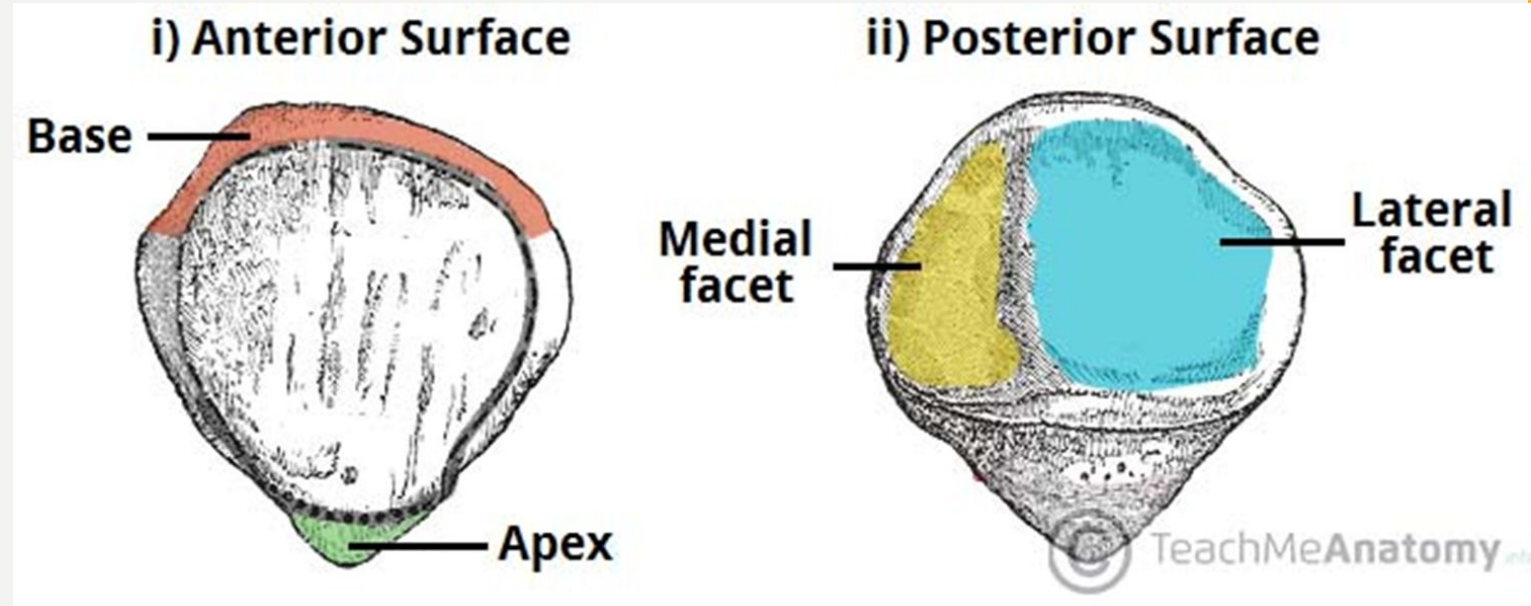


LOWER LIMB

PREPARED BY: DR.YASER HAMAM

- 
- 
- Articulation / Bones
 - Compartments / Muscle
 - Vascular and Neuronal supply

PATELLA

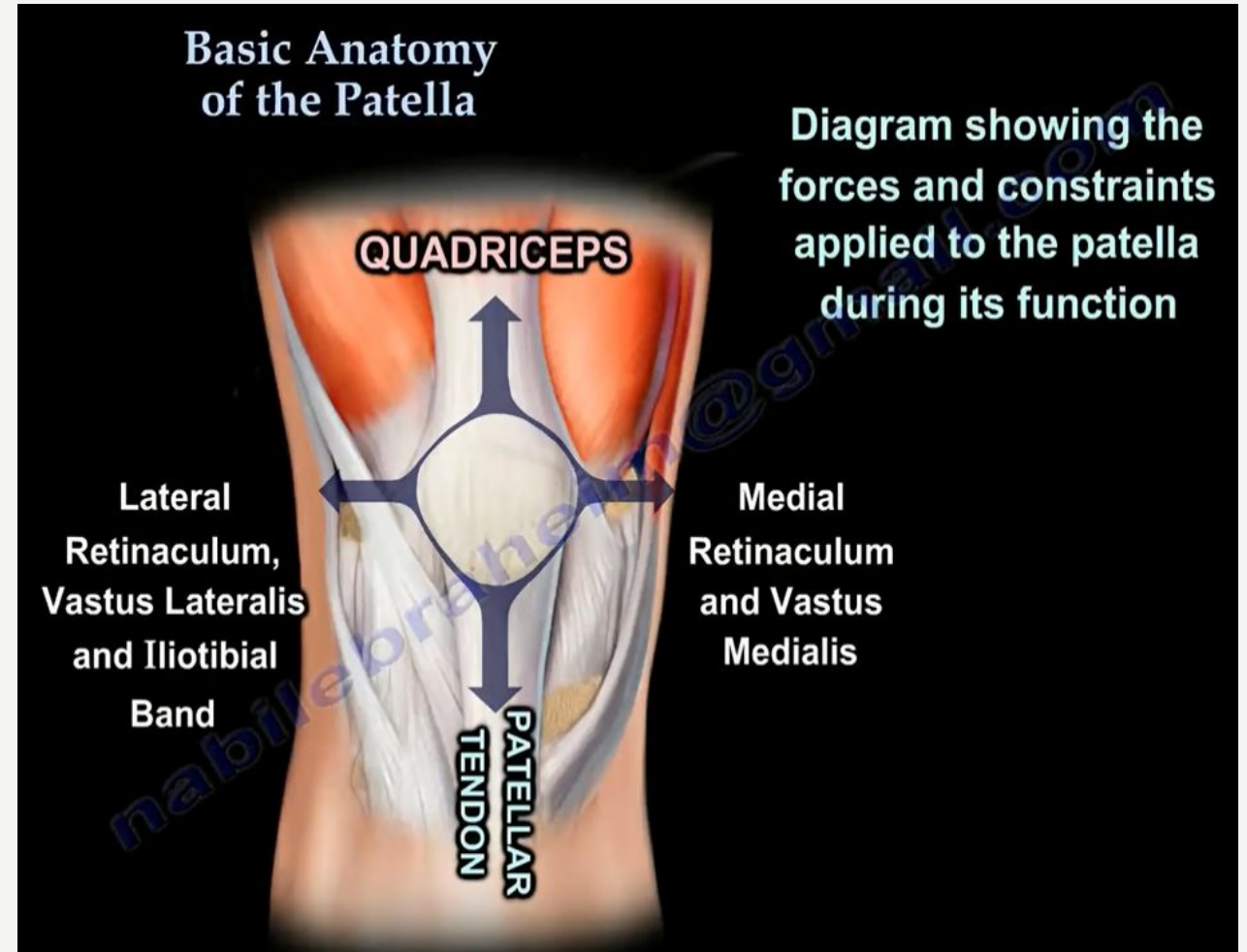


- The largest sesamoid bone
- Triangular-shape, has apex, base, 2 borders (**Lateral** “large lateral facet” and **Medial** “small medial facet”) and 2 surfaces (anterior and posterior)
- Its apex lies inferiorly
- The posterior surface articulates with the condyles of the femur
- The posterior surface (the articular surface) is smooth, while the anterior surface (the non-articular surface) is rough

PATELLA

Patella attachments include:

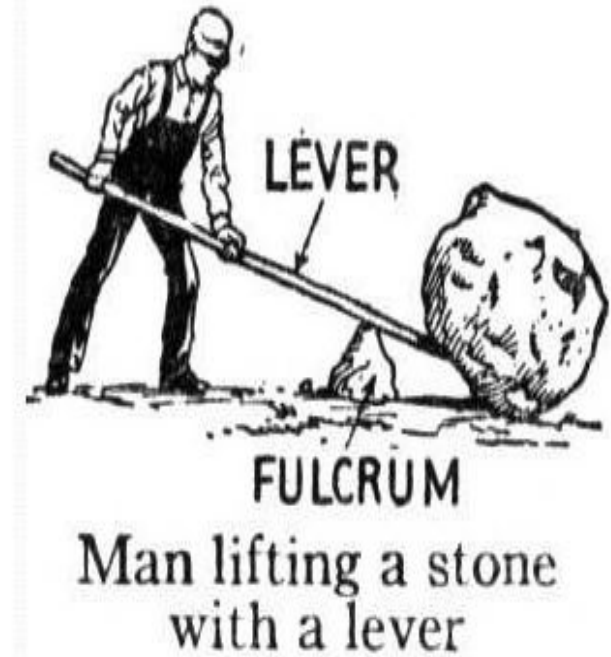
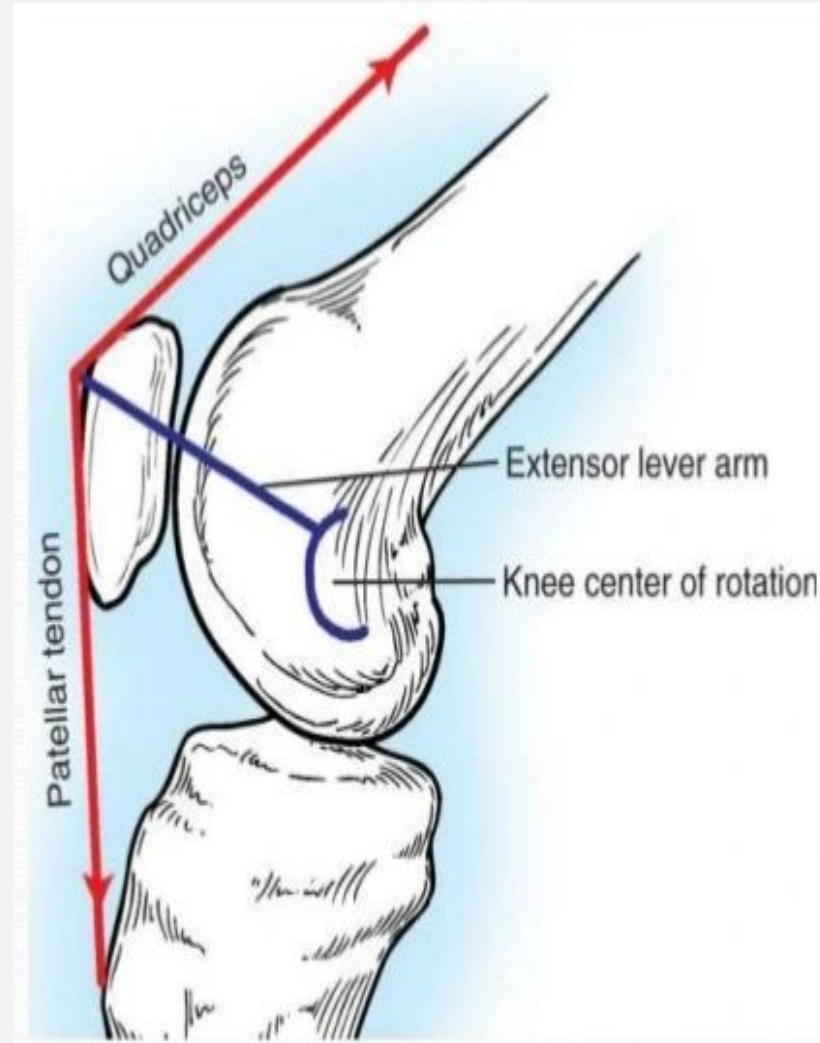
- **Base:** gives insertion to the quadriceps femoris muscle.
- **Apex:** gives attachment to the ligamentum patellae (patellar ligament).
- **Lateral border:** gives attachment to lower fibers of vastus lateralis.
- **Medial border:** gives attachment to lower fibers of vastus medialis.



PATELLA

Function:

1. Protects the anterior surface of the knee joint.
2. The patella primarily functions to improve the effective extension capacity of the quadriceps muscle by increasing the moment arm of the patellar ligament □ Allows for smooth movement during knee flexion/extension.

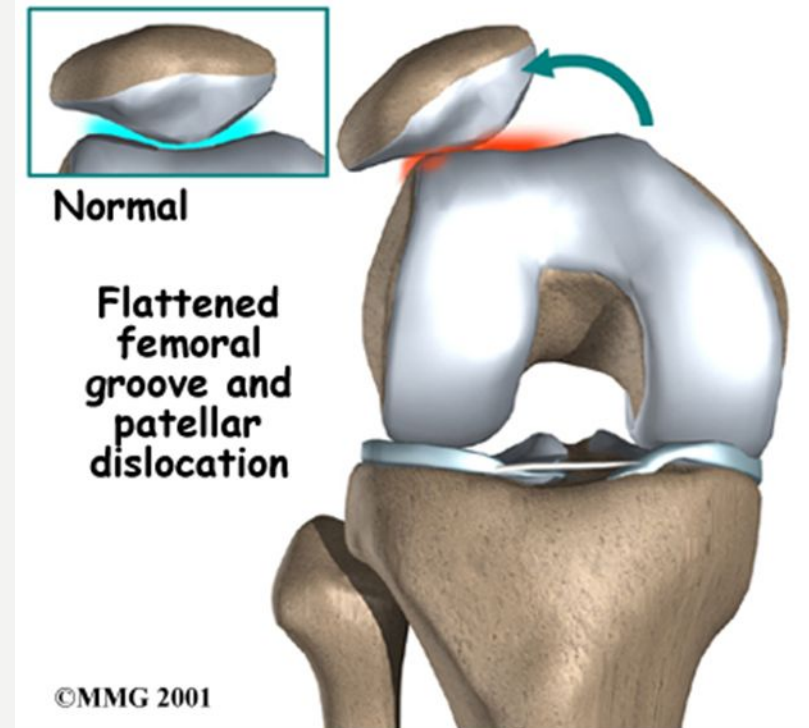


See:

<https://www.youtube.com/watch?v=XnYO4TnpTC0>

PATELLAR DISLOCATIONS

- **Congenital recurrent dislocations**
 - caused by underdevelopment of the lateral femoral condyle.
- **Traumatic dislocation of the patella**
 - results from direct trauma to the quadriceps attachments of the patella (especially the vastus medialis), with or without fracture of the patella.



PATELLAR DISLOCATIONS

- **Management:**

A= Nonoperative / Conservative [NSAIDS, activity modification, and physical therapy]

B= Surgical reduction

- I. **Congenital recurrent dislocations:**

- ☐ Surgical reduction for most part are recommended as the condition impairs long term function if left untreated. [Mainstay of treatment]

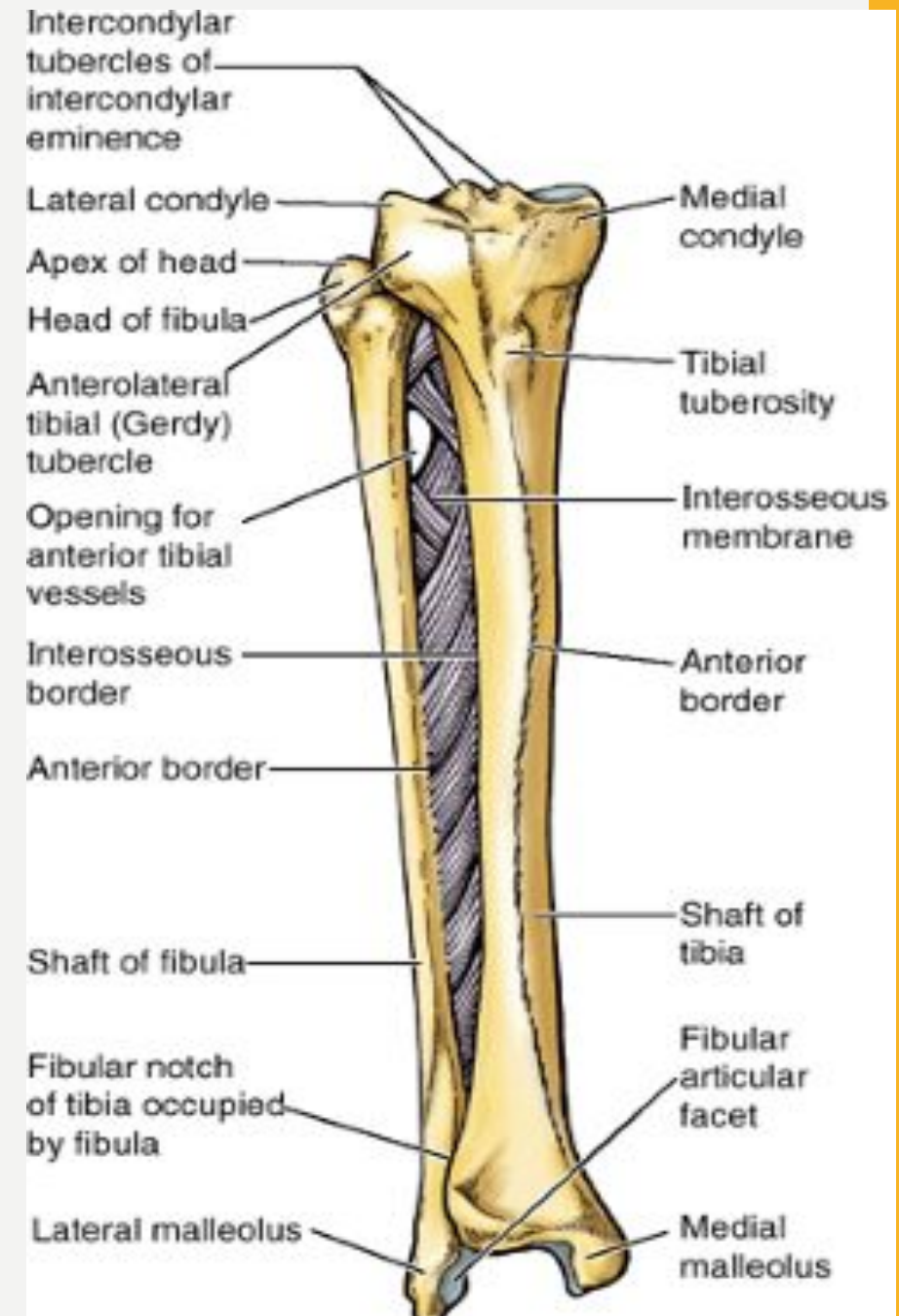
- II. **Traumatic dislocation of the patella:**

- ☐ Nonoperative is the mainstay of treatment for first time patellar dislocation without any loose bodies or intraarticular damage.

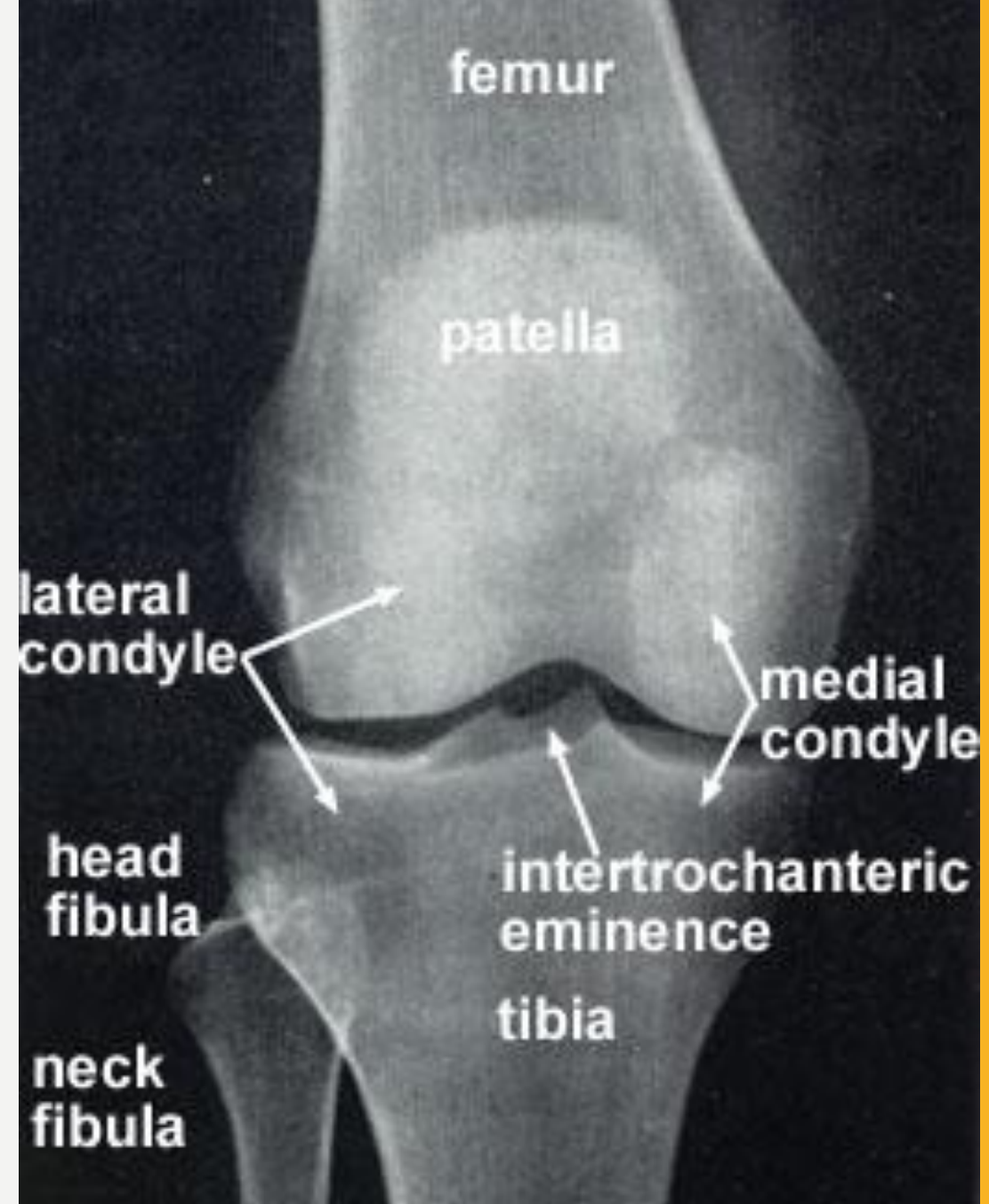
- ☐ If there is recurrent dislocation or underlying fracture with loose bodies or fragments ☐ Operative management

TIBIA

- A large weight-bearing medial bone of the leg
- It articulates with:
 1. The condyles of the femur
 2. The head of the fibula
 3. The talus
 4. The distal end of the fibula
- It has an expanded upper end, a smaller lower end, and a shaft.
- At the upper end, there is the lateral and medial condyles:
 - A. Medial condyle has two features:**
 - Articular surface is oval
 - Has a transverse groove on its posterior aspect for insertion of Semimembranosus muscle.
 - B. Lateral condyle has two features:**
 - Articular surface is circular
 - Has a small circular facet for head of fibula

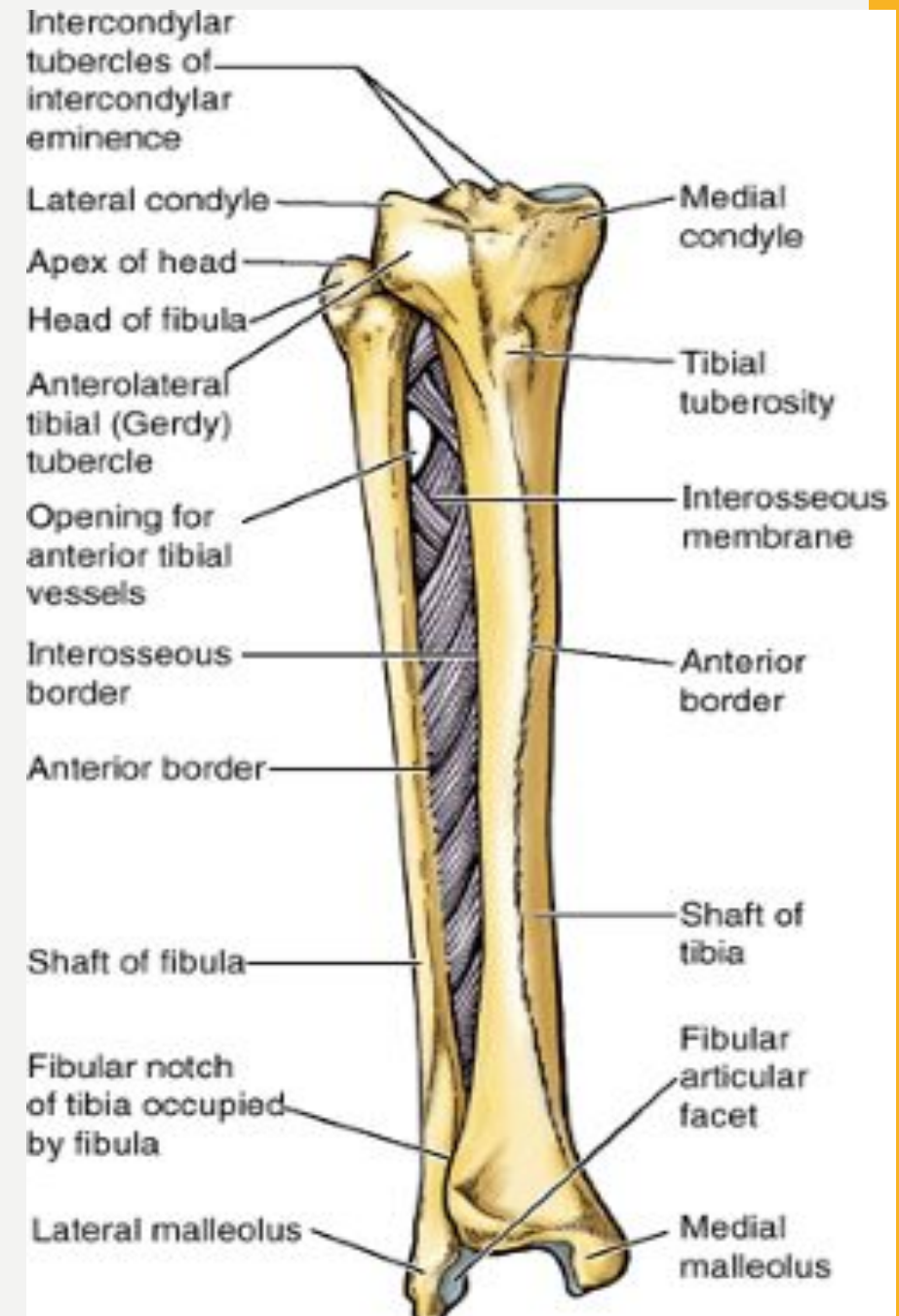


- The upper articular surfaces of the tibial condyles is separated by the **Intercondylar Eminence to Anterior** and **posterior intercondylar** areas.



THE SHAFT OF THE TIBIA

- Triangular in cross section.
- Three borders and three surfaces.
- **Anterior, medial borders and the medial surface are subcutaneous.**
- The anterior border is prominent and **forms the shin.**
- At the junction of the anterior border with the upper end of the tibia is **the tuberosity**, which receives attachment of the ligamentum patellae.
- The anterior border becomes rounded below, where it becomes continuous with the medial malleolus.
- **Junction of middle and lower third of tibia is narrowest part, common site for fracture.**
- The posterior surface of the shaft shows an oblique line, **the soleal line** for the attachment of the soleus muscle.



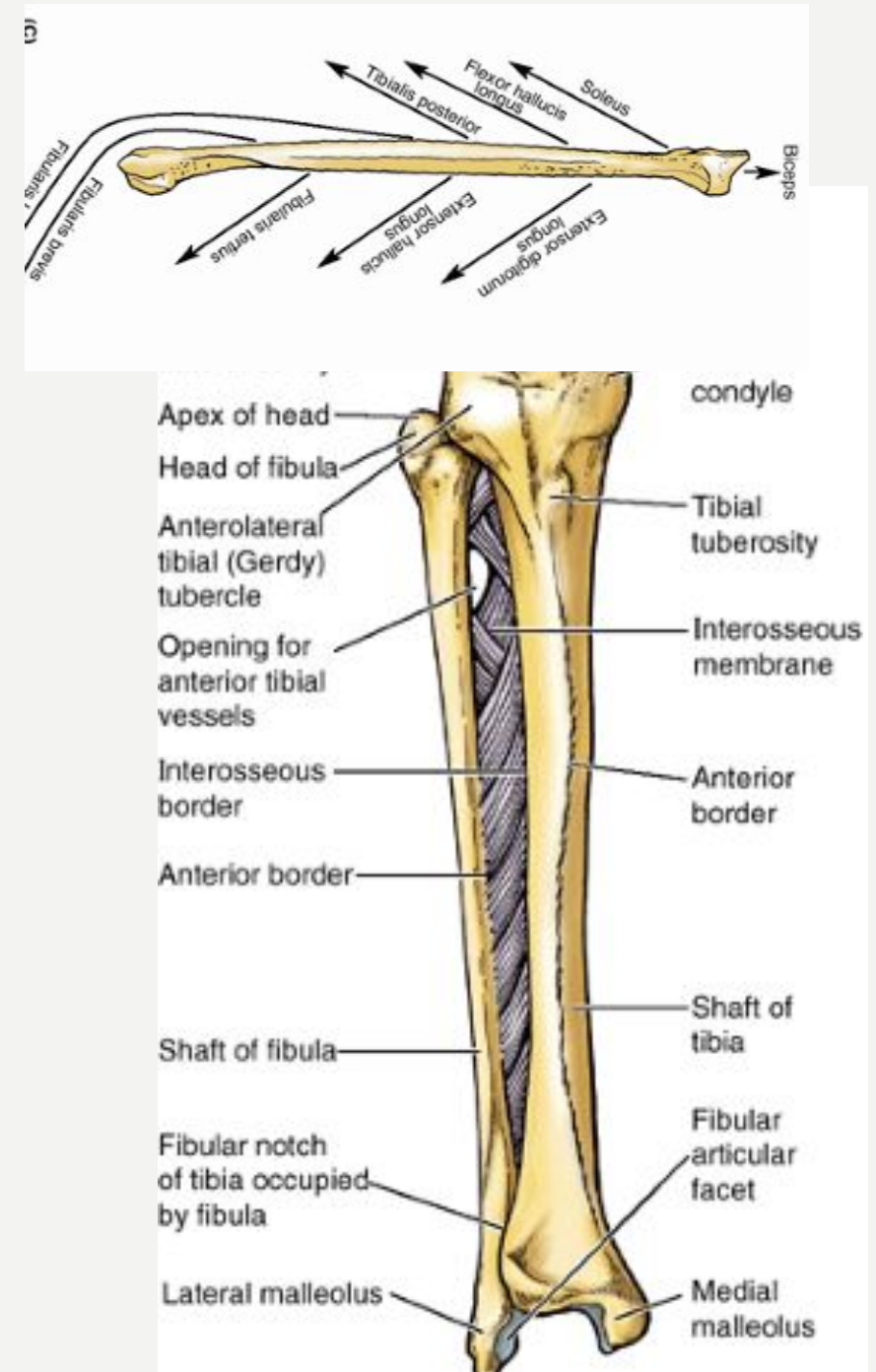
TIBIA

- The lower end of the tibia is slightly expanded and on its inferior aspect shows a saddle-shaped articular surface for the talus.
- The lower end is prolonged downward medially to form the medial malleolus.
- The lateral surface of the medial malleolus articulates with the talus.
- The lower end of the tibia shows a wide, rough depression on its lateral surface for articulation with the fibula.



