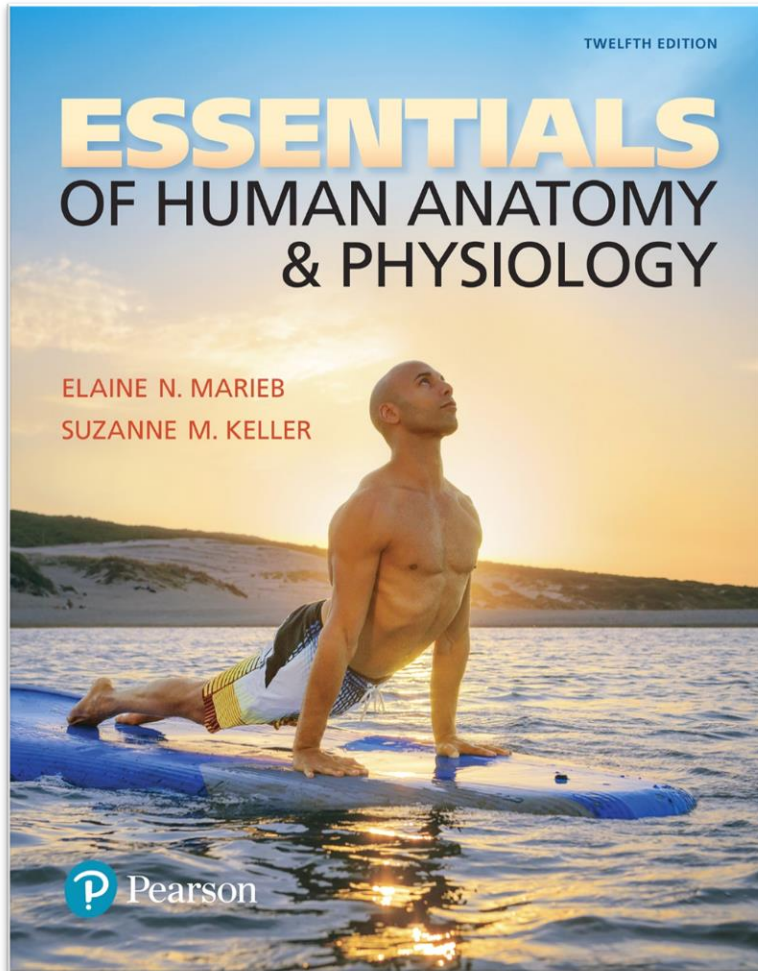


# Essentials of Human Anatomy & Physiology

Twelfth Edition



## Chapter 6

### The Muscular System

Lecture Presentation by  
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# Overview of Muscles

Name	Origin	Insertion	Primary action(s)
Frontalis	Cranial aponeurosis	Skin of eyebrows	Raises eyebrows
Orbicularis oculi	Frontal bone and maxilla	Tissue around eyes	Blinks and closes eye
Orbicularis oris	Mandible and maxilla	Skin and muscle around mouth	Closes and protrudes lips
Temporalis	Temporal bone	Mandible	Closes jaw
Zygomaticus	Zygomatic bone	Skin and muscle at corner of lips	Raises corner of mouth
Masseter	Temporal bone	Mandible	Closes jaw
Buccinator	Maxilla and mandible near molars	Orbicularis oris	Compresses cheek (as in sucking); holds food between teeth during chewing
Sternocleidomastoid	Sternum and clavicle	Temporal bone (mastoid process)	Flexes neck; laterally rotates head
Platysma	Connective tissue covering of superior chest muscles	Tissue around mouth	Tenses skin of neck (as in shaving)

# Table 6.3 Superficial Anterior Muscles of the Body (See Figure 6.22) (2 of 3)

## Trunk muscles

Name	Origin	Insertion	Primary action(s)
Pectoralis major	Sternum, clavicle, and first to sixth ribs	Proximal humerus	Adducts and flexes humerus
Rectus abdominis	Pubis	Sternum and fifth to seventh ribs	Flexes vertebral column
External oblique	Lower eight ribs	Iliac crest	Flexes and rotates vertebral column

## Arm/shoulder muscles

Name	Origin	Insertion	Primary action(s)
Biceps brachii	Scapula of shoulder girdle	Proximal radius	Flexes elbow and supinates forearm
Brachialis	Distal humerus	Proximal ulna	Flexes elbow
Deltoid	(See Table 4)		Abducts arm

# Table 6.3 Superficial Anterior Muscles of the Body (See Figure 6.22) (3 of 3)

## Hip/thigh/leg muscles

Name	Origin	Insertion	Primary action(s)
Iliopsoas	Ilium and lumbar vertebrae	Femur (lesser trochanter)	Flexes hip
Adductor muscles	Pelvis	Proximal femur	Adduct and medially rotate thigh
Sartorius	Ilium	Proximal tibia	Flexes thigh on hip
Quadriceps group (vastus medialis, intermedius, and lateralis; and the rectus femoris)	Vasti: femur Rectus femoris: pelvis	Tibial tuberosity via patellar ligament Tibial tuberosity via patellar ligament	All extend knee; rectus femoris also flexes hip on thigh
Tibialis anterior	Proximal tibia	First cuneiform (tarsal) and first metatarsal of foot	Dorsiflexes and inverts foot
Extensor digitorum longus	Proximal tibia and fibula	Distal toes 2–5	Extends toes
Fibularis muscles	Fibula	Metatarsals of foot	Plantar flex and evert foot

# Table 6.4 Superficial Posterior Muscles of the Body (Some Forearm Muscles Also Shown) (See Figure 6.23) (1 of 3)

## Head/Neck/trunk/shoulder muscles

Name	Origin	Insertion	Primary action(s)
Occipitalis	Occipital and temporal bones	Cranial aponeurosis	Fixes aponeurosis and pulls scalp posteriorly
Trapezius	Occipital bone and all cervical and thoracic vertebrae	Scapular spine and clavicle	Raises, retracts, and rotates scapula
Latissimus dorsi	Lower spine and iliac crest	Proximal humerus	Extends and adducts humerus
Erector spinae*	Iliac crests, ribs 3–12, and vertebrae	Ribs, thoracic and cervical vertebrae	Extends and laterally flexes spine
Quadratus lumborum*	Iliac crest, lumbar fascia	Transverse processes of upper lumbar vertebrae	Flexes spine laterally; extends spine
Deltoid	Scapular spine and clavicle	Humerus (deltoid tuberosity)	Abducts humerus

\*Erector spinae and quadratus lumborum are deep muscles (they are not shown in Figure 6.23; see Figure 6.18b).

