



MSS Module

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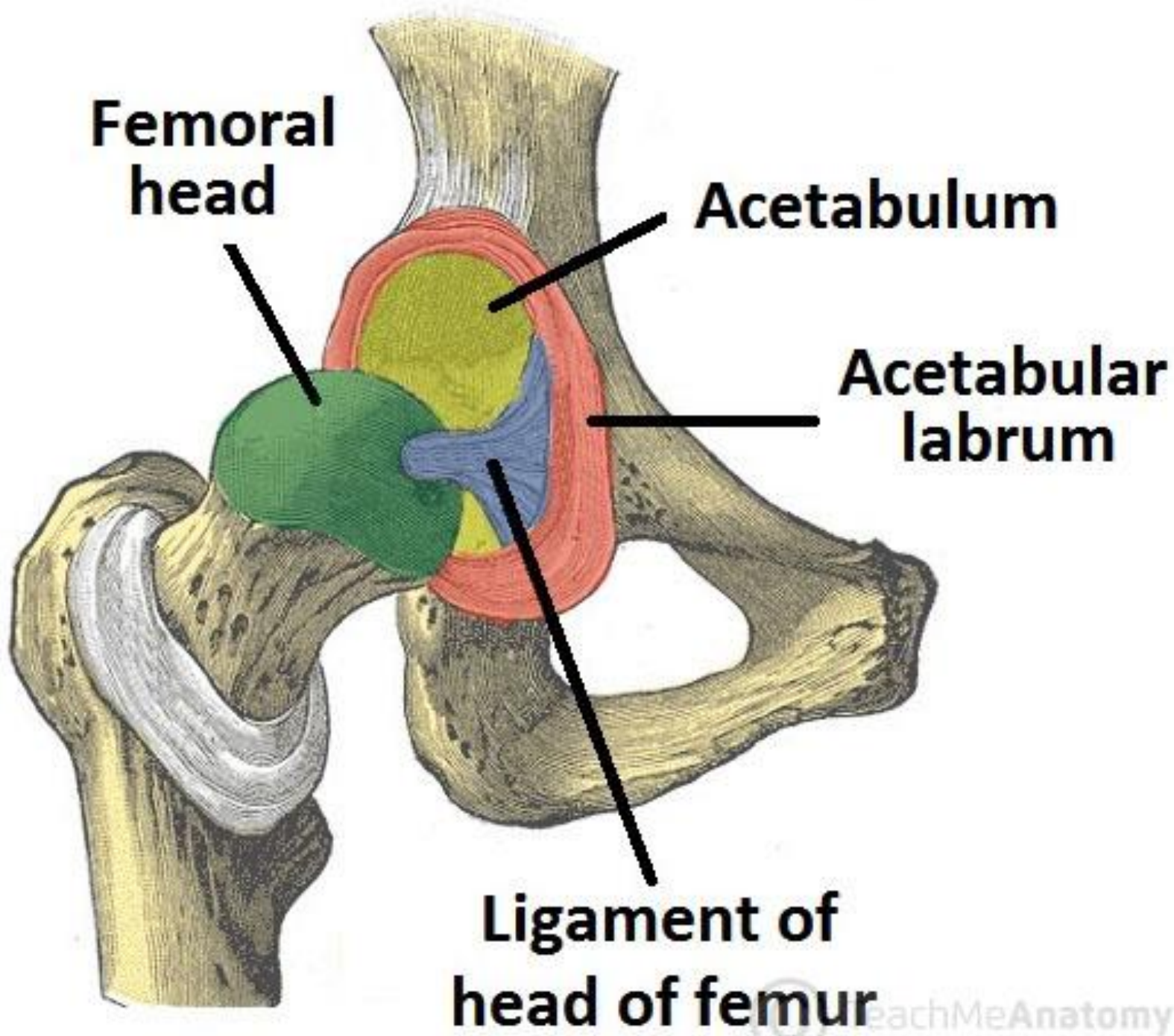
Joints

Hip & Knee



Hip Joint

- The hip joint consists of an articulation between the **head of femur** and **acetabulum** of the pelvis.
- The acetabulum is a cup-like depression located on the inferolateral aspect of the pelvis. Its cavity is deepened by the presence of a fibrocartilaginous collar – the **acetabular labrum**. The head of femur is hemispherical, and fits completely into the concavity of the acetabulum.



Femoral head

Acetabulum

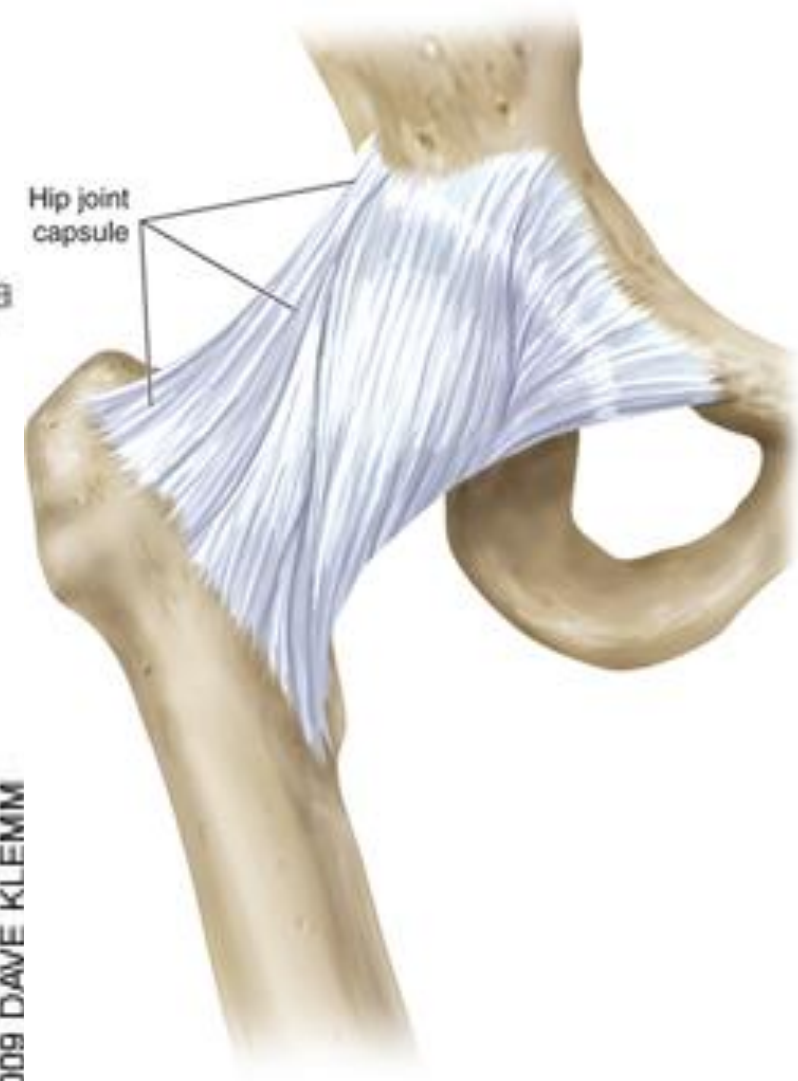
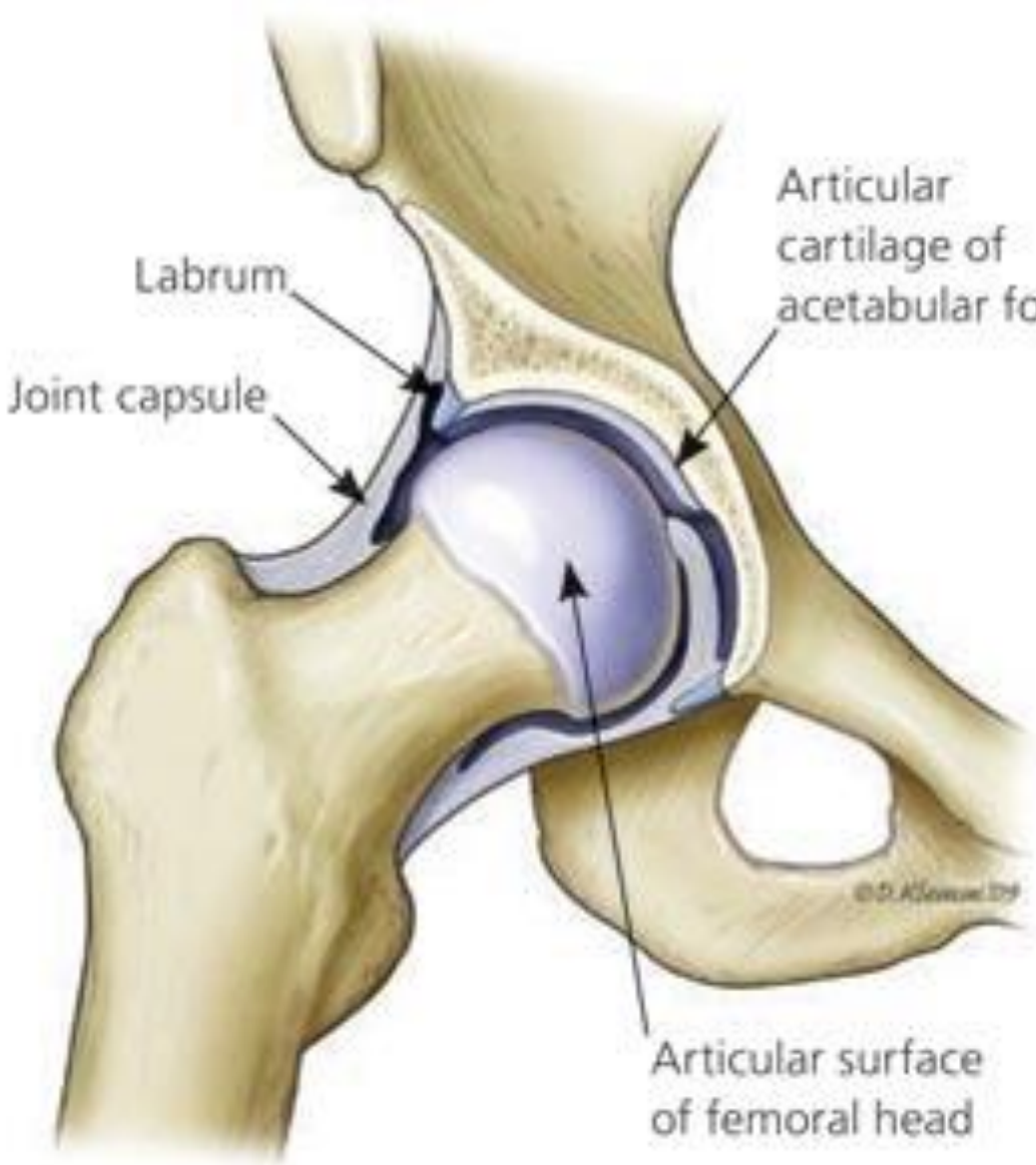
Acetabular labrum

Ligament of head of femur



Hip Joint

- Both the acetabulum and head of femur are covered in **articular** cartilage, which is thicker at the places of weight bearing.
- The capsule of the hip joint attaches to the edge of the acetabulum proximally. Distally, it attaches to the intertrochanteric line anteriorly and the femoral neck posteriorly.



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Practical Office Orthopedics
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Ligaments

- The ligaments of the hip joint act to increase stability. They can be divided into two groups, intracapsular and extracapsular:

Intracapsular

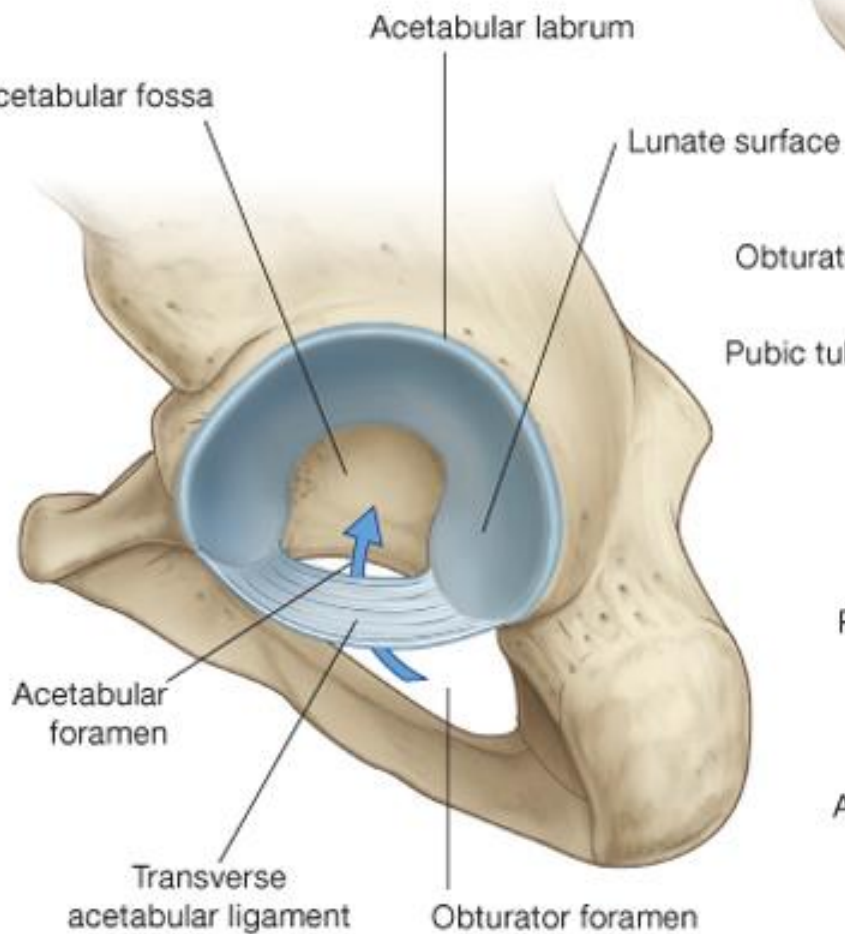
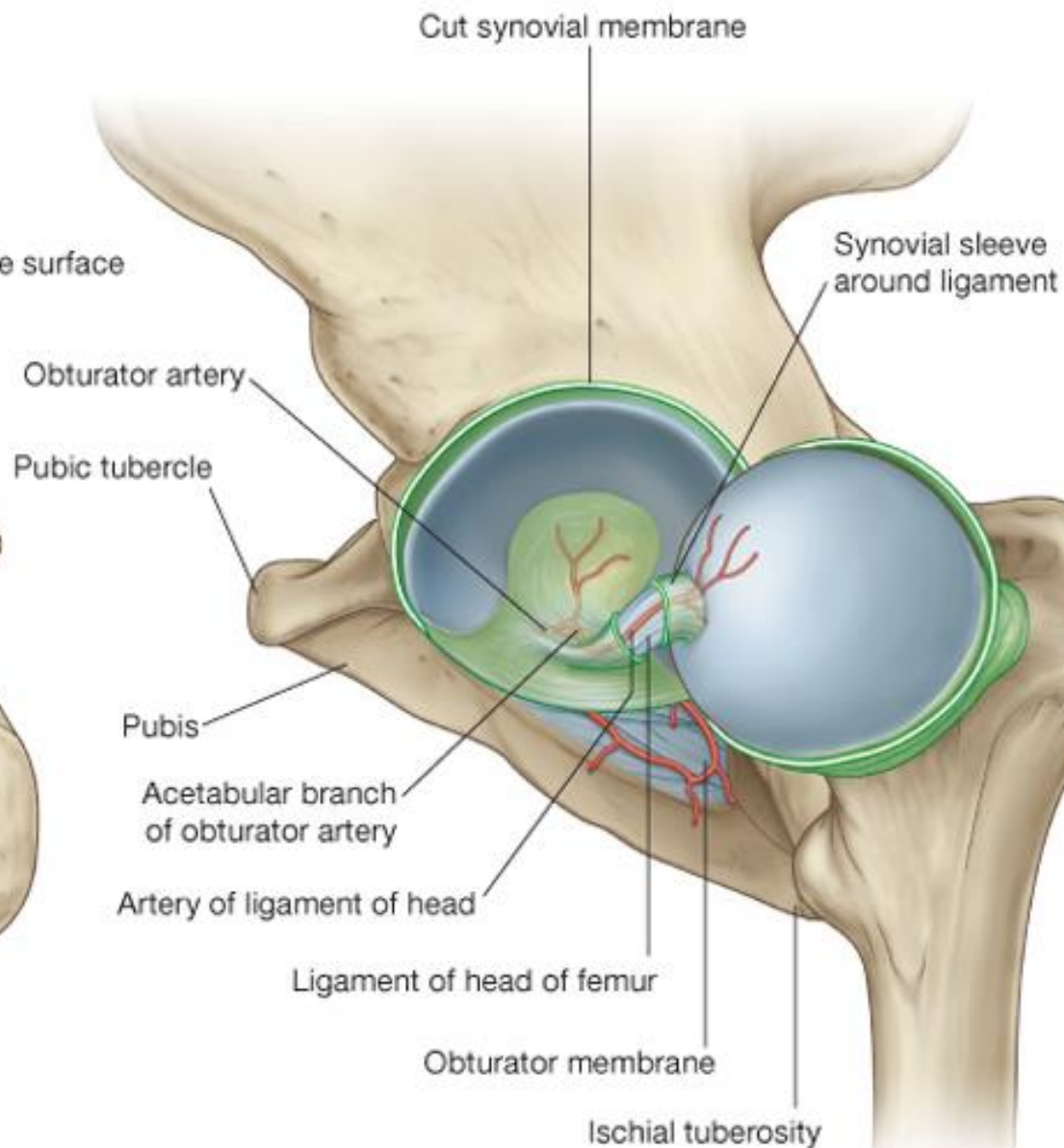
- The *only intracapsular* ligament is the *ligament of head of femur*. It is a relatively small structure, which runs from the acetabular fossa to the fovea of the femur. It encloses a branch of the **obturator artery** (artery to head of femur), main blood supply to the head of femur >>>> *Clinical Relevance ?!!*

