THIGH

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Introduction

- The thigh is the region of the lower limb that lies between the hip and knee joints
- Anteriorly, it is separated from the abdominal wall by the inguinal ligament;
- Posteriorly, it is separated from the gluteal region by the gluteal fold superficially, and by the inferior margins of the gluteus maximus and quadratus femoris on deeper planes.

Structures that enter and leave the upper thigh

- Posteriorly the sciatic nerve leaves the gluteal region to enter the thigh
- Anteriorly, the iliopsoas and pectineus muscles, the femoral nerve, artery and vein, and lymphatic vessels; passes between the abdominal cavity and the thigh through the aperture between the inguinal ligament and the pelvic bone.
- Medially, structures (including the obturator nerve and associated vessels) pass between the thigh and pelvic cavity through the obturator canal

Bones of the Thigh

- The skeletal framework of the thigh is formed by the Femur which provides origin for the gastrocnemius muscles.

N/B Refer to the lecture on Osteology of the lower limbs for more details

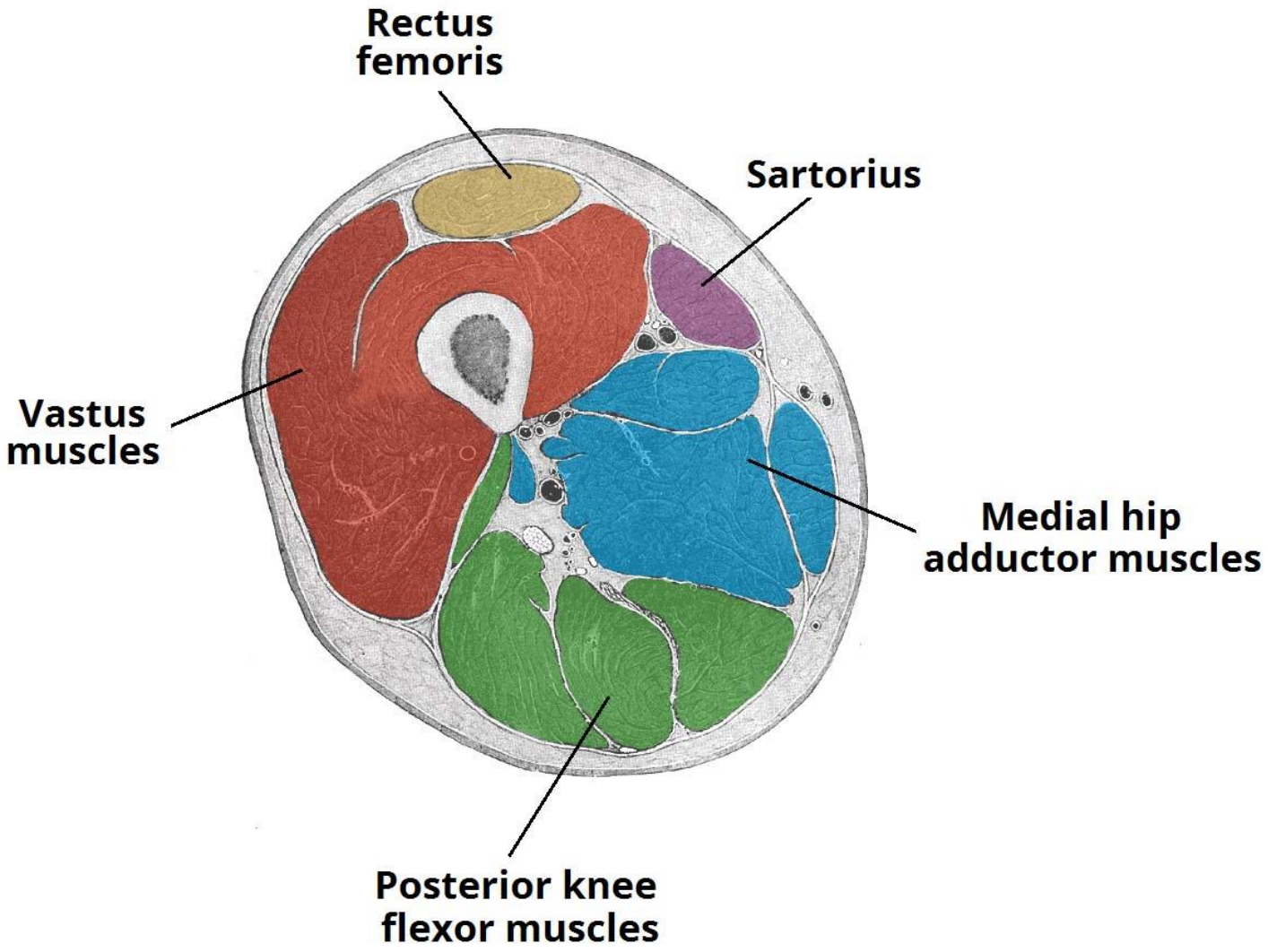
3 Muscular Compartments of the thigh

- The thigh is divided into three compartments by intermuscular septa between the posterior aspect of the femur and the fascia lata
  - The fascia lata is the thick layer of deep fascia that completely surrounds or invests the thigh
- the **anterior compartment of thigh** extend the leg at the knee joint;
- the **posterior compartment of thigh** extend the thigh at the hip joint and flex the leg at the knee joint;
- the **medial compartment of thigh** adduct the thigh at the hip joint.

- The sciatic nerve innervates muscles in the posterior compartment of thigh,
- the femoral nerve innervates muscles in the anterior compartment of thigh,
- and the obturator nerve innervates most muscles in the medial compartment of thigh.

Anterior compartment

- The muscles of the anterior compartment are;
- Iliopsoas
  - Psoas major
  - Ilacus
- Sartorius
- Quadricep femoris
  - Rectus femoris
  - Vastus medialis
  - Vastus intermedius
  - Vastus lateralis


Rectus femoris
Sartorius
Vastus muscles
Medial hip adductor muscles
Posterior knee flexor muscles

Iliopsoas

Origin

- The psoas major: the lumbar vertebrae, and the iliacus :the iliac fossa of the pelvis.

Insertion

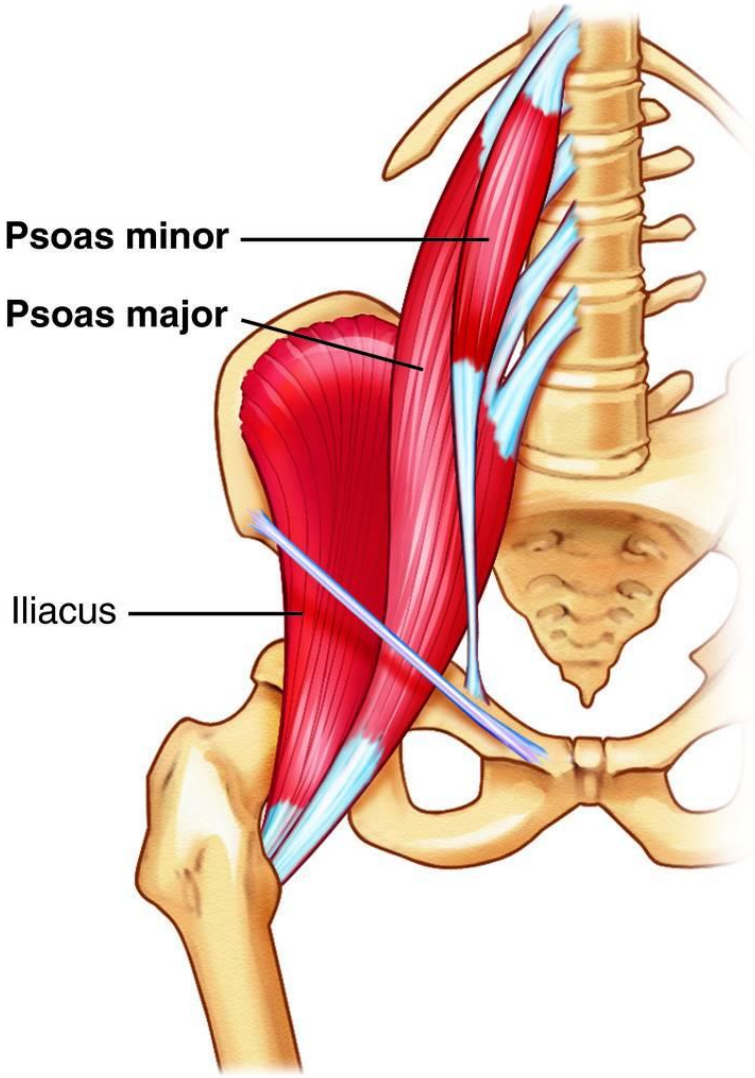
- They insert together as a common tendon onto the lesser trochanter of the femur.

