

\* HIP JOINT

KNEE JOINT

\* ANKLE JOINT

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# HIP JOINT

# OBJECTIVES

At the end of the lecture, students should be able to:

List the type & articular surfaces of hip joint.

Describe the ligaments of hip joints.

Describe movements of hip joint.

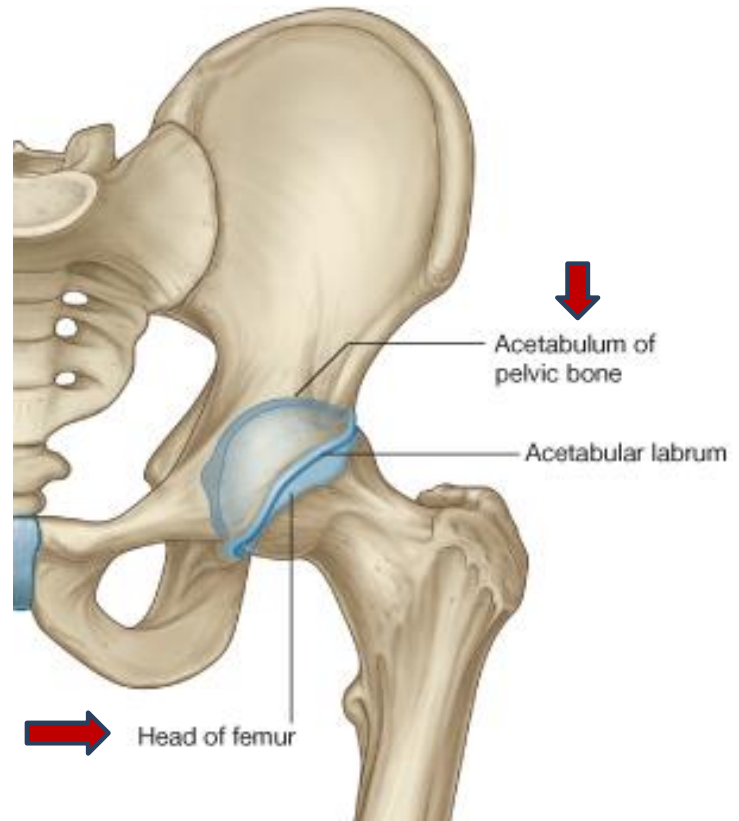
# TYPES & ARTICULAR SURFACES

## TYPE:

- It is a synovial, ball & socket joint.

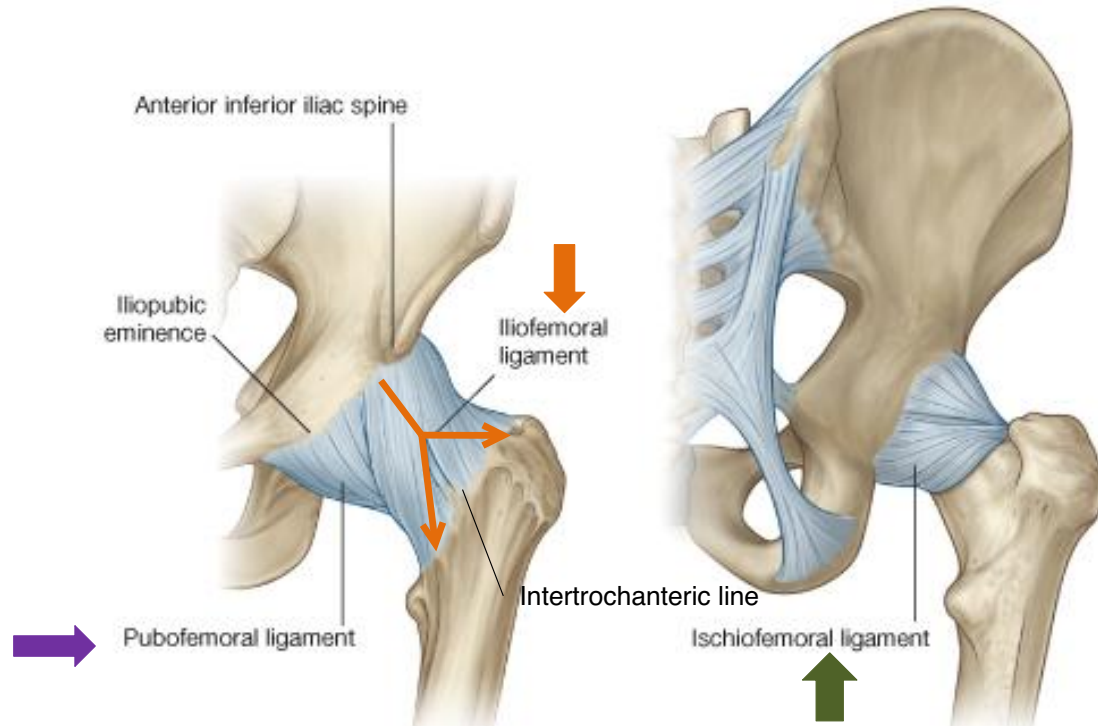
## ARTICULAR SURFACES:

- Acetabulum of hip (pelvic) bone
- Head of femur.