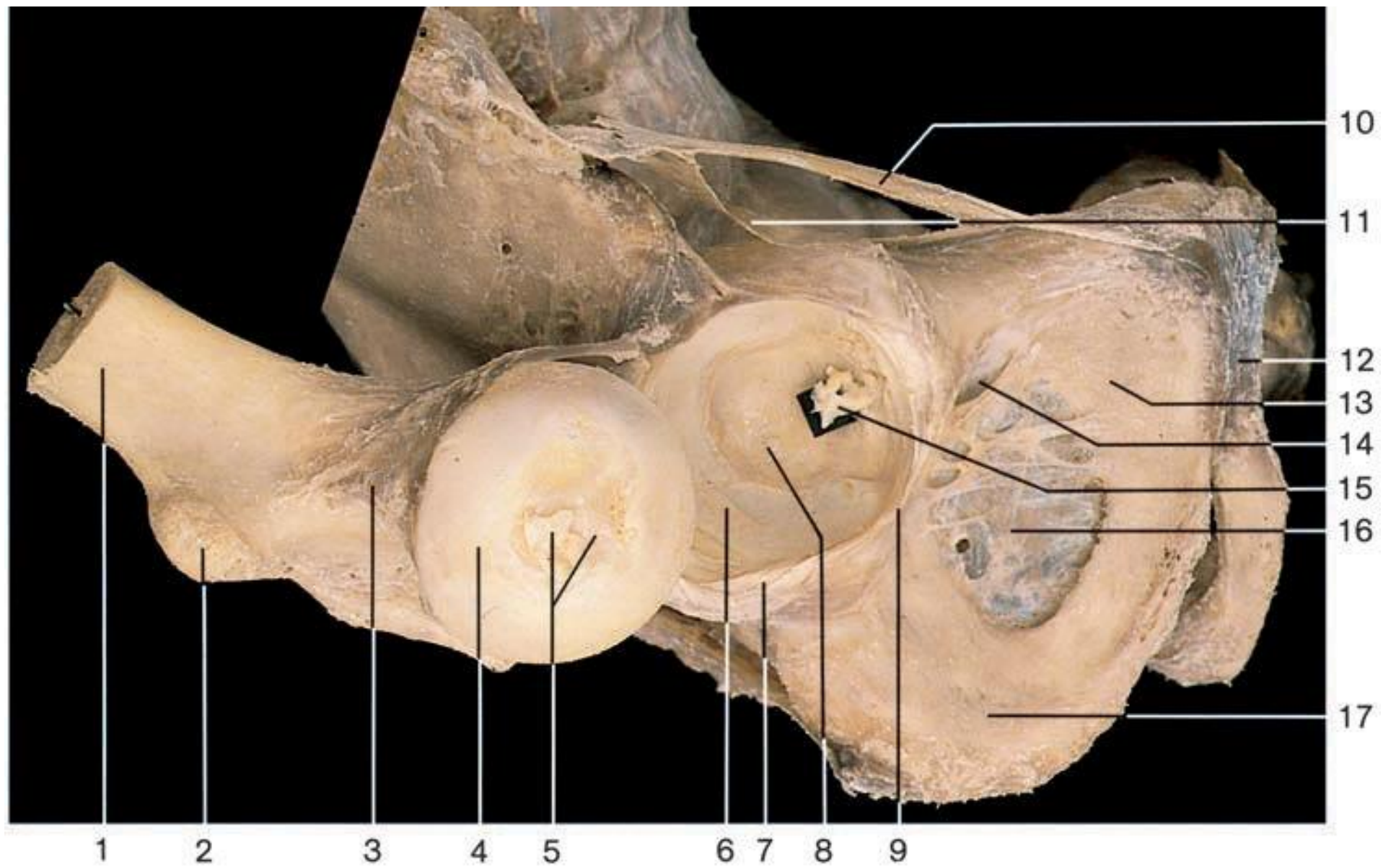


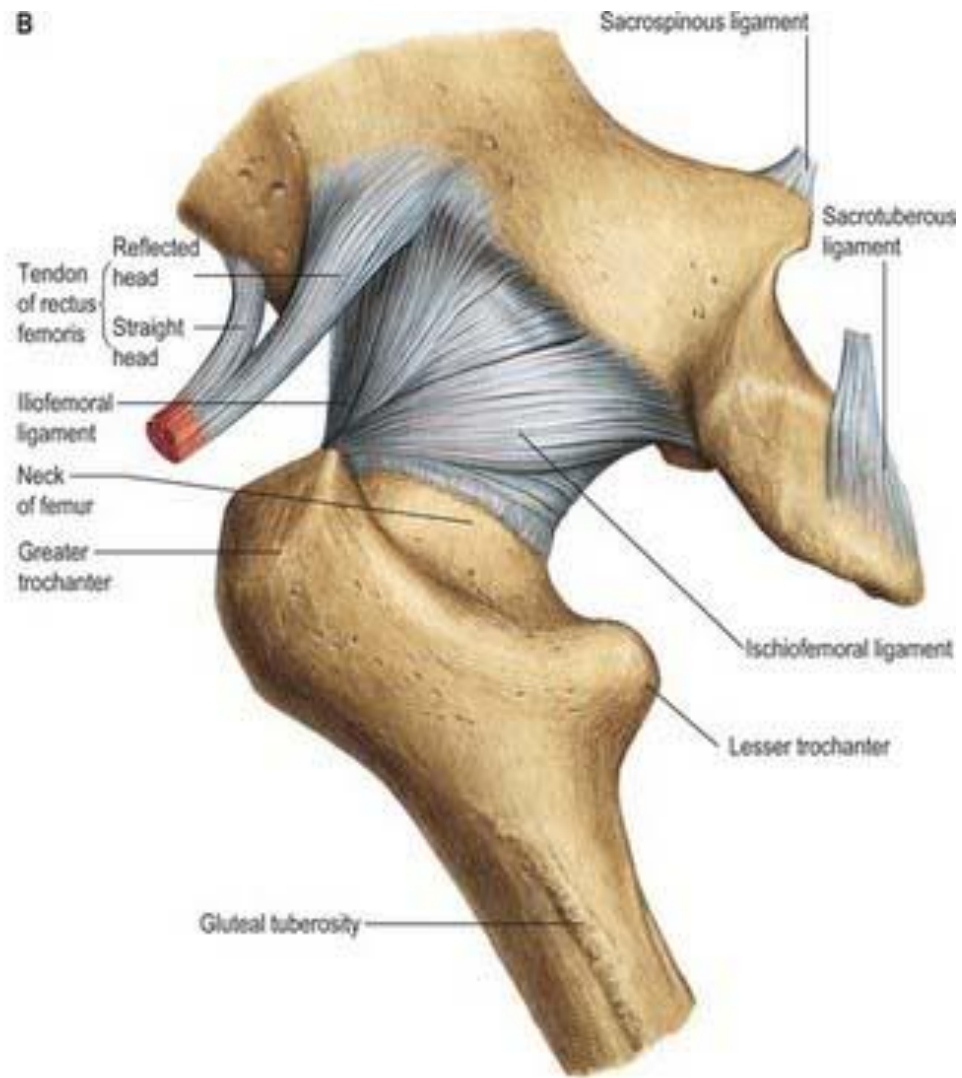
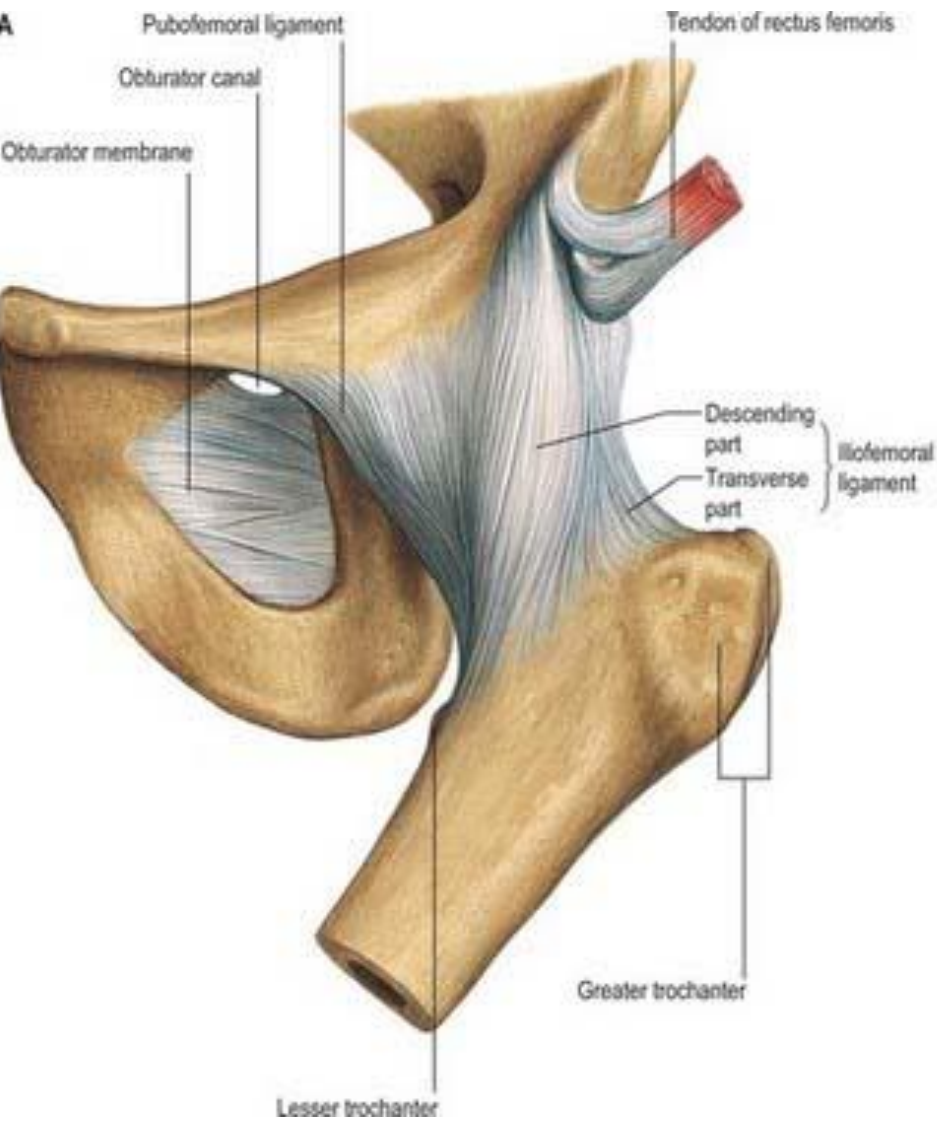
Ligaments

- ***Extracapsular***

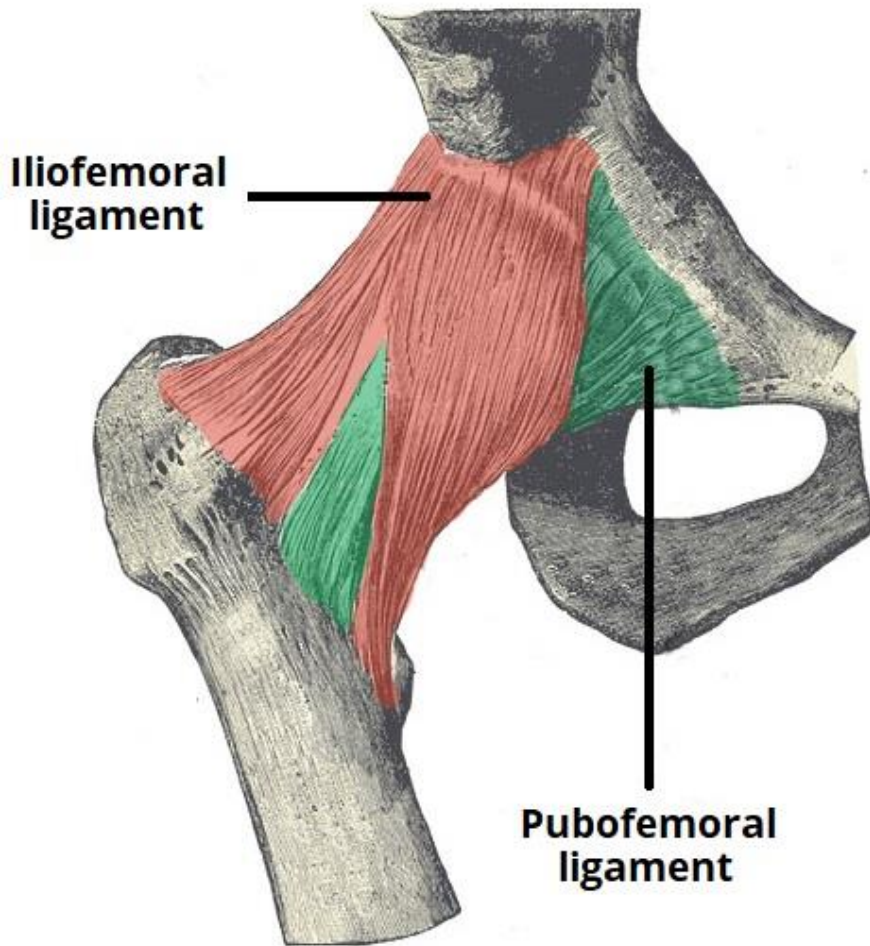
- There are three main extracapsular ligaments, continuous with the outer surface of the hip joint capsule:
- ***Iliofemoral ligament:*** arises from the anterior inferior iliac spine and then bifurcates before inserting into the intertrochanteric line of the femur.
- It has a 'Y' shaped appearance, and prevents hyperextension of the hip joint. It is the strongest of the three ligaments.

