KNEE JOINT

DR. KUNJ BIHARI
M.D.(ANATOMY)
ASSISTANT PROFESSOR

JANU SANDHI

- जङ्घोर्वोः सन्धाने जानु, तत्र खञ्जता; जानुन ऊर्ध्वमुभयतस्त्र्यङ्गुलमानो..... (सु.शा.6/25)

- *Acharya Sushruta* has described the junction of *Uru* and *Jangha* as *Janu* (knee), it denotes the knee joint which is counted as a *Marma*. It causes lameness; its length is three fingers

- .....जानुकूर्परसीमन्ताधिपतिगुल्फमणिबन्धकुकुन्दरावर्तकृकाटिकाश्चेति सन्धिमर्माणि || (सु.शा.6/7)

- *Janu Sandhi Marma* a *Sandhi Marma* present in *Sakthi* that is lower extremity and is of the *Vaikalyakar Marma*.

KNEE JOINT

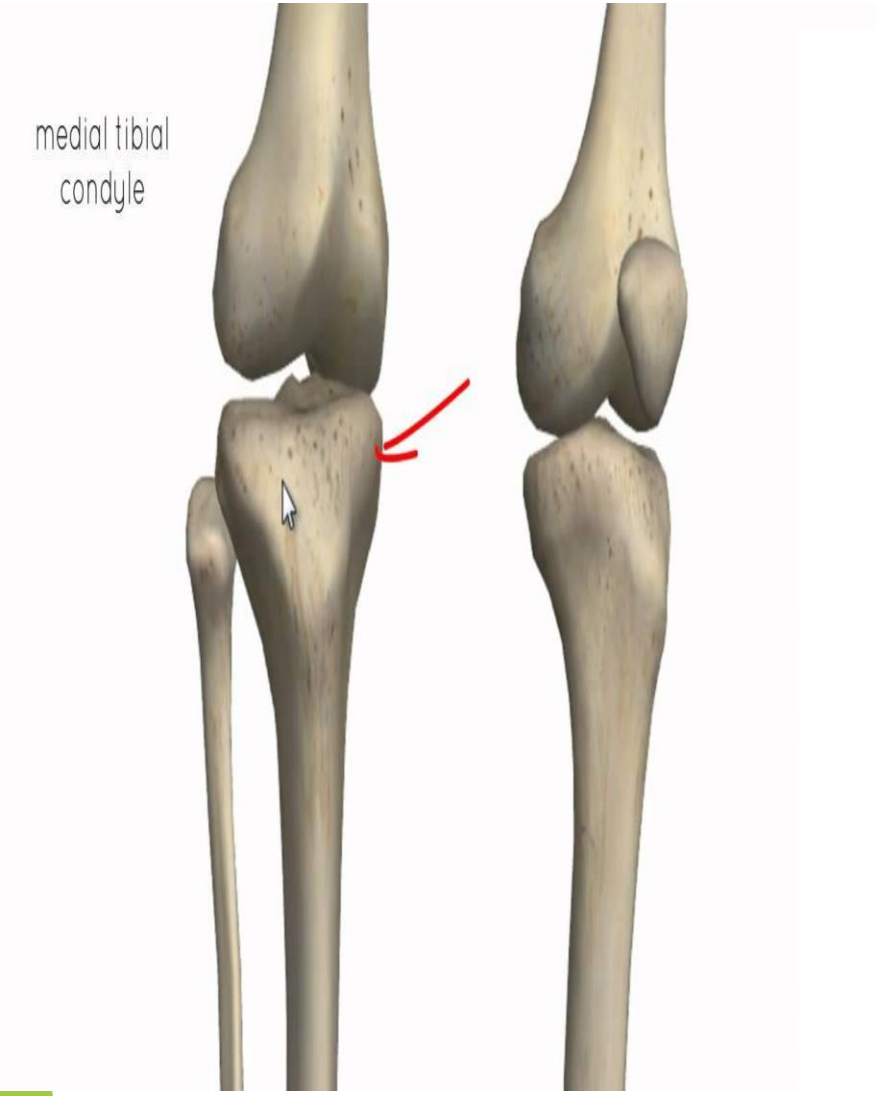
Introduction

- The knee joint is the largest and most superficial joint.
- The knee joint joins the thigh with the leg
- It is a compound synovial joint
- The knee is a modified hinge joint, which permits flexion and extension as well as slight internal and external rotation.

- **The joint is vulnerable to injury**
- **The most important muscle in stabilizing the knee joint is the large quadriceps femoris.**
- **The fibula is not involved in the knee joint**

Articular surface

Knee joint is consists of two articulations: one between the femur and tibia (tibiofemoral joint), and one between the femur and patella (patellofemoral joint).


medial tibial
condyle


Femur
(thigh bone)
Kneecap
(patella)
Fibula
Tibia
(shin bone)

- Two condylar joints between the condyles of the femur and tibia
- One saddle joint between the femur and the patella

Fibrous capsule

- The joint capsule of the knee joint is typical in consisting of an external fibrous layer (fibrous capsule) and an internal synovial membrane.
- The fibrous layer has a few thickened parts that make up intrinsic ligaments.

- **The fibrous layer attaches to the femur superiorly, Posteriorly, encloses the condyles and the intercondylar fossa. Inferiorly, attaches to the margin of the superior articular surface of the tibia, except where the tendon of the popliteus crosses the bone.**

Synovial membrane

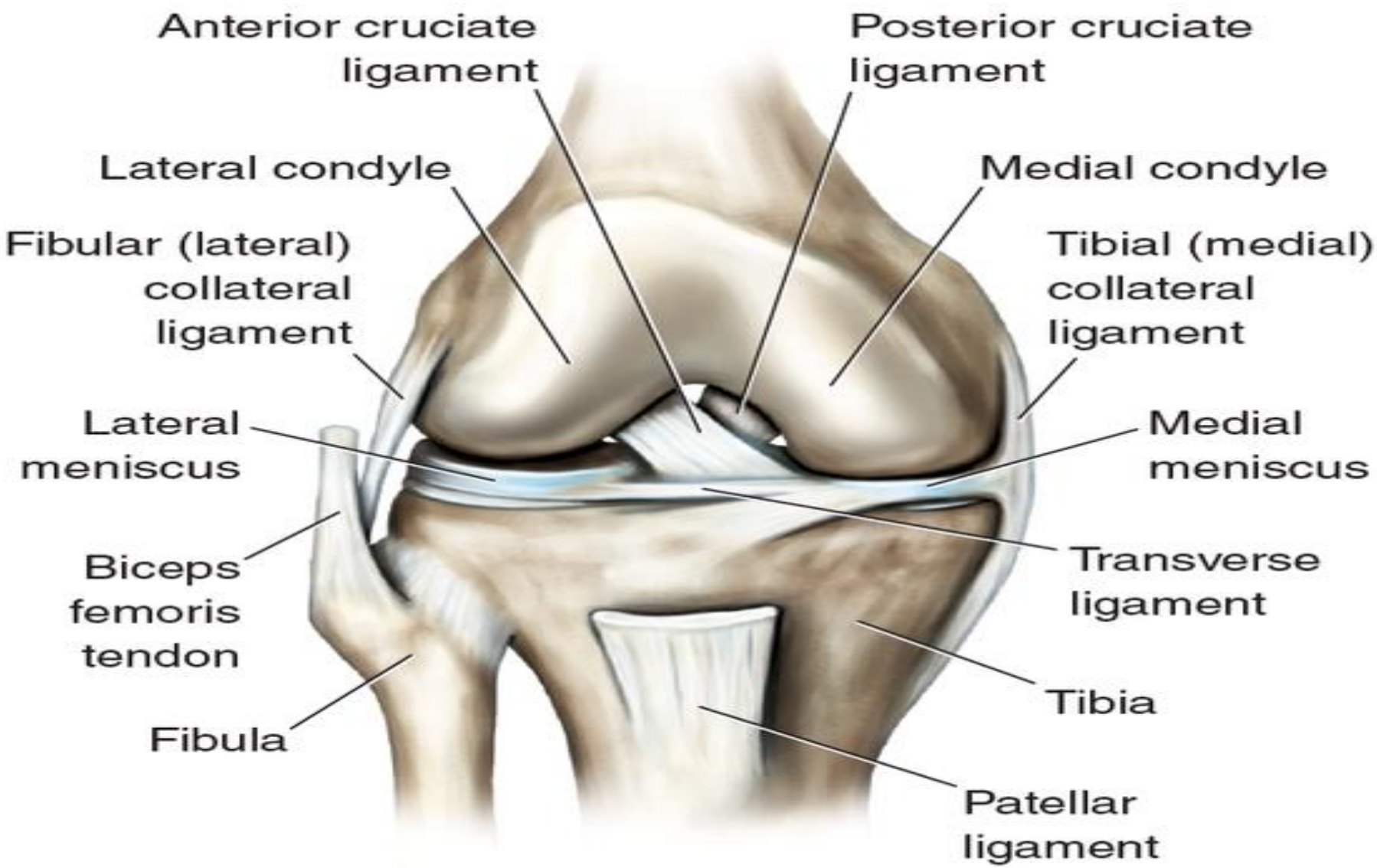
- **The synovial membrane of the joint capsule is continuous with the synovial lining of the bursa.**

