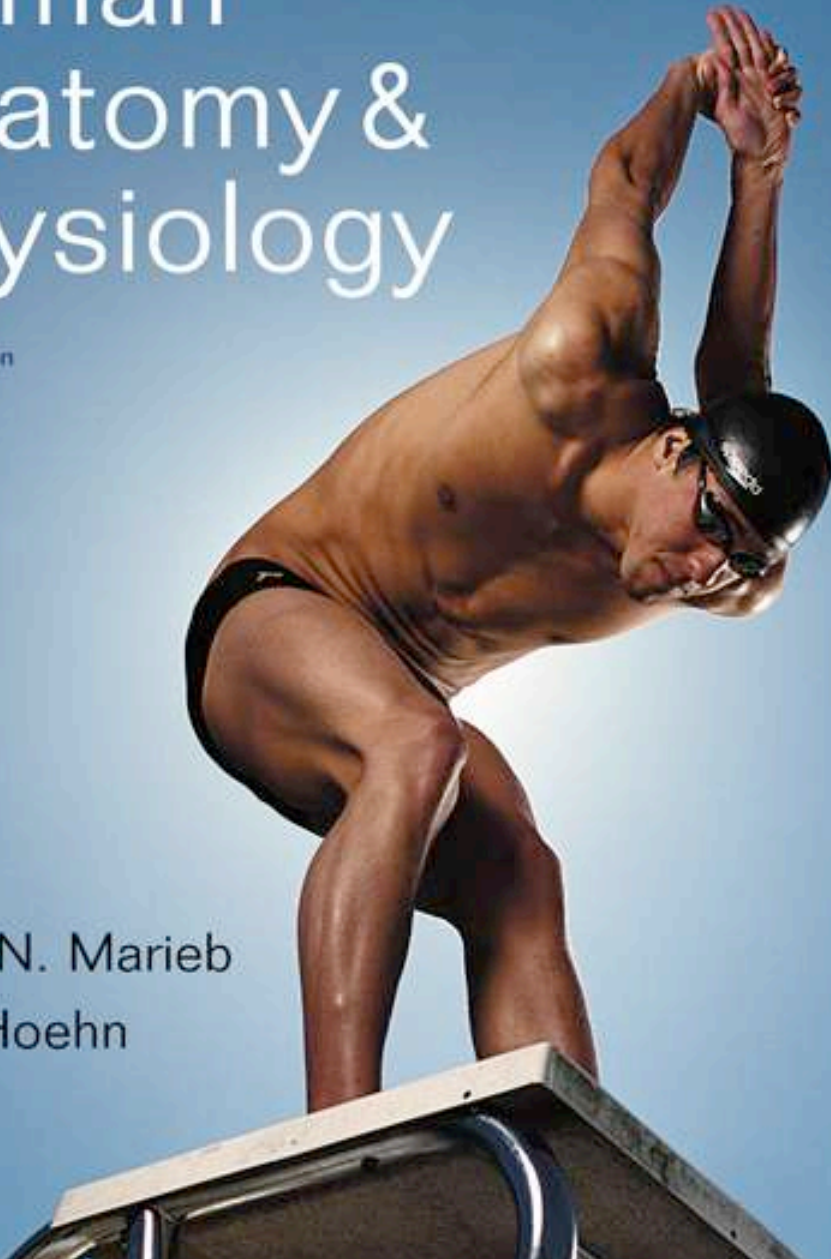


Human Anatomy & Physiology

Eighth Edition

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PowerPoint® Lecture Slides
prepared by
Janice Meeking,
Mount Royal College

CHAPTER 10

The Muscular System: Part D

Muscles Crossing Hip and Knee Joints

- Most anterior muscles flex the femur at the hip and extend the leg at the knee (foreswing of walking)
- Most posterior muscles extend the thigh and flex the leg (backswing of walking)
- Medial muscles all adduct the thigh
- All three groups are enclosed by the fascia lata



**A&P Flix™: Muscles that act on the hip joint and femur:
An overview**

Movements of the Thigh

- Include flexion, extension, abduction, adduction, circumduction, and rotation
- Thigh flexors pass in front of the hip joint
 - Iliopsoas (iliacus and psoas major): prime mover of flexion
 - Tensor fasciae latae
 - Rectus femoris
- Assisted by medial adductors and sartorius