FIBULA

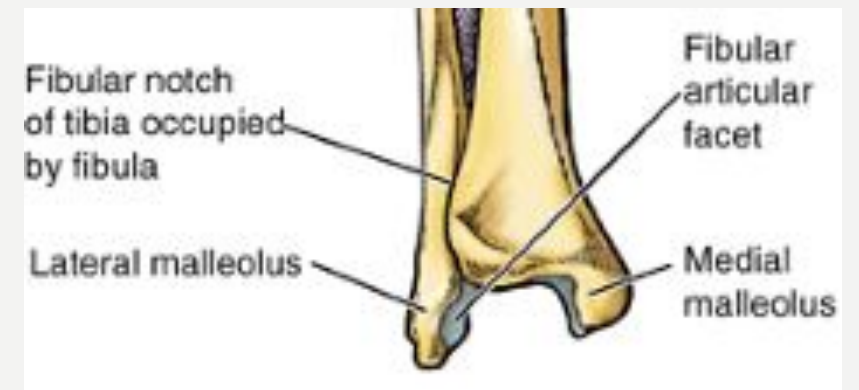
- The slender lateral bone of the leg.
- No part in the articulation at the knee joint.
- No part in the transmission of body weight.
- Below it forms the lateral malleolus of the ankle joint.
- Provides attachment for muscles.
- An expanded upper end, a shaft, and a lower end.
- The **upper end, or head**
 - A **styloid process**.
 - **Articular surface** for articulation with the lateral condyle of the tibia
- The **shaft of the fibula**
 - Long and slender.
 - **Four borders and four surfaces**
 - The medial or interosseous border gives attachment

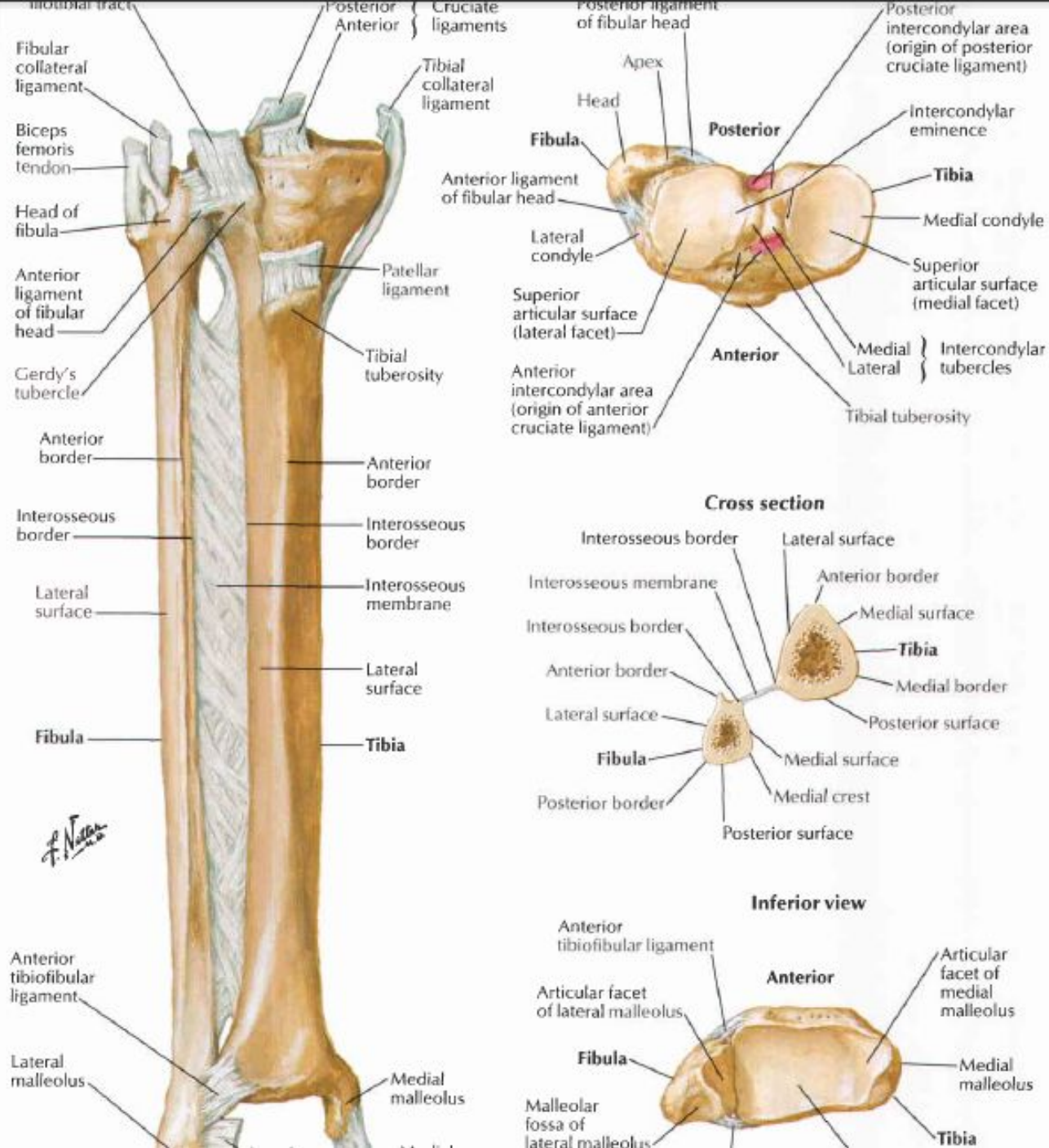


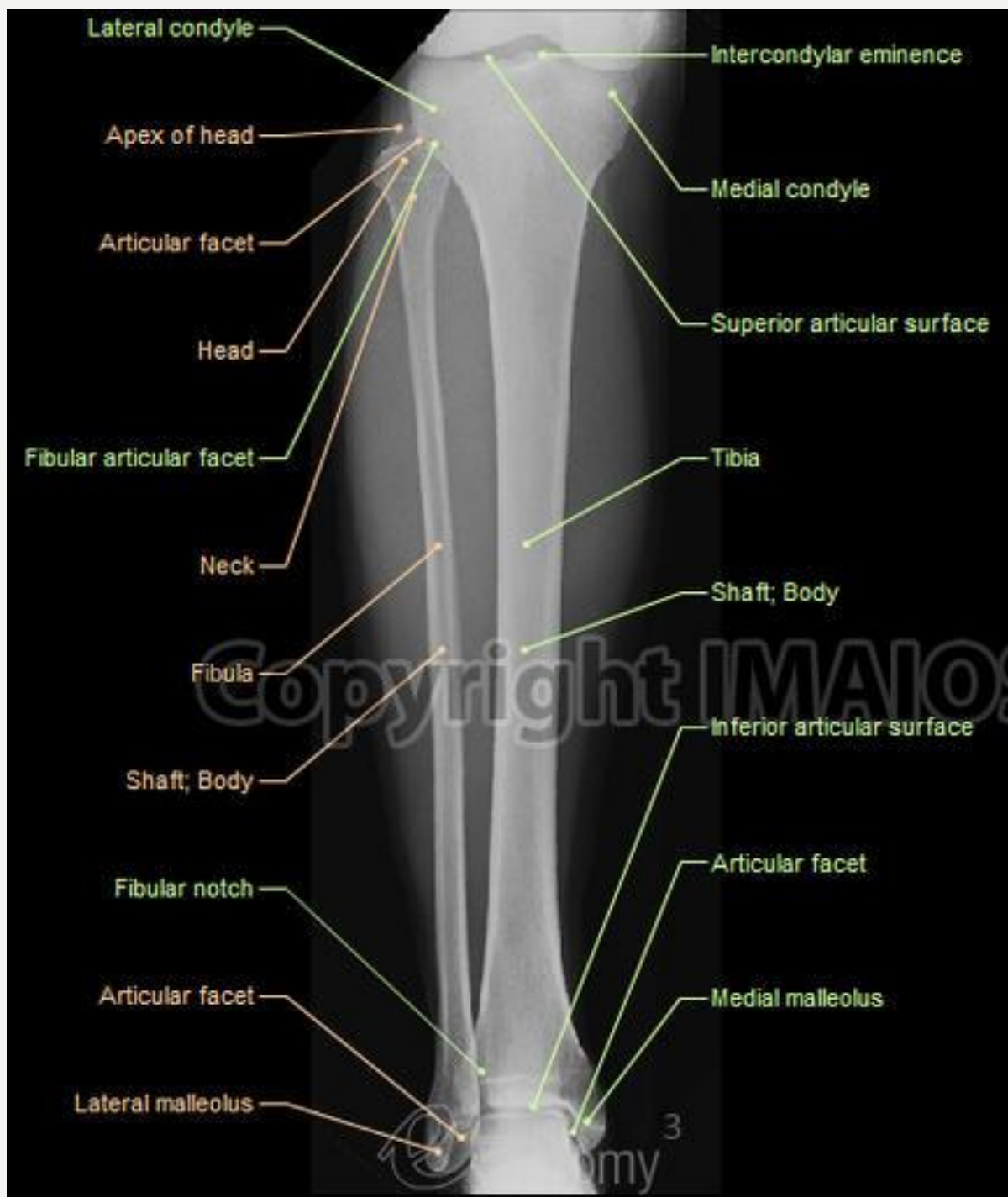
FIBULA

- The **lower end of the fibula**
 - forms the **triangular lateral malleolus**, which is subcutaneous.
 - On the medial surface of the lateral malleolus is a triangular **articular facet** for articulation with the lateral aspect of the talus.

FIG. 477.—The lower end of the right fibula. Medial aspect.







Supporting Structures

```
graph TD; A[Supporting Structures] --> B[Capsule:]; A --> C[Extracapsular ligaments:]; A --> D[Intracapsular ligaments]; B --> E[2 parts]; C --> F[5 ligaments]; D --> G["• ACL<br/>• PCL<br/>• Menisci"]
```

Capsule:

2 parts

**Extracapsular
ligaments:**

5 ligaments

**Intracapsular
ligaments**

- **ACL**
- **PCL**
- **Menisci**

EXTRACAPSULAR LIGAMENTS

1. Patellar ligament:

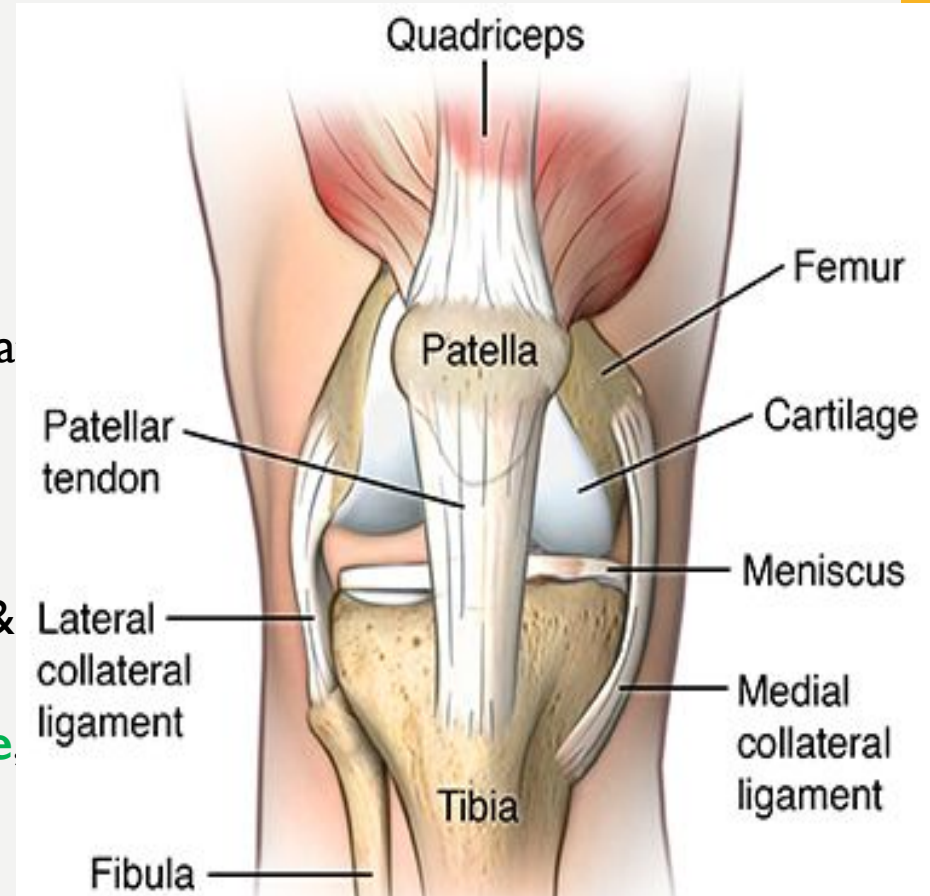
- Distal part of quadriceps tendon
- **Extends from:** Patellar apex □ to Tibial tuberosity

2. Fibular Collateral Ligament (also known as the lateral collateral ligament “LCL”)

- **Extends from:** lateral Epicondyle of femur □ to Head of fibula (La
- Injured in *violent abduction of knee*.

3. Tibial Collateral Ligament (also known as the medial collateral ligament “MCL”):

- **Extends from:** Medial epicondyle of femur □ to Medial condyle & surface of tibia.
- Liable to injury in *direct contact from the outside of the knee landing forcefully, rapid changes in direction while running, or a twisting motion to the knee* where it turns inwards can result in a sprain or tear of the ligament.
- MCL injuries also often occur at the same time as an anterior cruciate ligament (ACL) injury.



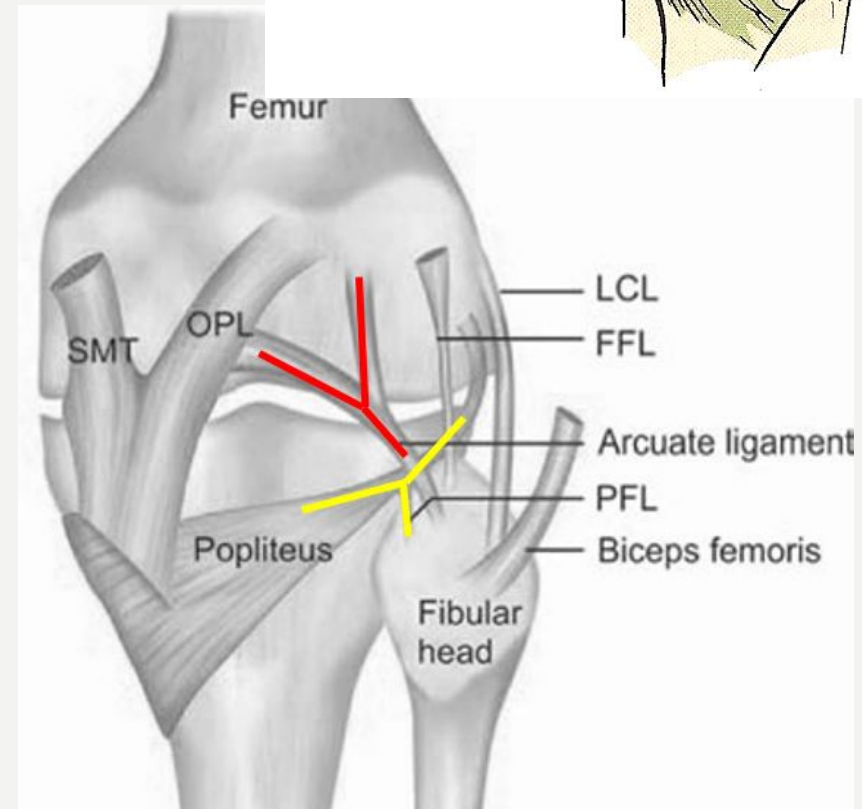
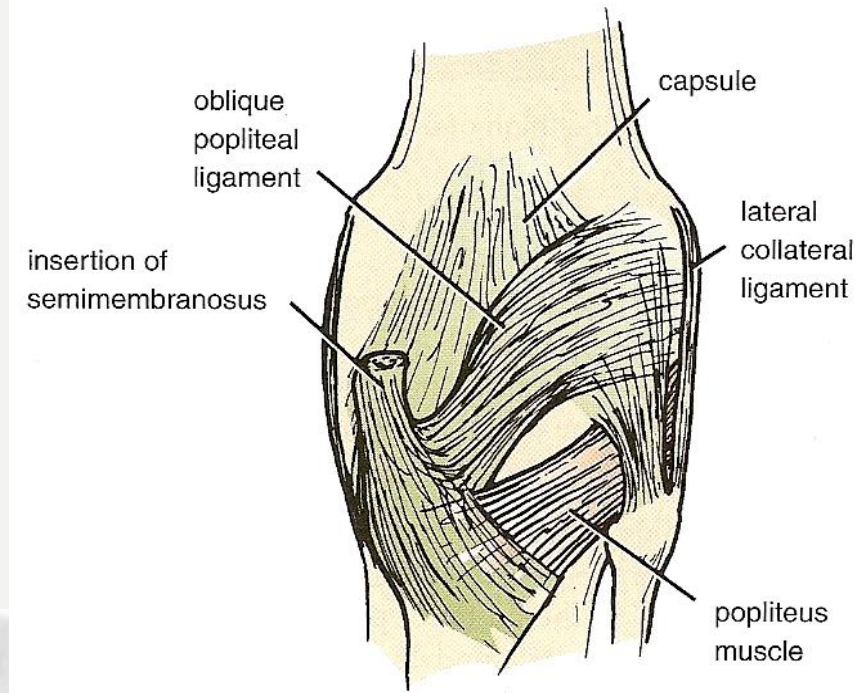
4. Oblique Popliteal ligament:

- Reflected expansion of Semimembranosus tendon
- Passes upwards and laterally to lateral condyle of femur.

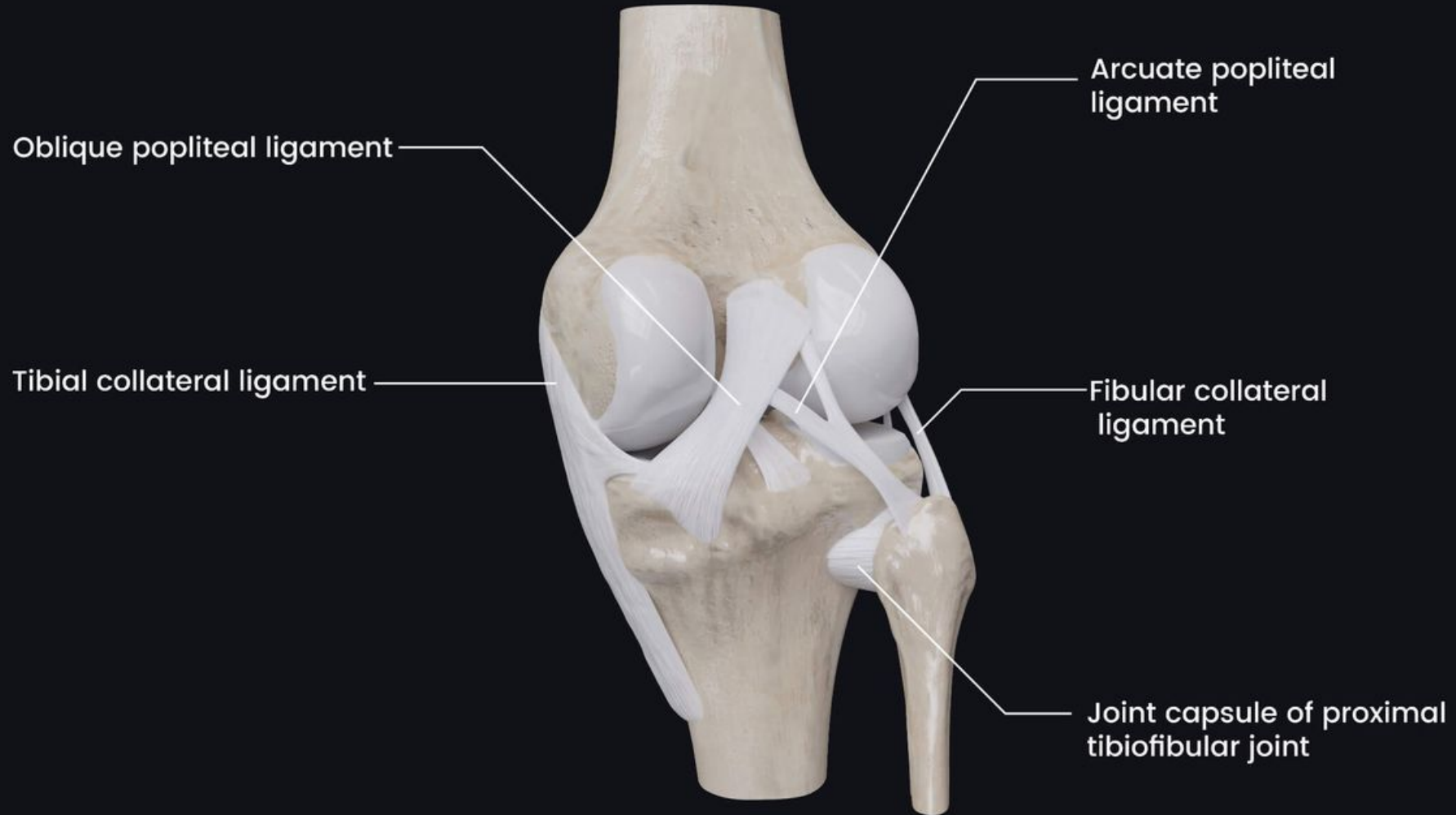
5. Arcuate Popliteal ligament:

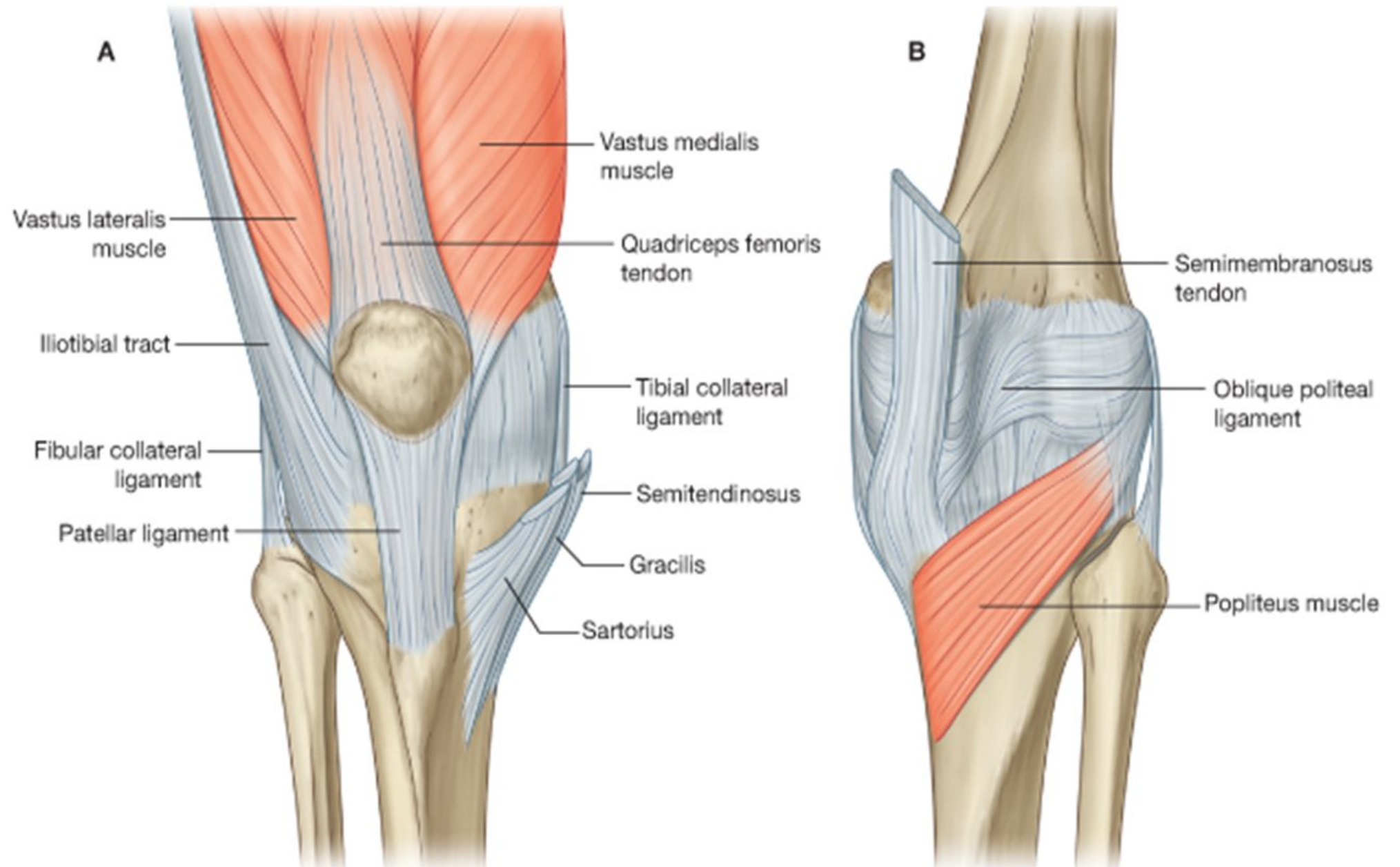
= Arcuate ligament

- The arcuate popliteal ligament is an Y-shaped extracapsular ligament of the knee.
 - It has its **origin at** the posterior aspect of the head of the fibula.
 - **It has two insertions:**
 - The **medial limb** blend with the oblique popliteal ligament;
 - The **lateral limb** passes to the lateral epicondyle of the femur
 - Covers the popliteus tendon & strengthens the capsule
- ☐ Both lig. blend into fibrous capsule



Extracapsular ligaments of knee joint

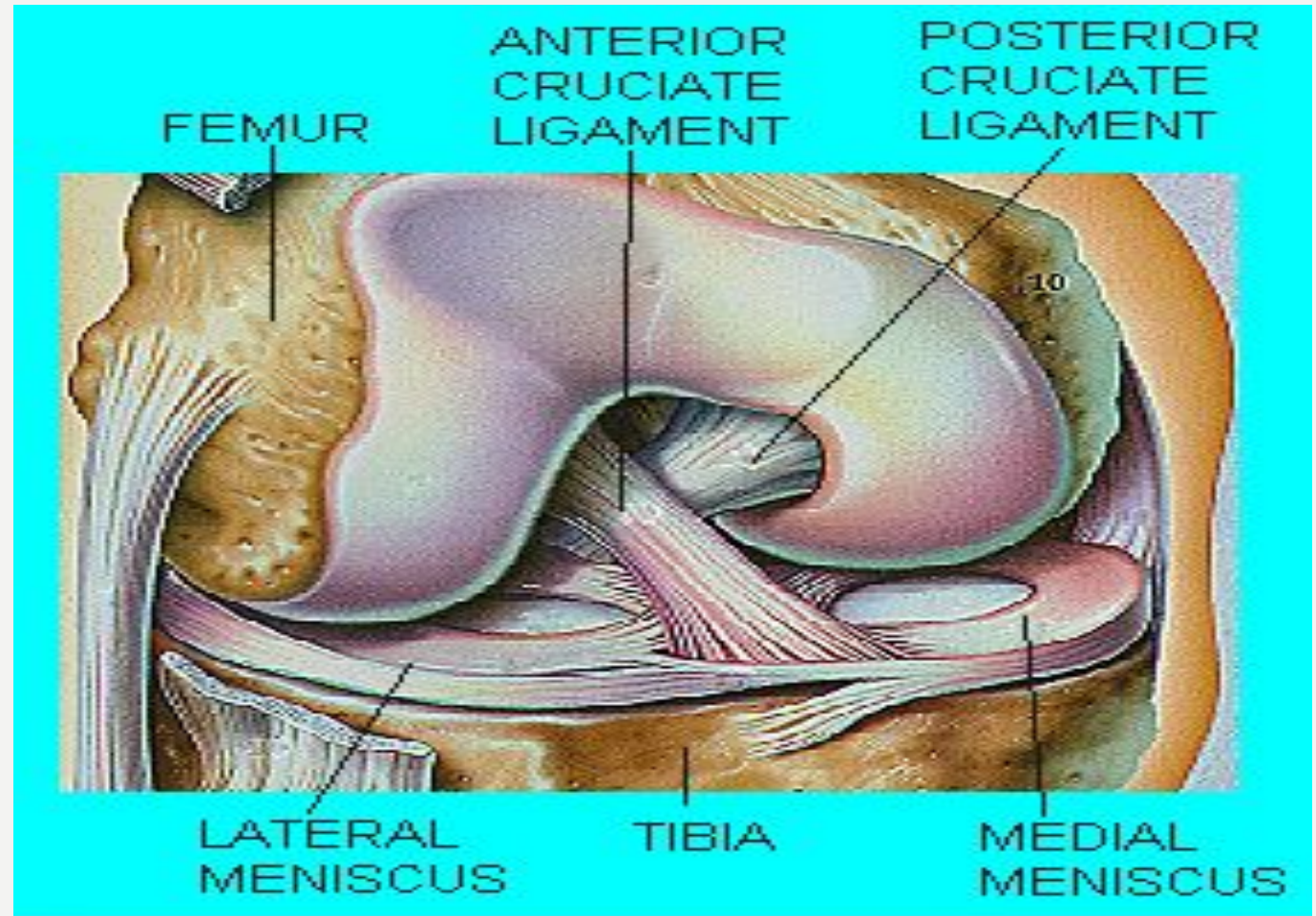




INTRA CAPSULAR LIGAMENTS

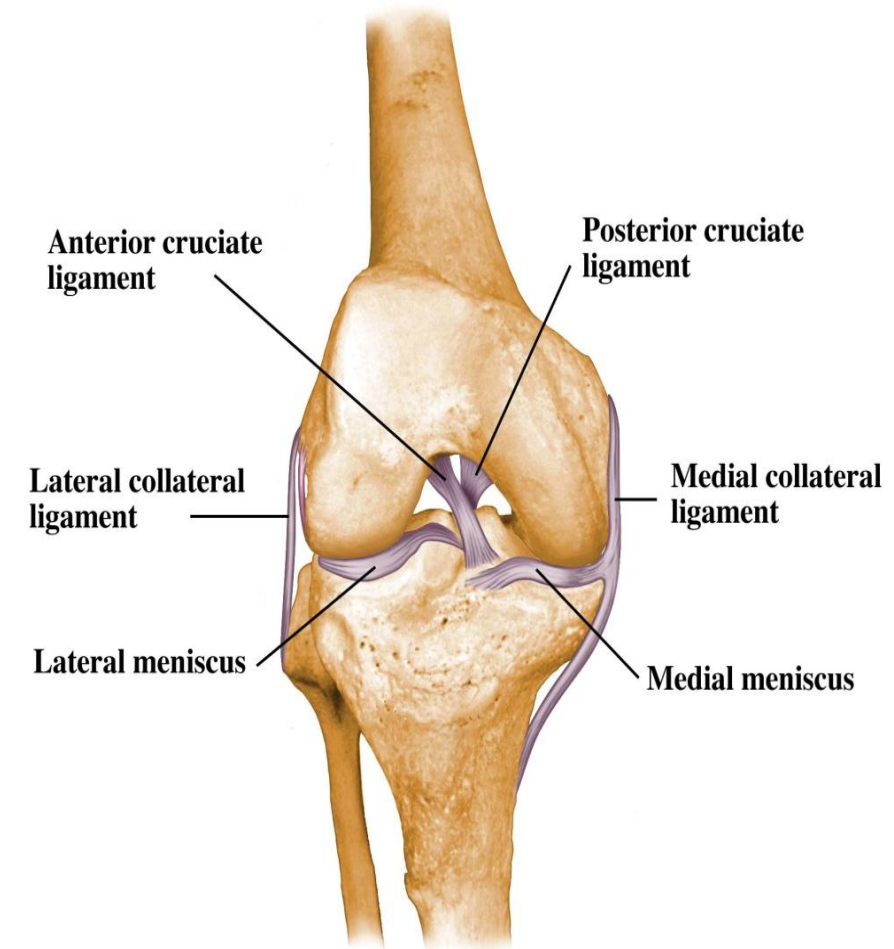
Cruciate Ligaments:

- Join the femur to intercondylar region of the tibia.
- Named according to their tibial attachment.
- Pass in criss-cross direction (X)
- They are NOT included within the synovial cavity.