Ligaments

1. Extracapsular Ligaments of the Knee Joint

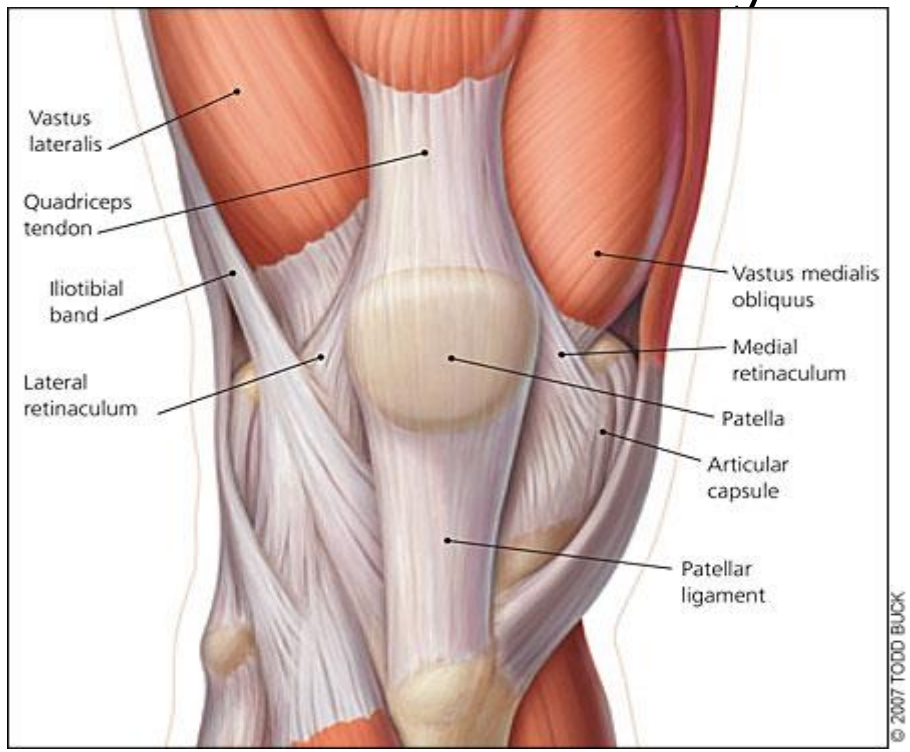
The Joint Capsule is Strengthened by five Extracapsular Or Capsular (Intrinsic) Ligaments-

- Patellar Ligament
- Fibular Collateral Ligament
- Tibial Collateral Ligament
- Oblique Popliteal Ligament
- Arcuate Popliteal Ligament.


Anterior cruciate ligament
Posterior cruciate ligament
Lateral condyle
Medial condyle
Fibular (lateral) collateral ligament
Tibial (medial) collateral ligament
Lateral meniscus
Medial meniscus
Biceps femoris tendon
Transverse ligament
Fibula
Tibia
Patellar ligament

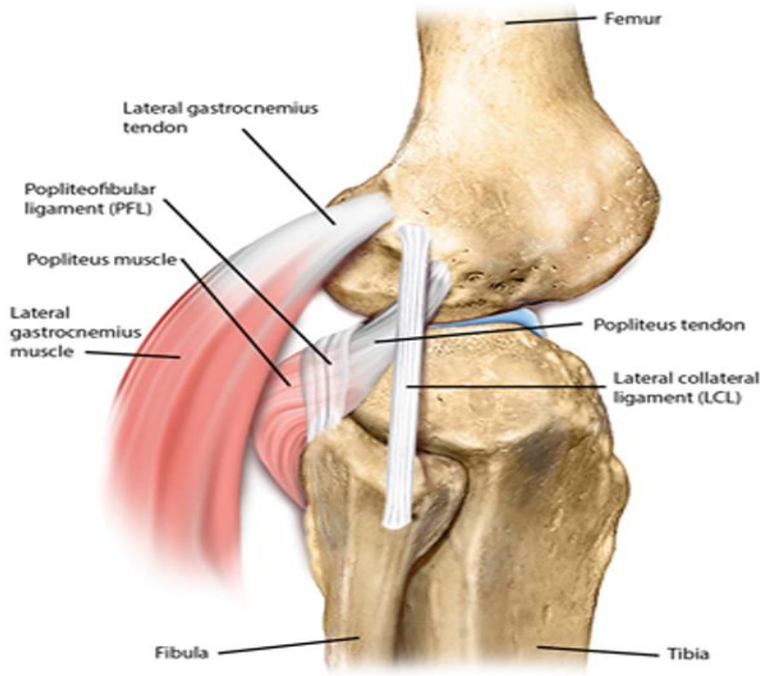
1. Patellar Ligament

- **This is the central portion of the common tendon of insertion of the quadriceps femoris.**
- **It is attached above the apex of the patella and upper part of tibial tuberosity.**



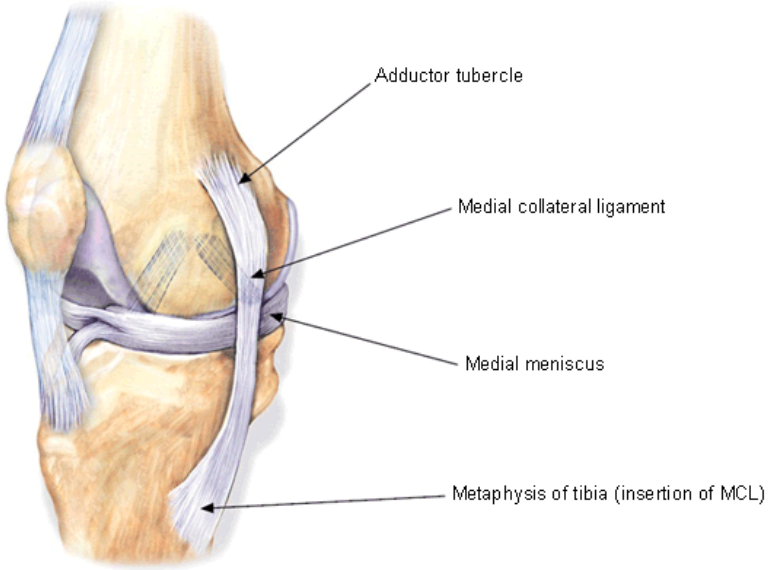
2. Fibular collateral ligament (lateral collateral ligament)

- A cord-like extra-capsular ligament.
- It extends inferiorly from the lateral epicondyle of the femur to the lateral surface of the fibular head.



