

Foot Pain and Pedorthotics

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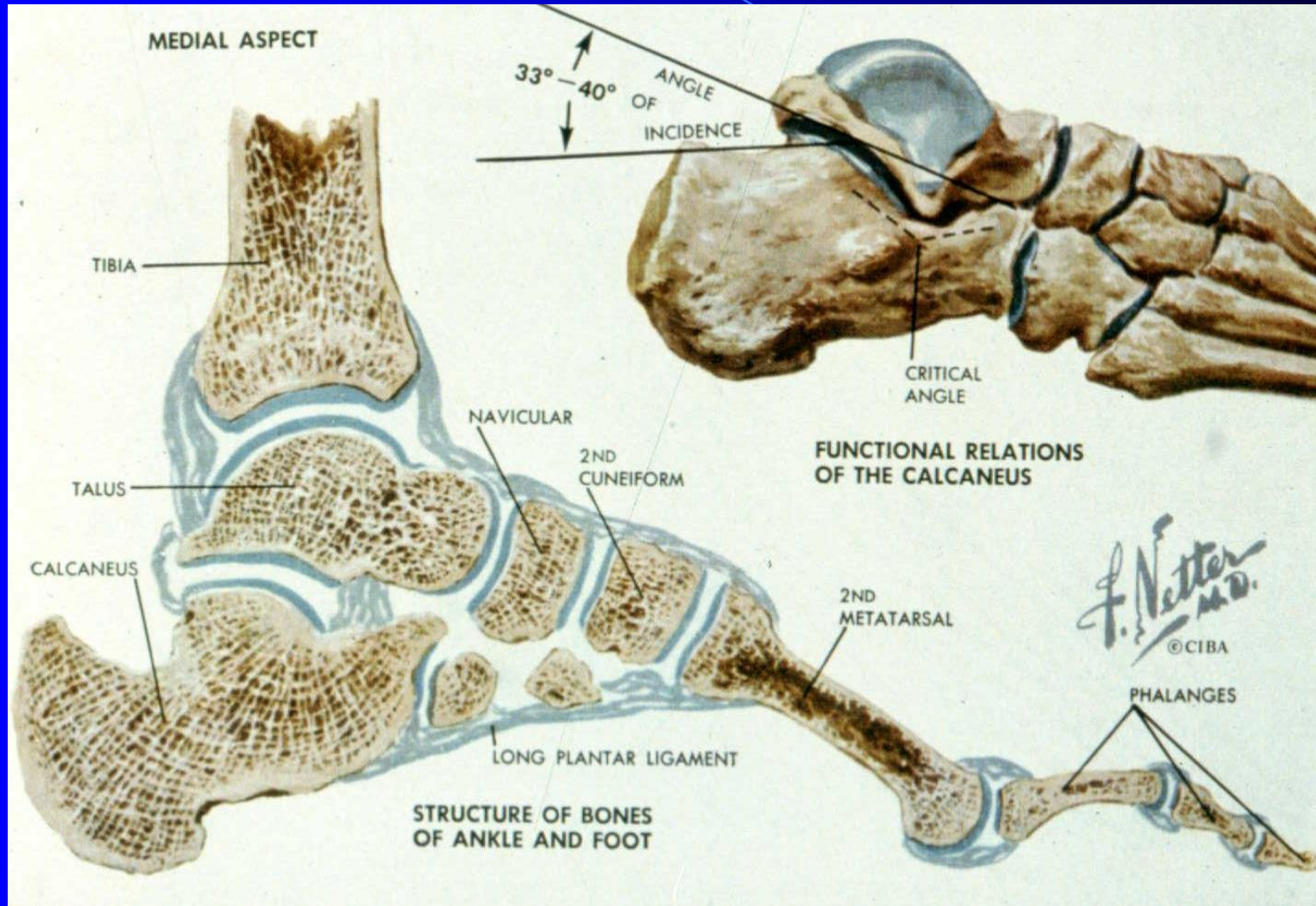
Medical Director, Prosthetic/Orthotic Team

JFK - Johnson Rehab Institute

Outline

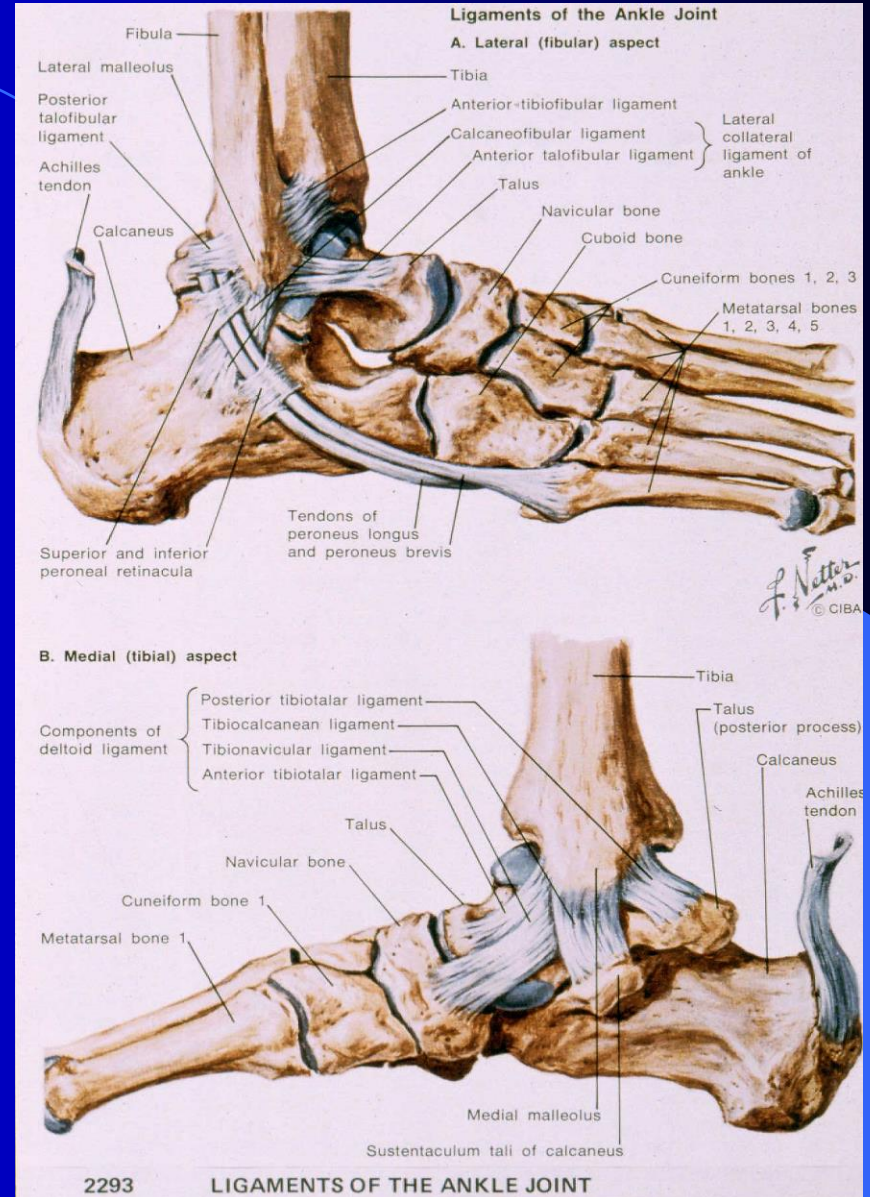
- **Normal anatomy**
- **Biomechanics of the foot and ankle**
- **Pathology**
- **Treatment options**