# Table 6.4 Superficial Posterior Muscles of the Body (Some Forearm Muscles Also Shown) (See Figure 6.23) (2 of 3)

## Arm/forearm muscles

Name	Origin	Insertion	Primary action(s)
Triceps brachii	Shoulder girdle and proximal humerus	Olecranon process of ulna	Extends elbow
Flexor carpi radialis	Distal humerus	Second and third metacarpals	Flexes wrist and abducts hand (see Figure 6.22)
Flexor carpi ulnaris	Distal humerus and posterior ulna	Carpals of wrist and fifth metacarpal	Flexes wrist and adducts hand
Flexor digitorum superficialis <sup>†</sup>	Distal humerus, ulna, and radius	Middle phalanges of second to fifth fingers	Flexes wrist and fingers
Extensor carpi radialis	Humerus	Base of second and third metacarpals	Extends wrist and abducts hand
Extensor digitorum	Distal humerus	Distal phalanges of second to fifth fingers	Extends fingers

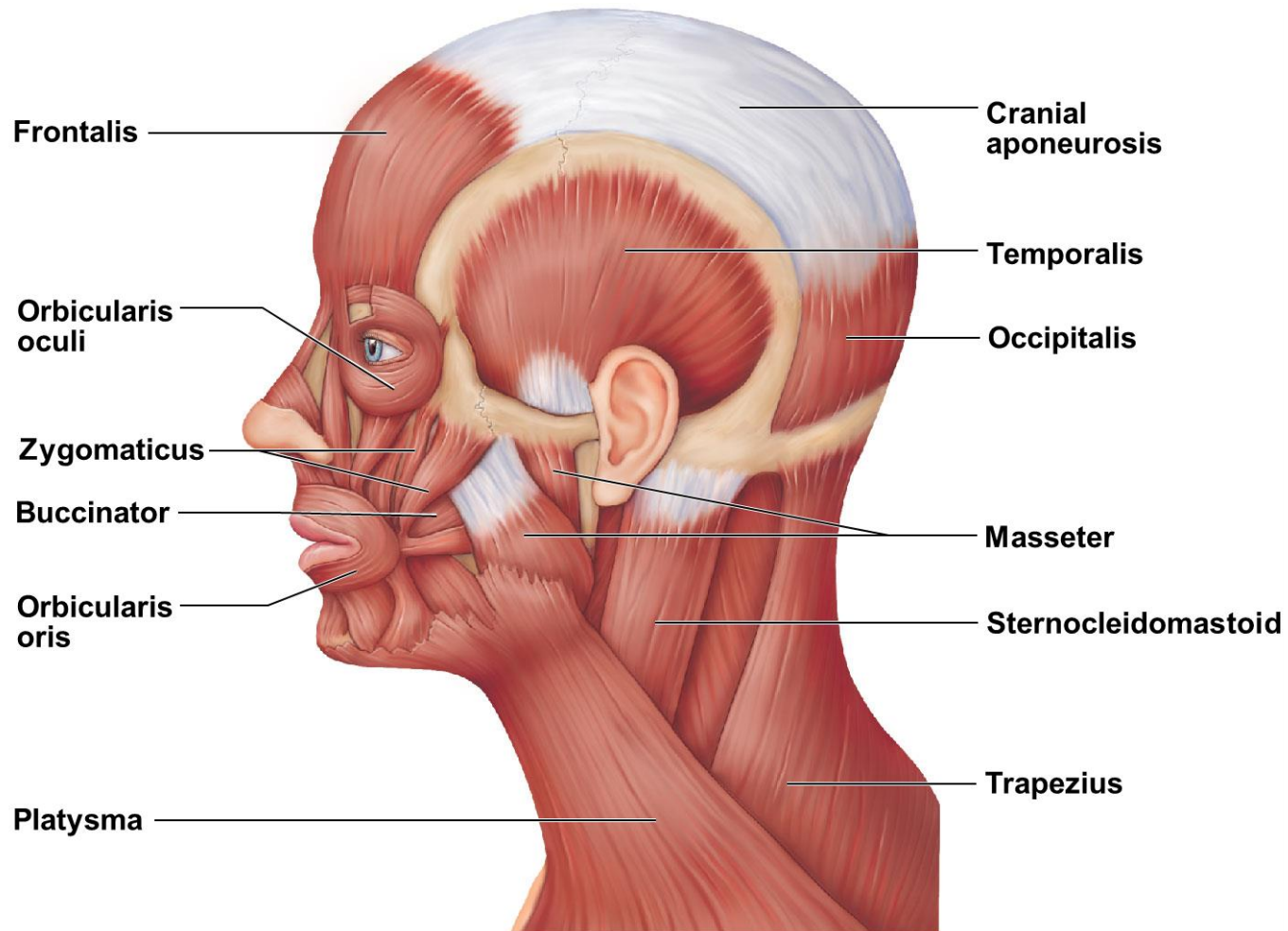
<sup>†</sup>Although its name indicates that it is a superficial muscle, the flexor digitorum superficialis lies deep to the flexor carpi radialis and is not visible in a superficial view.

# Table 6.4 Superficial Posterior Muscles of the Body (Some Forearm Muscles Also Shown) (See Figure 6.23) (3 of 3)

## Hip/thigh/leg muscles

Name	Origin	Insertion	Primary action(s)
Gluteus maximus	Sacrum and ilium	Proximal femur (gluteal tuberosity)	Extends hip (when forceful extension is required)
Gluteus medius	Ilium	Proximal femur	Abducts thigh; steadies pelvis during walking
Hamstring muscles (biceps femoris, semitendinosus, semimembranosus)	Ischial tuberosity	Proximal tibia (head of fibula in the case of biceps femoris)	Flex knee and extend hip
Gastrocnemius	Distal femur	Calcaneus (heel via calcaneal tendon)	Plantar flexes foot and flexes knee
Soleus	Proximal tibia and fibula	Calcaneus	Plantar flexes foot

# Superficial Muscles of the Head and Neck





# Skull & Facial Muscles

- Muscles of facial expression provide humans with the ability to express a wide variety of emotions. Often, their origins are in fascia or bones of the skull; their insertions are into the skin.
  - (1) Frontalis: Allows you to raise eyebrows and wrinkle skin on forehead.
  - (2) Orbicularis oculi: allows you to close, squint, blink, and wink the eye
  - (3) Orbicularis oris: muscle of the lips. Often called the “kissing” muscle because it protrudes the lips

# Skull & Facial Muscles

- (4) Zygomaticus: draws mouth upward, “smiling”, extends from corner of the mouth to the cheekbone
- (5) Occipitalis: pulls the scalp posteriorly
- (6) Buccinator: runs horizontally across the cheek. Flattens the cheek, as in whistling.
- (7) Masseter: elevates mandible, closes mouth “chewing”
- (8) Temporalis: elevates and retracts mandible in order to close the jaw. Overlies the temporal bone

# Neck Muscles

- Most muscles of the neck are rotators, flexors, and extensors.
  - (1) Platysma: single sheetlike muscle that covers the anterolateral neck
    - Pulls corner of mouth inferiorly into a sad face
  - (2) Sternocleidomastoid: paired muscles, one found on each side of the neck
    - When both sides contract it flexes head (lowering head as in a prayer)
    - When one side contracts, it rotates head (rotates face to the shoulder)

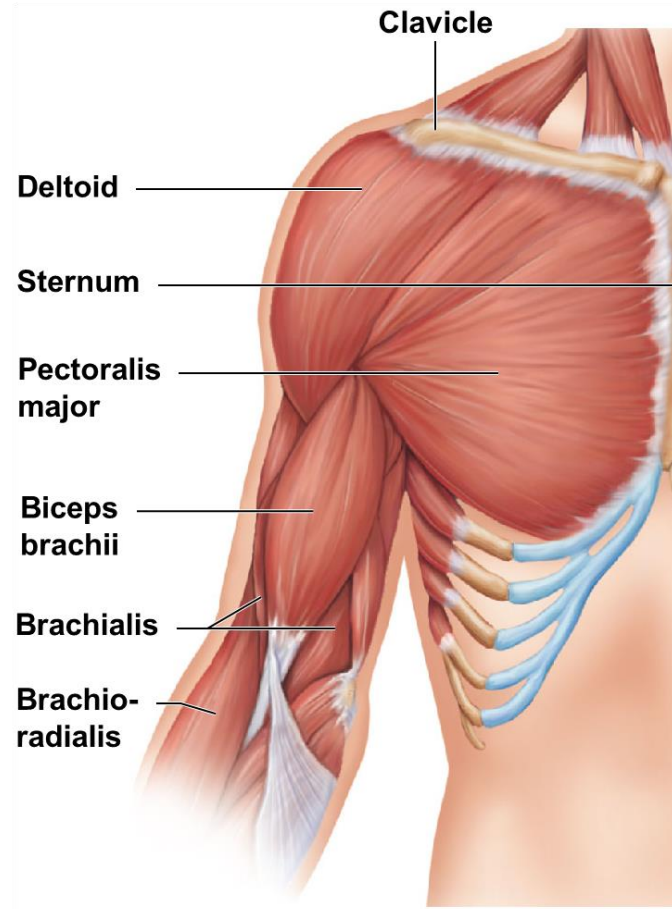
# Trunk Muscles

- Muscles that move the vertebral column
- Muscles of the anterior thorax
- Muscles of the abdominal wall

