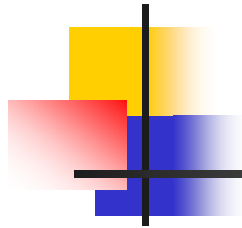




Human Anatomy

Appendicular Muscles

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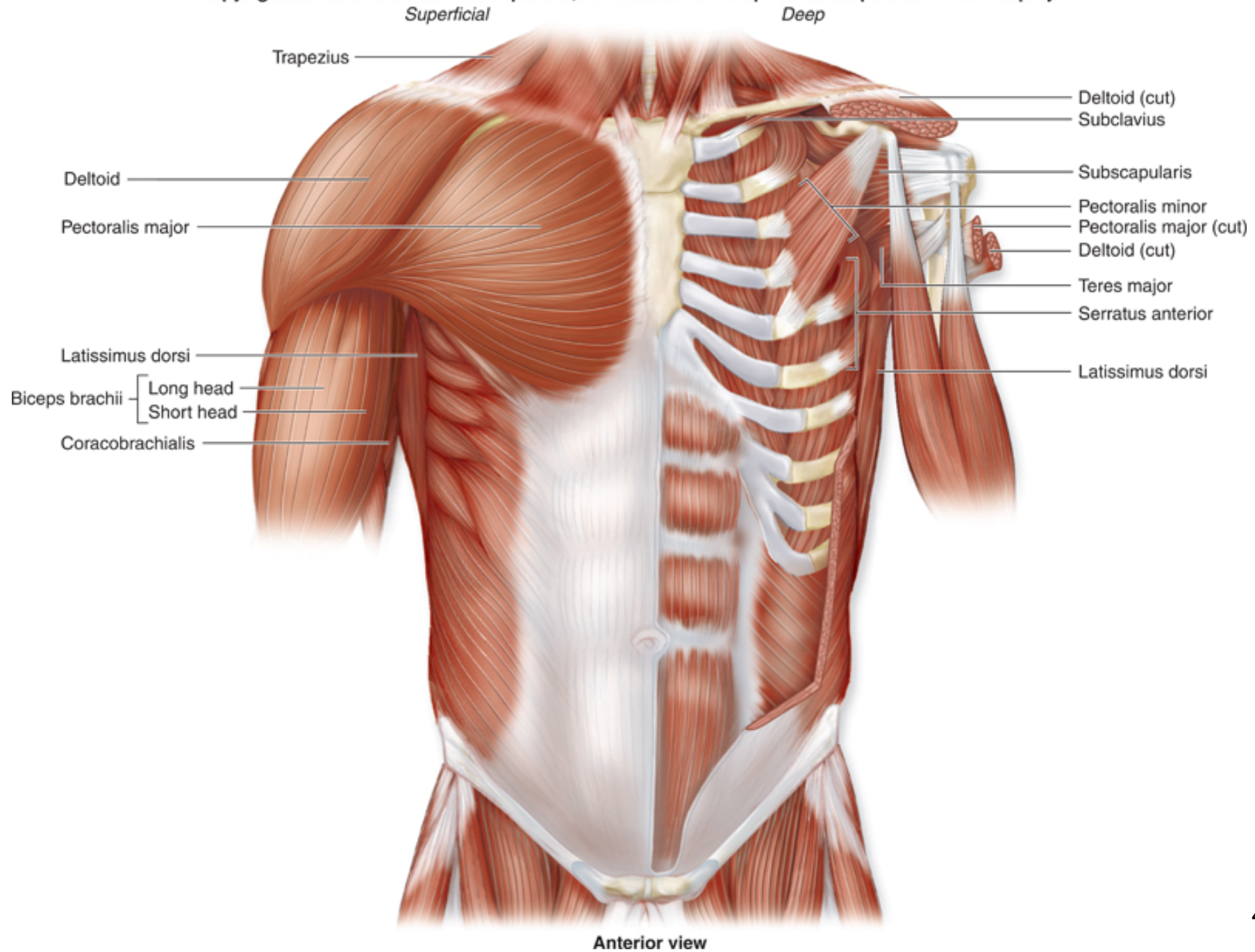
Appendicular Muscles

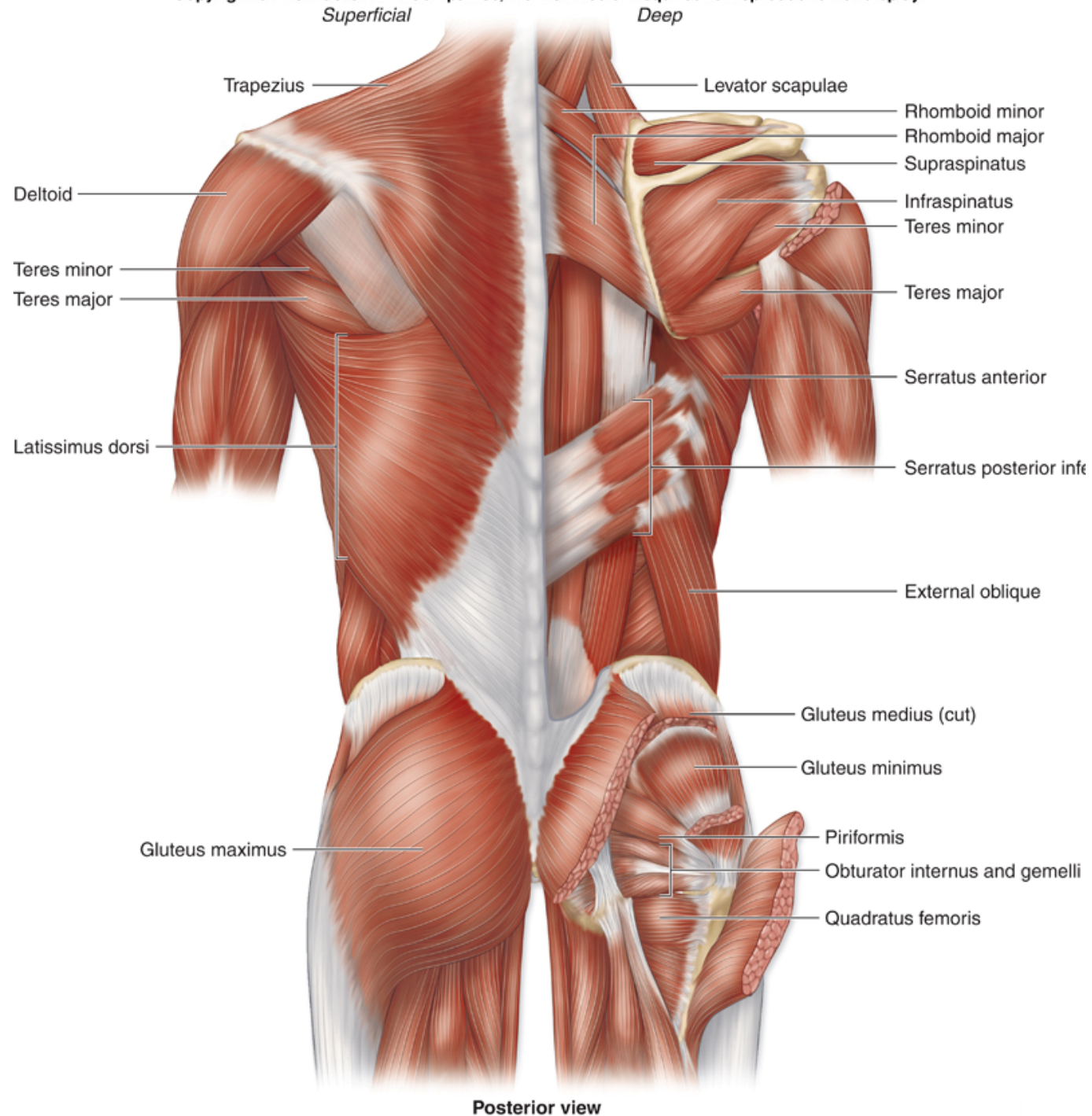
- Control the movements of the upper and lower limbs.
- Stabilize and control the movements of the pectoral and pelvic girdles.
- Organized into groups based on their location in the body or the part of the skeleton they move.
- Work in groups that are either synergistic or antagonistic.

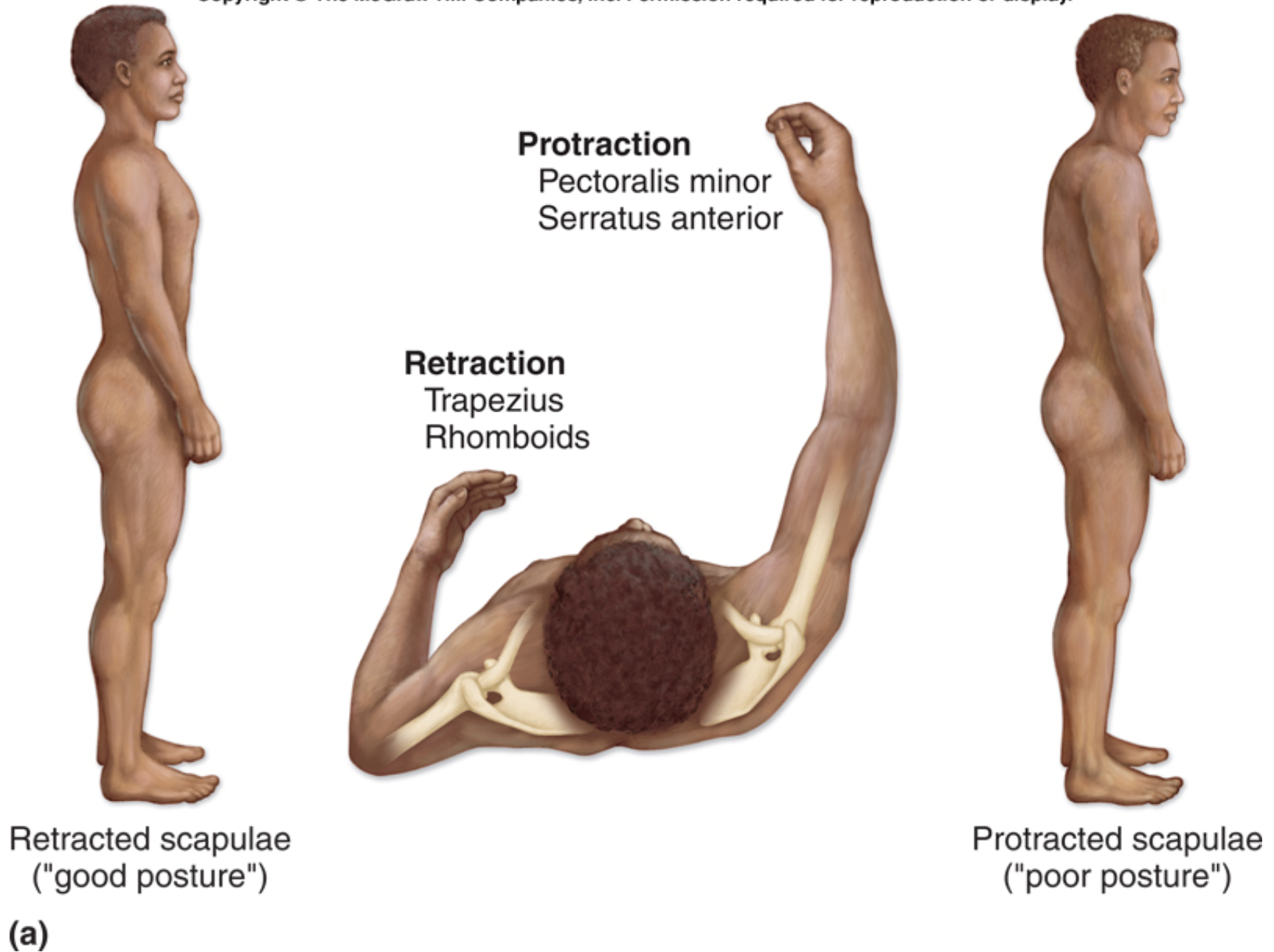


Appendicular Muscles

- Organized into specific groups.
 - muscles that move the pectoral girdle
 - muscles that move the glenohumeral joint/arm
 - arm and forearm muscles that move the elbow joint/forearm
 - forearm muscles that move the wrist joint, hand, and fingers
 - intrinsic muscles of the hand





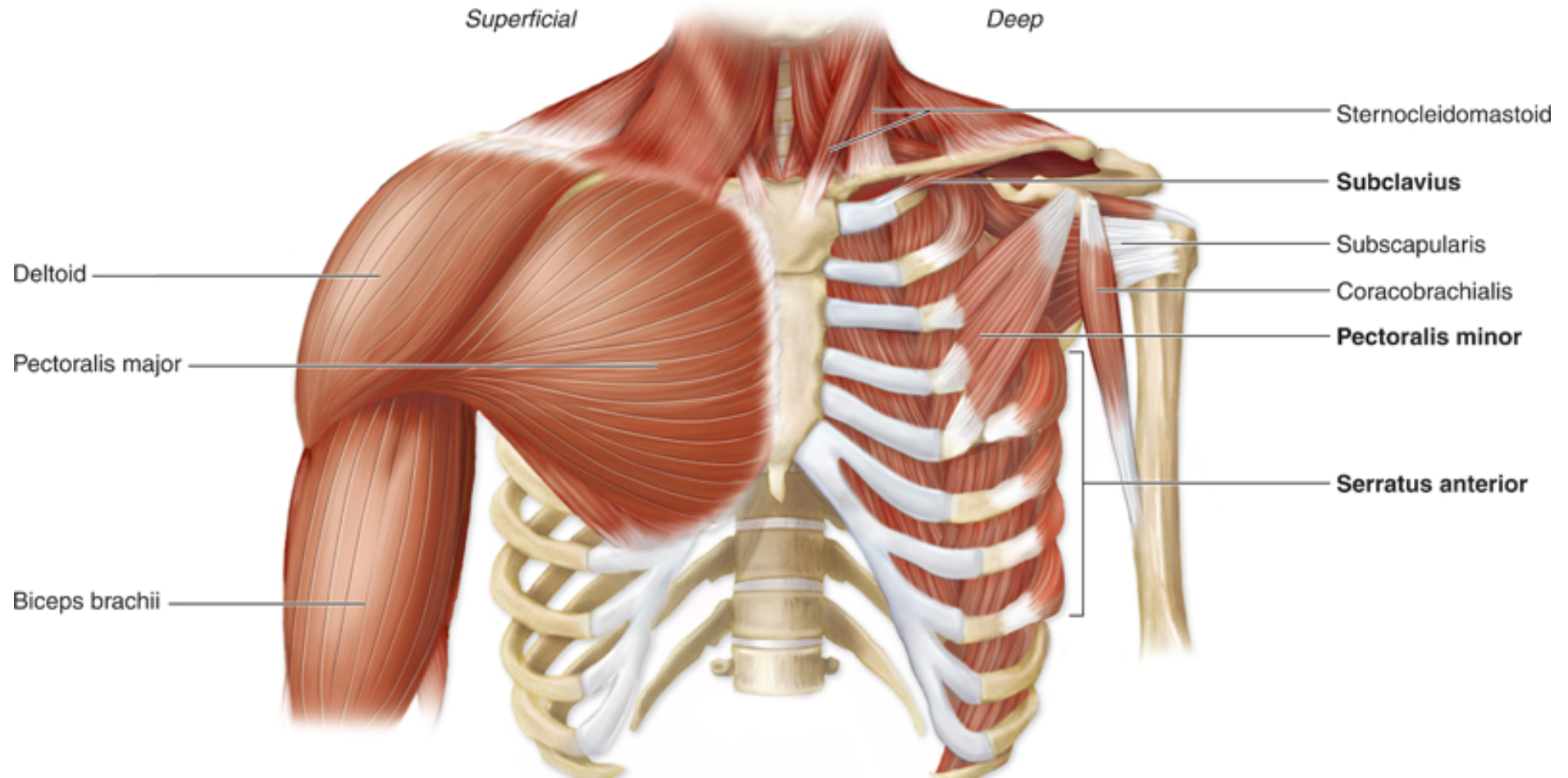




Muscles That Move the Pectoral Girdle

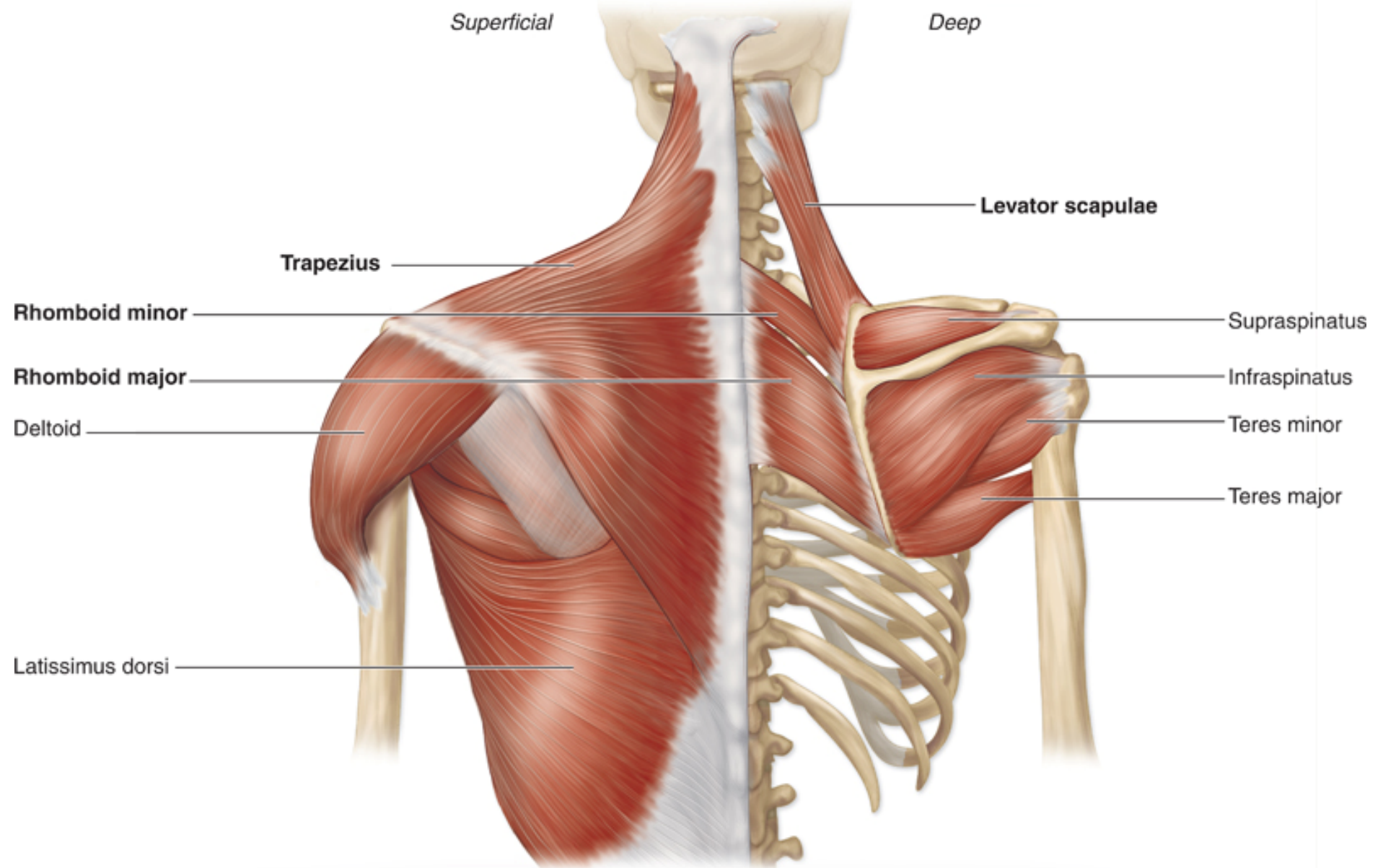
- Originate on the axial skeleton and insert on the clavicle and scapula.
- Stabilize the scapula and move it to increase the arm's angle of movements.
- Some of the superficial muscles of the thorax are grouped together according to the scapular movement they direct.
 - elevation, depression, protraction, or retraction

