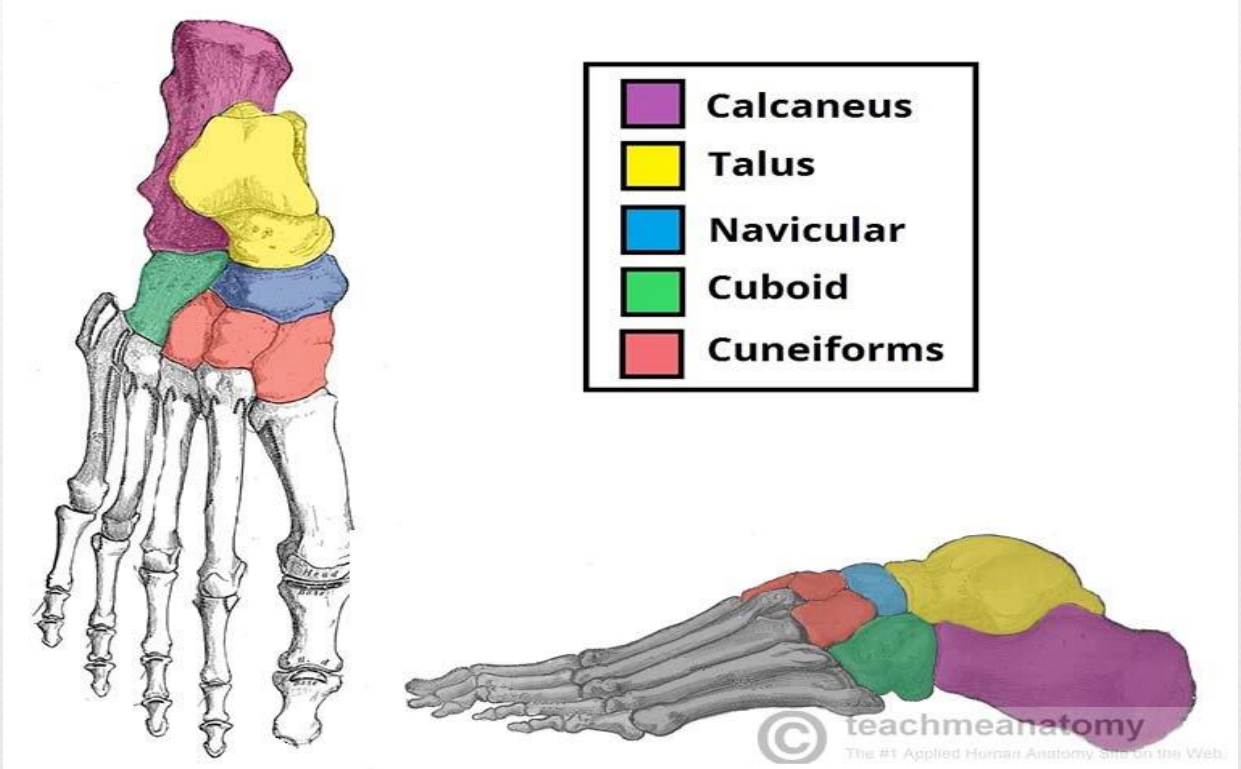
Lower Extremity

The Fun Begins

Foot

- Tarsal Bones
  - Calcaneus
  - Talus
  - Navicular
  - Cuboid
  - Lateral Cuneiform
  - Intermediate Cuneiform
  - Medial Cuneiform

Foot Bones


Calcaneus
Talus
Navicular
Cuboid
Cuneiforms
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Foot

- Metatarsals
  - Labeled 1-5 from great toe to pinky toe
    - Metatarsal Heads

Phalanges

- 2 in great toe
- 3 in each of the four lesser toes

Foot

- Arches
  - Longitudinal
  - Transverse
  - The foot also has 33 joints, over 100 tendons and countless ligaments
  - Transverse Tarsal Joints
    - Inversion and Eversion

