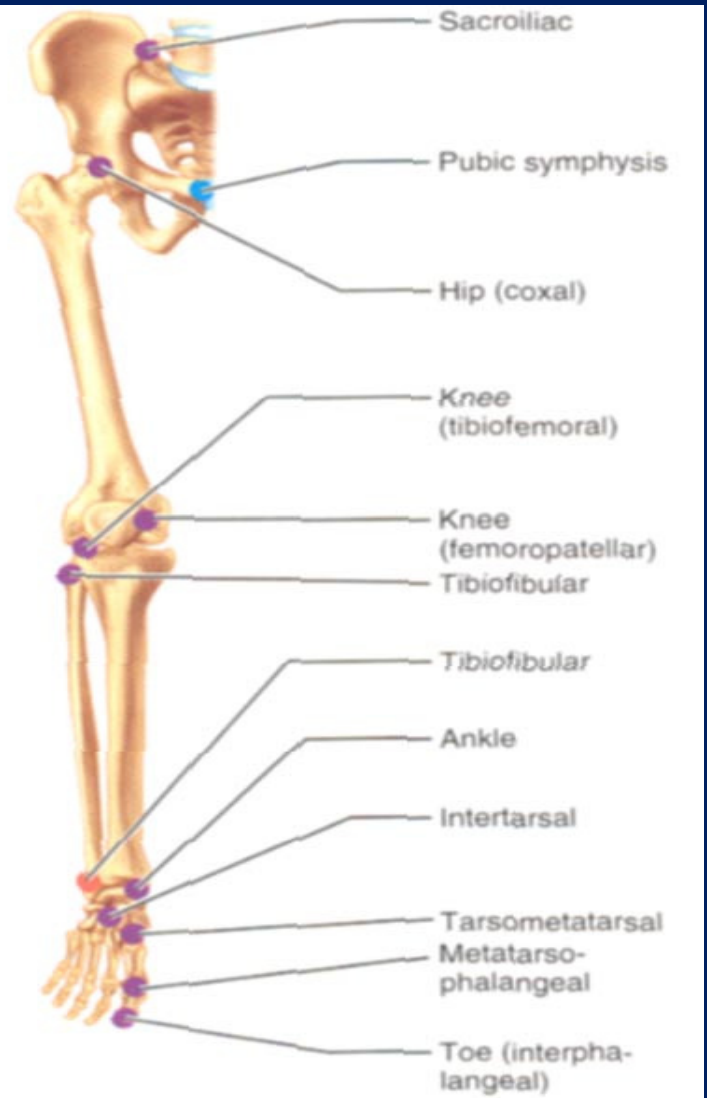
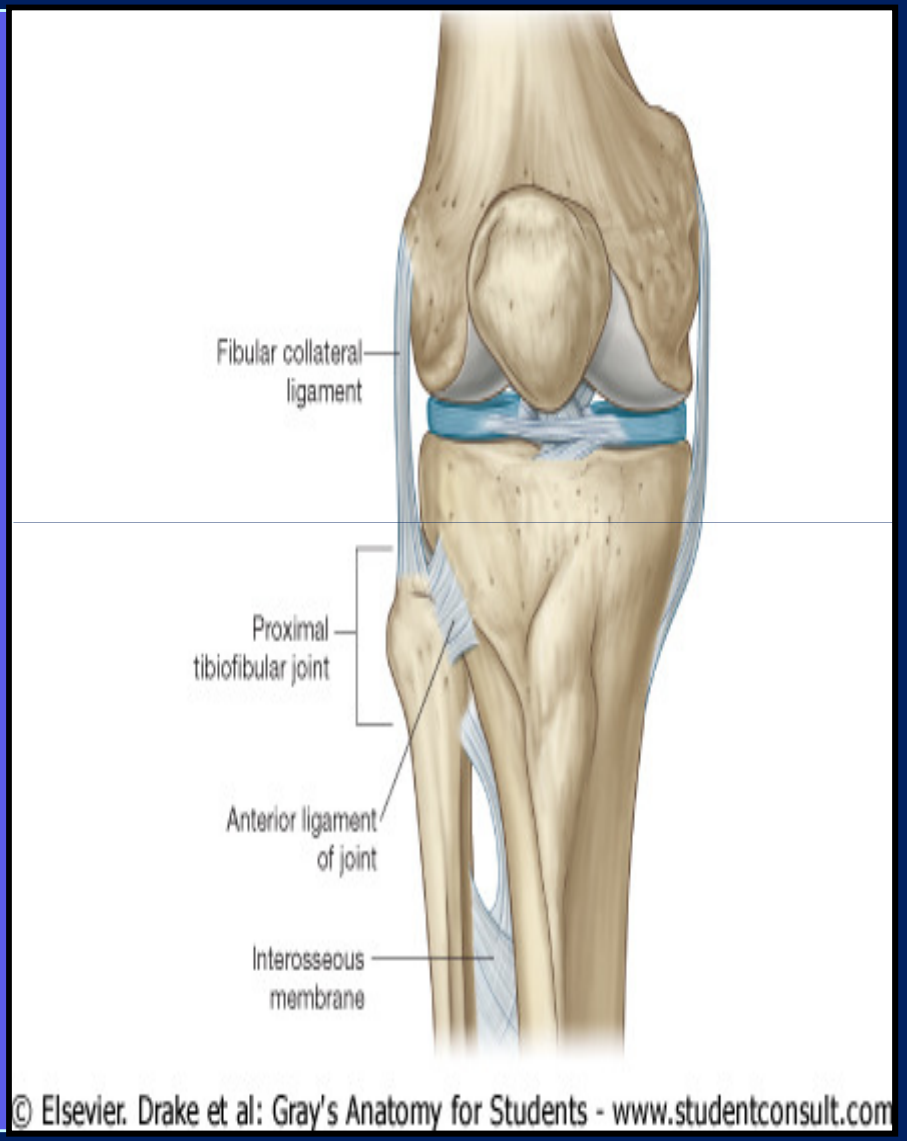
Joints of the Lower Limb

- Joints of the Lower Limb:
  - Knee Joint
  - Proximal Tibiofibular J.
  - Distal Tibiofibular J.
  - Ankle Joint



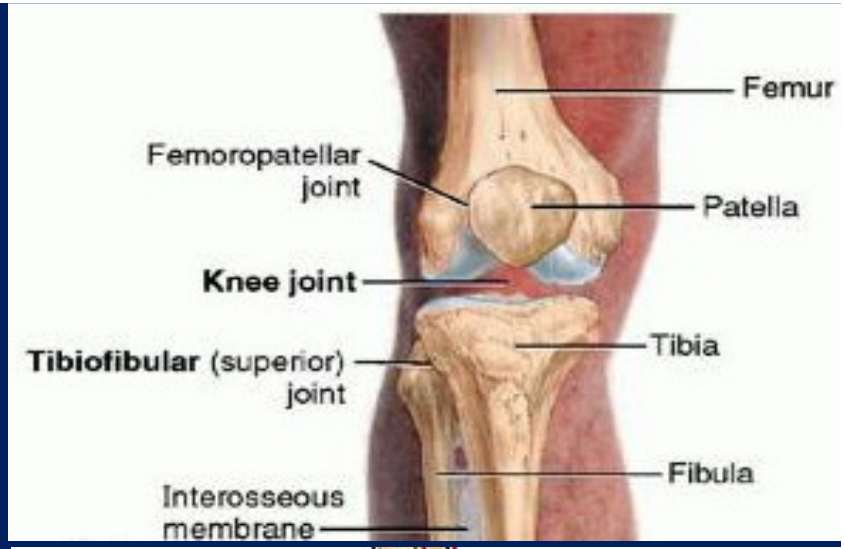
- Knee Joint:
  - Articulation
  - Type
  - Capsule
  - Ligaments
  - Bursaes
  - Nerve Supply
  - Movements

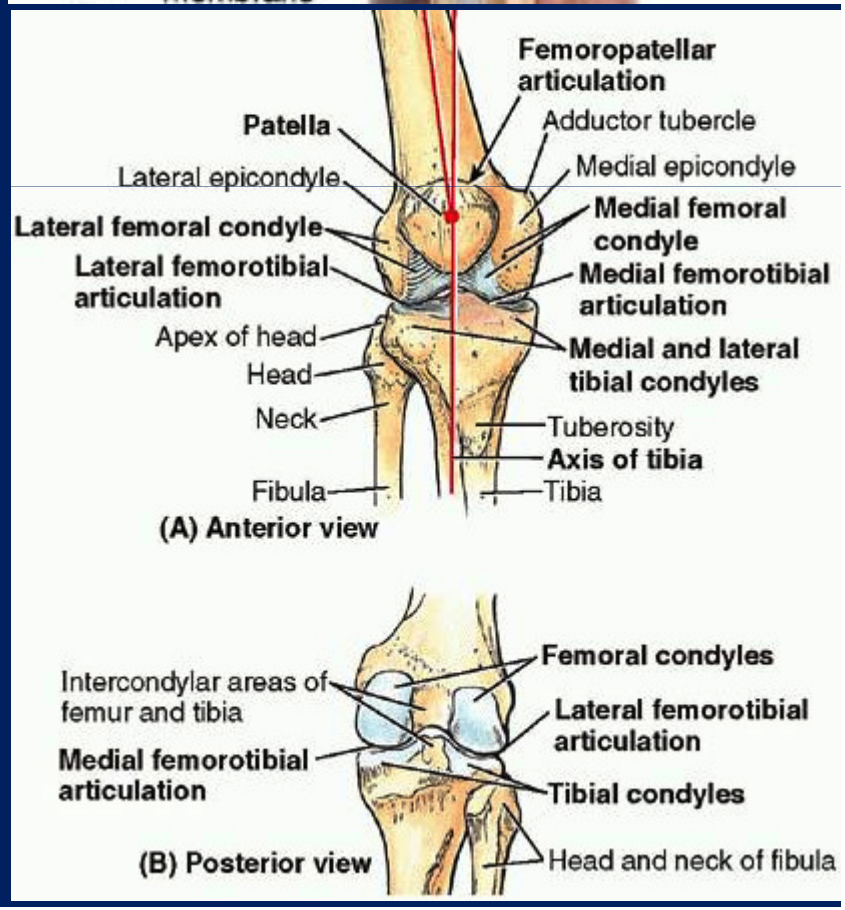


Knee Joint:

the largest and most complicated joint in the body consists of two condylar joints between the medial and lateral condyles of the femur and the corresponding condyles of the tibia, and a gliding joint, between the patella and the patellar surface of the femur. Note that the fibula is not directly involved in joint.

