

# Foot Pain and Pedorthotics

**Heikki Uustal, M.D.**

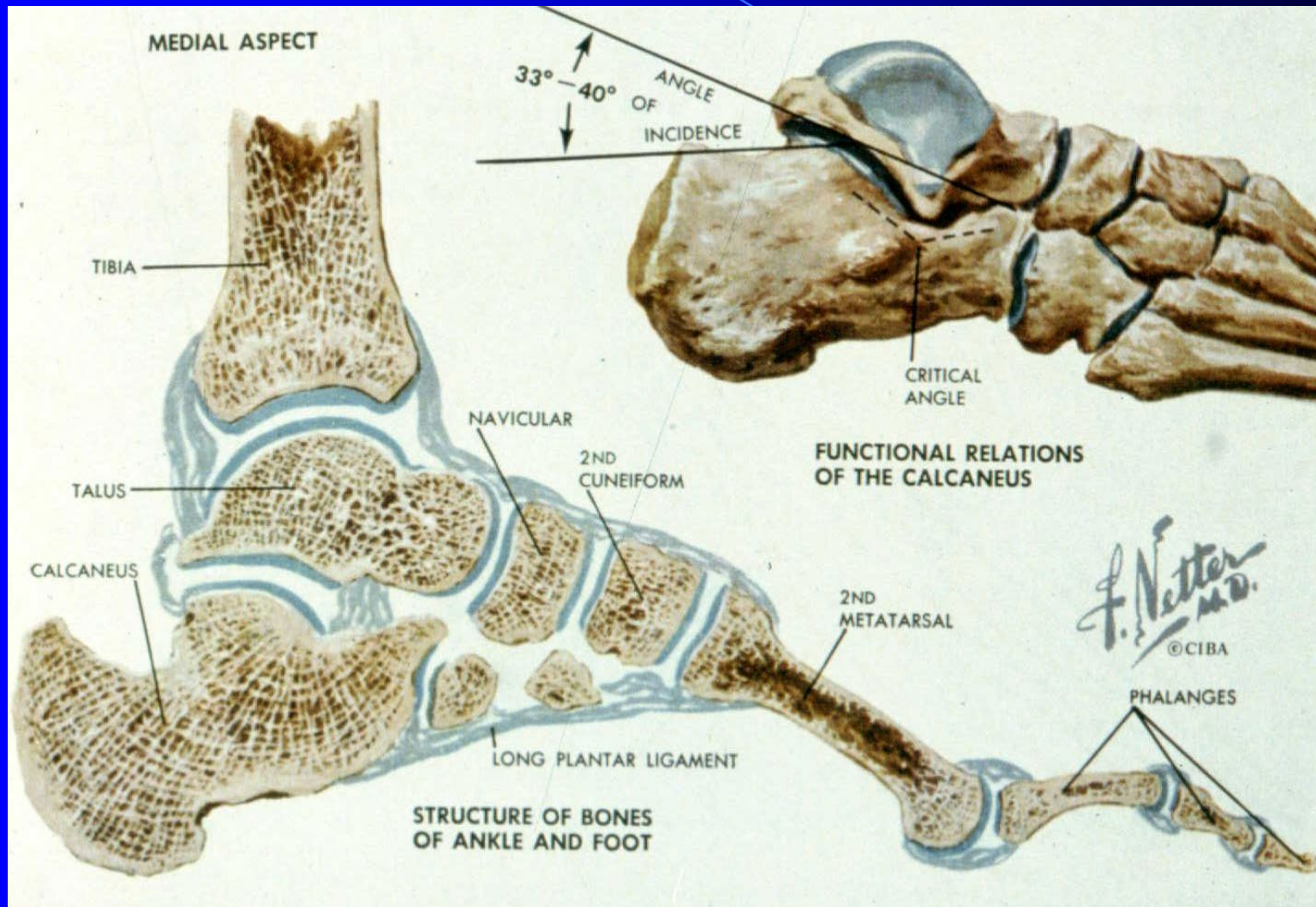
Medical Director, Prosthetic/Orthotic Team

JFK - Johnson Rehab Institute

# Outline

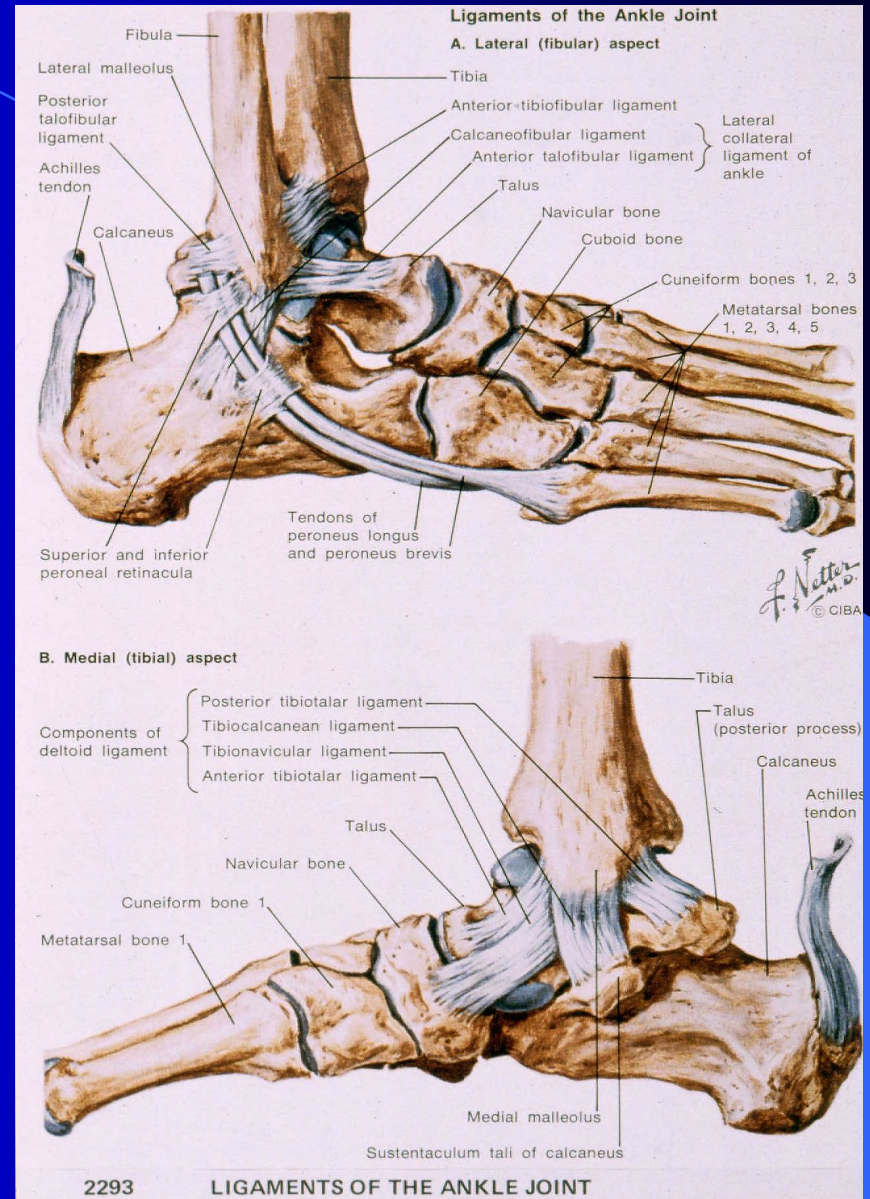
- **Normal anatomy**
- **Biomechanics of the foot and ankle**
- **Pathology**
- **Treatment options**

