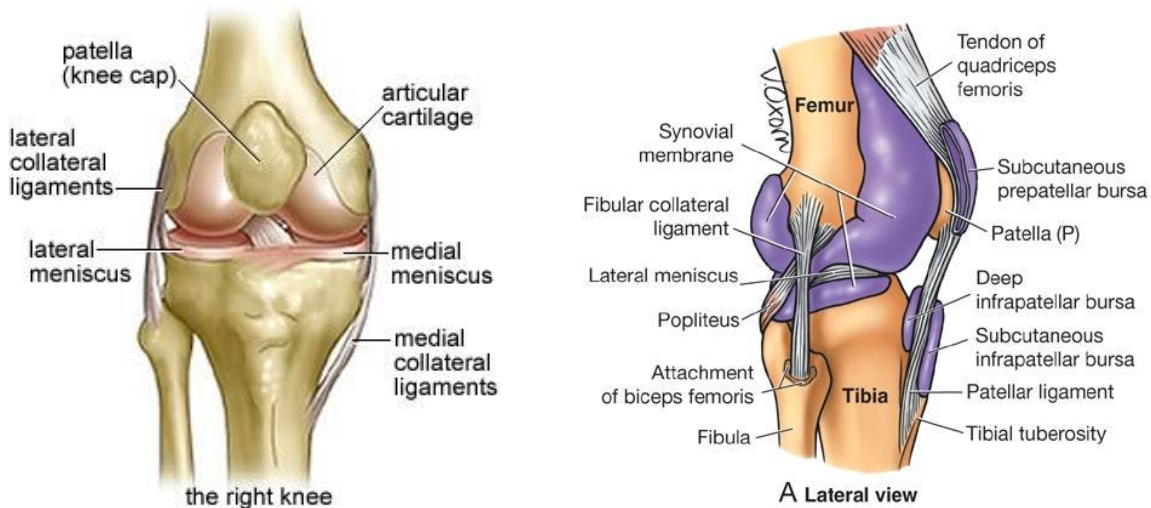
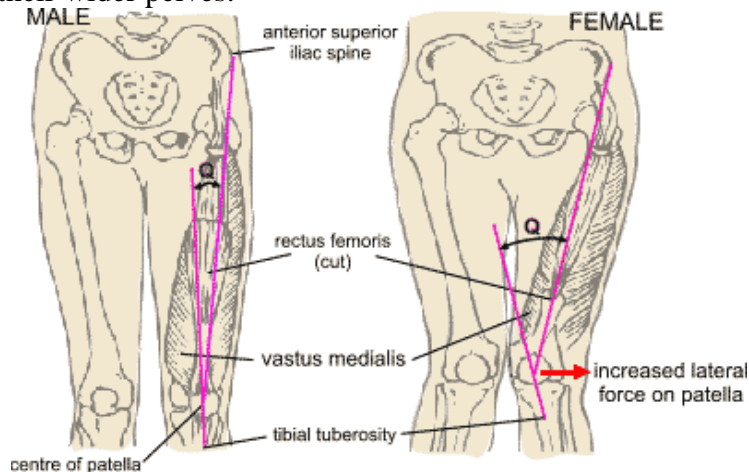


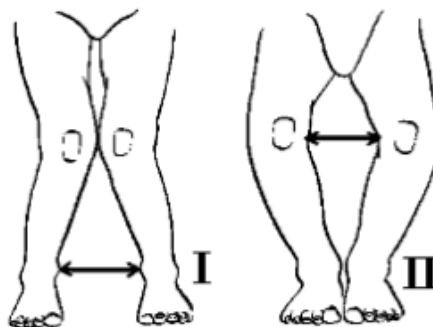
Unit VII – Problem 5 – Anatomy: Knee Joint



- **Knee joint**: synovial, modified hinge type (allowing flexion-extension mainly but also rotational movements especially when the knee is flexed).
- **Knee joint is a complex of 3 joints**:
 - **Patellofemoral joint**: between the posterior (articular) surface of the patella and the patellar surface of the femur.
 - **Medial and lateral femorotibial joints**: between the medial and lateral femoral and tibial condyles. Note that the fibula is not included in the knee joint (does not bear weight).
- **Q-angle**: assessed by drawing a line from the ASIS to the middle of the patella and another vertical line between the patella and tibial tuberosity. The angle is increased in females due to their wider pelvises.

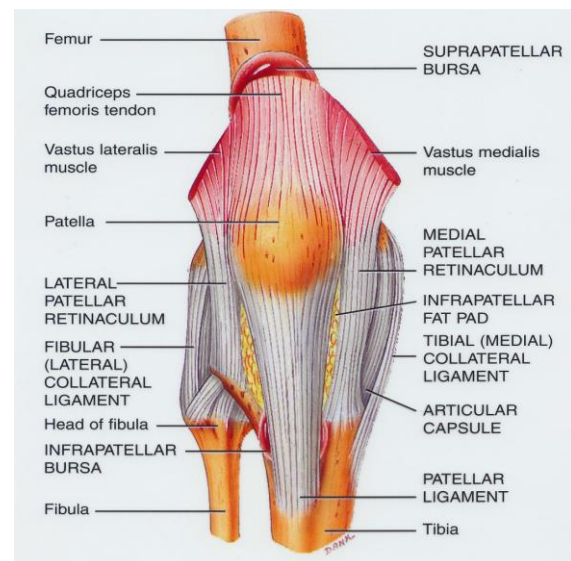
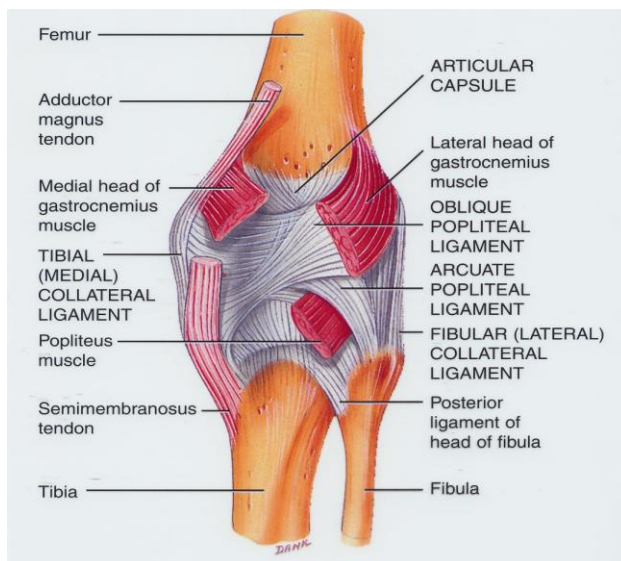