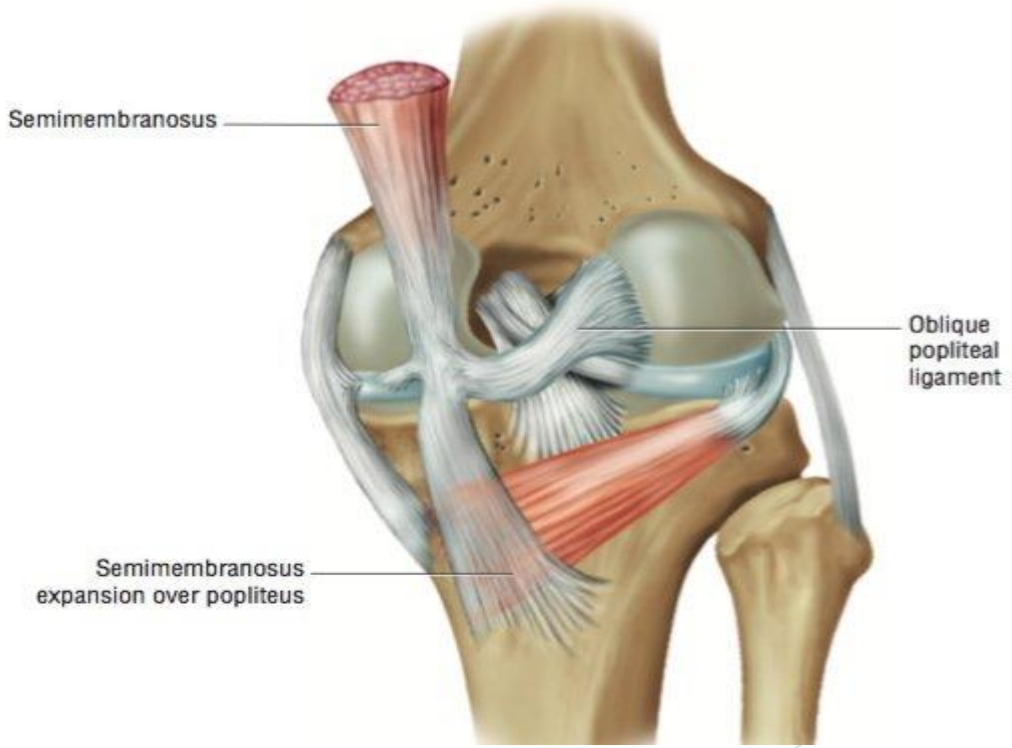
3.The tibial collateral ligament (TCL; medial collateral ligament)

- It is a strong, flat, band that extends from the medial epicondyle of the femur to the medial condyle and the superior part of the medial surface of the tibia.
- The TCL, weaker than the FCL, is more often damaged.



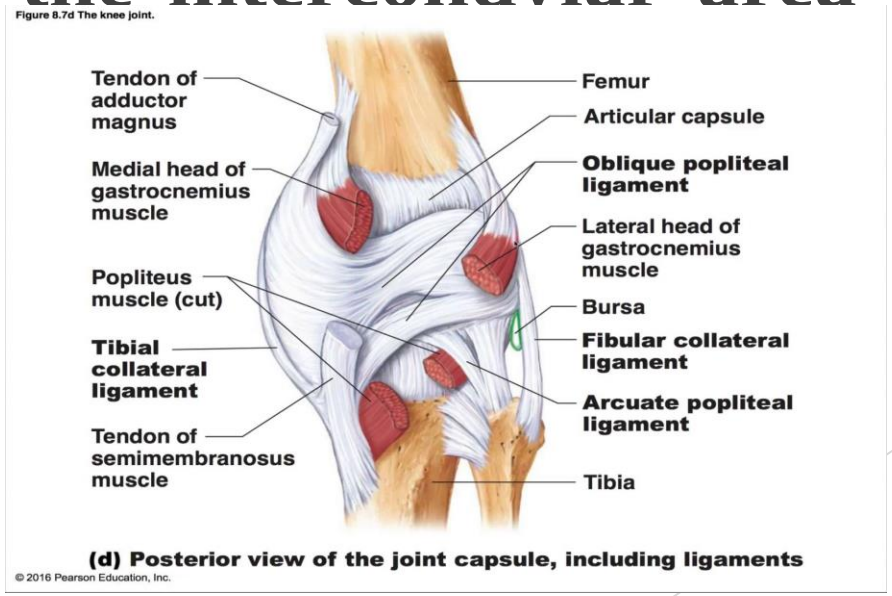
4. Oblique popliteal ligament

It is a recurrent expansion of the tendon of the semimembranosus. The ligament arises posterior to the medial tibial condyle and passes superolaterally toward the lateral femoral condyle.



5. Arcuate popliteal ligament

- It also strengthens the joint capsule posterolaterally.
- It arises from the posterior aspect of the fibular head, passes superomedially over the tendon of the popliteus, and is attached to the posterior border of the intercondvlar area of the tibia.



2. Intra-Articular Ligaments

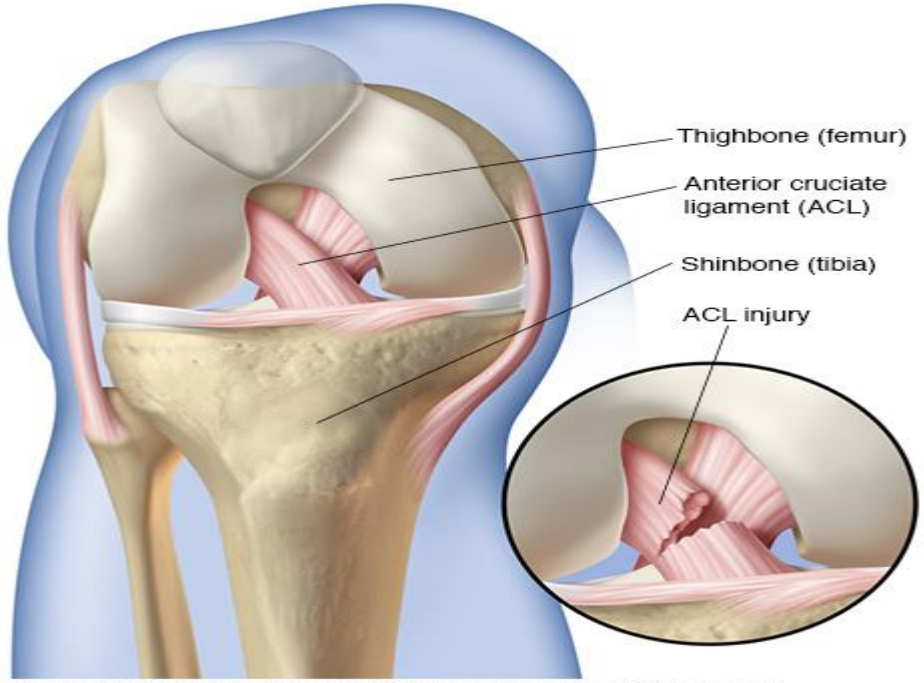
The intra-articular ligaments within the knee joint consist of –

- Anterior cruciate ligament
- Posterior cruciate ligament
- Medial menisci
- Lateral menisci.
- Transverse ligament

NOTE -: The popliteal tendon is also intra-articular during part of its course.

1. Anterior cruciate ligament

The weaker of the two cruciate ligaments, arises from the anterior intercondylar area of the tibia. and extends superiorly, posteriorly, and laterally to attach to the posterior part of the medial side of the lateral condyle of the femur.