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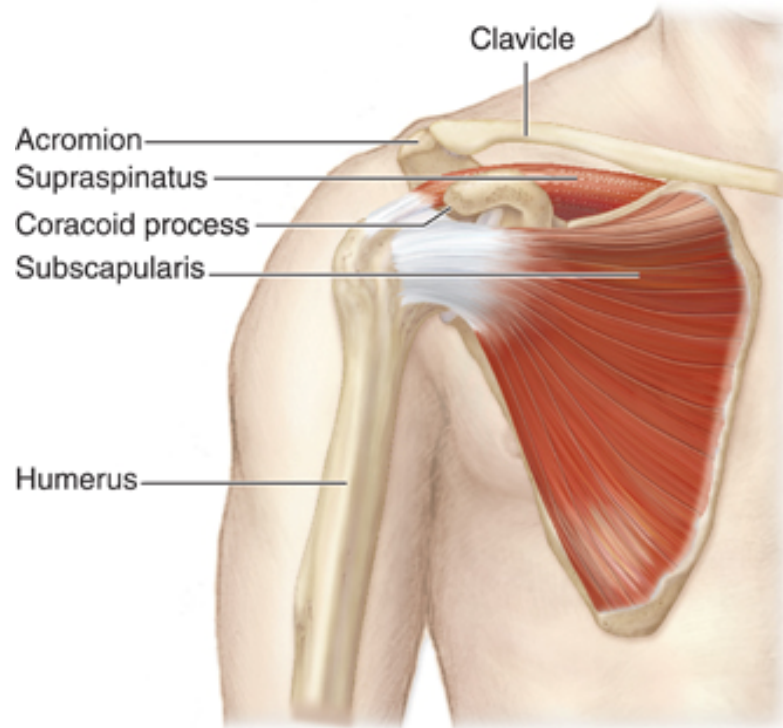


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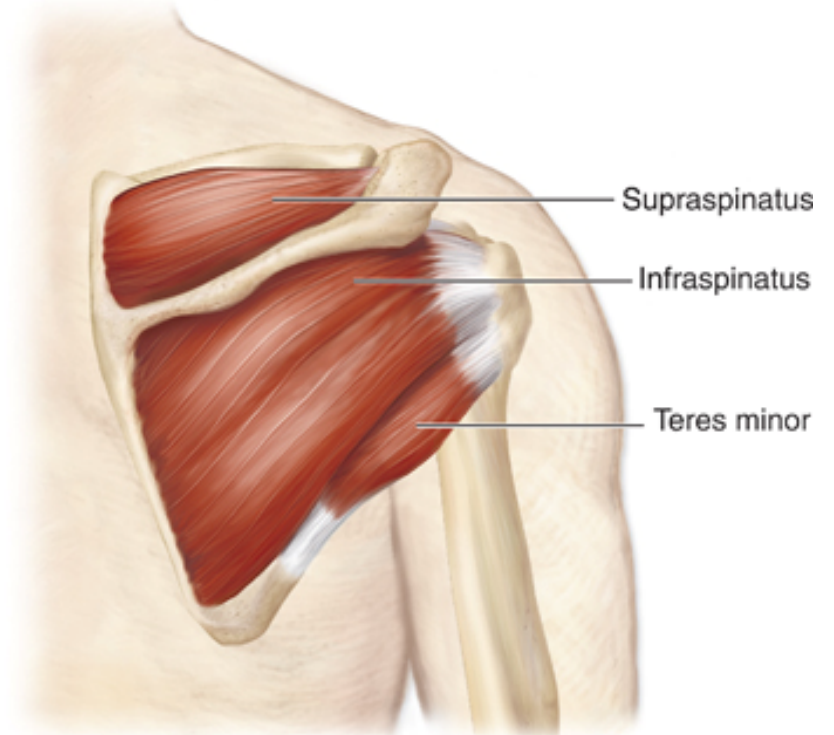
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(a) Anterior view



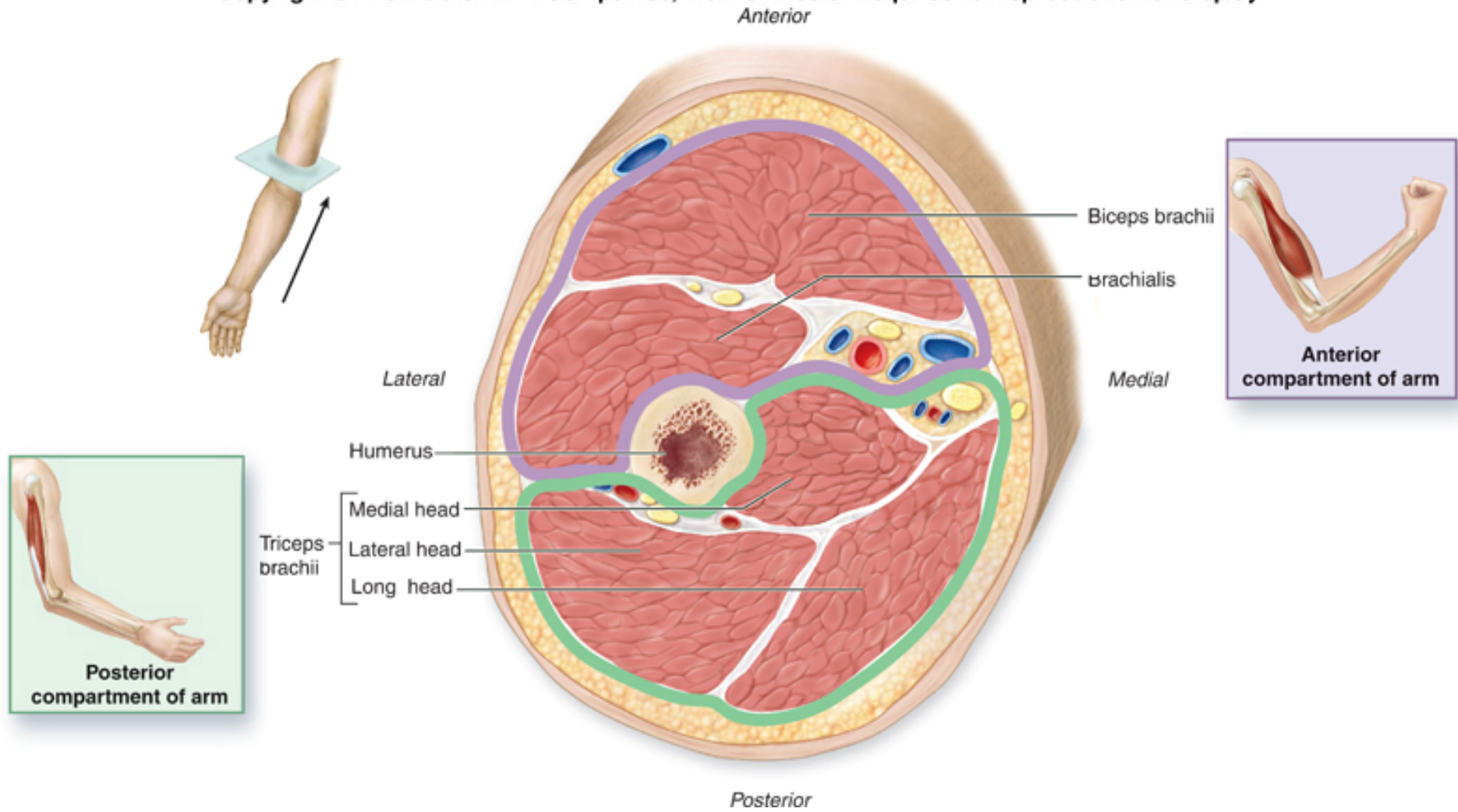
(b) Posterior view



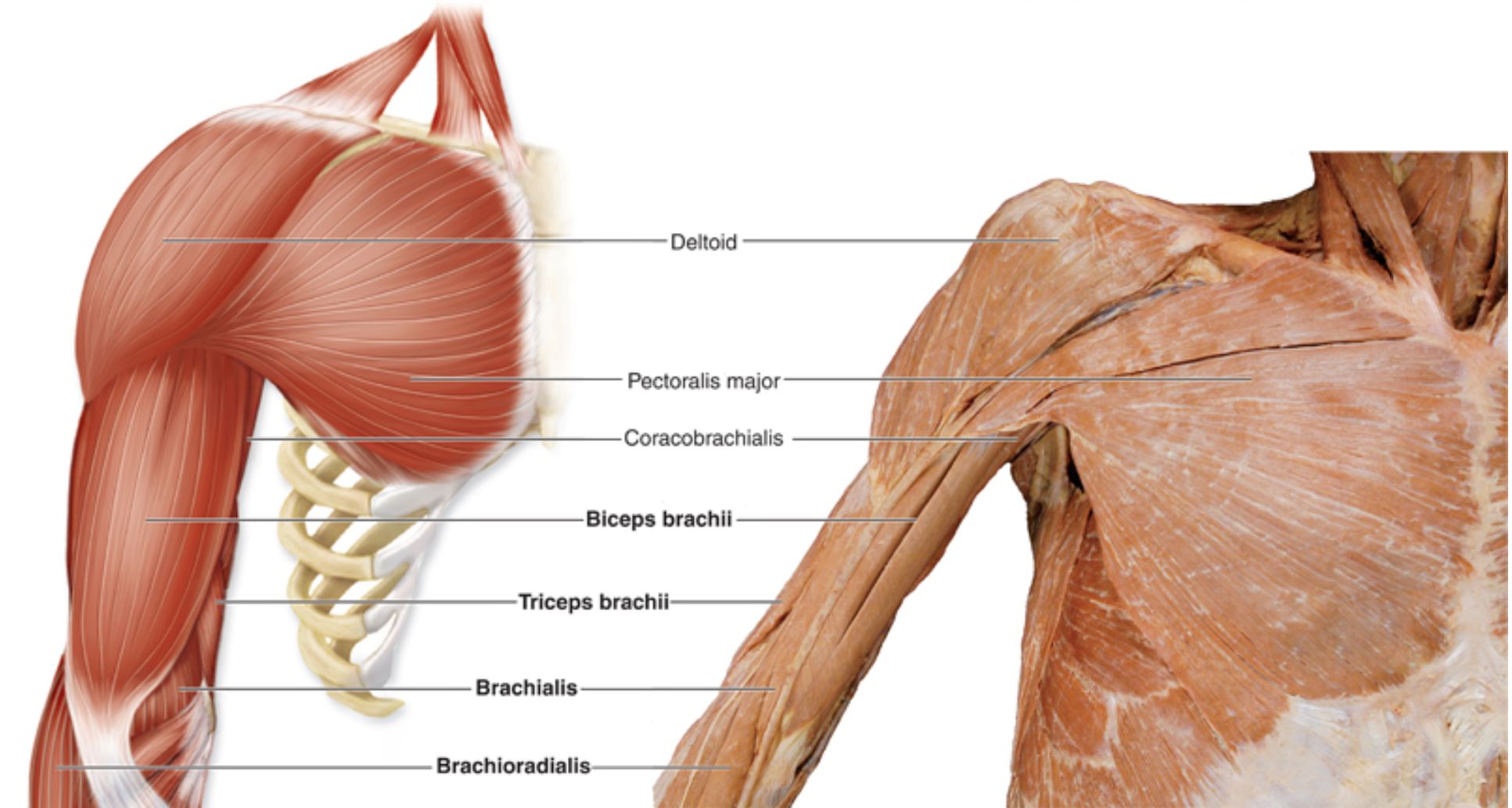
Arm and Forearm Muscles That Move the Elbow Joint/Forearm

- (Flexor) compartment
- Posterior (extensor) compartment
- Anterior compartment
 - primarily contains elbow flexors
- Posterior compartment contains elbow extensors
 - the principal flexors
 - biceps brachii, brachialis, and brachioradialis
 - muscles that extend the elbow joint
 - triceps brachii and the anconeus

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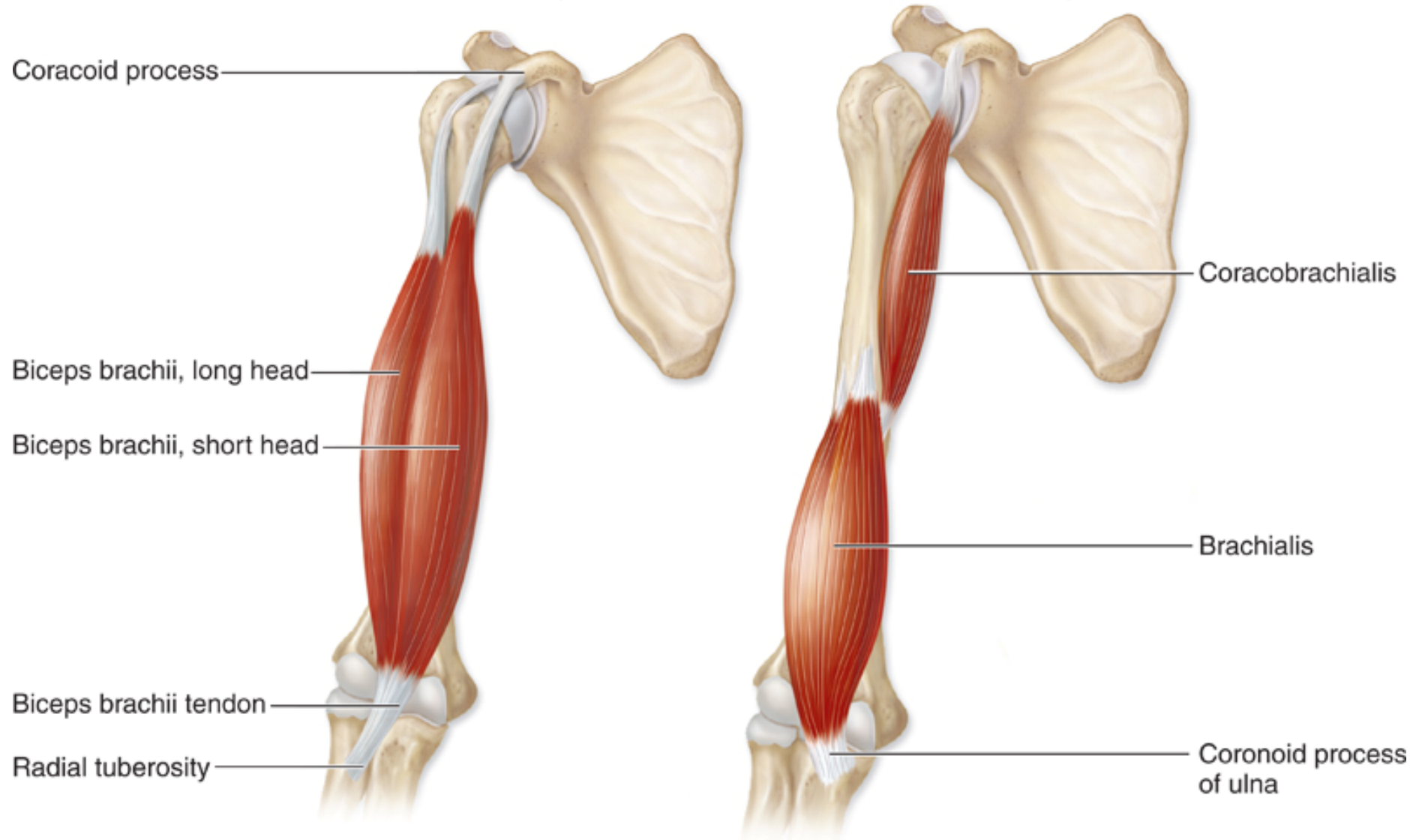
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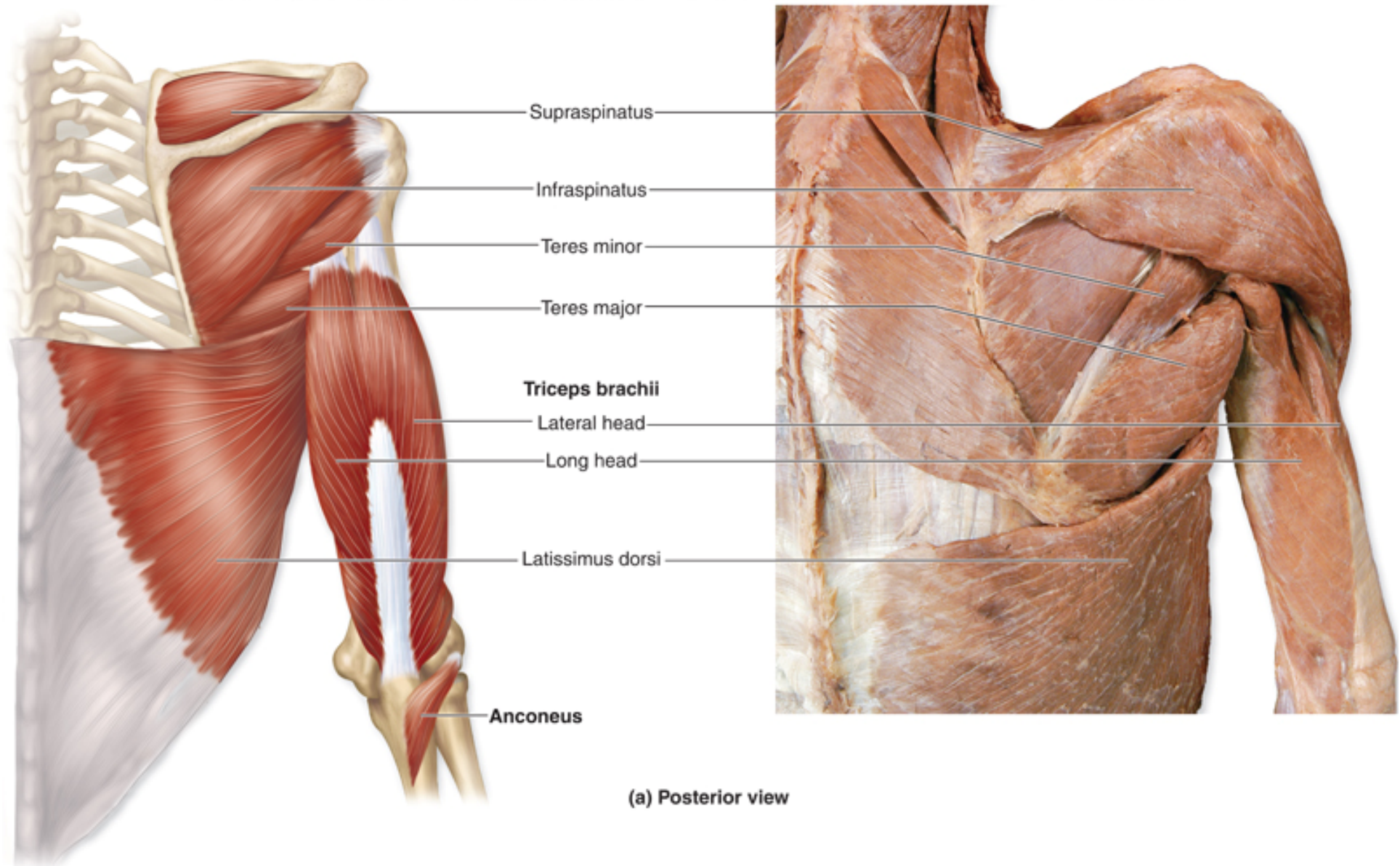
(a) Anterior view

