



The Lower Limb

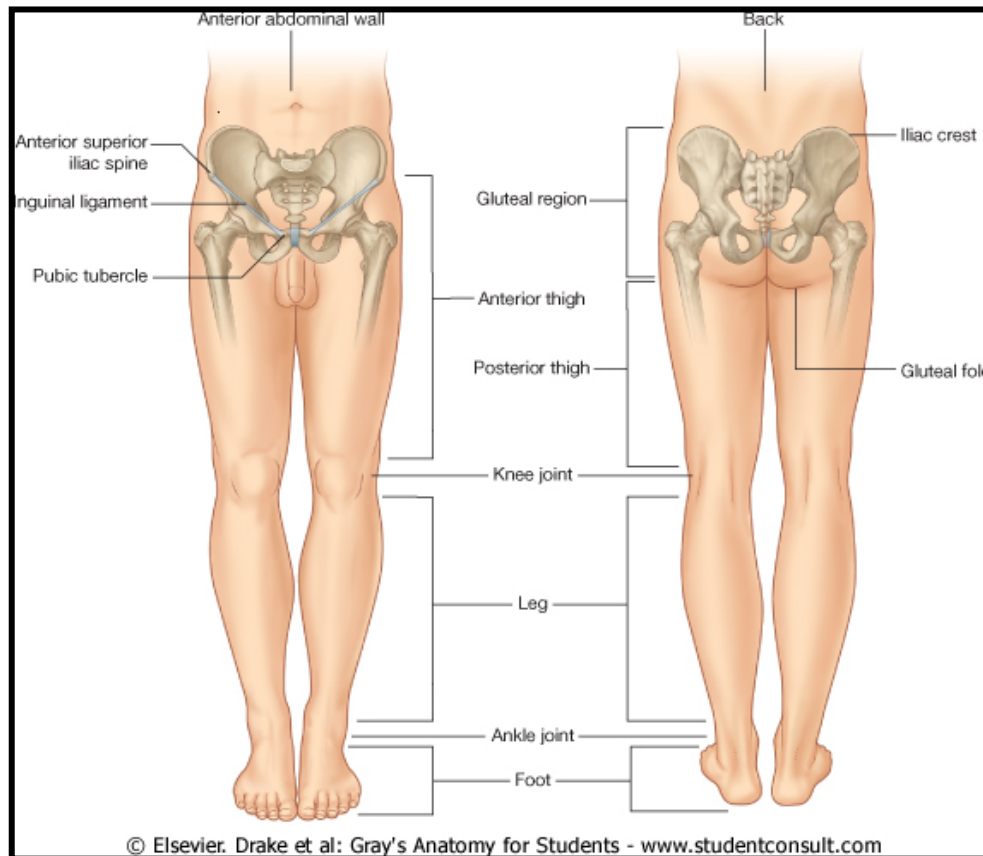
Pelvis, Thigh, Leg
and Foot

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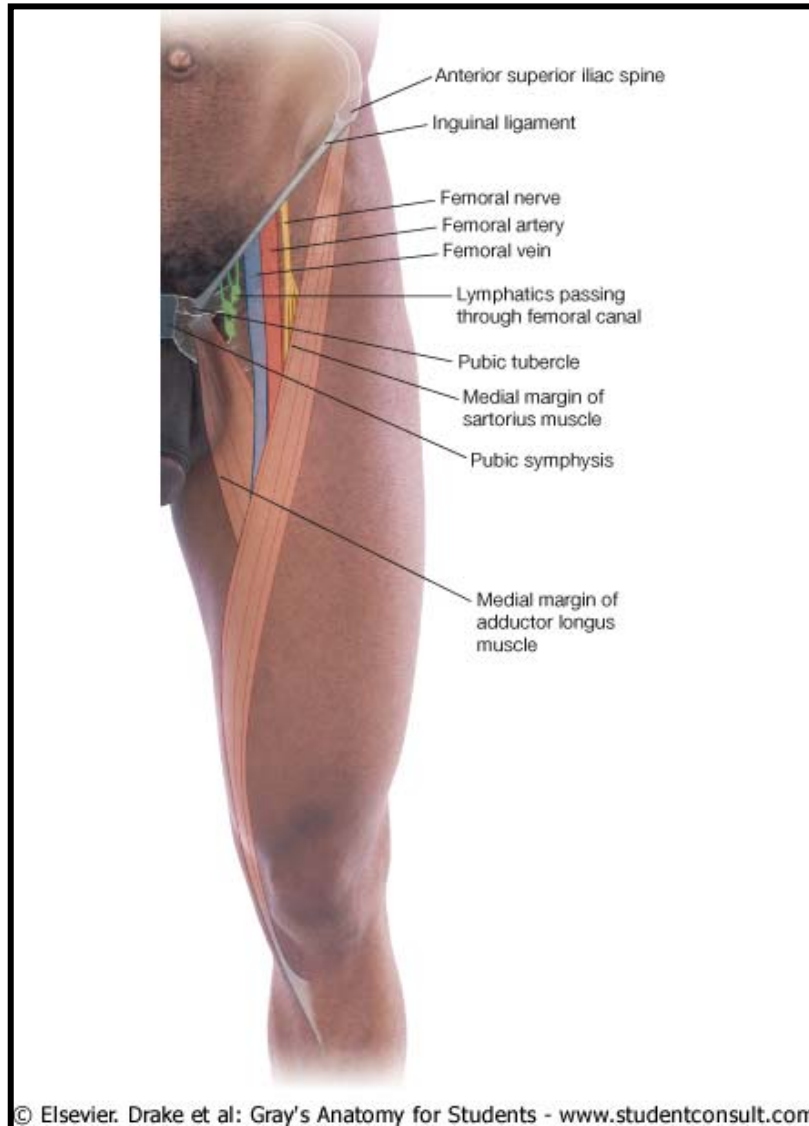
Surface Anatomy

Surface Anatomy



- Gluteal region / posterior pelvis
 - Iliac crest
 - Gluteus maximus
 - Cheeks
 - Natal/gluteal cleft
 - Vertical midline; “Crack”
 - Gluteal folds
 - Bottom of cheek; “prominence”

Surface Anatomy



■ Anterior thigh and leg

□ Palpate

- Patella
- Condyles of femur

□ Femoral Triangle

■ Boundaries:

- Sartorius (lateral)
- Adductor longus (medial)
- Inguinal ligament (superior)

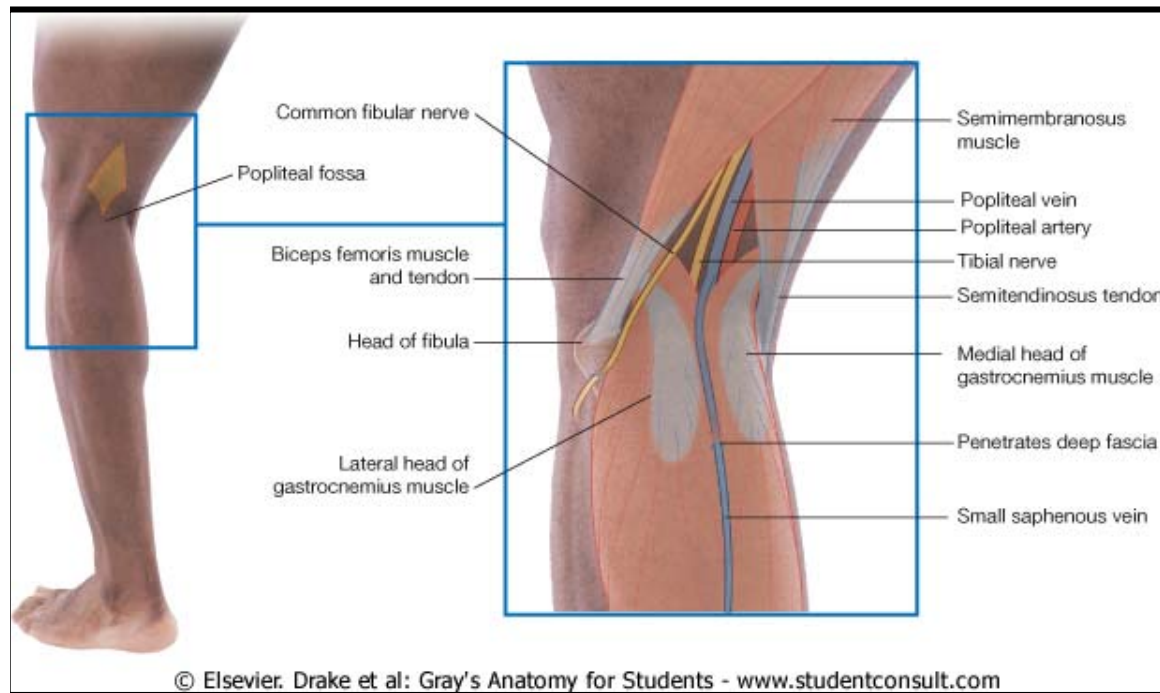
■ Contents:

- Femoral artery, vein and nerve, lymph nodes

Surface Anatomy

■ Posterior leg

□ Popliteal fossa



- Diamond-shape fossa behind knee

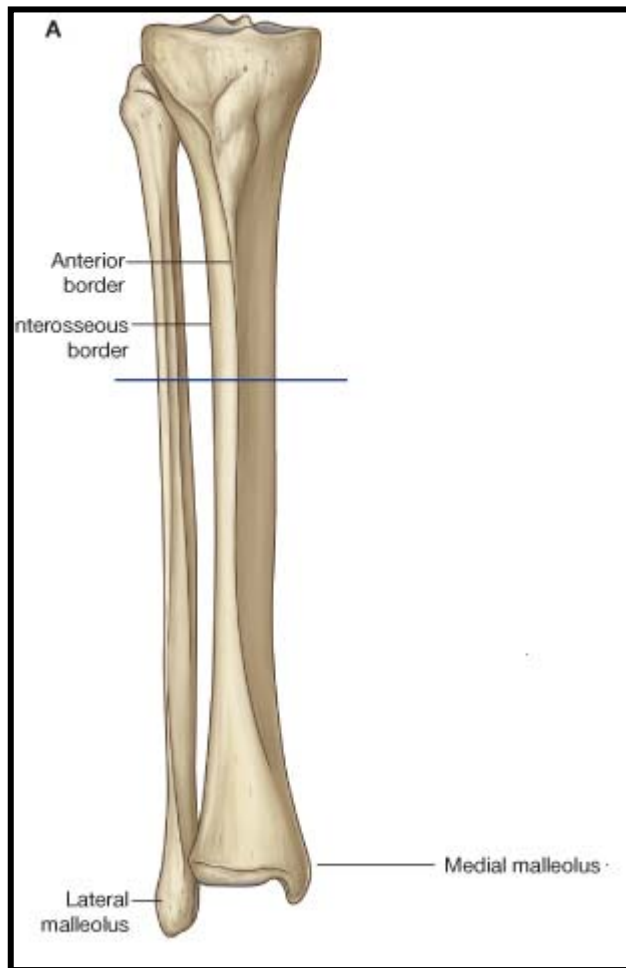
■ Boundaries

- Biceps femoris (superior-lateral)
- Semitendinosus and semimembranosus (superior-medial)
- Gastrocnemius heads (inferior)

