Thigh, Lower Leg and Ankle
Knee Bony Anatomy

**Femur**
- Condyles
  - Lateral
  - Medial

**Tibia**
- Tibial Tuberosity
- Medial Malleolus

**Fibula**
- Lateral Malleolus

**Patella**
- Patellar tendon
Joints of the Knee

Tibiofemoral

- Joint formed between the tibia and femur
- Allows knee flexion/extension

Patellofemoral

- Joint formed between the patella and femur
Soft Tissues

Menisci—medial & lateral
- Fibrocartilaginous disks
- Act as cushions between ends of femur and tibia/fibula
  - Outer 1/3 vascular
- Make knee joint more stable
  - Medial attached to MCL
Ligaments of Knee

Medial Collateral (MCL)
- Resists valgus forces

Lateral Collateral (LCL)
- Resists varus forces

Anterior Cruciate (ACL)
- Resists anterior translation of the tibia

Posterior Cruciate (PCL)
- Resists posterior translation of the tibia
Patellar Tendon

• Attaches the quadriceps muscle group to the tibia
Muscles of the Knee

- **Quadriceps (anterior)**
  - Vastus medialis
  - Vastus intermedius
  - Vastus lateralis
  - Rectus femoris
    - All extend the knee

- **Hamstrings (posterior)**
  - Biceps femoris
  - Semitendinosus
  - Semimembranosus
    - All flex the knee
Common Knee Injuries

WEIRD.
YOU INJURE YOUR KNEE, HE FAINTS.
Patellofemoral Syndrome

**Causes**
- Tight hamstring and calf muscles
- Increased Q-angle
- Poor foot mechanics
- Weak quadriceps muscle

**Treatment**
- Orthotics
- Muscle strengthening
- Muscle stretching
- Patellar tracking taping

**S/S**
- Dull ache
- Crepitus
- Pain with compression
- Tenderness on Patellar edge
Patellar Tendonitis

- **Signs & Symptoms**
  - Anterior knee pain
  - Local tenderness
  - Local swelling

- **Treatment**
  - Modify activity
    - Non-impact activities
  - Stretching/strengthening quads
  - Ice
  - Specialized bracing & taping
  - NSAID’s

- aka “Jumper’s knee”
- Inflammation of the patellar tendon d/t repetitive deceleration
MCL Sprain

MOI

- Valgus force medial tibiofemoral joint
- Blow to lateral aspect of knee
- High-energy twisting maneuver

Signs & Symptoms

- Pain & tenderness on medial aspect of knee
  - Joint line
  - Bony attachment sites
- Limited motion in full flexion and extension
- Swelling
- Varying degrees of laxity
MCL Sprain—Treatment

- RICE
- Rehab
  - Submax strengthening in subacute stage, but only if painfree
  - Bike once gain flex 110-115 degrees
- Gentle active & passive stretching
- Avoid valgus & twisting forces
- Restrict activity until asymptomatic
LCL Sprain

- Not frequently involved in sports injuries
- MOI: varus stress on lateral tibiofemoral joint
- Signs/symptoms & treatment similar to those of MCL sprain
ACL Injuries

- Females who participate in soccer and basketball 4-6 times more likely than males who play same sport
- 70% are non-contact injuries
- Why incidences higher in females?
Female Factors & ACL

1. Biomechanical factors
   - Use quads more than hamstrings
   - Land on flat foot vs toes
2. Hormonal influences
   - Estrogen levels
3. Environmental factors
4. Anatomic risk factors
ACL Tear

- Contact or non-contact
- Low to lateral knee
- Knee joint in combined position of flexion, valgus, and rotation of tibia on femur

- Once stretched or ruptured, will not heal
- Often accompanied by meniscus tears and/or MCL sprains
ACL Tear—Signs/Symptoms

- Heard or felt “pop”
- Rapid effusion
- Knee “buckles” or “gives way”
- F/u with orthopedist
  - MRI to confirm
ACL Tear—Treatment

- Acute: splint, ice, compressive wrap, crutches
- Reconstructive surgery necessary to replace ACL
  - Patellar tendon
  - Hamstring tendon
  - Cadaver
- Comprehensive rehab (6 months)
PCL Injuries

- Account for 3-20% of all injuries
- Less researched because injured less often (compared to ACL)
- MOI: tibia strikes ground/object and is pushed backward
  - Motor vehicle accident
  - Industrial accident
  - Fall on flexed knee with foot flexed
  - Hyperflexion of knee
### Signs & Symptoms
- Heard or felt “pop”
- Minimal swelling
- Posterior tibial sag

### Treatment
- **RICE**
- **Rehab**
  - Strength
    - Quadriceps
  - Proprioception
- Surgery usually avoided
Meniscus Tears

- Knee twisted suddenly
  - One or both menisci become trapped between femur and tibia
- Ligaments in & around knee torn
- As ages, menisci lose their rubbery consistency → will soften and fray
  - Weakened structures torn more easily
Meniscus Tears

**Signs & Symptoms**

- Mild knee swelling over several hours or more
- Joint line pain
- Locking
- Giving way of knee

**Treatment**

- **RICE**
  - Rehab (non-surgical)
    - Strength
    - ROM
    - Activity modification
    - NSAIDS
    - Support sleeve
  - Surgery
    - MRI

![Sagittal Knee Meniscus Tear](image-url)
Patella Dislocation

- **MOI**
  - Plants foot, decelerates, change of direction

- **Signs/Symptoms**
  - Obvious deformity
  - Pain
  - Swelling
  - Loss of function