I. Ant. Cruciate Ligaments:

- Ant. intercondylar area behind.
- **Role:** Prevent hyper extension, and Prevent posterior displacement of femur or anterior displacement of tibia
- **Course:** From anterior horn of medial semilunar cartilage □ pass Postero-laterally □ to the Posterior surface Lateral condyle of femur.
- Relaxed when knee is flexed, and tense in extension.
- Relatively weak ligament with poor bld. Supply.
- More susceptible to injuries than the posterior cruciate ligaments.
- **Mechanism of injury:**
 - **Noncontact mechanism** — The typical mechanism for a noncontact ACL injury involves a running or jumping athlete who suddenly decelerates and changes direction (eg, cutting) or pivots or lands in a way that involves rotation and lateral bending (ie, valgus stress) of the knee.
 - **Contact mechanism** — Contact-related ACL injuries usually occur from a direct blow causing hyperextension or valgus deformation of the knee.





Normal
Neutral stance



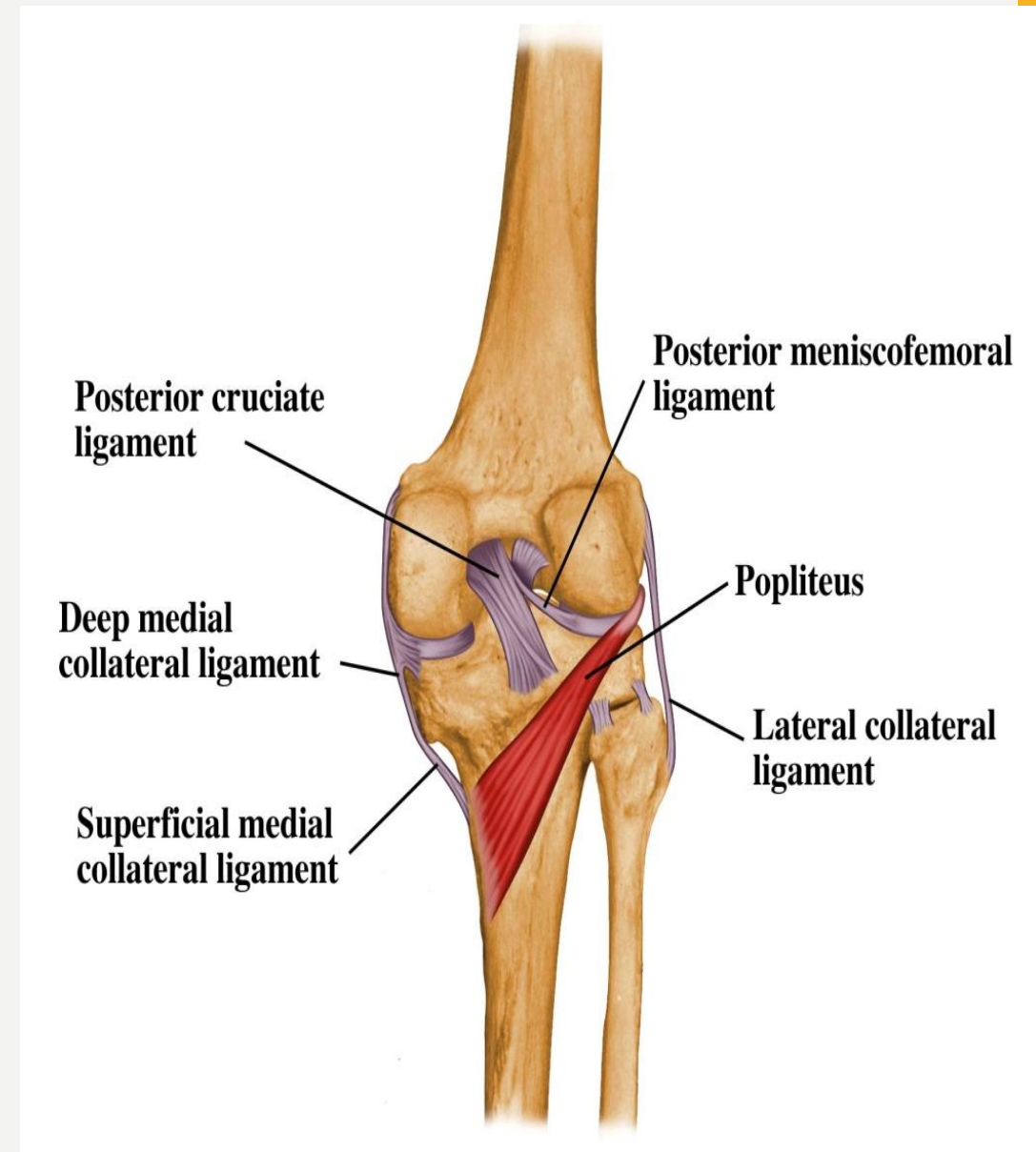
Varus deformation
Bow-legged



Valgus deformation
Knock-kneed

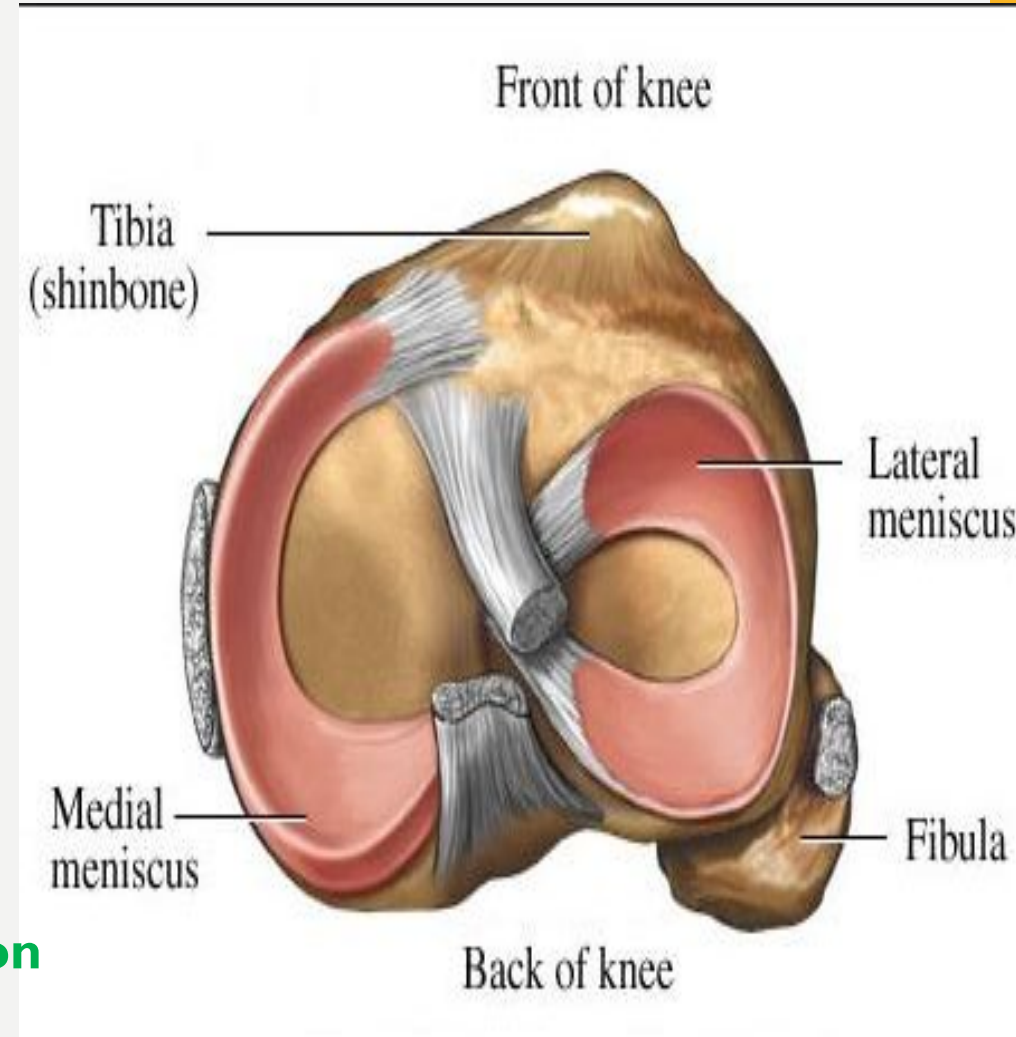
2. Post. Cruciate Ligaments:

- Strong ligament.
- Course: Most posterior part of Post. intercondylar area □ pass up antero-medially □ to anterior part of lateral surface of Medial condyle of femur.
- Stronger than ant. Cruciate.
- Relaxed in extension, and tense in flexion.
- Role: Prevent forward dislocation of femur, or backward dislocation or tibia.
- **Mechanism of injury:**
 - Posterior cruciate ligament (PCL) injuries may be sustained when a posteriorly directed shear force is applied to a flexed knee, primarily during motor vehicle collisions (MVCs).
 - PCL injuries sustained during athletics typically occur when an athlete falls on their flexed knee while the foot is plantarflexed or from a direct blow to the anterior knee.



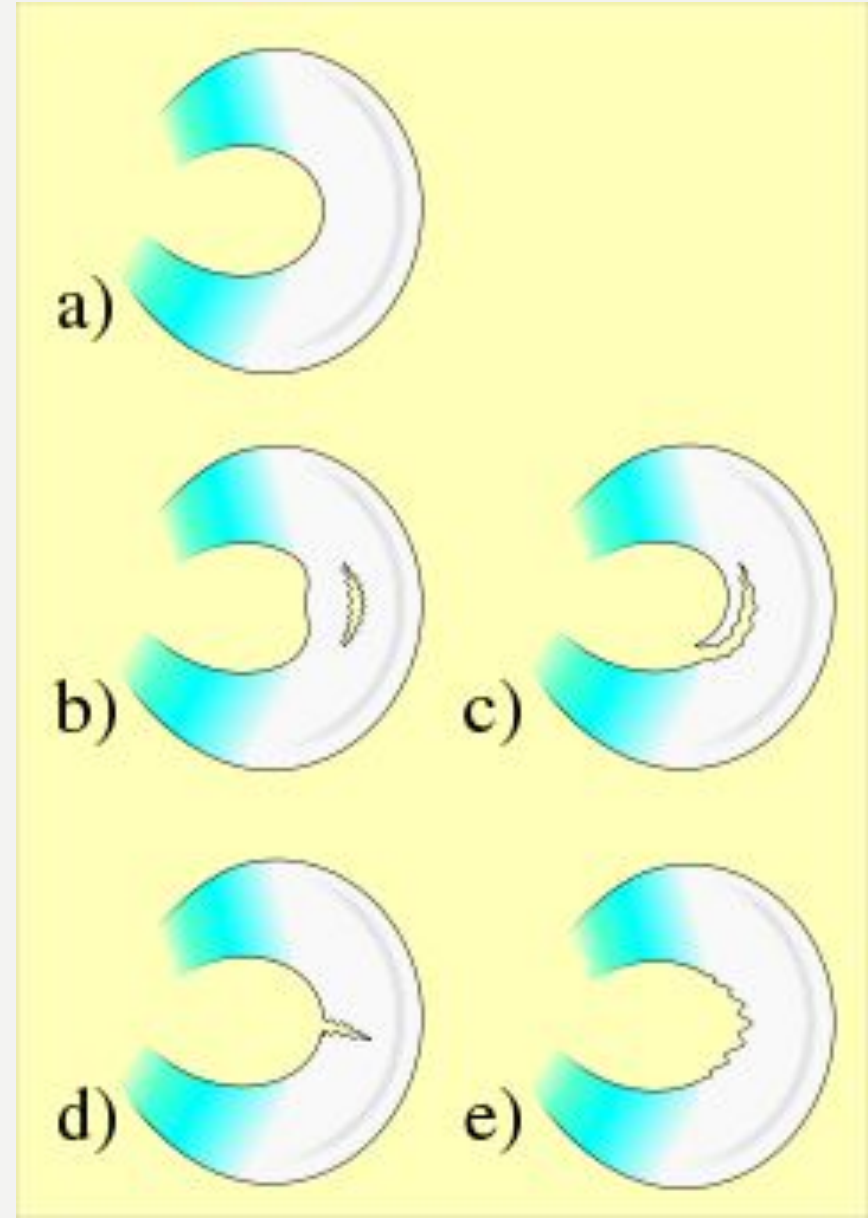
3. Menisci:

- C-shaped sheets of fibro cartilage.
- Lie on upper condyle of tibia.
- Thick convex peripheral borders.
- Attached to the capsule.
- Thin concave inner borders attached by anterior and posterior horn to ICA with free edge.
- **Significance:**
 1. Reduce friction & shock absorption
 2. Deepen the tibial condyles
- **Mechanism of injury:**
 - **Acute meniscal tears typically occur when a person changes direction in a manner that involves rotating or "twisting" the knee while the knee is flexed and the corresponding foot is planted.**
 - Such a maneuver places compressive, rotational, and shear stresses on the meniscus, which if they are excessive cause the meniscus to tear.



PTYPES OF MENISCUS TEAR

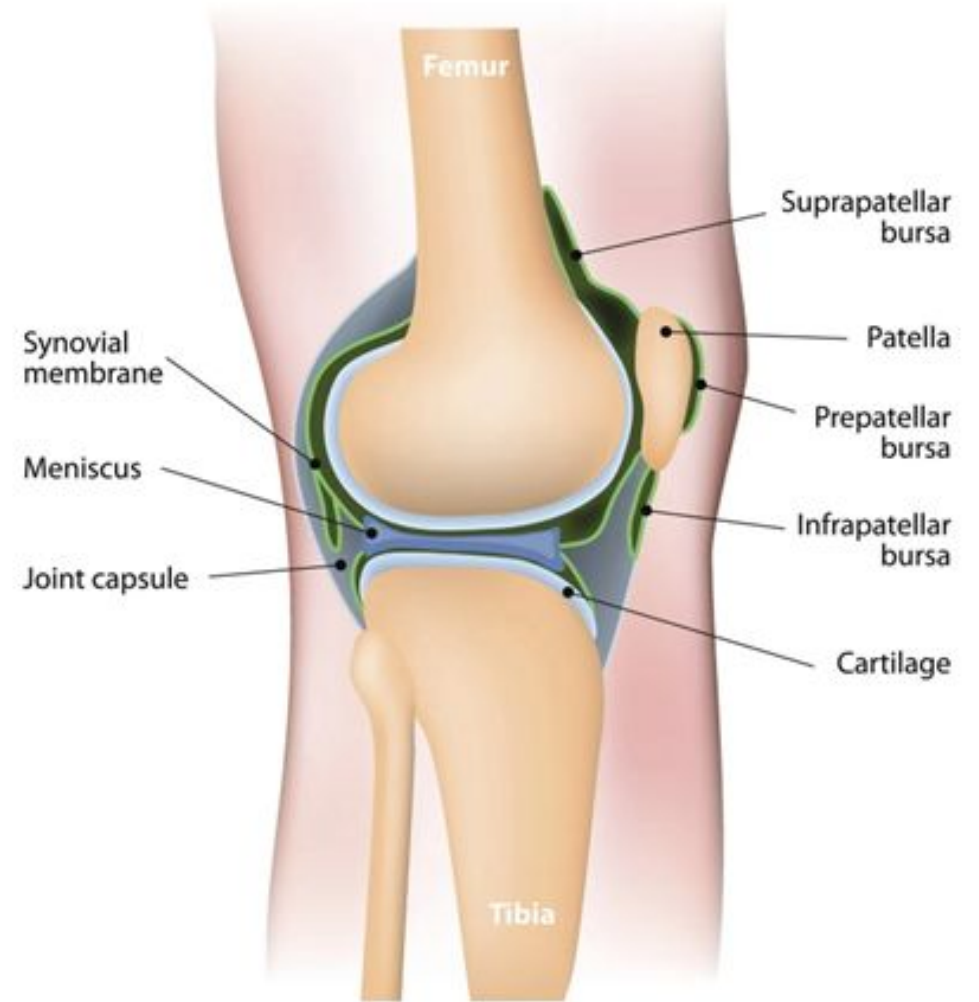
- a) Normal meniscus
- b) Longitudinal Tear
- c) Bucket Handle Tear
- d) Radial Tear
- e) Degenerative changes



KNEE CAPSULE

- The knee capsule is a dual-layered structure that surrounds the knee joint.
- It is relatively **thin anteriorly and posteriorly** and **thickened laterally** by the collateral ligaments.
- **The outer layer of the knee capsule** consists of fibrous connective tissue to hold the joint in place, whereas **the inner layer** consists of a synovial membrane which secretes synovial fluid into the joint to provides lubrication.

Synovial joint of the knee



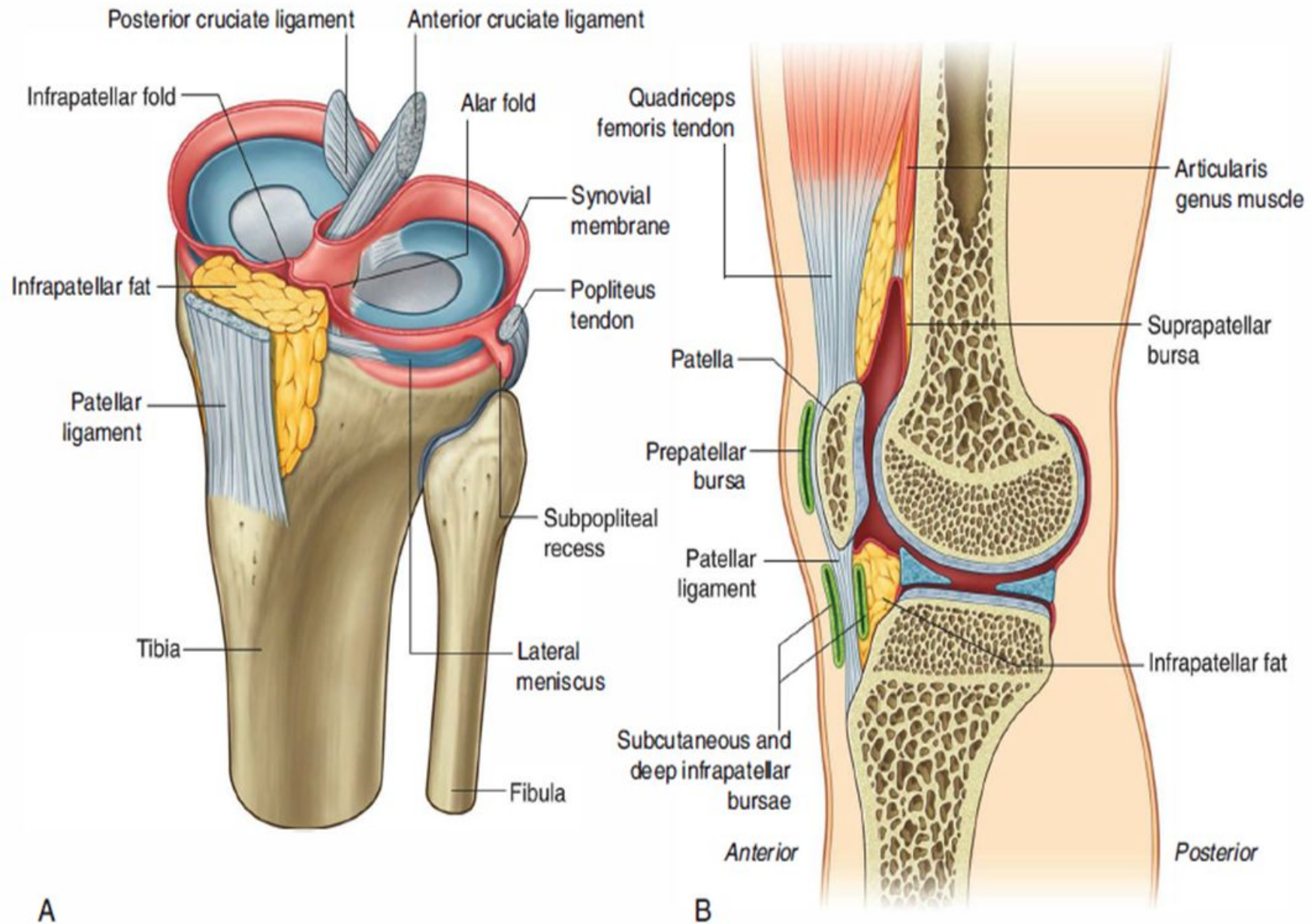


Fig. 6.72 Synovial membrane of the knee joint and associated bursae. **A.** Superolateral view; patella and femur not shown. **B.** Paramedial sagittal section through the knee.

BURSAE OF KNEE JOINT

- Fluid filled sacs to reduce friction.
- Usually beneath ligaments & tendons.
- Some are Continuation of synovial capsule.
- Usually around ~ 12 bursae
- **Main ones:** Anterior (4), medial (1), & posterior (2).

I- Anterior

1. Suprapatellar bursa:

- Beneath quadriceps tendon, communicate with joint cavity
- Extend 5 cm above patella in a hole in capsule

2. Prepatellar bursa :

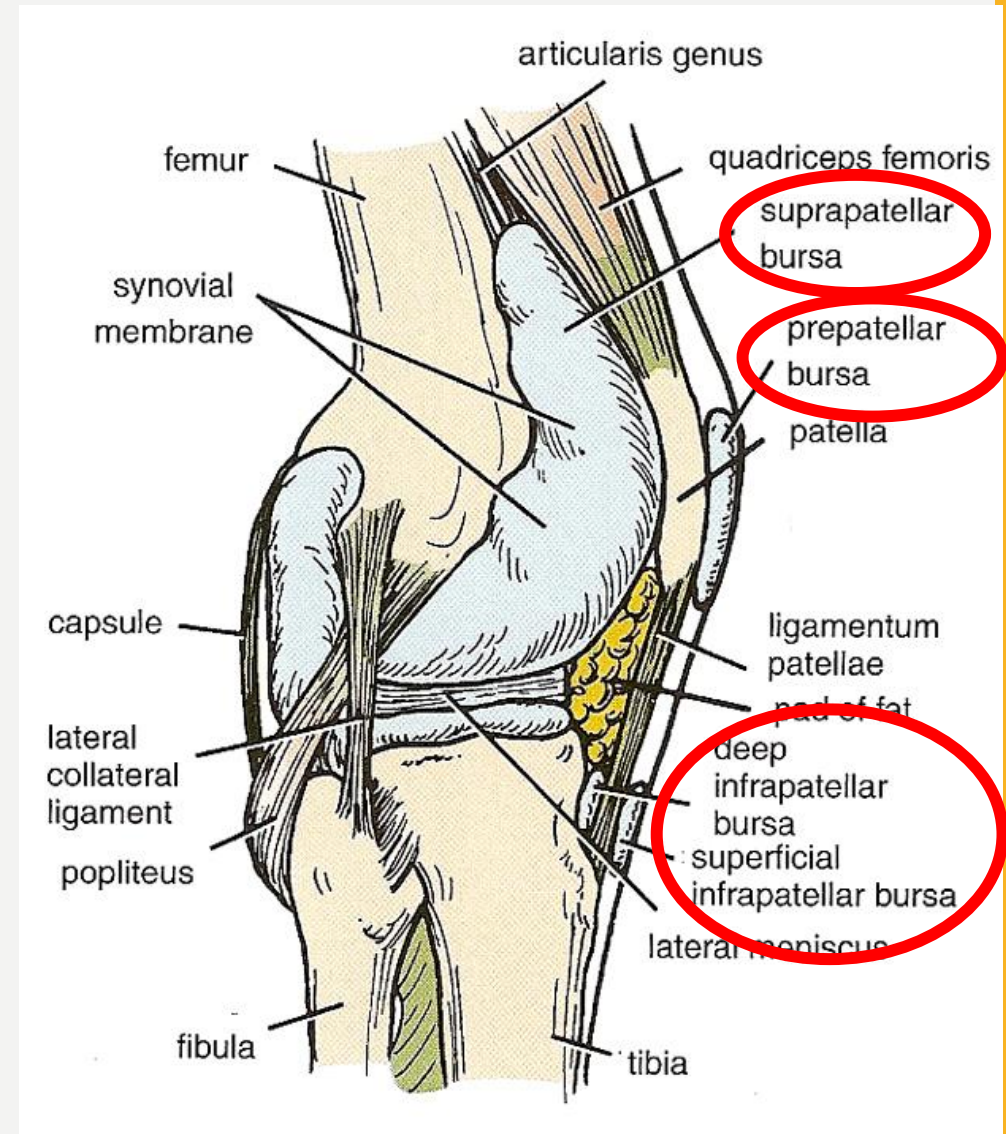
- Subcutaneous, in front of the patella.

3. Superficial infrapatellar bursa :

- Ant. to patellar ligament.

4. Deep infrapatellar bursa :

- Post. (beneath) the patellar ligament.



II- Medial bursa:

- Called subsartorial bursa or Anserine bursa
- Between Semitendinosus, & tibial collateral ligament.

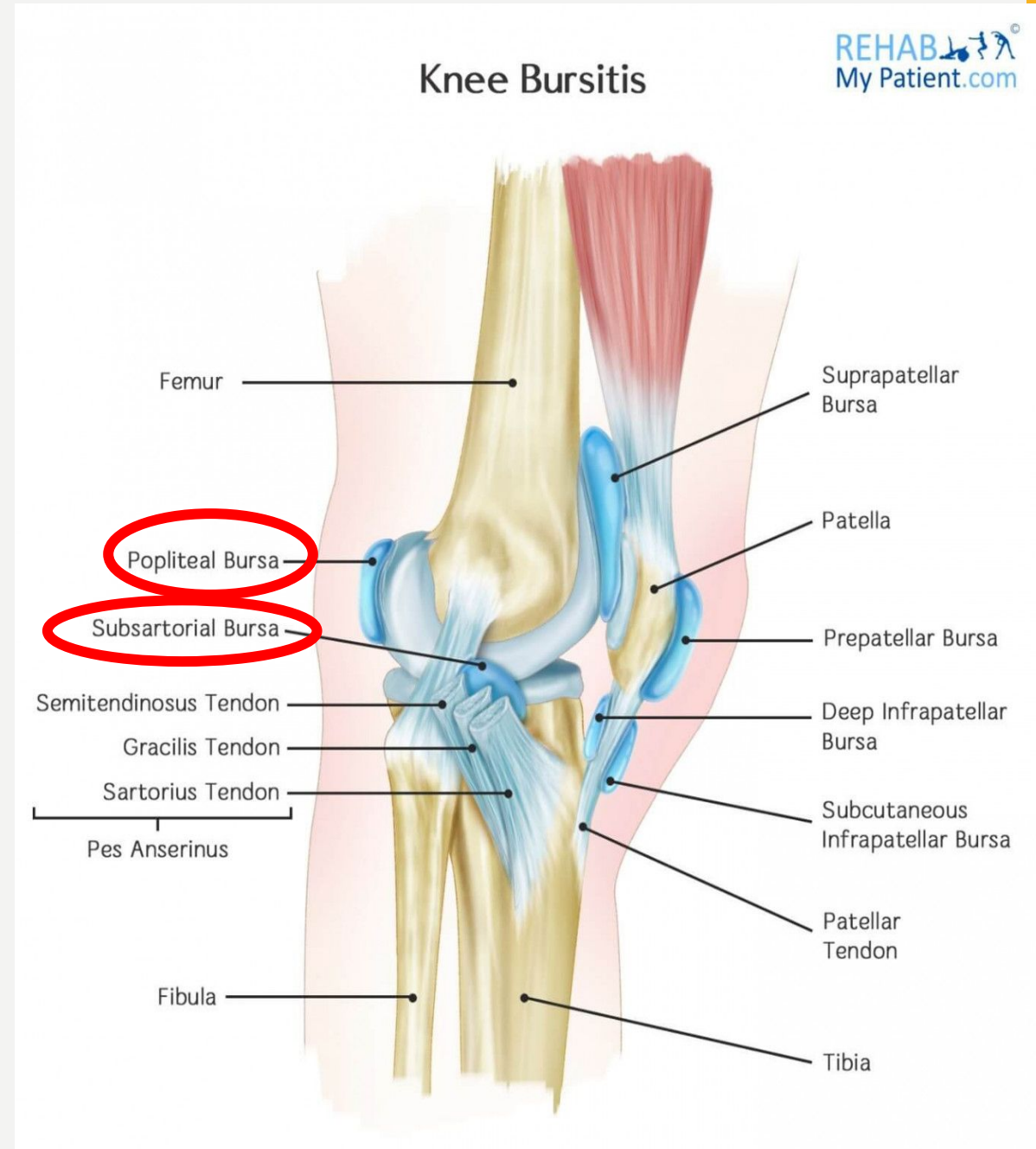
III- Posterior bursa

1. Popliteal bursa:

- Beneath popliteus tendon communicate with joint cavity

2. Semimembranosus bursa:

- Between medial head of gastrocnemius muscle and medial femoral condyle

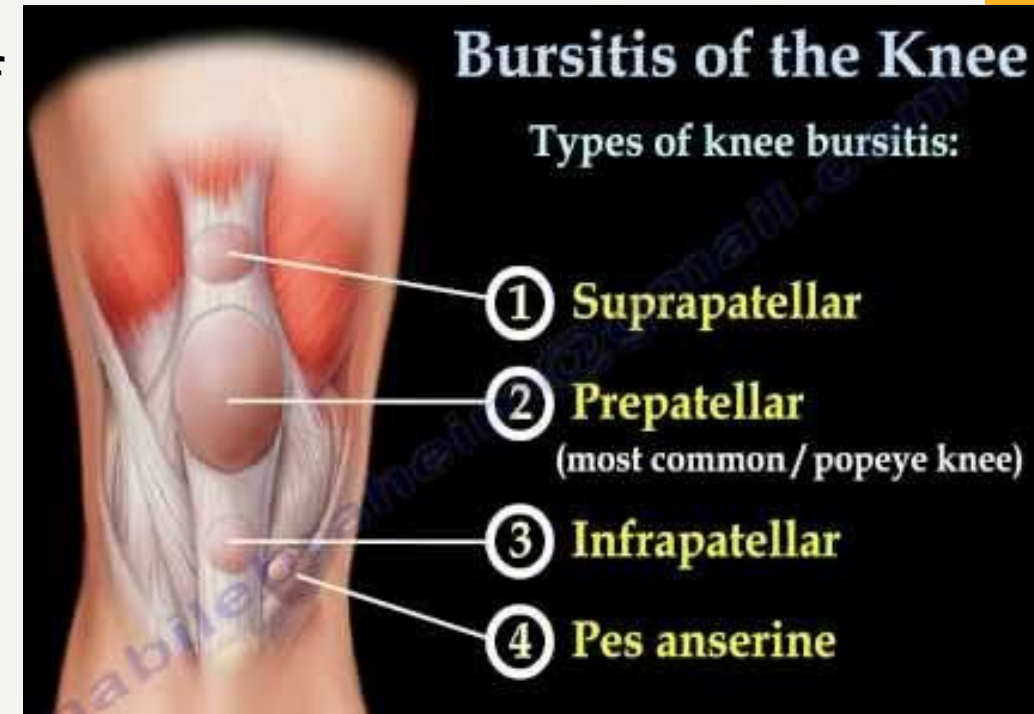


BURSITIS OF THE KNEE

- There is 4 types of bursitis that can affect the knee (see the photo)