Critical Bony Structures

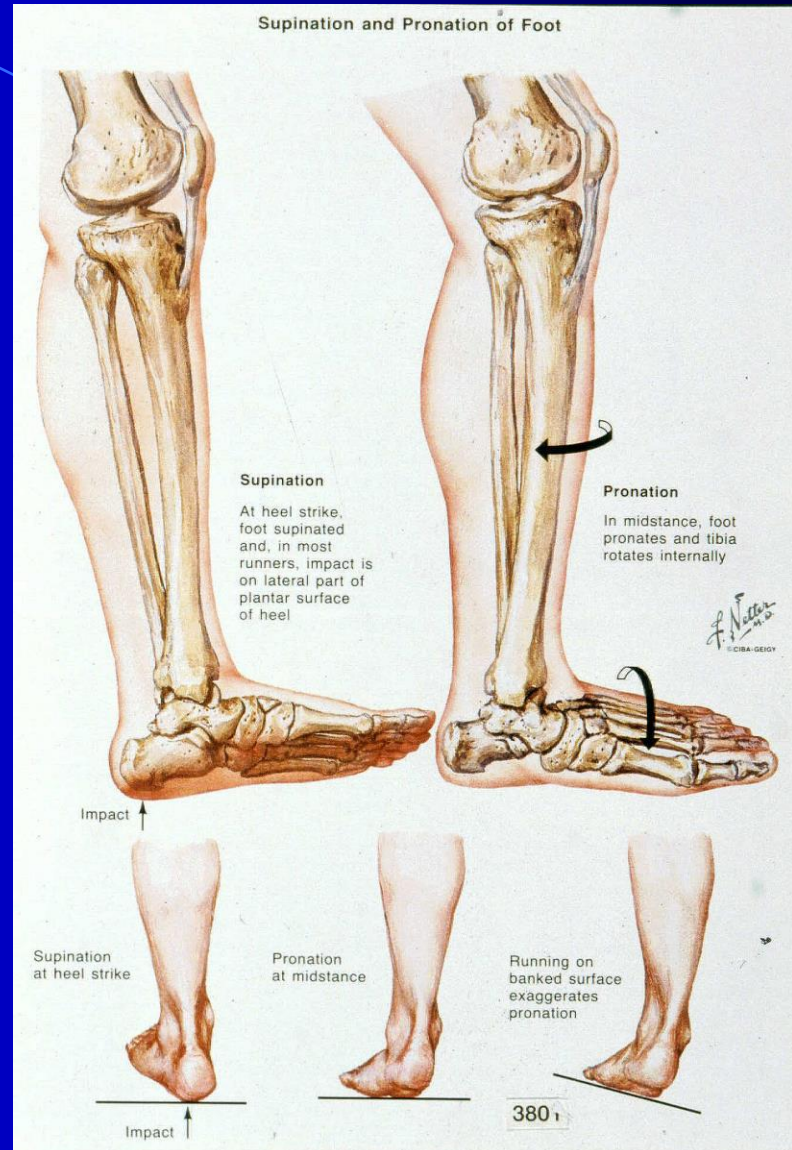


Lateral Ligaments

Medial Ligaments

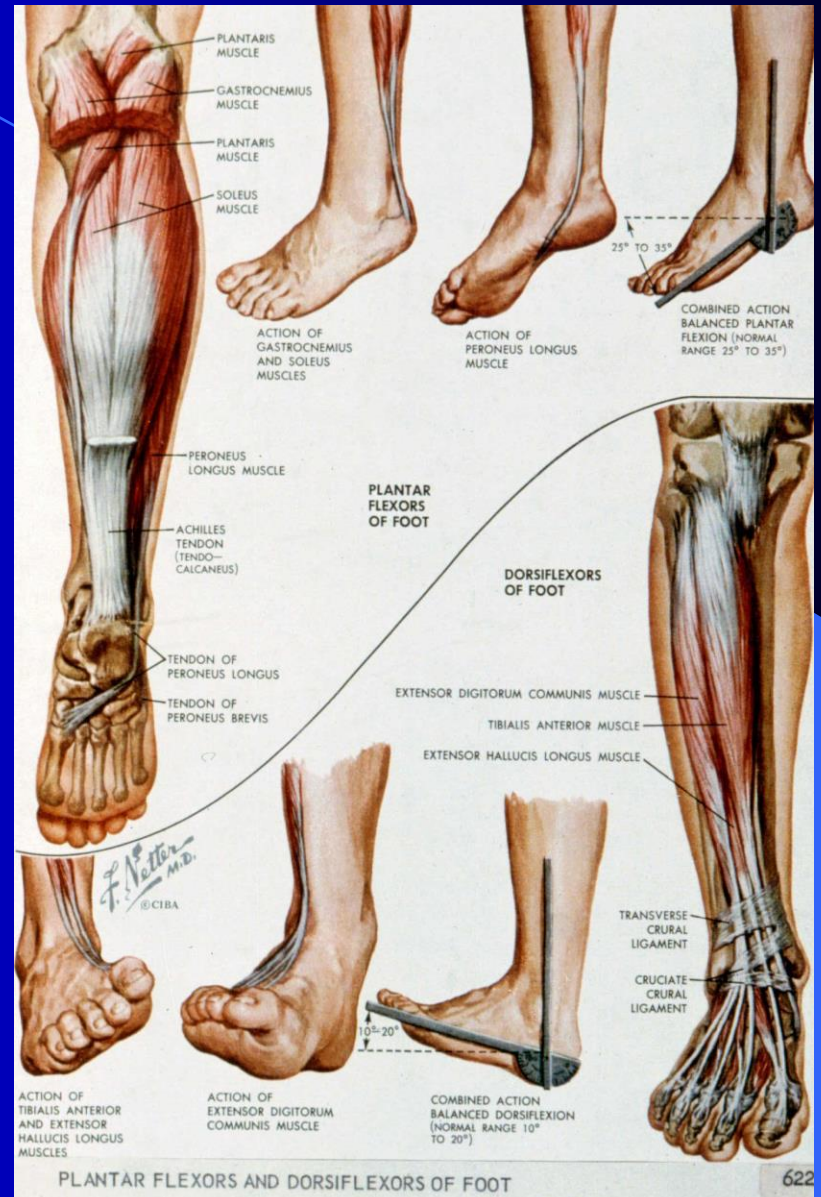


Supination and Pronation (mitered hinge joint)



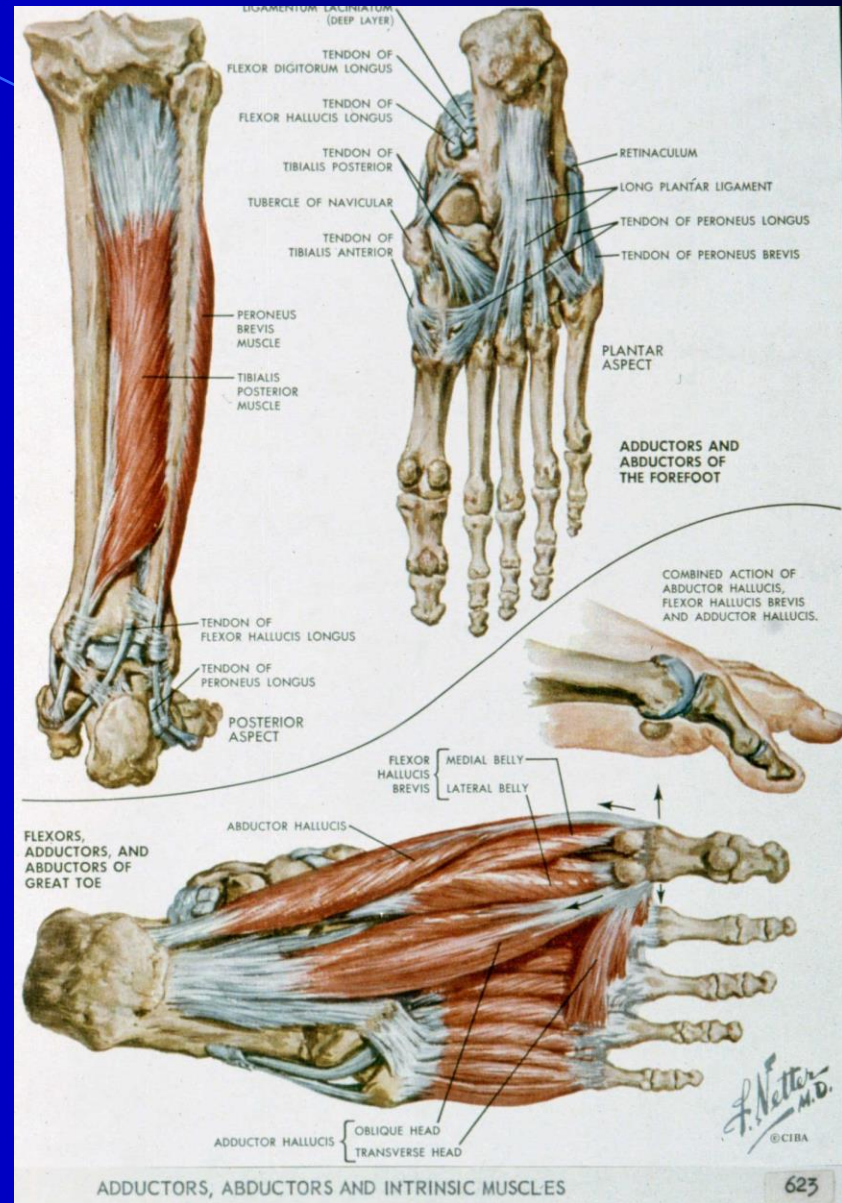
Plantarflexors:
Gastroc-soleus
Posterior tib
Peroneus longus