# Anterior Muscles of the Trunk

- 1) Pectoralis Major: Large, fan shaped muscle covering the upper part of the chest
  - Acts to adduct and flex the arm
- Intercostal Muscles: Deep muscles found between the ribs.
  - Important in breathing, help raise and lower the rib cage

# Figure 6.17a Muscles of the Anterior Trunk, Shoulder, and Arm

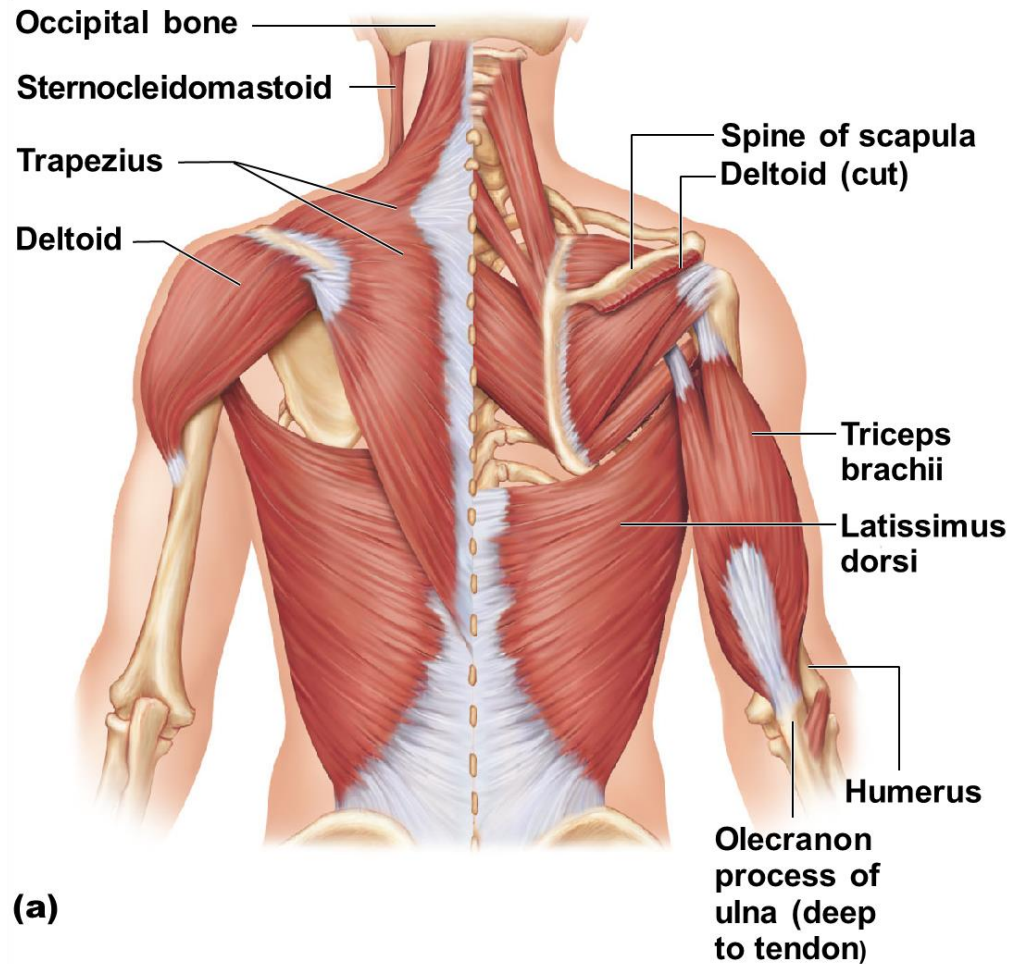


(a)

# Posterior Muscles of the Trunk

- 1) Trapezius: most superficial muscles of the posterior neck and upper trunk.
  - Seen together, they form a diamond muscle mass
  - Extend the head
  - Elevates, depresses, adducts, and stabilizes the scapula
- 2) Latissimus Dorsi: two very large, flat muscles that cover the lower back
  - Extends and adducts the humerus
  - Very important muscles when arm is brought down in a power stroke in swimming