Injuries to the Foot

- Too many to list them all

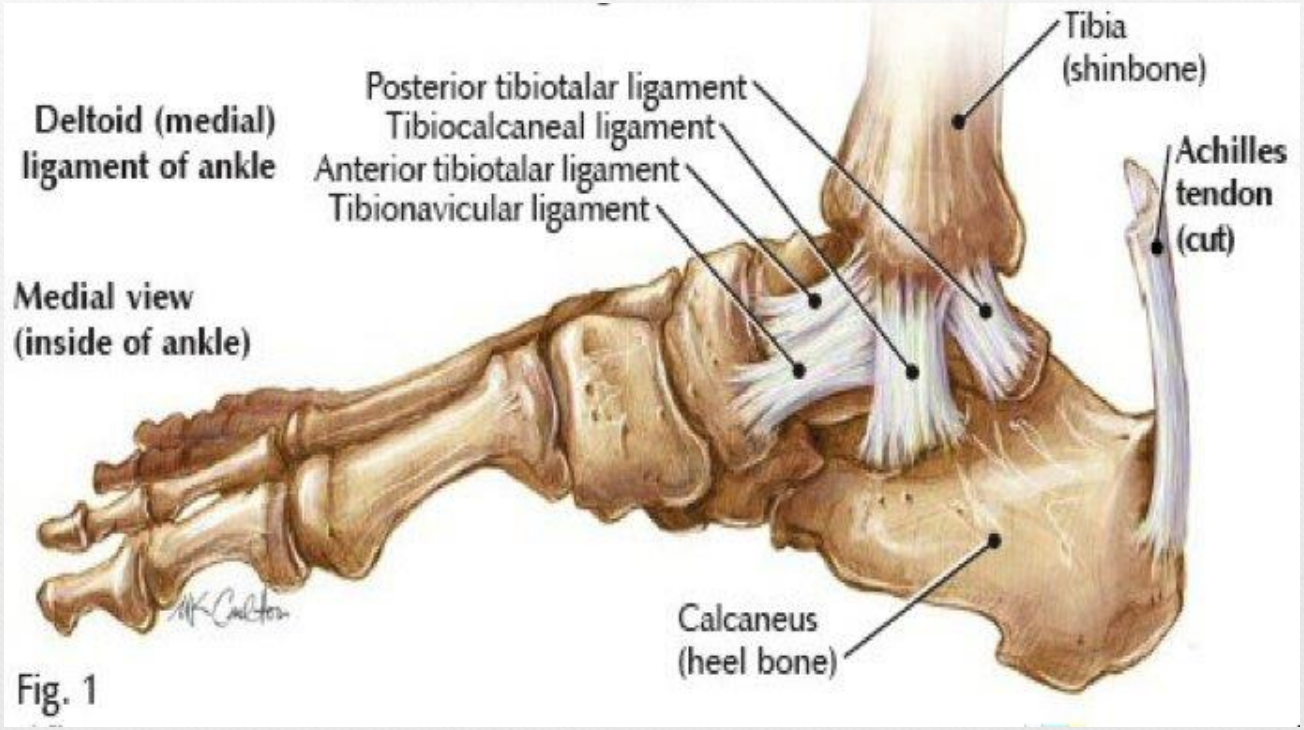
- Common Injuries:
  - Turf Toe - Mid-Foot Sprain
  - Spring Ligament - Plantar Fasciitis
  - Heel Bruise - Fractures
    - Other Foot Issues
      - Calluses – Keep them in check
      - Blisters – following slide
      - Athletes Foot Fungus – Damp, warm, dark environment

Ankle Joint

- True Joint - articulation between the talus and the tibia
- Tibia - medial malleolus
- Fibula - lateral malleolus
- Fibula non-weight bearing bone that serves as a point for muscle attachment of the muscles that control the ankle, foot and toes.

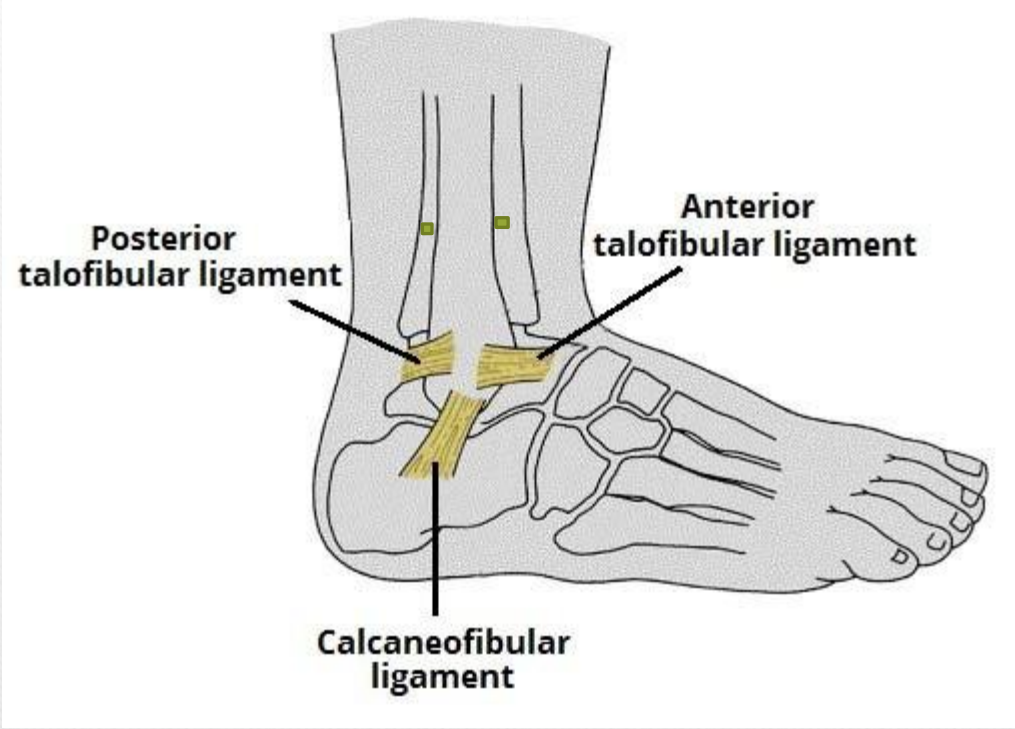
Ankle

- Stability
  - **Medial Ligament Complex** – Deltoid Ligament-Large complex ligament
    - MOI-Eversion
    - Testing – Eversion stress test in DF, Neutral, PF
  - **Tibiofibular Ligaments**
    - Rotation of body over ankle (cleats stick in turf)
    - Can also be sprained along with Medial or Lateral sprain
    - Testing – Eversion stress in neutral and DF
    - Testing – Squeeze Test


