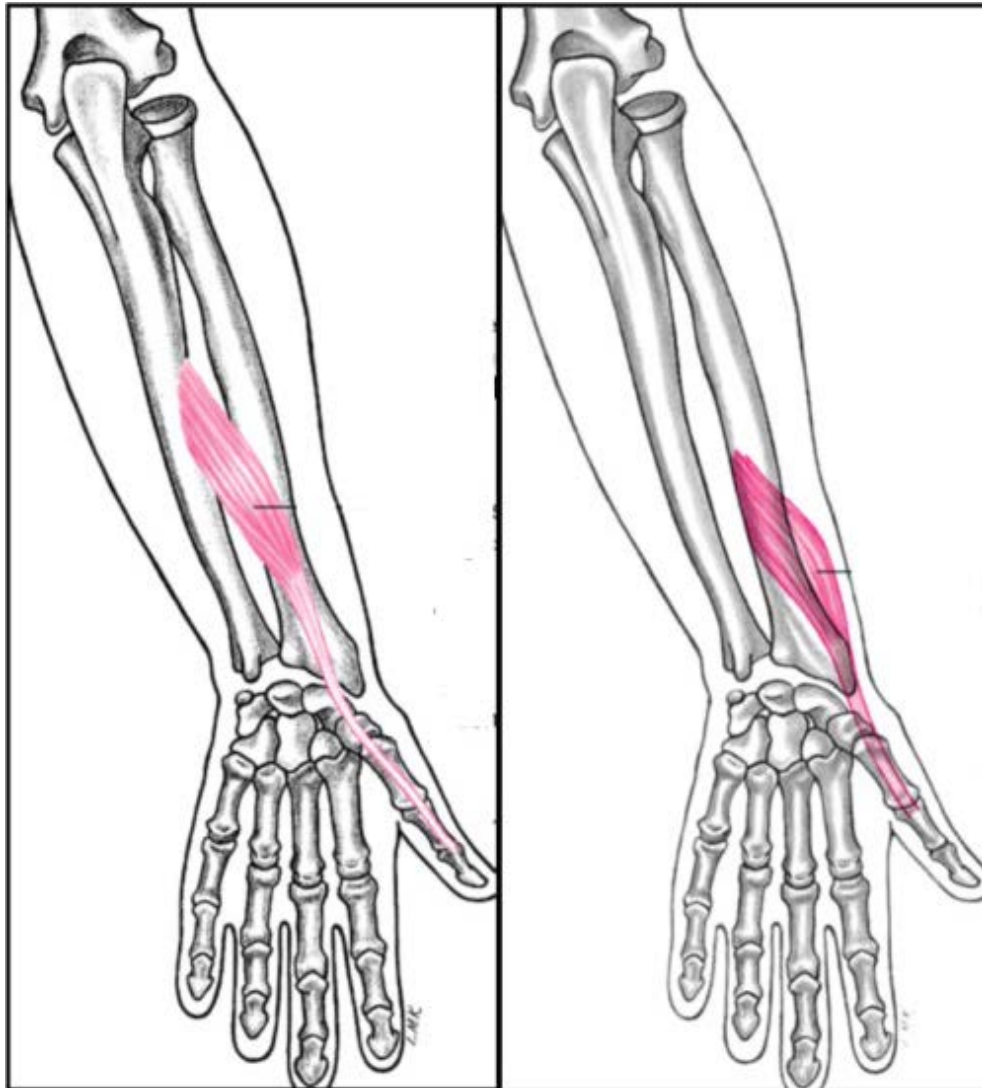
Extensor digitorum

Extensor indicis

Extensor digiti minimi

Extensor pollicis longus

Extensor pollicis brevis



To Test

Access Code: **WGMM**

Please write down case sensitive code. You will be asked for it. This course is 6 CE.

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