# LIGAMENTS

## (3 Extracapsular)



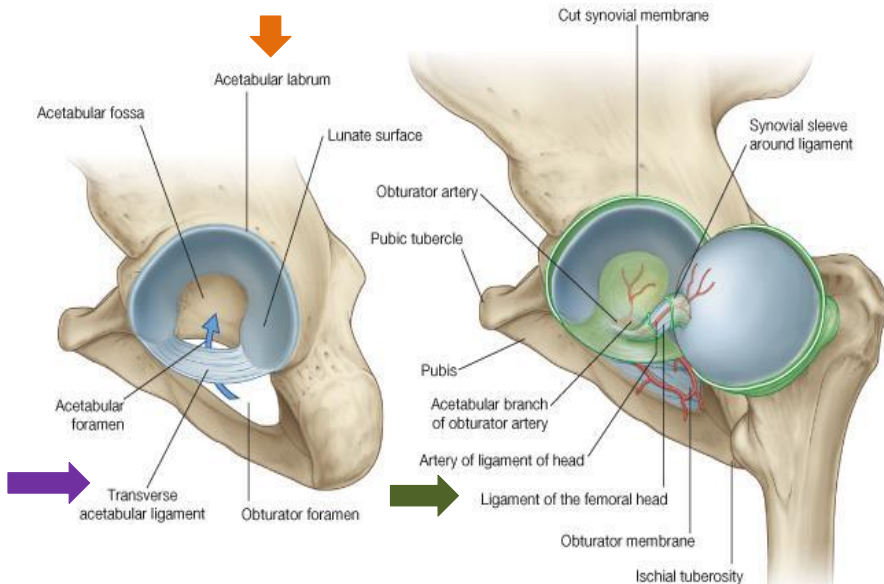
**Iliofemoral ligament:** Y-shaped strong ligament, anterior to joint, **limits extension**

**Pubofemoral ligament:** antero-inferior to joint, **limits abduction & lateral rotation**

**Ischiofemoral ligament:** posterior to joint, **limits medial rotation**

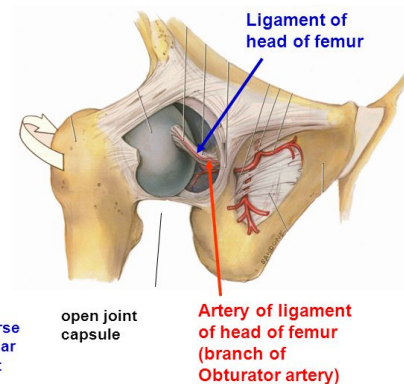
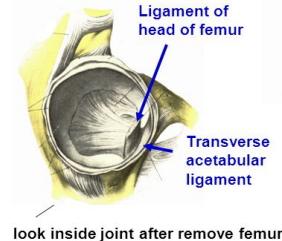
# LIGAMENTS

## (3 Intracapsular)



### HIP JOINT - LIGAMENTS

**C. Ligament of head of femur** - inside joint capsule; attached to head of femur at fovea capitis and to transverse acetabular ligament; transmits **Artery of ligament of head of femur (branch of Obturator artery)** .



**Acetabular labrum** - fibrocartilaginous collar attached to margins of acetabulum

to increase its depth for better retaining of head of femur (it is completed inferiorly by transverse ligament).

**Transverse acetabular ligament:** converts acetabular notch into foramen (acetabular foramen) through which pass acetabular vessels.

**Ligament of femoral head:** carries vessels to head of femur (branch of obturator artery).

# MOVEMENTS

**FLEXION:** Iliopsoas (mainly), sartorius, pectineus, rectus femoris.

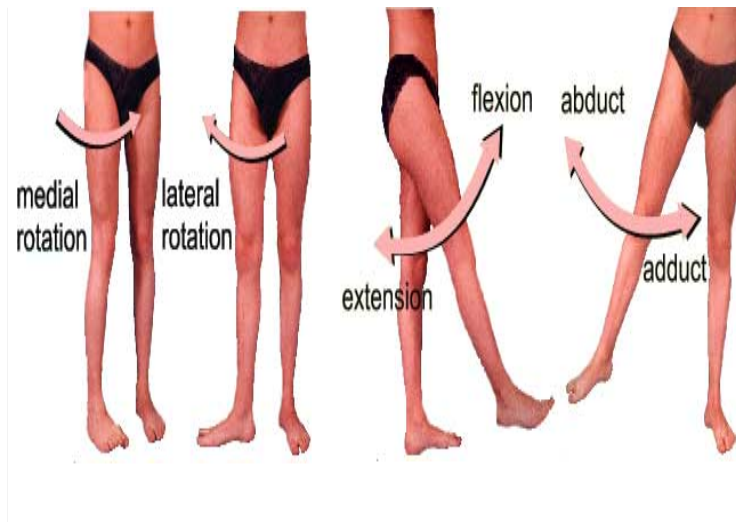
**EXTENSION:** Hamstrings (mainly), gluteus maximus (powerful extensor).

**ABDUCTION:** Gluteus medius & minimus, sartorius.

**ADDUCTION:** Adductors, gracilis.

**MEDIAL ROTATION:** Gluteus medius & minimus.

**LATERAL ROTATION:** Gluteus maximus, quadratus femoris, piriformis, obturator externus & internus.



# KNEE JOINT



# OBJECTIVES

At the end of the lecture, students should be able to:

List the type & articular surfaces of knee joint.

Describe the capsule of knee joint, its extra- & intra-capsular ligaments.

List important bursae in relation to knee joint.

Describe movements of knee joint.