■ Contents

- Popliteal artery and vein
- Calcaneal (Achilles) tendon

Surface Anatomy



■ Anterior leg bones

□ Tibia

- Tibial tuberosity
- Anterior crest
- Medial surface
- Medial malleolus

□ Fibula

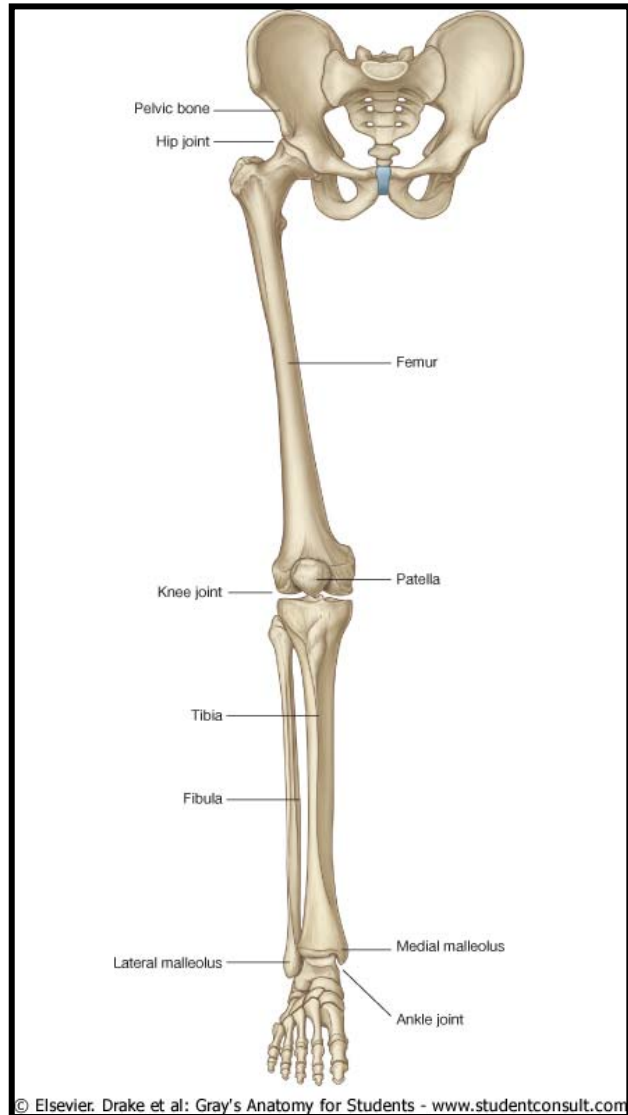
- Lateral malleolus



Skeletal Composition

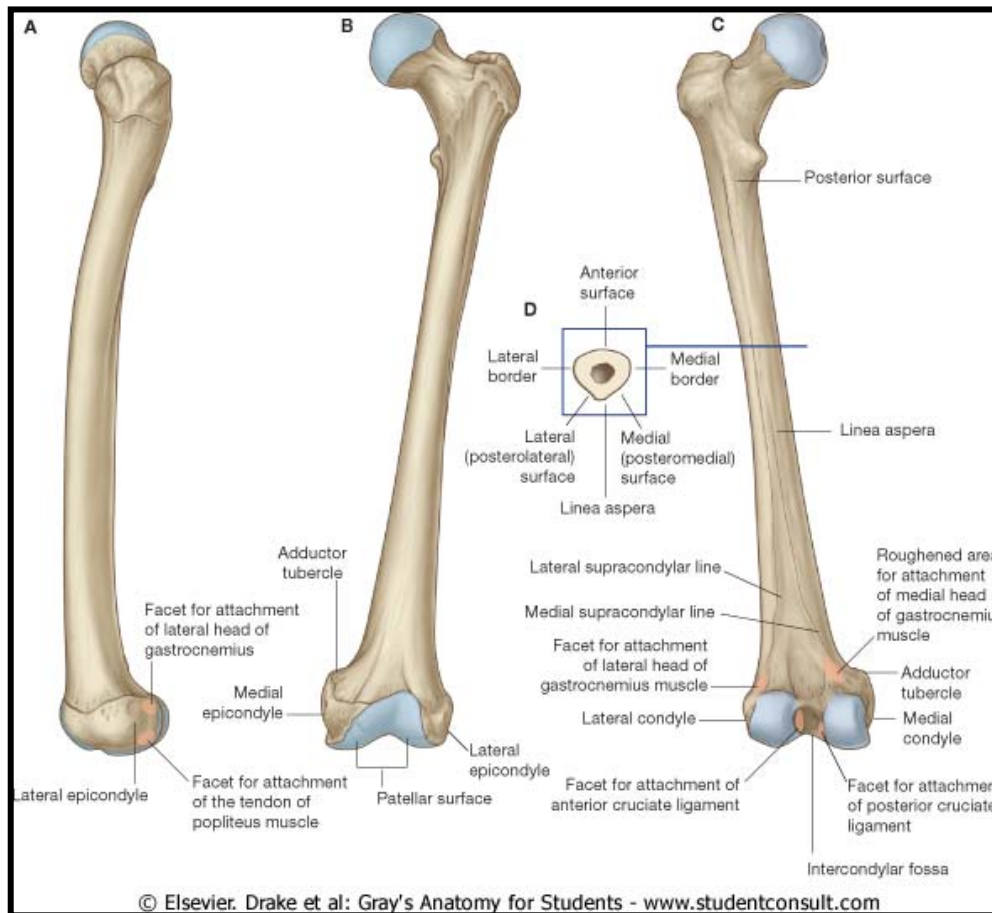
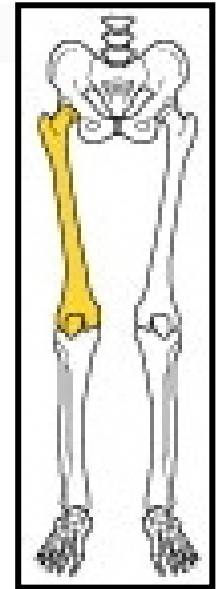
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Bones of the Lower Limb



- Function:
 - ☐ Locomotion
 - ☐ Carry weight of entire erect body
 - ☐ Support
 - ☐ Points for muscular attachments
- Components:
 - ☐ Thigh
 - Femur
 - ☐ Knee
 - Patella
 - ☐ Leg
 - Tibia (medial)
 - Fibula (lateral)
 - ☐ Foot
 - Tarsals (7)
 - Metatarsals (5)
 - Phalanges (14)

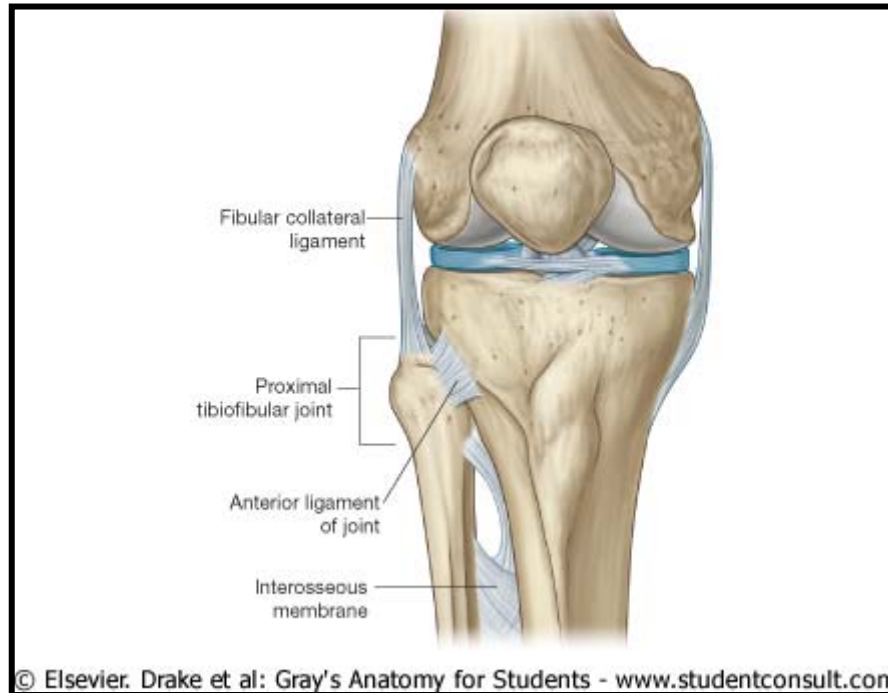
Thigh



■ Femur

- Largest, longest, strongest bone in the body!!
- Receives a lot of stress
- Courses medially
 - More in women!
- Articulates with acetabulum proximally
- Articulates with tibia and patella distally

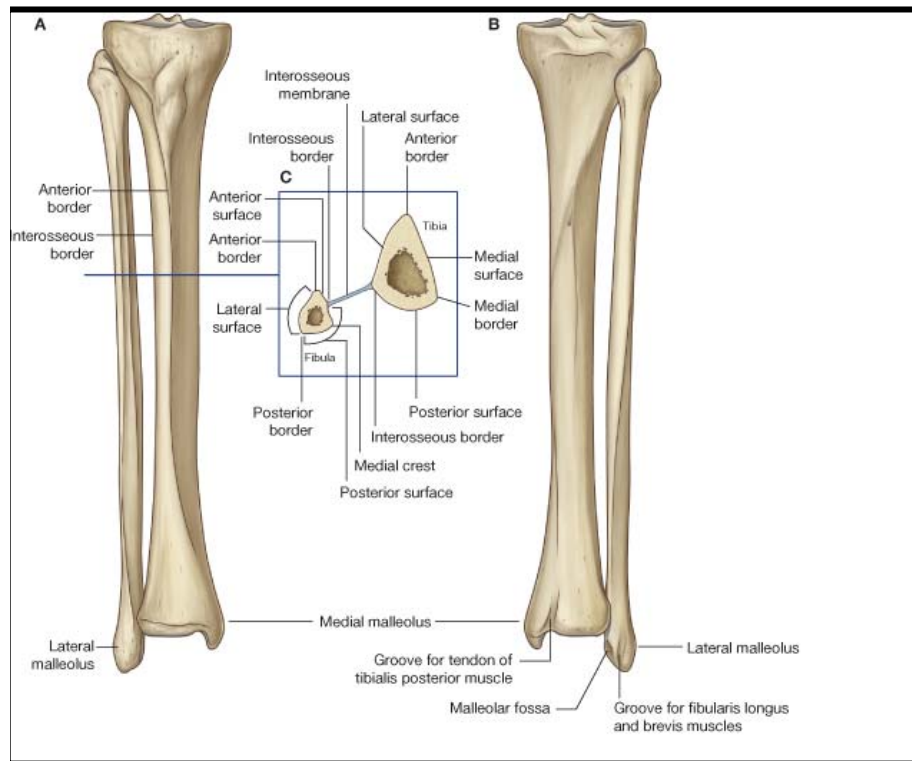
Knee



■ Patella

- Triangular sesamoid bone
- Protects knee joint
- Improves leverage of thigh muscles acting across the knee
- Contained within patellar ligament

Leg



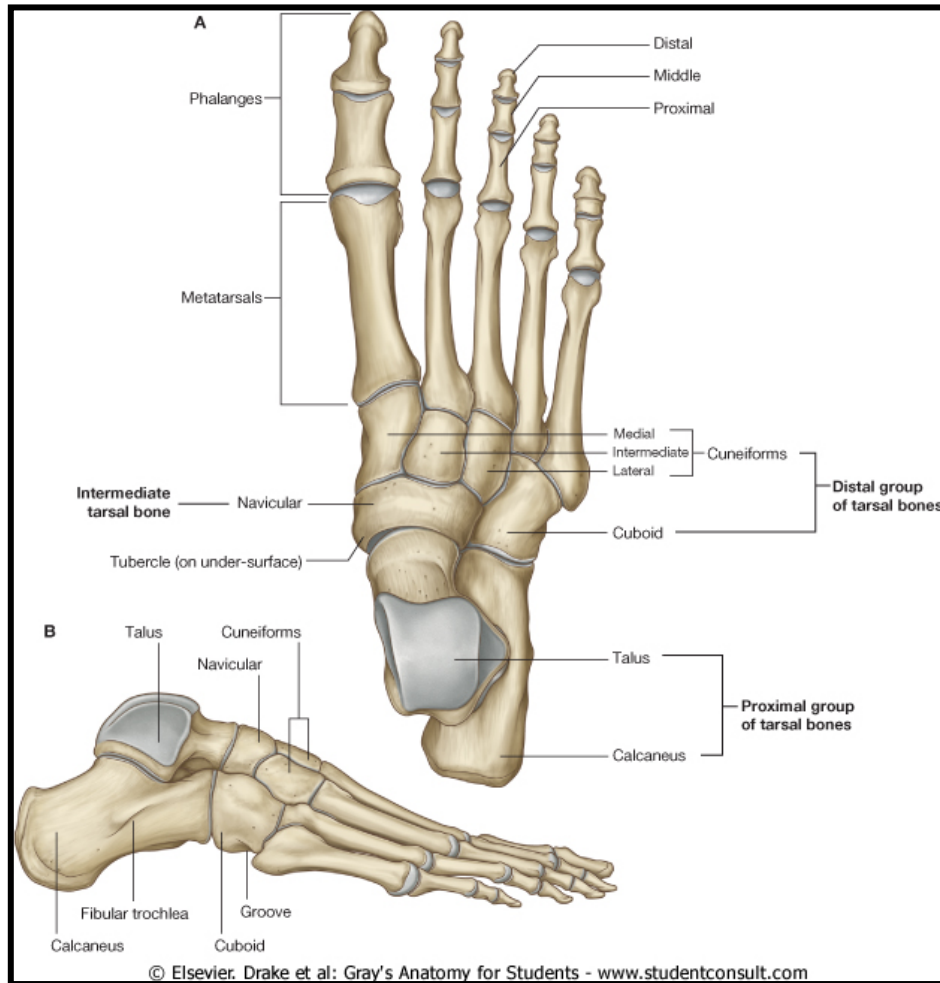
■ Tibia

- Receives the weight of body from femur and transmits to foot
- Second to femur in size and weight
- Articulates with fibula proximally and distally
 - Interosseous membrane