# Figure 6.18a Muscles of the Posterior Neck, Trunk, and Arm (1 of 2)

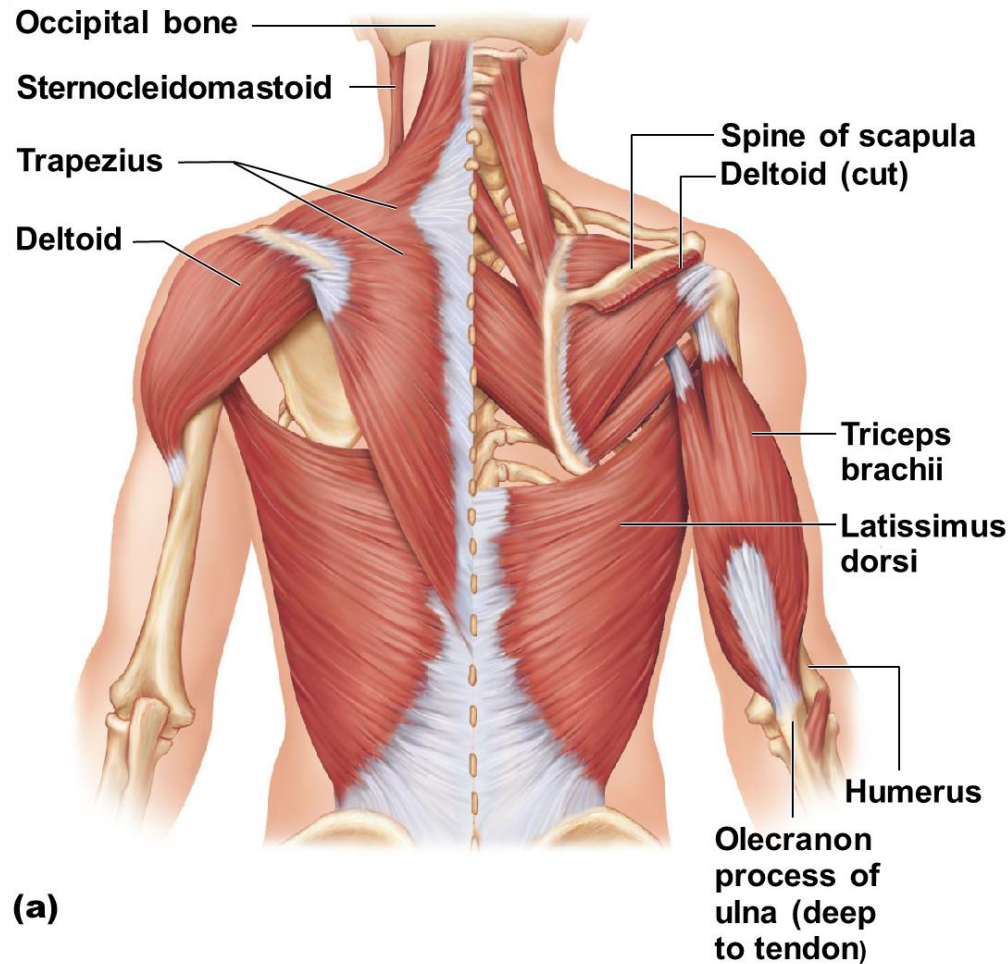




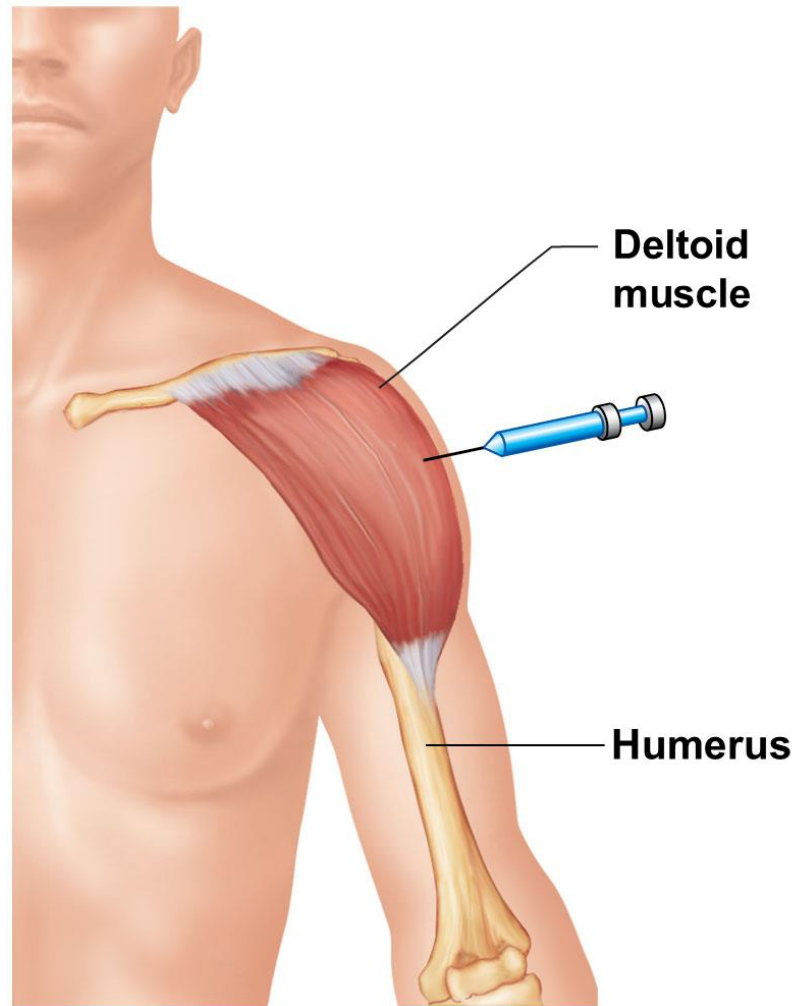
# Posterior Muscles of the Trunk

- 3) Erector Spinae (This is a deep muscle)
  - Spans entire length of vertebral column
  - Function of powerful back extensors but also provides resistance that helps control the action of bending over at the waste
- 4) Deltoid: fleshy, triangle-shaped muscles that form the rounded shape of your shoulders
  - Prime movers of arm abduction
- 5) Quadratus lumborum
  - Flexes spine laterally; extends lumbar spine

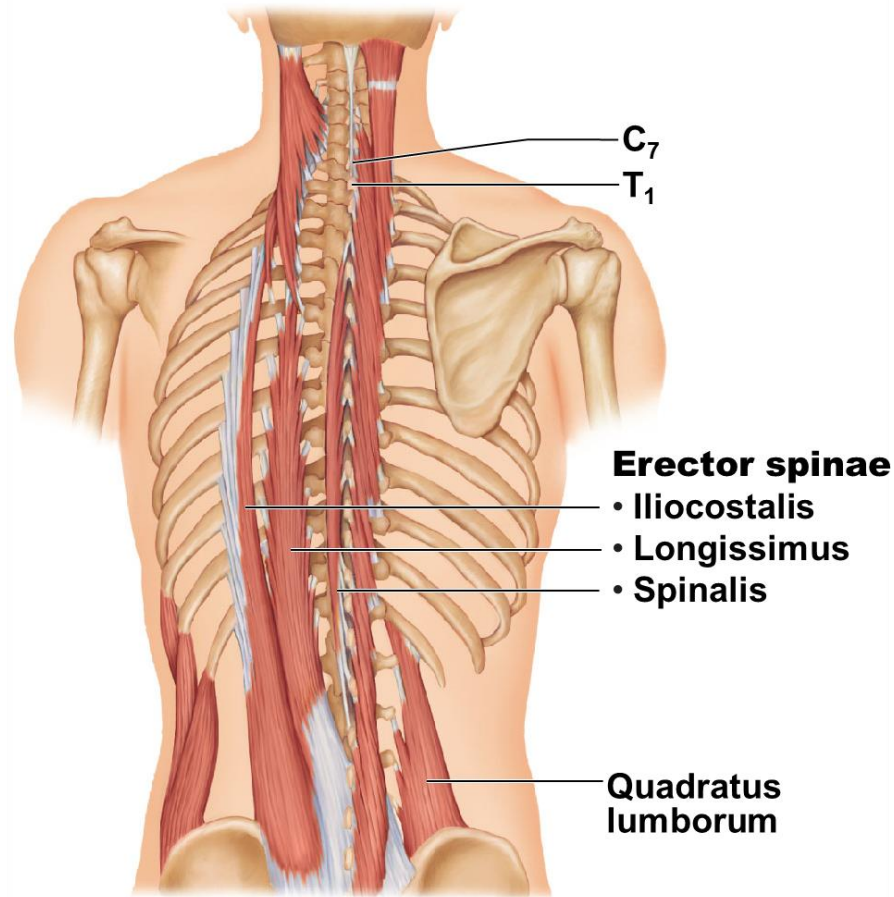
# Figure 6.18a Muscles of the Posterior Neck, Trunk, and Arm (1 of 2)



# Figure 6.19 The Fleshy Deltoid Muscle Is a Favored Site for Administering Intramuscular Injections



# Figure 6.18b Muscles of the Posterior Neck, Trunk, and Arm



(b)