# TYPES & ARTICULAR SURFACES

**Knee joint** is formed of:

**Three bones.**

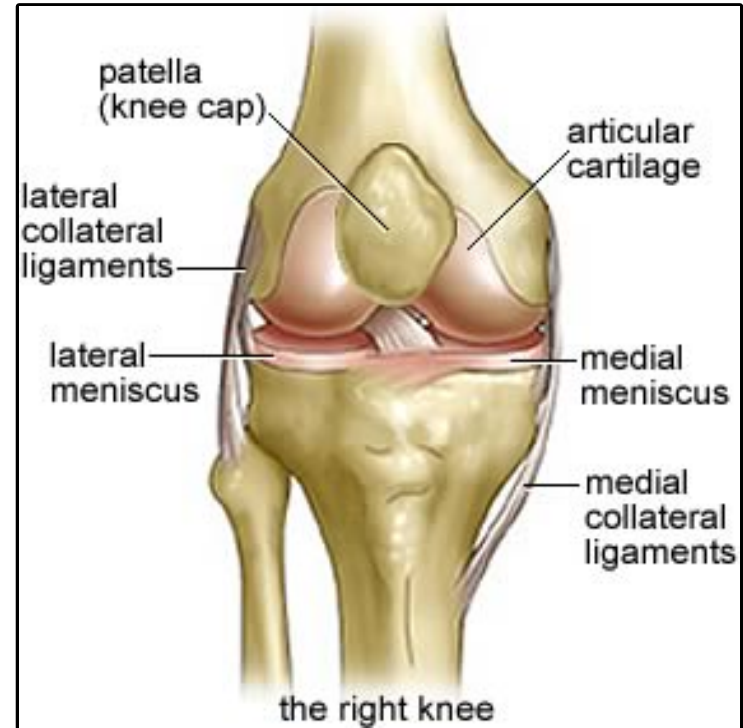
**Three articulations.**

Femoro-tibial articulations

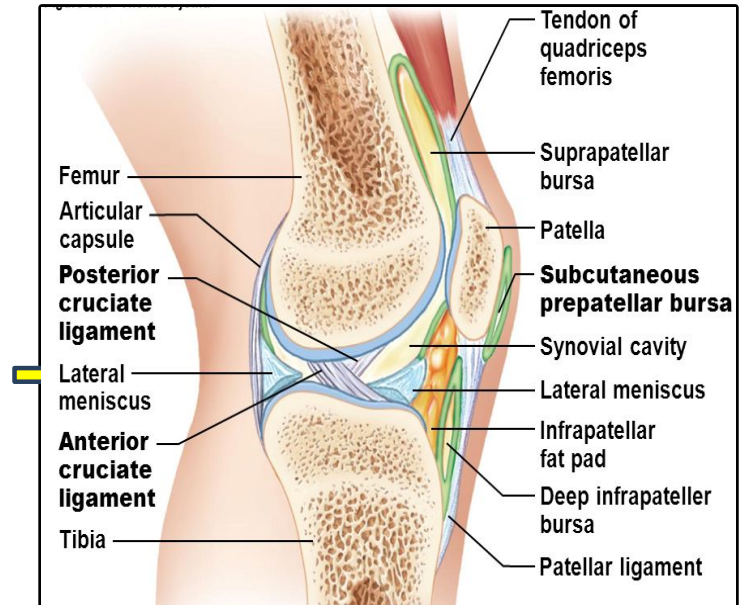
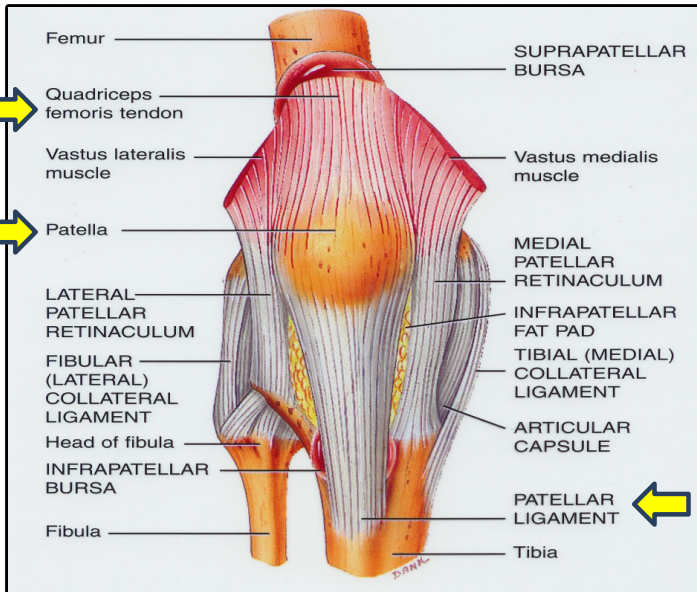
: between the 2 femoral condyles & upper surfaces of the 2 tibial condyles (Type: **synovial, modified hinge**).

Femoro-patellar

articulations: between posterior surface of patella & patellar surface of femur (Type: **synovial, plane**).



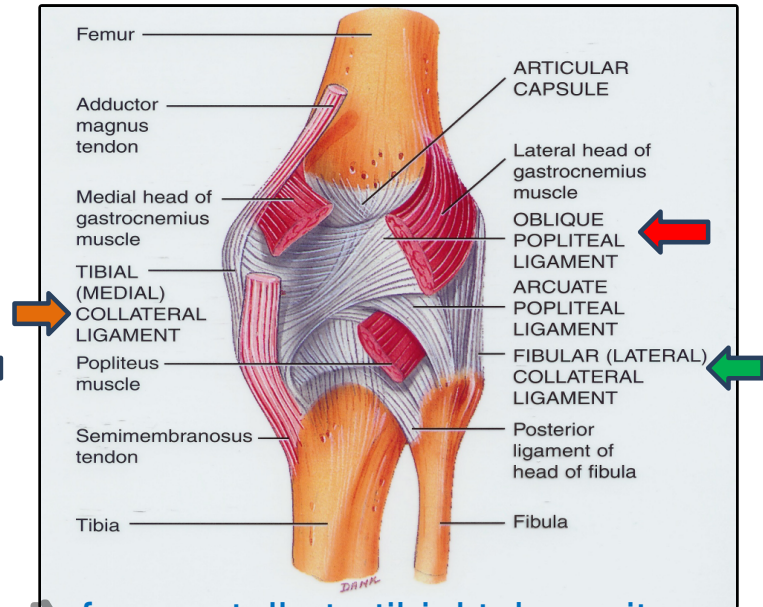
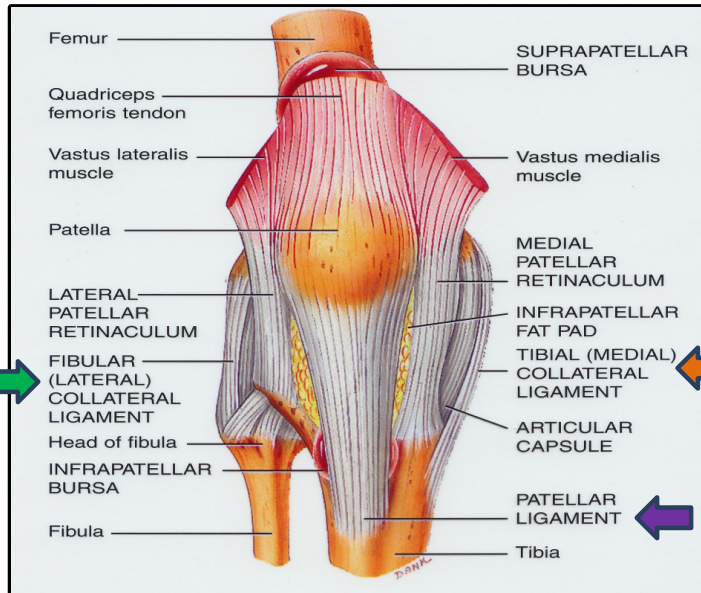
# CAPSULE



Is **deficient anteriorly** & is replaced by: quadriceps femoris tendon, patella & ligamentum patellae.