A&P FlixTM: Anterior muscles that cross the hip joint

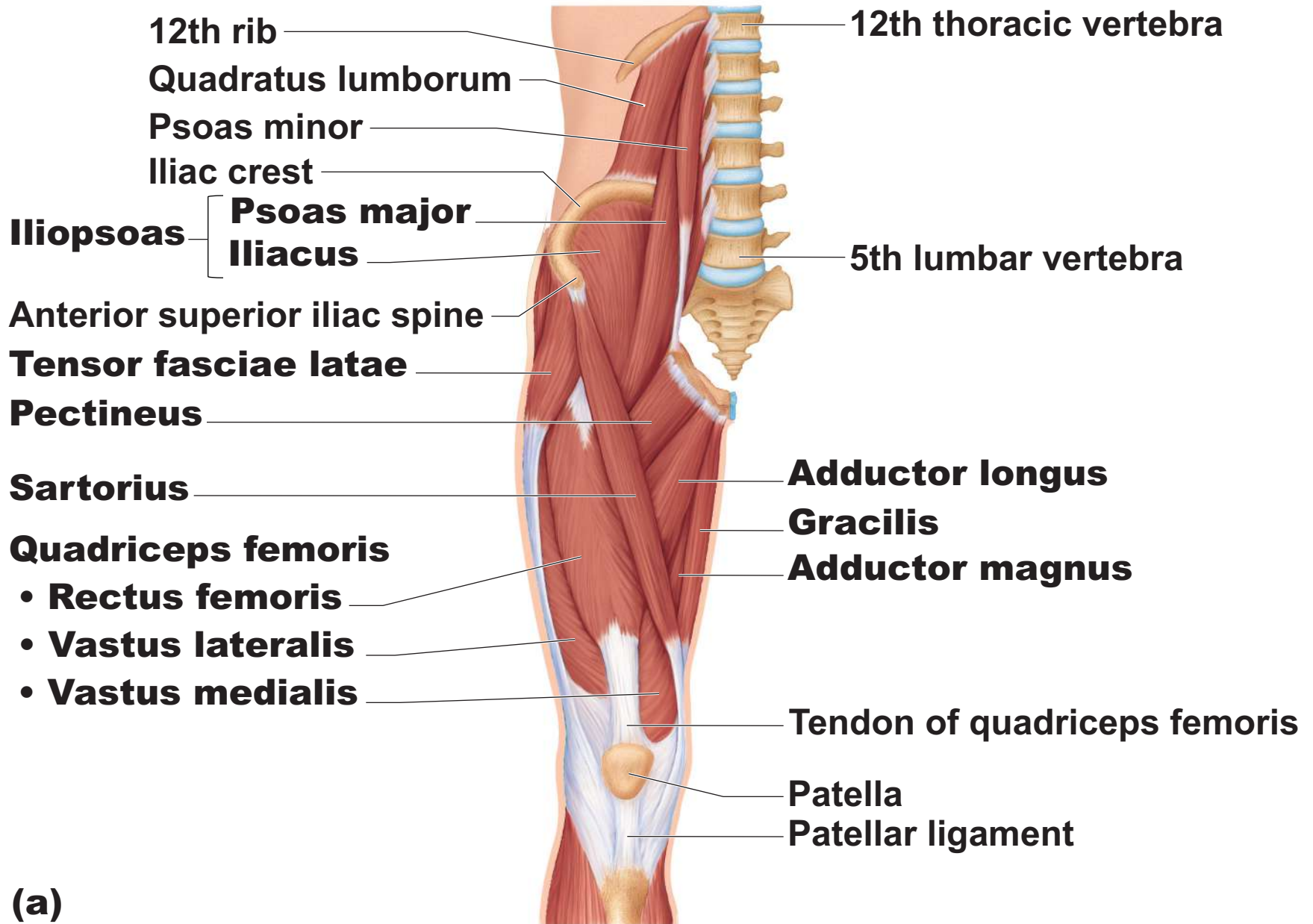


Figure 10.19a

Movements of the Thigh

PLAY

***A&P Flix™*: Iliopsoas**

PLAY

***A&P Flix™*: Tensor fasciae latae**

PLAY

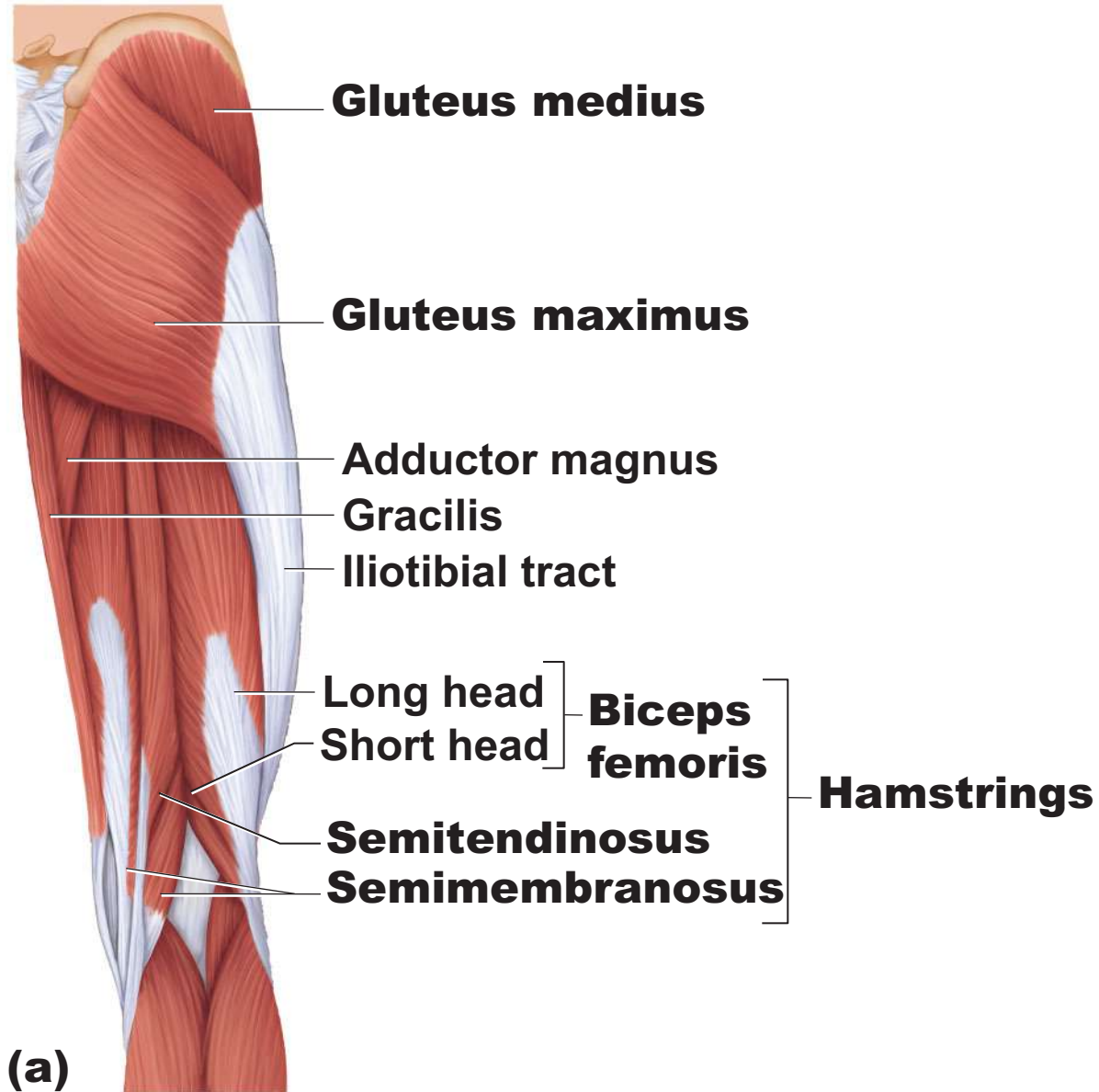
***A&P Flix™*: Rectus femoris**

PLAY

***A&P Flix™*: Sartorius**

Movements of the Thigh

- Thigh extensors
- Hamstring muscles (prime movers of extension)
 - Biceps femoris
 - Semitendinosus
 - Semimembranosus
- Gluteus maximus (prime mover during forceful extension)



Movements of the Thigh

PLAY

***A&P Flix™*: Biceps femoris**

PLAY

***A&P Flix™*: Semitendinosus**

PLAY

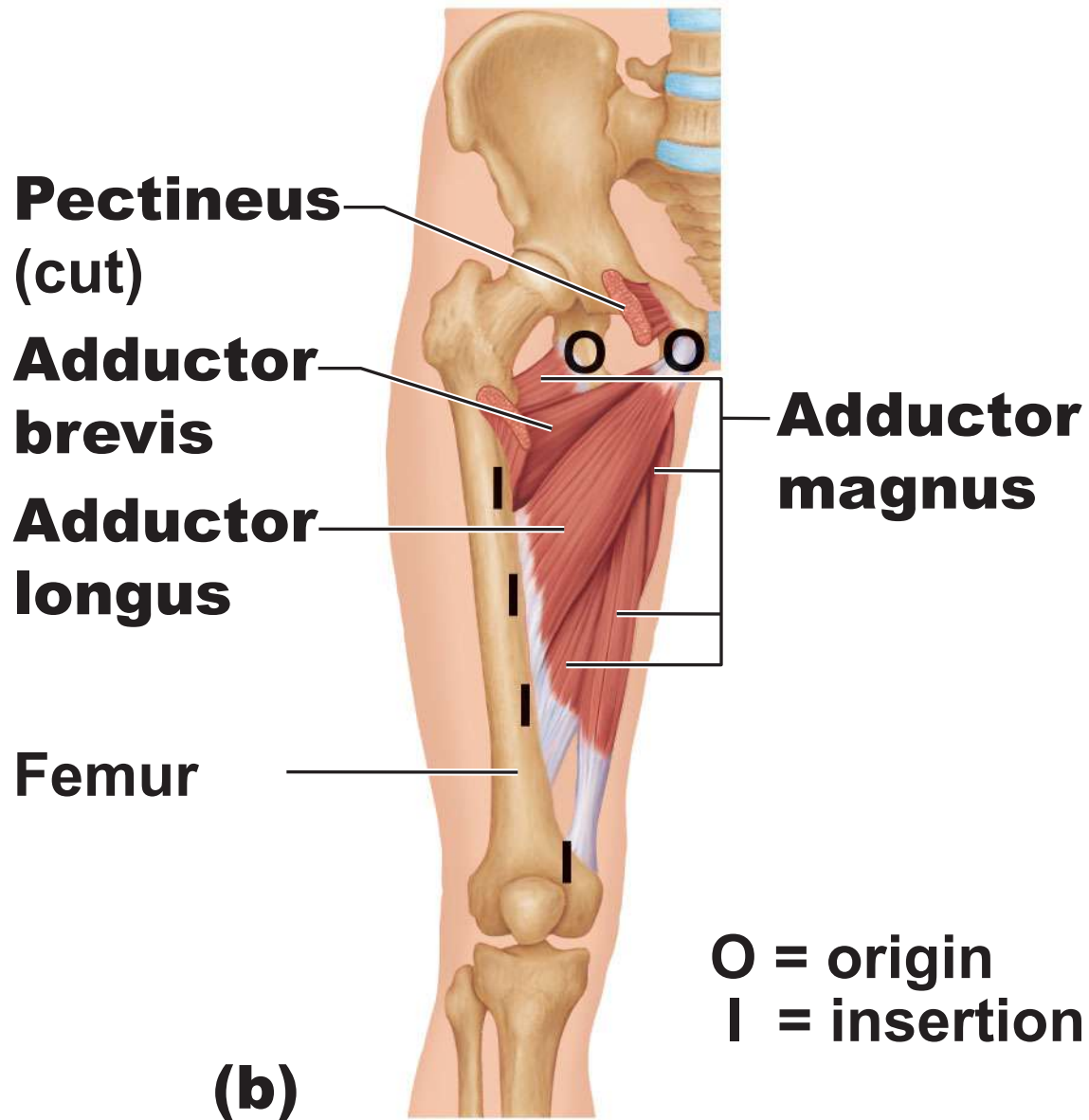
***A&P Flix™*: Semimembranosus**

Movements of the Thigh

- Adductors (also medially rotate thigh)
 - Adductor magnus
 - Adductor longus
 - Adductor brevis
 - Pectineus
 - Gracilis

PLAY

A&P FlixTM: Medial muscles that cross the hip joint



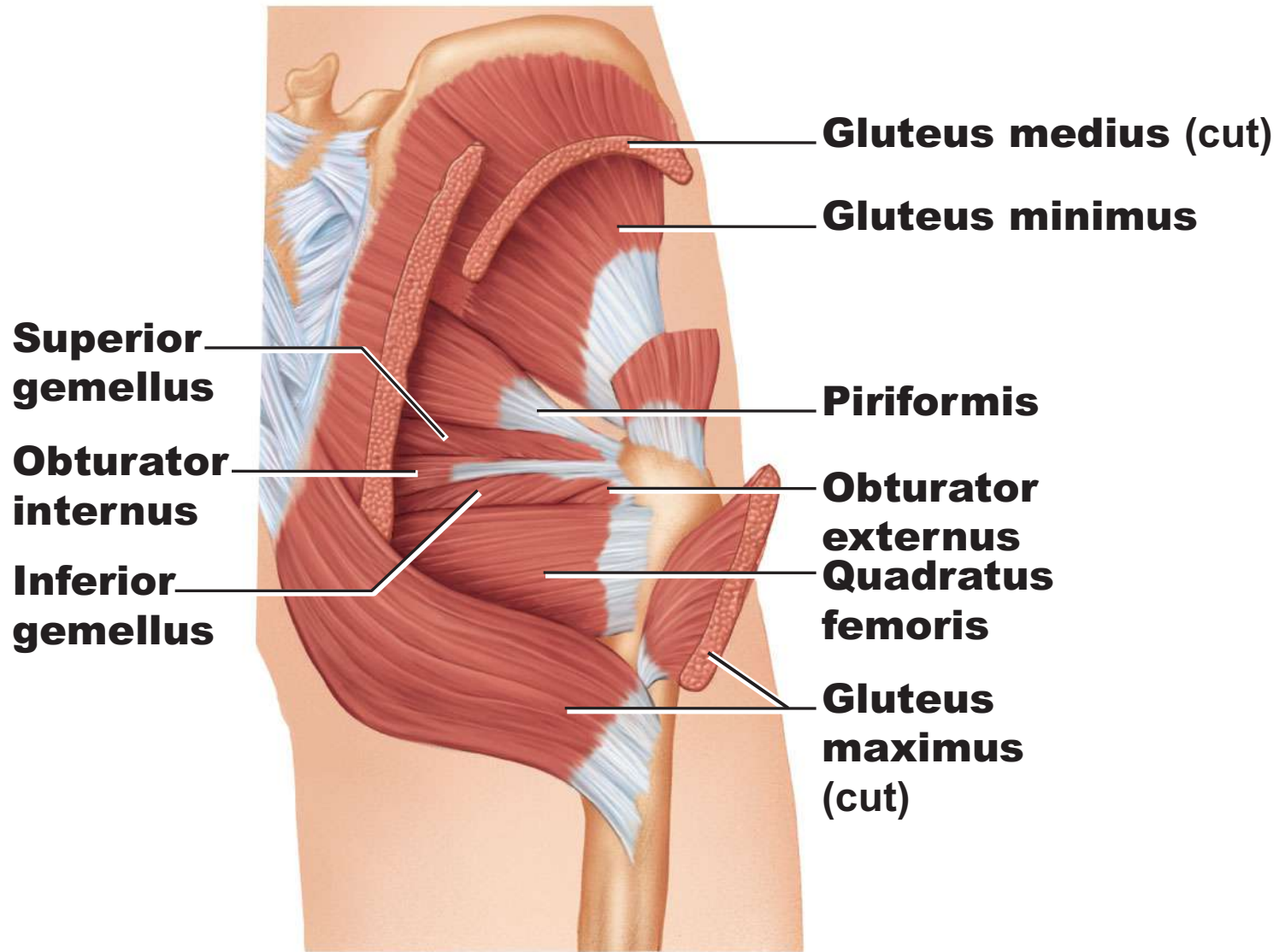
A&P Flix™: Pectineus

Movements of the Thigh

- Abductors
 - Gluteus maximus (also laterally rotates thigh)
 - Gluteus medius (also medially rotates thigh)
 - Gluteus minimus (also medially rotates thigh)
 - Piriformis (also laterally rotates thigh)
 - Obturator externus (also laterally rotates thigh)
 - Obturator internus (also laterally rotates thigh)
 - Gemellus (also laterally rotates thigh)