- **Articulation:** Above are the rounded condyles of femur; below are the condyles of tibia and their cartilaginous menisci in front is the articulation between the lower end of femur and patella.(articular surfaces covered with hyaline cartilage).



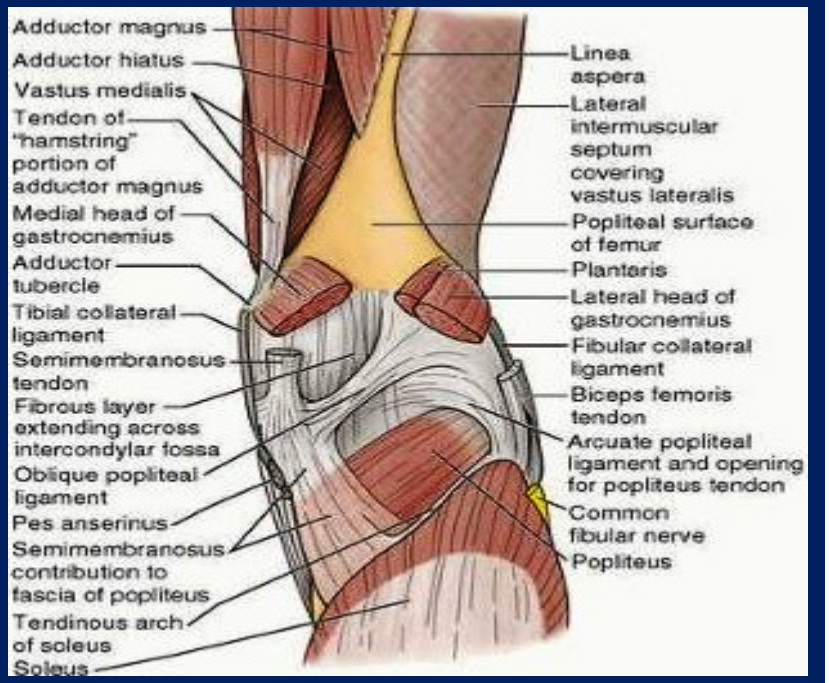


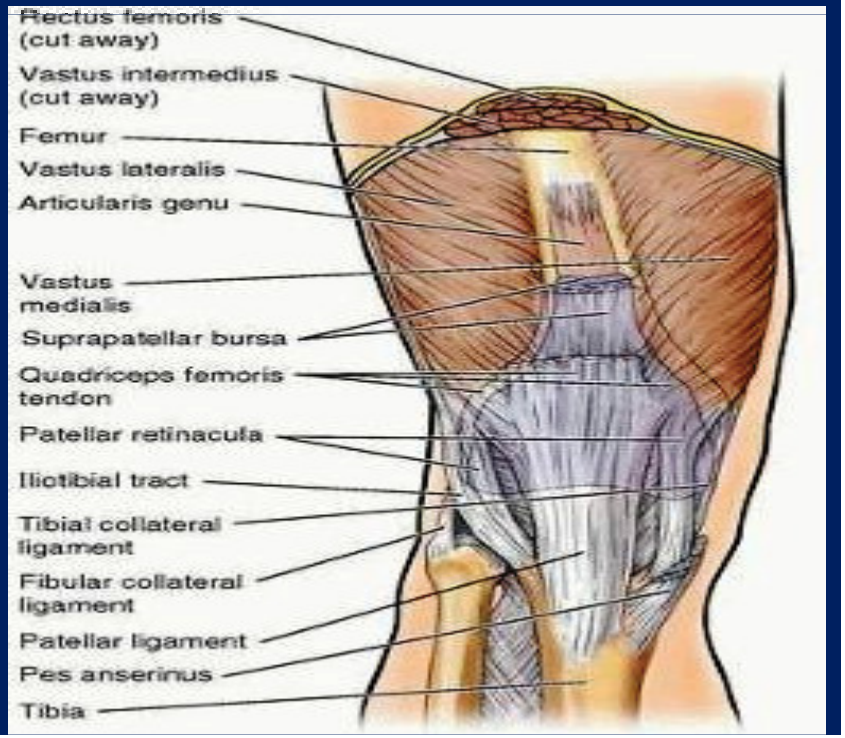
Type:

Femur & tibia is a synovial joint (hinge variety),between patella & femur is a synovial joint (plane gliding variety).

Capsule :

The capsule is attached to the margins of the articular surfaces posterior aspect of the joint. On the front of joint, the capsule is absent beneath the quadriceps tendon, forming the supra patellar bursa .On each side of patella tendons of vastus lateralis & medialis. Behind joint, capsule is strengthened by the semimembranous M called oblique popliteal ligament.An opening in capsule in lateral tibial condyle permits the tendon of the popliteus M.



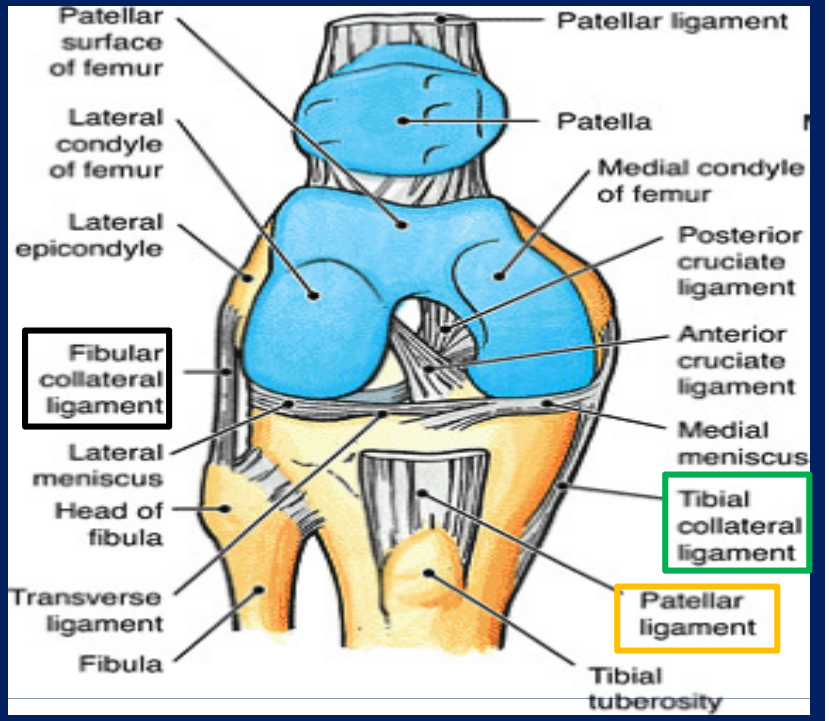


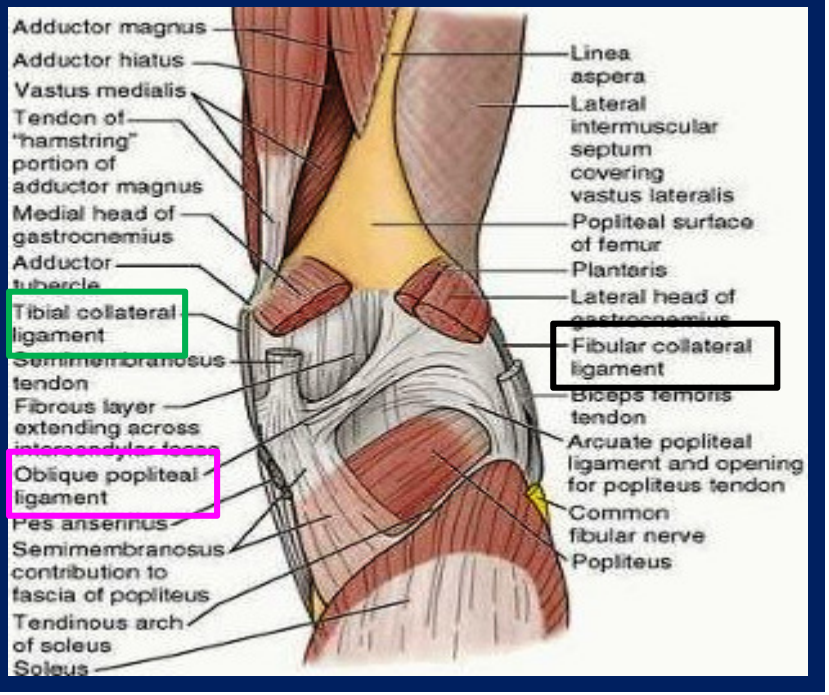
Ligaments:

divided into those that lie outside capsule and those that lie within the capsule.

