

Upper limb 2

Prof. MUDr. Jiří Ferda, Ph.D.

Attachement to the trunk

- ♦ skeleton

- ♦ Muscles

- ♦ Axilla

- ♦ Nervous structures

- ♦ Brachial plexus

- ♦ N. axillaris (C5-6)

- ♦ N. musculocutaneus (C5-7)

- ♦ N. radialis (C5 - 8, Th1)

- ♦ N. medianus (C6 - 8, Th1)

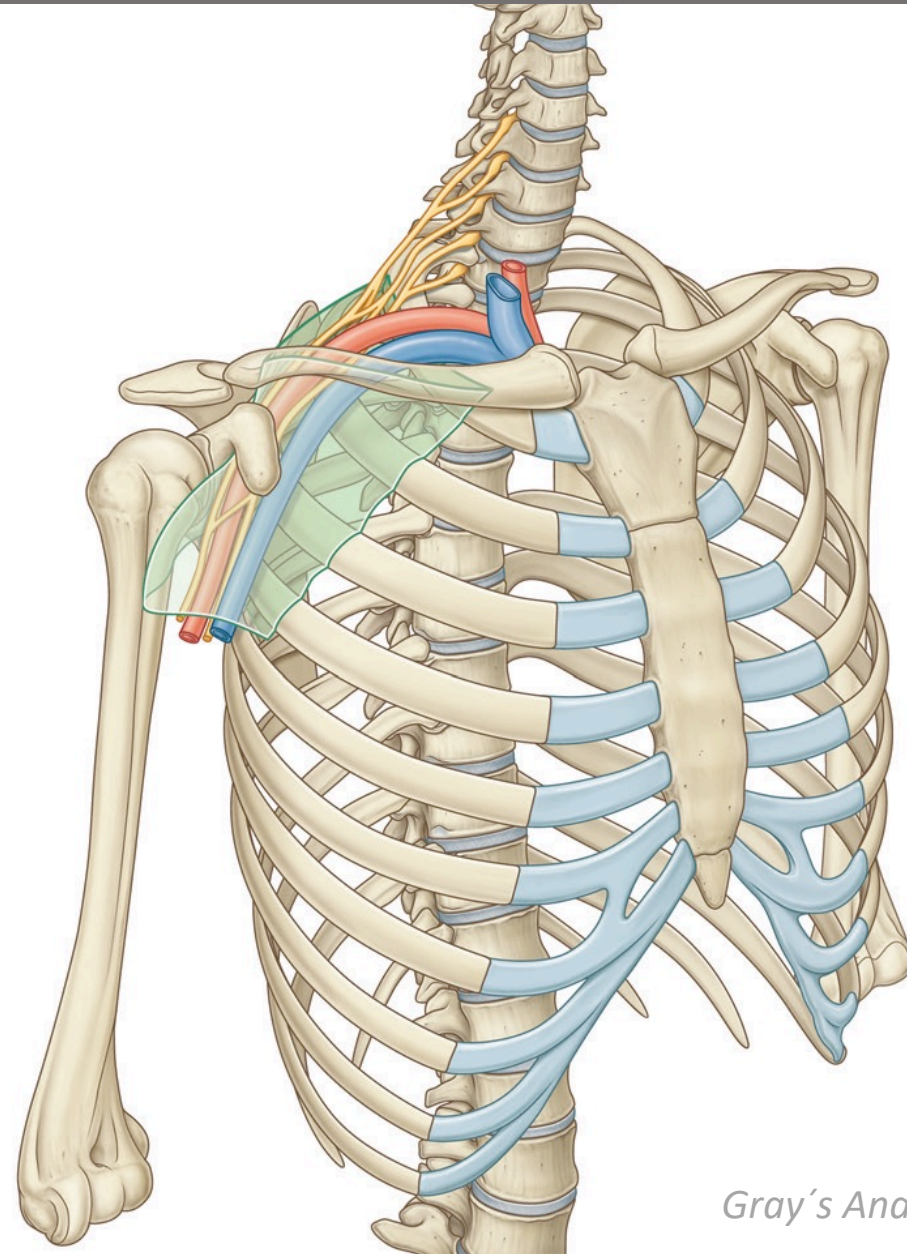
- ♦ N. ulnaris (C7, C8, Th1)

- ♦ vessels

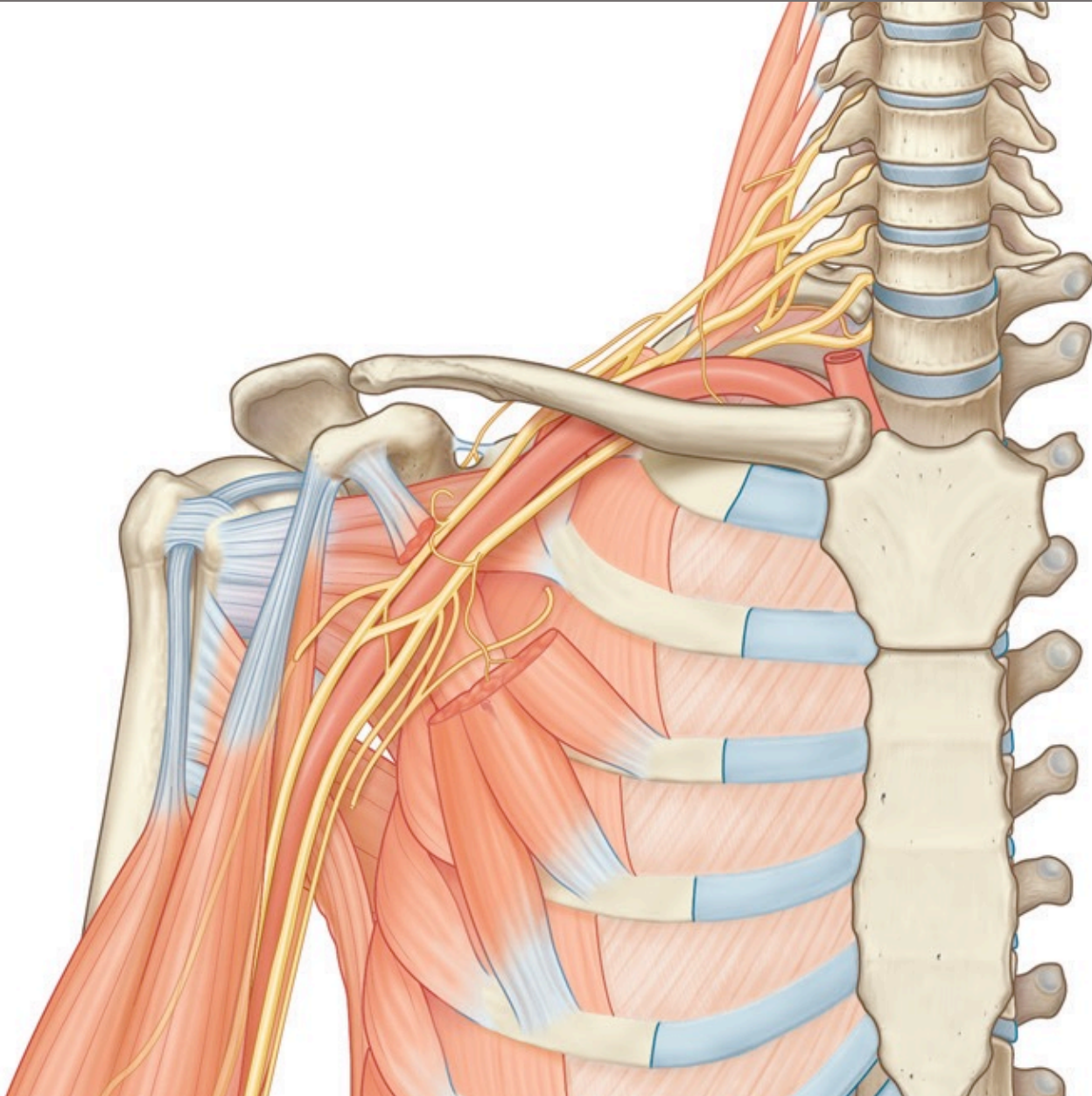
- ♦ A. axillaris (a. brachialis)

- ♦ V. axillaris (v. basilica)

- ♦ lymphatics



Plexus brachialis



♦ ***Plexus brachialis***

♦ ***Upper part - divisiones***

♦ *Přední a zadní oddíl*

♦ ***Middle part - fasciculi***

♦ *medialis, lateralis, posterior*

♦ ***Lower part - nervi***

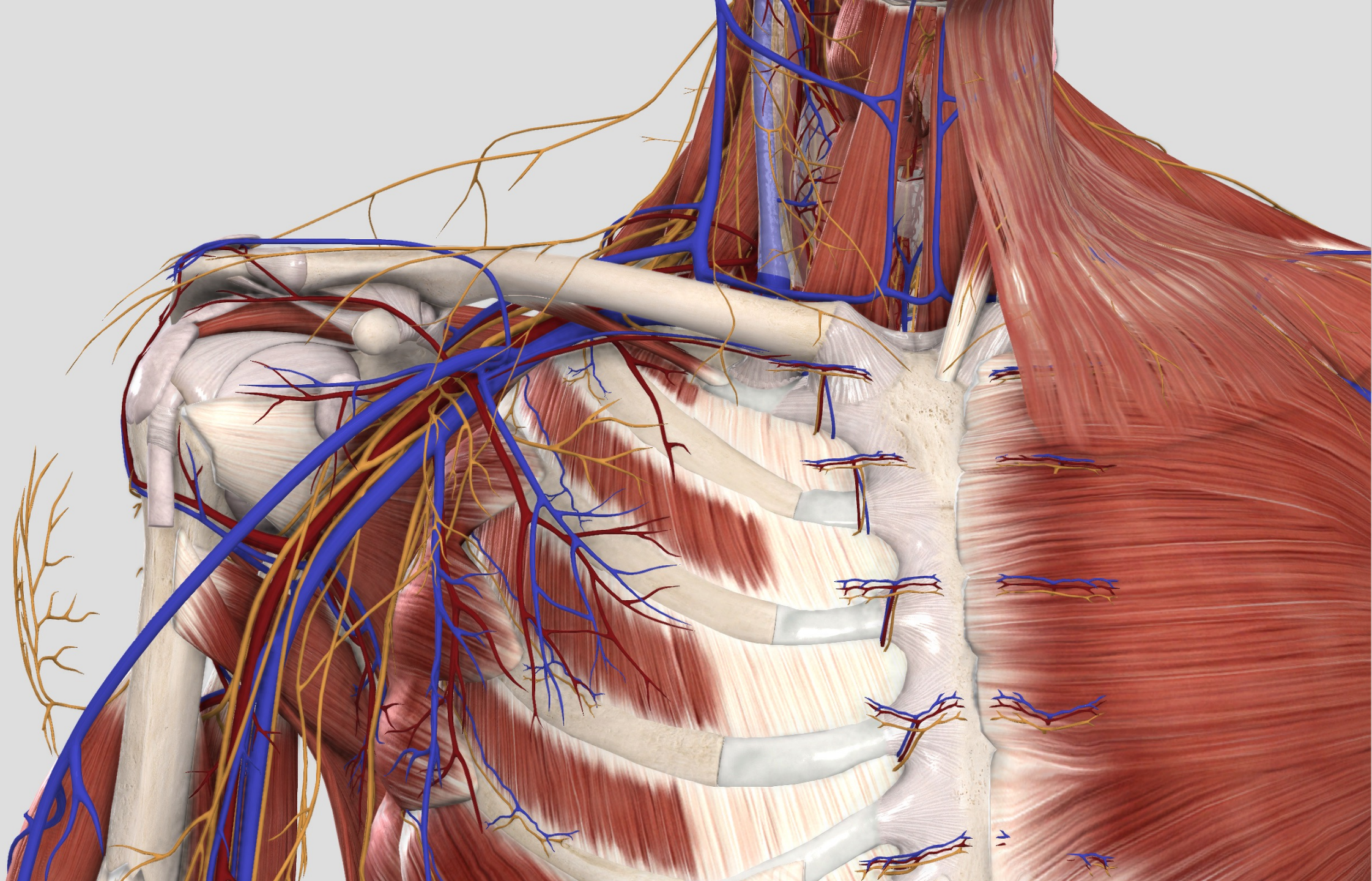
♦ *N. axillaris*

♦ *N. musculocutaneus*

♦ *N. radialis*

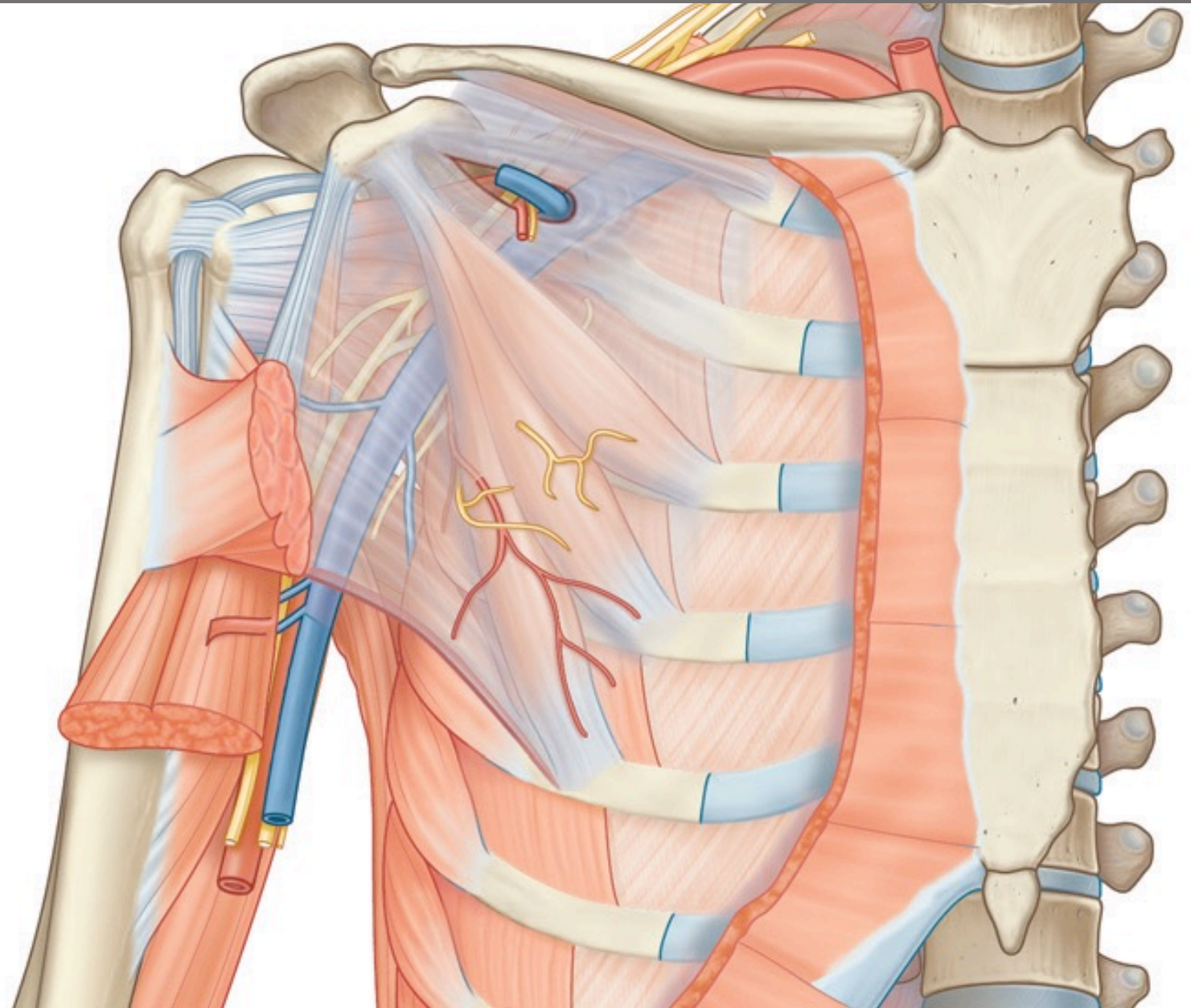
♦ *N. medianus*

♦ *N. ulnaris*

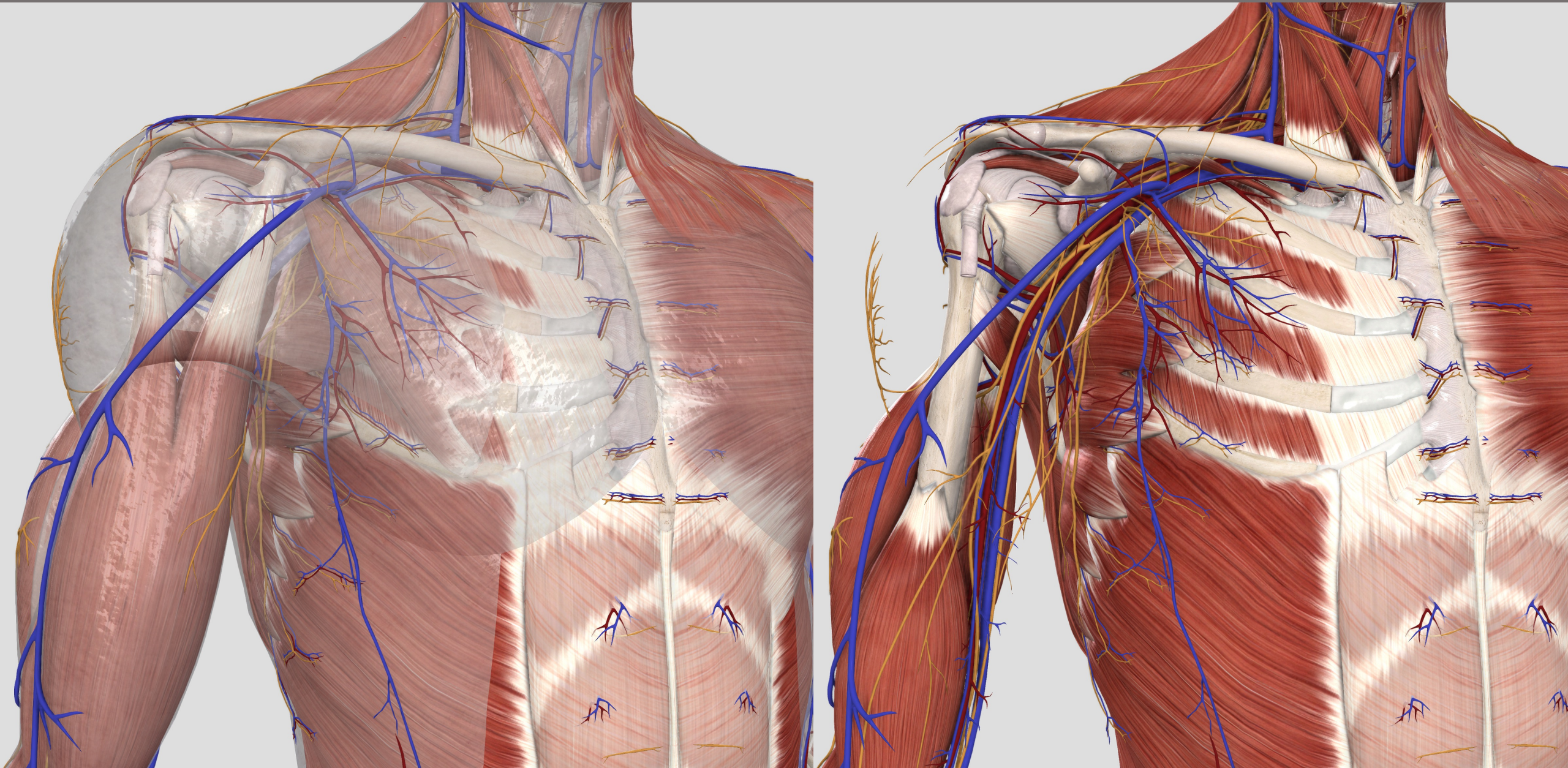


Fascia clavipectoralis

- ♦ Clavicula
- ♦ Processus coracoideus
- ♦ M. pectoralis minor
- ♦ Axilla (cutanea) – anterior fold
- ♦ x
- ♦ M pectoralis major
- ♦ **Trigonum clavipectorale**
 - ♦ *V. cephalica*
 - ♦ *A. thoracoacromialis*
 - ♦ *N. pectoralis lateralis*



Fascia clavipectoralis



Group of muscles

♦ Attachment of the scapula and trunk

- ♦ *M. trapezius*
- ♦ *M. levator scapulae*
- ♦ *M. rhomboidei minor et major*
- ♦ *M. pectoralis minor*
- ♦ *M. subclavius*
- ♦ *M. serratus anterior*

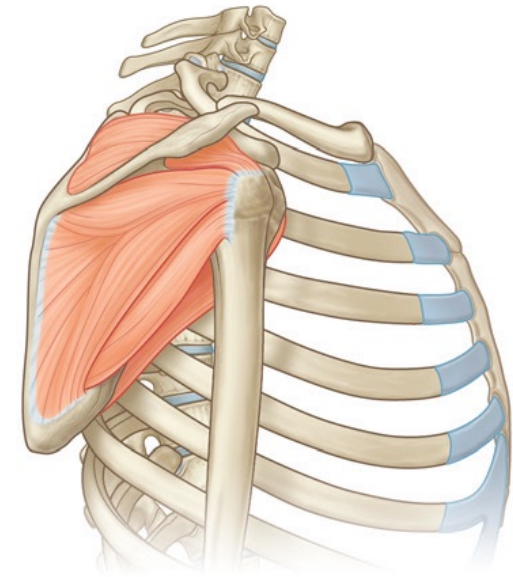
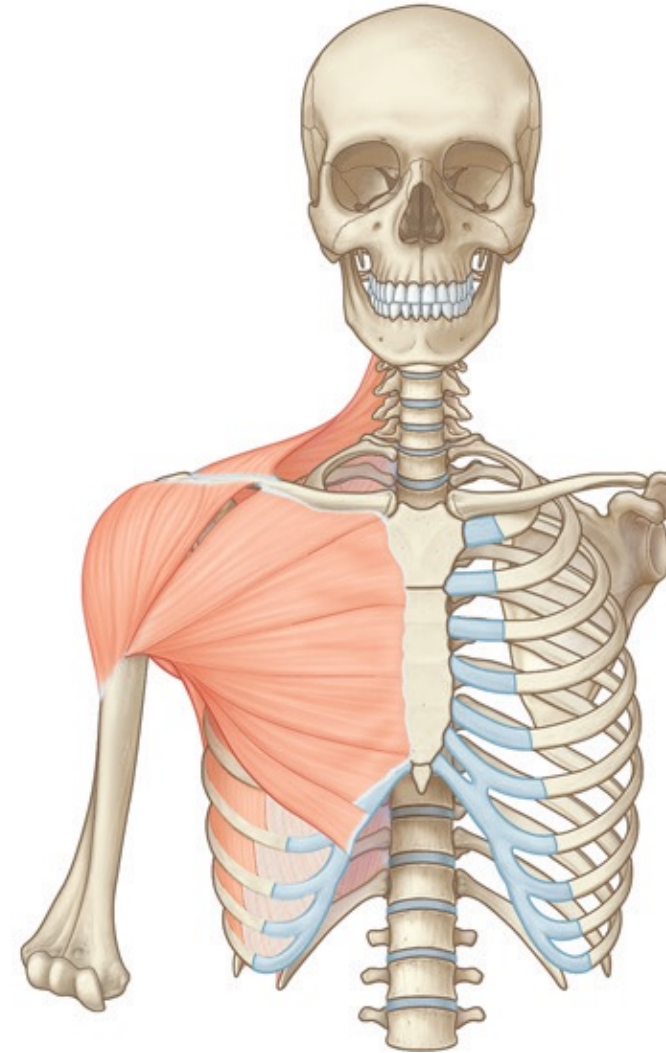
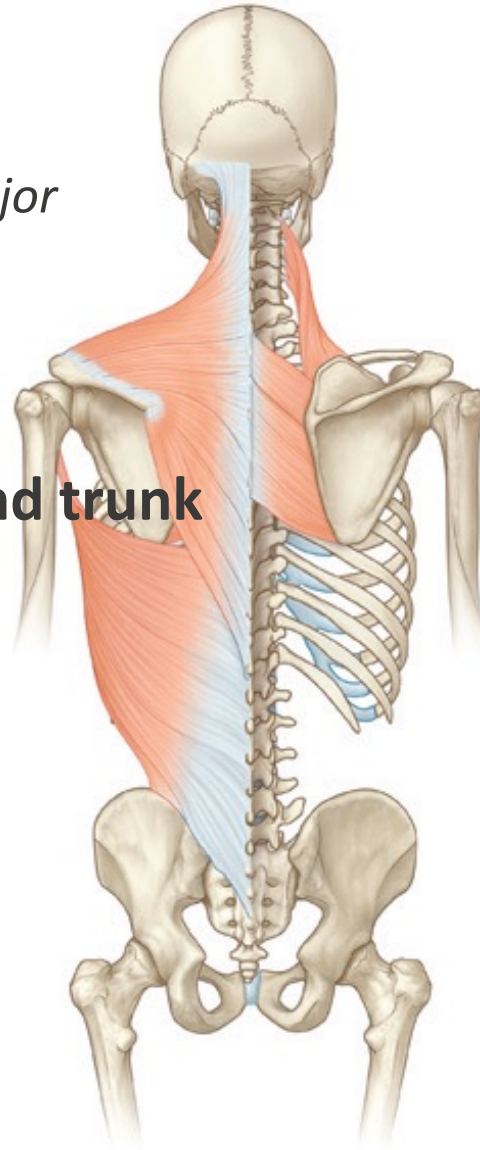
♦ Connection of humerus and trunk

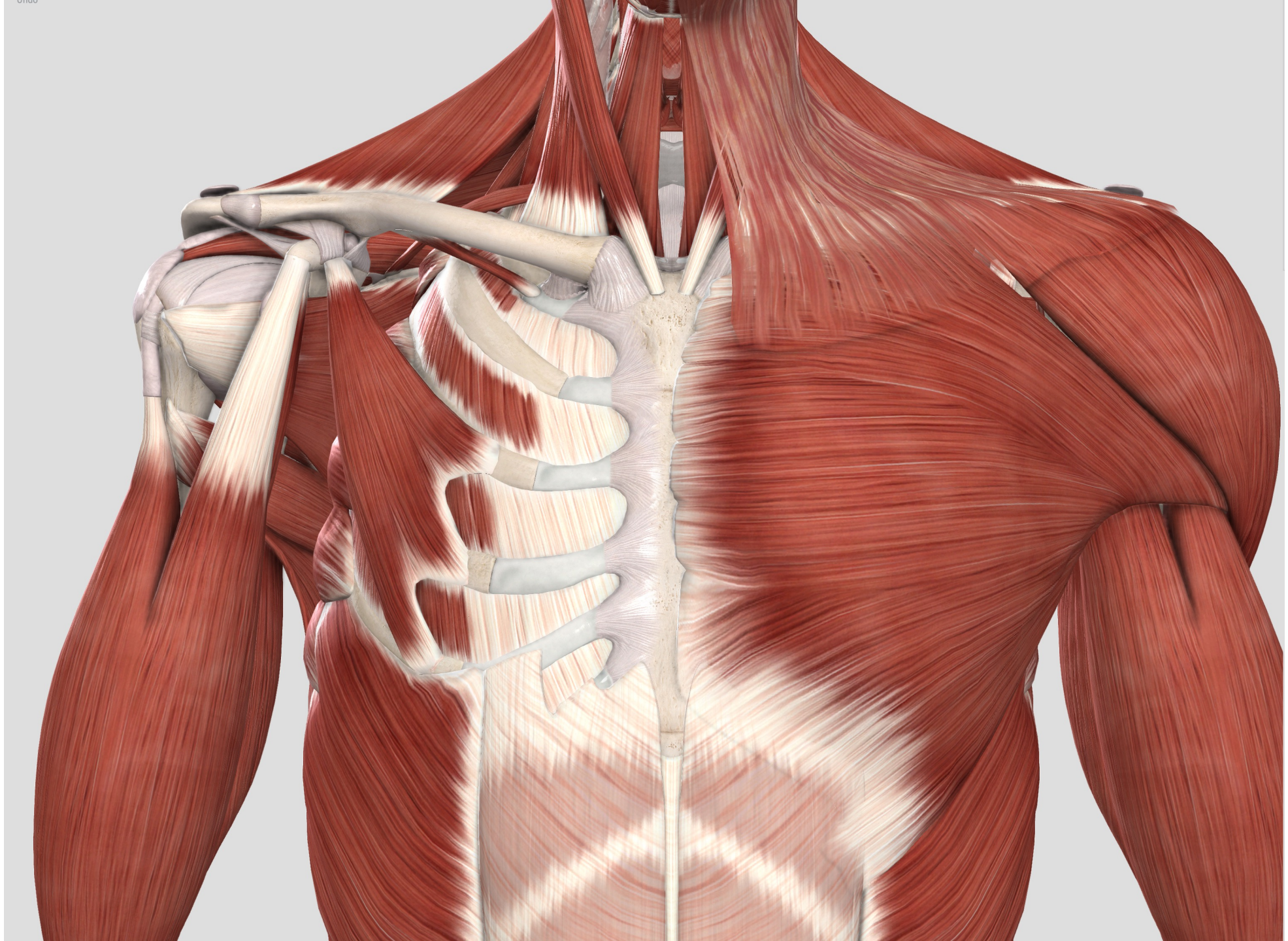
- ♦ *M. pectoralis major*
- ♦ *M. latissimus dorsi*
- ♦ *M. teres major*