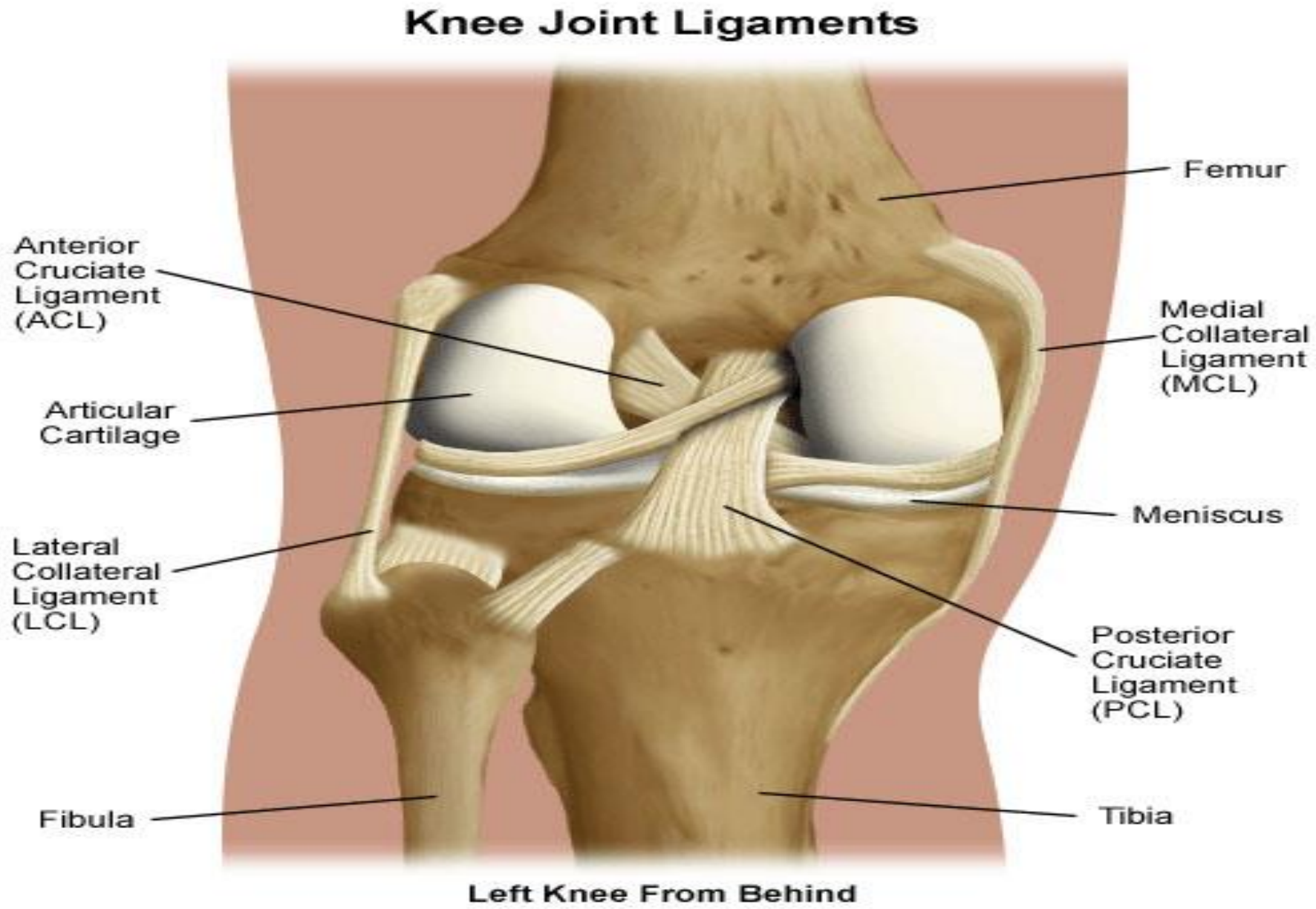


2. posterior cruciate ligament (PCL)

The stronger of the two cruciate ligaments, arises from the posterior intercondylar area of the tibia. The PCL passes superiorly and anteriorly on the medial side of the ACL to attach to the anterior part of the lateral surface of the medial condyle of the femur.

NOTE – Cruciate ligaments are maintains antero-posterior stability of knee joint.

ACL and PCL


Knee Joint Ligaments
Femur
Anterior Cruciate Ligament (ACL)
Medial Collateral Ligament (MCL)
Articular Cartilage
Meniscus
Lateral Collateral Ligament (LCL)
Posterior Cruciate Ligament (PCL)
Fibula
Tibia
Left Knee From Behind

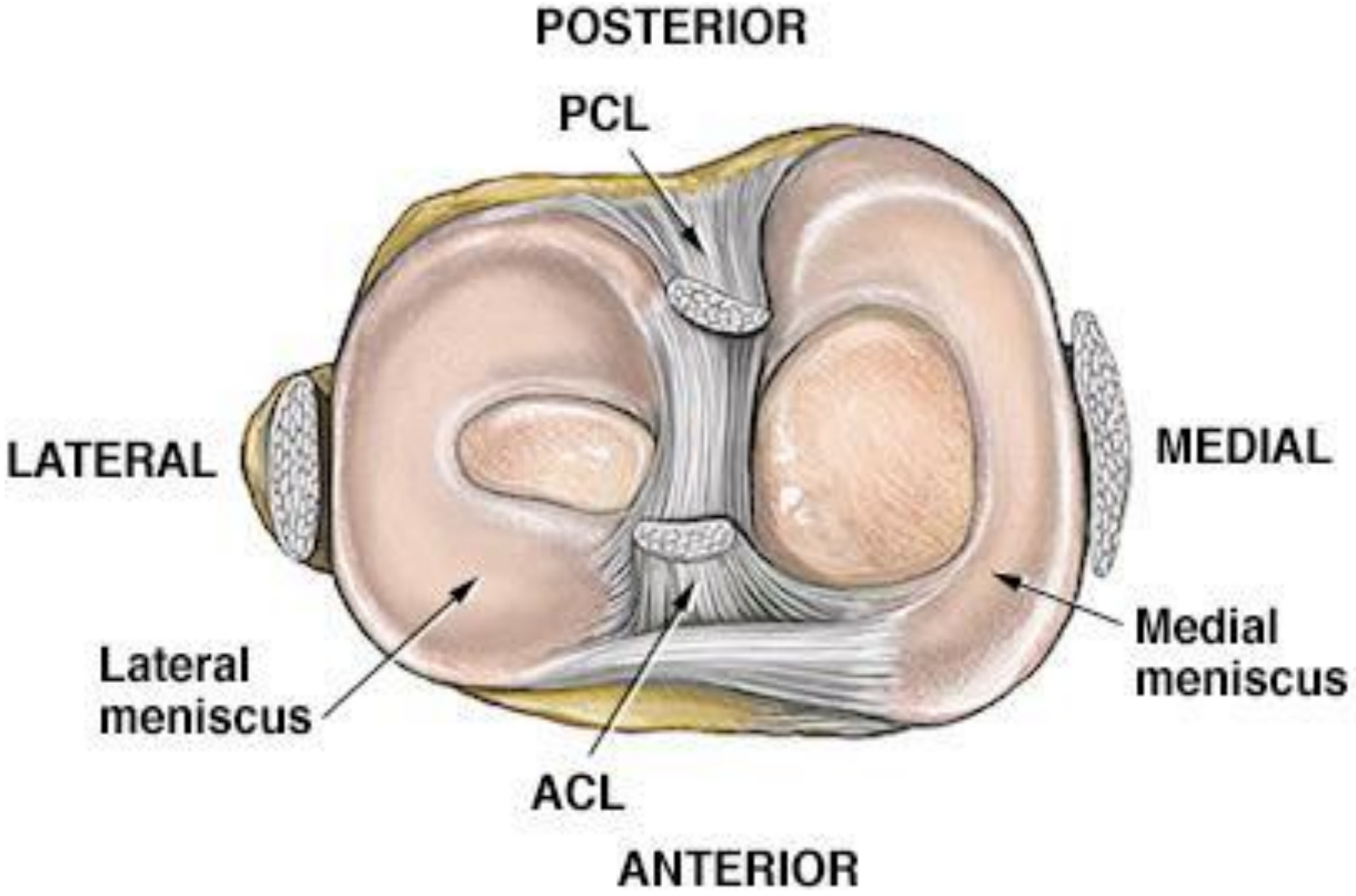
- The menisci of the knee joint are crescentic plates of **fibrocartilage** on the articular surface of the tibia that deepen the surface and play a role in shock absorption.