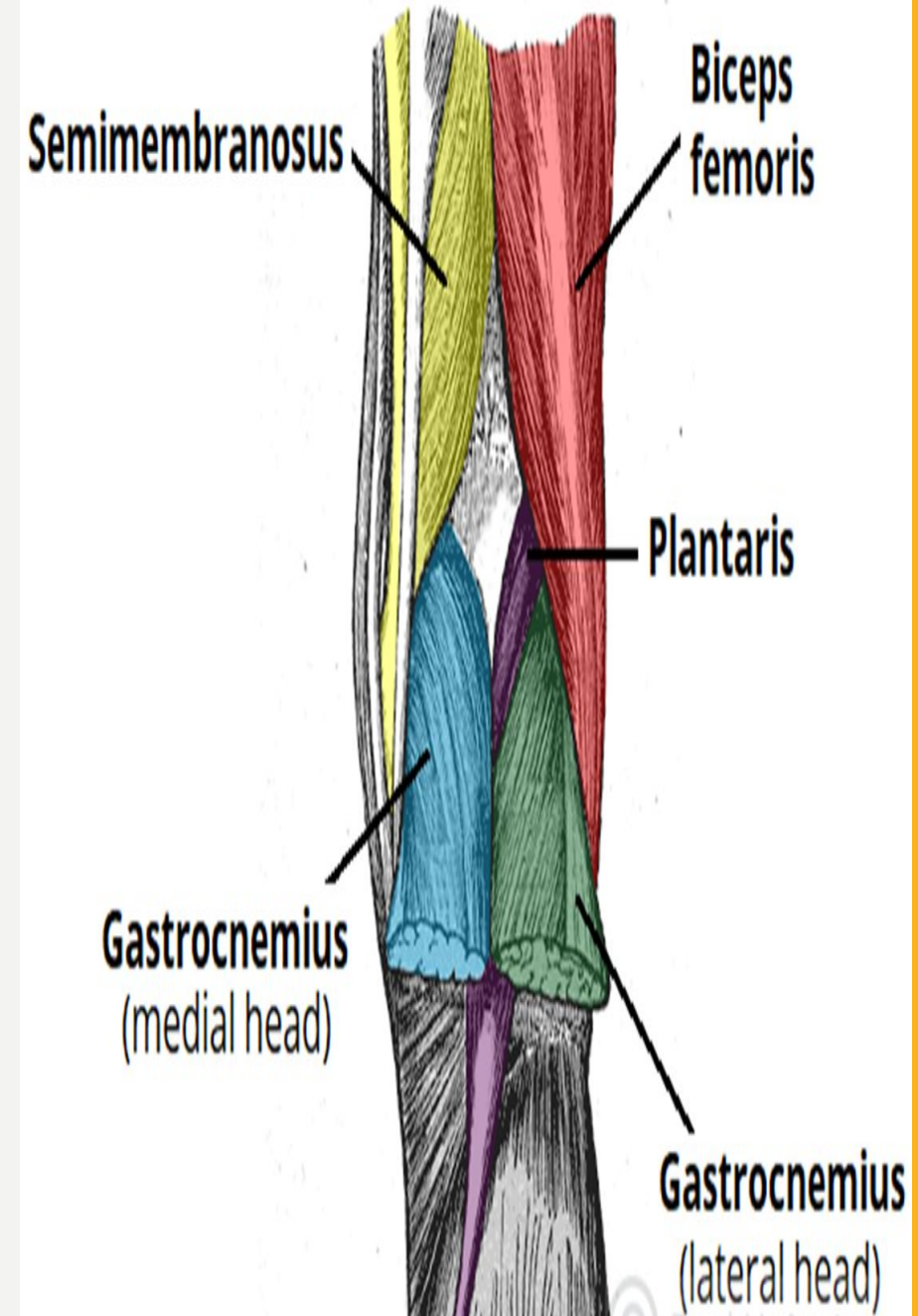
Prepatellar Bursitis (Housemaid's Knee)

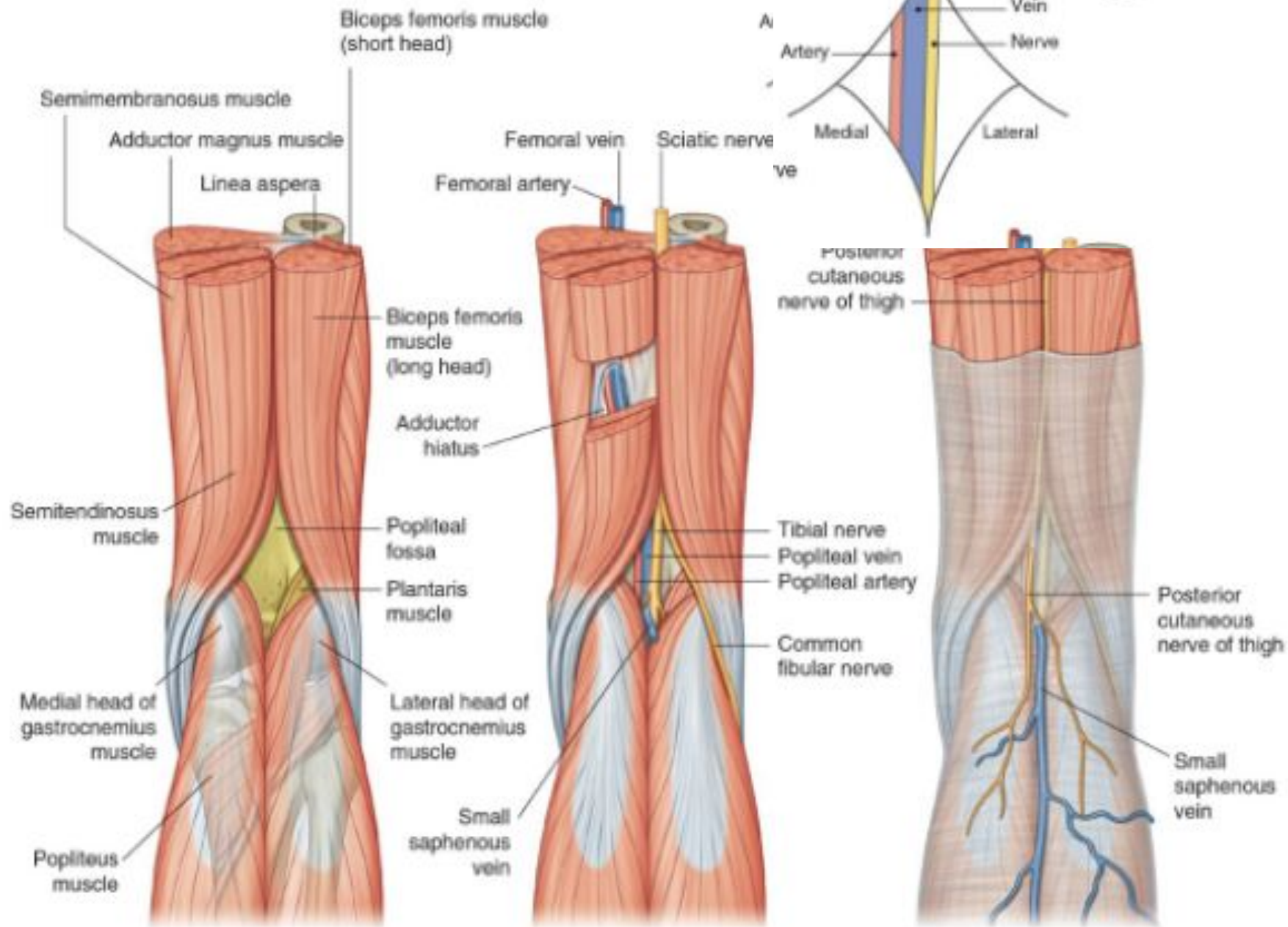
- Prepatellar bursitis is the swelling and inflammation of the anterior knee bursa associated with pain with kneeling.
- Prepatellar bursitis is often caused by pressure from **constant kneeling**. Plumbers, roofers, carpet layers, coal miners, and gardeners are at greater risk for developing the condition. **A direct blow to the front of knee** can also cause prepatellar bursitis.
- Diagnosis is made clinically with mild swelling and tenderness over the anterior knee overlying the patella.
- Treatment is nonoperative with compressive wraps and NSAIDs. Occasionally, in the setting of septic bursitis, antibiotics may be indicated.



POPLITEAL FOSSA

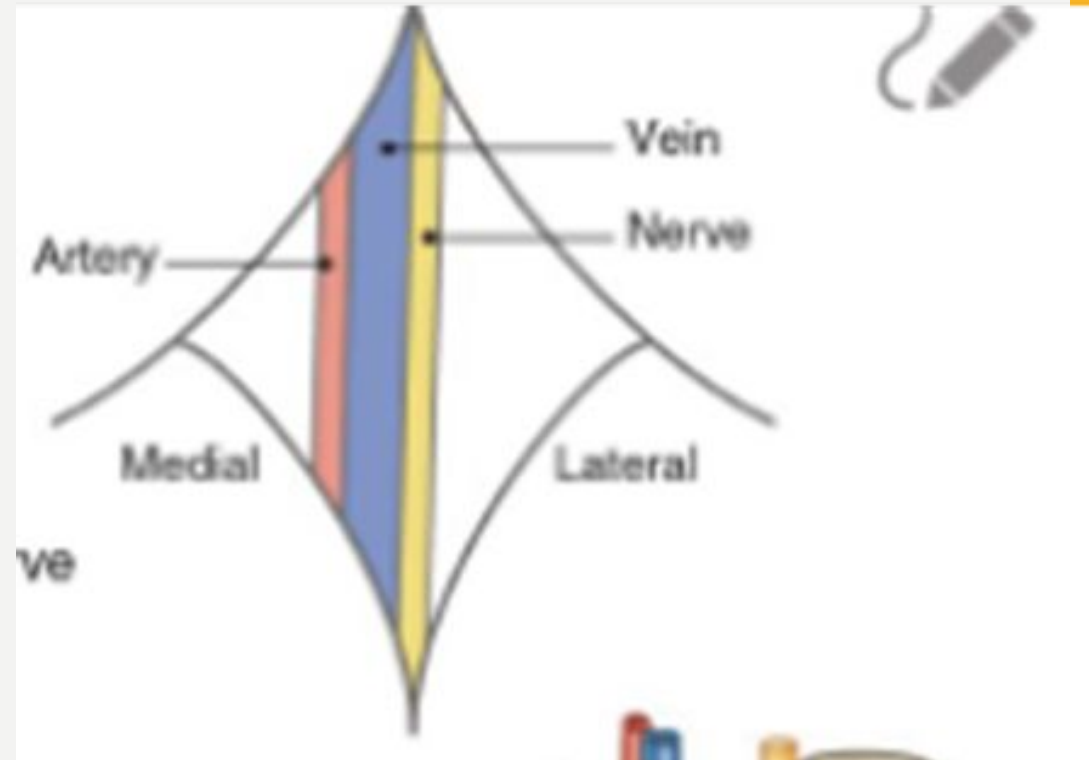
- The **popliteal fossa** is a diamond shaped area located on the posterior aspect of the knee. It is the main path by which vessels and nerves pass between the thigh and the leg.
- **Boundaries:**
 1. **Superomedial border** – semimembranosus, semitendinosus.
 2. **Superolateral border** – biceps femoris.
 3. **Inferomedial border** – medial head of the gastrocnemius.
 4. **Inferolateral border** – lateral head of the gastrocnemius and plantaris.
 5. **The floor** of the popliteal fossa is formed by the posterior surface of the knee joint capsule, popliteus muscle and posterior femur.
 6. **The roof** – is made of up two layers: popliteal fascia and skin.





POPLITEAL FOSSA CONTENT

- **Popliteal artery:**
 - Appears on the upper medial side of the popliteal fossa.
 - Is the deepest structure of fossa.
- **Popliteal vein:**
 - It exits the popliteal fossa superiorly to become the femoral vein by passing through the adductor hiatus.
- **The tibial and common fibular nerves**
 - originate proximal to the popliteal fossa as the two major branches of the sciatic nerve.
 - They are the most superficial structures in the popliteal fossa
- **Popliteal LNS 6-7.**



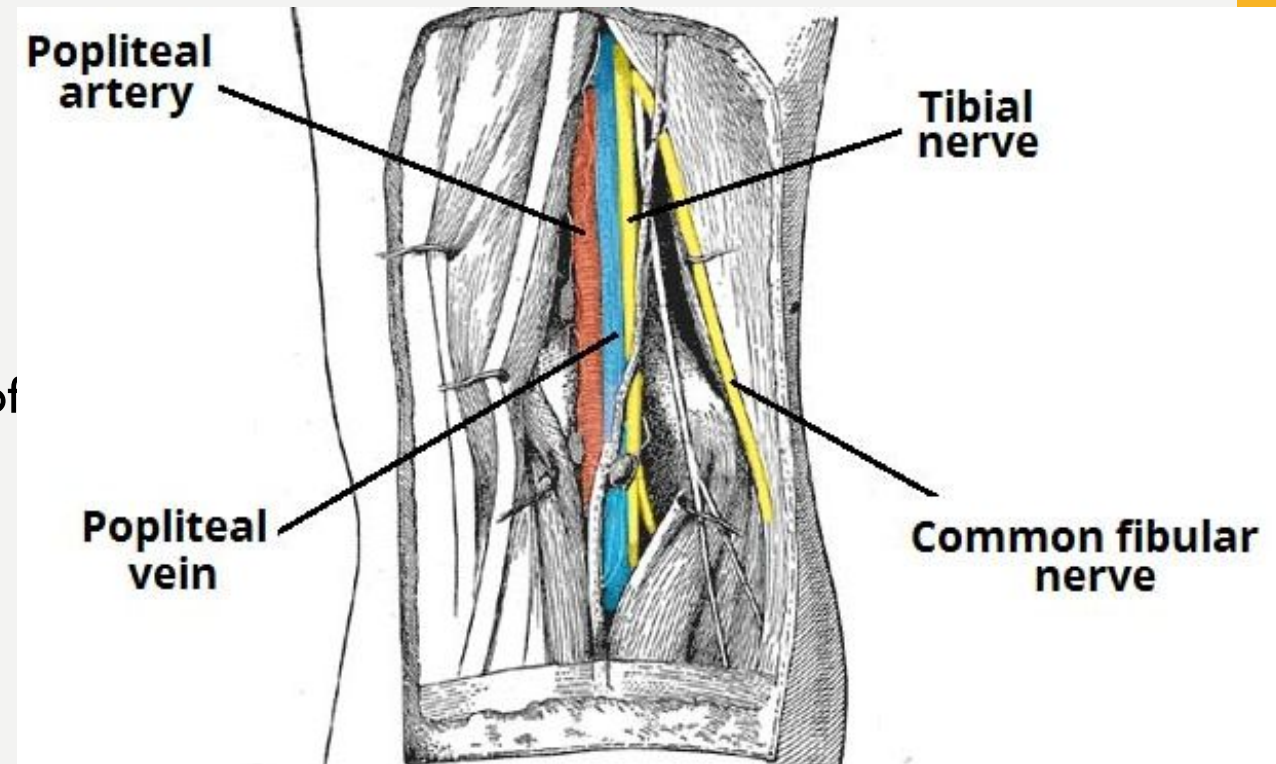
POPLITEAL FOSSA CONTENT

- **Common fibular nerve:**

- Enter fossa at upper angle
- Pass downward, laterally close to biceps, leave fossa at lateral angle.
- Continues to the lateral side of the leg where it swings around the neck of the fibula and enters the lateral compartment of the leg.

- **Tibial nerve:**

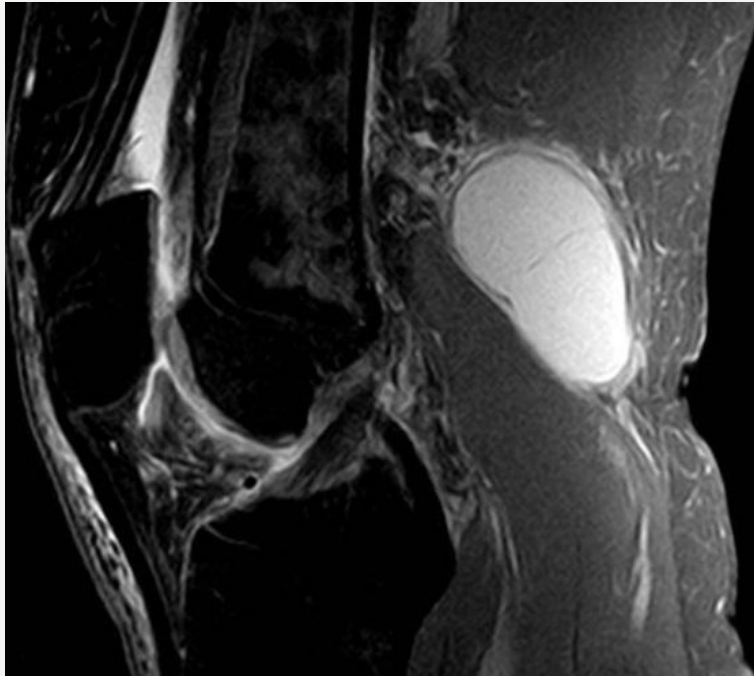
- The tibial nerve descends vertically through the popliteal fossa to enter the posterior compartment of the leg.



PATHOLOGIC CONTENT

Baker cyst:

- If rupture can cause DVT like pain



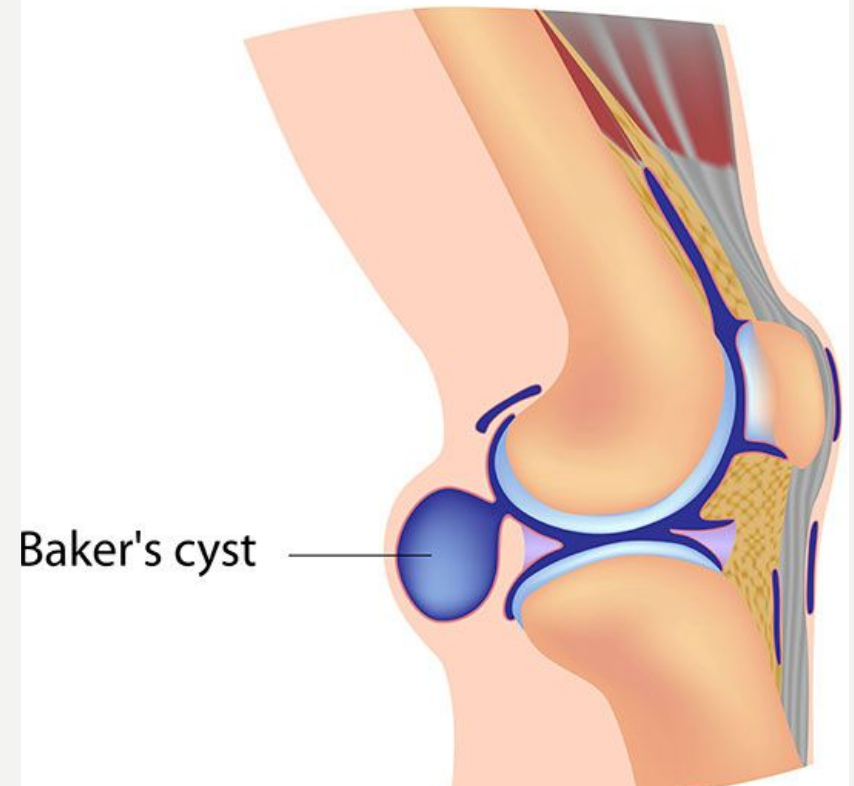
Popliteal aneurysm:

- Pulsating mass
- May cause compression symptom on the tibial nerve (weakness plantar flexion, numbness on foot and posteriolateral leg)



BAKER CYSTS

- Baker cysts, or popliteal cysts, are fluid-filled distended synovial-lined lesions arising in the popliteal fossa between the medial head of the gastrocnemius and the semimembranosus tendons via a communication with the knee joint.
- They are usually located at or below the joint line.
- **Epidemiology:**
 - Two peaks are described: at 4-7 years and 35-70 years.
- **Associated conditions:**
 1. Degenerative arthropathy
 2. Rheumatoid arthritis
 3. Charcot joint involving the knee
 4. Post-traumatic in athletes
- **Clinical presentation:**
 - Baker cysts are most often found incidentally when the knee is imaged for other reasons.
 - Symptomatic presentation may be acute when rupture occurs, in which case the chief differential diagnosis is deep venous thrombosis. A chronic/subacute presentation can manifest as a popliteal fossa mass or with pain.



BAKER CYSTS

A- Conservative management:

- Non-steroidal anti-inflammatory drugs (NSAIDs), such as ibuprofen, to reduce swelling and pain in the affected knee.
- Hold an ice pack to your knee for 10-20 minutes to reduce any swelling.
- Rest knee joint.
- Wear a knee support – you can buy these from a pharmacy.

B- Interventional therapy:

1. If no response, **inject corticosteroid medication** directly into the affected knee to help reduce swelling and inflammation.
2. **Direct cyst aspiration** — In patients who do not respond to intraarticular injection, ultrasound-guided direct aspiration of popliteal cysts.
3. **Surgical excision** may very infrequently be required if the cyst remains symptomatic with pain and/or limited mobility attributable to the cyst despite treatment of the underlying disorder and administration of intraarticular glucocorticoids.



THE LEG COVERINGS

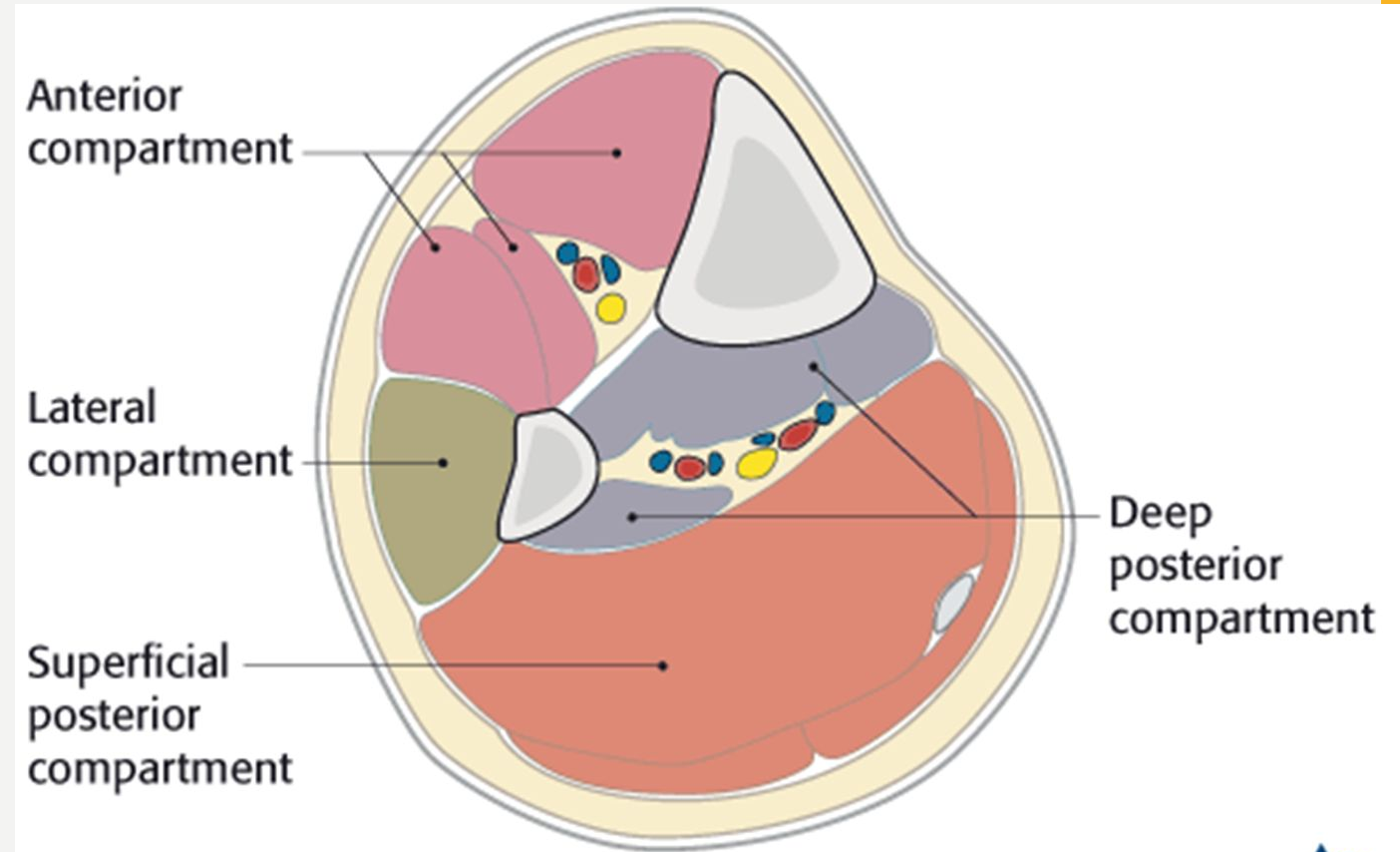
1. Skin

2. Superficial fascia:

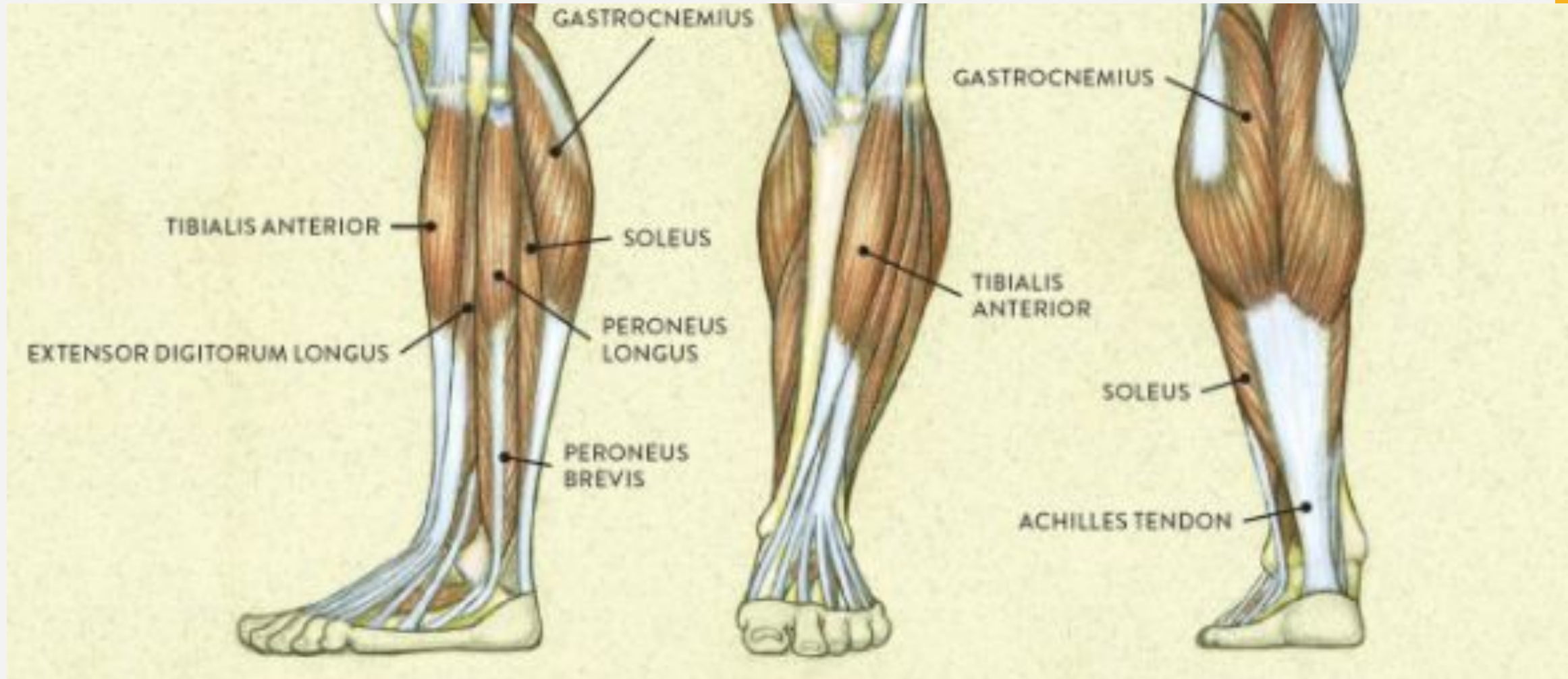
- Contains: Small & Great saphenous veins

3. Deep (Crural) fascia:

- Divided by intermuscular septa into 3 compartments: Ant., Lat., Post.



MUSCLE COMPARTMENT



ANTERIOR COMPARTMENT

- **Muscles**

- 1. Tibialis Anterior:**

- Actions: Dorsiflexion and inversion of the foot.