**Possesses 2 openings:** one for popliteus tendon & one for communication with suprapatellar bursa.

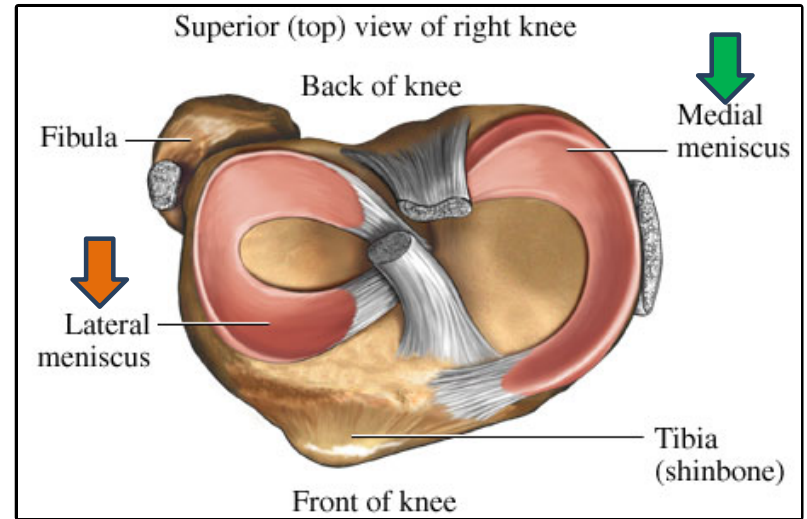
# EXTRA-CAPSULAR LIGAMENTS



1. **Ligamentum patellae (patellar ligament):** from patella to tibial tuberosity.
2. **Medial (tibial) collateral ligament:** from medial epicondyle of femur to upper part of medial surface of tibia (firmly attached to medial meniscus).
3. **Lateral (fibular) collateral ligament:** from lateral epicondyle of femur to head of fibula (separated from lateral meniscus by popliteus tendon).
4. **Oblique popliteal ligament:** extension of semimembranosus tendon.

# SULAR LIGAMENTS

## MENISCI



Each meniscus is attached by anterior & posterior horns into upper surface of tibia.

The outer surface of medial meniscus is also attached to capsule & medial collateral ligament: so; medial meniscus is less mobile & more liable to be injured.

### FUNCTIONS:

They deepen articular surfaces of tibial condyles.

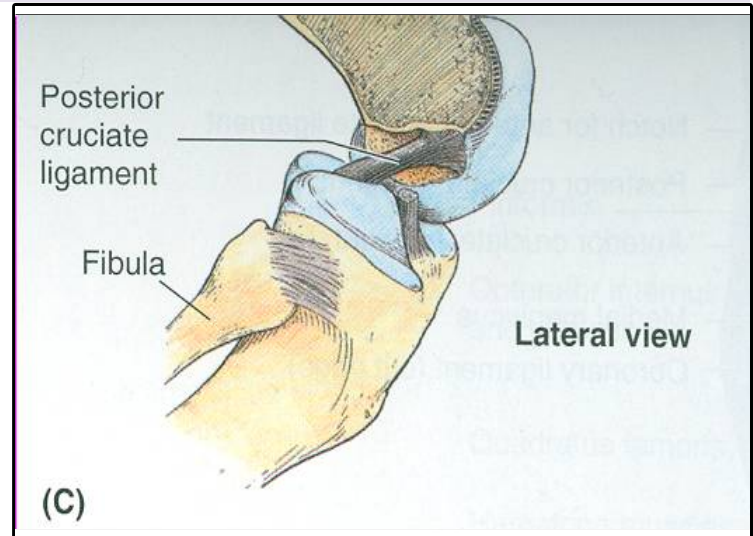
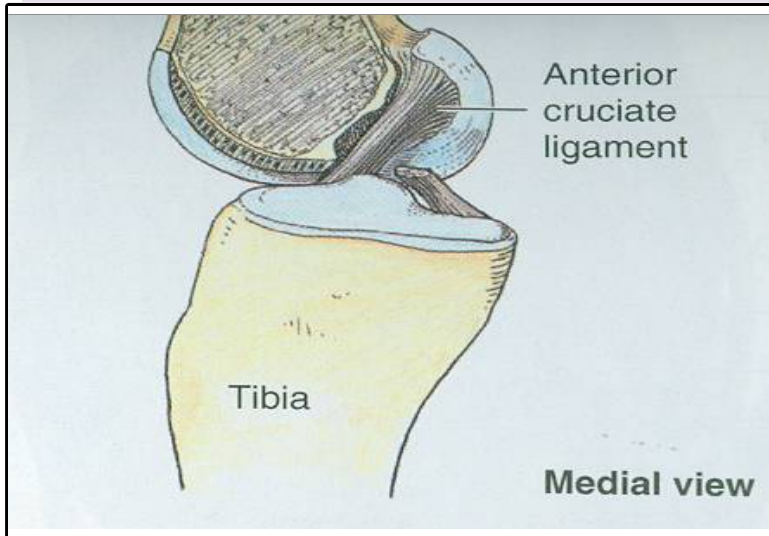
They serve as cushions between tibia & femur.

They are 2 C-shaped plates of fibrocartilage.

The **medial** meniscus is **large & oval**.  
The **lateral** meniscus is **small & circular**.

