Diabetic Foot Complications

Podiatry Specialty Clinic

YKHC

Bethel, Alaska

August 1-3, 2017

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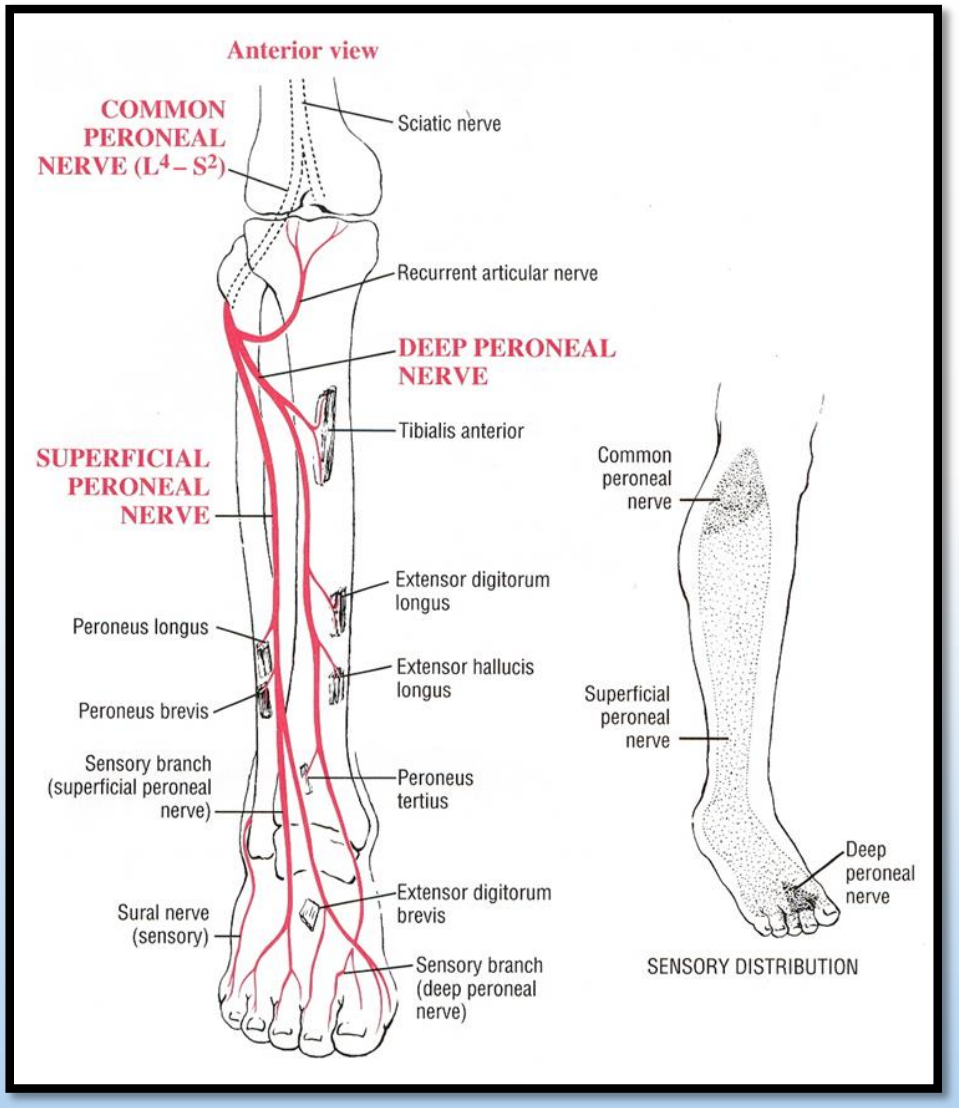
Alaska Native Tribal Health Consortium

