أهلا وسهلا

الأستاذ الدكتور يوسف حسين

أستاذ التشريح وعلم الأجنة - كلية الطب – جامعة الزقازيق – مصر

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دكتوراة من جامعة كولونيا المانيا

جروب الفيس د. يوسف حسين (استاذ التشريح)

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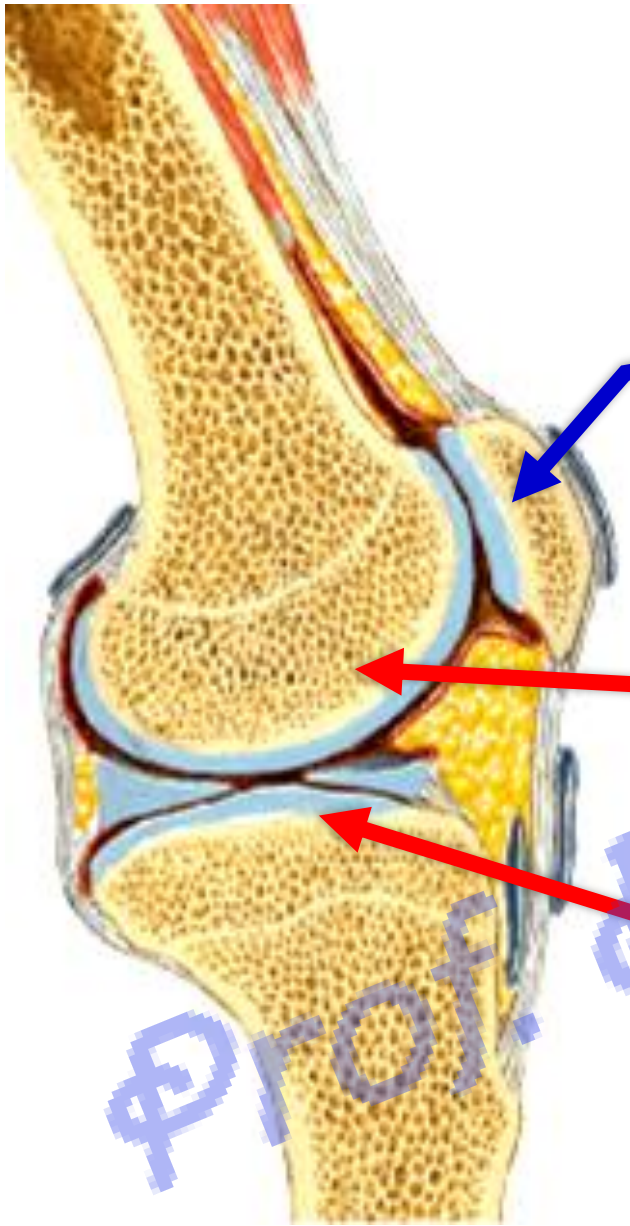
Knee joint



- **Type:** synovial joint; **modified hinge.**
- **Articular surfaces**

1- Lower surfaces of both femoral condyles

2- Superior surfaces of both tibial condyles (Plateau)

3- Posterior surface of the patella.

- **Complex:**

a- Femoropatellar articulation

b- Femorotibial articulation

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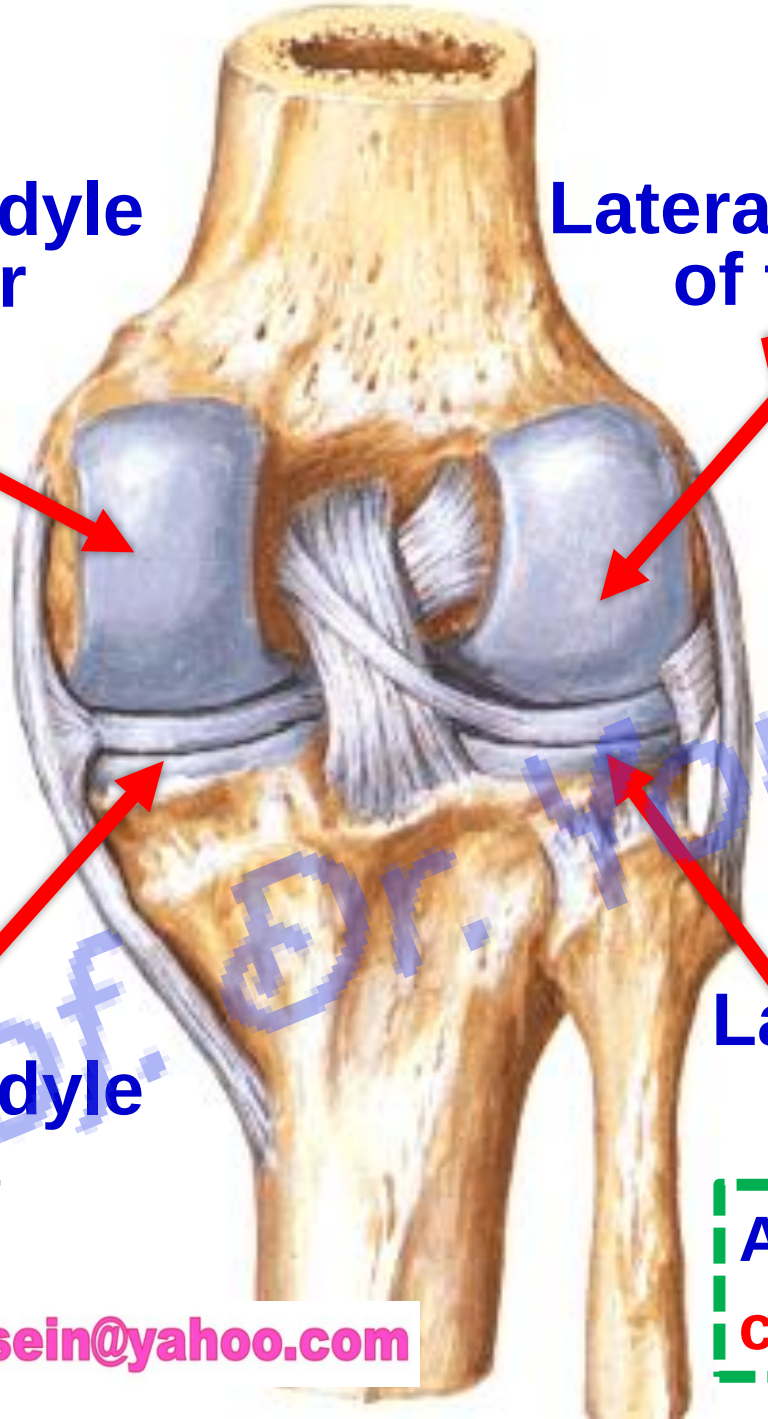