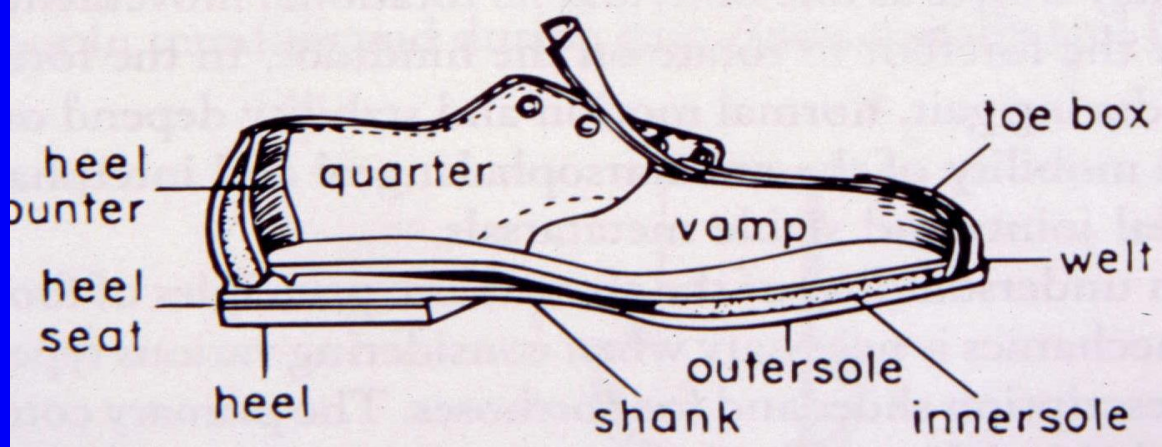
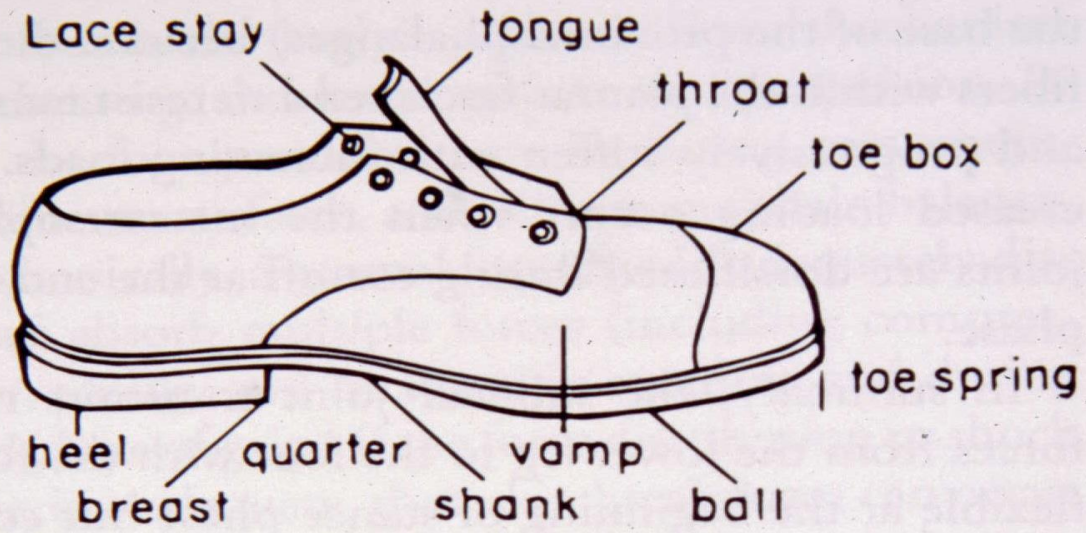
Dorsiflexors:
Anterior tib
Extensor hallucis
Extensor digitorum



