Diabetic Foot Complications

MIDWEST SCHOOL OF MODERN PEDORTHICS

Precertification Program in Pedorthics

Mequon, WI

Diabetic Foot Complications

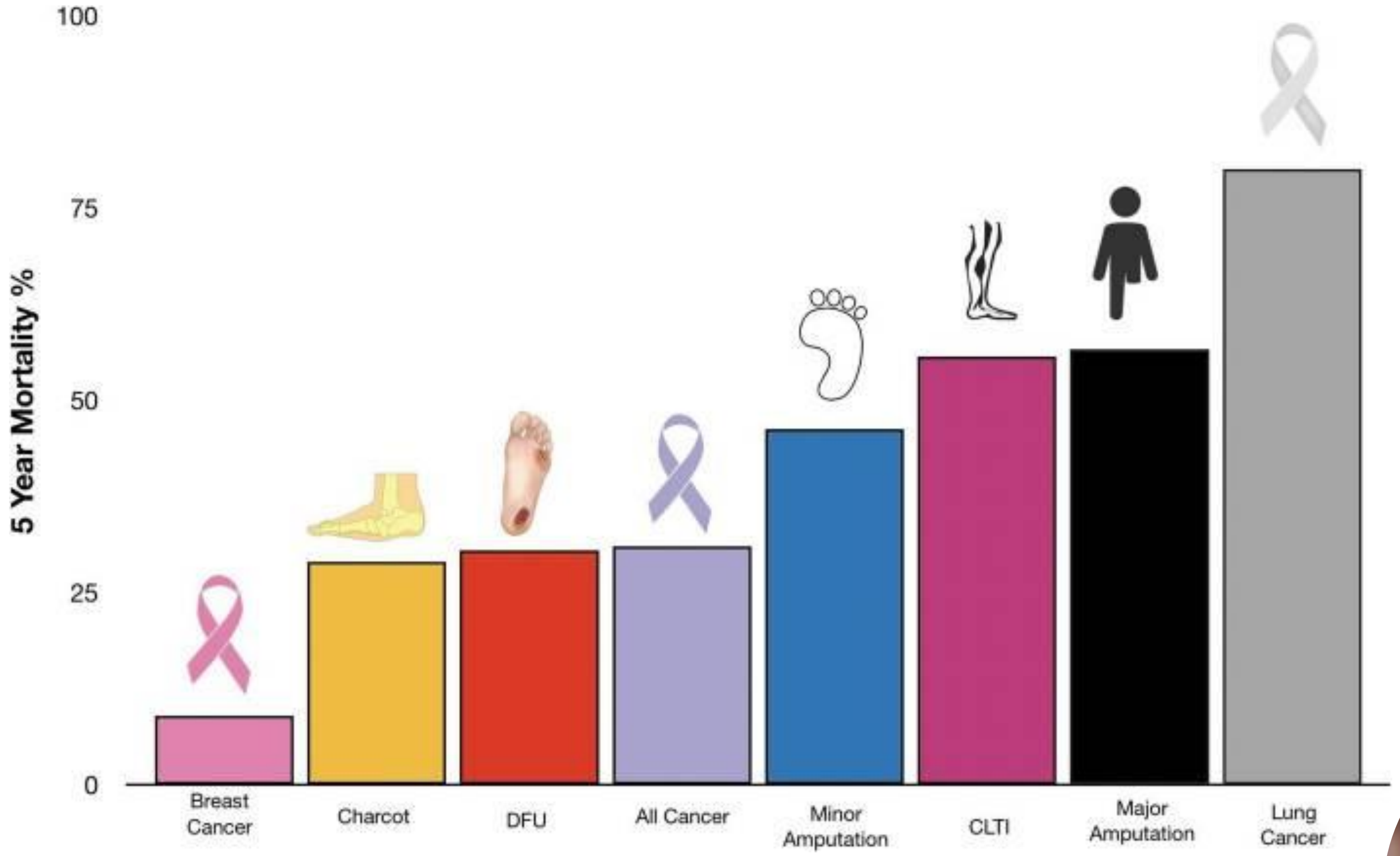
- Ulcerations
  - Will be covered in this module
- Neuropathic arthropathy
  - Will be covered in this module

- Peripheral neuropathy
  - Covered extensively in another module
- Amputations
  - Covered extensively in another module

Diabetic Foot Ulcers

Diabetic Foot Ulcers

- About 60% of diabetics will develop peripheral neuropathy, which could eventually lead to a foot ulcer.
- 15% to 25% of patients with diabetes mellitus will develop a diabetic foot ulcer during their lifetime. Some studies conclude that the real number is closer to 1/3.
- Over half of the ulcers will become infected.
- 17% of the ulcers will directly lead to an amputation.
- 85% of LE amputations is patients with diabetes begin with an ulcer.
- Five-year mortality for
    - Charcot foot = 29%
    - Diabetic foot ulcer = 30.5%
    - Minor amputations = 46.2%
    - Major amputations = 56.6%
        - Armstrong DG, Swerdlow MA, Armstrong AA, Conte MS, Padula WV, Bus SA. Five year mortality and direct costs with diabetic foot complications are comparable to cancer. J Foot Ankle Res. 2020 Mar 24;13(1):16. doi: 10.1186/ 00383-2. PMID: 32209136; PMCID: PMC7092527.



- Armstrong DG, Swerdlow MA, Armstrong AA, Conte MS, Padula WV, Bus SA. Five year mortality and direct costs of care for people wi complications are comparable to cancer. J Foot Ankle Res. 2020 Mar 24;13(1):16. doi: 10.1186/s13047-020-00383-2. PMID: 3220913 PMC7092527.

Cost Burden of DFU

- DFUs place a great economic burden on society, both to our healthcare system and due to lost productivity. In 2017, diabetes directly cost $237 billion in the USA, a 26% increase from 2012. On the order of one-third of these direct costs were attributable to care for diabetic foot disease.
- In remarkable contrast, the 2015 direct costs for cancer in the USA were $80.2 billion - nearly equal to the attributable cost of diabetic foot disease.

Diabetic Foot Ulcers

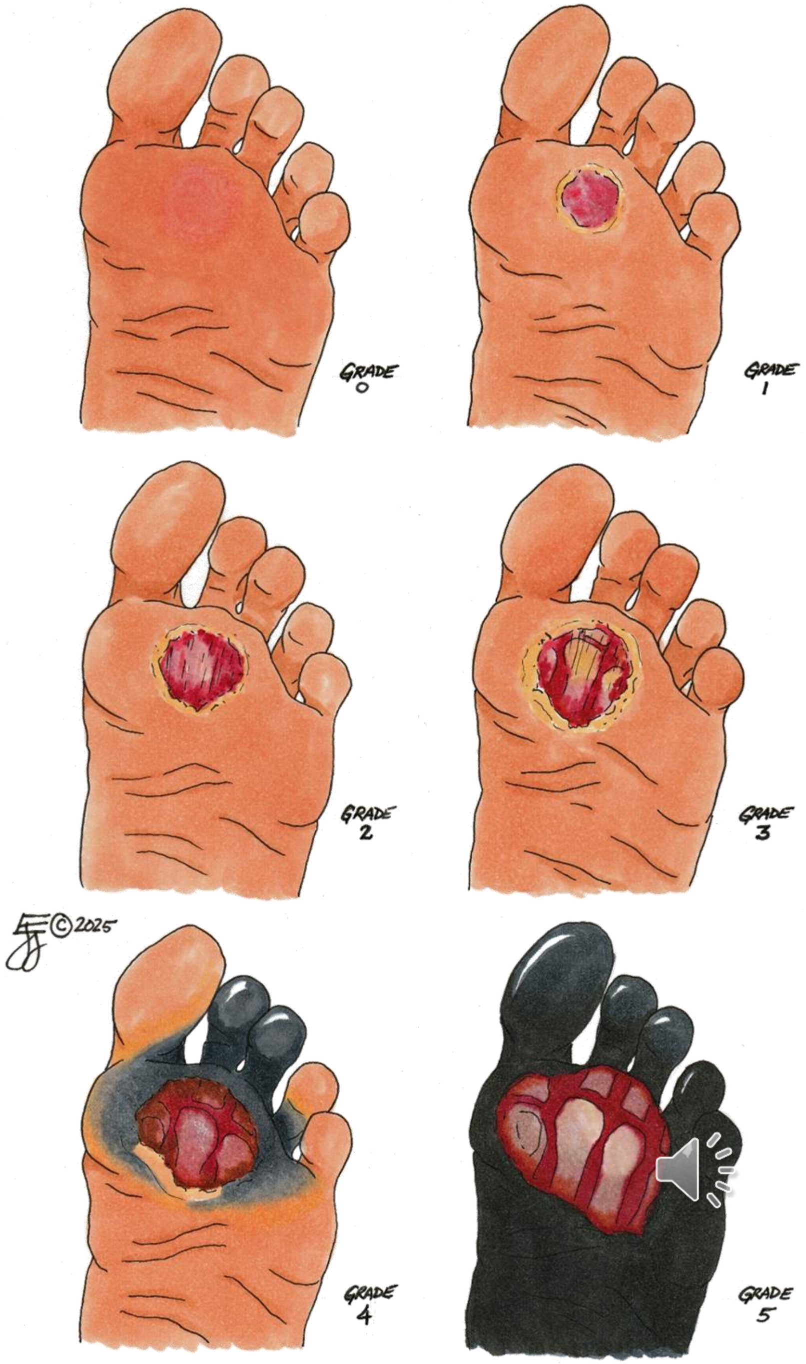
- The etiology for diabetic foot ulcer is multifactorial. Common underlying causes include:
  - Poor glycemic control
  - Calluses
  - Foot deformities
  - Improper foot care
  - Ill-fitting footwear
  - Underlying peripheral neuropathy and poor circulation
  - Dry skin
- The risk of a foot ulcer is increased in individuals with a flat foot as they have disproportionate stress across the foot, leading to tissue inflammation in high-risk areas of the foot.
- The annual incidence of diabetic foot ulcer worldwide is between 9.1 to 26.1 milli
- Diabetic foot ulcers can occur at any age but are most prevalent in patients with mellitus ages 45 and over.
- Latinos, African Americans, and Native Americans have the highest incidence o ulcers in the US.