■ Fibula

- Does NOT bear weight
- Muscle attachment
- Not part of knee joint
- Stabilize ankle joint

Foot



■ Function:

- Supports the weight of the body
- Act as a lever to propel the body forward

■ Parts:

□ Tarsals

■ Talus = ankle

- Between tibia and fibula
- Articulates with both

■ Calcaneus = heel

- Attachment for Calcaneal tendon
- Carries talus

■ Navicular

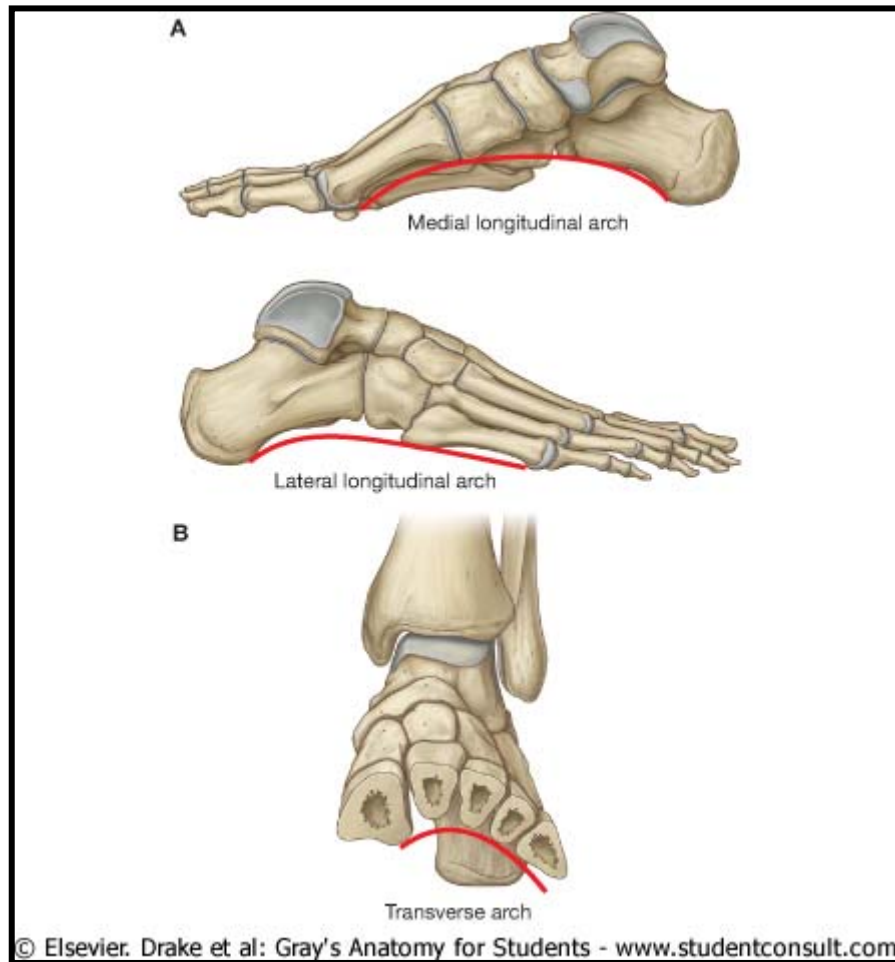
■ Cuboid

■ Medial, lateral and intermediate cuneiforms

□ Metatarsals

□ Phalanges

Foot



- 3 arches

- Medial

- Lateral

- Transverse

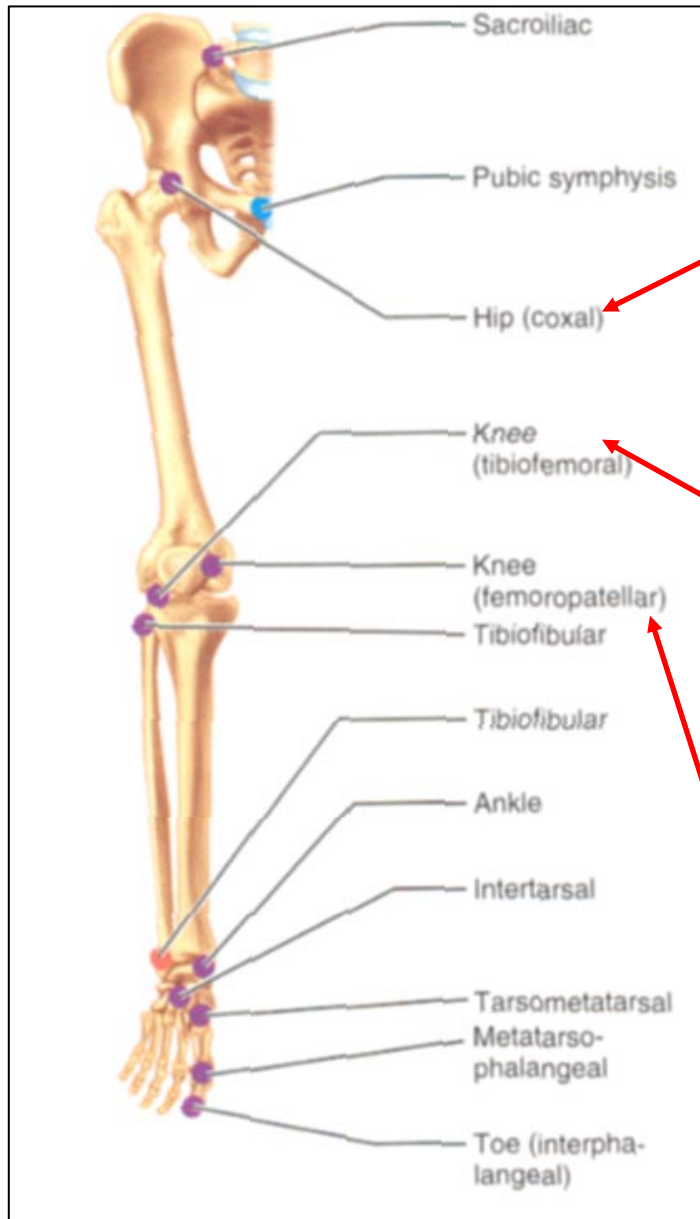
Longitudinal

- Has tendons that run inferior to foot bones
 - Help support arches of foot

- Function

- Recoil after stepping

Joints of Lower Limb



■ Hip (femur + acetabulum)

- ☐ Ball + socket
- ☐ Multiaxial
- ☐ Synovial

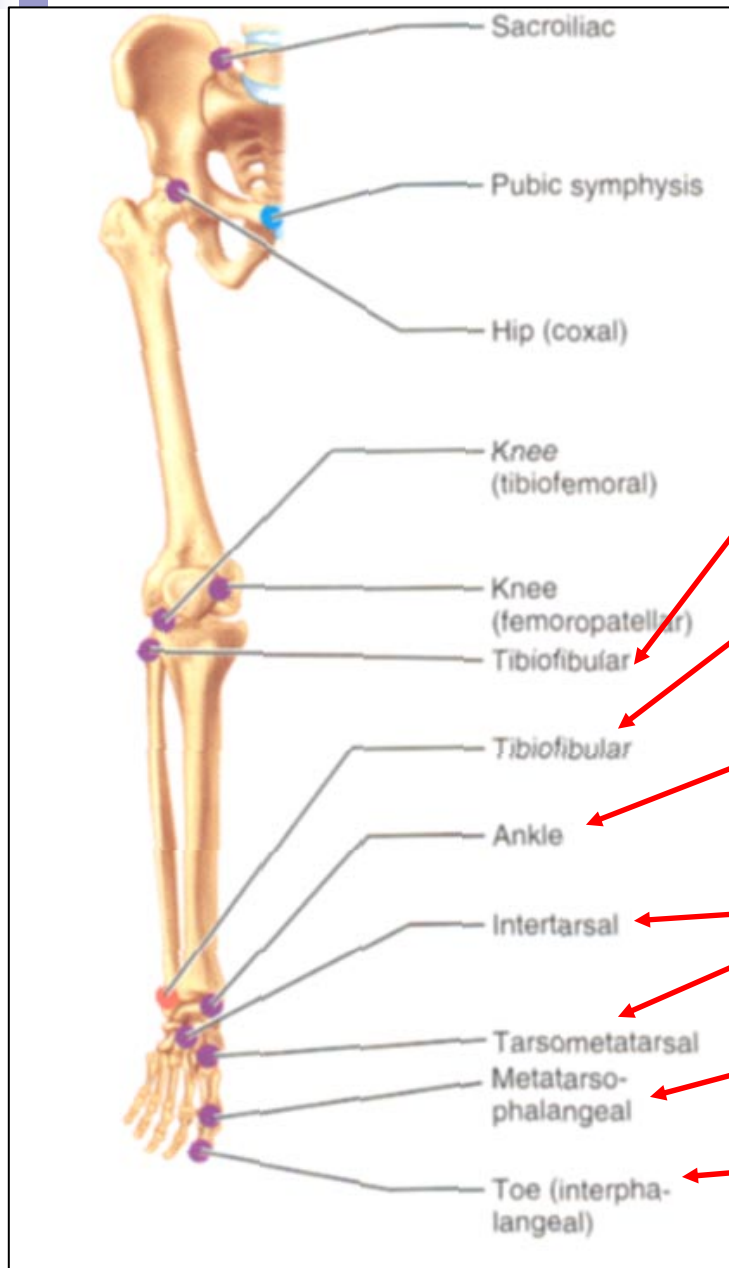
■ Knee (femur + tibia)

- ☐ Hinge (modified)
- ☐ Biaxial
- ☐ Synovial
- ☐ Contains menisci, bursa, many ligaments

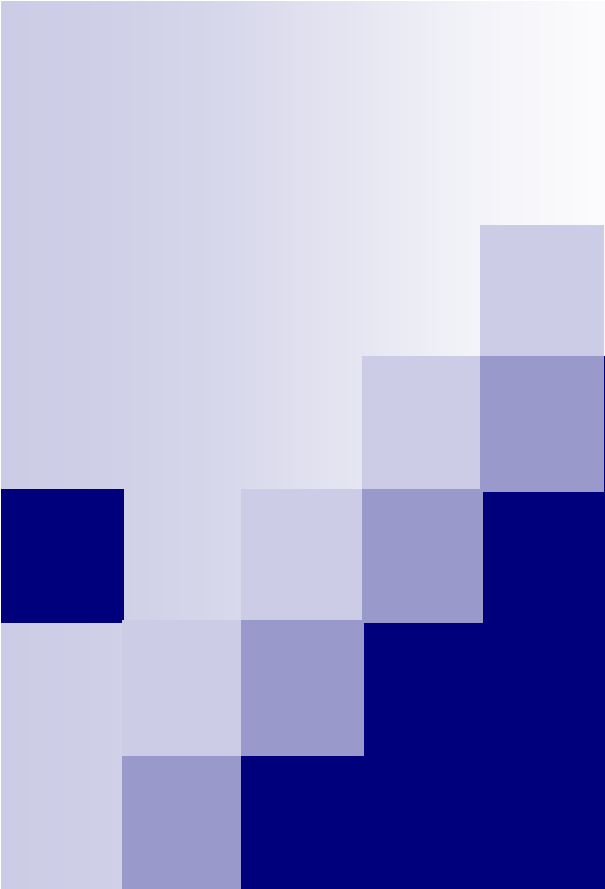
■ Knee (femur + patella)