Deltoid (medial)
ligament of ankle
Posterior tibiotalar ligament
Tibiocalcaneal ligament
Anterior tibiotalar ligament
Tibionavicular ligament
Tibia
(shinbone)
Achilles
tendon
(cut)
Medial view
(inside of ankle)
Calcaneus
(heel bone)
Fig. 1

- **Lateral Ligament Complex**-3 separate ligaments
  - Anterior Talofibular (ATFL)
  - Calcaneofibular (CFL)
  - Posterior Talofibular (PTFL)
    - MOI – Inversion with plantar flexion, ATFL will go first, followed by the CFL
    - Inversion with ankle in neutral (90°)will damage the CFL first
    - Inversion in Dorsiflexion will normally injure the PTFL
      - Testing – ATFL – Anterior Drawer Test
      - CFL – Talar tilt test
      - PTFL – Posterior Drawer Test ☹. I rely more on location of pain with PTFL.

Lateral Ligaments



Back to HOPS

- Ask them how it happened – do they remember what position their ankle was in when force was applied?
  - "Landed on someone's foot coming down from a jump"
  - "I was standing there watching the play and somebody rolled into my ankle"
  - "My heel fell into a hole; my toes were pointing upwards"
    - Where is the swelling?
    - Where is the pain – Anterior? Distal Fibula? Posterior?
      - Then palpate and your stress tests

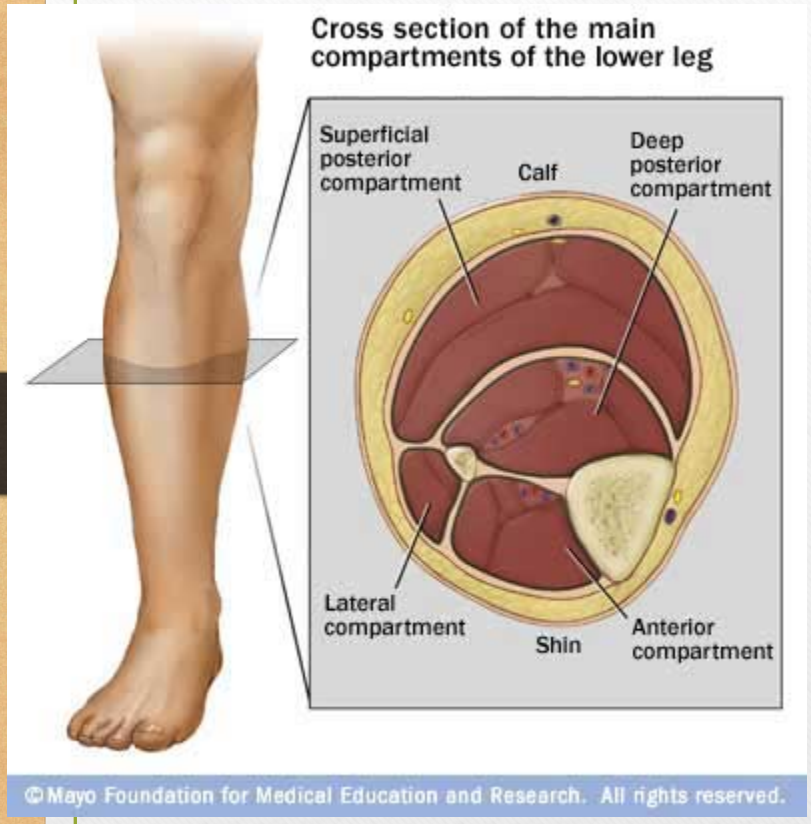
Other Ankle Issues

- Fracture
  - Avulsion Fractures – palpation bilaterally
  - Complete Fractures (picture)
- Dislocation
  - Uncommon by itself– normally associated with a fracture

Lower Leg

- Tibia
- Fibula
- Interosseous Membrane

- Lower Leg Injuries
  - Contusions – Can be very serious
    - Compartment Syndrome
      - Acute versus Chronic