♦ *M. deltoideus*

♦ *Rotator cuff muscles*

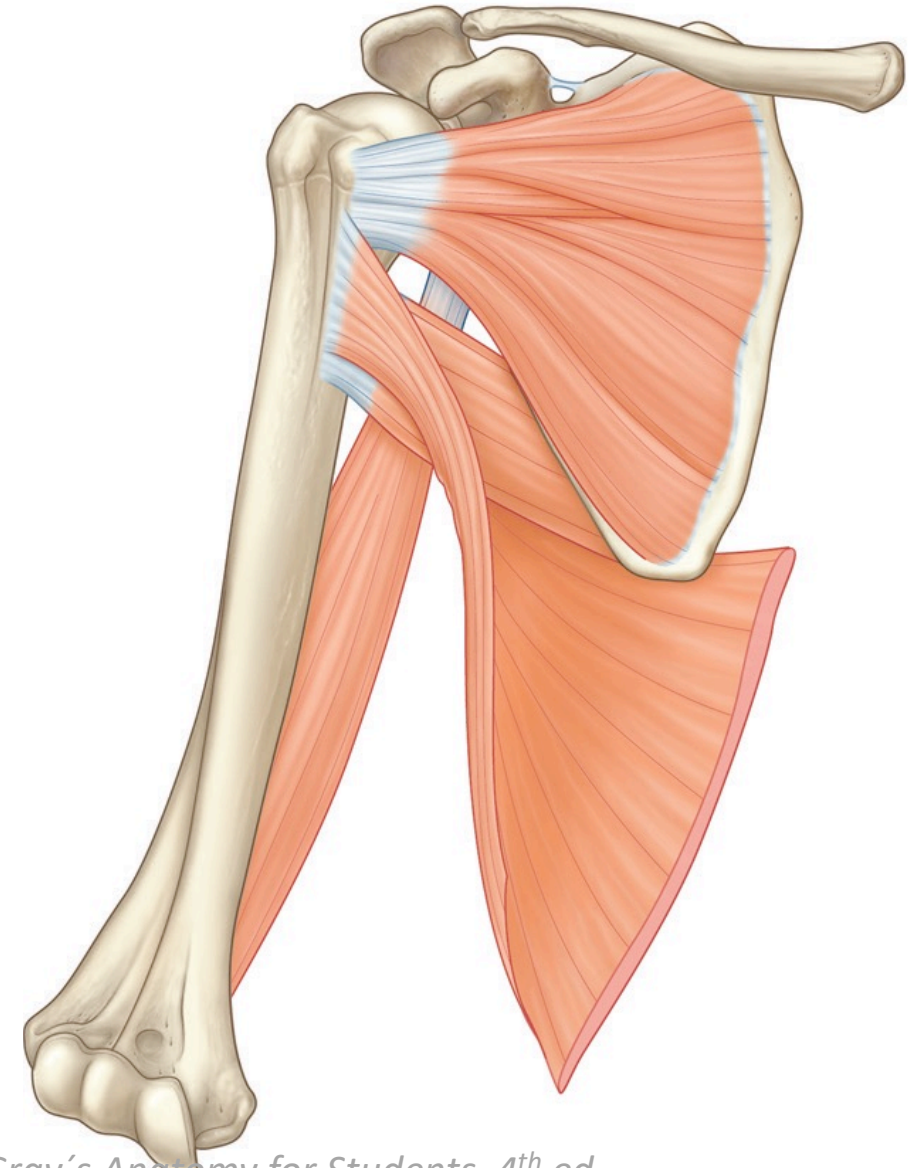
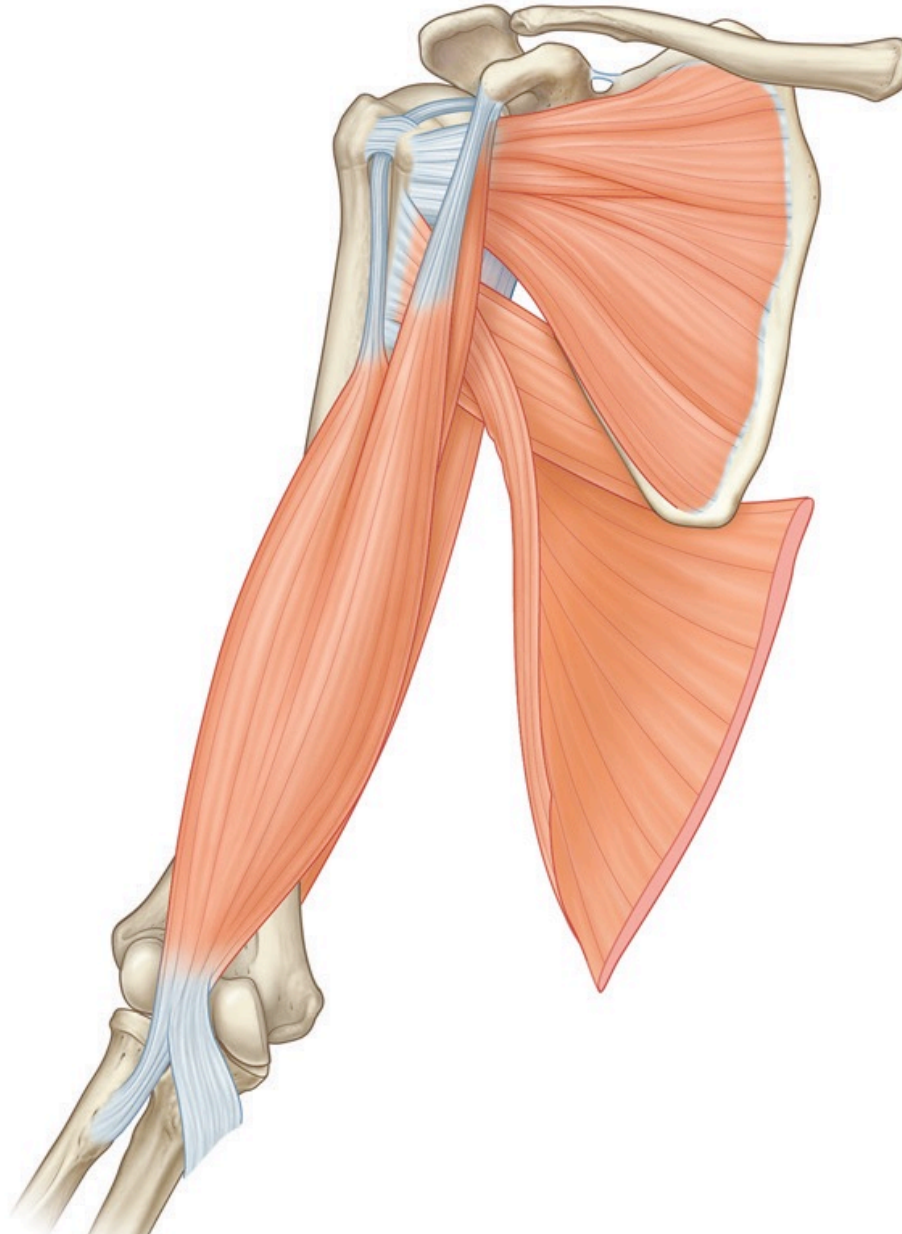
♦ *Arm muscles*



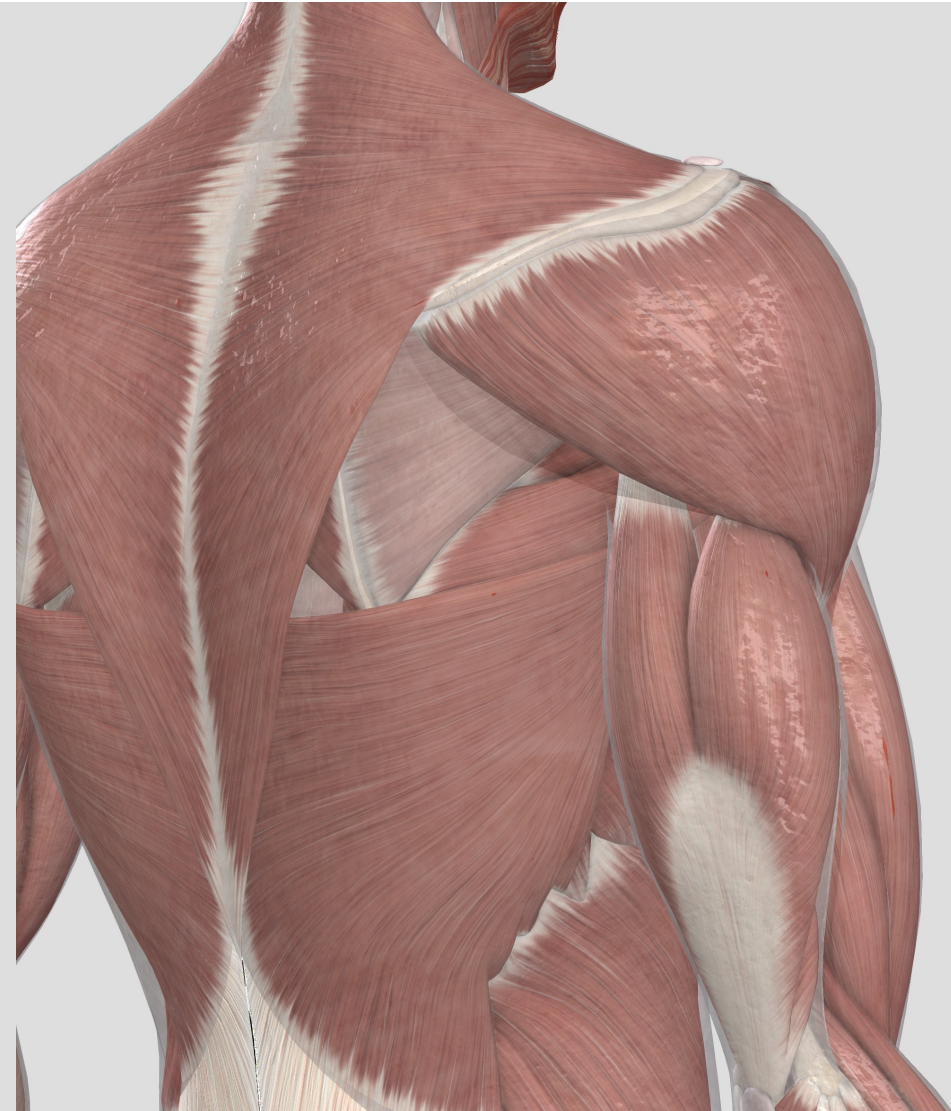
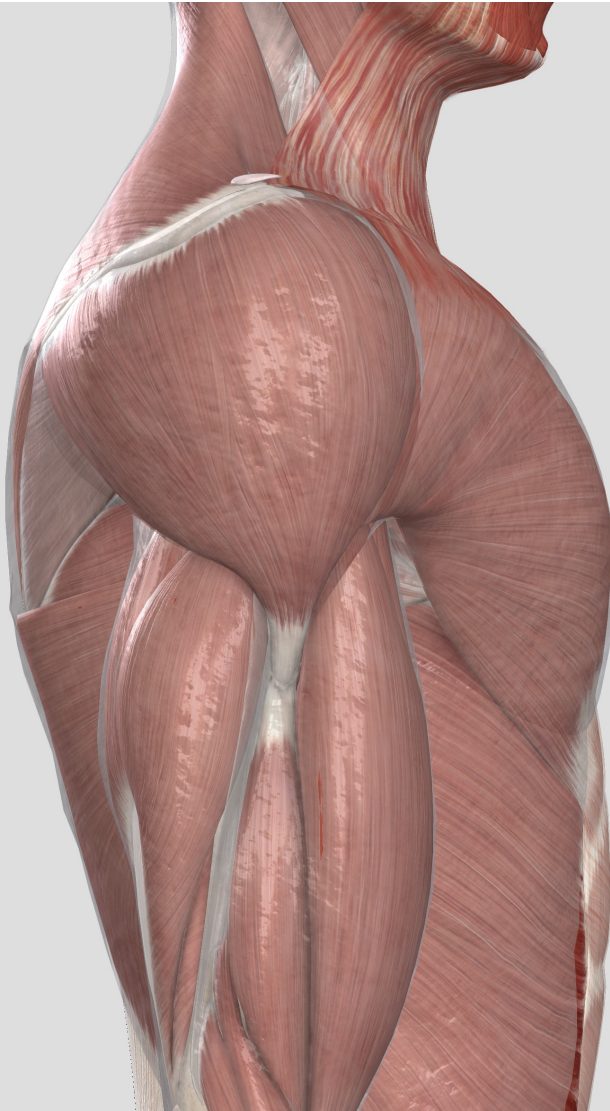
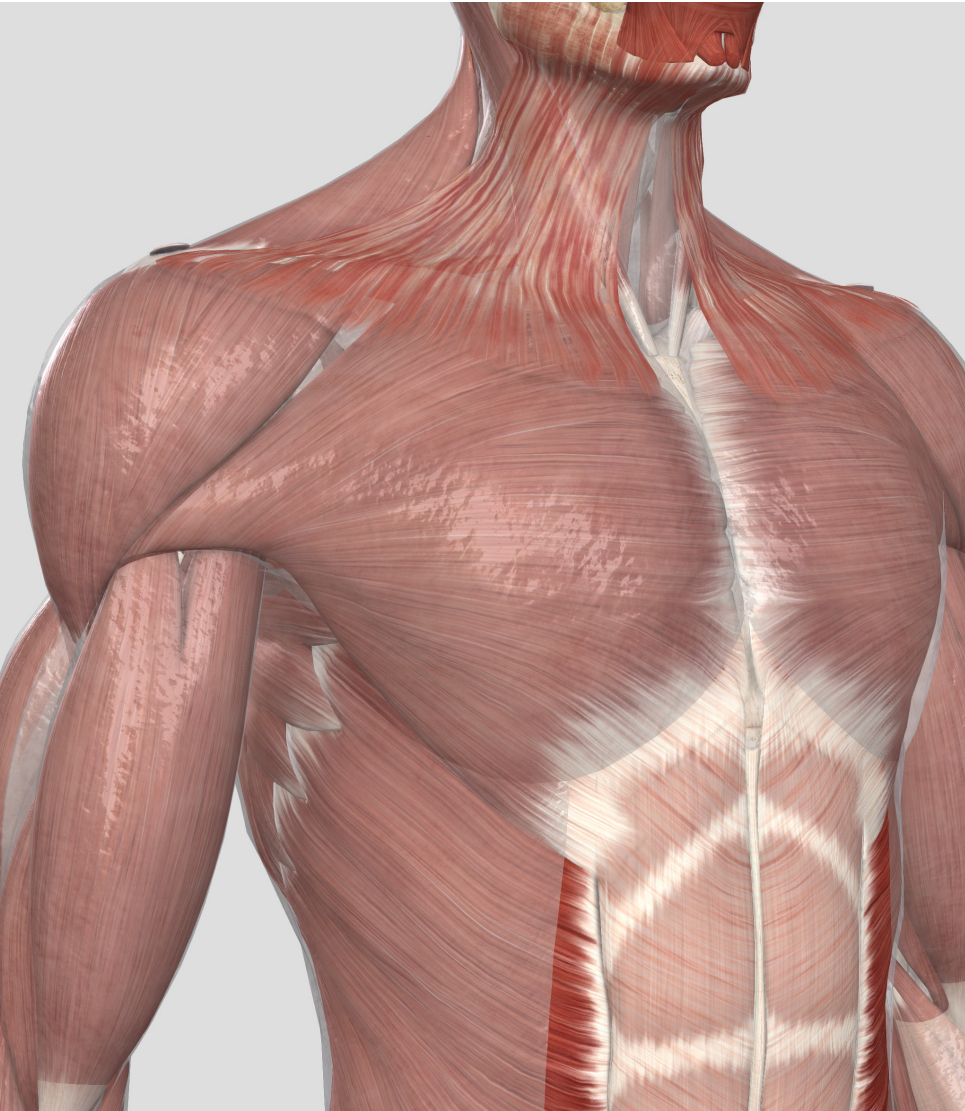


Muscles of the shoulder

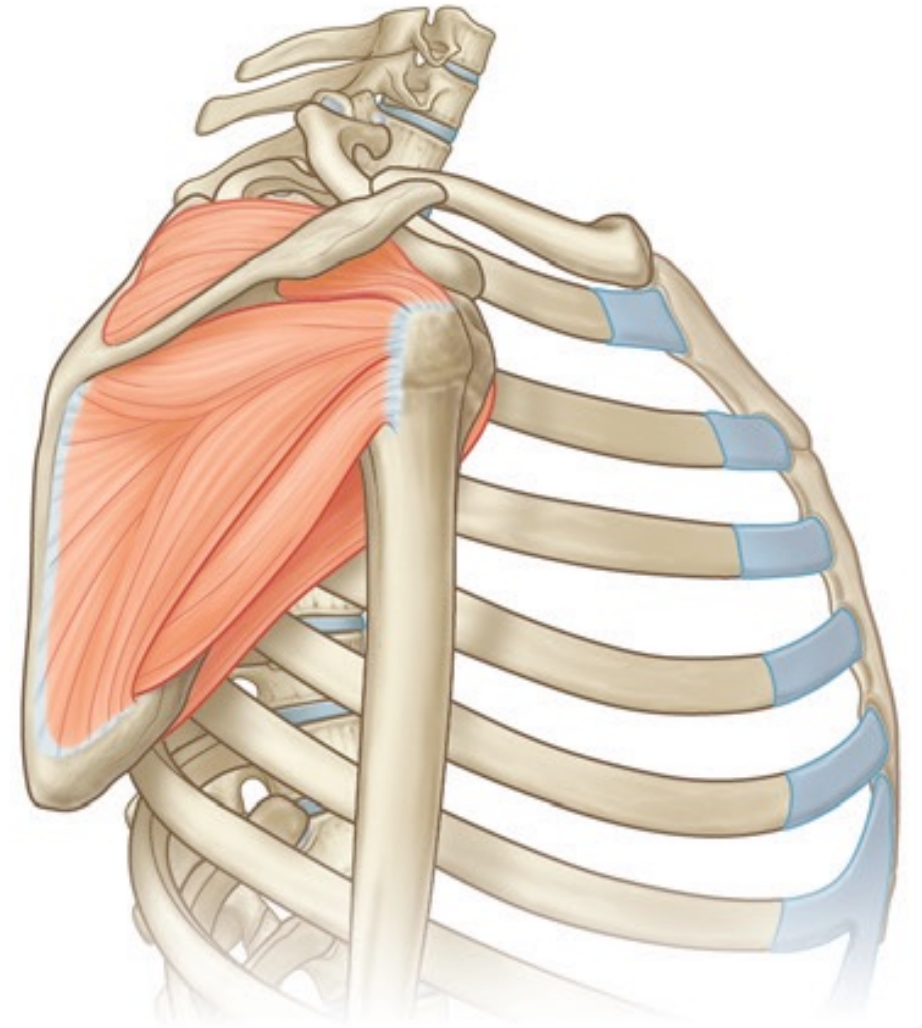
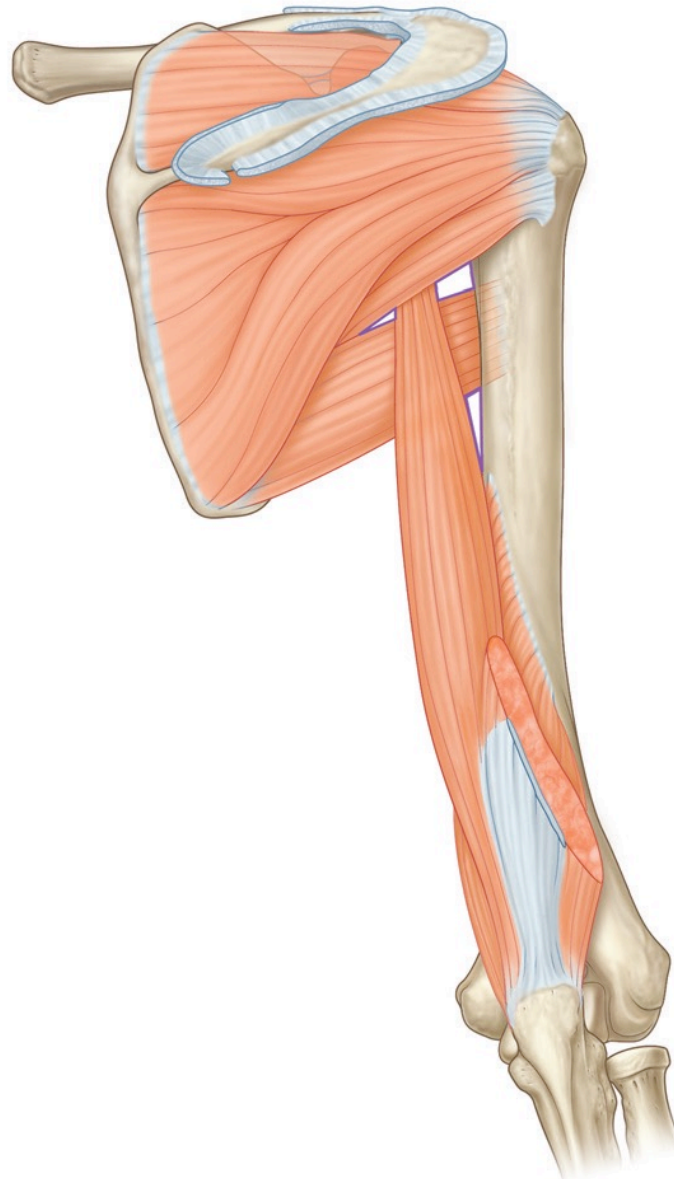
- ♦ *M. pectoralis major*
- ♦ *M. latissimus dorsi*
- ♦ *M. teres major*
- ♦ *M. subclavius*
- ♦ **M. deltoideus**
- ♦ **Rotator cuff muscles**
- ♦ **M. subscapularis**
- ♦ **M. supraspinatus**
- ♦ **M. infraspinatus**
- ♦ **M. teres minor**
- ♦ *M. biceps brachii*
- ♦ *M. triceps brachii*
- ♦ *M. coracobrachialis*



Shoulder muscles

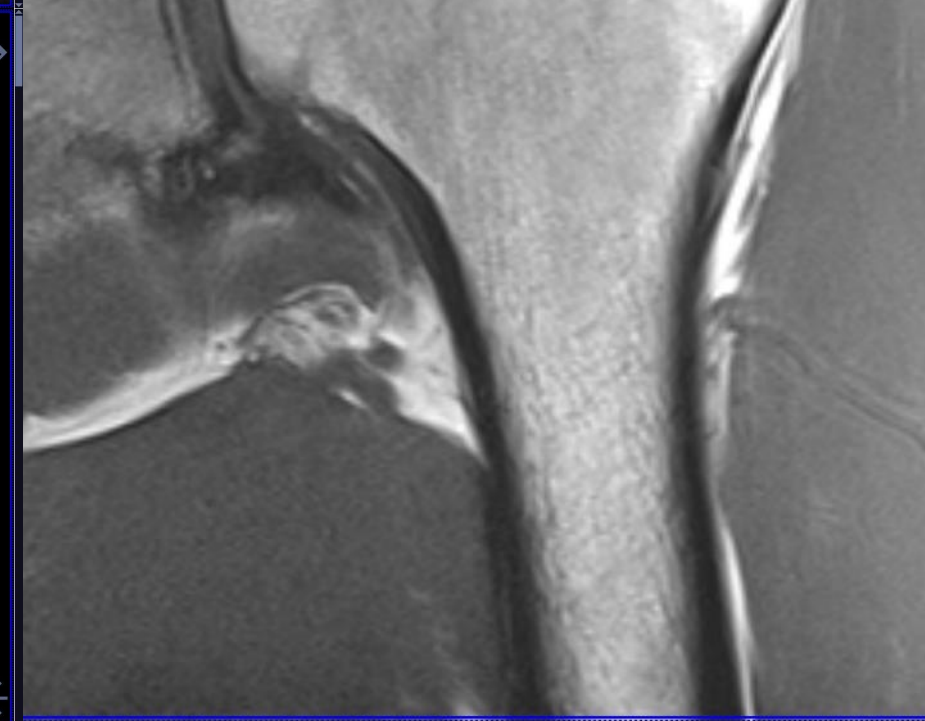
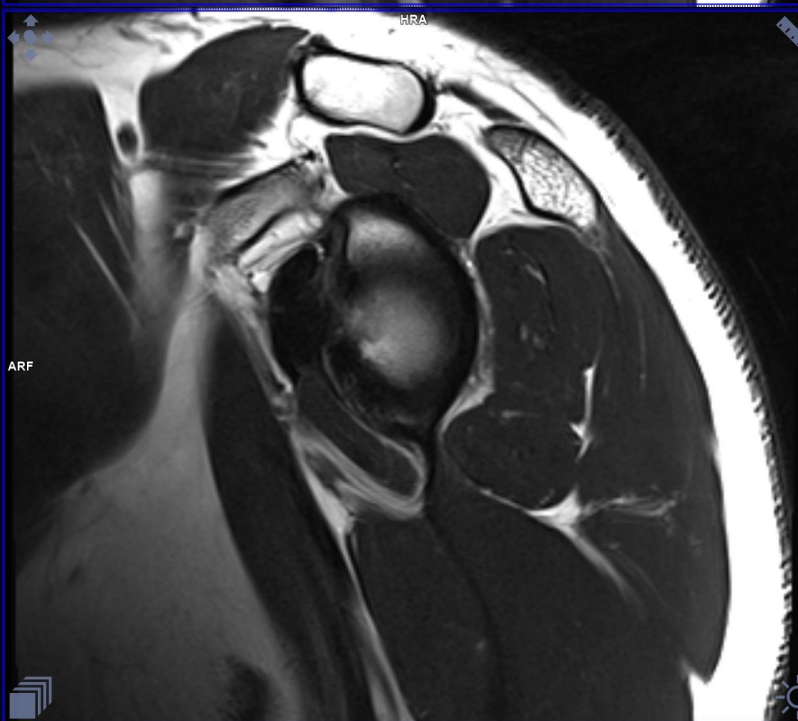
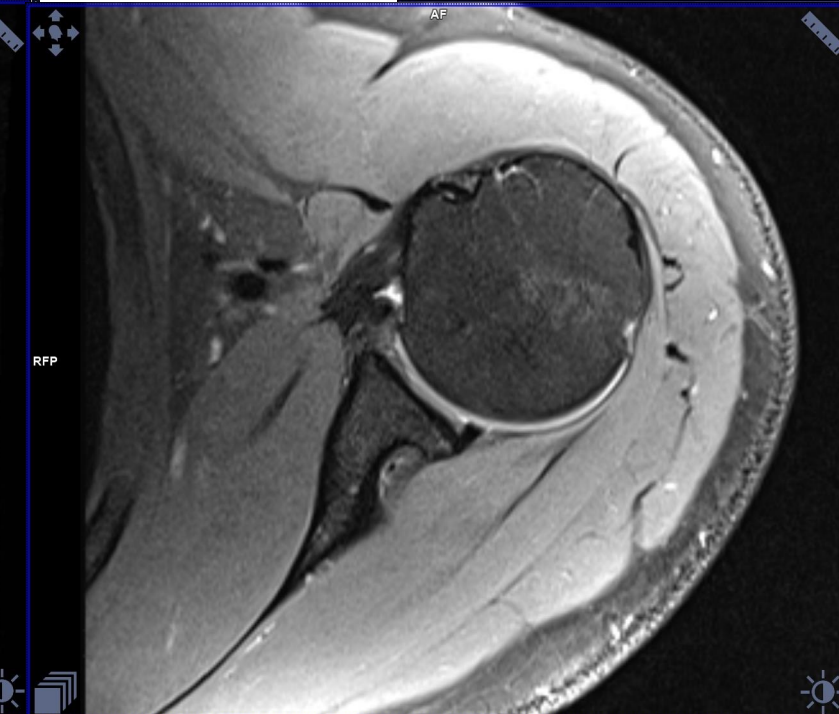
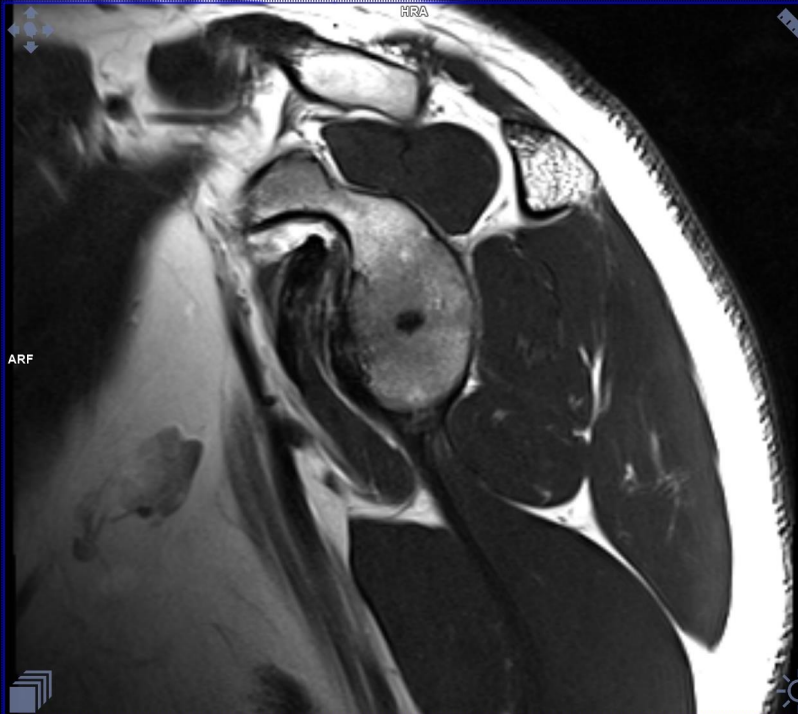


Shoulder muscles



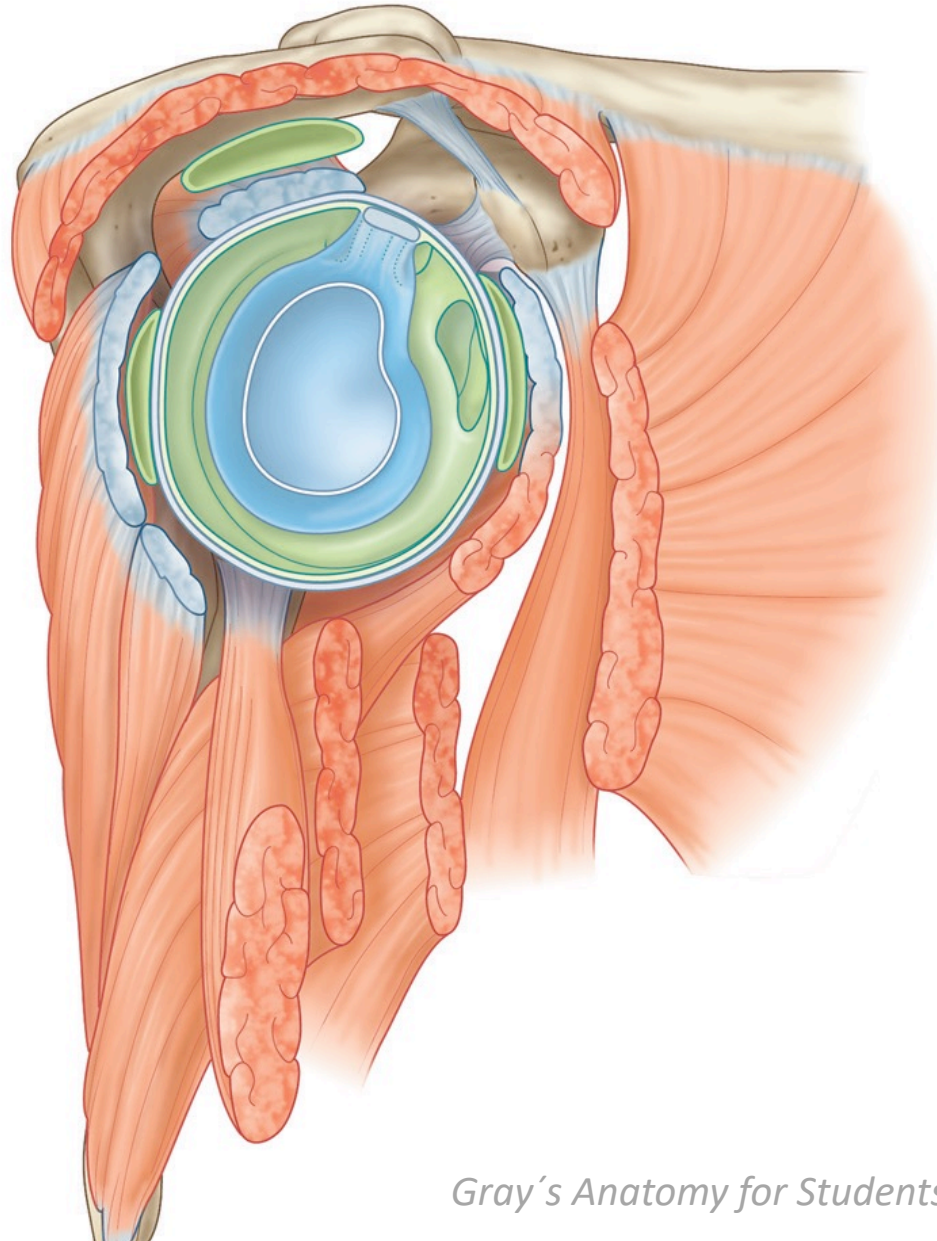
- ♦ *M. pectoralis major*
- ♦ *M. latissimus dorsi*
- ♦ *M. teres major*
- ♦ *M. subclavius*
- ♦ **M. deltoideus**
- ♦ **Rotator cuff**
- ♦ **M. subscapularis**
- ♦ **M. supraspinatus**
- ♦ **M. infraspinatus**
- ♦ **M. teres minor**
 - ♦ *M. biceps brachii*
 - ♦ *M. triceps brachii*
 - ♦ *M. coracobrachialis*