- 2. Extensor Hallucis Longus**

- Action: Extension of the great toe and dorsiflexion of the foot

- 3. Extensor Digitorum Longus.**

- Actions: Extension of the lateral four toes, and dorsiflexion of the foot

- 4. Peroneus (Fibularis) tertius.**

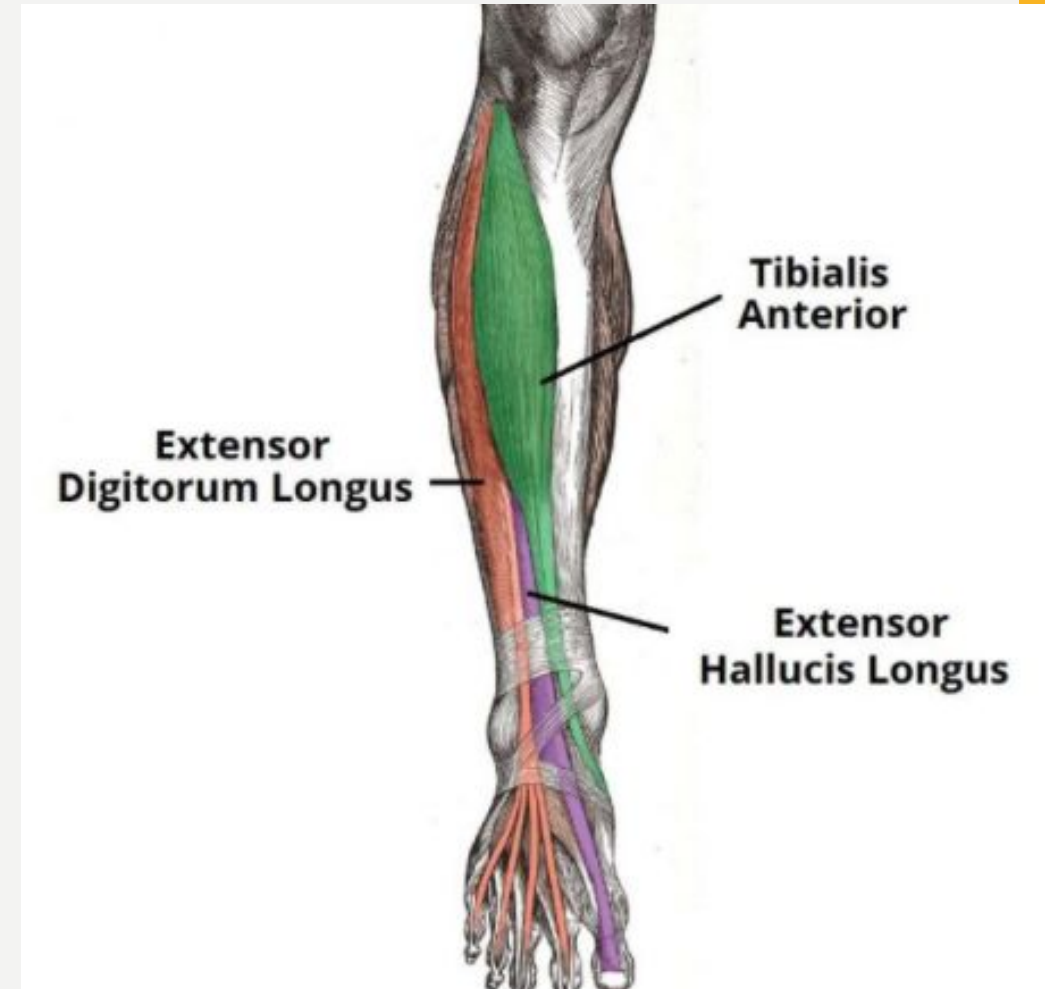
- Action: Eversion and dorsiflexion of the foot.

- **Blood supply:**

- Anterior tibial artery.

- **Nerve supply:**

- Deep peroneal nerve.



LATERAL COMPARTMENT

- **Muscles:**

1. Peroneus longus.
2. Peroneus brevis.

- **Function:**

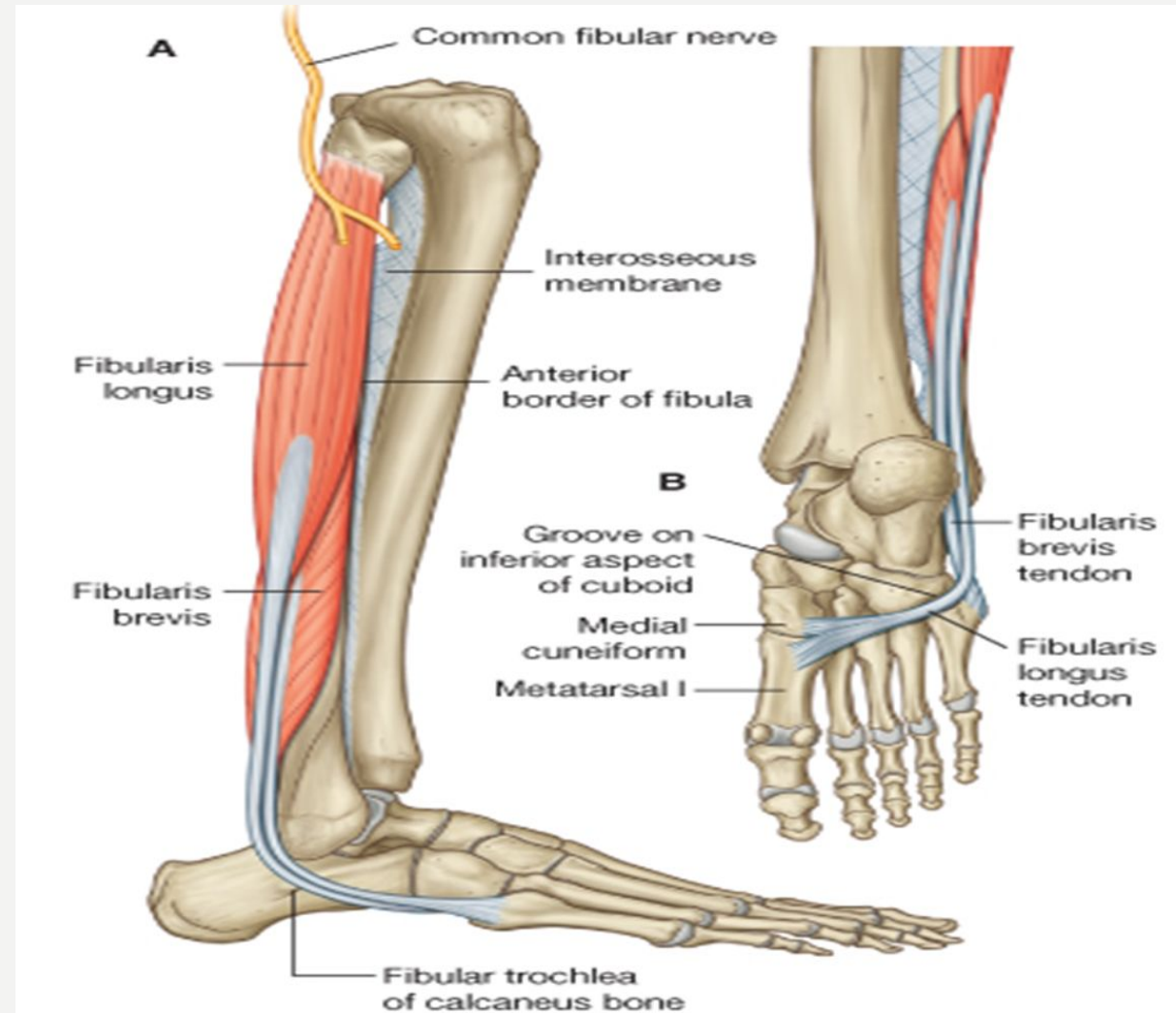
- Plantar flexes and Eversion of the foot.

- **Blood supply:**

- Branches from the peroneal artery.

- **Nerve supply:**

- Superficial peroneal nerve.



POSTERIOR COMPARTMENT

- **Muscles:**

- A septum that divides the muscles of the posterior compartment into superficial and deep groups.

A. Superficial group of muscles:

1. Gastrocnemius
2. Plantaris
3. Soleus.

B. Deep group of muscles:

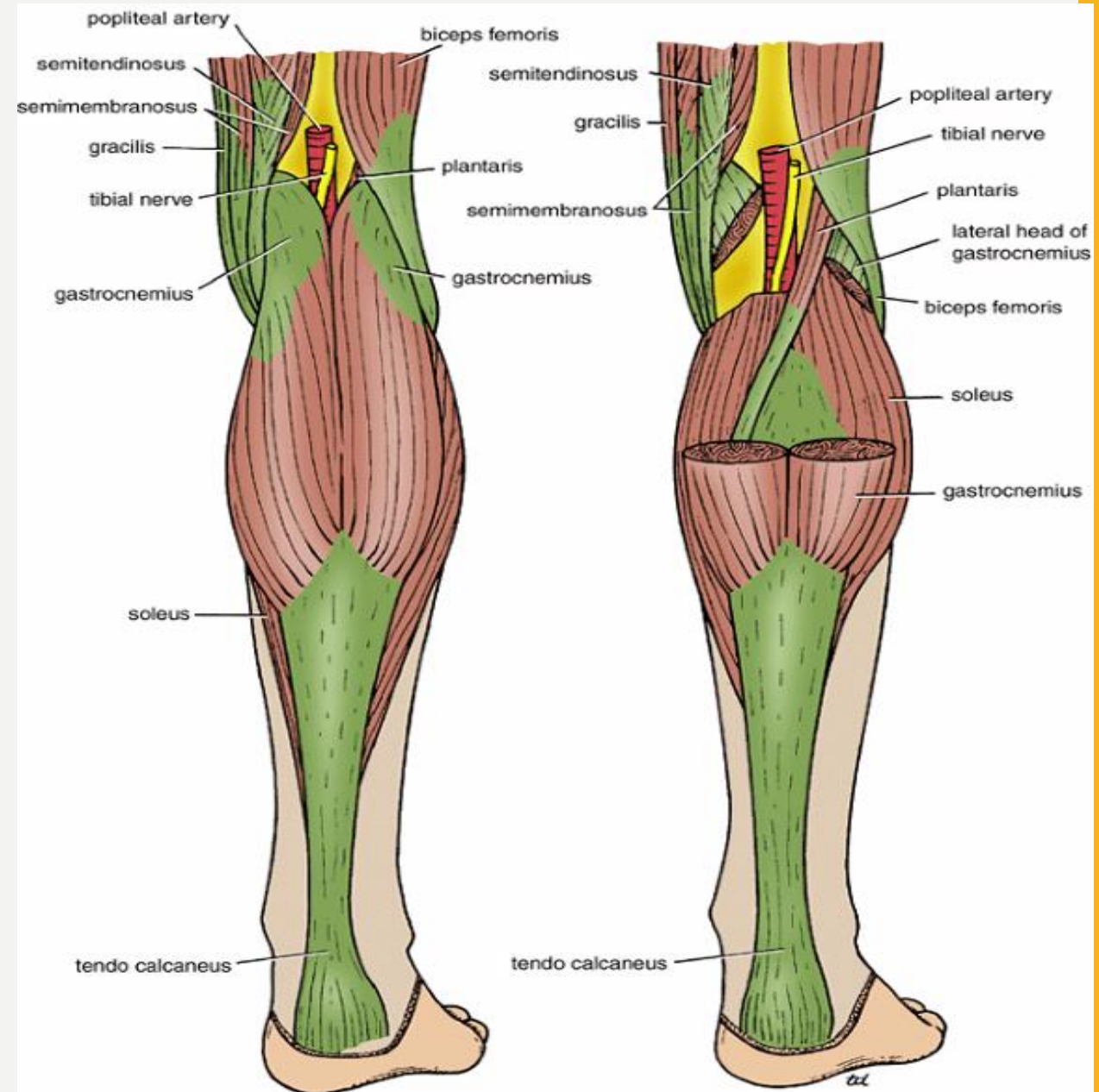
1. Popliteus
2. Flexor digitorum longus
3. Flexor hallucis longus
4. Tibialis posterior.

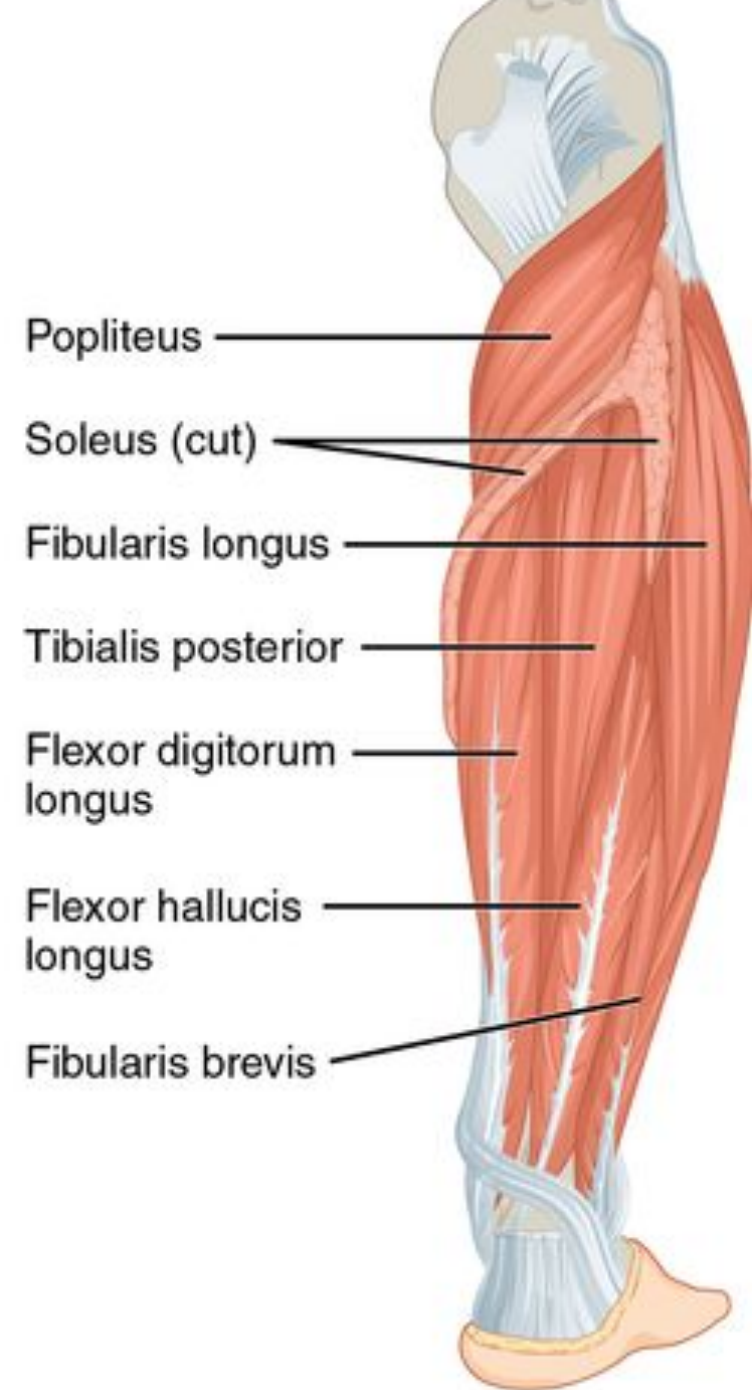
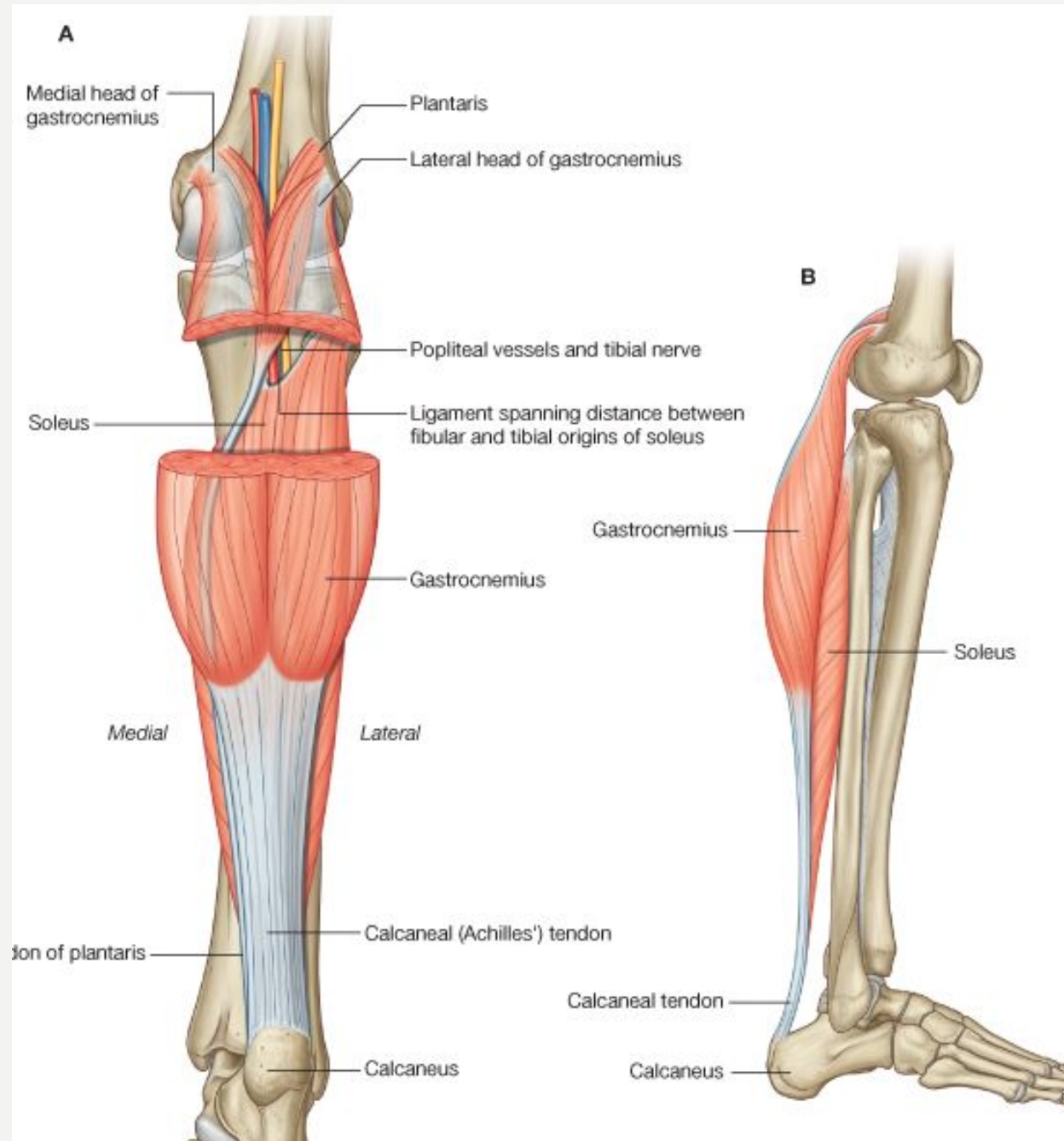
- **Blood supply:**

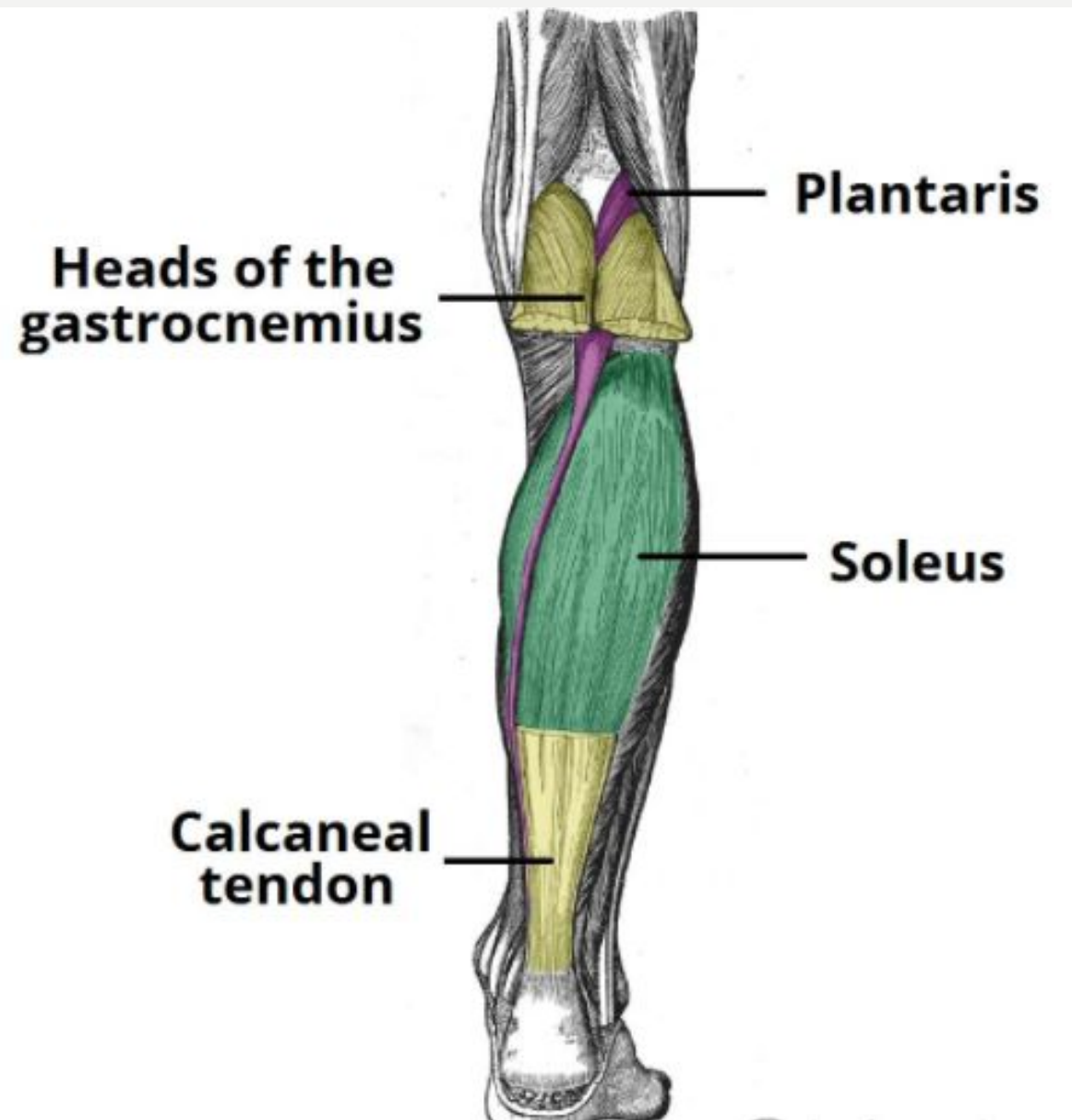
- Posterior tibial artery.

- **Nerve supply:**

- Tibial nerve.







COMPARTMENT SYNDROME

- **Definition:**

- Increase in hydrostatic pressure in closed osteofascial space resulting in decreased perfusion of muscle and nerves within compartment

- **Causes:**

- ❖ Fractures
- ❖ Burns
- ❖ Soft tissue injury
- ❖ Reperfusion
- ❖ Tight plaster

- **Symptoms and signs:**

1. Pain out of proportion
2. Pain on passive stretch, not relieved by elevation
3. Not relieved by rest, worsening
4. Parathesia,pins and needles
5. Paralysis
6. Pallor
7. Pulseless

= The typical clinical presentation of acute limb ischemia is encompassed by “the rule of P's”: pain, pulselessness, pallor, poikilothermia (cool extremity), paresthesia, and finally, onset of paralysis.

- **Treatment:**

- decompression by Fasciotomy

COMPARTMENT SYNDROME



COMPARTMENT SYNDROME



FEMORAL ARTERY

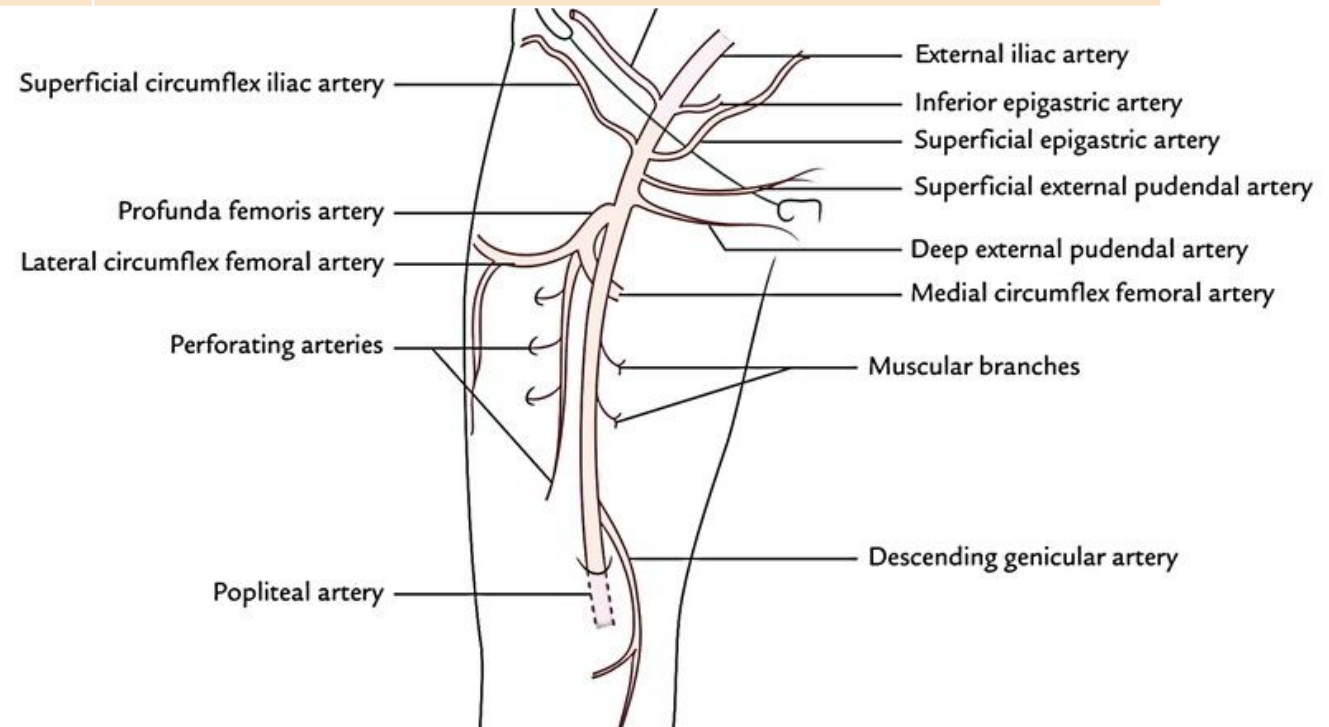
3 Deep branches:

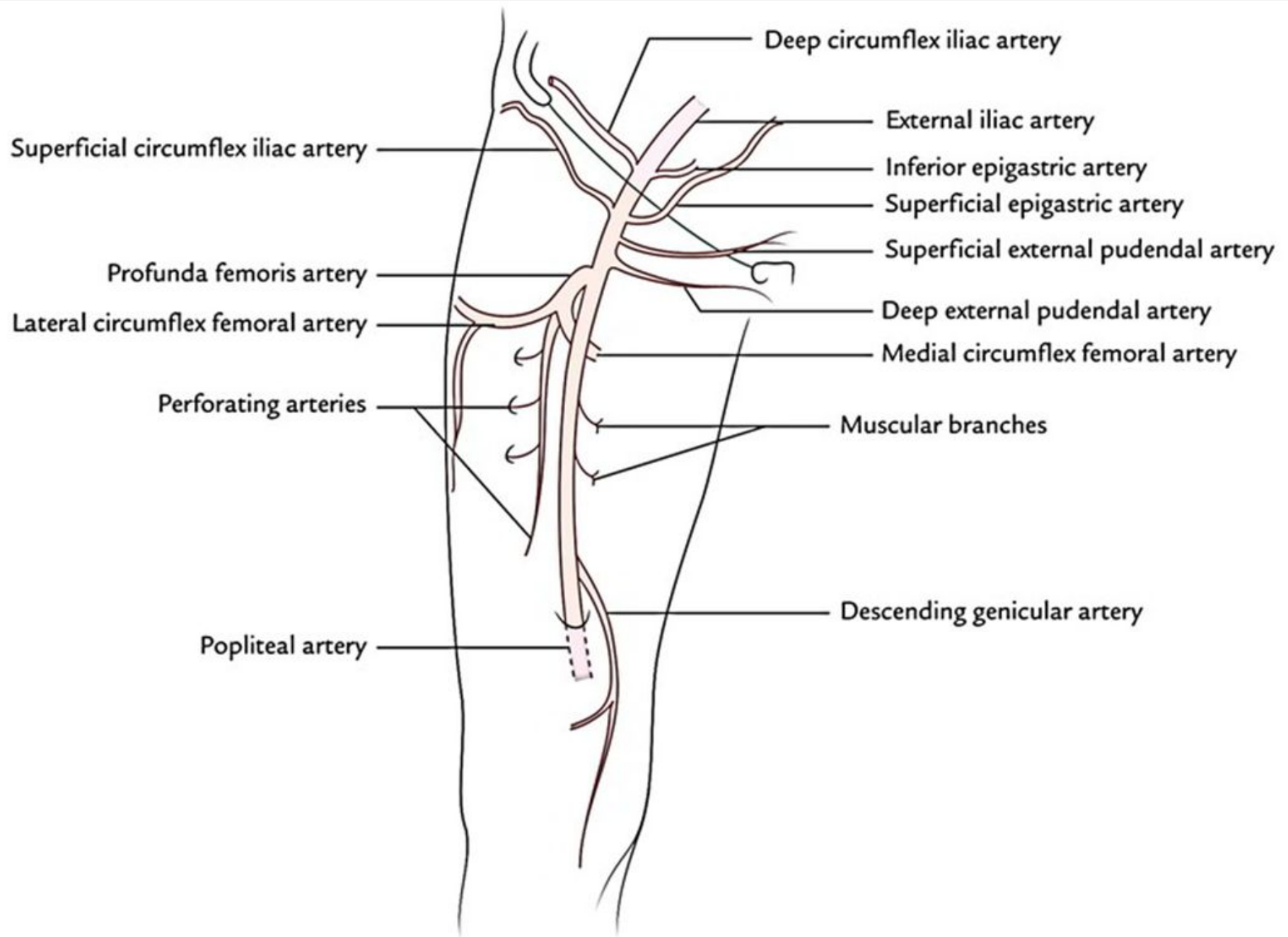
1. Profunda femoris a. = Deep femoral artery
2. descending genicular branch
3. deep external pudendal artery

3 Superficial branches:

1. superficial epigastric artery
2. superficial circumflex iliac artery
3. superficial external pudendal artery

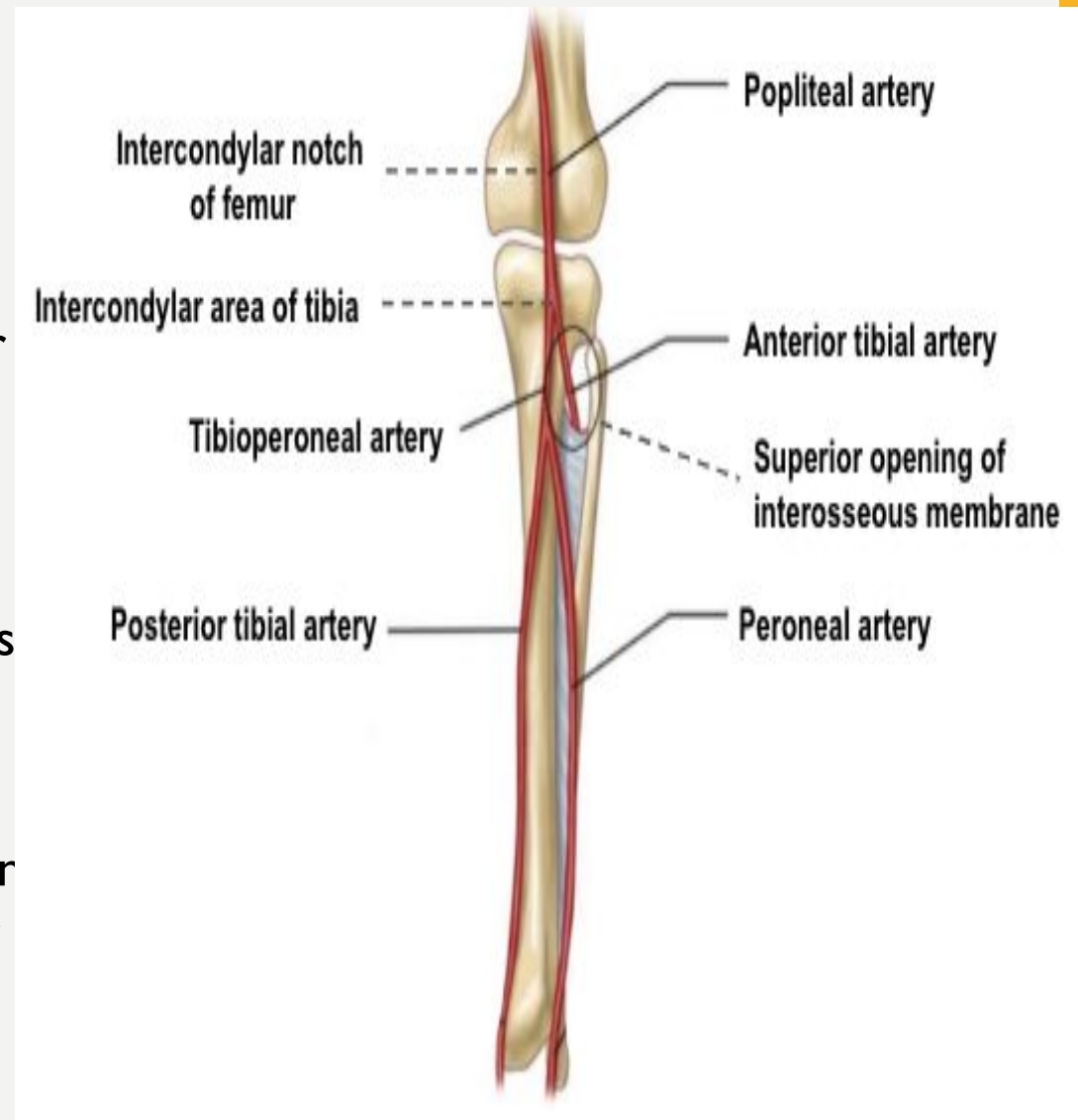
- **The popliteal artery** is the continuation of the femoral artery after it pass through the adductor hiatus and end by forming **anterior and posterior tibial arteries**.