Extra capsular Ligaments:

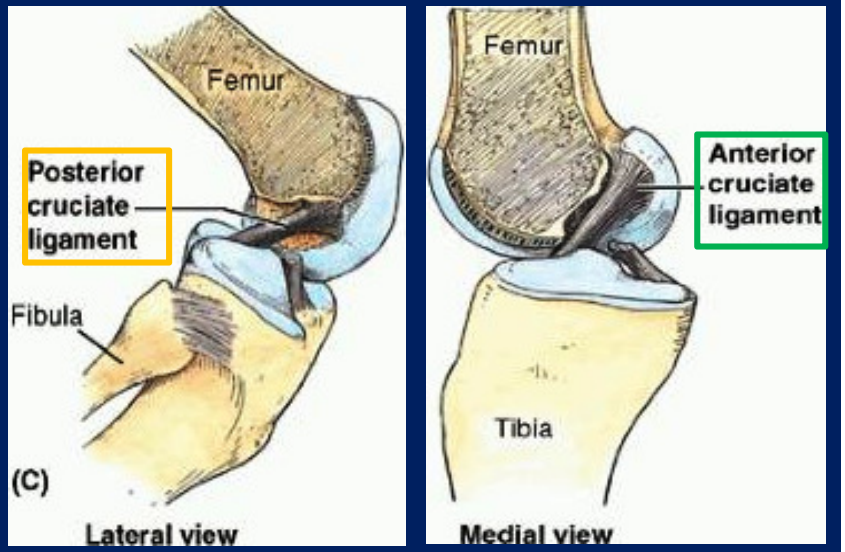
- **The ligamentum patellae** is attached above to the lower border of patella and below to the tuberosity of tibia .
- **lateral collateral ligament** is cordlike and is attached above to lateralcondyle of femur and below to head of fibula .
- **Medial collateral ligament** is a flat band and is attached above to medial condyle of femur and below to medial surface of the shaft of the tibia.
- **The oblique popliteal ligament** is a tendinous expansion derived from the semimembranosus M. (posterior)

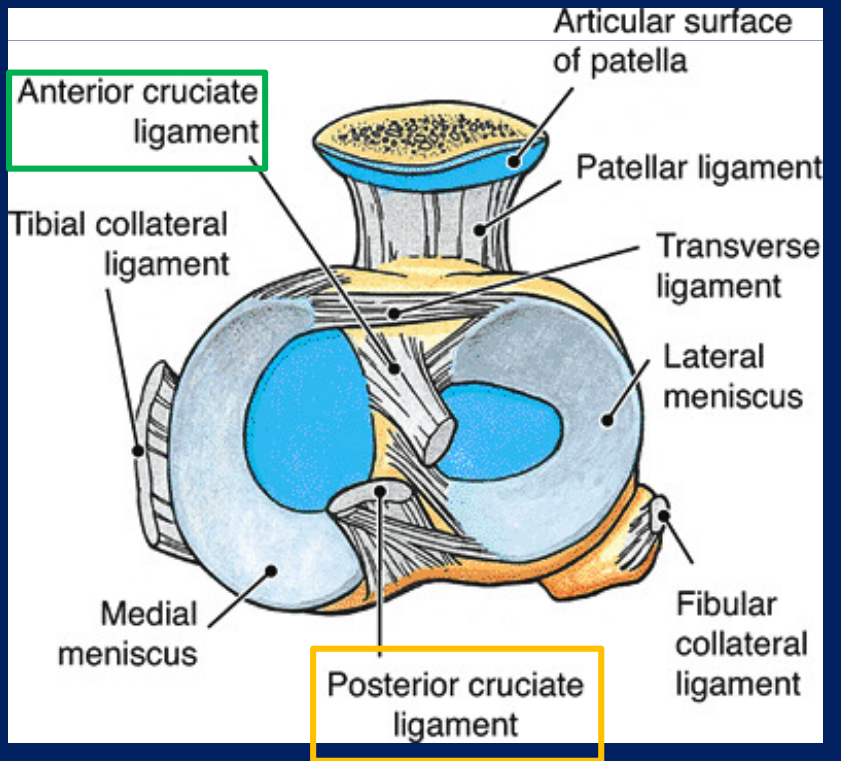




Intracapsular Ligaments:

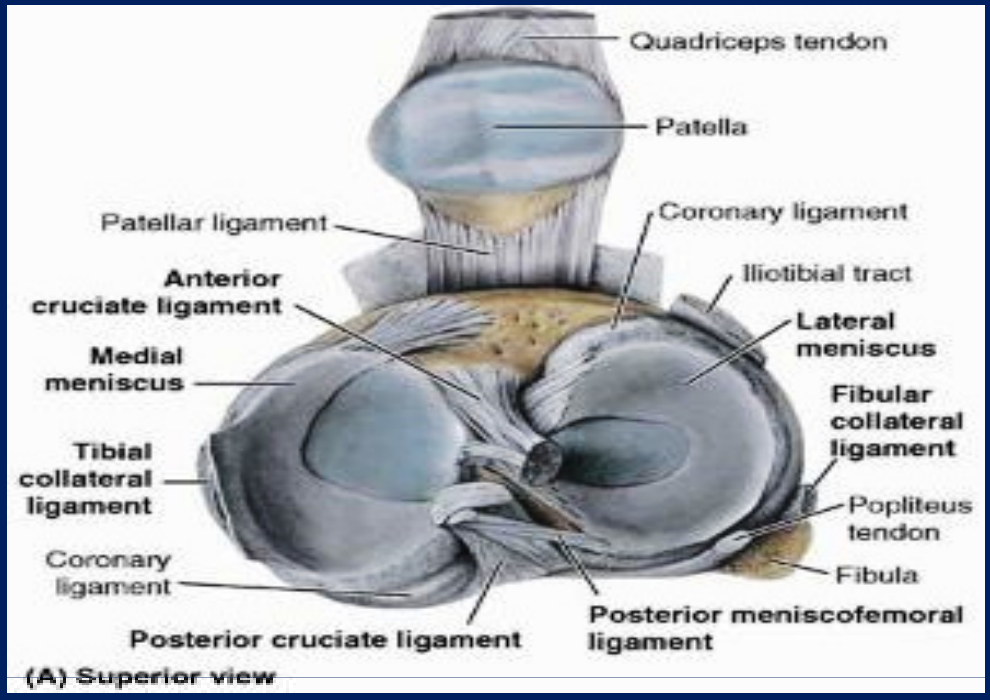
- **The cruciate ligaments** are two strong intracapsular ligaments.They are named anterior and posterior, according to their tibial attachments .
- **Anterior Cruciate Ligament** is attached to the anterior intercondylar area of the tibia and passes upward, backward and laterally to be attached to the posterior part of the medial surface of the lateral femoral condyle .
- **Posterior Cruciate Ligament** is attached to the posterior intercondylar area of the tibia and passes upward, forward and medially to be attached to the anterior part of the lateral surface of the medial femoral condyle.

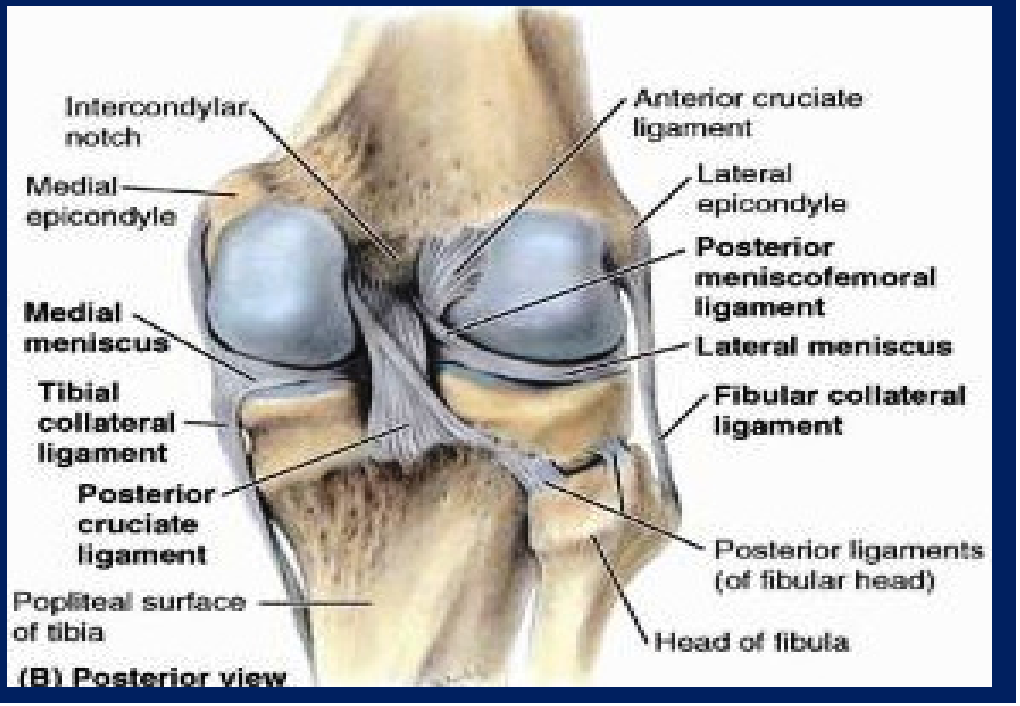




Menisci

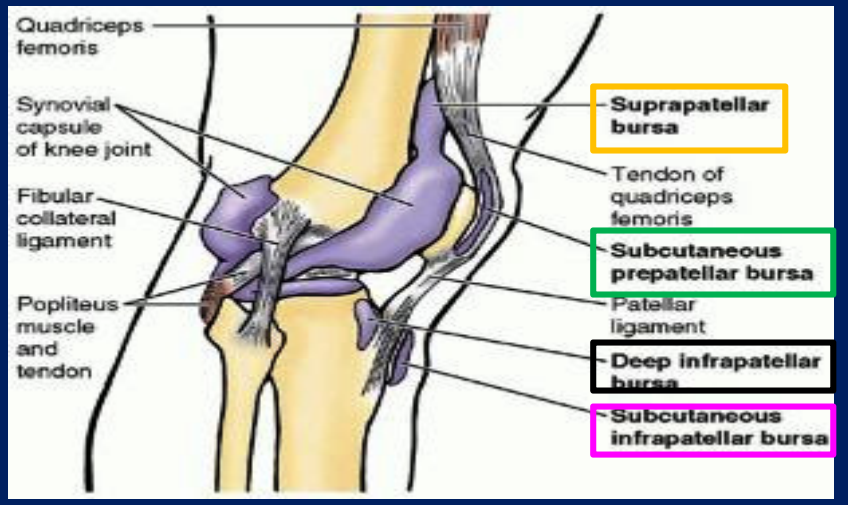
- The menisci are C-shaped sheets of fibrocartilage. The peripheral border is thick and attached to the capsule and the inner border is thin and concave and forms a free edge. The upper surfaces are in contact with the femoral condyles. The lower surfaces are in contact with the tibial condyles. Their function is to deepen the articular surfaces of the tibial condyles to receive the convex femoral condyles; they also serve as cushions between the two bones.