A**B**

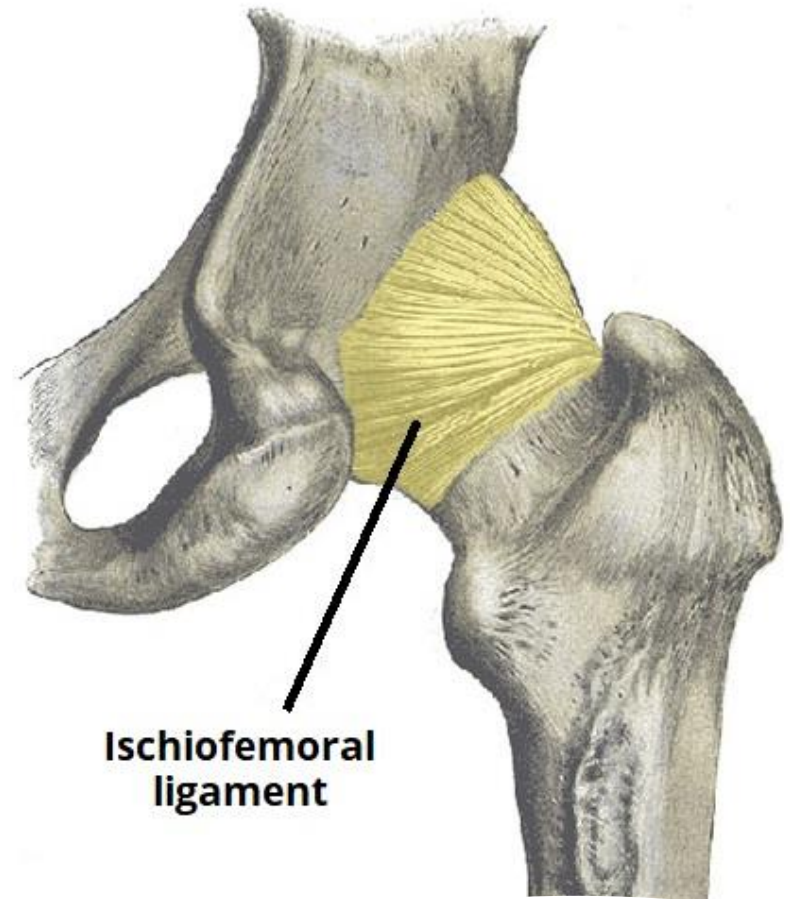


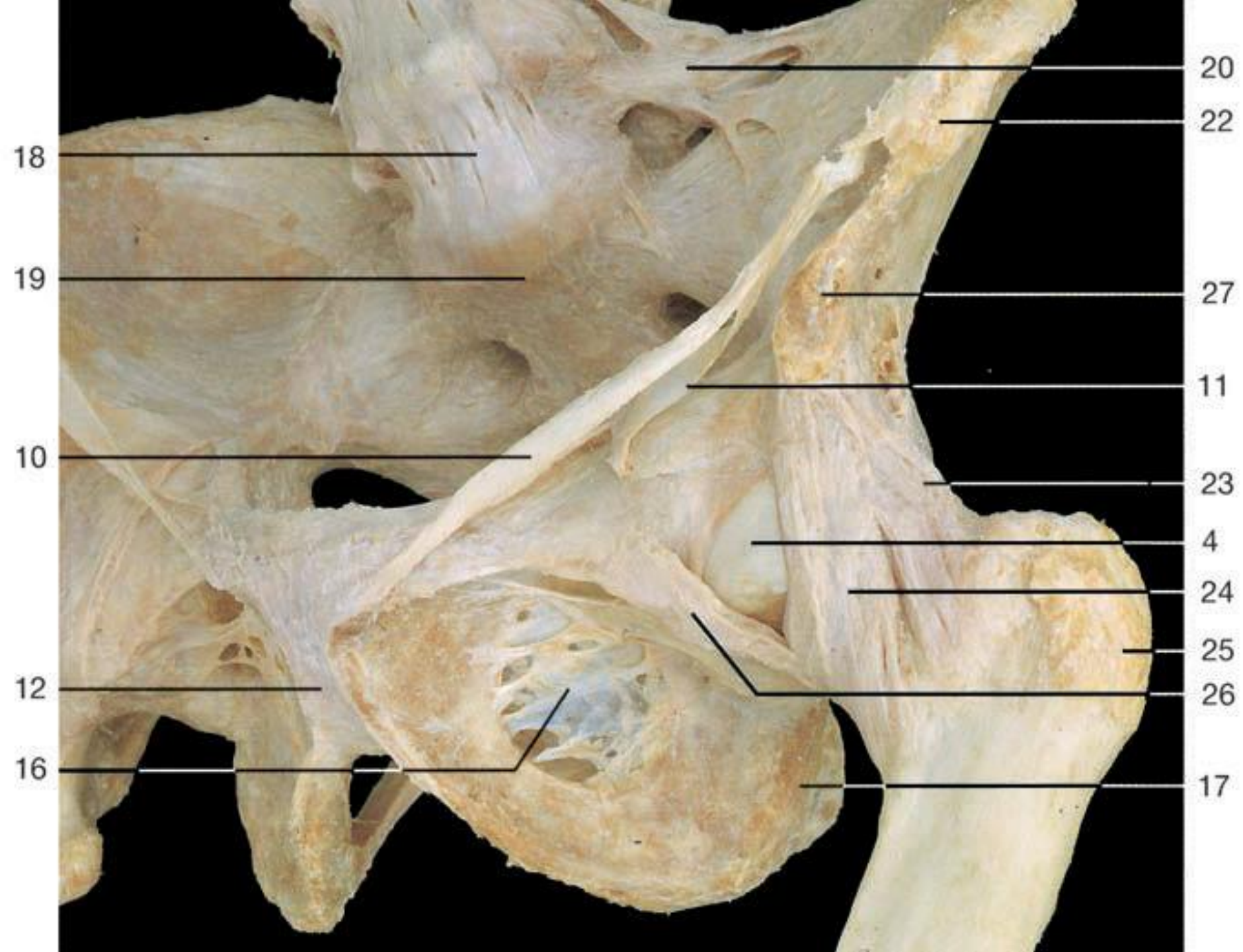


Anterior



Posterior

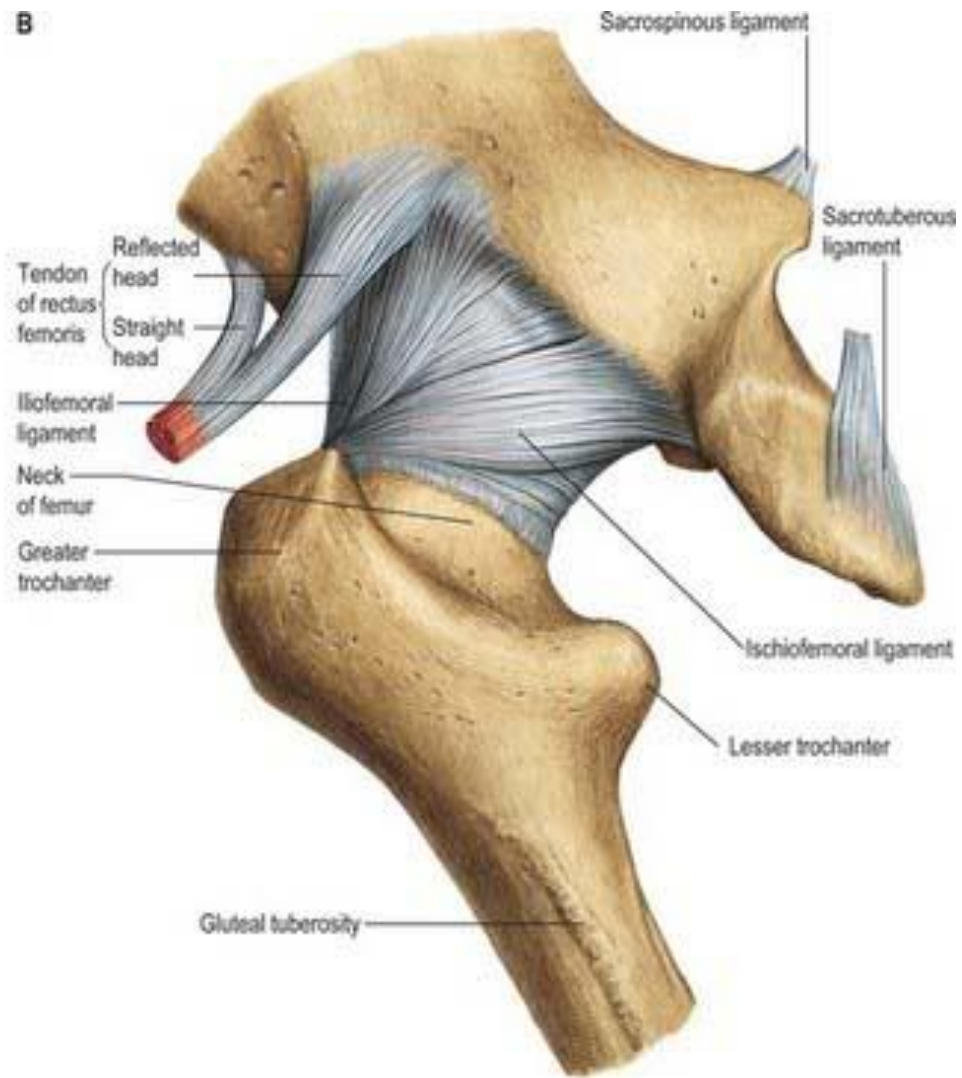
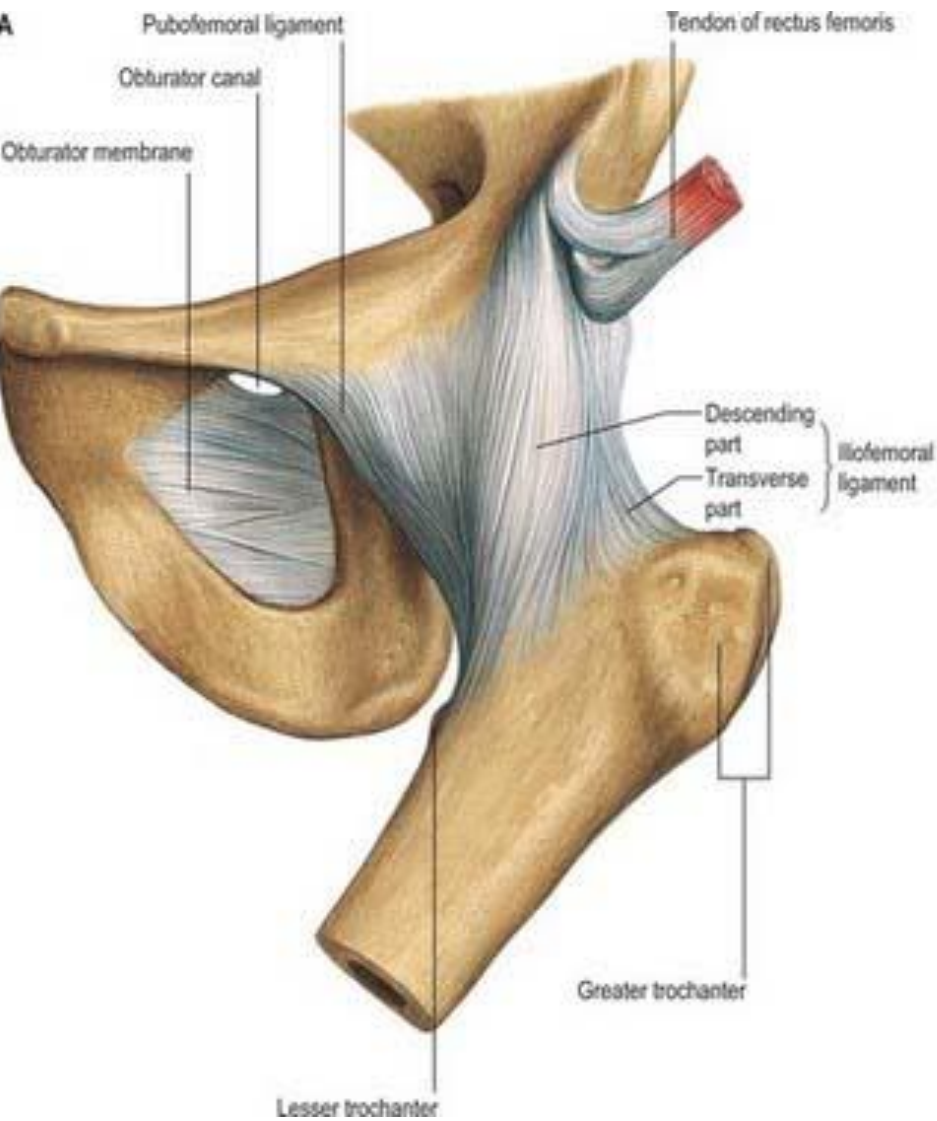