Medial condyle of femur

Lateral condyle of femur

Medial condyle of tibia

Lateral condyle of tibia

Small medial facet

Large lateral facet

Posterior surface of the patella

Articular surface on medial condyle is longer than lateral

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❖ Capsule of knee joint

is relatively thin

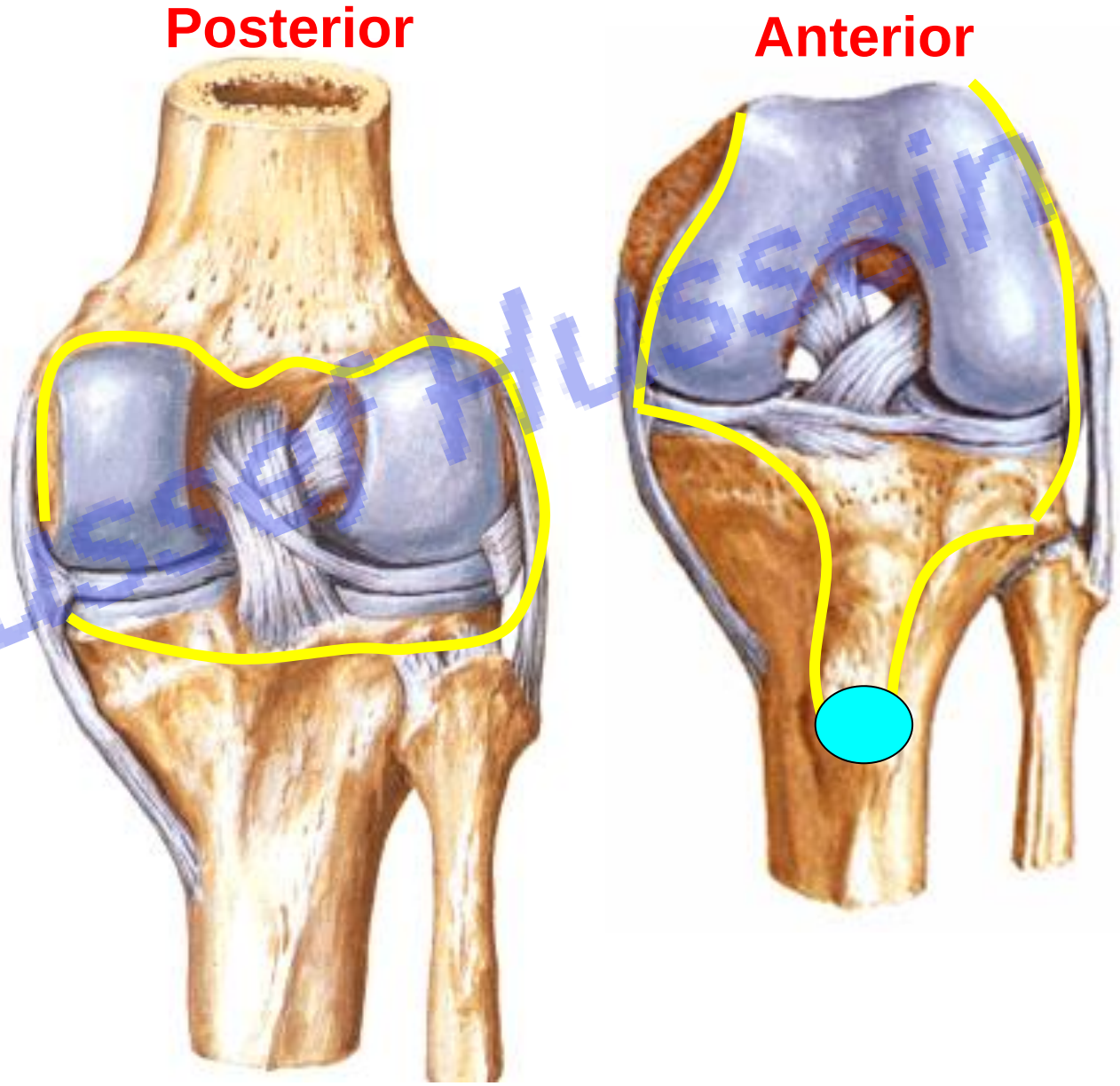
1- Attachment to the femur: to articular margin of the medial condyle.

- Laterally, articular margin to lateral condyle outside origin of **popliteus** muscle (popliteus is intracapsular extrasynovial)

2- Attachment to the tibia: to articular margins of both condyles.

3- Anteriorly, margins of patella.

N.B; the capsule may be absent **anteriorly** and replaced by quadriceps tendon and ligamentum patellae.



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❖ Synovial membrane

-It lines the capsule and nonarticual structures

1) **Anteriorly**, extends upward above the patella forming **suprapatellar bursa.**

2) **Below the patella**, it forms **infrapatellar fold**.

3) **Laterally**, it forms a synovial sheath **around tendon of popliteus**.

❖ Bursa On the medial aspect of knee joint

1- A bursa between medial head of gastrocnemius and capsule.

2- A bursa between tibial collateral ligament and tendons of (S.G.S).

3- A bursa between Semimembranous and medial condyle of the tibia.

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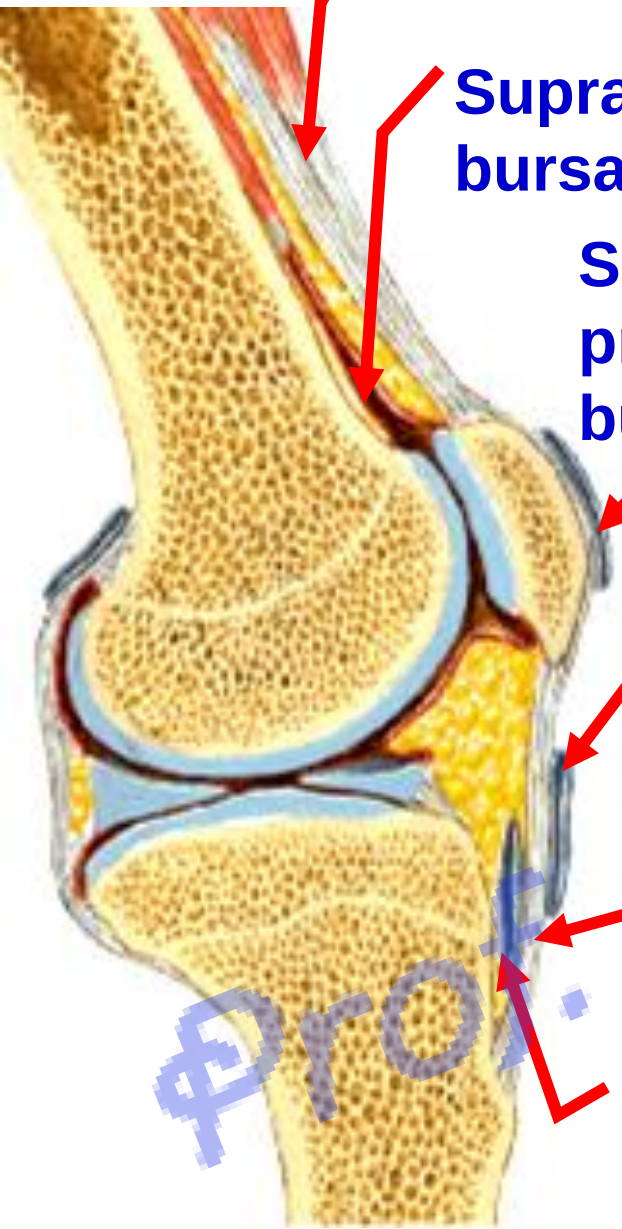

