

RUNNING INJURIES: PREVENTION AND REHABILITATION



FURMAN INSTITUTE OF RUNNING & SCIENTIFIC TRAINING

FIRST

Topics of Tonight's Lecture

- ◆ Common Injuries and Treatments
- ◆ Causes of Common Injuries
- ◆ Measures to Avoid Injury



Most Common Running Injuries

- ✦ Plantar Fasciitis
- ✦ Achilles Tendonitis
- ✦ Tibial Stress syndrome
 - AKA shin splints
- ✦ Iliotibial band syndrome
- ✦ Runner's knee
- ✦ Stress fractures
- ✦ Acute Muscle Tears

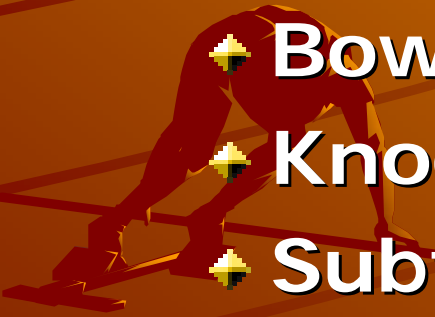
✦ Caused by

- 1) Training errors (too much too soon, for too long)
- 2) Inappropriate footwear
- 3) Inadequate strength
- 4) Inadequate flexibility
- 5) Poor biomechanics



Common Anatomical Afflictions

- ◆ Reduced Ankle Range of Motion
- ◆ Leg-length asymmetry
- ◆ Increased quadriceps angle
- ◆ Bow Legs
- ◆ Knock knees
- ◆ Subtalar Hyper Mobility
- ◆ High-arched or flat feet



Factors Related to Risks of Running Injuries

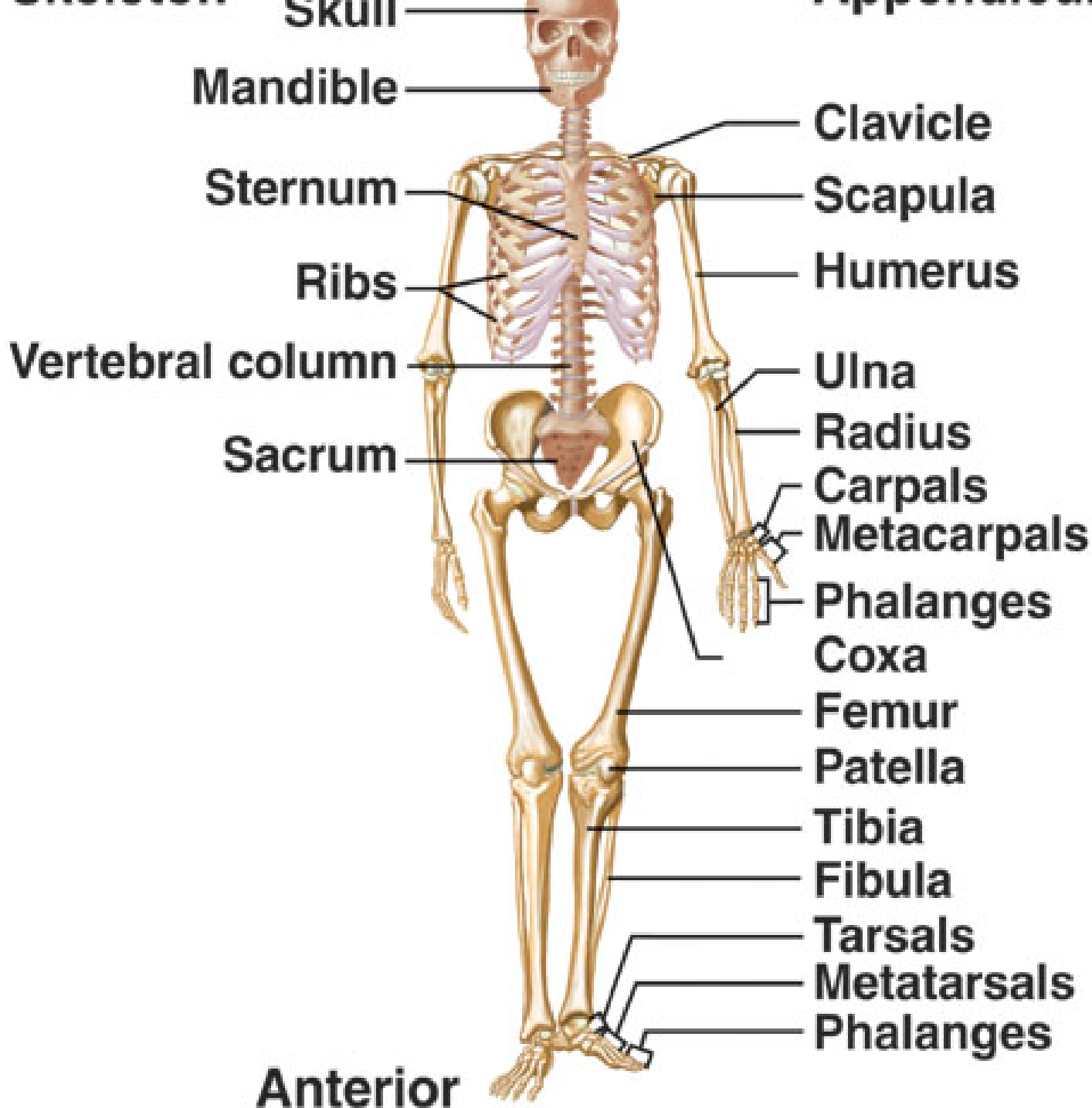
- Previous injury
- Lack of running experience
- Competitive running
- Excessive weekly running distance
- Low body mass



How To Avoid Injury

- ◆ Proper shoes
- ◆ Warm-up
- ◆ Training methods
- ◆ Stretching
- ◆ Muscle strengthening