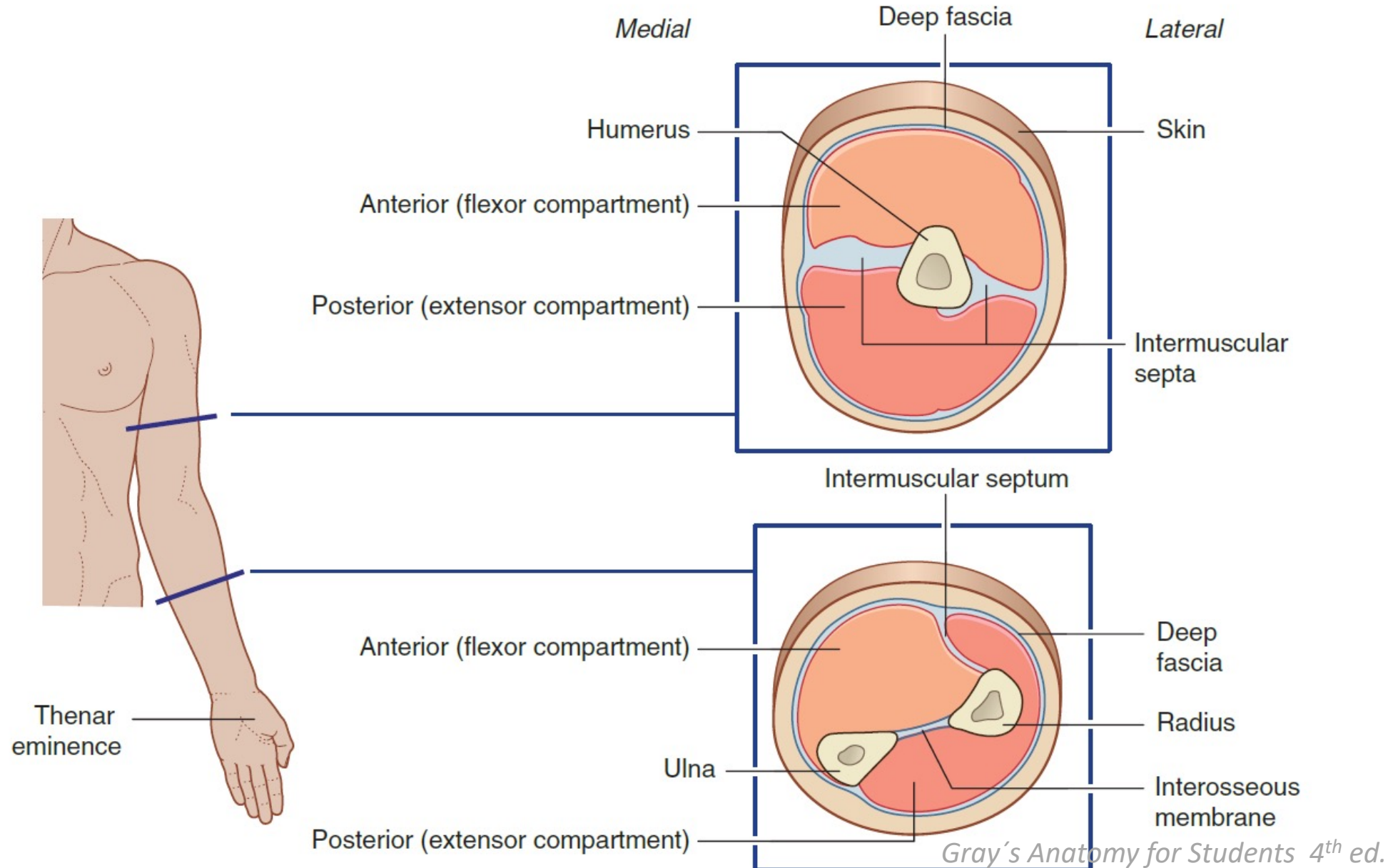


Rotator cuff muscles

- ♦ *M. pectoralis major*
- ♦ *M. latissimus dorsi*
- ♦ *M. teres major*
- ♦ *M. subclavius*
- ♦ **M. deltoideus**
- ♦ **Rotator cuff muscles**
- ♦ **M. subscapularis**
- ♦ **M. supraspinatus**
- ♦ **M. infraspinatus**
- ♦ **M. teres minor**
- ♦ *M. biceps brachii*
- ♦ *M. triceps brachii*
- ♦ *M. coracobrachialis*



Muscular spaces



Arm and elbow

- ♦ **Brachium - antebrachium**

- ♦ ***M. biceps brachii***

- ♦ *Tuberositas radii*

- ♦ *Aponeurosis m. bicipiti*

- ♦ ***M. brachialis***

- ♦ *Tuberositas ulnae*

- ♦ ***M. triceps brachii***

- ♦ *Olecranon*

- ♦ ***Mm. extensores antebrachii***

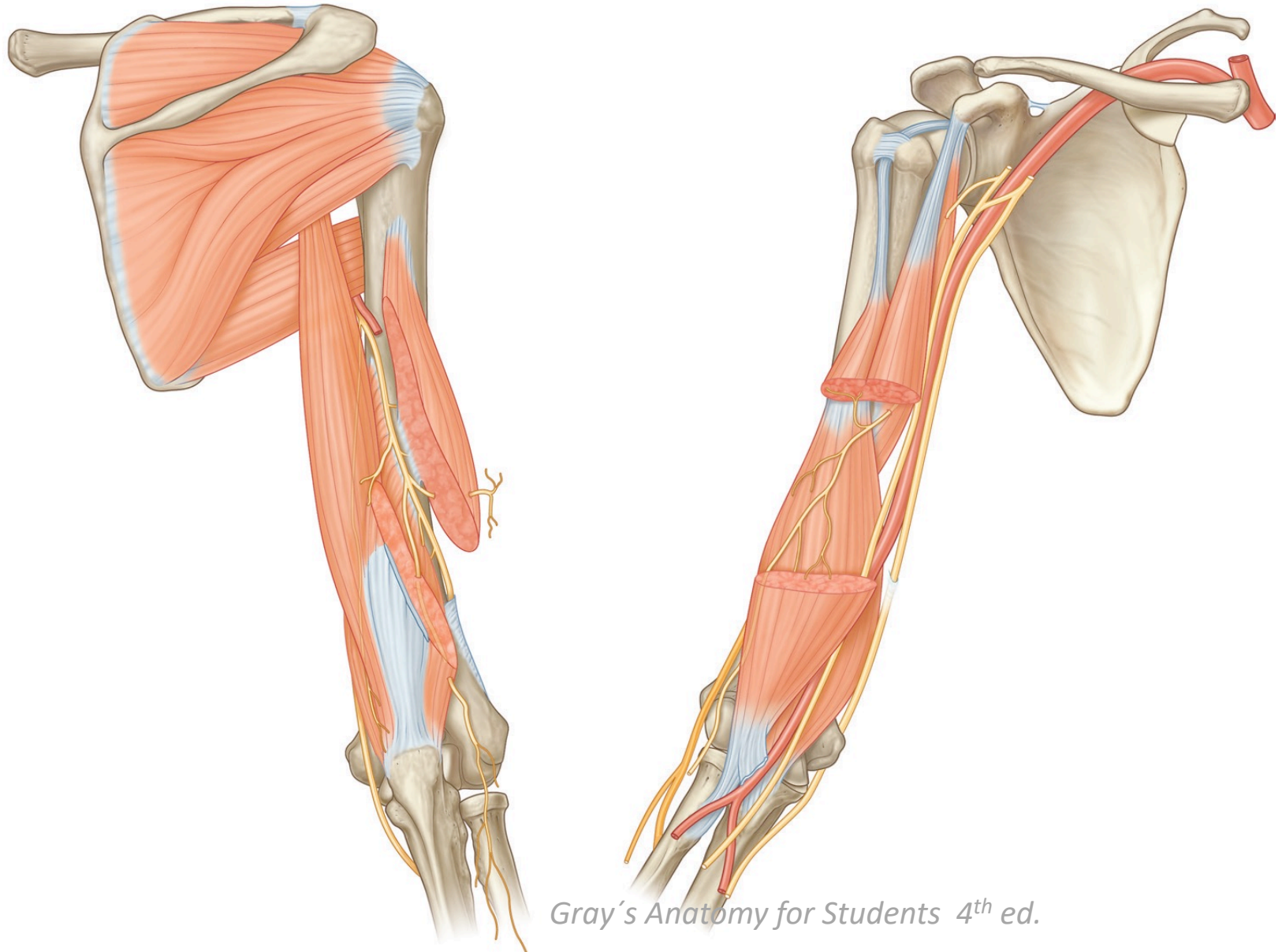
- ♦ ***M. brachioradialis***

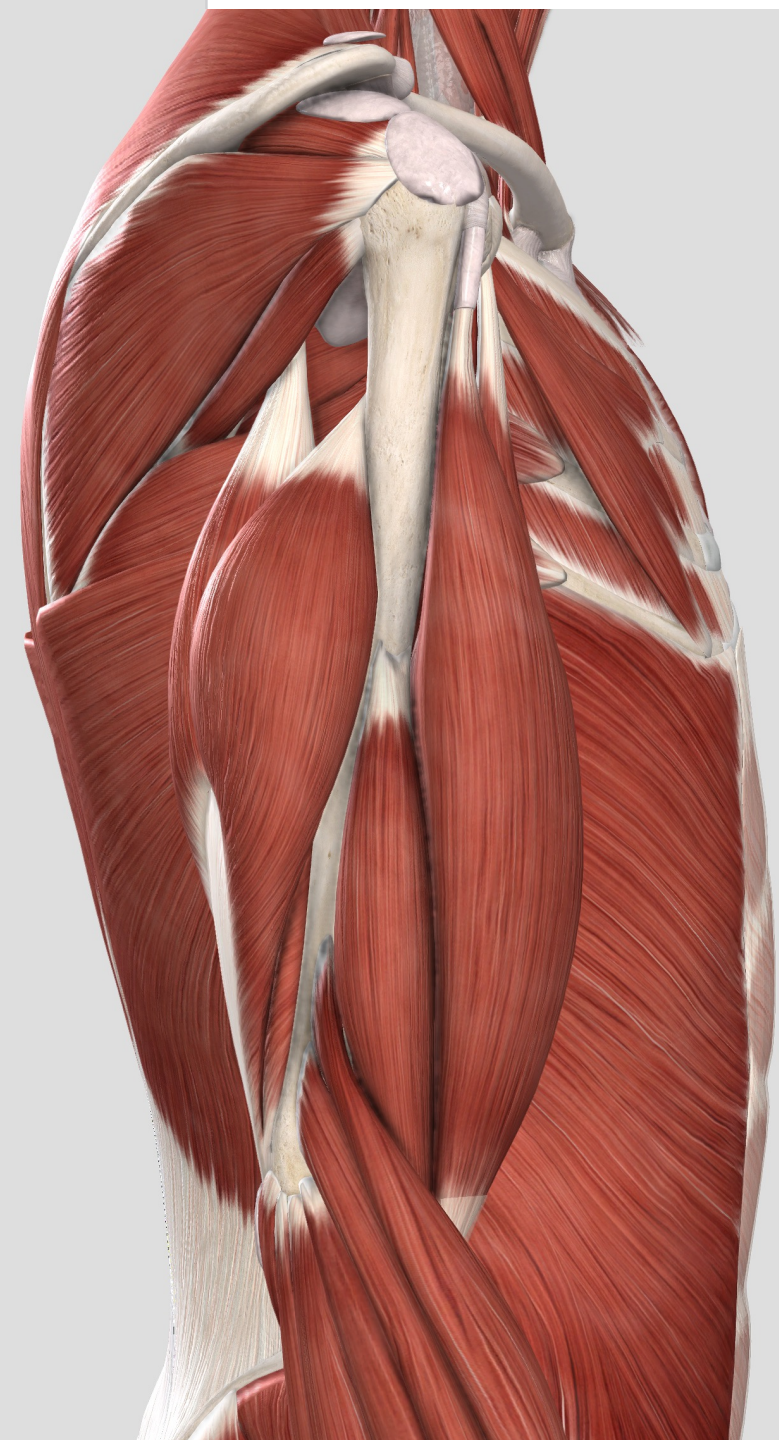
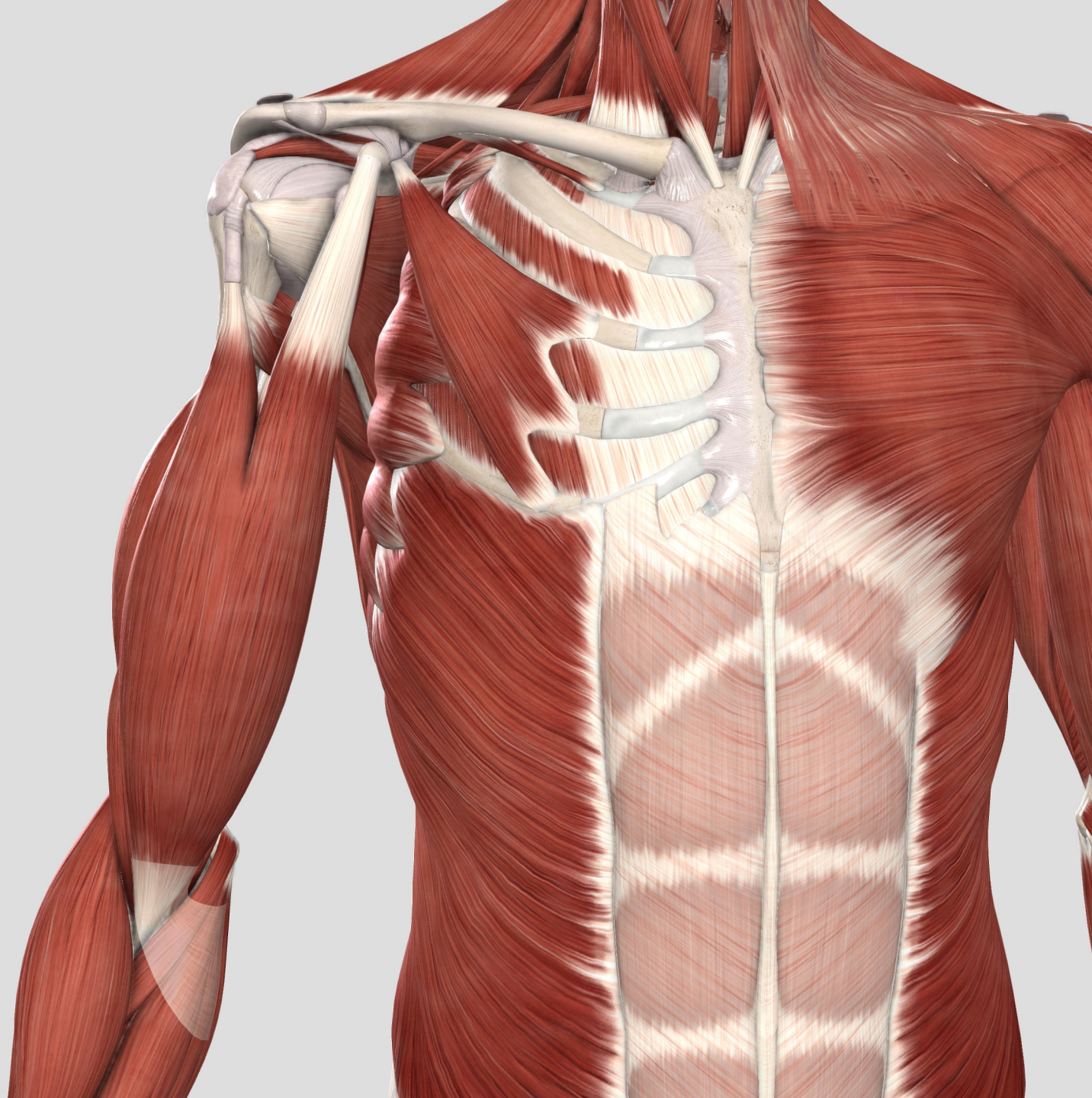
- ♦ *Epicondylus lateralis*

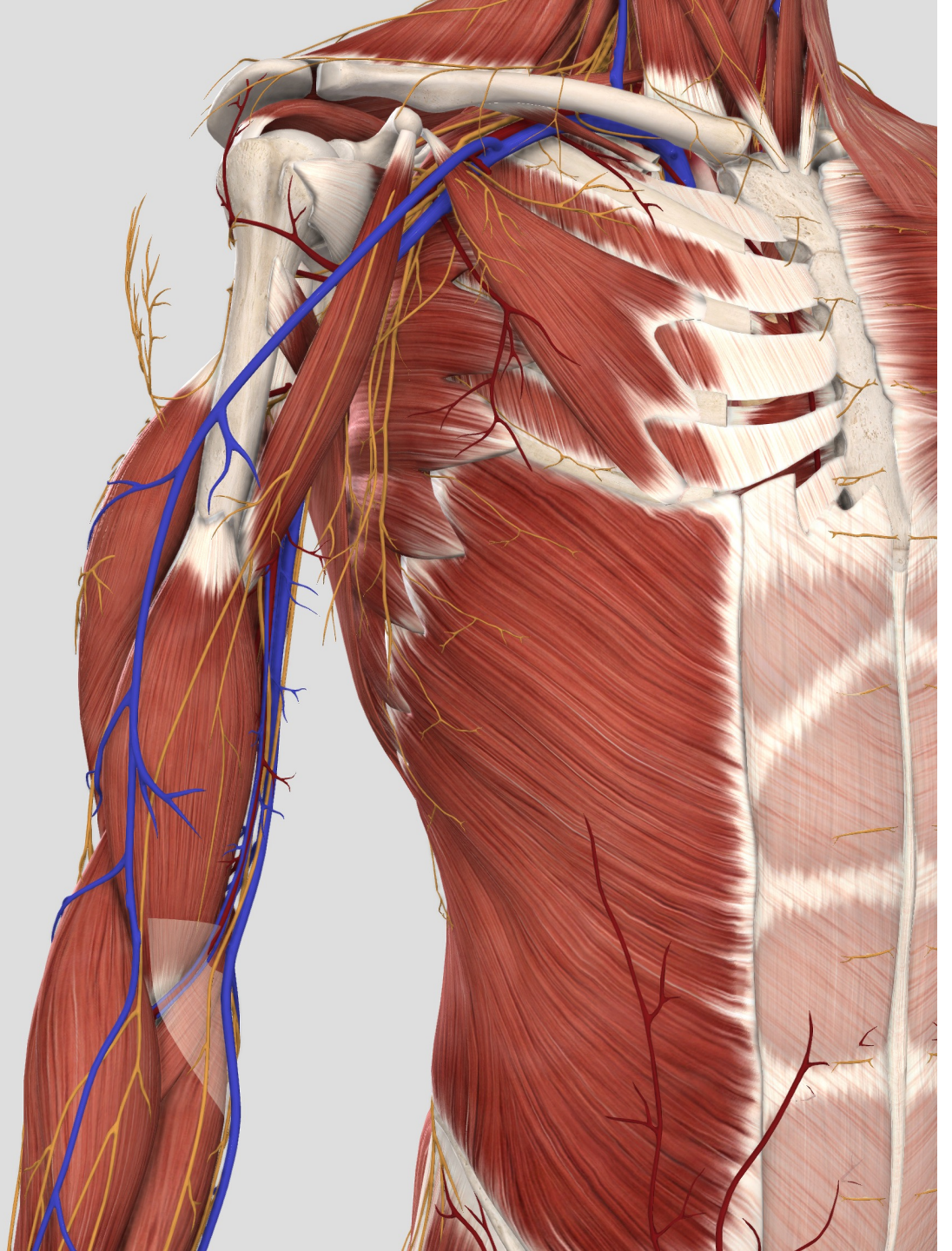
- ♦ ***Mm. flexores antebrachii***

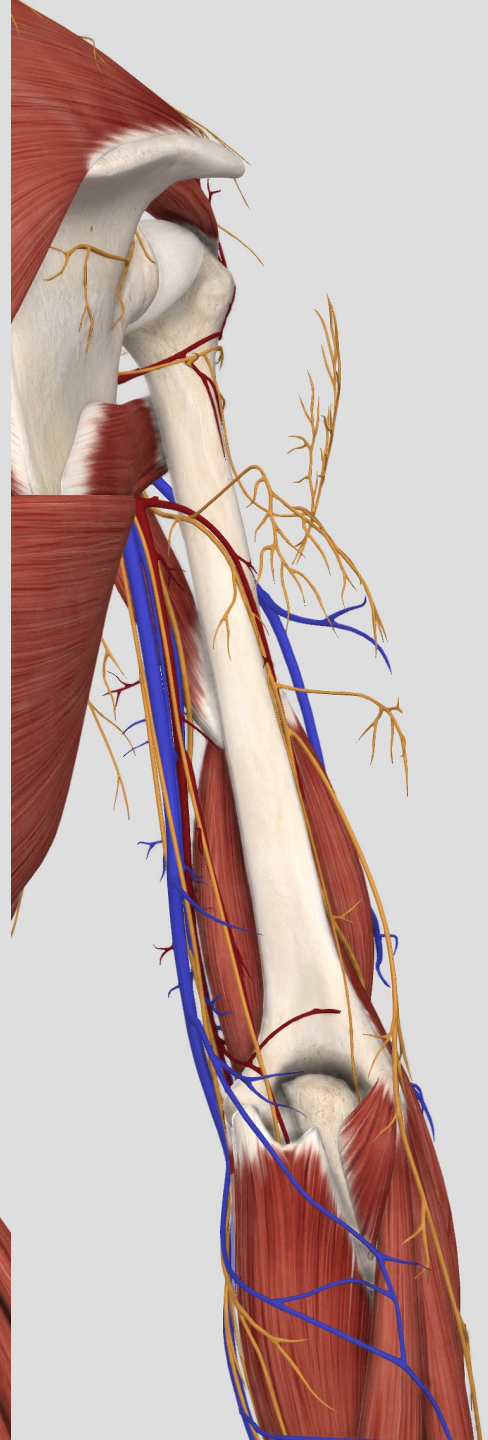
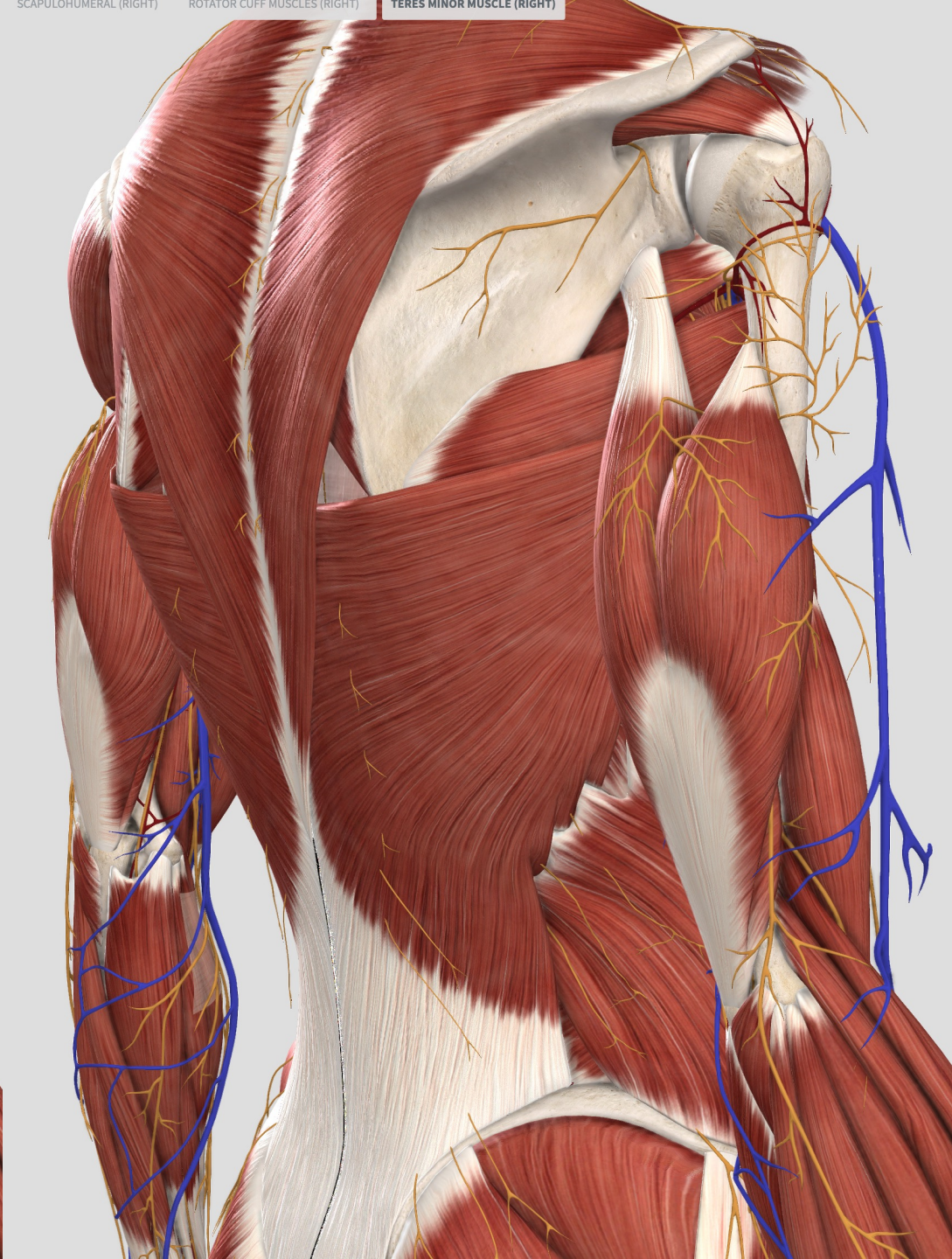
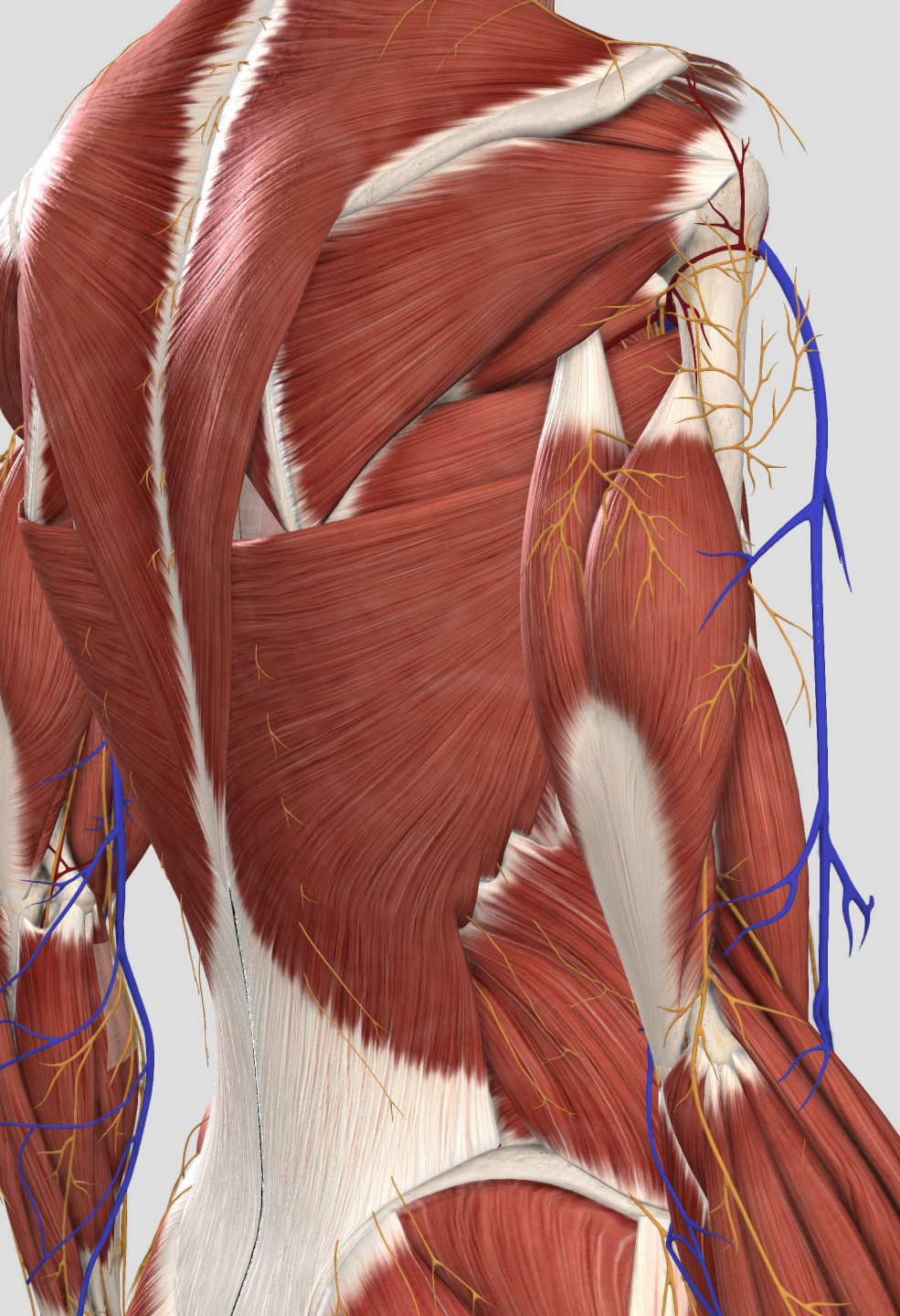
- ♦ ***M. pronator teres***

- ♦ *Epicondylus medialis*









mm. antebrachii ant.