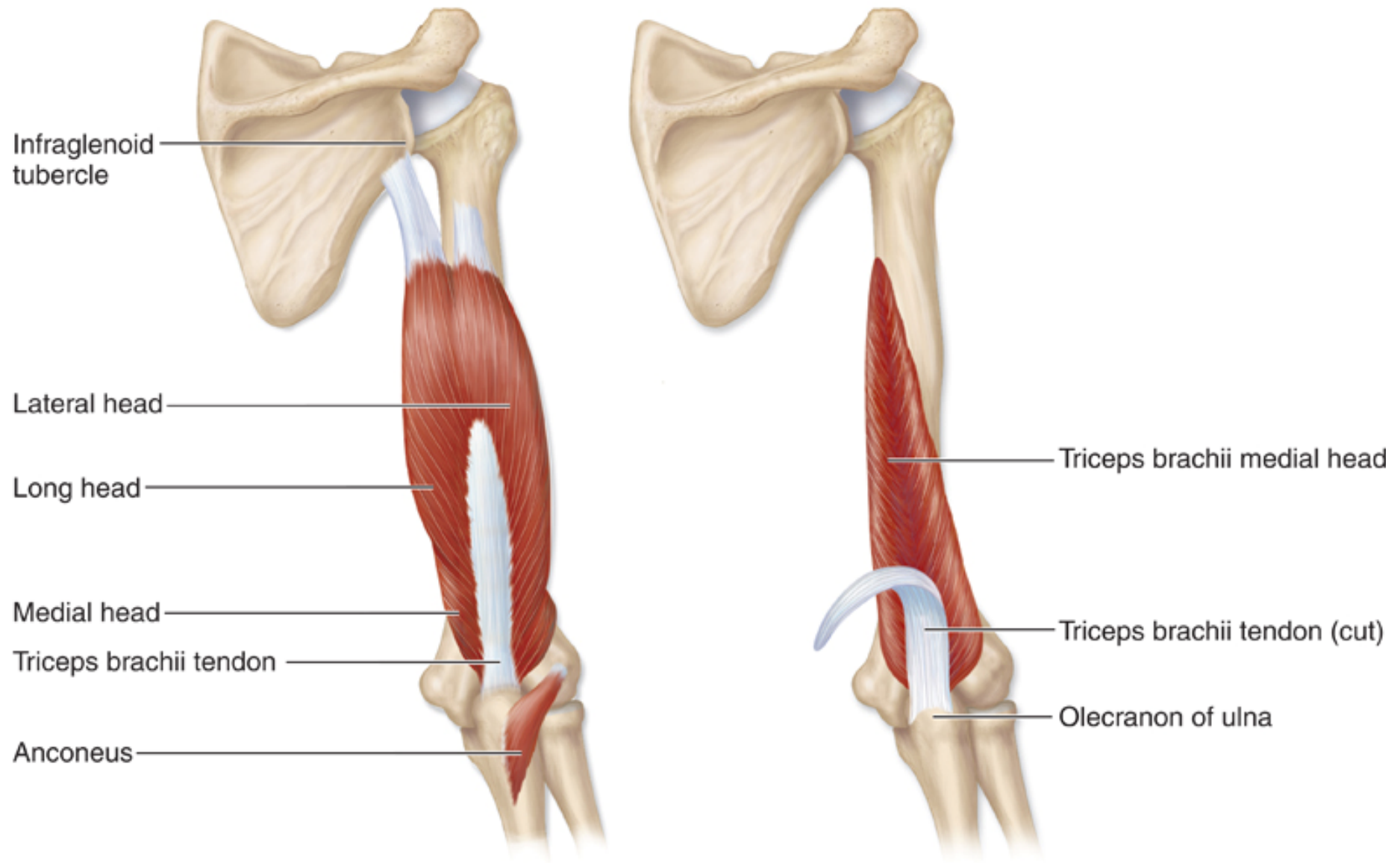
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Superficial *Deep*



(b) Anterior muscles



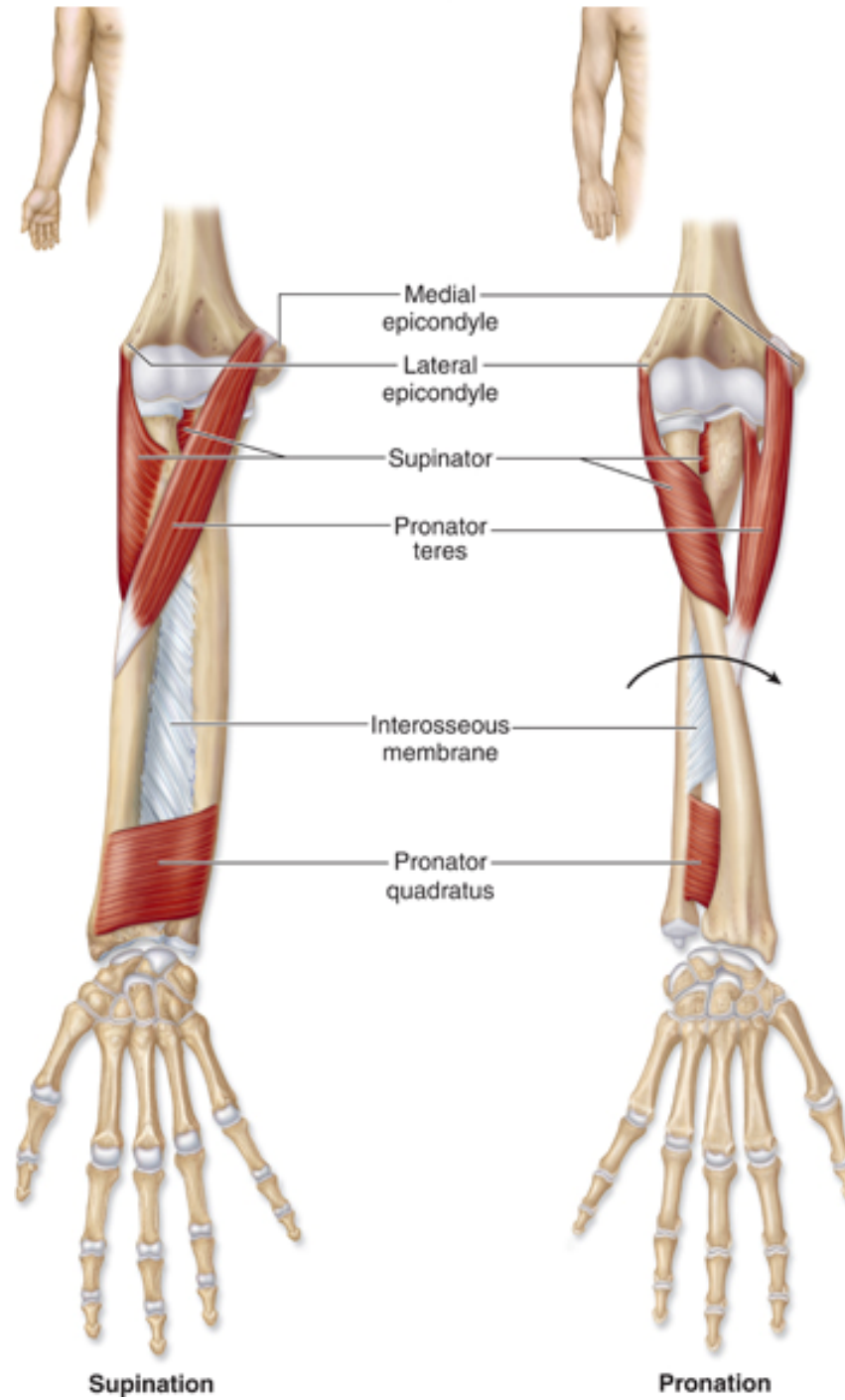


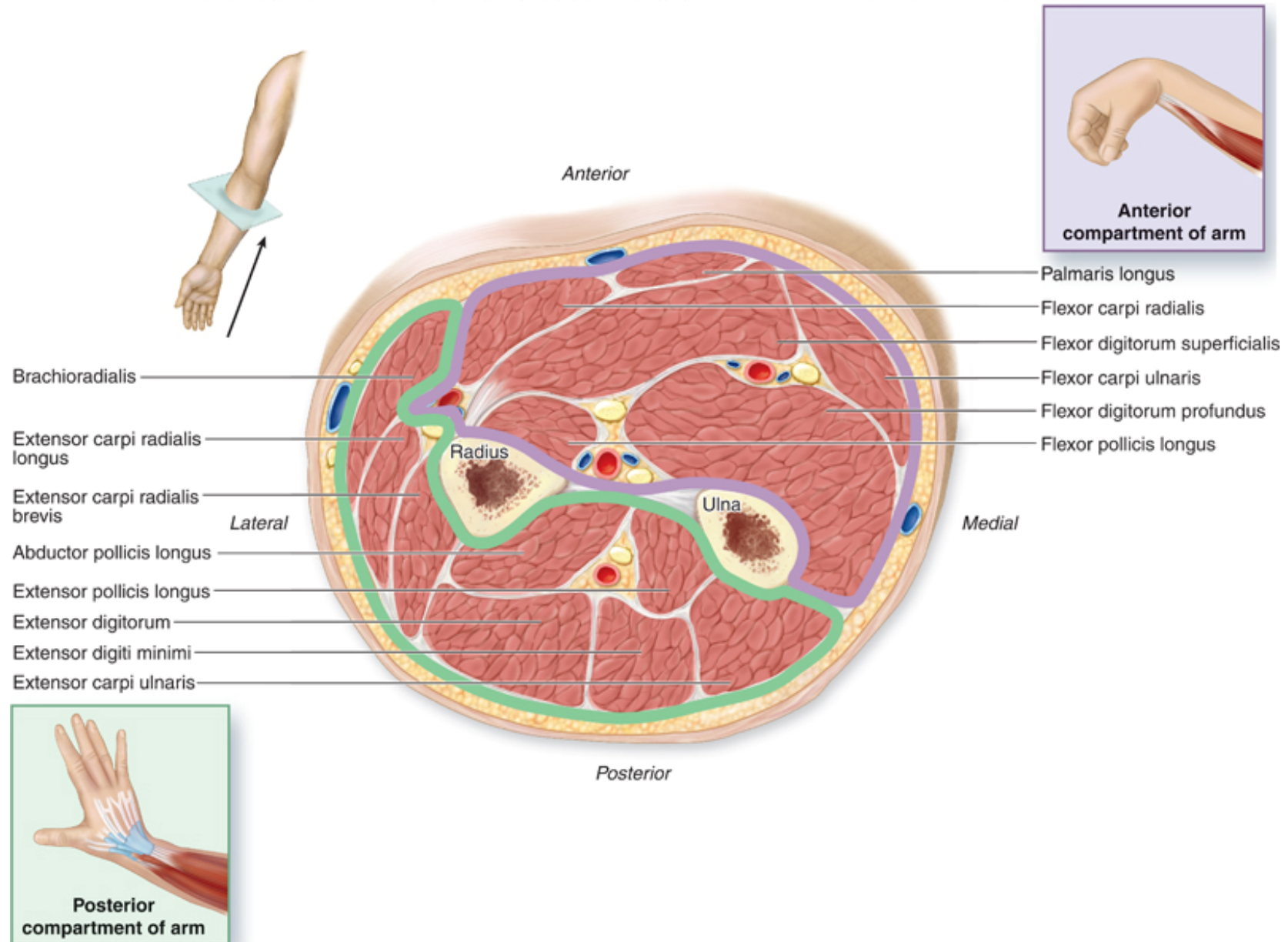
(b) Posterior muscles

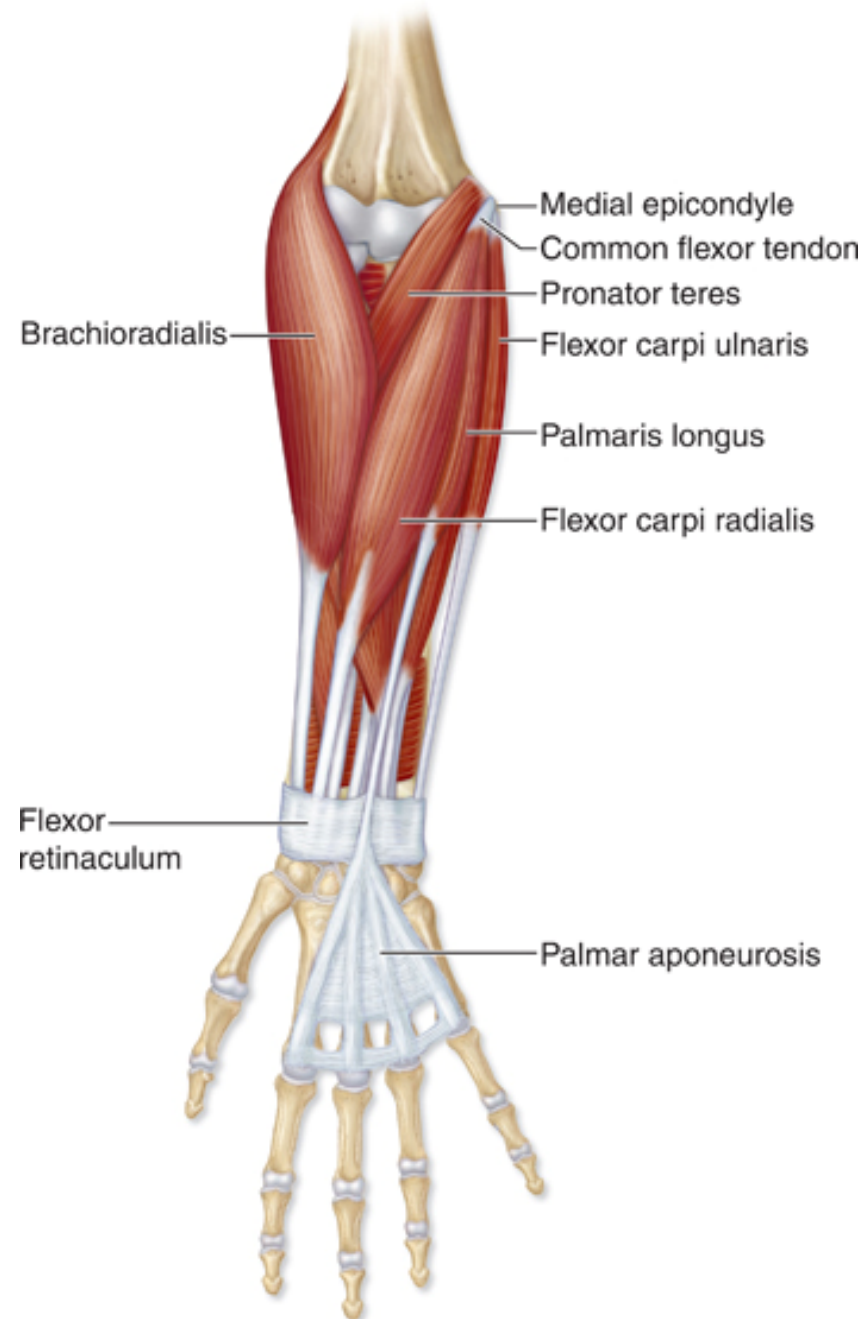


Forearm Muscles That Supinate and Pronate

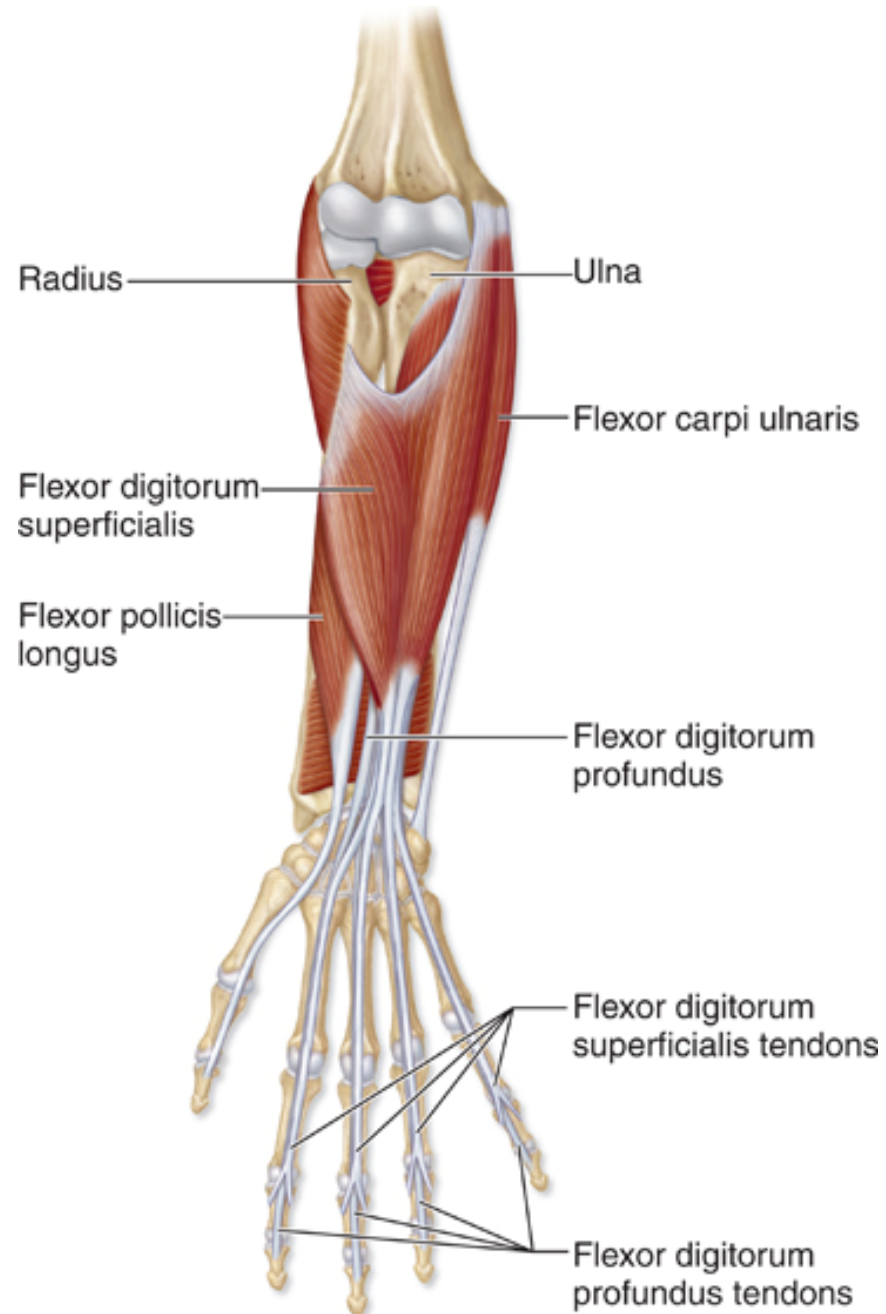
- **Supinator muscle** supinates the forearm.
- Contraction of the **pronator teres** and **pronator quadratus** pronates the forearm.
- **Biceps brachii** helps supinate the forearm.