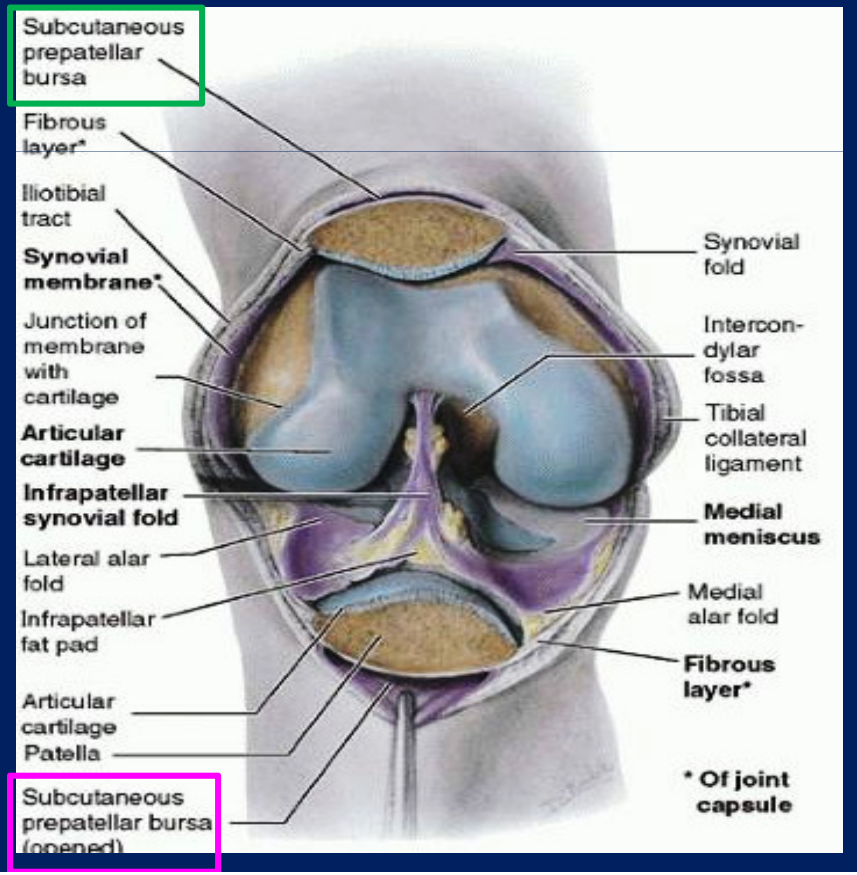




Anterior Bursae

- The suprapatellar bursa lies beneath quadriceps muscle and communicates with joint cavity.
- The prepatellar bursa lies in the subcutaneous tissue between the skin and the front of the lower half of the patella and the upper part of the ligamentum patellae.
- The superficial infrapatellar bursa lies in the subcutaneous tissue between the skin and the front of the lower part of the ligamentum patellae.
- The deep infrapatellar bursa lies between the ligamentum patellae and the tibia.

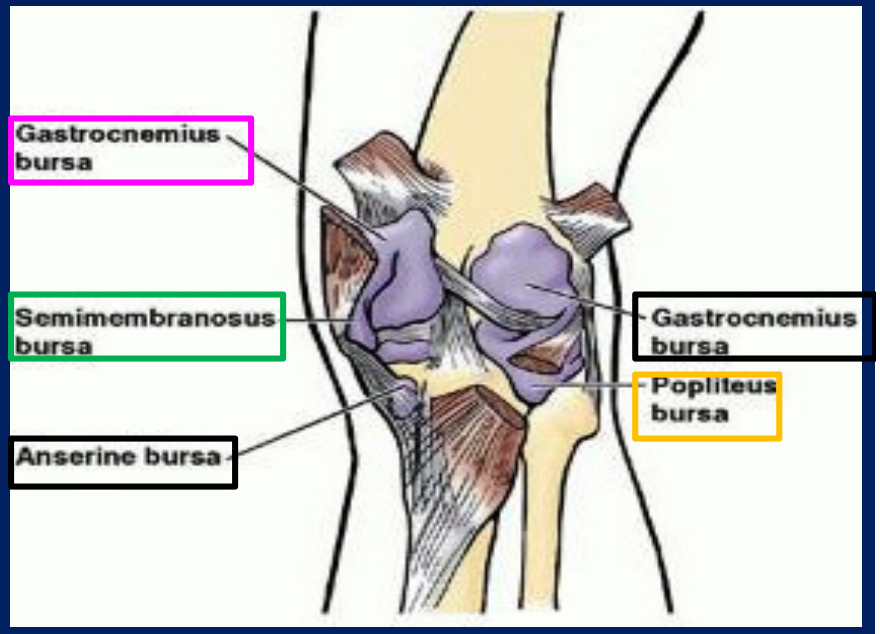


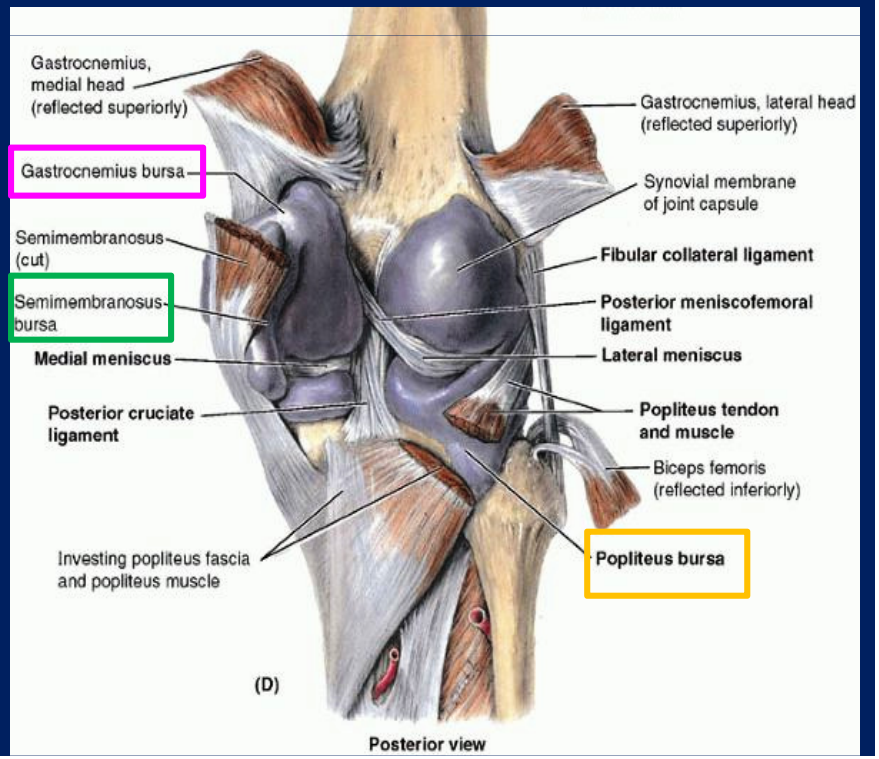


Posterior Bursae

- The popliteal bursa is found in association with the tendon of popliteus M and communicates with the joint cavity.
- The semimembranosus bursa is found related to the insertion of semimembranosus M and may communicate with joint cavity.

The remaining four bursae are found related to the tendon of insertion of the biceps femoris, sartorius, gracilis and semitendinosus muscles as they pass to their insertion on the tibia; beneath lateral head of origin of gastrocnemius M; and beneath medial head of origin of gastrocnemius M.



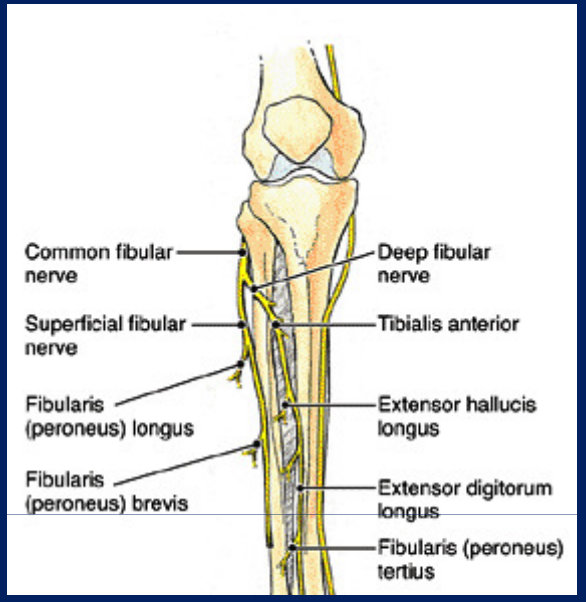


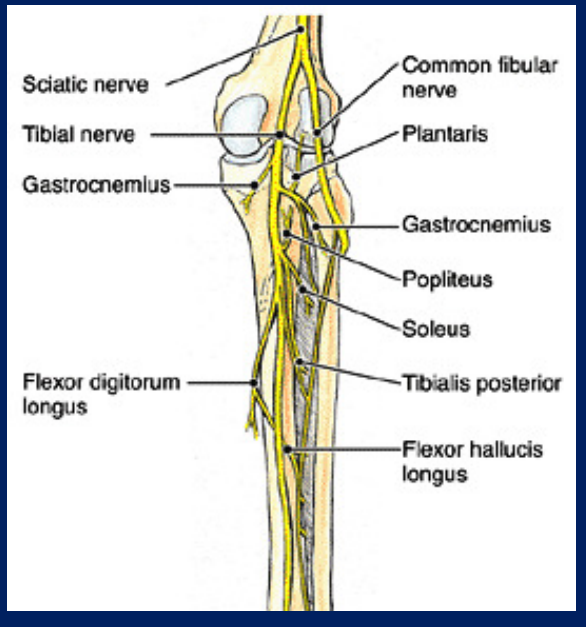
Nerve Supply

The femoral, obturator, common peroneal, and tibial nerves supply the knee joint.