PesCavus/PesPlanus

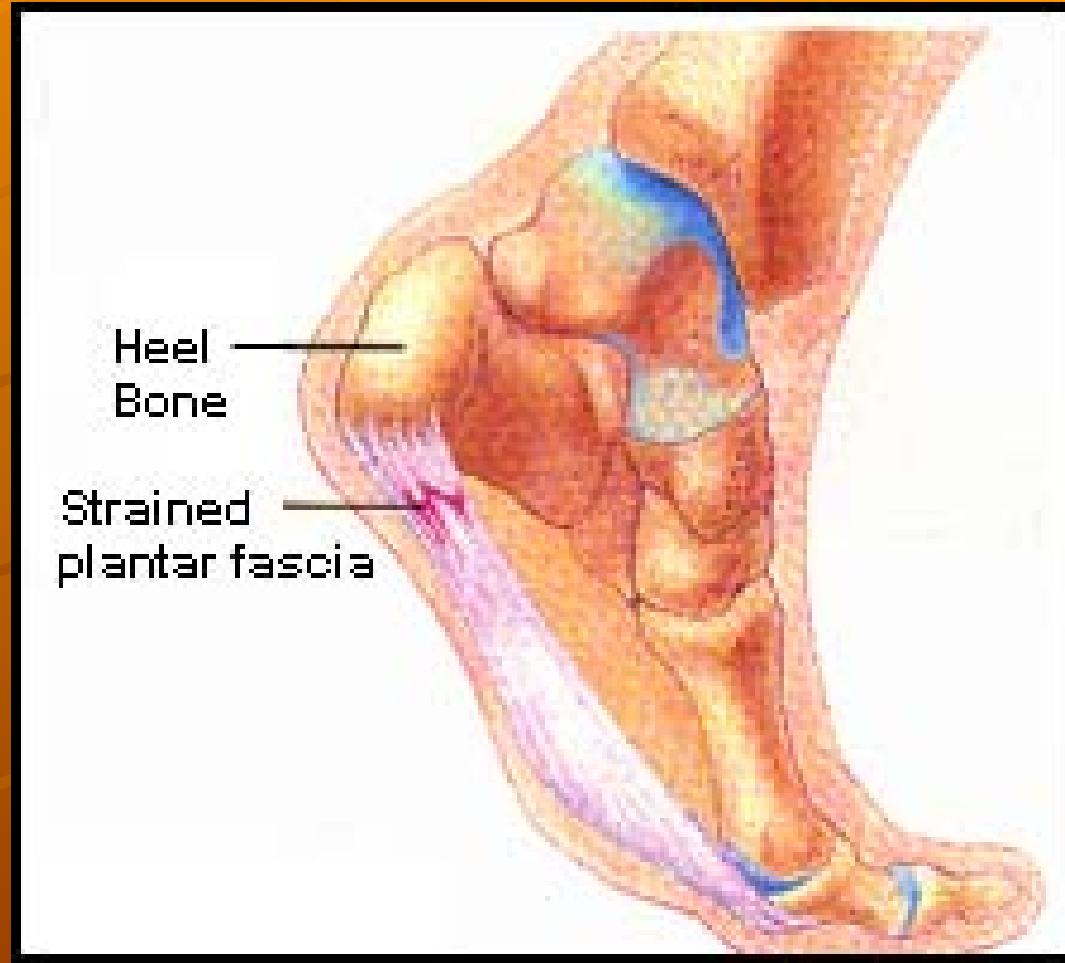
Pes Cavus associate with a more rigid foot and lateral leg injuries

Pes Planus associated with hypermobile foot and medial leg injuries

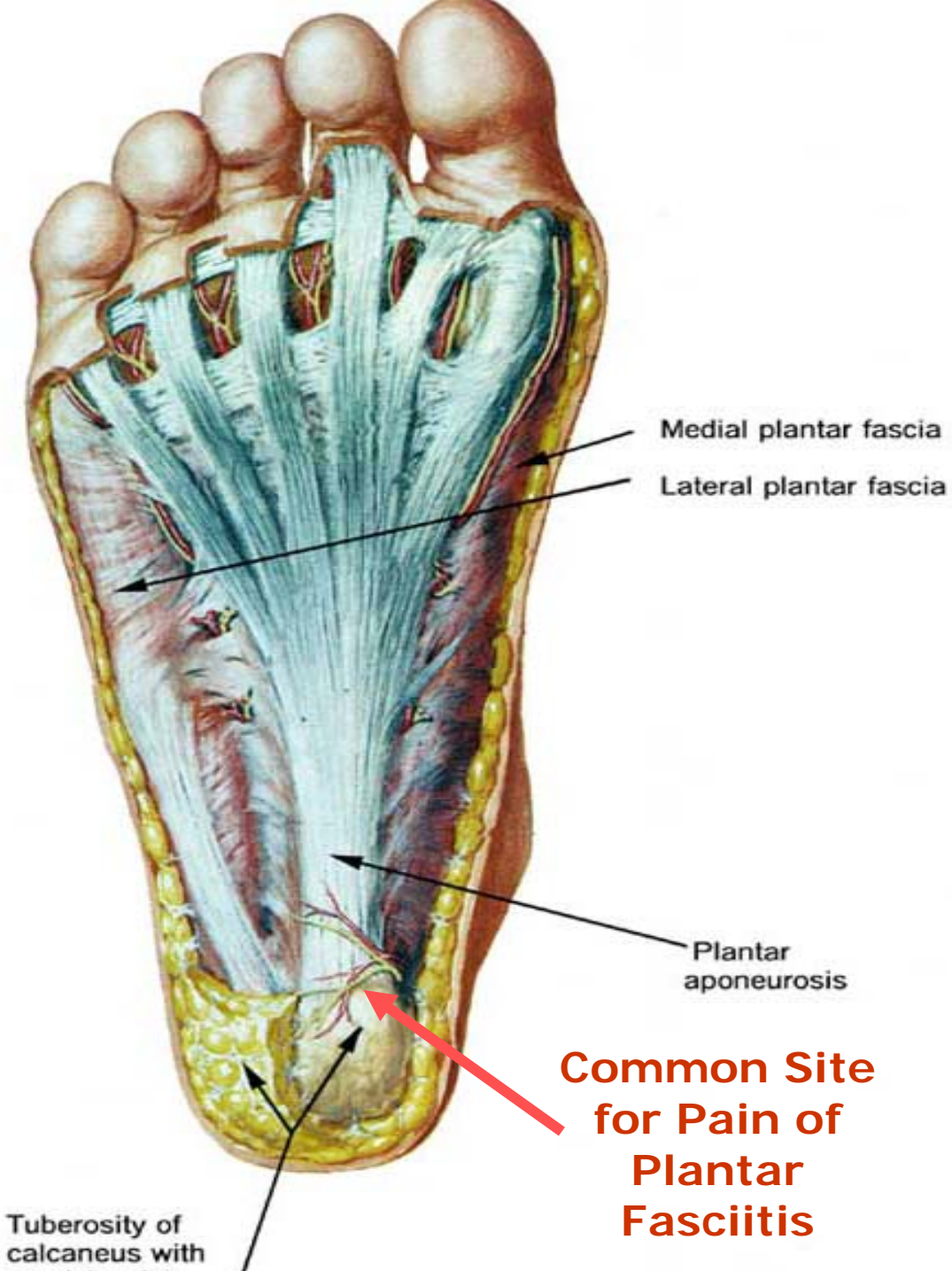


Plantar Fasciitis/Heel Pain

- ✦ **Definition:**
Inflammation of plantar fascia most often occurring at the origin on the heel (inside edge).
- ✦ Also may be associated with heel spurs (not necessarily the cause of the fasciitis)
- ✦ Chronic injury caused by repetitive overuse (changes in training levels)



Plantar Fascia of Right Foot



Plantar Fasciitis

✦ Etiology:

- Repetitive stress (traction) during weight bearing and/or push off
- predisposing factors: rigid pes cavus, shortened achilles tendon, hypermobile forefoot

✦ Pathology:

- Microtrauma/inflammation at the insertion of the plantar fascia into the calcaneous with w/out bony exostosis formation (calcaneal spur)



Plantar Fasciitis/Heel Pain

✦ Symptoms:

- Pain located in middle to medial aspect of heel
- Mornings bad, improves slightly during day and worse by end of day
- Pain is activity dependent

✦ Treatment:

- Effective in 95-98% of people
- Stage 1:
 - ✦ NSAID's, stretching, heel pads, over the counter orthotics, physical therapy
- Stage 2:
 - ✦ Steroid injection, night splint, custom orthotics, physical therapy
- Stage 3:
 - ✦ Surgical considerations after 6-12 months of failed conservative RX, new "shock wave therapy"

The Pain of Fasciitis



Treatments for Plantar Fasciitis



Helps increase flexibility of Plantar fascia.



