LOWER EXTREMITY 3

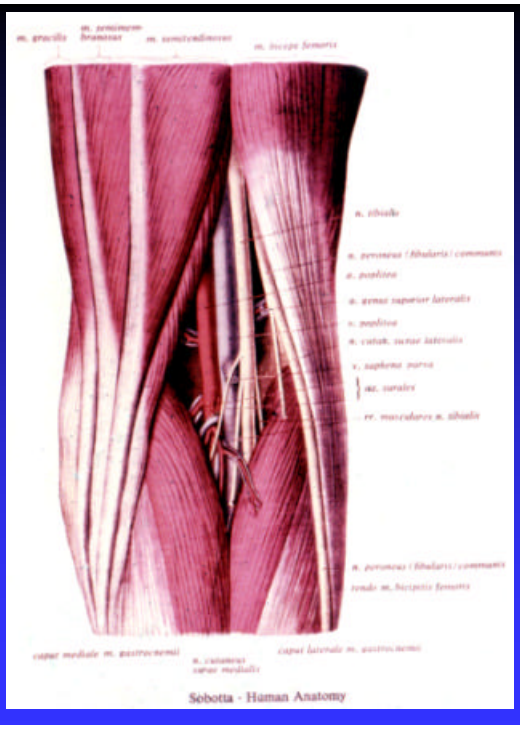
ANTERIOR LEG. KNEEJOINT

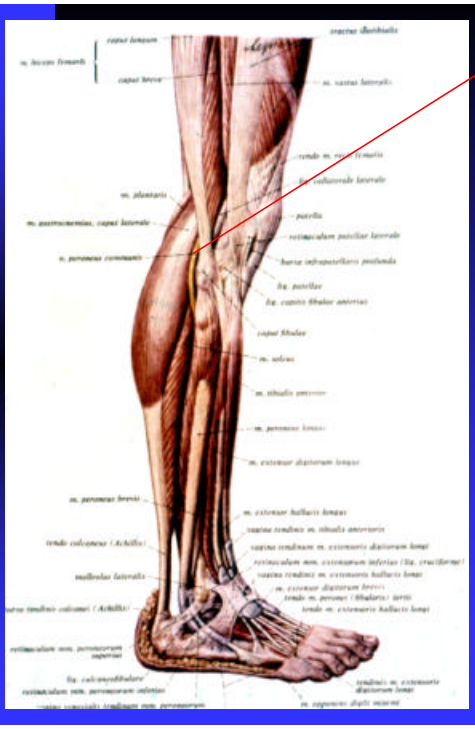
L.Moss-Salentijn

Leg: superficial structures

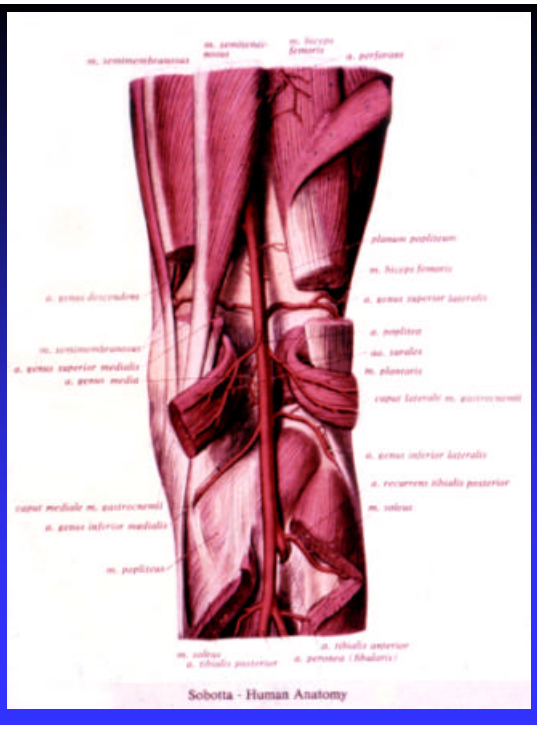
Great and lesser saphenous Vv, saphenous N, sural N