# Critical Bony Structures



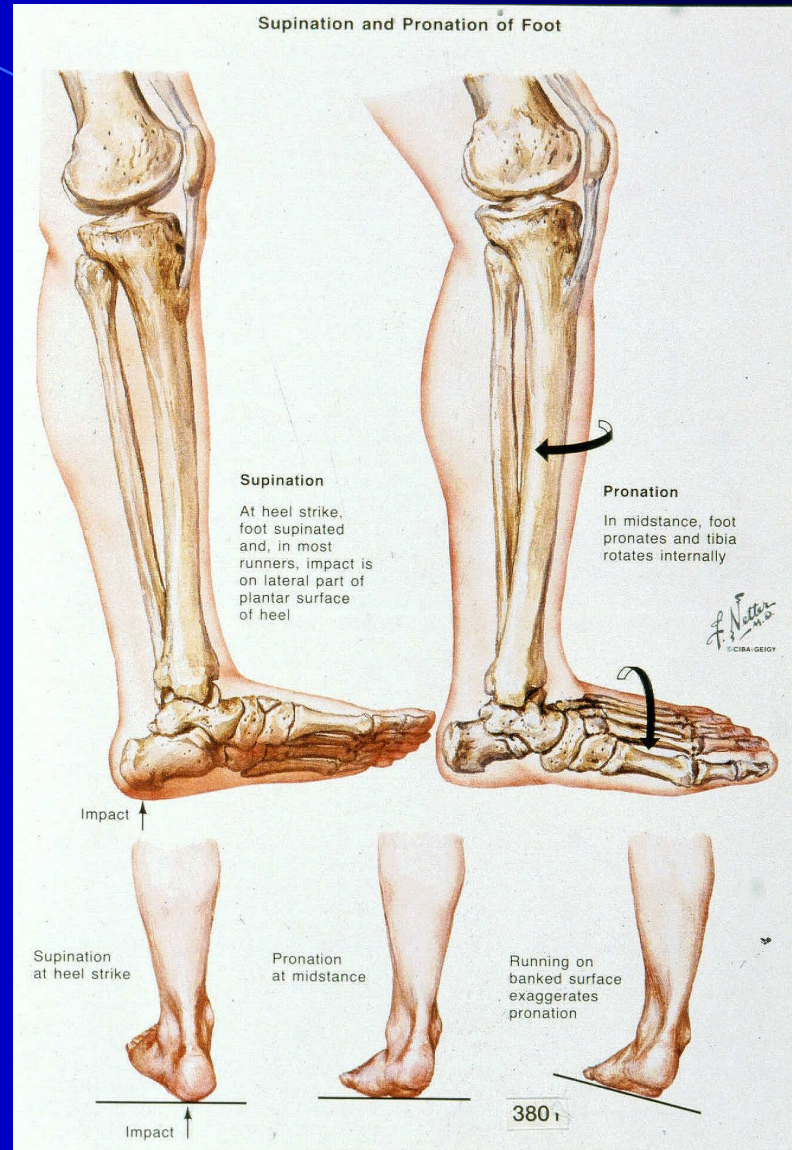
# Lateral Ligaments

# Medial Ligaments



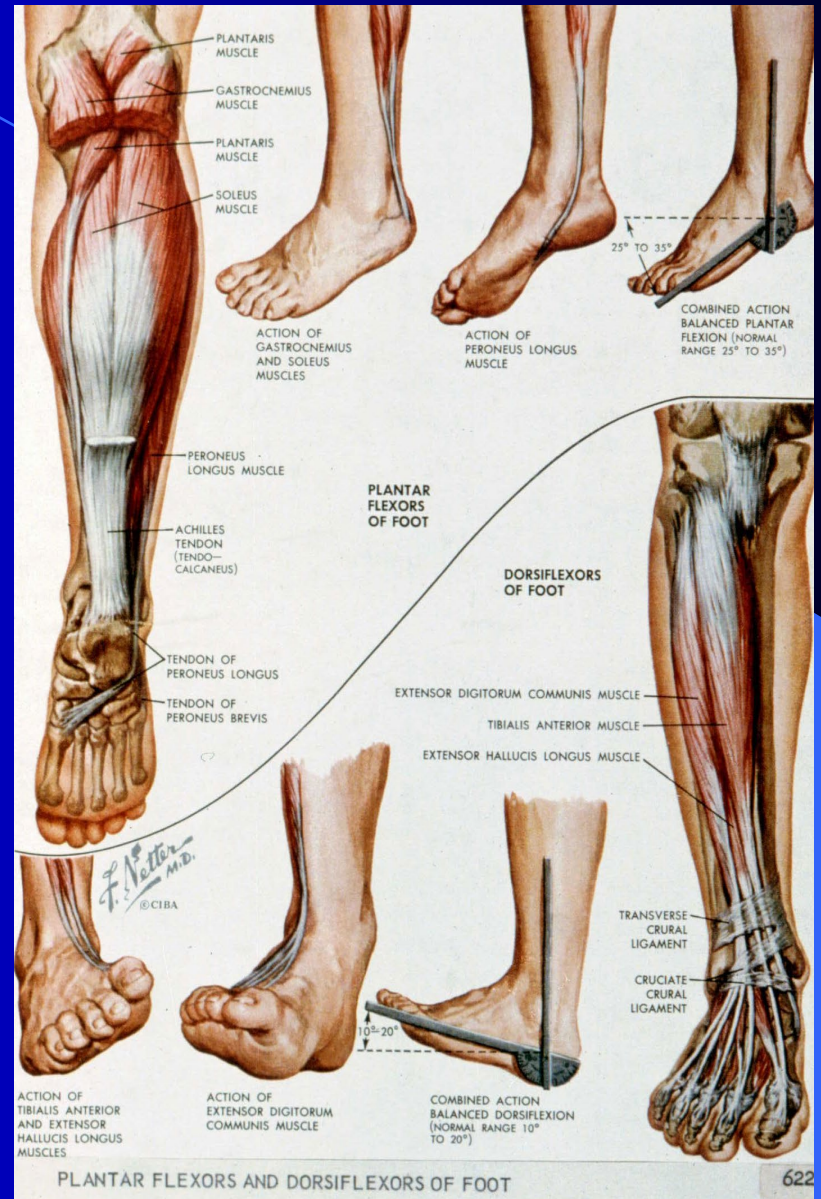


# Supination and Pronation (mitered hinge joint)



Plantarflexors:  
 Gastroc-soleus  
 Posterior tib  
 Peroneus longus

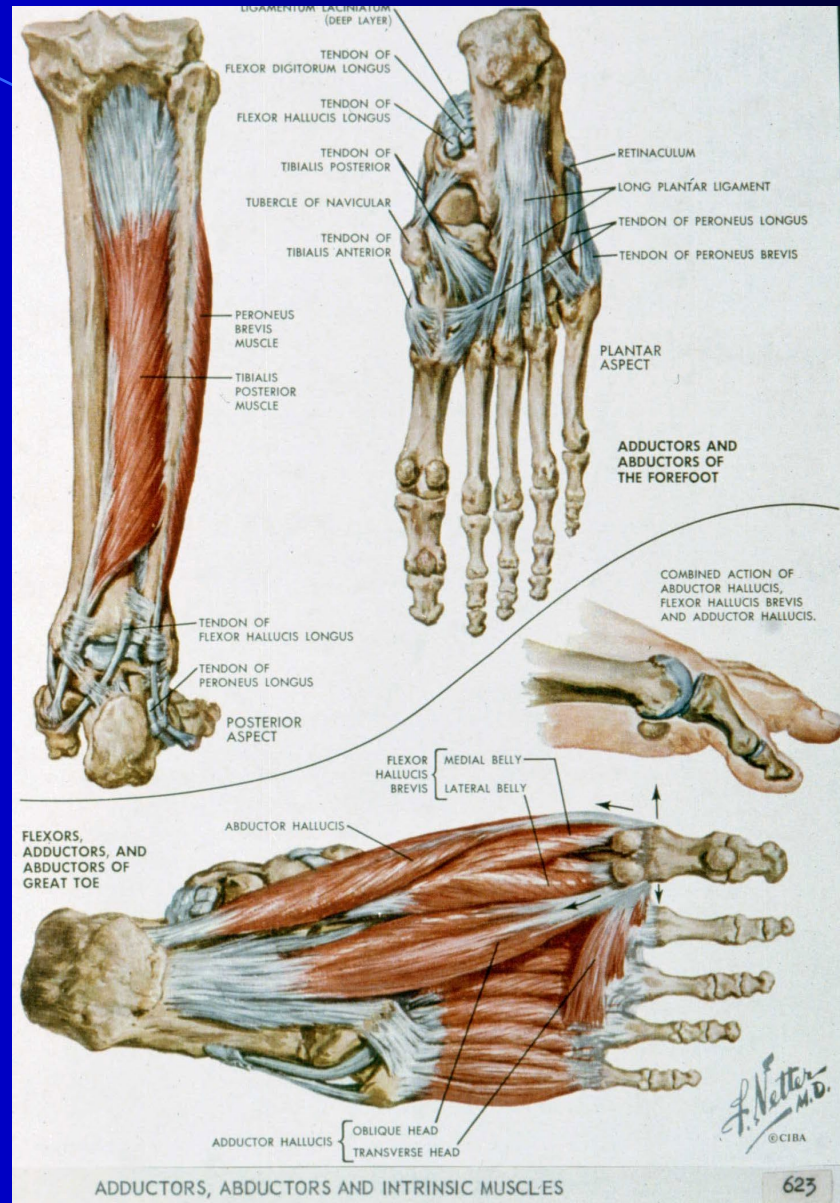
Dorsiflexors:  
 Anterior tib  
 Extensor hallucis  
 Extensor digitorum