A&P FlixTM: Posterior muscles that cross the hip joint



(c)

Movements of the Thigh

PLAY

A&P FlixTM: **Gluteus maximus(c)**

PLAY

A&P FlixTM: **Gluteus medius**

Summary of Movement at the Hip Joint

PLAY

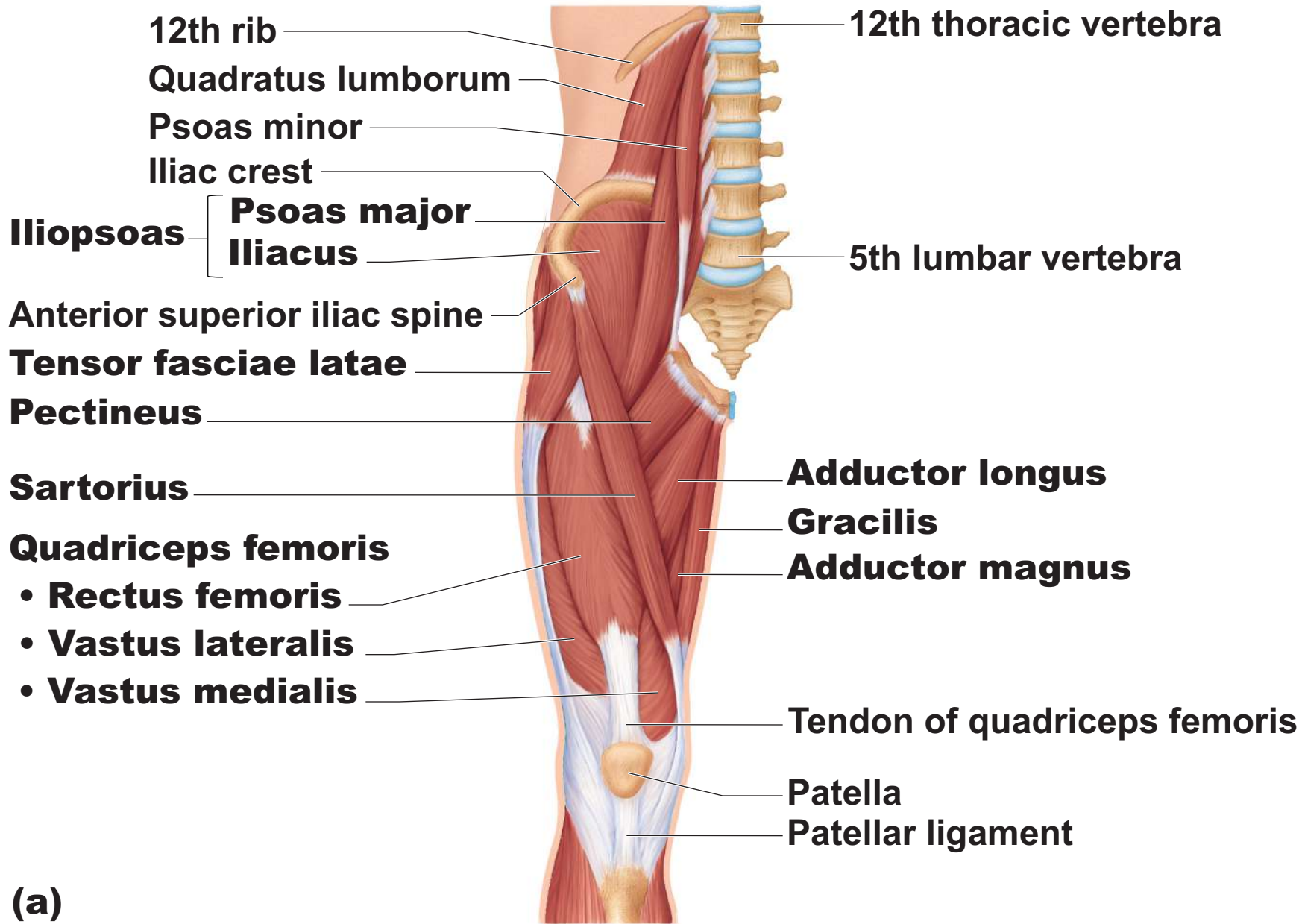
A&P Flix[™]: Movement at the hip joint

Muscles of the Thigh that Move the Knee Joint

- Quadriceps femoris—sole extensor of the knee
- Hamstring muscles—flex the knee, and are antagonists to the quadriceps femoris

PLAY

***A&P Flix*TM: Muscles that cross the knee joint: An overview.**



(a)



A&P Flix™: Movement at the hip joint

Figure 10.19a

Muscles of the Thigh that Move the Knee Joint

PLAY

***A&P Flix™*: Anterior extensors that act on the knee**

PLAY

***A&P Flix™*: Rectus femoris**

PLAY

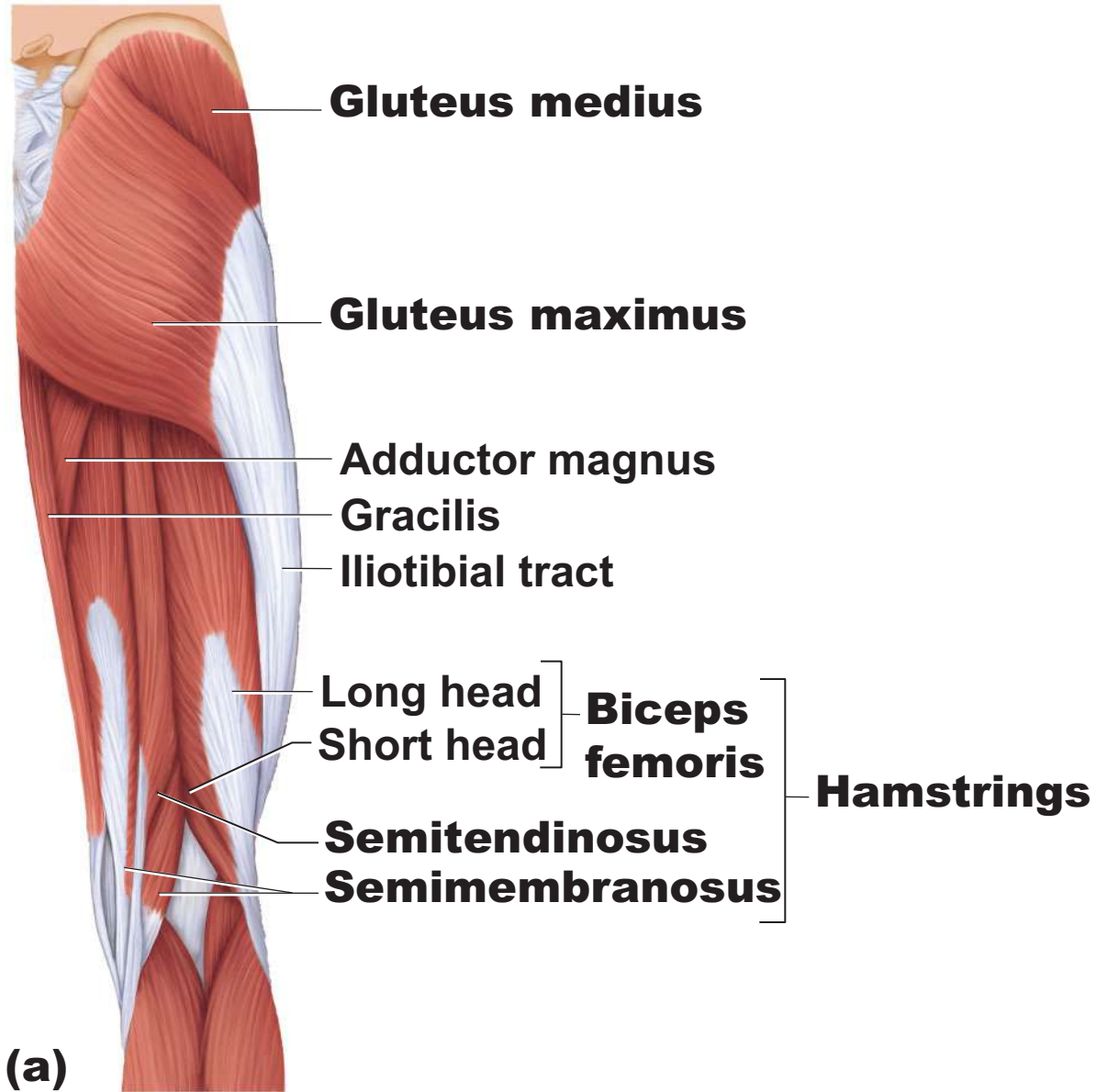
***A&P Flix™*: Vastus lateralis**

PLAY

***A&P Flix™*: Vastus medialis**

PLAY

***A&P Flix™*: Vastus intermedius**



A&P Flix™: Movement at the hip joint

Figure 10.20a

Muscles of the Thigh that Move the Knee Joint

PLAY

***A&P Flix™*: Posterior flexors that act on the knee**

PLAY

***A&P Flix™*: Biceps femoris**

PLAY

***A&P Flix™*: Semitendinosus**

PLAY

***A&P Flix™*: Semimembranosus**

Summary of Movement at the Knee Joint

PLAY

A&P FlixTM: Movement at the knee joint

Fascia of the Leg

- A deep fascia of the leg is continuous with the fascia lata
- This fascia segregates the leg into three compartments: anterior, lateral, and posterior
- Distally, the fascia thickens and forms the flexor, extensor, and fibular retinaculae