Popliteal fossa

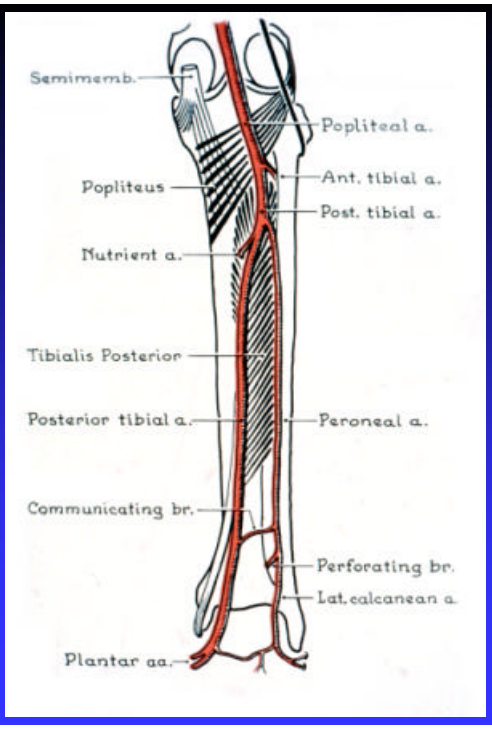


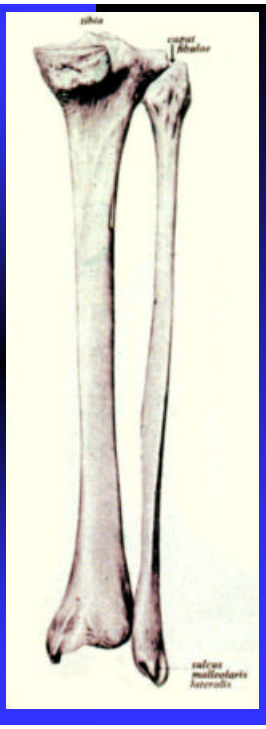


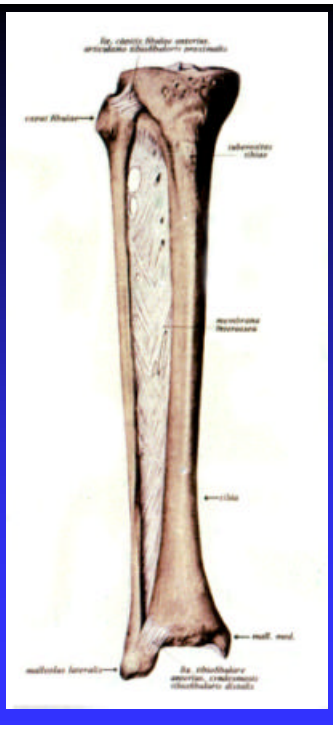
Common fibular N entering lateral and anterior compartments of leg: branches into deep and superficial fibular Nn



Major arteries of the leg





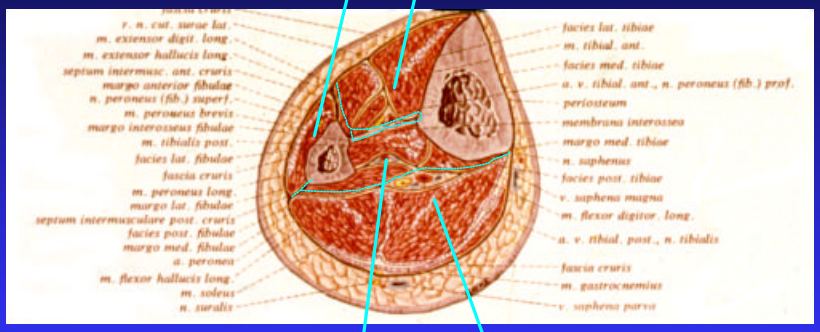


Skeleton of leg:
tibia and fibula with connecting interosseous membrane with vascular foramen

Crural (leg = crus) compartments

Anterior crural (prim. dorsal)

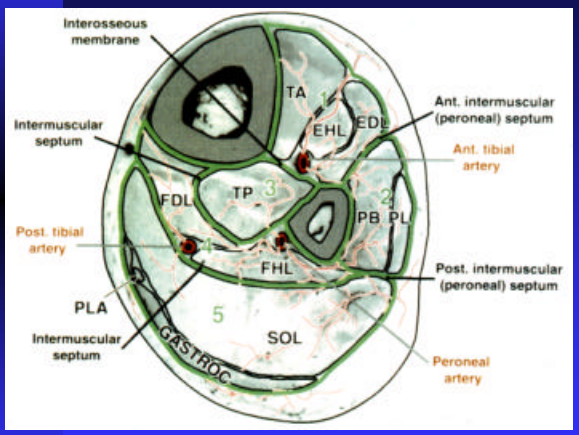
Lateral crural (prim. dorsal)



Deep posterior crural (prim. ventral)

Superficial posterior crural (prim. ventral)

Deep posterior crural compartment (3-4)



Tibial N (L4-S3)

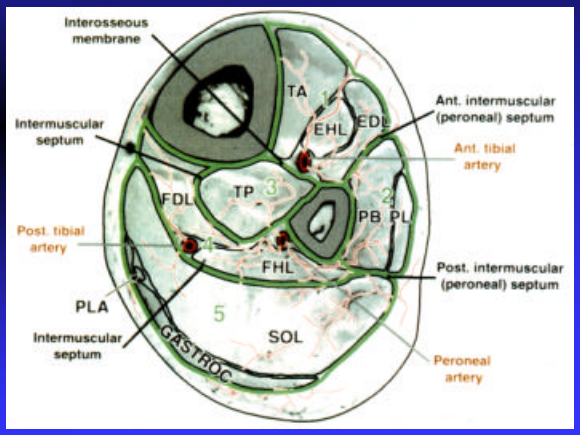
Fibular A

Tibialis posterior M (sometimes in separate compartment 3)

Flexor digitorum longus M

Flexor hallucis longus M

Superficial posterior crural compartment (5)



Tibial N (L4-S3)