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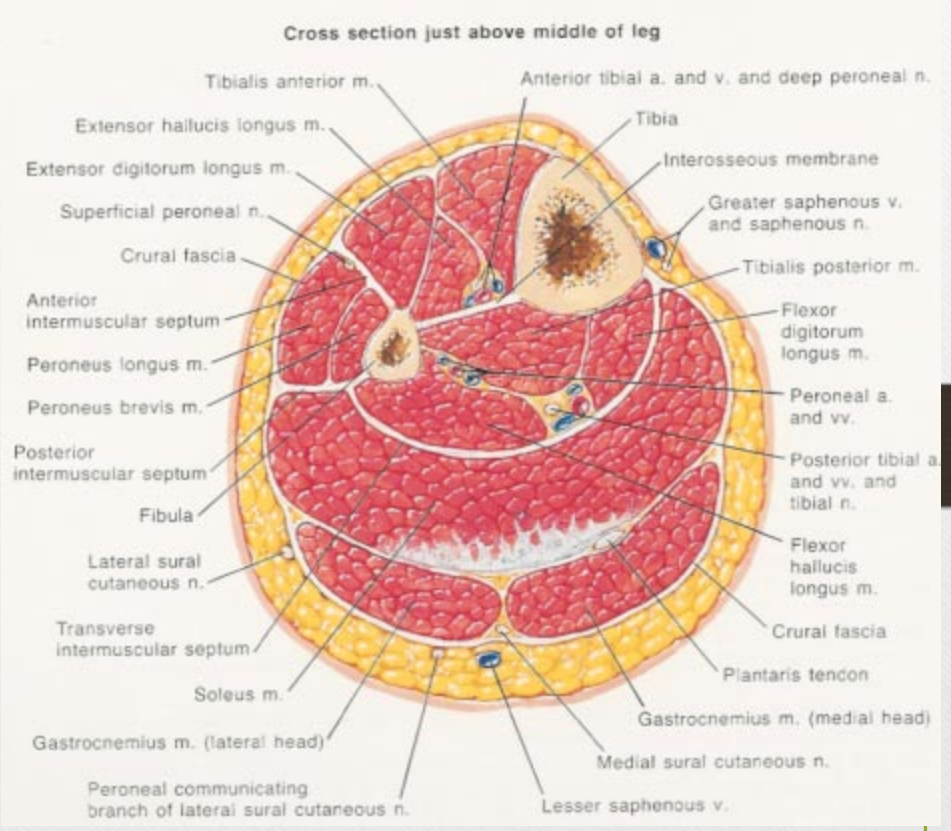
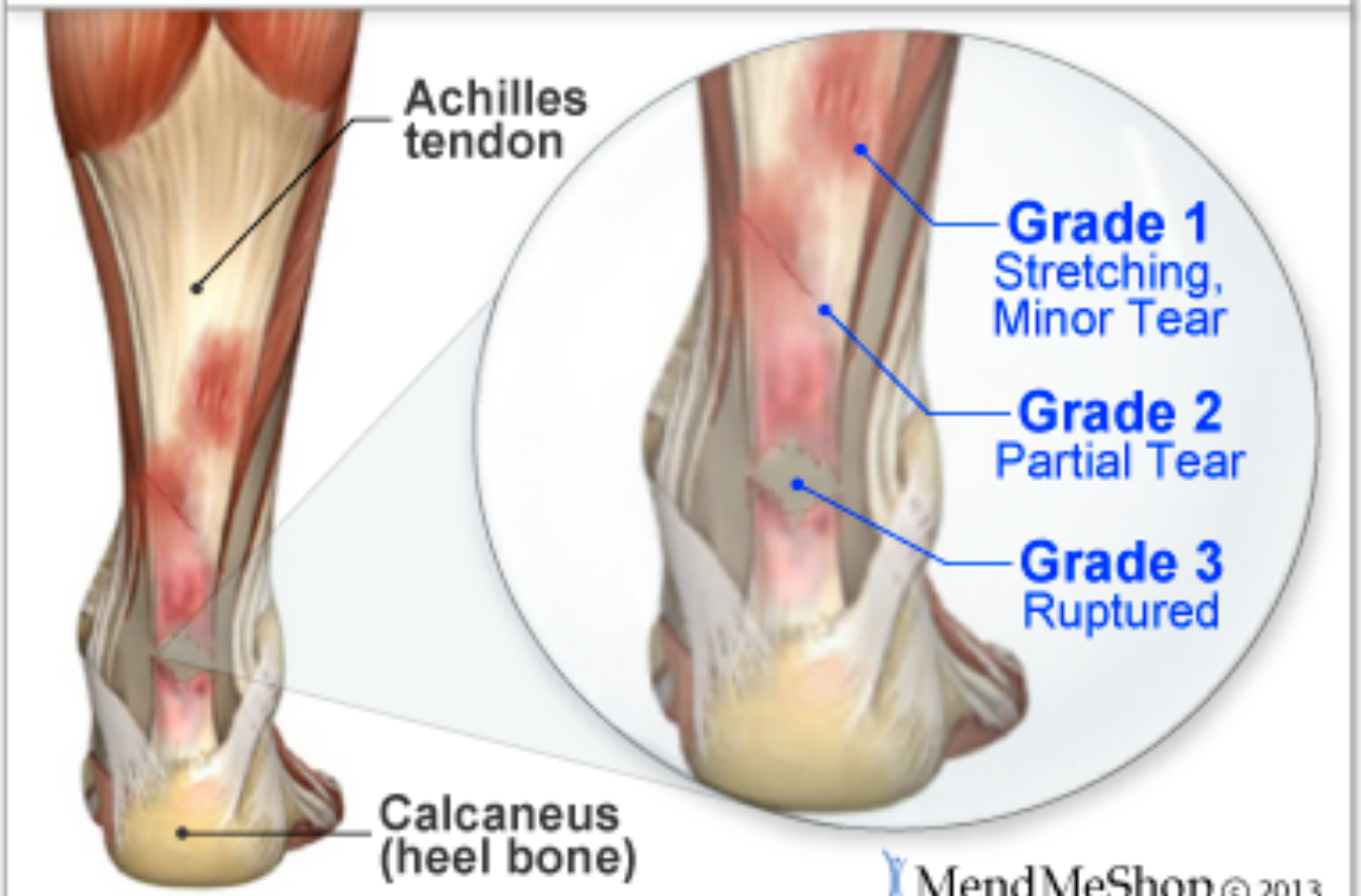