Pathophysiology

- The development of a diabetic ulcer occurs over three stages:
  - Initial stage is the development of a callus. The callus results from pressure.
  - Motor neuropathy causes physical deformity of the foot, and sensory neuropathy causes sensory loss which leads to ongoing trauma. Drying of the skin because of autonomic neuropathy is also another contributing factor.
  - Finally, frequent trauma of the callus results in subcutaneous hemorrhage and eventually, it erodes and becomes an ulcer.
- Patients with diabetes mellitus also develop severe atherosclerosis of the small blood vessels in the legs and feet, leading to vascular compromise, which, in and of itself, can cause ischemic ulcers. This also contributes infection as blood is not able to reach the wound, healing is delayed leading to necrosis and gangrene.

Wagner Classification

- **Wagner Grade 0:** Skin is intact with no open lesion or a pre-ulcerative lesion — may have a deformity or cellulitis
- **Wagner Grade 1**: Partial- or full-thickness ulcer (superficial ulcer)
- **Wagner Grade 2:** Deep ulcer extended to ligament, tendon, joint capsule, bone, or deep fascia without abscess or osteomyelitis (OM)
- **Wagner Grade 3:** Deep abscess, OM, or joint sepsis
- **Wagner Grade 4:** Partial-foot gangrene
- **Wagner Grade 5:** Whole-foot gangrene

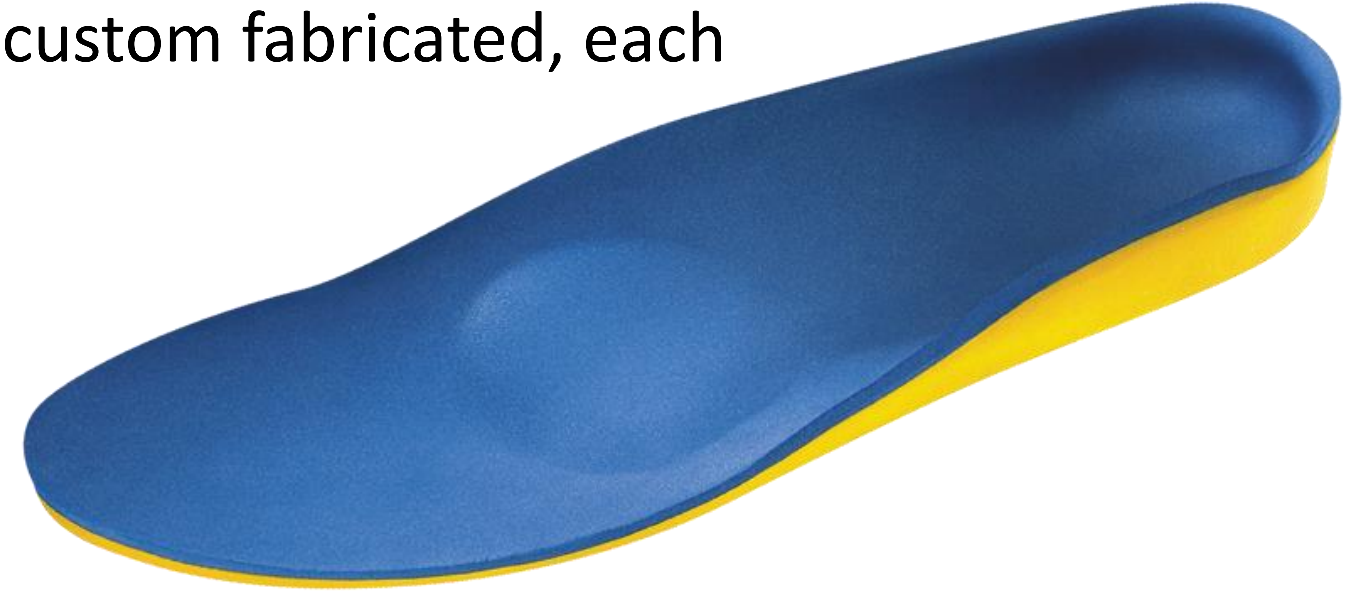


Pedorthic Management of Diabetic Foot Ulcers

A5510: Direct-formed, compression molded to patient’s foot without external heat source, multi-density insert(s), prefabricated, per shoe (*Not a reimbursable code*).

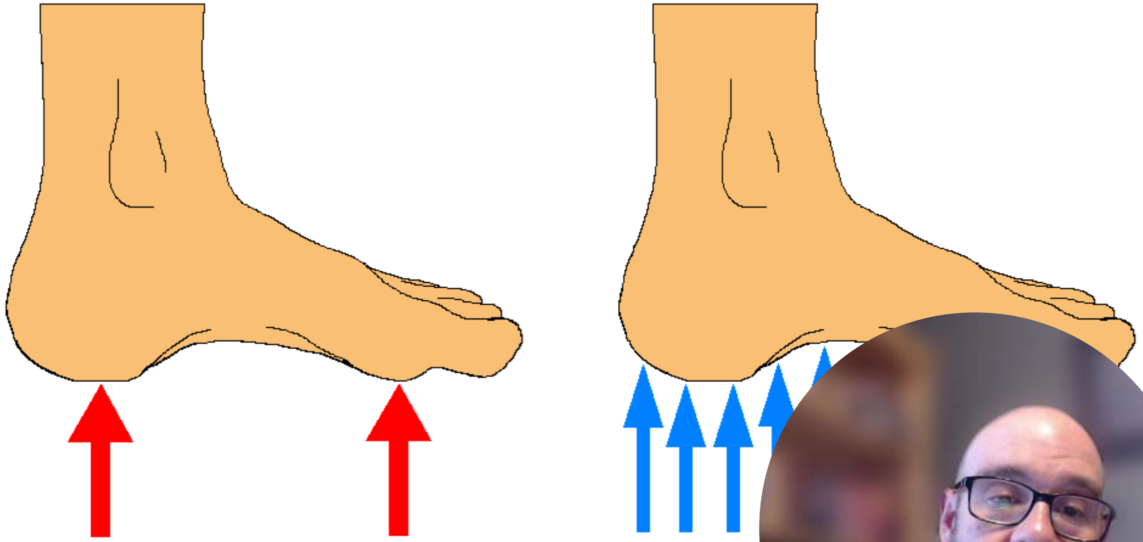
A5512: Multiple-density insert, direct-formed, molded to foot after external heat source of 230°F, or higher, total contact with patient’s foot, including arch, base layer minimum of 1/4” material of Shore A 35 Durometer or 3/16” material of Shore A 40 Durometer (or higher), prefabricated, each

A5513: Multiple-density insert, custom-molded from **model of patient's foot**, total contact with patient's foot, including arch, base layer, minimum of 3/16" material of Shore A 35 Durometer (or higher), including arch filler and other shaping material, custom fabricated, each



A5514: Multiple-density insert, made by [direct carving](#) with CAM technology from a rectified CAD model created from a digitized scan of the patient total contact with patient's foot, including arch, base layer, minimum of 3/16" material of Shore A 35 Durometer (or higher), and other shaping material, custom fabricated, each

L3020: Foot, insert, removable, molded to patient model, longitudinal/ metatarsal support, each

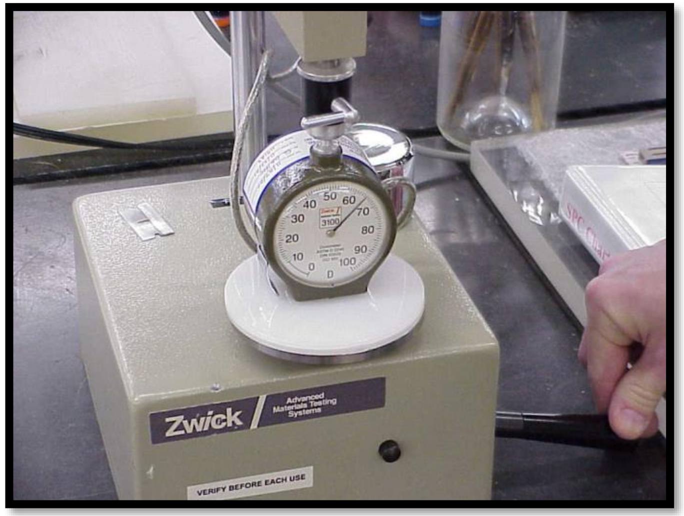


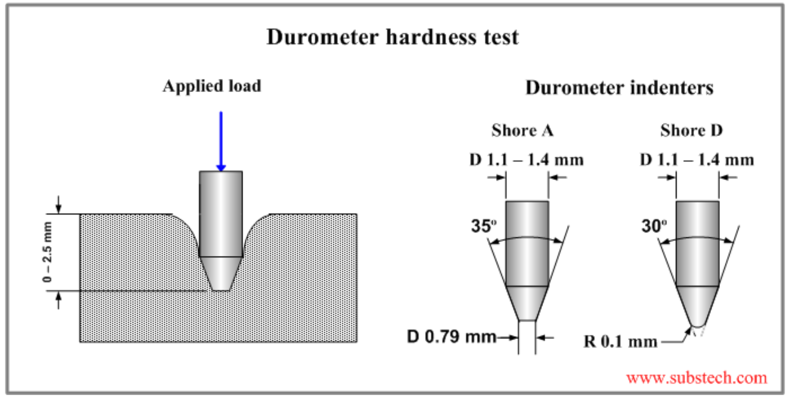
L5000: Partial foot, shoe insert with longitudinal arch, toe filler

FO Materials

- **What exactly is a Shore A durometer mean?**
  - Hardness may be defined as a material's resistance to permanent indentation. The durometer scale was defined by Albert F. Shore, who invented the durometer device in the 1920s.
- **How do you physically measure a material's hardness?**
  - The different Shore Hardness scales measure the resistance of a material to indentation. A ‘Shore Hardness' gauge has a needle on a spring protruding from one end. The needle is placed against the rubber or plastic and pressure is applied. Once the gauge is pressed firmly against the material and the needle has penetrated as far as it can go, the measurement needle will indicate the corresponding hardness measurement.