# INTRA-CAPSULAR LIGAMENTS

## ANTERIOR & POSTERIOR CRUCIATE LIGAMENTS



### ATTACHMENTS:

**Anterior cruciate:** from anterior part of intercondylar area of tibia to posterior part of lateral condyle of femur.

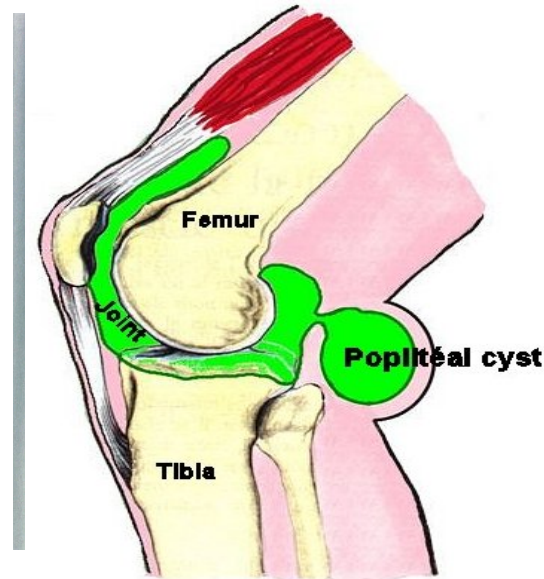
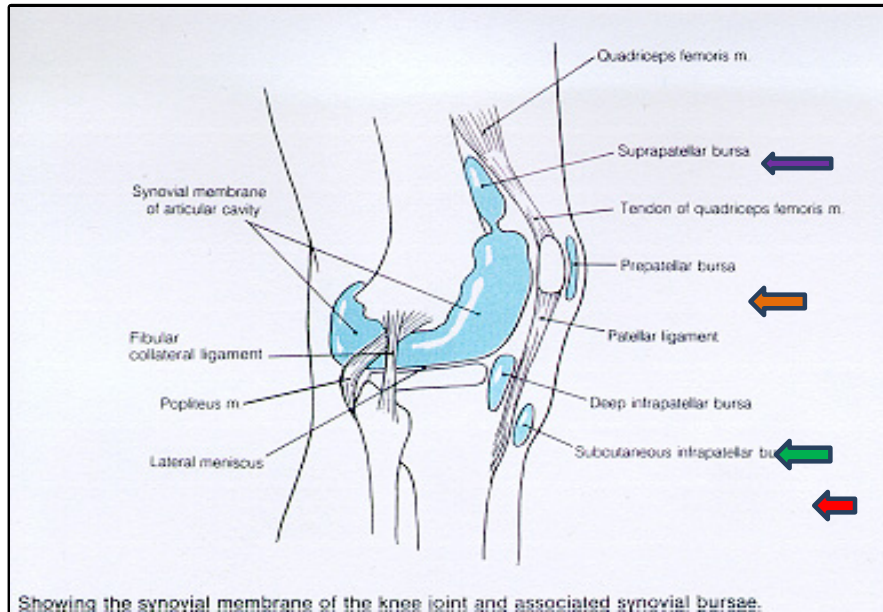
**Posterior cruciate:** from posterior part of intercondylar area of tibia to anterior part of medial condyle of femur.

### FUNCTIONS:

**Anterior cruciate:** prevents posterior displacement of femur on tibia.

**Posterior cruciate:** prevents anterior displacement of femur on tibia.

# IMPORTANT BURSAE RELATED TO KNEE



**Suprapatellar bursa:** between femur & quadriceps tendon, communicates with

synovial membrane of knee joint (Clinical importance?)---It is **commonly inflamed bursa** leads to bursitis.

**Prepatellar bursa:** between patella & skin.

**Deep infrapatellar bursa:** between tibia & ligamentum patella.

**Subcutaneous infrapatellar bursa:** between tibial tuberosity & skin.

**Popliteal bursa (not shown):** between popliteus tendon & capsule, communicates with synovial membrane of knee joint.

# MOVEMENTS

## FLEXION:

1. Mainly by hamstring muscles : biceps femoris , semitendinosus & semimembranosus.
2. Assisted by sartorius , gracilis & popliteus.

## EXTENSION:

Quadriceps femoris.

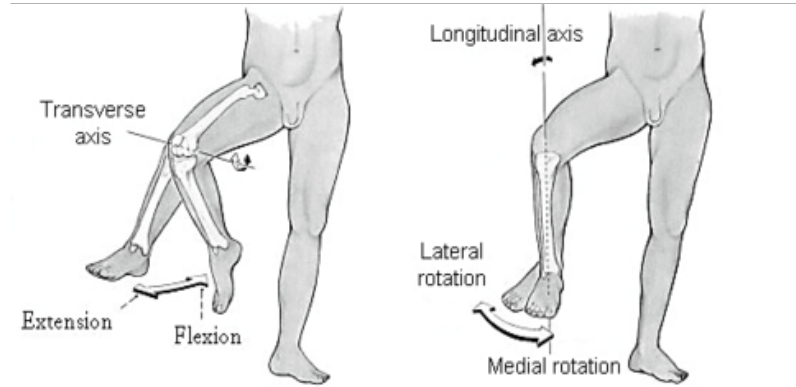
**ACTIVE ROTATION (PERFORMED WHEN KNEE IS FLEXED) :**

### A) MEDIAL ROTATION:

1. Mainly by semitendinosus & semimembranosus.
2. Assisted by sartorius & gracilis.

### B) LATERAL ROTATION:

Biceps femoris.