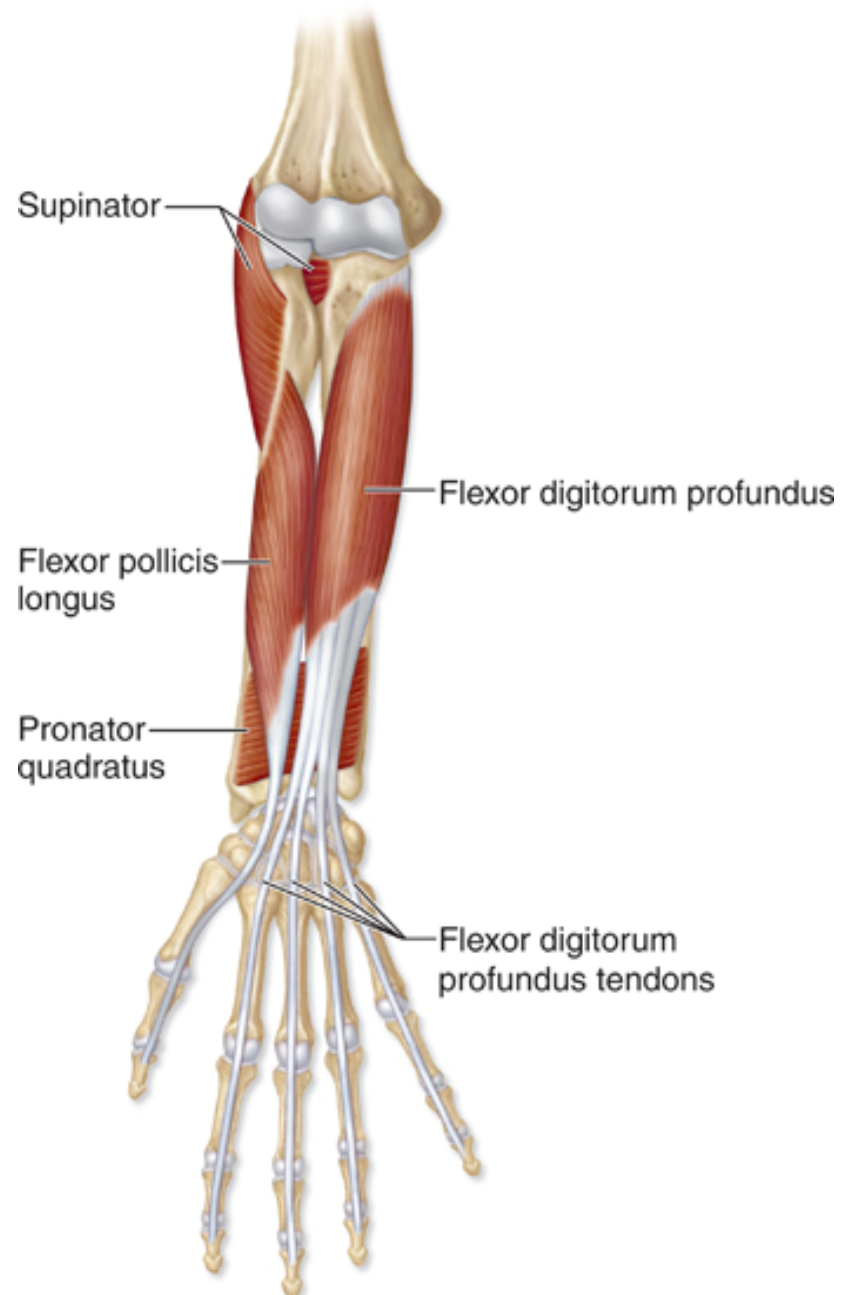




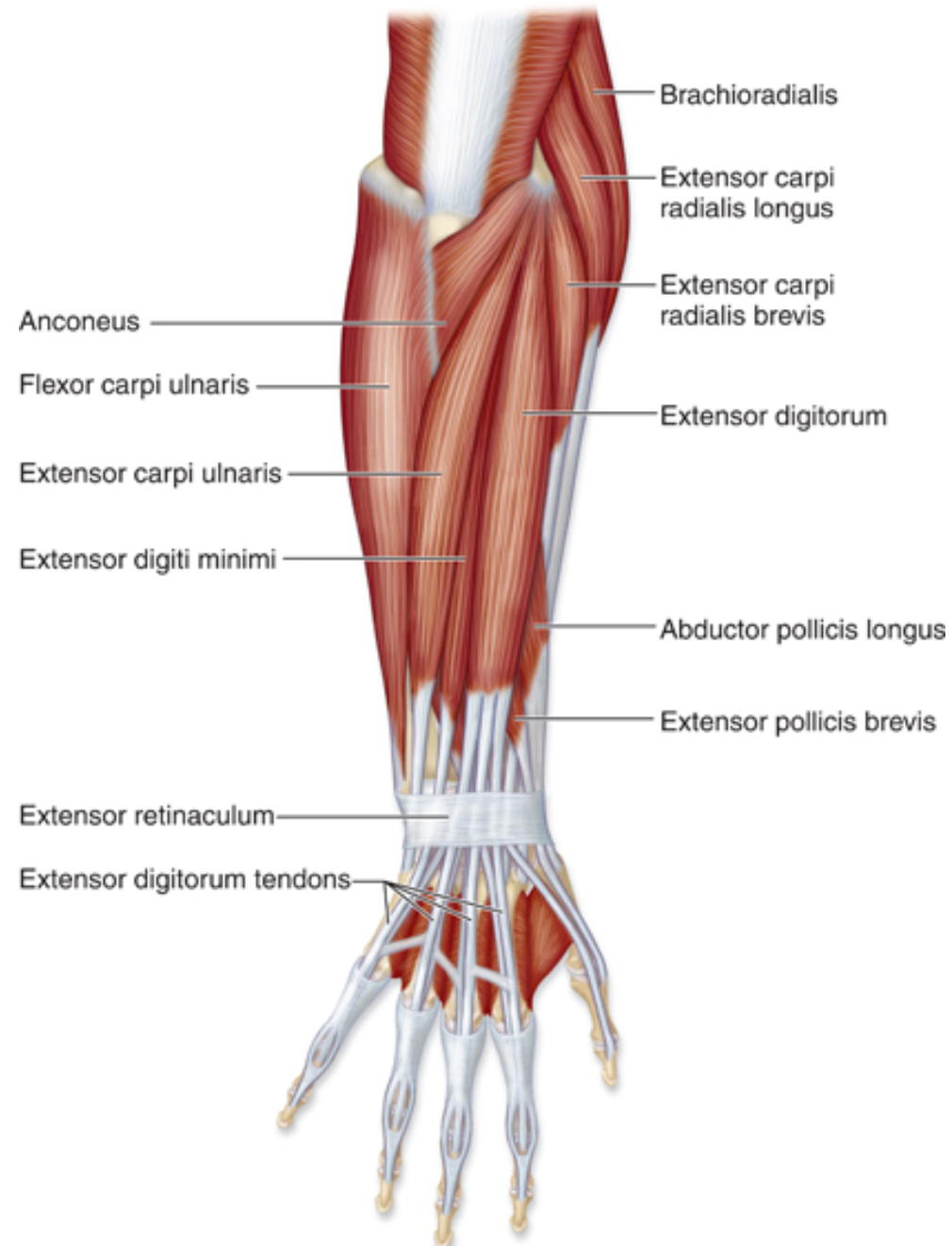
(a) Right anterior forearm, superficial view



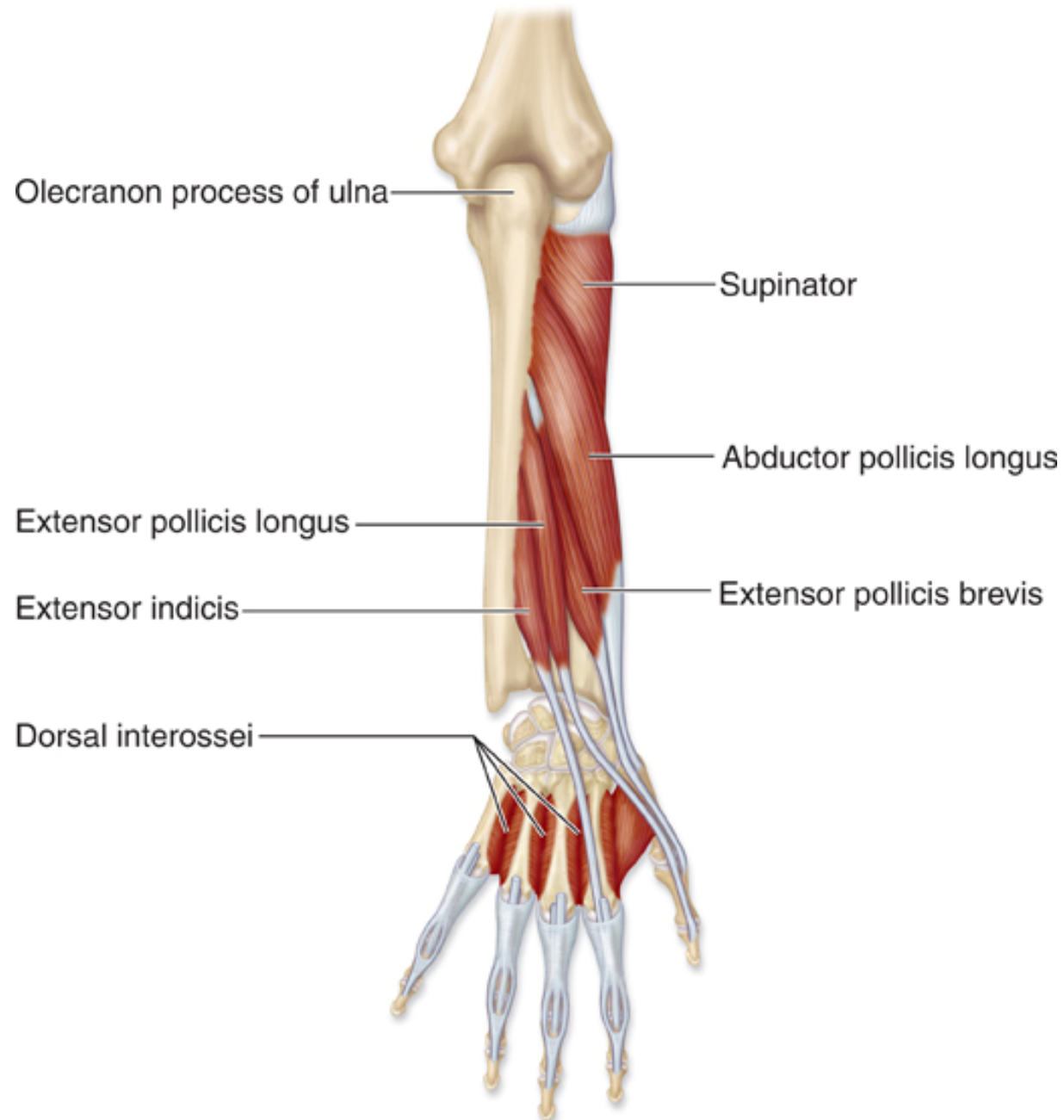
(b) Right anterior forearm, intermediate view



(c) Right anterior forearm, deep view



(a) Right posterior forearm, superficial views



(b) Right posterior forearm, deep views



Forearm Muscles That Move the Wrist Joint, Hand, and Fingers

- Muscles in the forearm move the hand at the wrist and/or the fingers.
- Extrinsic muscles of the wrist and hand originate on the forearm, not the wrist or hand.



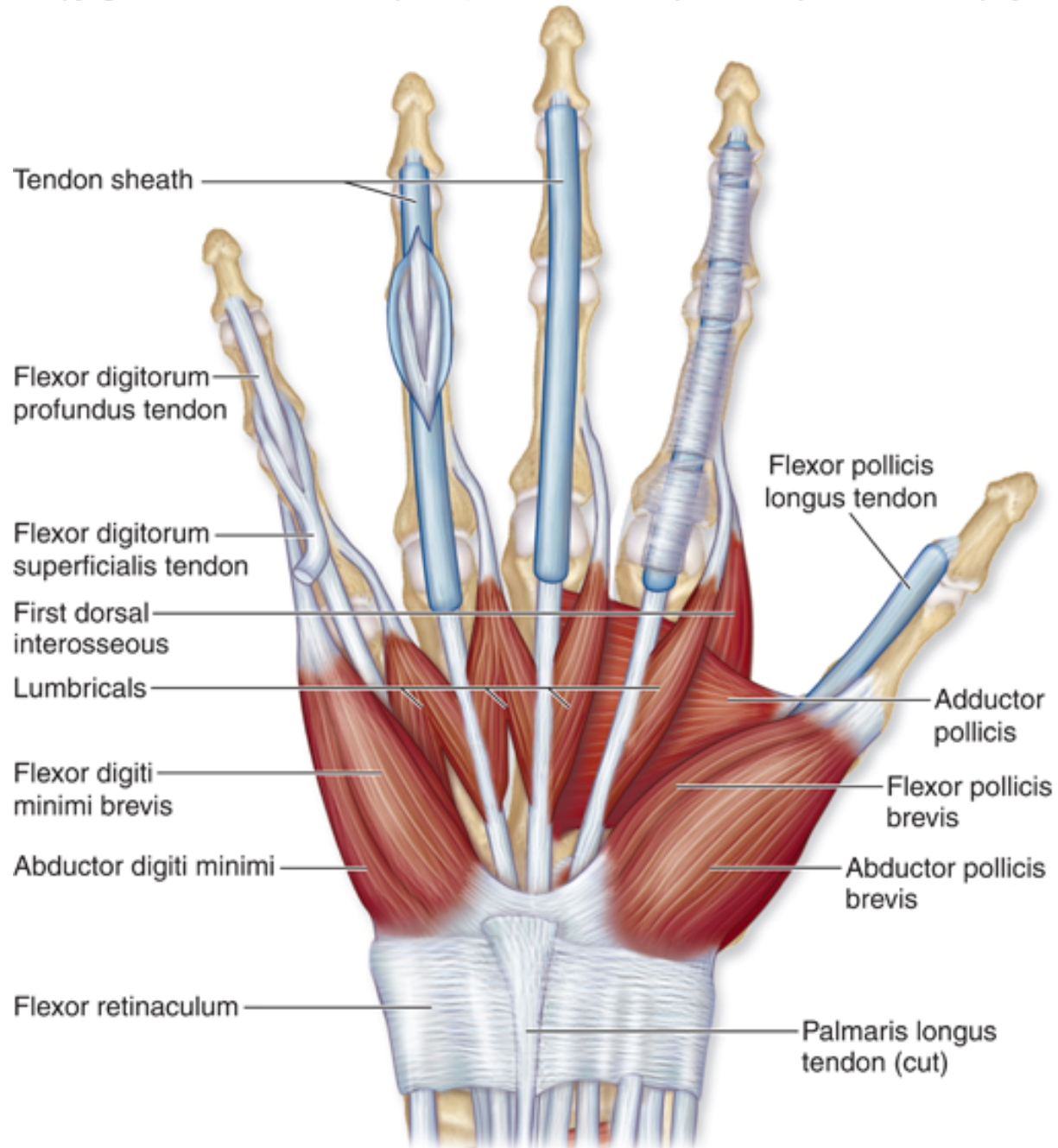
Forearm Muscles That Move the Wrist Joint, Hand, and Fingers

- Both the **pronator teres** and the **pronator quadratus** are located in the **anterior compartment** of the forearm.
 - their primary function is pronation
- The **supinator muscle** is in the **posterior compartment** of the forearm.
 - its primary function is supination
- Tendons of forearm muscles typically are surrounded by tendon (synovial) sheaths and held adjacent to the skeletal elements by strong fascial structures.
- At the wrist, the deep fascia of the forearm forms thickened, fibrous bands termed **retinacula**.

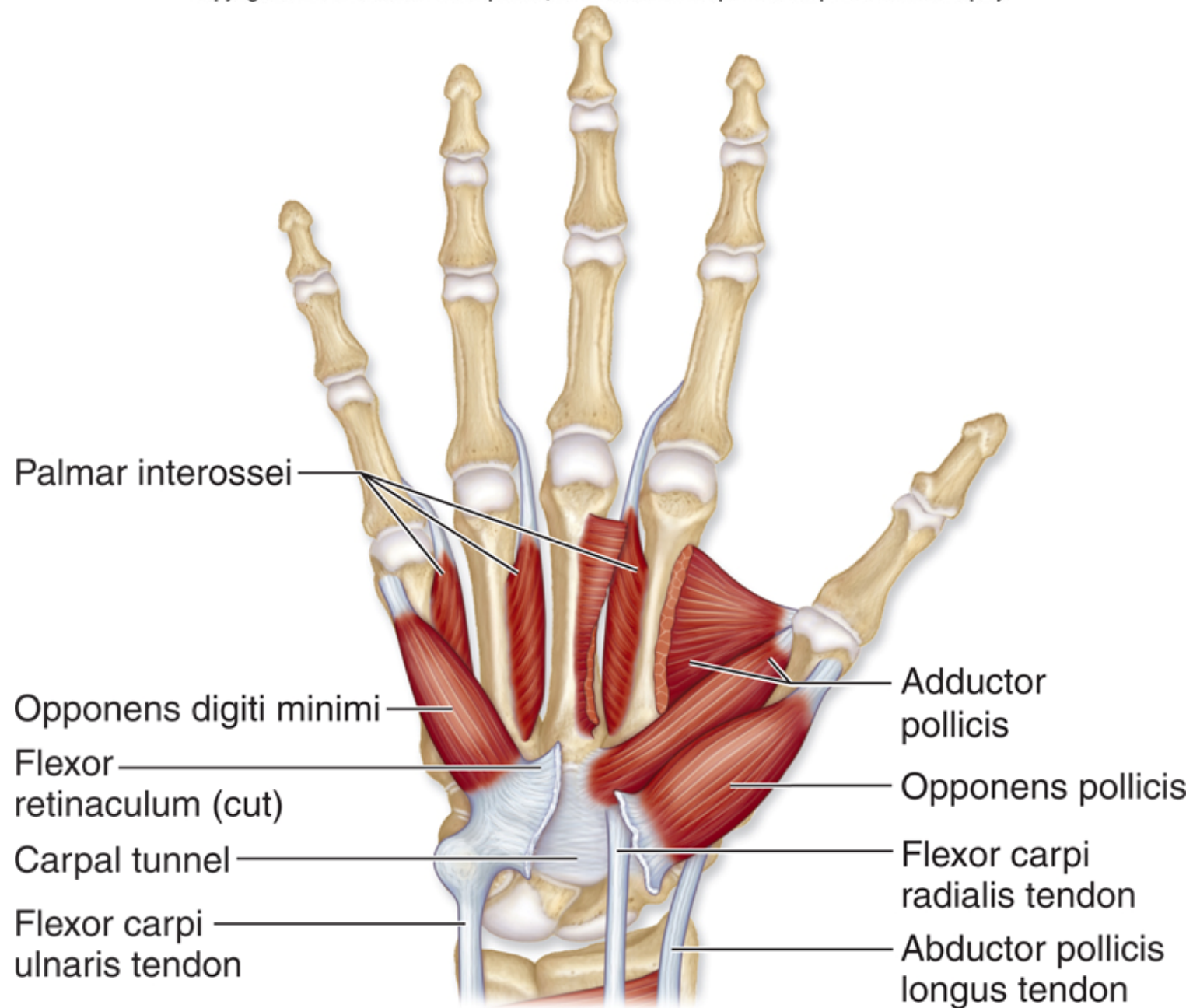


Intrinsic Muscles of the Hand

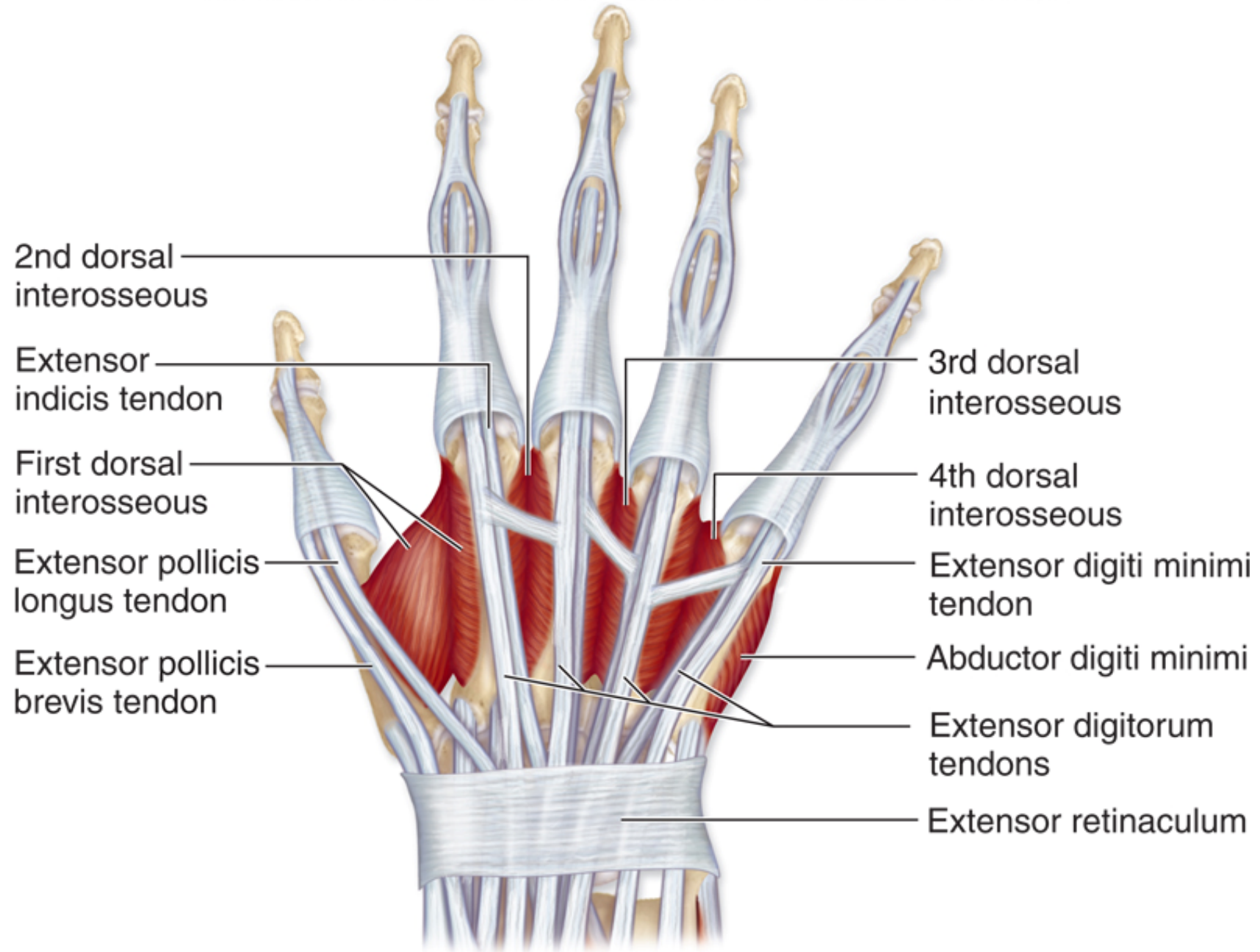
- Small muscles that both originate and insert on the hand.
- They are housed entirely within the palm.
 - **thenar group** forms the thick, fleshy mass (thenar eminence) at the base of the thumb
 - **hypothenar group** forms a smaller fleshy mass (hypothenar eminence) at the base of the little finger
 - **midpalmar group** occupies the space between the first two groups