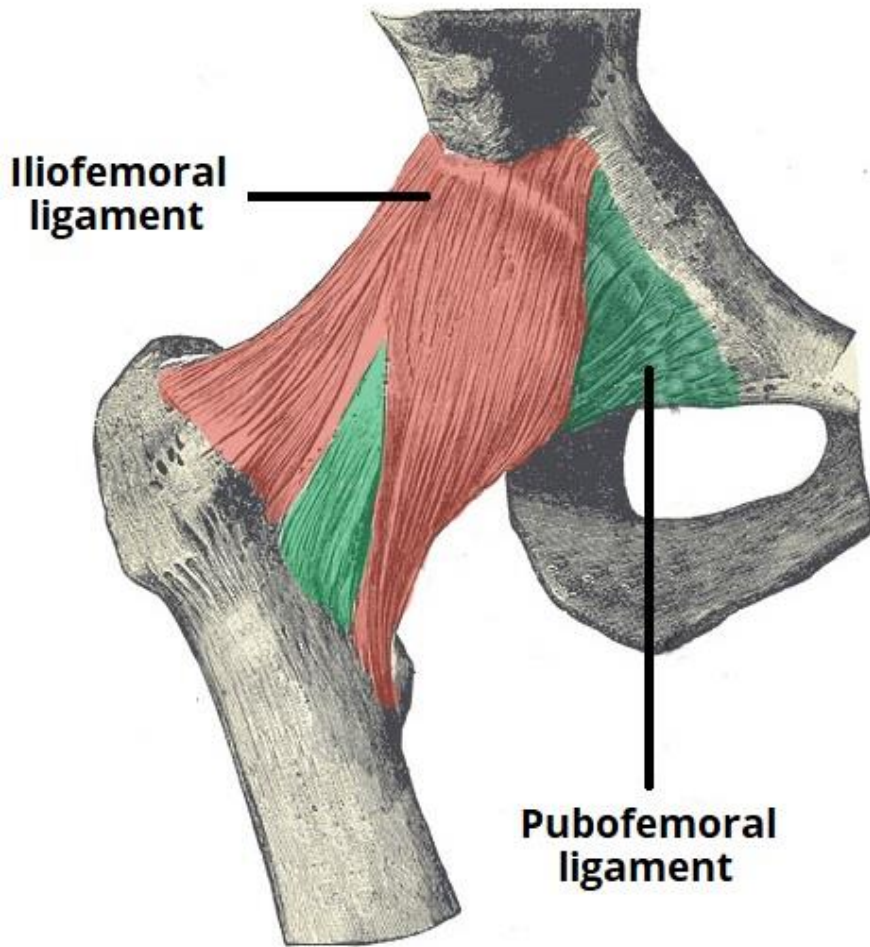


Ligaments

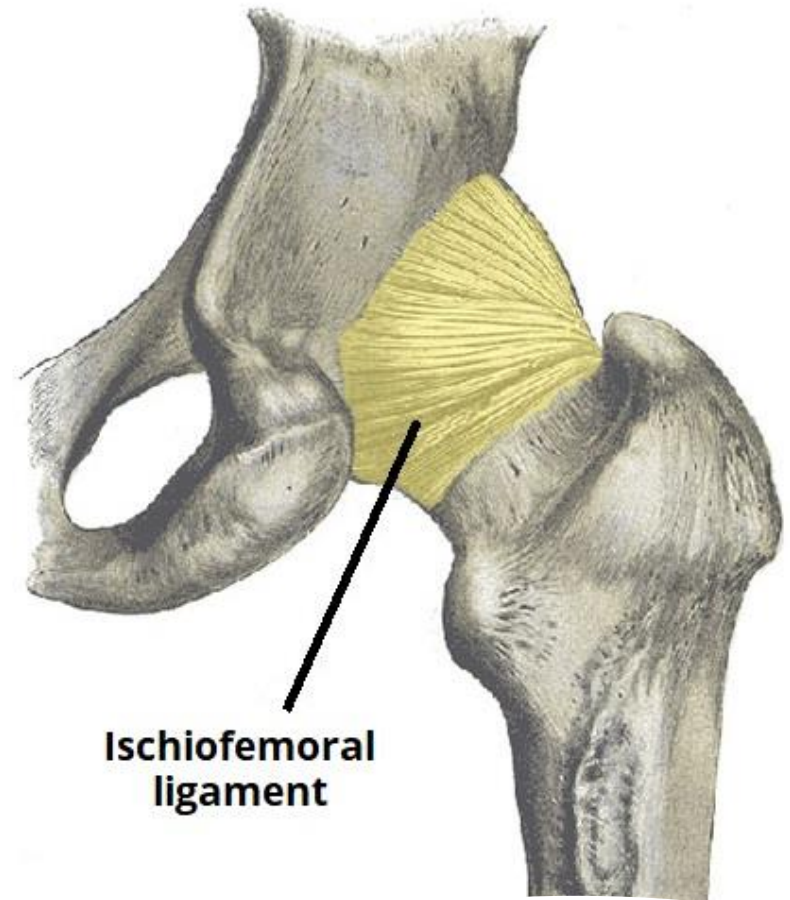
- ***Pubofemoral:*** spans between the superior pubic rami and the intertrochanteric line of the femur, reinforcing the capsule anteriorly and inferiorly. It has a triangular shape, and prevents excessive abduction and extension.
- ***Ischiofemoral:*** spans between the body of the ischium and the greater trochanter of the femur, reinforcing the capsule posteriorly, prevents hyperextension and holds the femoral head in the acetabulum.



Anterior



Posterior





Stabilizing Factors

- The primary function of the hip joint is to **weight-bear**.
- The first structure is the **acetabulum**. It is deep, accommodates nearly all the head of the femur. This decreases the probability of the head dislocation.
- The **labrum acetabular**, increases the depth of acetabulum & provides a larger articular surface, further improving the stability of the joint.



Stabilizing Factors

- The iliofemoral, pubofemoral and ischiofemoral ligaments are very strong, and along with the thickened joint capsule, provide a large degree of stability.
- These ligaments have a unique **spiral orientation**, this causes them to become tighter when the joint is extended.



Stabilizing Factors

- ***Anteriorly,*** where the ligaments are strongest, the medial flexors (located anteriorly) are fewer and weaker.
- ***Posteriorly,*** where the ligaments are weakest, the medial rotators are greater in number and stronger – they effectively ‘pull’ the head of the femur into the acetabulum.

Clinical Relevance ?!



Clinical Anatomy

Posterior dislocation (90%): the femoral head is forced posteriorly, and tears through the inferior and posterior part of the joint capsule, where it is at its weakest.

- The affected limb becomes shortened and medially rotated.
- The sciatic nerve runs posteriorly to the hip joint, and is at risk of injury (occurs in 10-20% of cases).



Clinical Anatomy

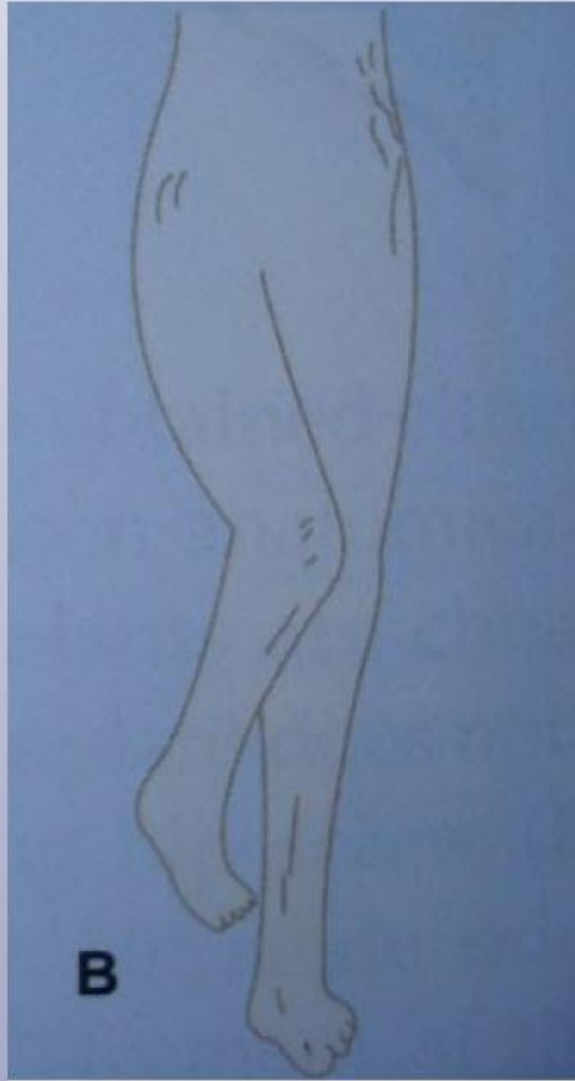
Anterior dislocation(rare):

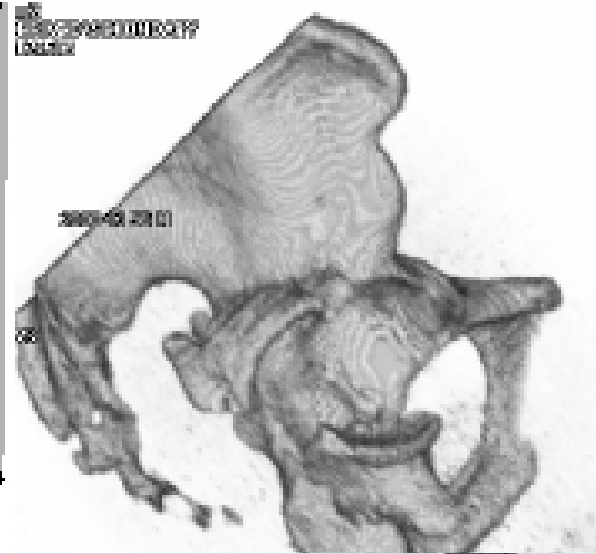
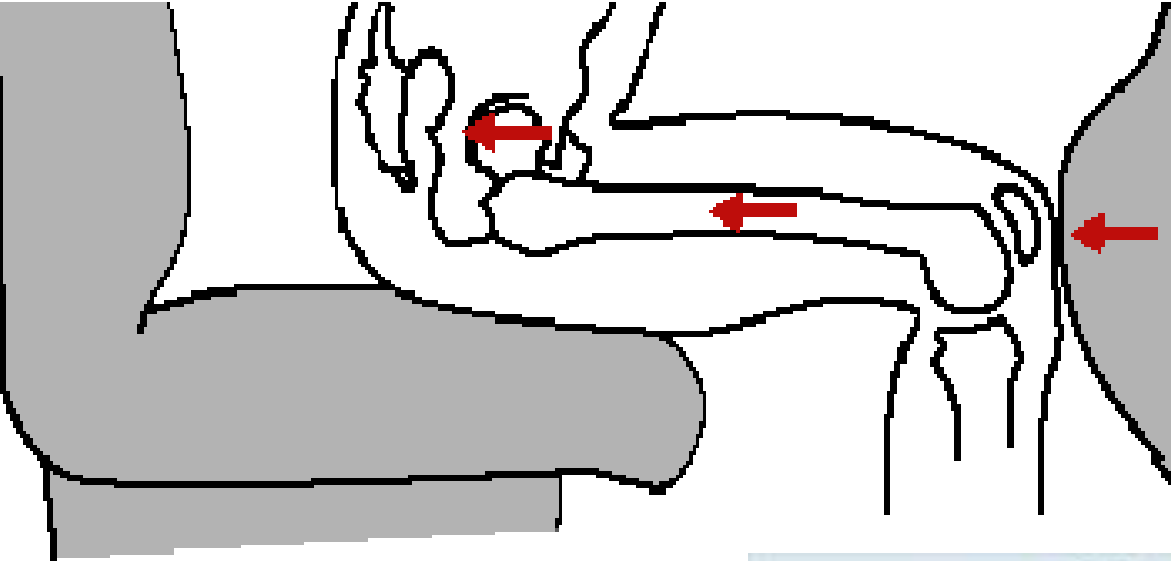
Occurs because of traumatic extension, abduction and lateral rotation. The femoral head is displaced anteriorly and (usually) inferiorly in relation to the acetabulum.

Anterior HJD



Posterior Hip dislocation

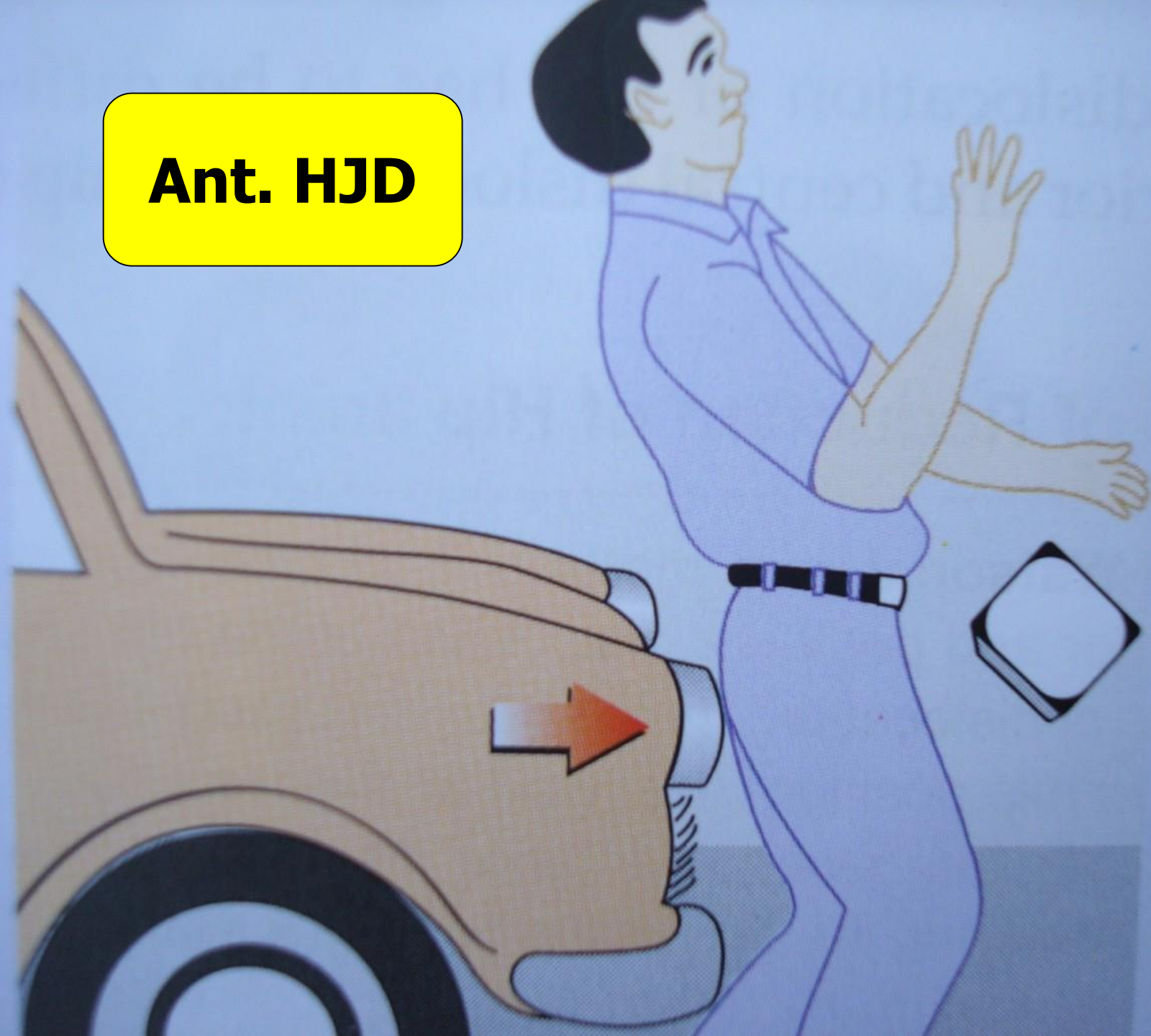




Post. HJD



Ant. HJD



R
E



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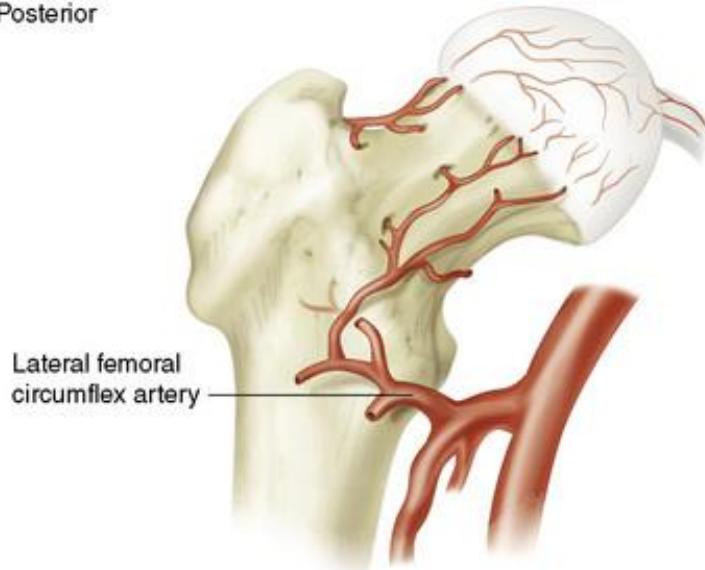