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♦ mm. superficiales

♦ **M. flexor carpi ulnaris** (n. ulnaris)

- ♦ Olecranon + dorsum ulnae, epiconylus medialis humeri
- ♦ Os pisiforme (lig. pisohamatum, pisocarpalium)

♦ **M. palmaris longus** (n. medianus)

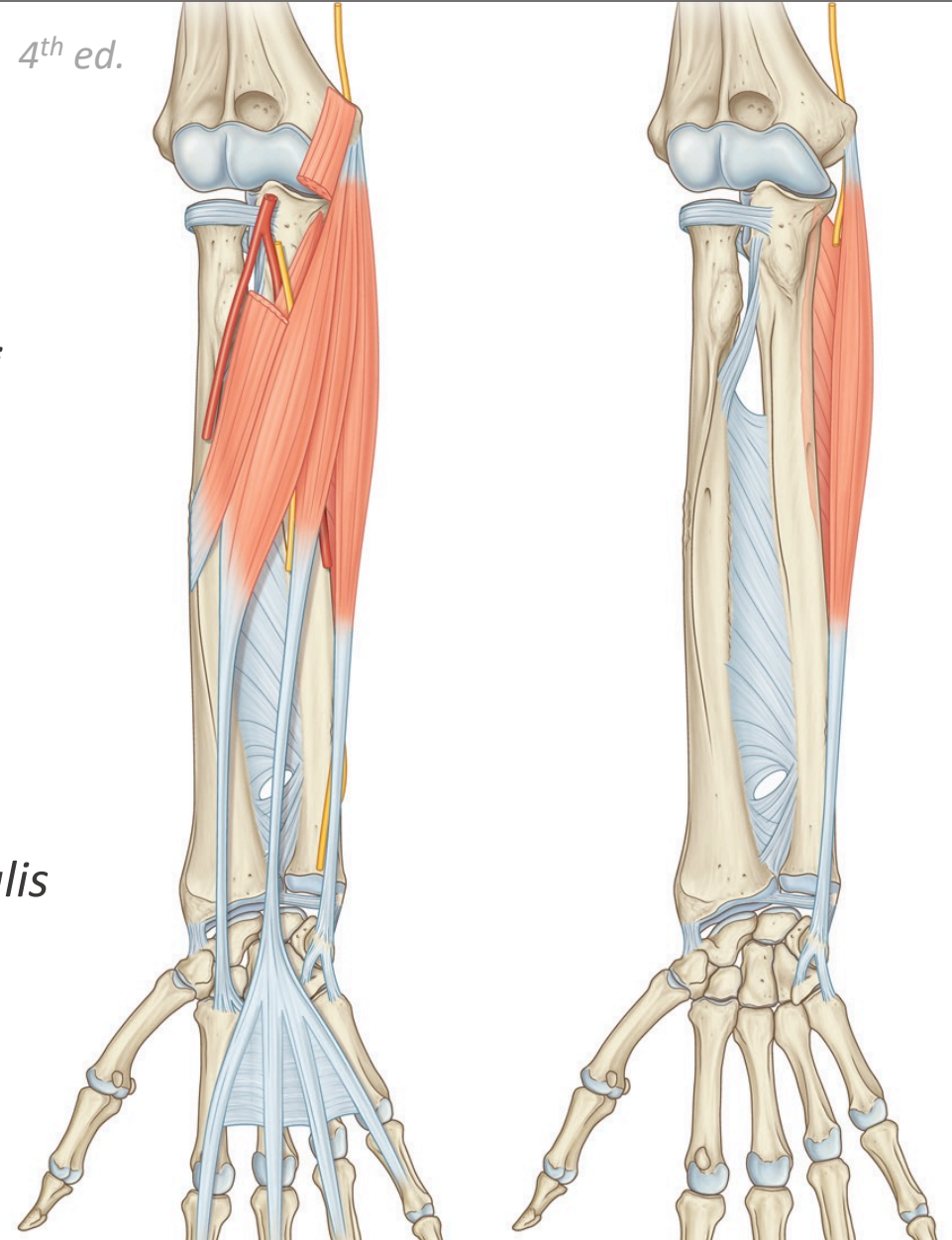
- ♦ Epicondylus medialis humeri
- ♦ Retinaculum flexorum + aponeurosis palmaris

♦ **M. flexor carpi radialis** (n. medianus)

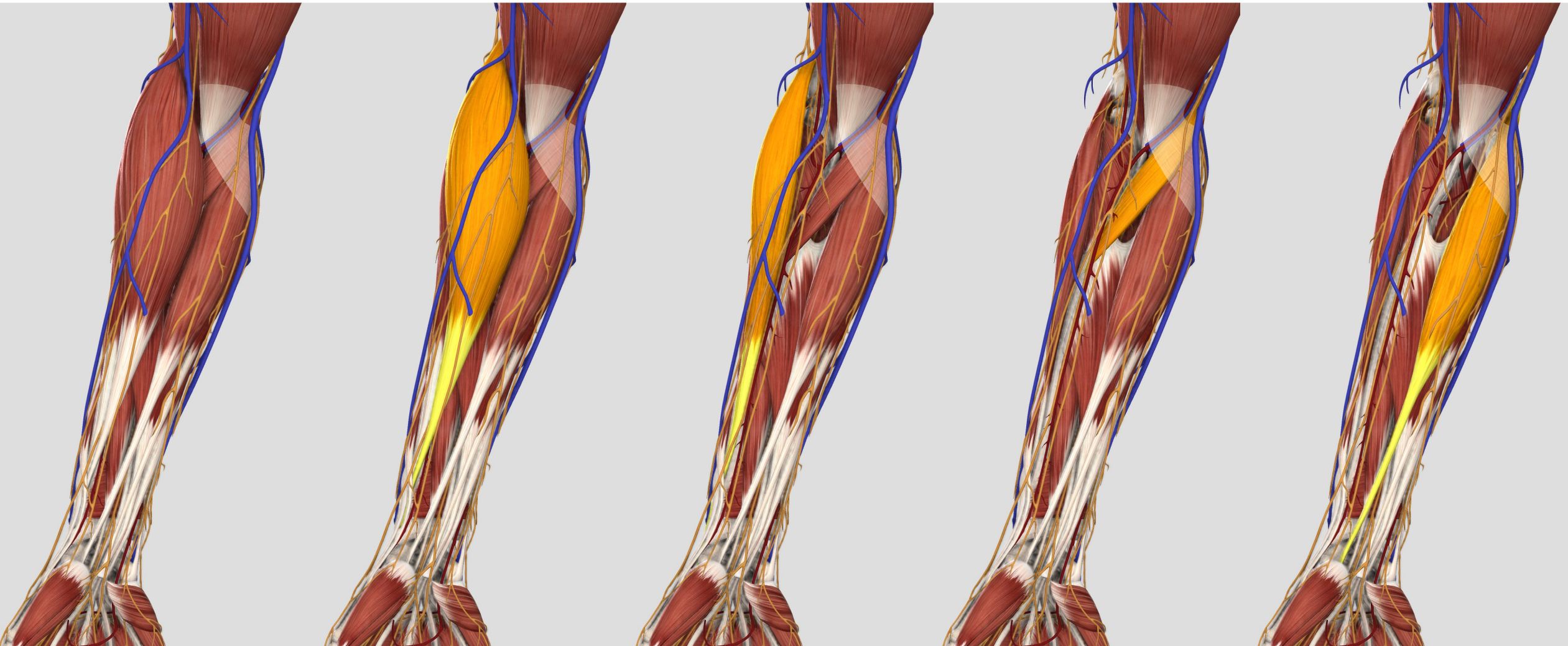
- ♦ Epicondylus medialis humeri
- ♦ Tendon laterally from medial space - palmaris a. radialis
- ♦ Base MTC II. et III.

♦ **M. pronator teres** (n. medianus)

- ♦ Epicondylus medialis humeri + processus coronoideus
- ♦ Outer surface of radius



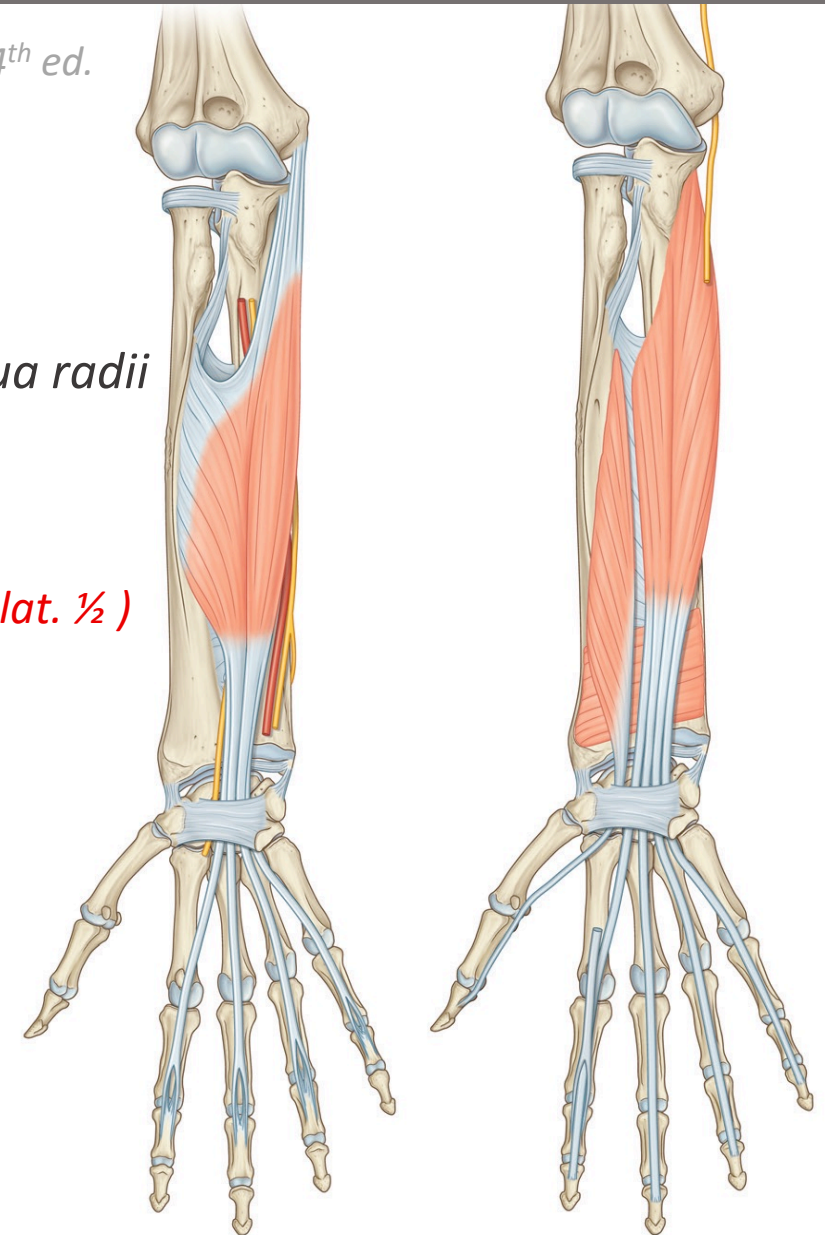
Flexores and extensores



mm. antebrachii ant.

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- ♦ Mm. **intermedii** et **profundi**
- ♦ **M. flexor digitorum superficialis** (*n. medianus*)
 - ♦ *Epicondylus medialis humeri + processus coronoideus; linea obliqua radii*
 - ♦ *Retinaculum flexorum*
 - ♦ *Phalanges medii II., III., IV., V.*
- ♦ **M. flexor digitorum profundus** (*n. ulnaris - med. ½, n. medianus - lat. ½*)
 - ♦ *Ulna facies anterior prox. + membrana interossea (uln.)*
 - ♦ *Phalanges distales II., III., IV., V.*
- ♦ **M. flexor pollicis longus** (*n. medianus*)
 - ♦ *Radius facies anterior + membrana interossea (rad.)*
 - ♦ *Phalanx distalis pollicis*
- ♦ **M. pronator quadratus** (*n. medianus*)
 - ♦ *Ulna facies anterior dist. ----- Radius facies anterior*





mm. antebrachii post.

- ♦ **Superficiales - origines - epicondylus humeri lateralis, n. radialis**

- ♦ **M. brachioradialis**

- ♦ *Proximal from processus styloideus ulnae*

- ♦ **M. extensor carpi radialis longus**

- ♦ *Dorsum baseos MTC II.*

- ♦ **M. extensor carpi radialis brevis**

- ♦ *Dorsum baseos MTC II. + III.*

- ♦ **M. extensor digitorum**

- ♦ *Aponeurosis dorsalis digiti II. - V.*

- ♦ **M. extensor digiti minimi**

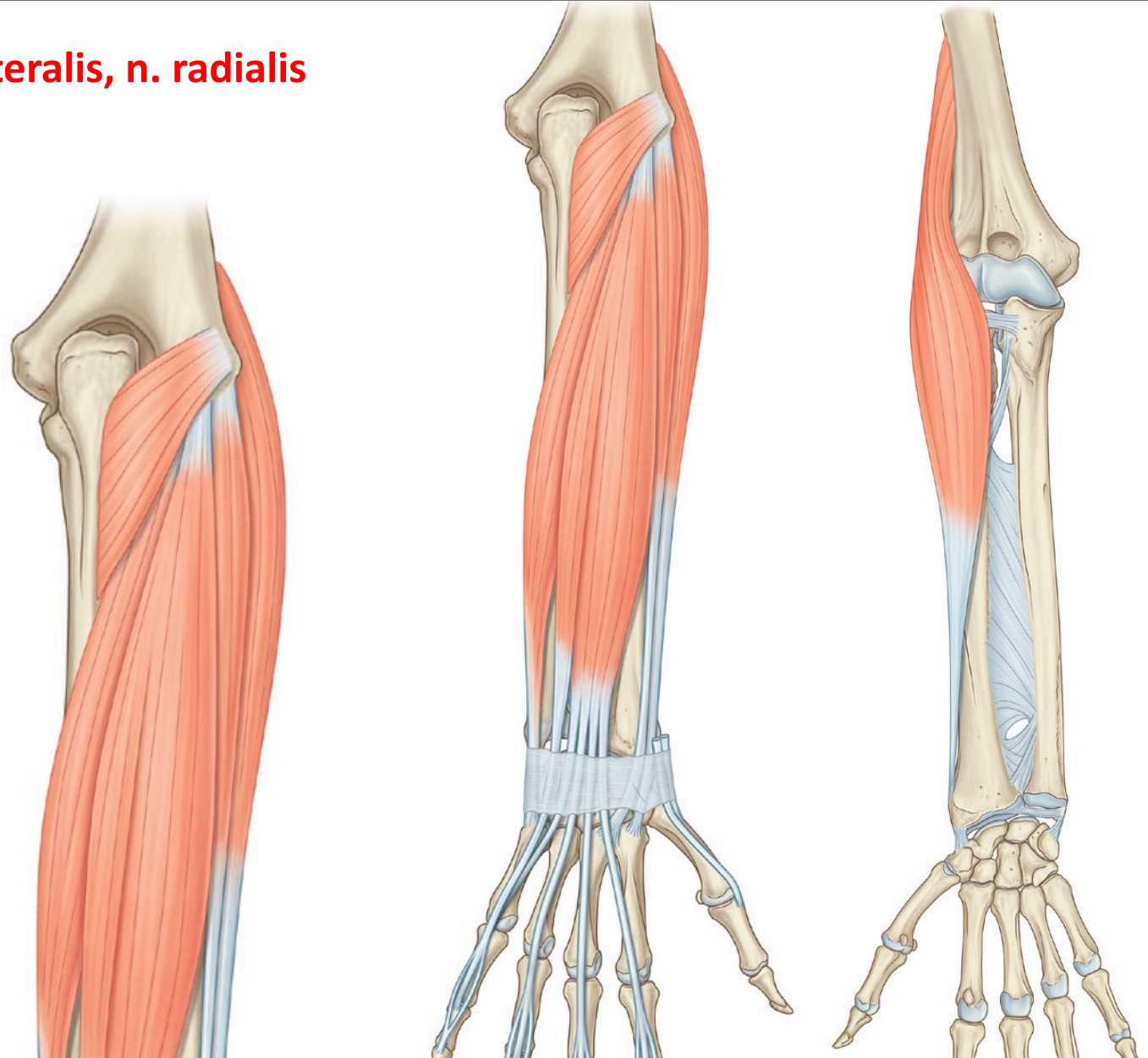
- ♦ *Aponeurosis dorsalis digiti minimi*

- ♦ **M. extensor carpi ulnaris**

- ♦ *Basis MTC V.*

- ♦ **M. anconeus**

- ♦ *Olecranon et facies dorsalis ulnae*



mm. antebrachii post.

♦ M. supinator

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- ♦ *Pars humeralis et pars ulnaris*
- ♦ *Radius facies anterior*

♦ M. abductor pollicis longus

- ♦ *Facies dorsalis ulnae, radii et membranae interossea*
- ♦ *Basis MTC I. - pars lateralis*

♦ M. extensor pollicis brevis

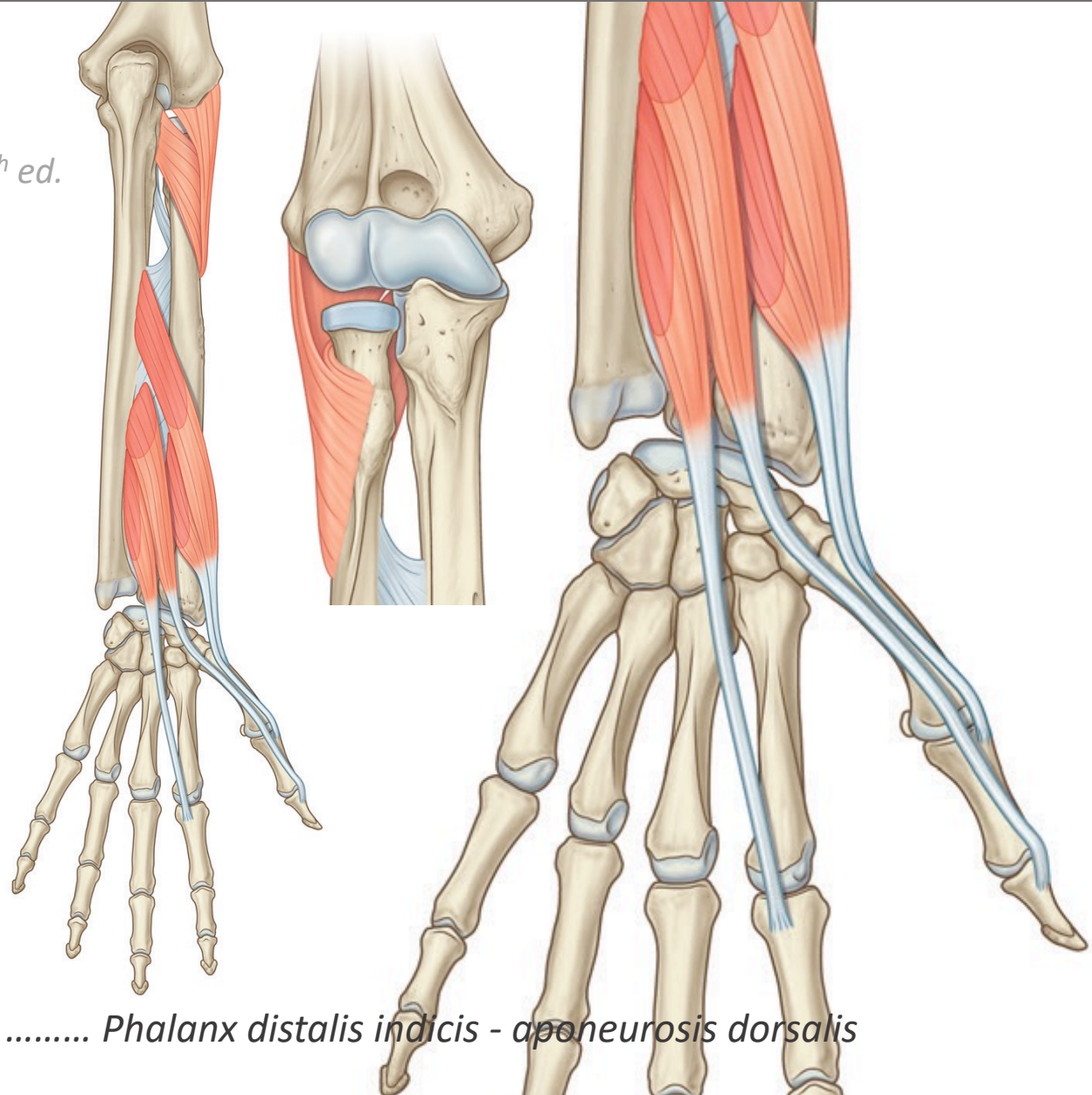
- ♦ *Facies dorsalis ulnae, radii et membranae interossea*
- ♦ *Phalanx basalis pollicis - dorsum*

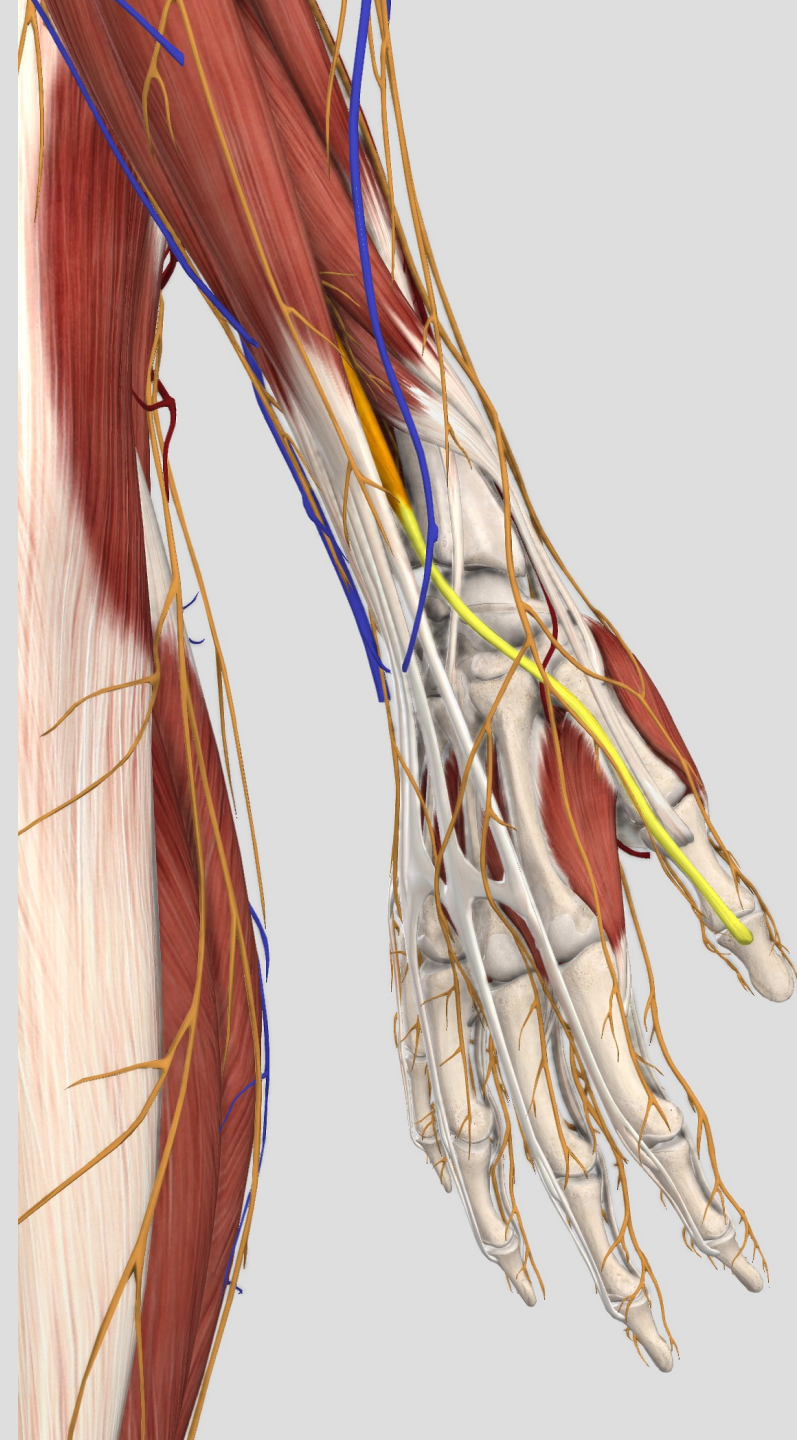
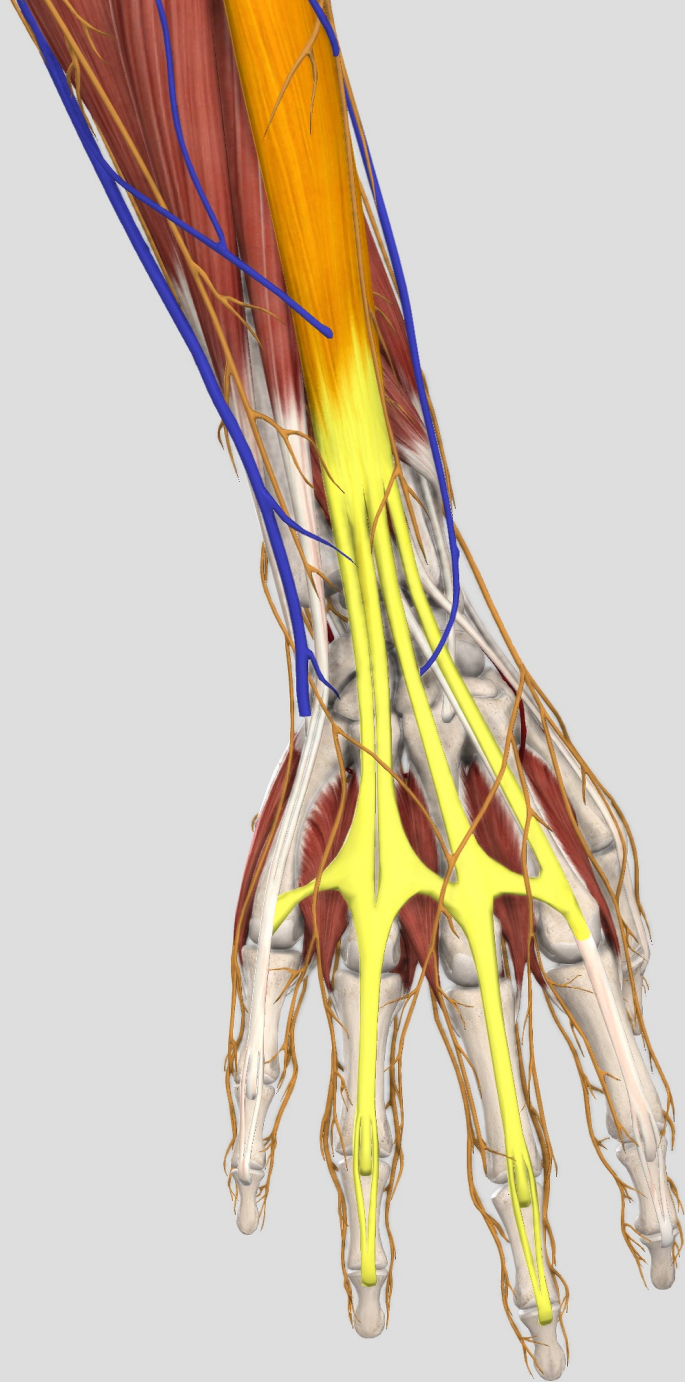
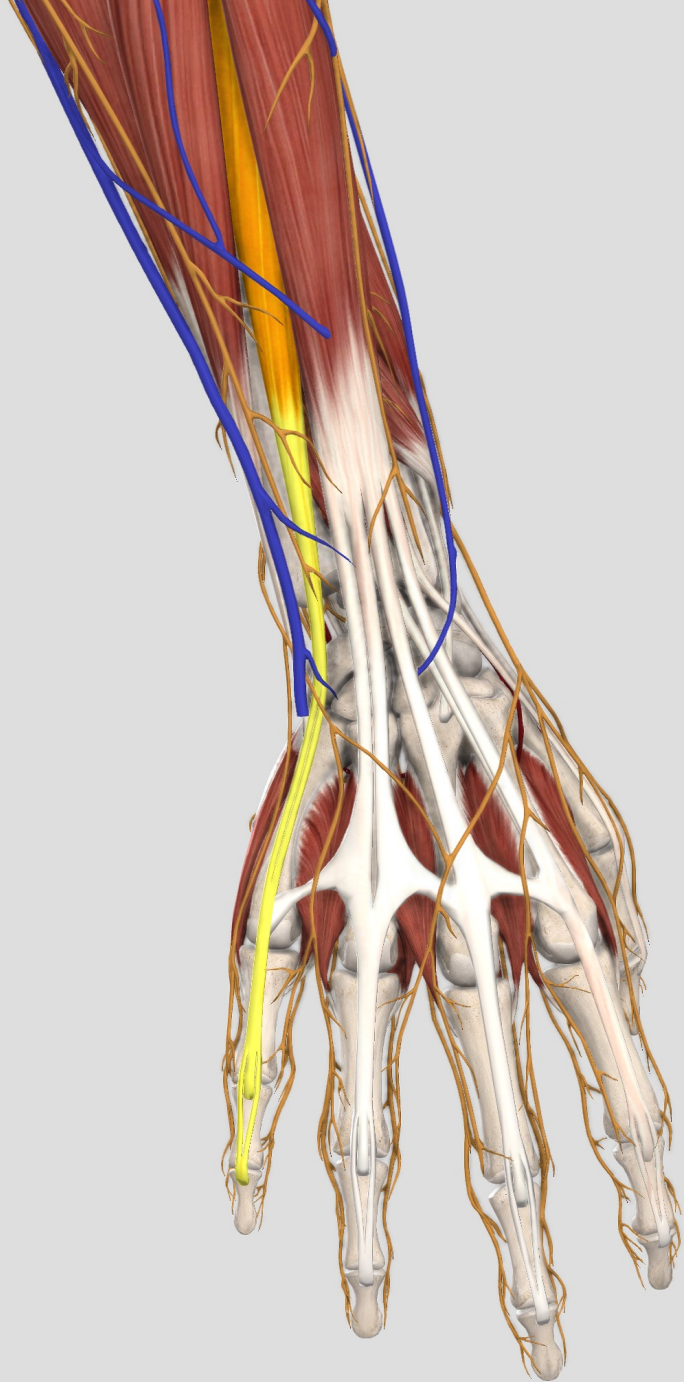
♦ M. extensor pollicis longus

- ♦ *Facies dorsalis ulnae, radii et membranae interossea*
- ♦ *Phalanx distalis pollicis - dorsum*

♦ M. extensor indicis

- ♦ *Facies dorsalis ulnae, radii et membranae interossea Phalanx distalis indicis - aponeurosis dorsalis*

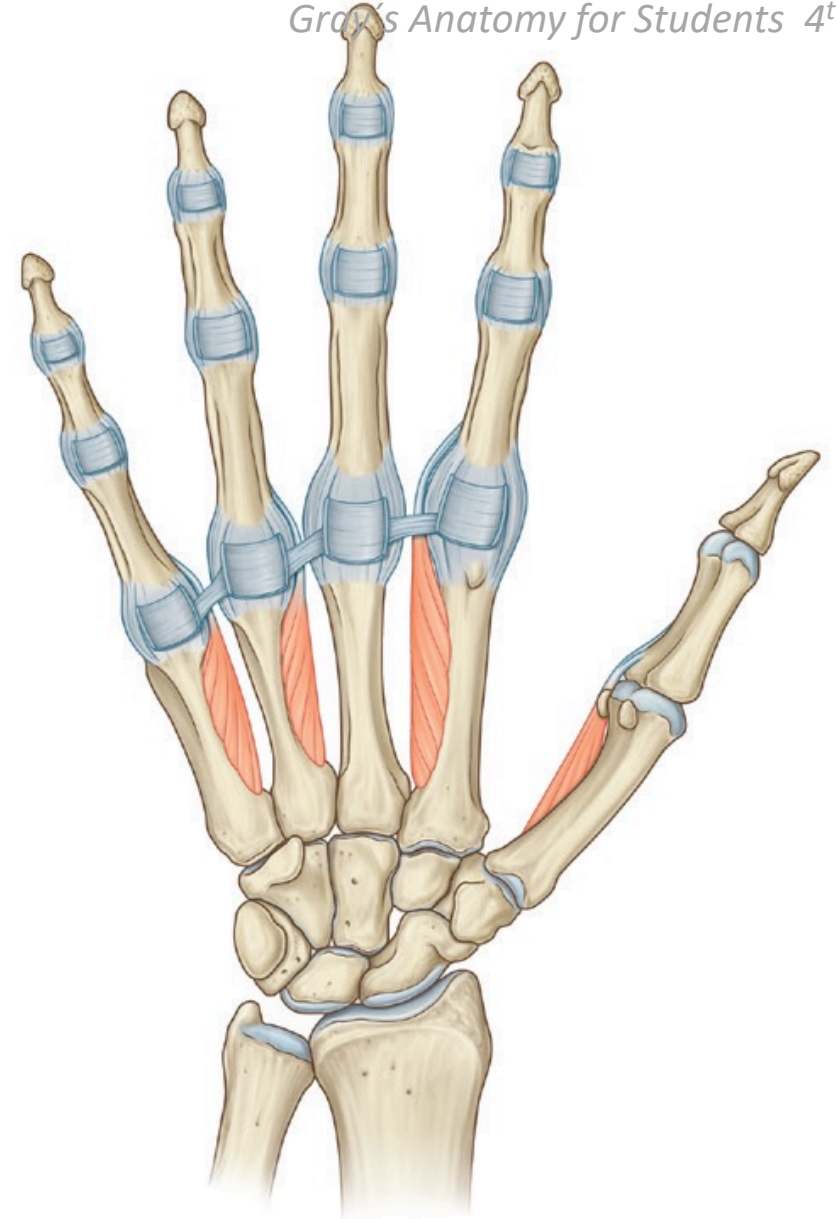
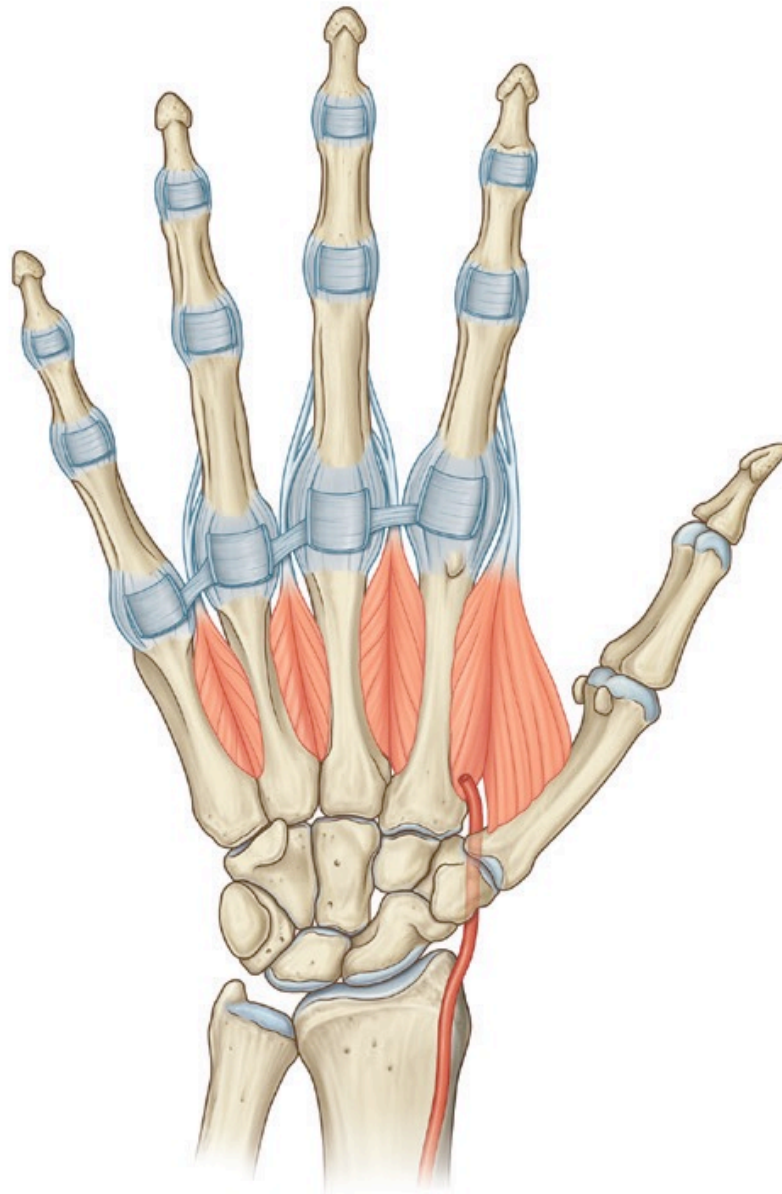