Inversion:
Posterior tib
Anterior tib

Eversion:
Peroneus
longus and
brevis





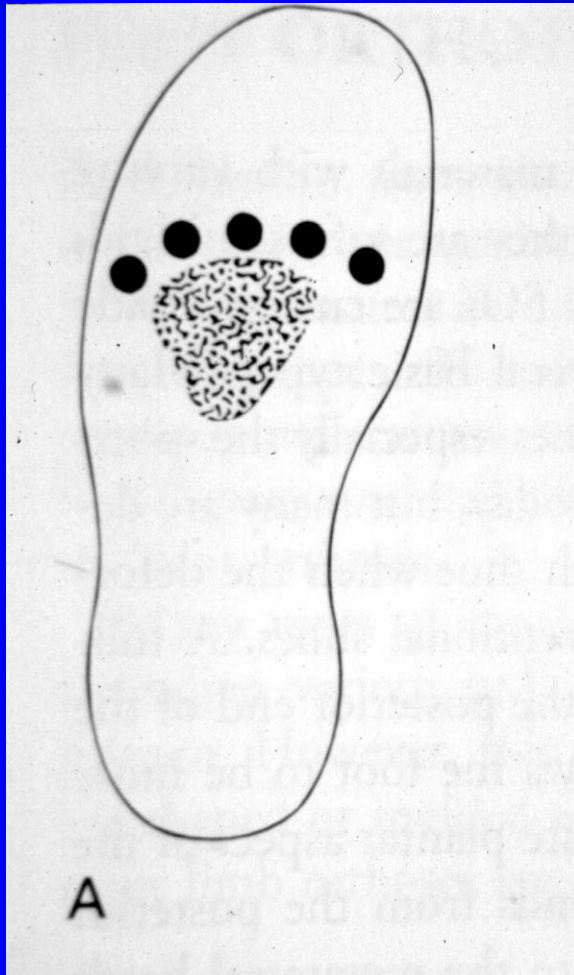




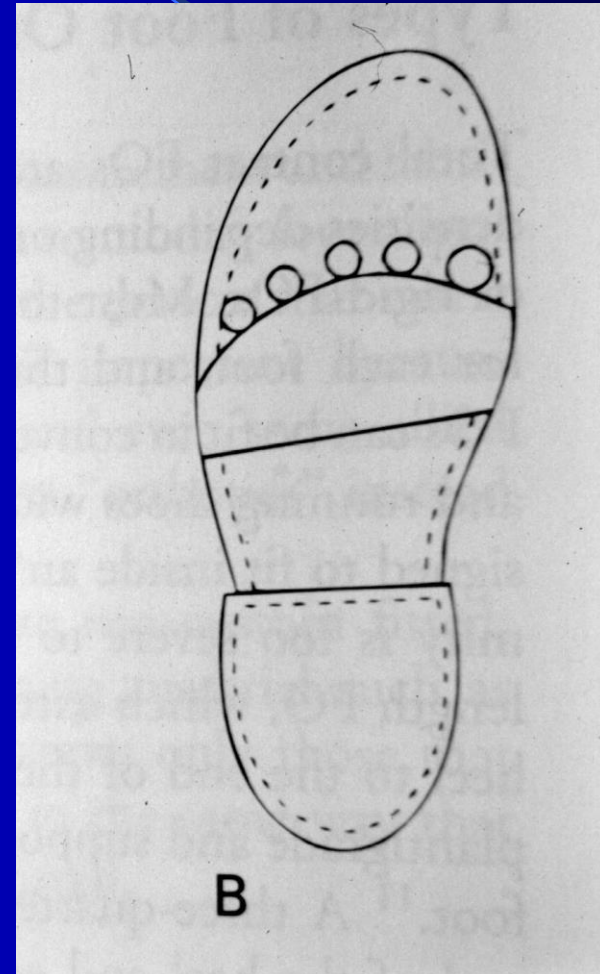




Met Pad

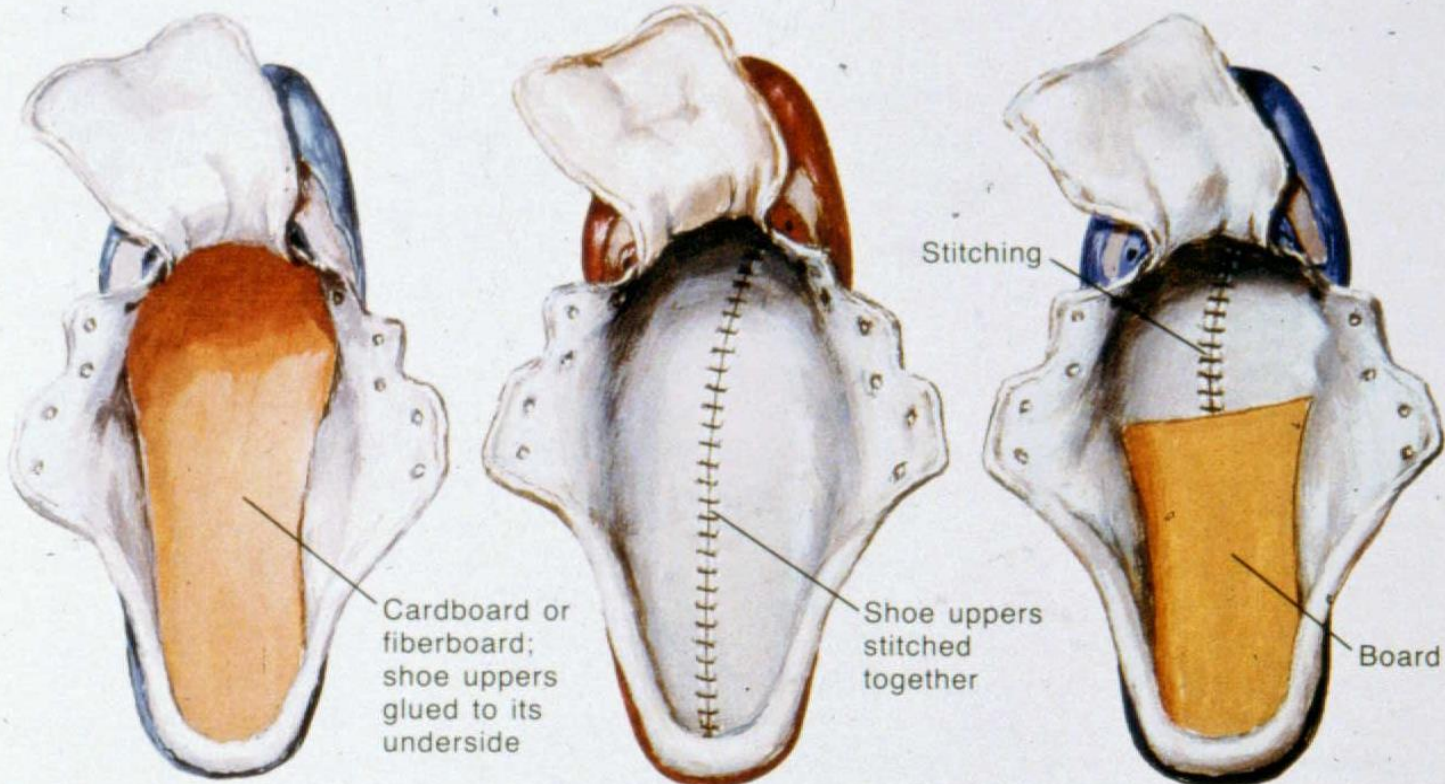


Met Bar





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

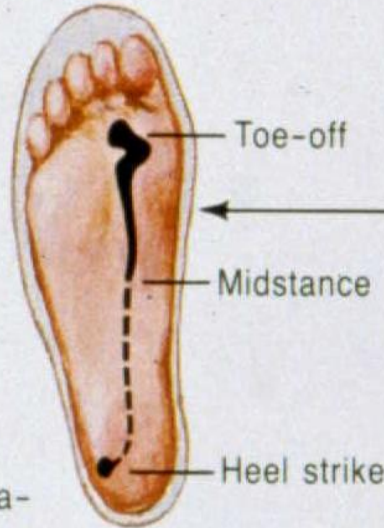
Pronated (hyperflexible) foot



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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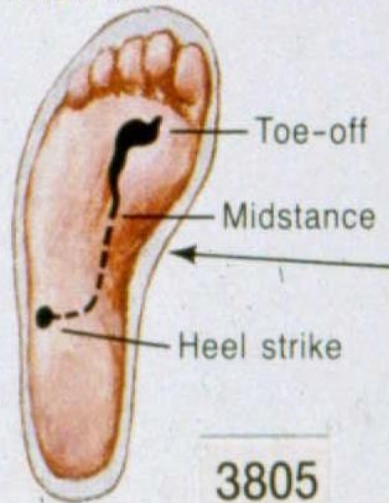
Cavus (rigid) supinated foot



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

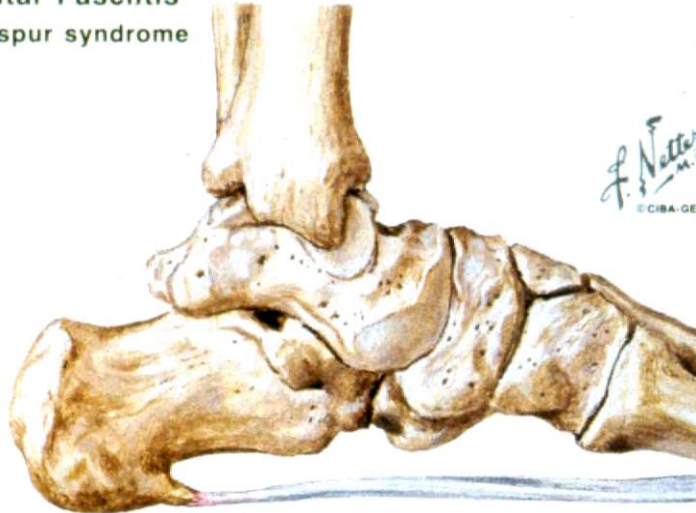
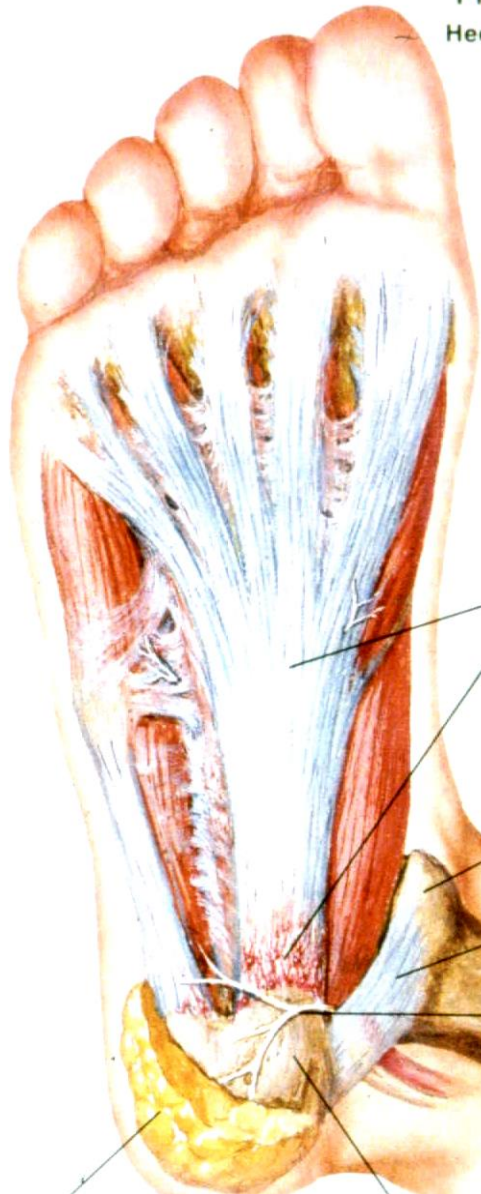
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Plantar Fasciitis