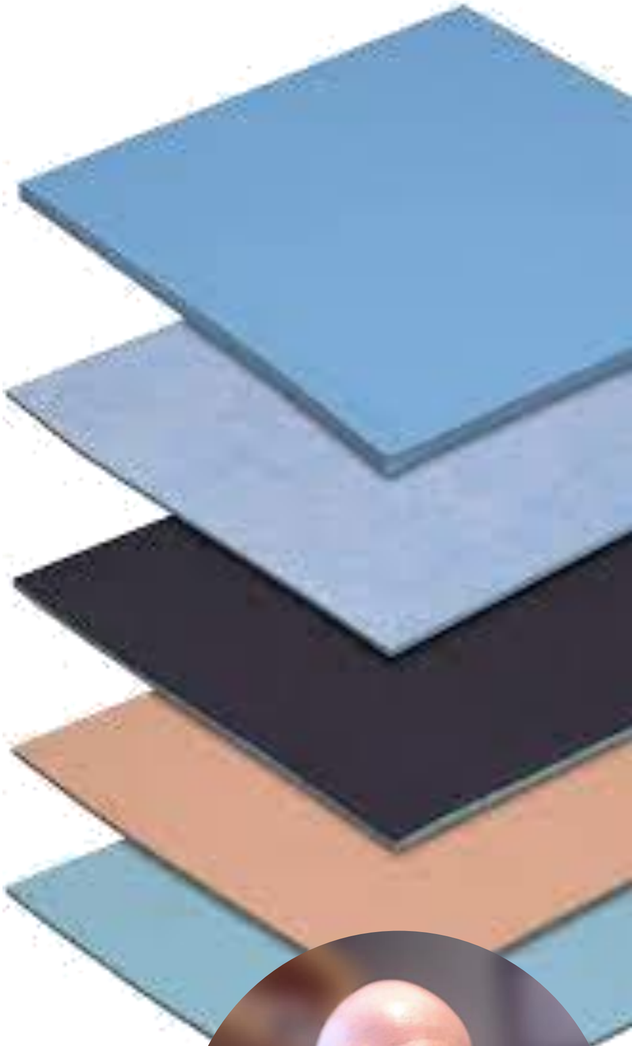
Shore Hardness Testing





Shore A Durometer

• Poron®	3
• Plastazote® #1	15
• AliPlast™	23
• P-Cell™	20-25
• Plastazote® #2	25
• UcoLite™	35
• Medium Pelite	37
• EVA soling	45
• Multicork	55-60
• Plastazote® #3	60
• Ripple soling	75

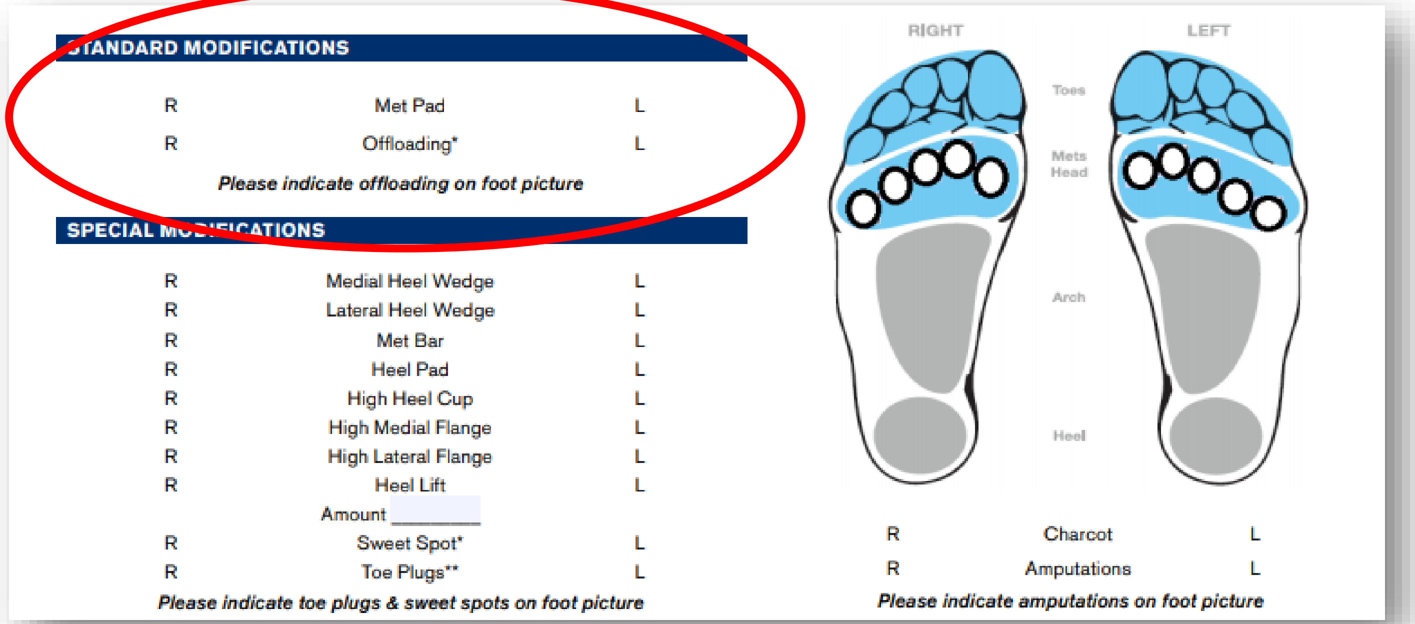


Intrinsic Vs Extrinsic Modifications

- **Intrinsic** = Built into either the positive model and/or the device itself. Typically refers to wedges, met pads and areas of relief.
- *Not easily adjustable.*

- **Extrinsic** = Added to the finished orthotic device. External wedges, met pads, etc.
- *Simpler to adjust/correct.*





STANDARD MODIFICATIONS

R	Met Pad	L
R	Offloading*	L

Please indicate offloading on foot picture

SPECIAL MODIFICATIONS

R	Medial Heel Wedge	L
R	Lateral Heel Wedge	L
R	Met Bar	L
R	Heel Pad	L
R	High Heel Cup	L
R	High Medial Flange	L
R	High Lateral Flange	L
R	Heel Lift	L
	Amount ________	
R	Sweet Spot*	L
R	Toe Plugs**	L

Please indicate toe plugs & sweet spots on foot picture

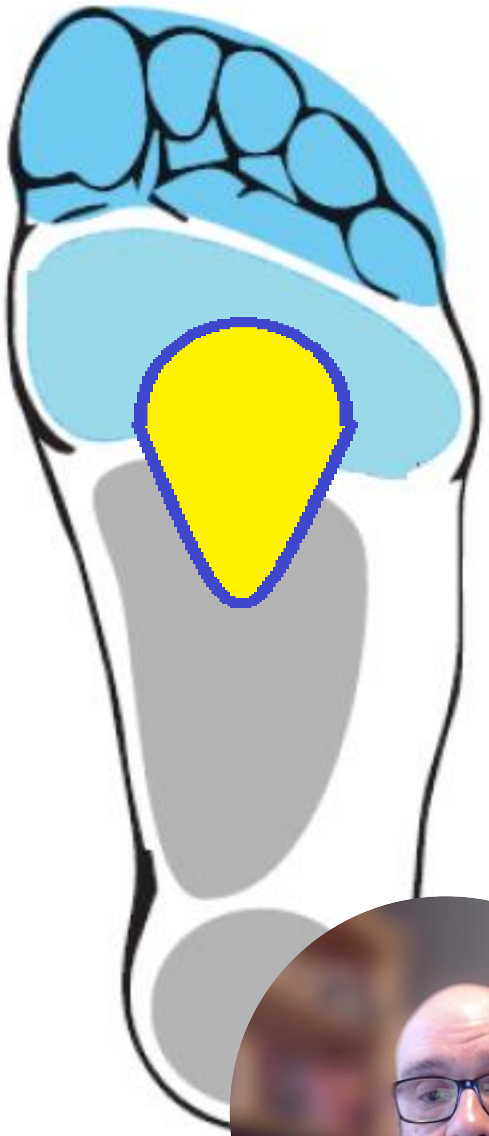
R	Charcot	L
R	Amputations	L

Please indicate amputations on foot picture

Met Pad

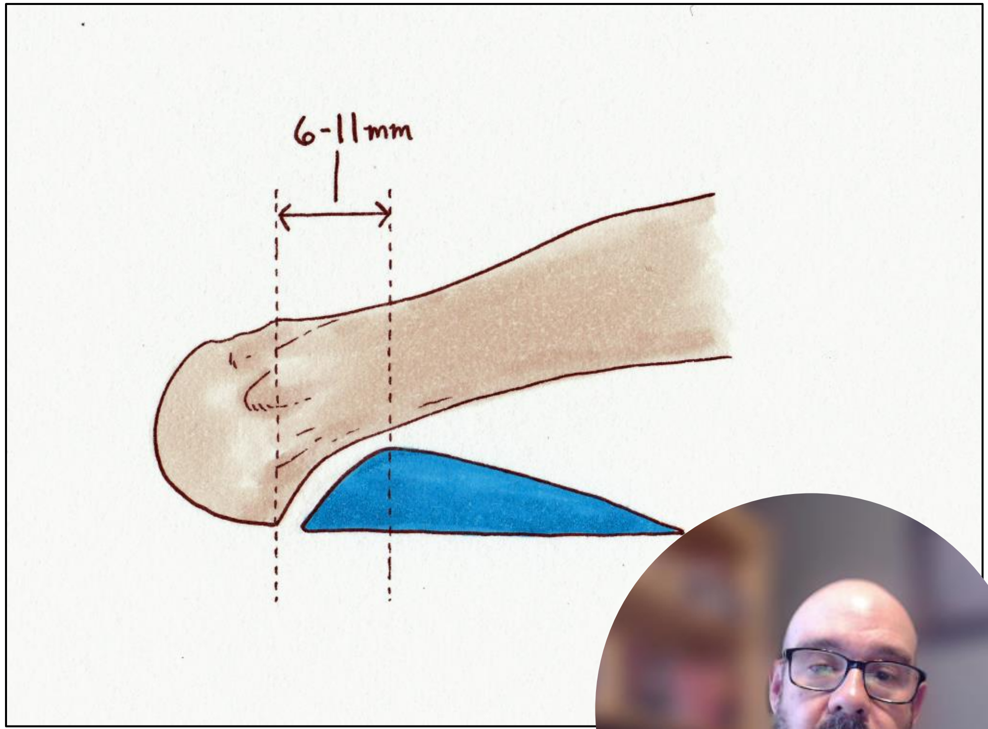
Transmetatarsal arch – supported by the met pad