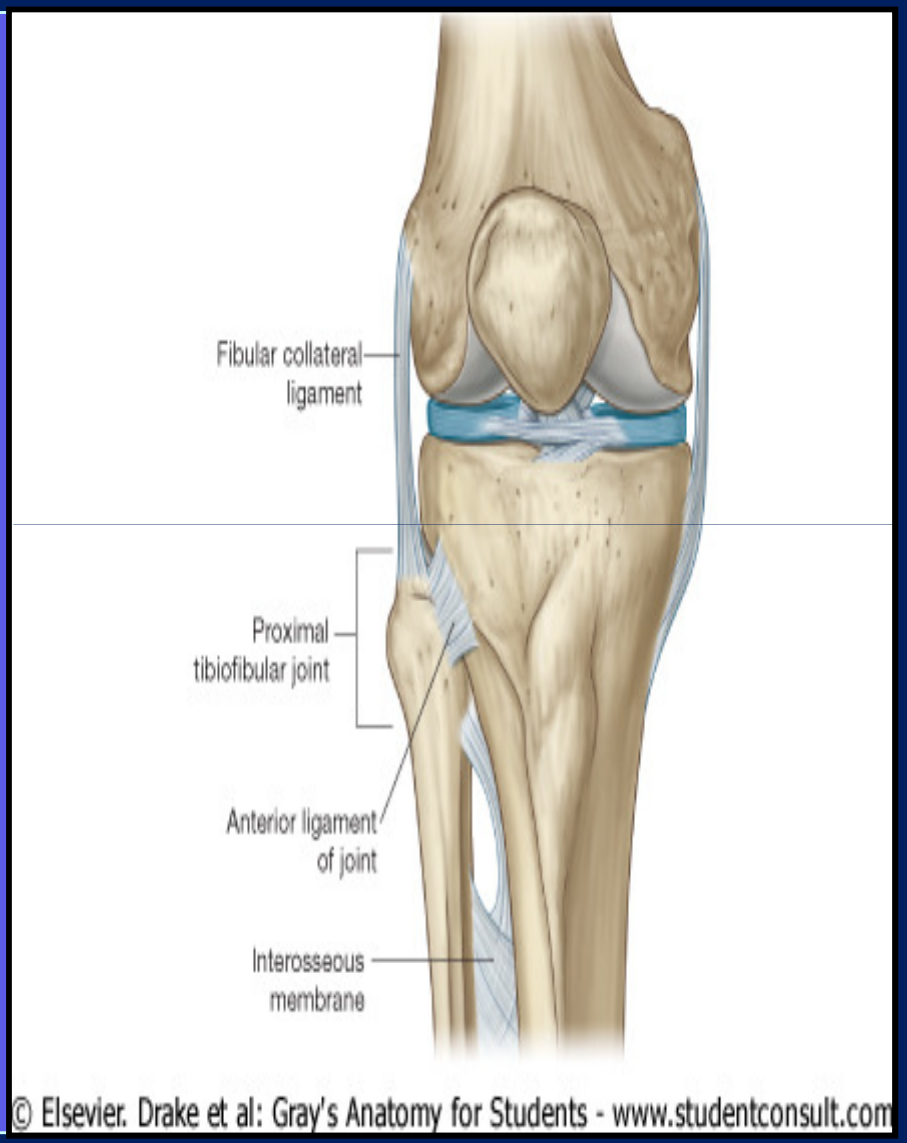
Movements

Flexion, extension and rotate.



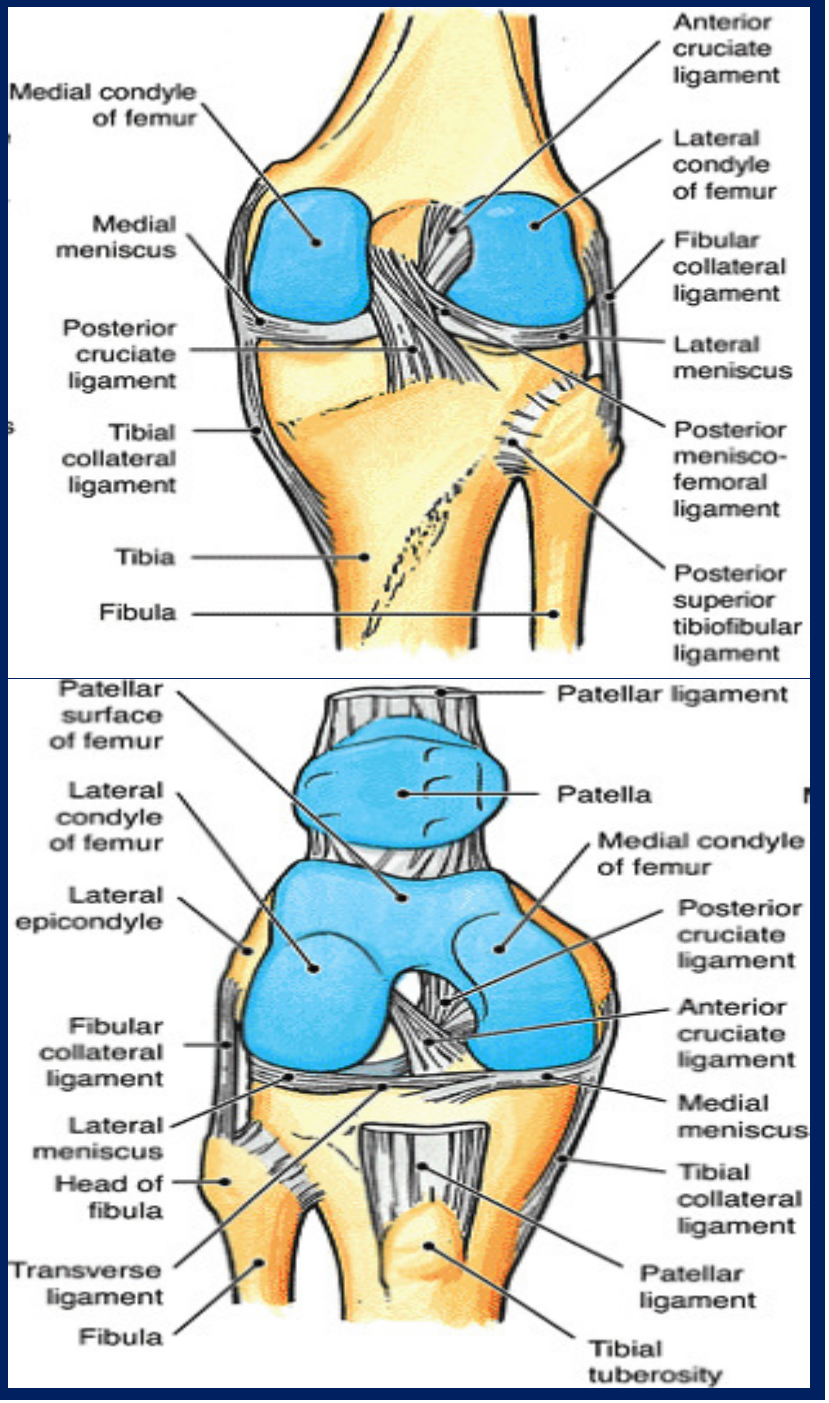


- Proximal Tibiofibular Joint:
  - Articulation
  - Type
  - Capsule
  - Ligaments
  - Nerve Supply
  - Movements

