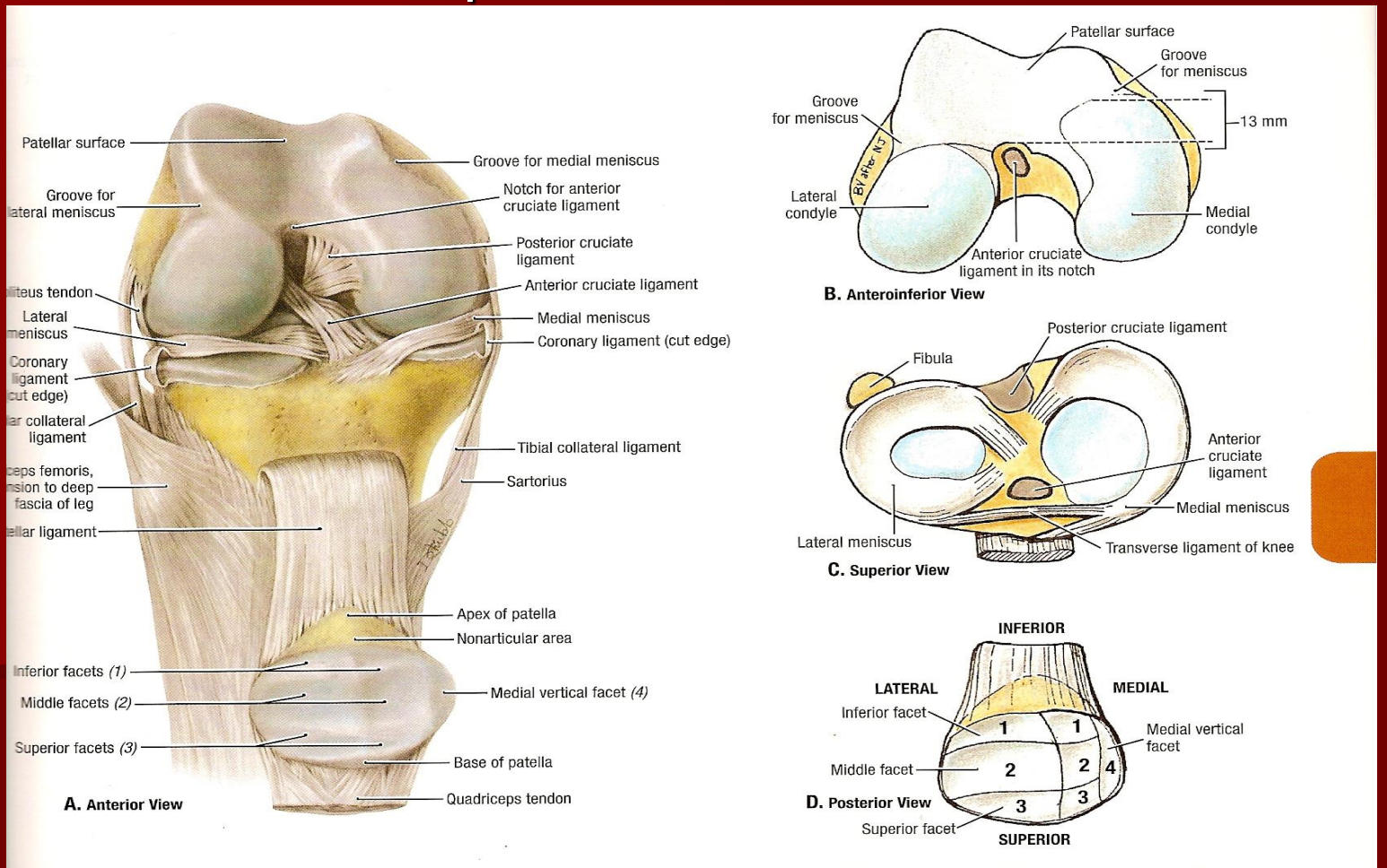
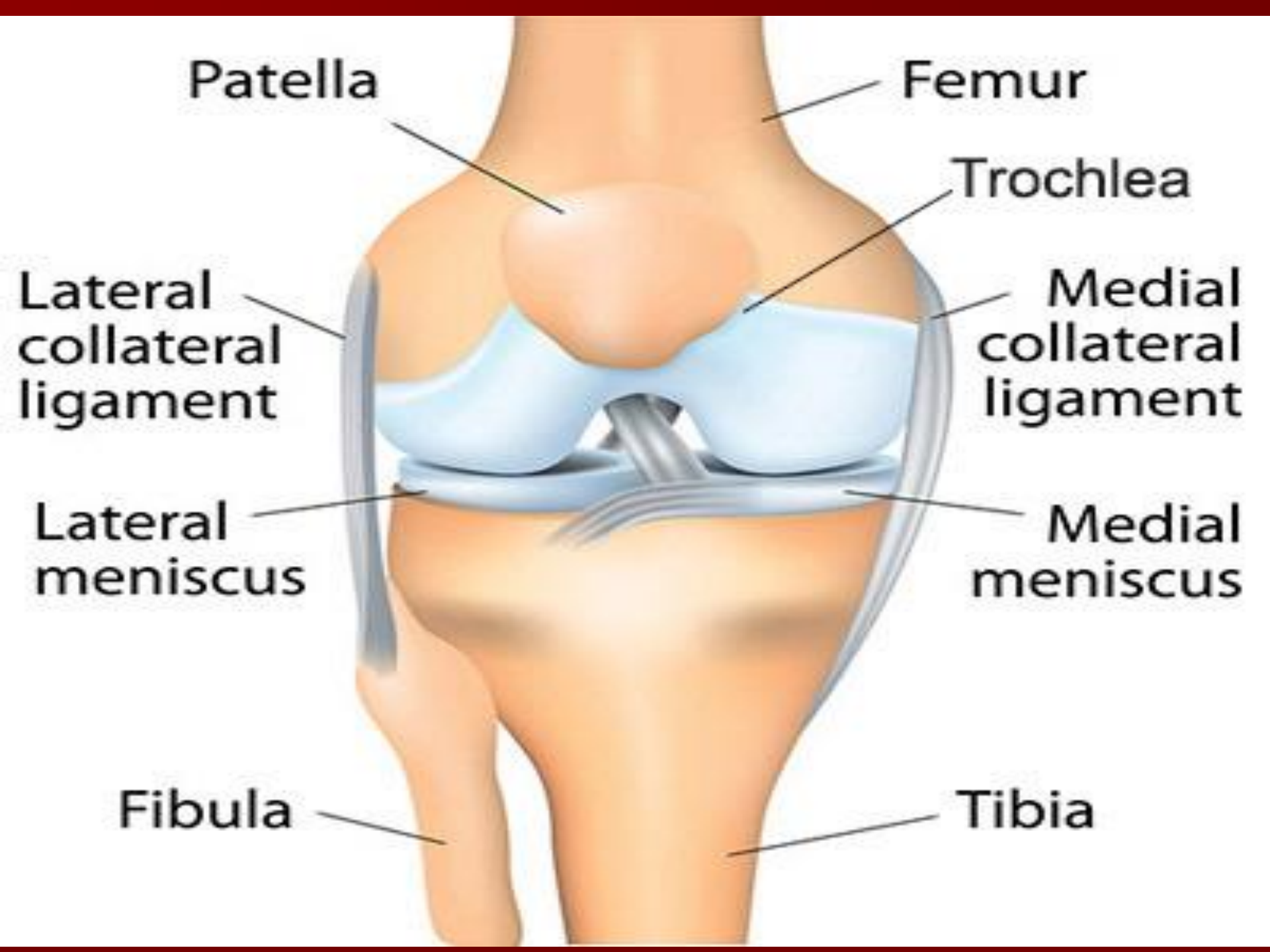
The Knee Joint

Type: comound,Synovial, modified hinge

Articular surfaces: Lower end femur, upper end tibia, & posterior surface of the patella.