❖ Bursa On the anterior aspect;

1- Suprapatellar bursa: between lower part of anterior surface of femur and quadriceps tendon, continues with synovial membrane.

2- Subcutaneous prepatellar bursa: between skin and lower part of the patella.

- Inflammation and enlargement of this bursa usually affects persons who kneel over the knees during work. This condition is known as "**house maid's knee**"

3- Subcutaneous infrapatellar bursa: between skin and lower part of tibial tuberosity.

4- Deep infrapatellar bursa: between upper end of tibia and ligamentum patellae.

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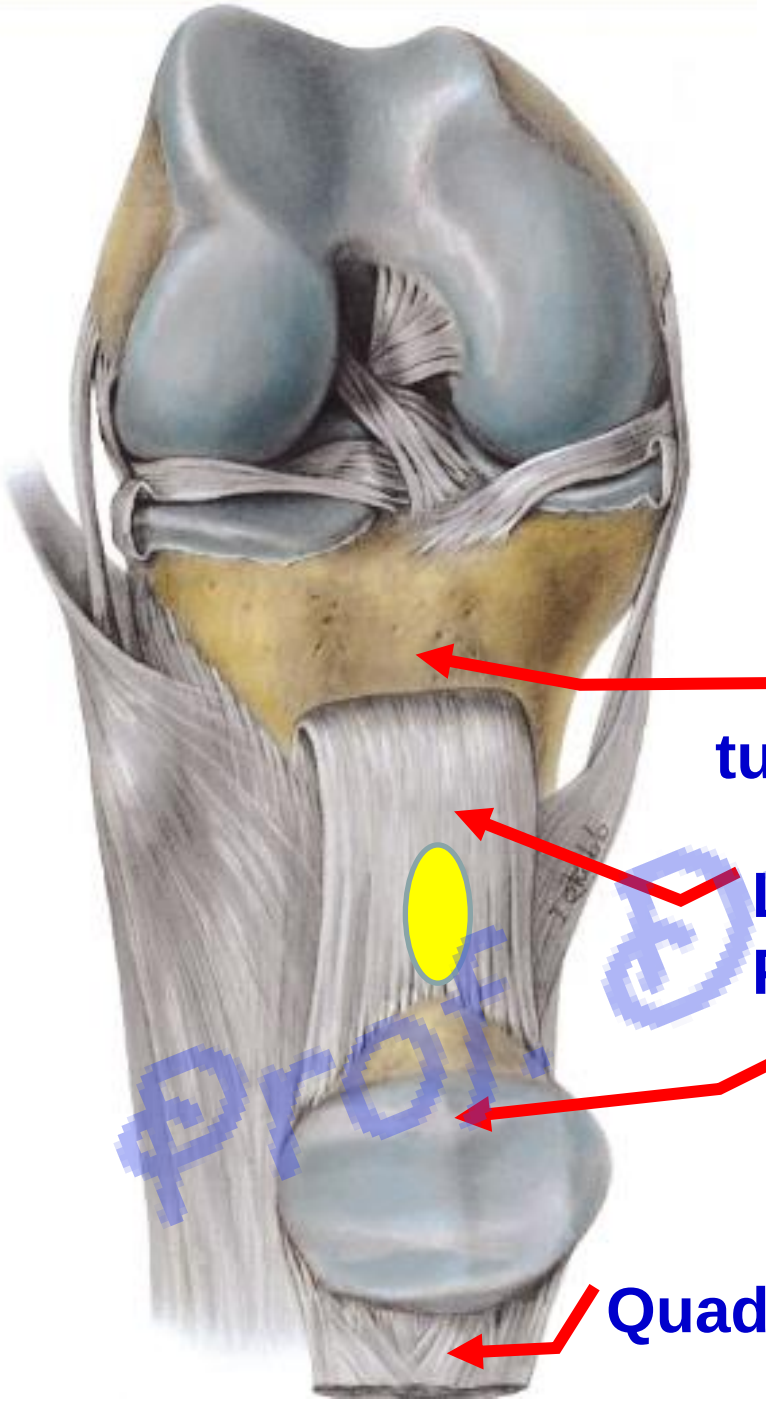
Extracapsular Ligaments



Ligamentum patellae (anterior):

- It is a strong ligament.
- It extends from the **apex** of the patella to the upper part of the **tibial tuberosity.**
- The deep surface is separated from the upper end of tibia by the **deep infrapatellar bursa.**