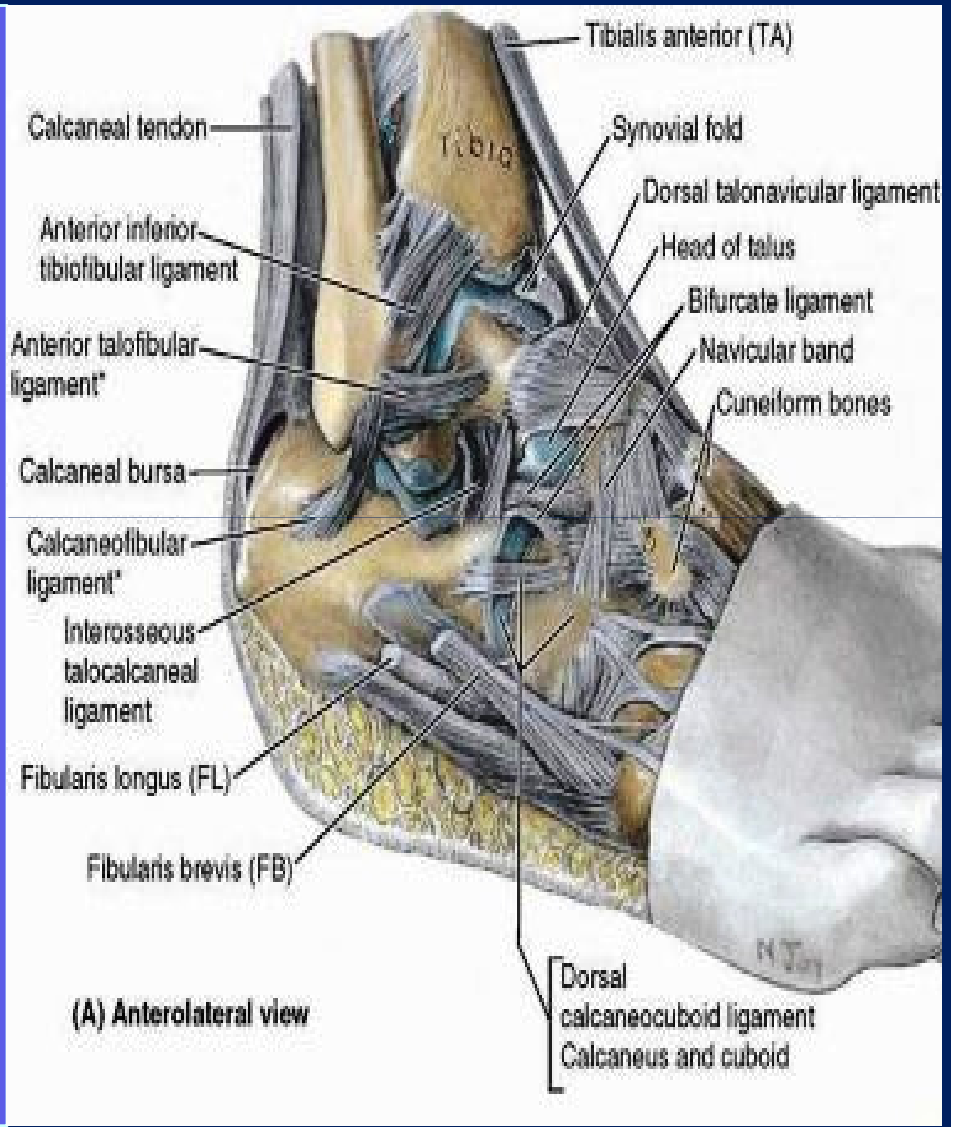


Proximal Tibiofibular Joint:

- **Articulation:** Is between lateral condyle of tibia and head of fibula. The articular surfaces are flattened and covered by hyaline cartilage.
- **Type:** This is a synovial, plane, gliding joint.
- **Capsule:** The capsule surrounds joint and is attached to margins of articular surfaces.
- **Ligaments:** Anterior and posterior ligaments strengthen the capsule.
  The interosseous membrane, which connects the shafts of the tibia and fibula together.
- **Synovial Membrane:** The synovial membrane lines the capsule and is attached to the margins of the articular surfaces.
- **Nerve Supply:** The common peroneal nerve supplies the joint.
- **Movements:** A small amount of gliding movement takes place during movements at the ankle joint.

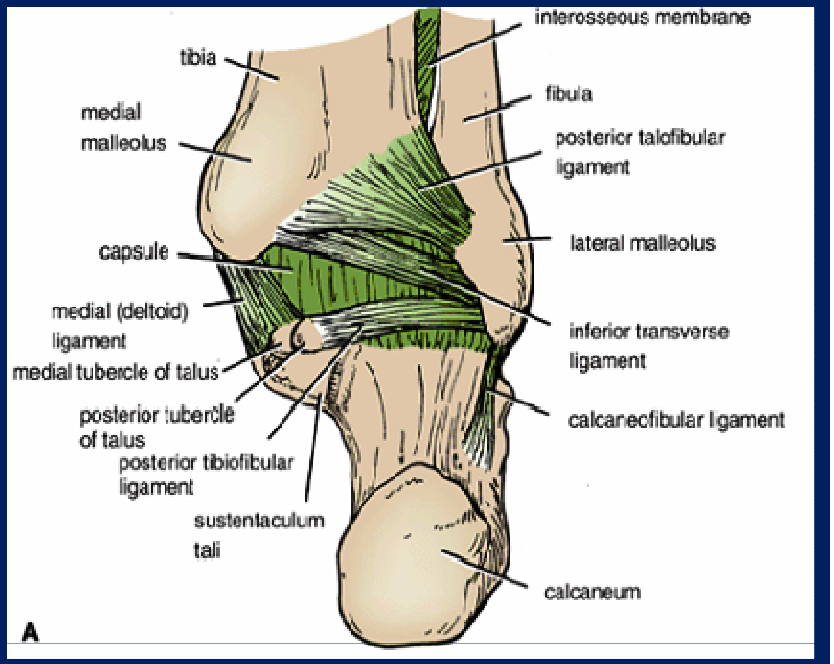


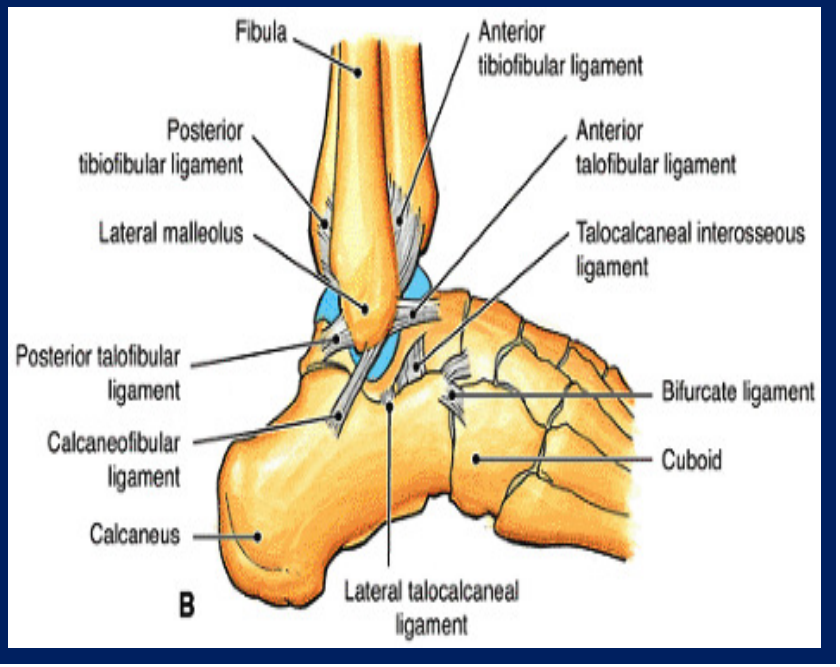
- Distal Tibiofibular Joint :
  - Articulation
  - Type
  - Capsule
  - Ligaments
  - Nerve Supply
  - Movements



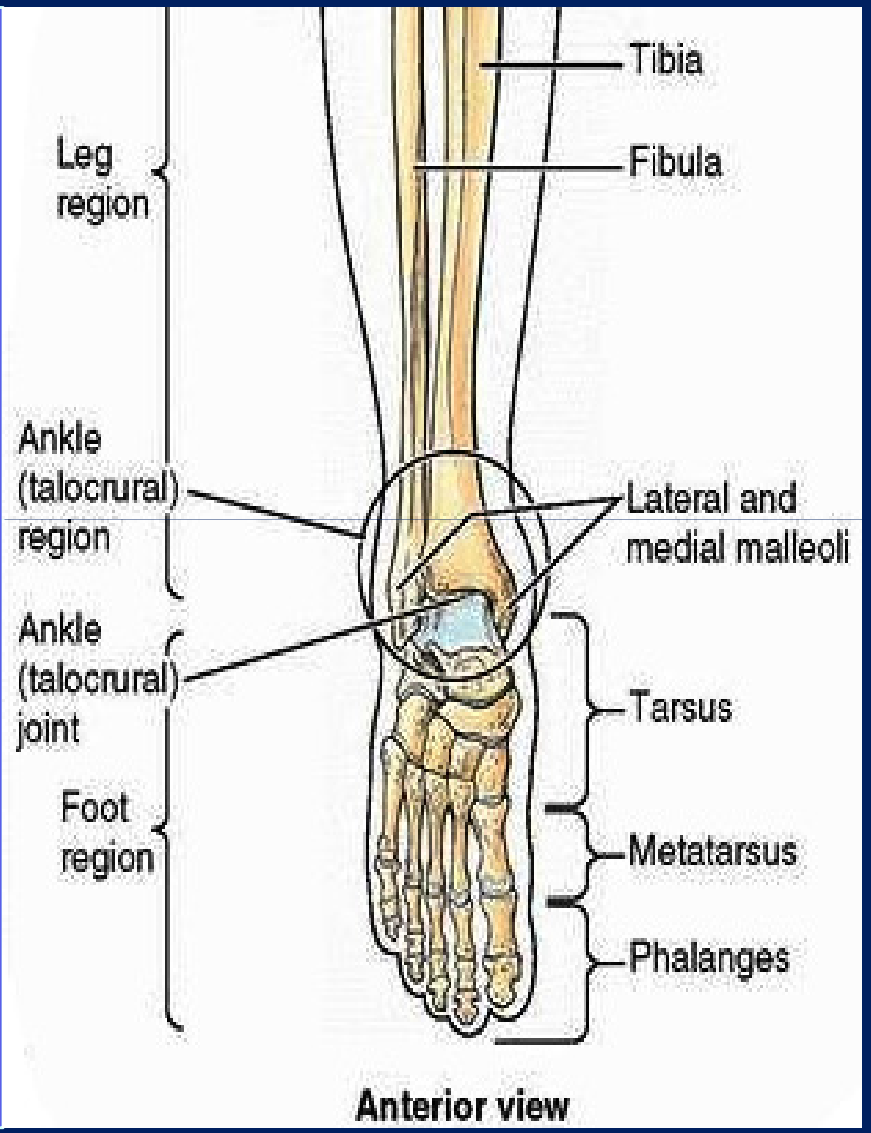
Distal Tibiofibular Joint:

- **Articulation:** Is between the fibular notch at lower end of tibia and lower end of fibula.
- **Type:** Distal tibiofibular joint is fibrous joint.
- **Capsule:** There is no capsule.
- **Ligaments:**
- Interosseous ligament is a strong,thick band of fibrous tissue that binds two bones together.
- Anterior and posterior ligaments are flat bands of fibrous tissue connecting two bones together in front & behind interosseous ligam.
- Inferior transverse ligament runs from medial surface of upper part of lateral malleolus to posterior border of lower end of the tibia.
- **Nerve Supply:** Deep peroneal and tibial nerves supply the joint.
- **Movements:** A small amount of movement takes place during movements at ankle joint.