- **Genu varum/ genu valgum**:
 - **Genu varum**: bowleg, decreased Q-angle, pressure on medial structures of the knee joint.
 - **Genu valgum**: knock-knee, increased Q-angle, pressure on the lateral structures of the knee joint.





- The knee joint is surrounded by a fibrous capsule which is lined internally by a synovial membrane. The synovial membrane extends superiorly in the anterior aspect of the joint to form suprapatellar bursa which is attaching to a small muscle know as articularis genu.
- **The stability of the knee joint depends on:**
 - Shape of **articulating bone** (incompatible).
 - Strong **ligaments** (intra and extracapsular).
 - Strong **muscles** surrounding (vastus medialis & vastus lateralis being the most important).
- The base of the patella is attached to quadriceps tendon which will continue as patellar ligament (distal to the apex of patella) and inserts in tibial tuberosity.
- **Anterior and posterior cruciate ligaments:**
 - **Anterior cruciate ligament:** arises from anterior intercondylar area of the tibia and extends superiorly, posteriorly and laterally to attach to posterior part of the medial side of the lateral condyle of the femur. *Functions:*
 - ✓ Limits posterior rolling of the femoral condyles on the tibial plateau during flexion of the knee.
 - ✓ Prevents posterior displacement of the femur on the tibia.
 - ✓ Prevents hyperextension of the knee joint.
 - **Posterior cruciate ligament:** arises from posterior intercondylar area of the tibia and extends superiorly, anteriorly and medially to attach to the anterior part of the lateral surface of the medial condyle of the femur. *Functions:*
 - ✓ Limits anterior rolling of the femur on the tibial plateau during extension.
 - ✓ Prevents anterior displacement of the femur on the tibia.
 - ✓ Prevents hyperflexion of the knee joint.
- **Medial and lateral menisci of the knee joint:**
 - Crescentic plates, fibrocartilage, on the articular surface of the tibia. They play role in shock absorption. The menisci are firmly attached at their ends to the intercondylar area of the tibia. Their anterior edges are joined by transverse ligament of the knee.
 - **Medial meniscus:** C-shaped, broader posteriorly, anterior end attaches to the anterior intercondylar area and the posterior end attaches to the posterior intercondylar area. It firmly adheres to the deep surface of the tibial collateral ligament.
 - **Lateral meniscus:** nearly circular, smaller, the tendon of popliteus separates the lateral meniscus from the fibular collateral ligament.





- **Bursae of the knee joint:**

- **Prepatellar bursa:** between the skin and the patella.
- **Suprapatellar bursa:** extension of the synovial membrane of the knee joint.
- **Infrapatellar bursae:** subcutaneous between the skin and tibial tuberosity and deep between the tibial and patellar ligament.

- The fibrous capsule of the knee joint is weak posteriorly and is reinforced by oblique and arcuate popliteal ligaments. The fibrous layer has an opening posterior to the lateral tibial condyle to allow the popliteus tendon to pass out of the joint capsule to attach to the tibia.
- On the medial and lateral sides of the knee joint are found the medial tibial collateral ligament and the lateral fibular collateral ligament.

- **Movements of the knee joint:**

- **Extension:** quadriceps muscle and tensor fascia lata.
- **Flexion:** hamstring muscles (arising from ischial tuberosity).
- **Medial rotation with flexed knee:** Sartorius, gracilis, semitendinosus, semimembranosus and popliteus.
- **Lateral rotation:** biceps femoris.

- **Arterial supply of the knee joint:** by 5 anastomosing genicular branches from the popliteal artery (superior medial, superior lateral, inferior medial, inferior lateral and middle genicular arteries).

- **Innervation of the knee joint:** branches from femoral, tibial, common fibular and obturator nerves.

- **Clinical correlation (unhappy triad):**

- The firm attachment of the tibial collateral ligament to the medial meniscus is of clinical significance because tearing of this ligament frequently results in concomitant tearing of the medial meniscus.
- The injury is frequently caused by a blow to the lateral side of the extended knee or excessive lateral twisting of the flexed knee.
- This injury is common in athletes who twist their flexed knees while running (in football and soccer).
- The anterior cruciate ligament may also tear subsequent to the rupture of tibial collateral ligament.

- **Popliteal fossa (fat-filled, diamond-shaped, posterior to the knee):**

• **Boundaries:**

- ✓ **Superolaterally:** biceps femoris.
- ✓ **Superomedially:** semitendinosus and semimembranosus.
- ✓ **Inferolaterally:** lateral head of gastrocnemius.
- ✓ **Inferomedially:** medial head of gastrocnemius.

• **Contents:**

- ✓ Popliteal artery: deepest structure.
- ✓ Popliteal vein.
- ✓ Tibial and common fibular nerves.