Prevents shortening of fascia over night.

Pronation of Talar and Subtalar Joints

Stresses

Tibial/Fibular Joints

Achilles' Tendon

Deltoid Ligament

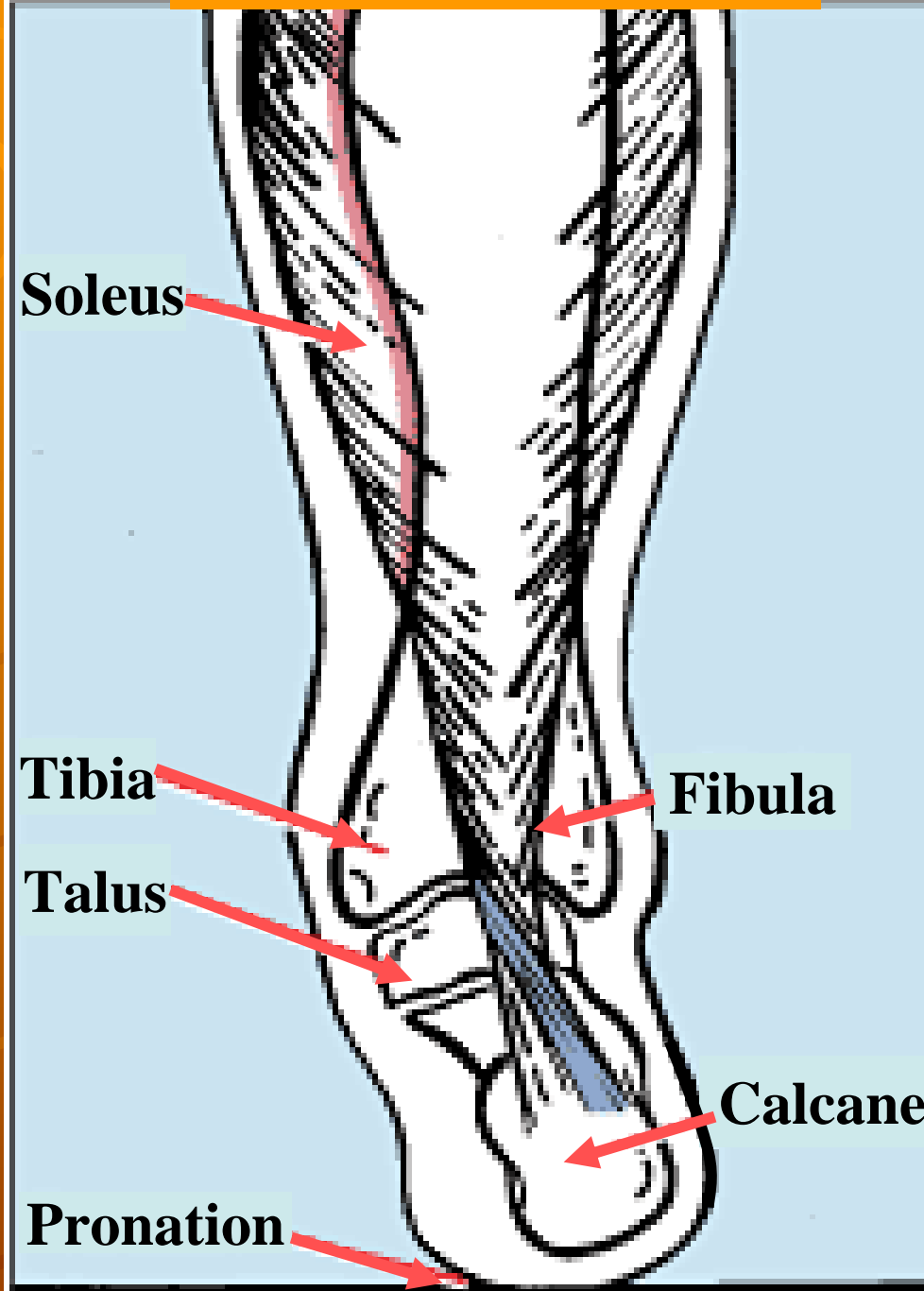
Spring Ligament

Longitudinal Arch of Foot

Transverse Arch of Foot

Tibialis Posterior Muscle

Anterior Tibialis



Foot Pronation and Tibial Torsion:

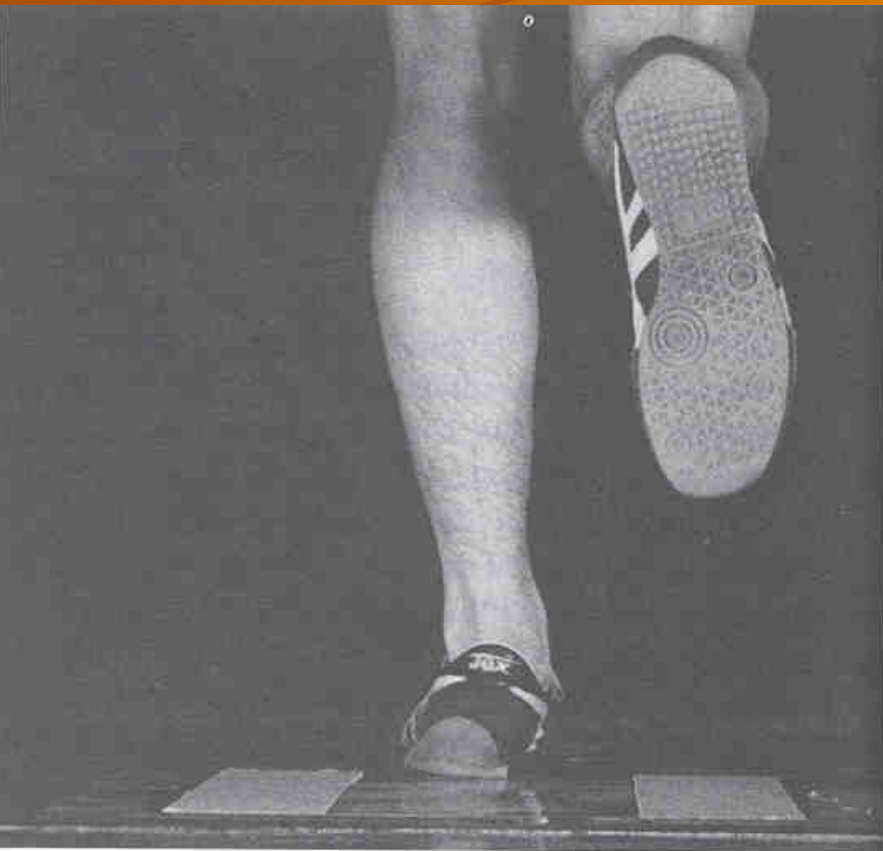


Fig. 4.5 A single frame from the early support phase of a runner who pronates excessively.