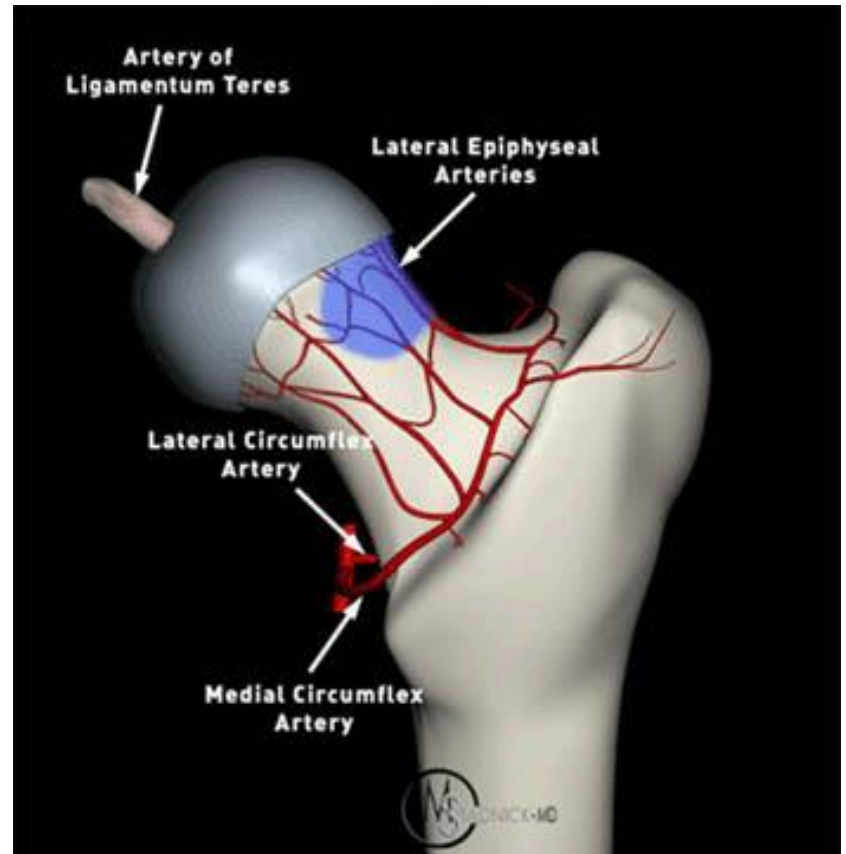
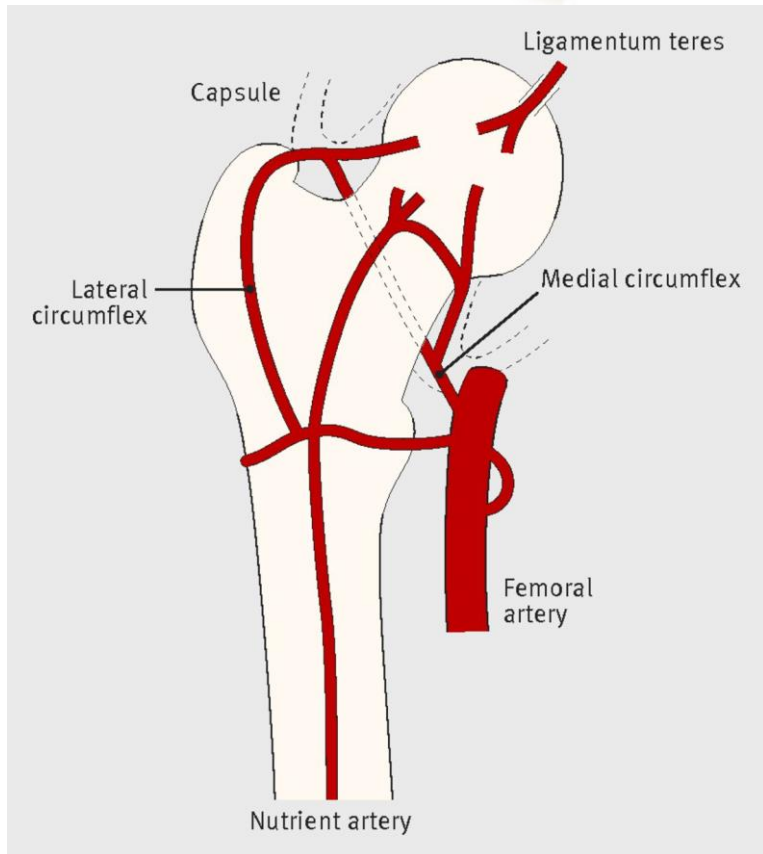
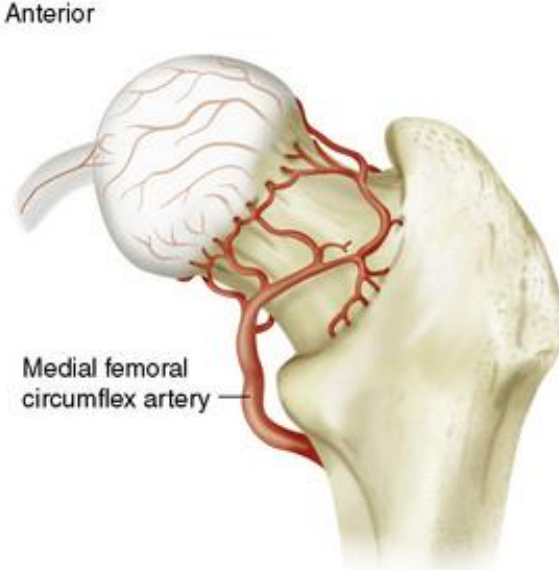
Blood Supply

- The arterial supply to the hip joint is largely via the ***medial*** and ***lateral circumflex femoral arteries***, branches of the profunda femoris artery (**deep femoral artery**). They anastomose at the base of the femoral neck to form a ring, from which smaller arteries arise to supply the hip joint itself.
- The ***medial circumflex femoral*** artery is ***responsible*** for the ***majority*** of the ***arterial supply*** (the lateral circumflex femoral artery has to penetrate through the thick iliofemoral ligament). Damage to the medial circumflex femoral artery can result in **avascular necrosis** of the femoral head.
- The ***artery of head of femur (ligamentum teres artery)*** ***branch of the obturator artery*** and the superior/inferior gluteal arteries provide some additional supply.

Posterior



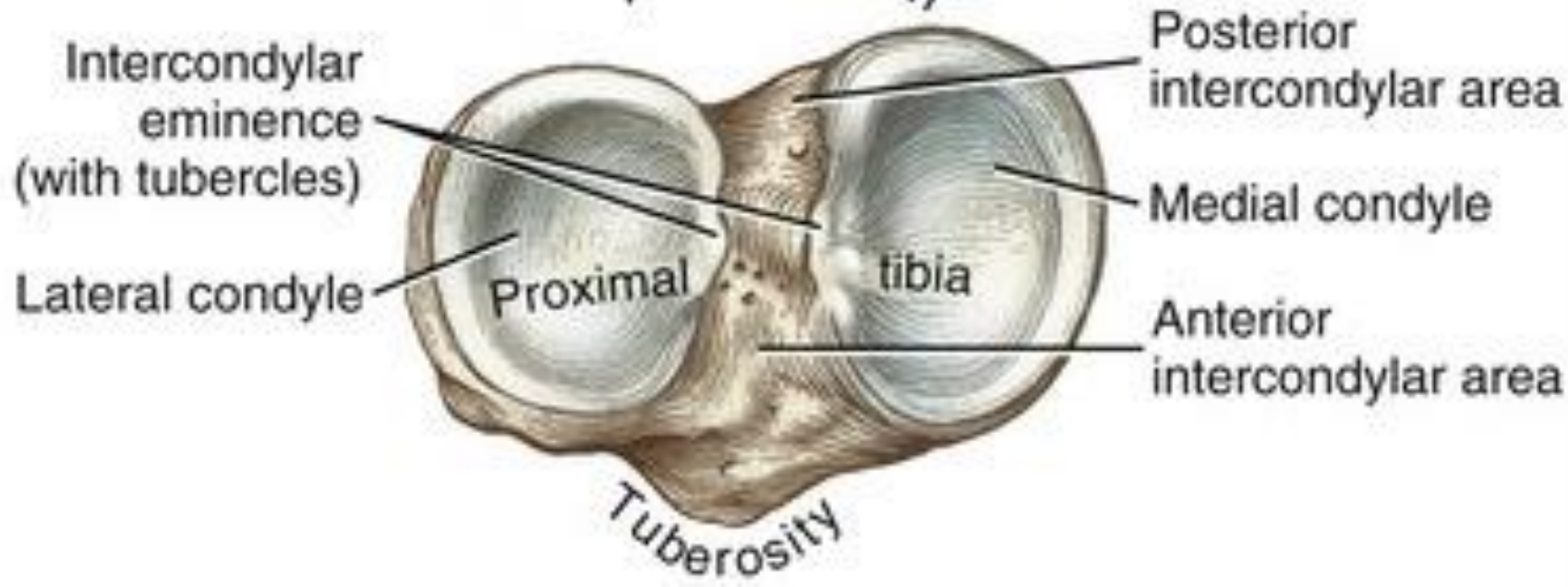
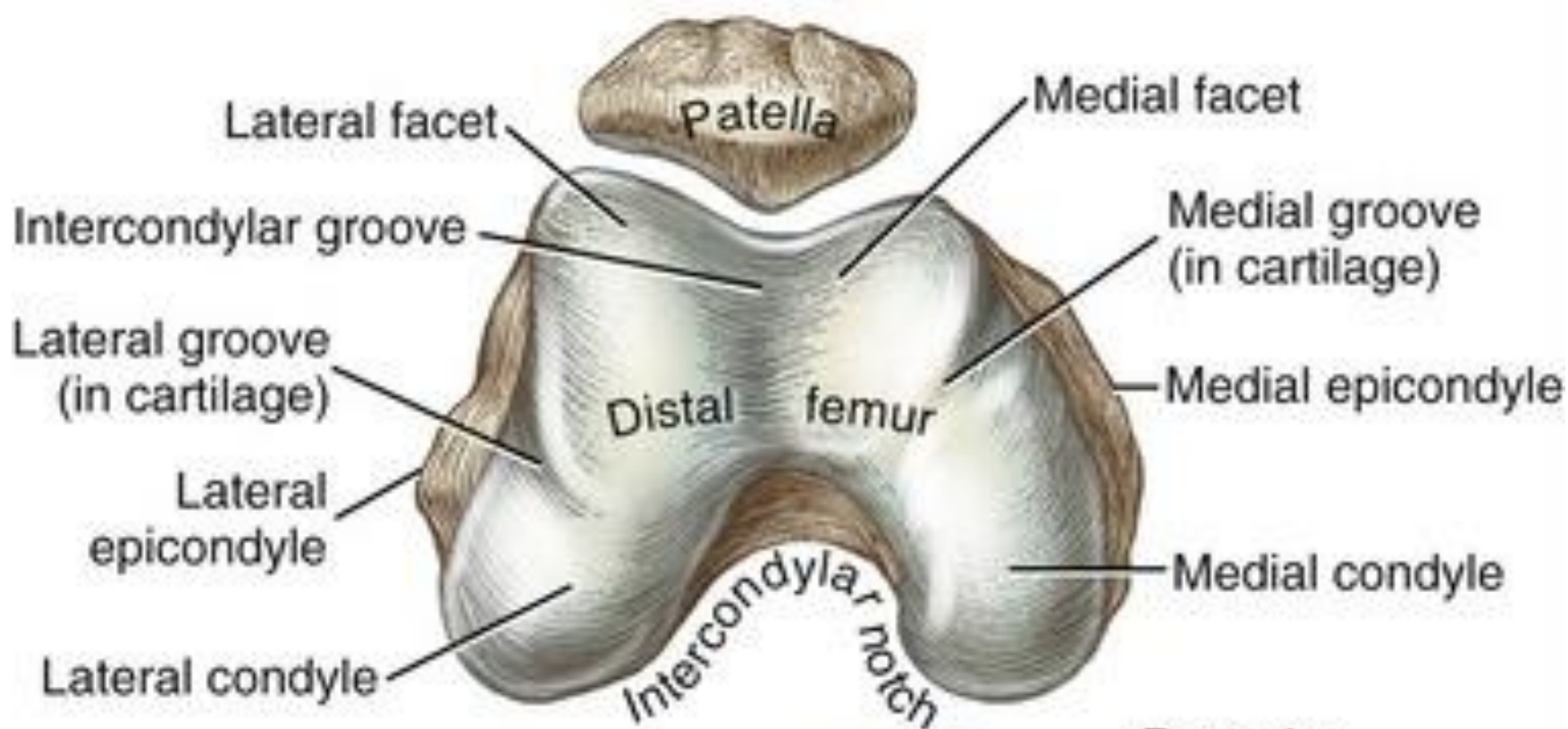
Anterior





Knee Joint

- The knee joint consists of two articulations, tibiofemoral and patellofemoral. The joint surfaces are lined with **hyaline** cartilage, and are enclosed within a single joint cavity.
- ***Tibiofemoral:*** medial and lateral condyles of the femur articulate with the tibial condyles. It is the weight-bearing component of the knee joint.