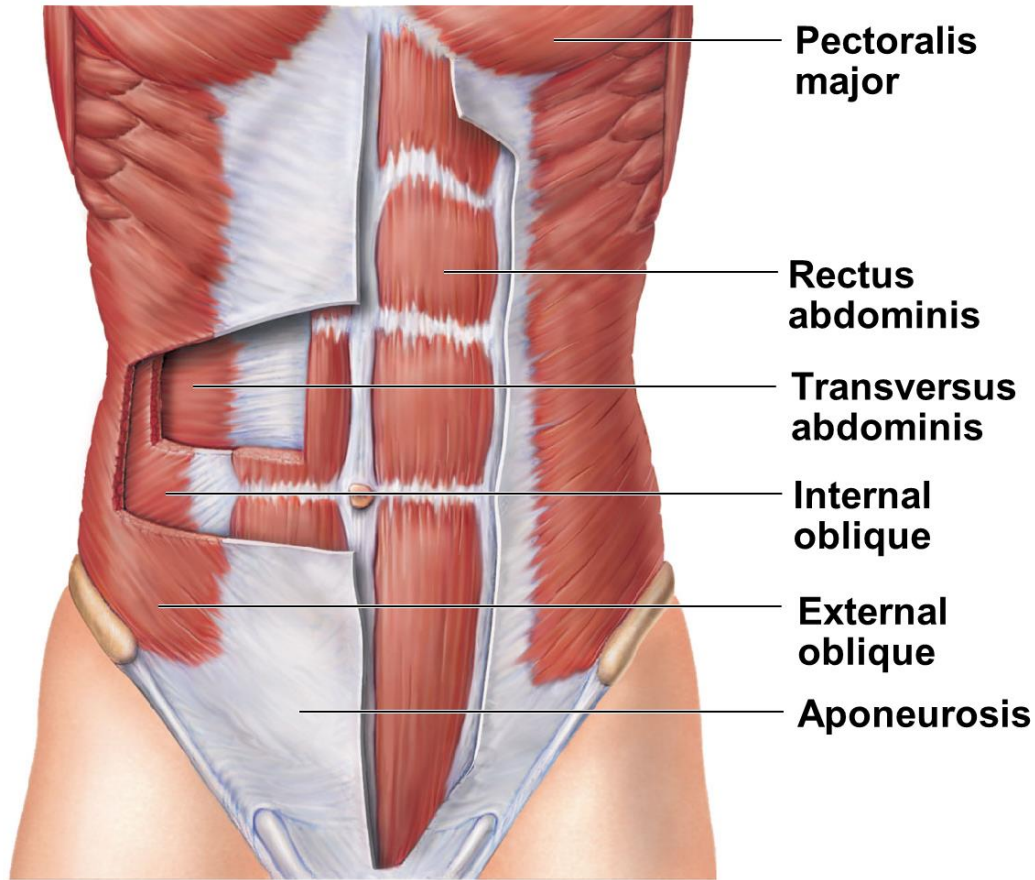
# Muscles of the Abdominal Girdle

- Form a “natural” girdle that reinforces the body trunk. Contains and protects the abdominal contents
  - (1) Rectus abdominis: most superficial muscle of abdomen
    - Runs from pubis to rib cage
    - Flexes the vertebral column
    - Compresses abdominal content during defecation and childbirth
  - (2) External oblique: Fibers run downward and medially from last eight ribs to insert in the ilium
    - Flexes the vertebral column
    - Rotates the trunk and bends it laterally

# Muscles of the Abdominal Girdle

- (3) Internal oblique: deep to the external obliques
  - Fibers run right angles to external obliques
  - Arise from iliac crest of hips and inserts into the last three ribs
    - Function match external obliques (Flexes the vertebral column, Rotates the trunk and bends it laterally)

# Figure 6.17b Muscles of the Anterior Trunk, Shoulder, and Arm



(b)

# Muscles of Upper Limbs

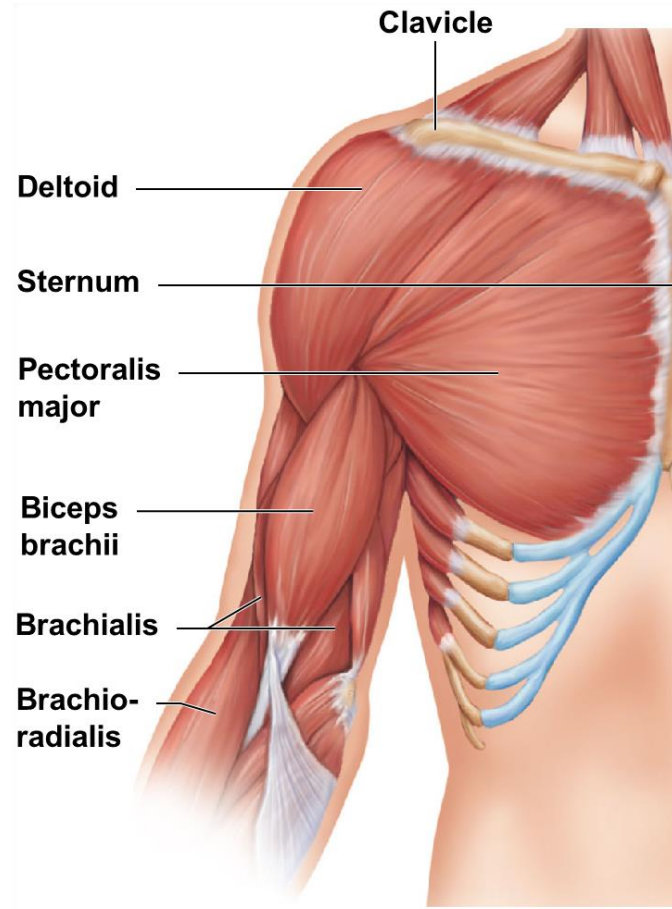
- Anterior arm muscles cause flexion, while posterior causes extension
  - (1) Biceps brachii
    - Bulges when elbow is flexed
    - Powerful prime mover for flexion
    - Acts to supinate the forearm
  - (2) Brachialis
    - Lies deep to the biceps
    - Elbow flexion
    - Lifts the ulna



# Muscles of Upper Limbs

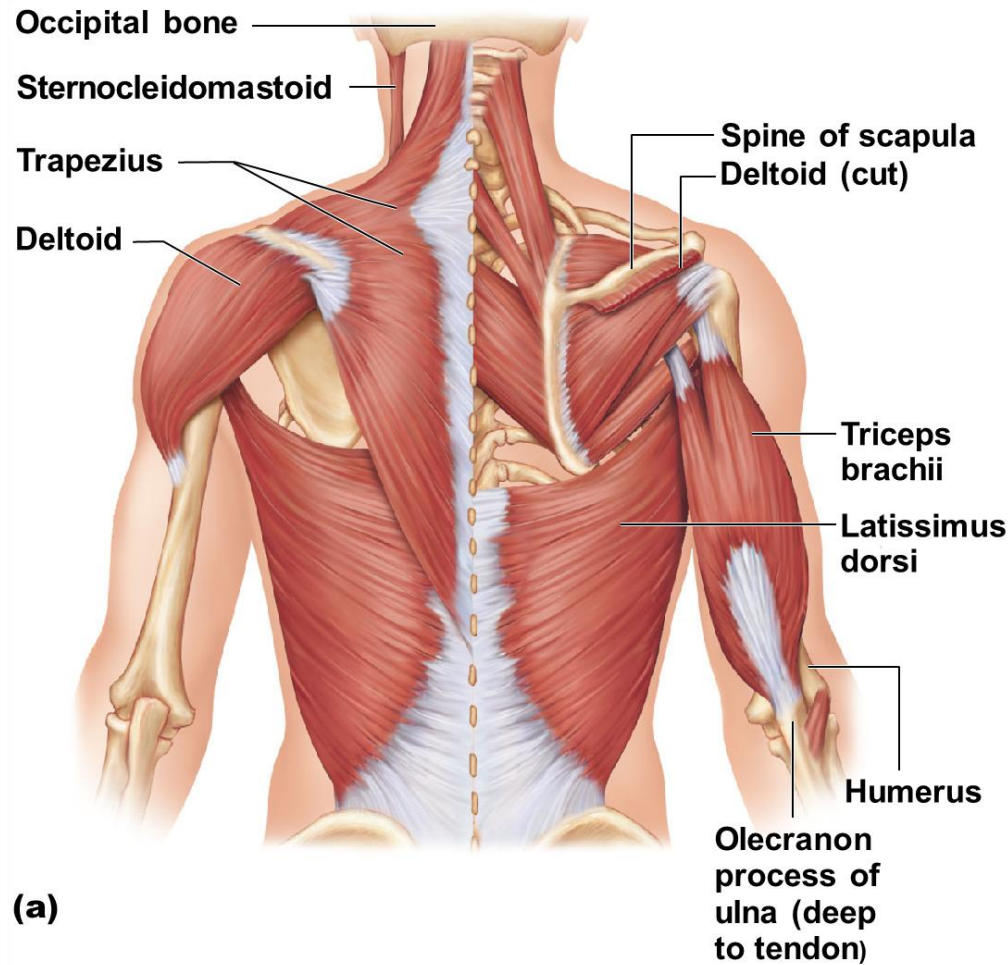
- Anterior arm muscles cause flexion, while posterior causes extension
  - (3) Triceps brachii: only muscle fleshing out the posterior humerus
    - Prime mover in elbow extension
    - Delivers strong jab in boxing
  - (4) Brachioradialis
    - Fairly weak muscle
    - Arises in the humerus but resides mainly in the forearm