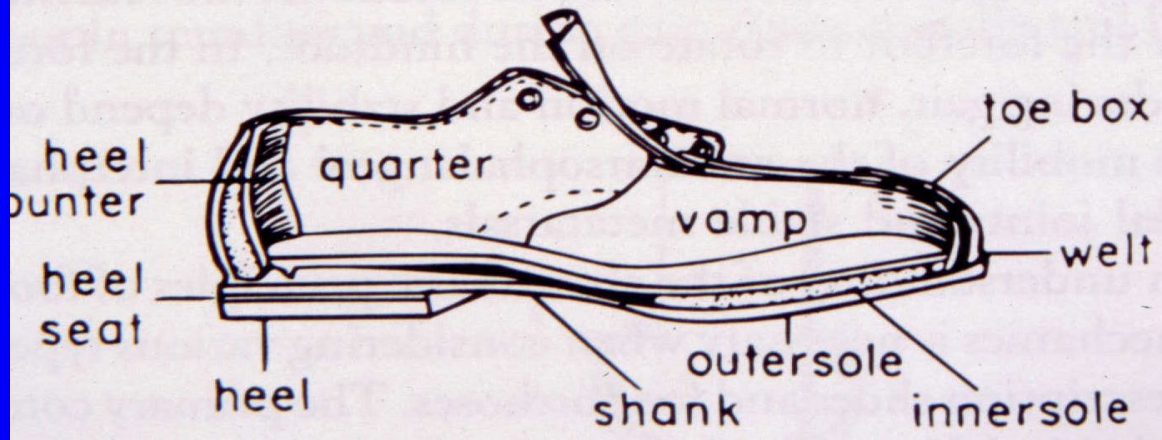
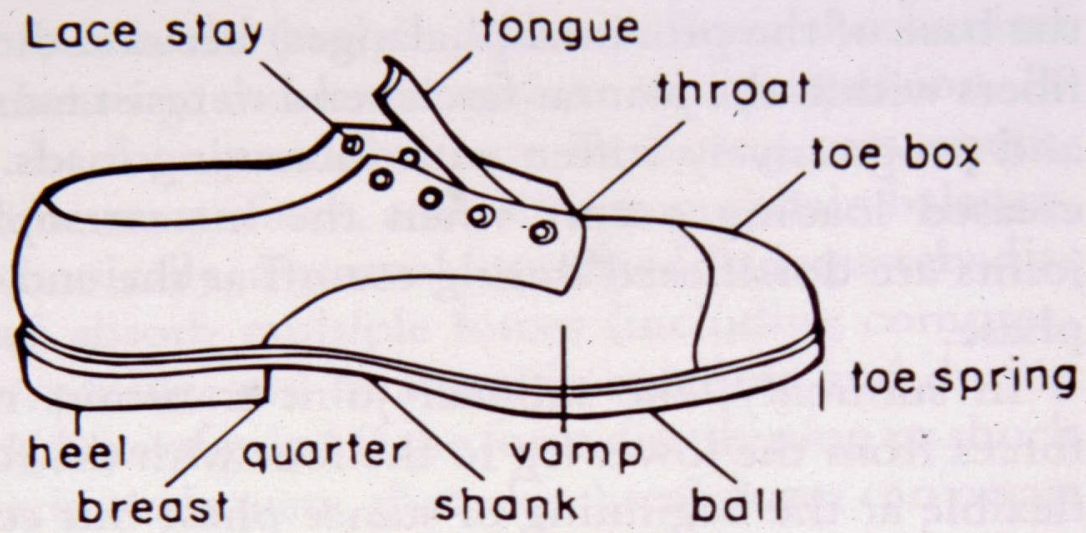