PLAY

A&P Flix[™]: Muscles that act on the ankle and foot:
An overview

Muscles of the Leg: Movements

- Various leg muscles produce the following movements
 - Ankle—dorsiflexion and plantar flexion
 - Intertarsal joints—inversion and eversion of the foot
 - Toes—flexion and extension

PLAY

A&P FlixTM: Movements of the ankle and foot (a)

Muscles of the Anterior Compartment of the Leg

- Primary toe extensors and ankle dorsiflexors
 - Tibialis anterior
 - Extensor digitorum longus
 - Extensor hallucis longus
 - Fibularis tertius (not always present)

PLAY

A&P Flix[™]: Anterior muscles that act on the ankle and foot

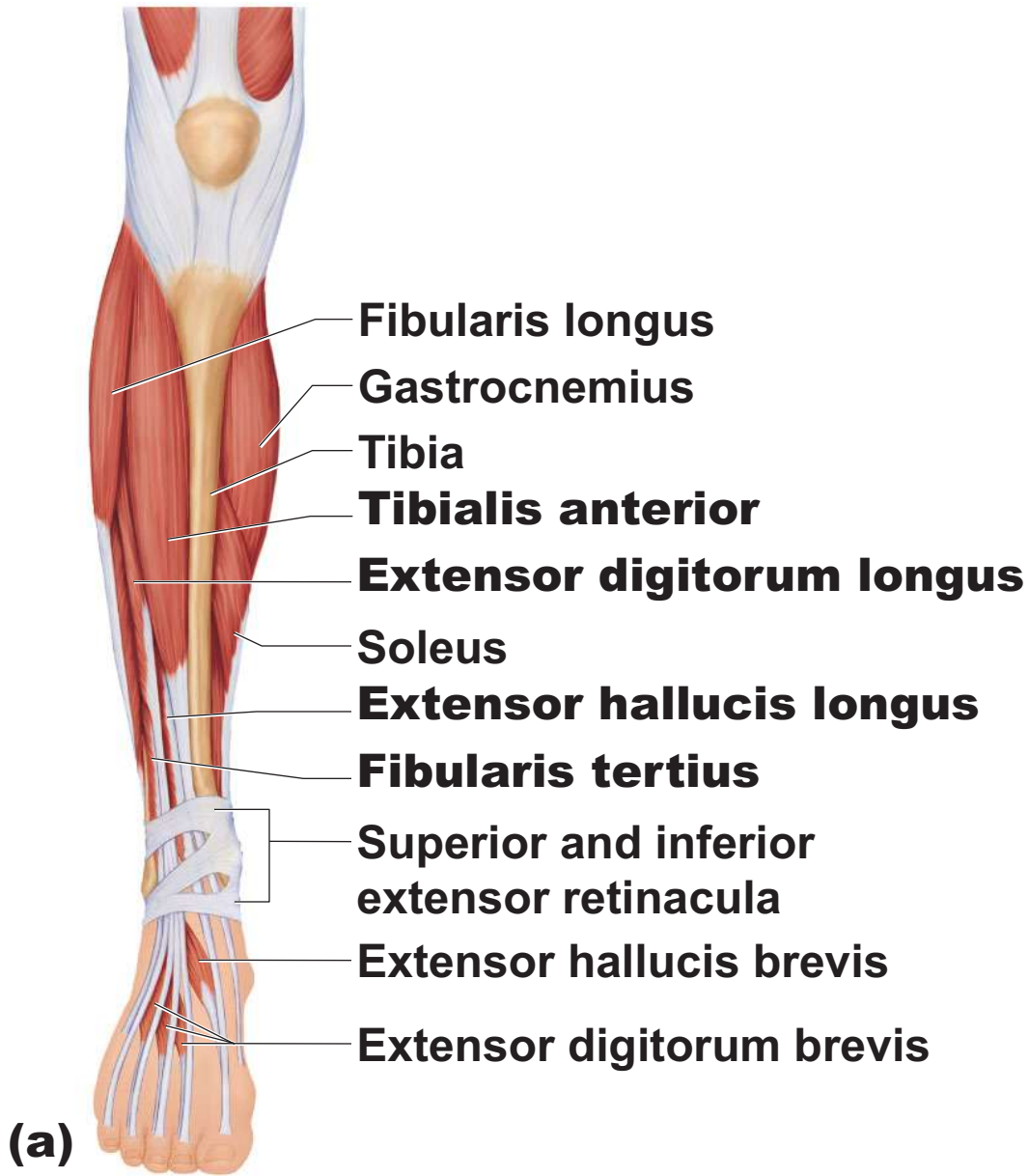


Figure 10.21a

Muscles of the Anterior Compartment of the Leg

PLAY

***A&P Flix*TM: Tibialis anterior**

PLAY

***A&P Flix*TM: Extensor digitorum longus**

PLAY

***A&P Flix*TM: Extensor hallucis longus**

Muscles of the Lateral Compartment of the Leg

- Plantar flexion and eversion of the foot
- Fibularis longus
- Fibularis brevis

PLAY

***A&P Flix*TM: Lateral muscles that act on the ankle and foot**

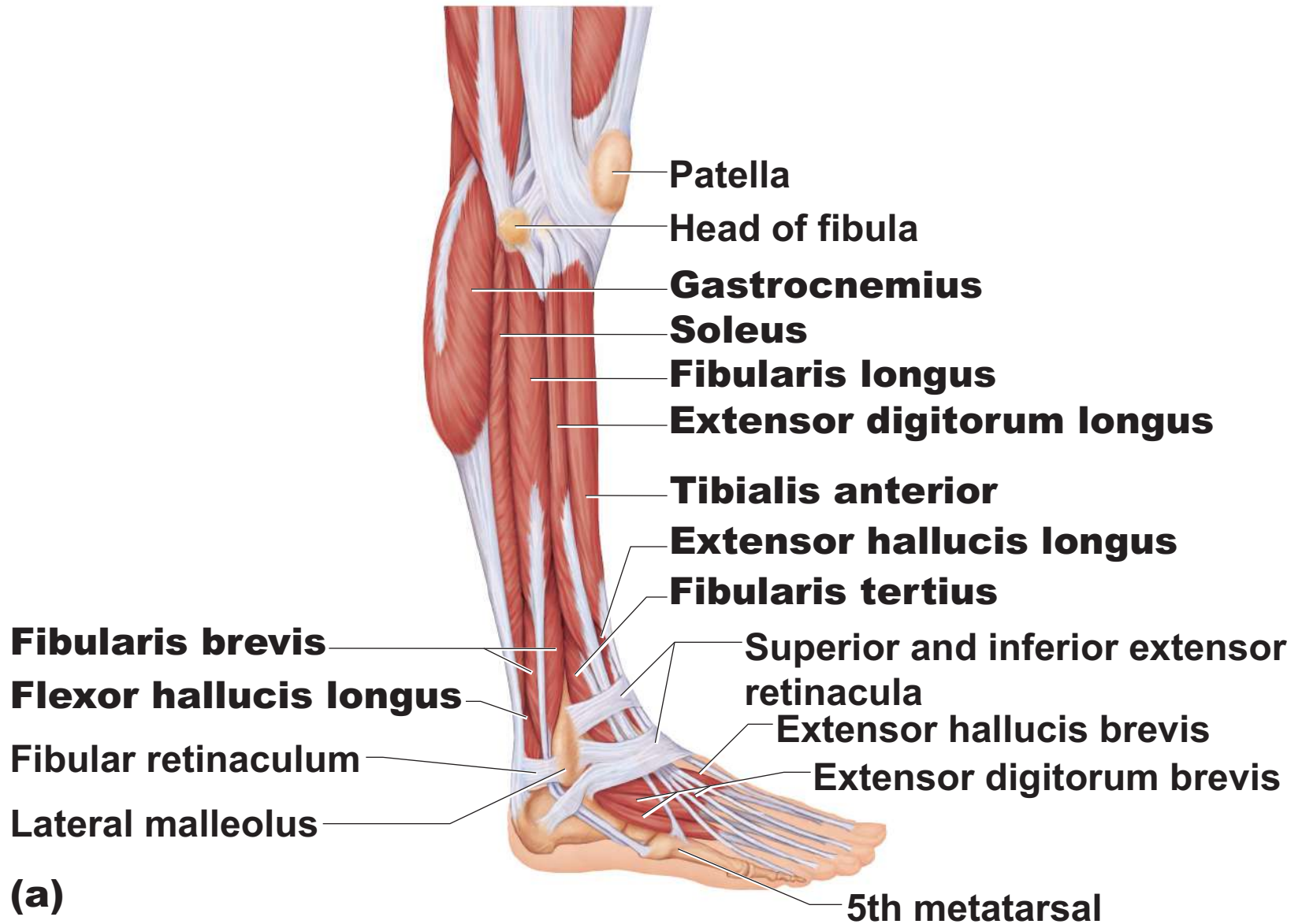


Figure 10.22a

Muscles of the Lateral Compartment of the Leg

PLAY

A&P Flix[™]: **Fibularis longus**

Muscles of the Posterior Compartment of the Leg

- Flexors of the foot and the toes
 - Gastrocnemius
 - Soleus
 - Plantaris
 - Popliteus
 - Tibialis posterior
 - Flexor digitorum longus
 - Flexor hallucis longus