- ☐ Plane
- ☐ Gliding of patella
- ☐ Synovial

Joints of Lower Limb



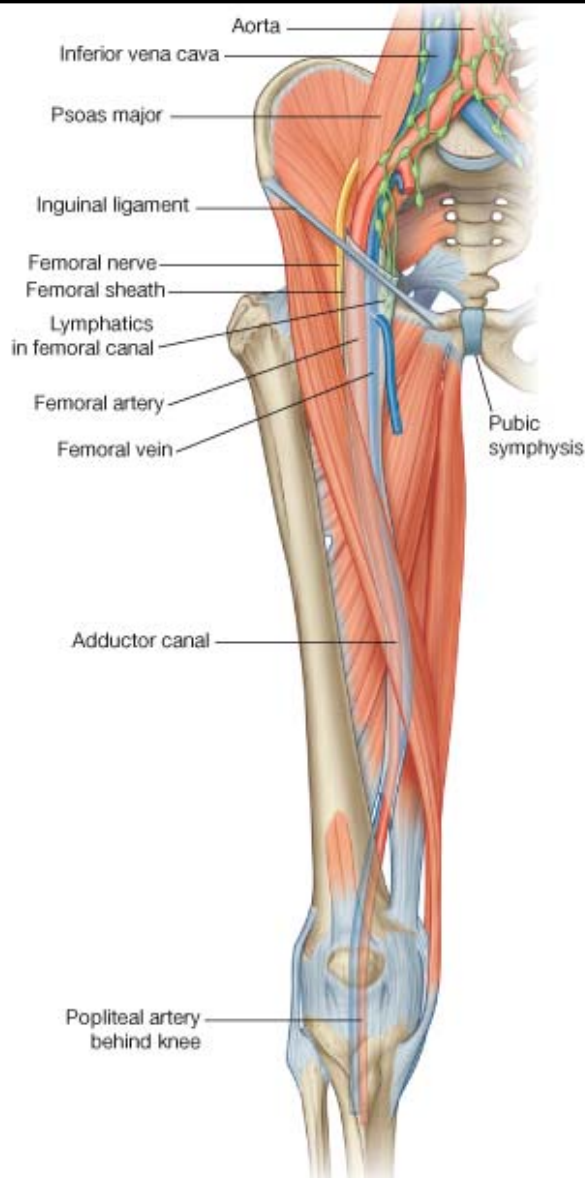
- Proximal Tibia + Fibula
 - Plane, Gliding
 - Synovial
- Distal Tibia + Fibula
 - Slight “give” (synarthrosis)
 - Fibrous (syndesmosis)
- Ankle (Tibia/Fibula + Talus)
 - Hinge, Uniaxial
 - Synovial
- Intertarsal & Tarsal-metatarsal
 - Plane, synovial
- Metatarsal-phalanges
 - Condylod, synovial
- Interphalangeal
 - Hinge, uniaxial



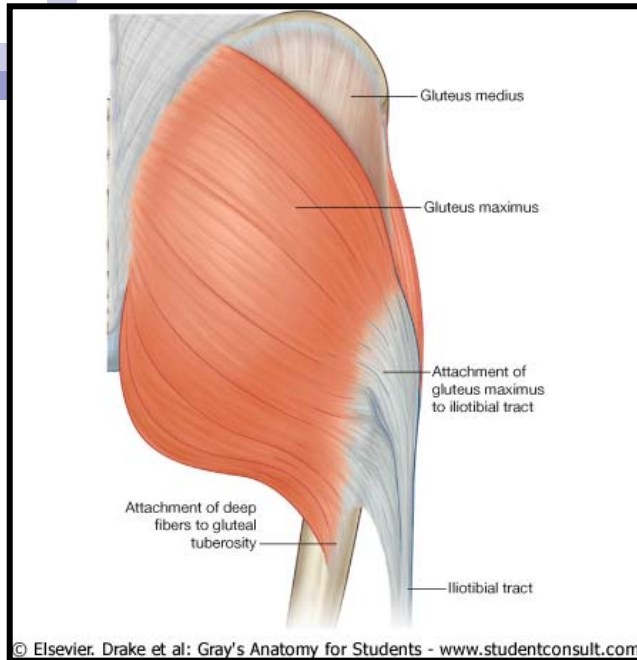
Muscles

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Muscles of Hip and Thigh



- **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



Gluteals

■ Gluteus maximus

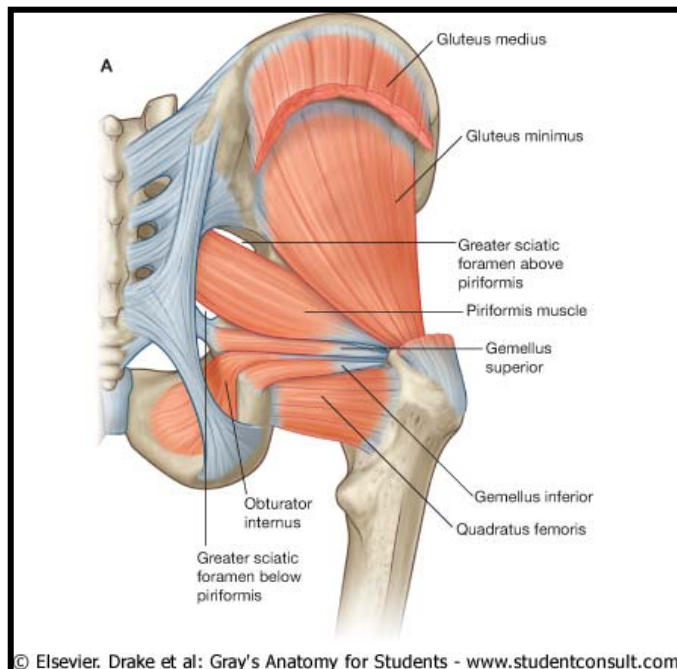
- Origin - Ilium, sacrum and coccyx
- Insertion - Gluteal tuberosity of femur, iliotibial tract
- Action - Extends thigh, some lateral rotation and abduction
- Innervation - Inferior gluteal nerve

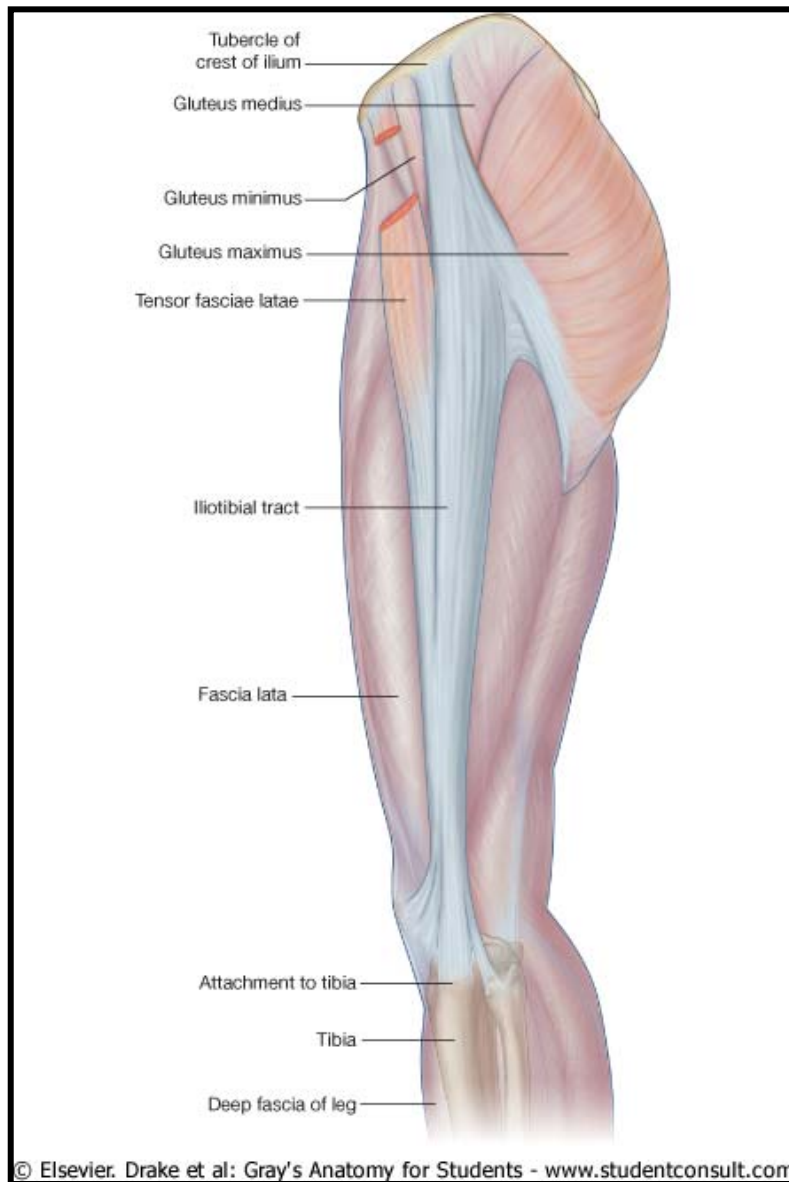
■ Gluteus medius

■ Gluteus minimus

- Origin - Ilium
- Insertion - Greater trochanter of femur
- Action - Abduction, medial rotation
- Innervation - Superior gluteal nerve

■ Lesser Gluteals help stabilize hip to allow fluent bipedal walking





Posterior Pelvis

■ Tensor fasciae latae

- Origin – iliac crest and anterior inferior iliac spine
- Insertion – iliotibial tract
- Action - Flex thigh, abduct thigh, medial rotation of thigh
- Innervation – Superior gluteal nerve

Anterior Compartment Thigh

- Quadriceps femoris

- Rectus femoris

- Origin – anterior inferior iliac spine, margin of acetabulum
 - Insertion – patella and tibial tuberosity via the patellar ligament
 - Action – extends knee, flexes thigh

- Vastus lateralis

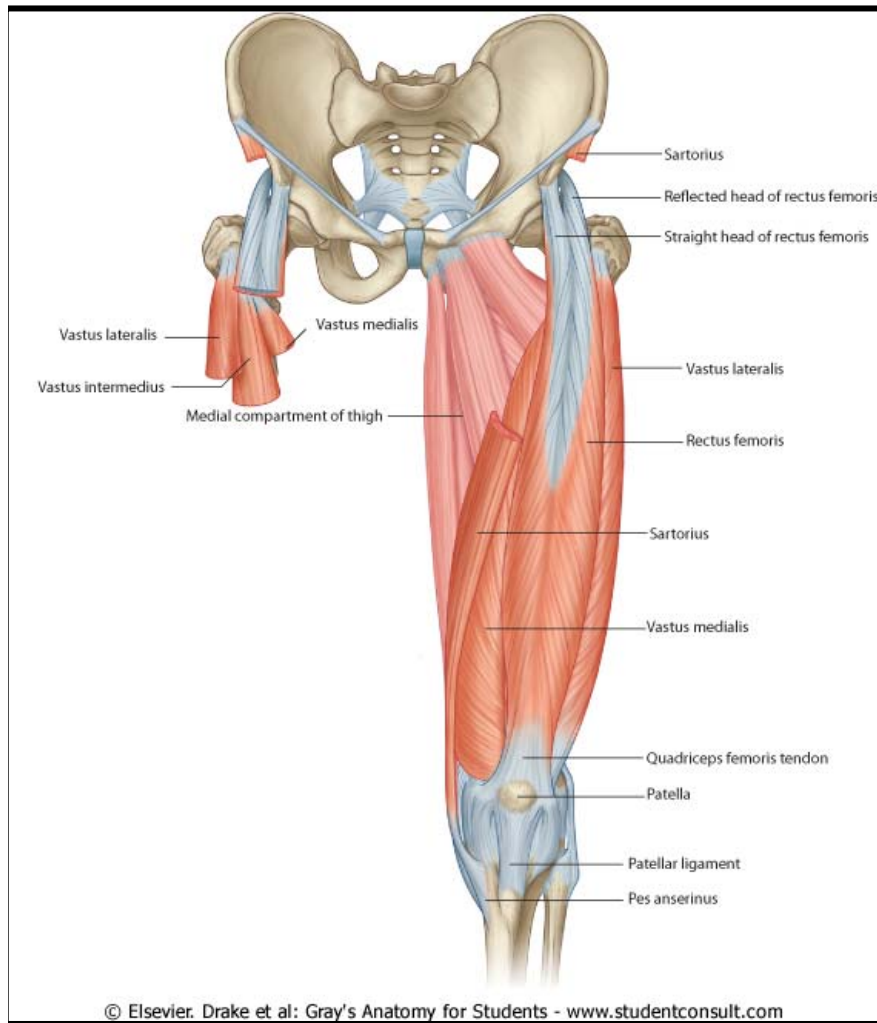
- Vastus medialis

- Vastus intermedius

- Origin - femur
 - Insertion – patella and tibial tuberosity via the patellar ligament
 - Action – extends knee