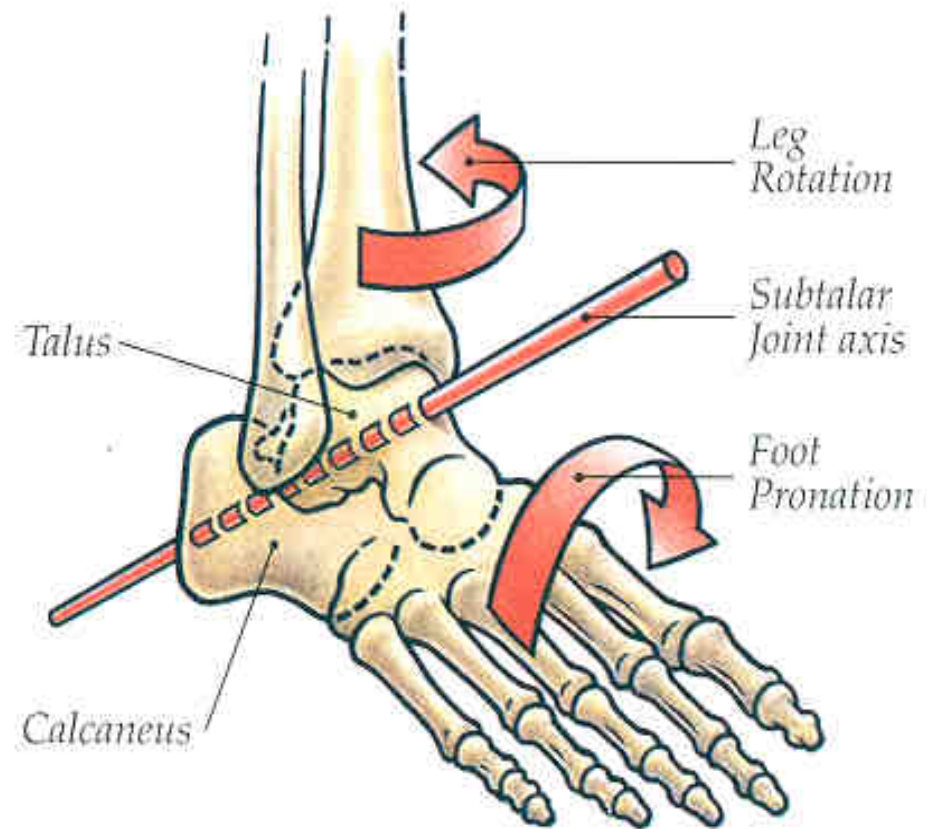


FIGURE 3
Foot pronation and leg rotation

Prevention of Over Pronation

- ✦ **Proper Shoe Selection**

Heel Wedge to Prevent Excessive Motion

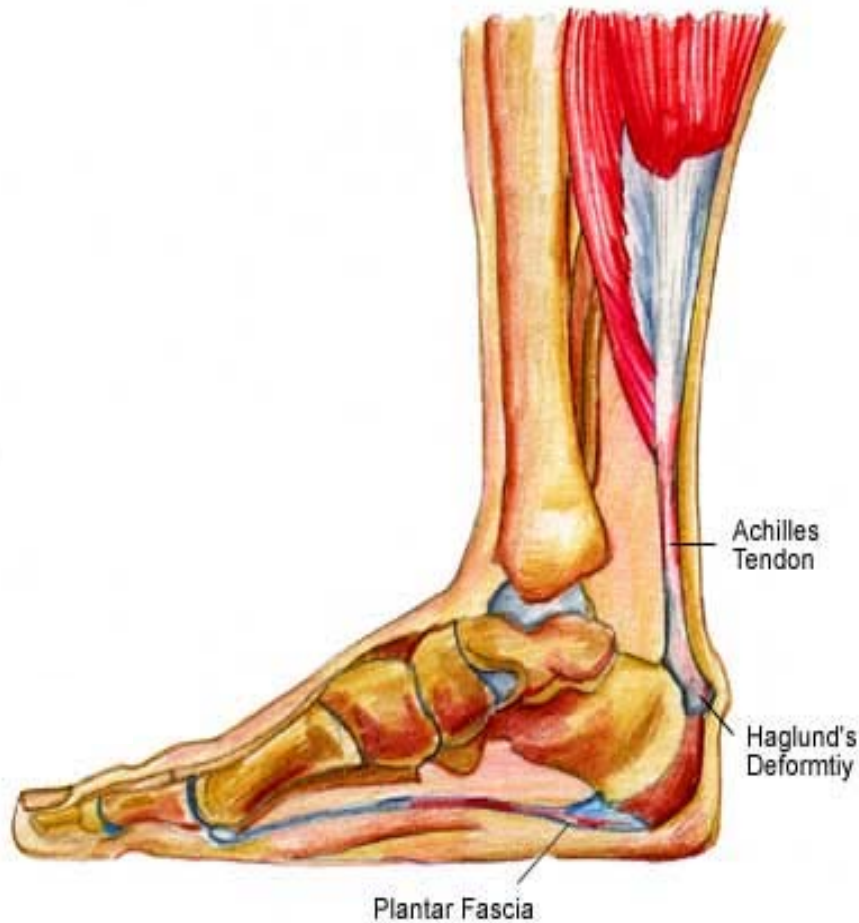
- ✦ **Strengthening of Anterior/ Posterior and Lateral/Medial Muscles of Leg**

- ✦ **Strengthening of Arch Muscle of Foot**

- ✦ **Proper Running Biomechanics**



Achilles Tendonitis



✦ Definition:

- Inflammation of the Achilles tendon most often occurring at the insertion on the back of the heel
- Often associated with a “pump bump” or bone spur

Achilles Tendonitis

+ Symptoms:

- Morning stiffness
- Pain with steps (esp. down)
- Pain with activity
- Pain can be located in middle of tendon as well and can produce a “nodule”


+ Treatment:

- NSAID's, physical therapy, heel lifts, stretching, ice/heat
- AVOID steroid injections!
- Casting if no relief with other conservative treatment
- Surgery as an absolute last resort