Musculi manus

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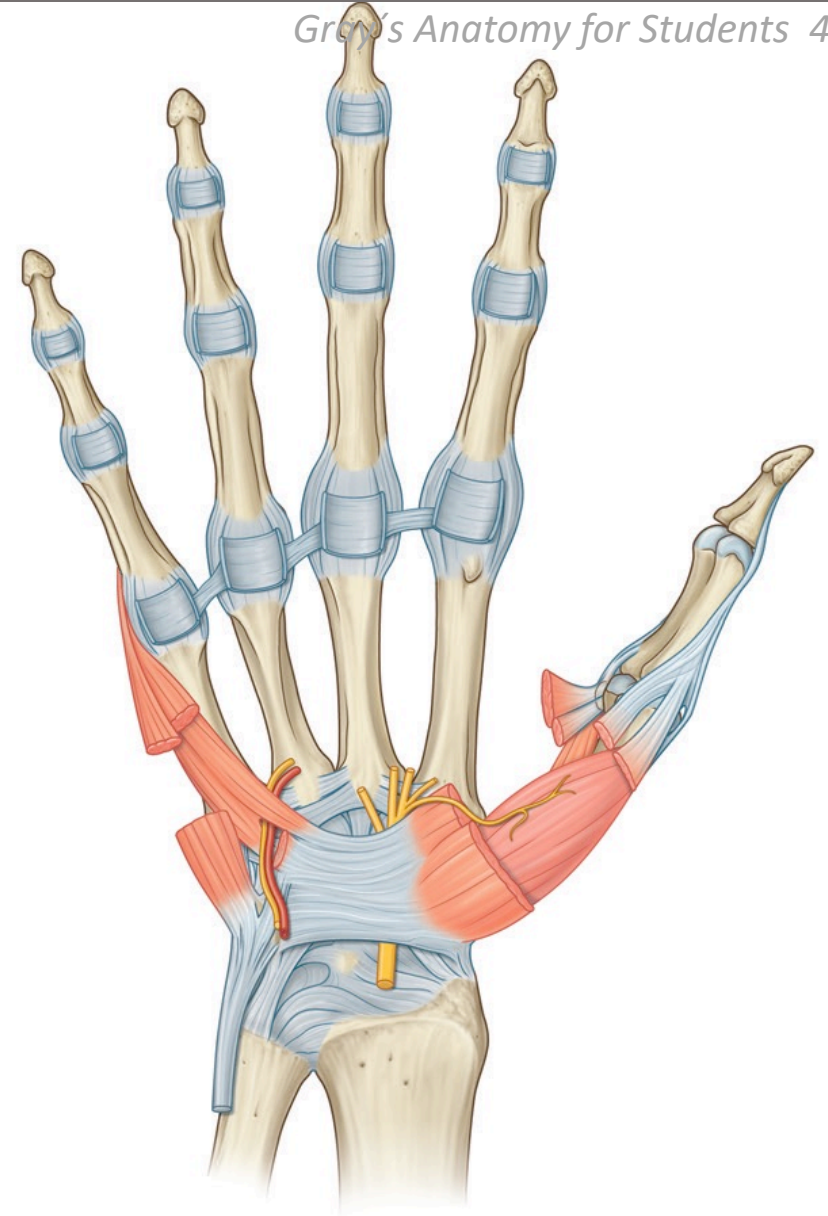
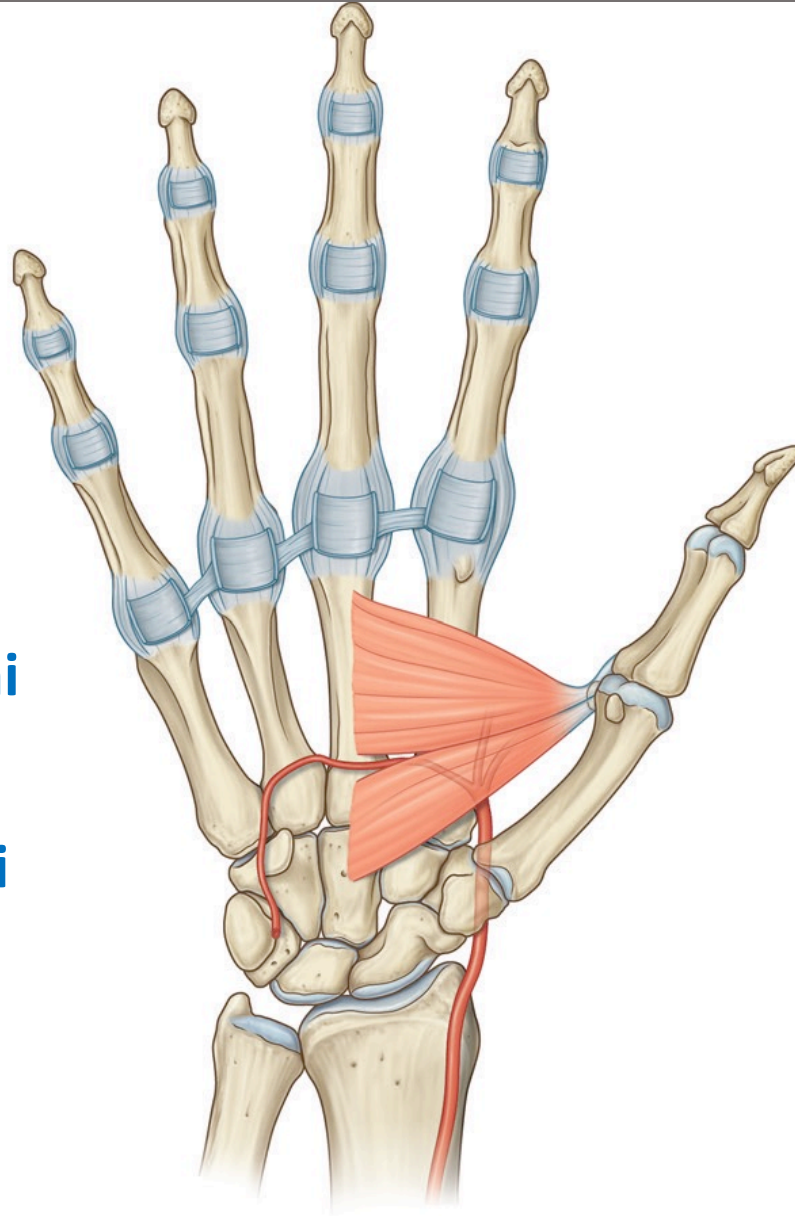
- ♦ Mm. interossei palmares
- ♦ Mm. interossei dorsales
- ♦ **M. adductor pollicis**
- ♦ **M. flexor pollicis brevis**
- ♦ **M. opponens pollicis**
- ♦ **M. adductor digiti minimi**
- ♦ **M. flexor digiti minimi**
- ♦ **M. opponens digiti minimi**
- ♦ **Mm. lumbricoidei**

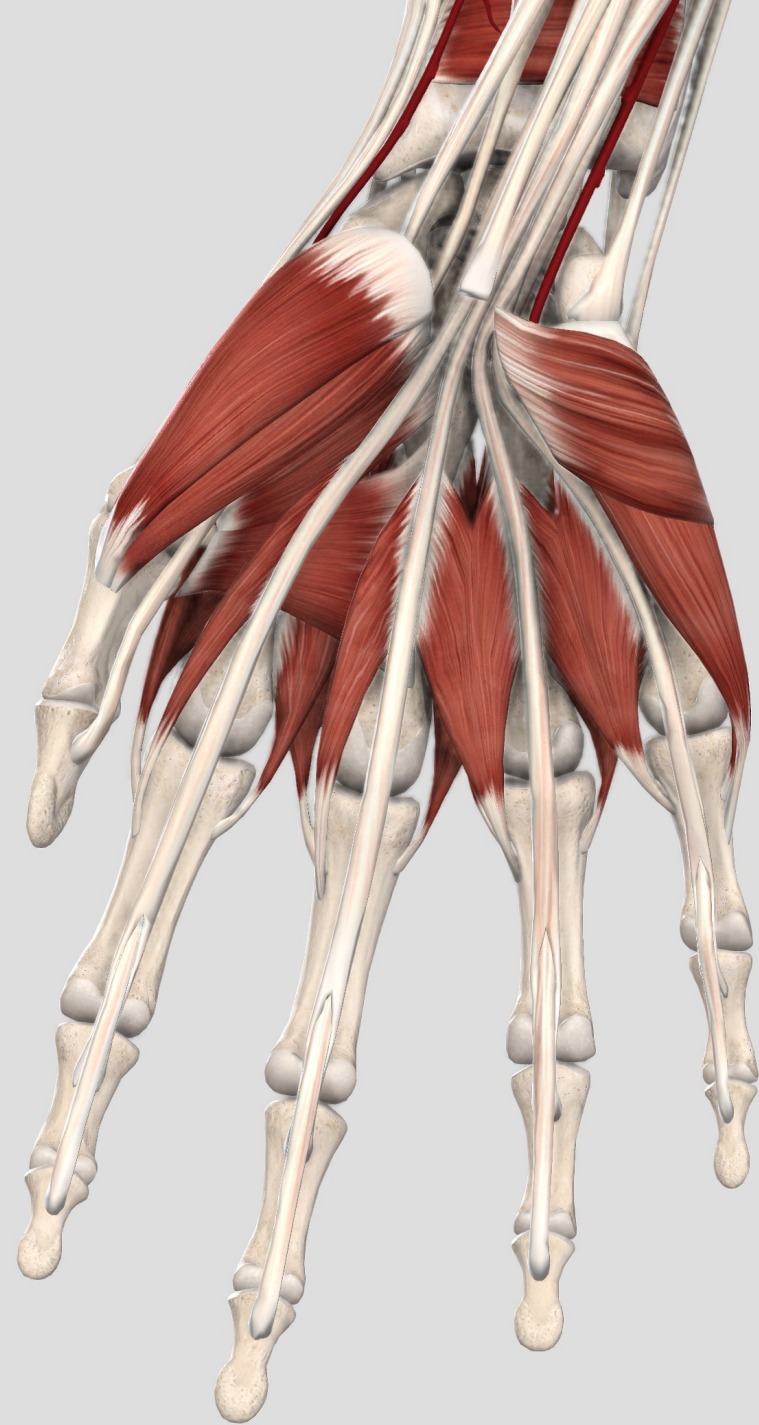
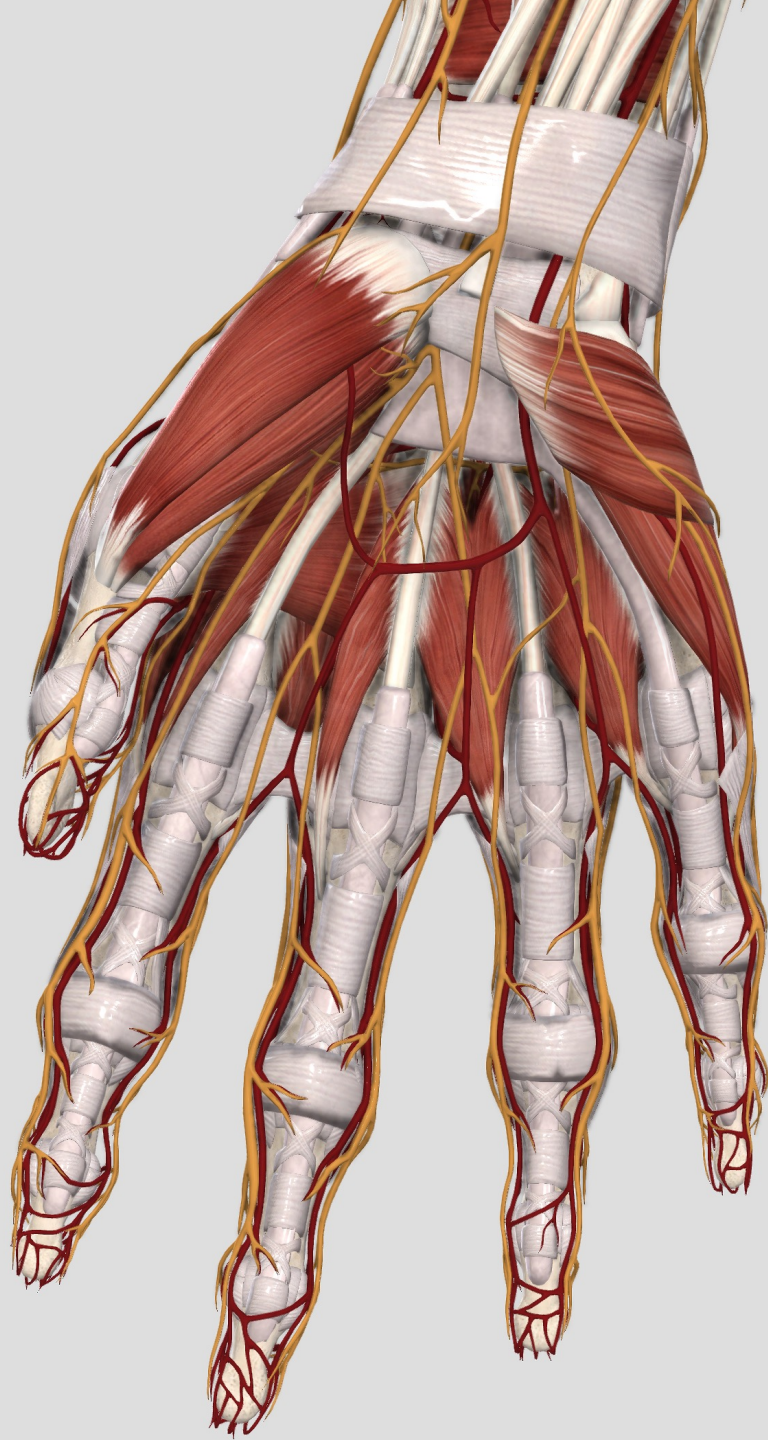


Musculi manus

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- ♦ Mm. interossei palmares
- ♦ Mm. interossei dorsales
- ♦ **M. adductor pollicis**
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- ♦ **M. opponens pollicis**
- ♦ **M. adductor digiti minimi**
- ♦ **M. flexor digiti minimi**
- ♦ **M. opponens digiti minimi**
- ♦ **Mm. lumbricoidei**

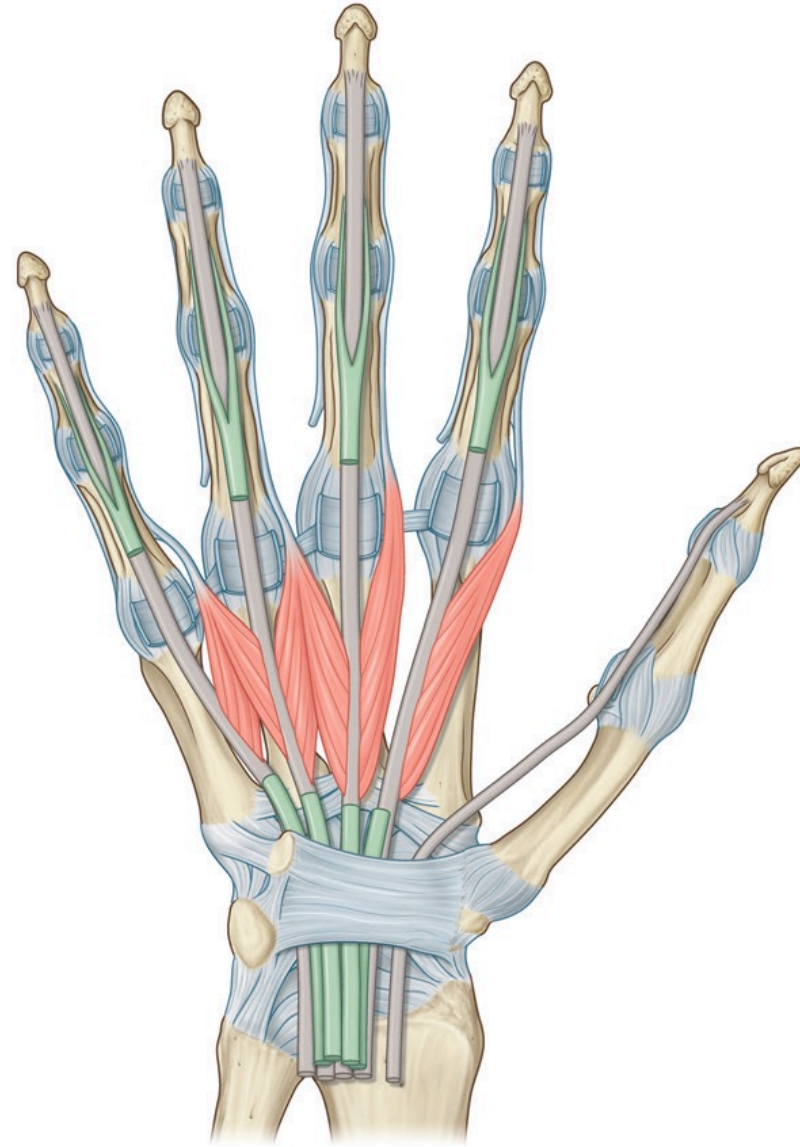




mm. lumbricoidei

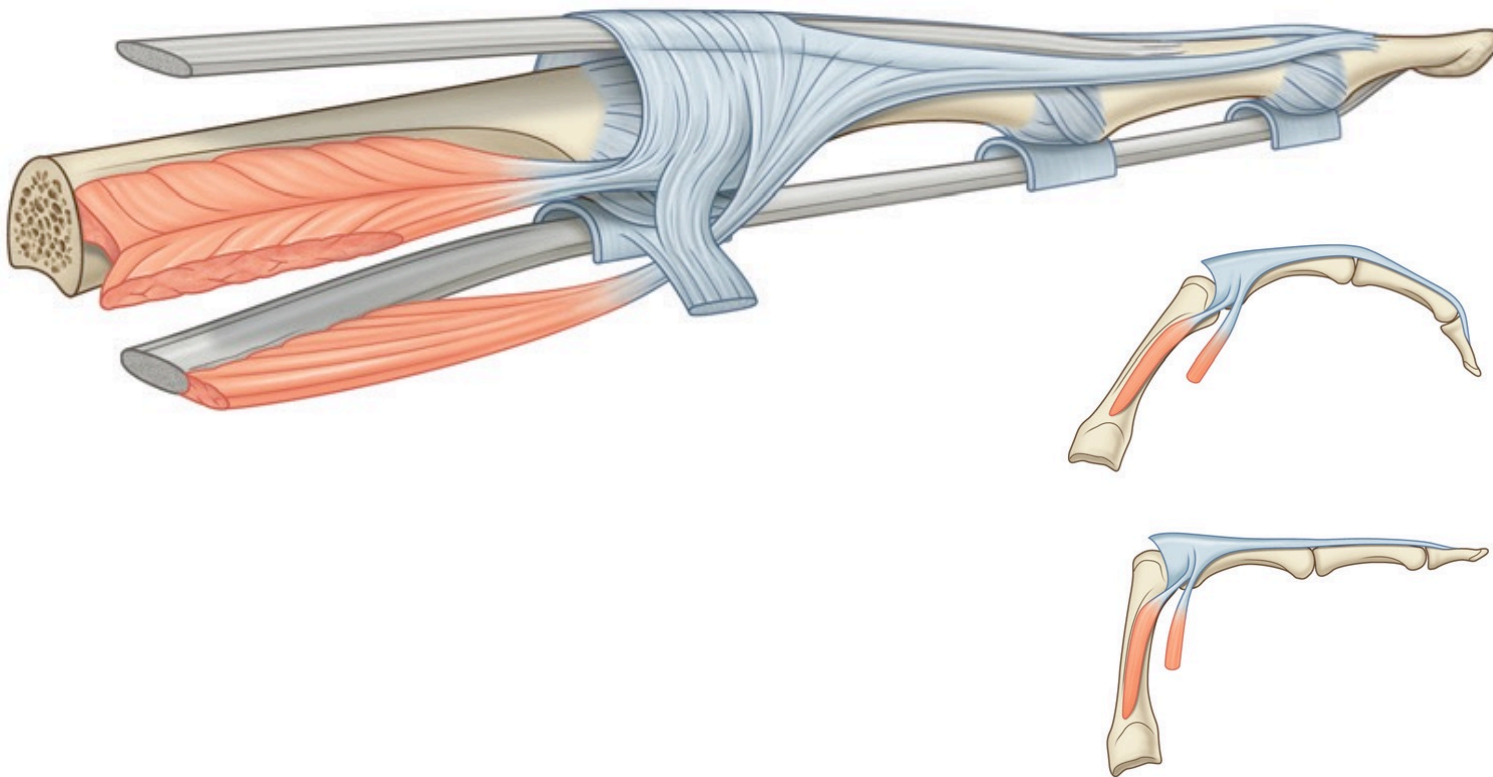
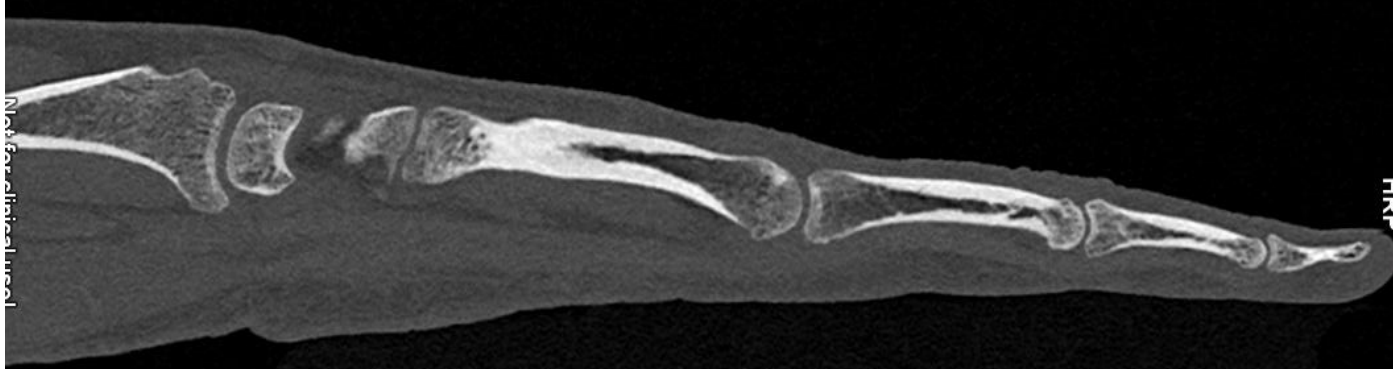
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- ♦ Mm. interossei palmares
- ♦ Mm. interossei dorsales
- ♦ **M. adductor pollicis**
- ♦ **M. flexor pollicis brevis**
- ♦ **M. oponens pollicis**
- ♦ **M. adductor digiti minimi**
- ♦ **M. flexor digiti minimi**
- ♦ **M. oponens digiti minimi**
- ♦ **Mm. lumbricoidei**



Musculi manus

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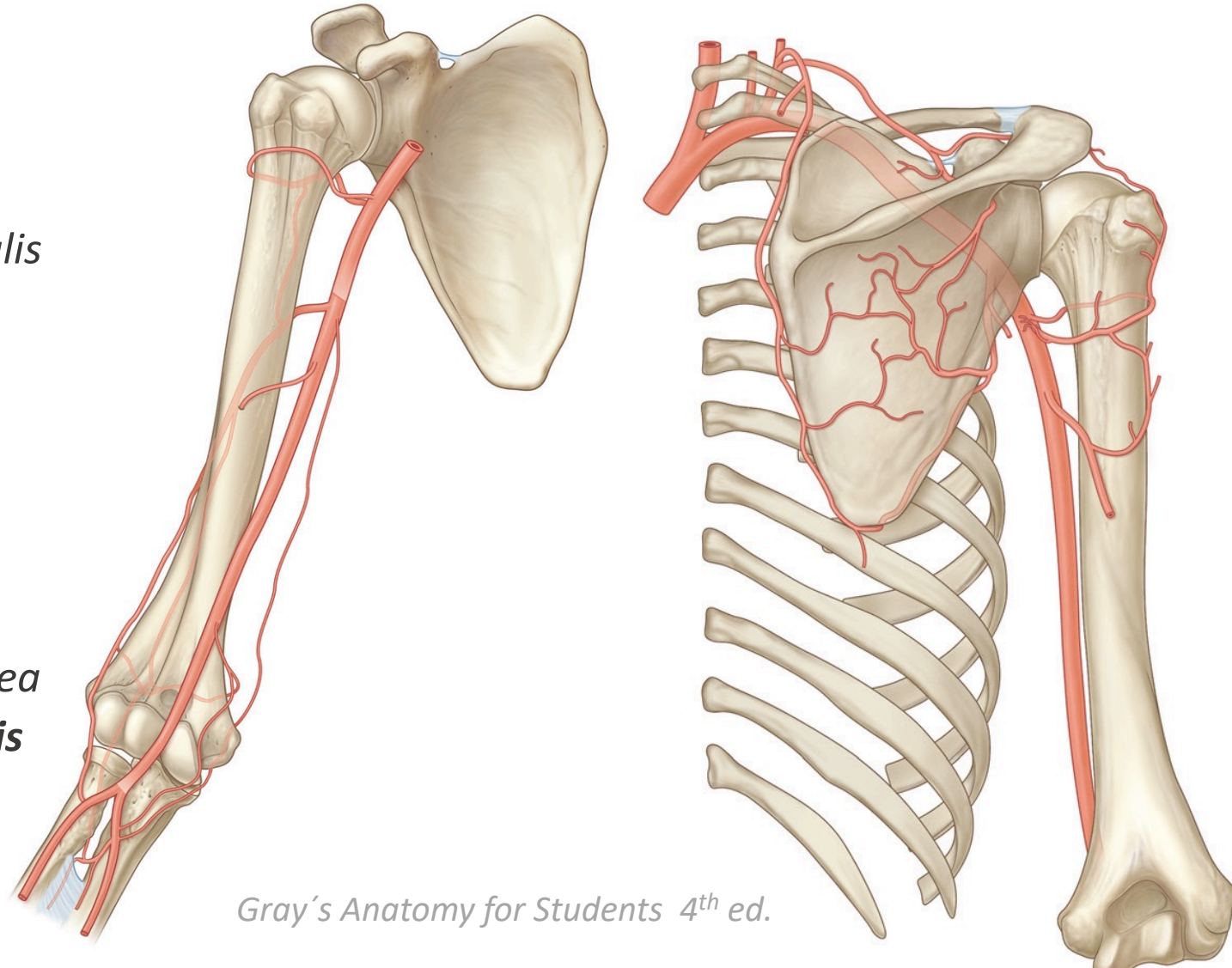


- ♦ **Mm. interossei palmares**
- ♦ **Mm. interossei dorsales**
- ♦ **M. lumbricoides**
- ♦ **Lig. palmare**
- ♦ **Lig. metacarpale transversum prof.**
- ♦ **M. flexor digitorum prof. tendo**
- ♦ **M. extensor digitorum - tendo**