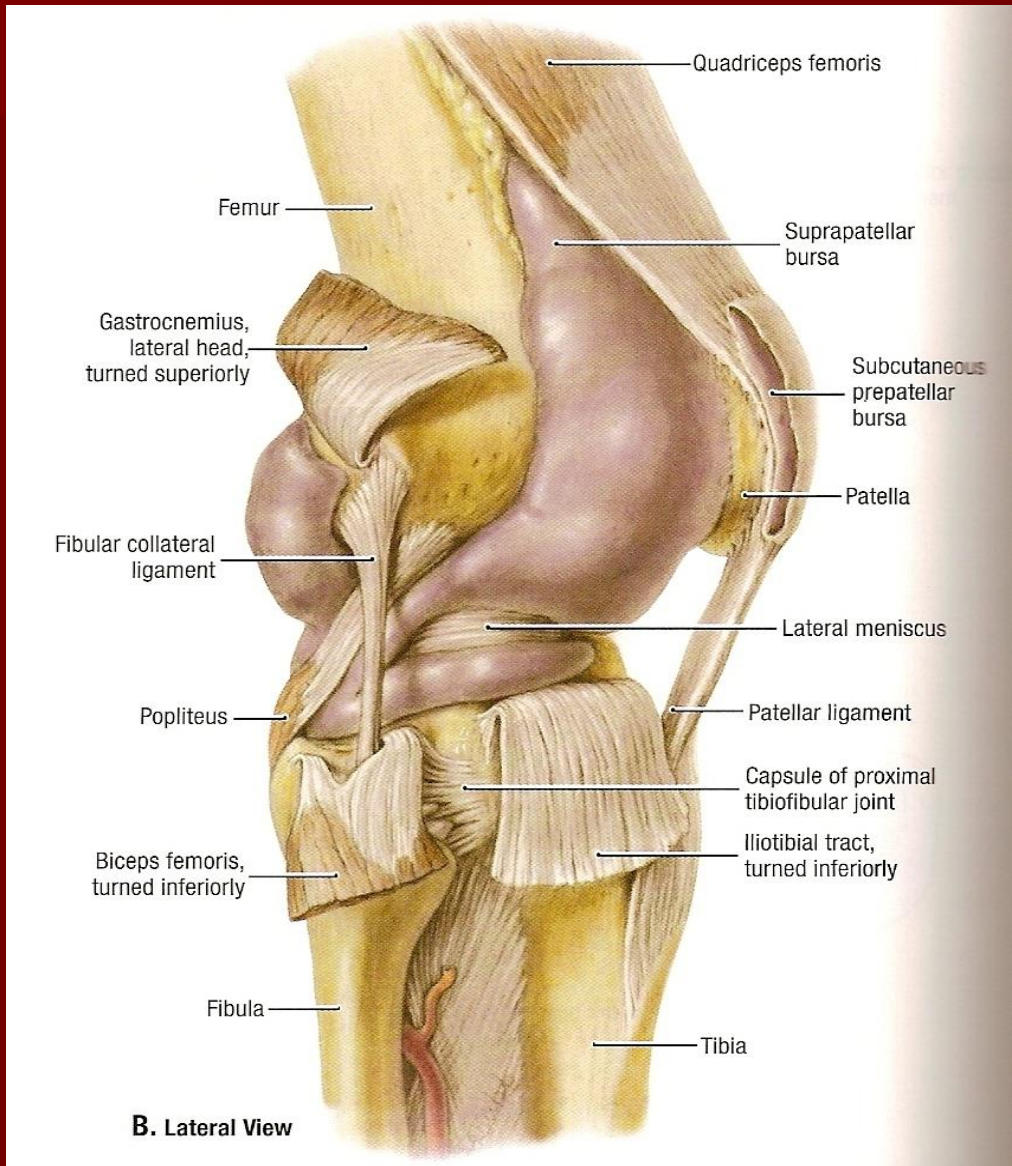

Patella
Femur
Trochlea
Lateral collateral ligament
Medial collateral ligament
Lateral meniscus
Medial meniscus
Fibula
Tibia

Patellofemoral Joint

Capsule and Ligaments:

The capsule is thin:

1- In front: It is absent and replaced by quadriceps tendon, patella, and ligamentum patellae.



2- Behind: the capsule is thin,

- It is thickened by the posterior oblique ligament (strong ligament, prevents hyper extension.
- It is perforated by the popliteus tendon.

Ligaments (outside the joint):

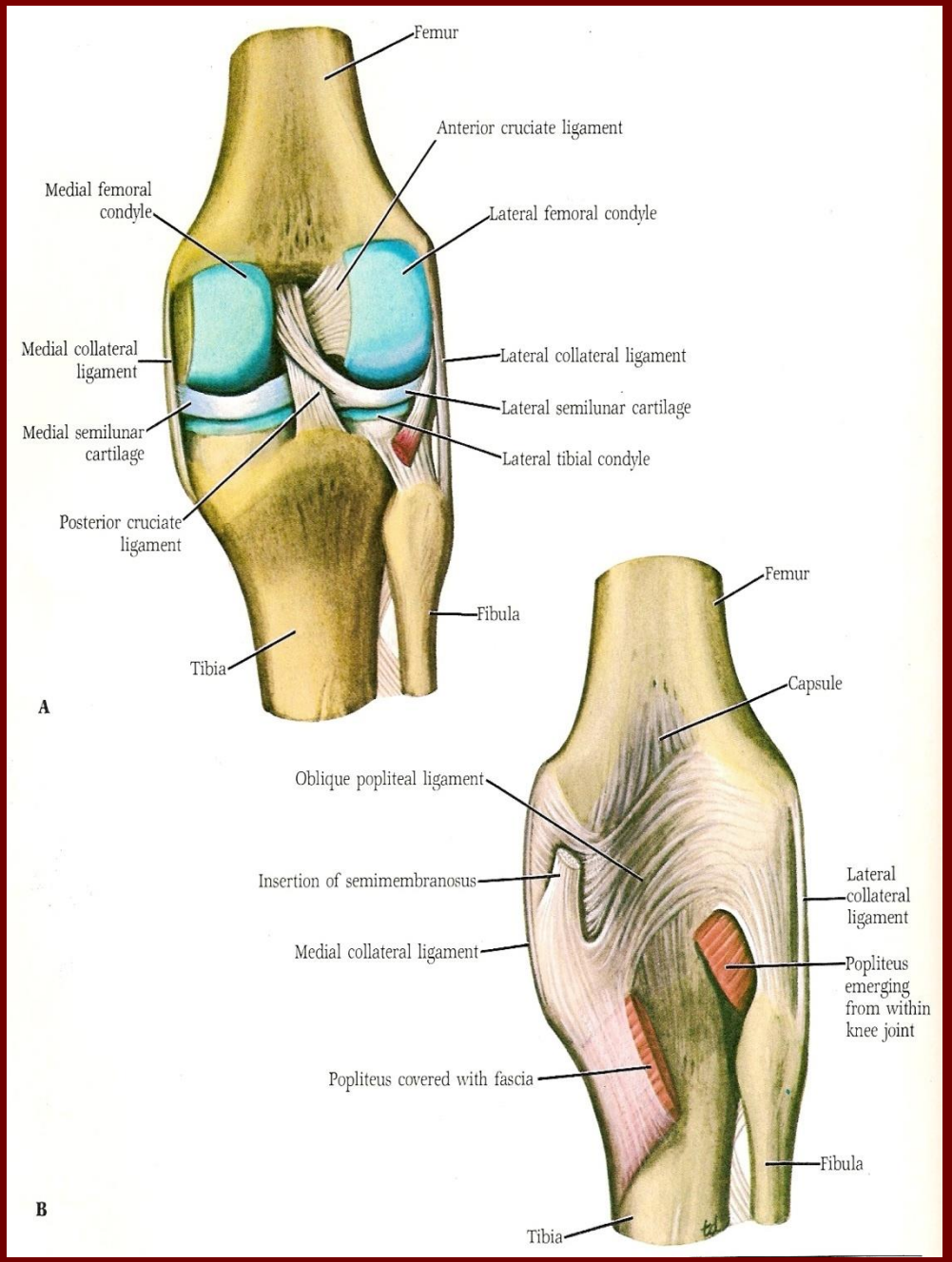
1- The patellar lig. (ant),

2- The posterior oblique lig.

3- The lateral collateral lig.

4- The medial collateral lig.