- Ankle Joint:
  - Articulation
  - Type
  - Capsule
  - Ligaments
  - Nerve Supply
  - Movements

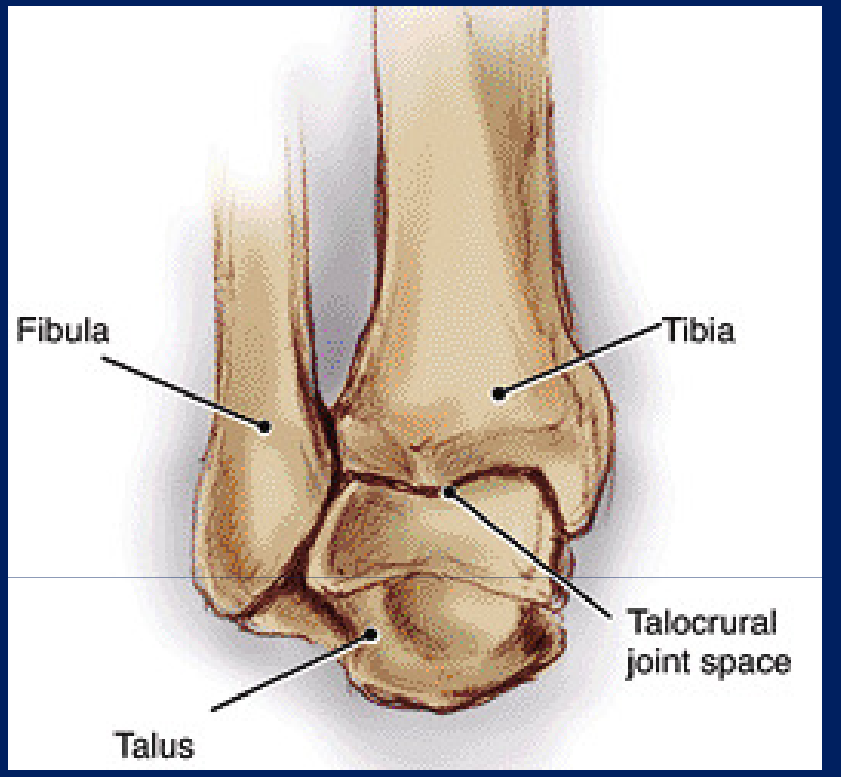


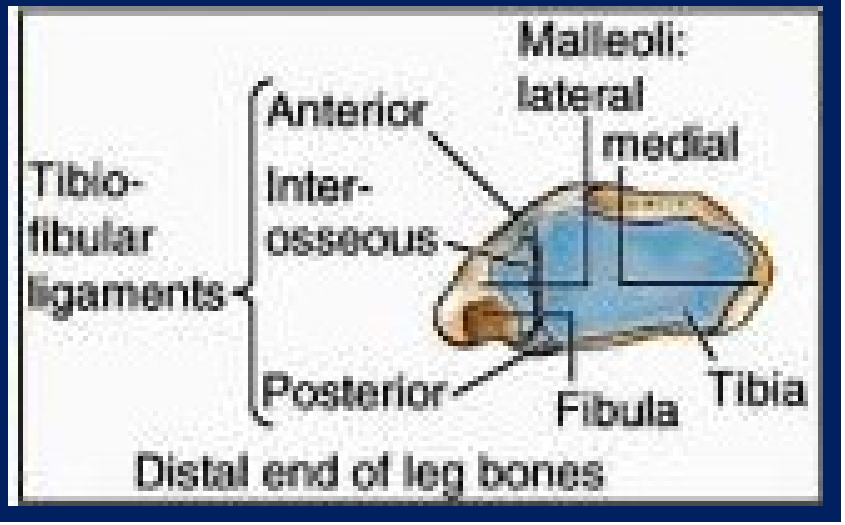
Ankle Joint:

The ankle joint consists of a deep socket formed by the lower ends of the tibia and fibula, into which is fitted the upper part of the body of the talus.

The shape of the bones and strength of ligaments and the surrounding tendons make this joint strong and stable.

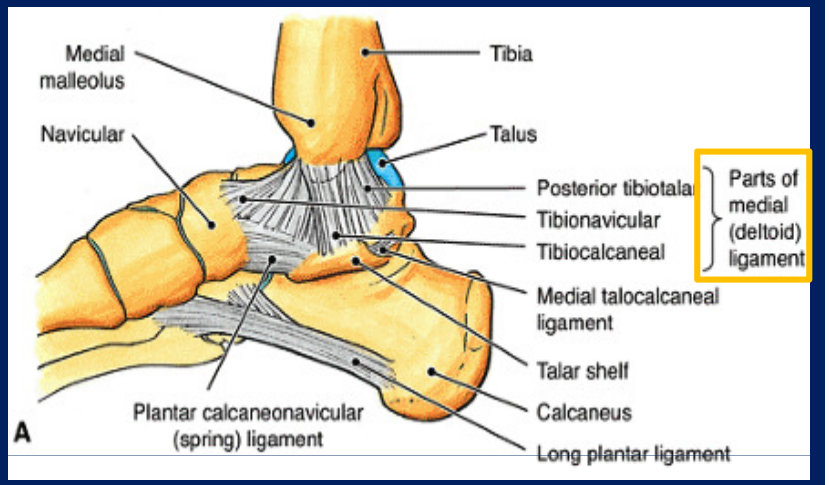
- **Articulation:** Articulation is between the lower end of tibia the two malleoli and body of talus. articular surfaces are covered hyaline cartilage.
- **Type:** Ankle is synovial hinge joint.
- **Capsule:** The capsule encloses the joint and is attached to the bones near their articular margins.

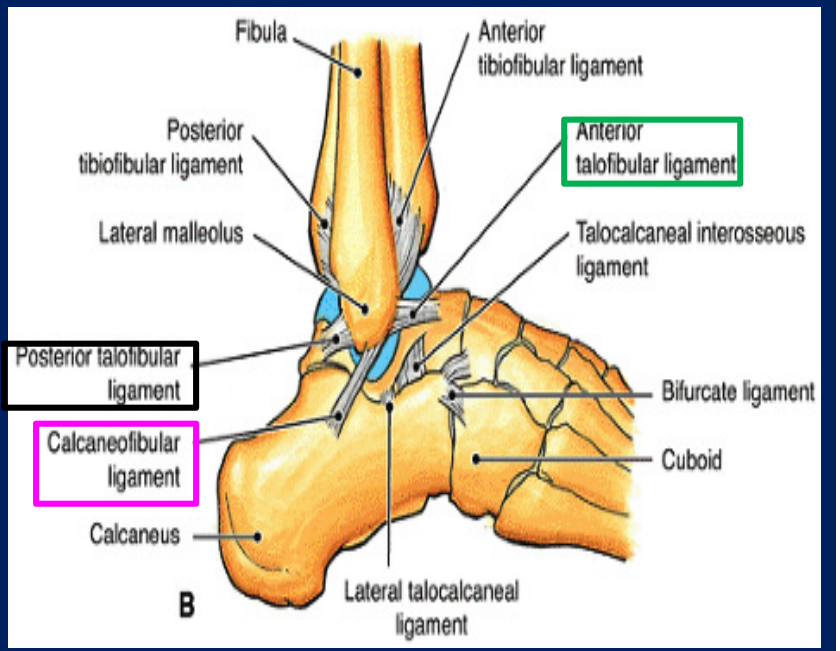




Ligaments:

- **The medial or deltoid ligament** is strong and is attached by its apex to the tip of the medial malleolus. Below deep fibers are attached to the nonarticular area on the medial surface of the body of talus.
- **lateral ligament** is weaker than medial ligament and consists of three bands.
- **The anterior talofibular** ligament runs from the lateral malleolus to the lateral surface of the talus.
- **The calcaneofibular ligament** runs from the tip of the lateral malleolus downward and backward to the lateral surface of the calcaneum.
- **The posterior talofibular ligament** runs from the lateral malleolus to the posterior tubercle of the talus.