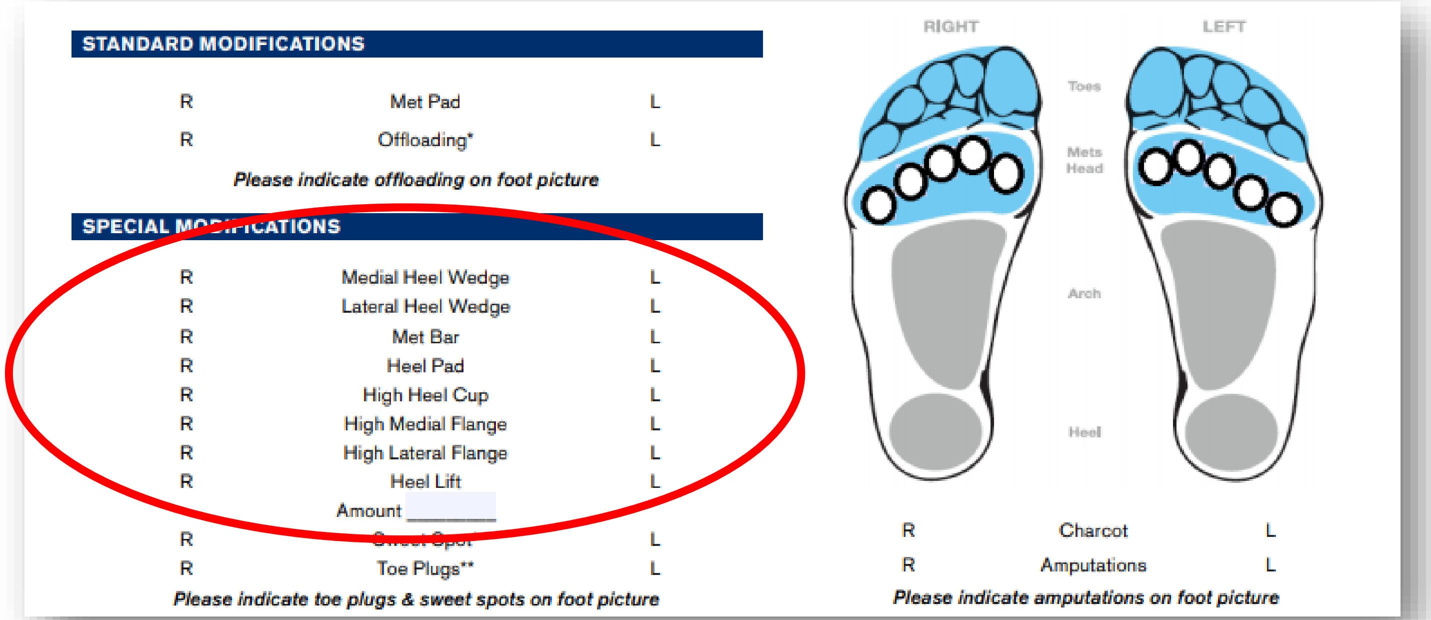
Used for: metatarsal pain, ulcerations, callouses



Proper Met Pad Placement

- Hastings MK, Mueller MJ, Pilgram TK, Lott DJ, Commean PK, Johnson JE. **Effect of metatarsal pad placement on plantar pressure in people with diabetes mellitus and peripheral neuropathy.** Foot Ankle Int. 2007 Jan;28(1):84-8. doi: 10.3113/FAI.2007.0015. PMID: 17257544.
- **METHODS:** Twenty subjects with diabetes mellitus, peripheral neuropathy, and a history of forefoot plantar ulcers were studied (12 men and eight women, mean age=57+/-9 years). CT determined the position of the metatarsal pad relative to metatarsal head and peak plantar pressures were measured on subjects in three footwear conditions: extra-depth shoes and a 1) total contact insert, 2) total contact insert and a proximal metatarsal pad, and 3) total contact insert and a distal metatarsal pad. The change in peak plantar pressure between shoe conditions was plotted and compared to metatarsal pad position relative to the second metatarsal head.
- **RESULTS:** Compared to the total contact insert, all metatarsal pad placements between 6.1 mm to 10.6 mm proximal to the metatarsal head line resulted in a pressure reduction (average reduction=32+/-16%). Metatarsal pad placements between 1.8 mm distal and 6.1 mm proximal and between 10.6 mm proximal and 16.8 mm proximal to the metatarsal head line resulted in variable peak plantar pressure reduction (average reduction=16+/-21%). Peak plantar pressure increased when the metatarsal pad was located more than 1.8 mm distal to the metatarsal head line.
- **CONCLUSION:** **Consistent peak plantar pressure reduction occurred when the metatarsal pad in this study was located between 6 to 11 mm proximal to the metatarsal head line. Pressure reduction lessened as the metatarsal pad moved outside of this range and actually increased if the pad was located too distal of this range.**





STANDARD MODIFICATIONS

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Please indicate offloading on foot picture

SPECIAL MODIFICATIONS

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R	Lateral Heel Wedge	L
R	Met Bar	L
R	Heel Pad	L
R	High Heel Cup	L
R	High Medial Flange	L
R	High Lateral Flange	L
R	Heel Lift	L
	Amount ________	
R	Sweet Spot	L
R	Toe Plugs**	L

Please indicate toe plugs & sweet spots on foot picture

RIGHT LEFT

Toes

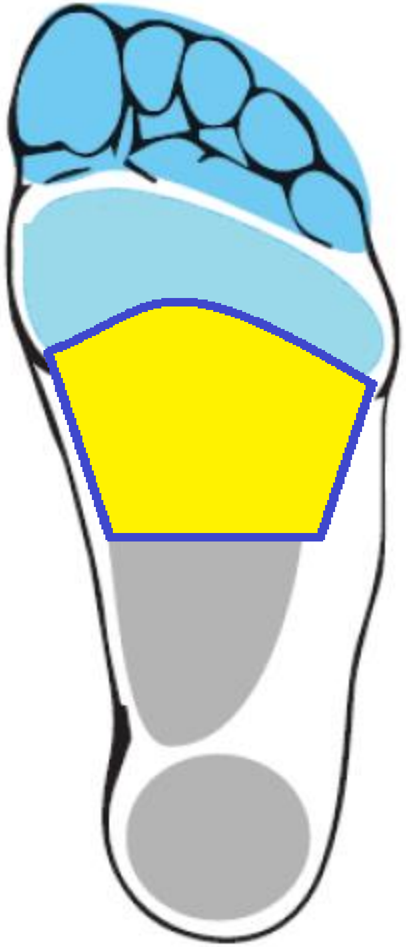
Mets Head

Arch

Heel

R	Charcot	L
R	Amputations	L

Please indicate amputations on foot picture

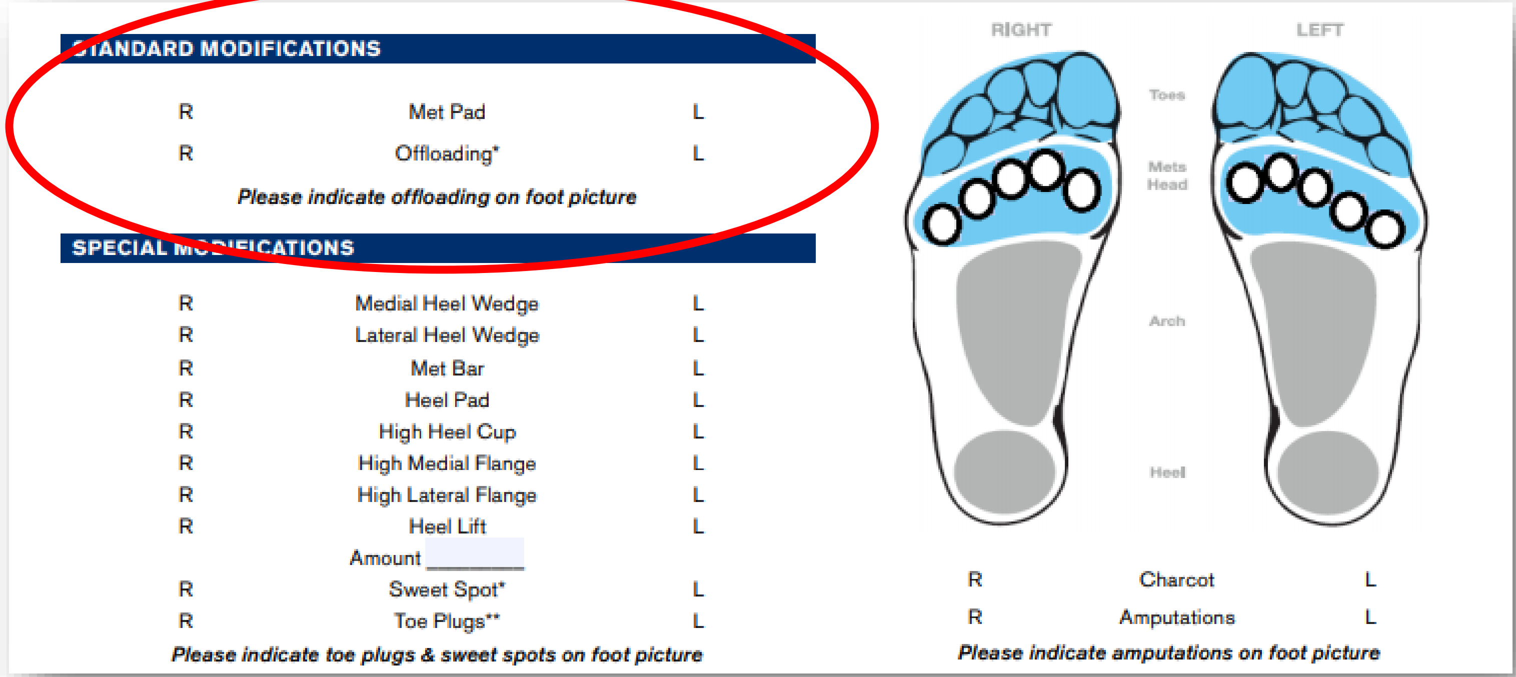


MET BAR

Placed proximal to the metatarsal heads… Transferring the weight bearing surface to the shafts of the metatarsals…

