MUSCLES OF THE LOWER LIMBS

Naming, location and general function

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ROLES THAT SHOULD NOT BE FORGOTTEN

- Most anterior compartment muscles of the hip and thigh: Flexor of the femur at the hip and Extend the leg at the knee
- Posterior compartment muscles of the hip and thigh: Extend the thigh and Flex the leg
- The medial compartment muscles all: Adduct the thigh
- These three groups are enclosed by the Fascia lata
MOUVEMENTS OF THE THIGH AT THE HIP: FLEXION

- The ball-and-socket Hip joint permits flexion, extension, abduction, adduction, circumduction, and rotation.
- The most important thigh flexors are:
  - The Iliopsoas (prime mover),
  - Tensor fasciae latae,
  - Rectus femoris
- The medially located Adductor muscles and sartorius assist in thigh flexion (Agonists)
MOVEMENTS OF THE THIGH AT THE HIP:
EXTENSION

- Thigh extension is primarily effected by the hamstring muscles
  - Biceps femoris
  - Semitendinosus
  - Semimembranosus
- Forceful extension is aided by the gluteus maximus
 Movements of the Thigh at the Hip: Other Movements

- Abduction and rotation are effected by the
  - Gluteus medius and minimus,
- Thigh adduction is the role of
  - Five adductor muscles
    - (adductor magnus, longus, and brevis muscles)
  - The pectineus muscle
  - The gracilis muscle
Muscle Actions of the Thigh: Summary

Key:
- Red = Posterior compartment muscles
- Brown = Anterior compartment muscles
- Orange = Medial compartment muscles of thigh and lateral compartment muscles of leg

Adductors
Hamstrings
Vastus lateralis
Femur
Vastus intermedius
Rectus femoris
Vastus medialis

Posterior compartment of thigh (flexes leg and extends thigh)
Medial compartment (adducts thigh)
Anterior compartment (extends leg)
Muscles of Hip and Thigh (Summary)

- **Gluteals**
  - Posterior pelvis
  - Extend thigh
  - Rotate thigh
  - Abducts thigh

- **Anterior Compartment Thigh**
  - Flexes thigh at hip
  - Extends leg at knee

- **Medial/Adductor Compartment**
  - Adducts thigh
  - Medially rotates thigh

- **Posterior Compartment Thigh**
  - Extends thigh
  - Flexes leg
THE GLUTEAL AND POSTERIOR THIGH COMPARTMENT MUSCLES
GLUTEALS

- **Gluteus maximus**
  - Origin - Ilium, sacrum and coccyx
  - Insertion - Gluteal tuberosity of femur, iliotibial tract
  - Action - Extends thigh, some lateral rotation and abduction

- **Gluteus medius**
  - Origin - Ilium
  - Insertion - Greater trochanter of femur
  - Action - Abduction, medial rotation

- **Gluteus minimus**
  - Origin - Ilium
  - Insertion - Greater trochanter of femur
  - Action - Abduction, medial rotation

- **Gluteus minimus**: help stabilize hip Joint to allow fluent bipedal walking
Muscles that Abduct the Thigh

- **4 Hip Abductors:**
  - originate from pelvis and insert onto the greater trochanter of femur
- **Gluteus Medius**
  - **origin** – iliac crest
- **Gluteus Minimus**
  - **origin** - anterior gluteal line
- **Sartorius**
- **Tensor fascia latae**
GLUTEAL REGION

- Gluteus medius (cut)
- Gluteus minimus
- Superior gemellus
- Obturator internus
- Inferior gemellus
- Piriformis
- Obturator externus
- Quadratus femoris
- Gluteus maximus (cut)
Tensor Fascia Lata

- **Origin** Anterior superior iliac spine
- **Insertion** Iliotibial band
- **Action** Abducts and helps stabilize and steady the hip and knee joints by putting tension on the iliotibial band of fascia
- **Innervation** Superior gluteal nerve (L4, L5, S1)
Hamstring Muscles posterior thigh group

The hamstring muscles flex the knee, and are antagonists to the quadriceps femoris (anterior group)
ANTERIOR GROUP

MUSCLE FLEXING THE THIGH AT THE HIP JOINT
ANTERIOR MUSCLES GROUP THAT MOVE THE KNEE JOINT

- The sole extensor of the knee is the quadriceps femoris
ANTERIOR THIGH MUSCLE COMPARTMENT
Quadriiceps Femoris Muscle

- Rectus femoris muscle
- Vastus lateralis muscle
- Vastus medialis muscle
- Vastus intermedius muscle

See Next Slide For Vastus Intermedius Muscle
Medial Thigh Muscle Compartment

Iliopsoas Group
- Psoas major
- Iliacus

Lateral Rotator Group
- Piriformis
- Obturator internus
- Obturator externus

Adductor Group
- Pectineus
- Adductor brevis
- Adductor longus
- Adductor magnus
- Gracilis

Anterior view of the iliopsoas muscle and the adductor group
MUSCLES OF THE LEG: MOVEMENTS

