Structure & Function of the Knee

One of the most complex “simple” structures in the human body.
The “middle child” of the lower extremity.
Objectives

Identify the bones and bony landmarks of the knee joint

Describe the supporting structures of the knee
The Knee Joint

Consists of
- Tibiofemoral joint
- Patellofemoral joint

Two planes of motion
- Flexion and Extension
- Internal and External Rotation
  - Any rotation occurs simultaneously with flex/ext
Screw Home Mechanism

External rotation in the last 20 degrees of extension

- A locking mechanism

Open Chain
-- Tibial Ext Rotation on femur

Closed Chain
-- Femoral Int Rotation on tibia
Osteology of the Knee

Distal femur

Right Femur

lateral epicondyle

medial epicondyle

intercondylar notch

patellar surface

lateral condyle

medial condyle

Anterior View

Posterior View

(ADDuctor tubercle)
Osteology of the Knee

The proximal tibia & fibula

The medial and lateral condyles of the tibia form the shallow articulations with the distal femur

The intercondylyar/intercondyloid eminence

the attachment point for the cruciate ligaments
Osteology of the knee

Base

Apex

Anterior view

Atricular surface

Posterior view
Anatomy of the Knee: Anterior Aspect

- Femur
  - Articular Cartilage
- Tibia
  - Tibial Tuberosity
- Fibula (head)
- Medial Meniscus
- Lateral Meniscus
- Medial Collateral Ligament
- Lateral Collateral Ligament
- Anterior Cruciate Ligament
Anatomy of the Knee: Posterior Aspect

- Femur
  - Medial condyle
  - Lateral condyle
  - ADDuctor Tubercle
- Tibia
- Fibula
  - Fibular Head
- Medial Meniscus
- Lateral Meniscus
- Posterior Cruciate Ligament
- Lateral Collateral Ligament
- Medial Collateral Ligament

Knee - Cruciate and Collateral Ligaments
Right Knee in Extension

Posterior View
Anatomy of the Knee

Cruciate Ligaments

**Anterior: (ACL)**
- resists anterior motion of the tibia on a fixed femur
- resists extremes of knee extension

**Posterior: (PCL)**
- resists posterior motion of the tibia on a fixed femur
- resists extremes of knee flexion
Common Pathologies of the Knee

The menisci:
absorb shock and disperse large compressive forces through the knee joint
They may not heal well:
inner 1/3: avascular (a)
middle 1/3: poor blood supply (b)
outer 1/3: good blood supply (c)
Genu Varum and Genu Valgum

Varus: inward deviation of the distal bone

Valgus deformity: outward deviation of the distal bone
Anatomy of the Knee: Genu “what?”

Genurecurvatum:
Hyperextension of the tibiofemoral joint placing excessive stress on the structures in the popliteal space

Tibial nerve
Popliteal Vein
Popliteal Artery
Common Peroneal Nerve