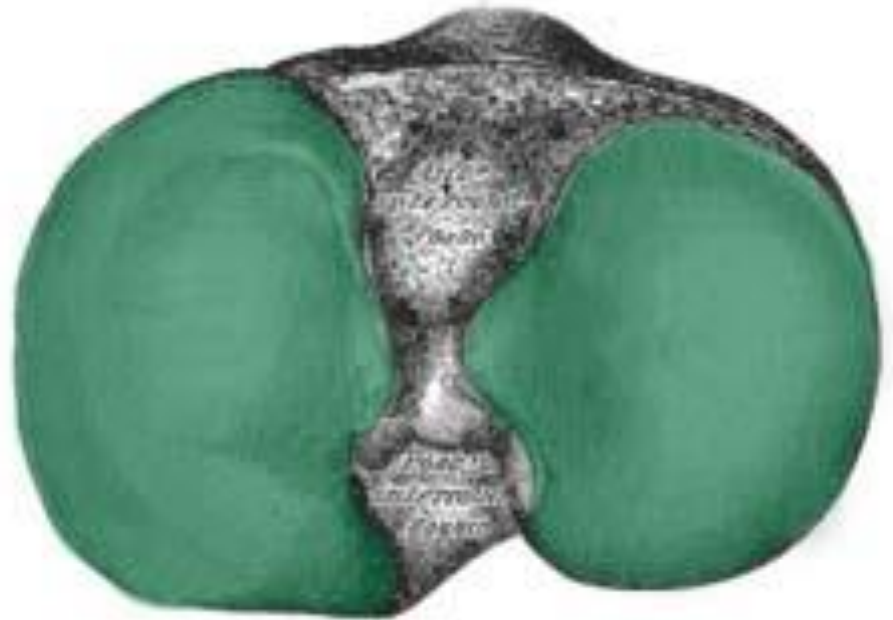




Femur



Tibia



Tibiofemoral surfaces

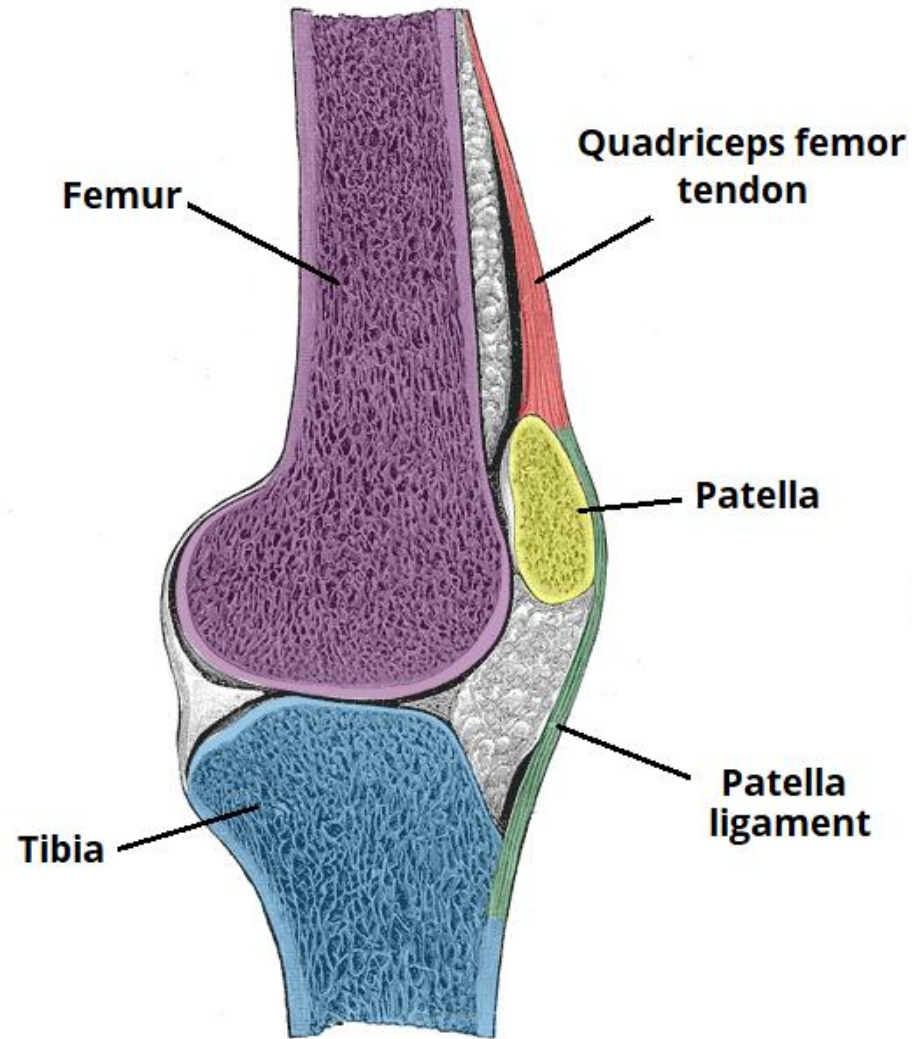


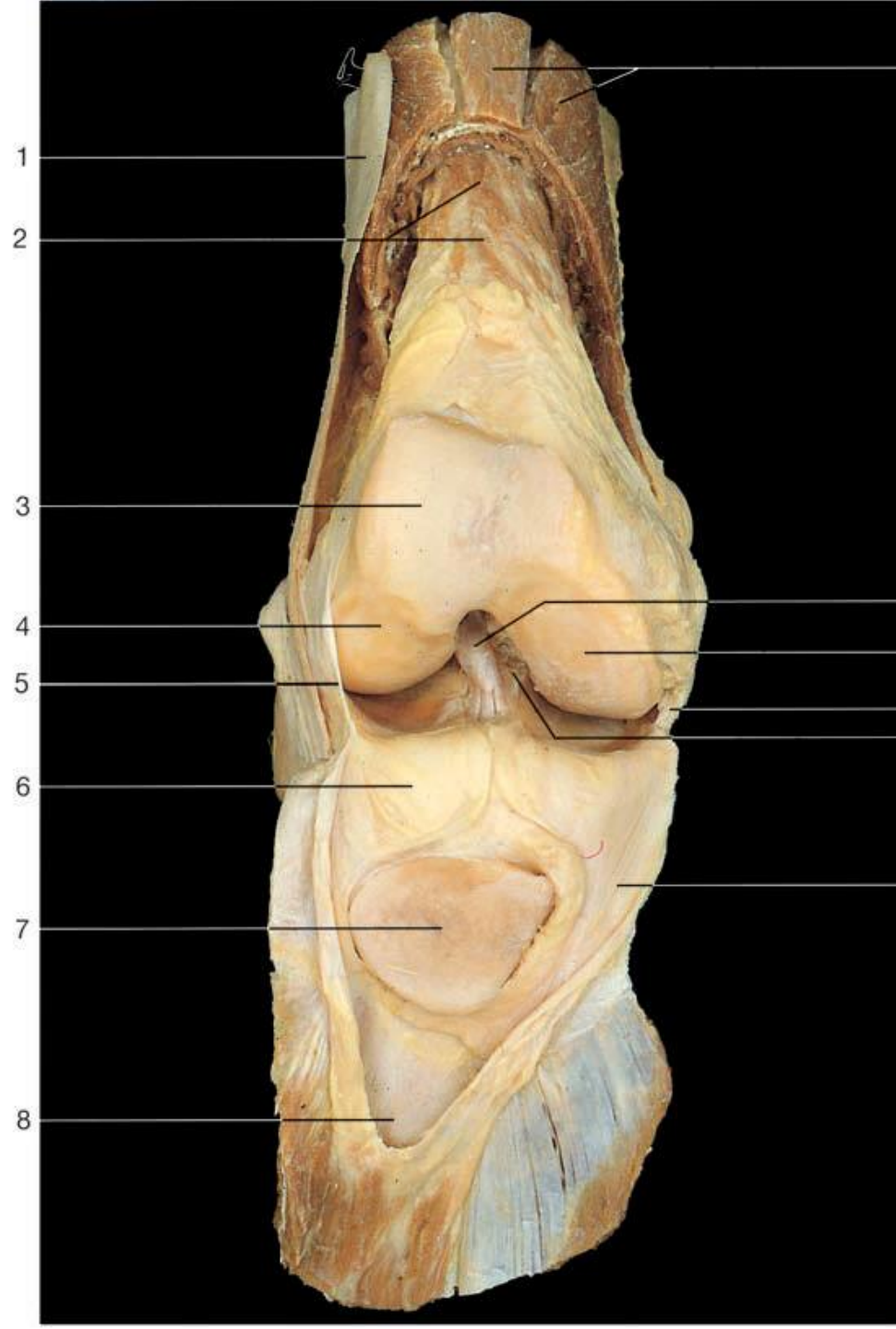
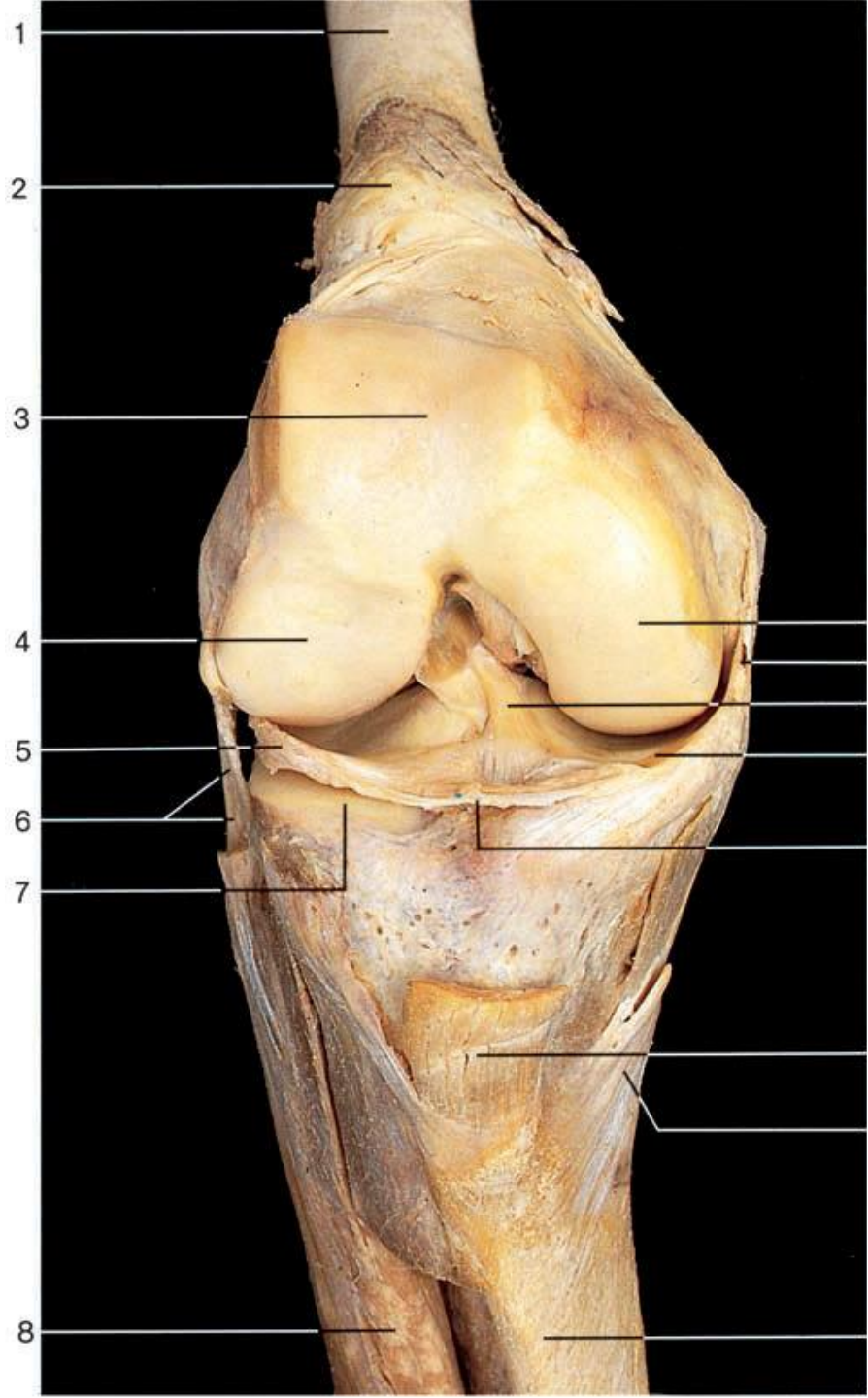
Patellofemoral surfaces



Knee Joint

- ***Patellofemoral:*** anterior aspect of the distal femur articulates with the patella. It allows the tendon of the quadriceps femoris (knee extensor) to be inserted directly over the knee, increasing the efficiency of the muscle.
- The patella increases power of the knee extensor, and serves as a stabilizing structure that reduces frictional forces placed on femoral condyles.









Menisci

The medial and lateral menisci are *fibrocartilage* structures in the knee that serve two functions:

1. To **deepen** the articular surface of the tibia, thus increasing stability of the joint.
2. To act as **shock absorbers** by increasing surface area to further dissipate forces.



Menisci

- They are C shaped, and attached at both ends to the **intercondylar** area of the tibia.
- In addition to the intercondylar attachment, the **medial meniscus** is **fixed** to the **tibial collateral ligament** and the joint capsule. Damage to the tibial collateral ligament usually results in a **medial meniscal tear**.
- The **lateral meniscus** is smaller and **does not have** any **extra attachments**, rendering it fairly mobile.