# Figure 6.17a Muscles of the Anterior Trunk, Shoulder, and Arm



(a)

# Figure 6.18a Muscles of the Posterior Neck, Trunk, and Arm (2 of 2)



# Muscles of the Lower Limbs

- Cause movement of the hip, knee, and foot joints. Some of the largest, strongest muscles in the body

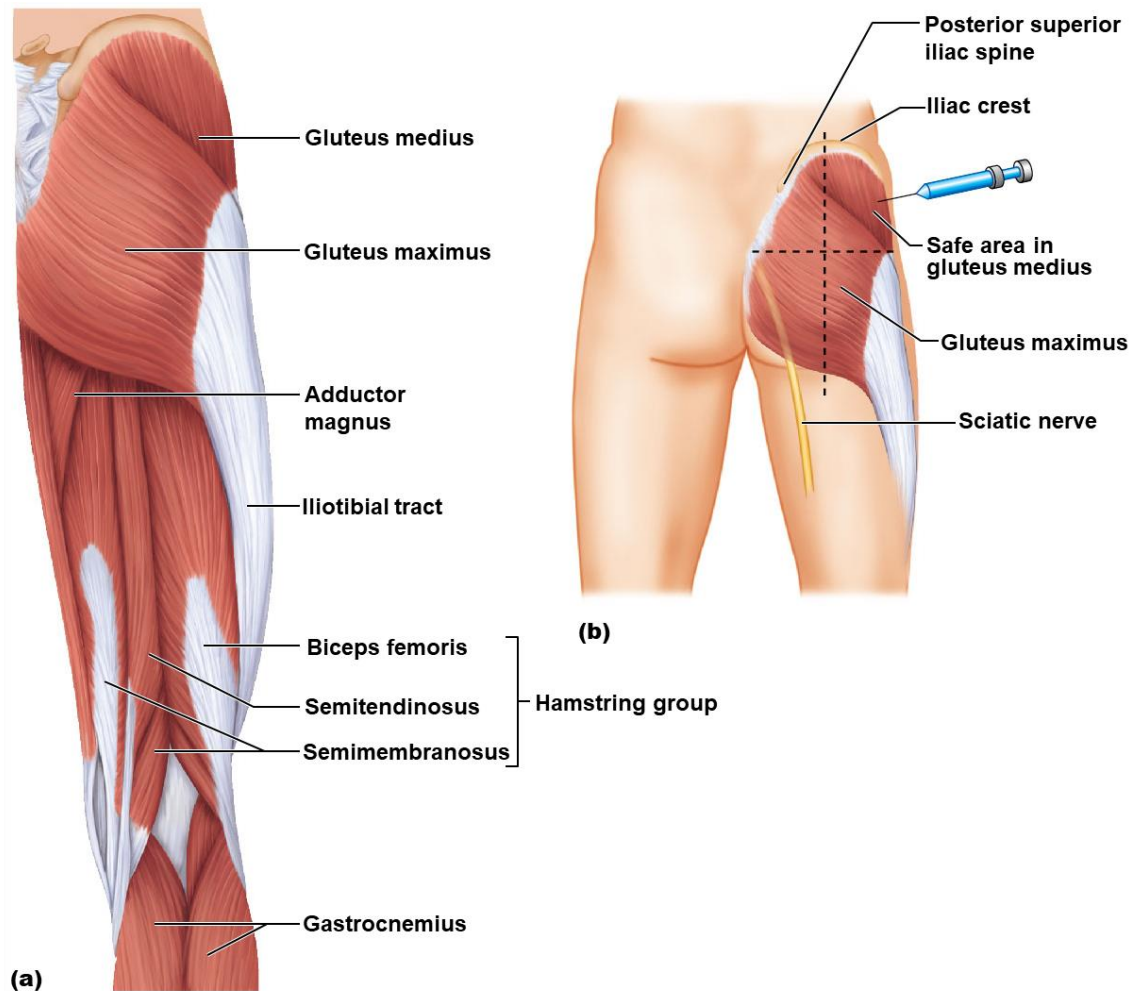
# Muscles of the Lower Limbs - Hip

- 1) Gluteus Maximus: superficial muscle of the hip that forms most of the buttocks
  - Powerful hip extensor; brings the thigh in a straight line with the pelvis
  - Extending leg as climbing stairs or jumping
- 2) Gluteus Medius: Beneath gluteus maximus; runs from iliac crest to the femur
  - Hip abductor; steadies the pelvis while walking
  - Site for intramuscular injections

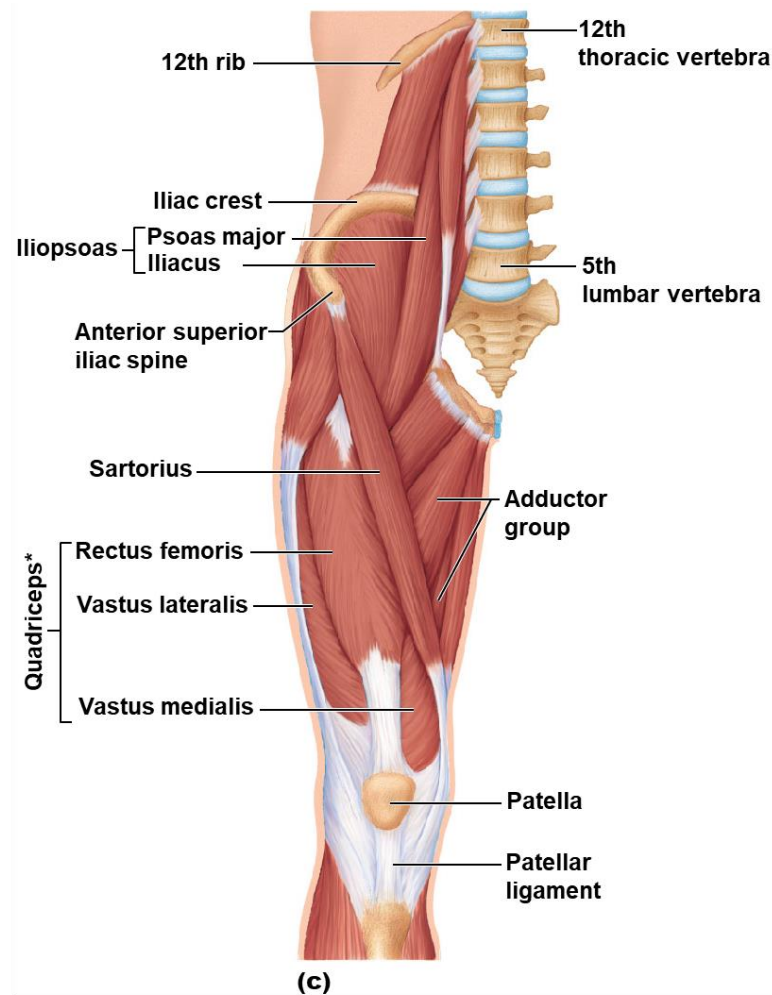
# Muscles of the Lower Limbs - Hip

- 3) Adductor Muscles
  - Forms the muscle mass at the medial side of each thigh
  - Adducts the thighs together
- 4) Iliopsoas: Composed of two muscles (iliacus and psoas major)
  - Runs from iliac bone and lower vertebrae
  - Hip flexion
  - Keeps the upper body from falling backwards when we are standing erect