Creating a “shelf” like system to **offload**…

Used for: metatarsal pain, ulcerations, callouses…



STANDARD MODIFICATIONS

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R	Offloading*	L

Please indicate offloading on foot picture

SPECIAL MODIFICATIONS

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R	Lateral Heel Wedge	L
R	Met Bar	L
R	Heel Pad	L
R	High Heel Cup	L
R	High Medial Flange	L
R	High Lateral Flange	L
R	Heel Lift	L
	Amount ________	
R	Sweet Spot*	L
R	Toe Plugs**	L

Please indicate toe plugs & sweet spots on foot picture

RIGHT LEFT

Toes

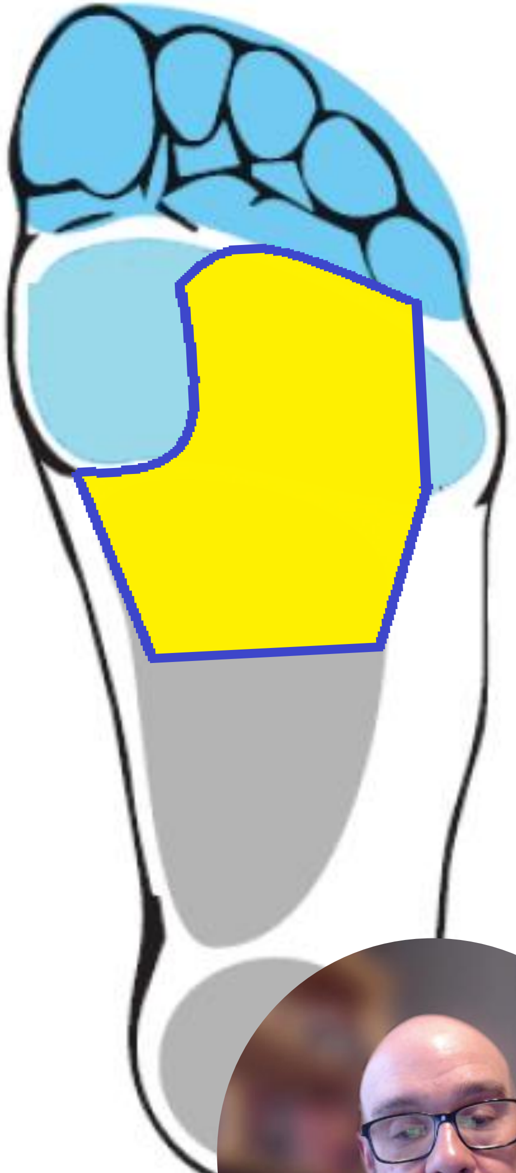
Mets Head

Arch

Heel

R	Charcot	L
R	Amputations	L

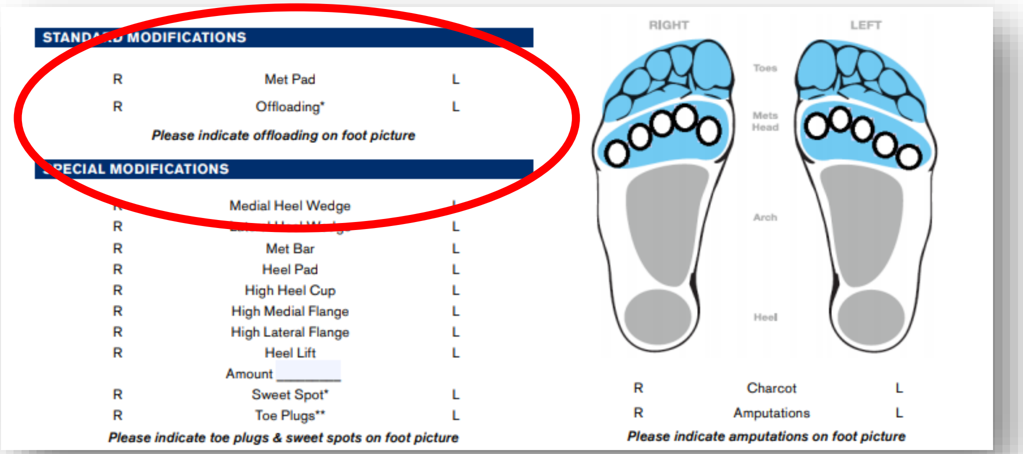
Please indicate amputations on foot picture



Offloading – DANCER PAD

Transferring weight bearing away from the affected area by *loading up the lesser metatarsals…*

Used for: metatarsal pain, ulcerations, callouses


STANDARD MODIFICATIONS

R	Met Pad	L
R	Offloading*	L

Please indicate offloading on foot picture

SPECIAL MODIFICATIONS

R	Medial Heel Wedge	L
R	[illegible]	L
R	Met Bar	L
R	Heel Pad	L
R	High Heel Cup	L
R	High Medial Flange	L
R	High Lateral Flange	L
R	Heel Lift	L
	Amount ________	
R	Sweet Spot*	L
R	Toe Plugs**	L

Please indicate toe plugs & sweet spots on foot picture

RIGHT LEFT

Toes

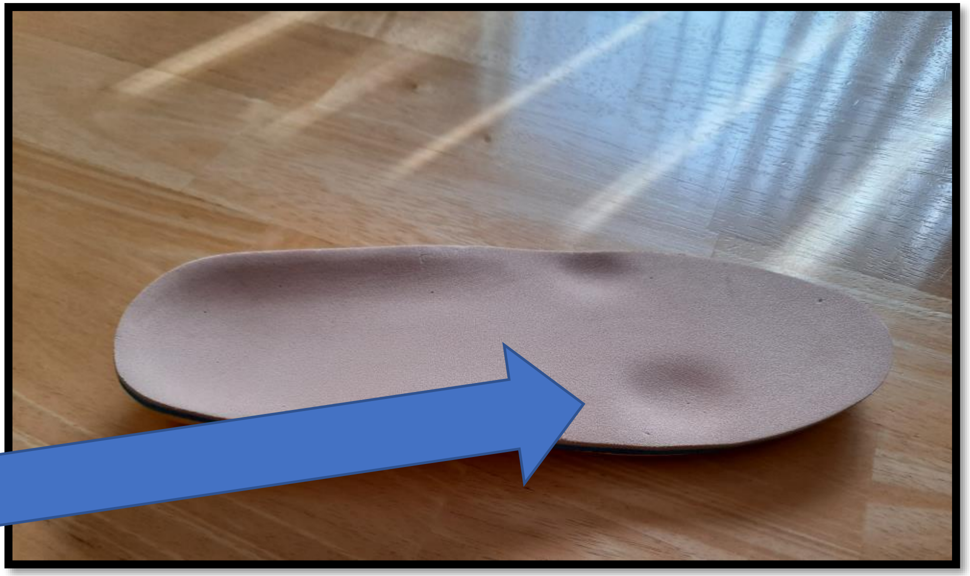
Mets Head

Arch

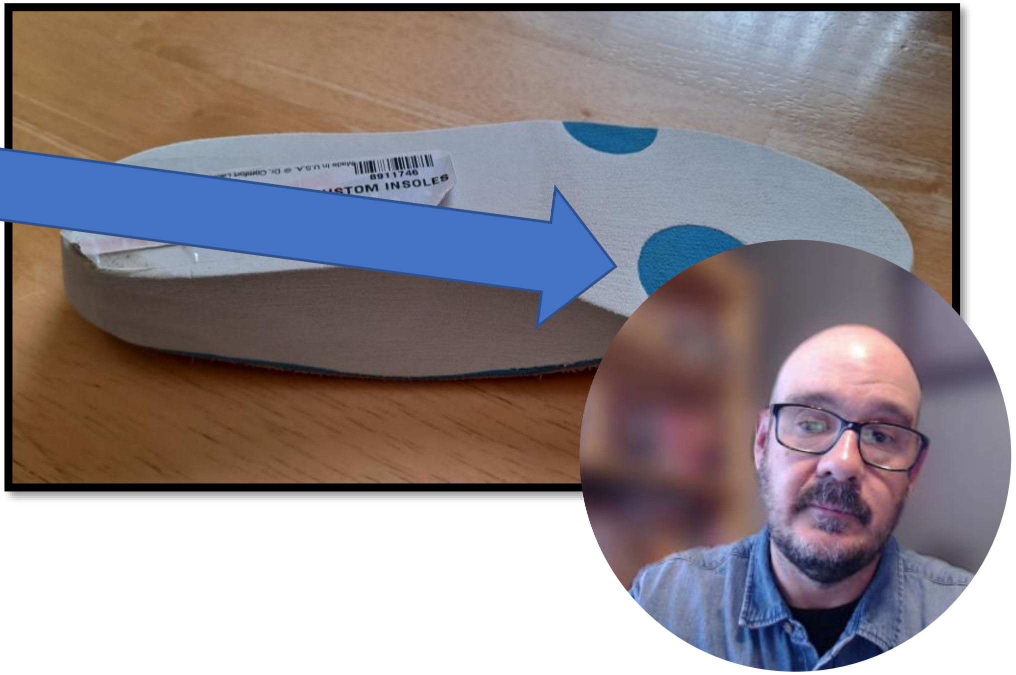
Heel

R	Charcot	L
R	Amputations	L

Please indicate amputations on foot picture



Offloading: **Depression in the insert**



"Sweet Spot": **Cutout in base backfilled with softer foam**

- Cushioning placed directly below the metatarsal heads (*possibly slightly distal*)
- Transferring weight bearing away from the affected area

Offloading is great and all, but...