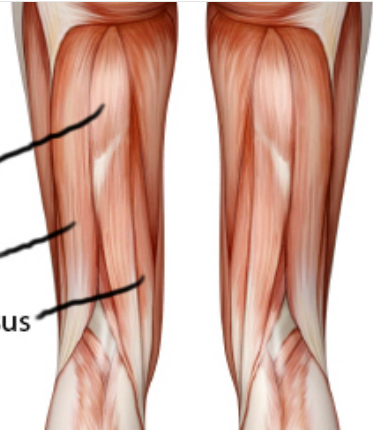


## Hamstring Muscles

Semitendinosus

Biceps Femoris

Semimembranosus





# MOVEMENTS (cont'd)

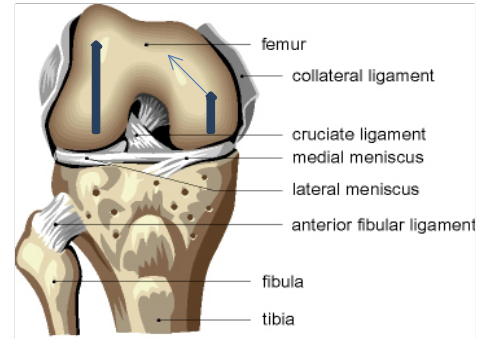
## INACTIVE (DEPENDANT) ROTATION :

### A) LOCKING OF KNEE:

- Slight Lateral rotation of tibia (or medial rotation of femur due to the shape of condyles), at the end of extension
- Results mainly by tension of anterior cruciate ligament.
- In locked knee, all ligaments become tight.

### B) UNLOCKING OF KNEE:

- Medial rotation of tibia (lateral rotation of femur), at the beginning of flexion.
- Performed by Popliteus to relax ligaments & allow easy flexion.



### Locking

- During last 30 degrees of extension
- Medial rotation of femur
- Helped by quadriceps femoris (mainly vastus medialis)
- As standing at attention
- The ligaments are taut

### Unlocking

- During initial stages of flexion
- Lateral rotation of femur
- Helped by popliteus
- As standing at ease
- The ligaments are relaxed

# ANKLE JOINT

# OBJECTIVES

At the end of the lecture, students should be able to:

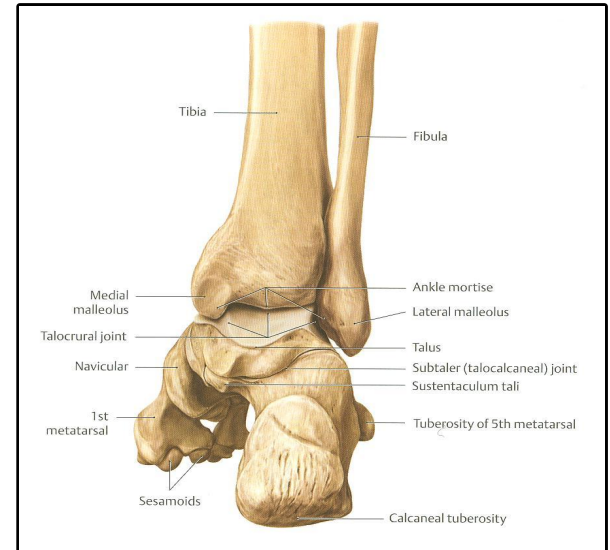
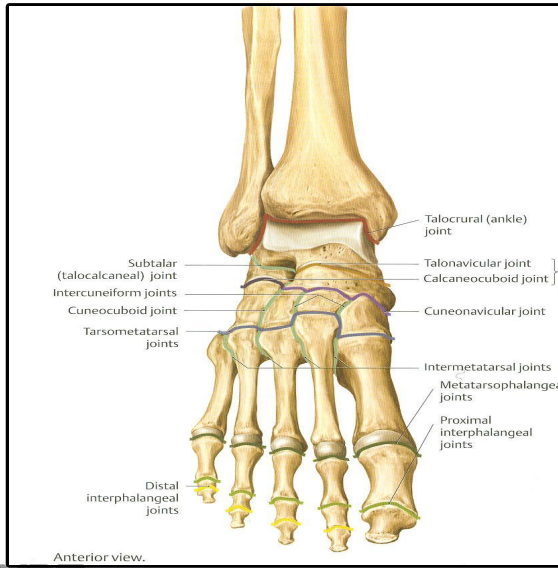
List the type & articular surfaces of ankle joint.

Describe the ligaments of ankle joints.

Describe movements of ankle joint.

Apply Hilton's law about nerve supply of joints.

# TYPES & ARTICULAR SURFACES



## TYPE:

It is a synovial, hinge joint.

## ARTICULAR SURFACES:

### UPPER:

A socket formed by: the lower end of tibia, medial malleolus & lateral malleolus.

### LOWER:

Body of talus.

# LIGAMENTS

## LATERAL LIGAMENT:

### MEDIAL (DELTOID) LIGAMENT:

A strong **triangular** ligament.

**Apex:** attached to medial malleolus.

**Base:** subdivided into 4 parts:

**Anterior tibiotalar part.**

**Tibionavicular part.**

**Tibiocalcaneal part.**

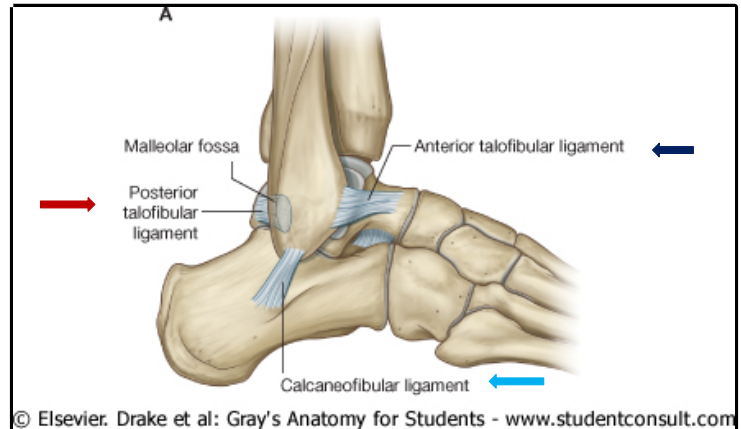
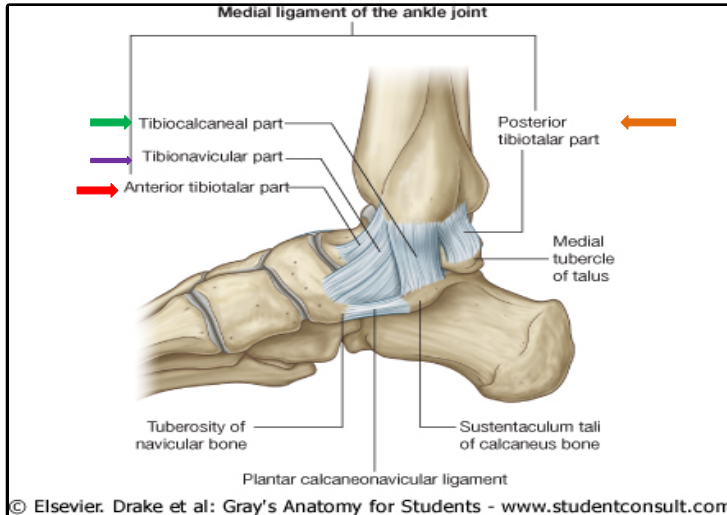
**Posterior tibiotalar part.**