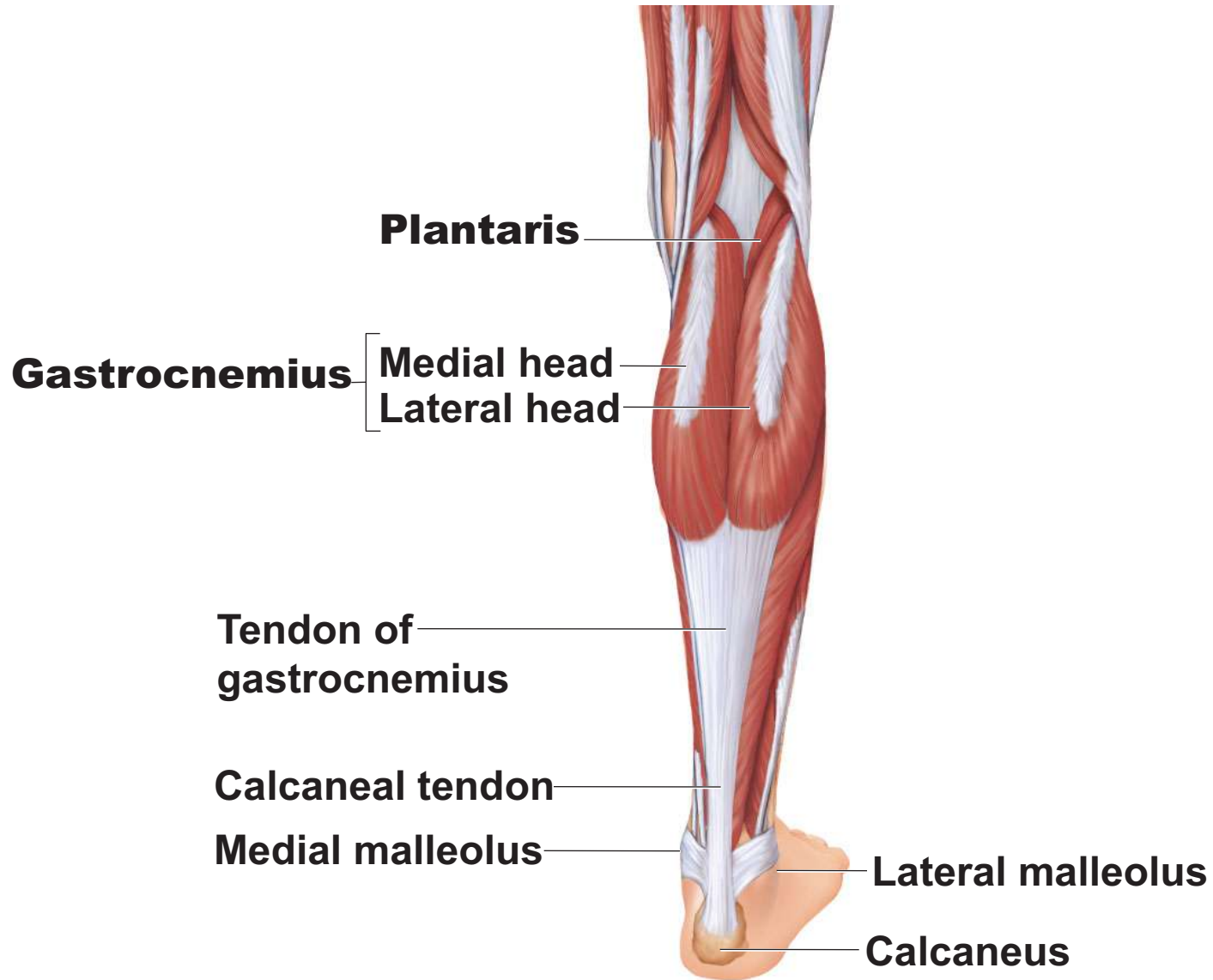
Muscles of the Posterior Compartment of the Leg

PLAY

***A&P Flix*TM: Superficial muscles that act on the ankle and foot**

PLAY

***A&P Flix*TM: Deep posterior muscles that act on the ankle and foot**



(a) Superficial view of the posterior leg.

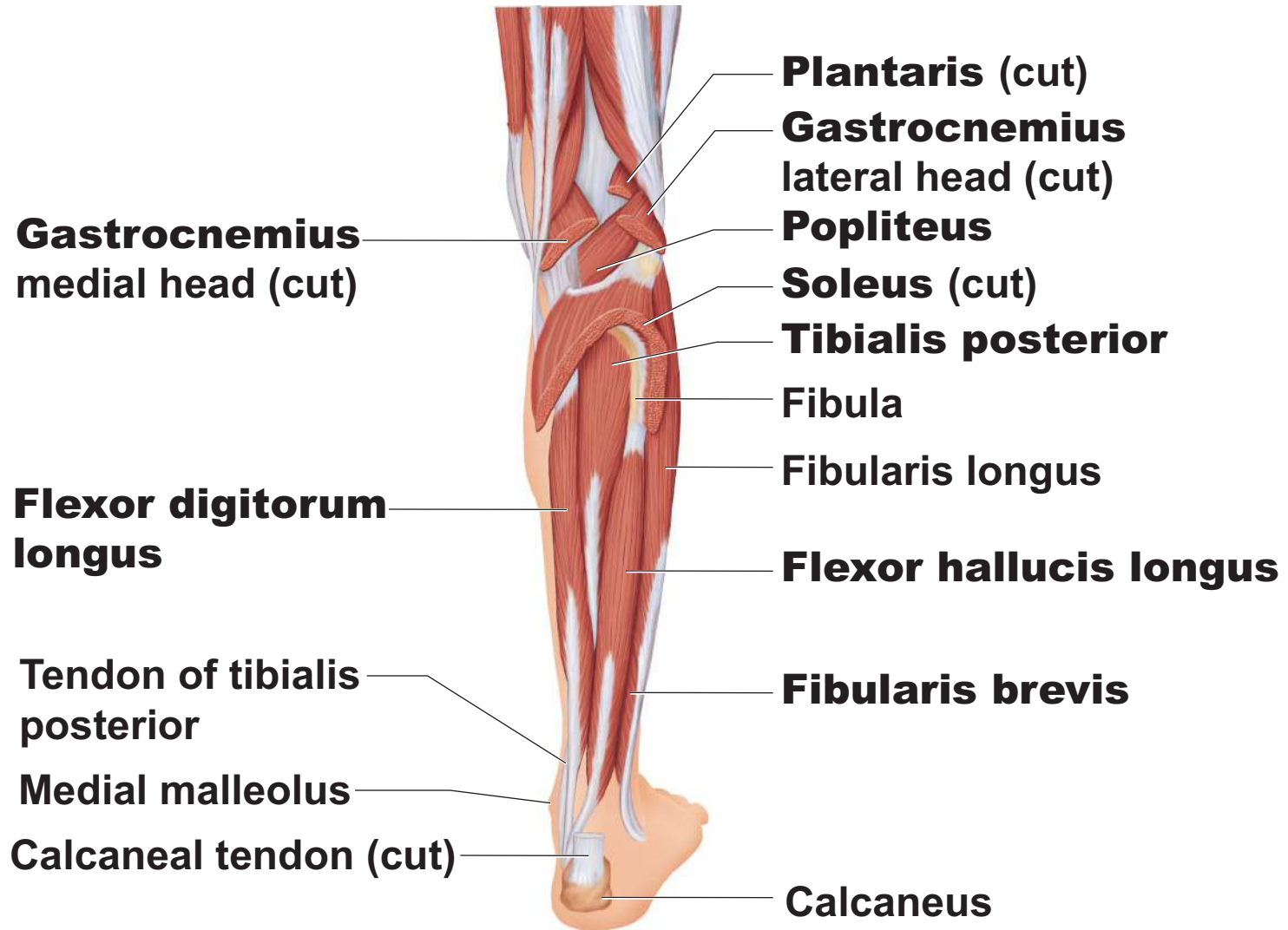
Muscles of the Posterior Compartment of the Leg

PLAY

A&P Flix[™]: **Gastrocnemius**

PLAY

A&P Flix[™]: **Soleus**



(c) The triceps surae has been removed to show the deep muscles of the posterior compartment.

Muscles of the Posterior Compartment of the Leg

PLAY

A&P Flix[™]: **Tibialis posterior**

PLAY

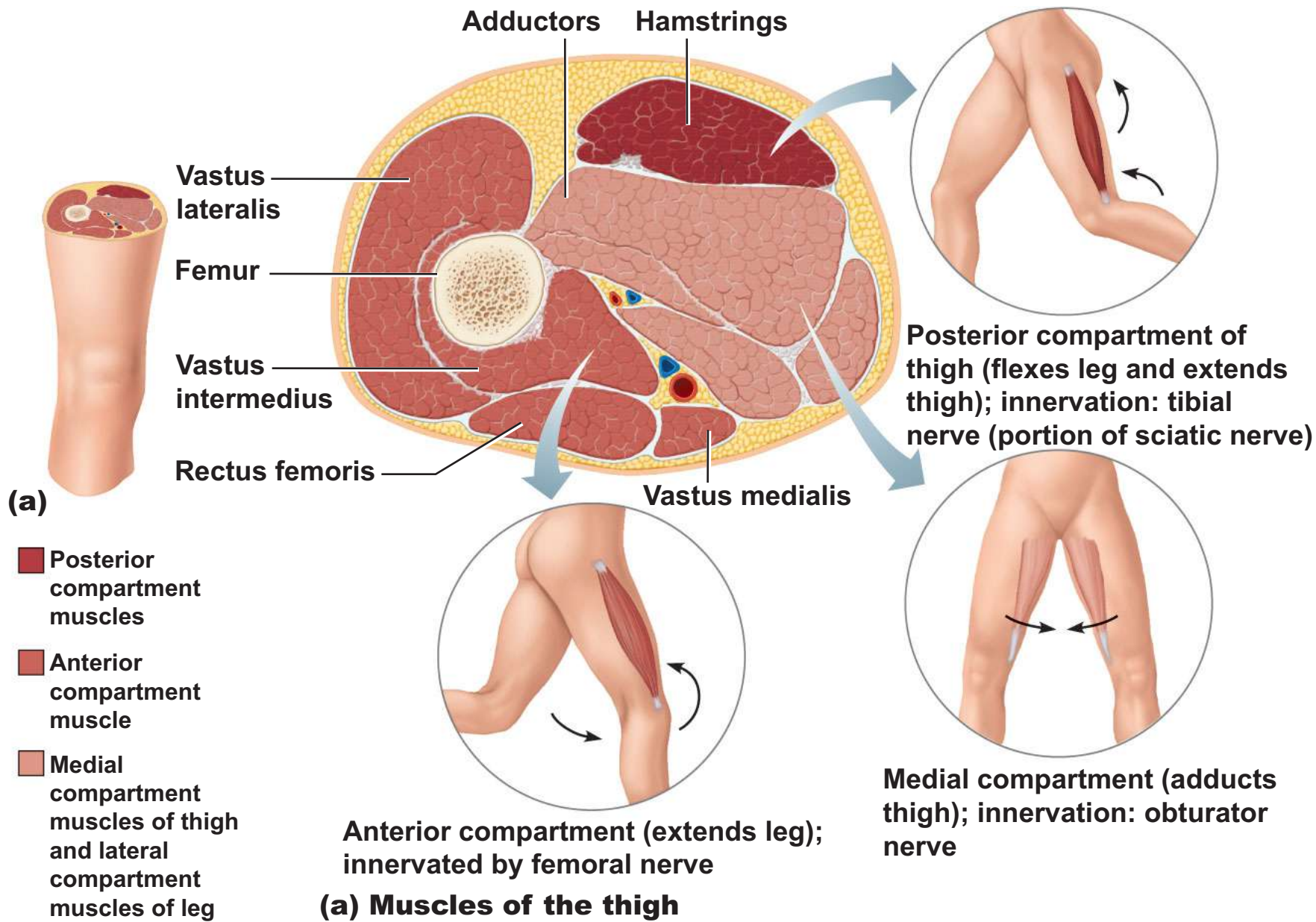
A&P Flix[™]: **Flexor digitorum longus**