Lower Leg injuries

- Stress Syndrome/Stress Fracture
  - Either tibia or fibula
  - History, palpation Cues
- Muscle Strain (medial tibial stress syndrome)
  - History, palpation of associated structures, testing
  - Must palpate the arch – tibialis posterior, FHL, FDL, spring ligament (following slide)
  - Achilles Tendon Strain

Strained Achilles Tendon

The 3 Different Grades of Tendon Strains



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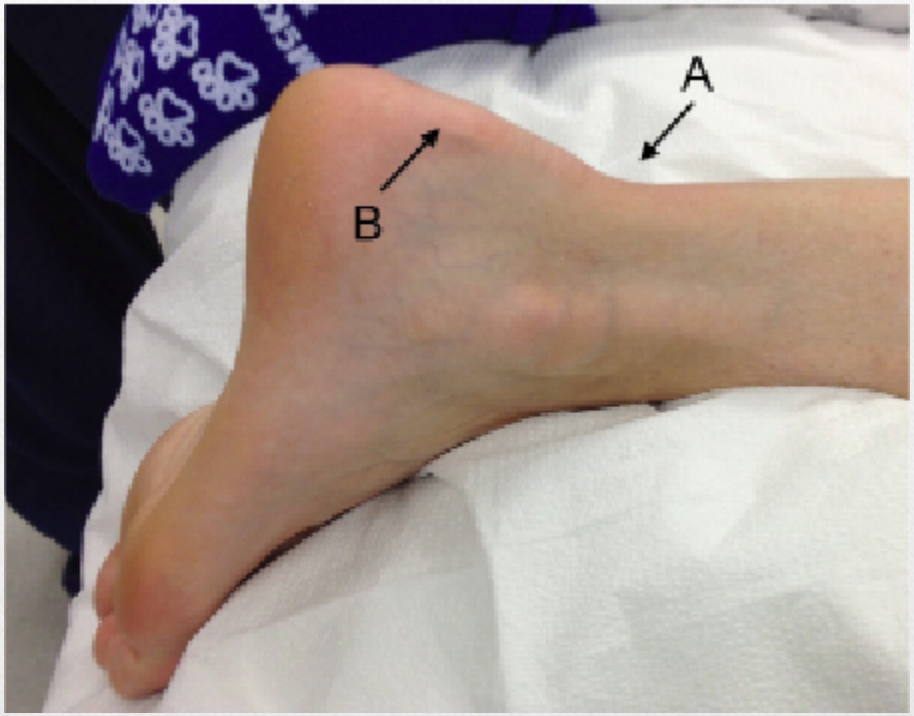
A
B

Knee

- Articulation of tibia and femur
- Largest joint in the body
- Capsule surrounds the condyles of the femur and extends three fingers above the superior pole of the patella. (joint effusion picture)

Knee

- Stability provided my numerous muscles and ligaments
- Muscles Include
  - Gastrocnemius
  - Hamstrings
    - Biceps Femoris – lateral insertion
    - Semimembranosus – posterior medial insertion
    - Semitendinosus – anterior medial insertion
  - Quadriceps
    - Vastus lateralis, medialis, intermedius
    - Rectus femoris

Two ligaments lie outside the joint capsule:

- tibial (medial) collateral ligament.
- fibular (lateral) collateral ligament

The two collateral ligaments prevent the knee from rotating when the joint is extended.

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Collateral Ligaments

- Ligament Structures
  - Lateral Collateral Ligament – Thin, cord ligament
  - Becomes looser in flexion
    - Your MOI, palpation and testing should guide you
    - MOI-Medial Blow
    - Palpation – from the head of the fibula superiorly across the joint line to the lateral femur
    - Testing – ADDUCTION stress test at 0°(or as close as possible), 15° and 30°. Expect the knee to feel loose(r) after you take it out of full extension.


Patella
(kneecap)
Lateral
collateral
ligament
Lateral
meniscus
Anterior
cruciate
ligament
Fibula
Femur
(thighbone)
Posterior
cruciate
ligament
Medial
collateral
ligament
Medial
meniscus
Tibia
(shinbone)

Collateral Ligaments

- Medial Collateral Ligament – Broad flat band ligament
  - Most commonly sprained ligament in the knee
  - Some fibers stay taut through entire range of motion
  - Deep and superficial layers
  - MOI-Blow from lateral side
  - Palpation – two fingers wide from 90° medial of the tibial tuberosity superiorly across the joint to the medial femoral epicondyle.
  - Testing – ABDUCTION stress test at 0°, 15°, 30°. Knee should remain stable in all three degrees as opposed to the LCL
- With either of these two the swelling will be located on the injured side but will be more spread out than it would be with a cruciate ligament injury


Tibial collateral ligament
Attaches to medial meniscus
ır tendon
Attaches to capsule
Gracilis
Sartorius
Semitendinosus