Inversion:  
Posterior tib  
Anterior tib

Eversion:  
Peroneus  
longus and  
brevis











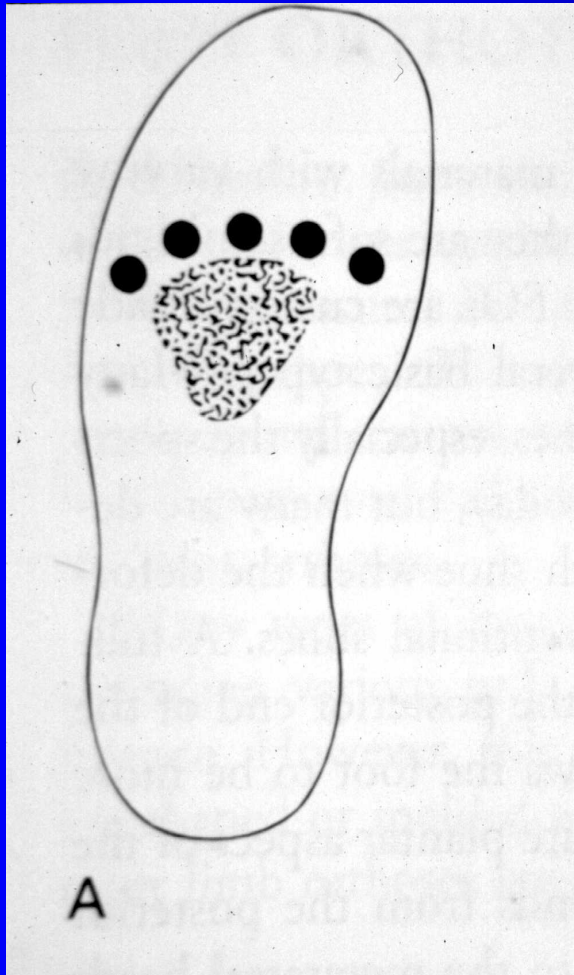




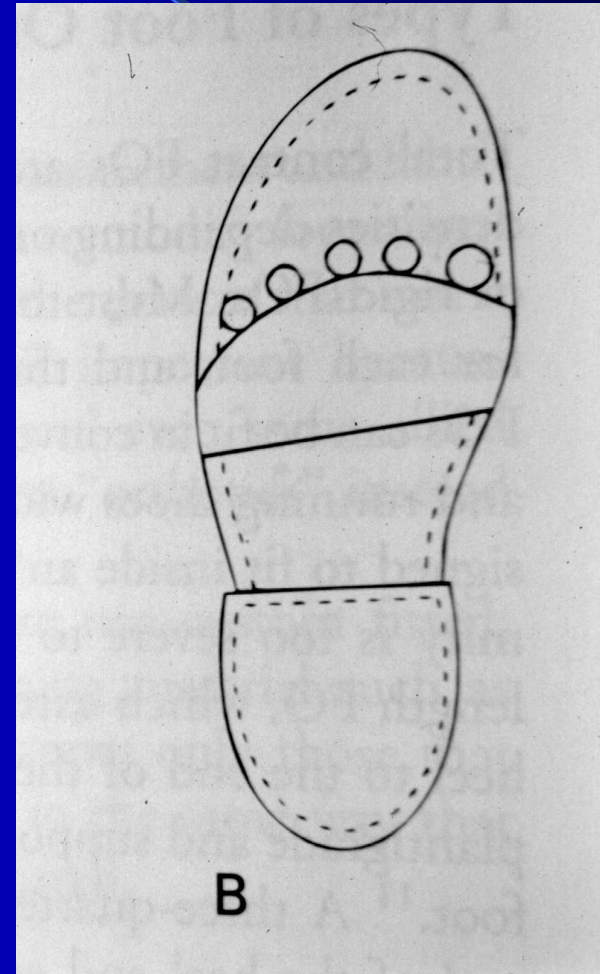




# Met Pad



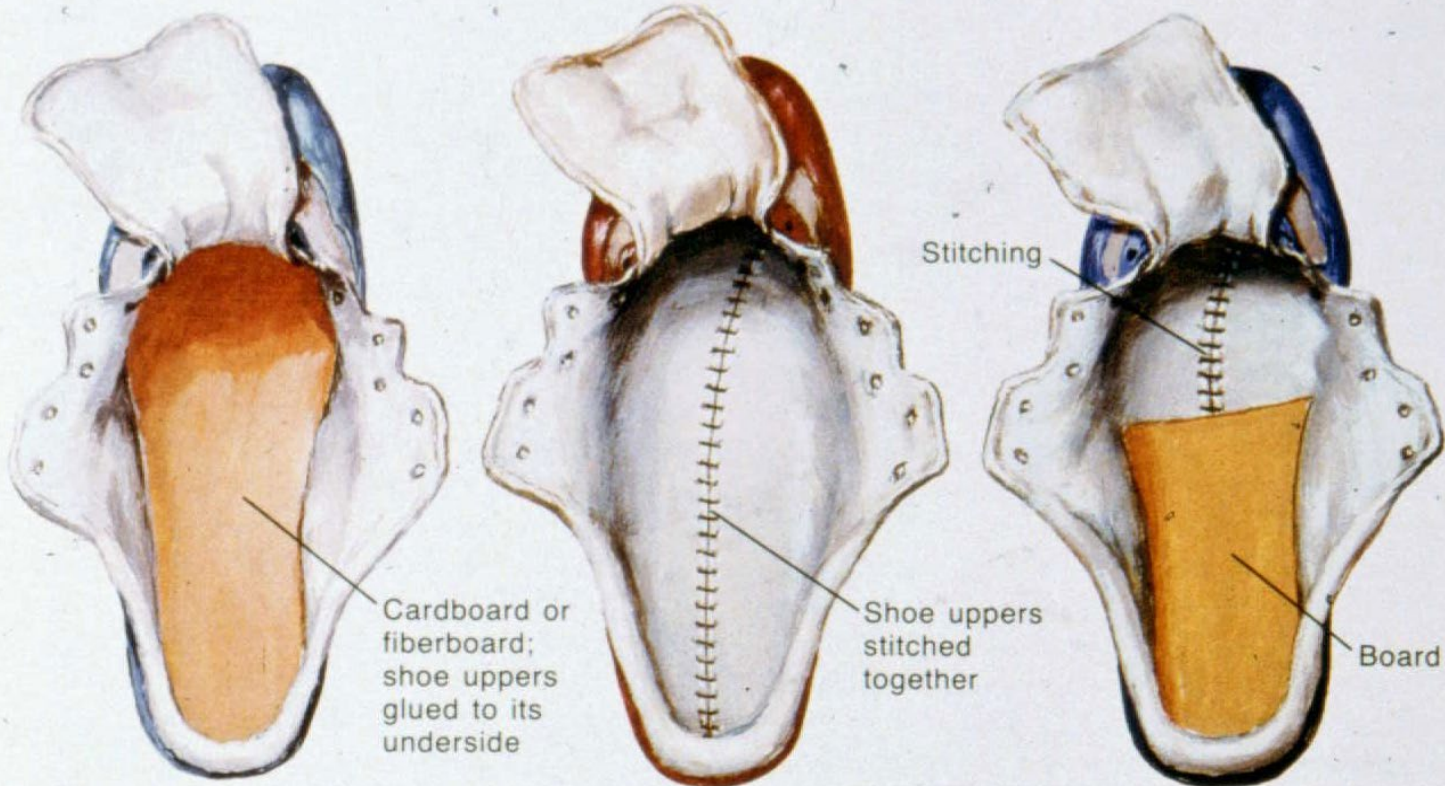
# Met Bar







## Shoe Lasts Adapted to Foot Types



Fully board-lasted shoe provides support for pronated foot (insole removed in this plate)

Slip-lasted shoe (most flexible) provides flexibility for cavus (rigid) foot

Combination last provides hindfoot stability, (board lasted); forefoot flexibility at toe-off (slip lasted)



Heel-cradled insole of polyurethane maintains heel fat pad in proper alignment; removable and replaceable with orthotic device if indicated

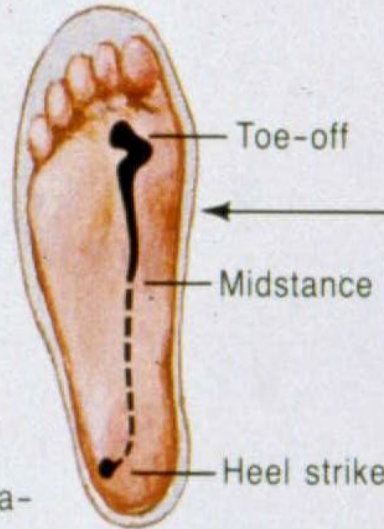
Pronated (hyperflexible) foot



Medial view. Flattened longitudinal arch during weight bearing



Posterior view. Hyperpronation during midstance



Plantar view shows gait pressure pattern. Straight, board-lasted shoe provides medial support in midstance

*F. Netter M.D.*  
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Cavus (rigid) supinated foot



Medial view. Cavus foot during weight bearing



Posterior view. Pronation limited during midstance



Plantar view shows gait pressure pattern. Curved, slip-lasted shoe accommodates to supinated foot, preventing shoe deformation

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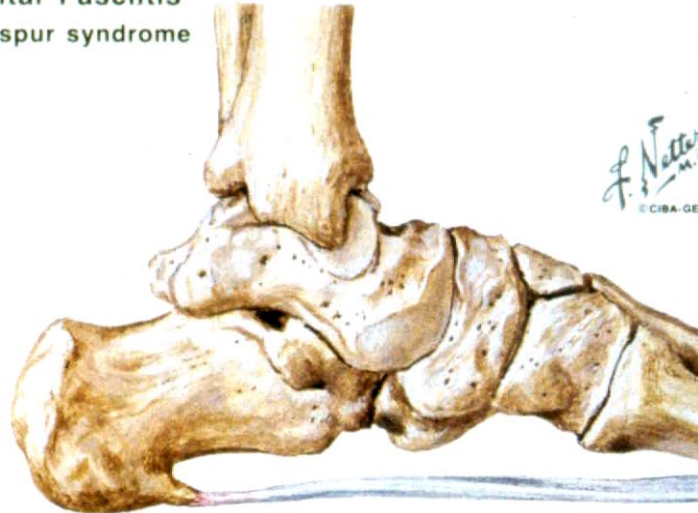
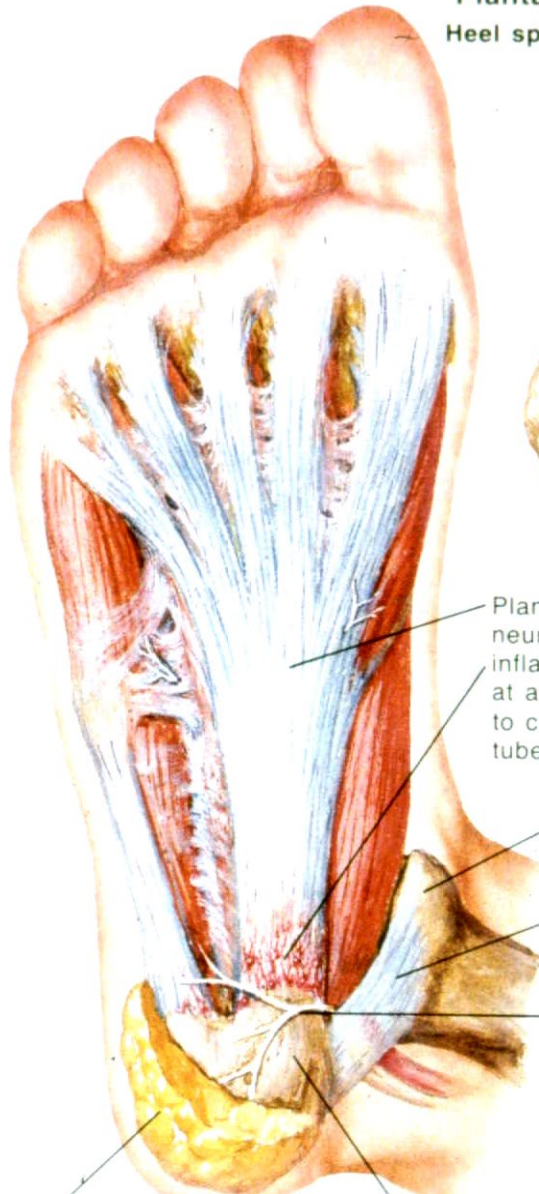