3. Medial menisci

- Medial menisci is on the inner side of the knee joint
- Medial menisci is semicircular band

4. Lateral menisci

- Lateral menisci is on the outer side of the knee joint
- The lateral menisci is almost circular and covers a larger portion of the tibial articular surface than the medial menisci


POSTERIOR
PCL
LATERAL
MEDIAL
Lateral meniscus
Medial meniscus
ACL
ANTERIOR
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5. Transverse ligament

It connects the ends of the medial and lateral menisci

BURSA

- There are at least 13 bursae around the knee joint.

Anterior-4

- The subcutaneous prepatellar and infrapatellar bursa, deep infrapatellar bursa
- The large suprapatellar bursa is especially important because an infection in it may spread to the knee joint cavity

Lateral -4

- A bursa deep to medial head of gastrocnemius.
- A bursa between the fibular collateral ligament and biceps femoris
- A bursa between the fibular collateral ligament and the tendon of popliteus
- Tendon of popliteus and the lateral condyle of the tibia

Medial bursa -5

- Deep to medial head of gastroncnemius
- Deep to the tibial collateral ligament
- Deep to the semimembranosus
- Between semimembranosus and semitendinosus
- **Anserine bursa** (deep to the tendinous distal attachments of the sartorius, gracilis, and semitendinosus)