PLAY

A&P Flix[™]: **Flexor hallucis longus**

Major Actions of Muscles Acting on the Thigh, Leg, and Foot

- View the next five slides for a summary of the major actions of the muscles acting on the thigh, leg, and foot

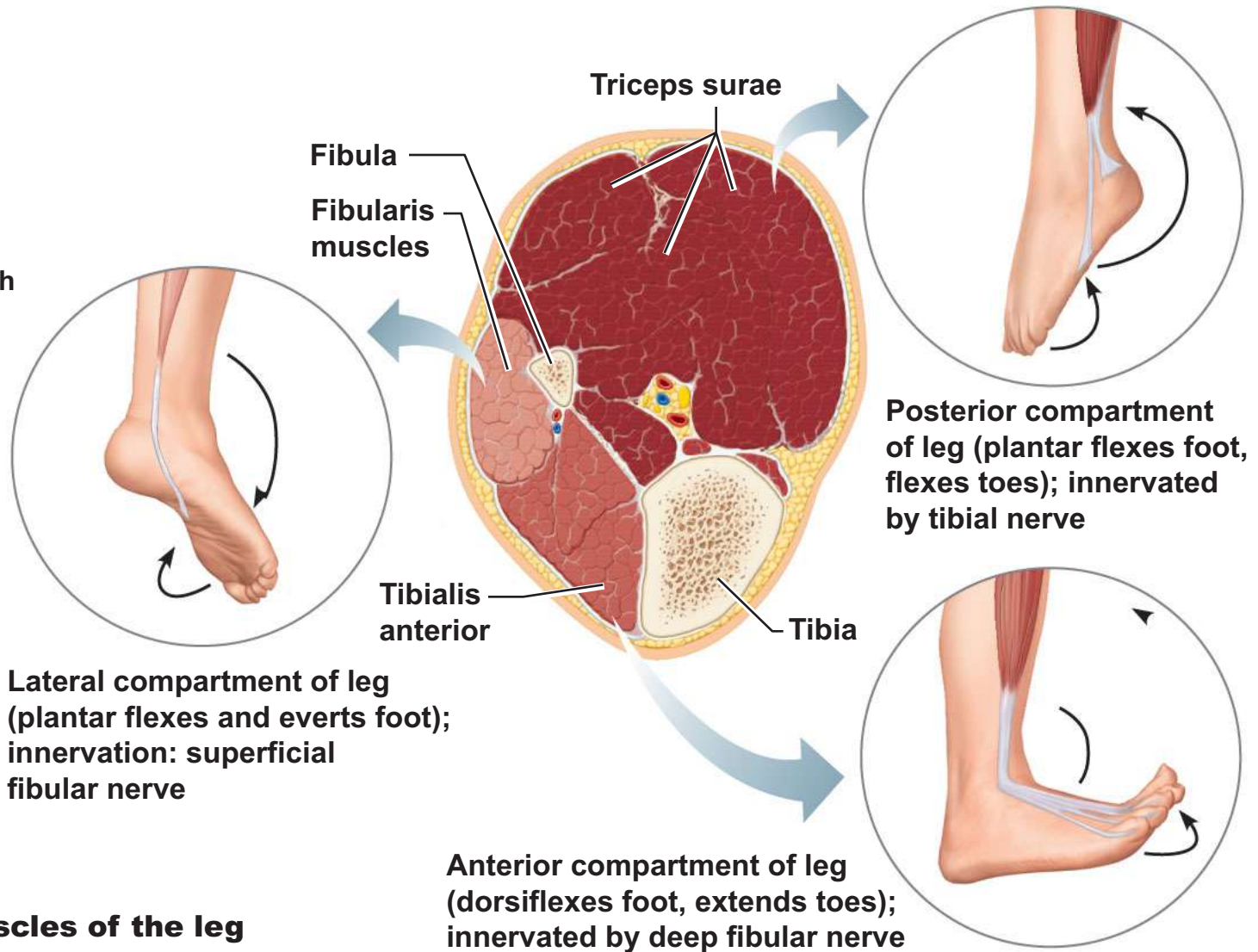


- Posterior compartment muscles
- Anterior compartment muscle
- Medial compartment muscles of thigh and lateral compartment muscles of leg



(b)

(b) Muscles of the leg



Major Actions of Muscles Acting on the Ankle and Foot

PLAY

***A&P Flix™*: Actions of the muscles of the anterior compartment of the leg**

PLAY

***A&P Flix™*: Actions of the muscles of the lateral compartment of the leg**

PLAY

***A&P Flix™*: Actions of the muscles of the posterior compartment of the leg**

MUSCLE GALLERY

TABLE 10.17 Summary of Major Actions of Muscles Acting on the Thigh, Leg, and Foot (Figure 10.25)

Part I:
Muscles Acting
on the Thigh and Leg
(PM = prime mover)

Anterior and Medial Muscles

Iliopsoas

Sartorius

Tensor fasciae latae

Rectus femoris

Vastus muscles

Adductor magnus

Adductor longus

Adductor brevis

Pectineus

Gracilis

Posterior Muscles

Gluteus maximus

Gluteus medius

Gluteus minimus

Piriformis

Obturator internus

Obturator externus

Gemelli

Quadratus femoris

Biceps femoris

Semitendinosus

Semimembranosus

Gastrocnemius

Plantaris

Popliteus

| | ACTIONS AT THE HIP JOINT | | | | | ACTIONS AT THE KNEE | | |
|----------------------|--------------------------|-----------|-----------|-----------|-----------------|---------------------|------------------------------|-----------|
| | Flexion | Extension | Abduction | Adduction | Medial Rotation | Lateral Rotation | Flexion | Extension |
| Iliopsoas | × (PM) | | | | | | | |
| Sartorius | × | | × | | | × | × | |
| Tensor fasciae latae | × | | × | | × | | | |
| Rectus femoris | × | | | | | | | × (PM) |
| Vastus muscles | | | | | | | | × (PM) |
| Adductor magnus | | × | | × | × | | | |
| Adductor longus | × | | | × | × | | | |
| Adductor brevis | × | | | × | × | | | |
| Pectineus | × | | | × | × | | | |
| Gracilis | | | | × | × | | × | |
| Gluteus maximus | | × (PM) | × | | | × | | |
| Gluteus medius | | | × (PM) | | × | | | |
| Gluteus minimus | | | × | | × | | | |
| Piriformis | | | × | | | × | | |
| Obturator internus | | | | | | × | | |
| Obturator externus | | | | | | × | | |
| Gemelli | | | | | | × | | |
| Quadratus femoris | | | | | | × | | |
| Biceps femoris | | × (PM) | | | | | × (PM) | |
| Semitendinosus | | × | | | | | × (PM) | |
| Semimembranosus | | × | | | | | × (PM) | |
| Gastrocnemius | | | | | | | × | |
| Plantaris | | | | | | | × | |
| Popliteus | | | | | | | × (and rotates leg medially) | |

MUSCLE GALLERY

TABLE 10.17 Summary of Major Actions of Muscles Acting on the Thigh, Leg, and Foot (Figure 10.25) (continued)

Part II:
Muscles Acting on
the Ankle and Toes

Anterior Compartment

Tibialis anterior

Extensor digitorum longus

Fibularis tertius

Extensor hallucis longus

Lateral Compartment

Fibularis longus and brevis

Posterior Compartment

Gastrocnemius

Soleus

Plantaris

Flexor digitorum longus

Flexor hallucis longus

Tibialis posterior

| | ACTIONS AT THE ANKLE JOINT | | | | ACTIONS AT THE TOES | |
|-----------------------------|----------------------------|--------------|-----------|----------|---------------------|---------------|
| | Plantar Flexion | Dorsiflexion | Inversion | Eversion | Flexion | Extension |
| Tibialis anterior | | × (PM) | × | | | |
| Extensor digitorum longus | | × | | | | × (PM) |
| Fibularis tertius | | × | | × | | |
| Extensor hallucis longus | | × | × (weak) | | | × (great toe) |
| Fibularis longus and brevis | × | | | × | | |
| Gastrocnemius | × (PM) | | | | | |
| Soleus | × (PM) | | | | | |
| Plantaris | × | | | | | |
| Flexor digitorum longus | × | | × | | × (PM) | |
| Flexor hallucis longus | × | | × | | × (great toe) | |
| Tibialis posterior | × | | × (PM) | | | |