# Figure 6.20 Pelvic, Hip, and Thigh Muscles of the Right Side of the Body



# Figure 6.20c Pelvic, Hip, and Thigh Muscles of the Right Side of the Body





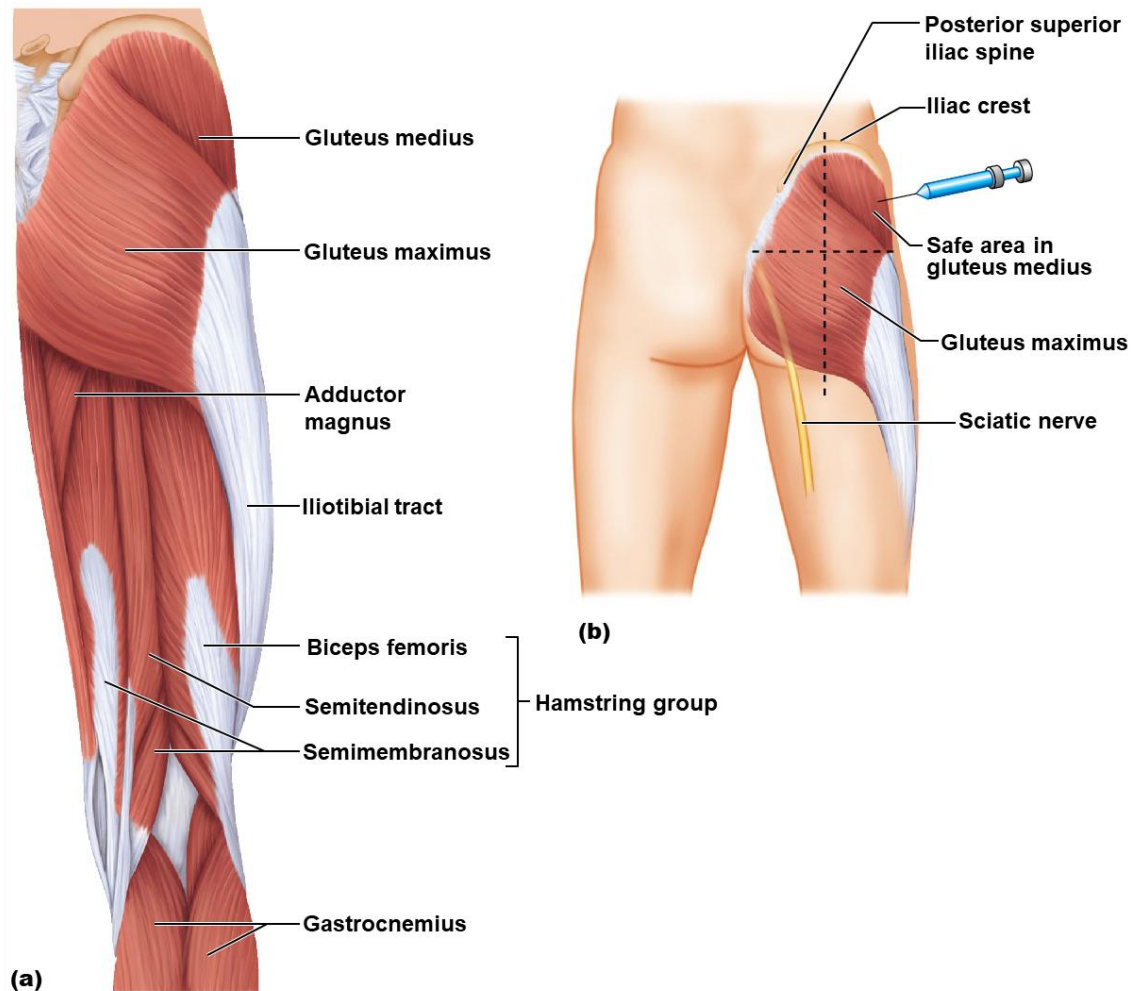
# Muscles of the Lower Limbs - Knee

- 1) Hamstring group (3 muscles)
  - Composed of biceps femoris, semimembranosus, and semitendinosus
  - Located on posterior thigh
  - Functions as prime movers of thigh extension and knee flexion
  - Most commonly injured muscles, specifically the biceps femoris

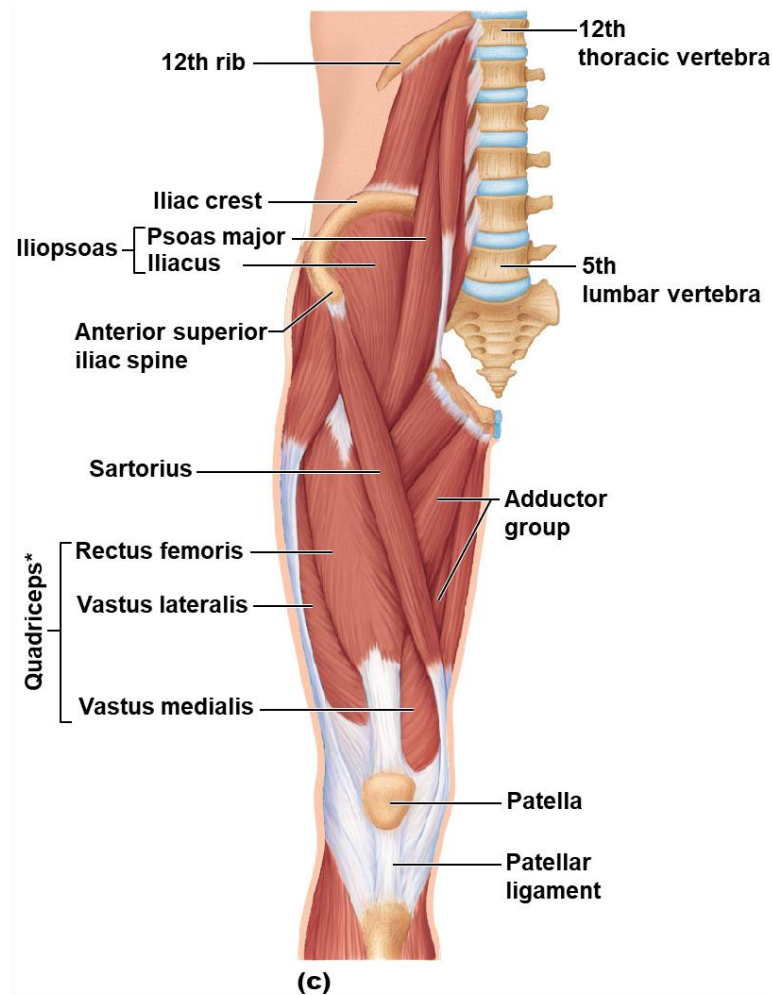
# Muscles of the Lower Limbs - Knee

- 2) Sartorius: very thin and straplike
  - Most superficial muscle of the thigh
  - Very weak thigh flexor
- 3) Quadriceps Group (4 muscles)
  - Composed of rectus femoris and three vastus muscles
    - Crosses hip and knee joints and helps flex the hip
    - Extends the knee powerfully