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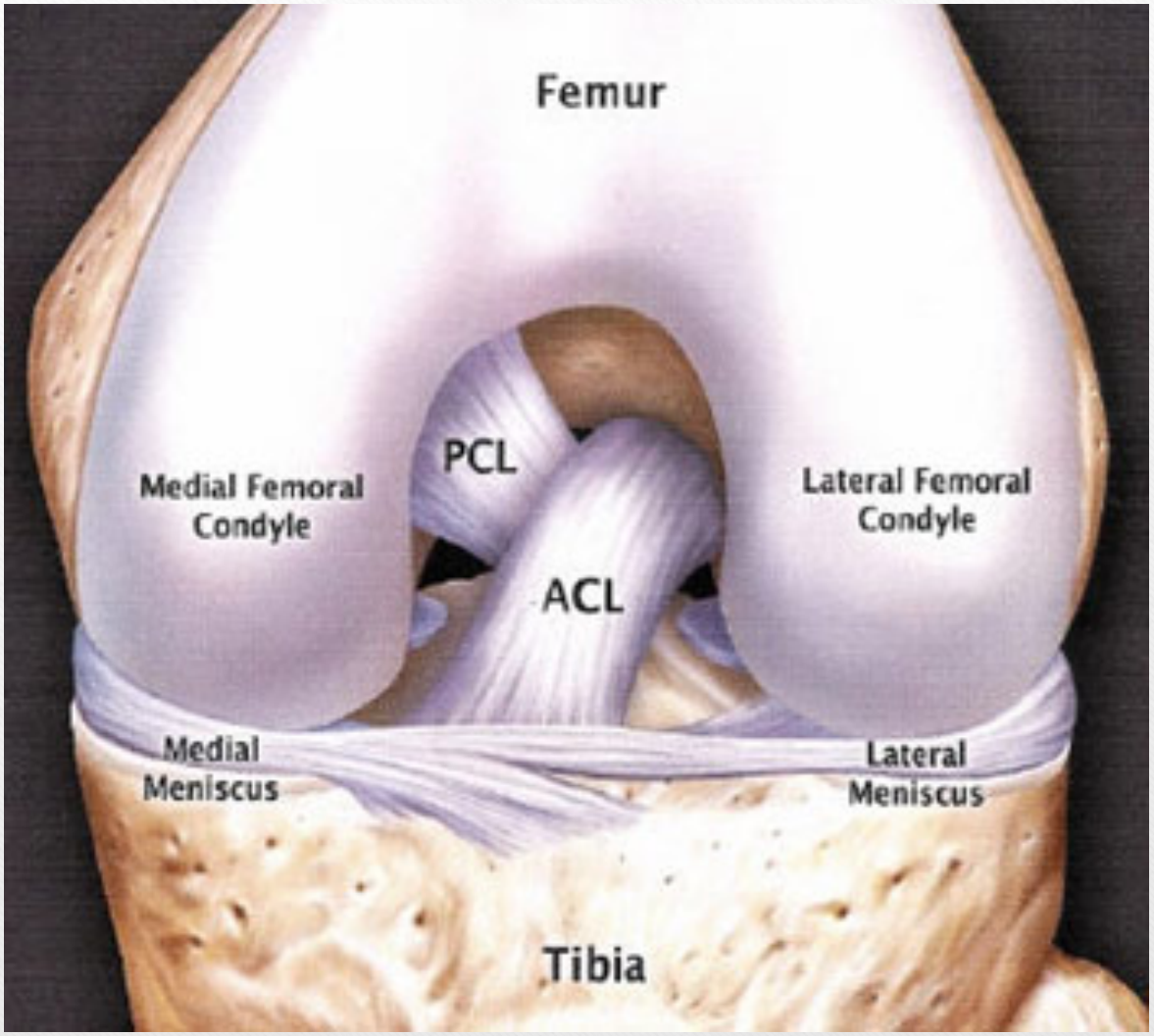
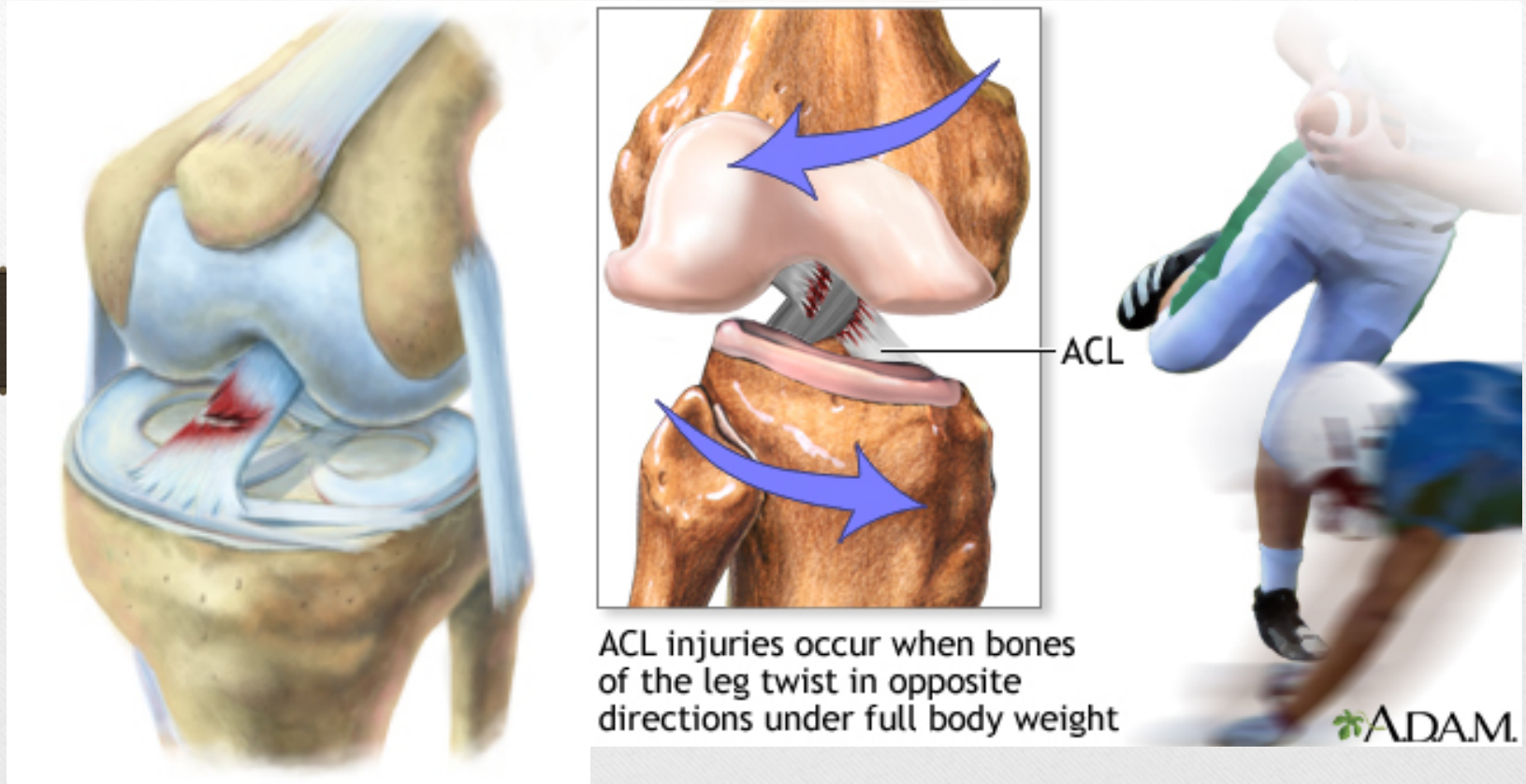
Cruciate Ligaments