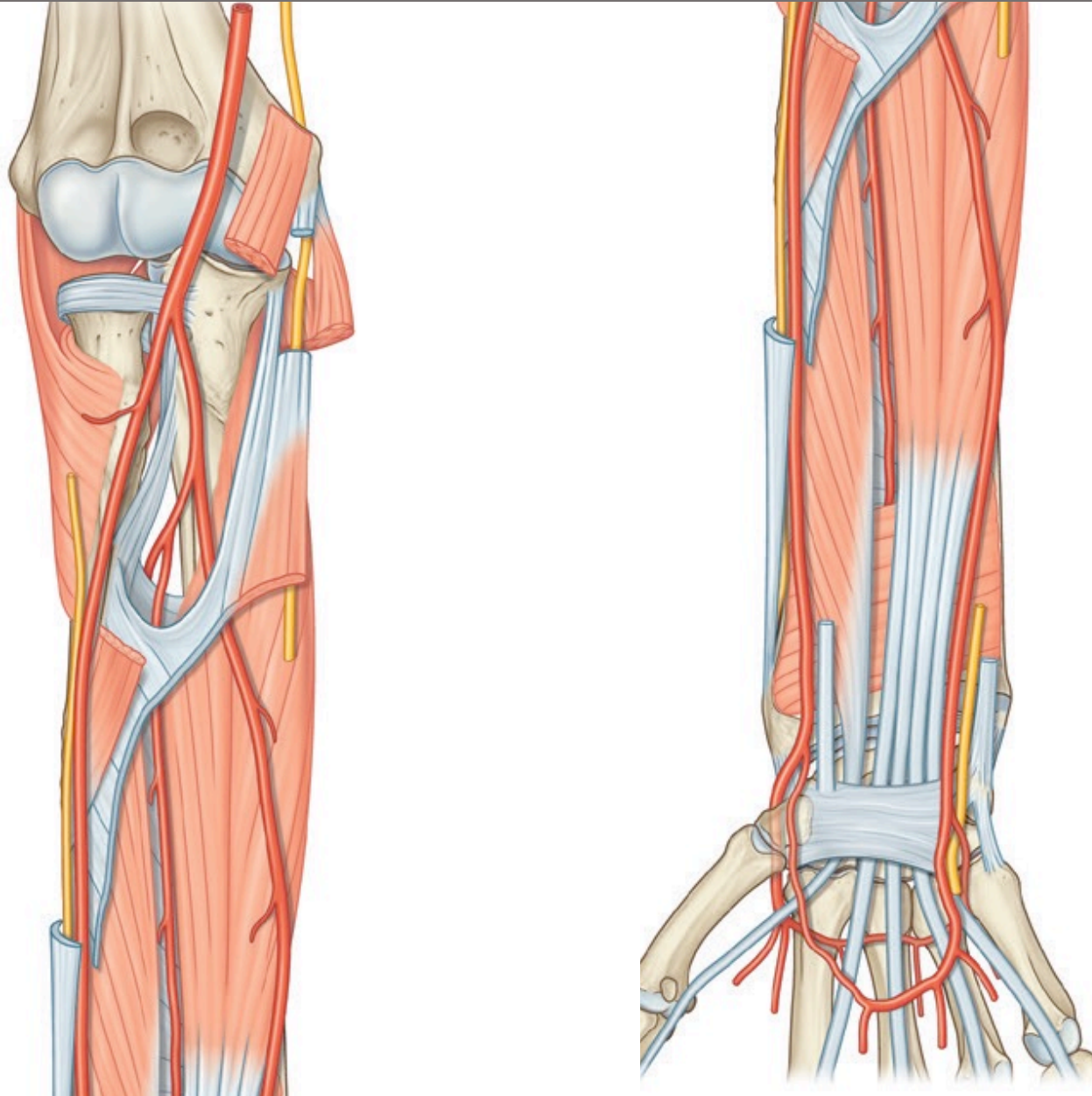
Arteriae membri superioris

- ♦ **A. axillaris (.... a. subclavia)**

- ♦ *A. circumflexa humeri ant. et post.*
- ♦ **A. brachialis**
- ♦ *A. profunda brachii - A. collateralis radialis*
- ♦ *A. collateralis ulnaris superior*
- ♦ *A. nutritia*
- ♦ *A. collateralis ulnaris inferior*
- ♦ **A. radialis**
- ♦ **A. ulnaris**
- ♦ *A. interossea ant. et post.*
- ♦ *Aa. recurentes - radialis, ulnaris, interossea*
- ♦ **Arcus palmaris profundus et superficialis**
- ♦ **A. transversa cervicis**
- ♦ **A. suprascapularis - A. circumflexa scapulae**



Arteriae antebrachii

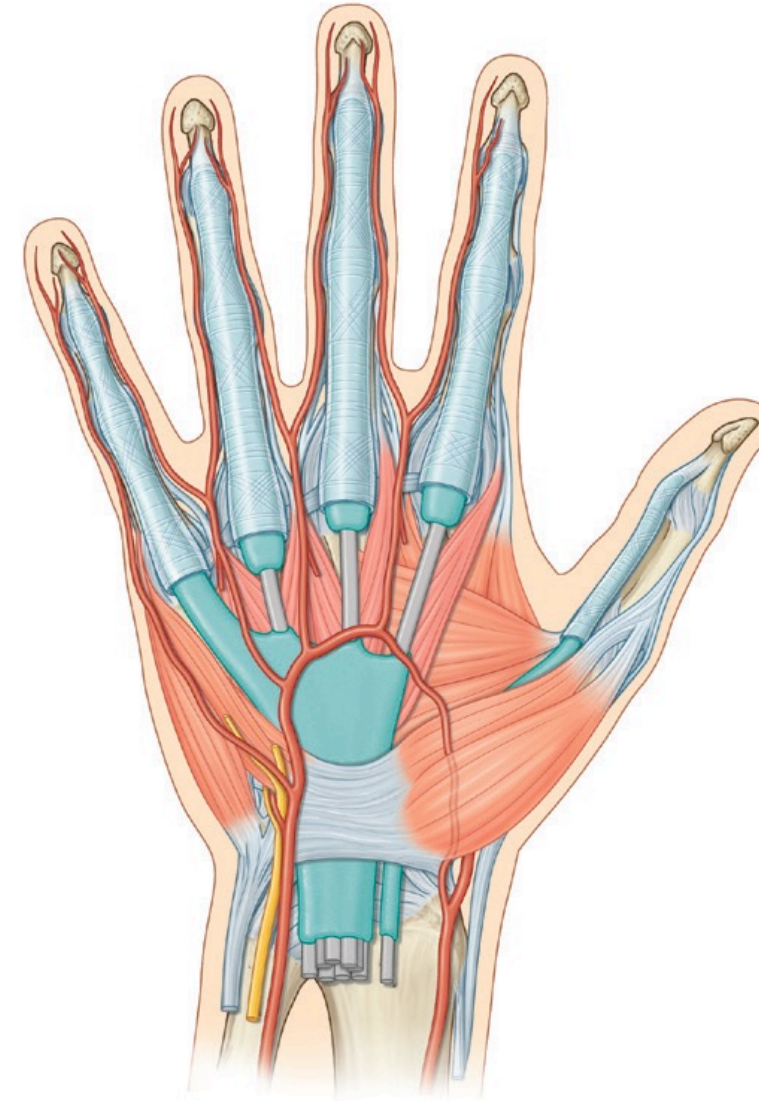
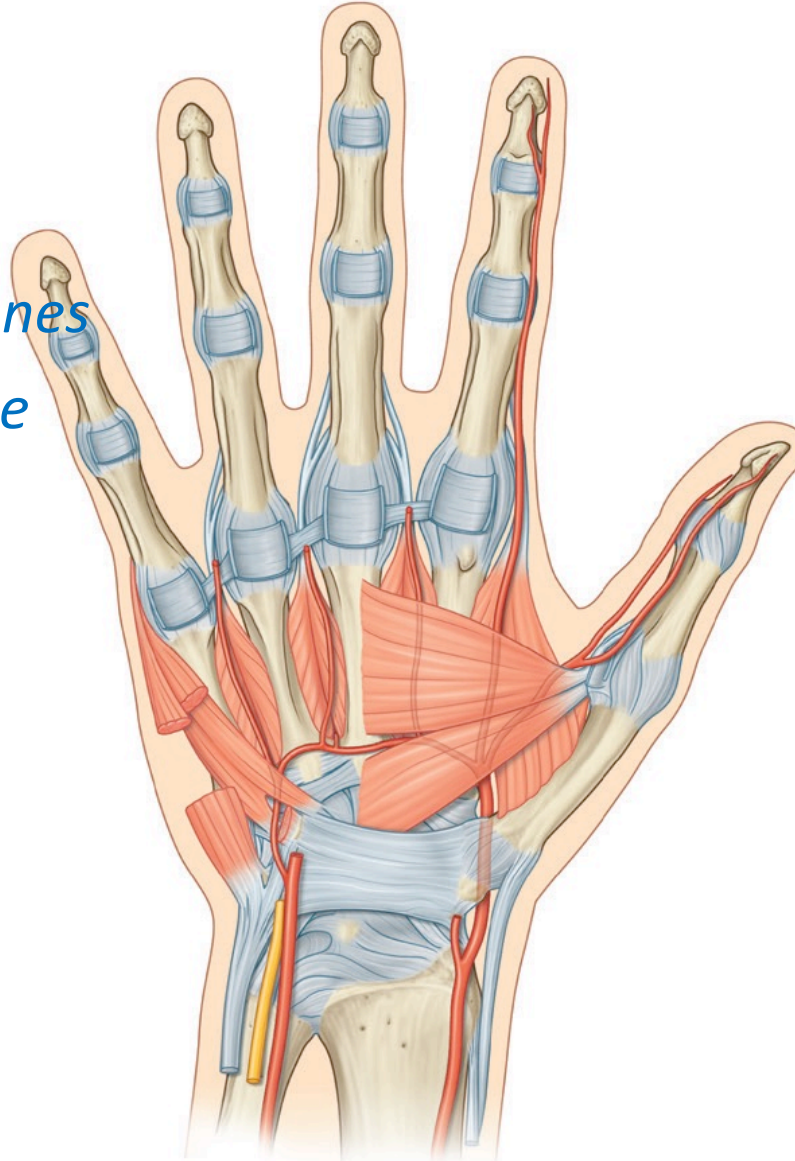


- ♦ ***A. radialis***
- ♦ ***A. ulnaris***
 - ♦ ***A. ulnaris recurrens (ant. et post.)***
 - ♦ ***A. interossea communis***
 - ♦ ***A. interossea anterior***
 - ♦ ***A. interossea posterior***
- ♦ ***Arcus palmaris superficialis***
- ♦ ***Arcus palmaris profundus***

Arcus palmaris superf. et prof.

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- ♦ **Arcus palmaris superficialis**
- ♦ **Delší oblouk**
- ♦ *Aa. digitales palmares communes*
- ♦ *Aa. digitales palmares propriae*
- ♦ **Arcus palmaris profundus**
- ♦ **Shorter arch**
- ♦ *Aa. metacarpales palmares*
- ♦ *A. radialis indicis*



Arcus dorsalis

- ♦ **Arcus arteriosus dorsalis**
- ♦ **Aa. metacapales dorsales**
- ♦ **A. princeps pollicis**
- ♦ **Aa. digitorum dorsales**
- ♦ **Aa. digitorum palmares propriae**
 - ♦ **Rami dorsales**

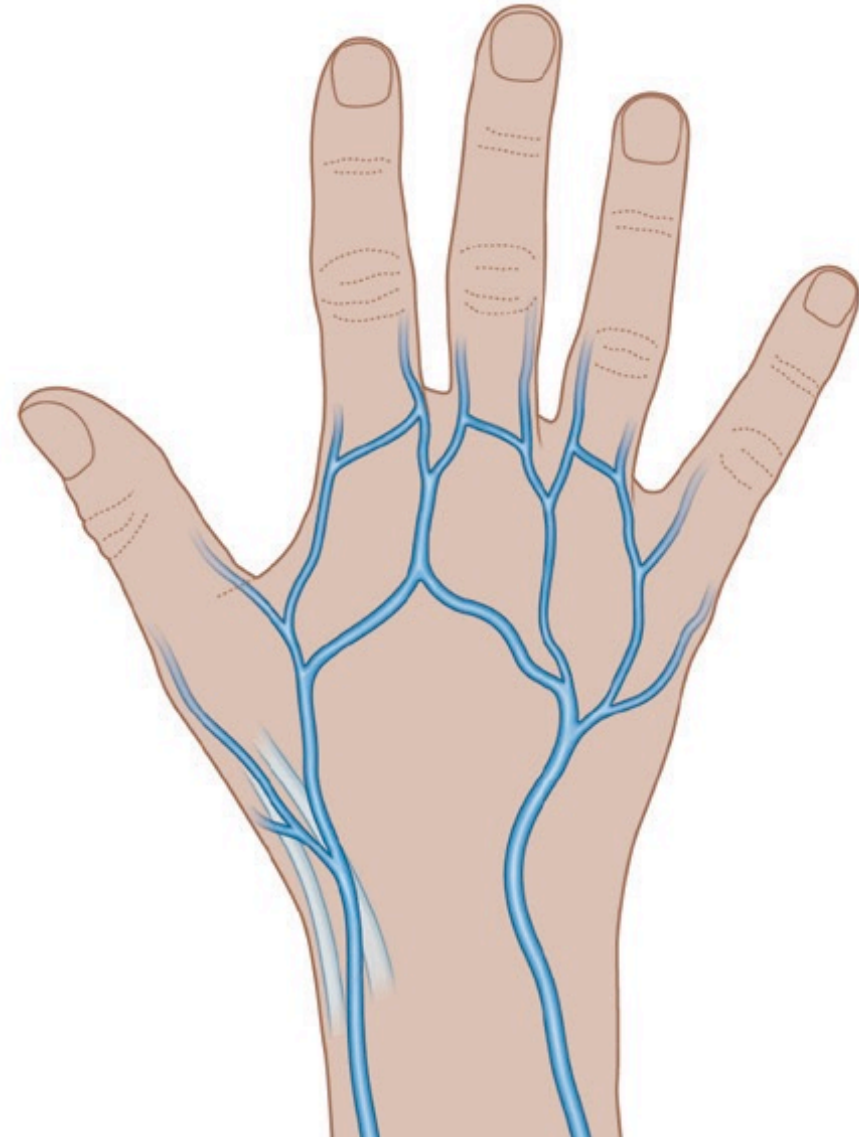




Venae manus

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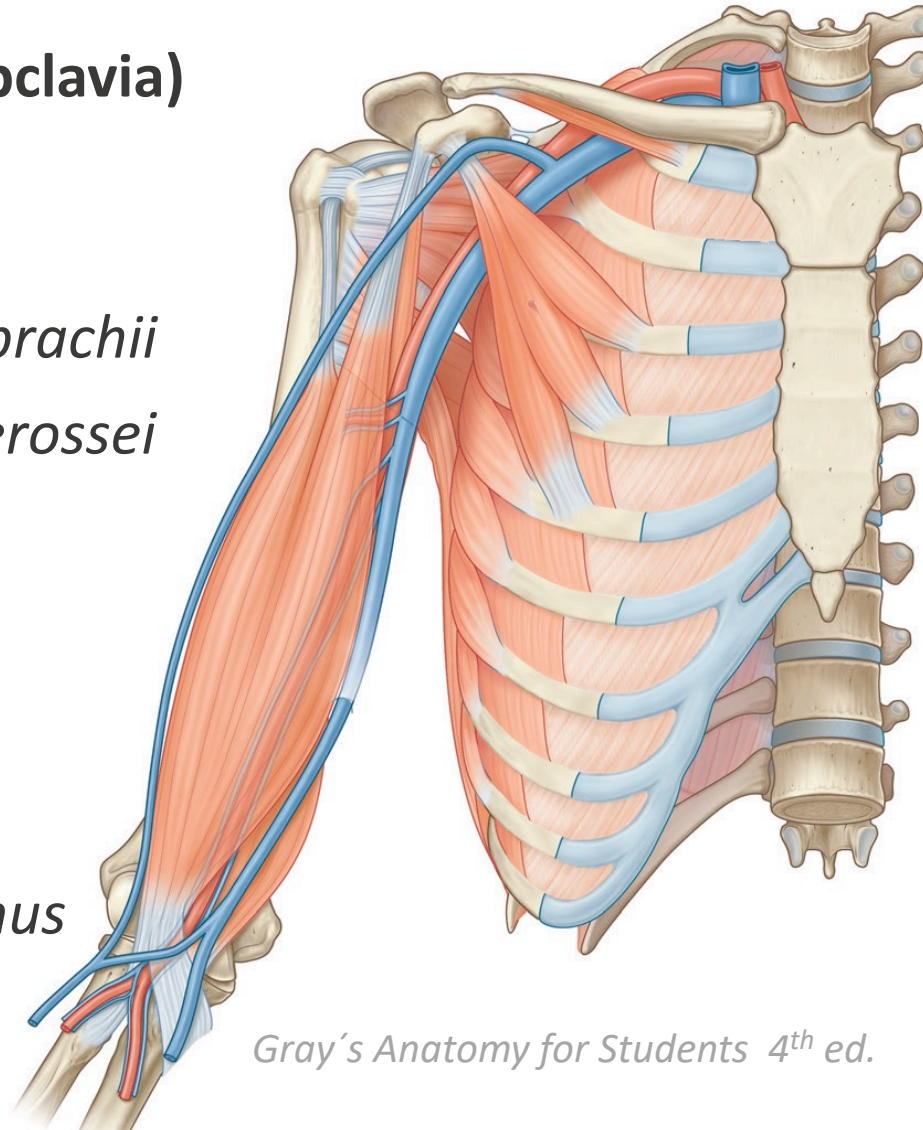
- **V. cephalica pollicis**
- **V. cephalica**
- **V. basilica**
- **Rete venosum dorsale**



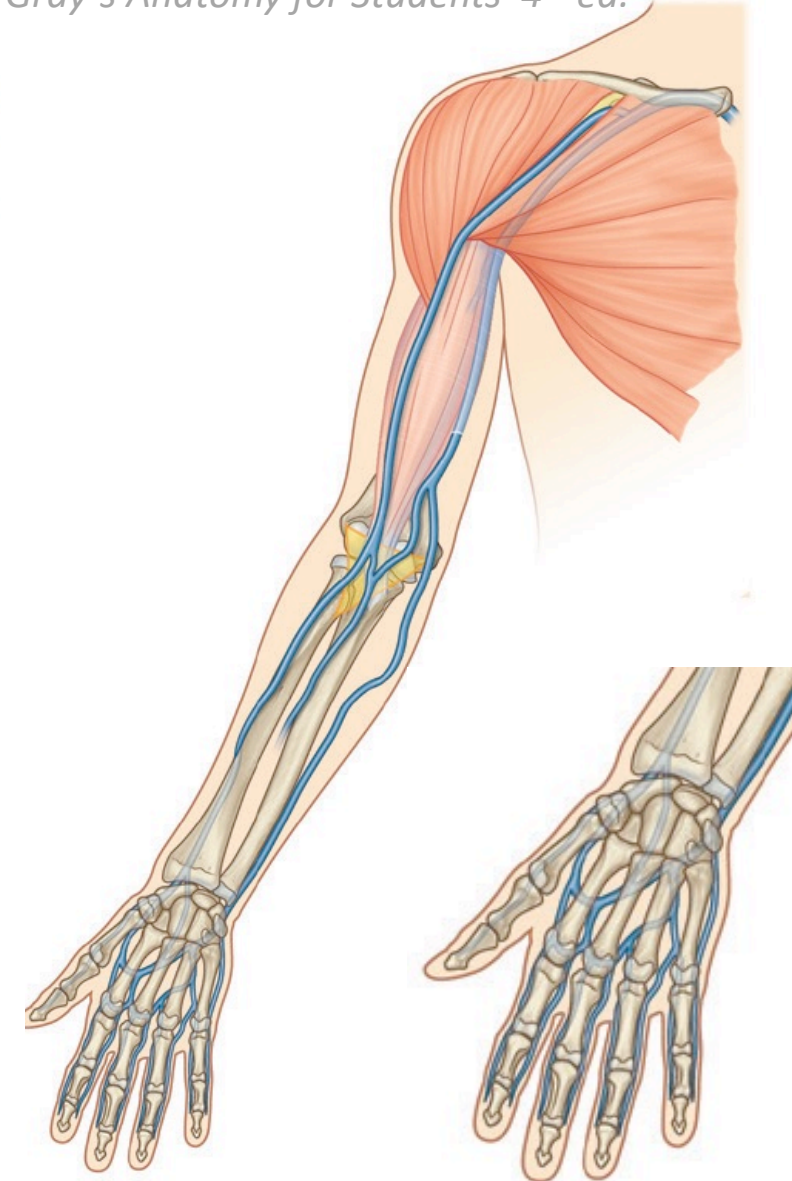
venae

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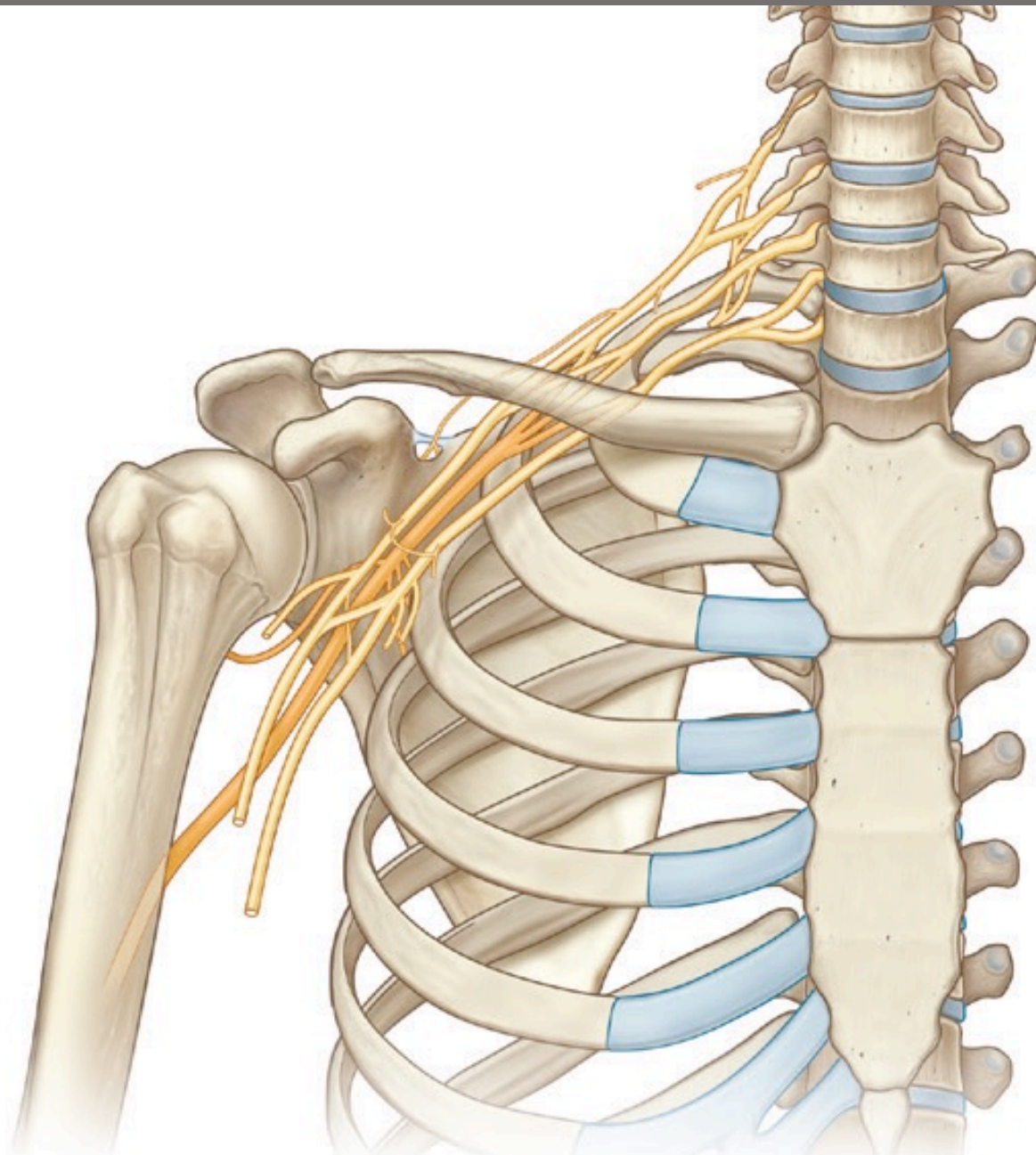
- ♦ **V. axillaris** (dále jako v. subclavia)
- ♦ **Vv. profundae**
 - ♦ sledují tepny
- ♦ *Vv. brachiales, profundae brachii*
- ♦ *Vv. radiales, ulnares et interossei*
- ♦ **Vv. superficiales**
- ♦ *V. cephalica*
- ♦ *V. basilica*
- ♦ *V. mediana cubiti*
- ♦ *Rete venosum dorsale manus*



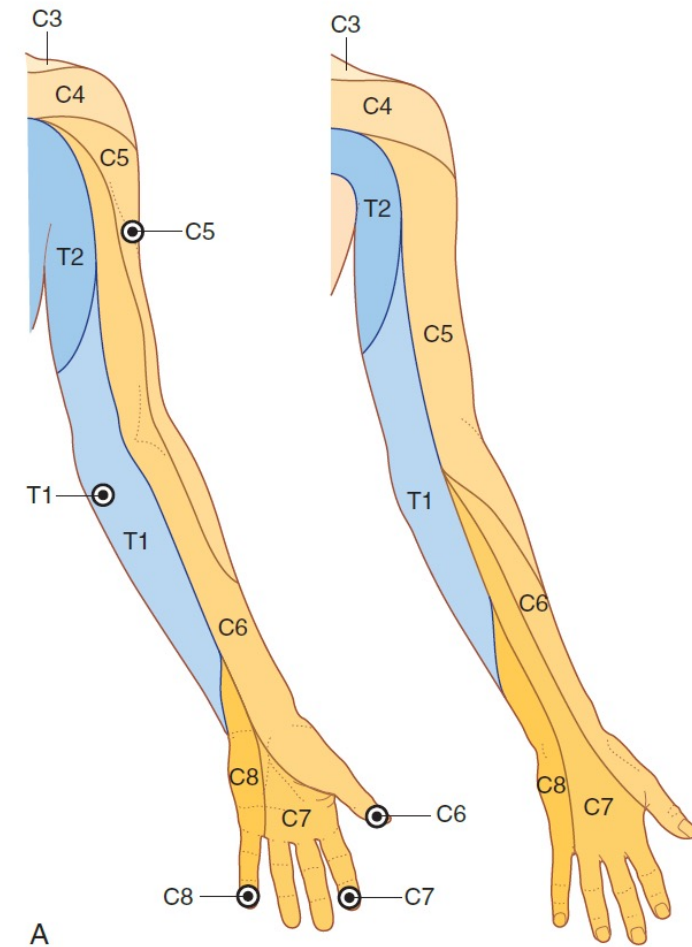
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Nervi



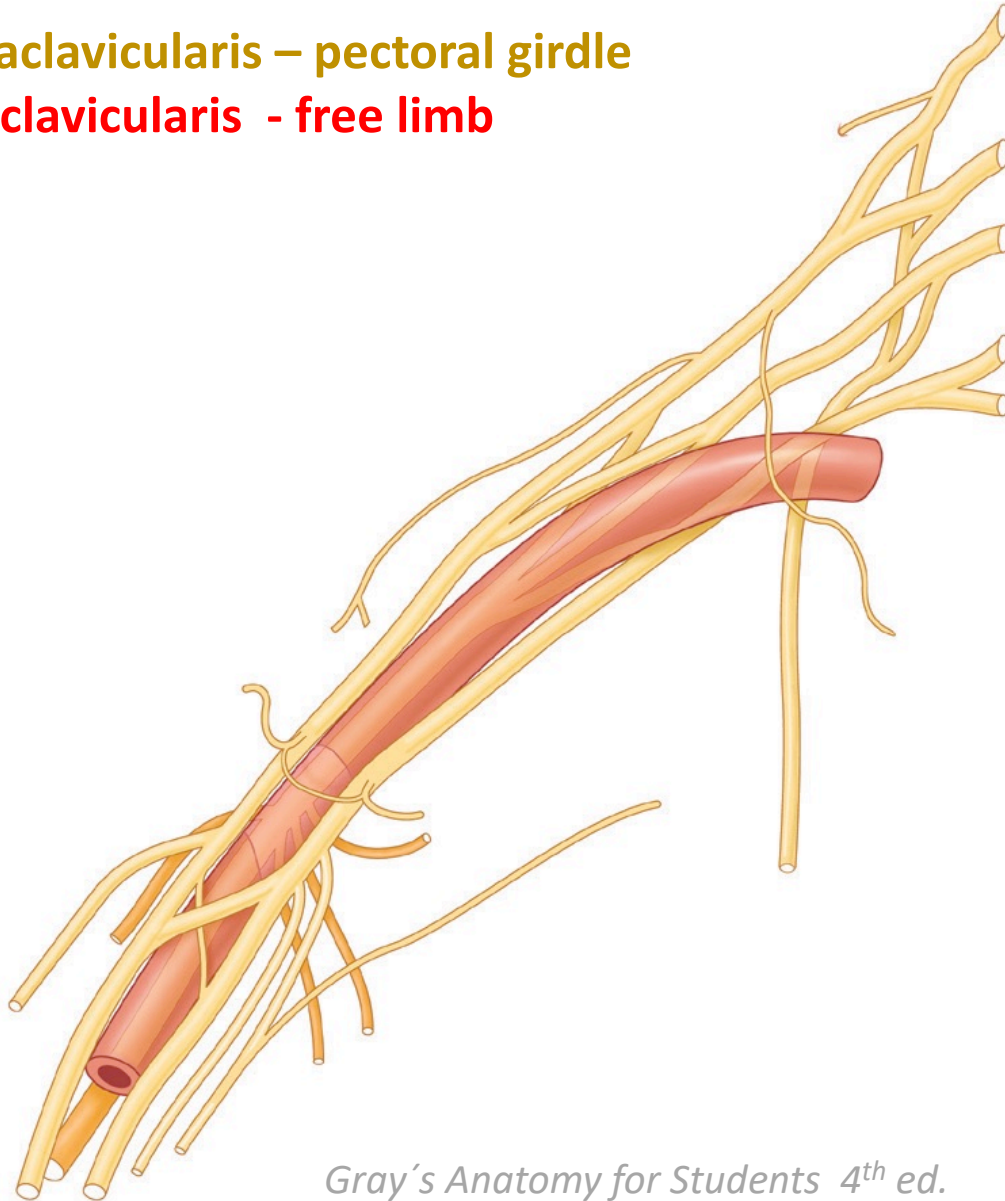
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Plexus brachialis

Pars supraclavicularis – pectoral girdle

Pars infraclavicularis - free limb



♦ **Trunci**

- ♦ I. superior C5,6
- ♦ II. medius C7
- ♦ III. Inferior C8, Th1

♦ **Divisiones**

- ♦ Anterior C5 - C7 + Posterior C5-Th1

♦ **Fasciculi (angl. cords)**

- ♦ Lateralis C5 - 7 (n. musculocutaneus, ulnaris, cutaneus brachii)
- ♦ Medialis C8, Th1 (n. ulnaris, n. cutaneus brachii medialis, n. cutaneus antebrachii medialis)
- ♦ Posterior C5 - Th1 (n. axillaris, n. radialis)