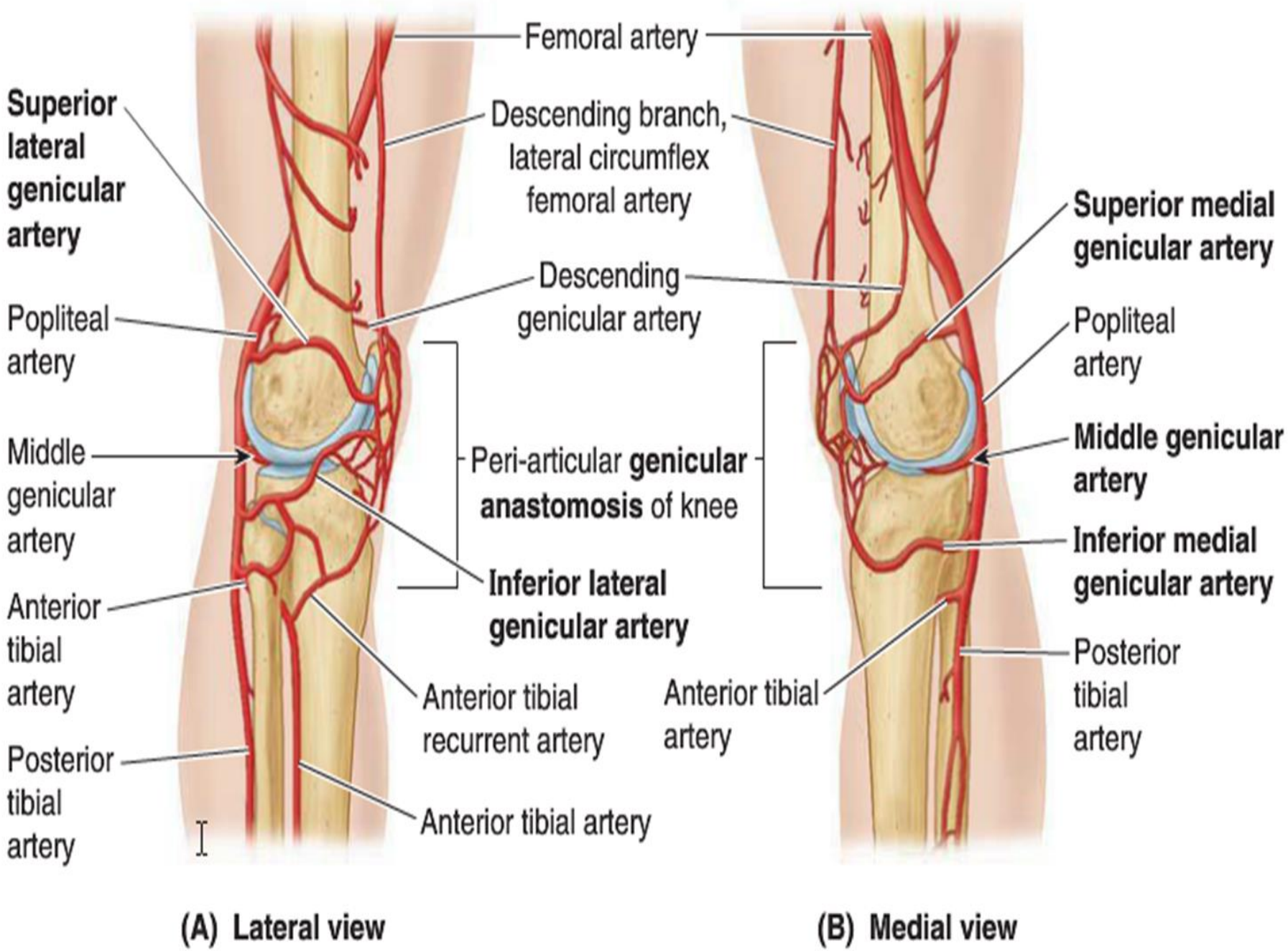
Movements

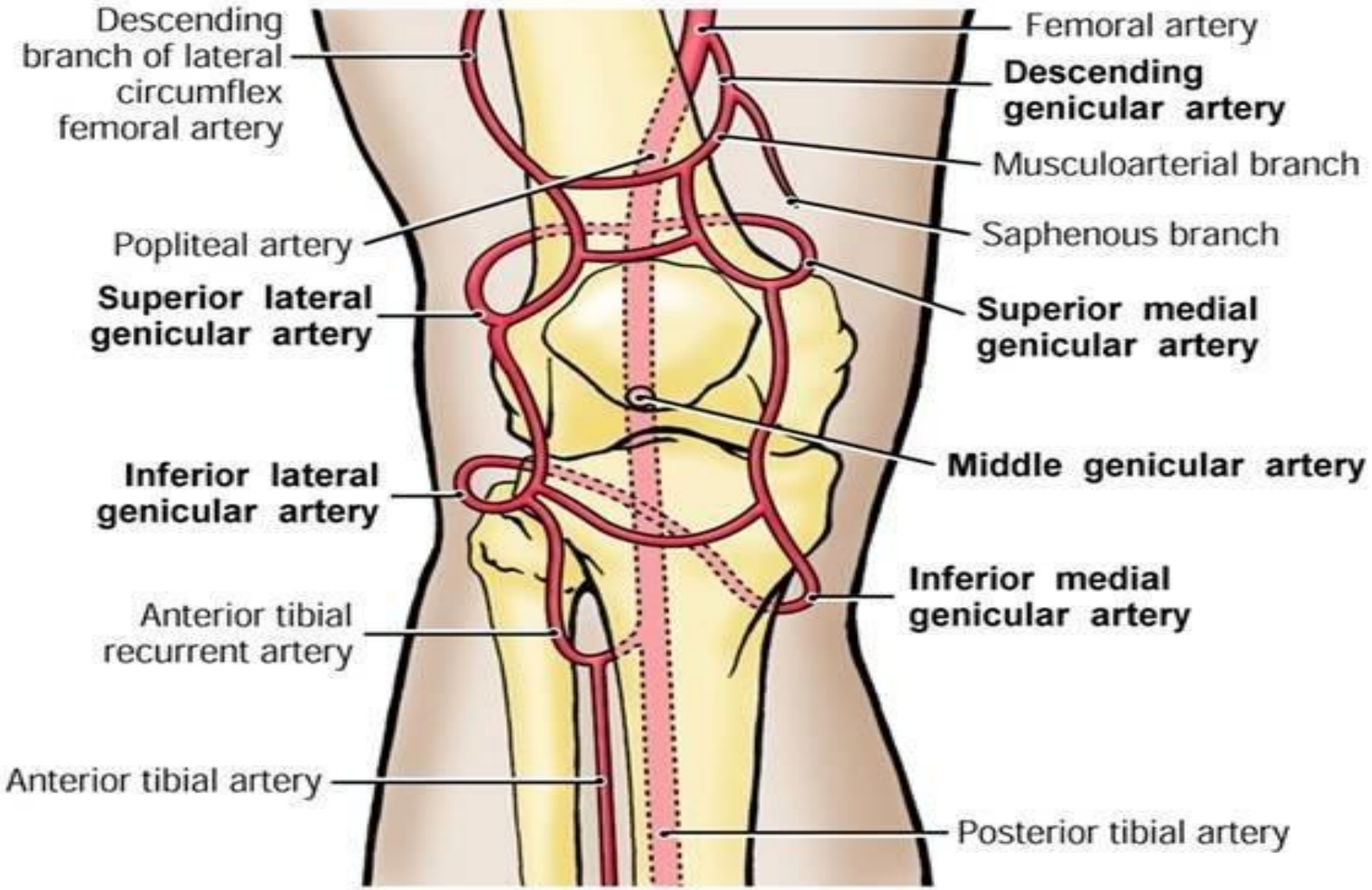
- Flexion and extension are the main knee movements; some rotation occurs when the knee is flexed

Innervations

- Femoral nerve
- Sciatic nerve
- Obturator nerve

Blood Supply


Femoral artery
Superior lateral genicular artery
Descending branch, lateral circumflex femoral artery
Descending genicular artery
Popliteal artery
Middle genicular artery
Peri-articular genicular anastomosis of knee
Inferior lateral genicular artery
Anterior tibial artery
Anterior tibial recurrent artery
Posterior tibial artery
Anterior tibial artery
(A) Lateral view
Superior medial genicular artery
Popliteal artery
Middle genicular artery
Inferior medial genicular artery
Anterior tibial artery
Posterior tibial artery
(B) Medial view



A. Anterior View

Clinical Conditions

1	• Meniscal tear
2,3	• Patella dislocation • Patellar tendinitis
4,5	• Medial collateral ligament injury • Lateral collateral ligament injury

6

- **Patellofemoral syndrome (runner's knee)**

7,8

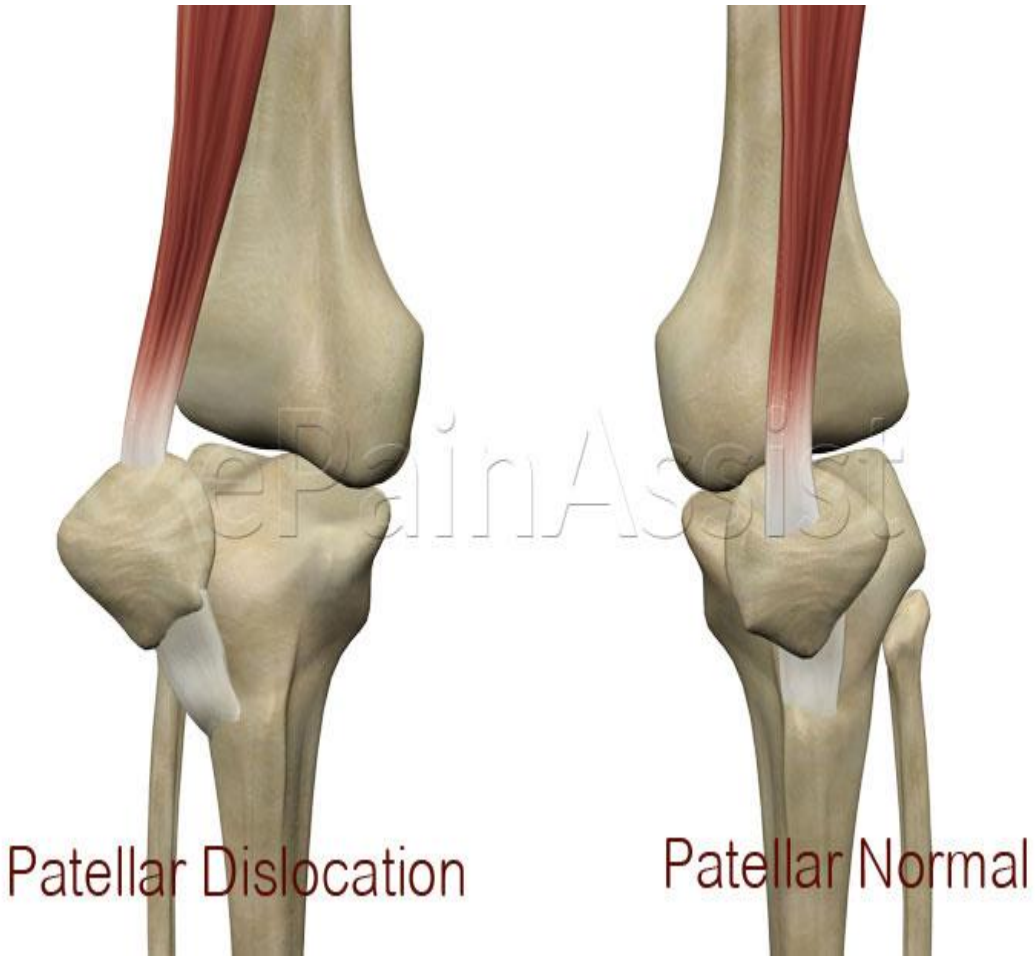
- **Genu valgum and genu varum**
- Rheumatoid arthritis

