# Diabetes and the Foot

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MONUMENT HEALTH

# The Diabetic Foot

Amputation rates are

15 – 40 times higher for diabetic than non-diabetic patients.

- American Diabetes Association

# The Diabetic Foot

If one amputation takes place there is a 50% – 66% chance of contra-lateral limb amputation within 3-5 years.

- Various Studies

# The Diabetic Foot

- 85% of all diabetes-related amputations are preceded by a diabetic foot ulceration.

  - Armstrong

- Foot Ulcers develop in 10-15% of patients with Diabetes.

  -Boulton (1997)

# The Diabetic Foot

85,000 Amputations performed each year in patients with diabetes, with neuropathy the major contributor in 87% of cases.

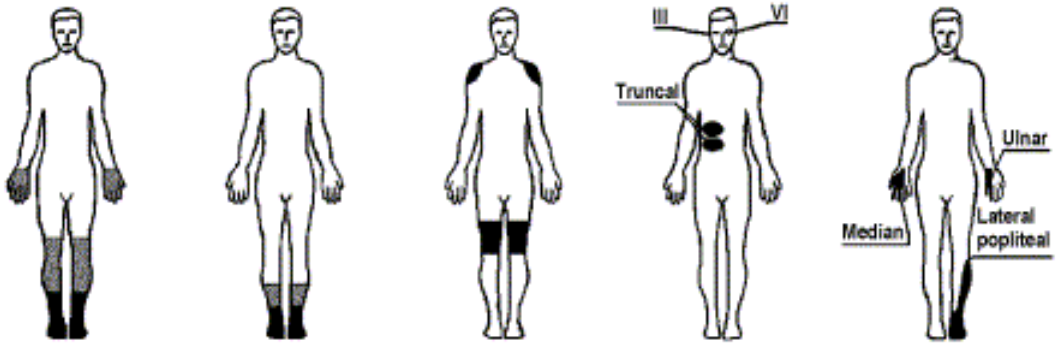
- Vinik, et al. Medical Clinics of North America, July 2004