- Named according to the tibial attachment
  - Posterior Cruciate Ligament
    - Tibia forced posterior or femur forced anterior (direct blow)
    - Forced Deep flexion
      - Stronger than ACL, located nearer to center of the joint
  - Anterior Cruciate Ligament
    - Get's all the publicity, injured much more frequently than PCL
    - Main stabilizing ligament in the knee
    - Tibia forced anterior or femur posterior (direct blow)
    - Deceleration, hamstrings don't react quickly enough
    - Deep flexion
    - Rotation over knee, foot normally fixed (cleats stick)

Testing of Cruciate Ligaments

- PCL – Godfrey's 90/90 test, Posterior Sag Test
- ACL Testing
  - Does joint effusion occur rapidly and completely surround the knee joint anteriorly?
    - Lachman's test before swelling sets in. If swelling is already present, WHERE the swelling is located and the AMOUNT OF TIME that has past since the injury occurred can guide you.
    - ACL or PCL? Both will look the same objectively and it is quite possible that the MOI could be the same. In either case, a doctors referral will be necessary

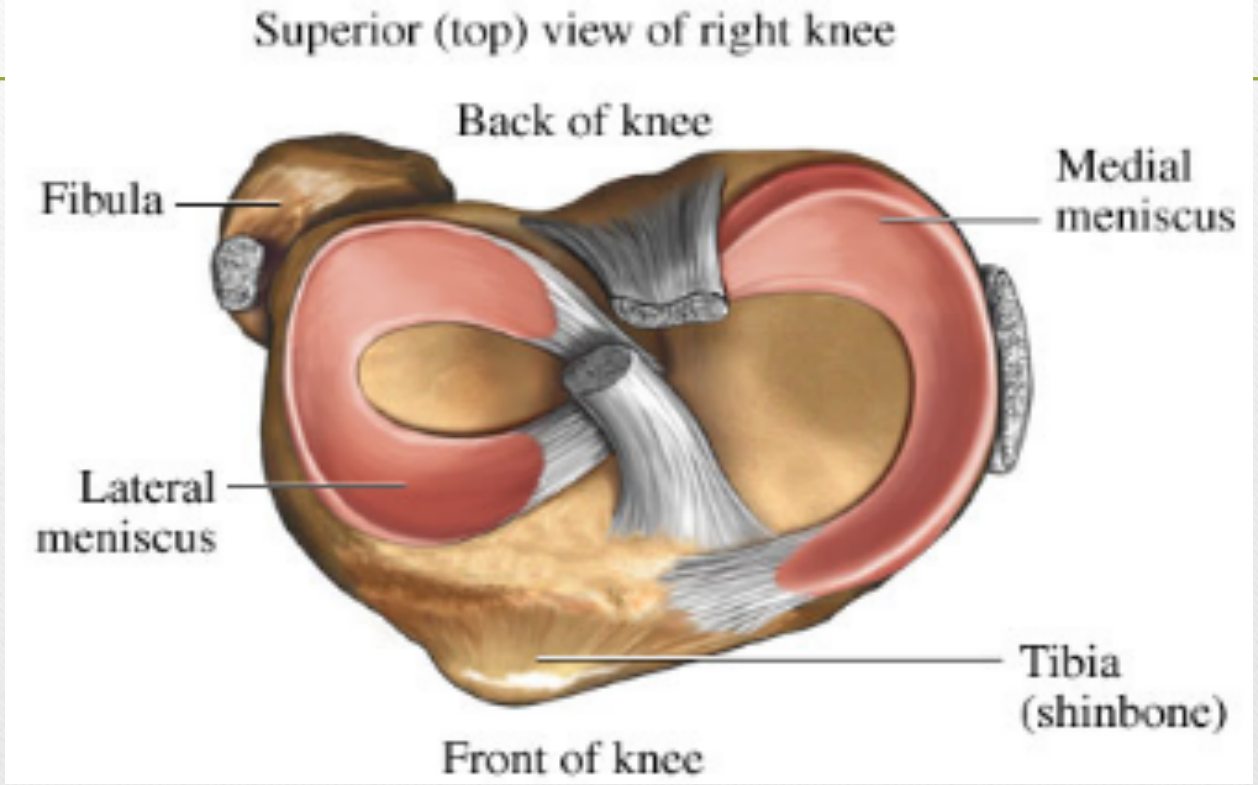

Femur
PCL
Medial Femoral Condyle
Lateral Femoral Condyle
ACL
Medial Meniscus
Lateral Meniscus
Tibia


ACL
ACL injuries occur when bones of the leg twist in opposite directions under full body weight
A.D.A.M.

Meniscus Injuries