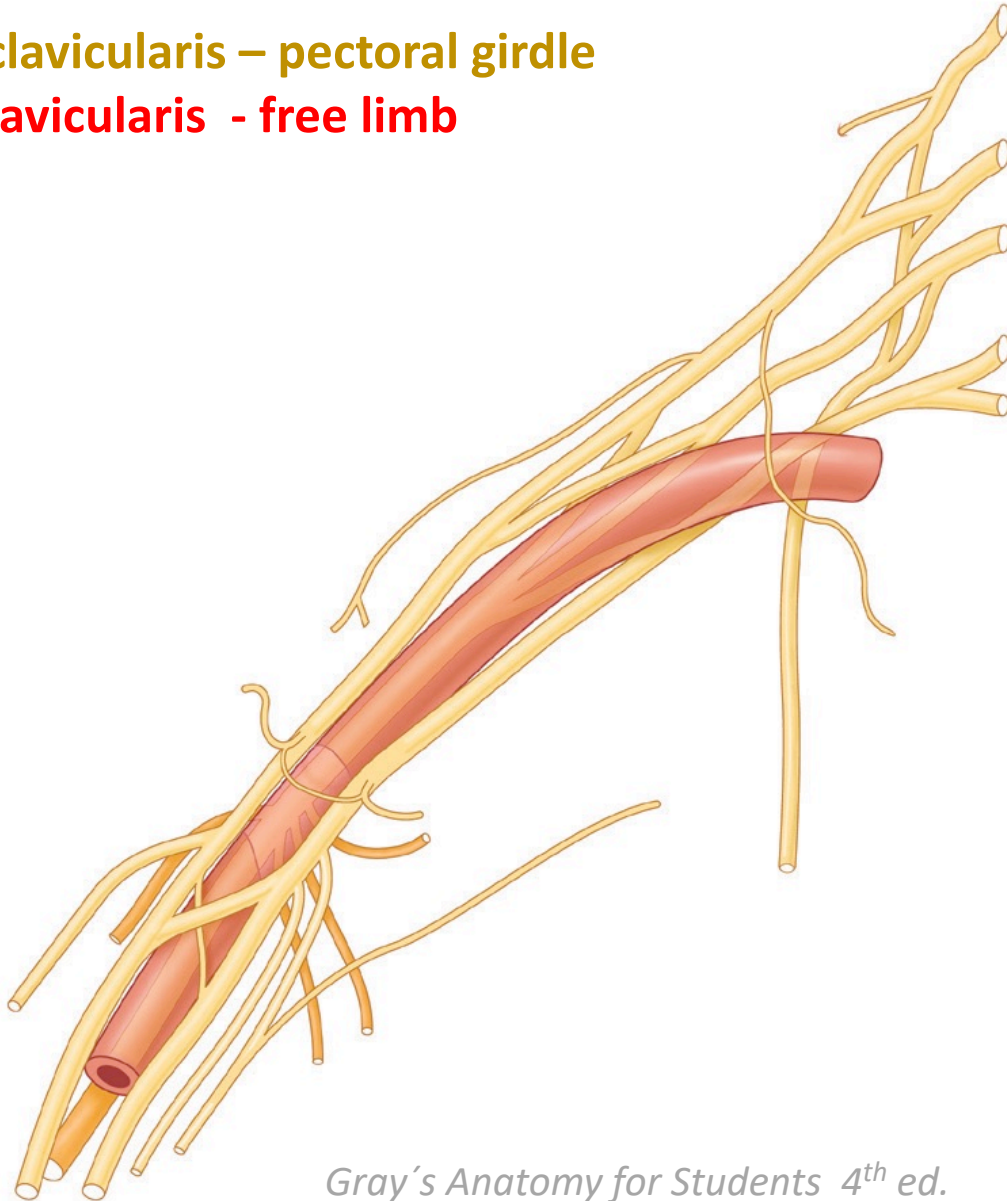
♦ **Nervi - infraclaviculares**

- ♦ N. musculocutaneus (C5-C7)
- ♦ N. medianus (C5 - Th1)
- ♦ N. ulnaris (C(7)8 - Th1)
- ♦ N. cutaneus brachii medialis (C7 - Th1)
- ♦ N. cutaneus antebrachii medialis (C7 - Th1)
- ♦ N. radialis (C5-TH1)
- ♦ N. axillaris (C5-6)

Plexus brachialis

Pars supraclavicularis – pectoral girdle

Pars infraclavicularis - free limb



♦ **Spinohumeral mm.**

♦ **Thoracohumeral mm.**

♦ **Scapular mm.**

♦ ***Nervi – dorsal group***

♦ *N. dorsalis scapulae (C5,6)*

♦ *N. suprascapularis (C4-6)*

♦ *N. thoracicus longus (C5,6)*

♦ *N. thoracodorsalis (C6-8)*

♦ *Nn. scapulares (C5-7)*

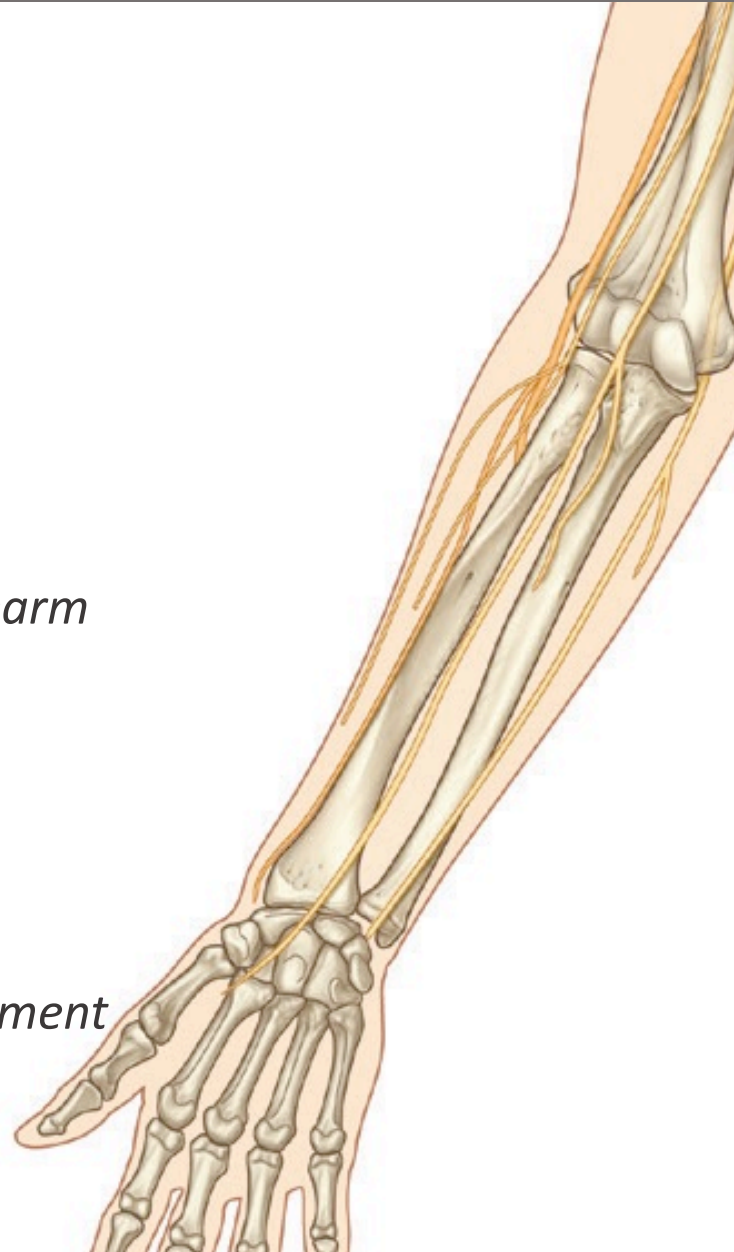
♦ ***Nervi – ventral group***

♦ *N. subclavius (C5,6)*

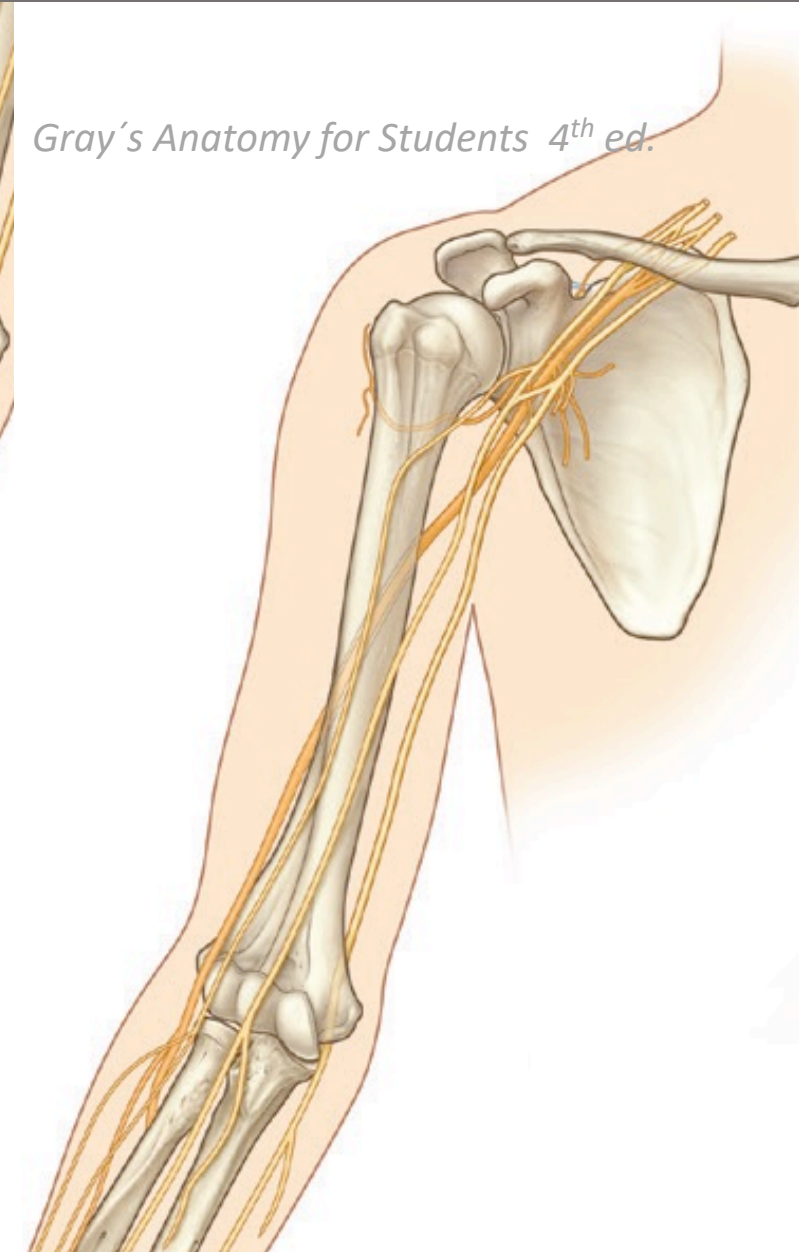
♦ *N. pectoralis medialis et lateralis (C5-Th1)*

Motor nerves

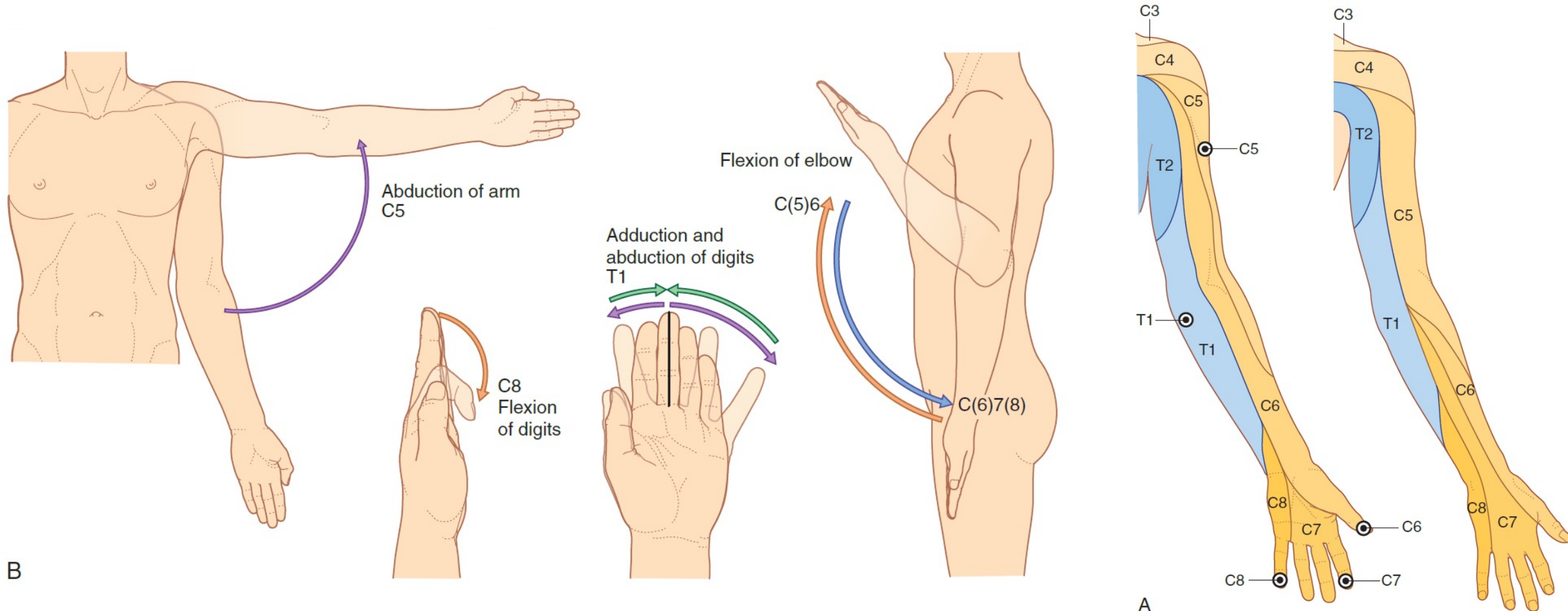
- ♦ **N. axillaris (C5 - 6)**
 - ♦ *M. deltoideus*
- ♦ **N. musculocutaneus (C5-7)**
 - ♦ *Anterior arm compartment*
- ♦ **N. radialis (C5 - 8, Th1)**
 - ♦ *Dorsal compartment of arm and forearm*
- ♦ **N. medianus (C6 - 8, Th1)**
 - ♦ *Deeper forearm compartment*
 - ♦ *Thenar + 2 lateral m. lumbricoides*
- ♦ **N. ulnaris (C7, C8, TH1)**
 - ♦ *anterior superficial forearm compartment*
 - ♦ *Deep palmar mm. except*
 - ♦ *Except thenar + 2 lateral m. lumbricoides*



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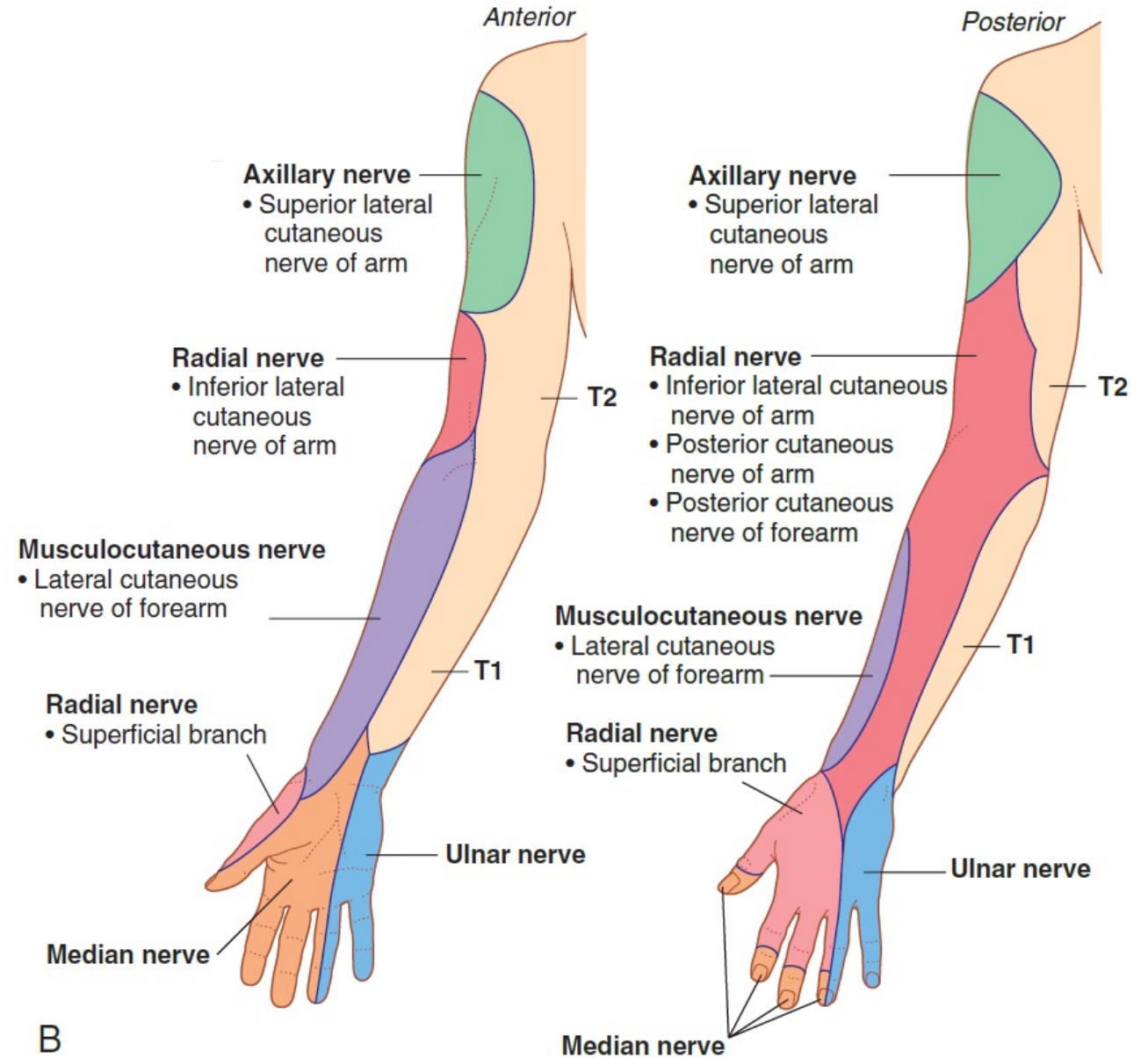


Dermatomes and myotomes



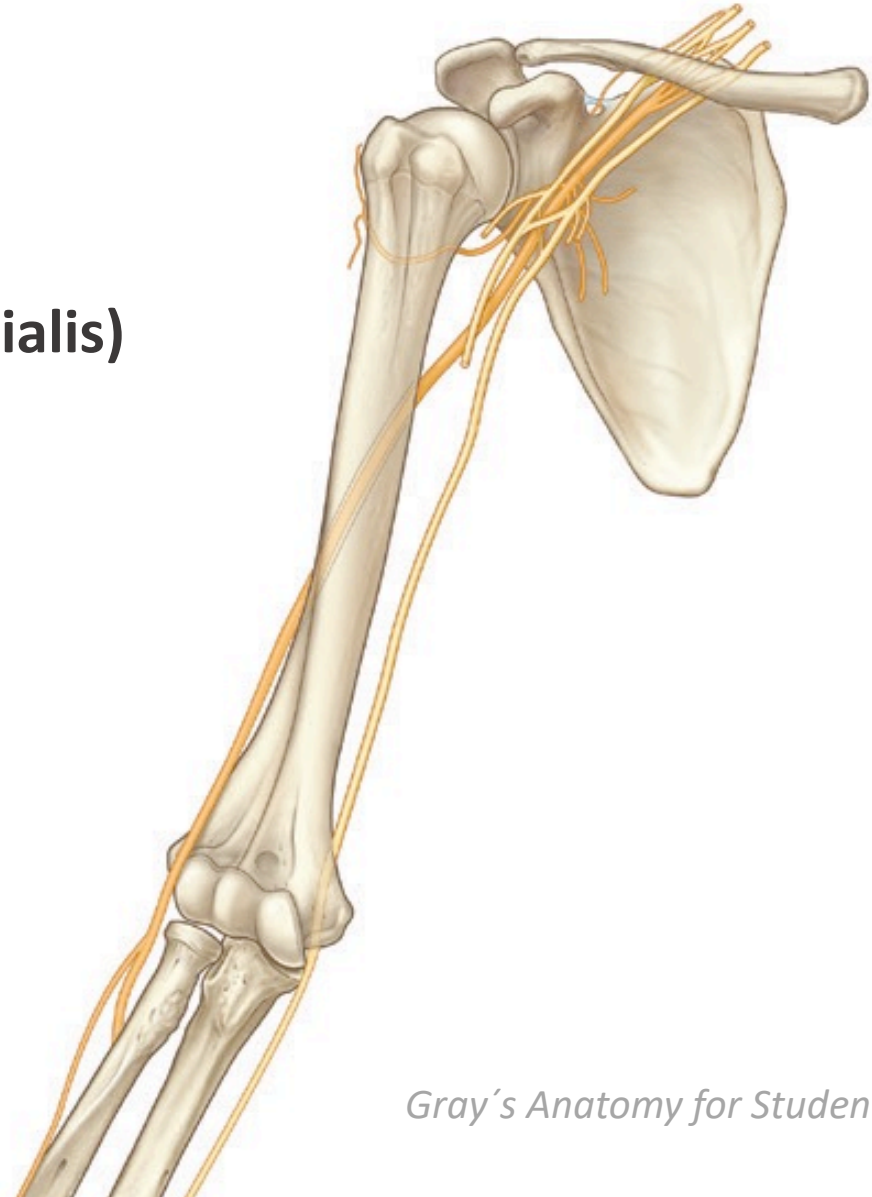
Areae nervinae

- ♦ Plexus brachialis
- ♦ N. axillaris (C5 - 6)
- ♦ N. musculocutaneus (C5 - 7)
- ♦ N. radialis (C5 - 8, Th1)
- ♦ N. medianus (C5 - 8, Th1)
- ♦ N. ulnaris (**C7**, C8, TH1)



Ossa et nervi

- ♦ N. axillaris - collum humeri chirurgicum
- ♦ N. radialis - sulcus nervi radialis
- ♦ N. ulnaris - sulcus nervi ulnaris (epicondylus medialis)



Nervi antebrachii

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♦ N. ulnaris

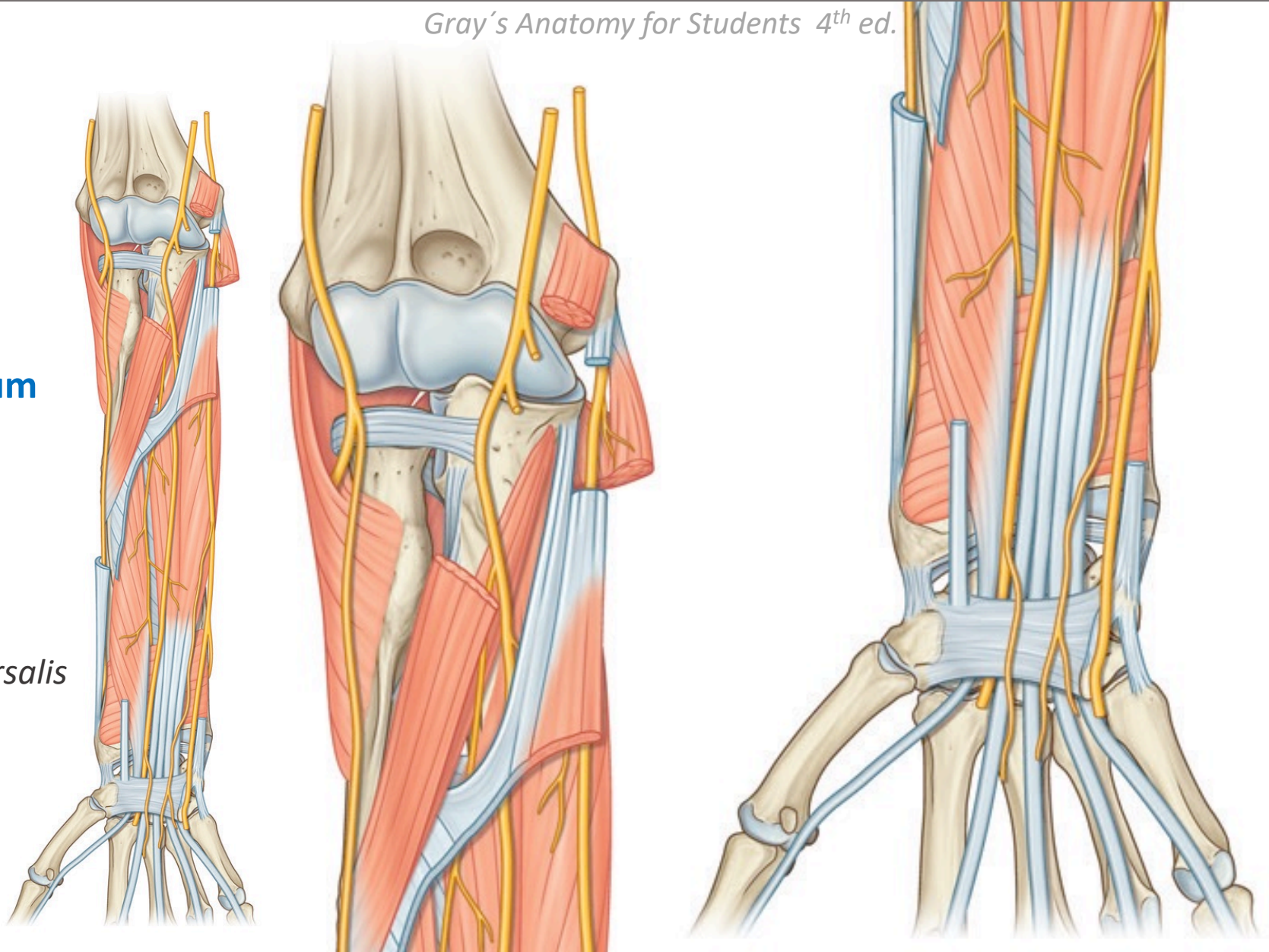
- ♦ *Ramus dorsalis*
- ♦ *Ramus palmaris*

♦ N. medianus

- ♦ *Retinaculum flexorum*
- ♦ *Ramus palmaris*

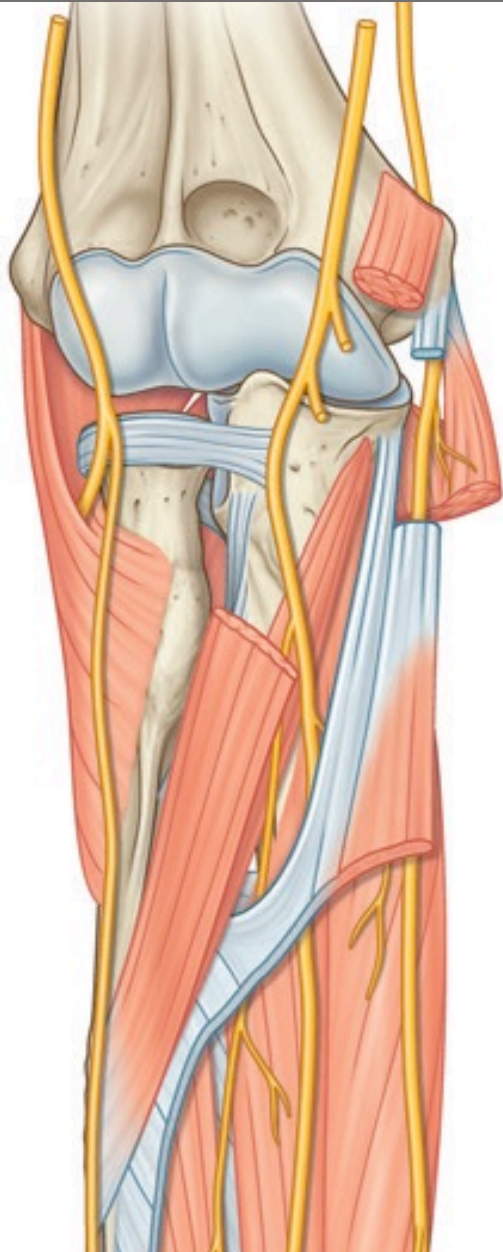
♦ N. radialis

- ♦ *Ramus superficialis*
- ♦ *Ramus profundus*
 - ♦ *N. interosseus dorsalis*



Nervi antebrachii

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♦ **N. ulnaris**

- ♦ *Epicondylus humeri medialis*
- ♦ *Sulcus nervi ulnaris - dorsum*

♦ **N. medianus**

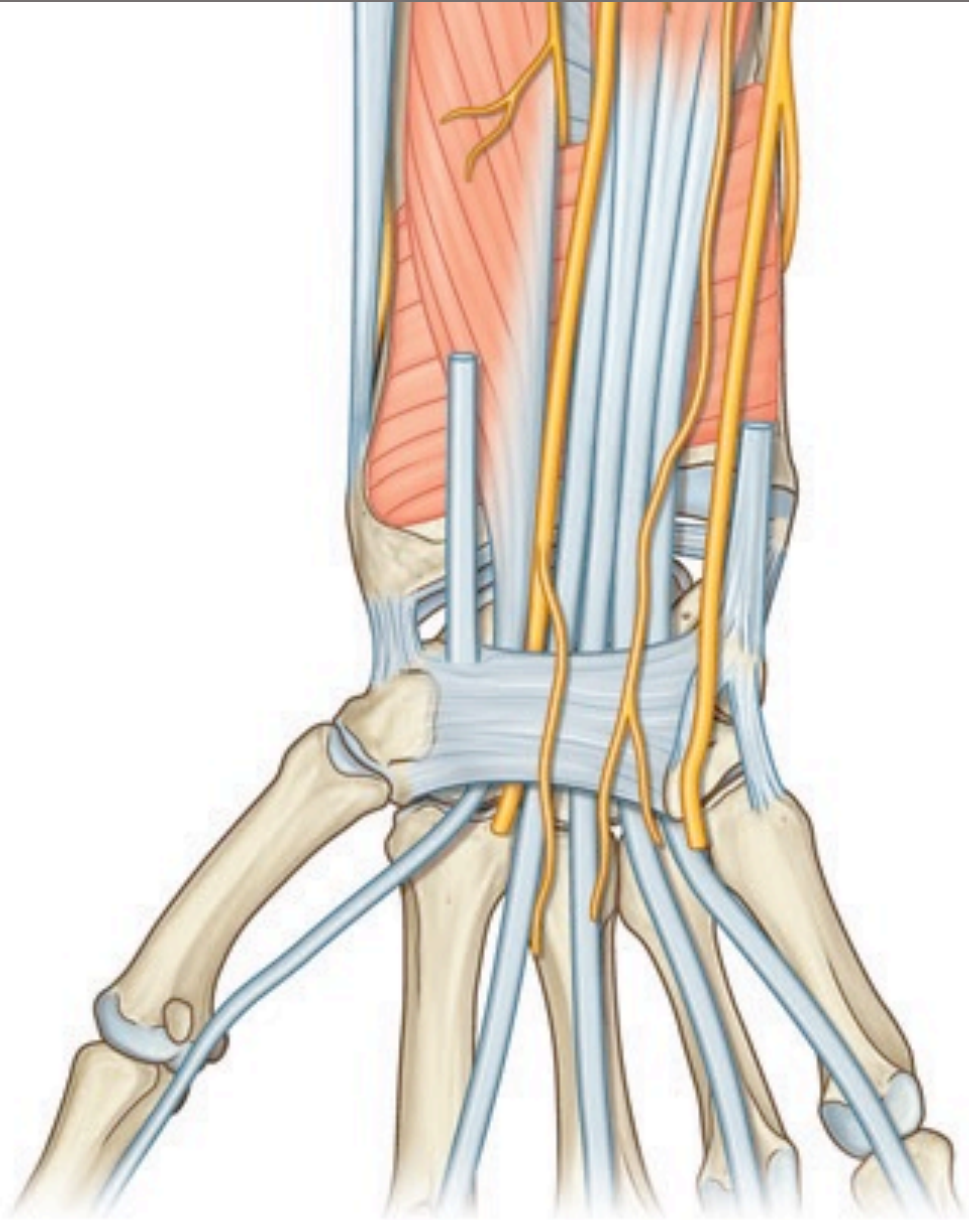
- ♦ *Epicondylus humeri medialis*
- ♦ *Processus coronoideus*