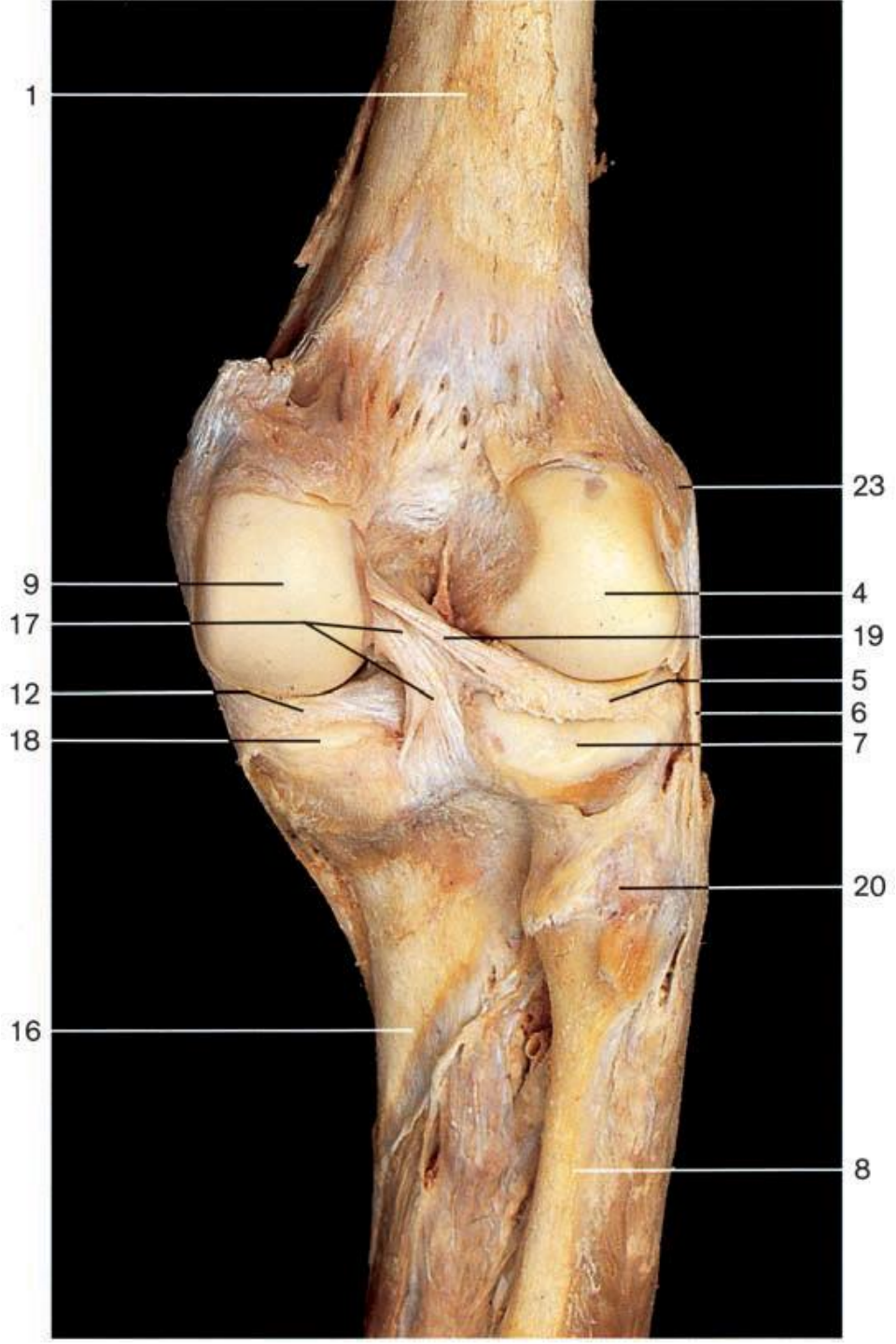
Knee
Meniscus



Lateral
Meniscus

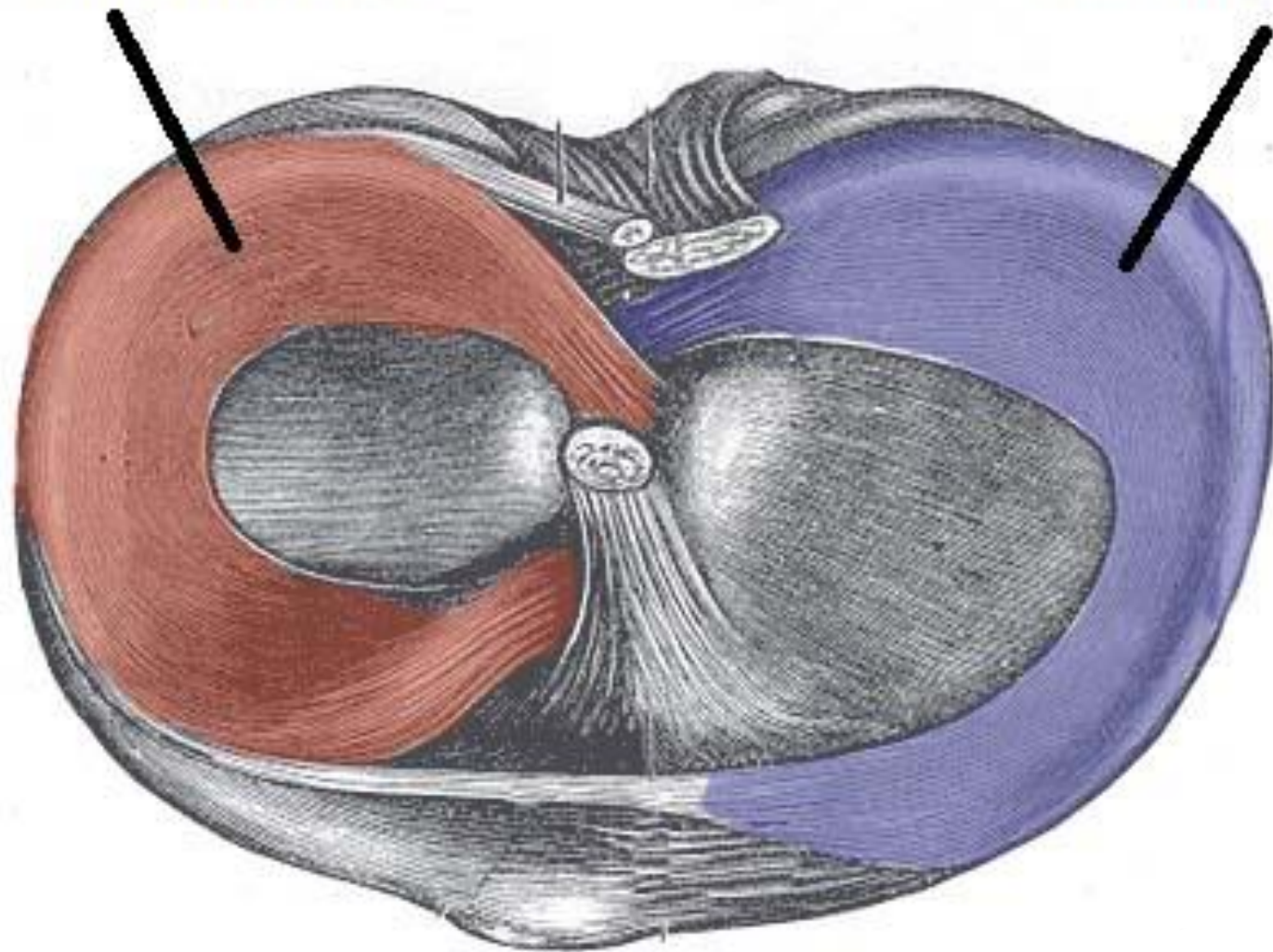
Medial
Meniscus





Lateral meniscus

Medial meniscus







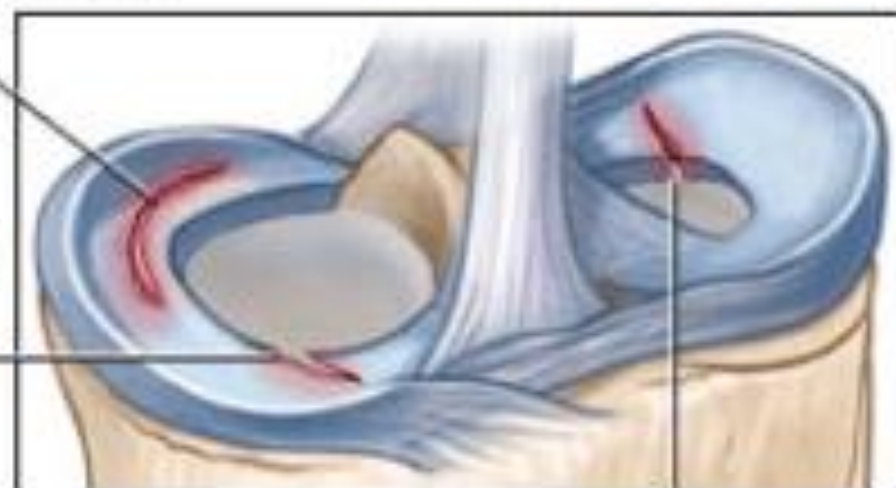
Red zone

White zone



Longitudinal tear

Oblique tear



Radial tear



Bursae

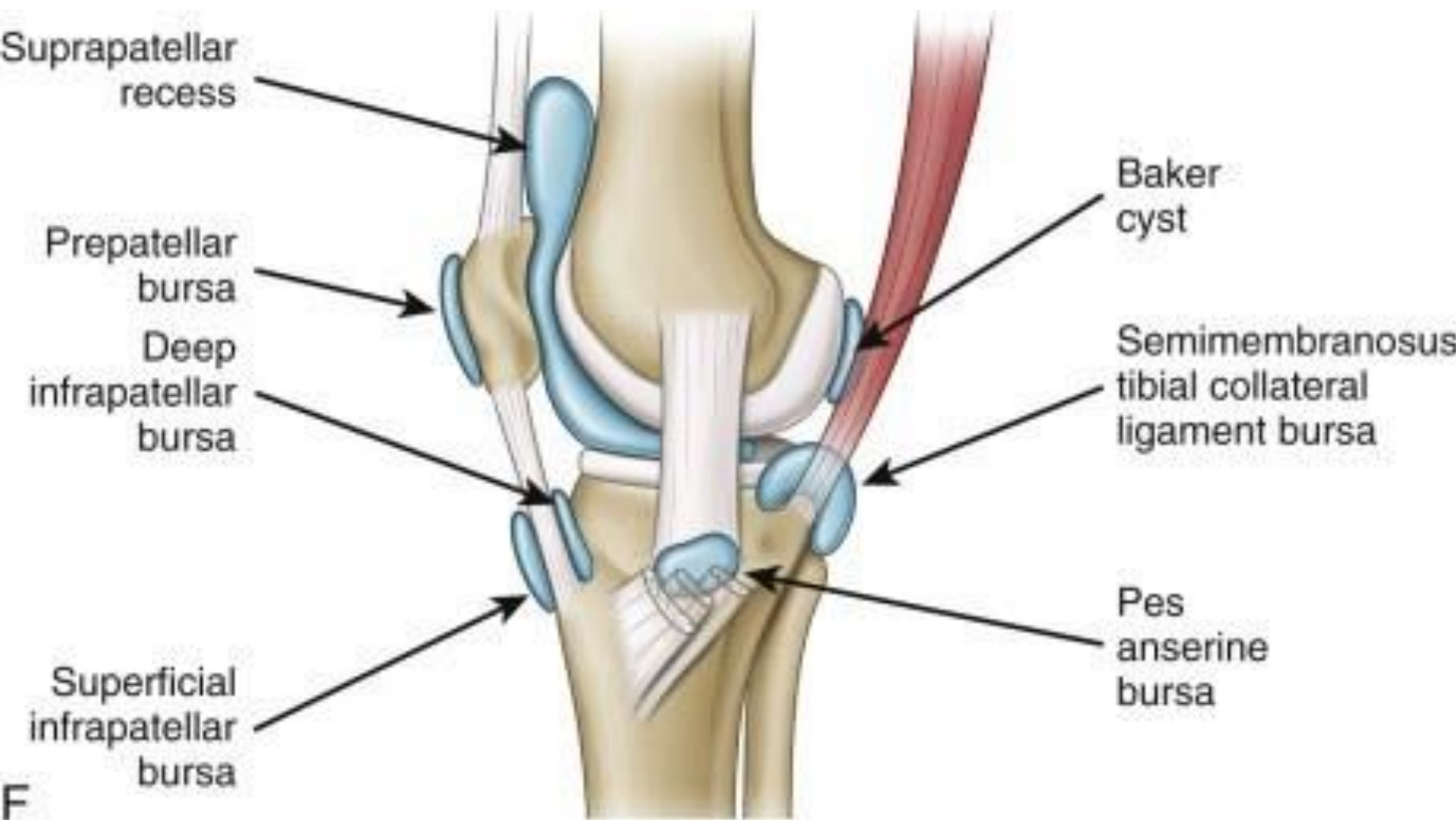
- ***Suprapatella bursa:*** This is an extension of the synovial cavity of the knee, located between the quadriceps femoris and the femur.
- ***Prepatella bursa:*** Found between the apex of the patella and the skin.





Bursae

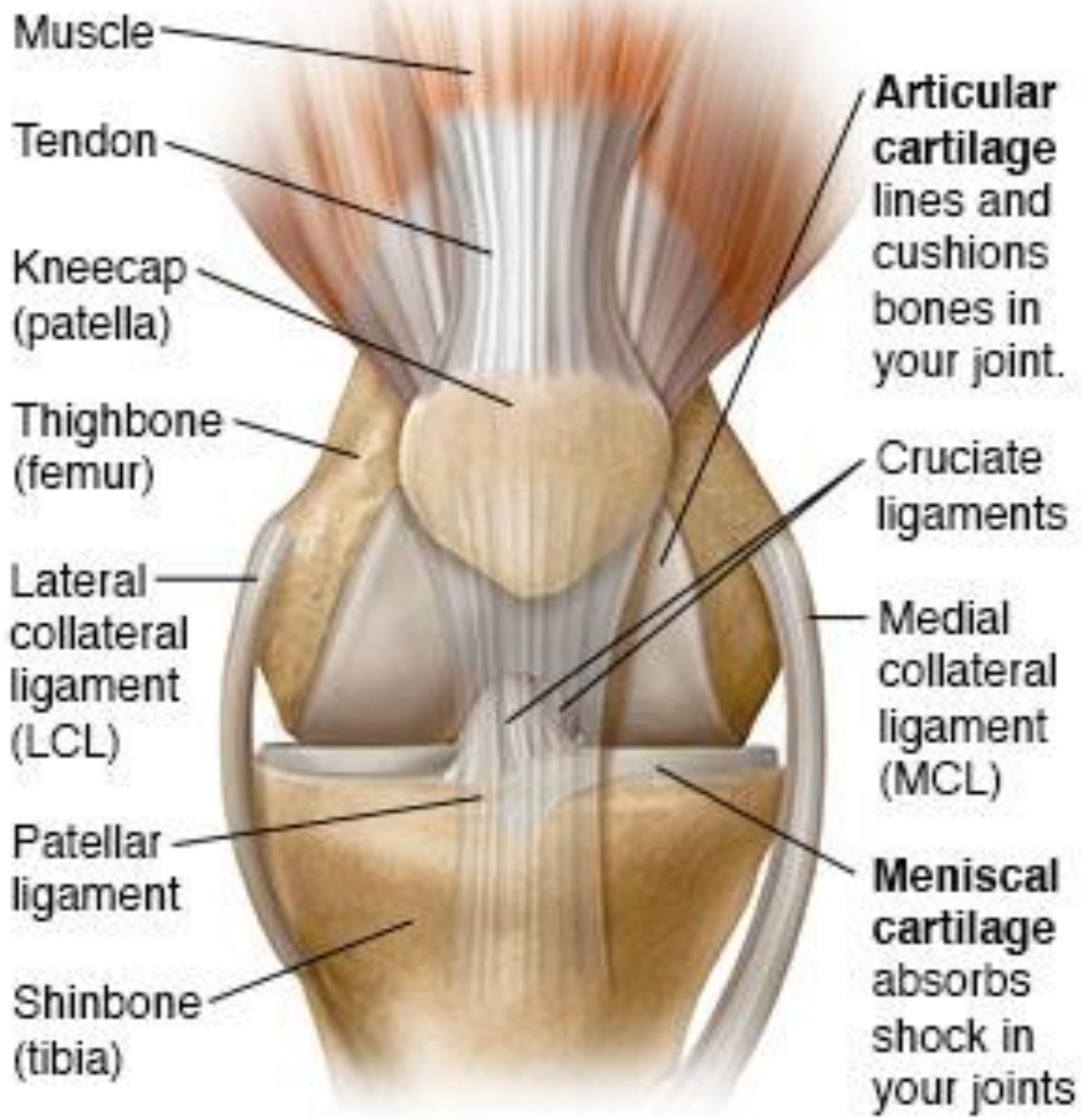
- ***Infrapatella bursa:*** Split into deep and superficial. The deep bursa lies between the tibia and the patella ligament. The superficial lies between the patella ligament and the skin.
- ***Semimembranosus bursa:*** Located posteriorly in the knee joint, between the semimembranosus muscle and the medial head of the gastrocnemius.





Ligaments

- ***The major ligaments in the knee joint are:***
- ***Patellar ligament:*** a continuation of the quadriceps femoris tendon distal to the patella. It attaches to the tibial tuberosity.
- ***Collateral ligaments:*** two strap-like ligaments. They act to stabilize the hinge motion of the knee, preventing excessive ***medial*** or ***lateral*** movement



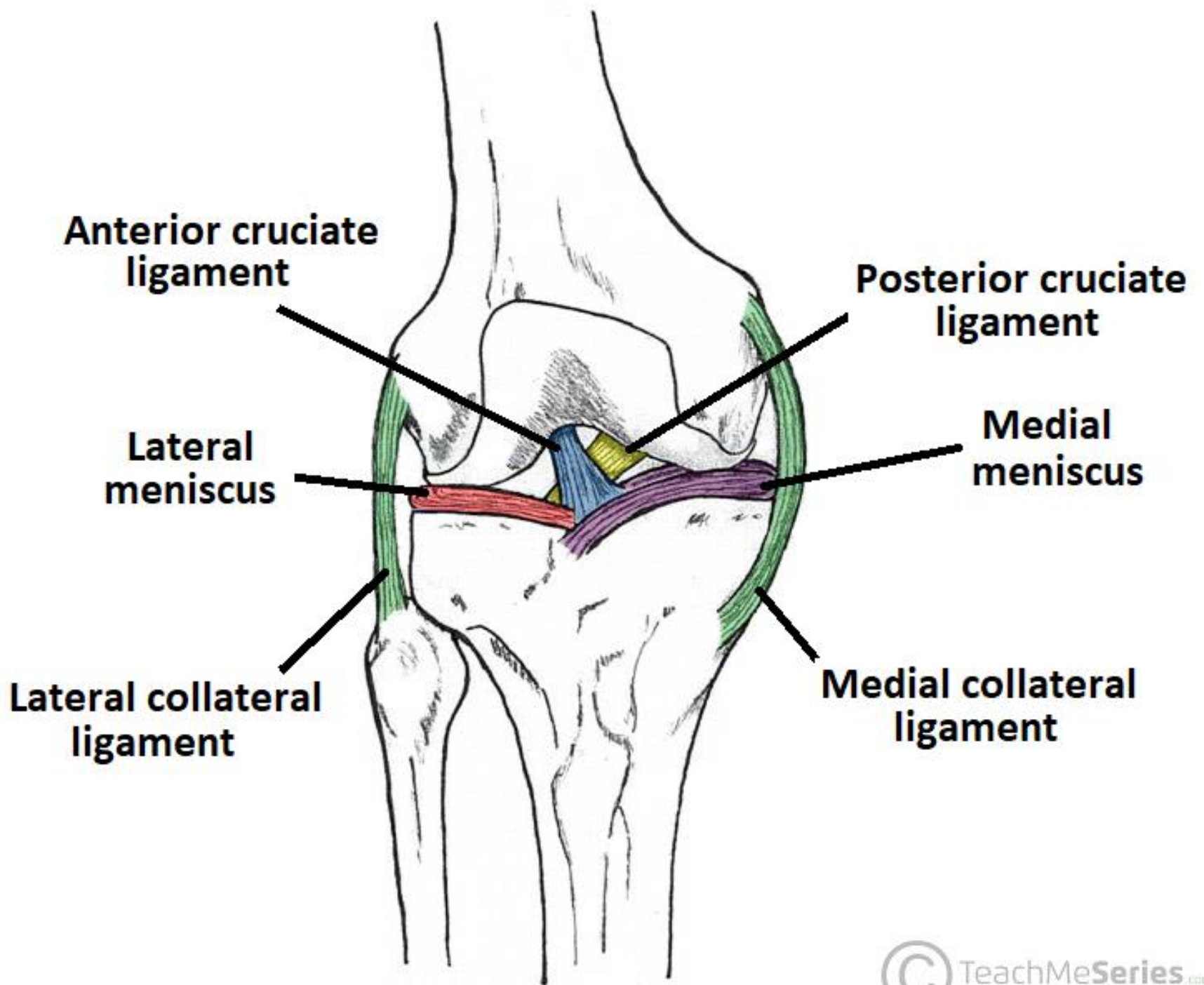




Ligaments

Tibial (medial) collateral ligament: A wide and flat ligament, found on the medial side of the joint. Proximally, it attaches to the medial epicondyle of the femur, distally it attaches to the medial condyle of the tibia.