5- arcuate lig



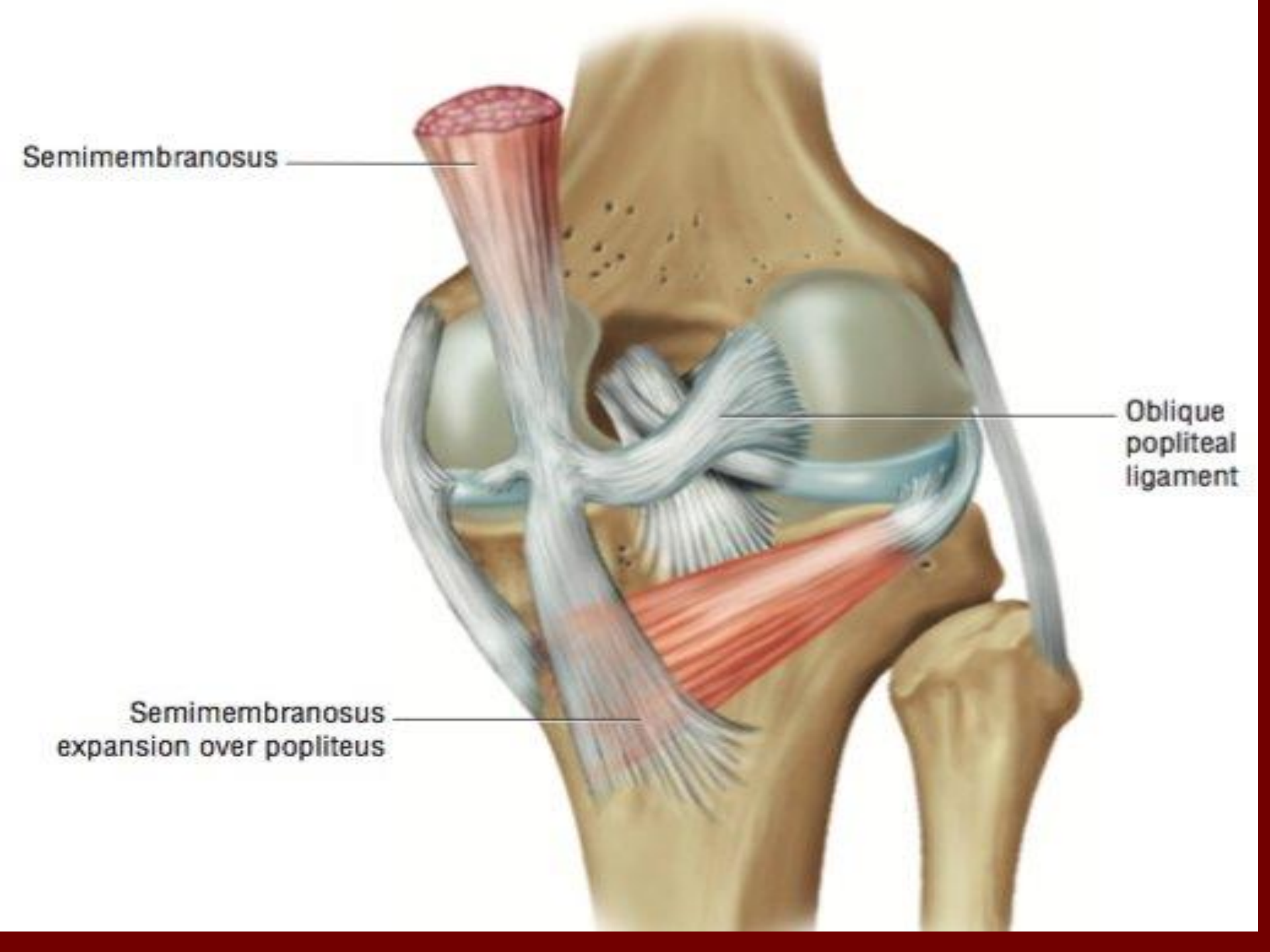
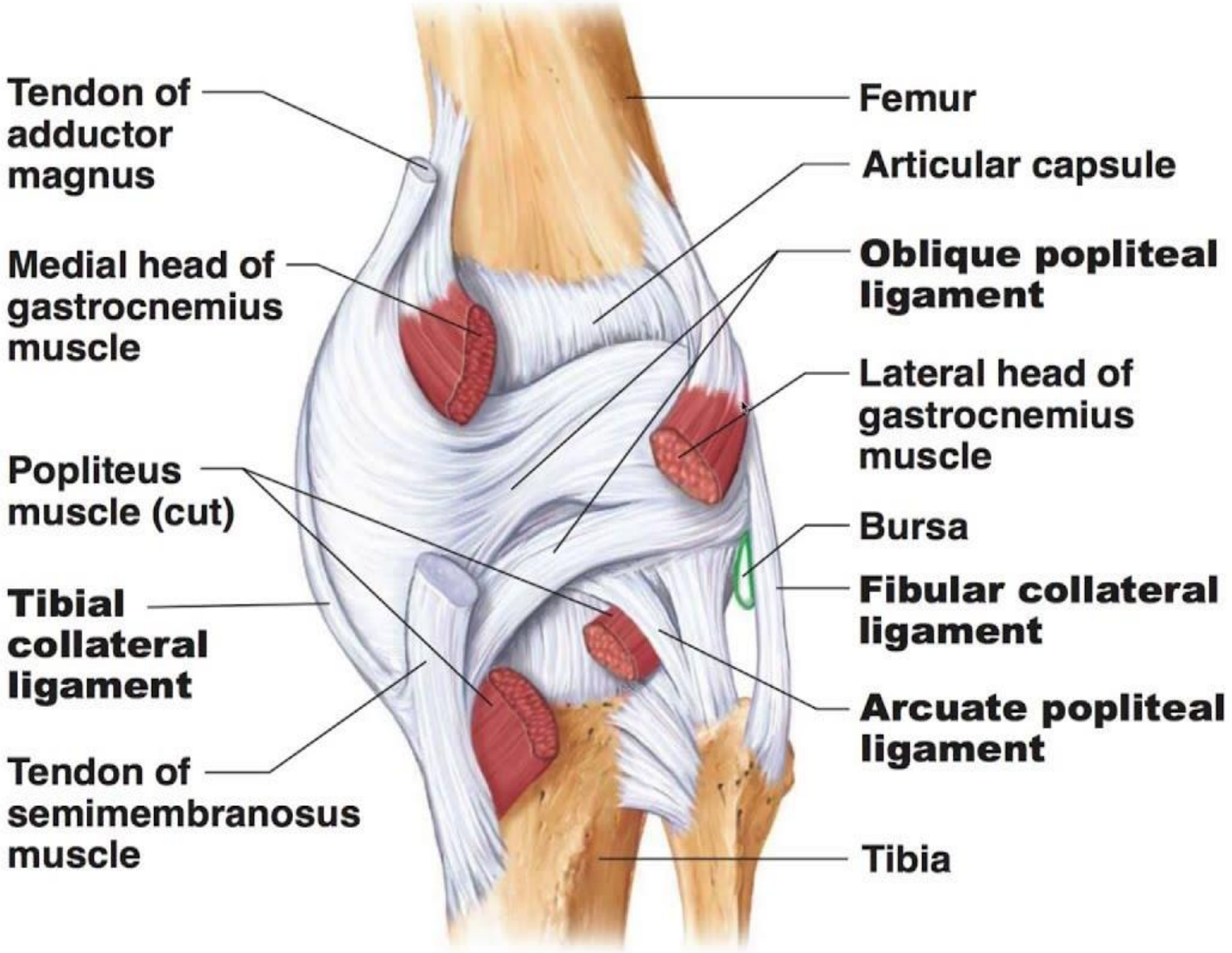
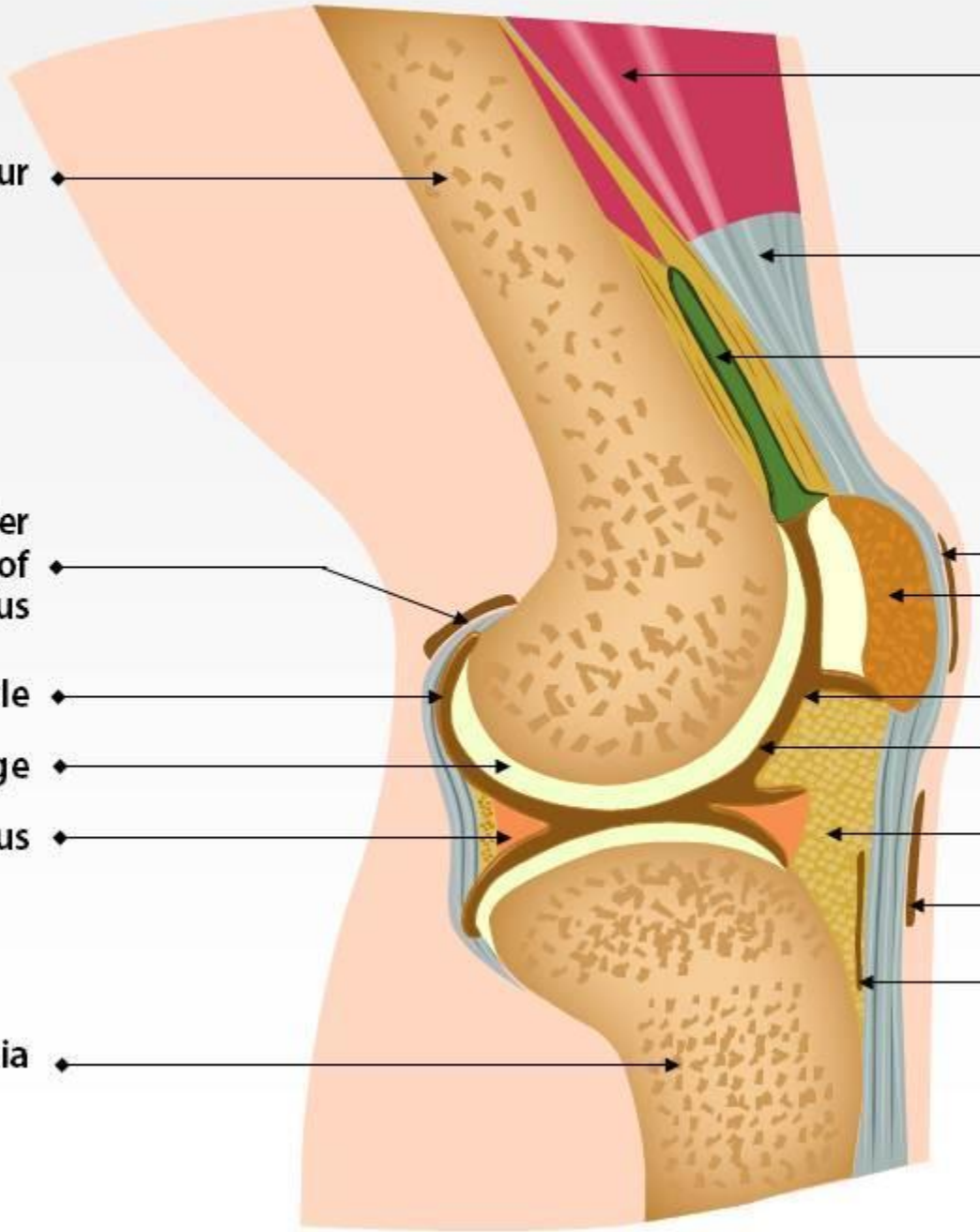