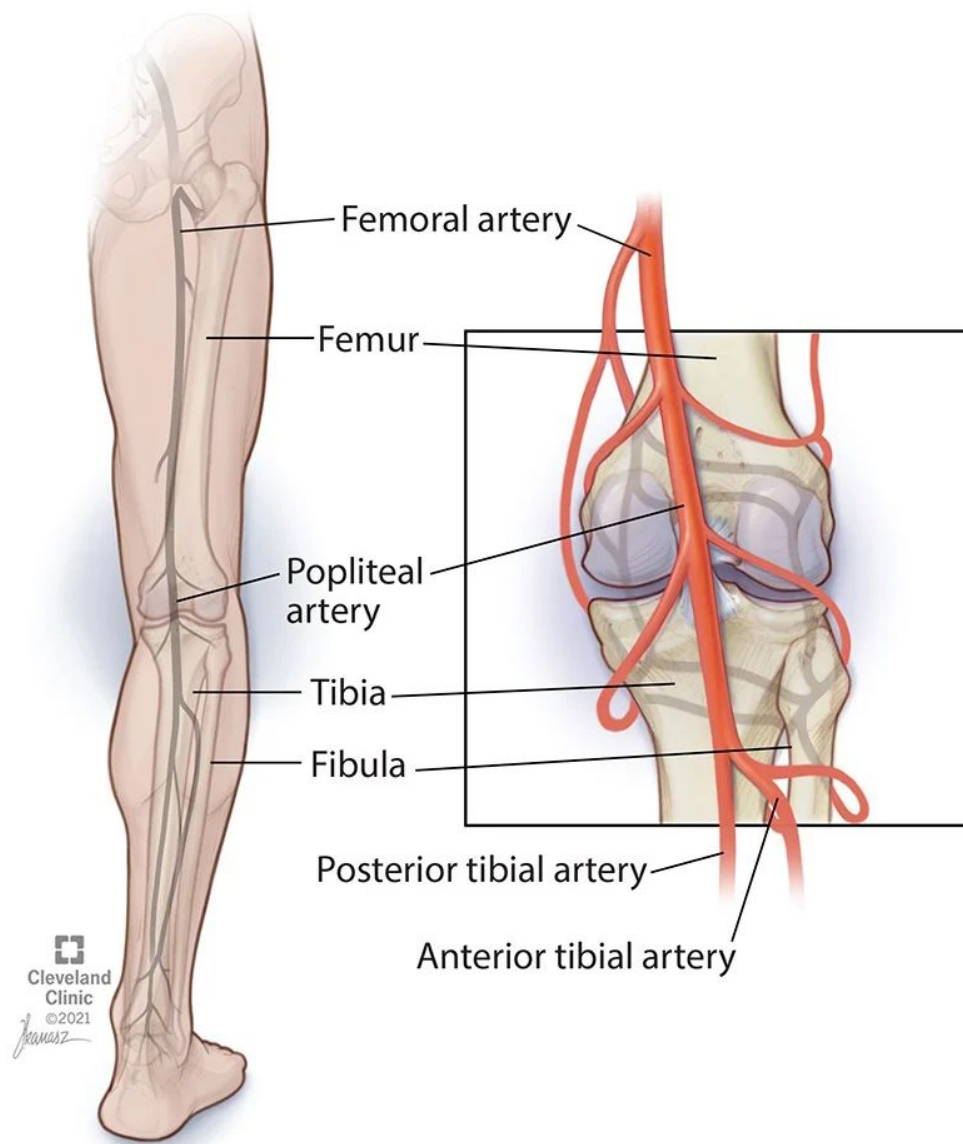


POPLITEAL ARTERY

- **Origin:**
 - As a continuation of the femoral (superficial femoral) artery as it passes into the popliteal fossa through the adductor canal at the junction of the middle and lower thirds of the thigh.
- **Course:**
 - Descends as the deepest structure on the floor of the popliteal fossa. Courses just superficial to the popliteus muscle.
- **Branches:**
 - Anterior tibial artery and tibioperoneal trunk (this trunk is further divided to fibular (common peroneal) artery and posterior tibial artery).
 - Note: Variant anatomy
 - The TP trunk may be absent if the popliteal artery terminates as a trifurcation



Popliteal Artery



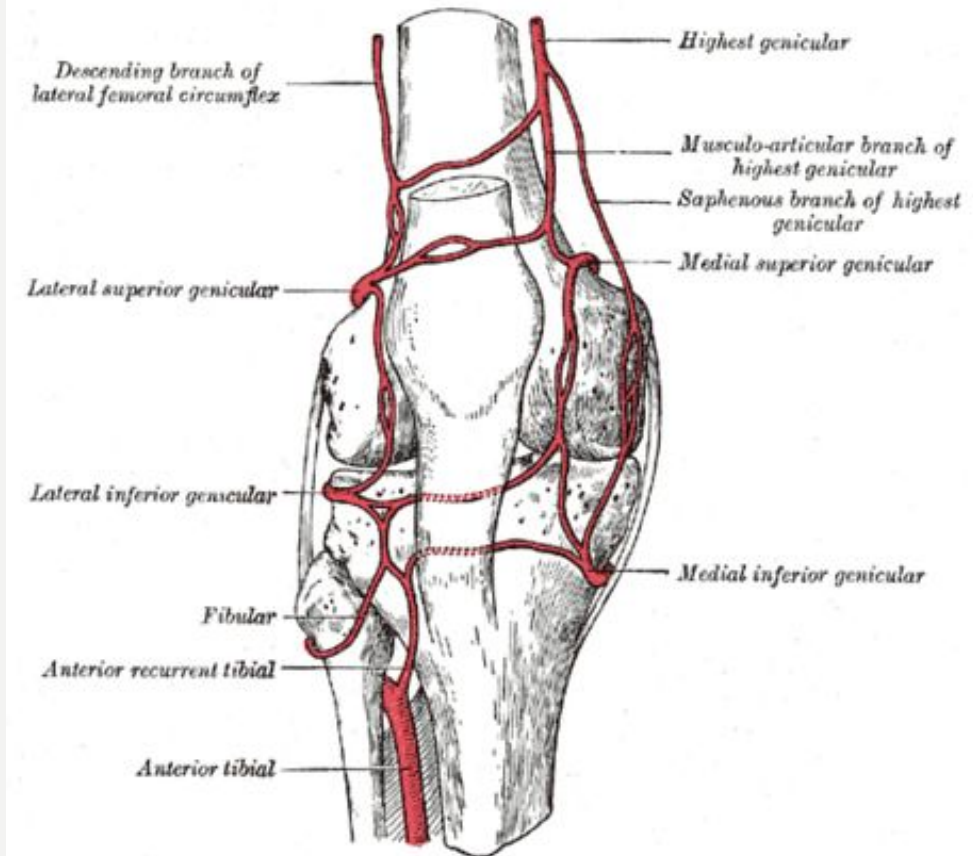
POPLITEAL ARTERY

- **Branches:**

- 1. superior medial and lateral genicular arteries** - course around the femoral condyles as part of the genicular anastomosis
- 2. inferior medial and lateral genicular arteries** - course around the tibial condyles as part of the genicular anastomosis
- 3. middle genicular artery** - pierces oblique popliteal muscle
- 4. muscular branches** - supply hamstrings, adductor magnus, and triceps surae
- 5. cutaneous branches** - supply skin over knee joint

Genicular arteries

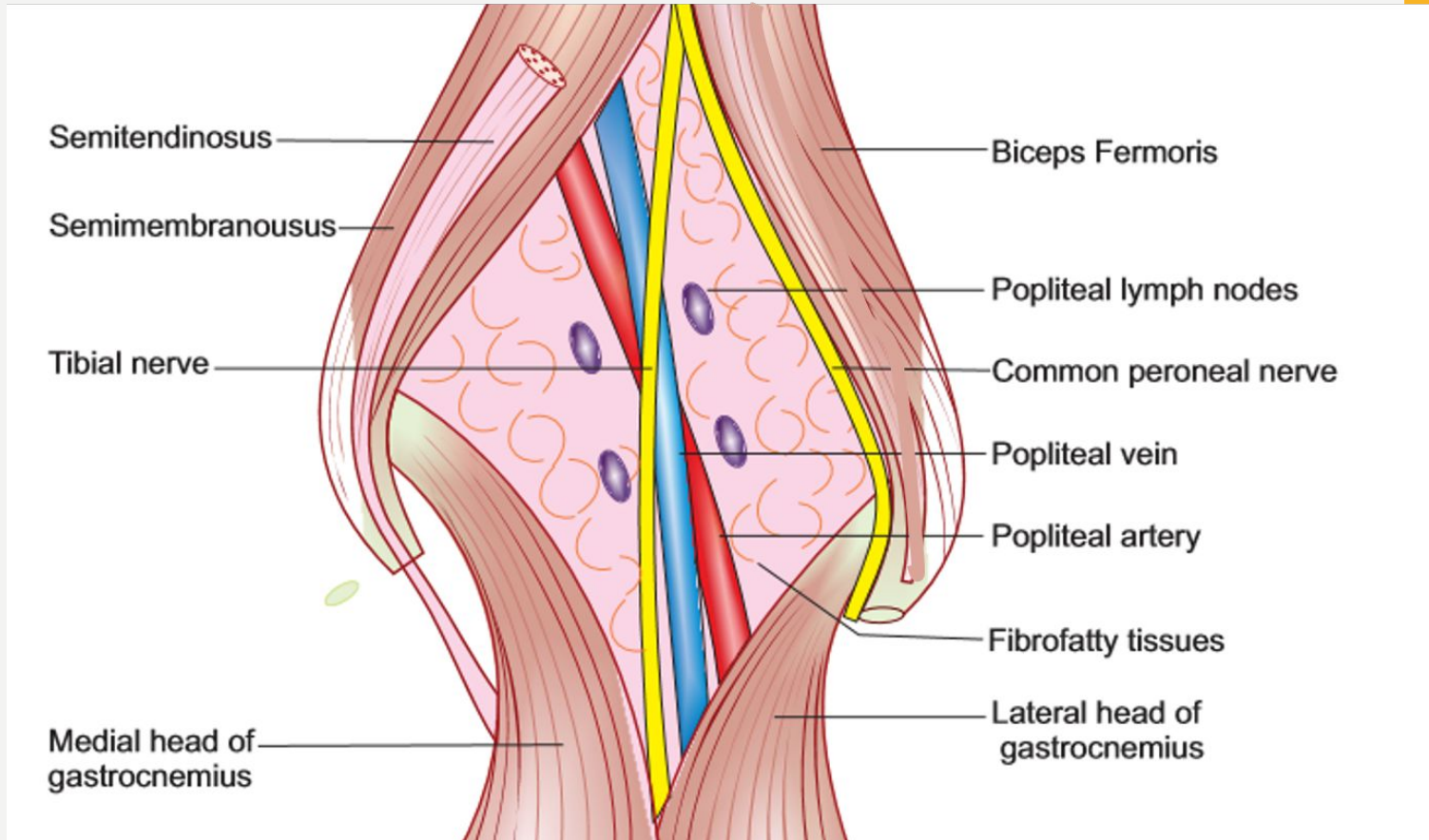
Anterior view



POPLITEAL ARTERY

- **Relations**

1. Popliteal artery **starts medial** to tibial nerve and **ends lateral** to it; the popliteal vein always between the two
2. **Deep/anterior**: popliteal surface of the femur (separated by fat), knee joint capsule, and popliteus
3. **Superficial/posterior**: popliteal vein, tibial nerve (most superficial)



ANTERIOR TIBIAL ARTERY

- The anterior tibial artery is the main arterial supply of **the anterior compartment of the leg.**
- **Course**
 - The popliteal artery usually divides **at the distal border of the popliteus muscle** into the tibioperoneal trunk and anterior tibial artery.
 - It passes through a gap above the interosseous membrane into the anterior compartment of the leg.
 - Here, it lies on the interosseous membrane, **lateral to tibialis anterior muscle.**
 - The anterior tibial artery passes in front of the ankle joint and **continues as the dorsalis pedis artery** onto the dorsum of the foot lateral to the tendon of the extensor hallucis longus and medial to the extensor digitorum longus and deep peroneal nerve.

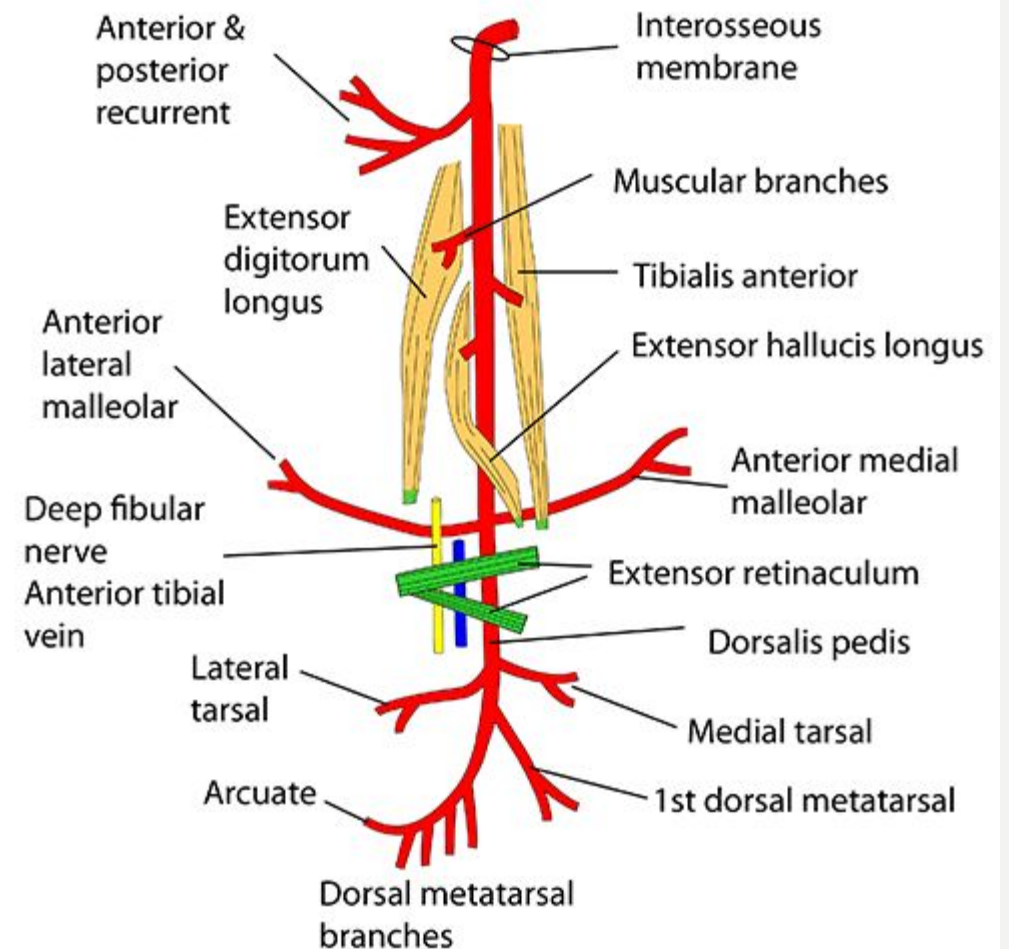
ANTERIOR TIBIAL ARTERY

- **Branches include:**

1. anterior tibial recurrent artery
2. muscular branches
3. perforating branches
4. anterior medial malleolar artery
5. anterior lateral malleolar artery

□ **continues as the dorsalis pedis artery**

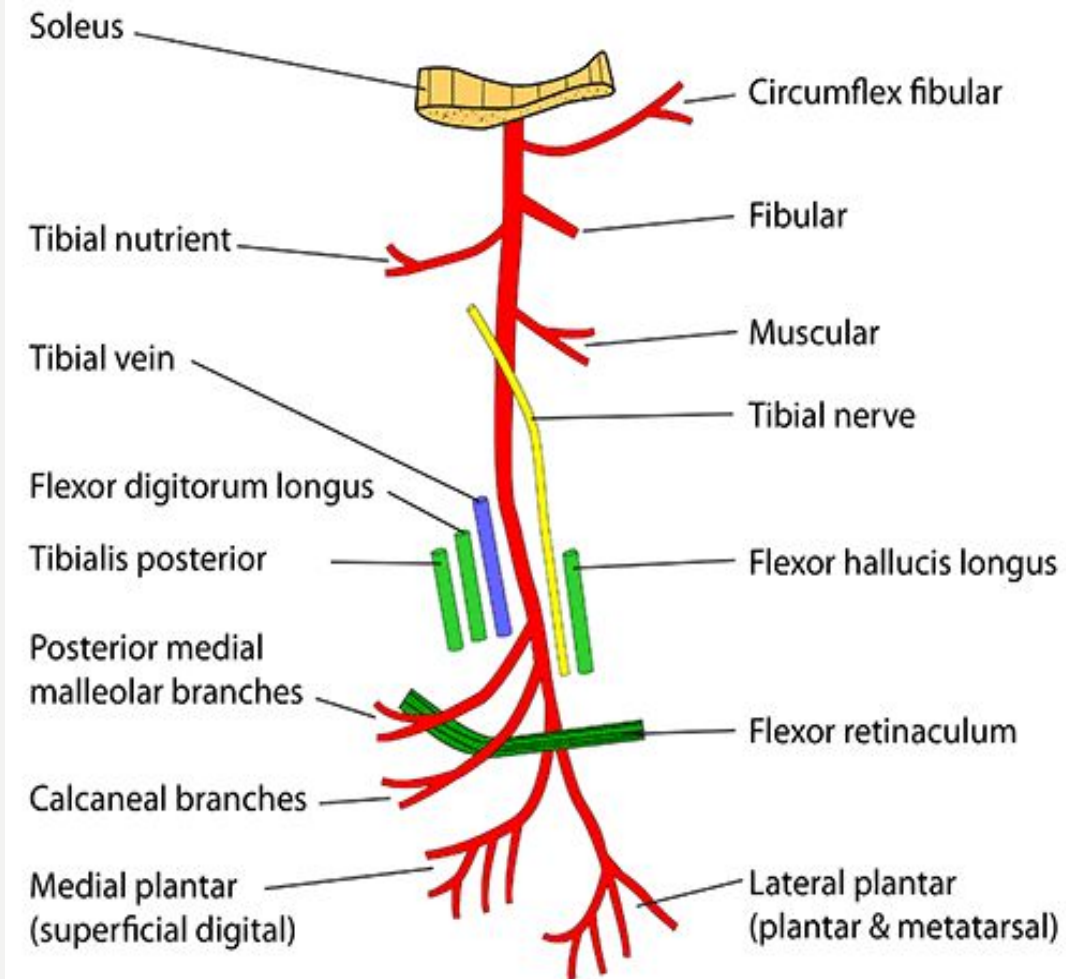
RIGHT ANTERIOR TIBIAL ARTERY
VIEWED FROM IN FRONT



POSTERIOR TIBIAL ARTERY

- It is the main arterial supply of the posterior compartment of the leg.
- It is accompanied by the posterior tibial vein, along its course.
- **Main branches:**
 1. circumflex fibular artery
 2. medial plantar artery
 3. lateral plantar artery
- **Origin:**
 - The posterior tibial artery originates from tibioperoneal trunk at the inferior margin of popliteus muscle.
 - It runs inferomedially through the posterior compartment of the leg.
 - It enters the foot by passing posterior to the medial malleolus. Midway from the malleolus to the calcaneal tubercle, it divides into the terminal branches.
- **Termination:**
 - Midway between malleolus and calcaneal tubercle it divides into medial and lateral plantar arteries, within the tarsal tunnel.

RIGHT POSTERIOR TIBIAL ARTERY
VIEWED FROM BEHIND



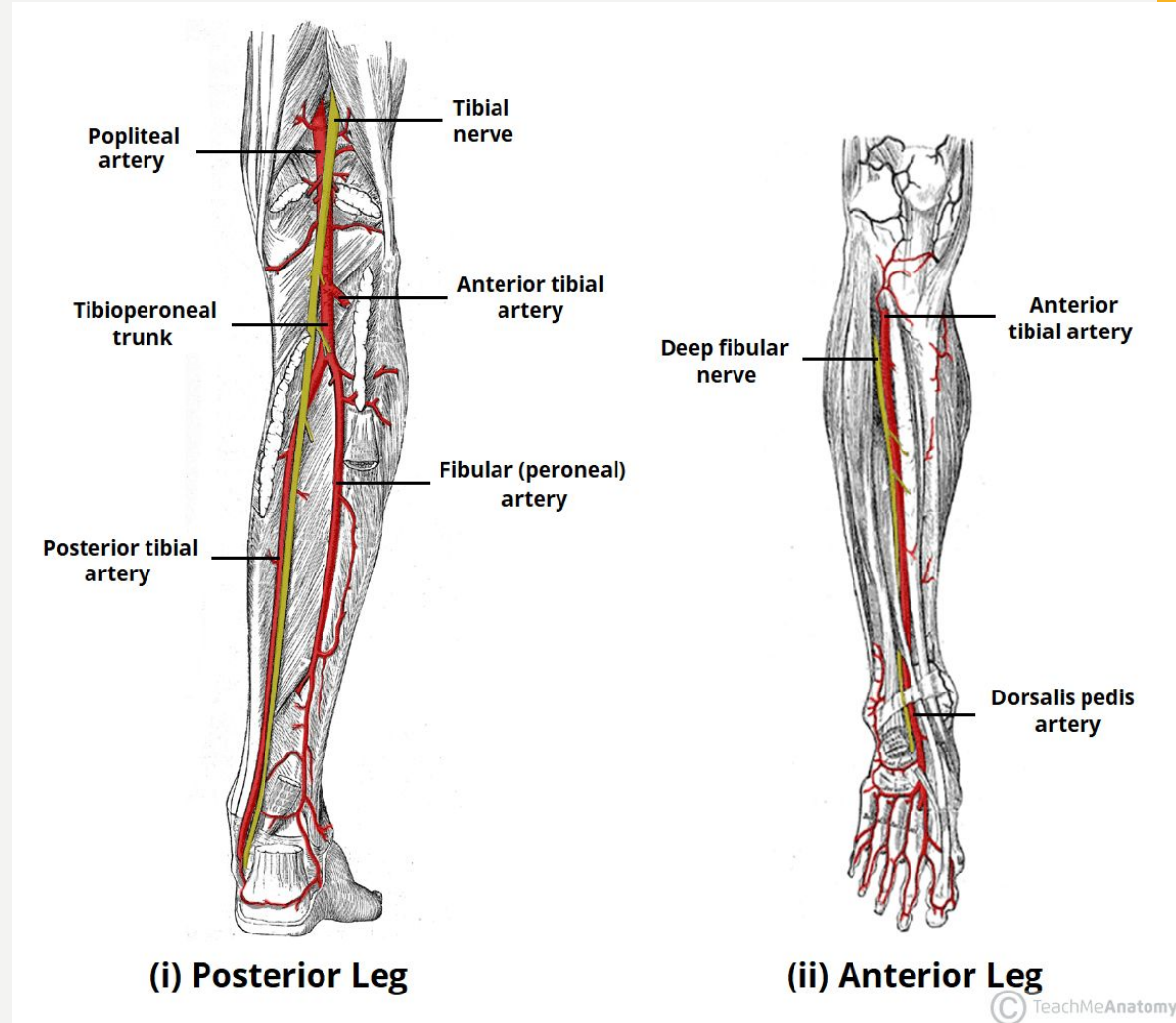
FIBULAR ARTERY

- **Origin and course:**

- Arises from the tibioperoneal trunk approximately 2.5 cm distal to popliteus and passes obliquely to the fibula, descending along its medial crest either in a fibrous canal between tibialis posterior and flexor hallucis longus or within flexor hallucis longus
- Reaching the inferior tibiofibular joint, it divides into calcaneal branches that ramify on the lateral and posterior surfaces of the calcaneus

- **Branches:**

1. muscular branches
2. nutrient artery
3. perforating branches
4. communicating branch
5. calcaneal branches



POPLITEAL ARTERY ANEURYSM

- Popliteal artery aneurysms are **the most common peripheral aneurysm**.
- The popliteal artery is **defined as** aneurysmal when a localized diameter is 1.5 times normal artery diameter.
- **Risk factors** for popliteal aneurysm include:
 - smoking, hypertension, male sex, advancing age, other large vessel aneurysm, and vasculitis.
- **Management:**
 - ❖ **Patients with popliteal aneurysm <2.0 cm**, we follow conservative treatment
 - ❖ **For patients with patent popliteal aneurysm ≥ 2.0 cm**, we suggest elective surgical repair of the aneurysm.
 - ❖ For patients with **acute lower extremity ischemic symptoms** due to popliteal aneurysm (any size), we recommend emergency popliteal aneurysm repair due to the high risk of limb loss without treatment

VENOUS DRAINAGE OF THE LOWER LIMB

- The veins of the lower extremities are arranged in three systems: the superficial, the deep, and the perforating venous systems.

Perforating venous system	Deep venous system	Superficial venous system
• perforators of the foot • perforators of the ankle (medial, anterior, lateral) • perforators of the leg (Cockett perforators) • perforators of the knee (Boyd perforators) • perforators of the distal thigh (Dodd perforators) • perforators of the proximal thigh (Hunter perforators) • perforators of the gluteal muscles	1. Common femoral vein [Formed by the femoral vein and the deep femoral vein] 2. Femoral vein [Anterior tibial veins + Posterior tibial veins □ Popliteal vein □ Femoral vein] Note: • The peroneal or fibular veins terminate in the posterior tibial vein. • "superficial femoral vein" or its abbreviation, "SFV" should not be used as it is a misnomer 3. Deep femoral vein or the profunda femoris vein	1. plantar venous arch 2. dorsal venous arch 3. medial marginal vein 4. lateral marginal vein 5. great saphenous vein 6. small saphenous vein

GREAT SAPHENOUS VEIN

- The great saphenous vein (GSV) forms part of the superficial venous system of the lower limb.
- **Origin and course**
 - The great saphenous vein forms on the dorsum of the foot as the continuation of the medial marginal vein of the foot. (as a continuation of the **medial aspect of dorsal venous plexus**)
 - It then passes **anteriorly to** the medial malleolus to ascend **at first medial to** and **then posterior to** the medial aspect of the tibia.
 - The great saphenous vein then winds its way around the medial aspect of the knee and continues upwards in the medial aspect of the thigh to pierce the saphenous hiatus of the deep fascia of the thigh, 1-3 cm distal (below) to the inguinal ligament, to drain into the femoral vein at the saphenofemoral junction (SFJ) in the femoral triangle.
 - It has **many valves 10-20 more in leg than thigh**, one valve is present at saphenofemoral junction and is connected to short saphenous vein behind the knee.

GREAT SAPHENOUS VEIN

- **Relations:**

- **Below the knee**, the branches of the **saphenous nerve** are located posteriorly and anteriorly.
- **Above the knee**, the saphenous nerve is not closely related (i.e. is not within the saphenous compartment).

- **Tributaries:**

- **small saphenous vein (SSV)**: communicating branches in the region of the popliteal fossa
- lateral accessory vein
- superficial epigastric vein
- superficial circumflex iliac vein
- superficial external iliac vein
- superficial external pudendal vein
- deep external iliac vein
- anterior accessory saphenous vein

SMALL SAPHENOUS VEIN

- The small saphenous vein (SSV) forms part of the **superficial venous drainage of the lower limb**.
- **Origin and course**
 - The small saphenous vein forms by the confluence of **the lateral aspect of the dorsal venous network of the foot** (lateral marginal vein).
 - It **passes behind the lateral malleolus** and courses directly superiorly in the subcutaneous tissue of the calf.
 - It **perforates the deep fascia (fascia lata)** to enter the lower aspect of the popliteal fossa and drain into the popliteal vein.
- **Tributaries**
 - communicating branches with the great saphenous vein
 - cutaneous venous tributaries
 - Communicates with deep venous system via numerous perforating veins.
- **Relations**
 - accompanied by the **sural nerve** (branch of the tibial nerve).

POPLITEAL VEIN

- The popliteal vein is a component of the **deep venous system** of the lower limb.
- **Start at the level of the popliteus muscle, and end at the adductor hiatus.**
- **Location**
 - It is predominantly located within the popliteal fossa.
- **Origin and tributaries**
 - The popliteal vein originates at the level of the popliteus muscle, where it is formed by **the peroneal, anterior tibial and posterior tibial veins.**
 - As it passes through the adductor hiatus, it becomes the femoral vein.
 - Other tributaries include:
 1. small saphenous vein in the lower aspect of the popliteal fossa
 2. veins corresponding to branches of the popliteal artery, namely the genicular arteries
 3. muscular veins, including a large branch from each head of gastrocnemius

Posterior tibial vein

- Drain the **posterior compartment** of the leg, ankle joint and plantar surface of the foot
- They are formed from **a confluence of the medial and lateral plantar veins** of the foot and follow the posterior tibial artery along its course.
- They join **the anterior tibial veins** to form the **popliteal vein** and enter the popliteal fossa.