Repetitive Loading

- ✓ Virtually all repetitive loading has a "rub" component
- ✓ Reddened skin ≠ Area of high pressure
- ✓ Reddened skin = Area of friction
- ✓ Calluses are caused by a combination of pressure and friction
- ✓ Pressure without friction = Bruising

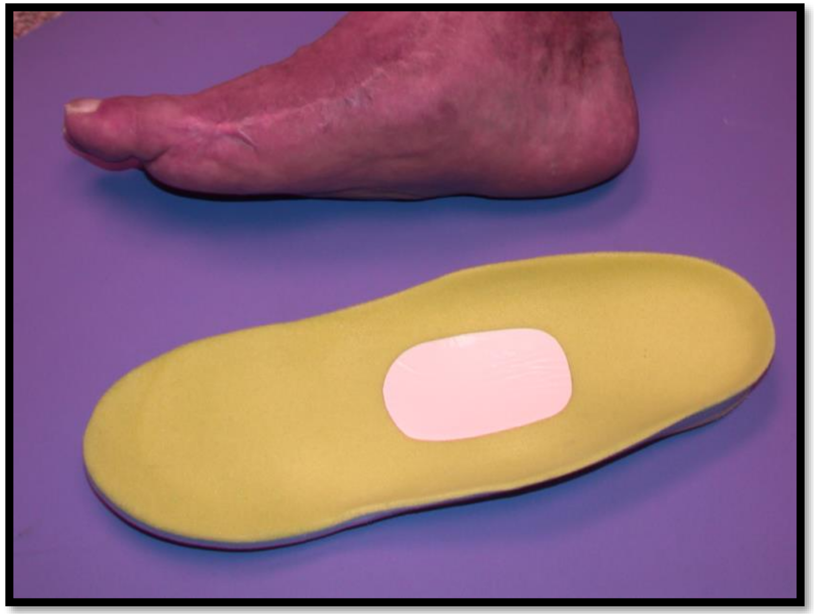
Shear

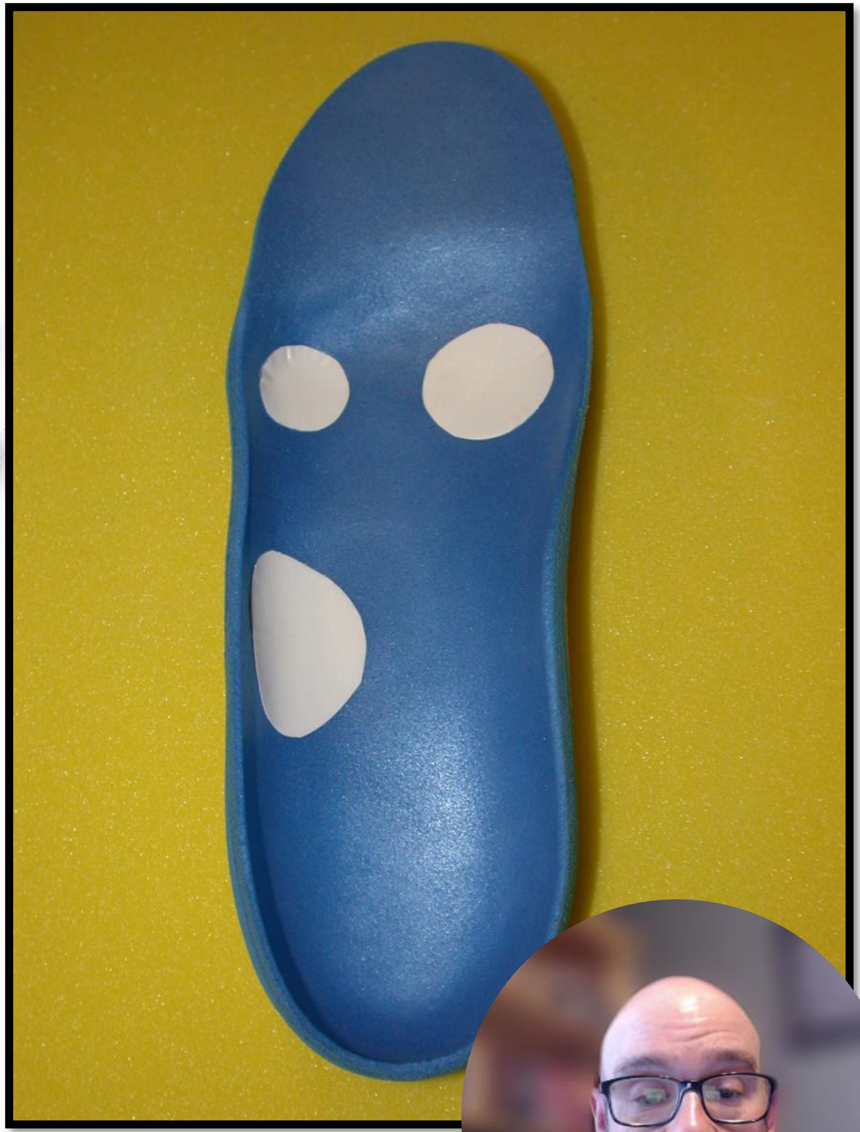
- **Dr Naylor knew back in the 1950's…**
  - Cause of friction blisters. Naylor PF. Lancet. 1973 Mar 3;1(7801):495.
  - The reaction to friction of patients with flexural eczema. NAYLOR PF. Br J Dermatol. 1955 Nov;67(11):385-91
  - Experimental friction blisters. NAYLOR PF. Br J Dermatol. 1955 Oct;67(10):327-42.
  - The skin surface and friction. NAYLOR PF. Br J Dermatol. 1955 Jul;67(7):239-46

Shear

- **Shear-reducing insoles to prevent foot ulceration in high-risk diabetic patients.**
  - Lavery LA, LaFontaine J, Higgins KR, Lanctot DR, Constantinides G. Adv Wound Care. 2012 Nov;25(11):519-24
  - Standard therapy (therapeutic footwear, EVA/Plastazote® FO, diabetic foot education, regular visits to DPM) Vs Standard therapy + Shear-reducing insole
  - Patients in standard group 3.5 x more likely to develop ulcer.

Shearban®





Inserts are great and all, but…

The truth about socks

Myth:

- Recommend 100% cotton all white socks to your patients…

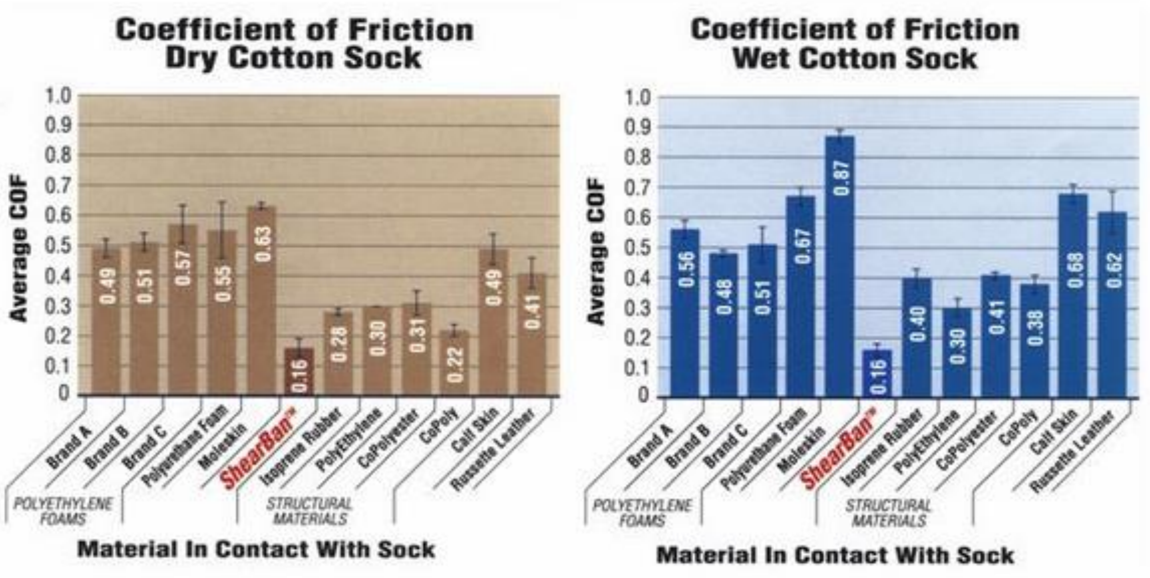
Fact:

- ***Cotton absorbs and holds moisture…***


100%
COTTON

Socks

- Carlson, J. (2006). **Functional Limitations From Pain Caused by Repetitive Loading on the Skin: A Review and Discussion for Practitioners, With New Data for Limiting Friction Loads.** JPO: Journal of Prosthetics and Orthotics. 18. 93-103. 10.1097/00008526-



There are many health care practitioners who persist in the belief that shear trauma to the skin is something rarely seen—something entirely different from a “pressure area.” The extensive and thorough research by Naylor and Sulzberger and others is clear. Friction loading is the cause of repetitive loading damage to the skin. When pressure and friction coefficient are managed, the limiting friction load ($L_n \times$ COF) is reduce That also reduces the trauma per cycle to skin, which extends the limits of safe, pa function.

Cotton socks… NOT GOOD…

- Pollard JP, Le Quesne LP, Tappin JW. **Forces under the foot.** J Biomed Eng. 1983 Jan;5(1):37-40.
  - **[S]howed that diabetic neuropathic ulceration occurred at sites of maximal shear stress under the foot.**
- Mohamed M. K., Hasouna A. T., Ali W. Y., **Friction between foot, socks and insoles.** Journal of the Egyptian Society of Tribology, Article 3, Volume 7, Issue 4, October 2010, Page 27-39.
  - **It was found that friction coefficient increased with increasing cotton content of the socks… while polyamide socks showed the lowest friction coefficient.**
- Dai XQ, Li Y, Zhang M, Cheung JT. **Effect of sock on biomechanical respons of foot during walking.** Clin Biomech (Bristol, Avon). 2006 Mar;21(3):31
  - **Wearing sock with low friction against the foot skin was found to be more eff reducing plantar shear force on the skin than the sock with low friction agai insole.**

Conclusion

- If you want to prevent neuropathic foot ulcers in your patients with diabetes and loss of protective sensation, each patient needs (at least) three things from you:
  - Well-fitted, appropriate depth shoes
  - Total contact inserts designed to redirect excessive pres away from susceptibl
  - Low-friction socks

Neuropathic Arthropathy (Charcot foot)