Actions:

- The iliopsoas flexes the lower limb at the hip joint and assists in lateral rotation at the hip joint.

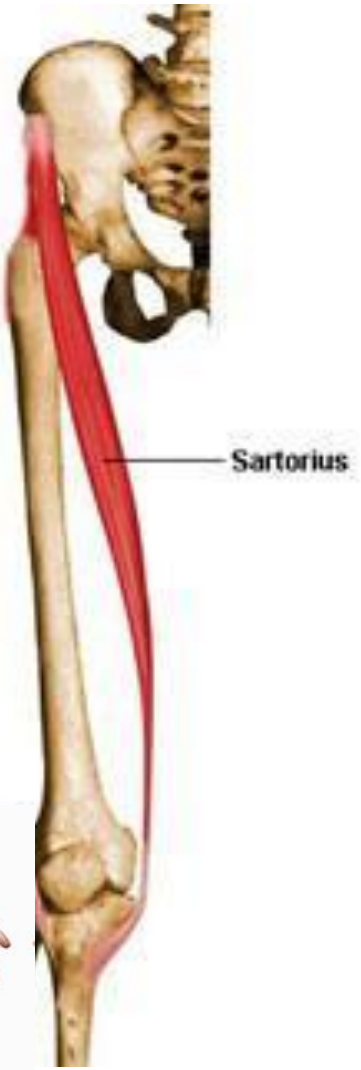
Innervation:

- Psoas major: branches from the anterior rami of L1 to L3
- Iliacus : branches from the femoral nerve in the abdomen.



Sartorius

- Is the longest muscle in the body. It is long and thin, runs across the thigh in a inferomedial direction.
- The sartorius is positioned more superficially than the other muscles in the leg.
- **Origin:** Anterior superior iliac spine
- **Insertion**: Medial side of the proximal shaft of the tibia
- **Action**: flex thigh at hip & flex leg at knee
- **Innervation**: Femoral nerve



The quadriceps femoris

- The muscles that form quadriceps femoris unite proximal to the knee, and distally **attach to the patella via the patella tendon**. The patella attaches to the tibia by the **patella ligament**.
- The quadriceps femoris is the main extensor of the knee.

Vastus Lateralis

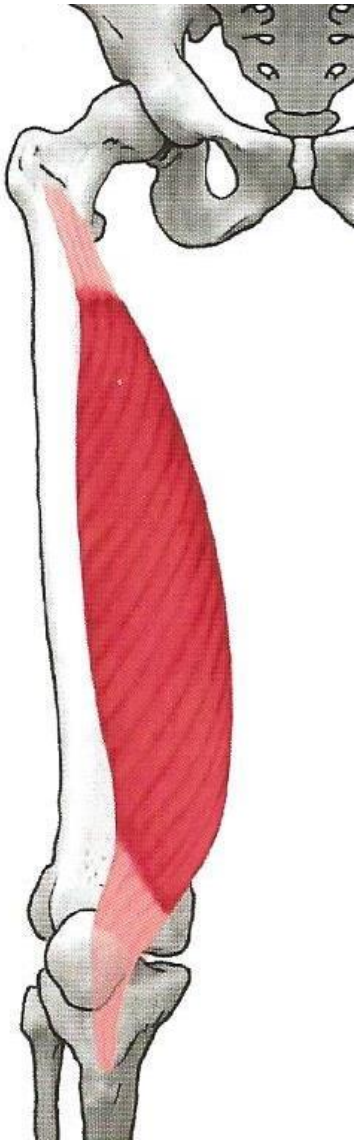
- **Origin**: Greater trochanter and the lateral lip of linea aspera.
- **Insertion:** Tibial tuberosity via patellar ligament
- **Actions:** Extends the knee joint and stabilises the patella.
- **Innervation:** Femoral nerve.

Vastus intermedius

- **Origin:** Anterior and lateral surfaces of the femoral shaft.
- **Insertion:** Tibial tuberosity via patellar ligament
- **Actions:** Extends the knee joint and stabilises the patella.
- **Innervation:** Femoral nerve.

Vastus medialis

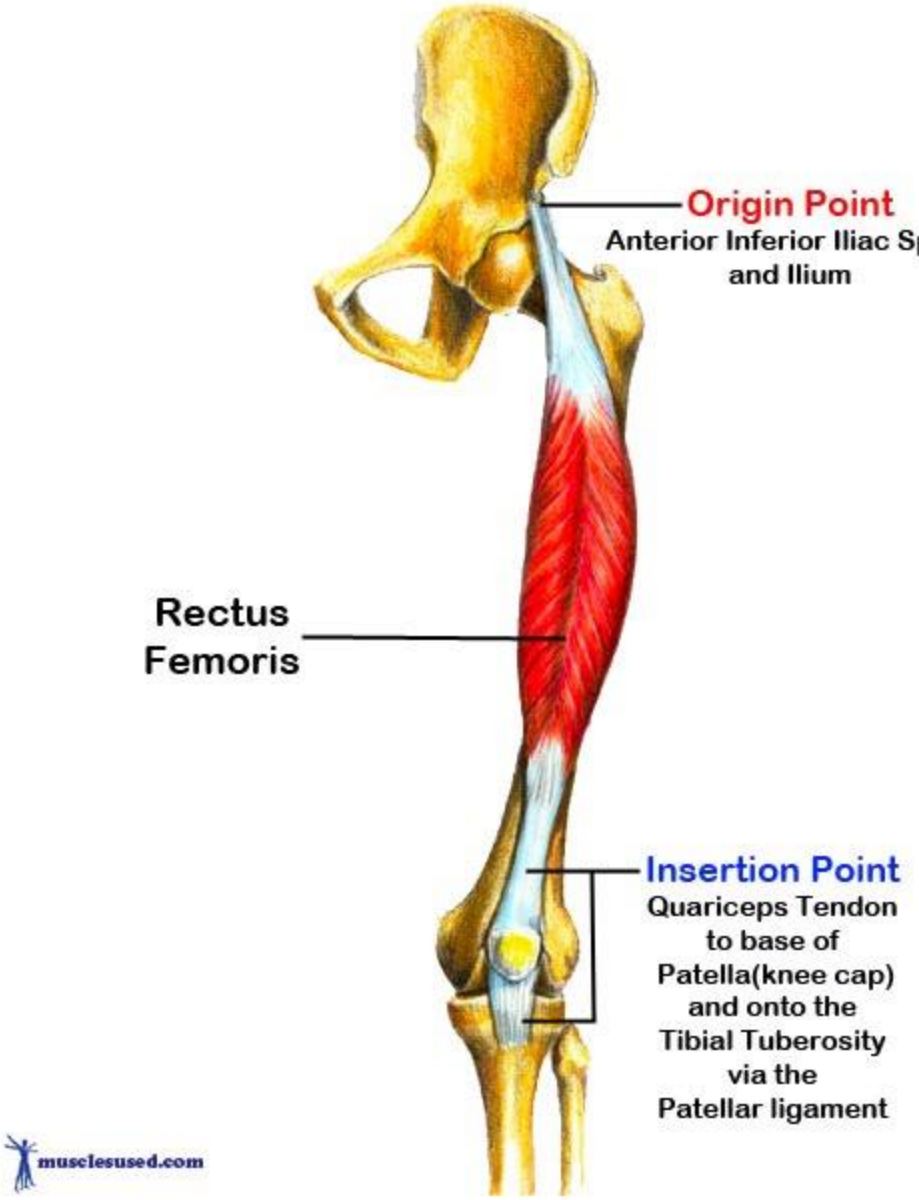
- **Origin:** The intertrochanteric line and medial lip of the linea aspera.
- **Insertion:** Tibial tuberosity via patellar ligament
- **Actions:** Extends the knee joint and stabilises the patella, particularly due to its horizontal fibres at the distal end.
- **Innervation:** Femoral nerve.