9,10

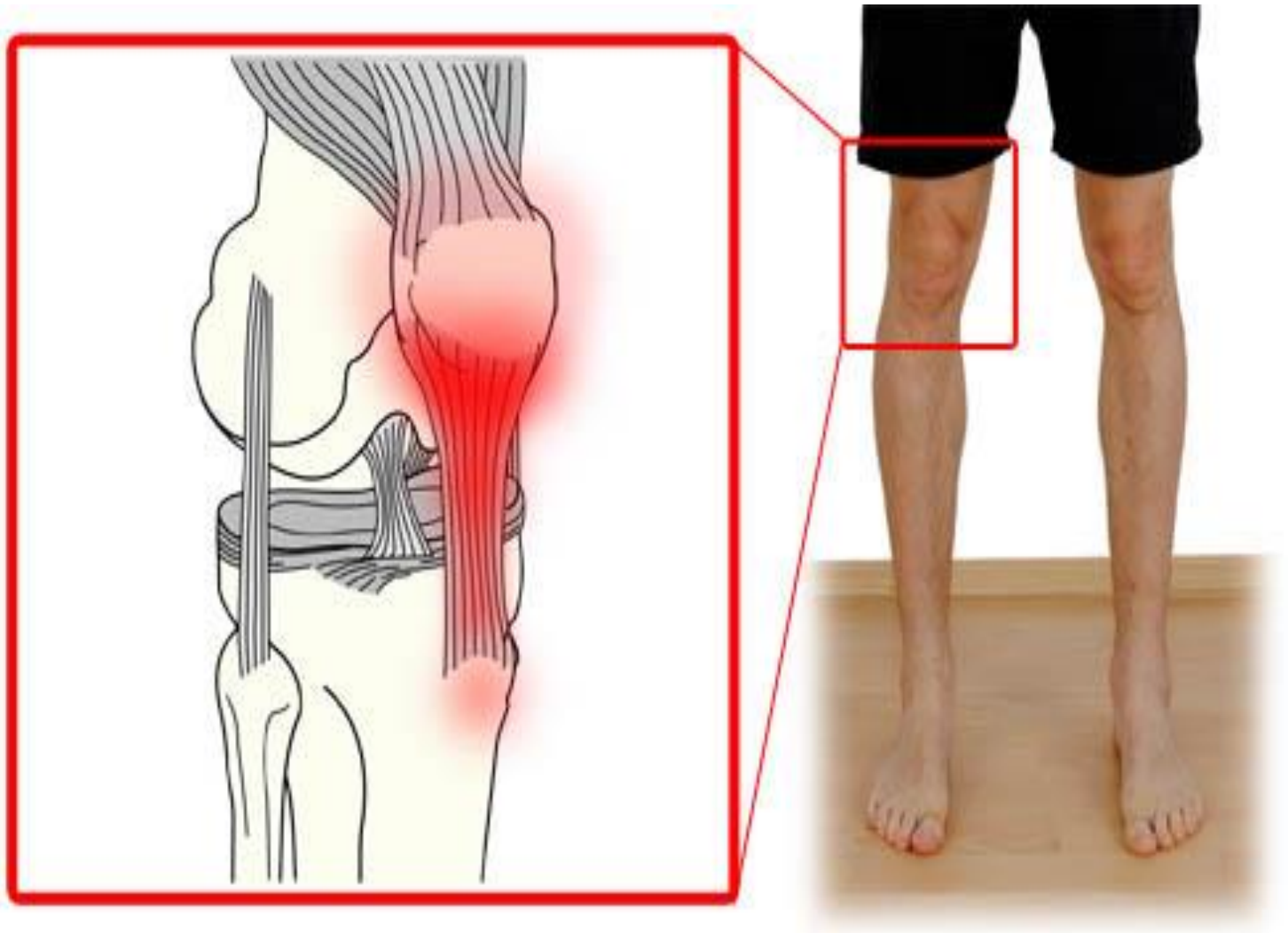
- **Anterior cruciate ligament injury**
- **Posterior cruciate ligament injury**