Posterior tibial A

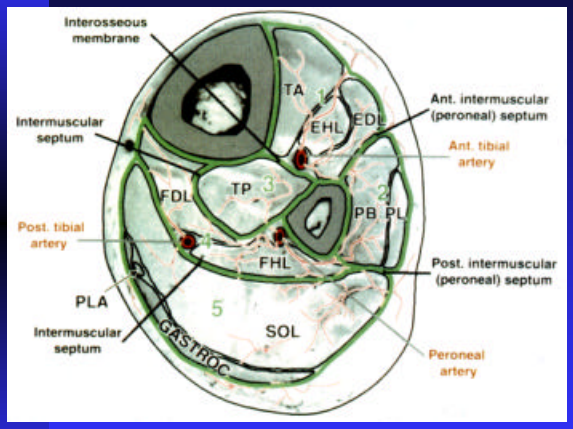
Gastrocnemius M

Plantaris M

Popliteus M

Soleus M

Anterior crural compartment (1)



Deep fibular N L4-S2

Anterior tibial A

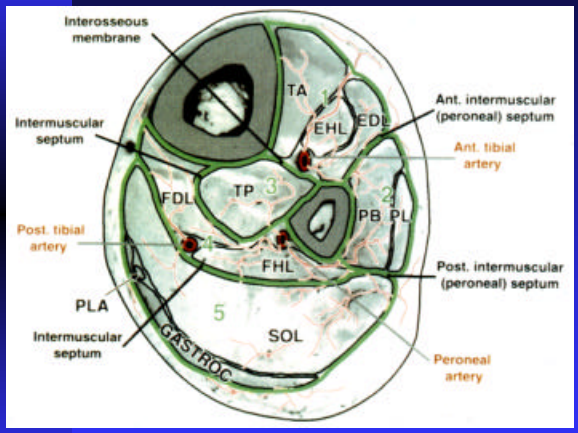
Tibialis anterior M

Extensor hallucis longus M

Extensor digitorum M

(Fibularis tertius M)

Lateral crural compartment (2)



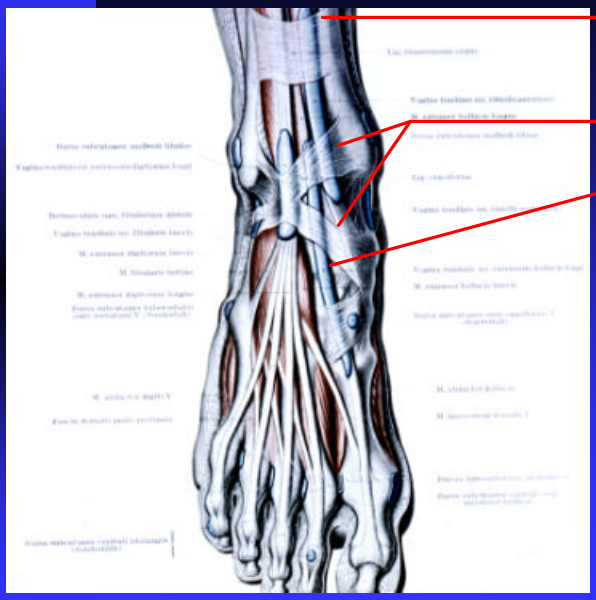
Superficial fibular N

Perforating branches of anterior tibial A and fibular A

Fibularis longus M

Fibularis brevis M

Retinacula and tendon sheaths



Superior (transverse) retinaculum

Inferior retinaculum

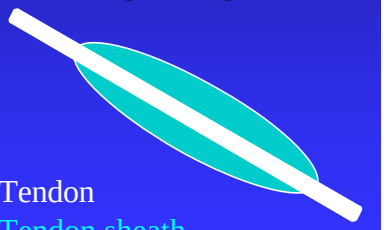
Tendon sheath

Retinacula redirect lines of action of the muscles.
None of the muscles in the anterior and lateral compartments cross the kneejoint. They act on distal joints (ankle joints and joints of the foot)

Synovial fluid-filled structures

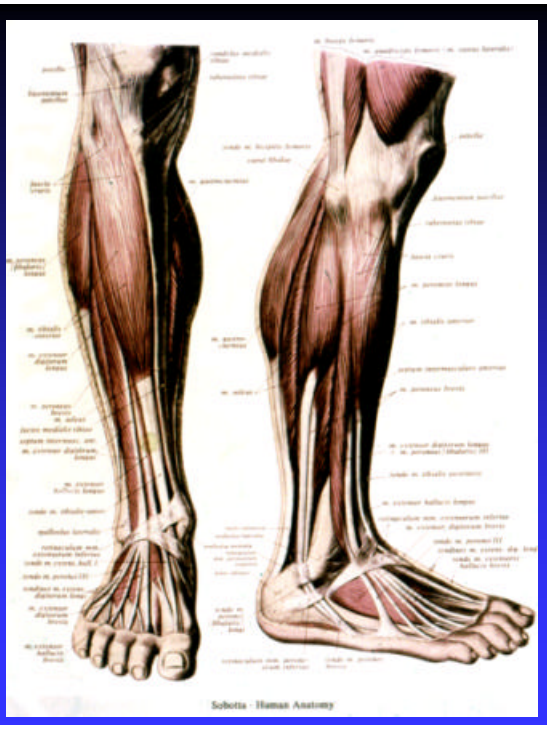
- Diarthrodial joint spaces: reduce friction in joint movement
- Bursae: allow movement of muscles over rigid surfaces
- Tendon sheaths: allow smooth gliding of long tendons