Fibular (lateral) collateral ligament: Thinner and rounder than the tibial collateral, this attaches proximally to the lateral epicondyle of the femur, distally it attaches to a depression on the lateral surface of the fibular head.





Ligaments

Cruciate Ligaments:

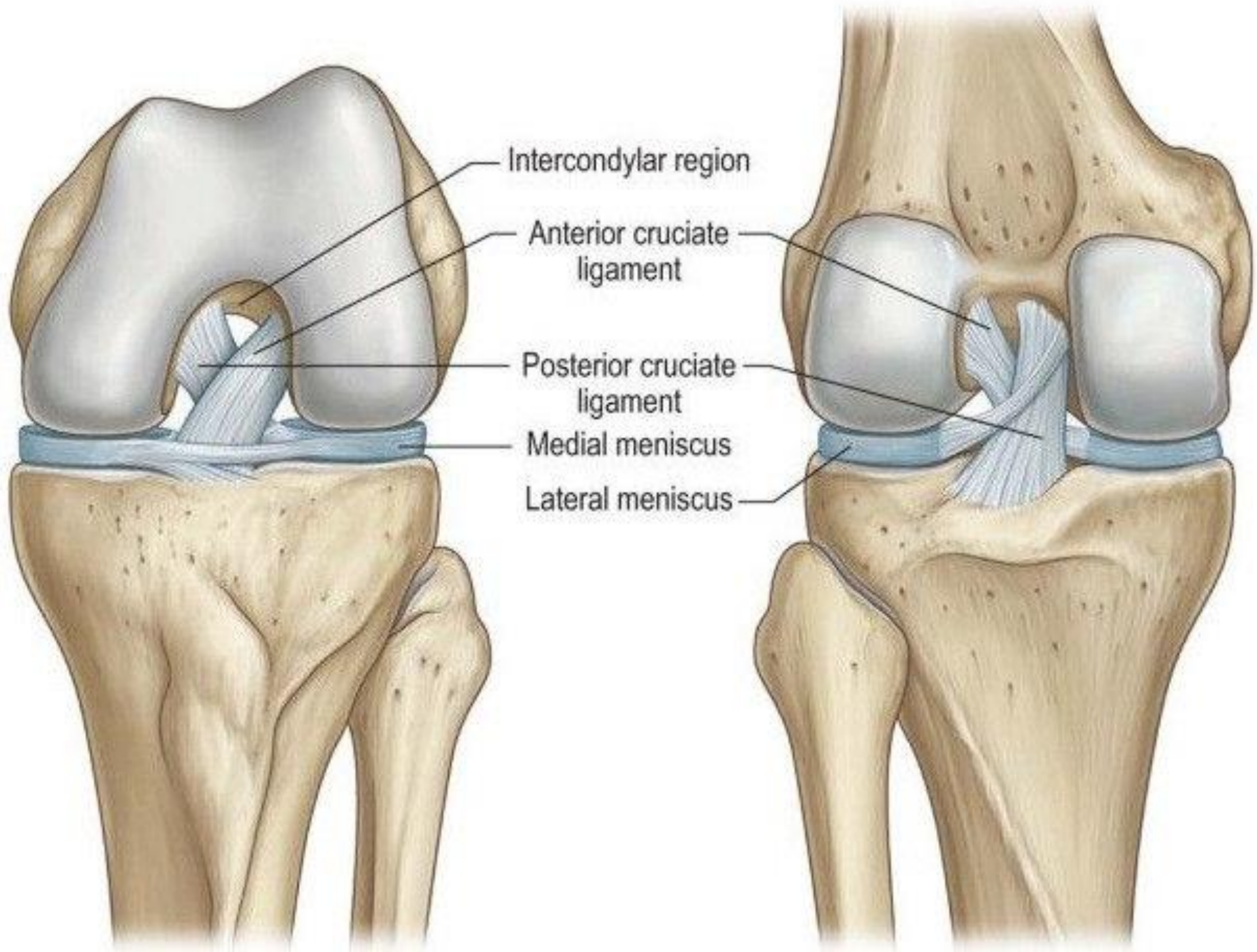
- These two ligaments connect the femur and the tibia.
- ***Anterior cruciate ligament:*** it attaches at the anterior intercondylar region of the tibia where it blends with the medial meniscus. It ascends posteriorly to attach to the femur in the intercondylar fossa. It ***prevents anterior dislocation*** of the tibia onto the femur.



Ligaments

Cruciate Ligaments:

- ***Posterior cruciate ligament:*** attaches at the posterior intercondylar region of the tibia, and ascends anteriorly to attach to the anteromedial femoral condyle. It ***prevents posterior dislocation*** of the tibia onto the femur.





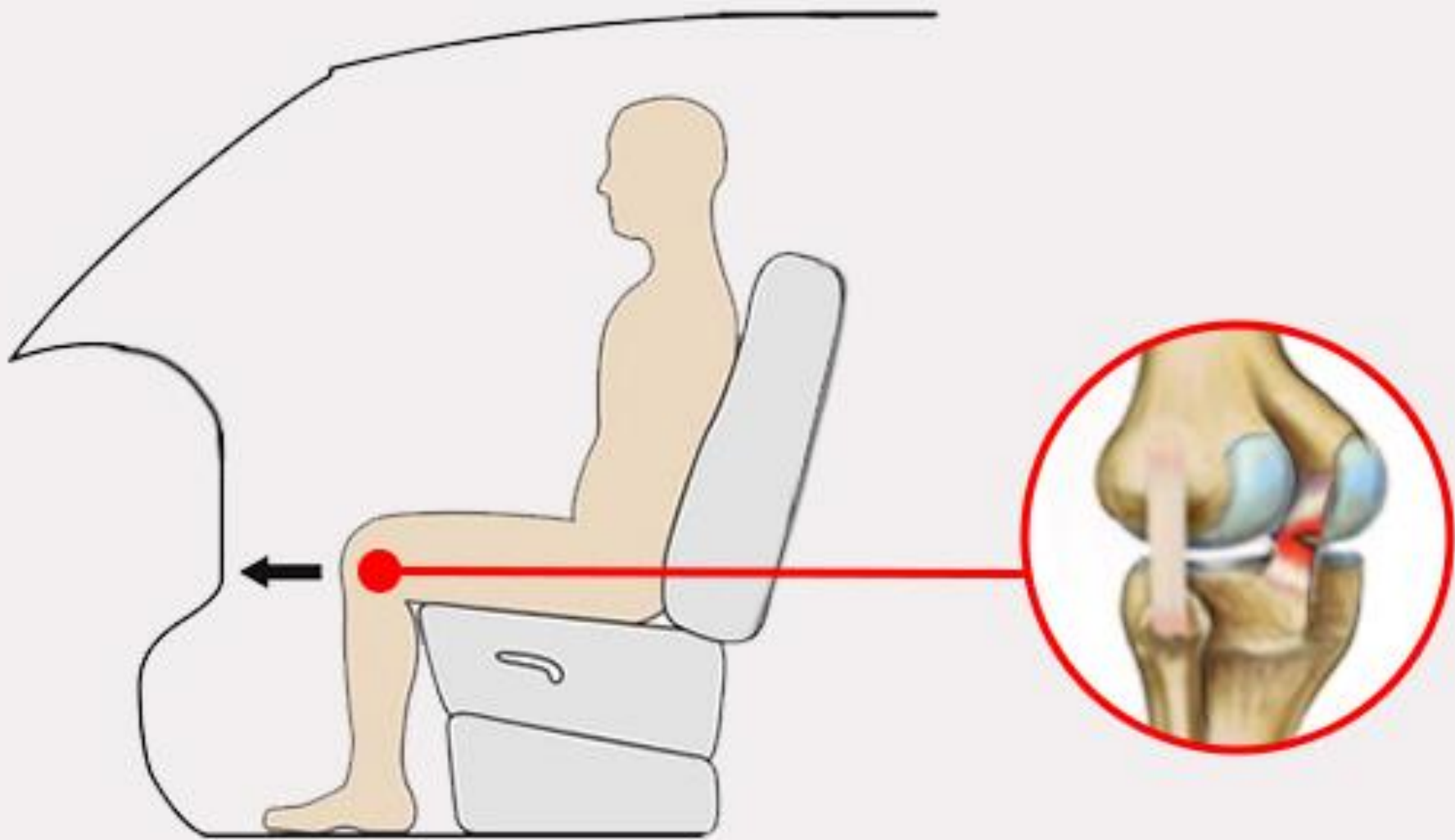
Cruciate Ligament Injuries

- The anterior cruciate ligament (ACL) can be torn by hyperextension of the knee joint, or by the application of a large force to the back of the knee with the joint partly flexed.
- The most common mechanism of posterior cruciate ligament (PCL) damage is the 'dashboard injury'. This occurs when the knee is flexed, and a large force is applied to the shins, pushing the tibia posteriorly.





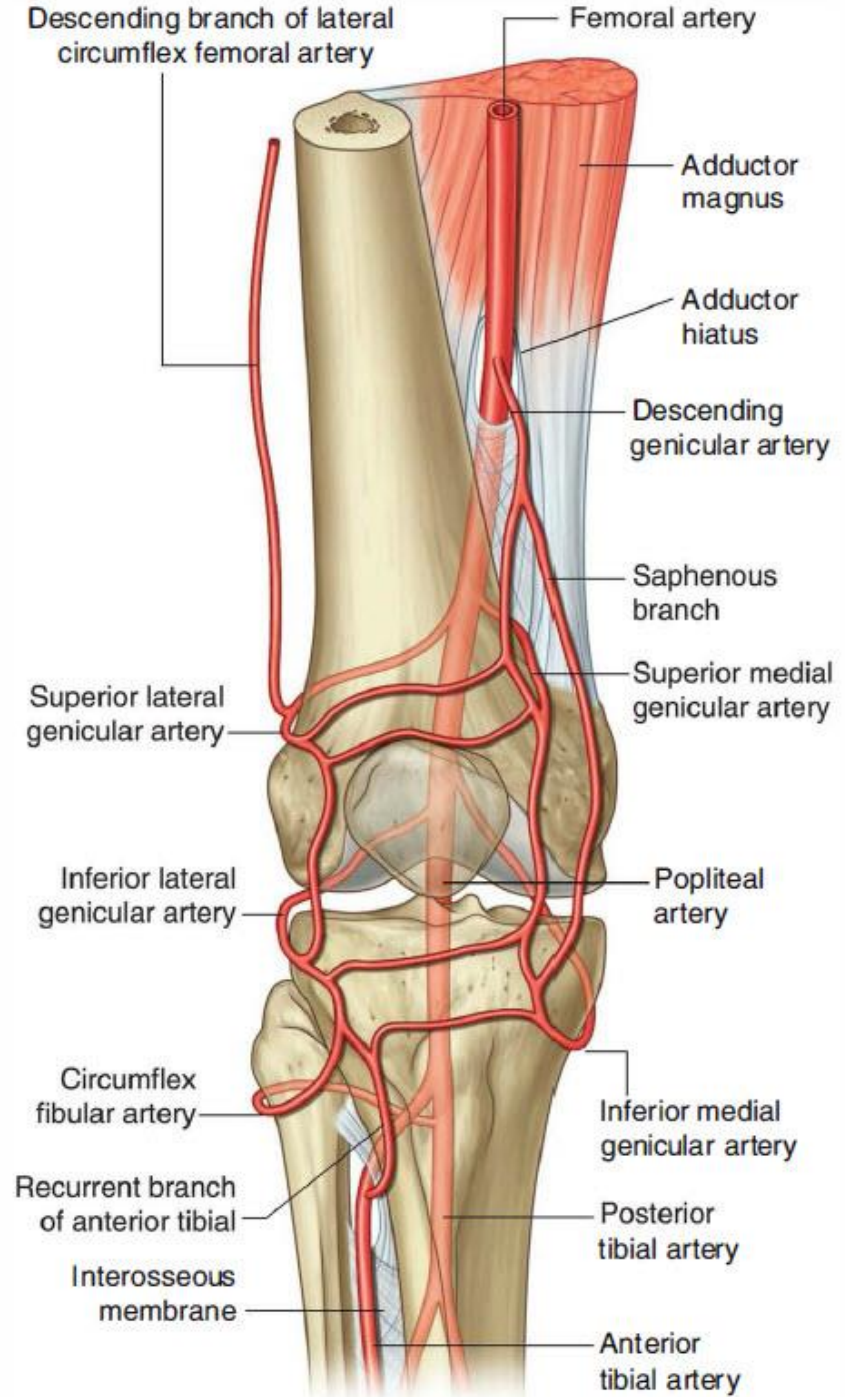
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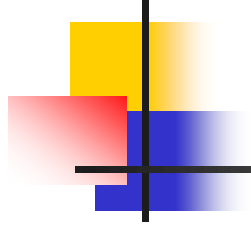




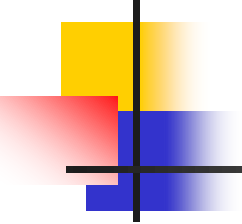
Blood and Nerve Supply

- **Vascular supply** to the knee joint is predominantly through **descending and genicular branches** from the **femoral, popliteal,** and **lateral circumflex femoral** arteries in the thigh and the **circumflex fibular** artery and **recurrent** branches from the **anterior tibial artery** in the leg forming an anastomosis around the joint.
- The knee joint is **innervated** by branches from the **obturator, femoral, tibial,** and **common fibular** nerves





Thank You

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- For further inquiries **PLZ** feel free to contact at any time through email

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