Charcot Arthropathy

- .12% to 7.5% diabetes population
- According to ADA, 3.5% of persons w/ diabetes will develop Charcot arthropathy
- Charcot arthropathy has major negative effect on quality of life
  - (Sohocki MP, et al. Foot Ankle Surg. 2008;14(1):11-5.)
- Charcot arthropathy significantly associated with higher mortality risk than diabetes alone
  - (Sohn MW, et al. Diabetes Care. 2009 May;32(5):816-21.)
- Often misdiagnosed initially as hallmark signs mimic infection and radiographs normal in early stages

Charcot Arthropathy

- In 1703, William Musgrave first described a neuropathic joint as an arthralgia caused by venereal disease
- In 1868, Jean-Martin Charcot gave the first detailed description of the neuropathic aspect of this disease; hence, the condition is named after him. Charcot noted this disease process as a complication of syphilis
- Syphilis was believed to be the most common cause of Charcot arthropathy until 1936, when Dr. Jordan linked it to diabetes. Diabetes is now considered to be the most common etiology of Charcot arthropathy

Jean-Martin Charcot

Factors involved in development of Charcot foot deformity

- Average age 57 years w/ duration of diabetes / 15 years
- More common in Type 1 DM
- Compared to persons w/ diabetes alone:
    - Those w/ diabetes and neuropathy are14 times as likely to develop Charcot arthropathy
    - Those w/ diabetes and obesity are 59% more likely to develop Charcot arthropathy
    - Those w/ diabetes, neuropathy and obesity are 21 times more likely to develop Charcot arthropathy
    - (Stuck RM, Sohn MW, Budiman-Mak E, Weiss, KB; Am J Med, Nov 2008)

Factors involved in development of Charcot foot deformity

- Sensory-Motor Neuropathy
- Minor Trauma
- Autonomic Neuropathy

Other Causes of Charcot Arthropathy

- Foot Ankle Int. 2002 Feb;23(2):155-7.
    - **An unusual case of bilaterally symmetrical neuropathic osteoarthropathy of the midfoot as a result of lyme disease-induced peripheral neuropathy: a case report.**
        - Adams HB, Blasko GA, DiDomenico LA.
        - Department of Research, Forum Health, Youngstown, Ohio 44501, USA.
- J Pediatr Orthop. 2010 Apr-May;30(3):289-95.
    - **Orthopaedic manifestations of Navajo familial neurogenic arthropathy.**
        - Woiczik MR, D'Astous JL.
        - Shriners Hospitals for Children-Intermountain, Salt Lake City, UT, USA. mwoiczik@shrinenet.org
- Med Sci Monit. 2009 Jul;15(7):CS113-6.
    - **Unilateral developments of osteoarthritis and Charcot's joint in a patient with neurofibromatosis.**
        - Matsukawa Y, Hara H, Ryu J, Nakano Y, Takeuchi M, Sasaki K, Sawada S.
        - Department of Medicine, Division of Hematology and Rheumatology, Nihon University School of M Oyaguchi-Kamimachi, Itabashi, Tokyo, Japan. m-2000@mbk.ocn.ne.jp

Other Causes of Charcot Arthropathy

- J Foot Ankle Surg. 2009 May-Jun;48(3):362-4.
    - **Pedal neuroarthropathy in a nondiabetic patient as a result of long-term amiodarone use.**
        - Dhatariya K, Gooday C, Murchison R, Bullen B, Hutchinson R.
        - Department of Diabetes and Endocrinology, Norfolk & Norwich University Hospital, NHS Foundation Trust, Colney Lane, Norwich, Norfolk NR4 7UY, UK. ketan.dhatariya@nnuh.nhs.uk
- J Foot Ankle Surg. 2008 Mar-Apr;47(2):118-24.
    - **Alcohol-induced neuroarthropathy in the foot: a case series and review of literature.**
        - Shibuya N, La Fontaine J, Frania SJ.
        - Department of Orthopaedics/Podiatry, The University of Texas Health and Science Center at San Antonio, TX, USA. shibuya@uthscsa.edu
- J Am Podiatr Med Assoc. 2008 Mar-Apr;98(2):153-5.
    - **Charcot's arthropathy in a patient with HIV-associated neuropathy.**
        - Rogers LC, Bevilacqua NJ, Dellacorte MP, Francis K, Armstrong DG.
        - Amputation Prevention Center at Broadlawns Medical Center, Des Moines, IA 50314, USA. Lee.C.Rogers@gmail.co

Other Causes of Charcot Artropathy

- Eur J Intern Med. 2008 Nov;19(7):482-7. Epub 2008 Apr1.
    - **Deforming arthropathy in systemic lupus erythematosus.**

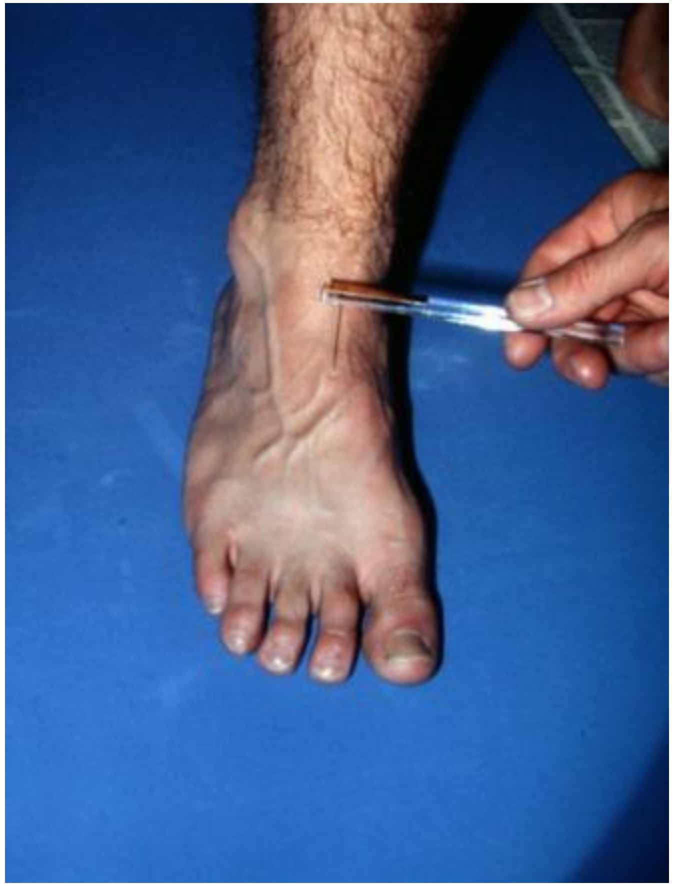
        - Pipili C, Sfritzeri A, Cholongitas E.
        - Department of Internal Medicine, General Hospital of Sitia, GR-72300, Greece. chrisapi2001@yahoo.gr

- J Pediatr Orthop B. 2007 Sep;16(5):373-9.
    - **Conservative treatment of Charcot artroparthy in a series of spina bifida patients: the experience of one center and review of the literature.**

        - Yalcin S, Kocaoglu B, Berker N, Erol B.
        - Department of Orthopedic Surgery, Marmara University School of Medicine, Istanbul, Turkey

Sensory-Motor Neuropathy

- Loss of protective sensation
- Diminished vibratory sense
- Muscle weakness
- Ankle equinus



Minor Trauma

- Repetitive moderate stress
- Repetitive impulse loading
- Inadequately protected fractures and sprains
- Surgery

Autonomic Neuropathy

- Sympathetic denervation
- Increased peripheral blood flow
- Increased bone blood flow

Pathophysiology

- The exact nature of Charcot arthropathy remains unknown, but the following major theories exist regarding the pathophysiology of this condition:
  - Neurotraumatic theory - This theory states that Charcot arthropathy is caused by an unperceived trauma or injury to an insensate foot. The sensory neuropathy renders the patient unaware of the osseous destruction that occurs with ambulation. This microtrauma leads to progressive destruction and damage to bone and joints.
  - Neurovascular theory - This theory suggests that the underlying condition leads to the development of autonomic neuropathy, causing the extremity to receive an increased blood flow. This in turn results in a mismatch in bone destruction and synthesis, leading to osteopenia.
  - Charcot arthropathy most likely results from a combination of the processes described above. The autonomic neuropathy leads to abnormal bone formation, and the sensory neuropathy leads to an insensate joint that is susceptible to trauma. The development of abnormal bone with no ability to protect the joint results in gradual bone fracture and in the subluxation of the joint.

Stages of Development
Acute

- Swelling and joint effusion
- Local elevation in skin temperature
- Bone resorption and softening from hyperemia
- Ligaments weakened by hyperemic resorption

Stages of Development
Acute

- Increased joint mobility
- Erosion of cartilage and subchondral bone
- Dislocation and fragmentation of bone
- Bone and cartilage debris

Stages of Development Coalescence

- Absorption of fine debris
- Periosteal new bone formation
- Fusion and rounding of large fragments
- Decreased joint mobility

Stages of Development Reconstruction

- Increased Stabilization
- Increased bone density and sclerosis
- Deformity

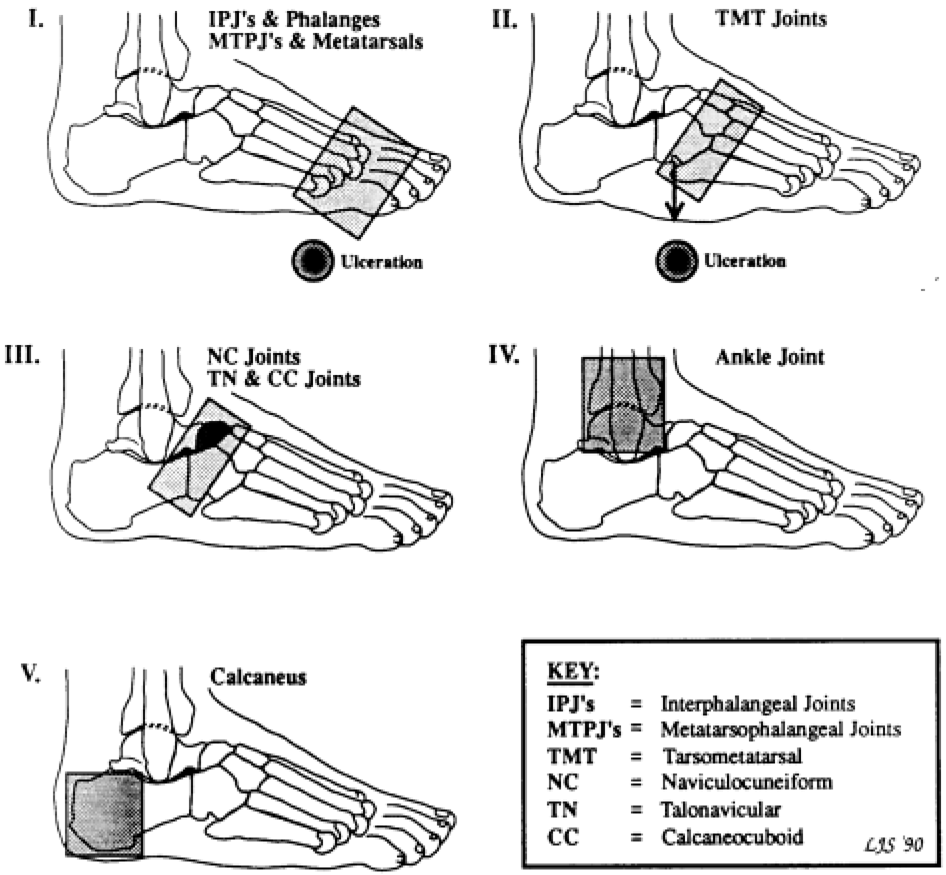
Common Areas of Foot Involvement

- Patterns of Bone and Joint Destruction
- Deformity Increases Risk/Pressure
- Pressure Results in Ulceration