(a) Right hand, superficial palmar view



(b) Right hand, deep palmar view



(c) Right hand, posterior view



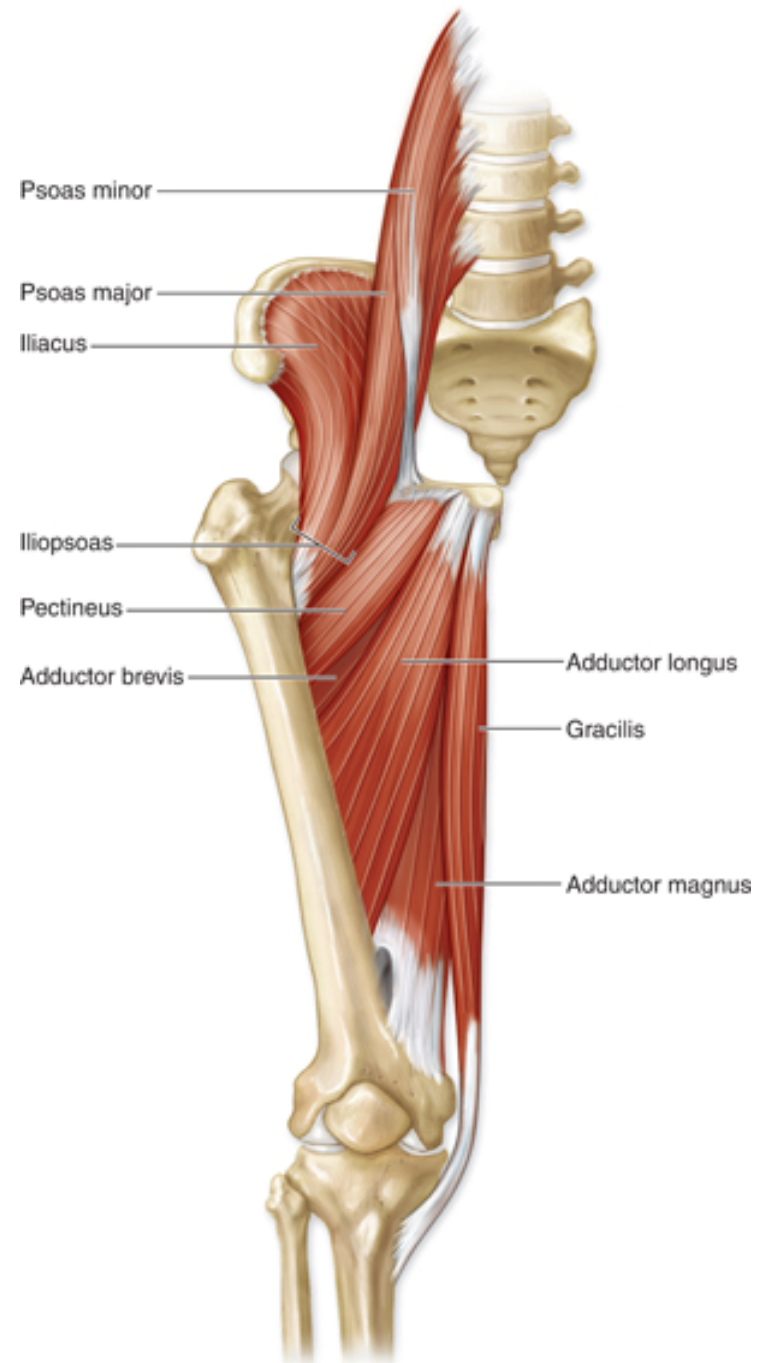
Muscles That Move the Pelvic Girdle and Lower Limb

- The most powerful and largest muscles in the body.
- Several of these muscles cross and act upon two joints—the **coxal joint** (hip) and the **knee joint**.

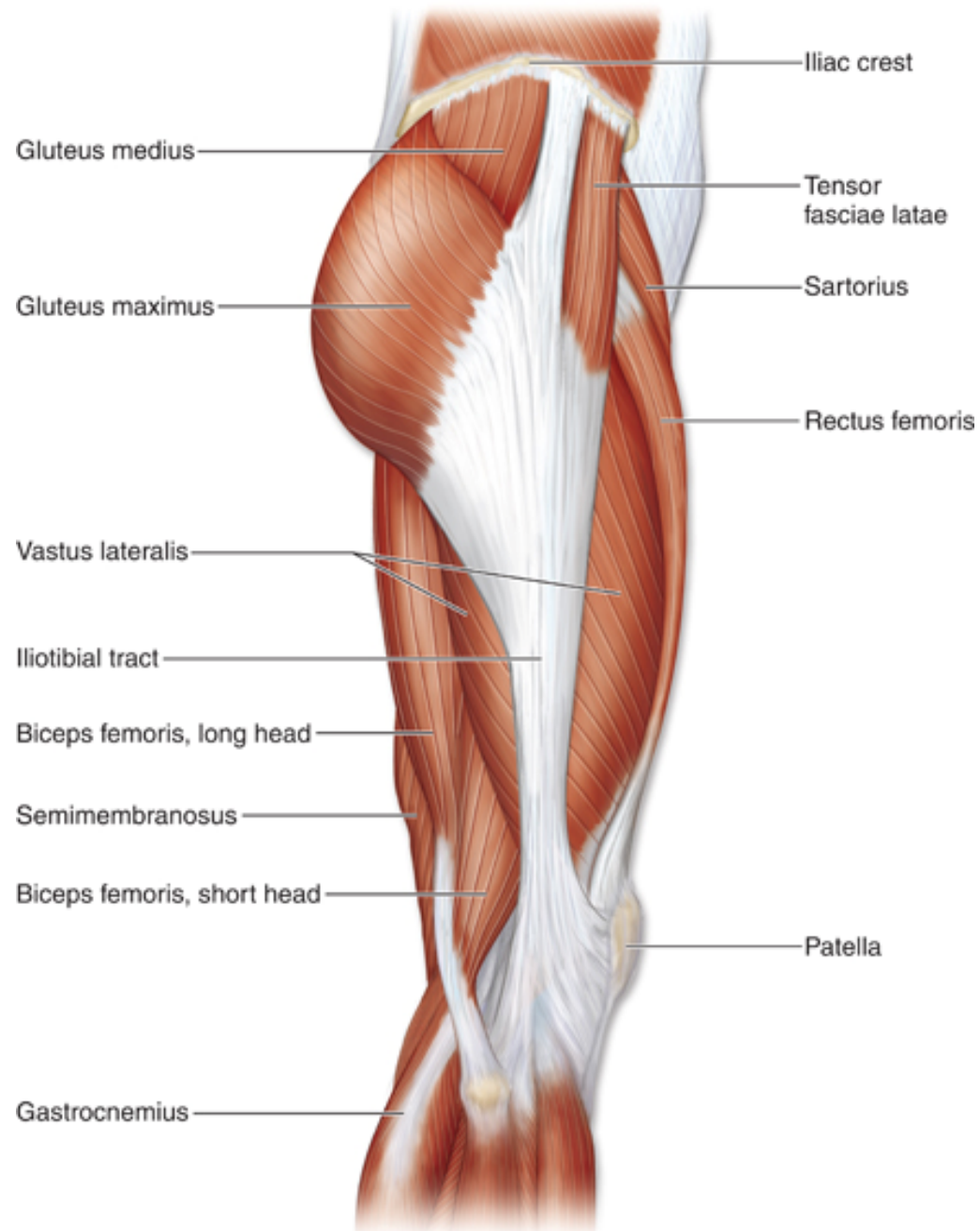


Muscles That Move the Coxal Joint/Thigh

- Most muscles that act on the coxal joint/thigh originate on the os coxae.
- Stabilize the highly movable coxal joint and support the body during standing and walking.
- Majority of the muscles that move the thigh at the coxal joint originate on the pelvic girdle and insert on the femur.

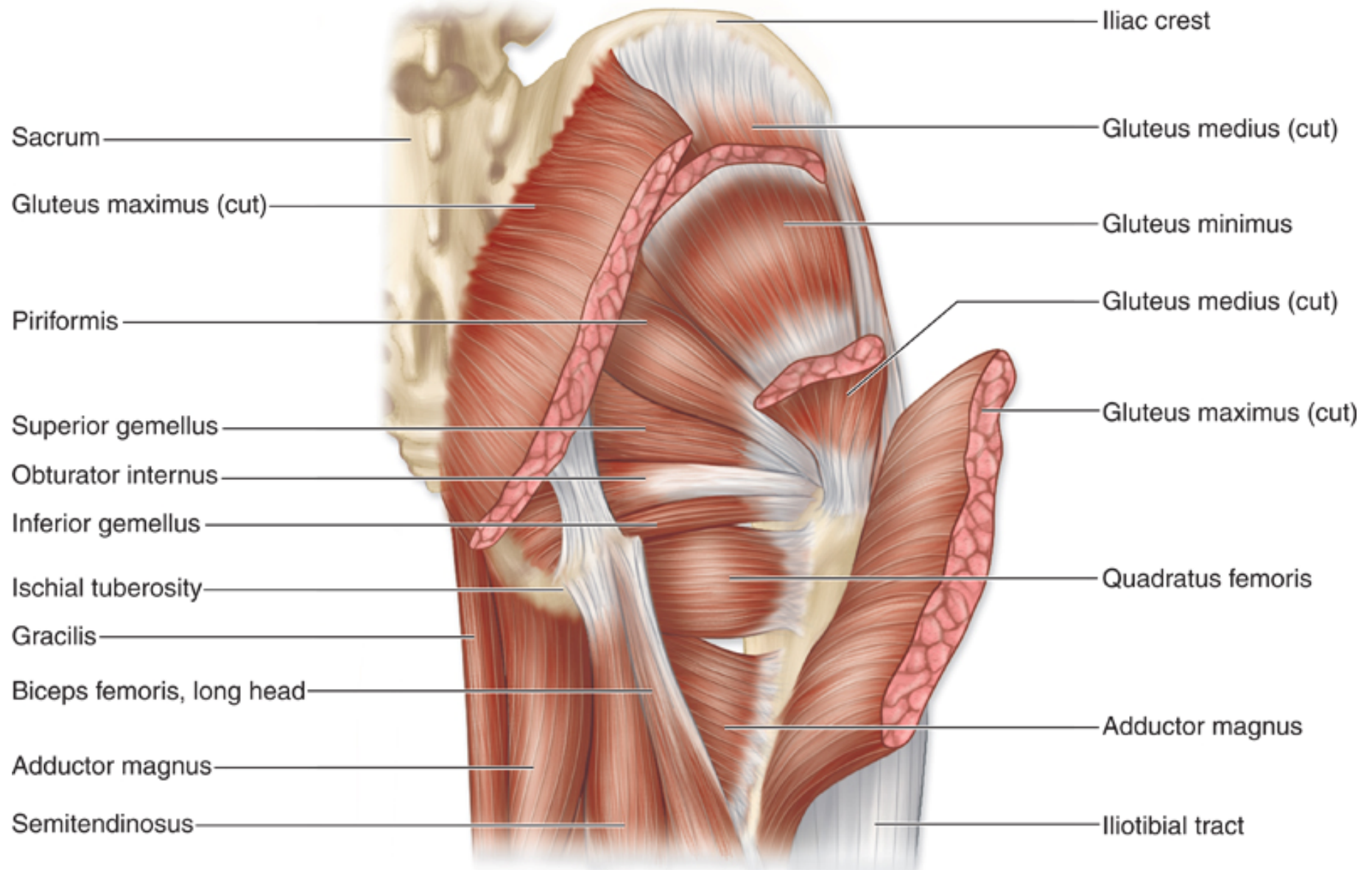


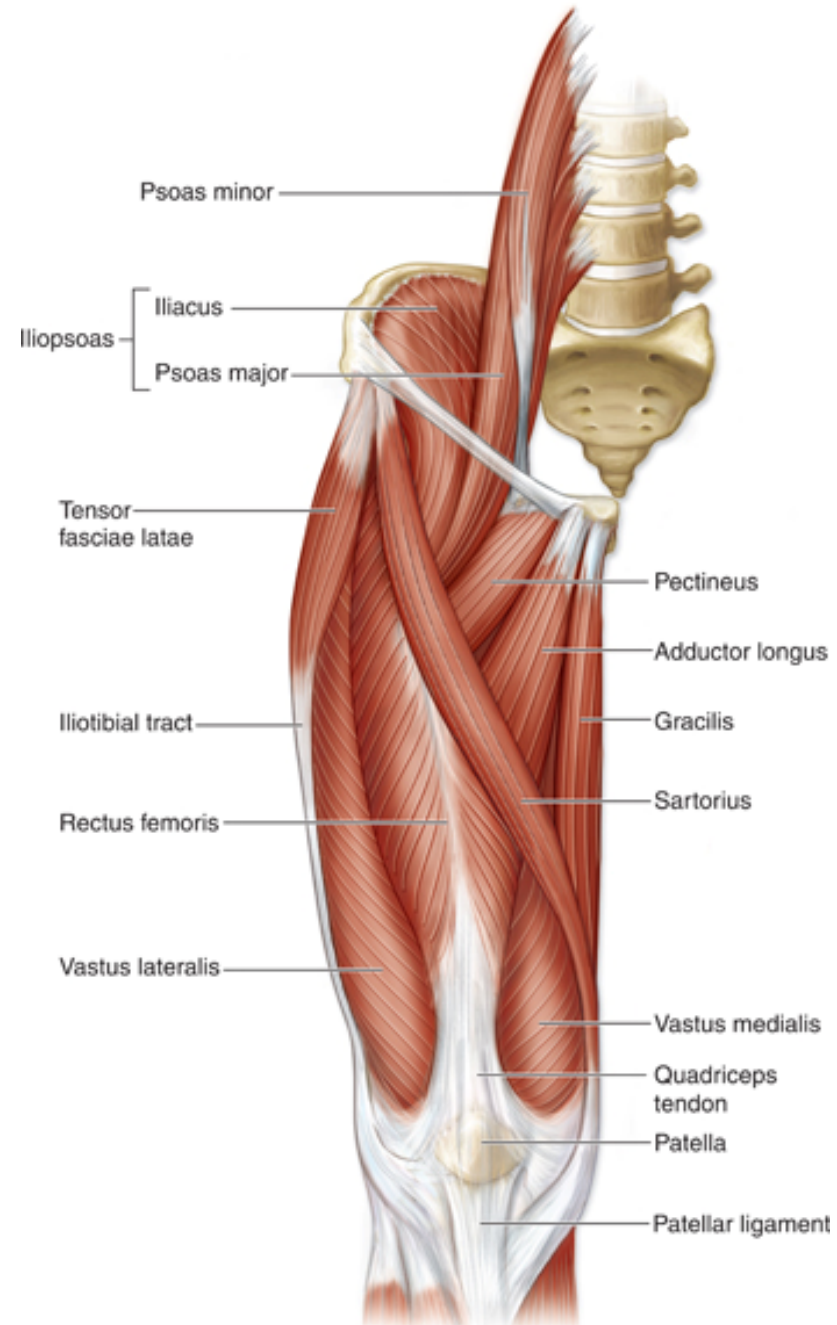
(a) Right thigh, anterior view



(b) Right thigh, lateral view

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Muscles of the Hip and Thigh

- Multiple muscles insert on the anterior thigh and flex the coxal joint.
 - the **psoas major** and the **iliacus** have different origins, but they share the common insertion at the lesser trochanter of the femur
 - they merge and insert on the femur as the **iliopsoas**
 - work synergistically to flex and laterally rotate the thigh
 - the **sartorius** crosses over the anterior thigh and helps flex the thigh



Muscles of the Hip and Thigh

- Five muscles are located in the medial compartment of the thigh.
- Adduct the thigh and perform additional functions.
- Adductor longus, adductor brevis, gracilis, and pectineus also flex the thigh.
- Adductor magnus extends and laterally rotates the thigh.
- Tensor fasciae latae abducts and medially rotates the thigh.



Muscles of the Hip and Thigh

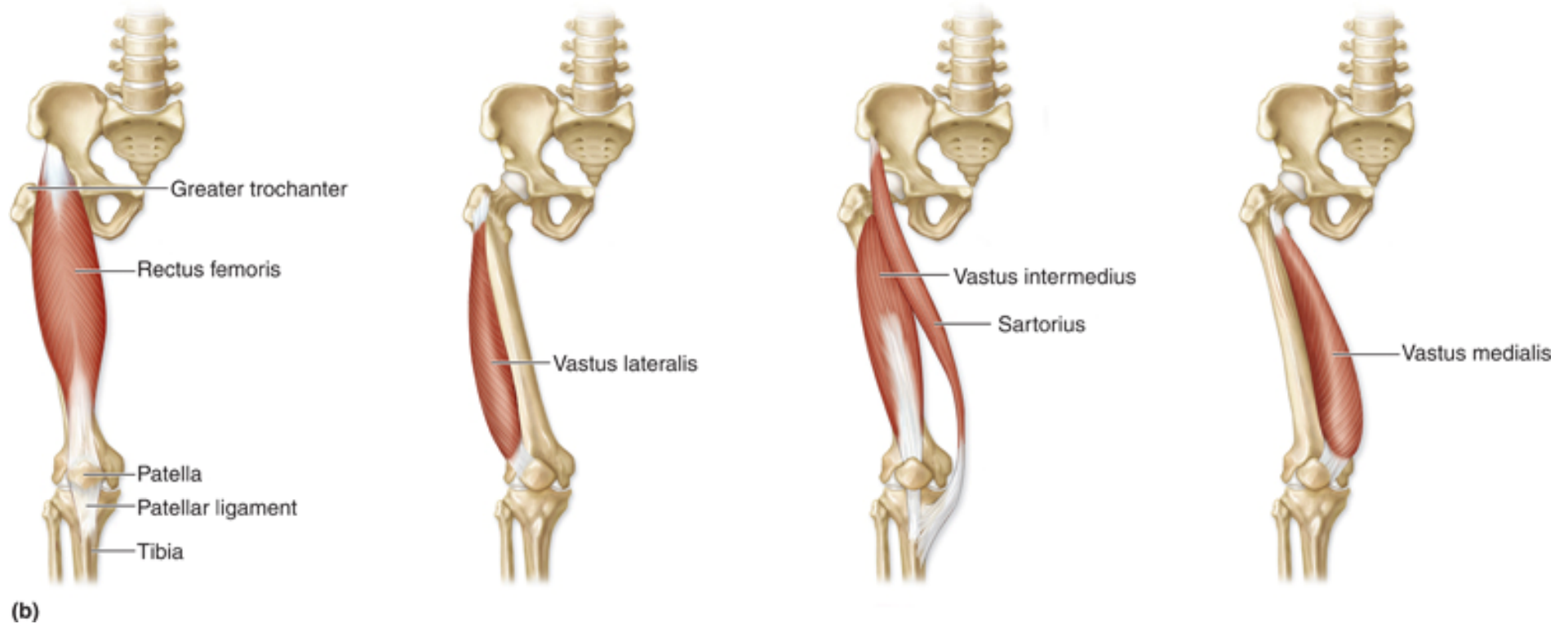
- The **gluteus maximus**.
 - the largest and heaviest of the three gluteal muscles
 - one of the largest muscles in the body
 - is the chief extensor of the thigh
 - laterally rotates the thigh
- Deep to the gluteus maximus is the **gluteus medius**.
 - a powerful abductor of the thigh
 - medially rotates the thigh
 - intramuscular injections are often given here
- The smallest of the gluteal muscles is the **gluteus minimus**.
 - lies deep to the gluteus medius
 - works with the gluteus medius to abduct and medially rotate the thigh



Muscles of the Hip and Thigh

- Deep to the gluteal muscles are a group of muscles that collectively laterally rotate the thigh/coxal joint.
 - piriformis
 - superior gemellus
 - obturator externus
 - inferior gemellus
 - obturator internus
 - quadratus femoris

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Muscles of the Hip and Thigh

- The posterior thigh contains a group of muscles that are collectively referred to as the **hamstrings**.
 - biceps femoris
 - semimembranosus
 - semitendinosus
- Share a common origin on the ischial tuberosity of the os coxae.
- Insert on the leg.
- Move both the thigh and the knee.
- Primary thigh movement is extension.