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

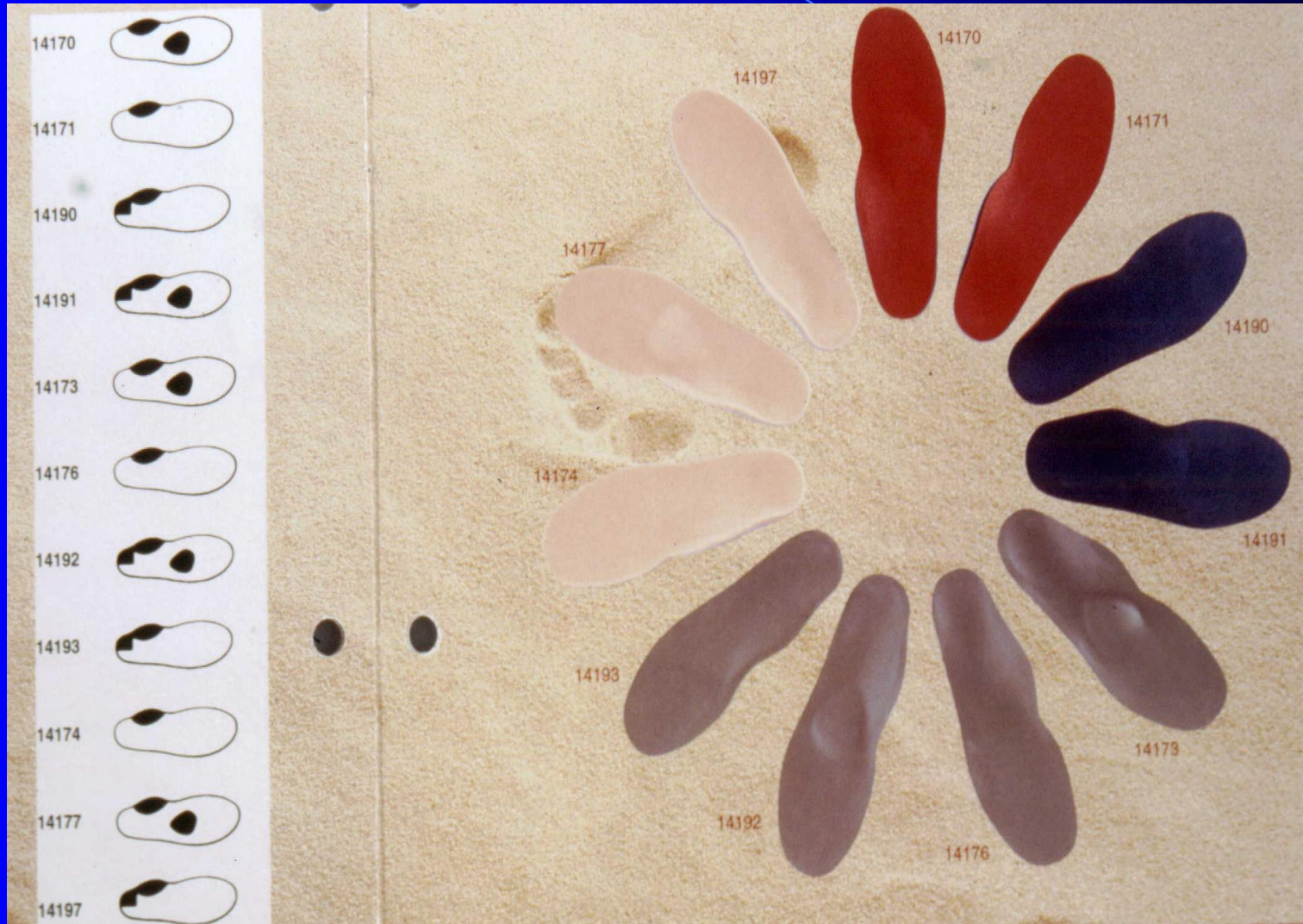
Positive bone scan of calcaneal stress fracture



Foot Orthotics



So Many Choices



Custom Foot Orthotics



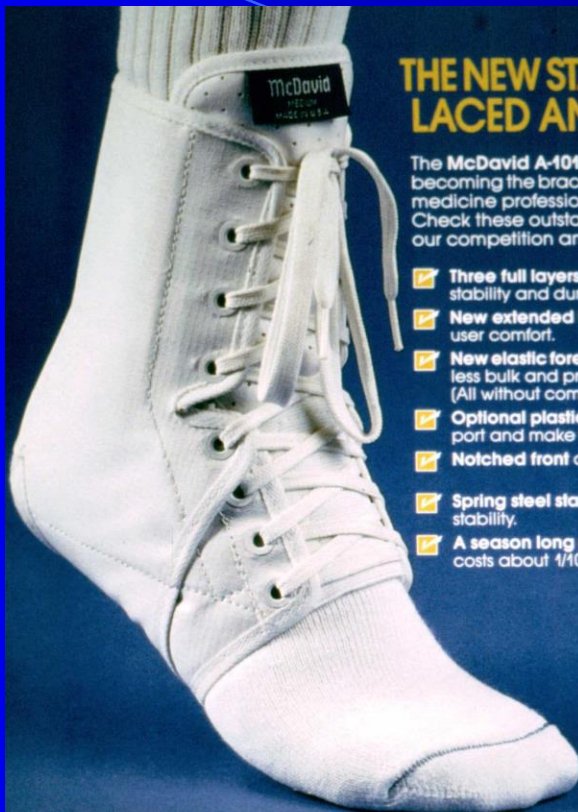
Night-time positioning splint



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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- ✓ **Optional plastic inserts** provide added support and make this two products in one!
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- ✓ **Spring steel stays** provide necessary stability.
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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