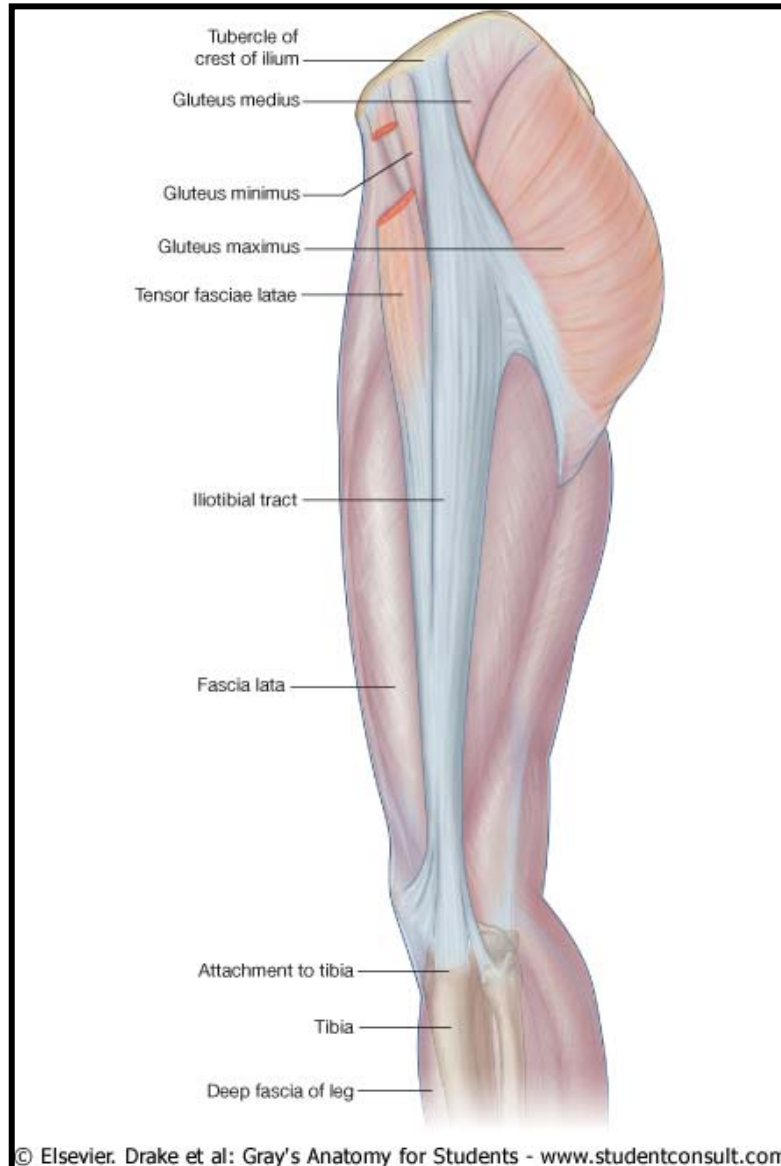
Sartorius

- Origin - anterior superior iliac spine
 - Insertion – medial tibia
 - Action - flex, abduct, lat rotate thigh; weak knee flexor



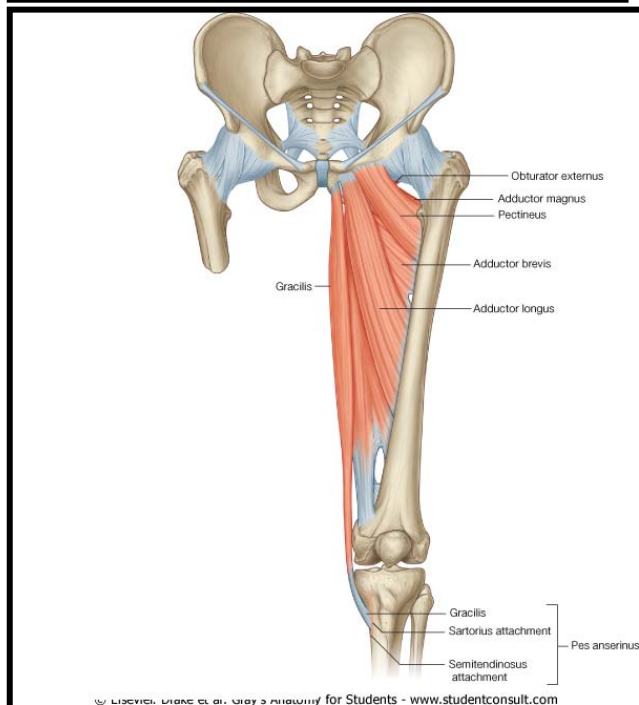
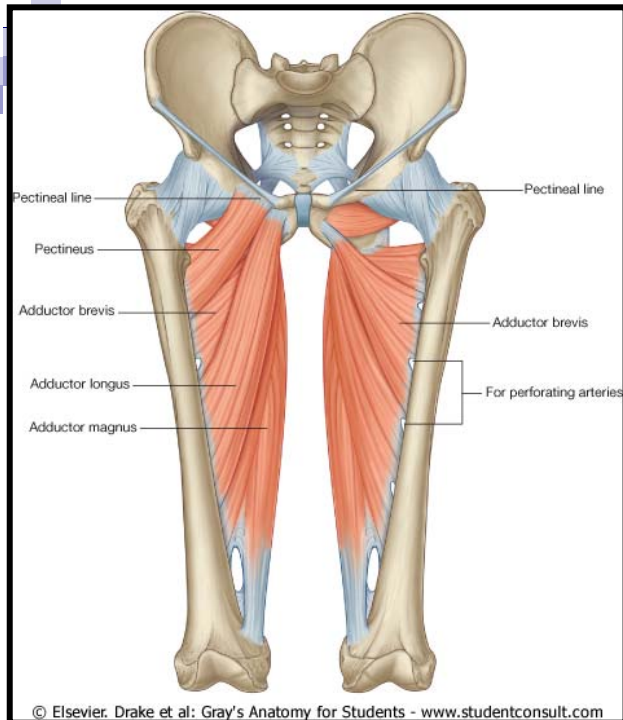
All above innervated by the femoral nerve!!!

Anterior Compartment Thigh



■ Iliopsoas

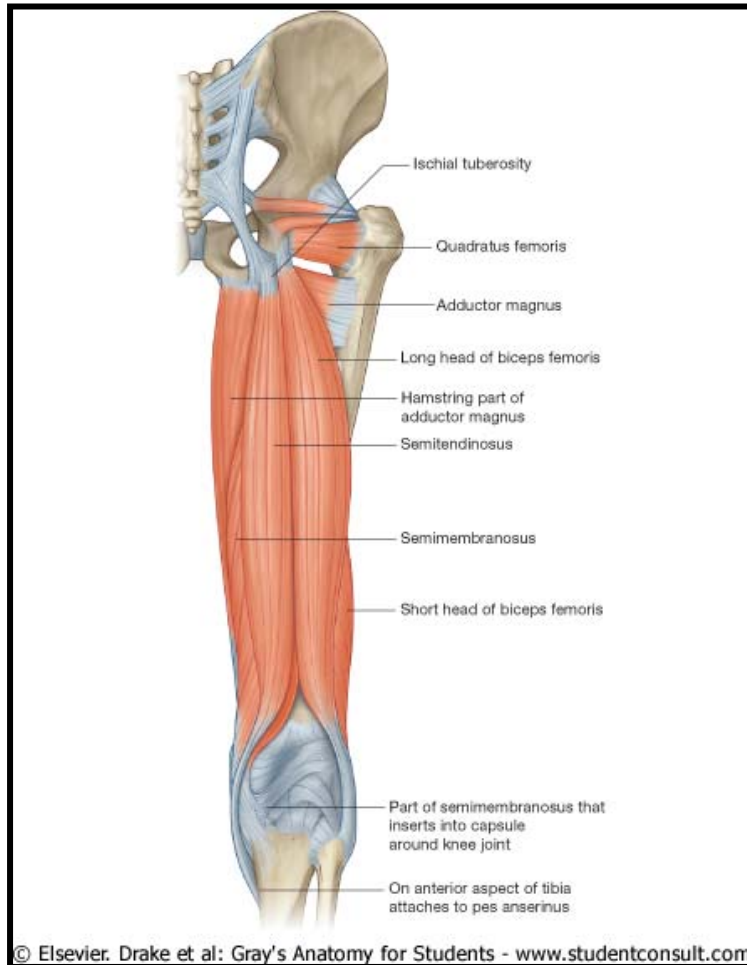
- Origin - Iliac crest, sacrum, lumbar vertebrae
- Insertion – lesser trochanter
- Action – **flexor of thigh**
- Innervation – femoral nerve



Adductors

- Adductor longus
- Adductor brevis
- Adductor magnus
 - Origin – inferior pelvis
 - Insertion - femur
 - Action – **adducts** and medial rotates
 - Innervation – Obturator nerve
- Pectineus
 - Origin - pubis
 - Insertion – lesser trochanter
 - Action – **adducts**, medial rotates
 - Innervation – femoral, sometimes obturator
- Gracilis
 - Origin - pubis
 - Insertion – medial tibia
 - Action – **adducts** thigh, flex, medial, rotates leg
 - Innervation – Obturator nerve

Posterior Compartment - Hamstring



- Biceps femoris (2 heads)
 - Origin – ischial tuberosity, distal femur
 - Insertion - lateral tibia, head fibula
 - Action - thigh extension, knee flexion, lateral rotation
- Semitendinosus
- Semimembranosus
 - Origin - ischial tuberosity
 - Insertion - medial tibia
 - Action - thigh extension, knee flexion, medial rotation

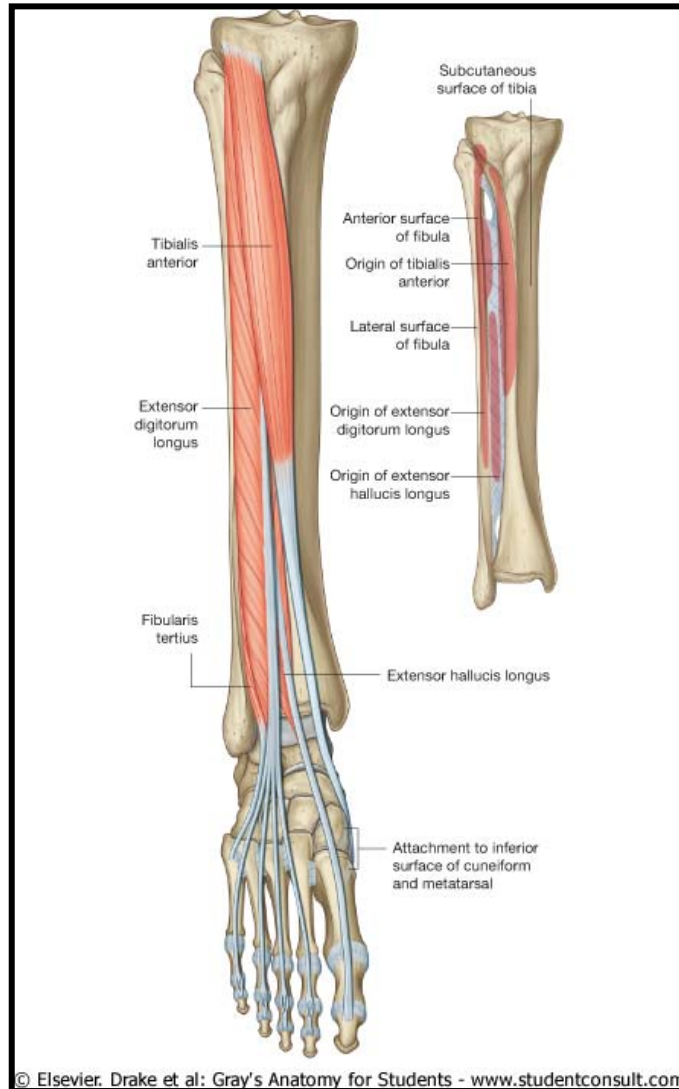
Sciatic nerve innervates all of the above muscles!!!