Rectus Femoris

Unlike the vastus muscles, the **rectus femoris** muscle crosses both the hip and the knee joints

- **Origin**: the anterior inferior iliac spine , and the ilium just superior to the acetabulum.
- **Insertion**The two heads of rectus femoris unite to form an elongate muscle belly, which lies anterior to the vastus intermedius muscle and between the vastus lateralis and vastus medialis muscles, to which it is attached on either side. At the distal end, the rectus femoris muscle converges on the quadriceps femoris tendon and inserts on the base of the patella.
- **Actions**: It flexes the leg at the hip joint, and extends at the knee joint.
- **Innervation**: Femoral nerve.


Origin Point
Anterior Inferior Iliac Spine
and Ilium
Rectus
Femoris
Insertion Point
Quariceps Tendon
to base of
Patella(knee cap)
and onto the
Tibial Tuberosity
via the
Patellar ligament
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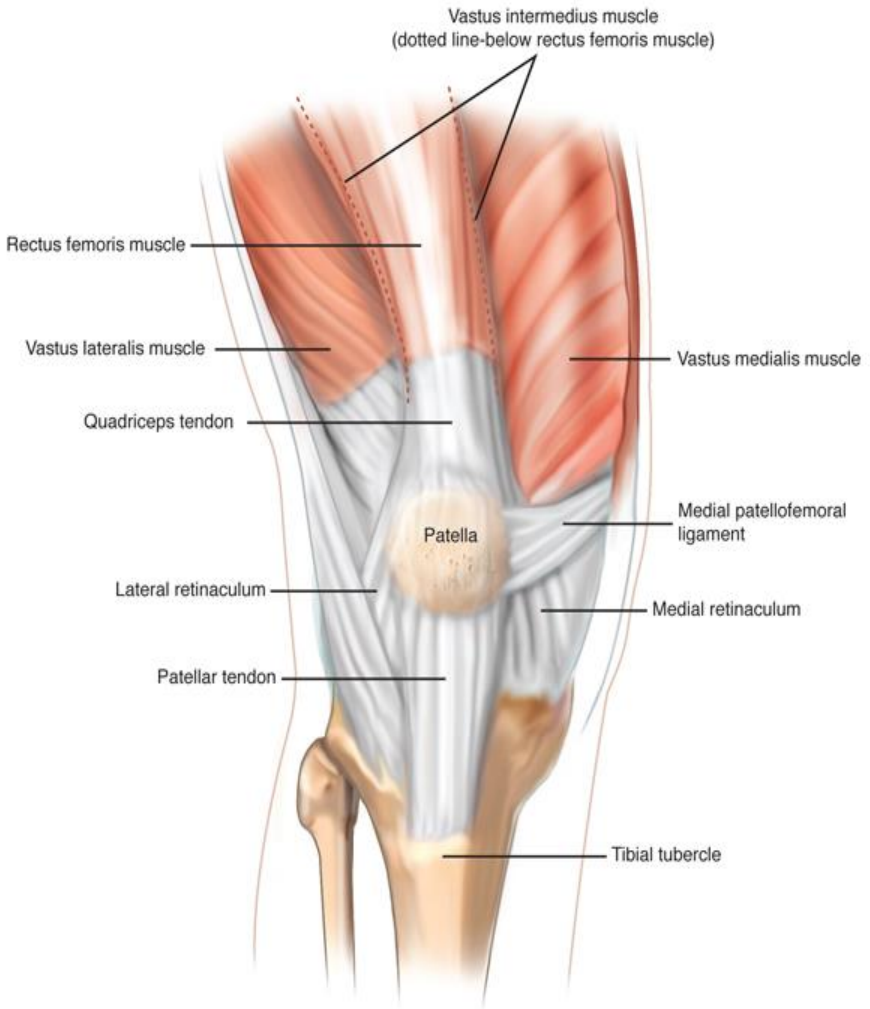
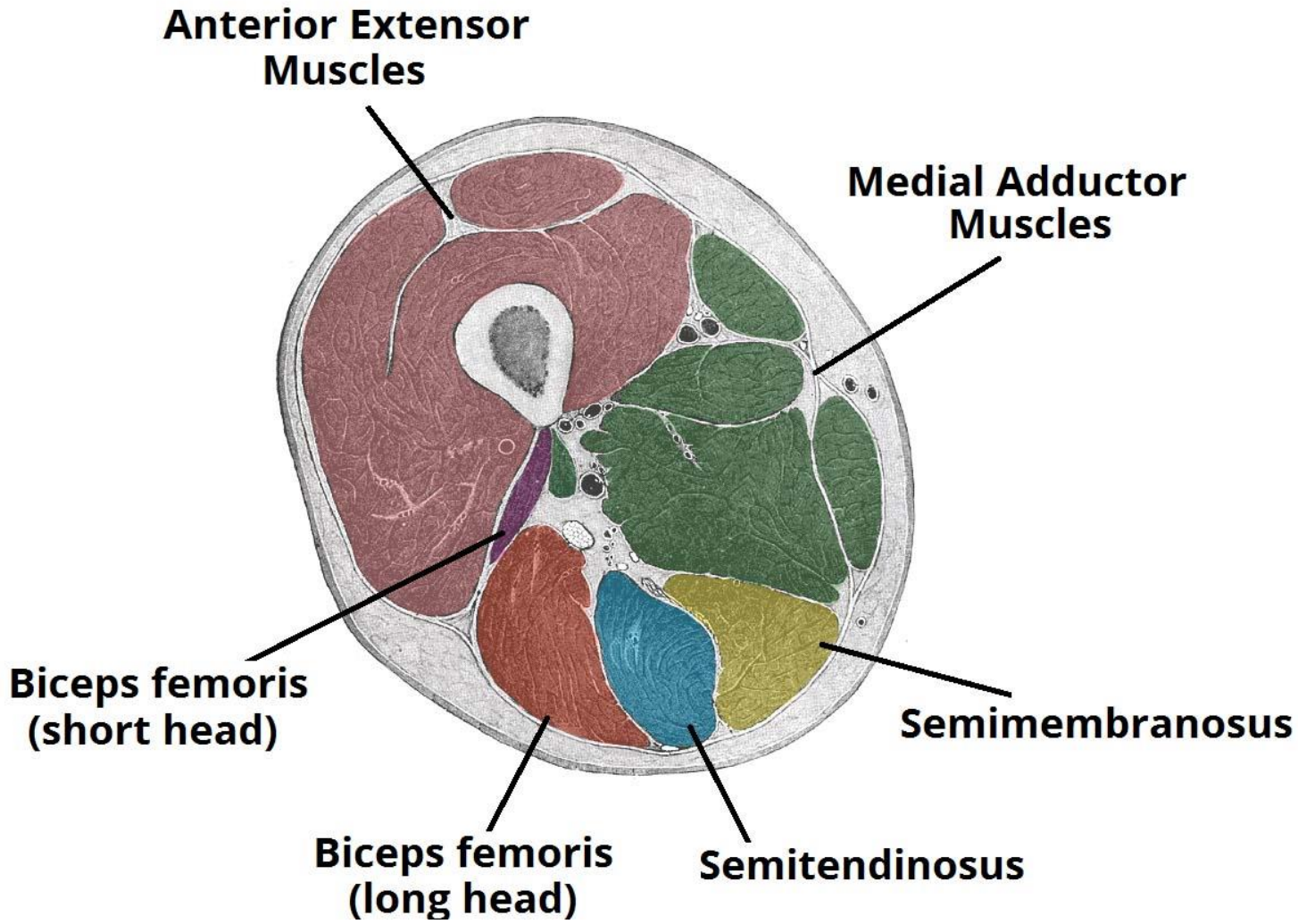
Patellar ligament