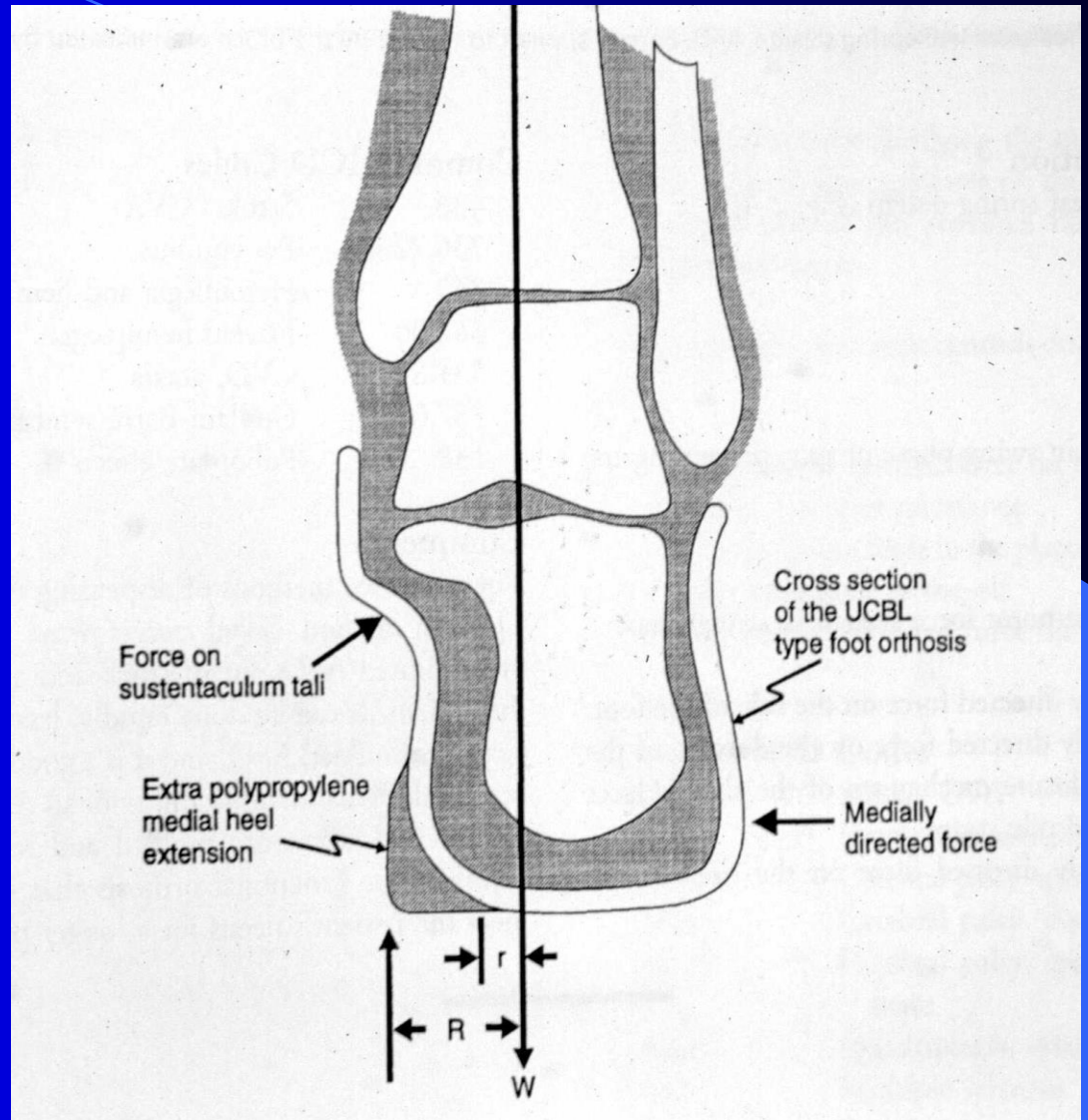
Corrective semi-rigid foot orthotics



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

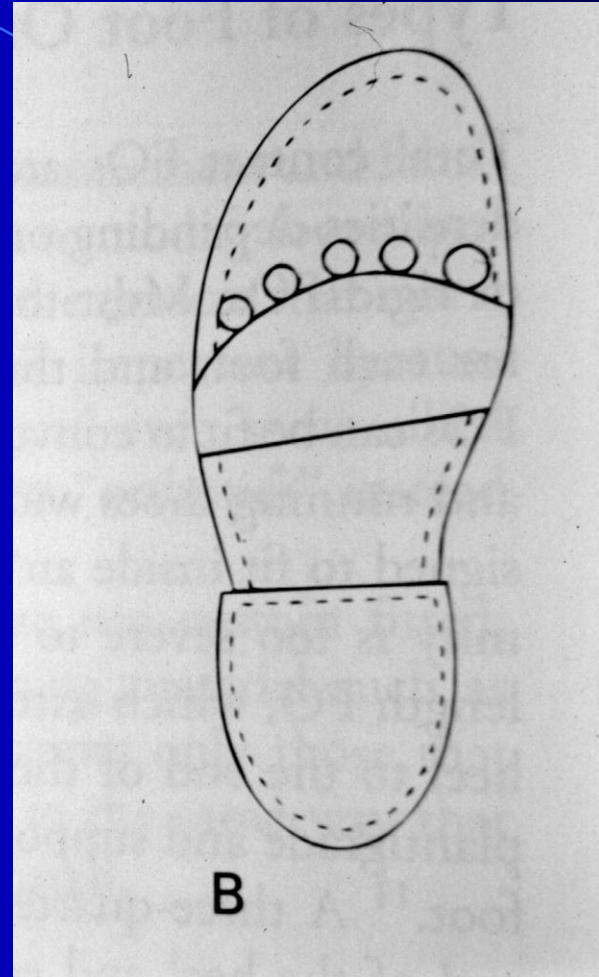
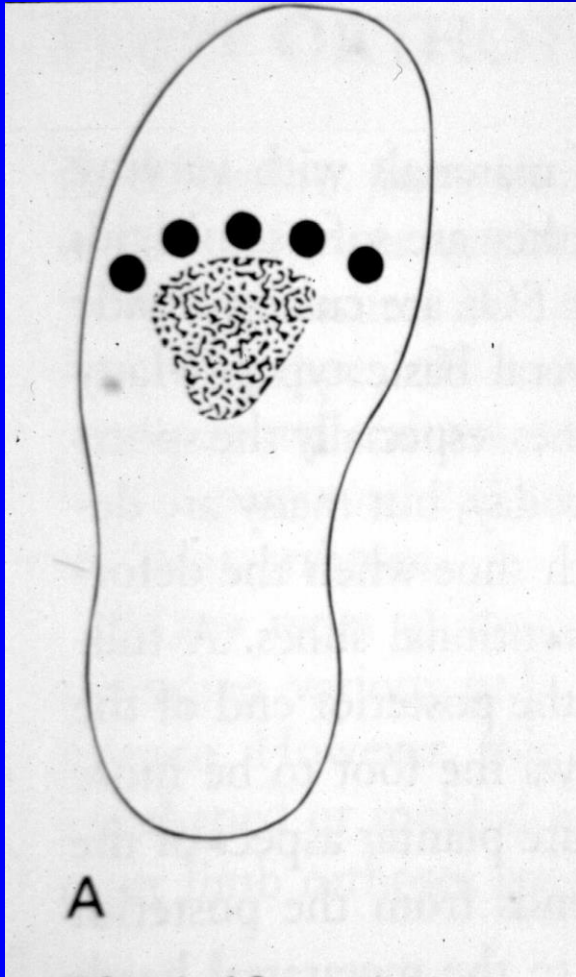
Soft Heel Wedge