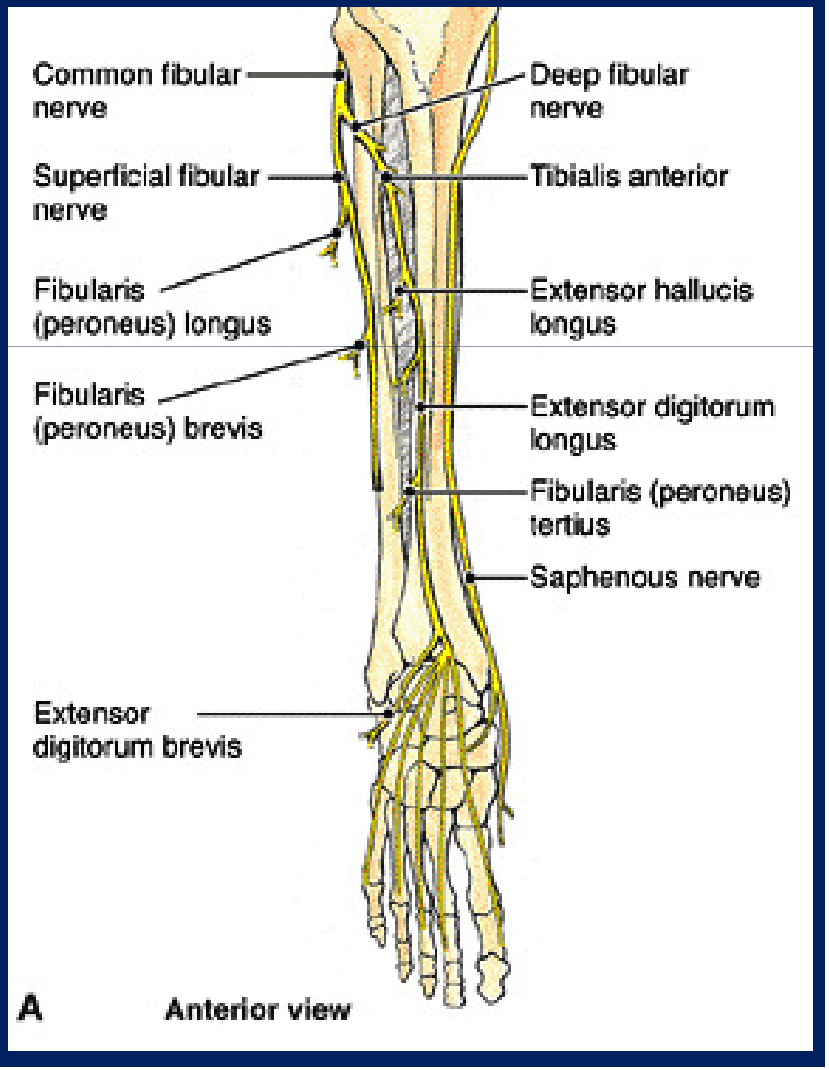


Nerve Supply

Deep peroneal and tibial nerves supply the ankle joint.

Movements

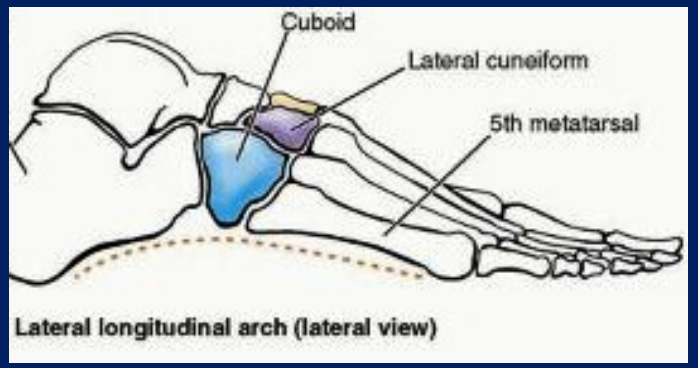
Dorsiflexion (toes pointing upward) and plantar flexion (toes pointing downward) are possible. The movements of inversion and eversion take place at the tarsal joints and not at the ankle joint.



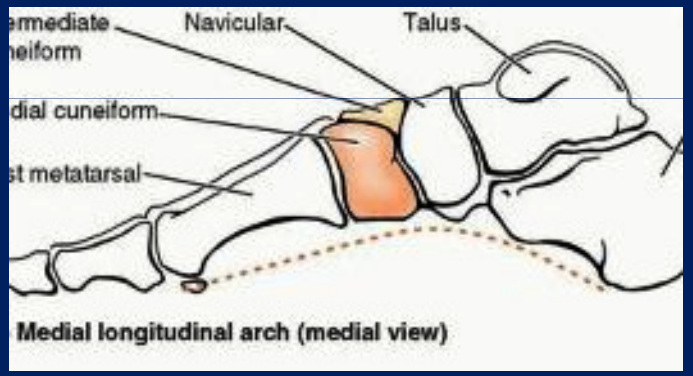
The Arches of the Foot

The foot has **three** arches, which are present at birth: the medial longitudinal, lateral longitudinal, and transverse arches .

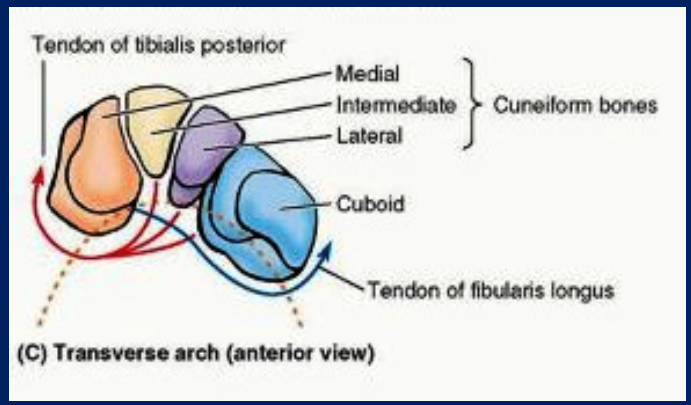
- **the lateral** margin of the foot, pad under the metatarsal heads and pads of the distal phalanges are in contact with the ground.
- **The medial** margin of the foot, from the heel to first metatarsal head is arched above the ground.
- **The transverse** arch involves the bases of the five metatarsals and the cuboid and cuneiform bones.



Lateral longitudinal arch (lateral view)



Medial longitudinal arch (medial view)



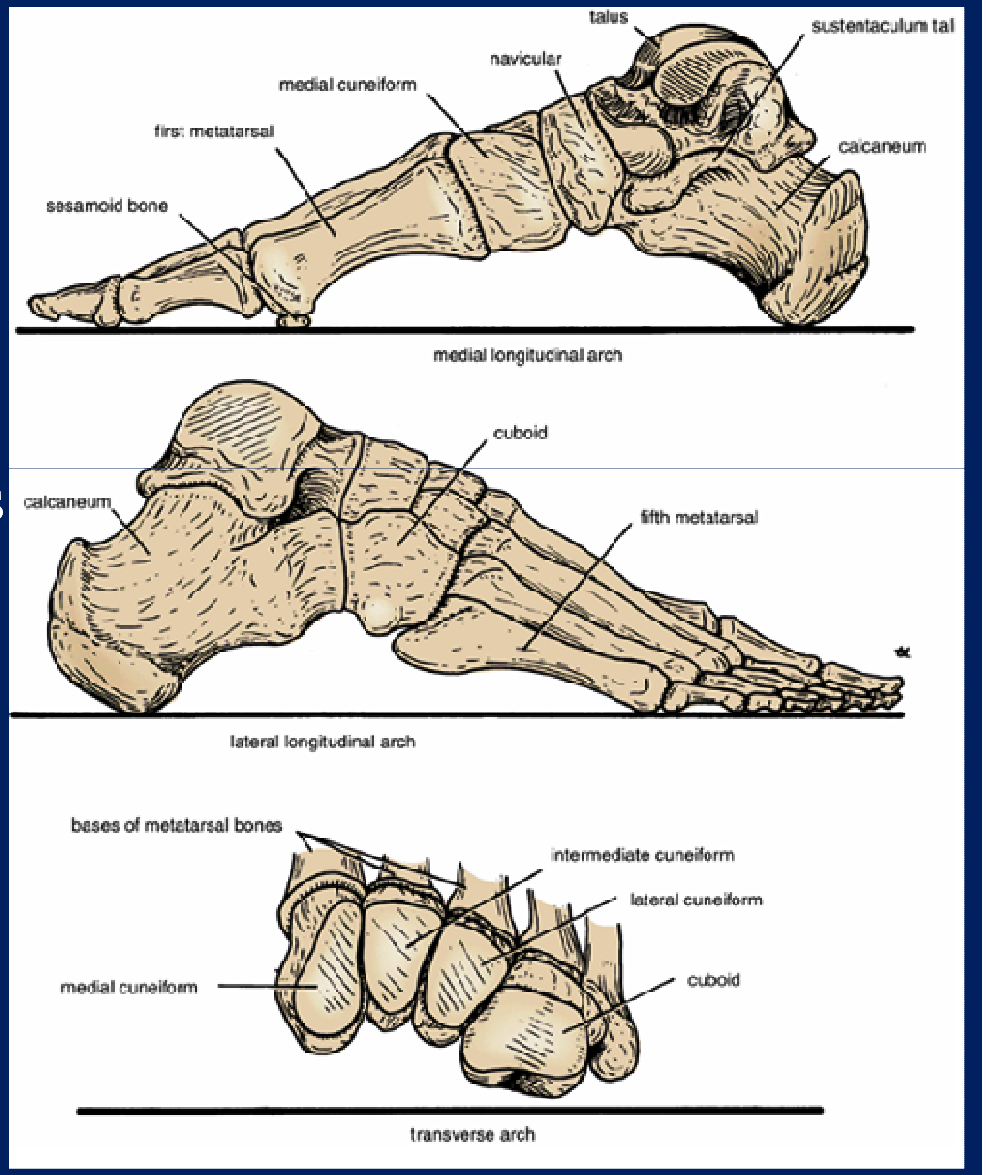
(C) Transverse arch (anterior view)

The Bones of the Arches

- **Medial longitudinal arch**: This consists of the calcaneum, the talus, the navicular bone, the three cuneiform bones, and the first three metatarsal bones.

- **Lateral longitudinal arch**: This consists of the calcaneum, the cuboid, and the fourth and fifth metatarsal bones .

- **Transverse arch**: This consists of the bases of the metatarsal bones and the cuboid and the three cuneiform bones .



Common Peroneal Nerve Injury

- The common peroneal nerve is extremely vulnerable to injury as it winds around the neck of the fibula.

  At this site, it is exposed to direct trauma or is involved in fractures of the upper part of the fibula.

- Injury to the common peroneal nerve causes **footdrop.**(All the muscles of the anterior and lateral compartments of the leg are paralyzed (dorsiflexors and everters) and the opposing muscles (plantar-flexors and inverters) keep the foot plantar-flexed and inverted)

Thank You & Good Luck