- The patellar ligament is functionally the continuation of the quadriceps femoris tendon below the patella
- It is attached above to the apex and margins of the patella and below to the tibial tuberosity



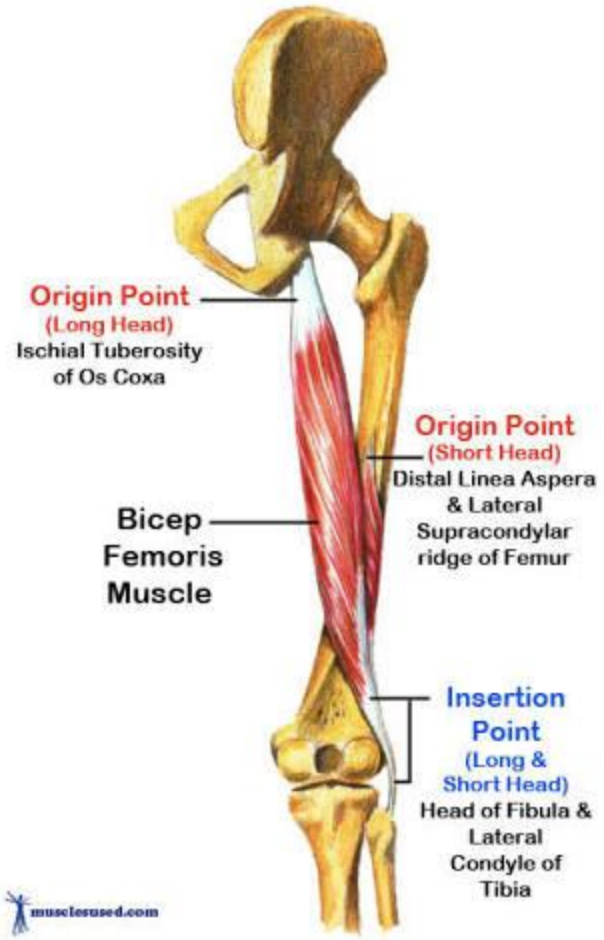
Posterior compartment

- There are three long muscles in the posterior compartment of thigh:
  - biceps femoris
  - semitendinosus
  - Semimembranosus
- Collectively known as the hamstrings
- All except the short head of biceps femoris cross both the hip and knee joints.
- Flex the leg at the knee joint and extend the thigh at the hip joint.
- They are also rotators at both joints


Anterior Extensor Muscles
Medial Adductor Muscles
Biceps femoris (short head)
Semimembranosus
Biceps femoris (long head)
Semitendinosus

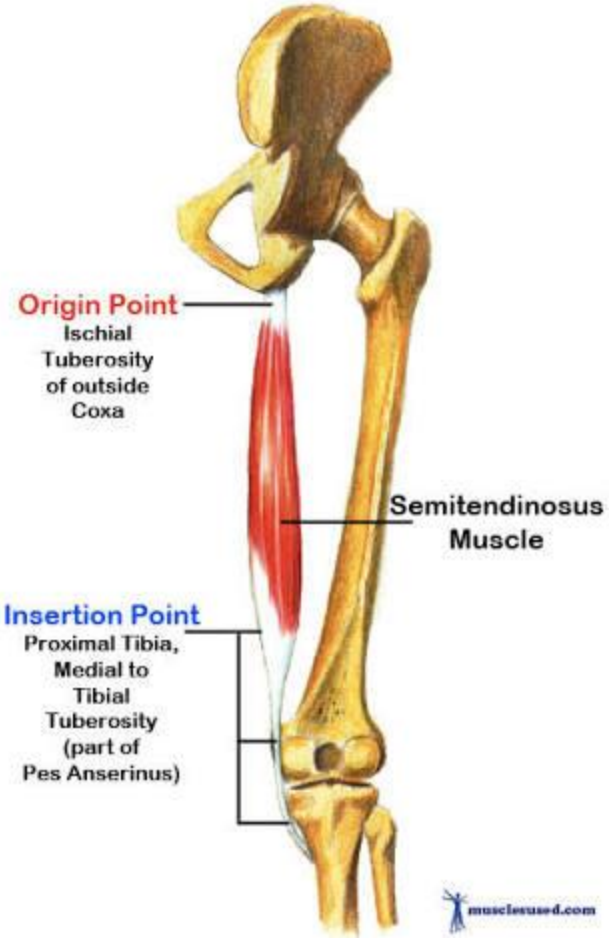
Biceps femoris muscle

- Two heads – a long head and a short head
- Most lateral muscle of the posterior compartment
- The common tendon of the two heads can be felt laterally at the posterior knee.
- Origin:
  - The long head - the ischial tuberosity of the pelvis.
  - The short head –the linea aspera on posterior surface of the femur
- Insertion:
  - the heads form a tendon, which inserts into the head of the fibula.
- Action: Main action is flexion at the knee. The long head also extends and laterally rotates the hip.
- Innervation:
  - Long head is innervated by the tibial part of the sciatic nerve
  - short head is innervated by the common fibular part of the sciatic nerve.