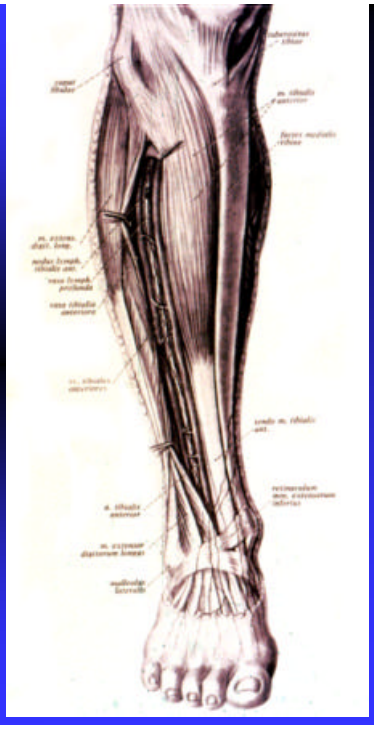
Muscle
Bursa
Skeletal element

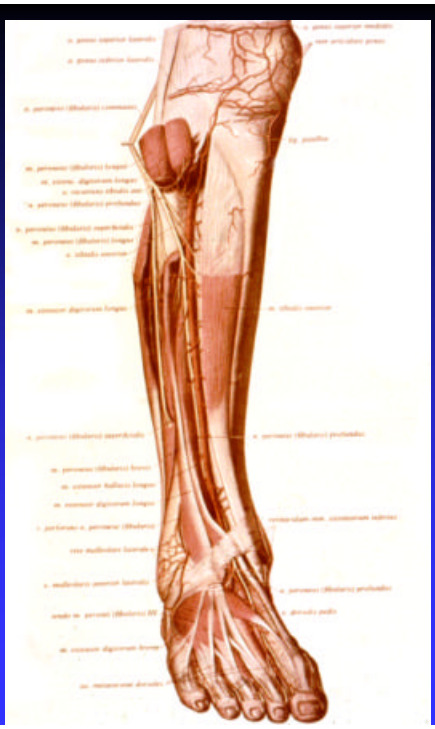


Tendon
Tendon sheath

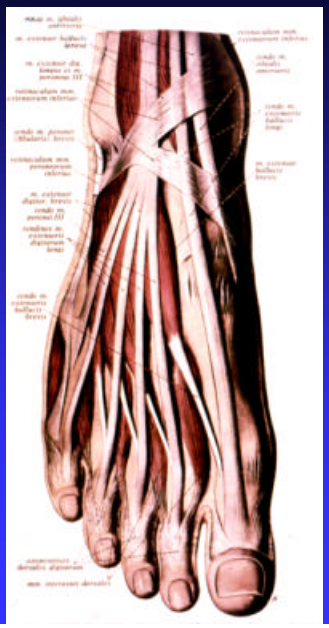
Muscles of the anterior and lateral crural compartments