Composed of 3 separate ligaments.

**Anterior talofibular ligament.**

**Calcaneofibular ligament.**

**Posterior talofibular ligament.**



# MOVEMENTS

## DORSIFLEXION:

Performed by muscles of anterior compartment of leg (tibialis anterior, extensor hallucis longus, extensor digitorum longus & peroneus tertius).

## PLANTERFLEXION:

- Initiated by soleus.
- Maintained by gastrocnemius.
- Assisted by other muscles in posterior compartment of leg (tibialis posterior, flexor digitorum longus & flexor hallucis longus) + muscles of lateral compartment of leg (peroneus longus & peroneus brevis).



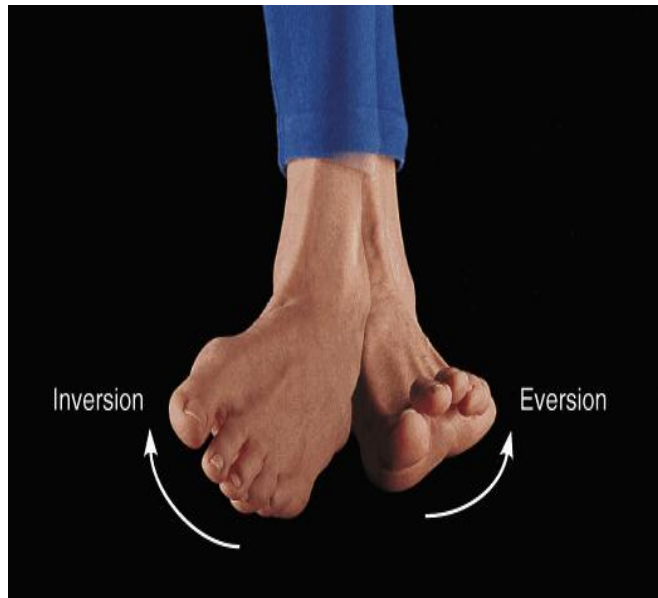
# N.B.

□ INVERSION & EVERSION MOVEMENTS occur at the talo-calcaneo-navicular joint.

MUSCLES PERFORM  
INVERSION :

Tibialis  
anterior.

Tibialis  
posterior.



MUSCLES PERFORM  
EVERSION :

Peroneus  
longus.

Peroneus  
brevis.

Peroneus  
tertius.

# NERVE SUPPLY

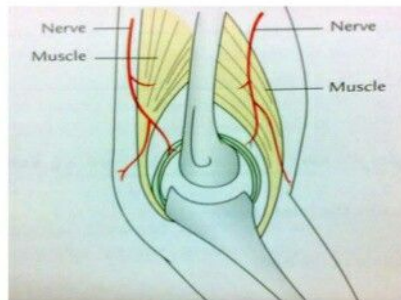
REMEMBER HILTON'S LAW:

“The joint is supplied by branches from nerves supplying muscles acting on it”.

## NERVE SUPPLY

- **HILTON'S LAW**

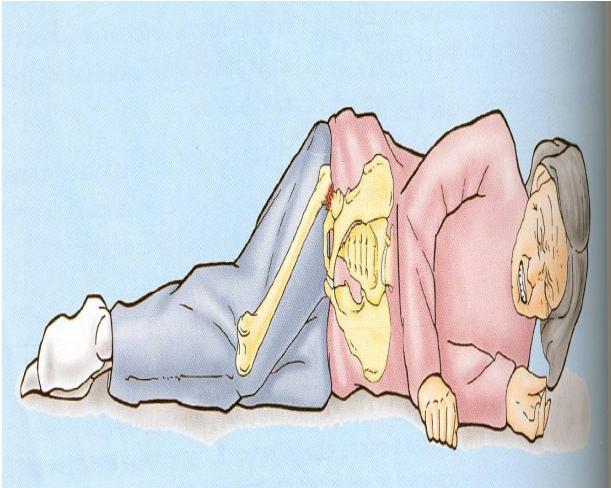
The nerves supplying the joint capsule also supply the muscles regulating the movement of the jt & skin over the joint.



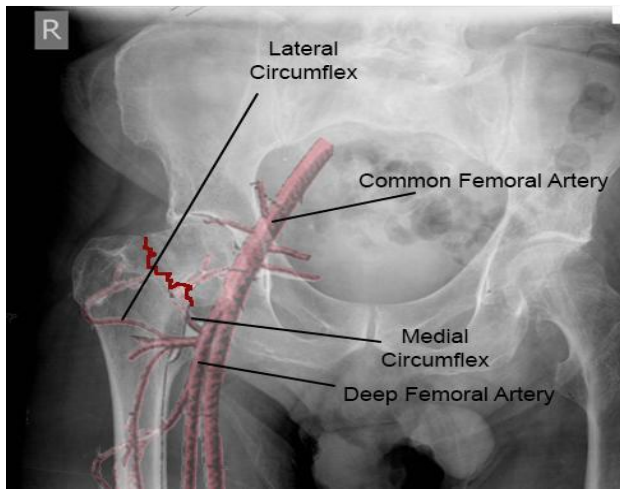


**THANK YOU**

# Fracture neck of the femur



- It is common after age of (60) years especially in women because of **Osteoporosis**.
- It results in **a vascular necrosis** of the head of femur.
- Blood supply to femoral head; Mainly is **medial femoral circumflex**.
- Displacement of femoral neck fracture will disrupt the blood supply and cause an **intracapsular hematoma**