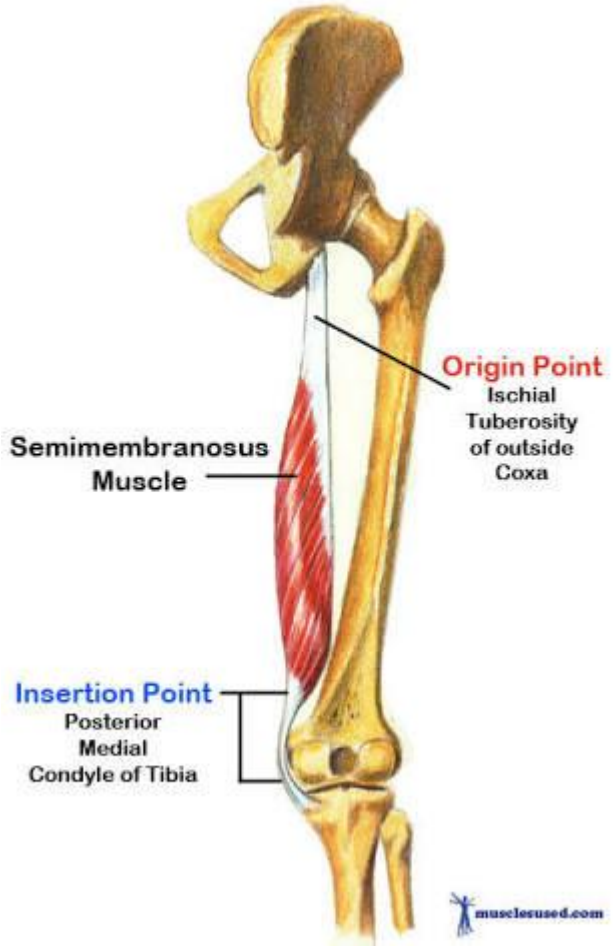
Semitendinosus

- Largely tendinous muscle.
- lies medially to the biceps femoris
- covers the majority of the semimembranosus.
- **Origin**:
  - the ischial tuberosity of the pelvis along with the long head of the biceps femoris muscle
- **Insertion**:
  - attaches to the medial surface of the tibia.
- **Actions**:
  - Flexion of the leg at the knee joint. Extension of thigh at the hip. Medially rotates the thigh at the hip joint and the leg at the knee joint.
- **Innervation**:
  - Tibial part of the sciatic nerve.



Semimembranosus

- Lies deep to the semitendinosus muscle
- **Origin**:
  - the ischial tuberosity, but does so more superiorly than the semitendinosus and biceps femoris.
- **Insertion**:
  - medial tibial condyle.
- **Actions**:
  - Flexes the leg at the knee joint.
  - Extends thigh at the hip.
  - Medially rotates the thigh at the hip joint and the leg at the knee joint.
- **Innervation**:
  - Tibial part of the sciatic nerve.

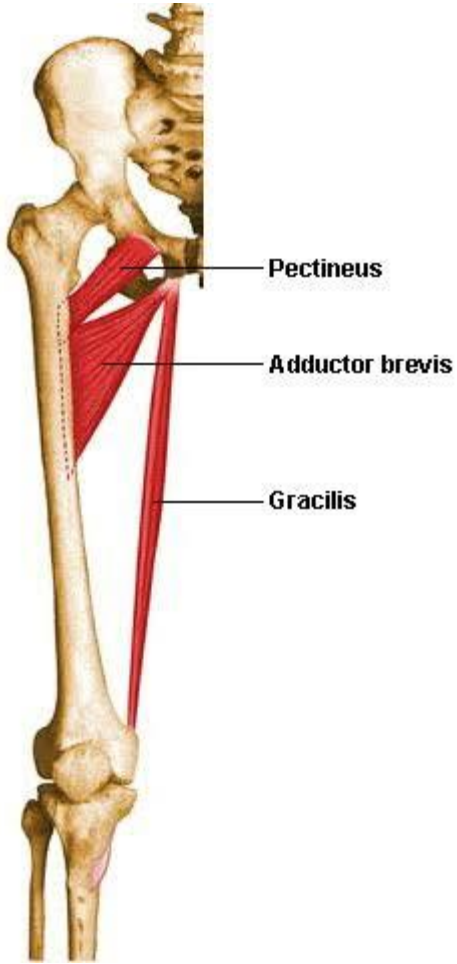


Medial compartment

- There are six muscles in the medial compartment of the thigh:
  - gracilis,
  - pectineus,
  - adductor longus,
  - adductor brevis,
  - adductor magnus, and
  - obturator externus

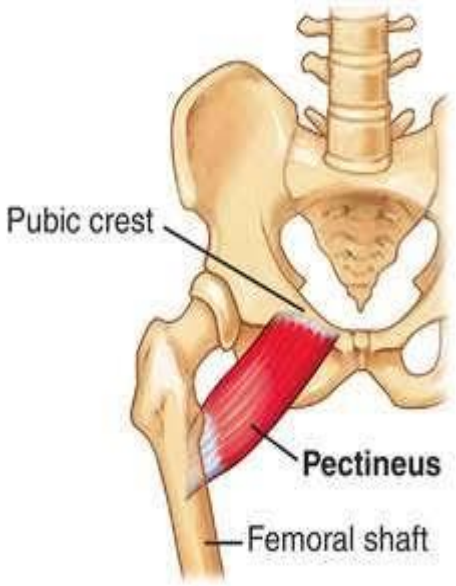
Gracilis

- Most superficial of the muscles in the medial compartment of thigh
- Descends almost vertically down the medial side of the thigh
- Origin:
  - outer surface of the ischiopubic ramus of the pelvic bone
- Insertion:
  - medial surface of the proximal shaft of the tibia (sandwiched between the tendon of sartorius in front and the tendon of the semitendinosus behind).
- Action
  - Adducts thigh at hip joint
  - Flexes leg at knee joint
- Innervation
  - Obturator nerve (L2, L3)



Pectineus

- is a flat quadrangular muscle
- **Origin:**
  - pectineal line of the pelvic bone and adjacent bone, and descends laterally
- **Insertion:**
  - oblique line extending from the base of the lesser trochanter to the linea aspera on the posterior surface of the proximal femur.
- **Action:**
  - Adducts and flexes thigh at hip joint
- **innervation:**
  - Femoral nerve

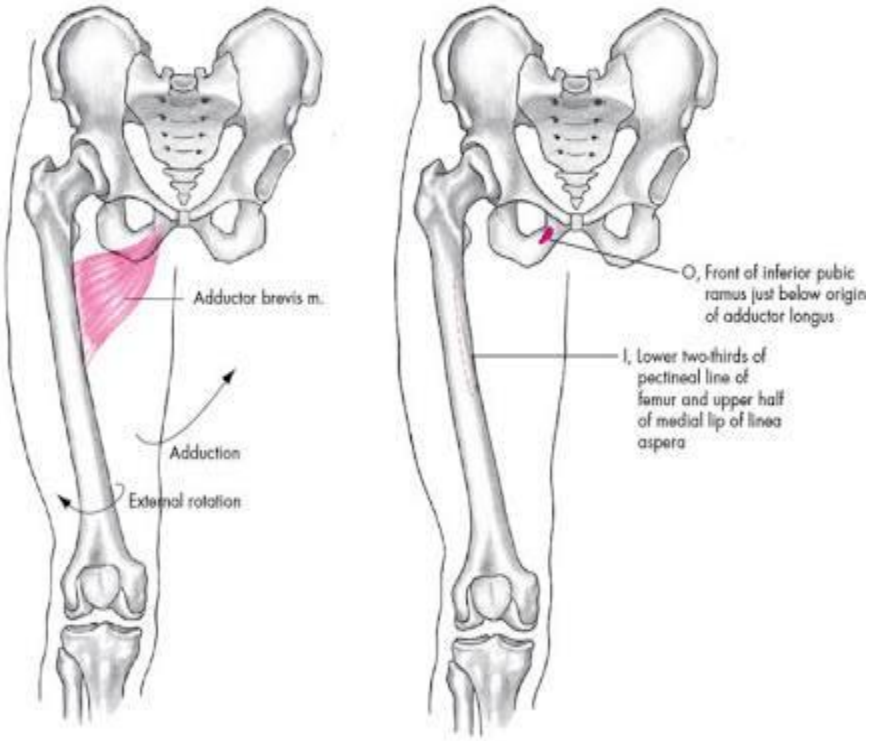


Adductor longus

- Flat fan-shaped muscle that contributes to the floor of the femoral triangle, and its medial margin forms the medial border of the femoral triangle.
- It also forms the proximal posterior wall of the adductor canal.
- **Origin**:
  - a small rough triangular area on the external surface of the body of the pubis just inferior to the pubic crest and lateral to the pubic symphysis
- **Insert**:
  - into the middle third of the linea aspera via an aponeurosis
- **Action**:
  - Adducts and medially rotates thigh at hip joint
- **Innervation**:
  - Obturator nerve (anterior division)