- **Treatment**
  - RICE
  - Immobilize
  - ROM & strengthening
  - Taping and bracing
Thigh Contusion

MOI
- Severe impact to the thigh

S/S
- Pain
- Loss of function
- Swelling

Treatment
- Ice
- Compression with knee flexed

Wear protective equipment
Lower Leg Anatomy

- Tibia
  - Medial malleolus
- Tibial tuberosity
- Fibula
  - Lateral malleolus
- Talus (link between lower leg & foot)
Muscles of the Lower Leg

- **Anterior tibialis**
  - Dorsiflexion at the ankle
    - Anterior of tibia

- **Posterior tibialis**
  - Inversion at the ankle
    - Posterior of tibia
Muscles of the Lower Leg (lateral)

- Peroneus longus & brevis
  - Eversion of the foot and ankle
    - Along the fibula
Muscles of the Lower Leg (posterior)

- **Gastrocnemius**
  - Plantar flexion at the ankle and assists with knee flexion

- **Soleus**
  - Plantar flexion at the ankle
Bones of the Foot

- Calcaneous
  - Heel bone

- Metatarsals
  - 5 bones

- Phalanges
  - 14 bones
  - toes

- talus
Joints of the Foot

- **Tibiotalar/Talocrural**
  - Allows ankle plantar and dorsiflexion

- **Subtalar**
  - Allows inversion and eversion

- **Midfoot**
  - Tarsals meet metatarsals

- **Metarsal phalangeal (MP)**
  - Allows toe flexion/extension

- **Interphalangeal (DIP/PIP)**
  - Allows flexion/extension of toe segments
Ankle Motions

- **Plantar Flexion**
  - Point toes down

- **Dorsiflexion**
  - Lift toes up

- **Inversion**
  - Point toes medially

- **Eversion**
  - Point toes laterally
**Ankle Articulations**

**Talar Joint (Talocrural joint)**
- Tibia & fibula with talus
- Dome of talus articulates with mortise formed by tibia & fibula
- *Motions*: dorsiflexion & plantar flexion

**Subtalar Joint**
- Articulation of talus with calcaneus
- *Motions*: inversion & eversion
Ligaments

- Lateral aspect
  - Anterior talofibular (ATF)
  - Anterior tibiofibular
  - Calcaneofibular (CF)
  - Posterior talofibular

- Medial aspect
  - Deltoid Ligament
Common Injuries to the Ankle & Lower Leg
**Contusions**

- Occur most often on tibia
- Can be painful and disabling
- Complication → compartment syndrome
Muscle Strains

- Most common in calf
- Result from:
  - violent contraction
  - Overstretching
  - Continued overuse

- Usually occur in area of MTJ or insertion of Achilles tendon
- Result from:
  - Repetitive overuse
  - Single violent contraction

- Acute strain to Achilles have tendency to become chronic
Medial Tibial Stress Syndrome

- aka “shin splints”
- Catchall term for pain that occurs below knee
  - Anterior shin
  - Medial shin

Associated with:
- repetitive activity on hard surface
- forcible excessive use of leg muscles (running, jumping)
- tightness of gastroc and/or soleus muscles
- improper footwear
- running biomechanics
MTSS Treatment

- Ice
- Reduce activity level
- Biomechanical assessment
- Orthotics
- NSAIDs
- Strengthening and flexibility program
Ankle Sprains

- **MOI:** combo of excessive inversion and PF
  - aka lateral ankle sprain

- **Anterior Talofibular Ligament (ATF)**
  - Calcaneofibular (CF)
  - Posterior talofibular (PTF)

- **Eversion (medial) ankle sprain less common**
  - Deltoid ligament
Ankle Sprains

- Injury to ligamentous and capsular tissue
- Traumatic joint twist that results in stretching of total tearing of the stabilizing connective tissue
- One of most common & disabling sports injuries

General Symptoms:
- Joint swelling
- Local temperature increase
- Pain
- Point tendernessness
- Skin discoloration
- **Inversion**
  - Anterior Talofibular
  - Calcaneofibular
  - Posterior Talofibular

- **Eversion**
  - Deltoid Ligament

- **Syndesmotic**
  - High ankle sprain
Ankle Sprain—S/SXS

- **Grade 1**
  - Some pain
  - Minimum LOF
  - Mild point tenderness
  - Little or no swelling
  - No abnormal motion

- **Grade 2**
  - Pain
  - Moderate LOF
  - Swelling
  - Slight to moderate instability

- **Grade 3**
  - Severe sprain
  - Extremely painful initially
  - LOF
  - Severe instability
  - Tenderness
  - Swelling
Ankle Sprain—Treatment

- R.I.C.E.
- Crutches
- Boot
- Splint, tape, brace
- Compressive wrap
- Horseshoe
Turf Toe

- Great toe strain
- Hyperextension of the first MTP joint of the big toe
- Treatment:
  - RICE & Symptomatic modalities
  - Limit movement
    - Turf toe taping
    - Steel toe insoles
## Plantar Fasciitis

<table>
<thead>
<tr>
<th>MOI</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Tight calf muscles</td>
<td>- Calf stretching</td>
</tr>
<tr>
<td>- Poor arch support</td>
<td>- Plantar stretching</td>
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<tr>
<td>- Over striding while running</td>
<td>- Heel cup/orthotics</td>
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</tbody>
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<table>
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<tr>
<th>S/S</th>
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<tr>
<td>- Medial heel pain in morning</td>
<td></td>
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<tr>
<td>- Pain with forced D/F of toes</td>
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![Before Image](image-url)
QUESTIONS?