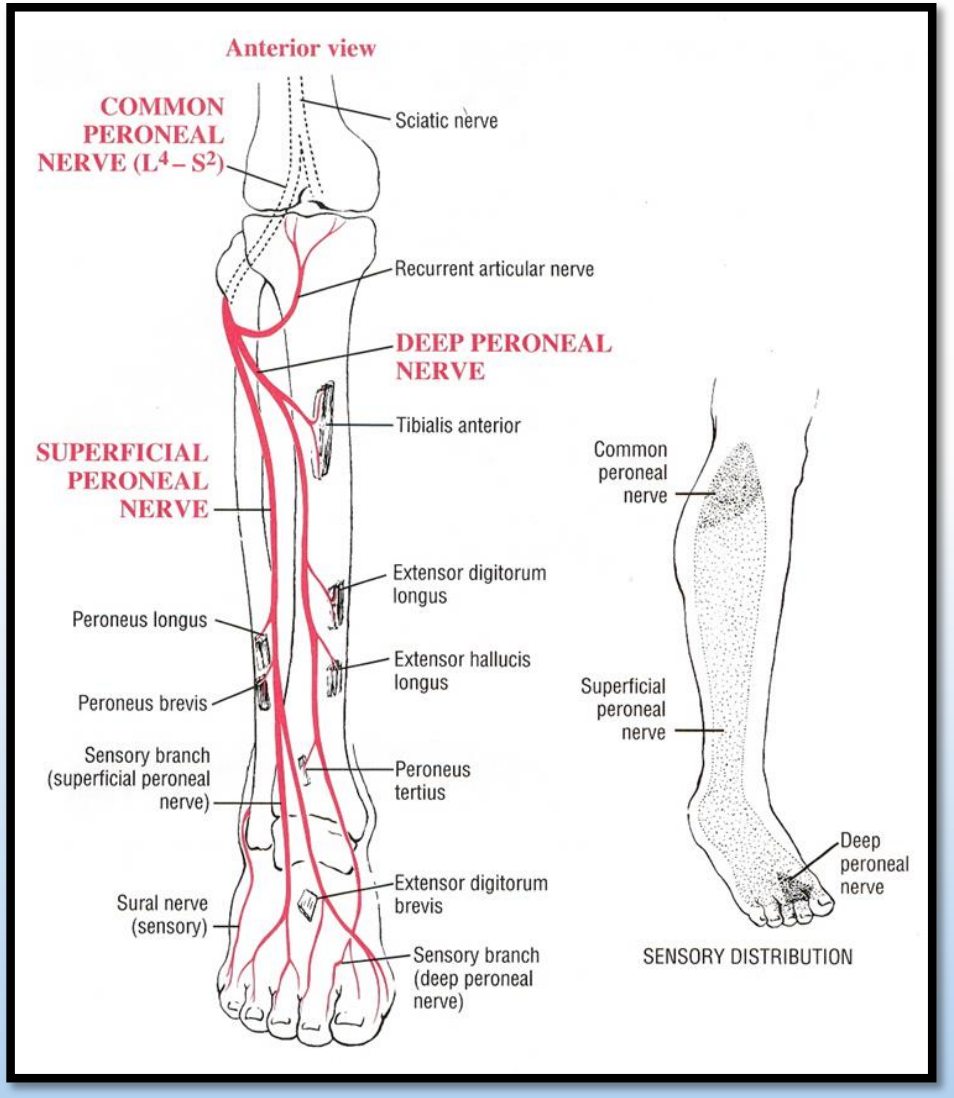
Peripheral Neuropathy



Diabetic Peripheral Neuropathy

- **Insidious onset**
- **8-10% have nerve damage at time of Dx T2DM**
- **Glycemic control is single biggest factor**
- **Considered irreversible once present**
- **80% of foot ulcers are neuropathic**