Adductor brevis

- Lies posterior to the pectineus and adductor longus.
- **Origin:**
  - the body of the pubis and inferior pubic ramus just superior to the origin of the gracilis muscle
- **Insertion**
  - upper aspect of linea aspera of femur
- **Action:**
  - adducts the thigh at the hip joint
- **Innervation**:
  - obturator nerve

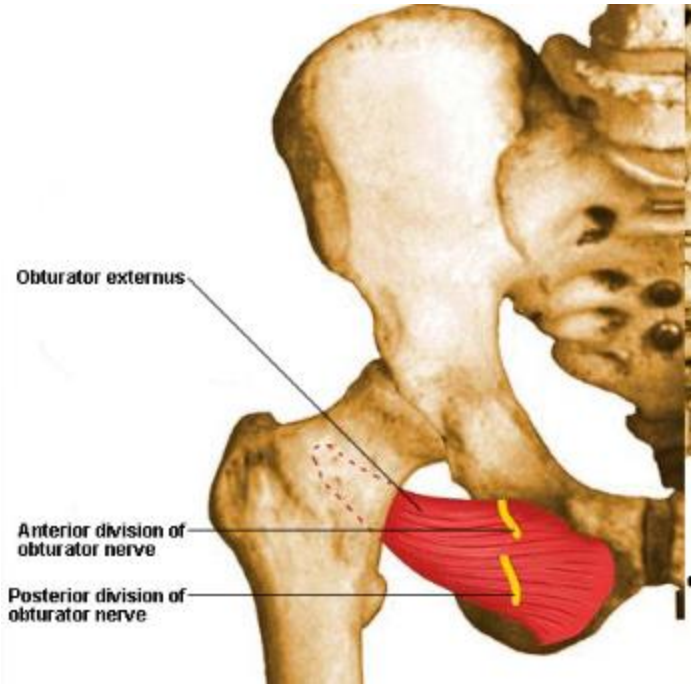


Adductor magnus

- is the largest and deepest of the muscles in the medial compartment of thigh
- is a triangular or fan-shaped muscle
- It forms the distal posterior wall of the adductor canal
- **Origin**
  - Adductor part – ischiopubic ramus
  - Hamstring part – ischial tuberosity
- **Insertion**
  - Adductor part – Posterior surface of proximal femur, linea aspera, medial supracondylar line
  - Hamstring part – Adductor tubercle and supracondylar line
- **Action**:
  - The adductor magnus adducts and medially rotates the thigh at the hip joint.
- **Innervation**:
  - The adductor part - obturator nerve
  - hamstring part - tibial division of the sciatic nerve.

Obturator externus

- Flat fan-shaped muscle.
- **Origin**:
  - external aspect of the obturator membrane and adjacent bone
- **Insertion**:
  - lateral wall of Trochanteric fossa
- **Action**:
  - rotates the thigh at the hip joint
- **Innervation**:
  - posterior branch of the obturator nerve



Arteries of the thigh

- Three arteries enter the thigh:
  - femoral artery,
  - obturator artery
  - inferior gluteal artery which also contributes towards the vasculature of the posterior thigh.
- The femoral artery is the largest and supplies most of the lower limb.

Femoral artery

- The femoral artery is the continuation of the external iliac artery
- The external iliac becomes the femoral artery when it crosses under the inguinal ligament and enters the femoral triangle.
- It passes vertically through the femoral triangle and then continues down the thigh in the adductor canal.
- It leaves the canal by passing through the adductor hiatus in the adductor magnus muscle and becomes the popliteal artery behind the knee.

Branches of femoral artery

Small branches

- They arise from the anterior aspect of the proximal part and include:
  - Superficial epigastric artery
  - superficial circumflex iliac artery
  - superficial external pudendal artery
  - deep external pudendal artery.

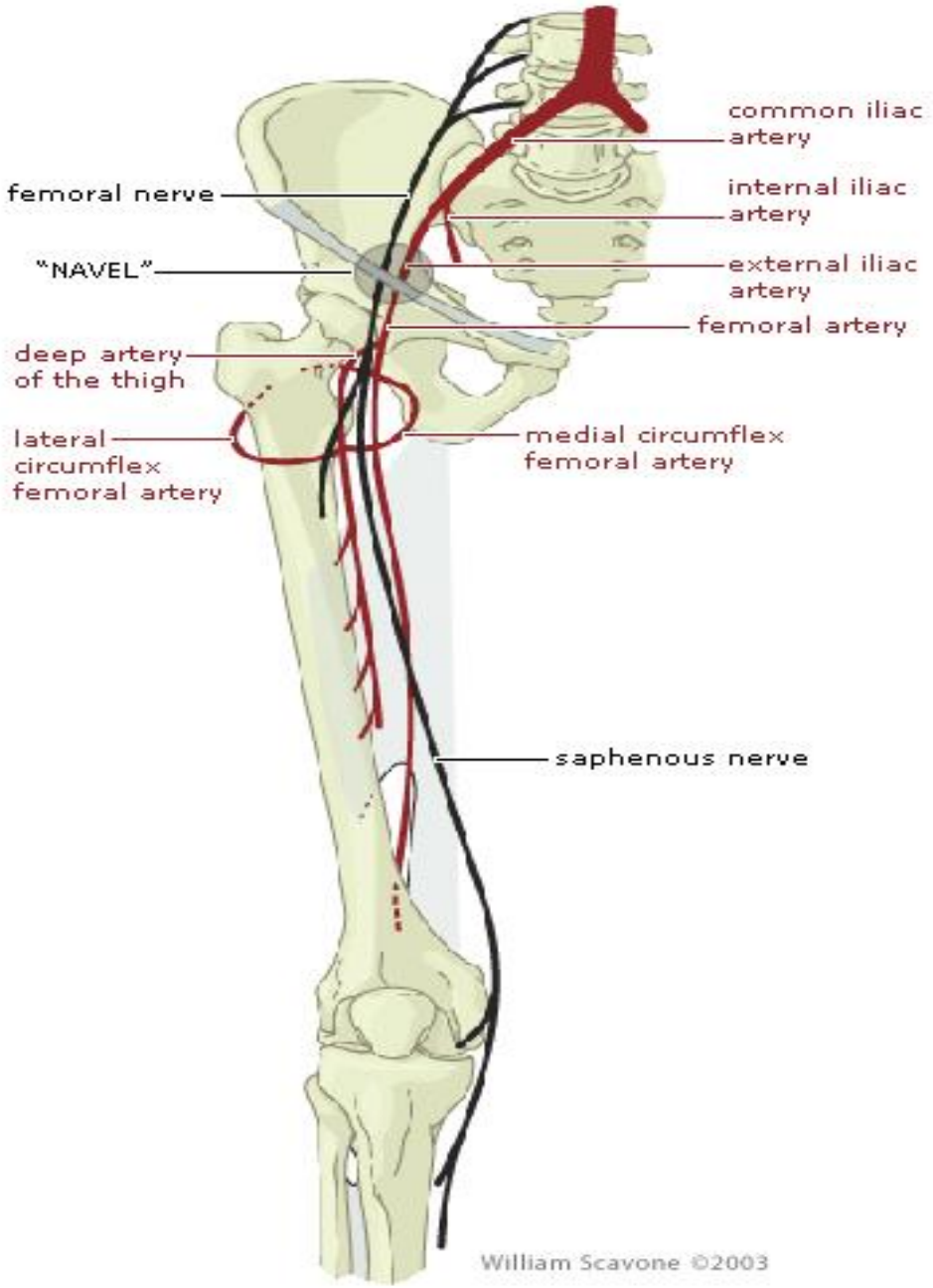
- These arteries supply cutaneous regions of the upper thigh, lower abdomen, and perineum