# CALLUSES?


- Neuropathic ulcer secondary to callus formation

# Diabetic Neuropathy

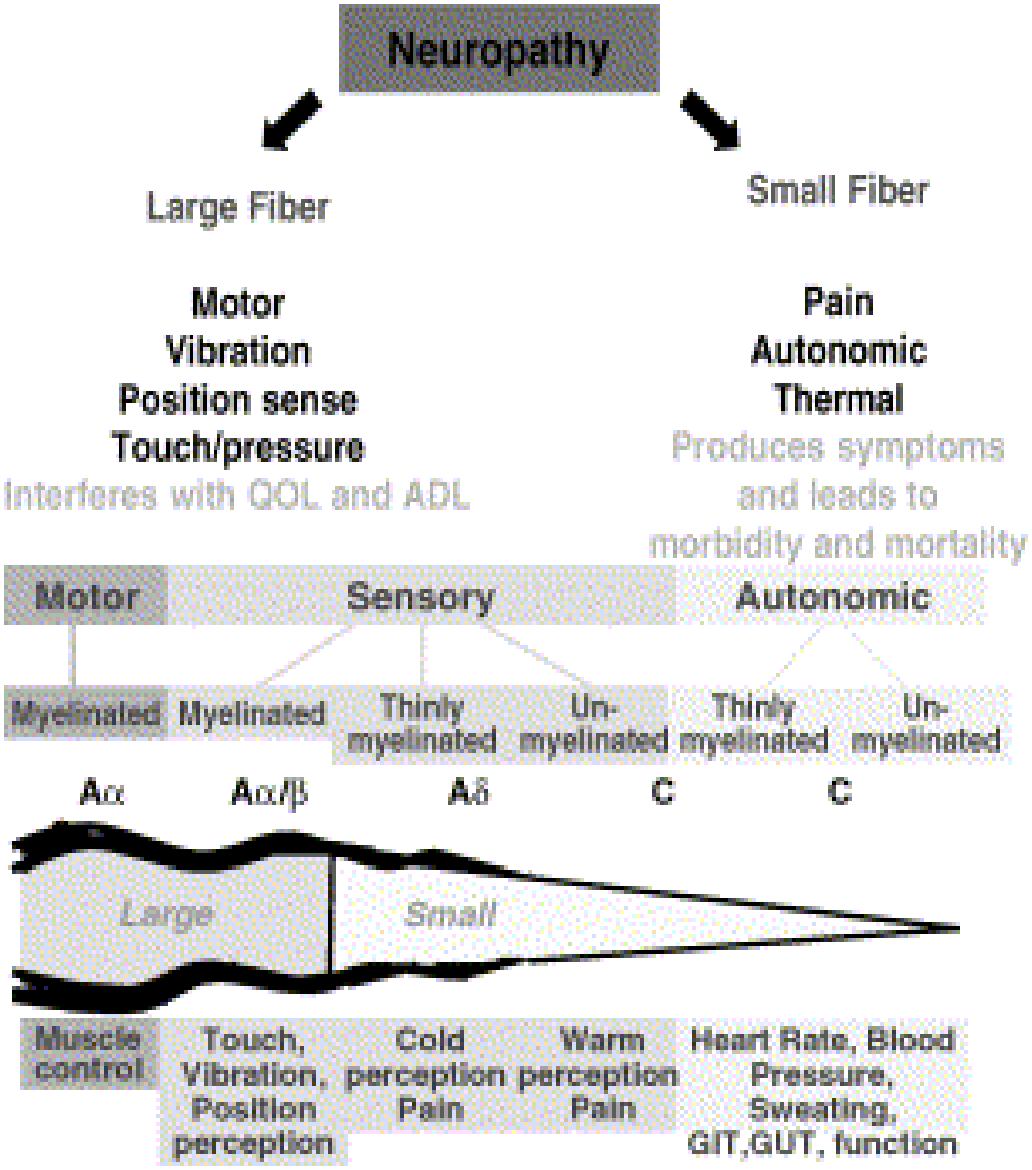
- The most common form of neuropathy and accounts for more hospitalizations than all other diabetic complications combined
- Responsible for 50-75% of non-traumatic amputations.
- Occurs in a “Stocking-glove” distribution