Meniscal tear

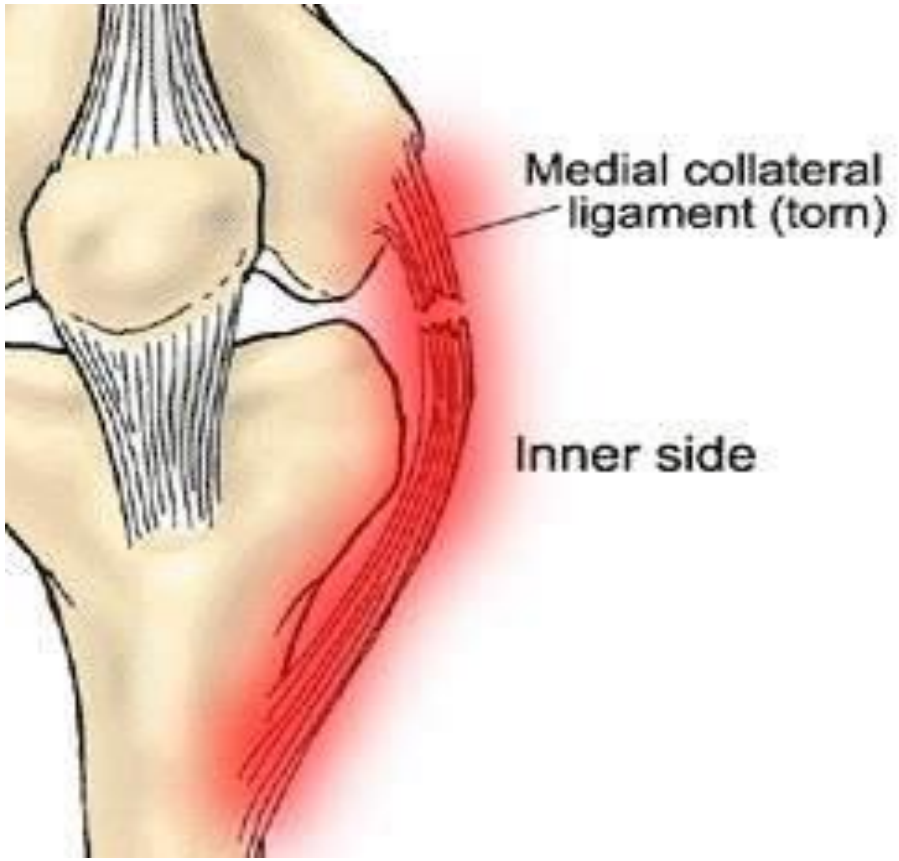
Patella dislocation



Patellar tendinitis

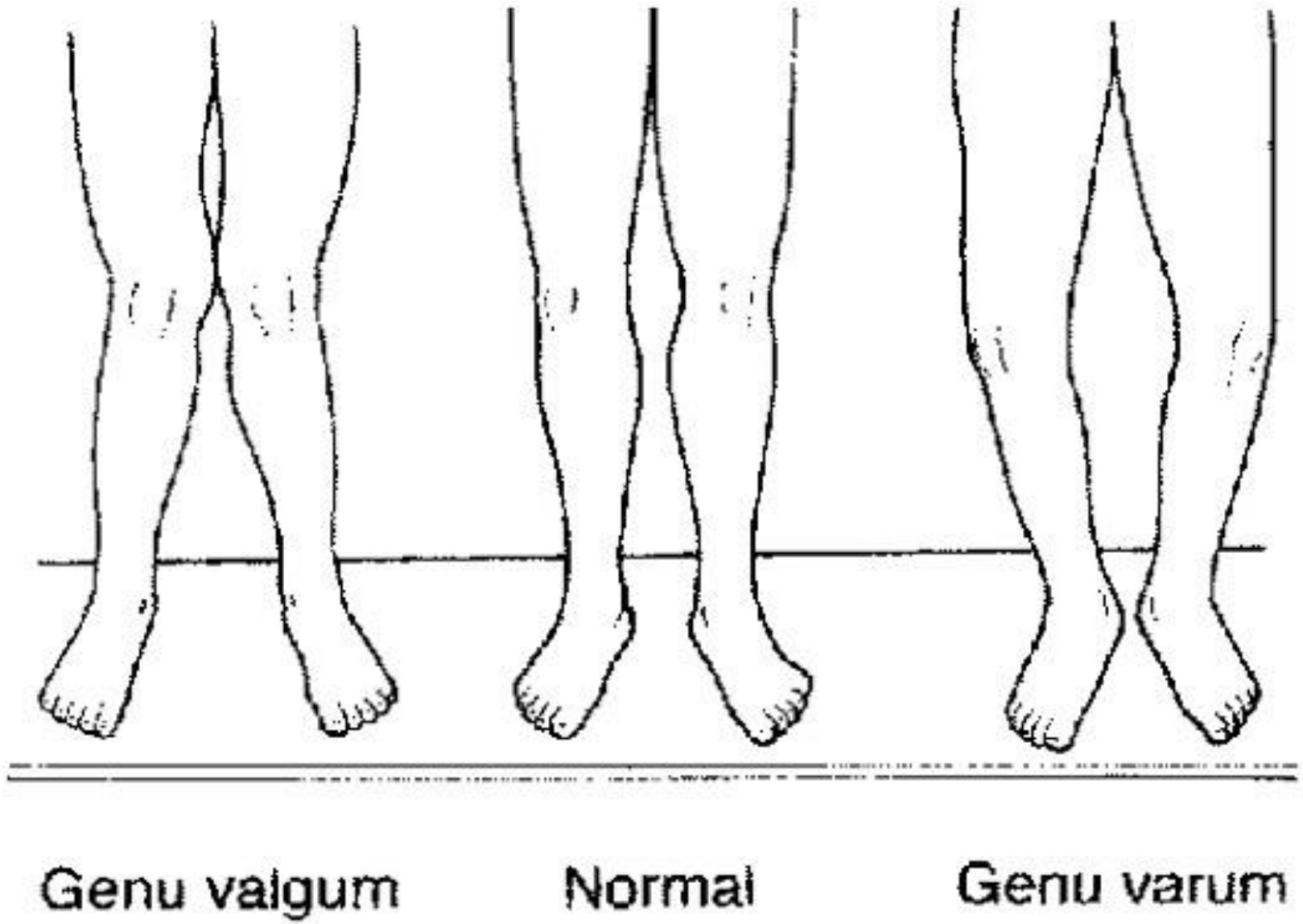


Medial collateral ligament injury
Lateral collateral ligament injury

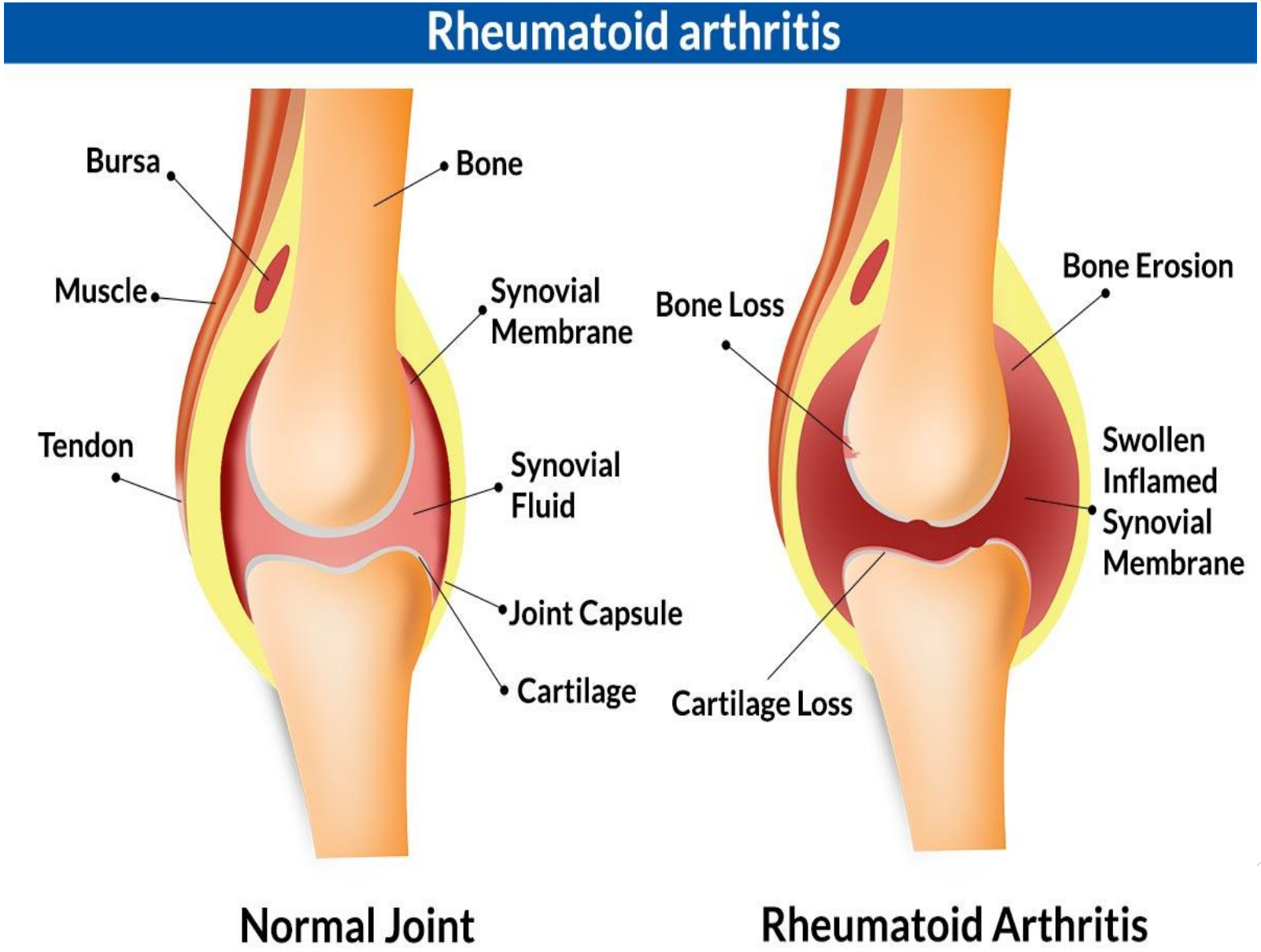


Patellofemoral syndrome (runner's knee)

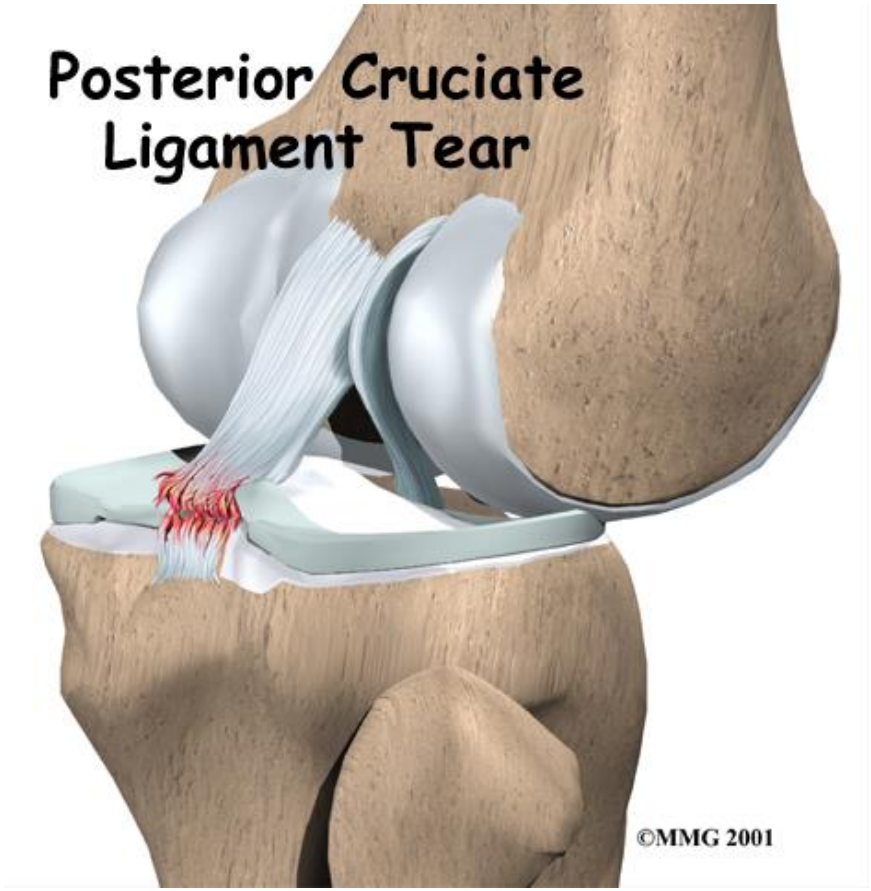
Genu valgum and genu varum



Rheumatoid arthritis



Anterior cruciate ligament injury
Posterior cruciate ligament injury



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