Muscles of the Leg

- Anterior Compartment
 - Dorsiflex ankle, invert foot, extend toes
 - Innervation: Deep fibular nerve
- Lateral Compartment
 - Plantarflex, evert foot
 - Innervation: Superficial Fibular nerve
- Posterior Compartment
 - Superficial and deep layers
 - Plantarflex foot, flex toes
 - Innervation: Tibial nerve

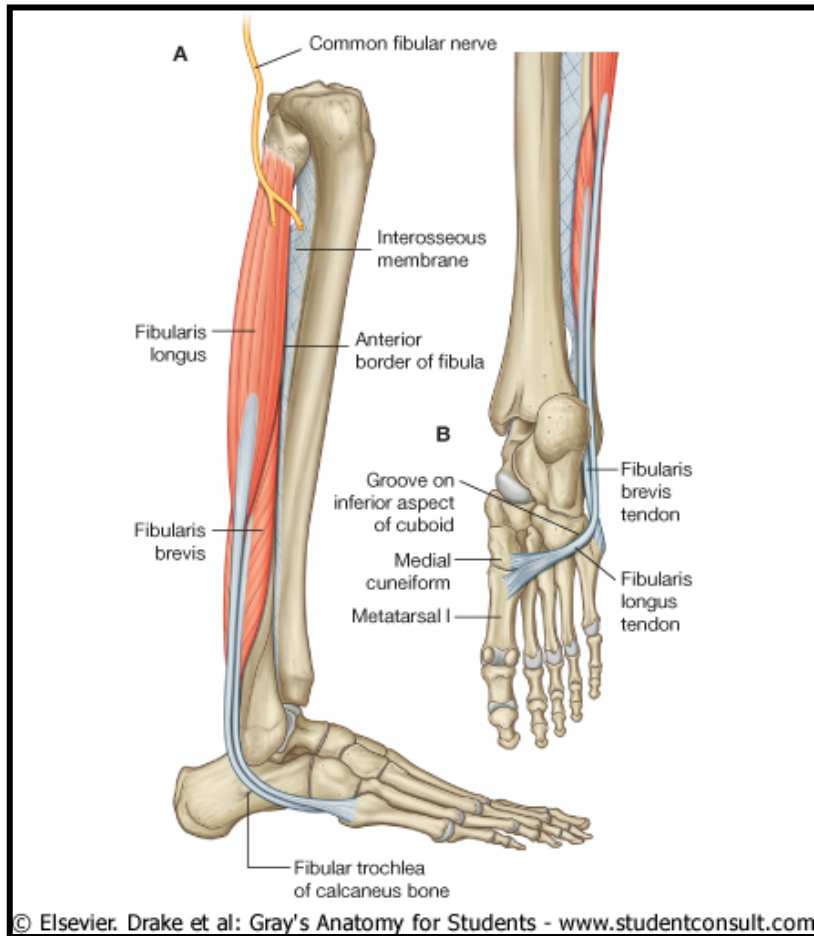
Anterior Compartment



- **Tibialis anterior**
 - Origin - tibia
 - Insertion - tarsals
 - Action - dorsiflexion, foot inversion
- **Extensor digitorum longus**
 - Origin – tibia and fibula
 - Insertion - phalanges
 - Action – toe extension
- **Extensor hallucis longus**
 - Origin – fibula, interosseous membrane
 - Insertion – big toe
 - Action - extend big toe, dorsiflex foot

All innervated by deep fibular nerve

Lateral Compartment



■ Fibularis (peroneus) longus

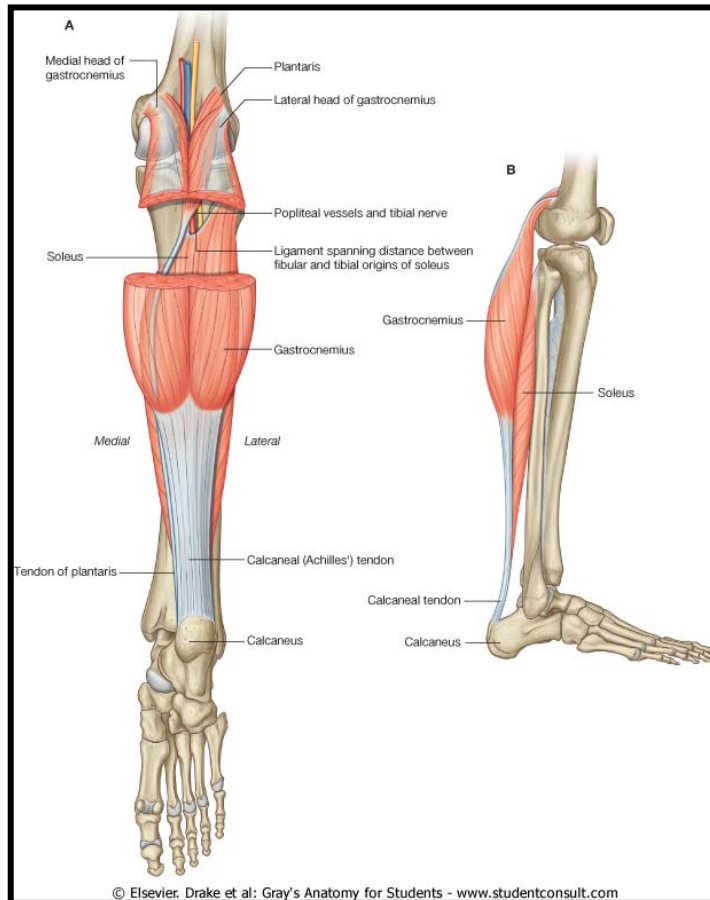
- Origin – lateral fibula
- Insertion – 5th metatarsal, tarsal
- Action - plantarflex, evert foot

■ Fibularis (peroneus) brevis

- Origin – distal fibula
- Insertion - proximal fifth metatarsal
- Action – same as above!!

All innervated by the superficial fibular nerve

Superficial Posterior Compartment



All innervated by the tibial nerve

■ Triceps surae

□ Gastrocnemius (2 heads)

- Origin - medial and lateral condyles of femur
- Insertion - posterior calcaneus via Achilles tendon

□ Soleus

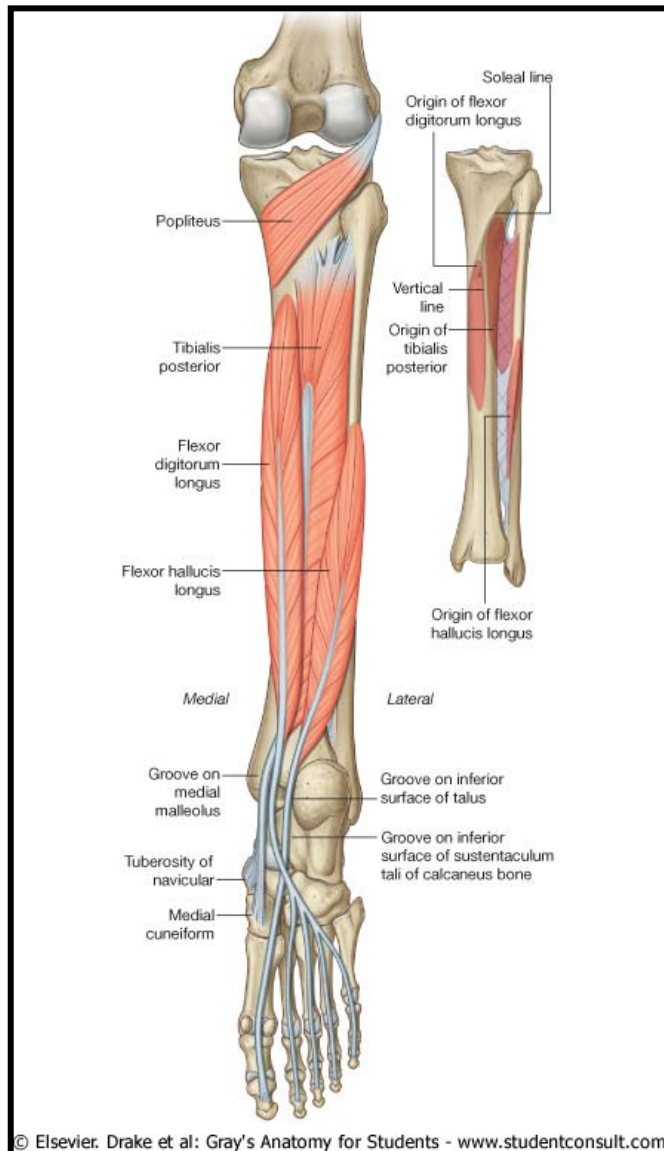
- Origin – tibia and fibula
- Insertion – same as above

□ Action of both – plantarflex foot

■ Plantaris (variable)

- Origin – posterior femur
- Insertion – same as above!
- Action – plantarflex foot, weak knee flexion

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

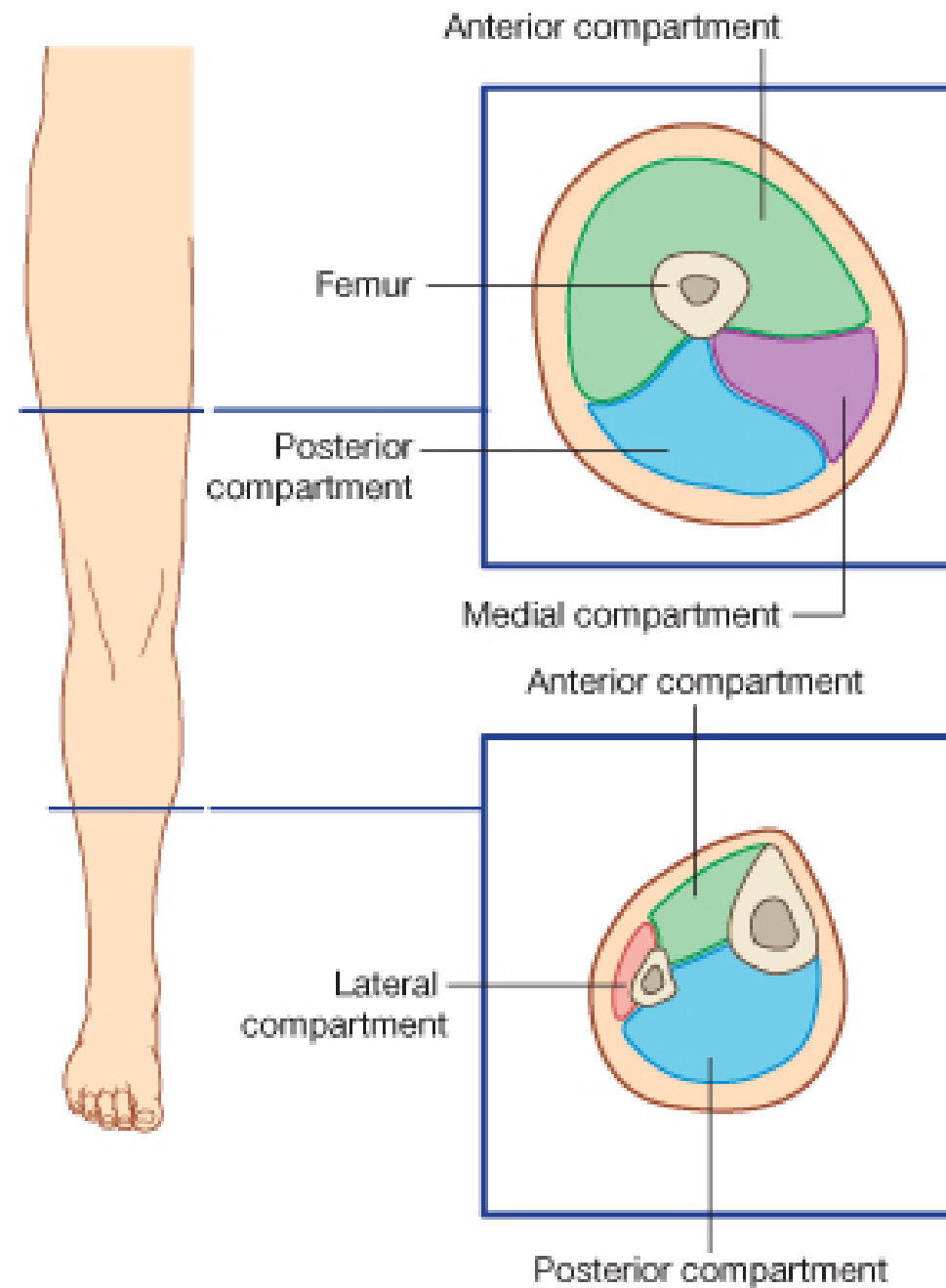
■ Flexor hallucis longus

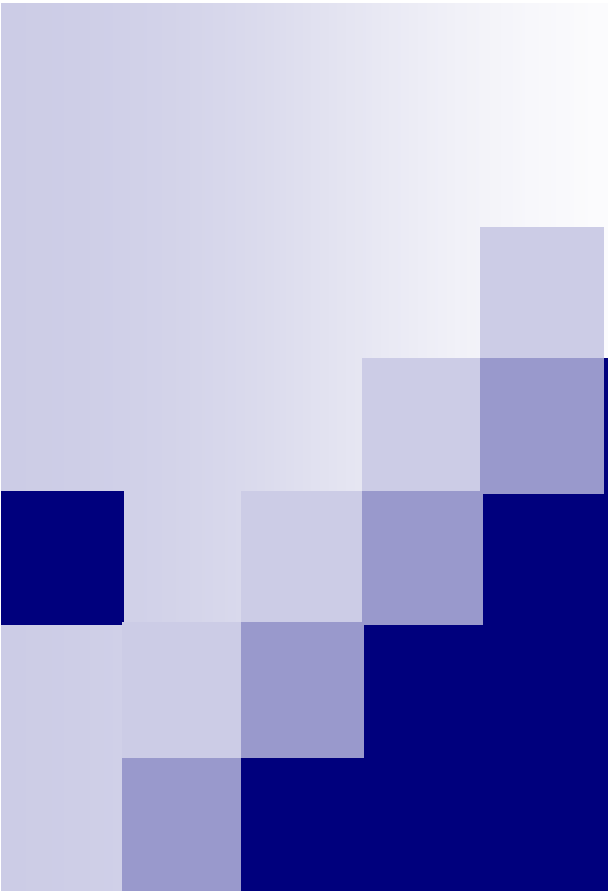
- Origin - fibula
- Insertion - distal phalanx of hallux
- Action - plantarflex and invert foot, flex toe