Metatarsalgia

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

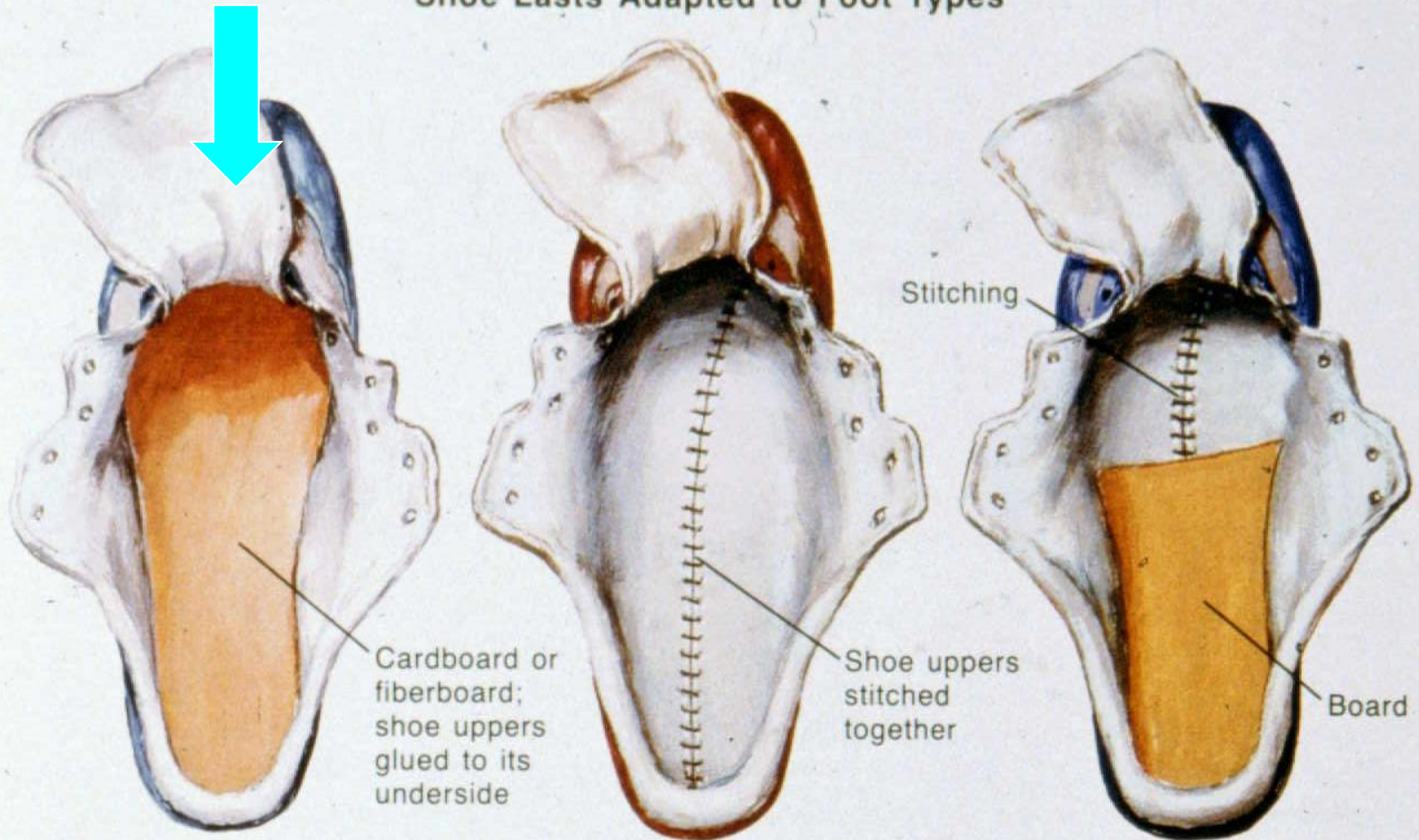
Treatment: Foot orthotics with met pad or bar
Rigid or board-lasted shoes to minimize toe-break



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



Shoe Lasts Adapted to Foot Types



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)

Neuroma

Pathology: Swelling and inflammation of distal nerves between 3rd-4th 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

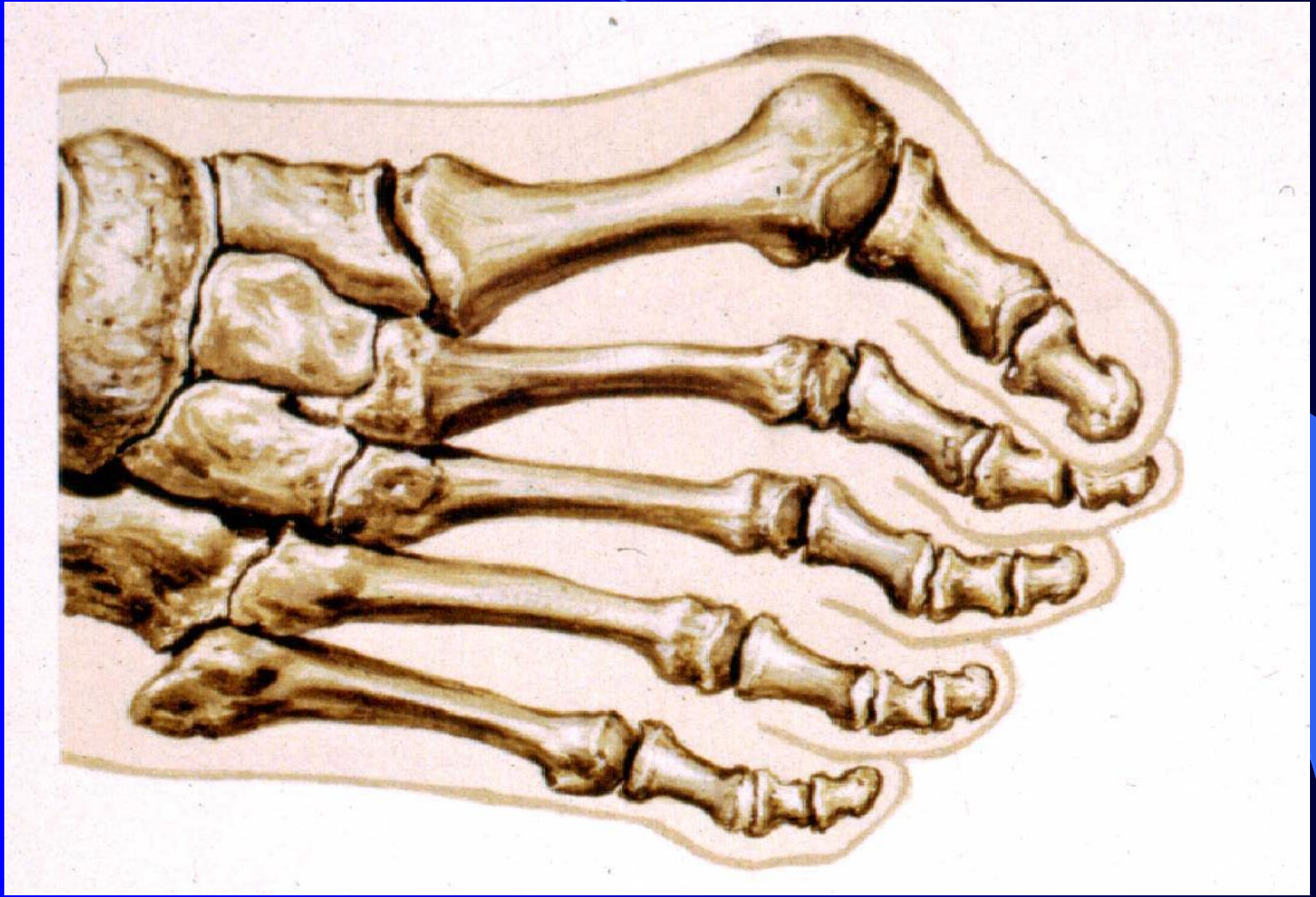
Pathology: Usually hereditary lateral deviation of big toe with hypertrophy of medial portion of 1st MCP joint

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 1st MTP joint due to excessive impact from running and excessive extension of big toe

Treatment: Foot orthotic with build up at 1st metatarsal shaft and relief at sesamoid bones

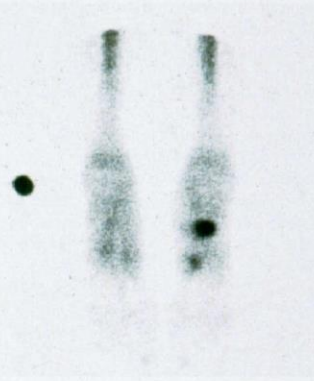
Extra-depth shoe with rigid sole to minimize toe-break

Metatarsal Stress Fracture

Pathology: Overuse fracture of metatarsal shaft commonly seen in runners

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

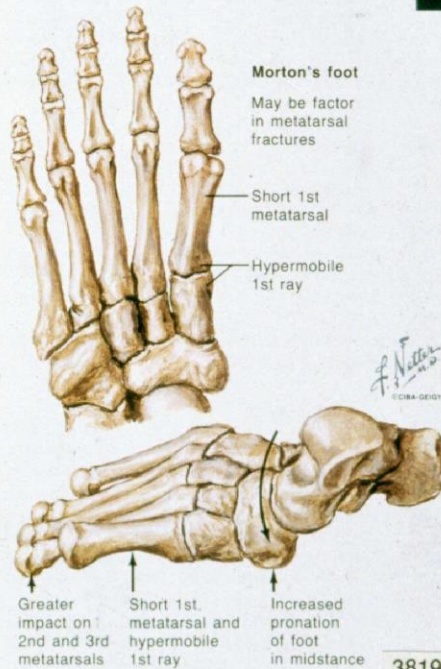
Stress Fractures



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

Greater impact on 2nd and 3rd metatarsals

Short 1st. metatarsal and hypermobile 1st ray

Increased pronation of foot in midstance

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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