Various leg muscles produce the following movements at the:
- Ankle – dorsiflexion and plantar flexion
- Inter-tarsal joints – inversion and eversion of the foot
- Toes – flexion and extension
Muscles of the Anterior Compartment

- These muscles are the primary toe extensors and ankle dorsiflexors

- They include:
  - Tibialis anterior
  - Extensor digitorum longus
  - Extensor hallucis longus
  - Fibularis tertius
MUSCLES OF THE LEG: ANTERIOR COMPARTMENT

- Tibialis anterior
- Extensor hallucis longus
- Extensor digitorum longus
- Fibularis tertius

= origin
= insertion
These muscles plantar flex and evert the foot

They include:
- Fibularis longus and fibularis brevis muscles
MUSCLES OF THE LATERAL COMPARTMENT

Peronios

Fibularis longus

Tendon of Fibularis longus

Fibularis brevis
MUSCLES OF THE POSTERIOR COMPARTMENT

- These muscles primarily flex the foot and the toes.
- They include:
  - Gastrocnemius
  - Soleus
  - Tibialis posterior
  - Flexor digitorum longus
  - Flexor hallucis longus
SUPERFICIAL POSTERIOR COMPARTMENT

- **Triceps surae**
  - Gastrocnemius (2 heads)
    - Origin - medial and lateral condyles of femur
    - Insertion - posterior calcaneus via Achilles tendon
  - Soleus
    - Origin – tibia and fibula
    - Insertion – same as above
    - Action of both – plantarflex foot

- **Plantaris (variable)**
  - Origin – posterior femur
  - Insertion – same as above!
  - Action – plantarflex foot, week knee flexion

All innervated by the tibial nerve
MUSCLES OF THE POSTERIOR COMPARTMENT

- Gastrocnemius
  - Lateral head (cut)
  - Medial head (cut)
- Soleus
- Tendon of plantaris
- Flexor digitorum longus
- Tendon of tibialis posterior
- Plantaris
- Popliteus
- Head of fibula
- Fibularis longus
- Fibularis brevis
- Flexor hallucis longus
- Tibialis posterior
- Fibula
- Flexor digitorum longus
- Flexor hallucis longus
- Tendon of tibialis posterior
- Medial malleolus
- Calcaneal tendon (cut)
- Calcaneus
**Deep Posterior Compartment**

- **Popliteus**
  - Origin - lateral condyle femur and lateral meniscus
  - Insertion – proximal tibia
  - Action – flex and medially rotate leg

- **Flexor digitorum longus**
  - Origin - tibia
  - Insertion - distal phalanges of toe 2-5
  - Action – plantarflex and invert foot, flex toe

- **Flexor hallucis longus**
  - Origin - fibula
  - Insertion - distal phalanx of hallux
  - Action - plantarflex and invert foot, flex toe

- **Tibialis posterior**
  - Origin – tibia, fibula, and interosseous membrane
  - Insertion - tarsals and metatarsals
  - Action - plantarflex and invert foot

All innervated by the tibial nerve
MUSCLES OF THE POSTERIOR COMPARTMENT
DEEP GROUP

(d) Tibialis posterior

(e) Flexor digitorum longus

(f) Popliteus, Flexor hallucis longus

O = origin
I = insertion
**Muscle Actions of the Leg: Summary**

These muscles:

- Plantar flex and evert the foot (lateral compartment)
- Plantar flex the foot and flex the toes (posterior compartment)
- Dorsiflex the foot and extend the toes (anterior compartment)
Muscle Actions of the Leg: Summary

Key:
- Red = Posterior compartment muscles
- Dark red = Anterior compartment muscles
- Green = Medial compartment muscles of thigh and lateral compartment muscles of leg

Lateral compartment of leg (plantar flexes and everts foot)

Posterior compartment of leg (plantar flexes foot, flexes toes)

Anterior compartment of leg (dorsiflexes foot, extends toes)
**EXTENSOR DIGITORIUM BREVIS**

**ORIGIN**: Calcaneus anterior surface

**INSERTION**: Proximal phalynx of 1\textsuperscript{st} – 4\textsuperscript{th} toes
- Muscle divides into 4 tendons for medial 4\textsuperscript{th} toe
- The medial most part of muscle called as extensor hallucis brevis
- Lateral 3 tendons join lateral side of for dorsal digital expansion of 2\textsuperscript{nd}, 3\textsuperscript{rd}, 4\textsuperscript{th} toe

**ACTION**: Extends MTP of great toe
- Other extends MTP, IP5 OF 2\textsuperscript{nd}, 3\textsuperscript{rd}, 4\textsuperscript{th} toes
FLEXOR DIGITORIUM BREVIS

ORIGIN:
Calcaneous :- medial tubercle
Plantar aponeurosis
Intermuscular septa

INSERTION:
Middle phalanx of 2nd - 5th toe
Muscle ends in 4 tendons 2-5th DP opp bone of proximal Phalanx each tendon divides into 2 slips

ACTION: Flexion of toes at MTP, IP5
PLANTAR MUSCLES

Figure 8.3 Intrinsic muscles of the foot.