Calf Stretches

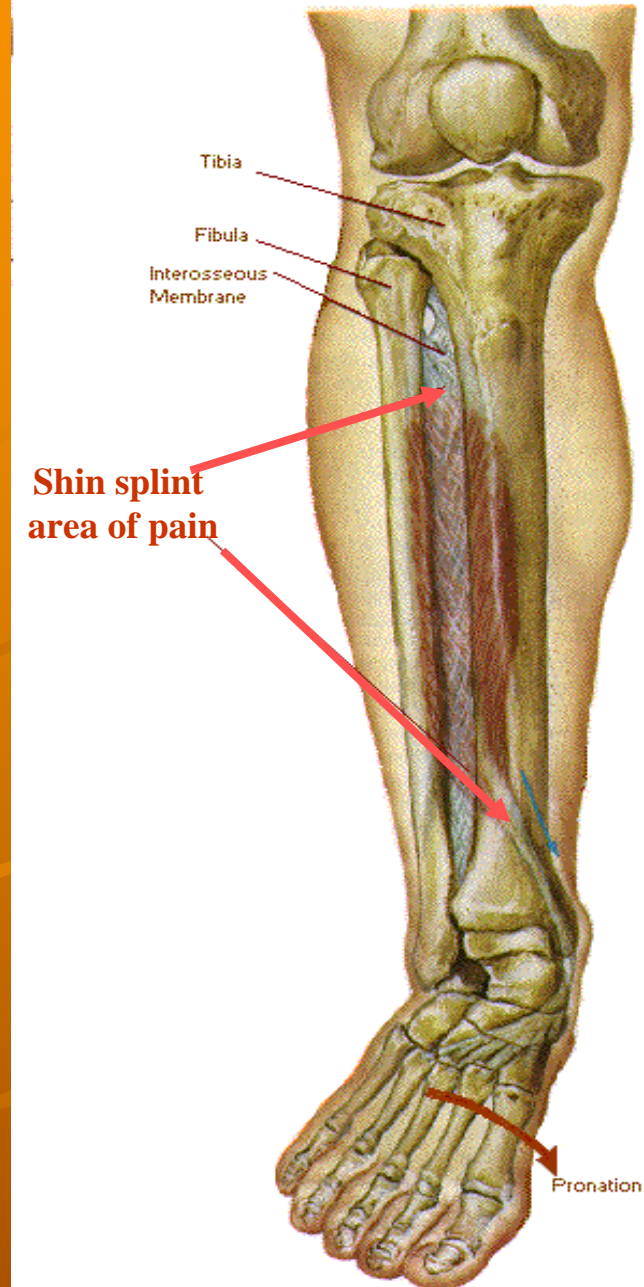


Medial Tibial Stress Syndrome AKA Shin Splints

- ✦ By definition it is irritation of the anterior compartment of the tibia
 - ✦ Can also occur posteriorly or along the fibula
 - ✦ Very broad definitions depending on your sources
- 

Shin Splints

Shin splints is the name given to pain at the front of the lower leg. The most common cause is inflammation of the periosteum of the tibia (sheath surrounding the bone). The injury is an overuse injury and can be caused by **running on hard surfaces**, **running on tip toes** and sports where a lot of **jumping** is involved. If you **overpronate** then you are also more susceptible to this injury.



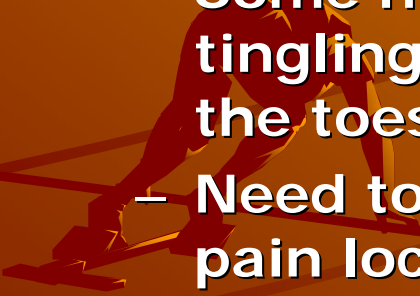
Shin Splints

✦ Symptoms:

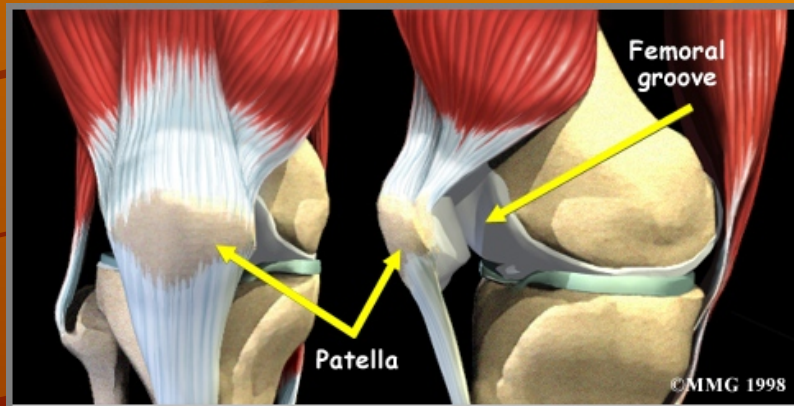
- Pain is activity dependent
- Burning/deep ache along distal 1/3 of tibia
- Some numbness and tingling may occur in the toes
- Need to be aware of pain localizing to one point as sign of stress fracture developing

✦ Treatment:

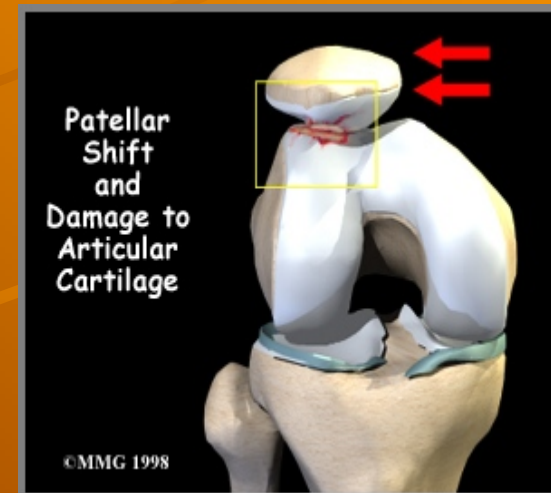
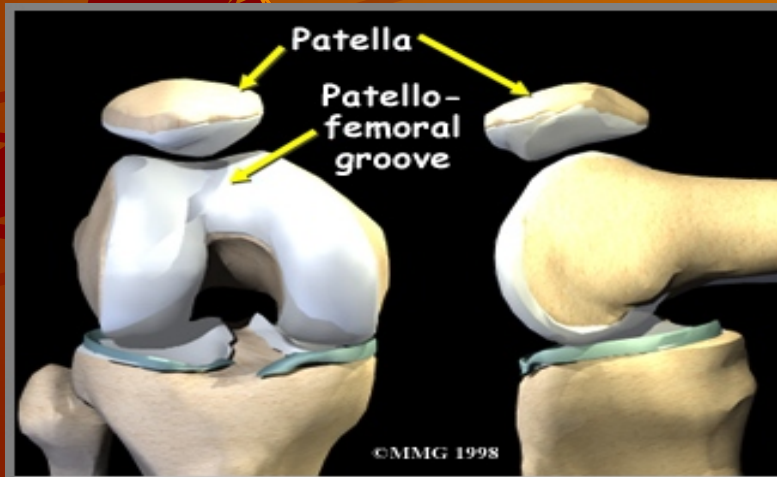
- Modify training schedules, change routes
- Add cross training/pool workouts
- Ice, shoe evaluation, possible orthotic intervention