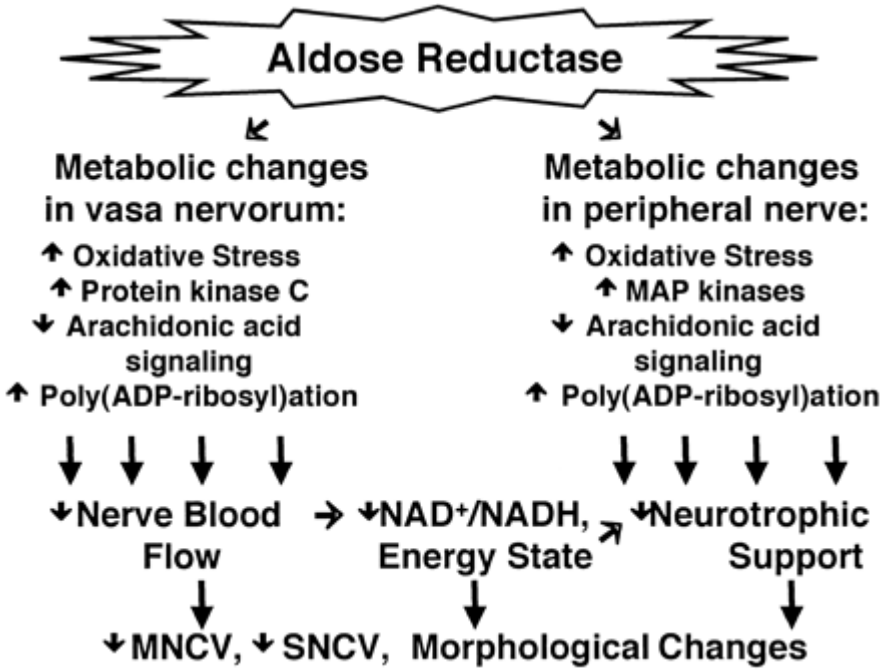

| Large fiber Neuropathy | Small fiber Neuropathy | Proximal motor Neuropathy | Acute mono Neuropathies | Pressure Palsies |
|---|---|---|---|---|
| Sensory loss: 0 → +++ (Touch, vibration) Pain: + → +++ Tendon reflex: N → ↓↓↓ Motor deficit: 0 → +++ | Sensory loss: 0 → + (thermal , allodynia) Pain: + → +++ Tendon reflex: N → ↓ Motor deficit: 0 | Sensory loss: 0 → + Pain: + → +++ Tendon reflex: ↓↓ Proximal Motor deficit: + → +++ | Sensory loss: 0 → + Pain: + → +++ Tendon reflex: N Motor deficit: + → +++ | Sensory loss in Nerve distribution: + → +++ Pain: + → ++ Tendon reflex: N Motor deficit: + → +++ |

# Neuropathy

- Sensory
  - Small nerve fiber
- Autonomic
  - Small nerve fiber
- Motor
  - Large nerve fiber

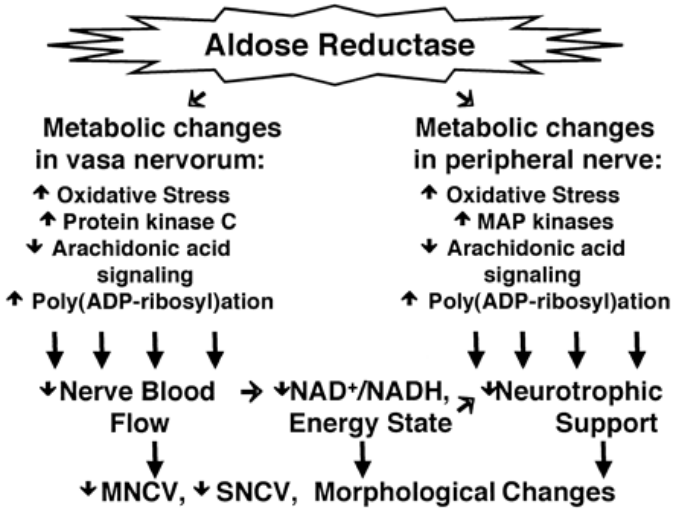


# Diabetic Neuropathy




- Chronic Hyperglycemia may cause an increase in the peripheral nerve Polyol Pathway activity within the nerve.
- The PW is where Aldose Reductase facilitates the metabolism of glucose to Sorbitol and is the mediating pathway for peripheral neuropathy.

- Therefore, an increase in glucose leads to increase in Sorbitol which cannot permeate the endoneurium of nerves and accumulates around the nerve causing osmotic swelling