# DISLOCATION OF HIP JOINT

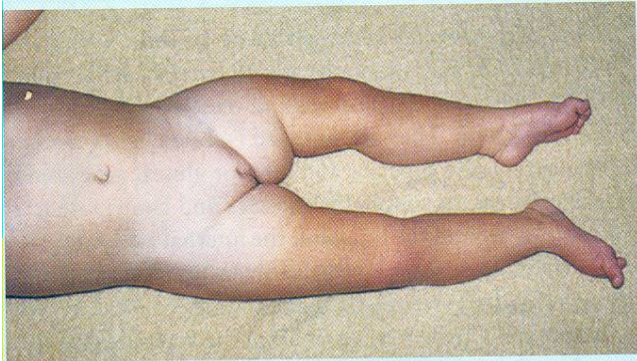
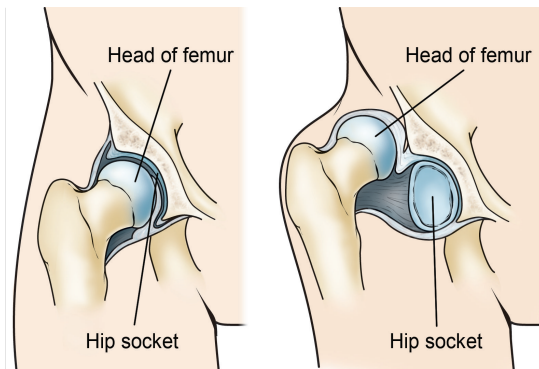
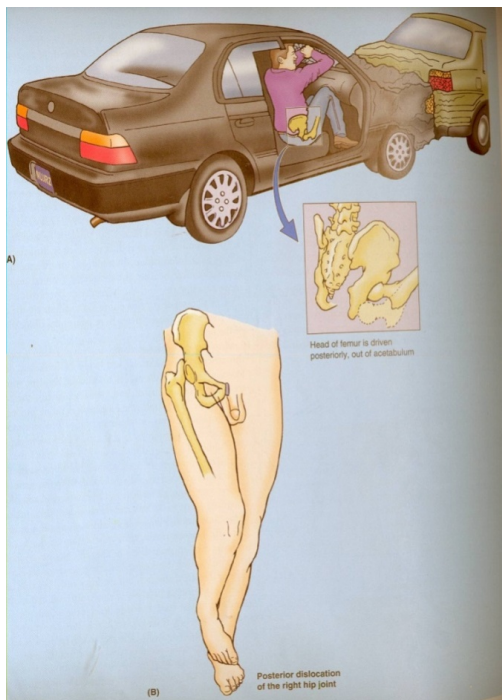


Figure 15.16 Congenital dislocation of left hip – note the extra skin creases in the upper thigh

- CONGENITAL
- More common in girls and associated with inability to adduct the thigh.
- The upper lip of the acetabulum fails to develop adequately.
- The head of the femur rides up out of the acetabulum onto the gluteal surface of the ileum.



- TRAUMATIC Hip Dislocation:
- It is common in motor vehicle accidents when the thigh is flexed and adducted.
- The dislocated head is displaced **posteriorly** to lie on the posterior surface of the ilium.
- In posterior dislocation the **sciatic nerve** is liable to be injured.

# Knee joint injury

## 1. Meniscal tears :

These pieces of cartilage can tear suddenly during sporting activities; **With a sudden meniscus tear**, a pop may be heard or felt in the knee. They may also tear slowly due to aging (**degenerative meniscus tear**).

## 2. Anterior cruciate ligament injuries :

Injuries to the ACL can be **serious and require surgery**.

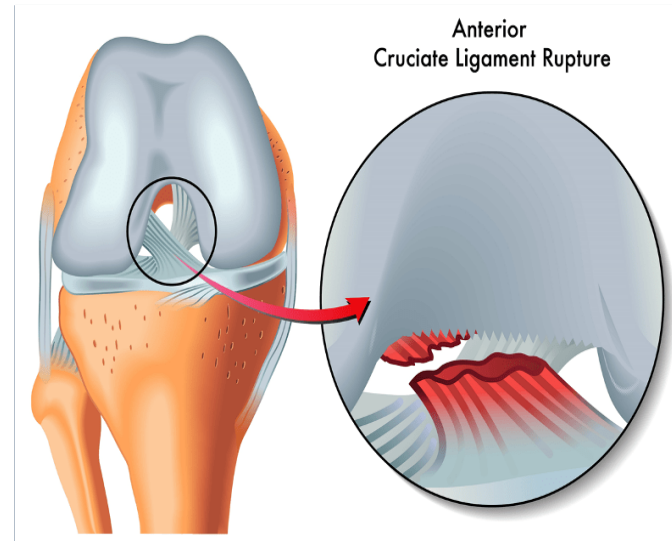
A grade 1 sprain is a mild injury to the ACL, while a grade 3 refers to a complete tear.

**Causes** : sports as in **Football**; Improperly landing from a **jump** or **quickly changing the direction**.

## 3. Posterior cruciate ligament injuries :

An injury to the posterior cruciate **requires powerful force while the knee is in a bent position**.

This happens **when someone falls hard onto a bent knee** or is in an **accident**.



# What are Kinds of Ankle Injuries?

**Ankle injuries are** Sprains, Strains, and Fracture; That affect **bone, ligament, or tendon**.

**A sprain** is a common sports injury, but can also happen any time a sudden twist displaces the ankle joint.

**A sprain** is the term that describes damage to **ligaments** when they are stretched beyond their normal range of motion. It ranged from mild to a complete tear or rupture.

**A strain** refers to damage to **muscles** and **tendons** as a result of being pulled or stretched too far.

**A fracture** describes a break in one or more of the **bones** in the ankle joint.