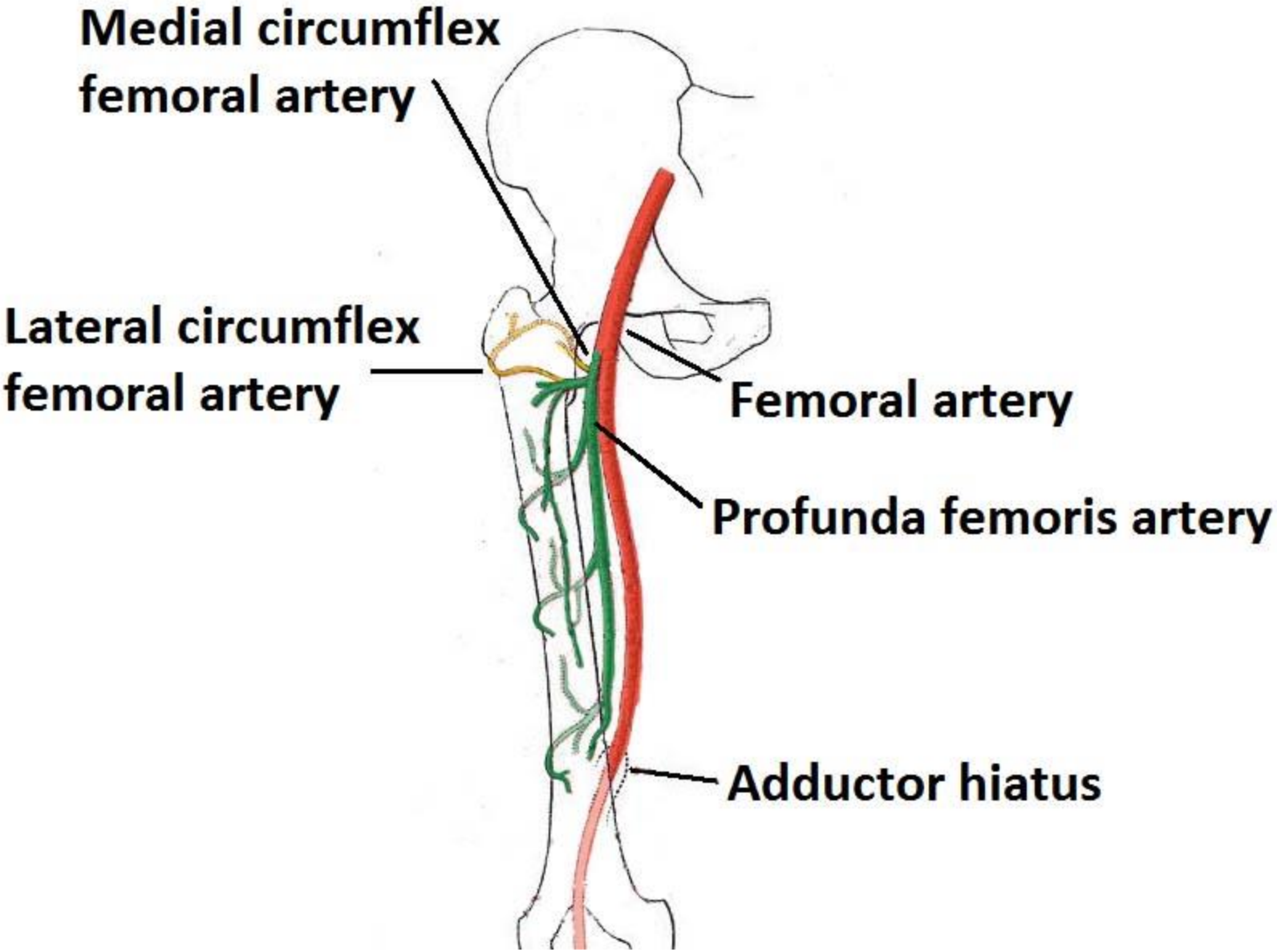
Deep artery of thigh (Profundus Femoris artery)

- Is the largest branch of the femoral artery in the femoral triangle and is the major source of blood supply to the thigh.

- It arises from the posterolateral aspect of the femoral artery.

- It travels posteriorly and distally, giving off three main branches:
  - lateral circumflex femoral branches
  - Medial circumflex femoral branches
  - Perforating branches.


common iliac artery
femoral nerve
internal iliac artery
"NAVEL"
external iliac artery
femoral artery
deep artery of the thigh
lateral circumflex femoral artery
medial circumflex femoral artery
saphenous nerve
William Scavone ©2003


Medial circumflex femoral artery
Lateral circumflex femoral artery
Femoral artery
Profunda femoris artery
Adductor hiatus

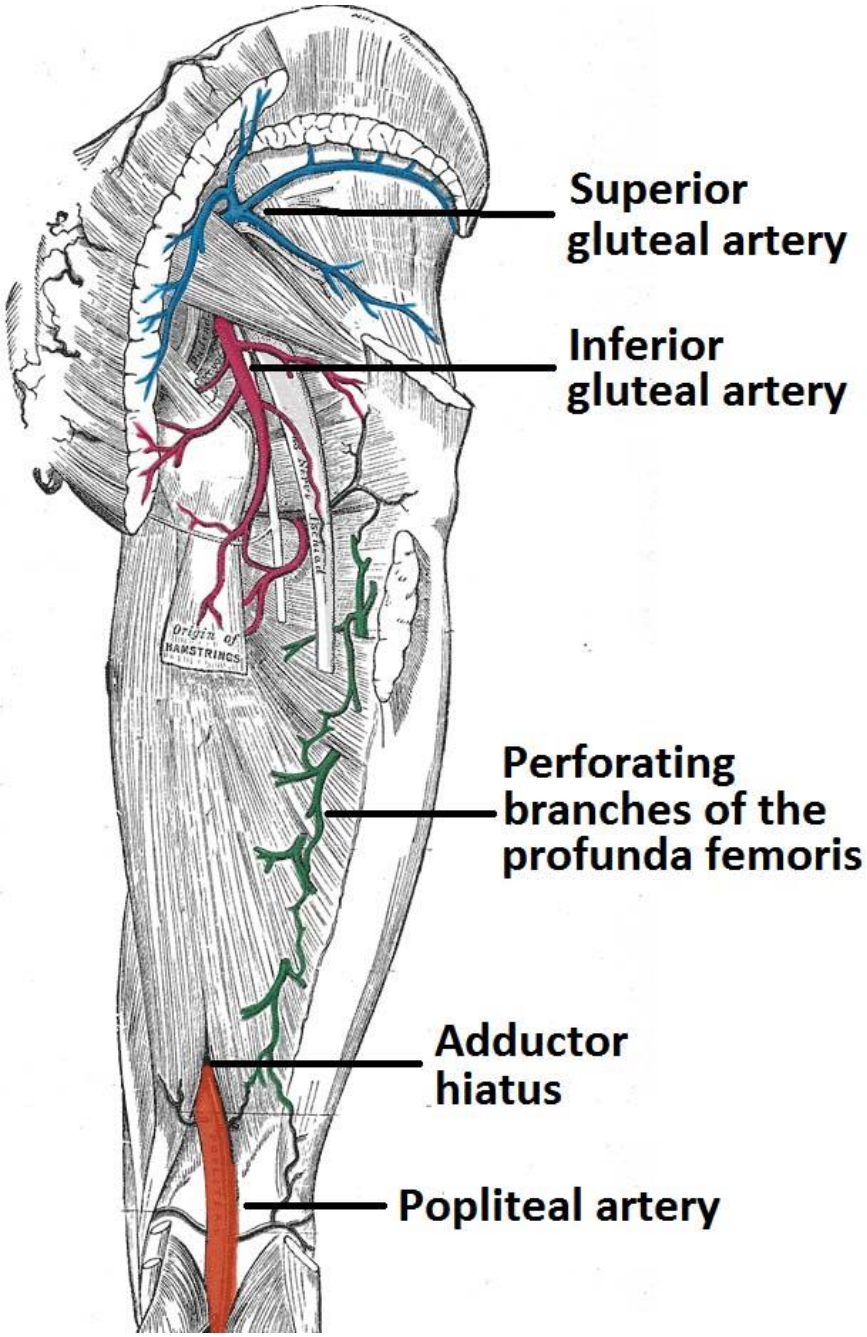
- **Perforating branches** – Consists of three or four arteries that perforate the adductor magnus, contributing to the supply of the muscles in the medial and posterior thigh.