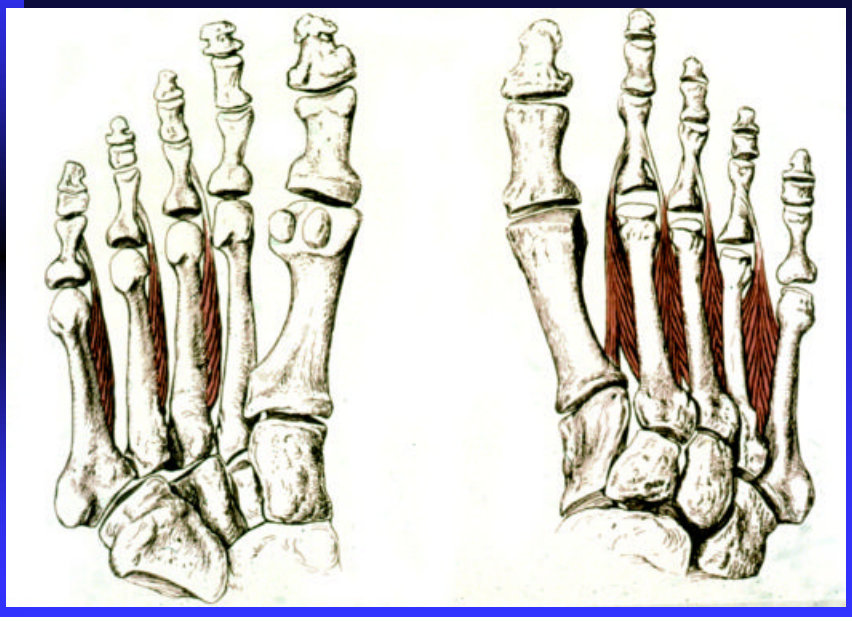


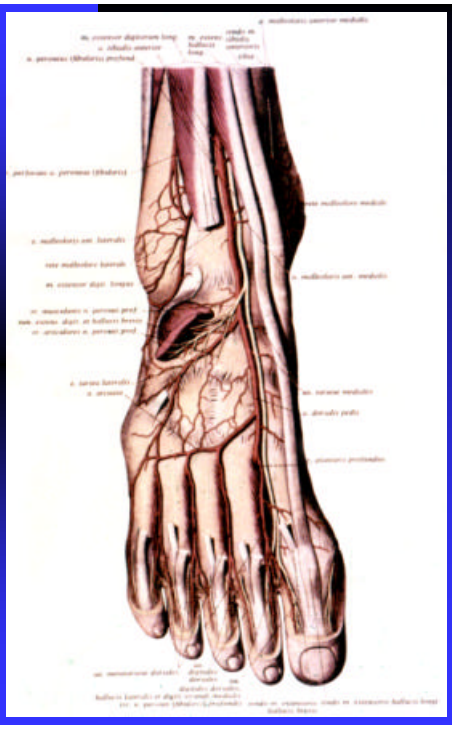


Dorsal foot

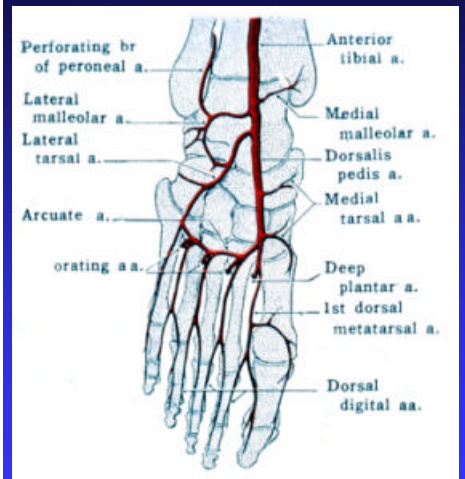


4 dorsal and 3 plantar interossei



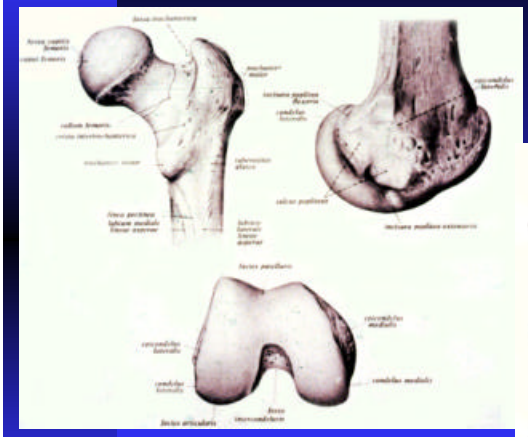


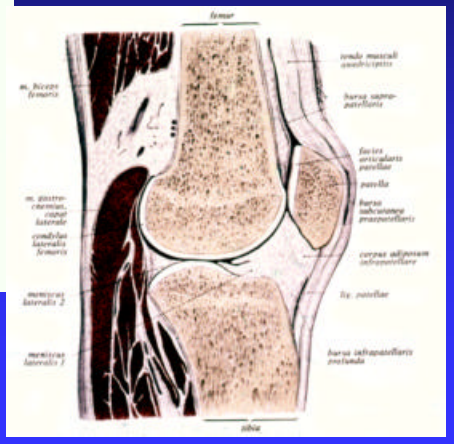
Dorsal foot: arteries and nerves



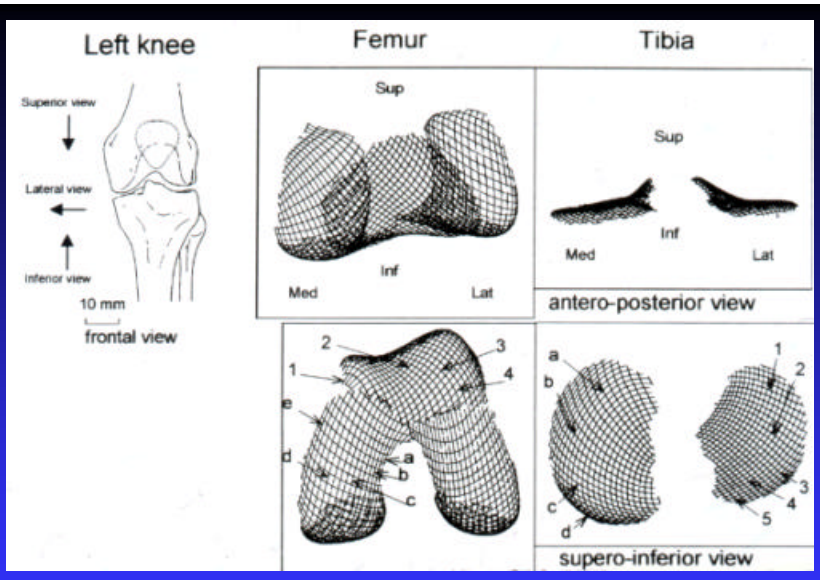
Superficial fibular N medial (I) /lateral br.II-V Sural N lat.toe V

Kneejoint: skeletal components

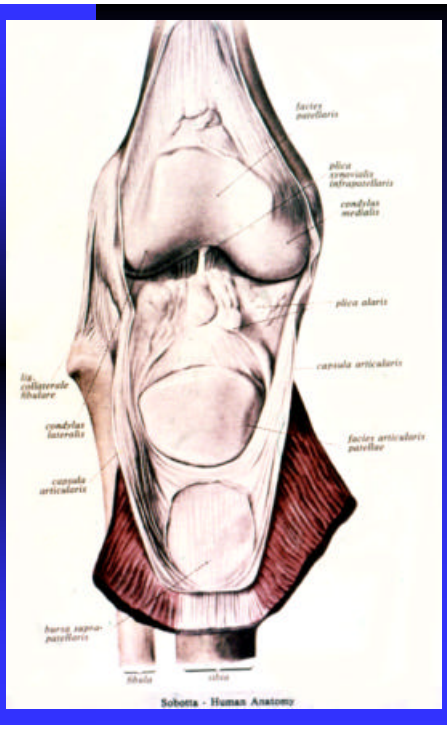




Distal femur: femoral condyles
Proximal tibial plateau and
Patella



Patella: allows for smooth gliding of quadriceps tendon; centralizes forces of different quadriceps heads; and improves efficiency through entire range of motion