Intrinsic Muscles of the Foot

- Help flex, extend, abduct, and adduct the toes
- Support the arches of the foot along with some leg tendons
 - Extensor digitorum brevis—dorsal foot muscle that helps extend the toes

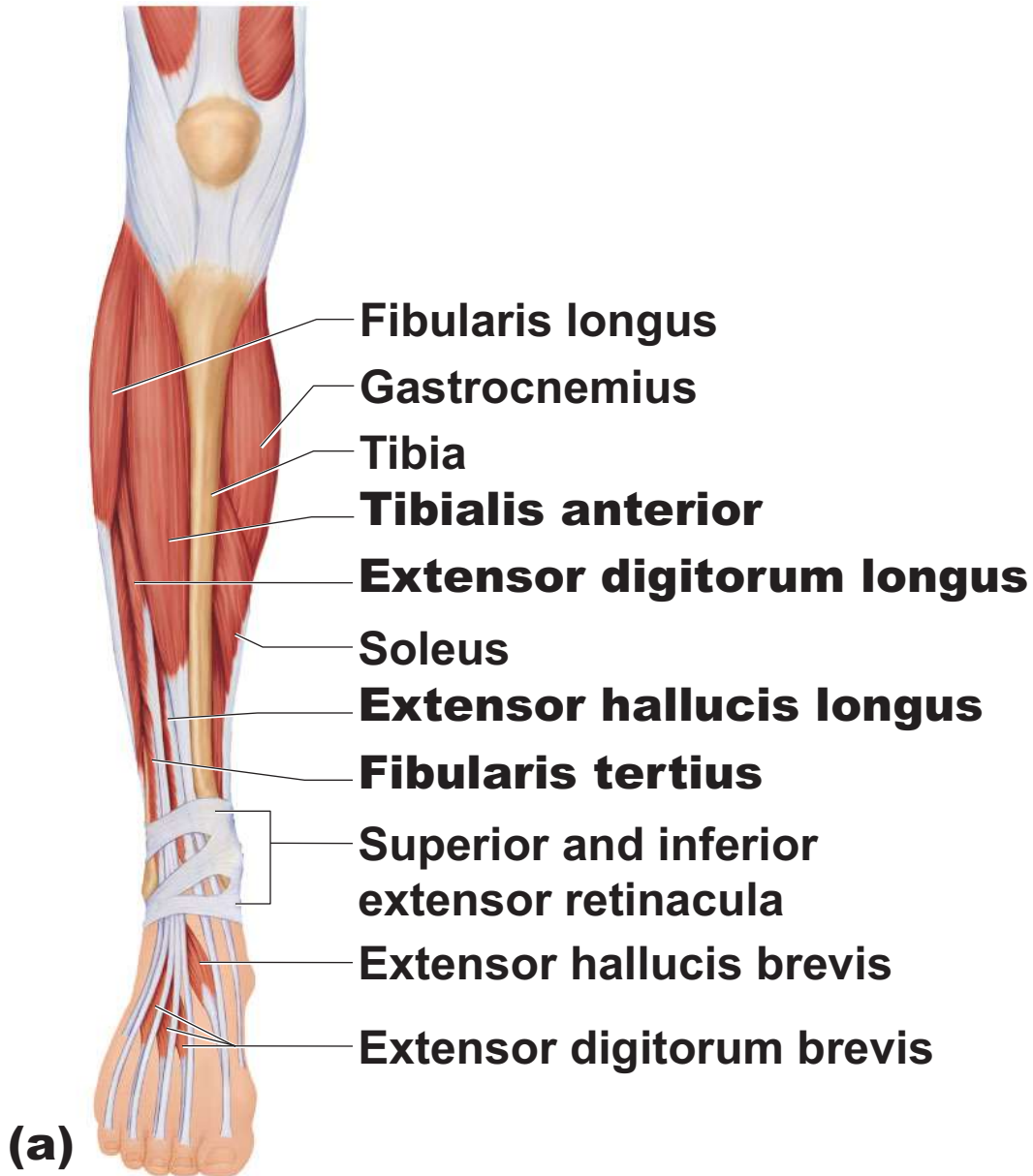


Figure 10.21a

Plantar Muscles

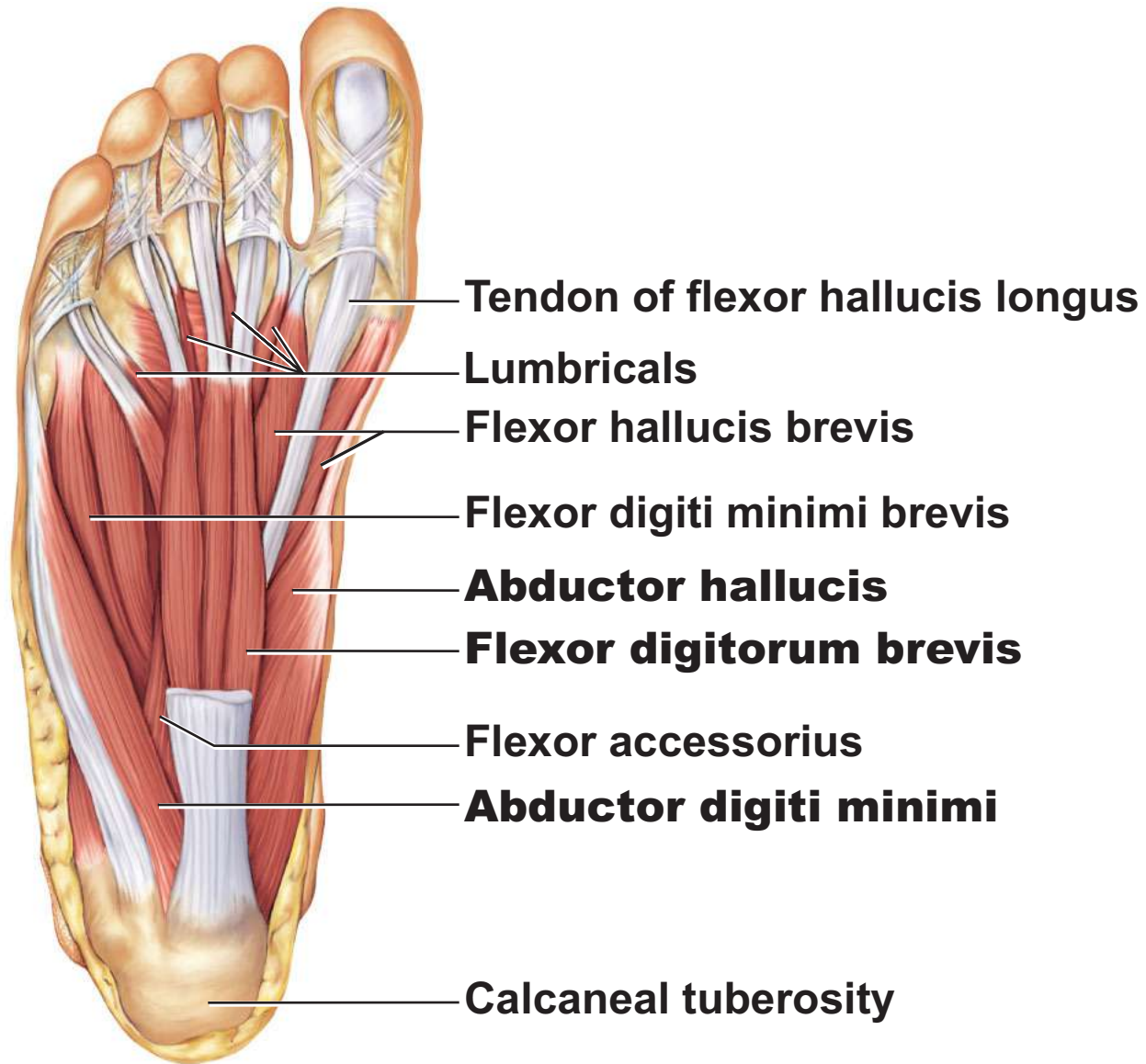
- The plantar muscles occur in four layers

1. Superficial layer

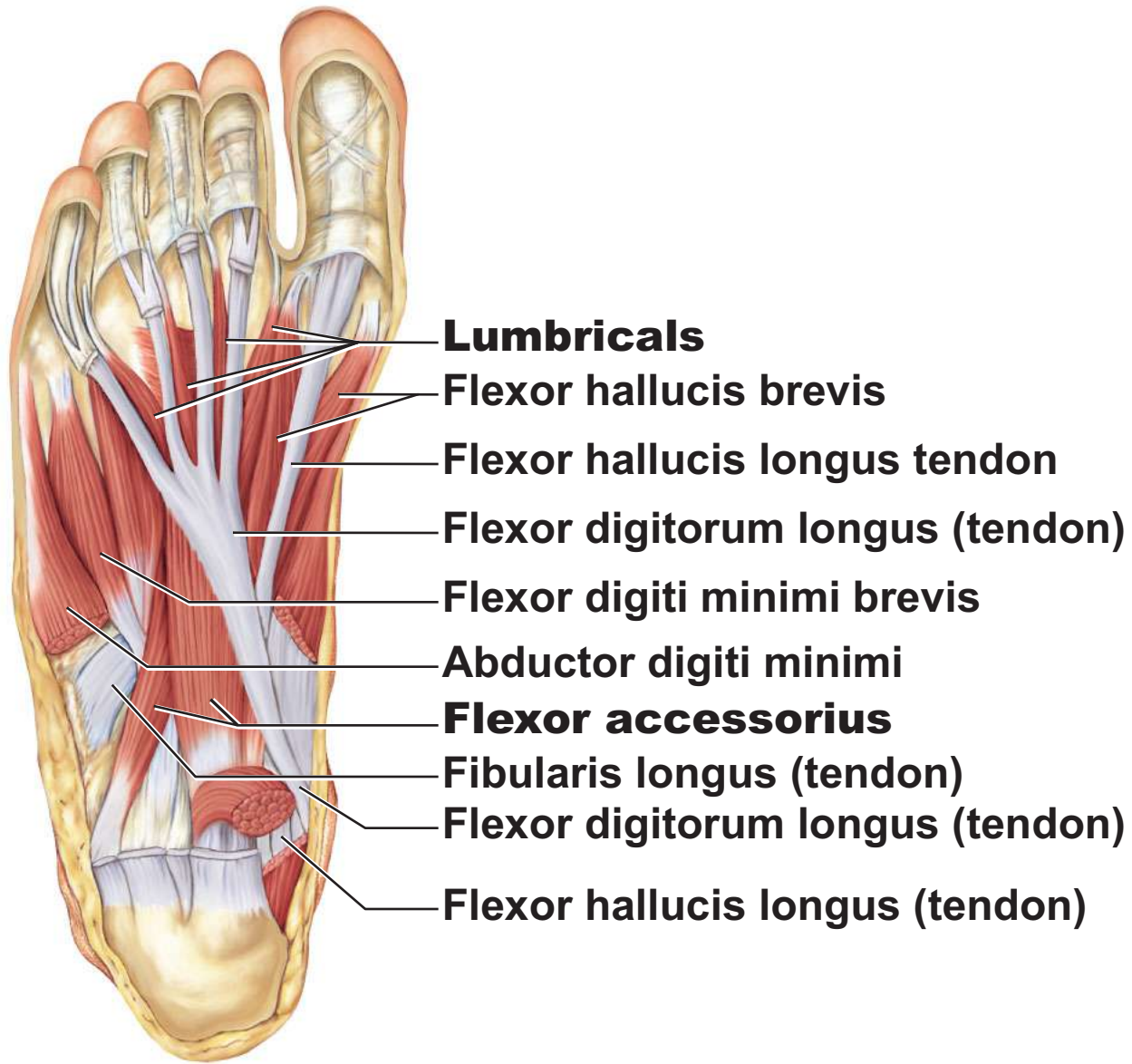
- Flexor digitorum brevis
- Abductor hallucis
- Abductor digiti minimi