■ Tibialis posterior

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

All innervated by the tibial nerve

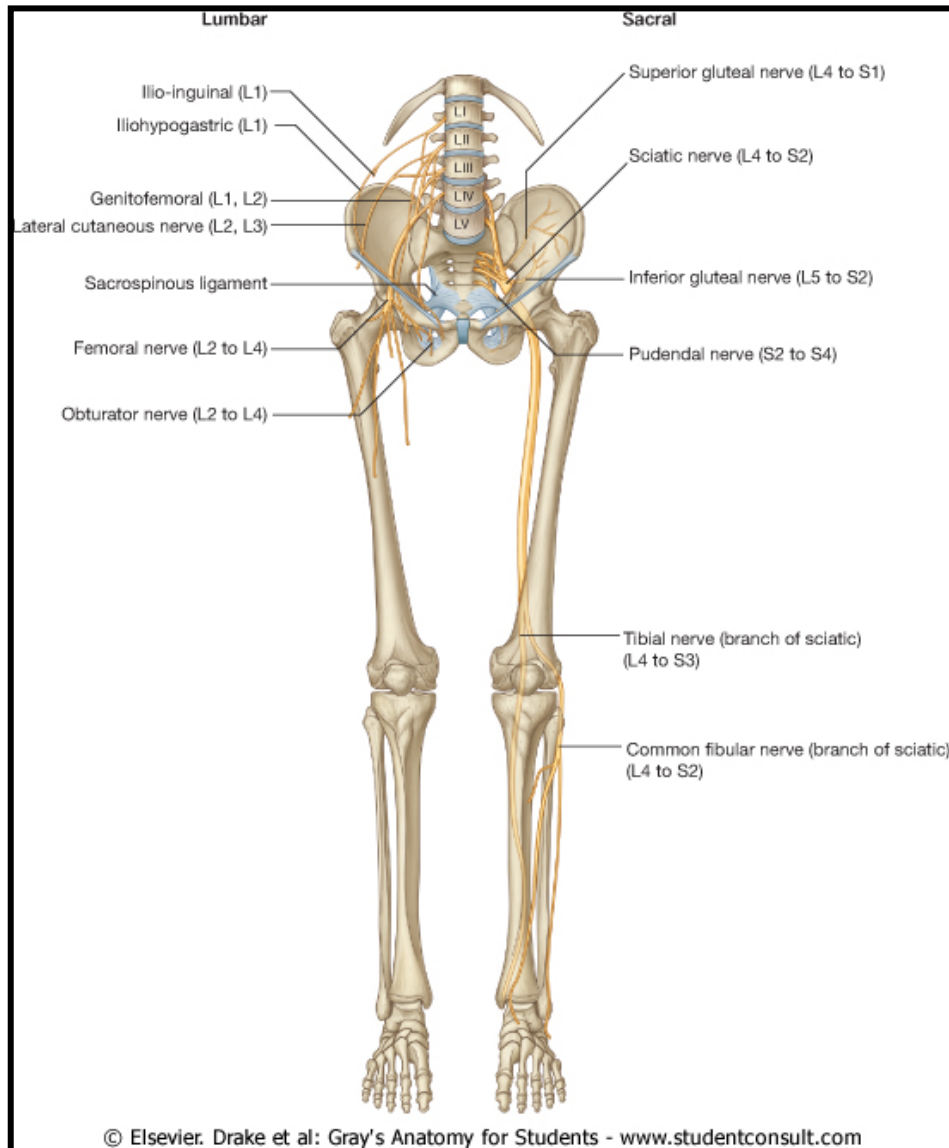




Innervation

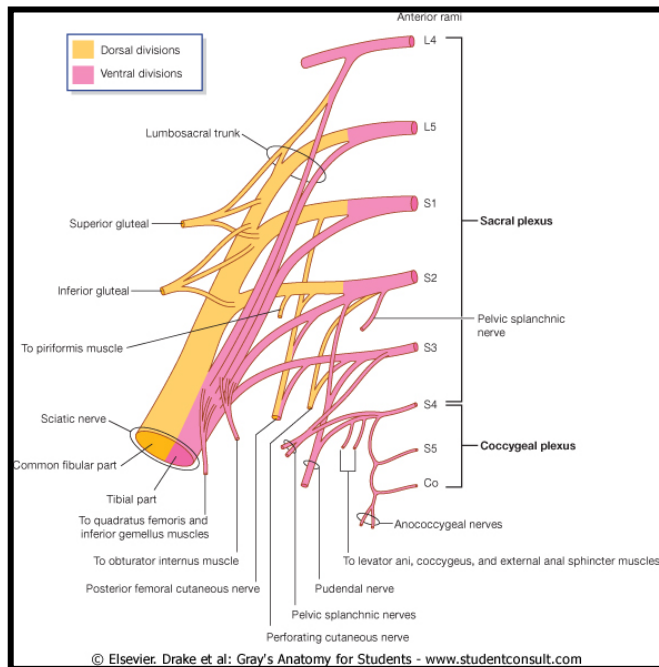
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Plexuses of the Lower Limb



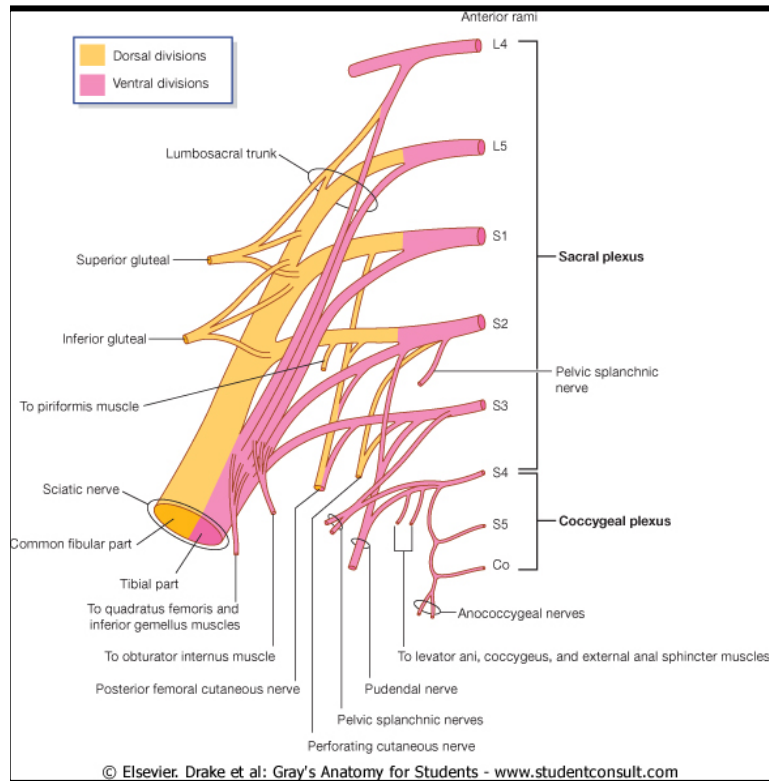
- “Lumbosacral plexus”
- Lumbar Plexus
 - Arises from L1-L4
 - Lies within the psoas major muscle
 - Mostly anterior structures
- Sacral Plexus
 - Arises from spinal nerve L4-S4
 - Lies caudal to the lumbar plexus
 - Mostly posterior structures

Lumbar Plexus



- Femoral nerve
 - Cutaneous branches
 - Thigh, leg, foot (e.g. saphenous nerve)
 - Motor branches
 - Anterior thigh muscles (e.g. quadriceps, sartorius, iliopsoas)
- Obturator nerve
 - Sensory
 - Skin medial thigh; hip, knee joints
 - Motor
 - Adductor muscles
- Lateral femoral cutaneous
 - Sensory
 - Skin lateral thigh
- Genitofemoral
 - Sensory
 - Skin scrotum, labia major, anterior thigh
 - Motor
 - Cremaster muscle

Sacral Plexus



■ Sciatic

□ Motor:

- Hamstring

□ Branches into:

- Tibial nerve

□ Cutaneous

- Posterior leg and sole of foot

□ Motor

- Posterior leg, foot

- Common fibular (peroneal) nerve

□ Cutaneous

- Anterior and lateral leg, dorsum foot

□ Motor

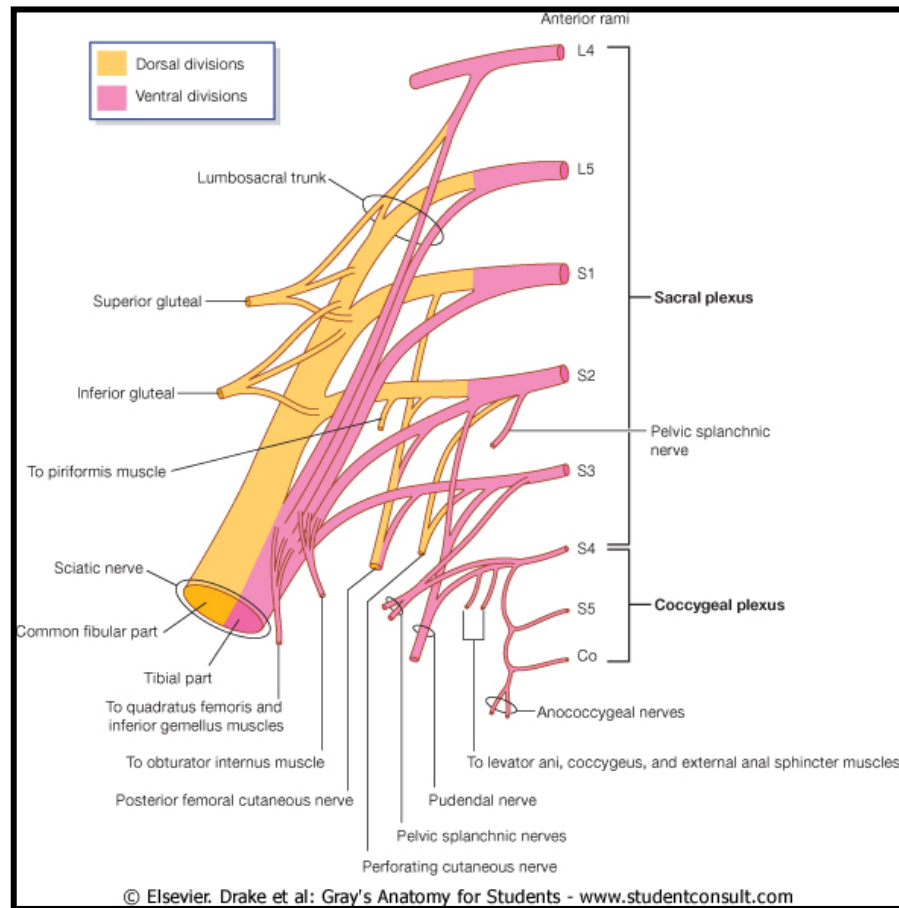
- Lateral compartment, tibialis anterior, toe extensors

■ Superior gluteal nerve

□ Motor

- Gluteus medius and minimus, tensor fasciae latae

Sacral Plexus (continued)