- **Lateral femoral circumflex artery** – Wraps round the anterior, lateral side of the femur, supplying some of the muscles in the lateral side of the thigh.

- **Medial femoral circumflex artery** – Wraps round the posterior side of the femur, supplying the neck and head of the femur. In a fracture of the femoral neck, this artery can easily be damaged, and avascular necrosis of the femur head can occur.

Obturator artery

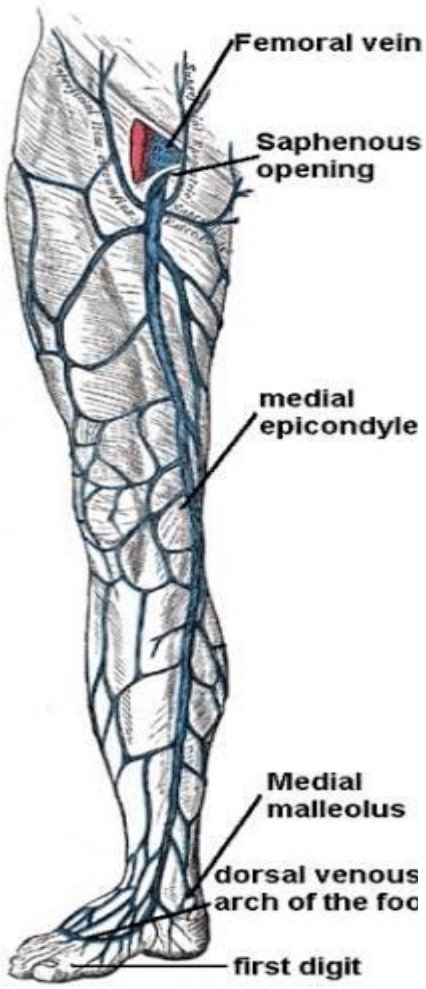
- Arises from internal iliac artery in the pelvic region.
- It descends via the obturator canal to enter the medial thigh, bifurcating into two branches:
- **Anterior branch –** This supplies the pectineus, obturator externus, adductor muscles and gracilis.
- **Posterior branch –** This supplies some of the deep gluteal muscles.

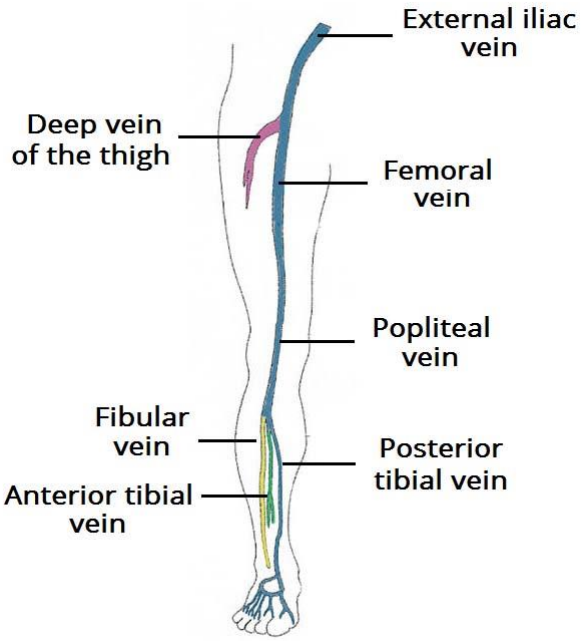

Superior gluteal artery
Inferior gluteal artery
Origin of HAMSTRINGS
Perforating branches of the profunda femoris
Adductor hiatus
Popliteal artery

Veins in the thigh

- Consist of superficial and deep veins.
- Deep veins generally follow the arteries and have similar names.
- Superficial veins are in the superficial fascia, interconnect with deep veins, and do not generally accompany arteries.
- The largest of the superficial veins in the thigh is the **great saphenous vein**.
- The great saphenous vein originates from a venous arch on the dorsal aspect of the foot and ascends along the medial side of the lower limb to the proximal thigh

- In the thigh the great saphenous vein passes through the saphenous ring in deep fascia covering the anterior thigh to connect with the femoral vein in the femoral triangle
- As the popliteal vein enters the thigh, it becomes the **femoral vein**
- The femoral vein leaves the thigh by running underneath the inguinal ligament, at which point it is known as the **external iliac** vein.





Nerves

- There are 3 major nerves in the thigh, each associated one of the three compartments.
- Femoral nerve- anterior compartment
- Obturator nerve- medial compartment
- Sciatic nerve- posterior compartment

Femoral Nerve

- largest branch of the lumbar plexus.
- It arises from the posterior cords of the lumbar plexus (L2-L4)
- It emerges from the lower lateral border of the psoas major, descends beneath the midpoint of the inguinal ligament and divides into an anterior (superficial) and a posterior (deep) division.
- The anterior division branches into the medial cutaneous and intermediate cutaneous nerve of the thigh and provides branches to the sartorius muscle. The posterior division supplies the quadriceps femoris musle.
- The femoral nerve terminates as the saphenous nerve which accompanies the femoral artery through the adductor canal.

Obturator nerve

- It is a mixed nerve which arises from the ventral (anterior) rami of the spinal nerves L2-L4.
- It descends through the fibers of the psoas major muscle, enters the lesser pelvis to run on the lateral wall of the pelvis, posterior to the common iliac artery and lateral to the internal iliac vessels.
- It exits the pelvis through the obturator canal to enter the medial compartment of the thigh where it gives off two branches; anterior and posterior branches to supply to the adductor longus, adductor brevis, gracilis, obturator externus and ischiocondylar part of adductor magnus muscle.

Sciatic nerve

- is the largest nerve in the human body derived from the sacral plexus.
- It originates from the ventral rami of the lumbar (L4-L5) and sacral spinal nerves (S1, S2, S3).
- It arises in the lumbosacral region, descends posteriorly and leaves the pelvis through the greater sciatic foramen.
- It descends through the posterior aspect of the thigh.
- Before entering the popliteal fossa, it terminates into two large terminal branches: the tibial nerve and common fibular (peroneal) nerve.

Assignment

- Discuss the clinical correlates associated with
- Muscles of the thigh
- Nerves of the thigh
- Arteries of the thigh
- Veins of the thigh