# Plantar Fasciitis

**Pathology:** Inflammation of plantar fascia  
Associated with lack of DF ROM and  
lack of arch support  
Calcaneal spurs develop long term

**Treatment:** Daytime semi-rigid foot orthotics with  
arch support (and heel lift?)  
NSAID and physical therapy  
Relative rest  
Night time splinting in neutral  
Steroid injection if necessary

**Plantar Fasciitis**  
Heel spur syndrome



Calcaneal spur at attachment of plantar aponeurosis

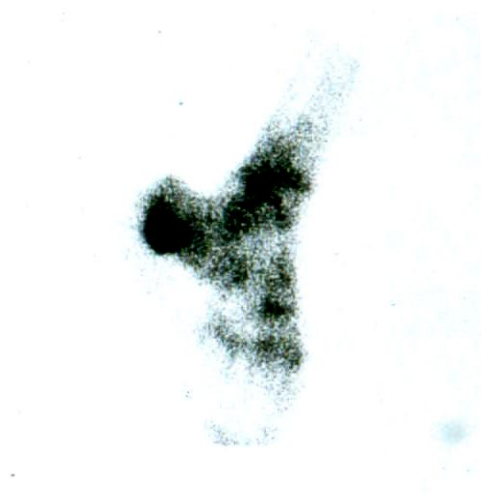
Plantar aponeurosis with inflammation at attachment to calcaneal tuberosity

Medial malleolus

Flexor retinaculum

Medial calcaneal branch of tibial nerve

Positive bone scan of calcaneal stress fracture



# Foot Orthotics





# So Many Choices





# Custom Foot Orthotics



# Night-time positioning splint

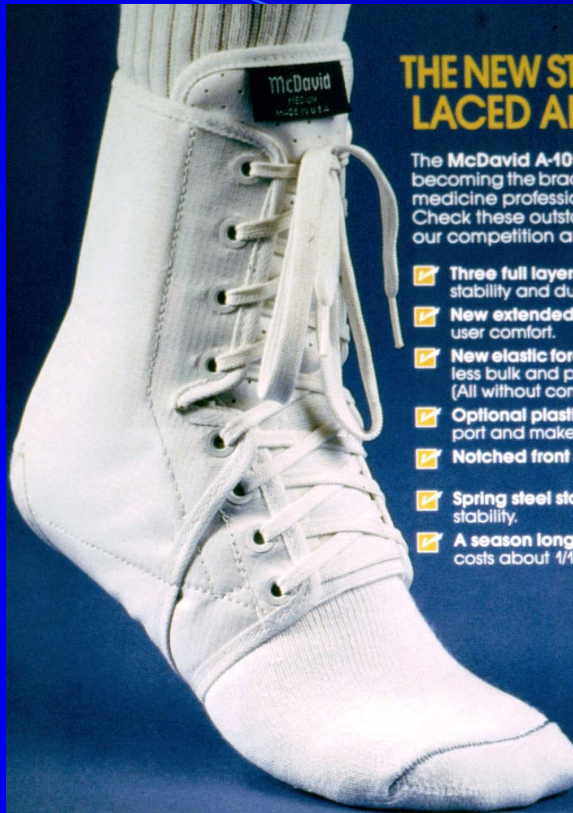




# Ankle Sprain

**Pathology:** Usually inversion injury  
Partial tear of anterior talo-fibular lig  
Possibly tear of calcaneo-fibular ligament

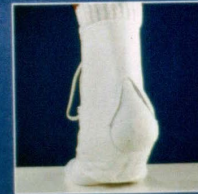
**Treatment:** “RICE” initially  
Requires 3-4 weeks of protection  
May require long-term M-L support  
(McDavid, Swedo non-elastic ankle lacer)  
Exercises for M-L stability  
(BAPS board)



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# Why do aircasts fail ?



# Posterior Tibialis Tendonitis

**Pathology:** Overstretch of posterior tibialis tendon due to pronating foot or collapsing arch

**Treatment:** Control arch and calcaneo-valgus positioning with foot orthotic and strong counter shoes/sneakers  
NSAID and physical therapy  
Worst case needs UCBL orthotic