2. Second layer

- Flexor accessorius
- Lumbricals



(a) First layer (plantar aspect)



(b) Second layer (plantar aspect)

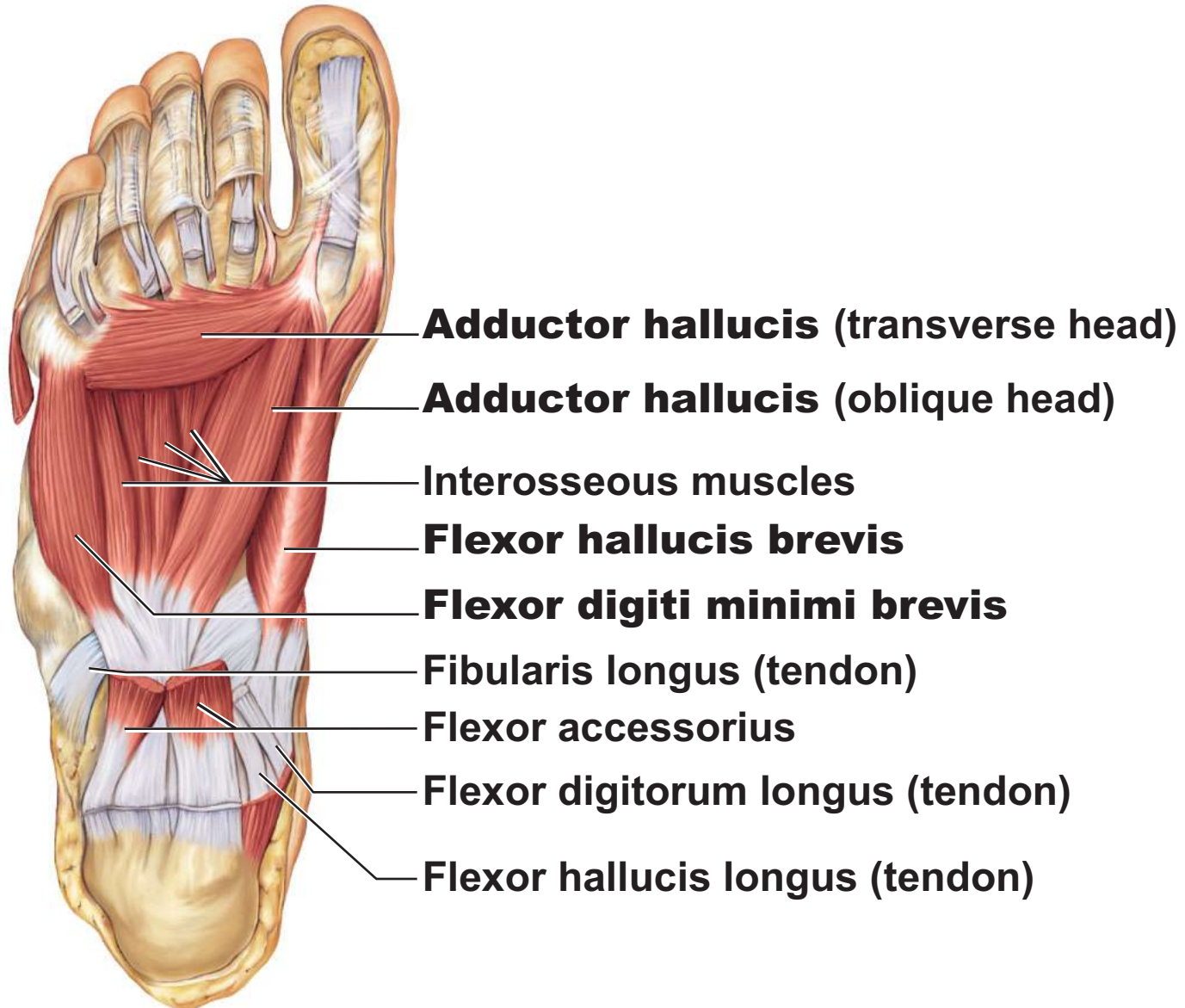
Plantar Muscles

3. Third layer

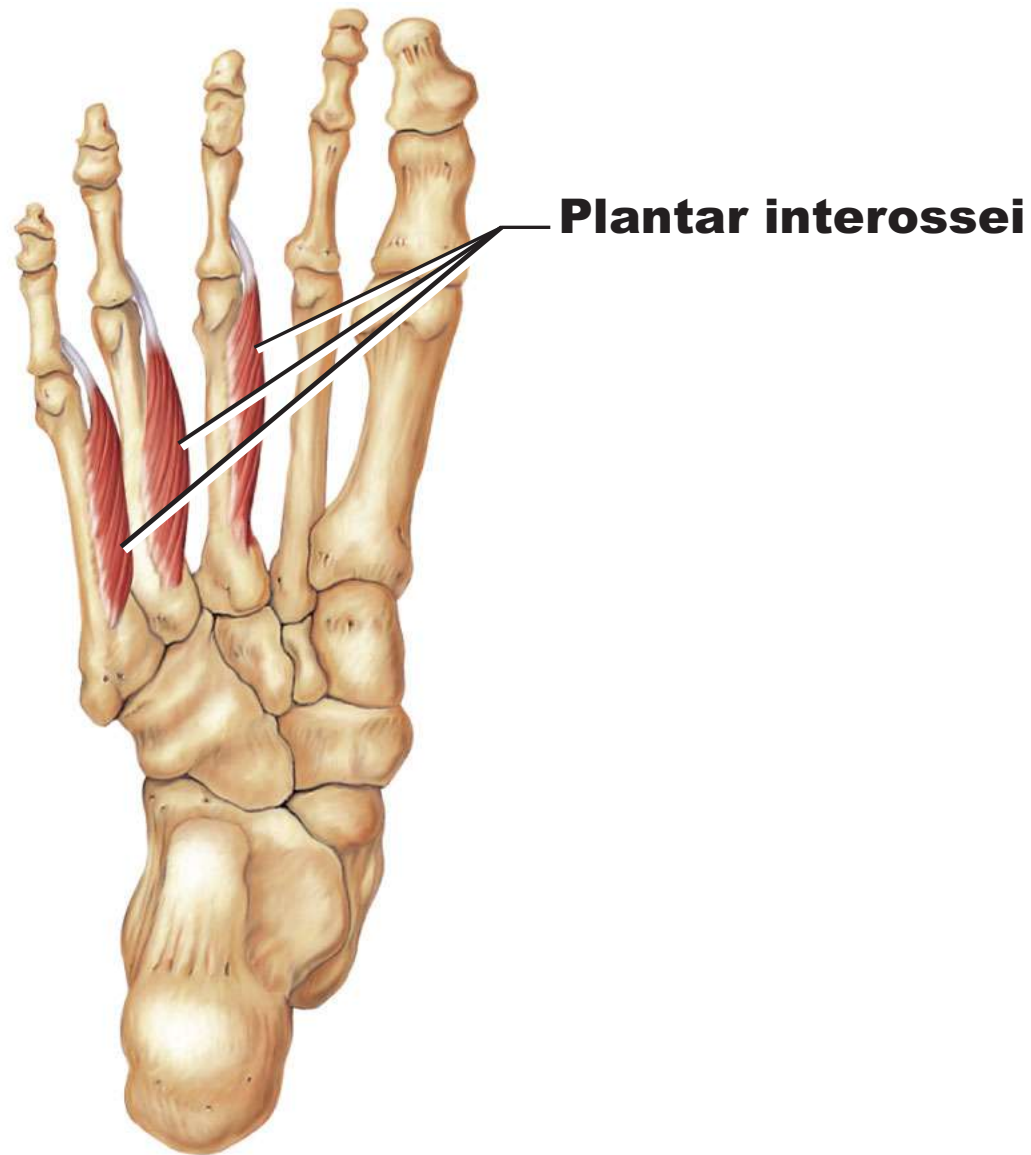
- Flexor hallucis brevis
- Adductor hallucis
- Flexor digiti minimi brevis

4. Deepest layer

- Plantar and dorsal interossei



(c) Third layer (plantar aspect)



(d) Fourth layer (plantar aspect): plantar interossei



Animation: Rotating foot