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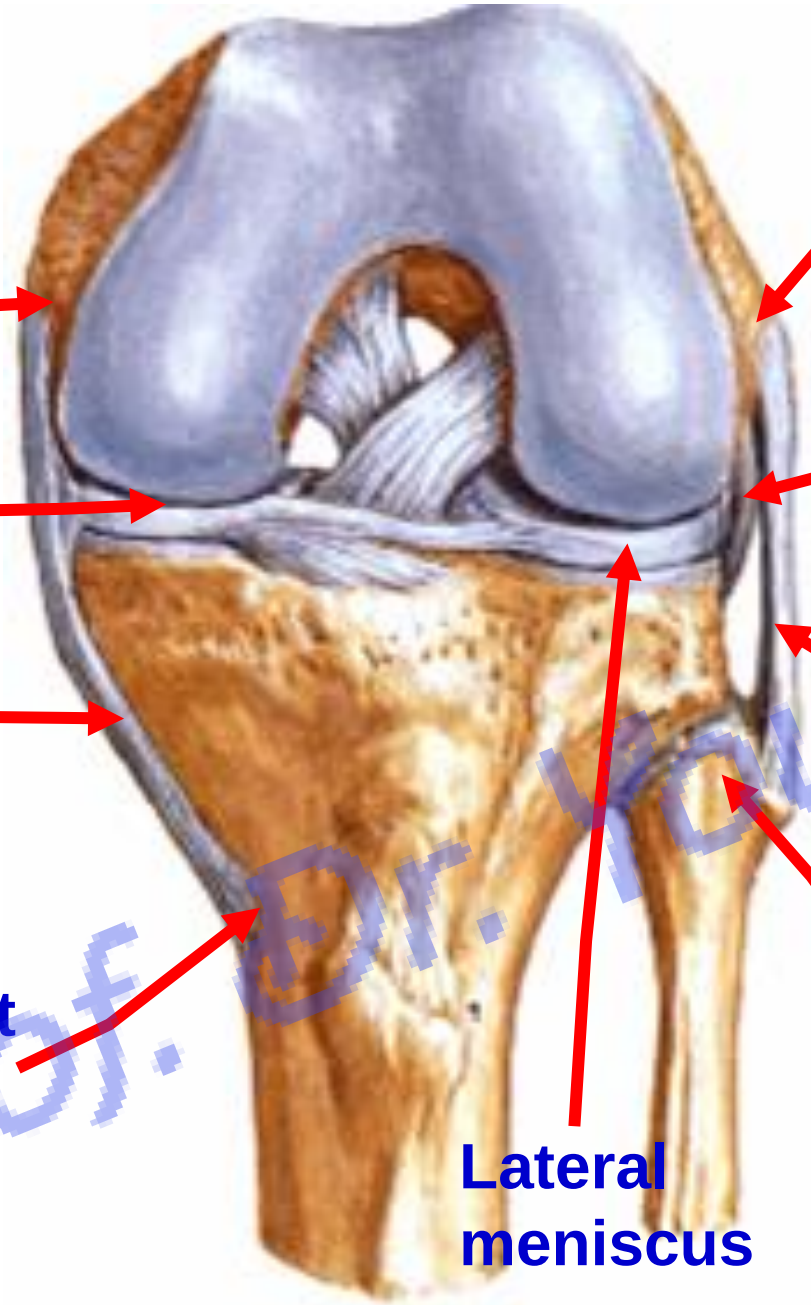

❖ **Medial collateral (tibial) ligament:** extends from medial epicondyle of femur to medial condyle and upper part of medial surface of tibia.

- It is **adherent** to the capsule and medial meniscus.

❖ **Lateral collateral (fibular) ligament**: extends from lateral epicondyle of femur to head of the fibula (*styloid process*).

- It is separated from the capsule and lateral meniscus by popliteus.

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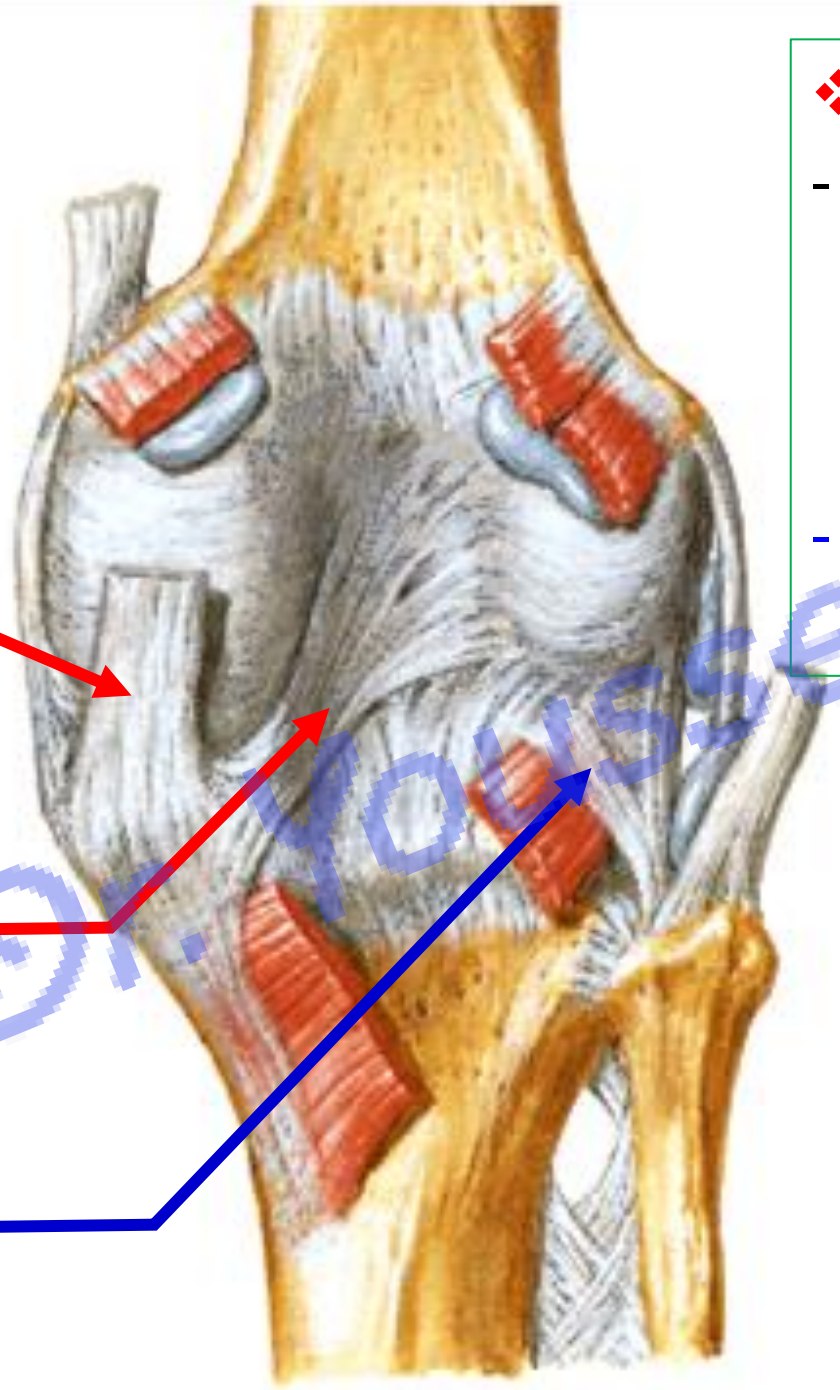

Semimembranosus tendon

Posterior oblique ligament

Arcuate popliteal ligament

❖ **Posterior oblique ligament:**

- It is a reflection from the semimembranosus tendon extends upwards and laterally to the lateral condyle of the femur.
- **Arcuate popliteal ligament.** Arches over Popliteus tendon