# Corrective semi-rigid foot orthotics

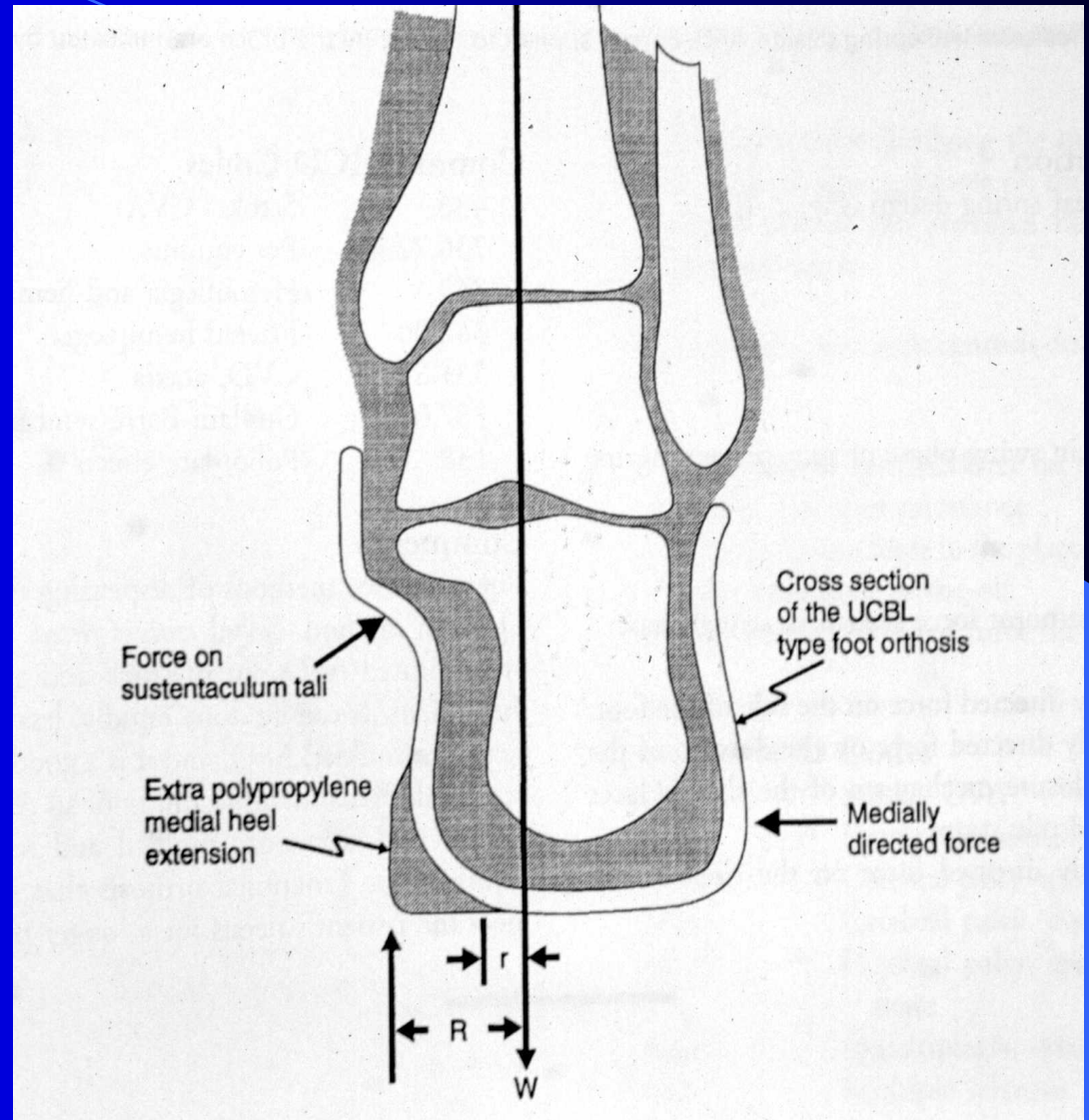


# UCBL Foot Orthotic





# Sub-talar Joint Control



# Heel Pain

**Pathology:** Chronic inflammation at the origin of the plantar fascia causes painful bone spurs

**Early sign of R.A.**

**Recurrent branch of the Tibial Nerve**

**Treatment:** Soft gel heel pad

**Soft heel on shoe**

**Foot orthotic for arch support**

# Soft Heel Wedge

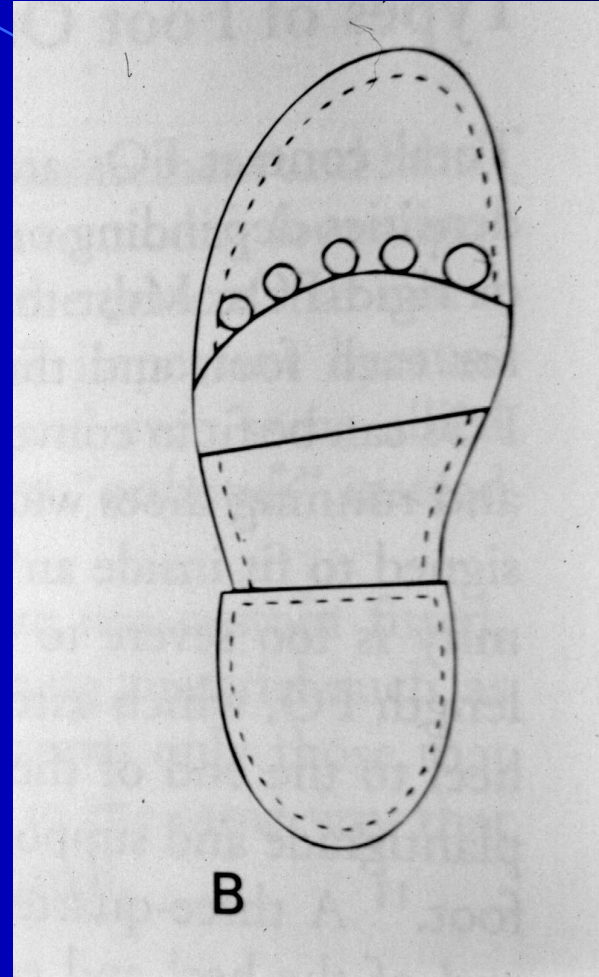
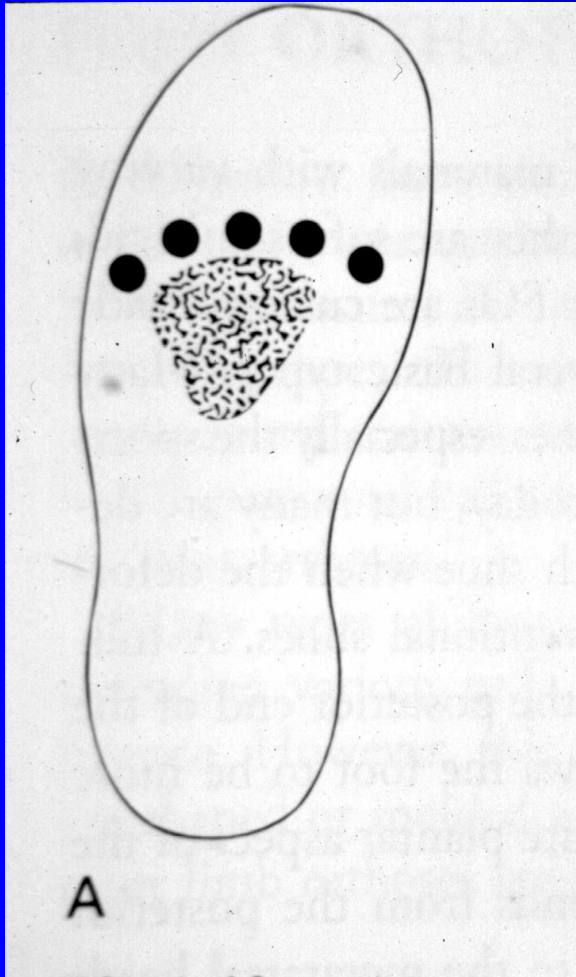




# Metatarsalgia

**Pathology:** Tenderness at metatarsal heads due to lack of natural padding or poor footwear for sports

**Treatment:** Foot orthotics with met pad or bar  
Rigid or board-lasted shoes to minimize toe-break

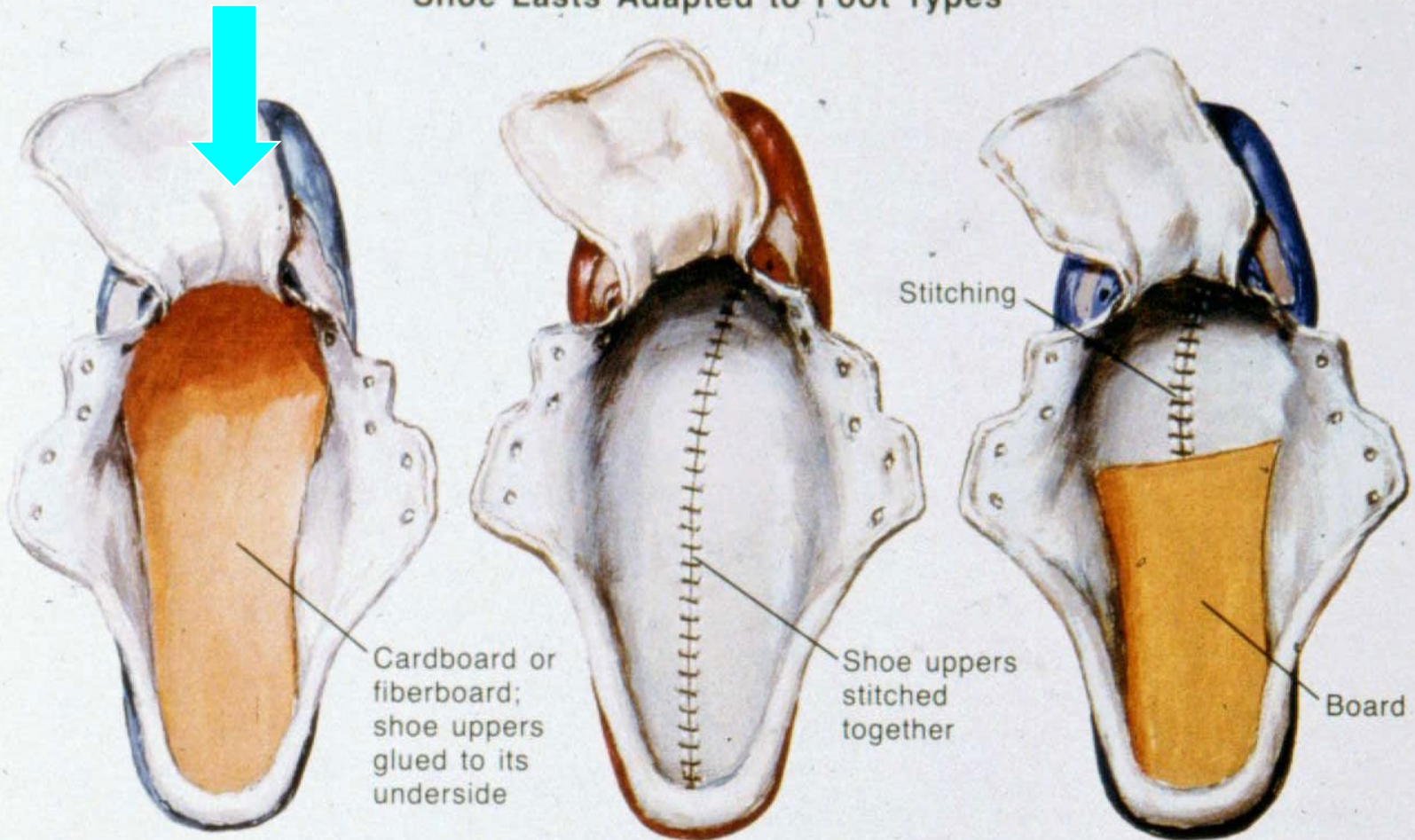


# Add Met Bar or Build-up from Heel to Met Heads





## Shoe Lasts Adapted to Foot Types



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Combination last provides hindfoot stability, (board lasted); forefoot flexibility at toe-off (slip lasted)