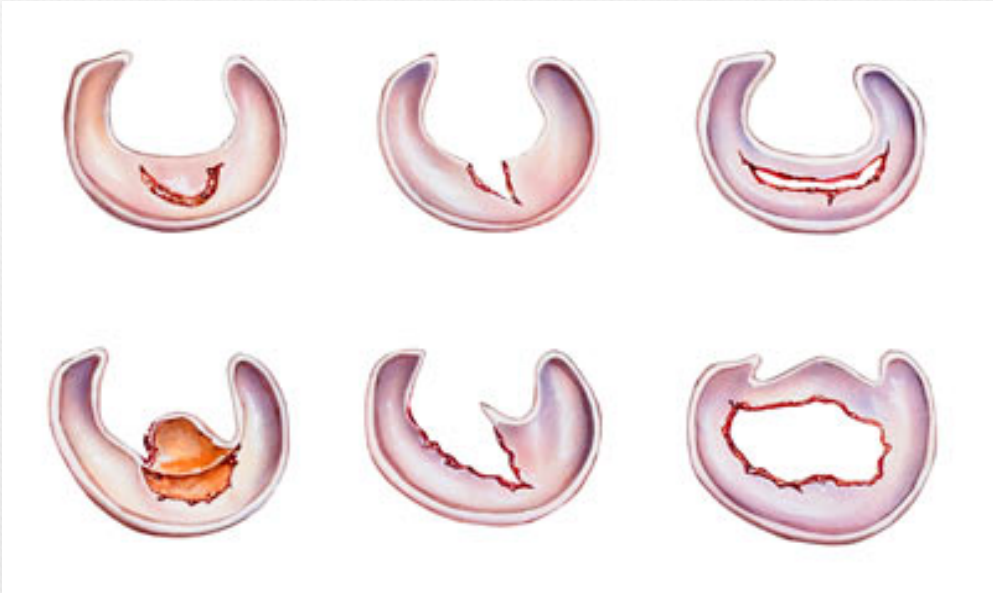
- Lateral Meniscus – Greater freedom of movement
- Medial Meniscus
  - Each is firmly attached at the periphery to the tibia
  - It is said that menisci tear when they are *trapped, pinched or crushed* between the femur and the tibial plateau.
- Tears
  - Flap, longitudinal, bucket handle
    - The actual tear is not of importance – most will need surgical intervention
      - Testing – Sweep Test

Meniscus


Superior (top) view of right knee
Back of knee
Fibula
Medial meniscus
Lateral meniscus
Tibia (shinbone)
Front of knee

Meniscus Tears

Flap Tear Radial Tear Longitudinal Tear
Parrot Beak Tear Bucket Handle tear



This is What Makes You Smarter

- Cruciate ligament injuries will cause major effusion in a short period of time (normally less than 24 hours). This is due to the great blood supply to these ligaments. Bloody Effusion
- Meniscal injuries will swell much slower (week(s) because they have a poor blood supply and the increase in joint swelling is caused by synovial fluid. This would yield a clear or straw colored effusion. This is where the sweep test is very effective in establishing an effusion.

Other Issues Around the Knee

- Pre patellar bursitis (next slide)
- Patellar Subluxation
- Chondromalacia Patella
- Patellar Tendinitis – Jumpers Knee
- Osgood Schlatter Disease
- ITB Friction Syndrome