Anterior tibial vein

- Drain the **anterior compartment** of the leg.
- They unite with **the posterior tibial veins** to form the **popliteal vein** at the distal border of the popliteus muscle, as it enters the popliteal fossa.

Peroneal or Fibular veins

- Drain the **lateral compartment** of the leg.
- They terminate in the posterior tibial vein.

VARICOSE VEINS

- Varicose veins are **dilated tortuous superficially located venous channels** that accompany the superficial veins of the upper or lower limbs.
- Varicose veins are **more common in women** than men and are more common in the lower limb than in the upper limb.
- **Risk factors** include: pregnancy, older age, female gender, prolonged standing
- **Pathology**
 - ❖ Incompetent saphenofemoral junction, which itself results from saphenofemoral valve insufficiency □ It leads to regurgitation of blood □ and consequently raises the venous pressure in the great saphenous and other superficial veins.
 - ❖ Incompetent perforators with destruction of the valves inside the perforators □ allow the blood to move from the deep to superficial system (reverse direction) □ and consequently increases the superficial venous pressure.

VARICOSE VEINS

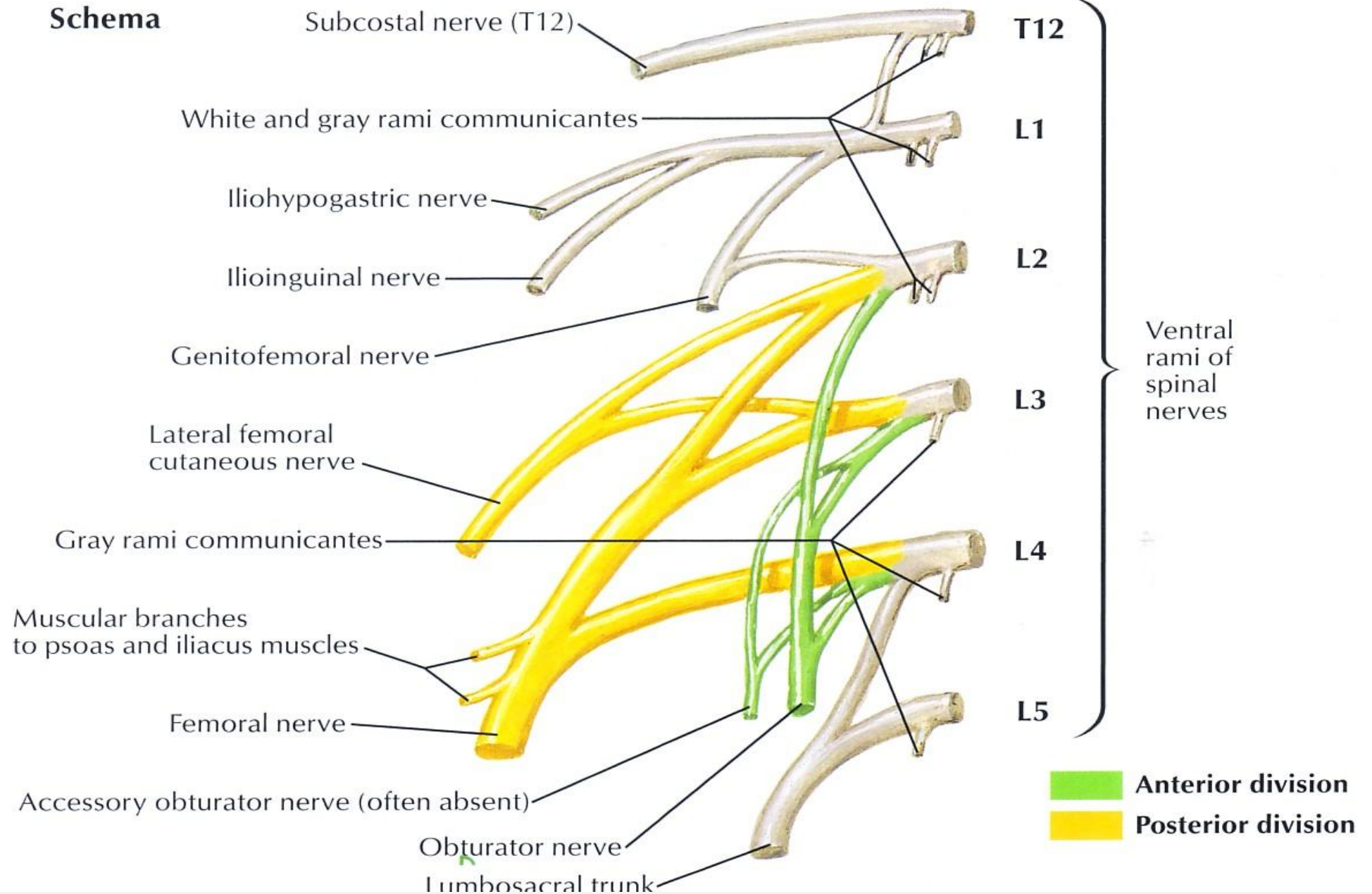
- **Symptoms and signs —** Symptoms or findings include pain, leg heaviness, aching, swelling, skin dryness, tightness, itching, irritation, and muscle cramps.
- **Management —**
- Initial treatment for most patients is nonoperative and includes **limb elevation, exercise, and compression therapy** (e.g.: compression Stockings or compression bandaging).
- Patients with persistent symptoms and signs of venous disease after a period of nonoperative management are candidates for **superficial venous ablation with ultrasound-guided sclerotherapy or surgical methods.**

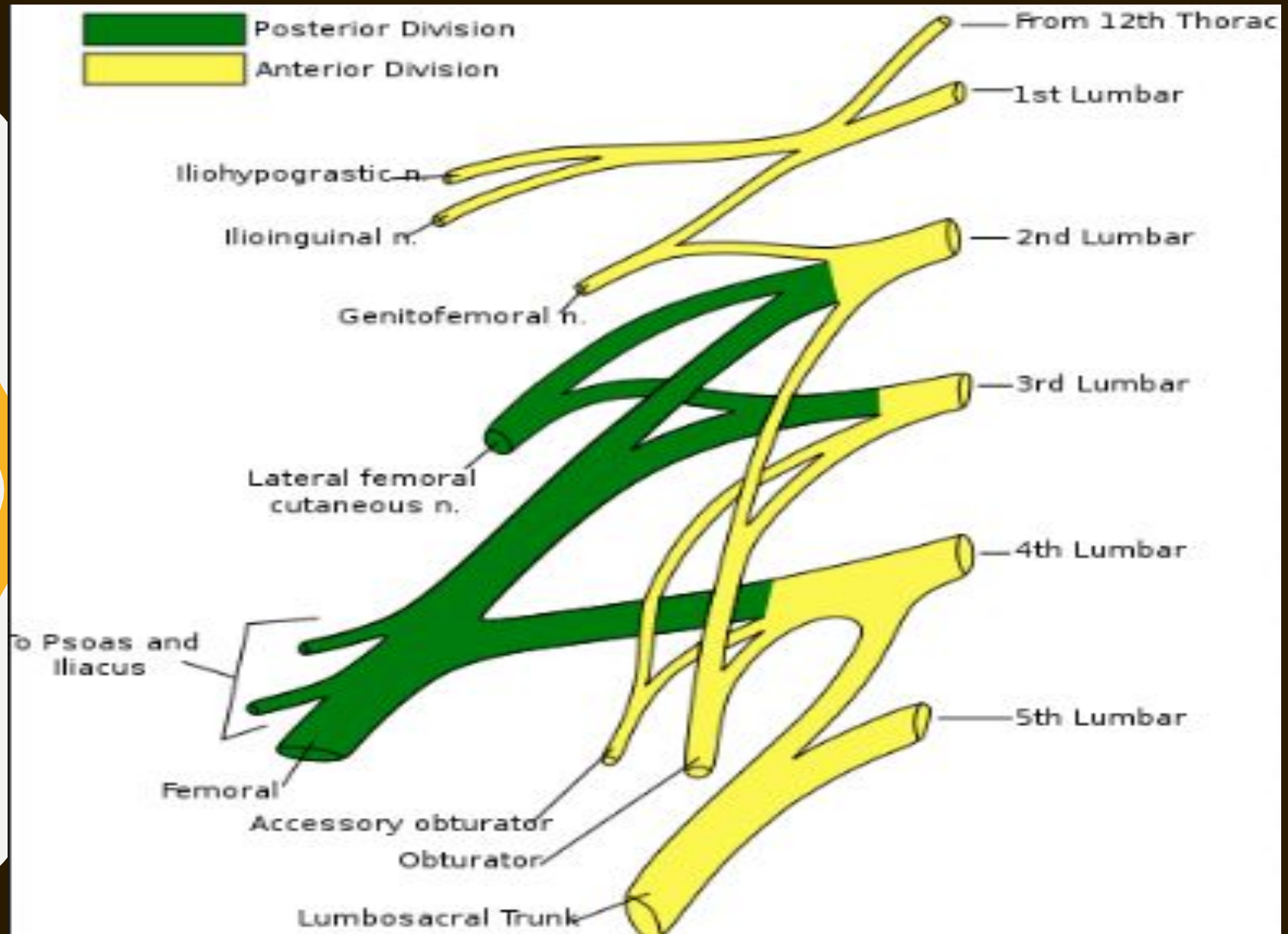
LUMBAR PLEXUS

- **Origin:** ventral rami of T12 to L5
- **Course:** formed within the substance of the psoas major muscle, anterior to the lumbar transverse processes.
- **Branches:**
 - Gives six nerves (Four small, Two main nerves)
 - 1. Iliohypogastric L1
 - 2. Ilioinguinal L1
 - 3. Genitofemoral nerve L1-L2
 - 4. Lateral cutaneous nerve of thigh L2-L3
 - 5. Femoral nerve L2-L3-L4 dorsal division
 - 6. Obturator nerve L2-L3-L4 ventral division

LUMBAR PLEXUS

Schema





FEMORAL NERVE

- **Origin:**

- It arises from **posterior divisions of L2-L4 roots of the lumbar plexus.**

- **Course:**

- It emerges from the **lateral border of the psoas muscle** at its inferior aspect
- It sends **a motor branch to iliacus before passing under the inguinal ligament** to enter the femoral triangle.

- **In Femoral triangle:**

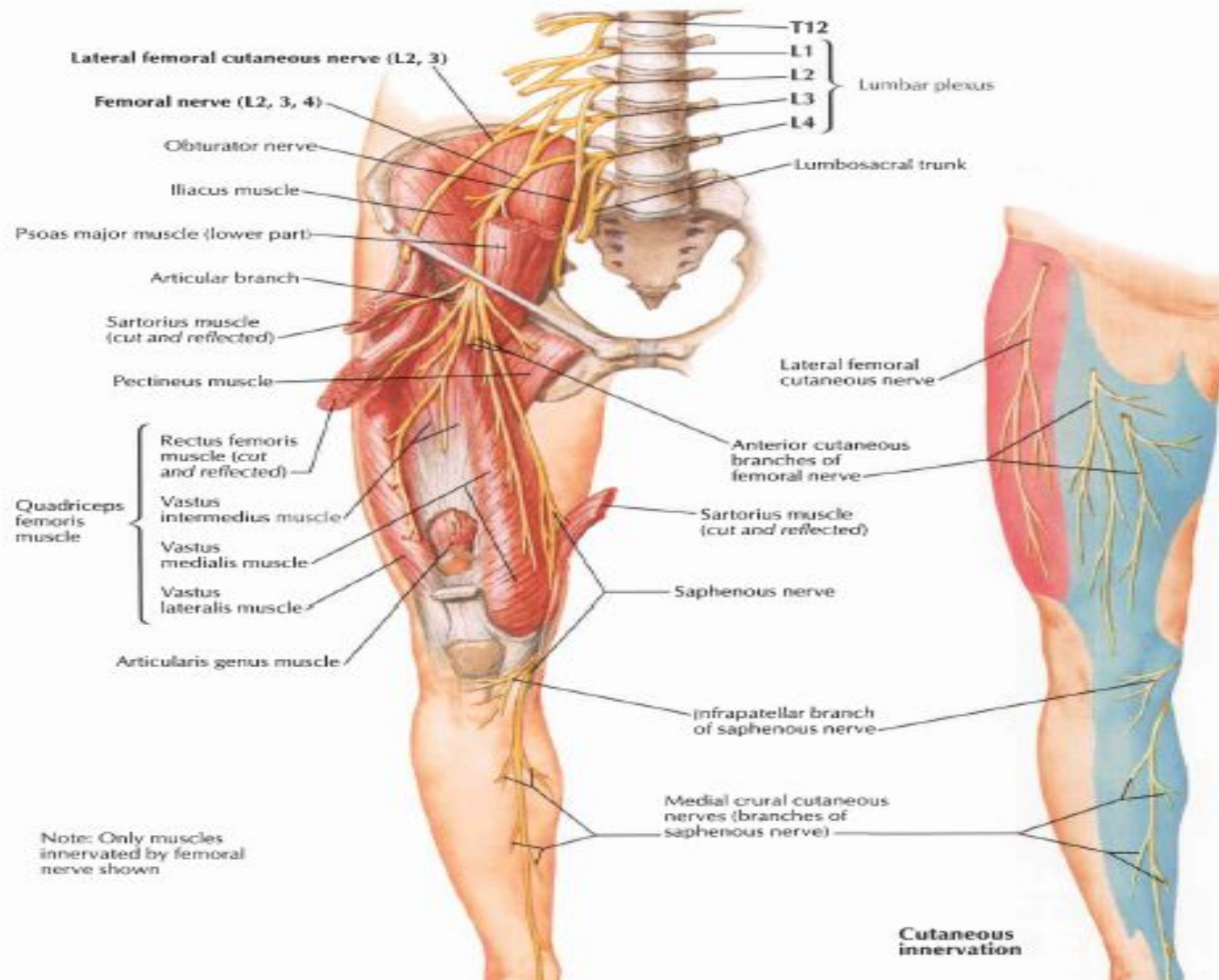
- ☐ Lies above iliacus, outside and lateral to the femoral sheath. **[Most lat. Str. In the triangle and lies out of the sheath]**
- ☐ Gives off the **nerve to pectineus, just after crossing the inguinal ligament**
- ☐ Divides into **anterior (superficial)** and **posterior (deep) divisions**, separated by **the lateral femoral circumflex artery.**
- ☐ The terminal branch of the deep division reaches the apex of the femoral triangle to become the **saphenous nerve.**

FEMORAL NERVE

Femoral Nerve Branches		
Deep (Posterior) division	Superficial (Anterior) division	Proximal branches
• 4x Nerves to quadriceps muscle • continues as the saphenous nerve, which passes behind sartorius	• nerve to sartorius • Medial and intermedial femoral cutaneous nerves • sympathetic vasomotor supply to blood vessels	• branches to iliacus muscle (prior to crossing inguinal ligament) • nerve to pectineus (immediately after crossing inguinal ligament)

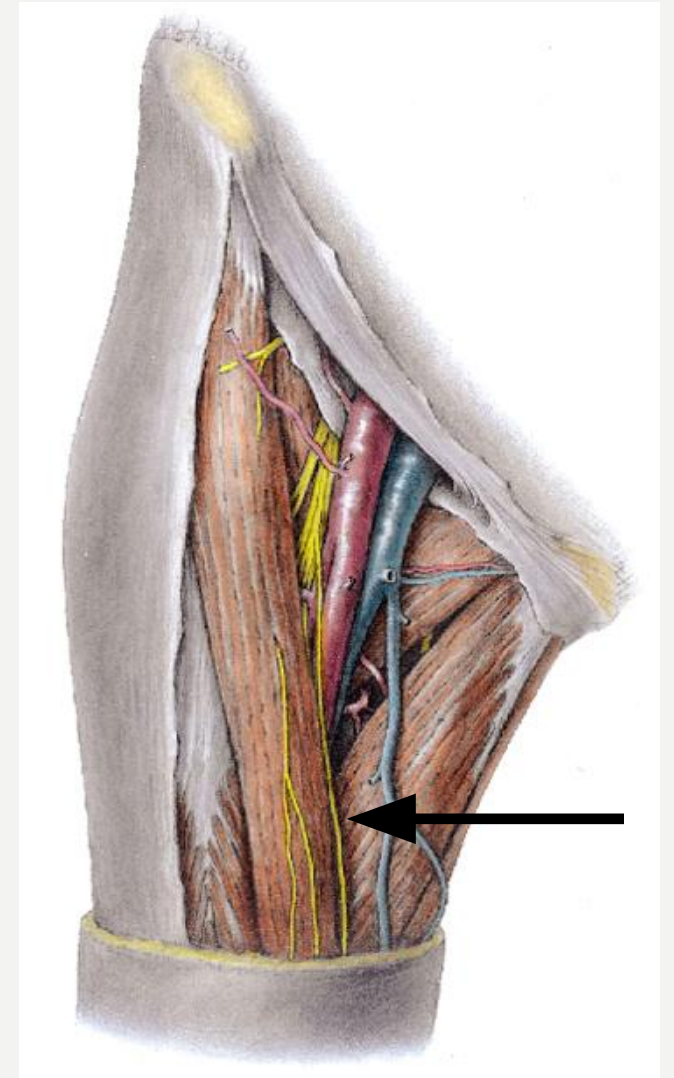
FEMORAL NERVE INJURY

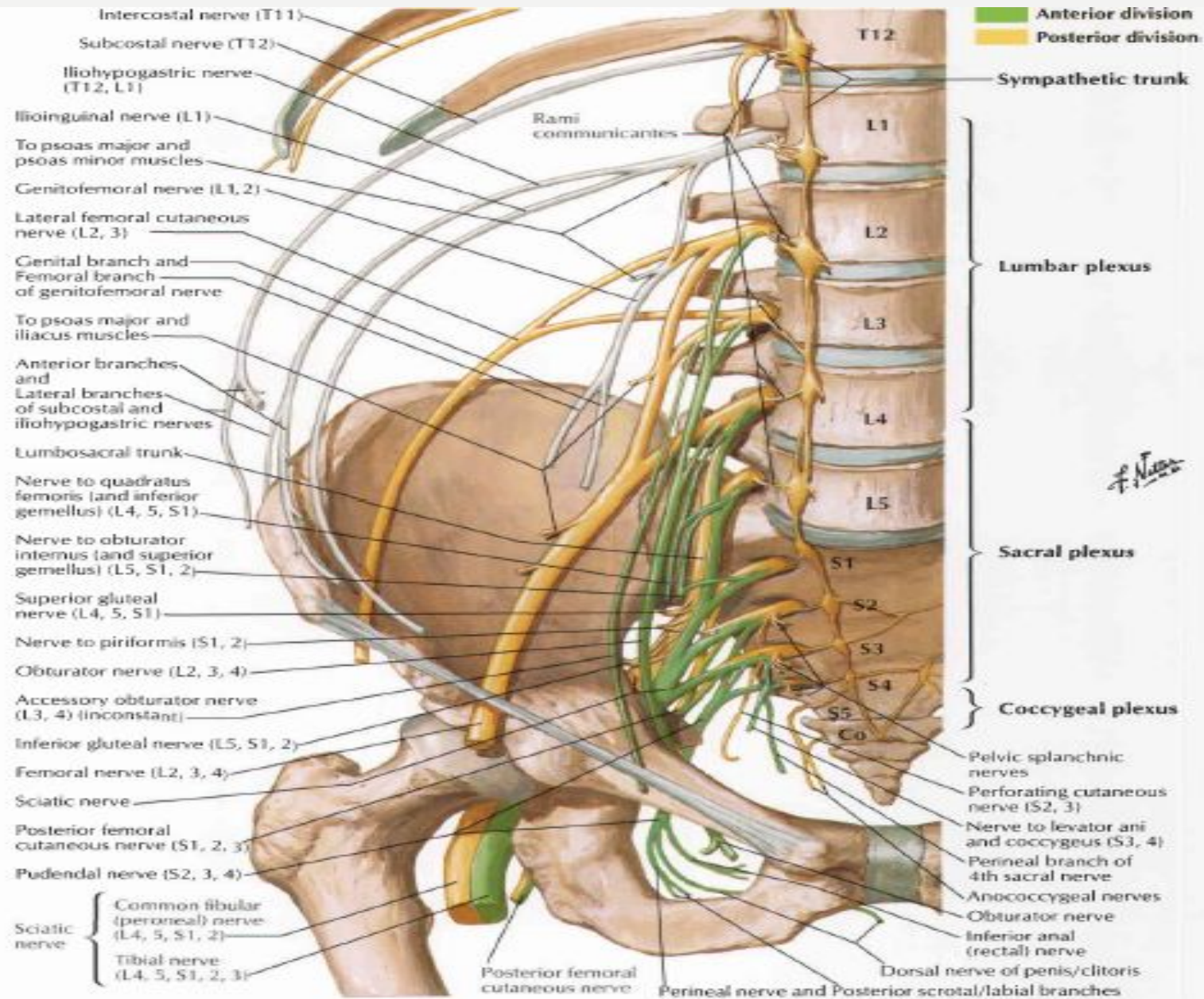
- Rare
- **Motor loss:** Paralysis of quads muscles □ Loss of knee extension
- **Sensory loss:** loss of sensation in front medial side of thigh ,leg and foot



SAPHENOUS NERVE

- Terminal branch of femoral n.
- **Origin:**
 - ❑ is the continuation of the deep (posterior) division of the femoral nerve in the femoral triangle.
- **Course:**
 - ❑ In femoral triangle lies Lat to femoral artery.
 - ❑ Accompany femoral artery & vein.
 - ❑ In the adductor canal, lies first lateral, then cross the femoral artery from lateral to medial. Then, pass superficially between Sartorius & Gracilis muscle.
 - ❑ In leg lies on medial side accompanied by GSV.
- **Supply**
 - ❑ provides sensation to **the medial leg and the medial aspect of the foot** as far as the first metatarsal-phalangeal joint
 - ❑ the infrapatellar branch supplies sensation to **the skin in front over the patella**





OBTURATOR NERVE

- The obturator nerve is a large nerve arising from the lumbar plexus and is the nerve of the medial compartment of the thigh.
- **Origin:**
 - Arise from **ventral** division of L2-L3-L4
- **Course:**
 - Is the nerve of medial adductor compartment of the thigh, emerge from medial side of psoas m.
 - It reach thigh by passing through obturator canal to lie behind adductor longus and divide into two divisions (Anterior and Posterior divisions, in relation to adductor brevis).

OBTURATOR NERVE

The adductor brevis muscle separates the divisions of the obturator nerve:

- **Anterior division**, give branches to:

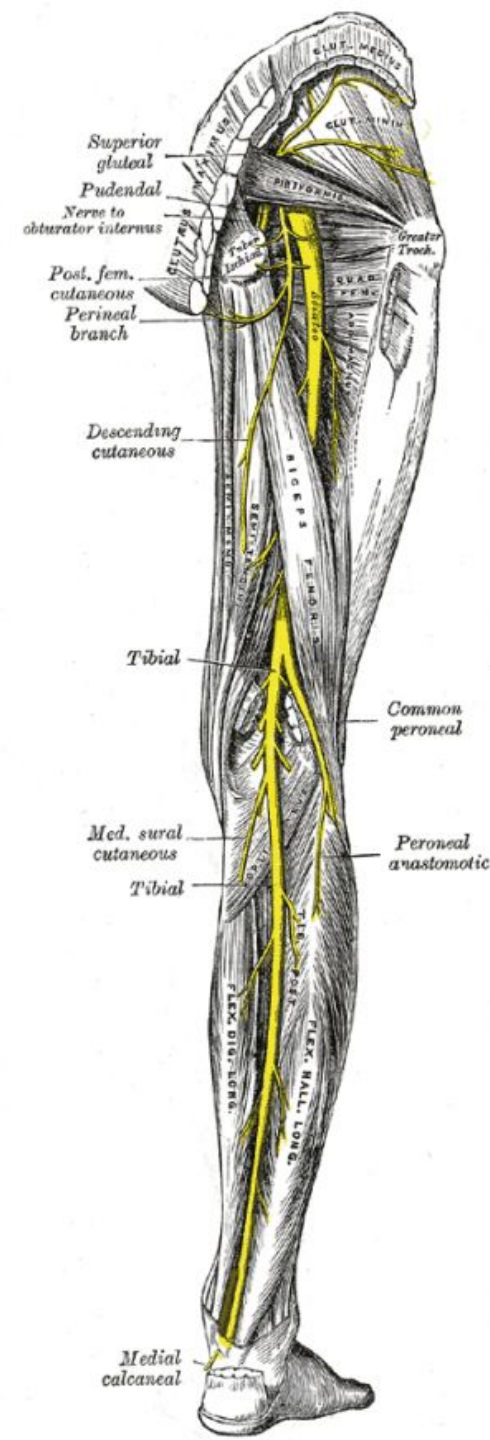
1. articular branch to hip joint
2. adductor brevis
3. adductor longus
4. gracilis
5. cutaneous branch: supplies skin along mid-portion of medial thigh

- **Posterior division**, give branches to:

1. obturator externus
2. adductor magnus (pubic part)
3. articular branch to knee joint: pierces oblique popliteal ligament

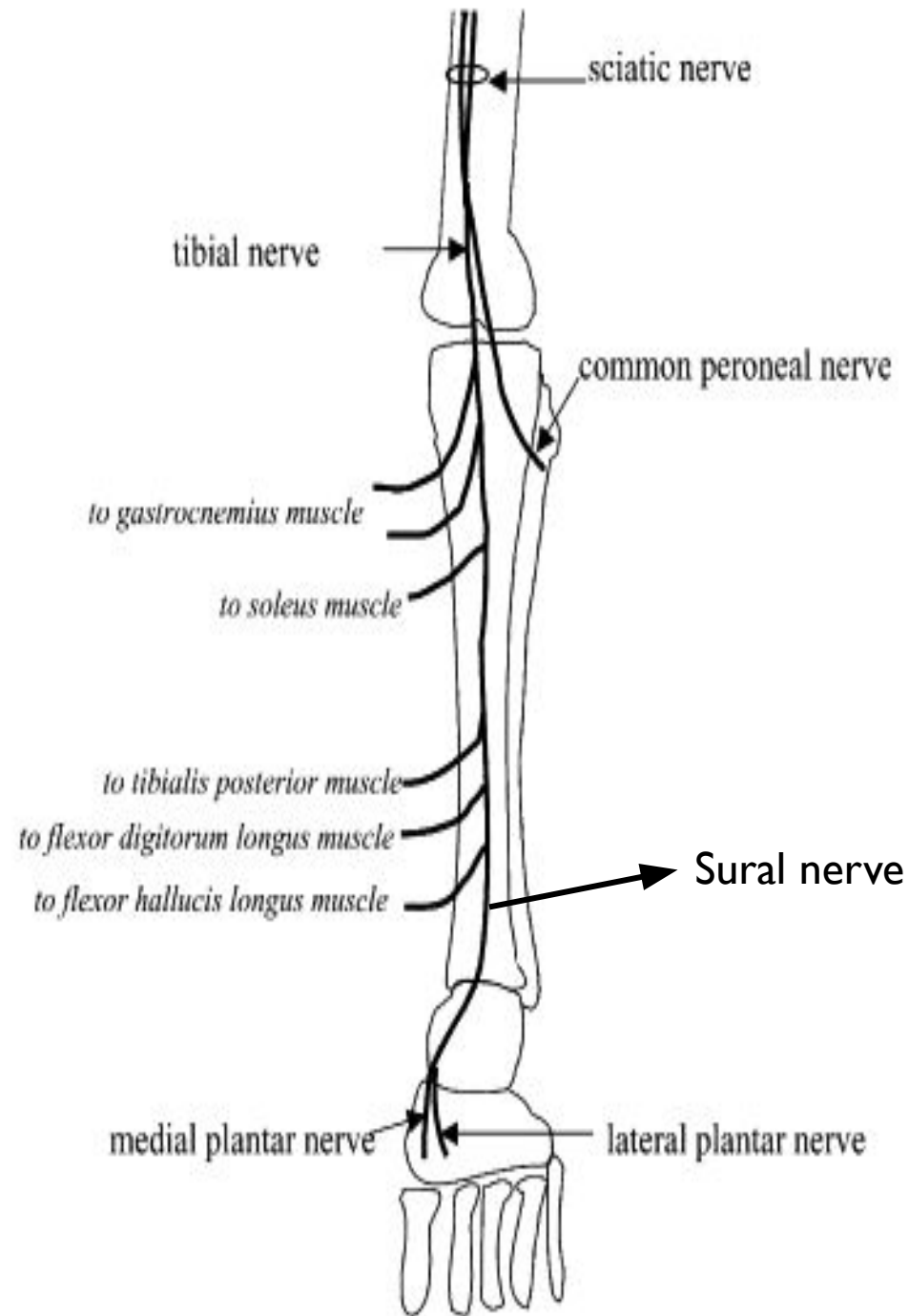
SCIATIC NERVE

- **Origin:** sacral plexus (L4-S3)
- **Course:**
 - Exits the pelvis through the **greater sciatic foramen** to enter the leg **between ischial tuberosity and femoral greater trochanter**, then courses inferiorly through **the posterior compartment of the thigh**
- **Major branches**
 1. tibial nerve (L4-S3)
 2. common peroneal nerve (L4-S2)
- **Function:**
 - ❑ **Motor supply:**
 - Innervates the muscles of the posterior thigh (biceps femoris, semimembranosus and semitendinosus) and the hamstring portion of the adductor magnus (remaining portion of which is supplied by the obturator nerve).
 - Indirectly innervates (via its terminal branches) all the muscles of the leg and foot.
 - ❑ **Sensory supply:**
 - No direct sensory functions. Indirectly innervates (via its terminal branches) the skin of the lateral leg, heel, and both the dorsal and plantar surfaces of the foot.