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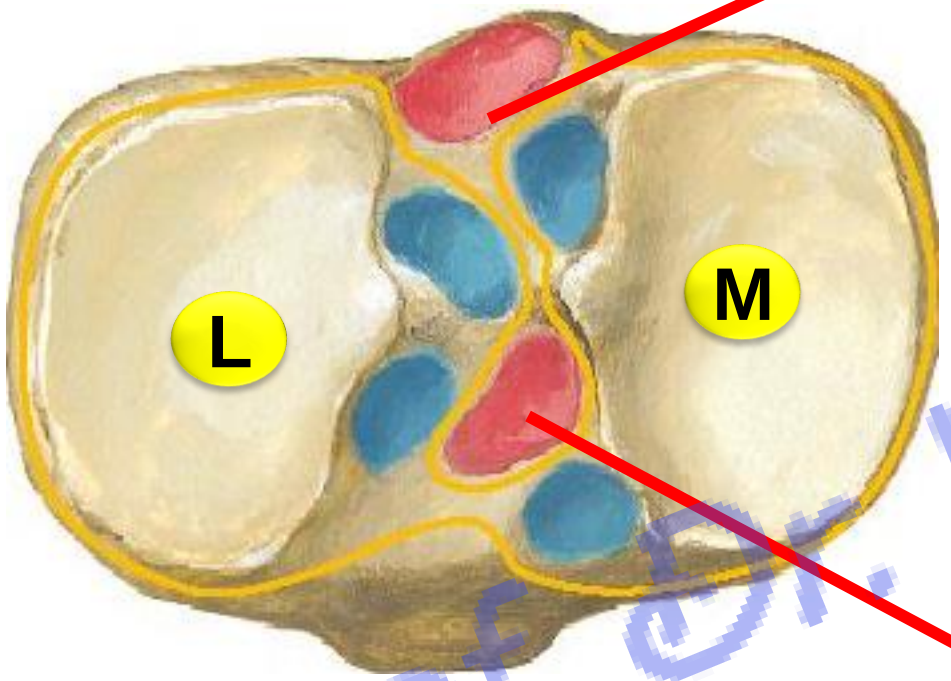
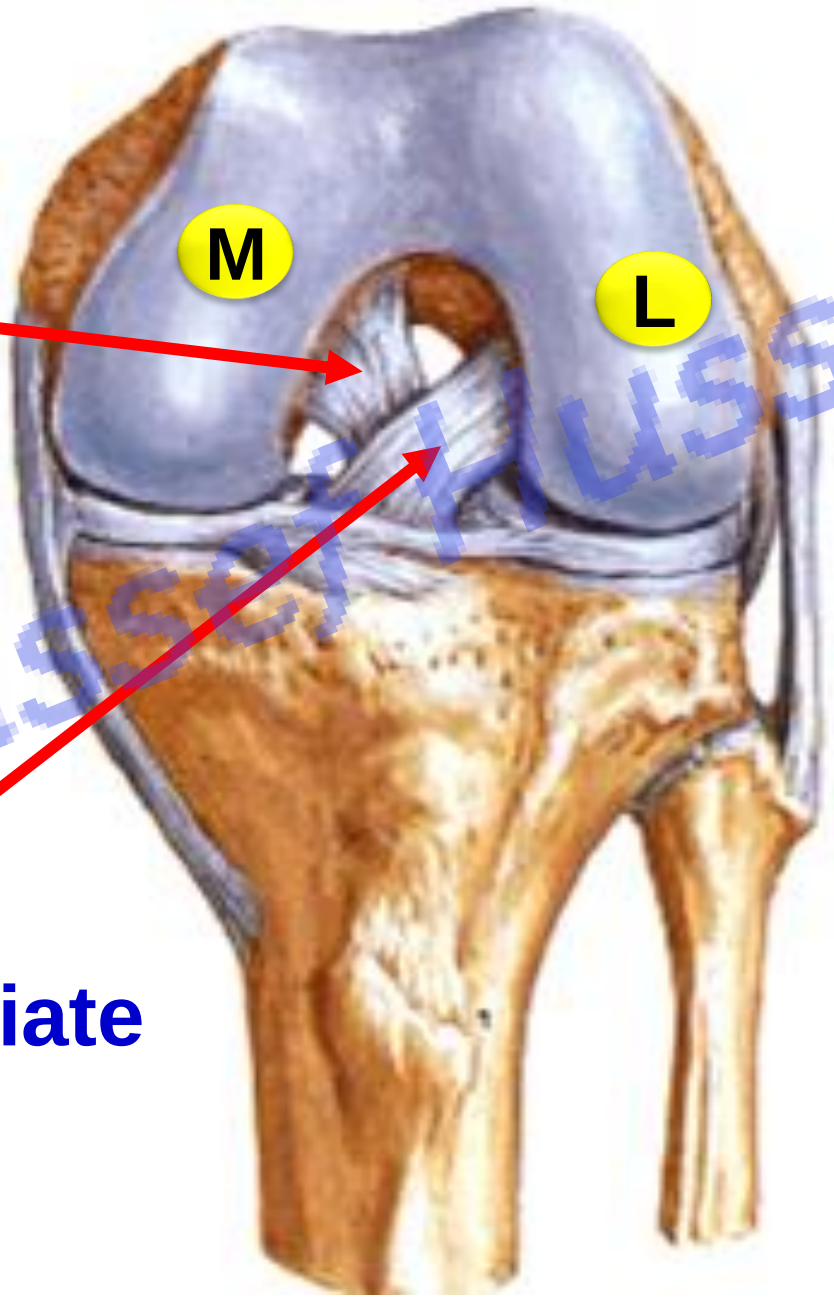
Intracapsular Ligaments

X- shaped figures

Posterior cruciate ligament





Anterior cruciate ligament

Intercondylar area of tibia

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❖ Cruciate ligaments:

- They are so called because they form an **X-shaped figure.**
- They are named anterior and posterior according to their attachment to the tibia.

a- Anterior cruciate ligament:

- **Attachment to the tibia**; to the anterior intercondylar area.
- **Course**; It extends upwards, **backwards** and **laterally**.
- **Attachment to the femur**; to posterior part of the medial surface of the lateral condyle.
- **Function:** 1- Prevents posterior displacement of femur on tibia.
  2- Prevents hyperextension of the knee.
  - Lax in flexion while tense in full extension

b- Posterior cruciate ligament (*larger and stronger than the anterior*):