■ Inferior gluteal nerve

□ Motor

- Gluteus maximus

■ Posterior femoral cutaneous nerve

□ Sensory

- Inferior buttocks, posterior thigh, popliteal fossa

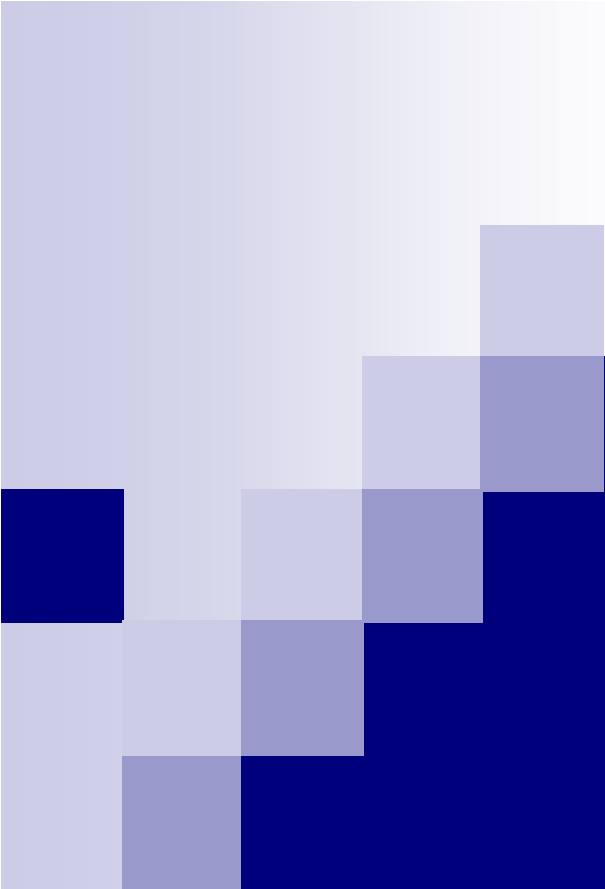
■ Pudendal nerve

□ Sensory

- External genitalia, anus

□ Motor

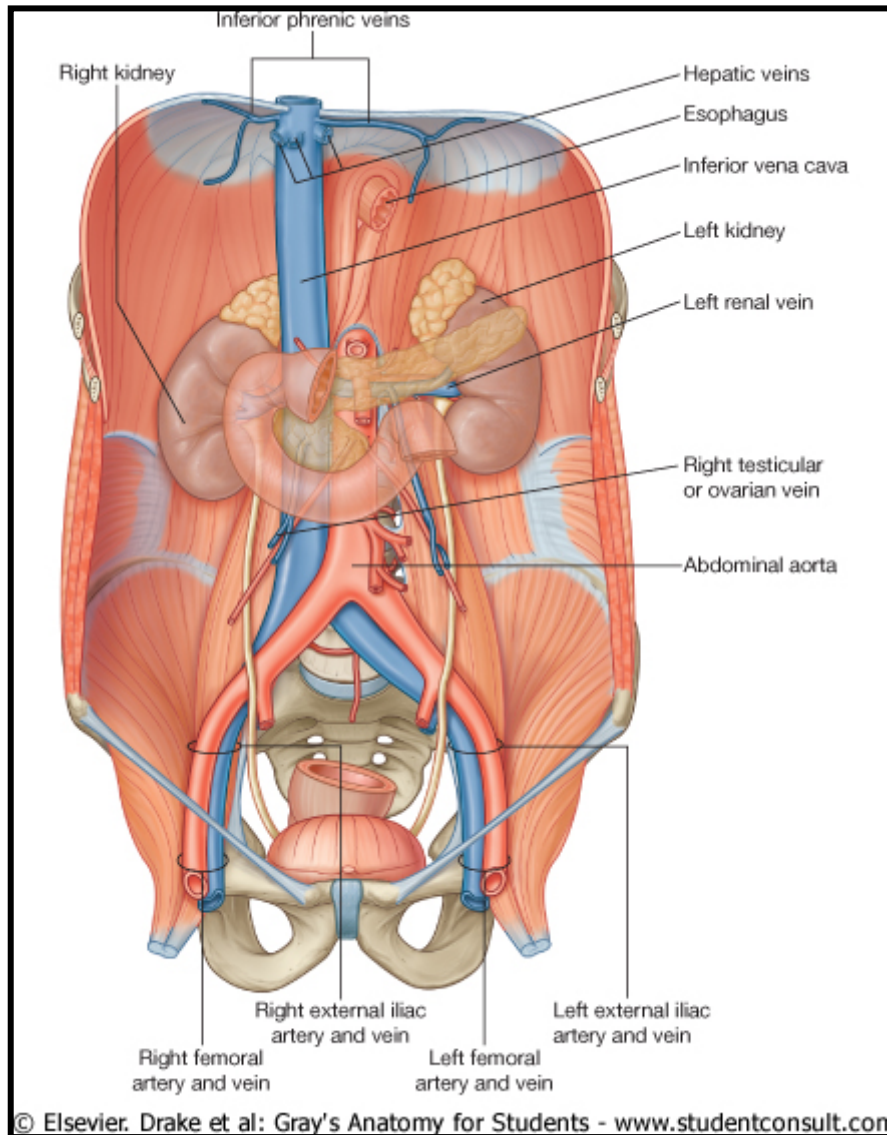
- Muscles of perineum



Vasculature

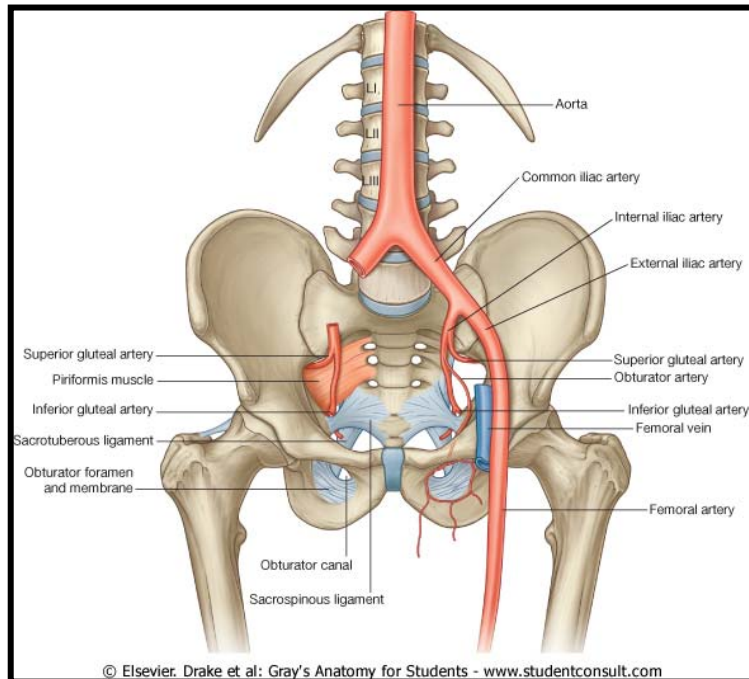
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Arteries



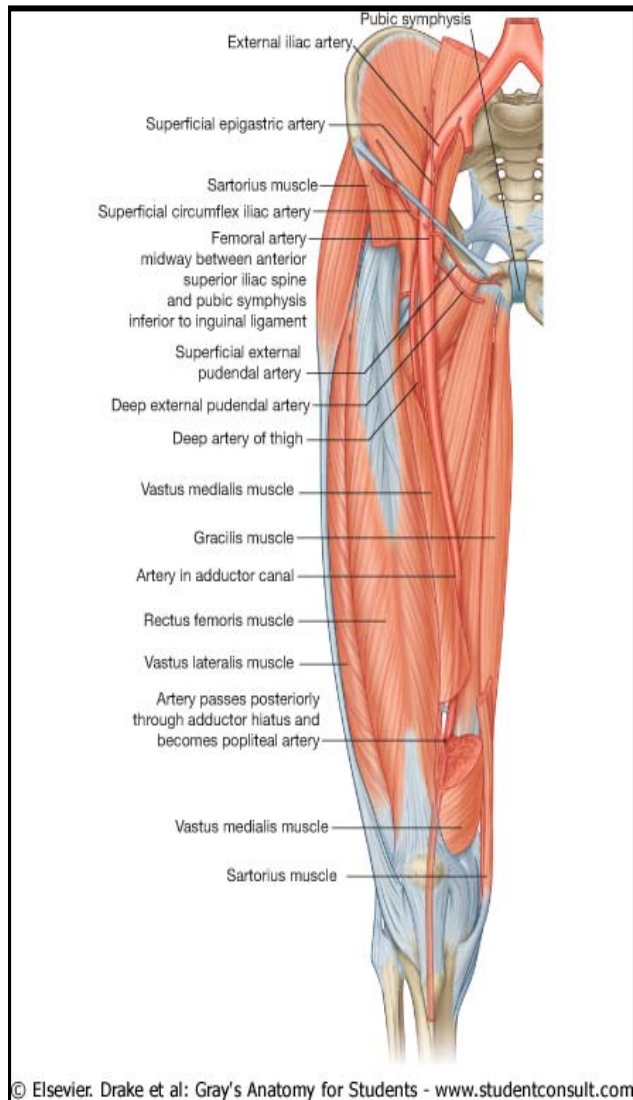
- Common iliac (from aorta) branches into:
 - Internal iliac
 - Supplies pelvic organs
 - External iliac
 - Supplies lower limb

Arteries



- Internal iliac branches into:
 - Cranial and Caudal Gluteals (Superior and Inferior)
 - Gluteals
 - Internal Pudendal
 - Perineum, external genitalia
 - Obturator
 - Adductor muscles
 - Other branches supply rectum, bladder, uterus, vagina, male reproductive glands

Arteries



■ External iliac becomes.....

□ **Femoral**

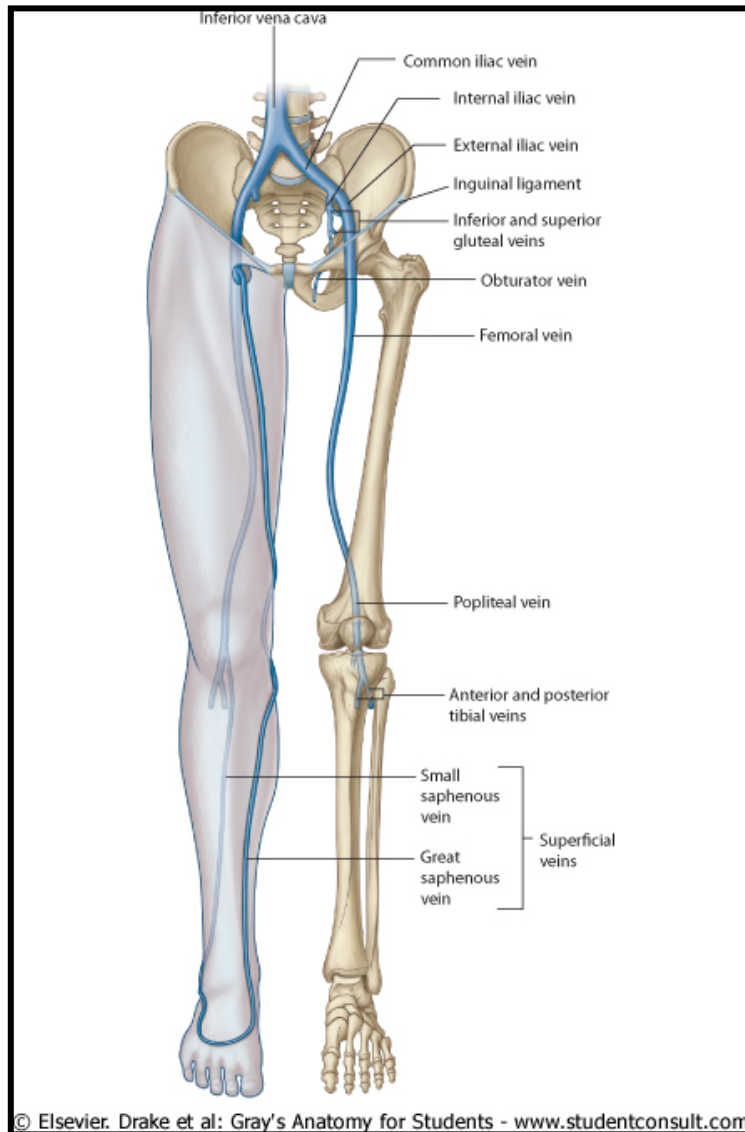
- Once passes the inguinal ligament
- Lower limb
- Branches into **Deep femoral**
 - Adductors, hamstrings, quadriceps
 - Branches into **Medial/lateral femoral circumflex**
 - Head and neck of femur

■ Femoral becomes.....

□ **Popliteal** (continuation of femoral)

- Branches into:
 - **Geniculars**
 - Knee
- Splits into:
 - **Anterior Tibial**
 - Anterior leg muscles, further branches to feet
 - **Posterior Tibial**
 - Flexor muscles, plantar arch, branches to toes

Veins



- Deep Veins: Mostly share names of arteries

- Ultimately empty into Inferior Vena Cava

- Plantar
 - Tibial
 - Fibular
 - Popliteal
 - Femoral
 - External/internal iliac
 - Common iliac

- Superficial Veins

- Dorsal venous arch (foot)
 - Great saphenous (empties into femoral)
 - Small saphenous (empties into popliteal)