- The swelling may cause a thickening of the basement membrane of the nerve

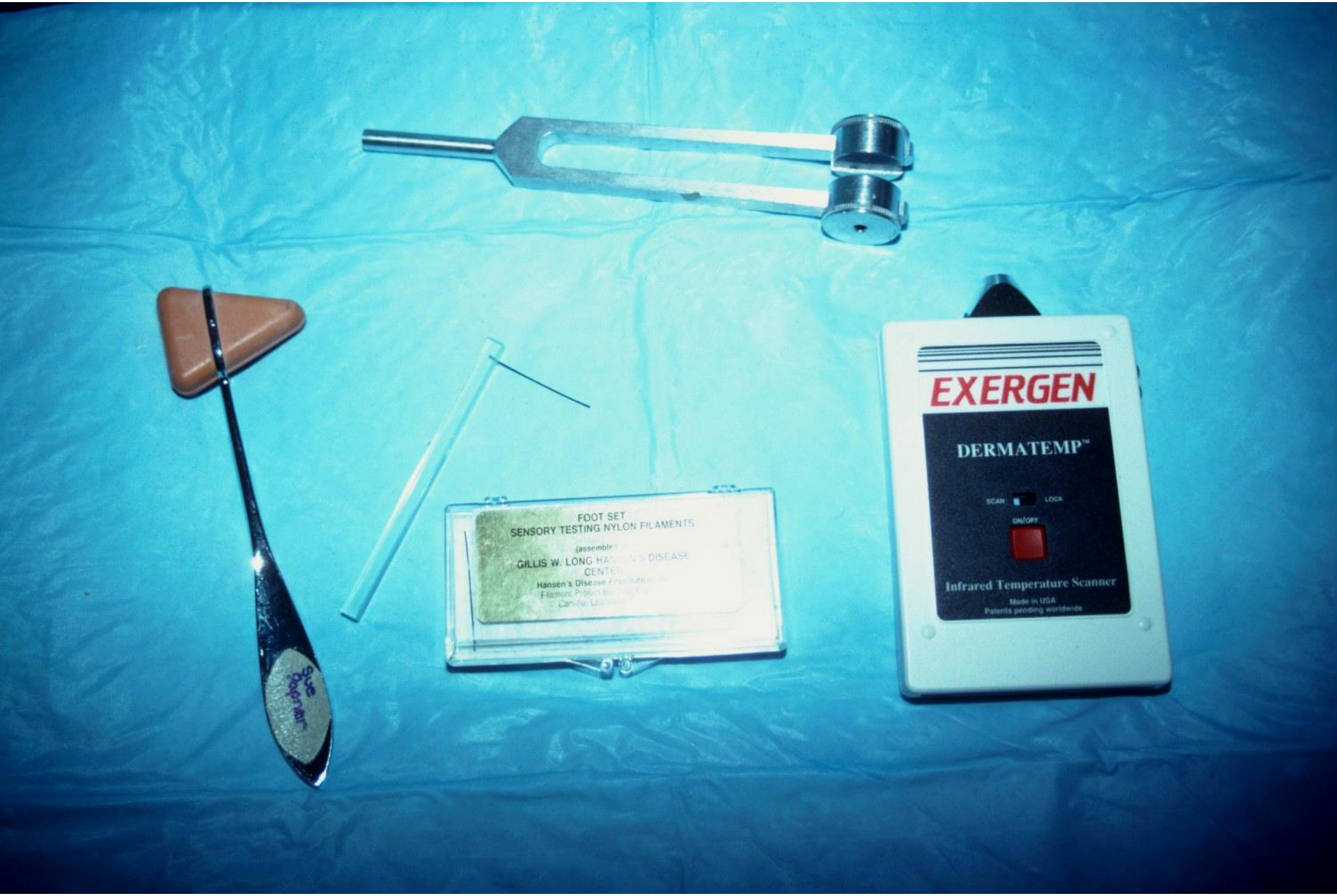
- The amount of swelling in endoneural microvessels is associated with the severity of neuropathy.


0
1
2
3
4
5

# Accessing Neuropathy

- Sharp/Dull
- Light Touch
- Vibratory
- Deep Tendon Reflexes

## What is the Gold Standard?


FOOT SET
SENSORY TESTING NYLON FILAMENTS
EXERGEN
DERMATEMP™
SCAN
LOCK
ON/OFF
Infrared Temperature Scanner
Made in USA
Patents pending worldwide

# Neuropathy

- **Semmes-Weinstein Monofilaments:**
  - **5.07 wire = 10 grams of force**
- Quantitative
- Reproducible
- Screening Tool
- Provides assessment of ulcer risk

# Deformity along with Neuropathy increases the risk of amputation 12-fold

# Cha

- Patholc th loss of vasomc oss of bone m
- Often p
- Occurs
- Most cc

# Charcot Deformity

- Glycosolation of the Achilles Tendon
- Motor neuropathy producing contracture of the Gastrocsoleus complex and weakening of the anterior muscle group.