- **Attachment to the tibia;** to the posterior intercondylar area.
- **Course**; It extends upwards, **forwards** and **medially**.
- **Attachment to the femur**; to the anterior part of the lateral surface of the medial condyle.
- **Functions**; It prevents anterior displacement of femur on tibia.
  - Tense in flexion while lax in extension

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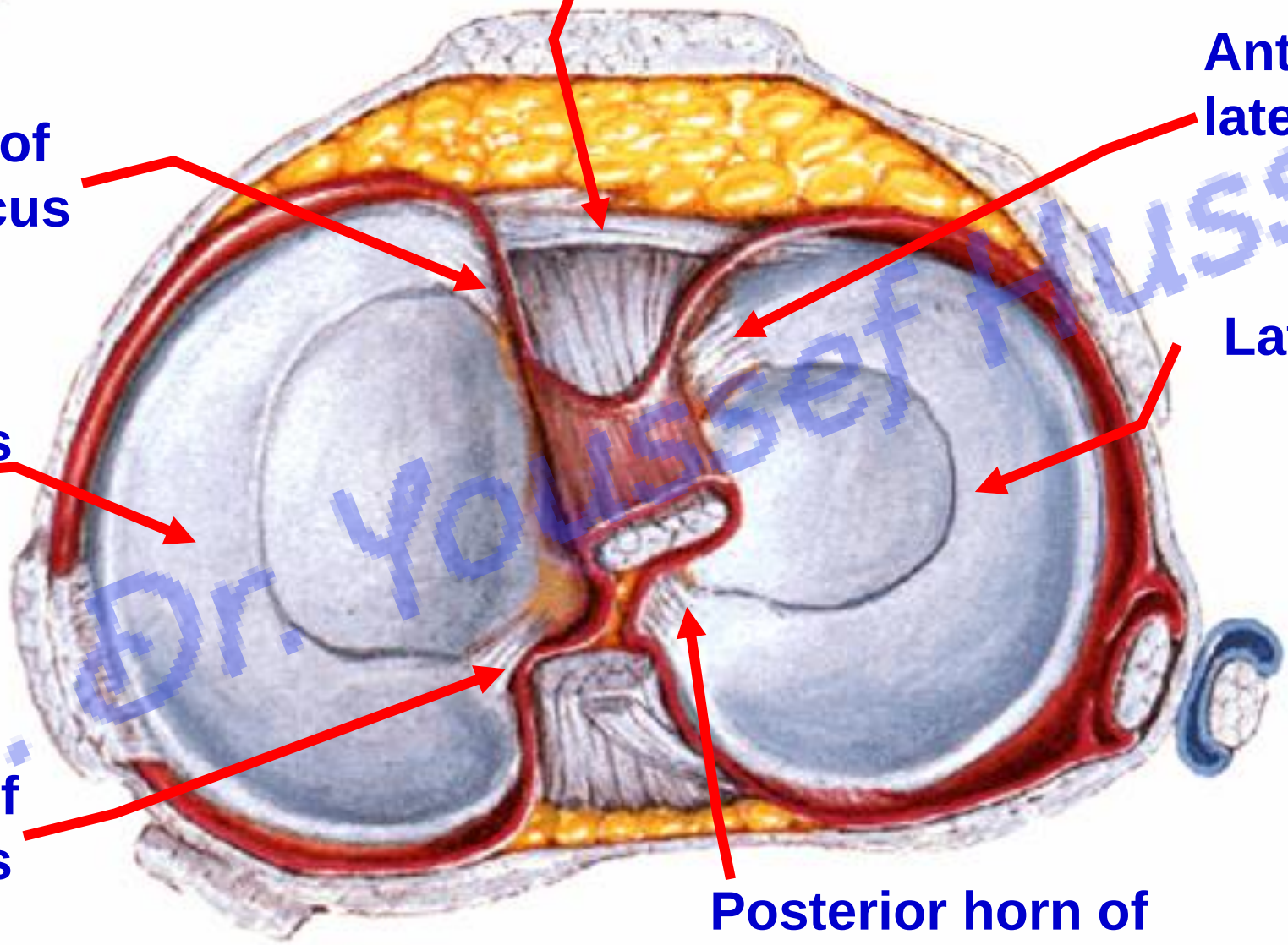

- **Menisci (Semilunar cartilages,** C-shaped**):**

- They cover the articular surfaces of both tibial condyles.

- Their peripheral borders are thick, but they gradually become thinner towards their inner borders.

- It is not covered by synovial membrane.

- They are attached to the intercondylar area by anterior and posterior horns.

- Medial meniscus is **larger than lateral meniscus**, **SO** The lateral horns inside the medial horns.

- **Transverse ligament:** It connects the **anterior** horns of both menisci

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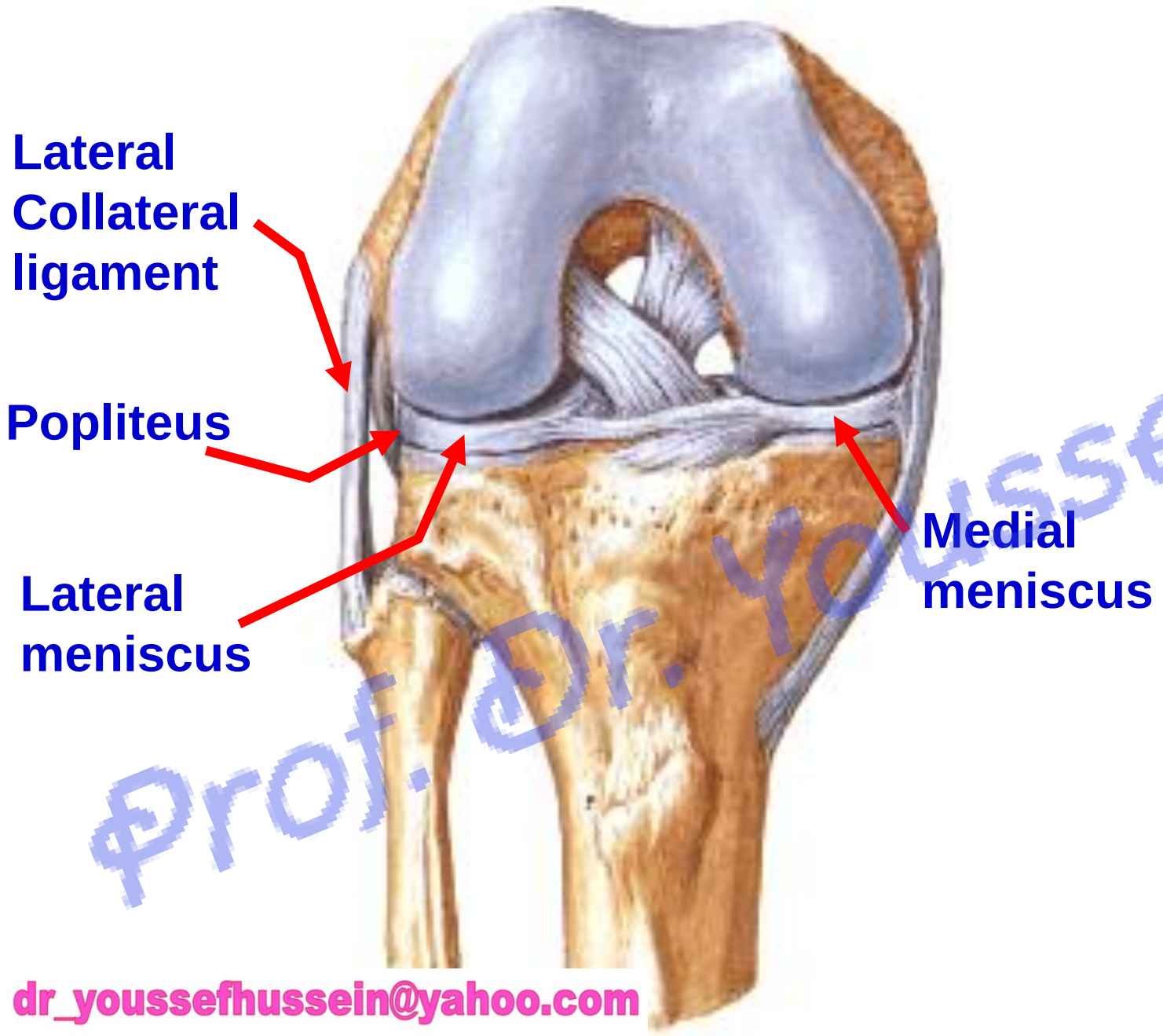