Semimembranosus
Oblique popliteal ligament
Semimembranosus expansion over popliteus

Figure 8.7d The knee joint.



(d) Posterior view of the joint capsule, including ligaments

Anatomy Of The Knee Joint



Quadriceps femoris
Femur
Quadriceps femoris tendon
Suprapatellar burse
Bursa under lateral head of gastrocnemius
Prepatellar burse
Patella
Joint capsule
Synovial membrane
Articular cartilage
Joint cavity
Meniscus
Superficial infrapatellar burse
Infrapatellar fat pad
Deep infrapatellar burse
Tibia

The synovial membrane

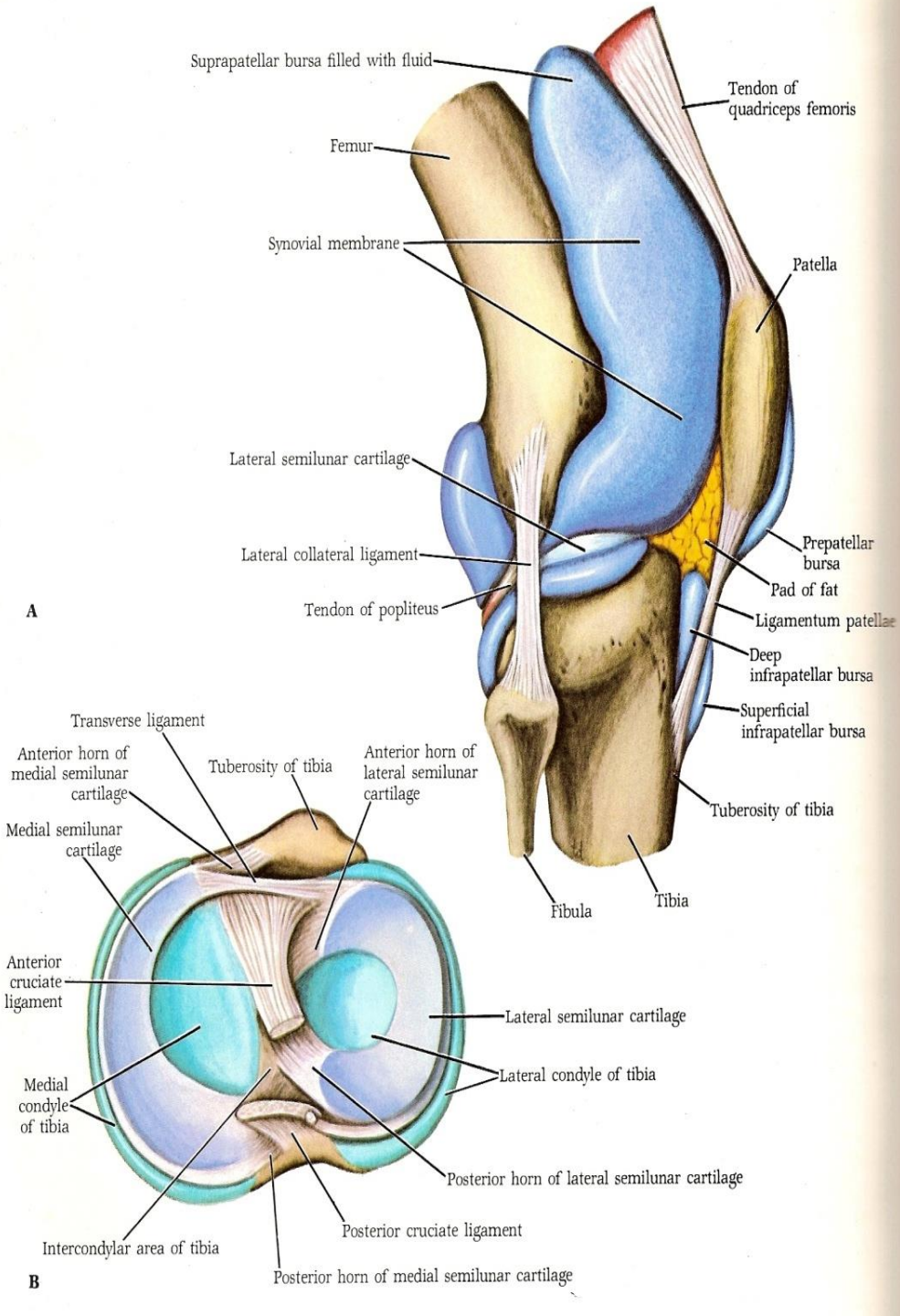
1- lines the capsule,

2- attaches to the peripheral edges of the menisci (semilunar cartilages),

3- covers the front of the ant. cruciate ligament, and the back of posterior cruciate ligament.

4- communicates with:

- suprapatellar bursa,
- popliteus bursa,
- semimembranosus burse,
- gastrocnemius bursa.