♦ **N. radialis**

- ♦ *Epicondylus humeri lateralis*
- ♦ *Capitulum radii*

Nervi antebrachii

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- ♦ **N. ulnaris**

- ♦ *Superficial*
- ♦ *Ramus palmaris*

- ♦ **N. medianus**

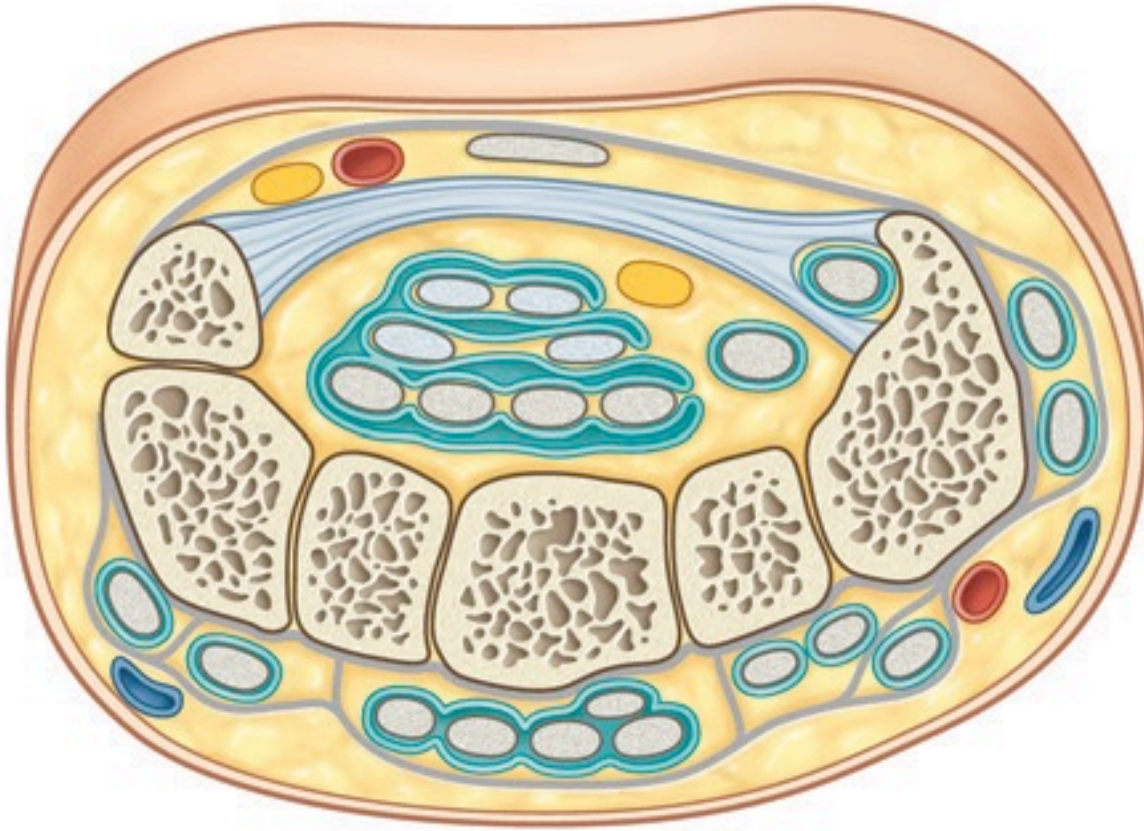
- ♦ **deeper**
- ♦ *Ramus palmaris*
- ♦ *below retinaculum*

- ♦ **Retinaculum flexorum**

- ♦ *Carpal tunnel syndrome*
- ♦ *Compression n. medianus*
- ♦ *Canalis carpalis*

Canalis carpalis

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♦ U - space

- ♦ *Tuberculum ossis trapezii*
- ♦ *Os pisiforme*

♦ Below retinaculum

- ♦ *N. medianus*
- ♦ *Mm. flexores digitorum superf. et prof. (T)*
- ♦ *M. flexor pollicis longus (T)*

♦ In retinaculum

- ♦ *M. flexor carpi radialis (T)*

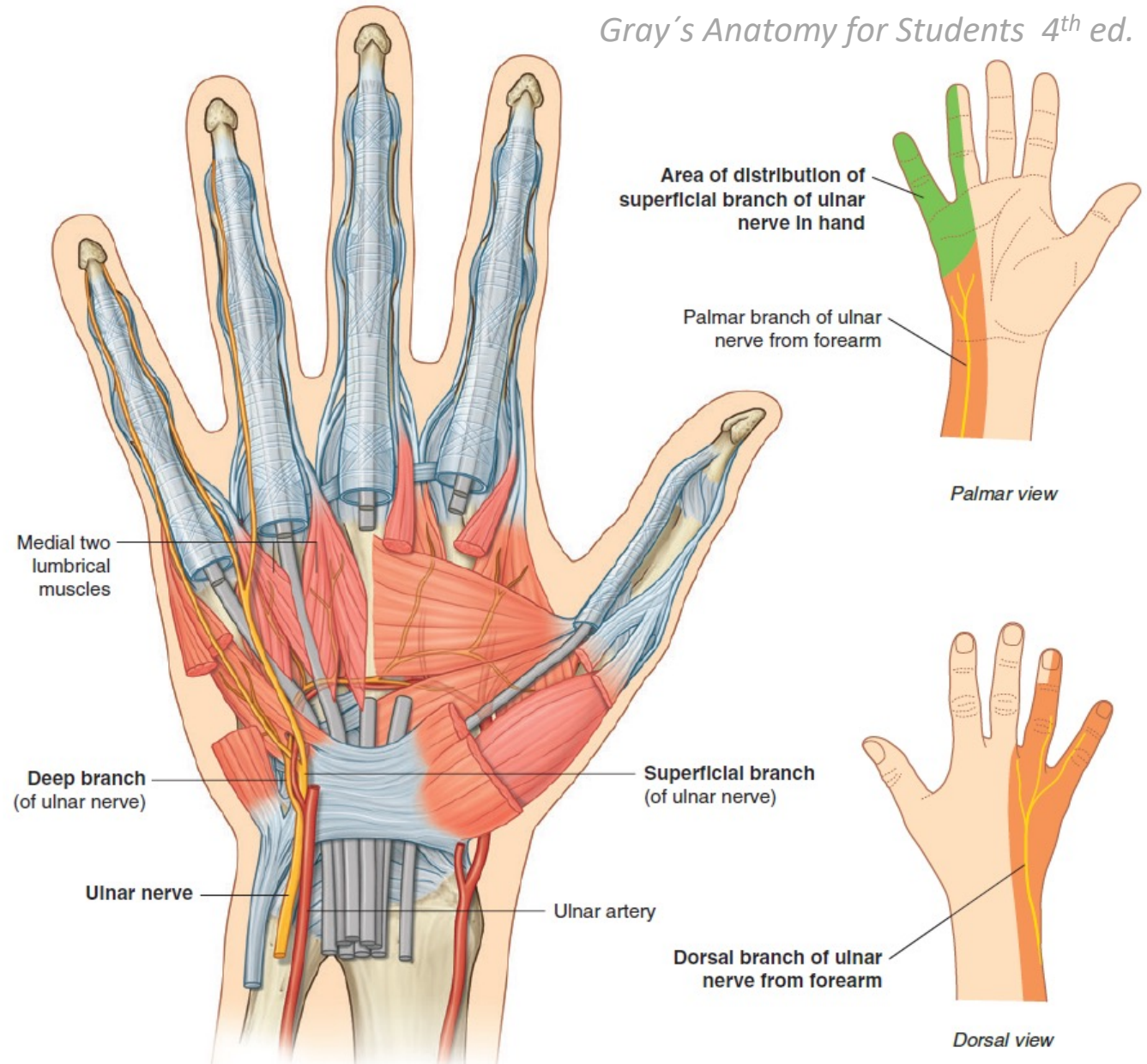
♦ Superficial to retinaculum

- ♦ *N. ulnaris*
- ♦ *A. ulnaris*
- ♦ *M. palmaris longus (T)*

Nervi manus

♦ N. ulnaris

- ♦ *Mm. lumbricoidei - ramus profundus*
- ♦ *Hypothenar*
- ♦ *Thenar*
 - ♦ *m. adductor policis*
 - ♦ *m. oponens p.*
- ♦ *Mm. interossei*

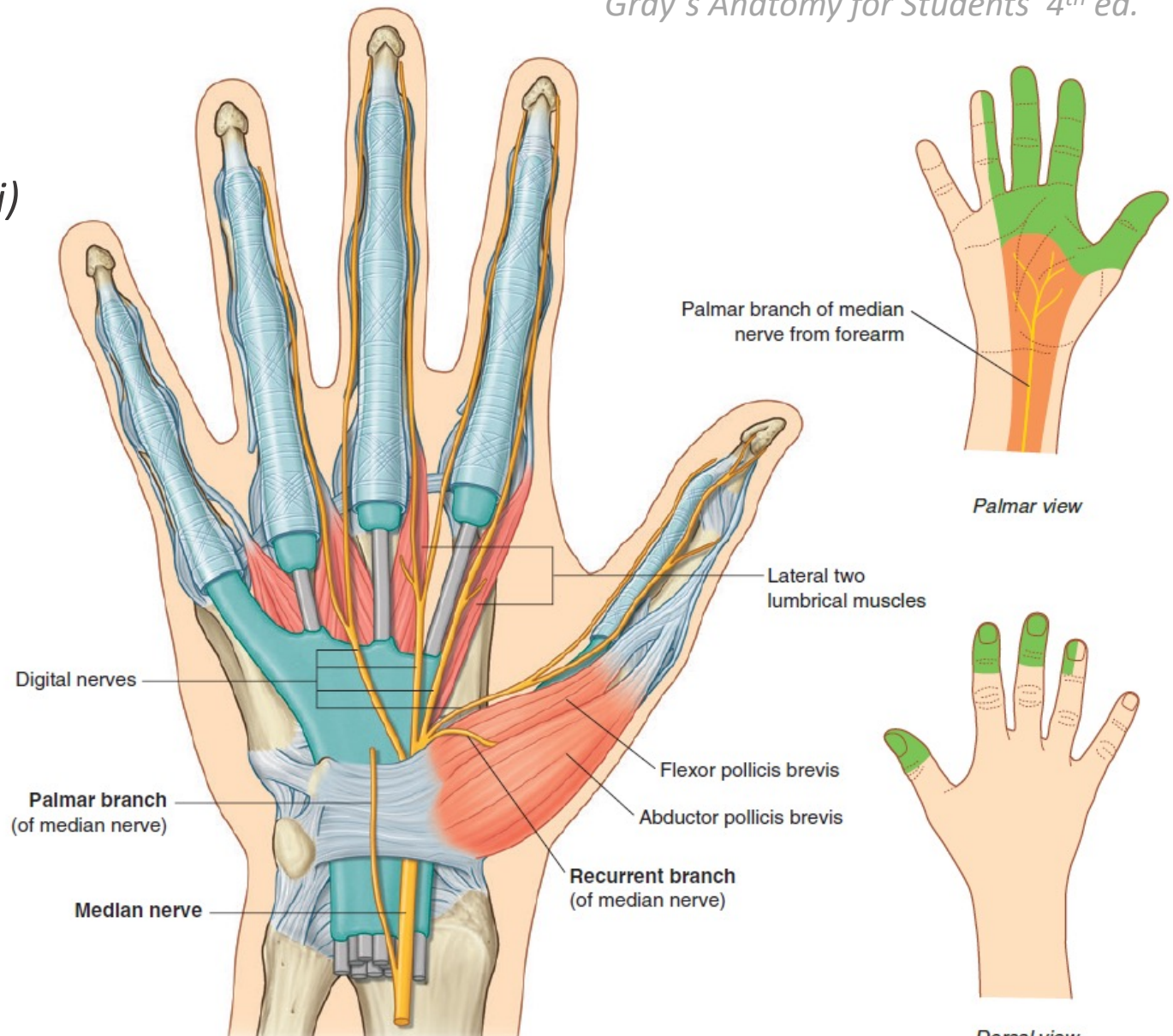


Nervi manus

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🔴 N. medianus

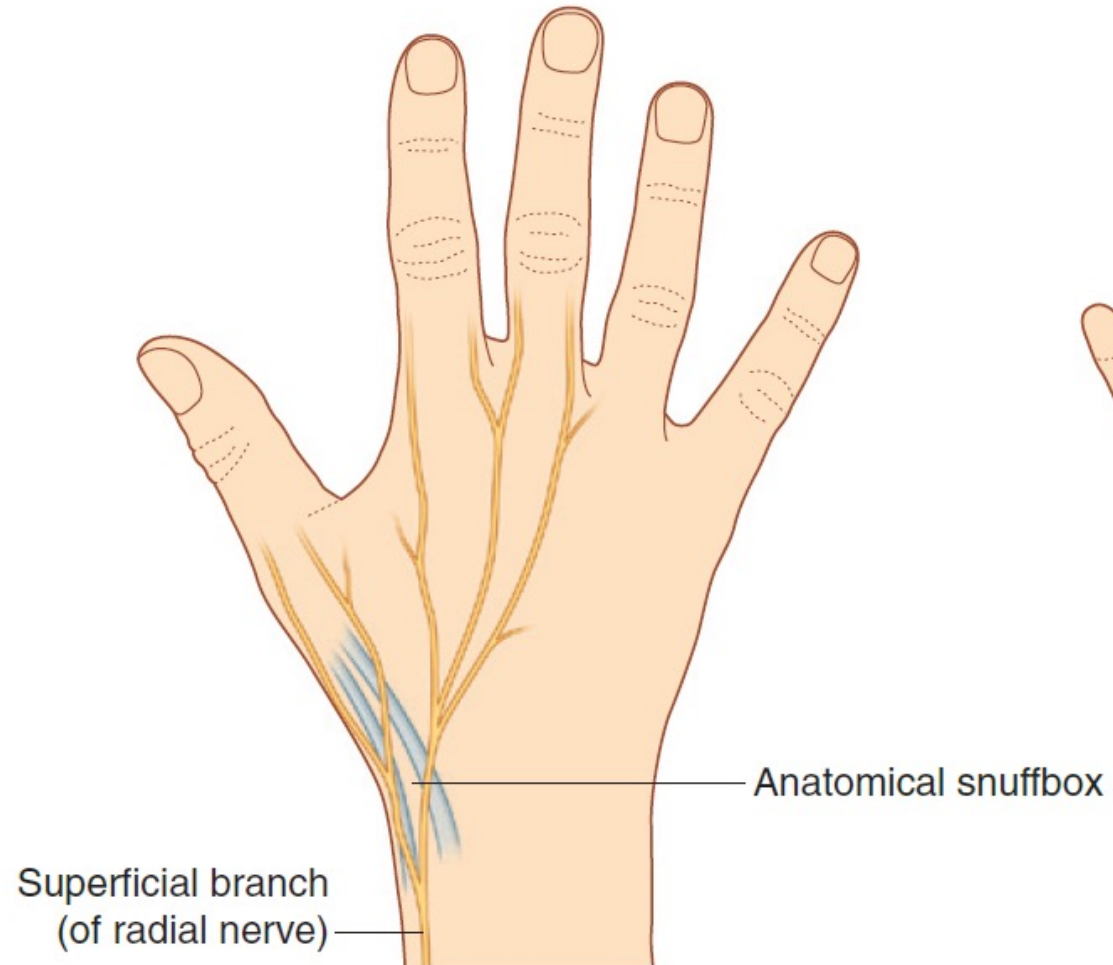
- 🔥 *Mm. lumbricoidei laterales (unipennati)*
- 🔥 *M. flexor pollicis brevis*
- 🔥 *M. abduktor pollicis*
- 🔥 *Nn. digitales*



Nervi manus

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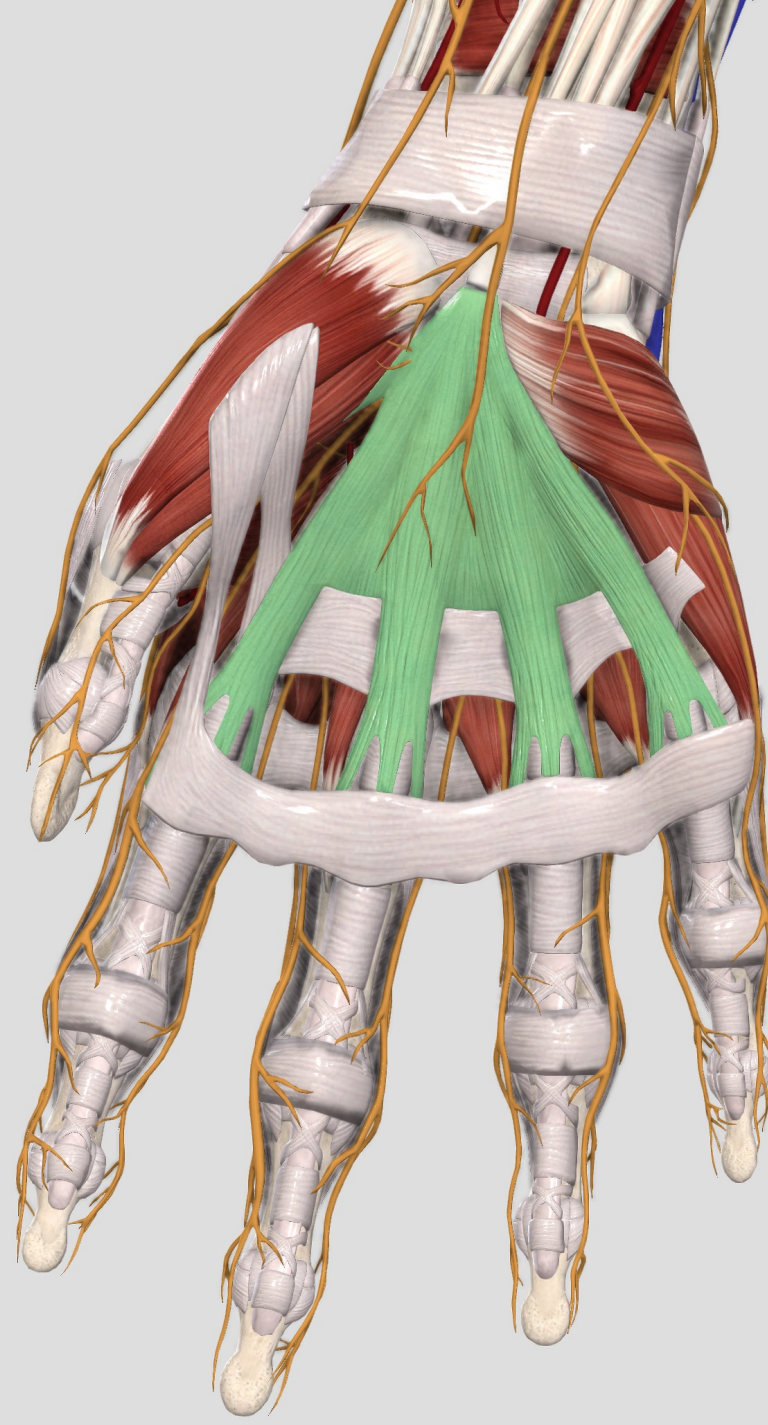
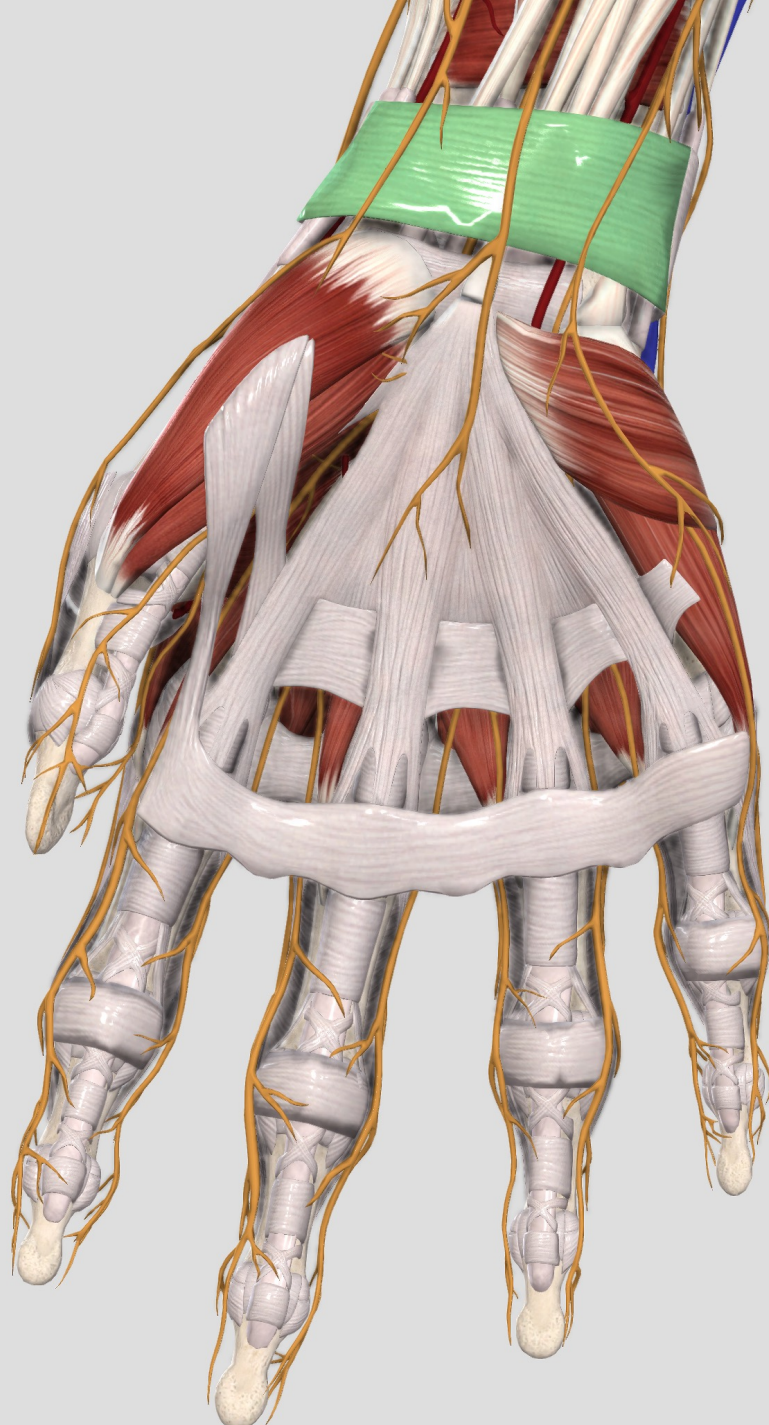
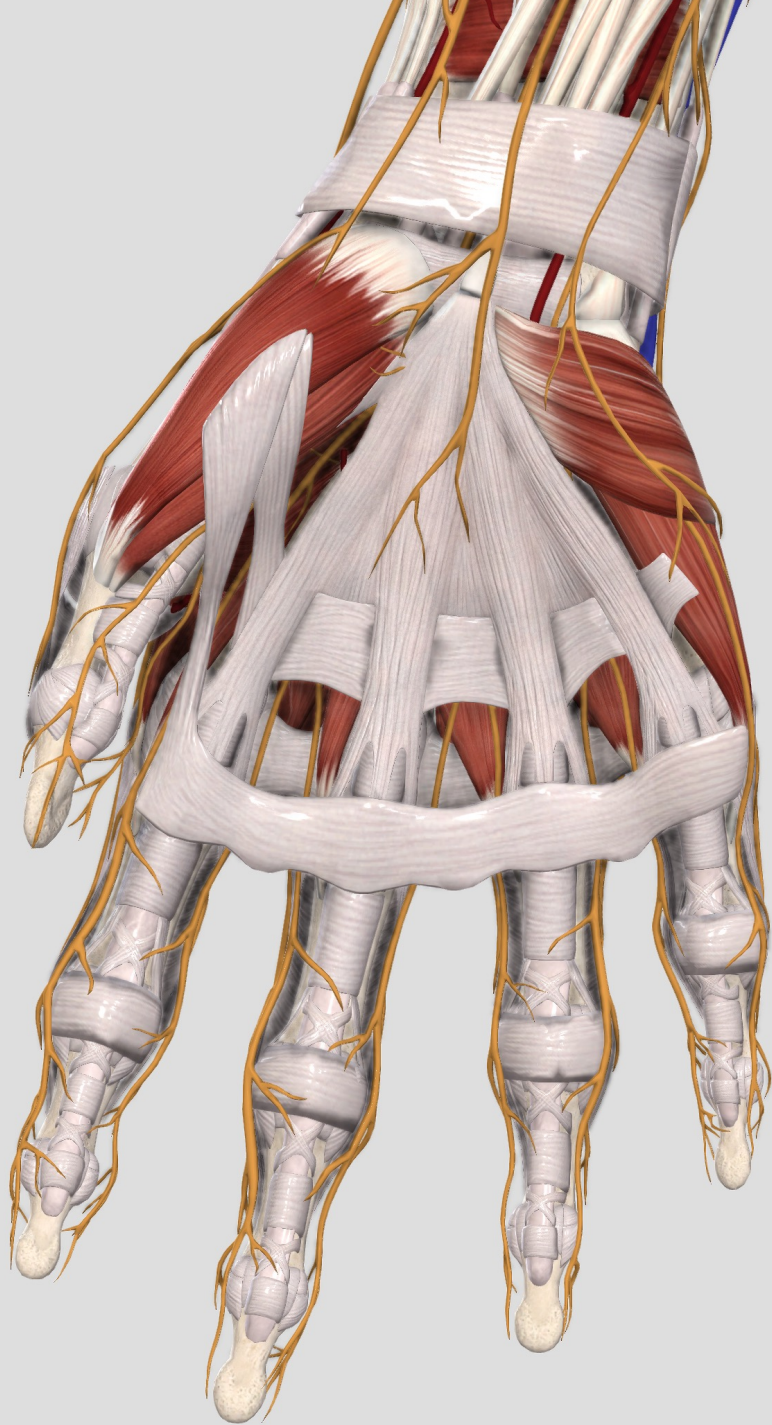
🔴 Ramus superficialis n. radialis



Palmar view



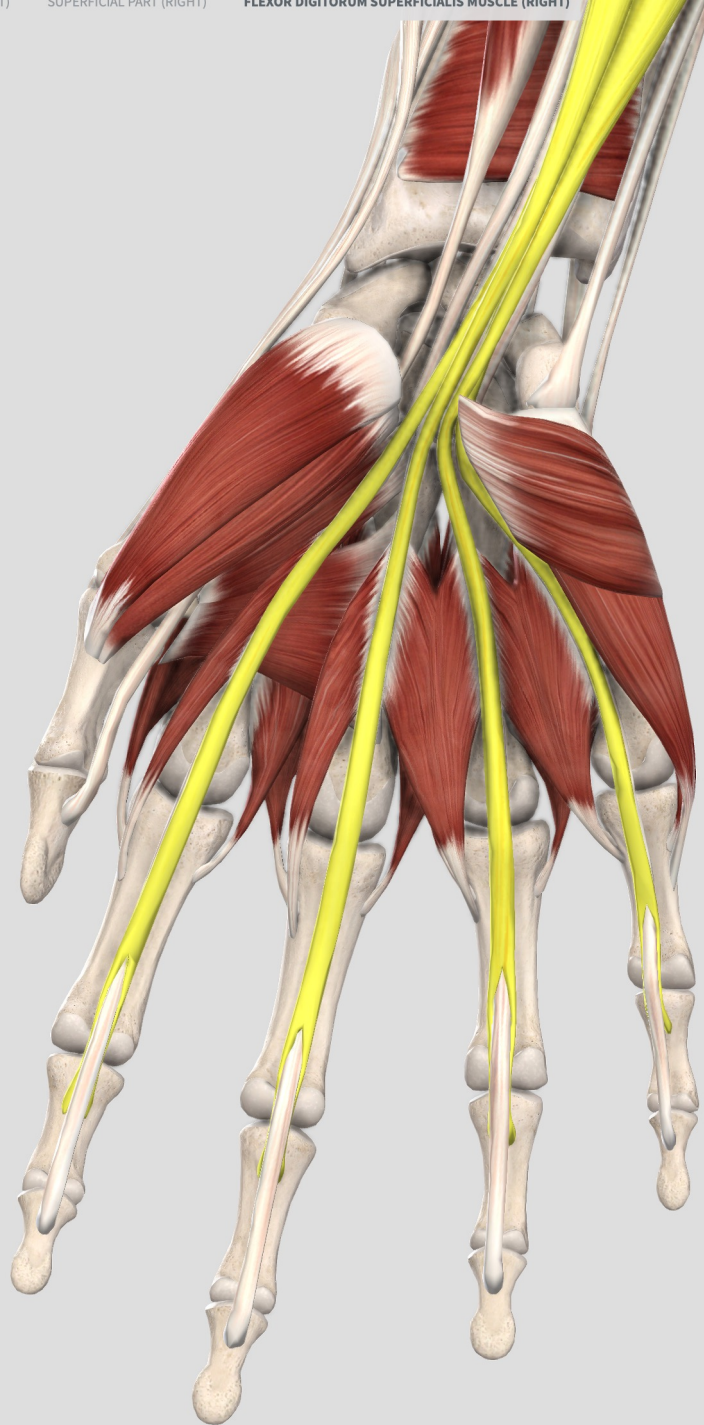
Dorsal view



ANTERIOR COMPARTMENT (RIGHT)

SUPERFICIAL PART (RIGHT)

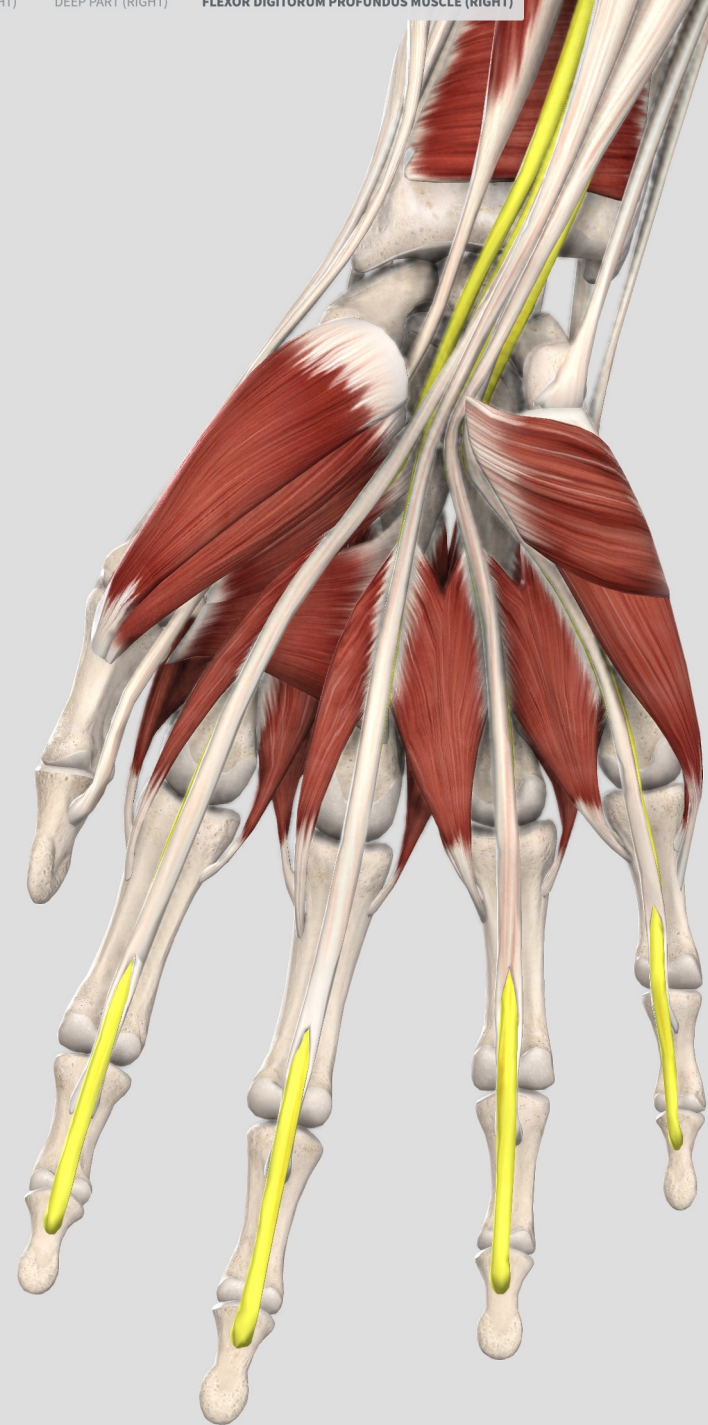
FLEXOR DIGITORUM SUPERFICIALIS MUSCLE (RIGHT)



ANTERIOR COMPARTMENT (RIGHT)

DEEP PART (RIGHT)

FLEXOR DIGITORUM PROFUNDUS MUSCLE (RIGHT)





ADDUCTOR POLLICIS (RIGHT)

TRANSVERSE HEAD OF ADDUCTOR POLLICIS MUSCLE (RIGHT)