Patella Femoral Stress Syndrome

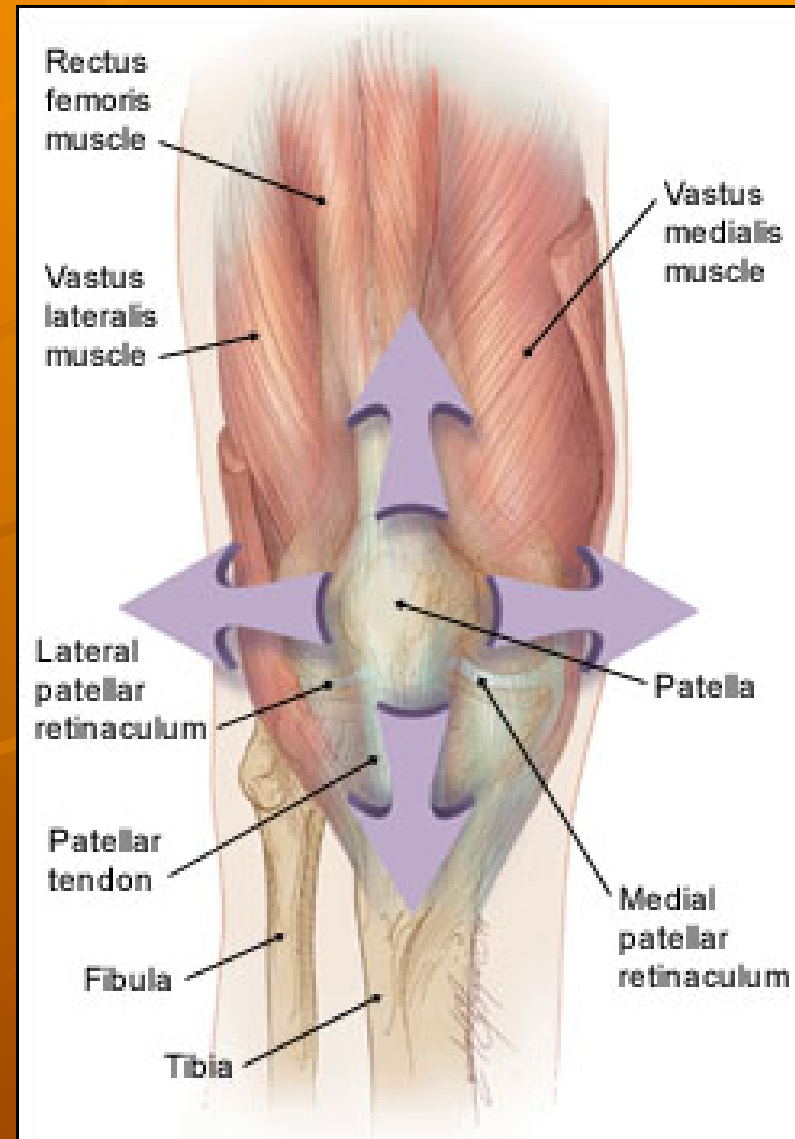


- ✦ Mechanism
- ✦ Signs and Symptoms



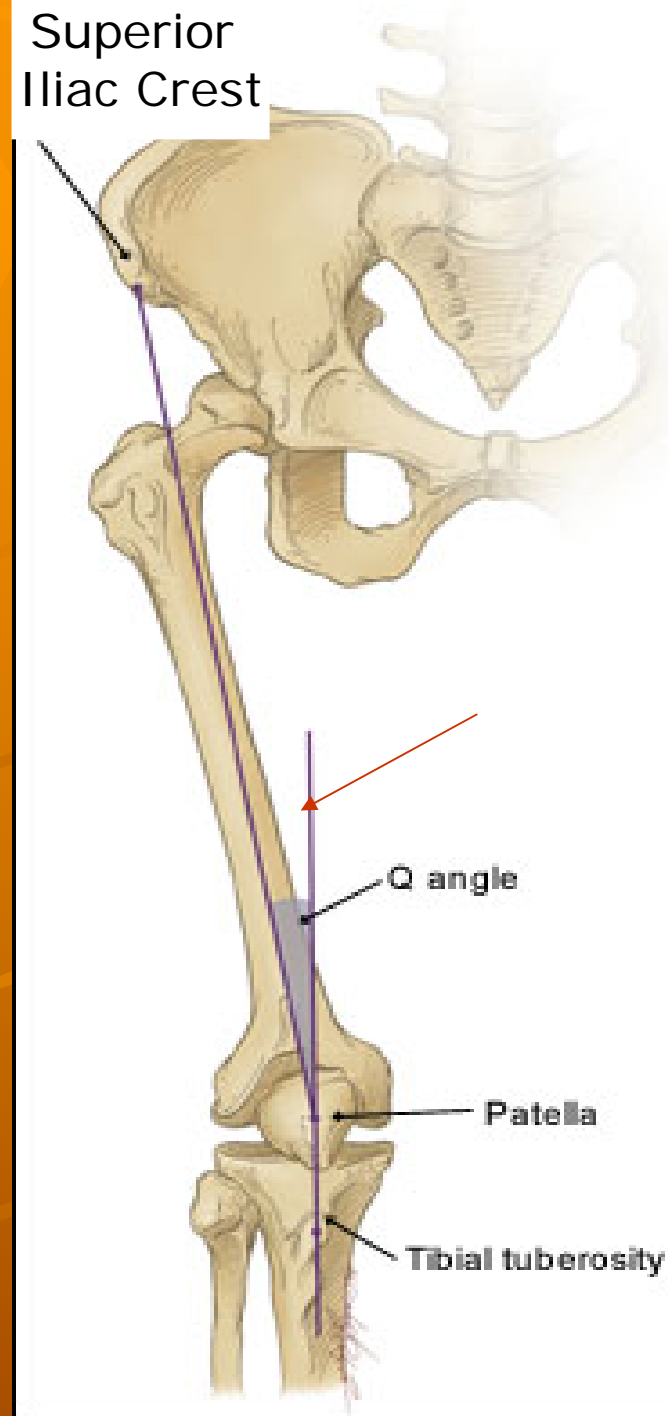
Knee Anatomy

The knee's stability and "health" is greatly dependent on the soft tissues that surround it, with muscle balance being a major factor