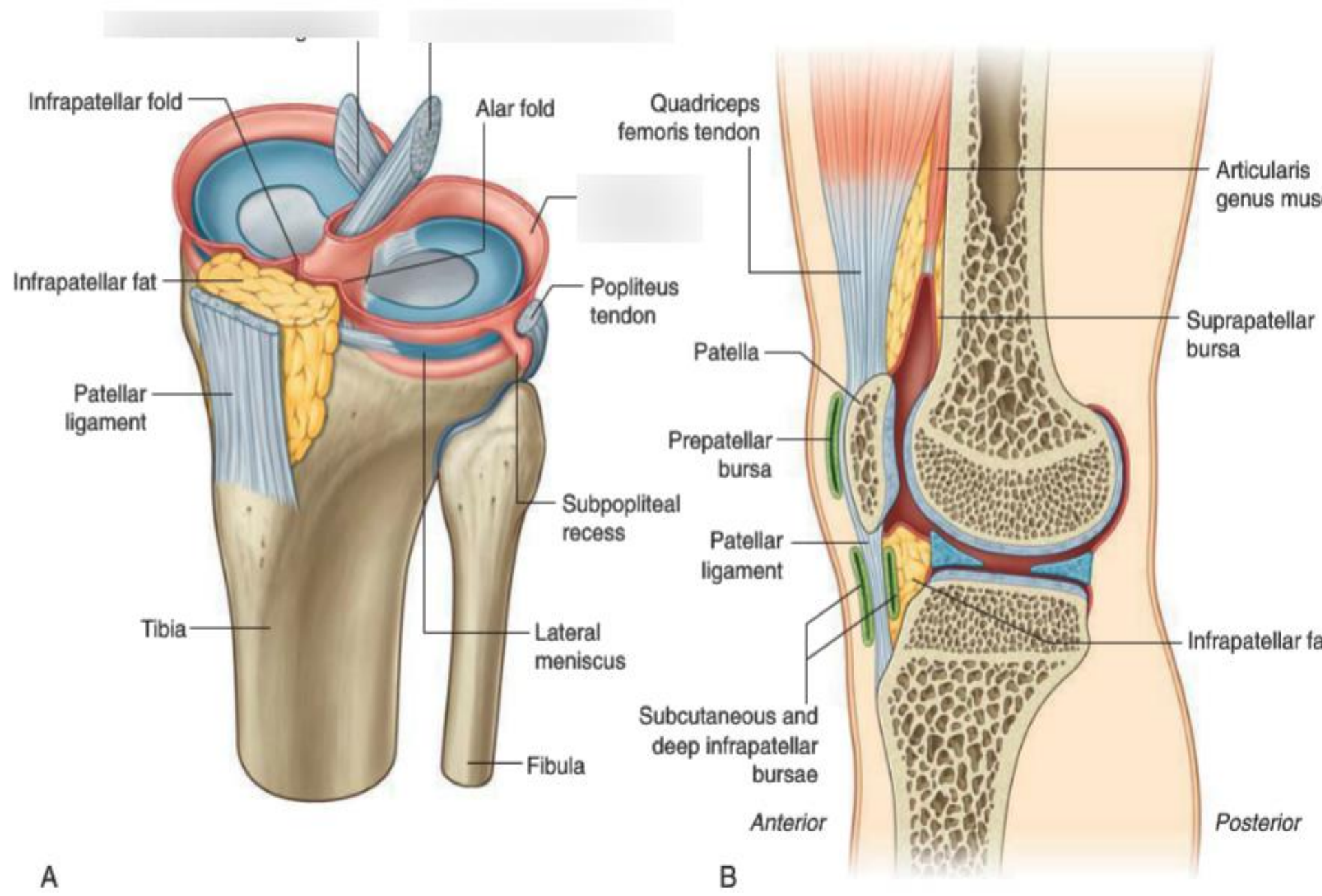
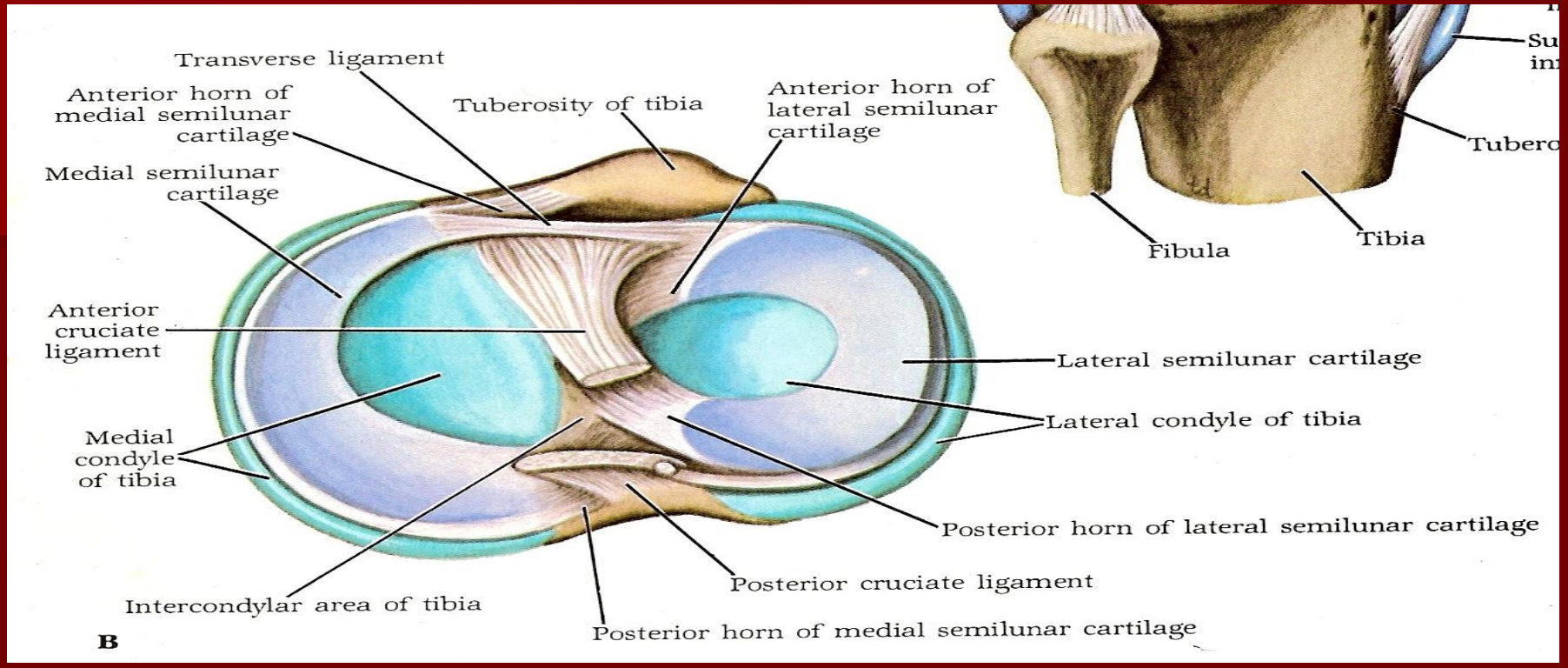


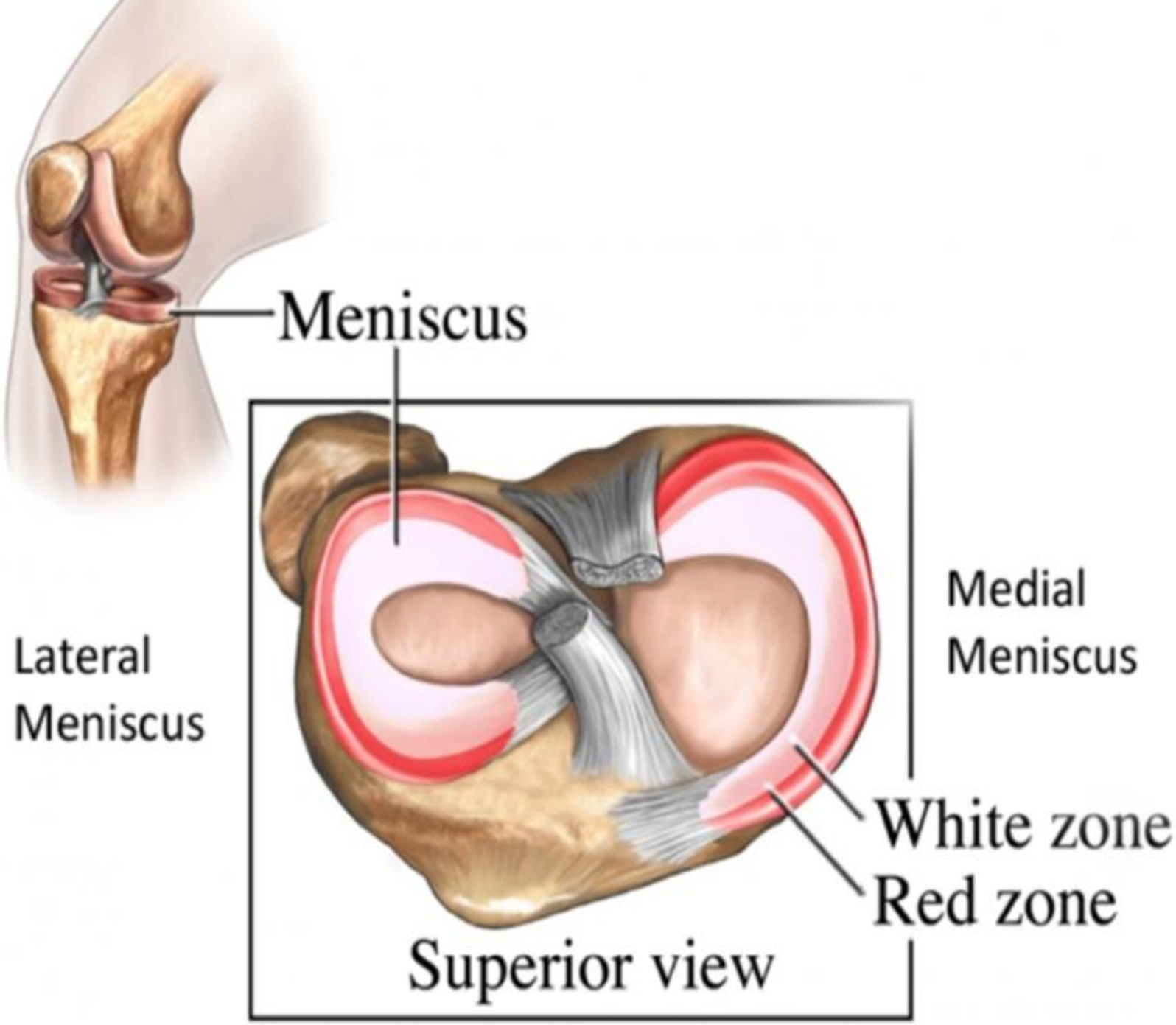
Fig. 6.72 Synovial membrane of the knee joint and associated bursae. **A.** Superolateral view; patella and femur not shown. **B.** Paramedial sagittal section through the knee.