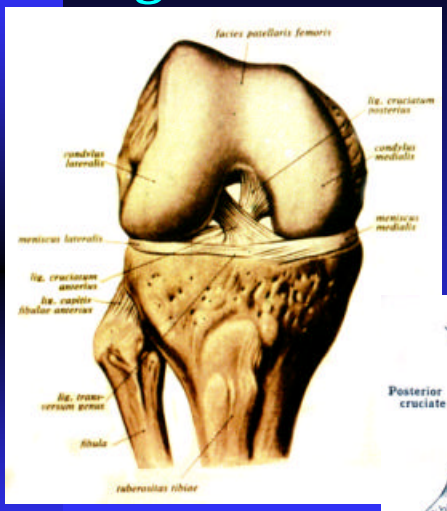
Sobotta - Human Anatomy

Ligaments associated with joints

Ligaments may

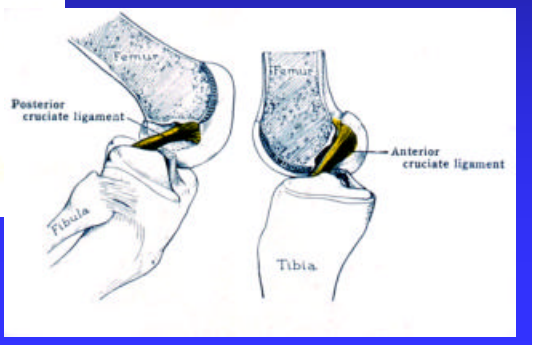
- **Cross the joint space inside the capsule**
- **Reinforce the capsule**
- **Run outside the capsule**

Ligaments crossing joint space



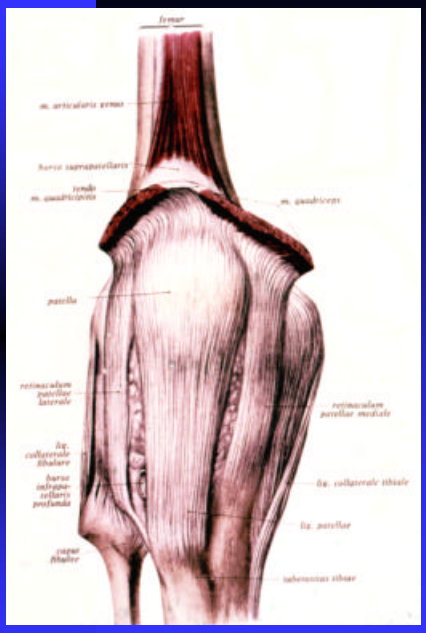
PCL: prevents forward displacement of femur in flexion

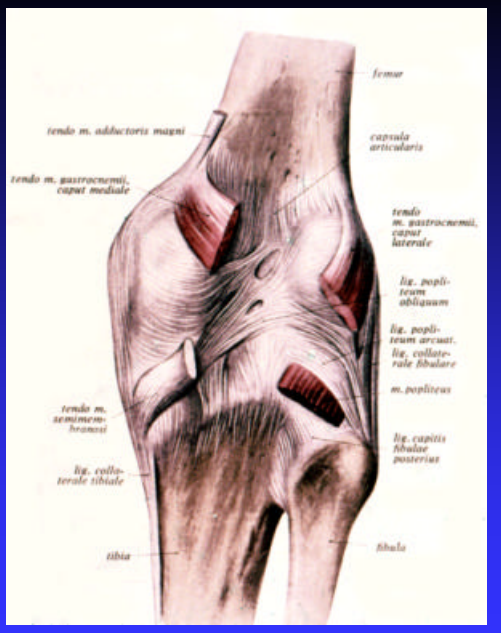
ACL: prevents backward displacement of femur in extension



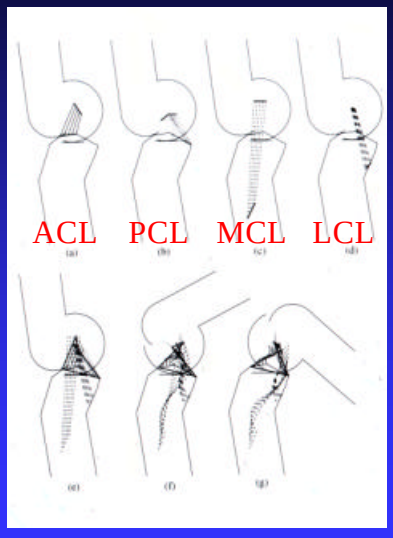
External ligaments

- Patellar ligament with lateral and medial patellar retinacula (expansion of vastus muscle tendons)
- Lateral and medial collateral ligaments (prevent lateral and medial displacement, and resist lateral rotation)
- Oblique popliteal ligament (resists medial rotation)
- Arcuate popliteal ligament