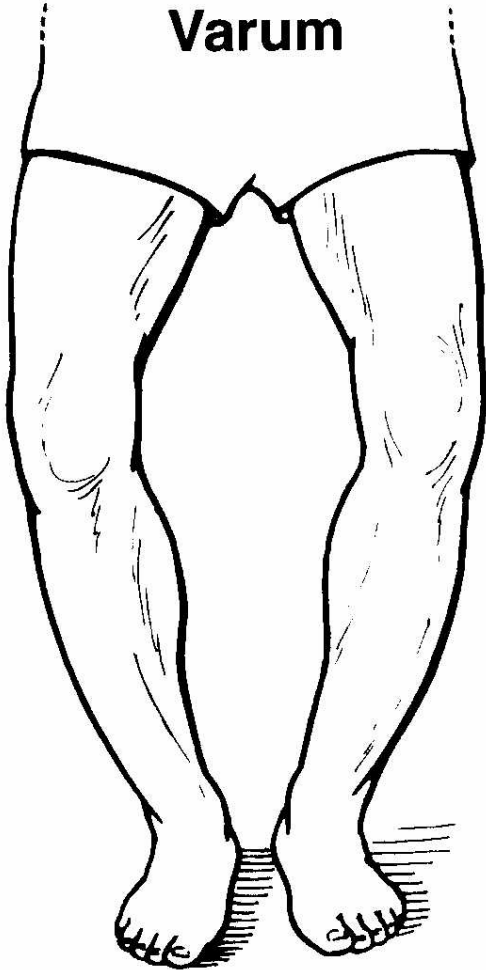
Q-Angle

The Q-angle is the angle formed by a line from the anterior superior spine of the ilium to the middle of the patella and a line from the middle of the patella to the tibial tuberosity. Males typically have Q-angles between 10 to 14°, females between 15-17°.



Atypical Q-angles

**Genu
Varum**

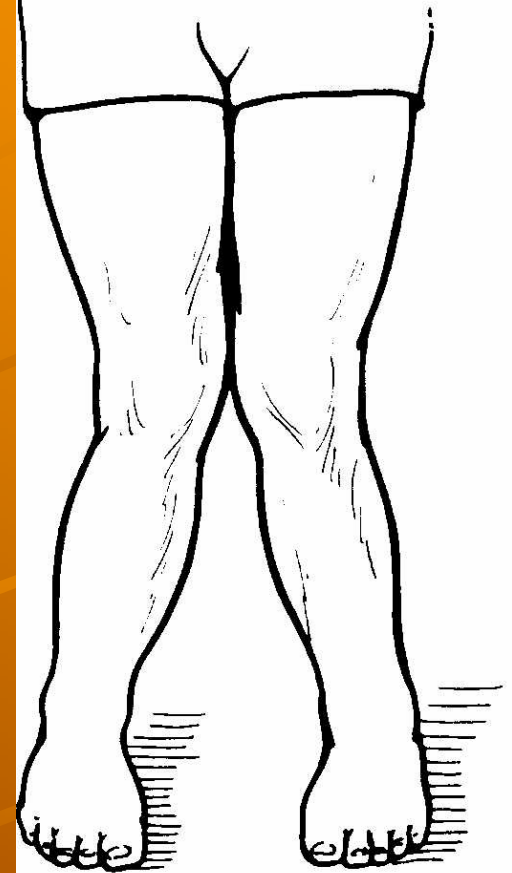


Small or negative
Q angle

bowleggedness

knock-knees

**Genu
Valgum**



Q angle > 17 degrees

Treatment for Runner's Knee

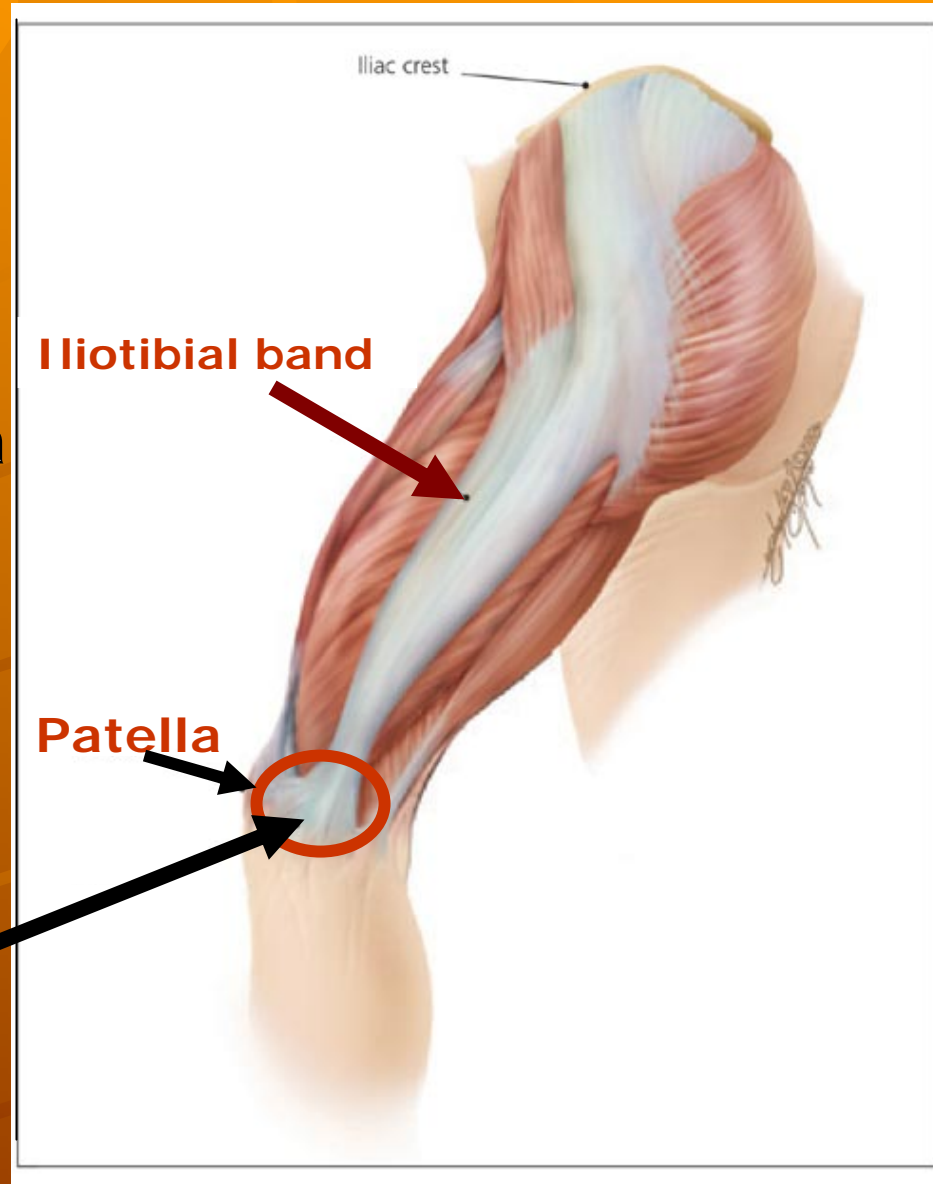
- ✦ Rest (relative or absolute)
- ✦ Ice after exercising
- ✦ NSAIDs
- ✦ Strengthen quadriceps
- ✦ Stretch Iliotibial Band
- ✦ Stretch hamstrings and gastrocnemius and soleus