Structures inside the knee joint:



1- The medial semilunar cartilage (Medial meniscus): C-shaped, fixed to the capsule of the knee joint and to the medial collateral ligament (liable to injury), its ant. Horn is attached to the most ant. part of the intercondylar area of the upper end tibia and connected to the lat. semilunar cartilage by the transverse lig.

2- The lateral semilunar cartilage (lat. Meniscus): Circular in shape, more mobile (separated from capsule and lat. collateral lig. by popliteus tendon, so it is more adaptive to twisting movement and less liable to injury.


Meniscus
Lateral Meniscus
Medial Meniscus
White zone
Red zone
Superior view

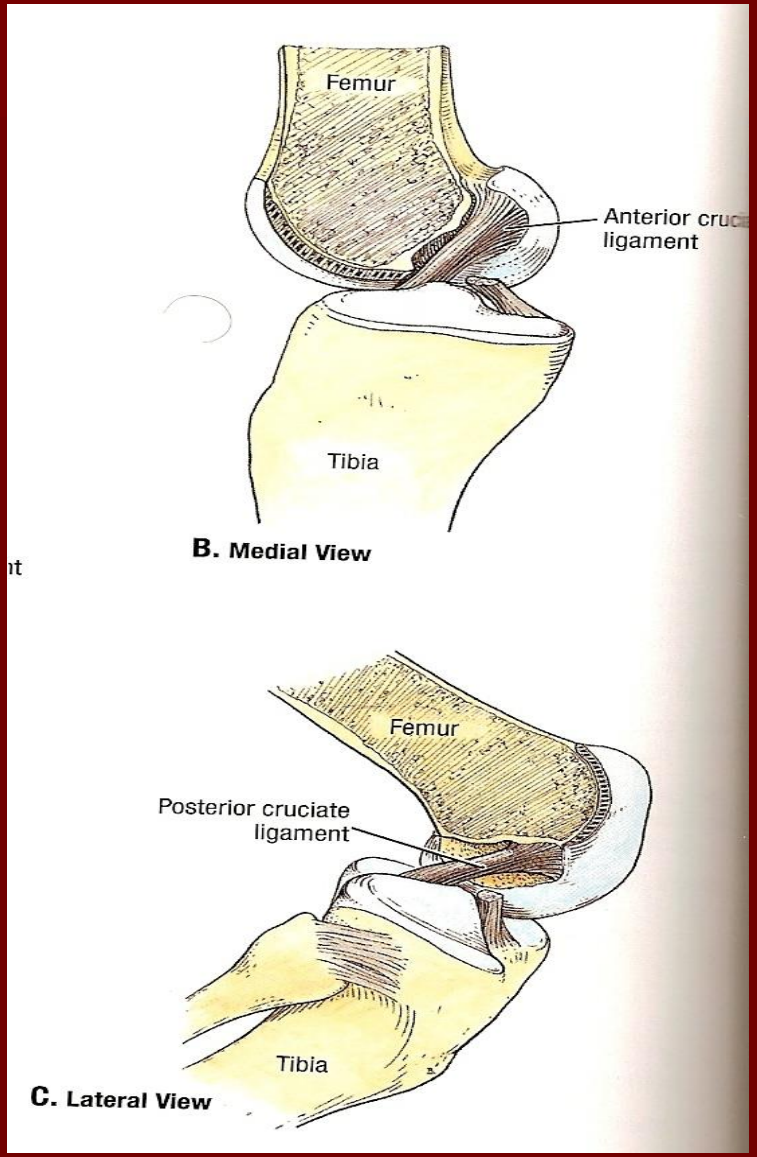
Structures inside the knee joint (cont.)

3- Anterior cruciate ligament:

- From ant. intercondylar area of tibia --→ upward, backward and laterally to the lat. condyle of the femur.
- It is relaxed in knee flexion, tense in extension so it prevents hyper-extension.

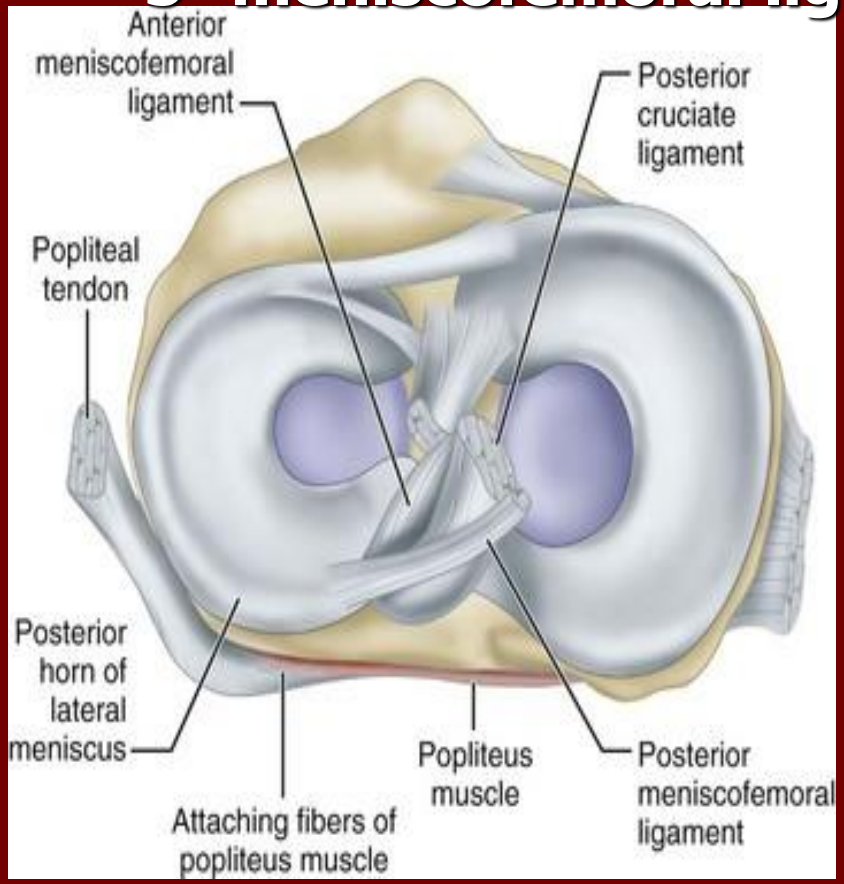
4- Posterior cruciate ligament:

- From post. Intercondylar area of tibia → upwards, forward and medially to ant. part of medial femoral condyle.
- It is relaxed in extension, tense in flexion so it prevents anterior femoral dislocation.



Structures inside the knee joint (cont.)

5- meniscofemoral lig



Movements of the knee joint:

1- Flexion: By the Hamstring muscles + gracilis, gastrocnemius, sartorius, popliteus, plantaris

2- Extension: By the Quadriceps femoris + tensor fascia latae.

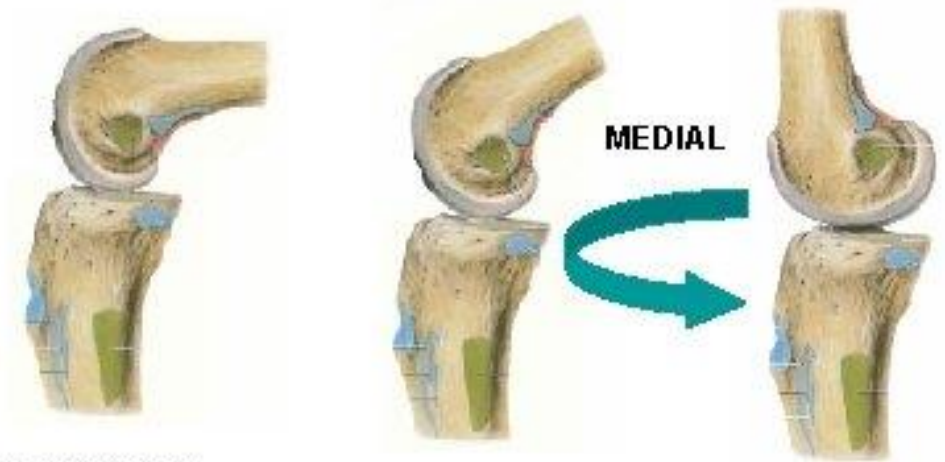
3- Locking of the knee joint = medial rotation of the femur on the tibia in full extension (or lateral rotation of the tibia) . It occurs passively by sum
ation of ligamentous stretching

4- Unlocking of the Knee: In standing (tibia fixed) = lateral rotation of femur on tibia, In supine or sitting (tibia free) = Medial rotation of tibia.actively By popliteus