# Charcot Deformity

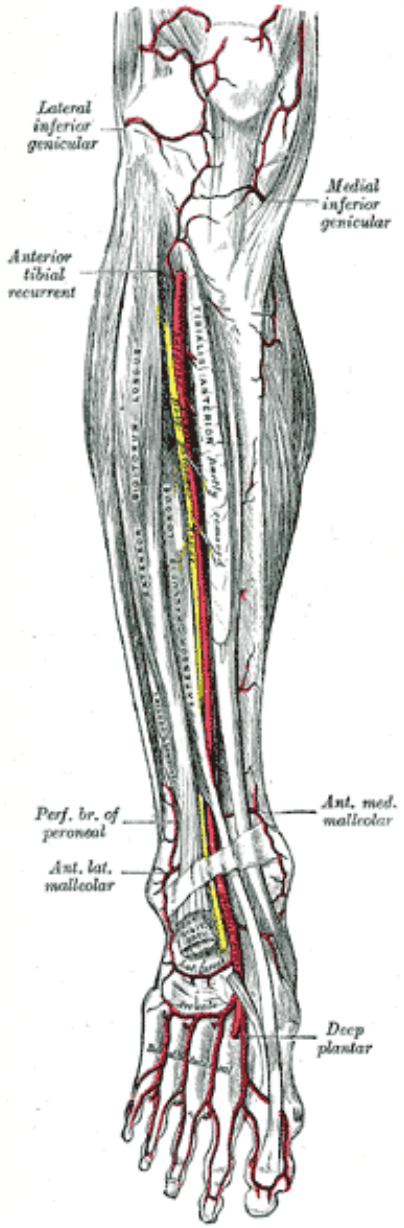
## S&S

- Edema, Erythema, increased warmth
- Temps 3-6 degrees greater than contralateral
- Sensory neuropathy
- Pain in 76%, not to the level of observed destruction