Muscles of the Hip and Thigh

- Vastus lateralis.
 - forms the anterolateral surface of the thigh
- Vastus medialis.
 - forms the anteromedial surface of the thigh
- Vastus intermedius.
 - positioned deep to the **rectus femoris**, and sandwiched between the other two vastus muscles
- All four converge on a single quadriceps tendon, which extends to the patella and then continues inferiorly as the patellar ligament and inserts on the tibial tuberosity.



Muscles of the Hip and Thigh

- Patella becomes encased in this tendon and ligament.
- **Quadriceps femoris** is the great extensor muscle of the leg
 - extends the knee
 - acts with the iliopsoas to flex the hip while the leg is off the ground
- **Sartorius** projects obliquely across the anterior surface of the thigh from the lateral to the medial side.
 - acts on both the coxal and knee joints, flexing and laterally rotating the coxal joint while flexing and medially rotating the knee joint
 - the longest in the body



Muscles of the Hip and Thigh

- The **medial (adductor) compartment** of the thigh.
 - muscles that adduct the coxal joint
 - adduct the thigh
 - gracilis also flexes the knee joint/leg
- The **posterior (flexor) compartment** of the thigh contains the three hamstring muscles discussed previously.
- These muscles also flex the knee. The **biceps femoris** is a two-headed muscle that inserts on the lateral side of the leg.
- The long head of the biceps femoris originates on the ischial tuberosity with the **semimembranosus** and **semitendinosus**.



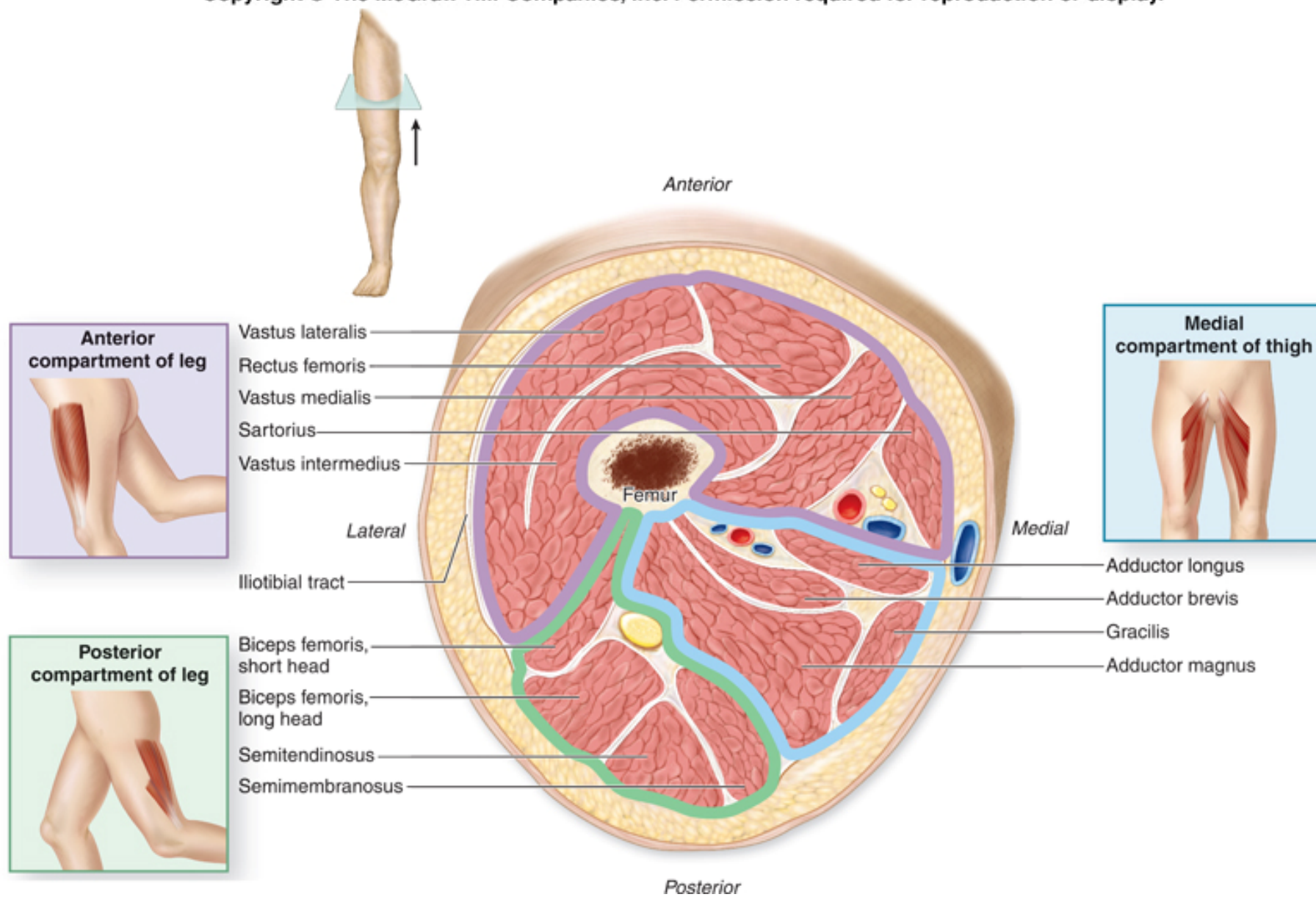
Muscles of the Hip and Thigh

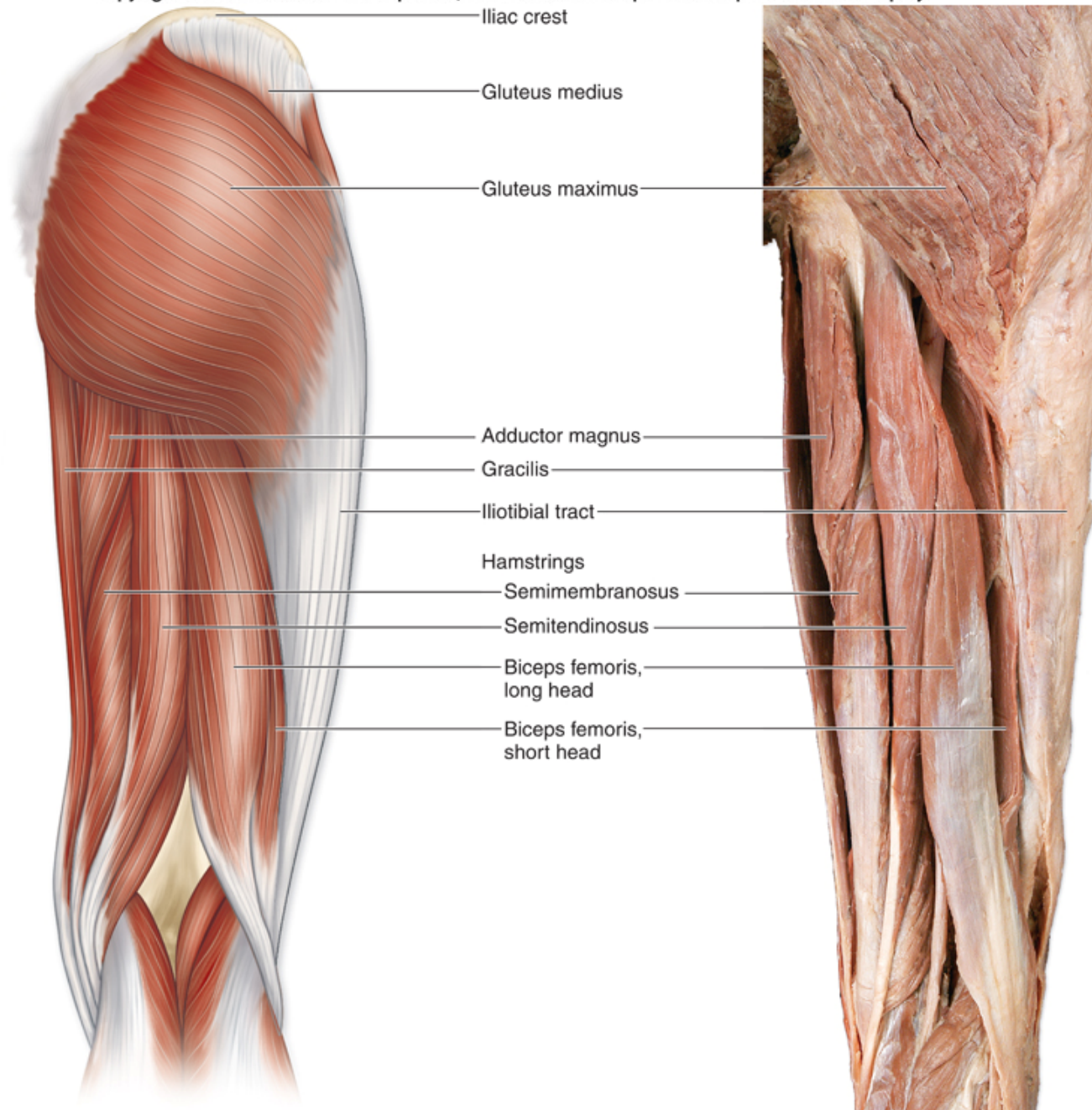
- The short head of the **biceps femoris** originates on the linea aspera of the femur.
- The short head cannot move the hip joint, but it does help the other hamstring muscles in flexing the knee.
- **Semimembranosus** is deep to the **semitendinosus**.
 - originates from the ischial tuberosity and attaches to the medial side of the leg
- **Semitendinosus** is superficial to the semimembranosus and is attached to the medial leg.



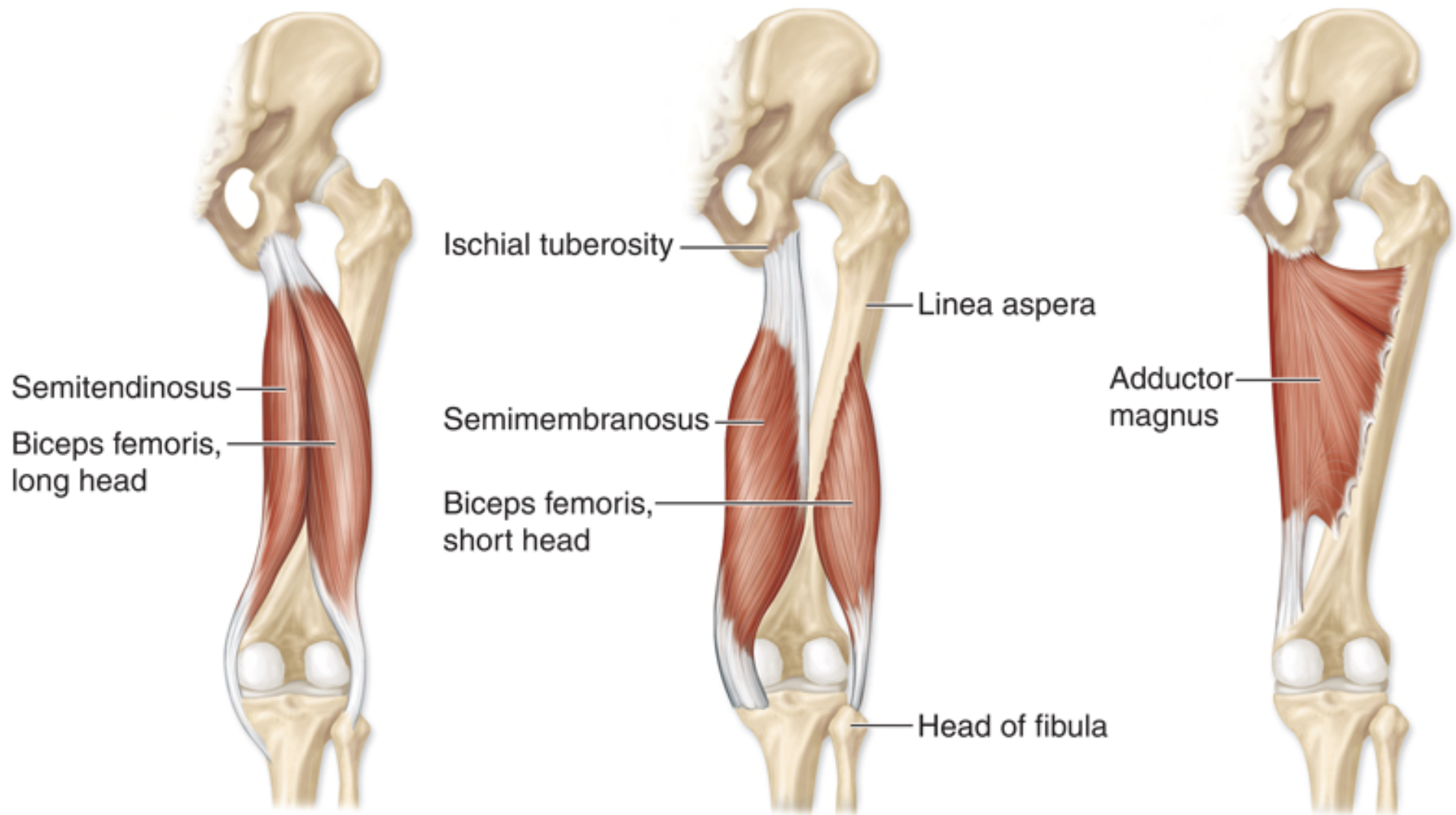
Muscles of the Hip and Thigh

- Several leg muscles span the knee joint and work to flex the knee.
 - gastrocnemius
 - plantaris
 - popliteus