# Neuroma

**Pathology:** Swelling and inflammation of distal nerves between 3<sup>rd</sup>-4<sup>th</sup> metatarsals  
Sometimes due to tight footwear

**Treatment:** Proper footwear (wide toe-box )  
Injection of steroids  
Limited ambulation  
Surgical resection as last resort

# Bunion/Hallux Valgus

**Pathology:** Usually hereditary lateral deviation of big toe with hypertrophy of medial portion of 1<sup>st</sup> MCP joint

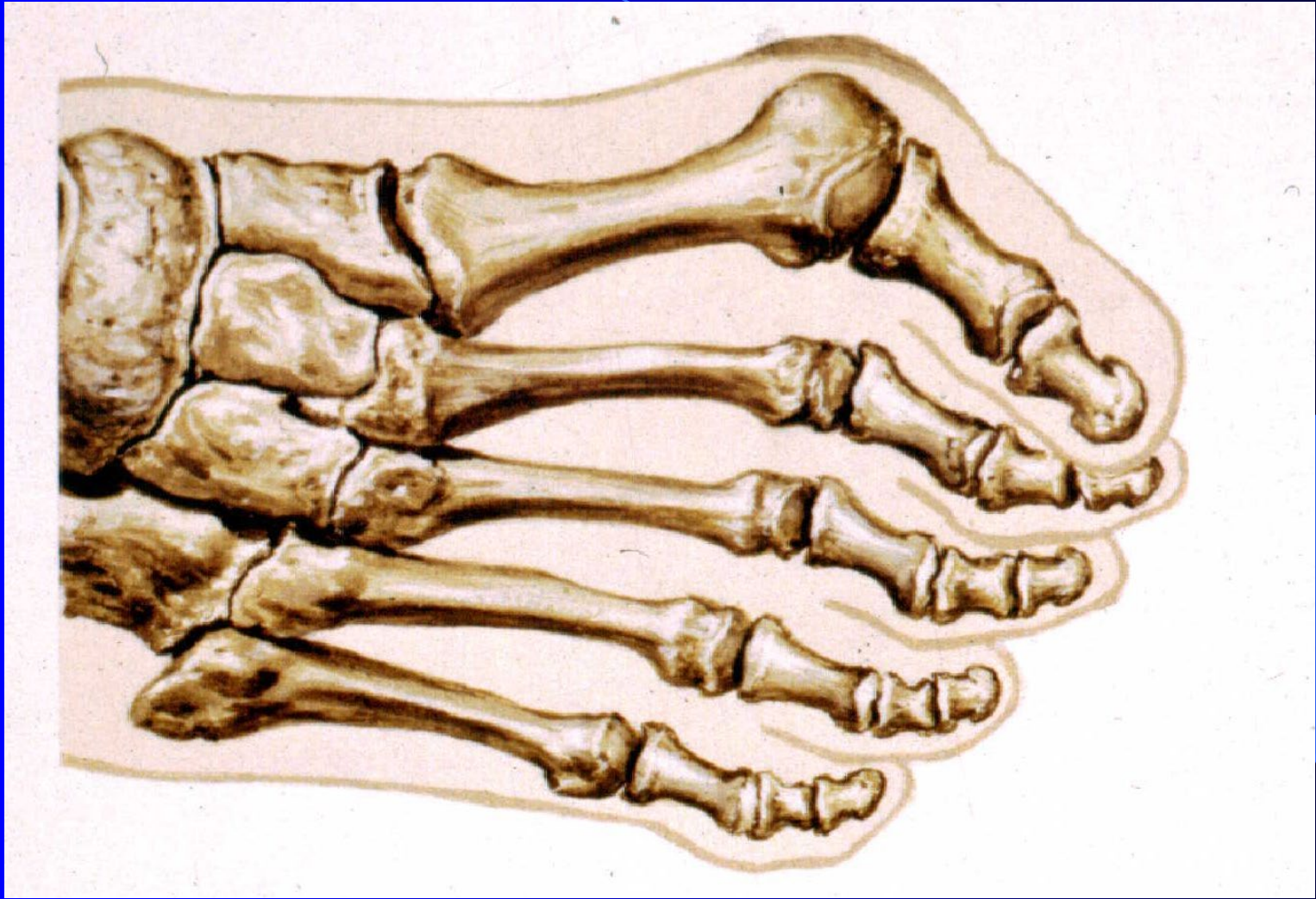
**Commonly associated with pronated feet**

**Treatment:** Extra-depth orthopedic shoes with wide-lasted (bunion-lasted) toe box

**Foot orthotic for pronation control**

**Surgical correction as last resort**





# Sesamoiditis

**Pathology:** Inflammation of sesamoid bones under 1<sup>st</sup> MTP joint due to excessive impact from running and excessive extension of big toe

**Treatment:** Foot orthotic with build up at 1<sup>st</sup> metatarsal shaft and relief at sesamoid bones

**Extra-depth shoe with rigid sole to minimize toe-break**

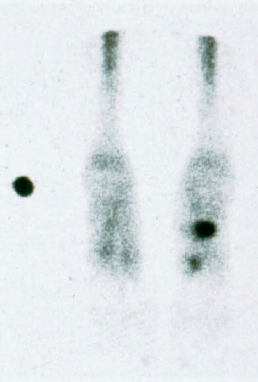
# Metatarsal Stress Fracture

**Pathology:** Overuse fracture of metatarsal shaft commonly seen in runners

**Treatment:** Rigid sole shoe or removable rigid boot (CAM walker)



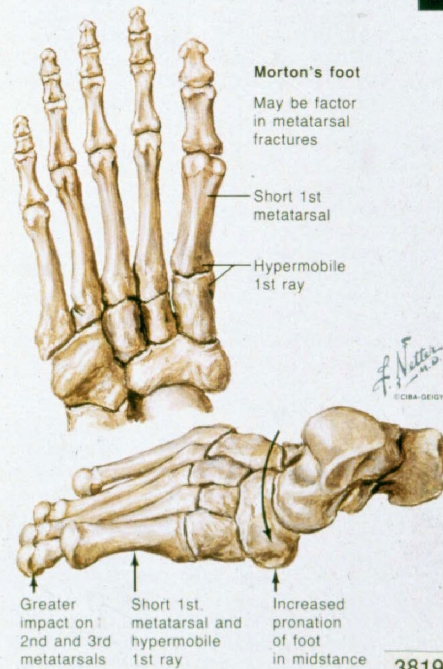
Stress Fractures



Positive bone scan of tarsal stress fracture



Radiograph of stress fracture of distal fibula



**Morton's foot**  
May be factor in metatarsal fractures

Short 1st metatarsal

Hypermobile 1st ray

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Greater impact on 2nd and 3rd metatarsals

Short 1st. metatarsal and hypermobile 1st ray

Increased pronation of foot in midstance



Running in water with waterskiing vest is excellent conditioning exercise during fracture healing. Fiberglass cast may be worn in water