TIBIAL NERVE

- **Origin:** one of two terminal branches of the sciatic nerve in the lower third of the thigh
- **Course:**
 - ❑ Descends behind knee joint in popliteal fossa.
 - ❑ Lies superficial to popliteal Vessels and deep to gastrocnemius & soleus muscle
 - ❑ Tibial nerve lies on medial side of tibial artery ,then crosses superficial, then lies lateral to it.
 - ❑ At ankle: Pass post. to med. Malleolus, between FDL & FHL
- **Major branches**
 1. Sural nerve
 2. Medial and Lateral plantar nerves
- **Functions:**
 - **Motor supply:** posterior compartment of the thigh, posterior compartments of the leg (superficial posterior and deep posterior) and the muscles of the sole of the foot
 - **Sensory supply:** articular branches to knee, ankle and foot joints; cutaneous branches to posterior calf and sole of the foot



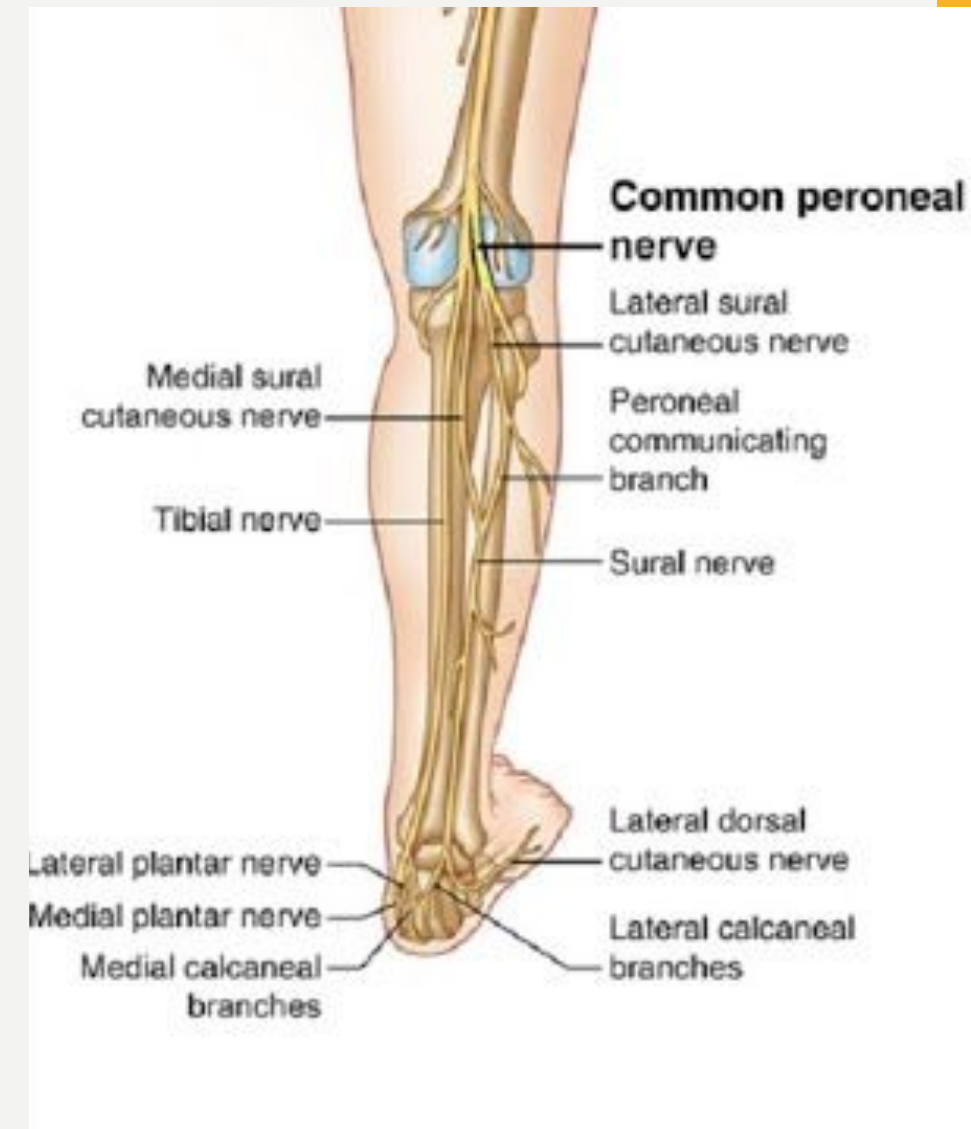
SCIATICA

- Sciatica **refers to** pain, weakness, numbness, or tingling down the leg from the lower back.
- **Causes**
 - Sciatica occurs when there is pressure on or damage to the sciatic nerve.
 - common causes of sciatica include:
 - Slipped or herniated disk (most common cause), Spinal stenosis, Piriformis syndrome (a pain disorder occurs when the piriformis muscle presses on the sciatic nerve), Pelvic injury or fracture, and Tumors
- **Symptoms:**
 - Sciatica pain can **vary widely**. It may feel like a **mild tingling, dull ache, or burning sensation**. In some cases, the pain is severe enough to make a person unable to move.
 - The pain most often occurs on one side (**Unilateral**).
- **Treatment:**
 - Treatment of underlying cause.
 - Pain relief can be achieved by
 - A. Analgesic such as ibuprofen (Advil, Motrin IB) or acetaminophen (Tylenol).
 - B. Apply heat or ice to the painful area. Try ice for the first 48 to 72 hours, then use heat.



COMMON PERONEAL NERVE

- **Origin:**
 - one of two terminal branches of the sciatic nerve
 - It arises from the posterior divisions of the anterior rami of L4-S2 nerve roots in the sacral plexus.
- **Course:**
 - Diverges away from the sciatic nerve by sloping lateral and downwards to lie laterally in the popliteal fossa.
 - It exits the popliteal fossa over the plantaris and lateral head of gastrocnemius. Here the common peroneal nerve pass laterally around the neck of fibula to enter the lateral compartment of the leg.
 - It divides into its terminal branches in the peroneus longus muscle - superficial and deep peroneal nerves.



SUPERFICIAL PERONEAL NERVE

- **Origin:**

- arises as a terminal branch of the common peroneal nerve in the lateral compartment of the leg

- **Course:**

- passes between peroneus longus muscle and peroneus brevis muscle.
- Arise in substance of peroneus longus muscle, on lateral side of neck of fibula.

- **Functions:**

- **Motor supply:** peroneus longus and peroneus brevis muscles

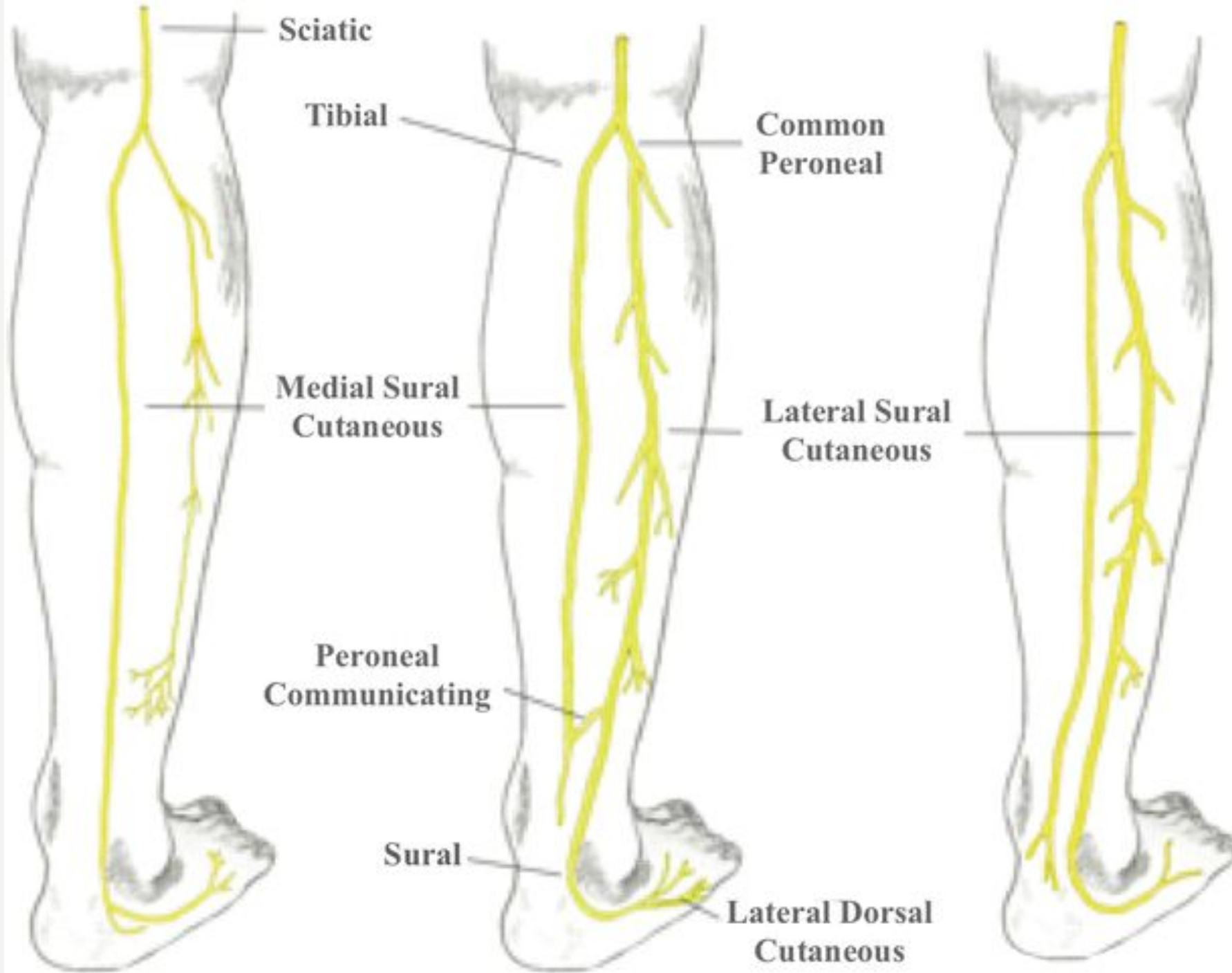
- **Sensory supply:** lower part of front of leg and back of foot, except first web (deep P), and lateral side of little toe (sural n)

- **Branches:**

- **Muscular branches** to the muscles of the lateral compartment of the leg [peroneus brevis muscle and peroneus longus muscle]

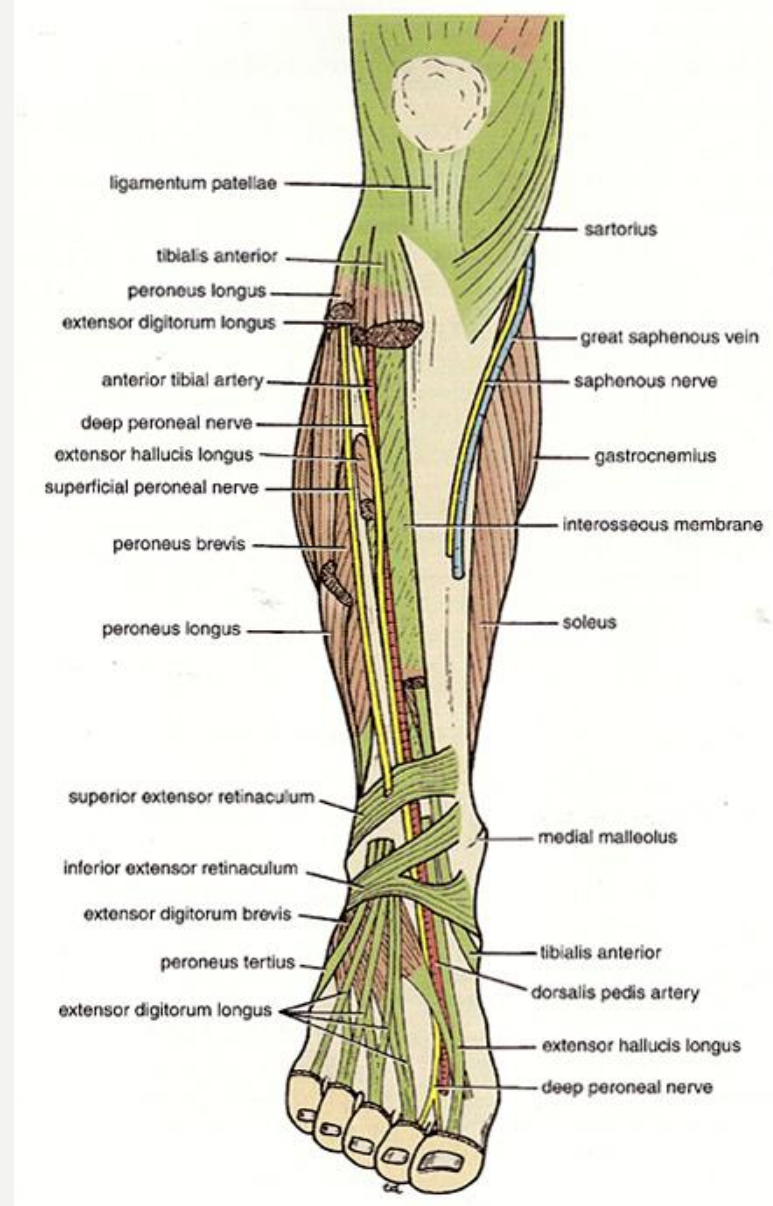
- **Terminal cutaneous sensory branches**

1. medial cutaneous branch (larger, supplies the medial dorsal skin of the foot)
2. lateral cutaneous branch (smaller, supplies the medial dorsal skin of the foot)



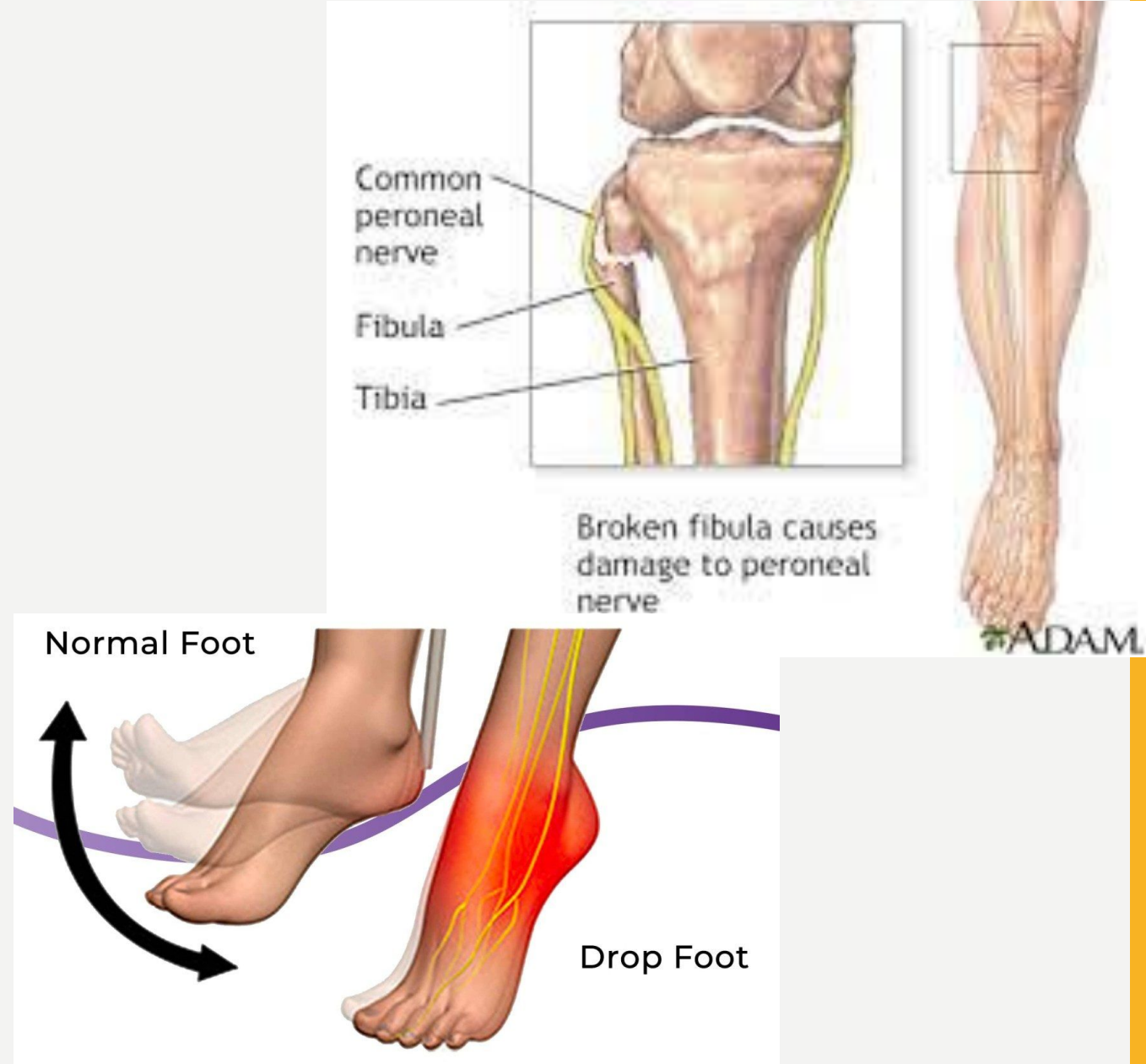
DEEP PERONEAL NERVE

- **Origin:**
 - the terminal branch of common peroneal nerve in the lateral compartment of the leg
- **Course:**
 - Arise in substance of Peroneus longus muscle, to the lateral side of neck of fibula
 - Joins ant. tibial a. in ant. compartment of leg
 - Passes into the anterior compartment of the leg, where it courses inferiorly into the dorsal aspect of the foot under the extensor retinaculum at the ankle, between the tendons of extensor hallucis longus and extensor digitorum longus
- **Function:**
 - **Motor supply:** anterior compartment of the leg
 - **Sensory supply:** dorsal aspect of the foot
- **Relations:**
 - Between EHL & EDL

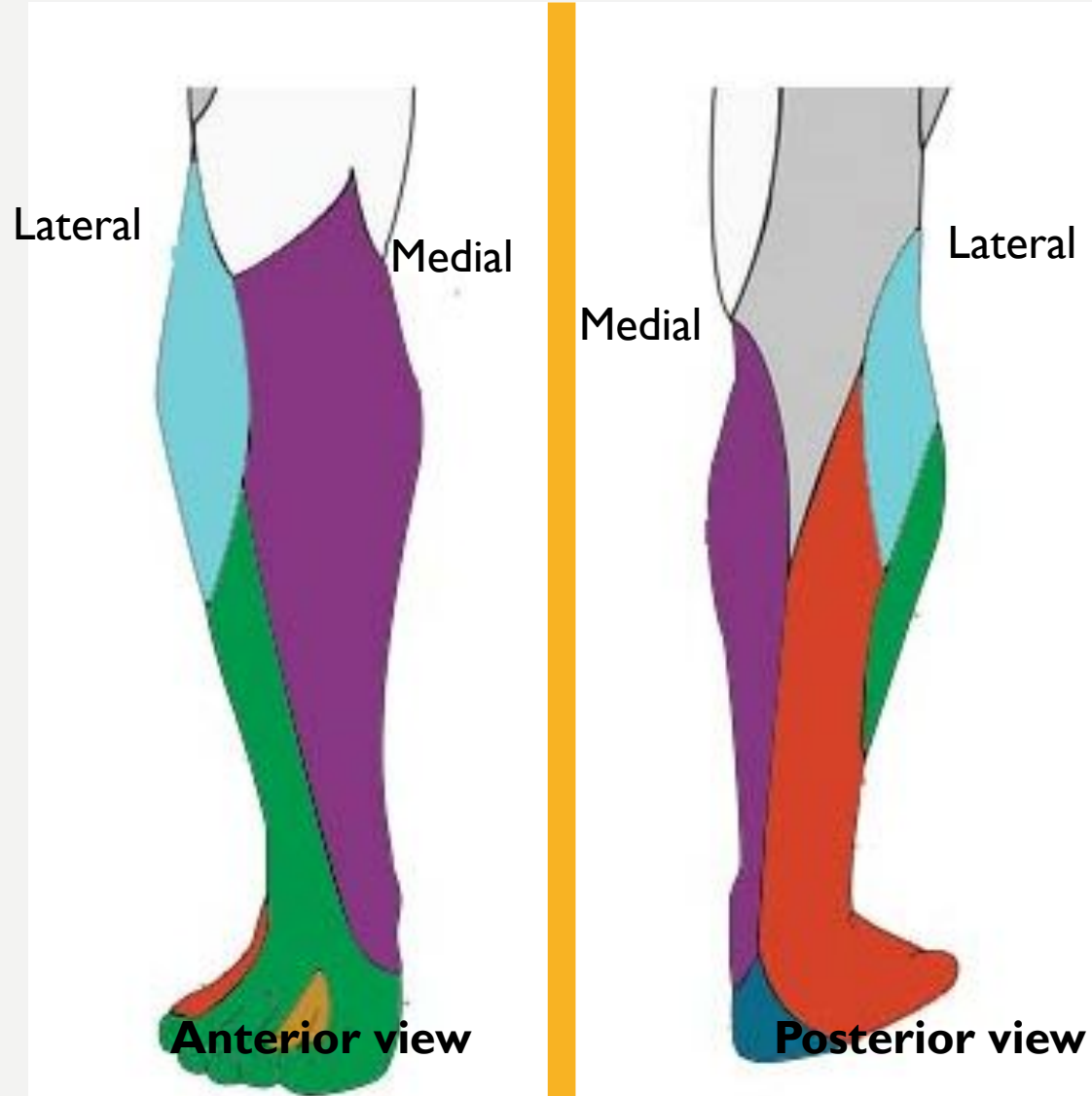


COMMON PERONEAL NERVE INJURY

- Foot drop refers to an inability to lift the forefoot due to weakness of the dorsiflexors.
- Caused by cut or damage of the common peroneal nerve that occur post fracture of the fibular head and neck or tight plaster.

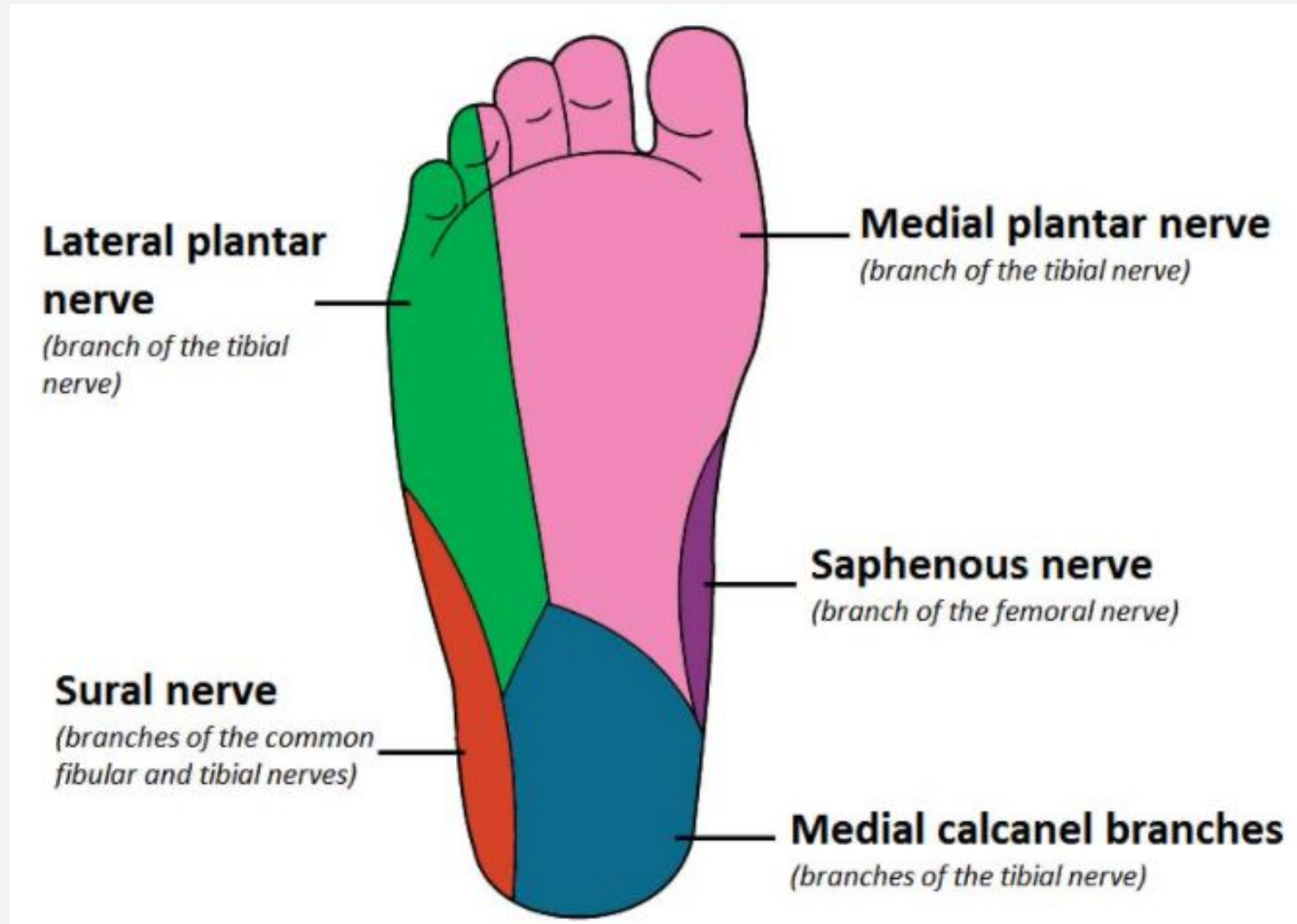


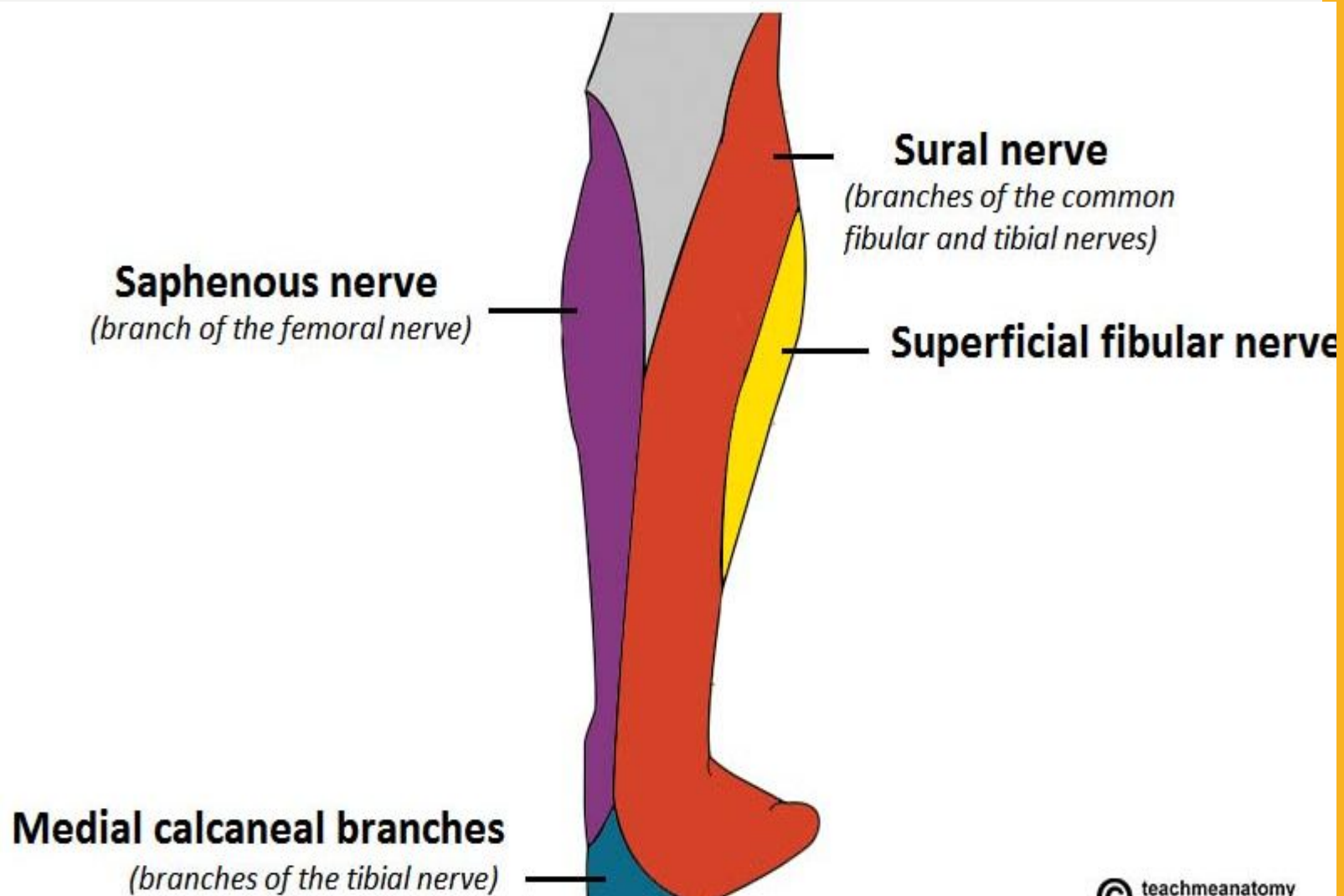
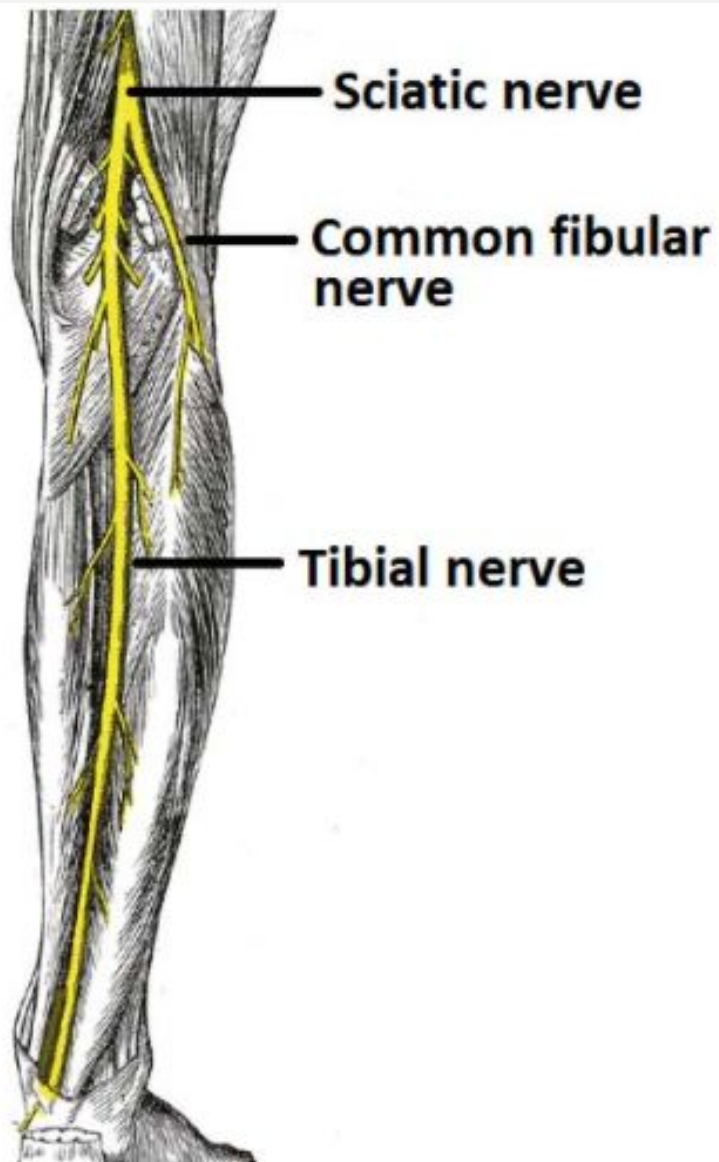
Cutaneous Sensation of the Lower Limb



- Saphenous** (*from femoral*)
- Lateral sural** (*from common fibular*)
- Sural** (*from common fibular and tibial*)
- Superficial fibular**
- Deep fibular**
- Medial calcaneal** (*from tibial*)

Cutaneous Sensation of the Lower Limb







THE END