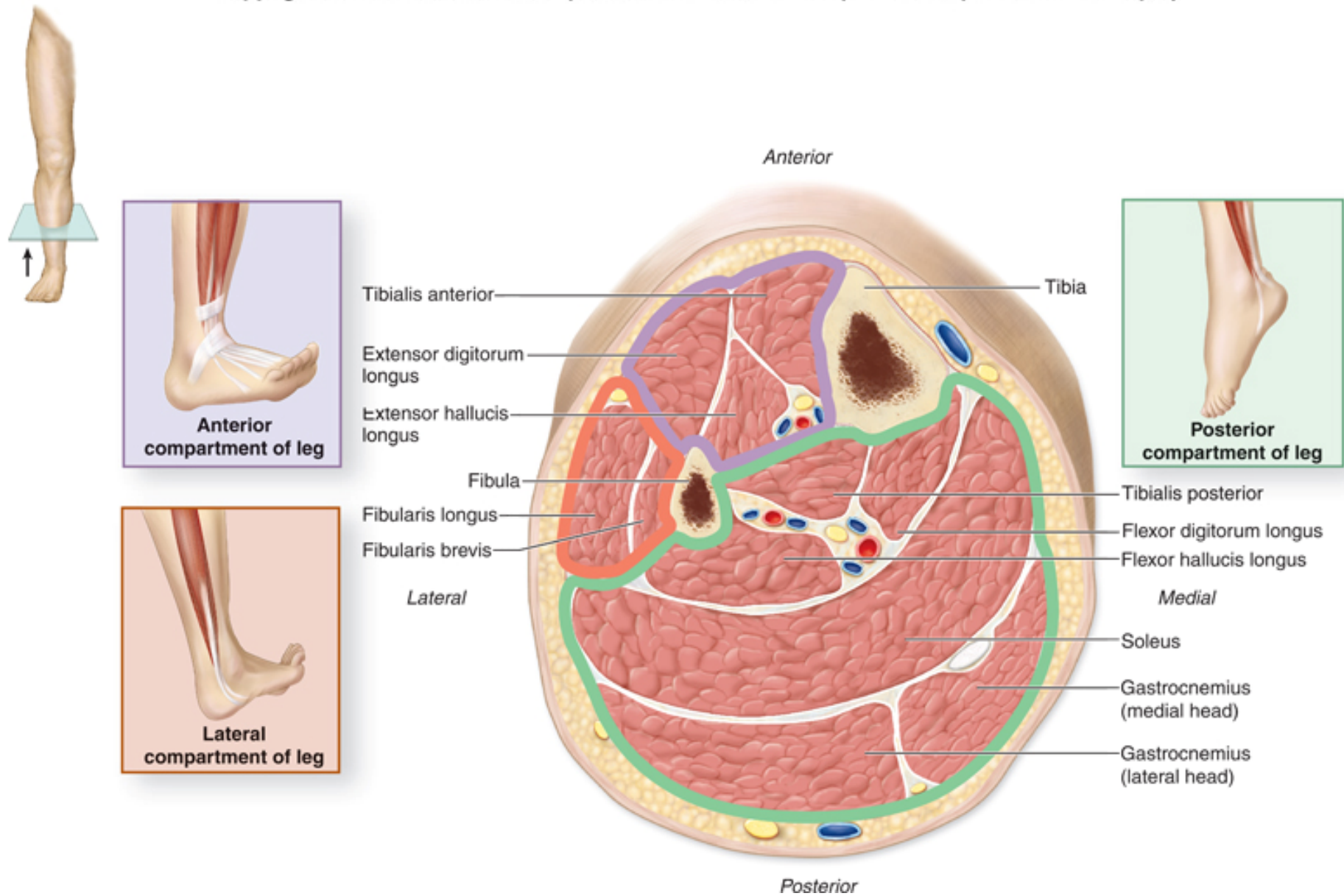


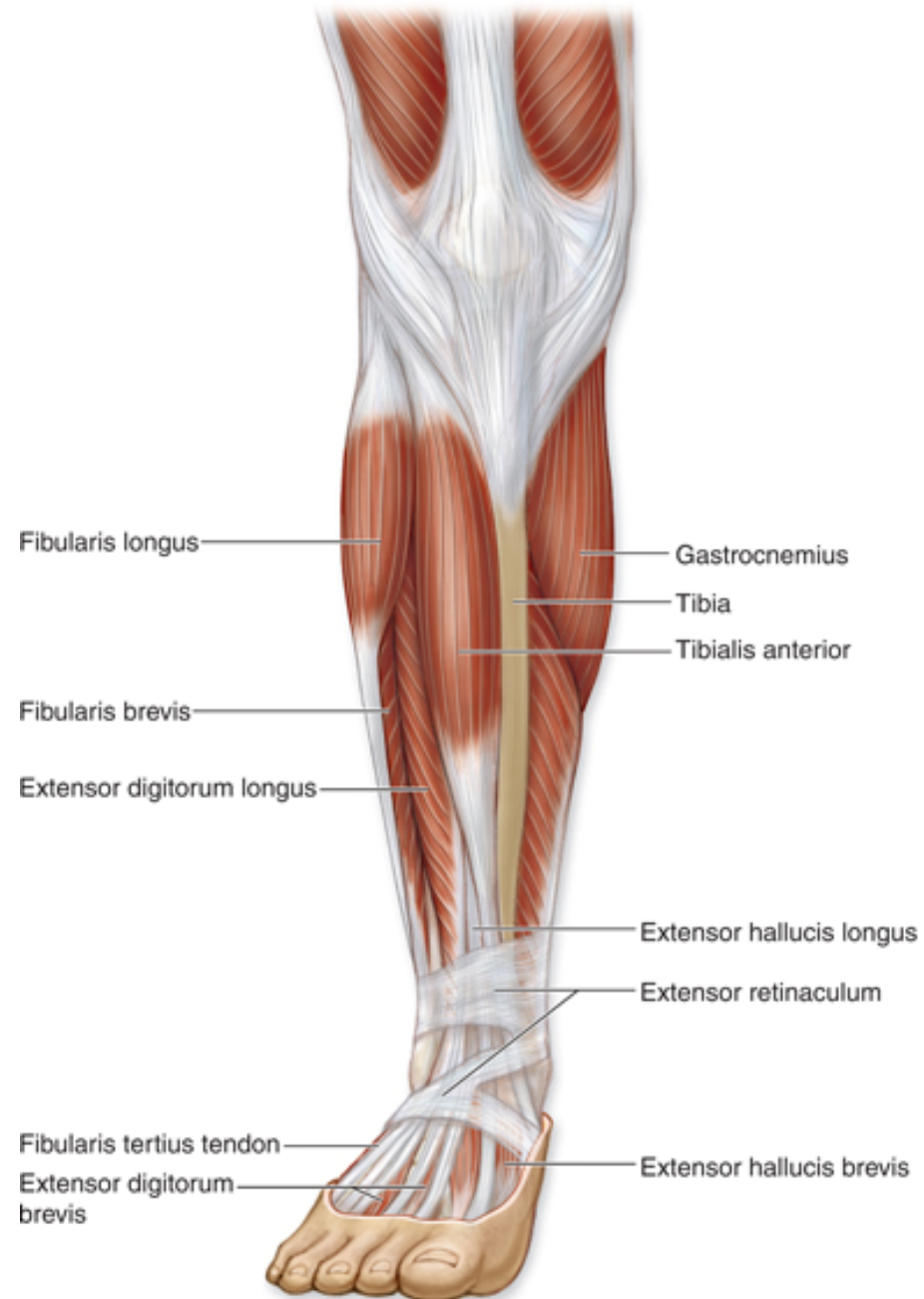


(a) Right thigh, posterior view

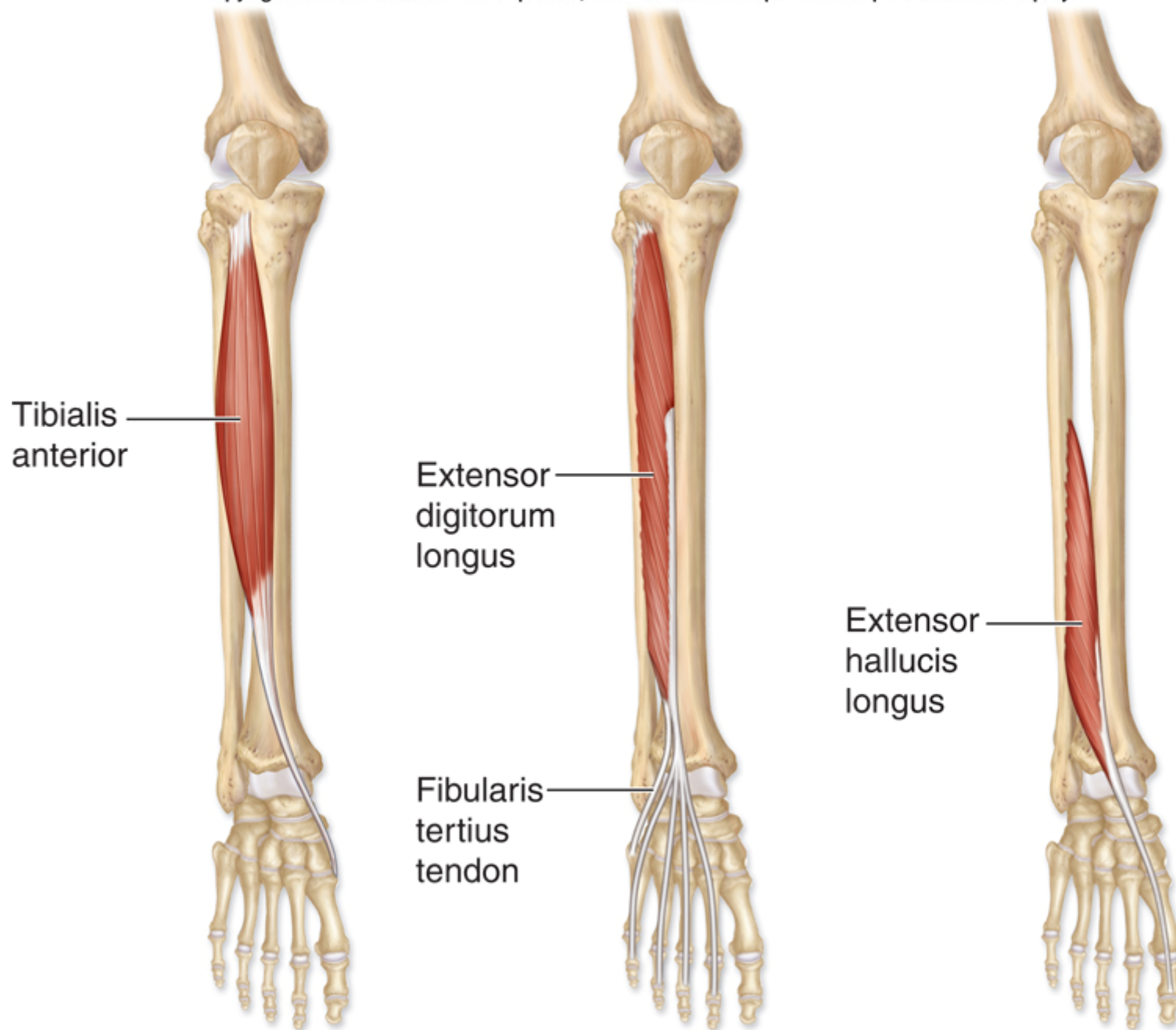


(b)

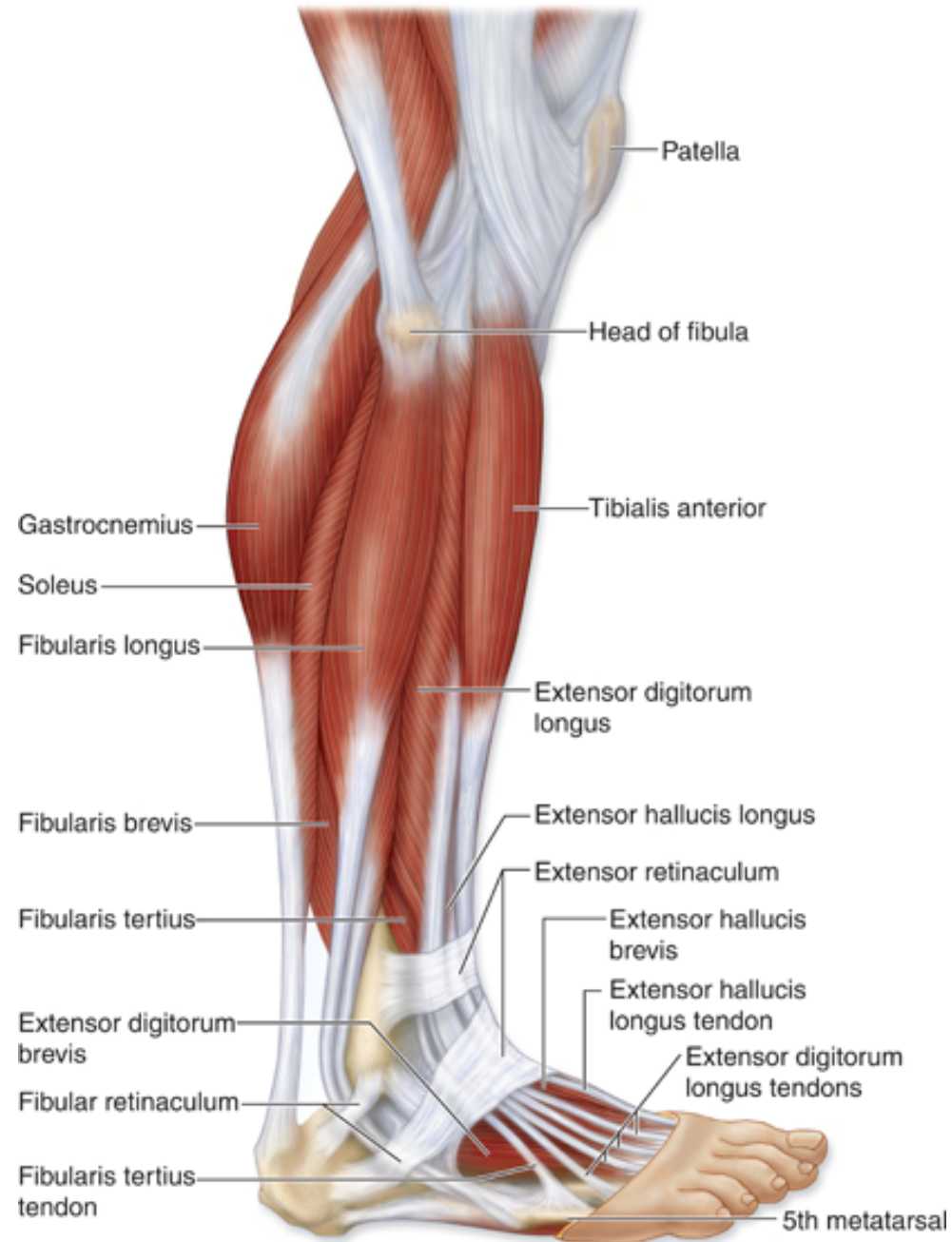




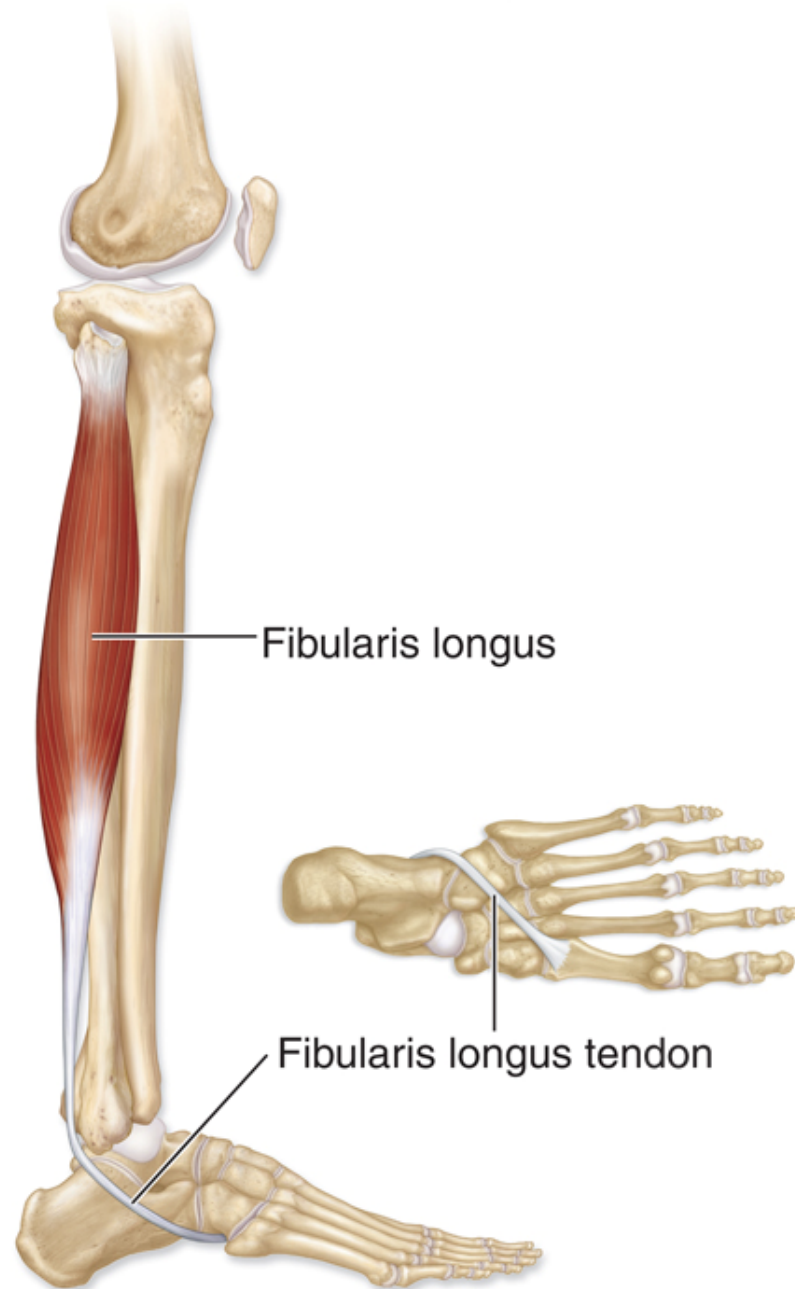
(a) Right leg, anterior view



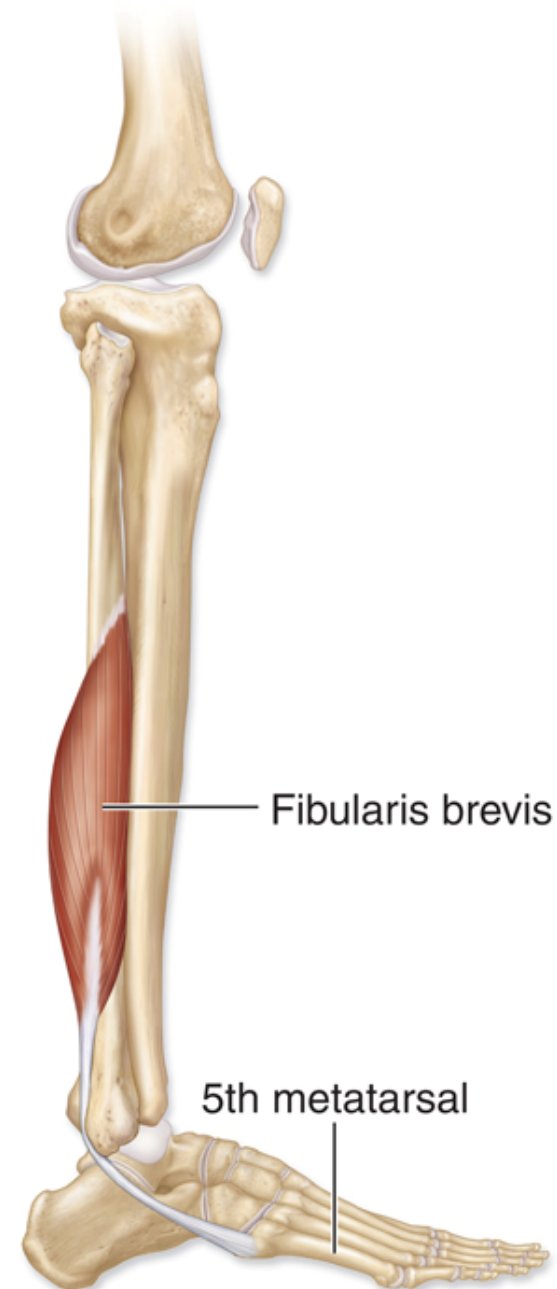
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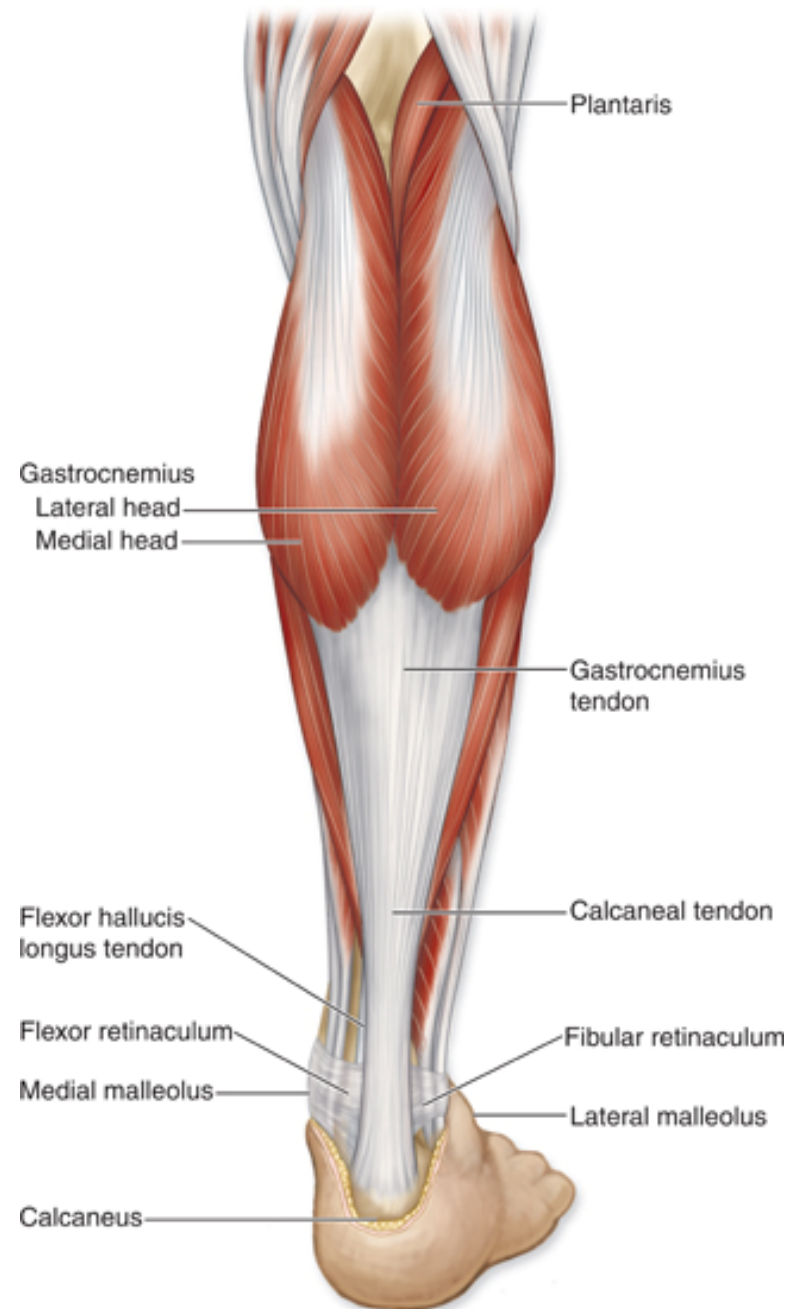