LOCKING AND UNLOCKING KNEE JOINT

Note: **LOCKING AND UNLOCKING KNEE JOINT**
- When moving to full extension of knee joint, femur rotates medially during last 30 degrees of movement; this pulls all major ligaments of the knee joint taut, 'locking' the knee and making it very stable; to flex knee from full extension, joint must first be unlocked by contracting the **popliteus muscle** which rotates the femur laterally (foot is firmly on ground) producing relaxation of ligaments. (LOCK femur rotates MEDIALLY; UNLOCK femur rotates LATERALLY)

femur rotates medially during last 30 degrees of extension, due to shape of condyles



POPLITEUS UNLOCKS KNEE WHEN FLEX KNEE

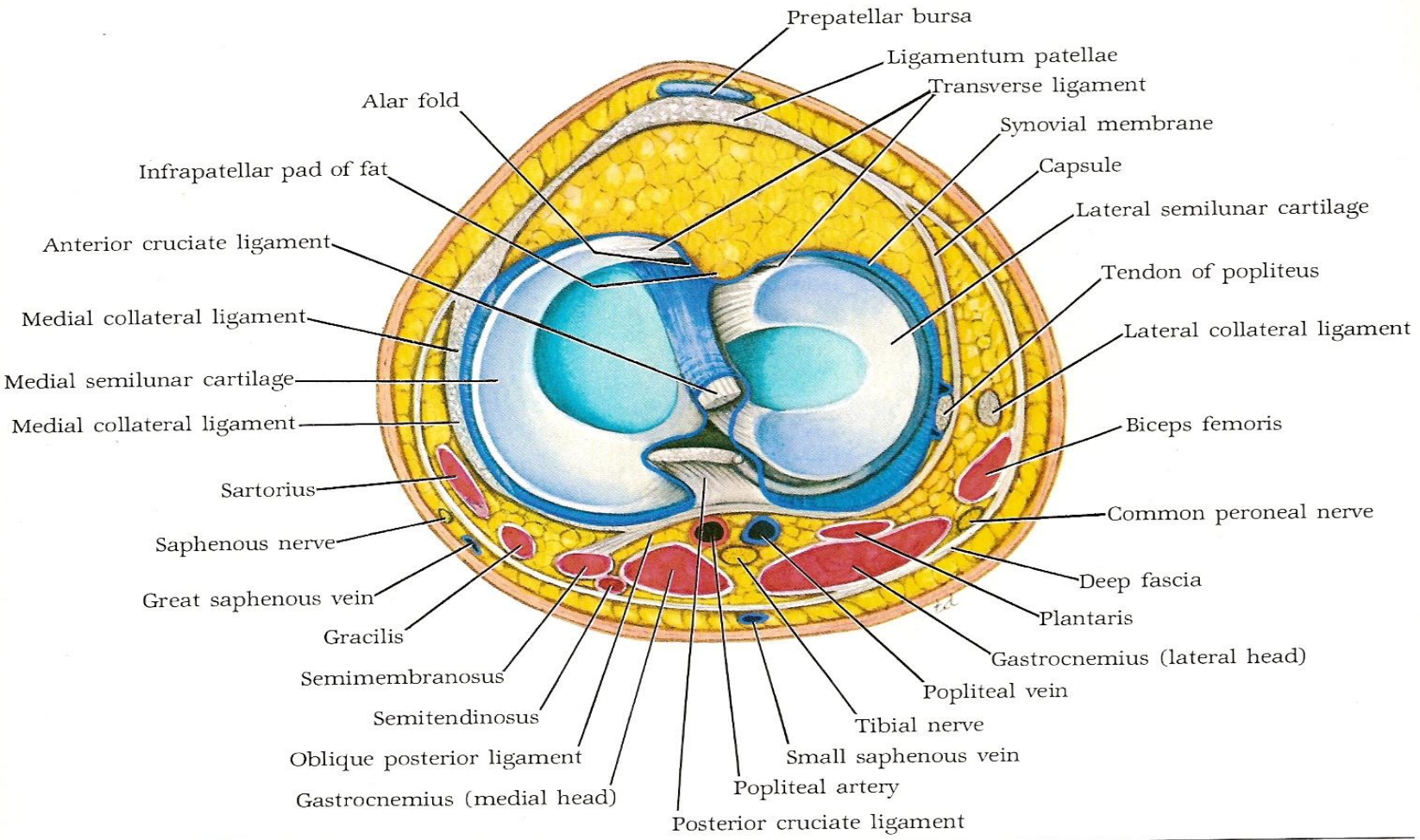
- **Relations of the knee joint:**

1- Anteriorly: Prepatellar bursa

2- Laterally: Popliteus tendon, common peroneal nerve, biceps femoris, fibular collateral ligament.

3- Posteriorly: Plantaris, gastrocnemius (lateral head), short saphenous vein, tibial nerve, popliteal vessels, gastrocnemius (medial head) and semimembranosus.

Relations of the knee joint:



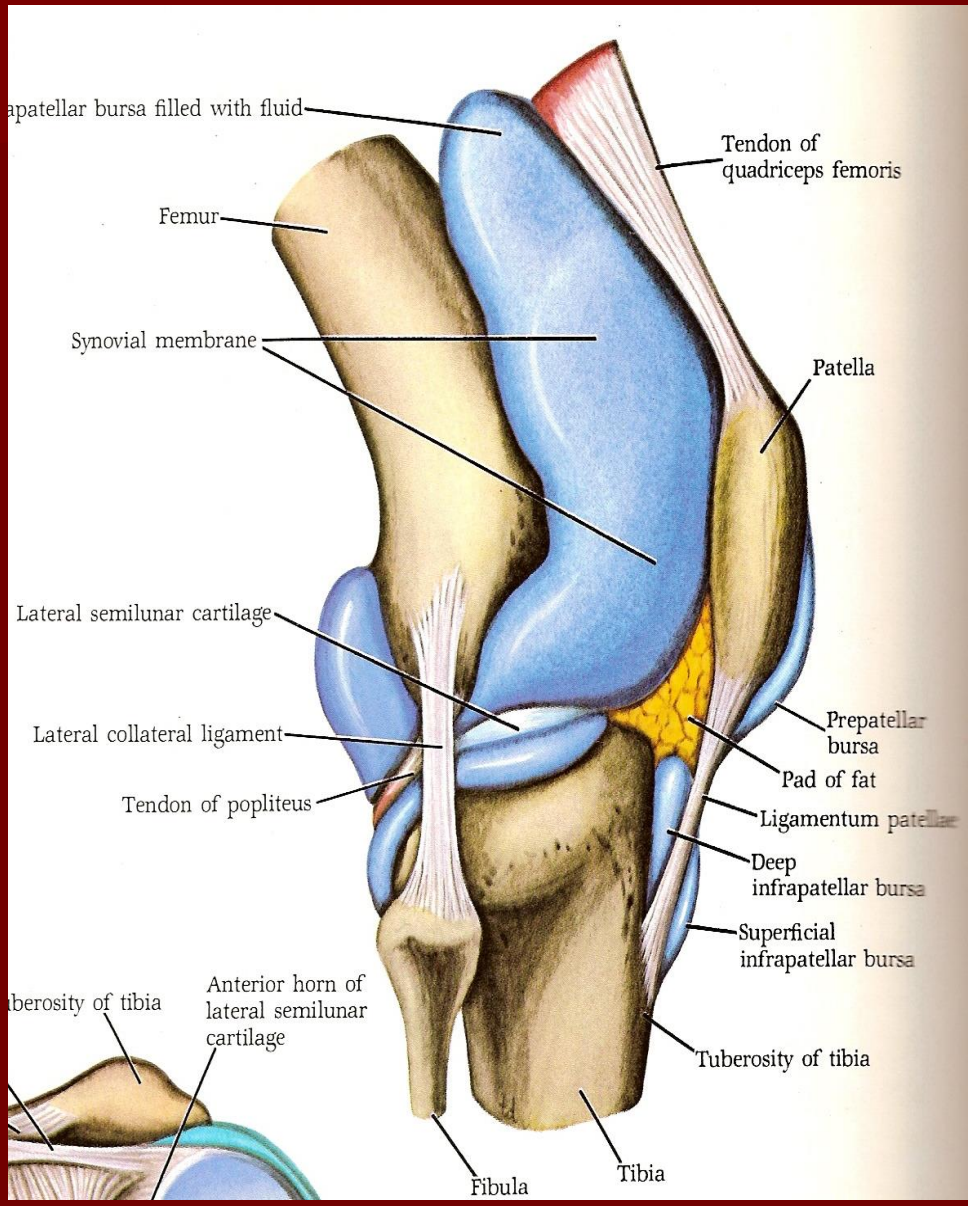
Bursae related to the knee joint:

1- Anterior to the knee:

1. supra-patellar bursa
2. prepatellar bursa
3. superficial infra-patellar bursa
4. deep infrapatellar bursa

2- Posterior to the knee:

1. popliteus bursa
2. semimembrenosus bursa
3. semitendinosus bursa
4. gastrocnemius bursa
5. gracilis bursa
6. biceps bursa
7. sartorius bursa



Structures inside the Knee joint:

1- the 2 menisci (semilunar cartilages).