* **Lateral meniscus, more mobile** because the outer border is separated from the capsule and fibular collateral ligament by the tendon of **popliteus**. **So**, it is less frequently to injury.

- Injury of menisci and cruciate ligaments are common especially in football players.

- It is caused by sudden rotatory movements of the partially flexed knee with the foot fixed on the ground.

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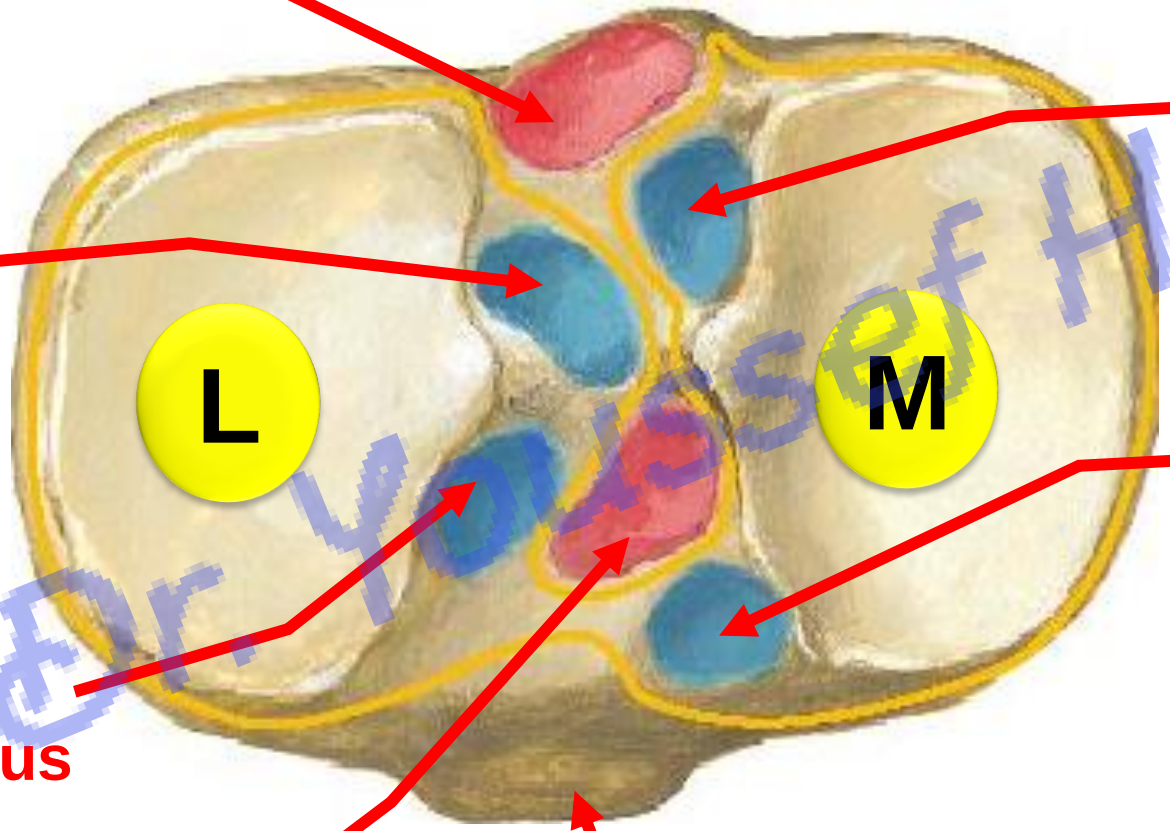

Posterior cruciate ligament

Posterior horn of lateral meniscus

Posterior horn of Medial meniscus

Anterior horn of lateral meniscus

Anterior horn of Medial meniscus

Anterior cruciate ligament

Tibial tuberosity (Anterior)

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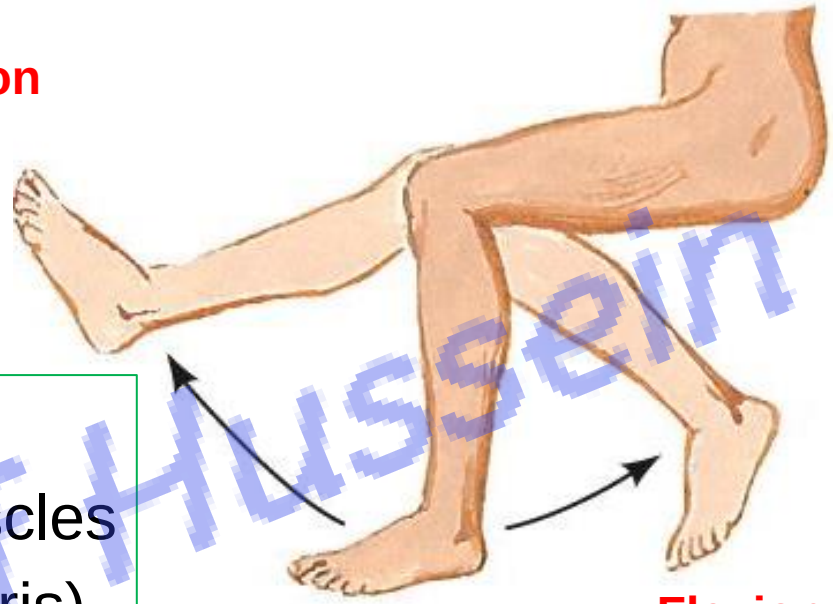

- **Movements of knee joint**

I- Flexion: mainly by the hamstring muscles (semimembranosus, semitendinosus and biceps femoris).