Patterns of Bone and Joint Destruction

- Interphalangeal joints and phalanges; Metatarsophalangeal joints and metatarsals
- Tarsometatarsal joints
- Naviculocuneiform joints; Talonavicular and calcaneocuboid joints
- Ankle joint
- Calcaneus

Patterns of Bone and Joint Destruction



Saunders LJ, Mrdjencovich D. Anatomical patterns of bone and joint destruction in neuropathic diabetics. *Diabetes*. 1991;40:529A

Deformity Increases Risk/Pressure

Pressure Results in Ulceration

Typical Charcot Foot

- There is no such thing as a typical Charcot foot…each presents its own challenge.

Pedorthic Management of the Charcot Foot

Objectives:

- Accommodate fixed or flexible deformities
- Restrict or control joint motion
- Relieve or transfer pressure
- Improve gait patterns
- Decrease weight bearing to the foot

Shoes

- Wide at the midfoot
- In-depth, or double-depth
- Blucher opening or surgical opening
- Long medial counter
- Shock-absorbing sole

Shoe Modifications

Medial and/or lateral sole and heel flare

- Stabilize deformity
- Reduce medial or lateral tilt
- Reduce ligament strain
- Broader base of support

Rocker bottom sole, designed for deformity

- Immobilize unstable, damaged joints
- Decrease midfoot pressure and strain
- Improve gait
- Decrease impact shock

Medial or lateral stabilizer

- Support collapsed foot
- Reduce ligament strain
- Decrease shear
- Disperse weight bearing

Re-last shoe

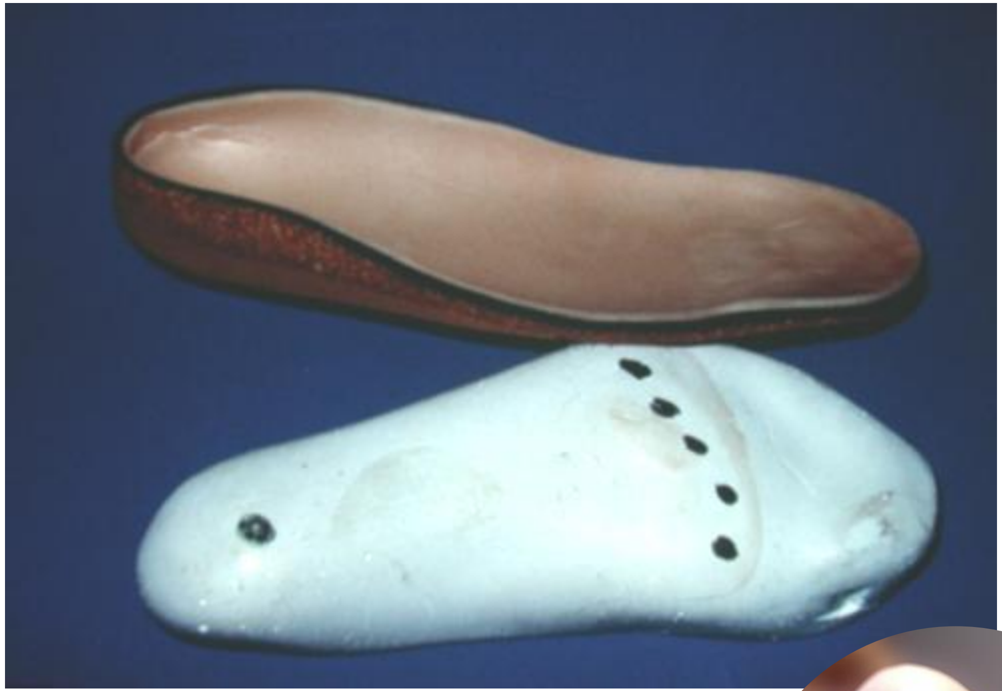
- Accommodate and protect rigid deformities
- Decrease shear
- Equalize weight bearing

Insole modifications

- Accommodate prominences
- Relieve pressure

Total Contact Orthosis

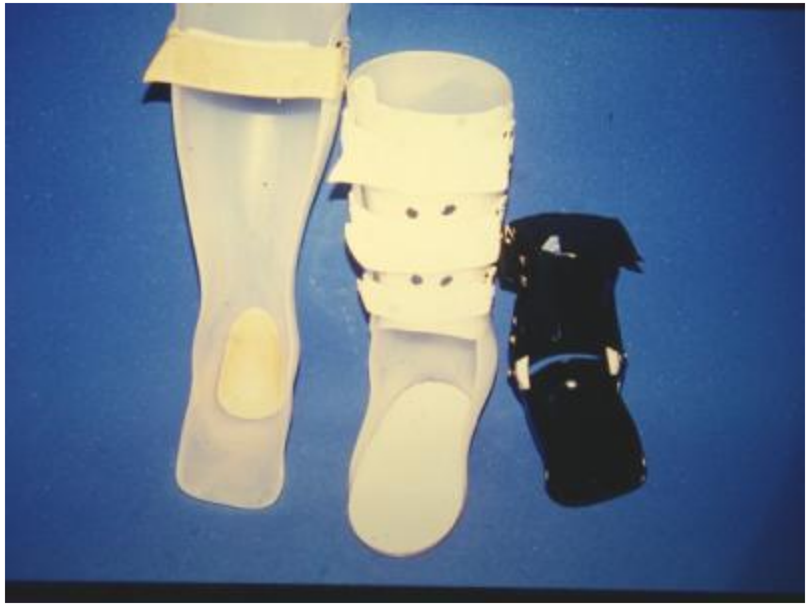
- Reduce impact shock
- Stabilize or restrict joint motion
- Accommodate and protect foot
- Decrease shear
- Equalize weight bearing



Ankle Foot Orthosis

Objectives:

- Stabilize and restrict joint motion
- Reduce force and pressures on involved joints
- Decrease weight to foot due to hydrostatic and/or patellar tendon
- Useful for maintenance after total contact casting



Types of AFOs

- Double upright calf lacer attached to in-depth shoe or custom-made shoe
  - Uses hydrostatic loading to decrease weight bearing on the foot and ankle

Types of AFOs

- Thermoplastic patellar tendon bearing AFO attached to an in-depth shoe or custom-made shoe
  - Uses patellar tendon bearing loading to decrease weight bearing on the foot and ankle

Types of AFOs

- Bivalve clamshell AFO with incorporated foot orthosis and rocker bottom (CROW)
  - Total immobilization
  - Possible alternative to total contact casting

Types of AFOs

- Ankle Gauntlet unweighting AFO
  - Reduce weight bearing on plantar surface of the heel and midfoot
  - Less bulky alternative

Keys of Success

- Importance of proper fit
- 2 – 3 pairs of shoes
- 2 pairs of orthoses
- Follow-up visits

Conclusion

Proper pedorthic management can help avoid complications such as ulcerations/amputations

Case Studies

Case Study #1

Case Study #1

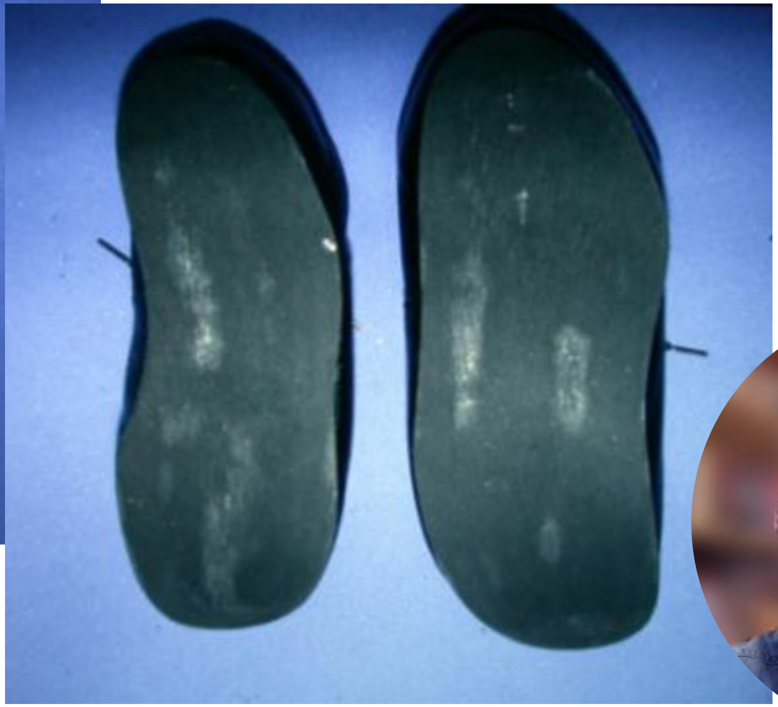
Case Study #2

Case Study #2

Case Study #2

Case Study #3

Case Study #3



Case Study #4

Case Study #4

Case Study #4

Case Study #4

The End