(a) Right leg, lateral view

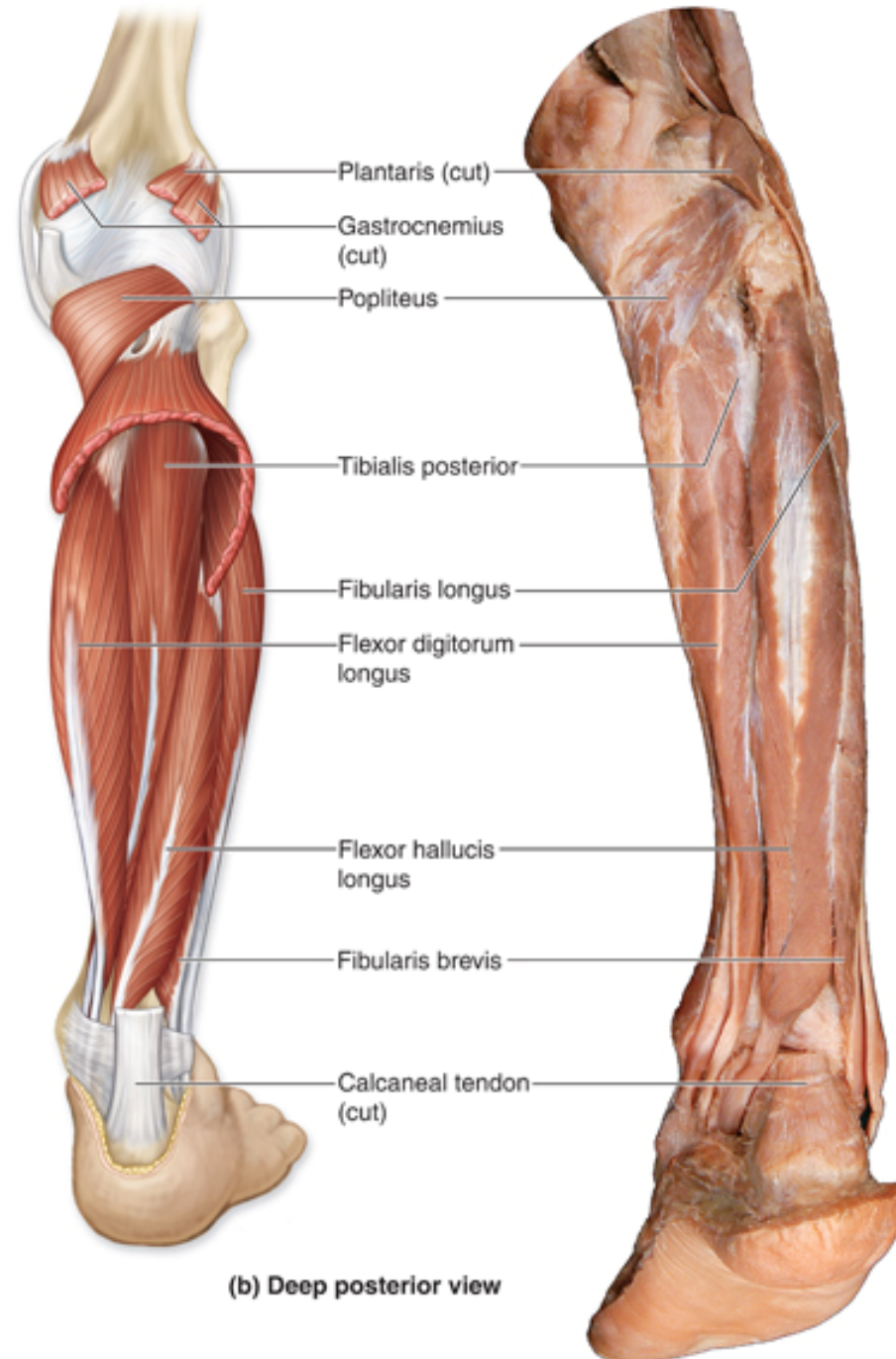


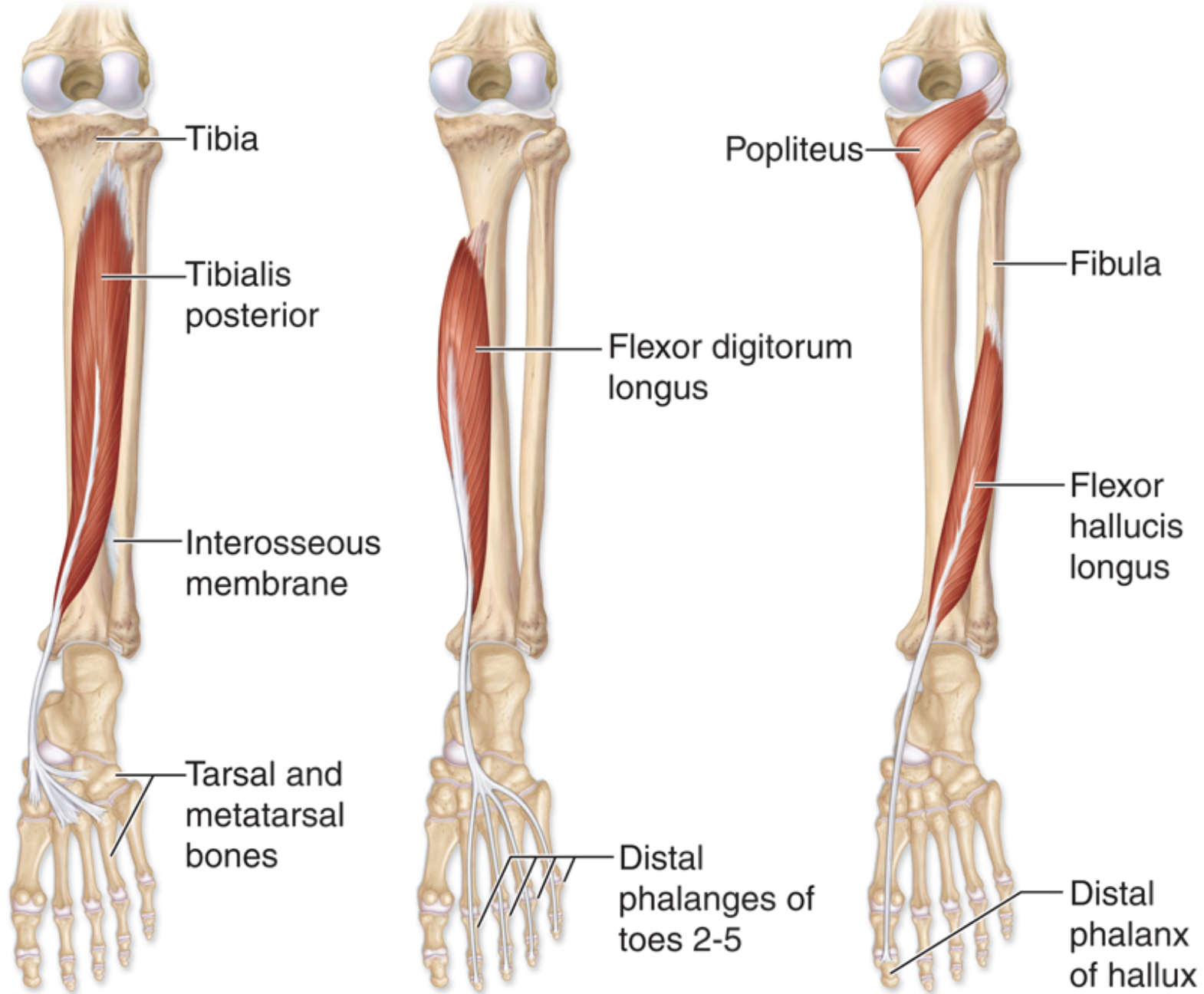
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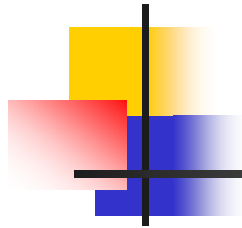


(a) Right leg, superficial posterior view



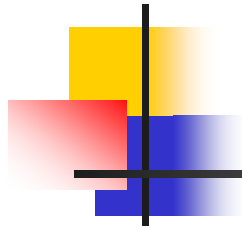


(c)



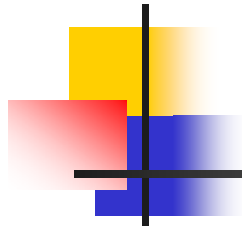
Leg Muscles

- Muscles that move the ankle, foot, and toes are housed within the leg.
 - called the crural muscles
 - help flex the knee joint/leg
 - three compartments (anterior, lateral, and posterior) each with its own nerve and blood supply



Leg Muscles

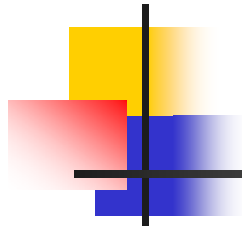
- Anterior compartment leg muscles
 - dorsiflex the foot and/or extend the toes
- Extensor digitorum longus
 - sends four long tendons to attach to the dorsal surface of toes 2–5
 - dorsiflexes the foot and extends toes 2–5
- Extensor hallucis longus
 - sends a tendon to the dorsum of the great toe (hallux)
 - dorsiflexes the foot and extends the great toe
- Fibularis (peroneus) tertius
 - extends from the extensor digitorum longus muscle
 - dorsiflexes and weakly everts the foot



Leg Muscles

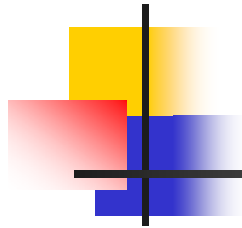
- **Tibialis anterior**

- primary dorsiflexor of the foot at the ankle
- attaches to the medial plantar side of the foot
- also inverts the foot
- analogous to the wrist
- tendons are held tightly against the ankle by multiple deep fascia thickenings (extensor retinaculum)



Leg Muscles

- The lateral compartment leg muscles
 - contains two synergistic muscles that evert and plantar flex the foot
 - very powerful evertors of the foot
 - plantar flexion is a secondary function for them
- Fibularis (peroneus) longus
 - superficial lateral muscle that covers the fibula
 - its tendon attaches to the plantar side of the foot
 - the fibularis (peroneus) brevis lies deep to the fibularis longus
 - its tendon inserts onto the base of the fifth metatarsal



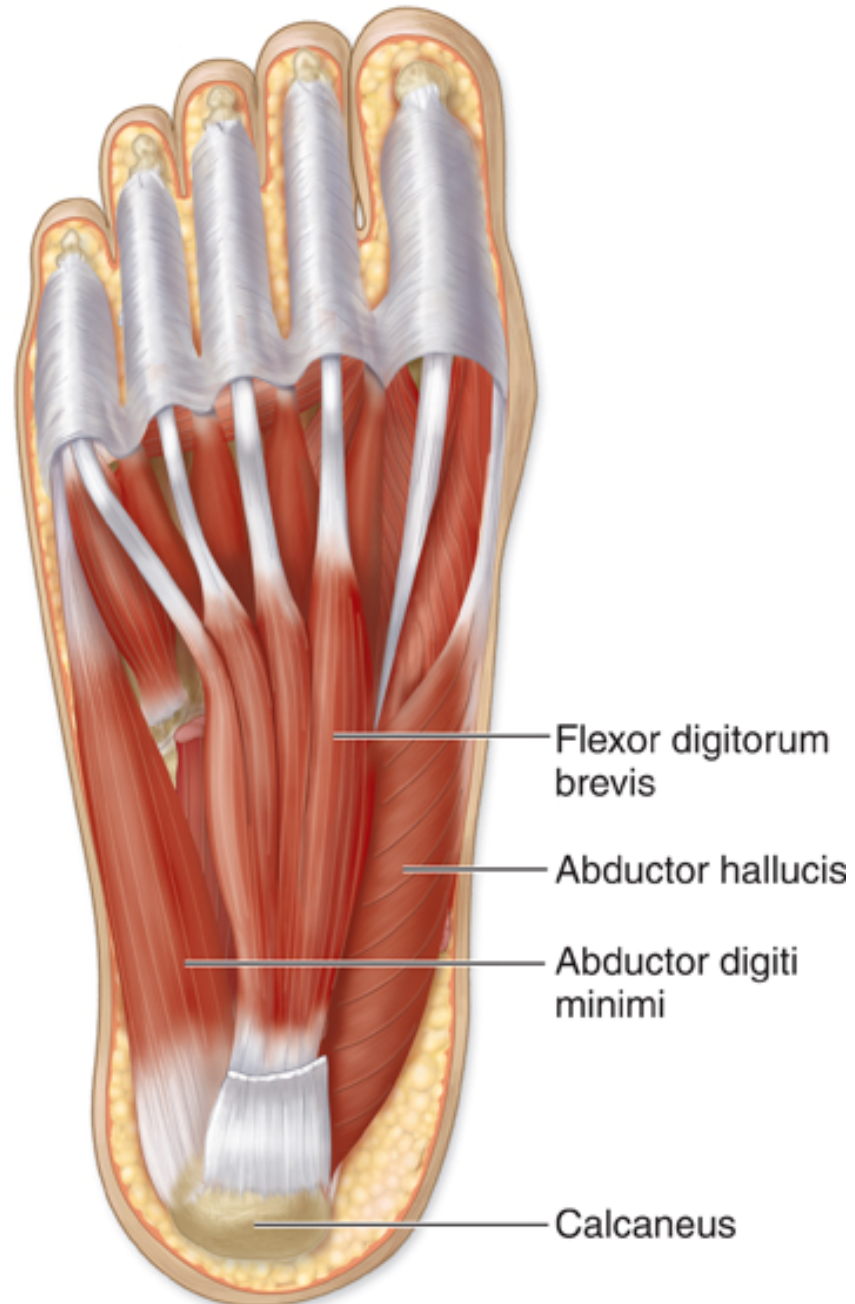
Leg Muscles

- The deep layer of the **posterior compartment** contains four muscles.
- The **flexor digitorum longus**.
 - attaches to the distal phalanges of toes 2–5
 - plantar flexes the foot
 - flexes the MP, PIP, and DIP joints of toes 2–5
- **Flexor hallucis longus**.
 - originates on the fibula, and yet
 - its tendon travels medially and runs along the plantar side of the foot to attach to the distal phalanx of the great toe
 - plantar flexes the foot and flexes the great toe

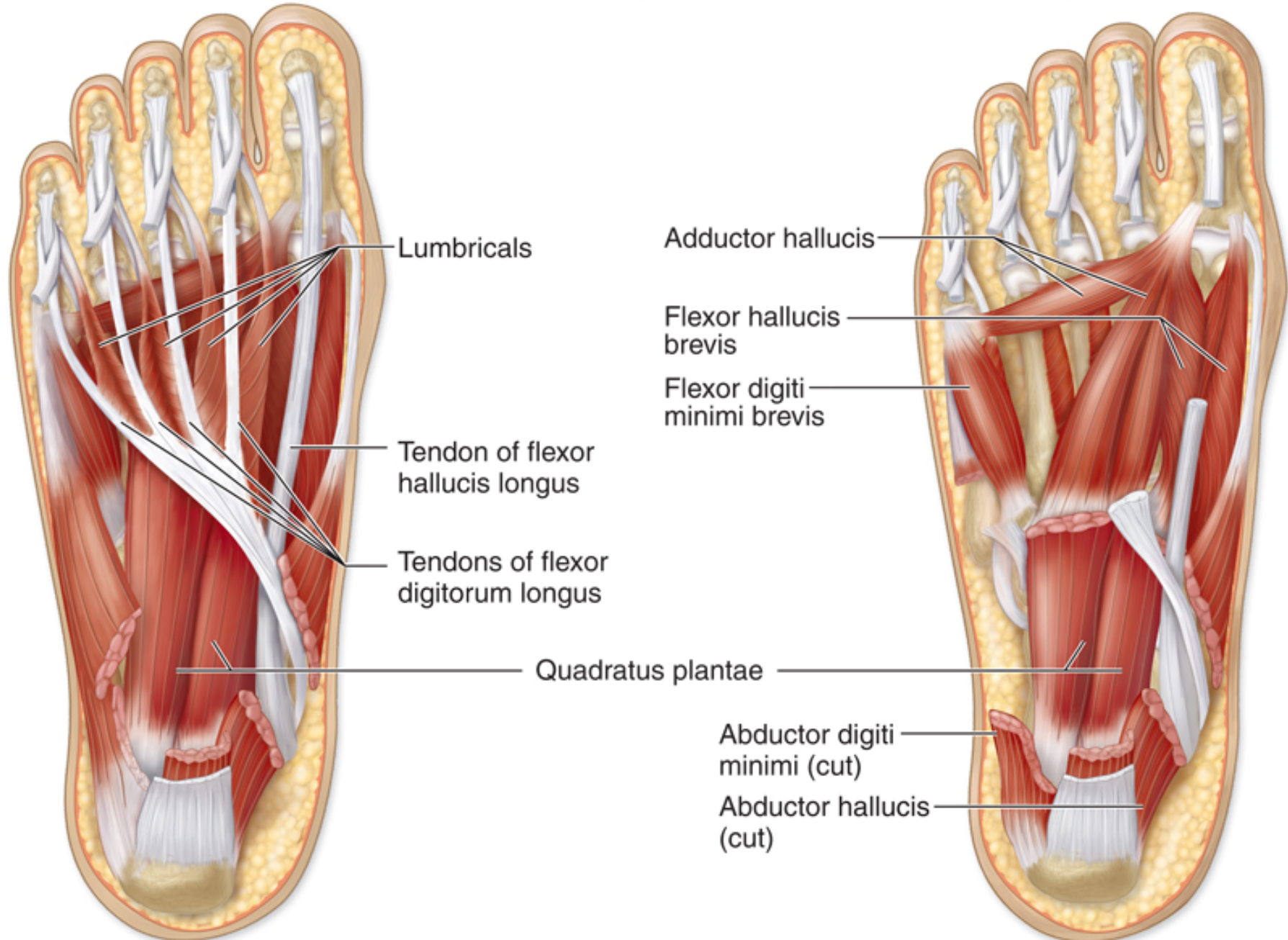


Leg Muscles

- **Tibialis posterior**
 - plantar flexes and inverts the foot
- **Popliteus**
 - forms the floor of the popliteal fossa, and acts to flex the leg
 - medially rotates the tibia slightly to “unlock” the fully extended knee joint
 - originates and inserts in the popliteal region
 - only moves the knee, not the foot

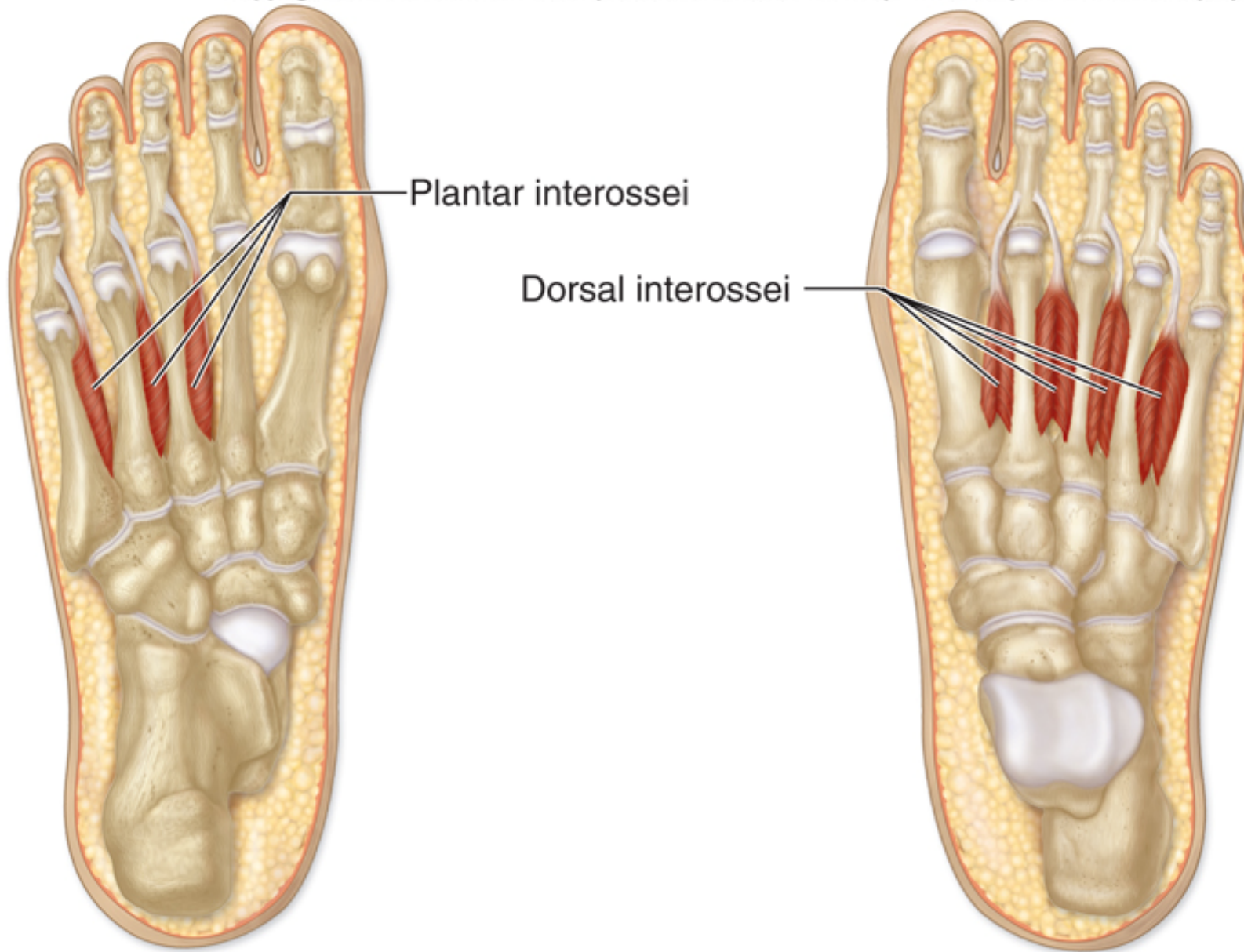


(a) Layer 1 (superficial)



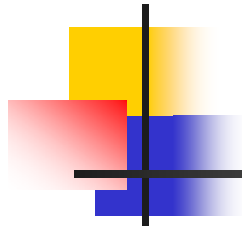
(b) Layer 2 (deep)

(c) Layer 3 (deeper)



(d) Layer 4 (deepest), plantar view

(e) Layer 4 (deepest), dorsal view



Leg Muscles

- The superficial muscles and most of the deep muscles plantar flex the foot at the ankle.
- The superficial layer of the **posterior compartment** contains three muscles.
 - gastrocnemius
 - soleus
 - plantaris



Leg Muscles

- **Gastrocnemius** is the most superficial muscle
 - referred to as the “calf”
 - spans both the knee and the ankle joints
 - flexes the knee joint and plantar flexes the foot
- **Soleus**
 - broad, flat muscle deep to the gastrocnemius
 - plantar flexes the foot
- **Plantaris**
 - small muscle that is absent in some individuals
 - projects obliquely between the gastrocnemius and soleus muscles
 - weak knee flexor and plantar flexor of the foot



Intrinsic Muscles of the Foot

- Originate and insert within the foot.
- Support the arches and move the toes to aid locomotion.
- Most are comparable to the intrinsic muscles of the hand.
- Rarely perform all the precise movements their names suggest.
- The dorsal group contains only two muscles.
 - **extensor hallucis brevis**
 - extends the MP joint of the great toe
 - **extensor digitorum brevis**
 - extends the MP and PIP joints of toes 2–4