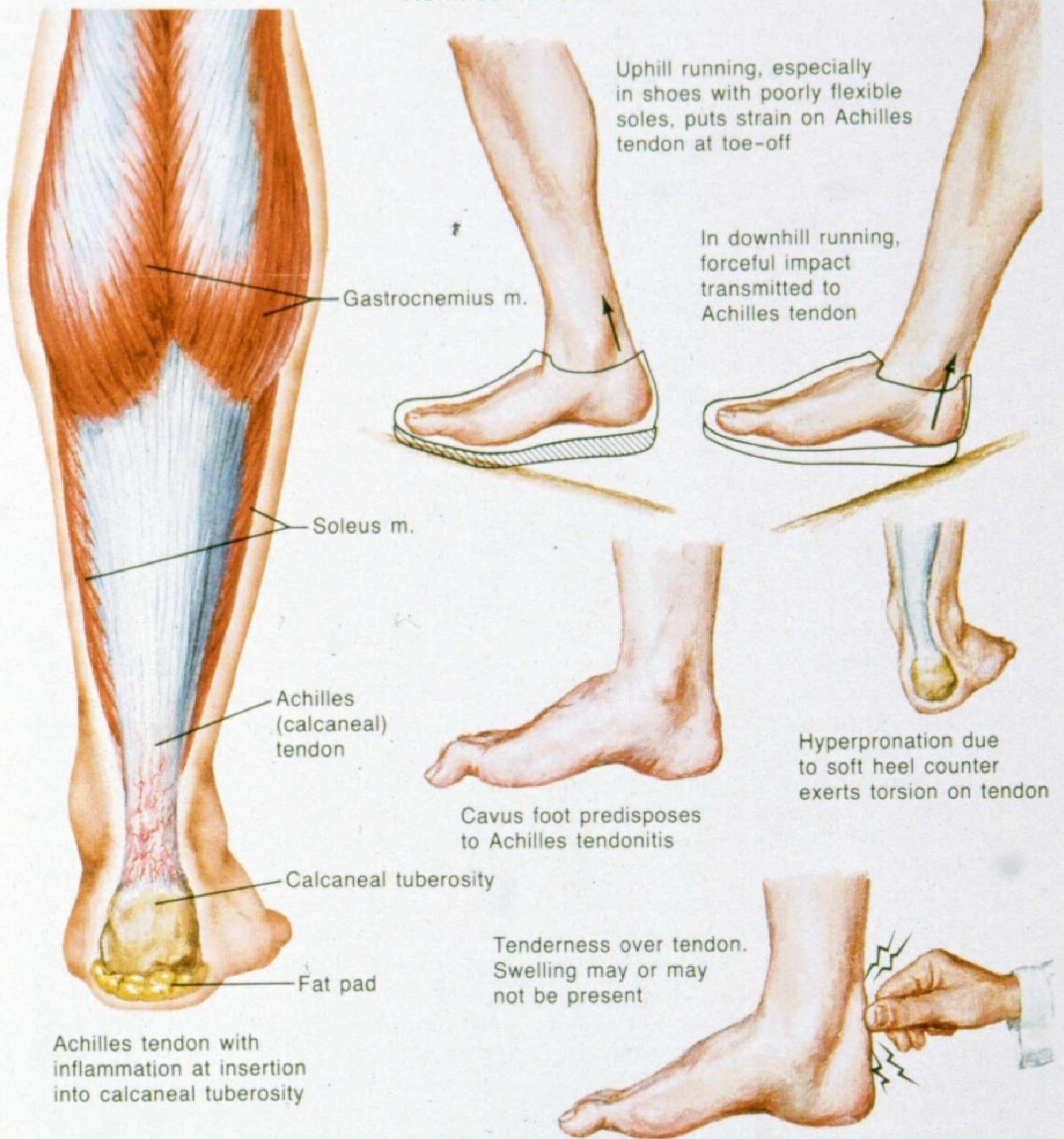
Lack of adequate dorsiflexion for sport

Treatment: Removable rigid boot (CAM walker)

NSAID and physical therapy modalities

Need to improve ankle DF ROM

Achilles Tendonitis

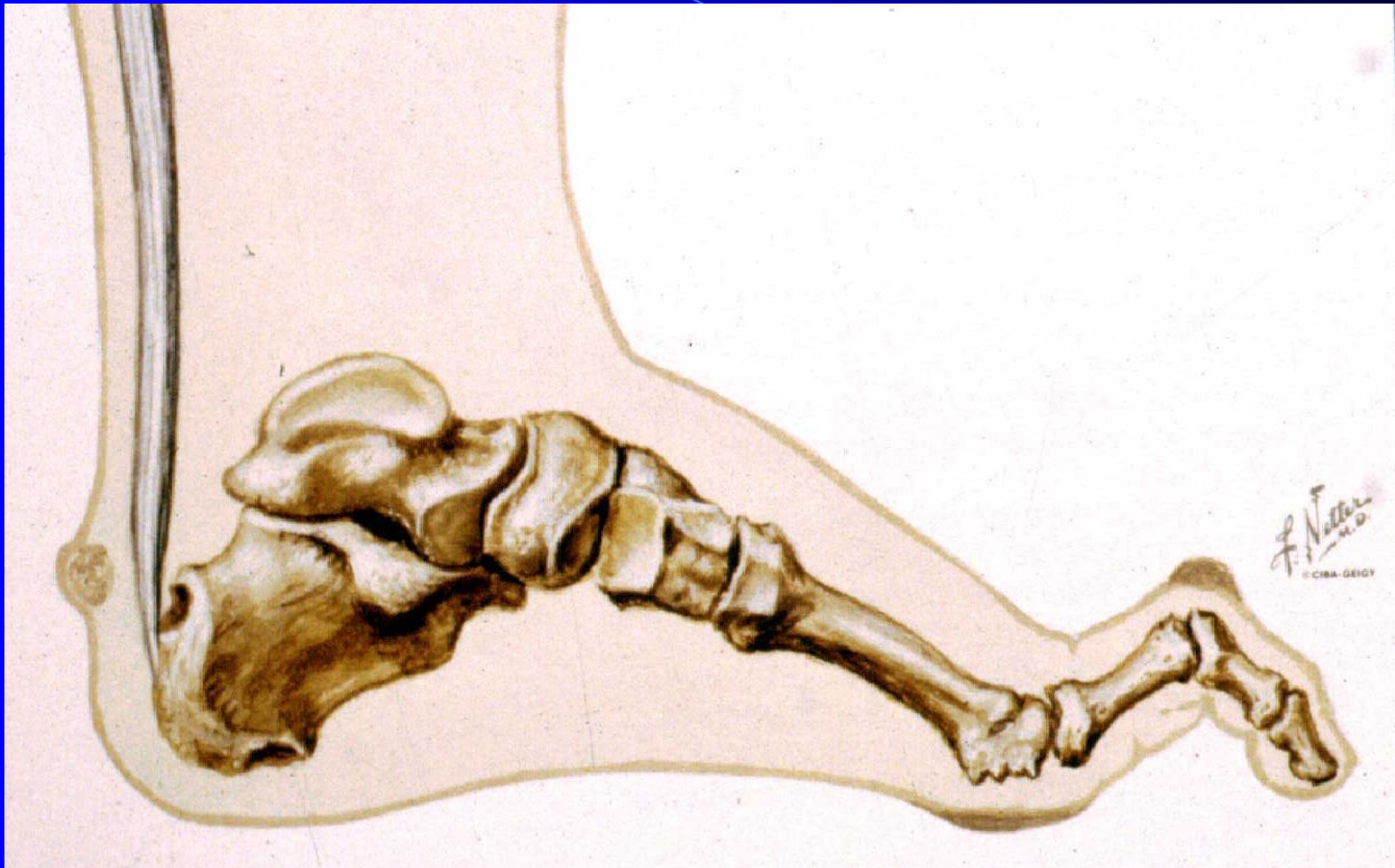




Hammer Toes

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