# Achilles Tendonitis

**Pathology:** Inflammation of Achilles tendon near insertion to calcaneous

**Common in cutting and turning sports (tennis) and mountain hiking**

**Lack of adequate dorsiflexion for sport**

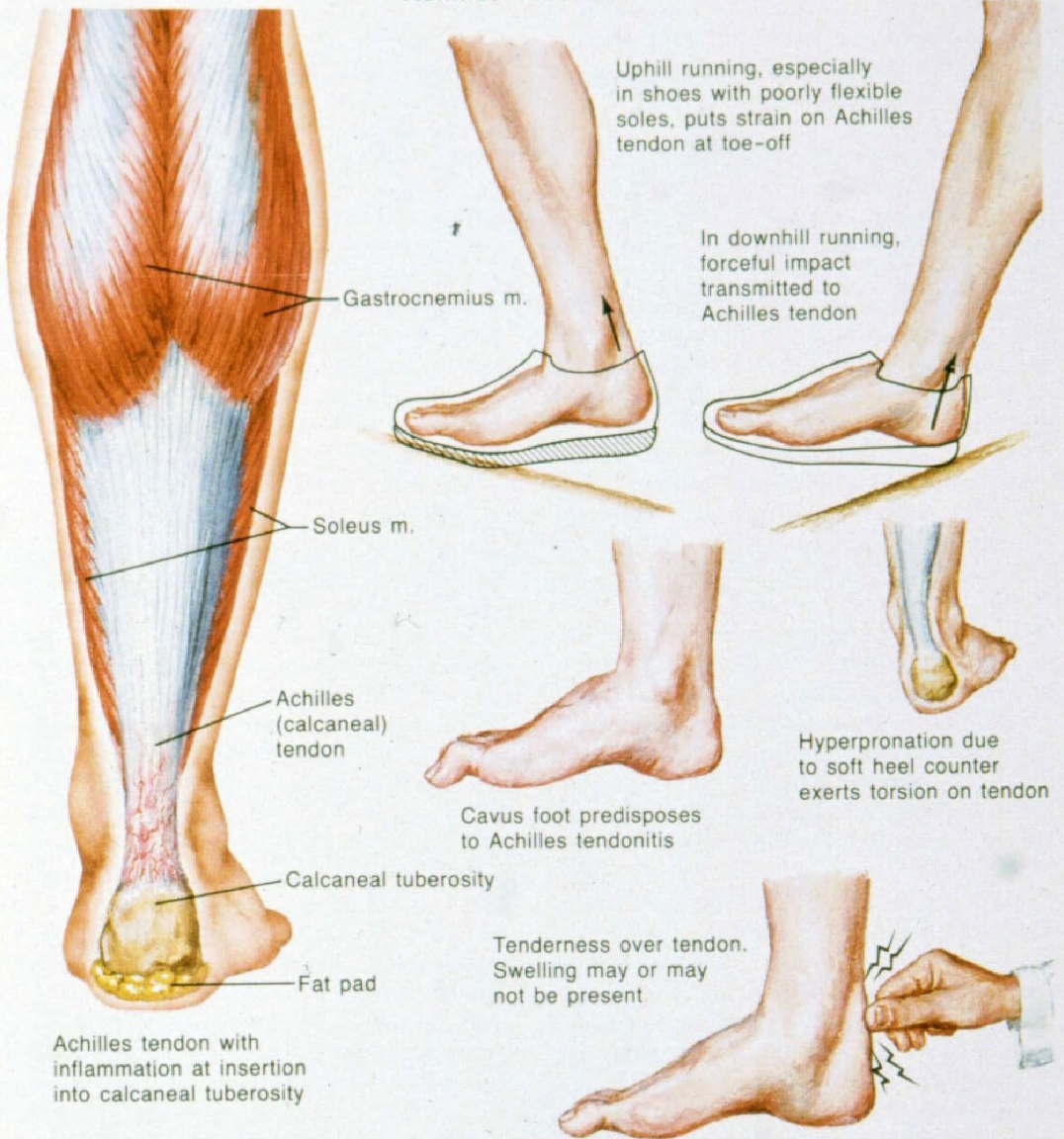
**Treatment:** Removable rigid boot (CAM walker)

**NSAID and physical therapy modalities**

**Need to improve ankle DF ROM**



# Achilles Tendonitis



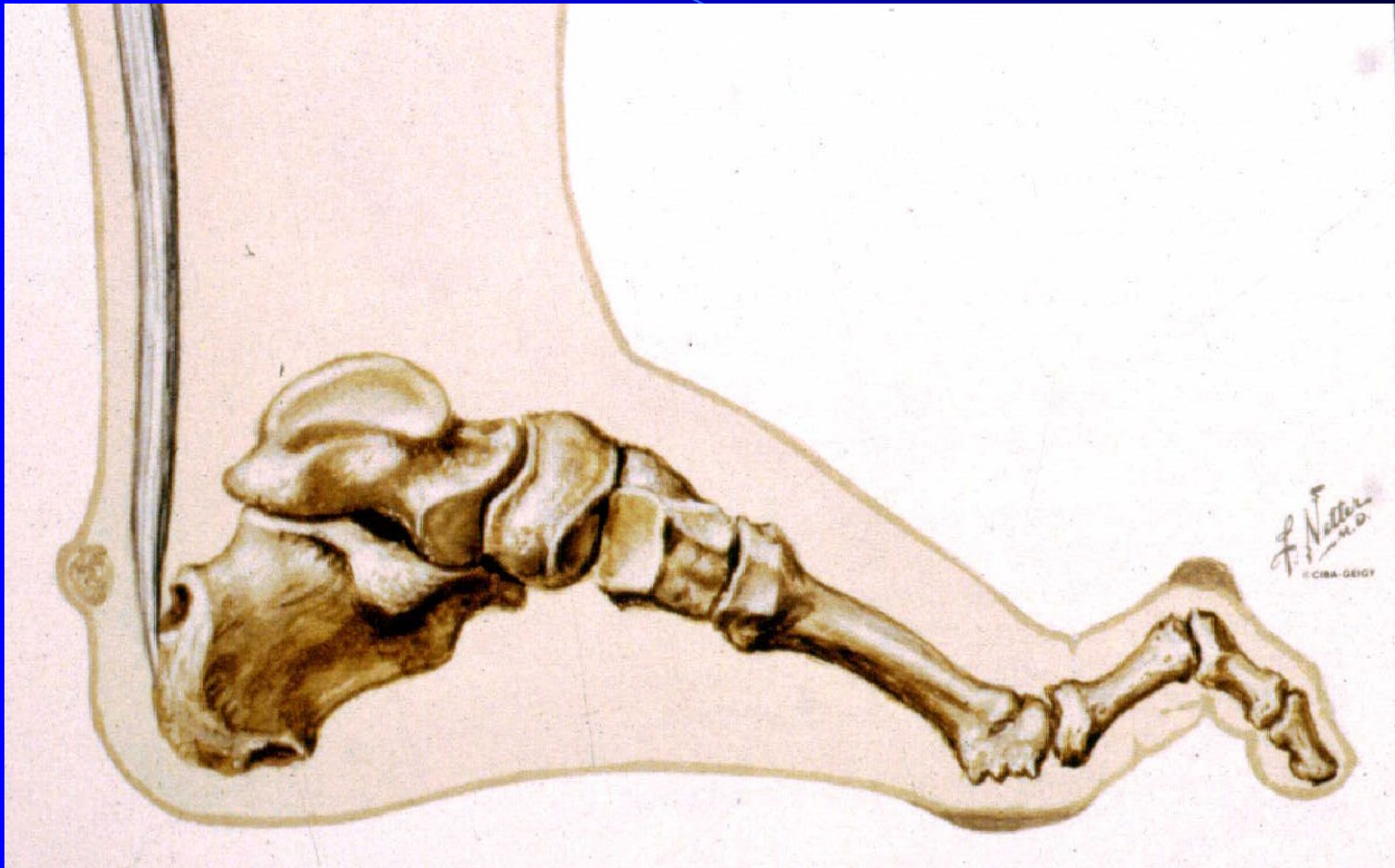


# Hammer Toes

**Pathology:** Can be hereditary deformity  
Often associated with intrinsic  
muscle atrophy due to neuropathy

**Treatment:** Extra-depth orthopedic shoes with  
high toe box  
Molded foot orthotic with met pad  
“Live with it”







**Thank You**