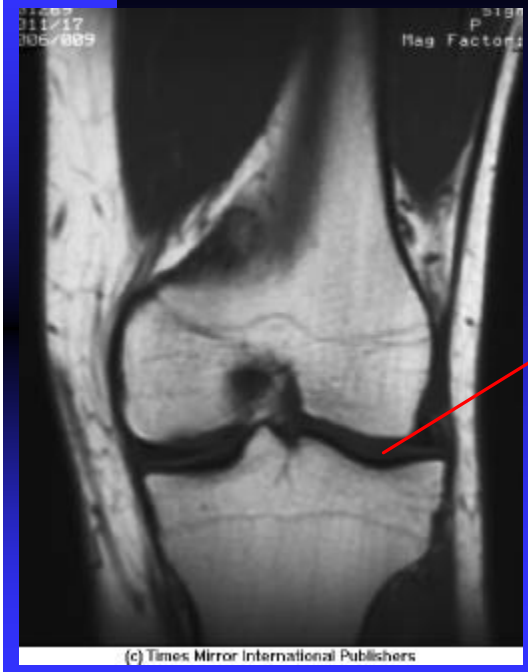




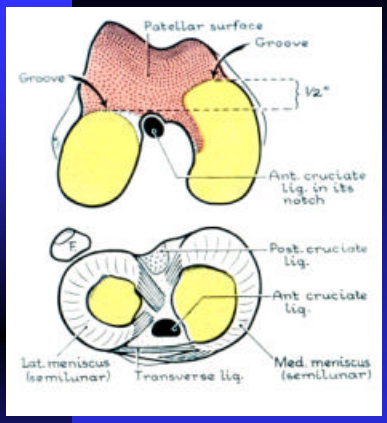
In extension, most ligaments are stretched

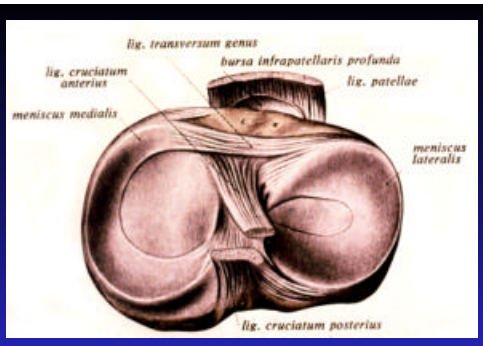


ACL PCL



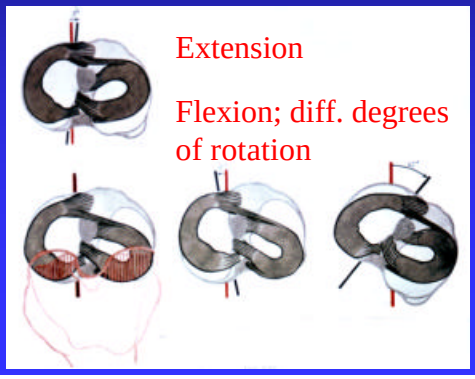
If opposing joint surfaces are incongruous discs (menisci) are present



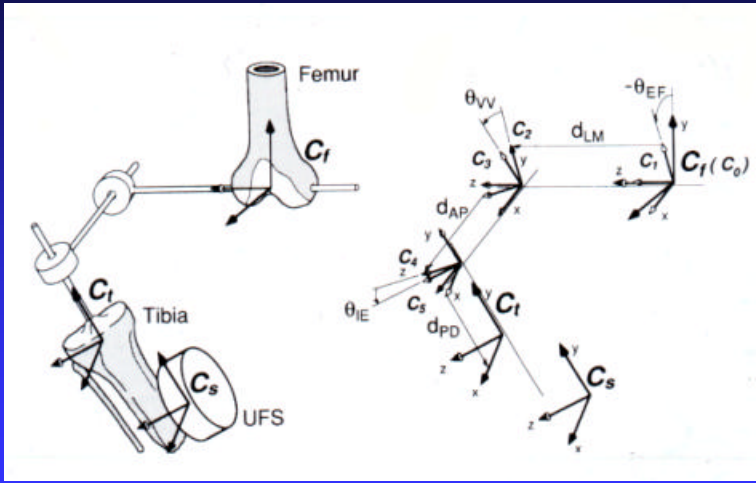


Medial meniscus position is relatively fixed – attachment to MCL

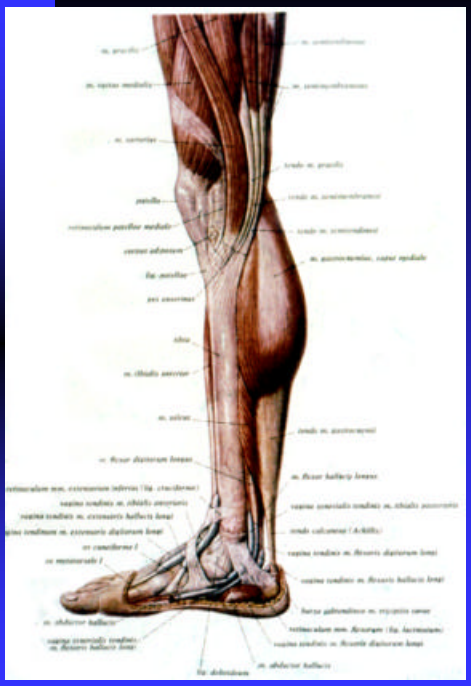
Lateral meniscus can move more freely – no attachment to LCL