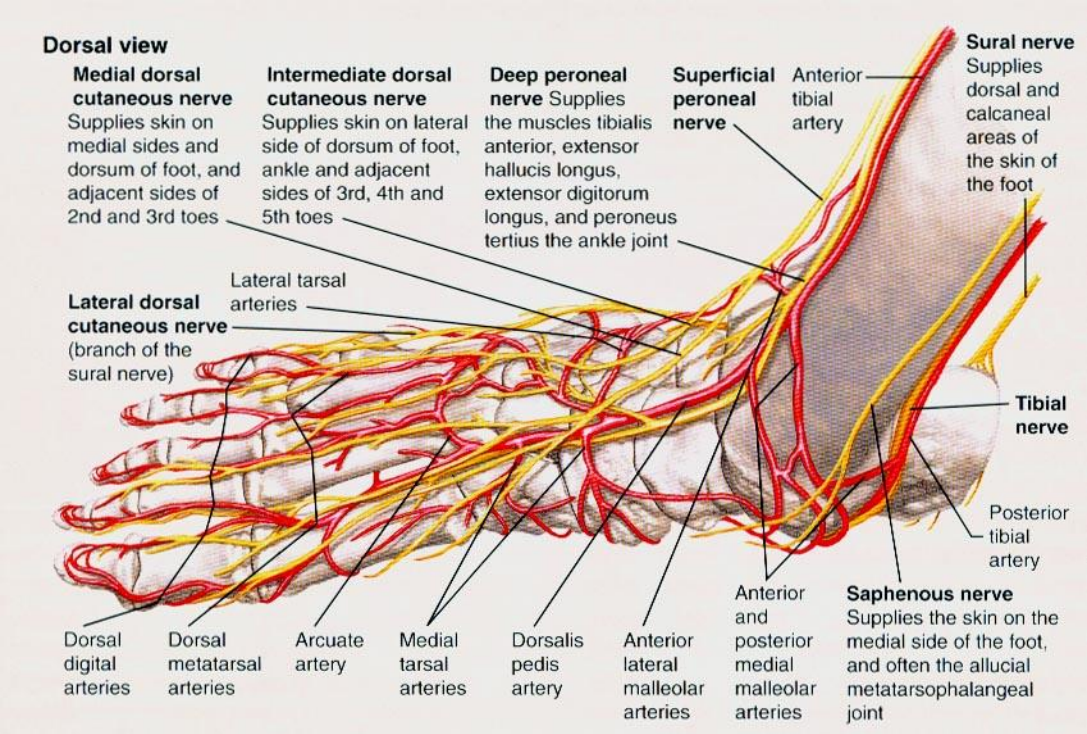
## Diabetic PVD

contributes to limb pain, ulceration, and impaired wound healing

**and** decreases the ability to fight infection by delaying or preventing the delivery of **oxygen**, **nutrients**, components of proper **immune response**, and **antibiotics** to the affected area

## Diabetic PVD has a predilection for the process to involve primarily the Tibial and Peroneal arteries between the knee and foot




The foot vessels are usually spared

The misconception is that DM is an occlusive microvascular disease affecting the foot arteries.

This can lead to inadequate vascular assessment of the Lower extremity to patients who may benefit from a revascularization needed for proper wound healing

# PVD

- **Dependent rubor** in the lower extremity of a patient with peripheral vascular disease. This condition can **mimic cellulitis**, which needs to be excluded during the physical examination. The erythema completely resolves when the extremity is elevated.

## **Dry gangrene** of digits 1-5. The digits are stable and have no signs of infection.

- **Notice the line of demarcation between the healthy and nonviable tissue.**
- **Treatment options include autoamputation or surgical amputation.**

This **does not** represent an urgent surgical situation unless it becomes infected.

# Treatment

- Neuropathic ulcer
- Charcot foot
- Post Surgical
- Fractures

Total Contact Cast


Ocm 1 2 3 4
PT# 3 days PT. VW
P.O
Study Date 11 20 03
Mo Day Yr.


Ocm 1 2 3 4
PT# 3 days PT. VW
P.O
Study Date 11 20 03
Mo Day Yr.


Ocm 1 2 3 4
PT# 3 days PT. VW
Study PO Date 11 / 20 / 03
Mo. Day Yr.


Ocm 1 2 3 4
PT# 7 days PT. VW
Study SLP DPC Date 12 / 2 / 03
Mo. Day Yr.


Ocm 1 2 3 4
PT# 7 days PT. VW
SIP DPC
Study Date 12, 2, 03
Mo. Day Yr.


Ocm 1 2 3 4
PT# PT. VW
TCC 17 app
Study Date 12, 2, 03
Mo. Day Yr.

# 4 months post-op

- TCC x 4 weeks
- Custom shoes X 3 months
- Custom Insoles

# Therapeutic Shoe Bill (Medicare)

- Covers
  - Custom Molded Shoes or-
  - Extra-Depth shoes
  - Triple density custom molded inserts
  - Shoe Modifications

# Therapeutic Shoe Bill

1. Has Diabetes
2. Is being treated under a comprehensive plan of care for his or her DM and needs DM shoes
3. Has one or more of the following conditions:
   - Peripheral neuropathy with evidence of callus
   - History of preulcerative calluses
   - History of previous ulceration
   - Foot Deformity
   - Previous amputation of the foot or part of the foot
   - Poor circulation
4. Footwear must be provided and fit by a qualified individual and must be registered with Medicare as either a provider or supplier of prescription footwear.

# Prevention and a Team Effort

- Education – constant repetition
- Skin and Nail care
- Appropriate shoe wear
- Proactive surgeries
- Multidisciplinary approach

# Thank You