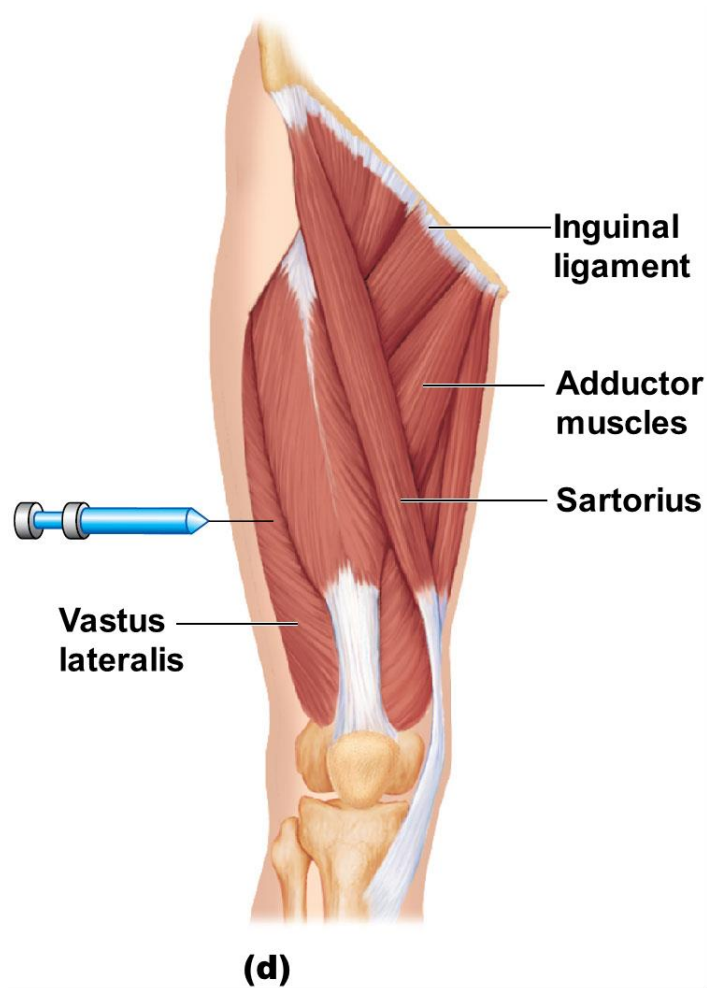
# Figure 6.20 Pelvic, Hip, and Thigh Muscles of the Right Side of the Body



# Figure 6.20c Pelvic, Hip, and Thigh Muscles of the Right Side of the Body



# Figure 6.20d Pelvic, Hip, and Thigh Muscles of the Right Side of the Body



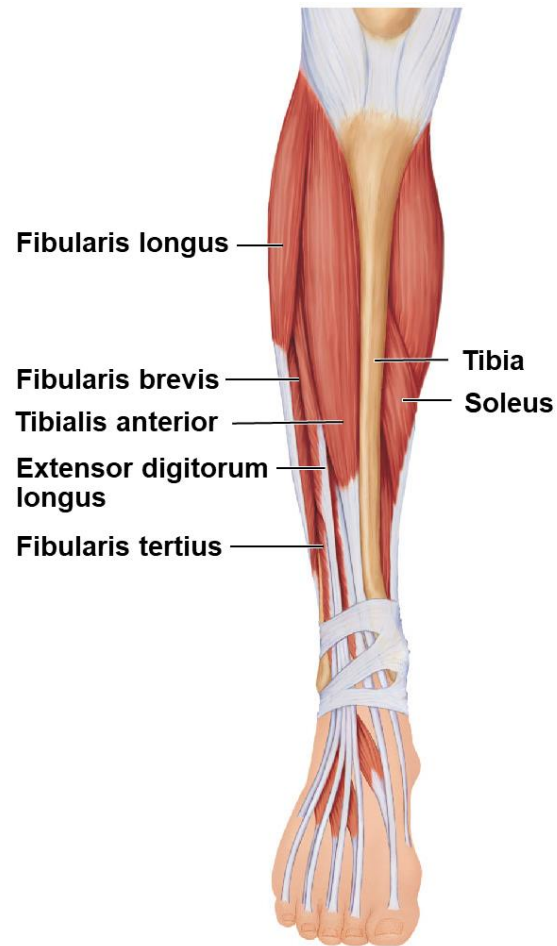
# Muscles of the Lower Limbs – Ankle & Foot

- 1) Tibialis Anterior: superficial muscle on the anterior leg
  - Acts to dorsiflex and invert the foot
- 2) Extensor Digitorum Longus
  - Prime mover of toe extension
- 3) Fibularis Muscles: Three muscles (longus, brevis, and tertius)
  - Found on lateral part of leg and arise from the fibula.
  - Plantar flexes and everts the foot

# Muscles of the Lower Limbs – Ankle & Foot

- 4) Gastrocnemius: two-bellied muscle that forms the curved calf of the posterior leg.
  - Inserts through the calcaneal (Achilles) tendon into the heel of the foot
  - Prime mover for plantar flexion
  - Sometimes called “dancer’s toe”
- 5) Soleus: deep to the gastrocnemius and arises on tibia and fibula
  - Does not affect knee movement
  - Strong plantar flexor of the foot

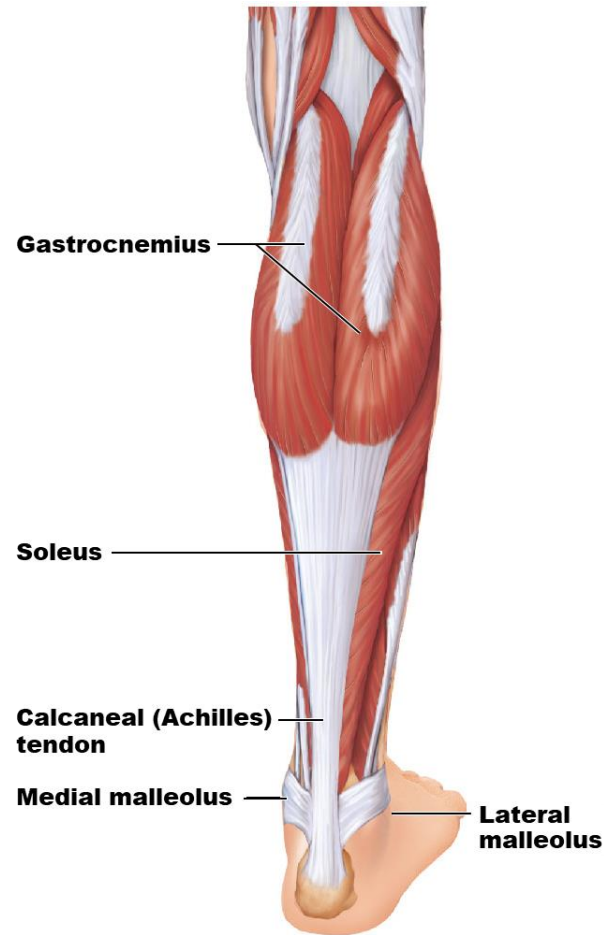
# Figure 6.21a Superficial Muscles of the Right Leg



(a)



# Figure 6.21b Superficial Muscles of the Right Leg



(b)