Iliotibial Band Syndrome

✦ IT-band

- thick strong band of ligamentous tissue
- connects tensor fascia latae to the lateral condyle of the femur and the lateral tuberosity of the tibia

✦ IT-band rubs against the lateral femoral condyle when there is excessive tension



Iliotibial Band Friction Syndrome

✦ Mechanism

- Overuse
- Running down hills
- Over pronation
- Worn out shoes
- Running on cambered surface
- Tight band
- Bow legs
- Weak quadriceps



Iliotibial Band Syndrome

Signs and Treatment

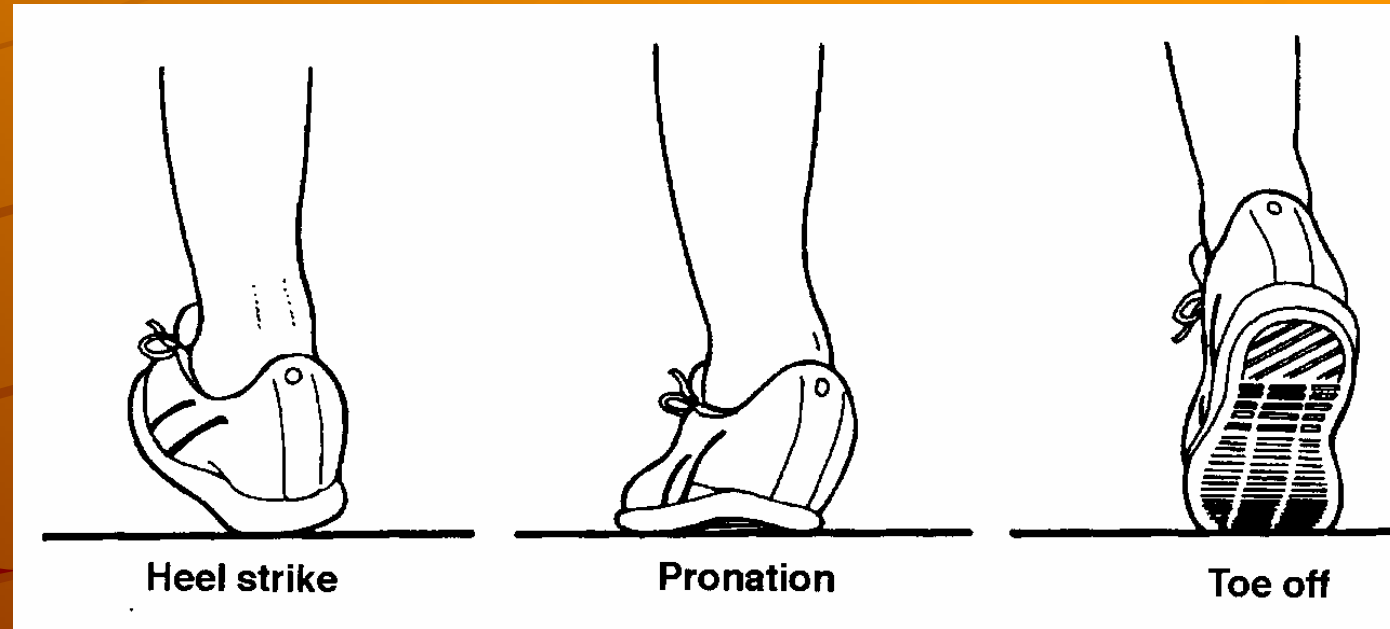
✦ Signs/Symptoms

- ✦ Pain on outer side of knee
- ✦ Pain usually increases with run
- ✦ Subsides slowly after run

✦ Treatment

- ✦ Ice
- ✦ Relative Rest
- ✦ NSAIDs
- ✦ ITB Stretches
- ✦ Quad Strengthening
- ✦ Pelvic Stability Ex
- ✦ Proper Shoes

✦ Excessive pronation increases internal rotation of the tibia, which accentuates the friction of the IT band and femoral condyle



Tibial alignment and size of femoral condyle may also contribute to the development of this condition



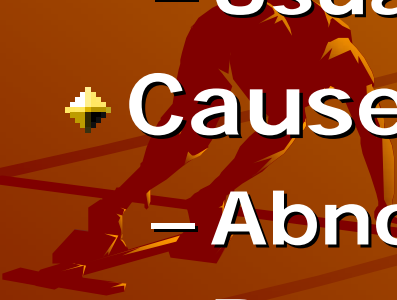
Stress Fractures

✦ Symptoms:

- Rapid Onset of Pain
- Well Localized
- Usually of the lower limb

✦ Causes:

- Abnormal concentration of stress
- Bones insufficiently strong



Acute Muscle Tears

Result of:

- ◆ Muscular strength imbalance
- ◆ Inflexibility
- ◆ Inadequate warm-up
- ◆ Eccentric contraction



Acute Muscle Tears


Treatment:

- ◆ Ice
- ◆ Stretching
- ◆ Strengthening



Chronic Muscle Tears

Characteristics:

- ✦ Gradual rather than sudden
 - ✦ Progresses and makes running difficult, particularly speed work
 - ✦ Knots appear in affected muscle
 - ✦ Common in calf muscle
 - ✦ Develop eccentric muscle weakness, exposed during faster running
- 
- A silhouette of a runner in a starting crouch on a track, positioned on the left side of the slide. The runner is wearing a dark singlet and shorts, and is in a low, forward-leaning position with hands on the ground, ready to start a race. The background of the slide is a warm orange gradient with curved lines.

Chronic Muscle Tears

Treatment:

- ◆ Stretching
- ◆ Strengthening
- ◆ Cross-friction massage



Side Stitch

- ✦ Exercise-induced abdominal pain
- ✦ Cramp of the diaphragm muscle
- ✦ Occurs with fast running and uncomfortable breathing
- ✦ Treatment requires breathing out fully rather than panting



Some Basic Tips

- ✦ Don't increase mileage by more than 10% a week.
- ✦ Don't run more than 45 miles a week.
- ✦ Don't run or stand on uneven surfaces.
- ✦ Don't run on sand.
- ✦ Don't run through pain.
- ✦ Ice often.
- ✦ Change your running shoes every 450 miles.
- ✦ Work regularly on strengthening.
- ✦ Work regularly on flexibility of ankle.



Foot Rehabilitation

✦ Strengthening

– A number of exercises can be performed

- ✦ Writing alphabet
- ✦ Picking up objects
- ✦ Ankle circumduction
- ✦ Gripping and spreading toes
- ✦ Towel gathering
- ✦ Towel Scoop



FIRST

Discussion ?
Comments ?
Q & A



Thank You