2- The cruciate ligaments.

3- Popliteus tendon.

4- transverse lig

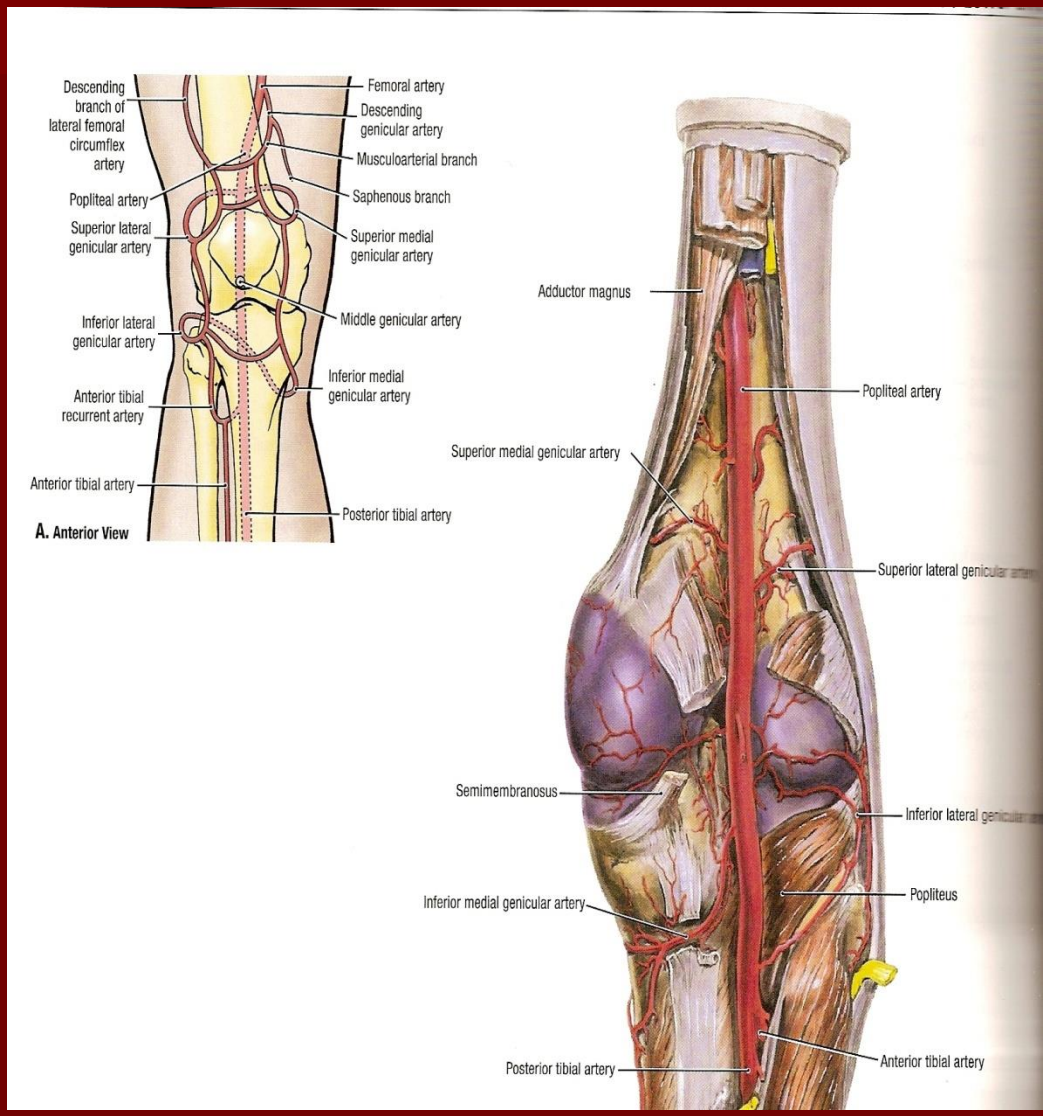
5- meniscofemoral lig.

Nerve supply of the knee joint:

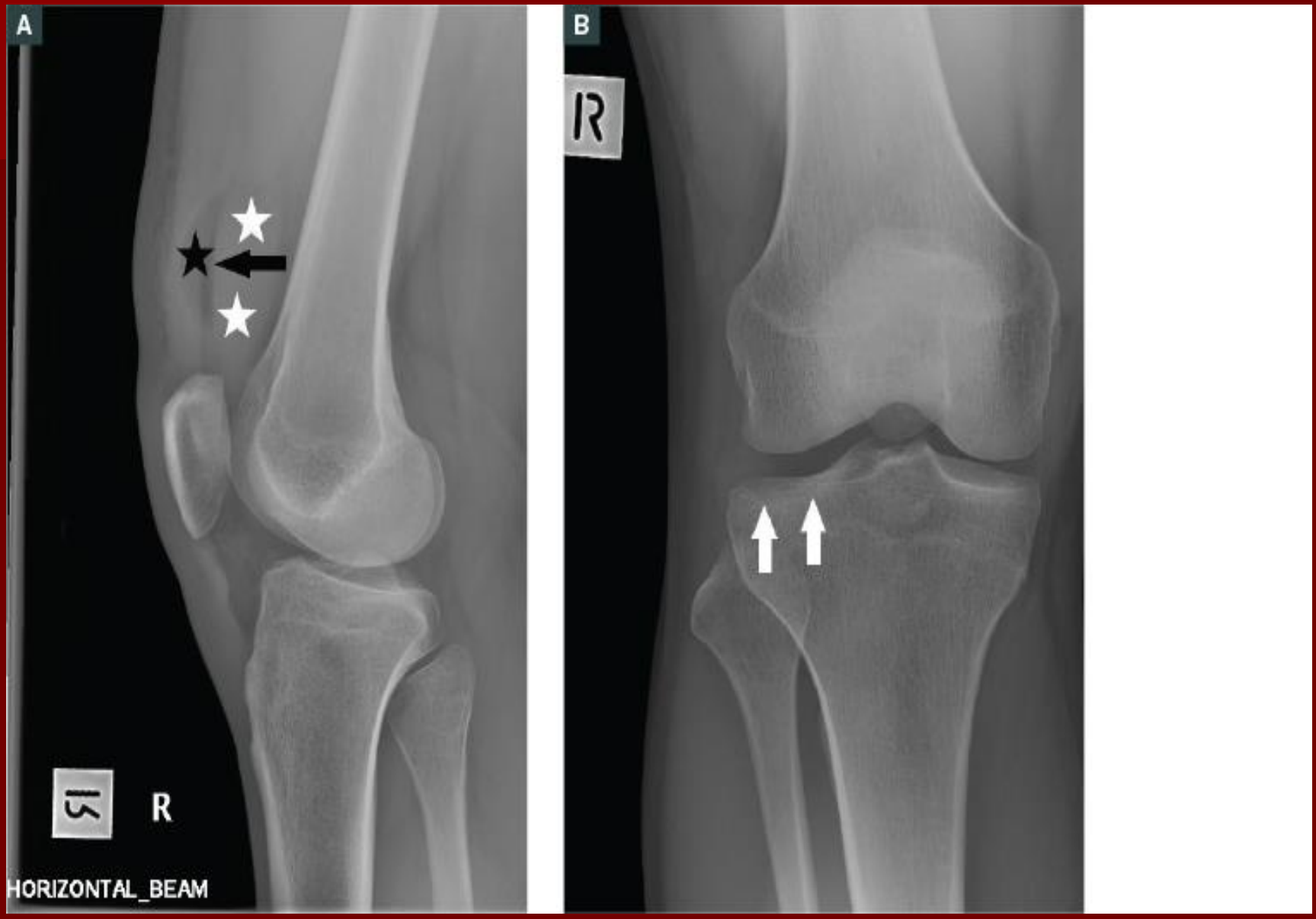
Femoral, obturator, tibial, and common pernoneal nerves.

Arterial supply of knee joint:

From the anastomosis around knee.



Imaging of the knee joint:



A 16-year-old boy making a powerful move out of the starting blocks to begin a 100-m sprint feels intense pain below his right knee and collapses to the ground, unable to straighten his leg. The given plain fi lm of the lateral knee reveals an avulsion fracture at the area indicated by the white arrowhead, with the fracture fragment identified by the white arrow. Which of the following muscles is most likely detached?

(A) Gastrocnemius

(B) Tibialis anterior

(C) Adductor magnus

(D) Rectus femoris

(E) Semitendinosus

Thank You

Thank You