Axes of rotation of kneejoint. 2 principal motions: flexion/extension, medial/lateral rotation



3rd AP axis: varus (knockkneed) and valgus (bowlegged)



Flexion of kneejoint – muscles posterior to transverse axis

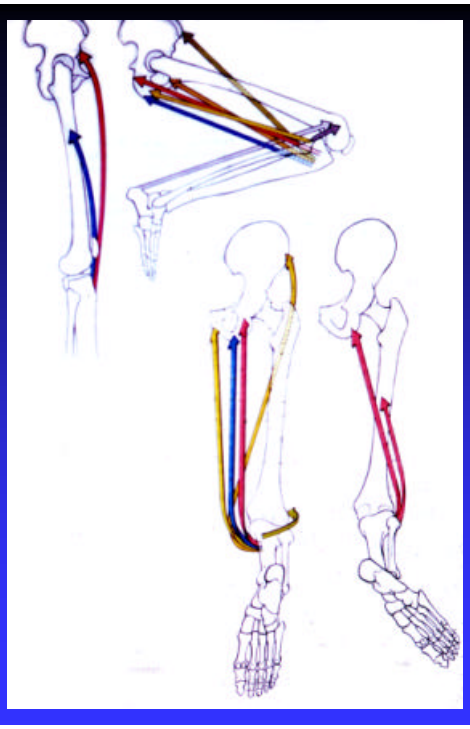
- Hamstrings
- Sartorius M
- Gracilis M
- Gastrocnemius M
- Plantaris M
- Popliteus M

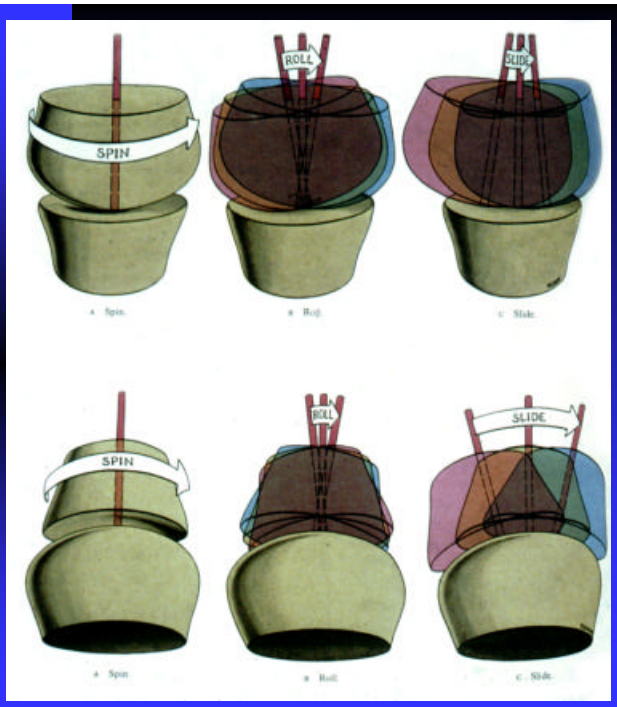
Extension of kneejoint

- Quadriceps femoris M
- Tensor fasciae latae M.

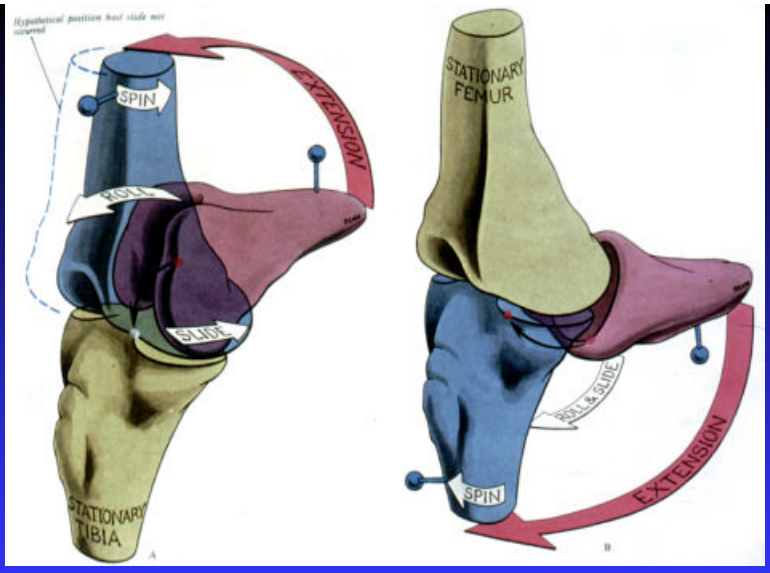
Lateral and medial rotation of kneejoint – in semiflexed position

- Biceps femoris M (lateral rotation)
- Semitendinosus M
- Semimembranosus M
- Gracilis M
- Sartorius M
- Popliteus M (unlocking extended knee)





Extension of kneejoint involves 3 motions



Initially simultaneous roll and slide. ACL and iliotibial tract become stretched and prevent further motion – final 10 degree of extension: spin with 5 degree lateral terminal rotation of tibia to locked position. To unlock popliteus M. must contract.