- Gastrocnemius, plantaris when the foot is fixed on ground

2- Extension: by the quadriceps femoris (rectus femoris, vasti medialis, lateralis, and intermedius).

3- Medial rotation: (SGS) Sartorius, gracillis & semitendinosus and semimembranosus .

4- Lateral rotation by the biceps femoris only.

Unlocking of knee joint

At the beginning of flexion by Popliteus muscle

Lateral rotation of femur on tibia by Popliteus when the foot is fixed on the ground

Or medial rotation of tibia on femur by Popliteus when the foot is raised from the ground

Locking of knee joint

- **At the end of extension:** tightening of the **anterior cruciate ligament** terminates the movement of the **lateral condyle** of femur
- **Full extension:** The articular surface on the **medial condyle is longer than lateral**.

Medial rotation of femur on tibia when the foot is fixed on the ground

Or lateral rotation of tibia on femur when the foot is raised from the ground

Anastomosis around the knee joint

- 5 Branches from popiteal artery

1- Superior **lateral genicular** artery.

2- Inferior **lateral genicular** artery.

4- Superior **medial genicular** artery.

5- Inferior **medial genicular** artery.

3 - Middle genicular artery.

- 2 Branches from femoral artery

1- **Descending** genicular artery.

2- **Descending** branch of lateral circumflex femoral artery.

- 2 Branches from anterior tibial artery

1 - Anterior **tibial recurrent** artery.

2- Posterior **tibial recurrent** artery.

- 1 Branch from posterior tibial artery

1- Circumflex fibular artery.

Nerve supply

1- Femoral nerve through nerves to **3** vasti muscles.

2- Obturator nerve from the posterior division.

3- Tibial nerve;

a- Superior medial genicular nerve.

b- Inferior medial genicular nerve.

c- Middle genicular nerve.

4- Common peroneal (lateral popliteal) nerve;

a- Superior lateral genicular nerve.

b- Inferior lateral genicular nerve.

c- Recurrent genicular nerve.

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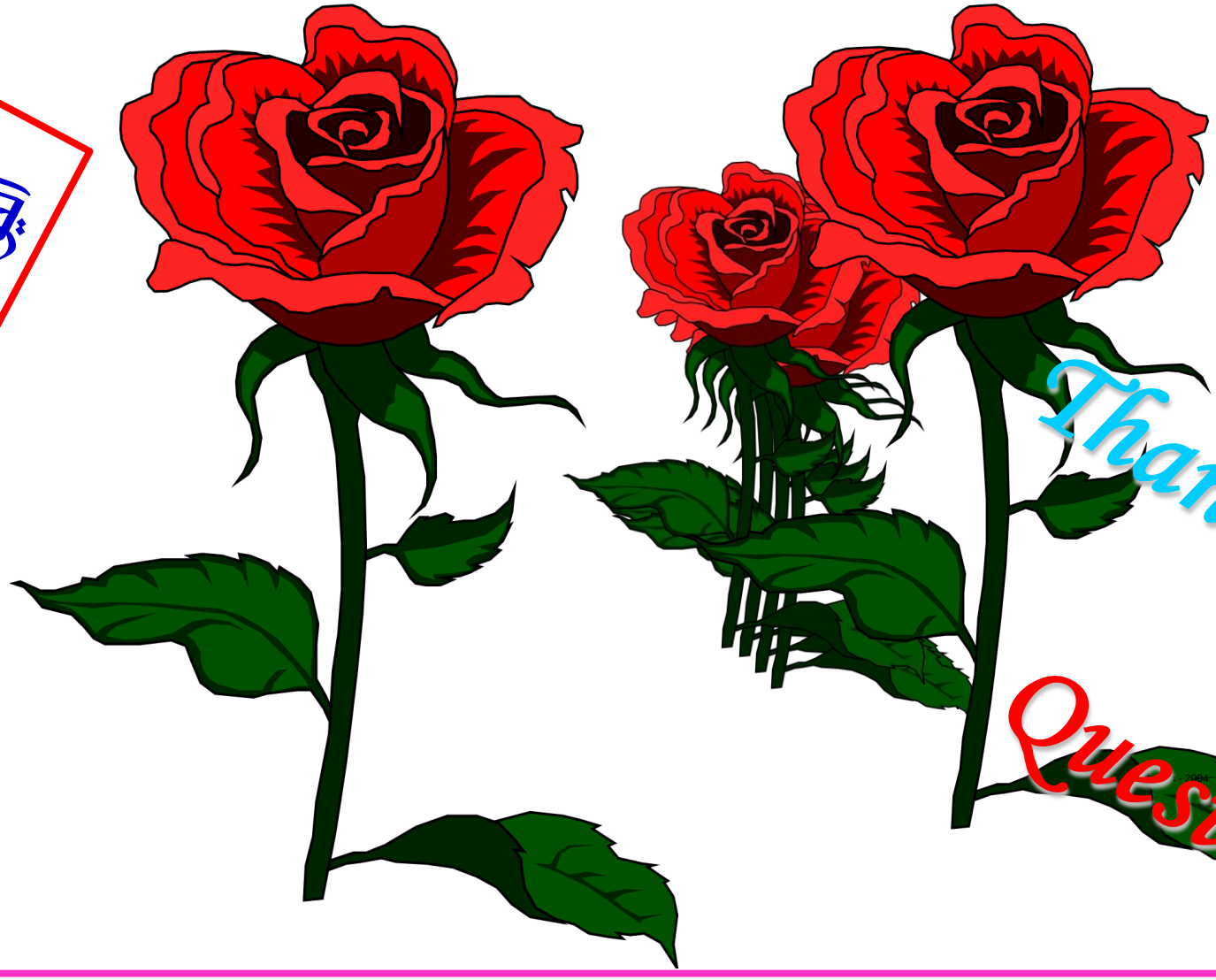

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