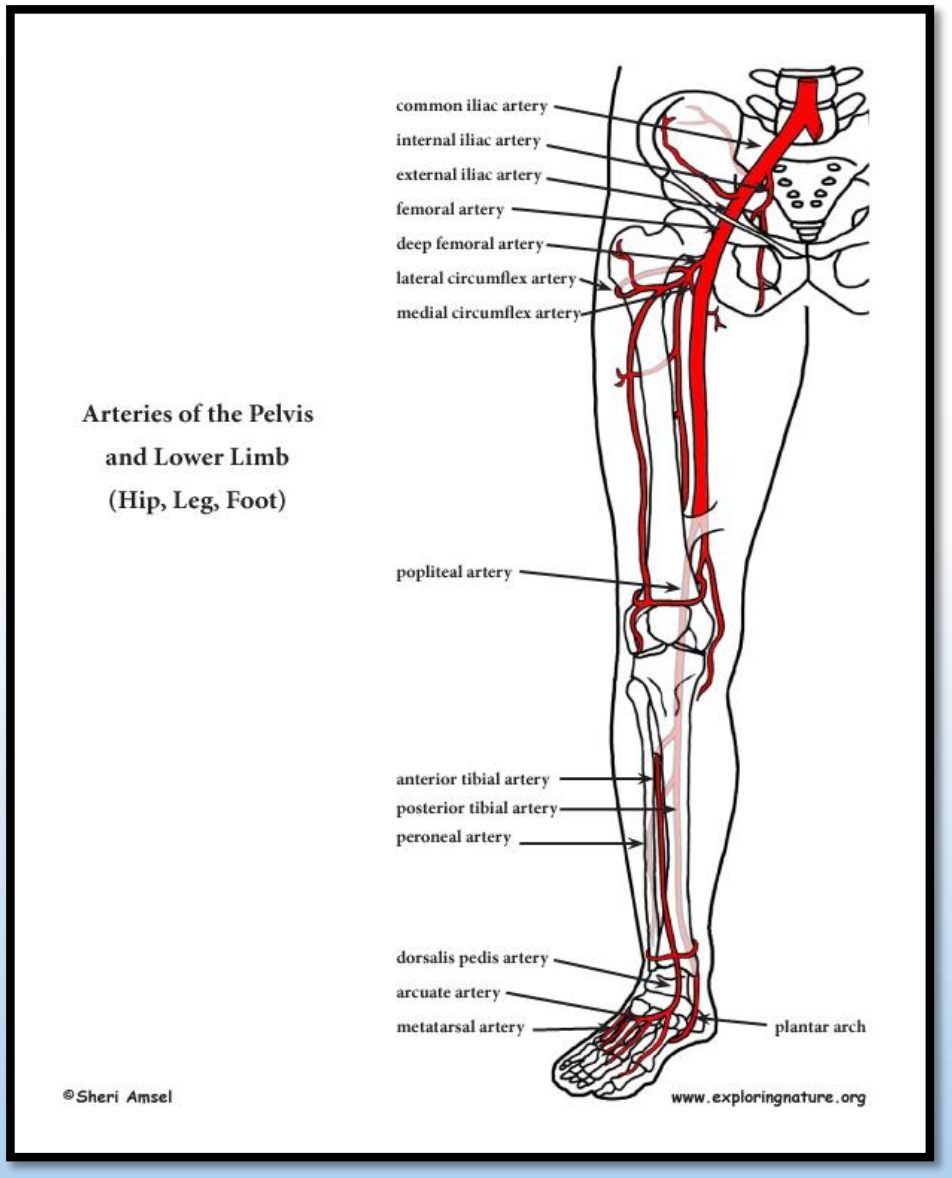
Peripheral Neuropathy



Polyneuropathy

- **Early findings:**
  - **Small fiber disease:**
    - **↓ temperature, vibration**
  - **Large fiber disease:**
    - **↓ light touch, pain**
  - **Ankle reflexes absent or ↓**
- **Late findings:**
  - **Motor nerve axonal degeneration**
    - **Intrinsic minus "claw foot"**
  - **Proprioceptive fiber degeneration**
    - **Gait imbalance and instability**
  - **Pain fibers**
    - **Usually 8 years+ after diagnosis**
  - **Autonomic neuropathy**

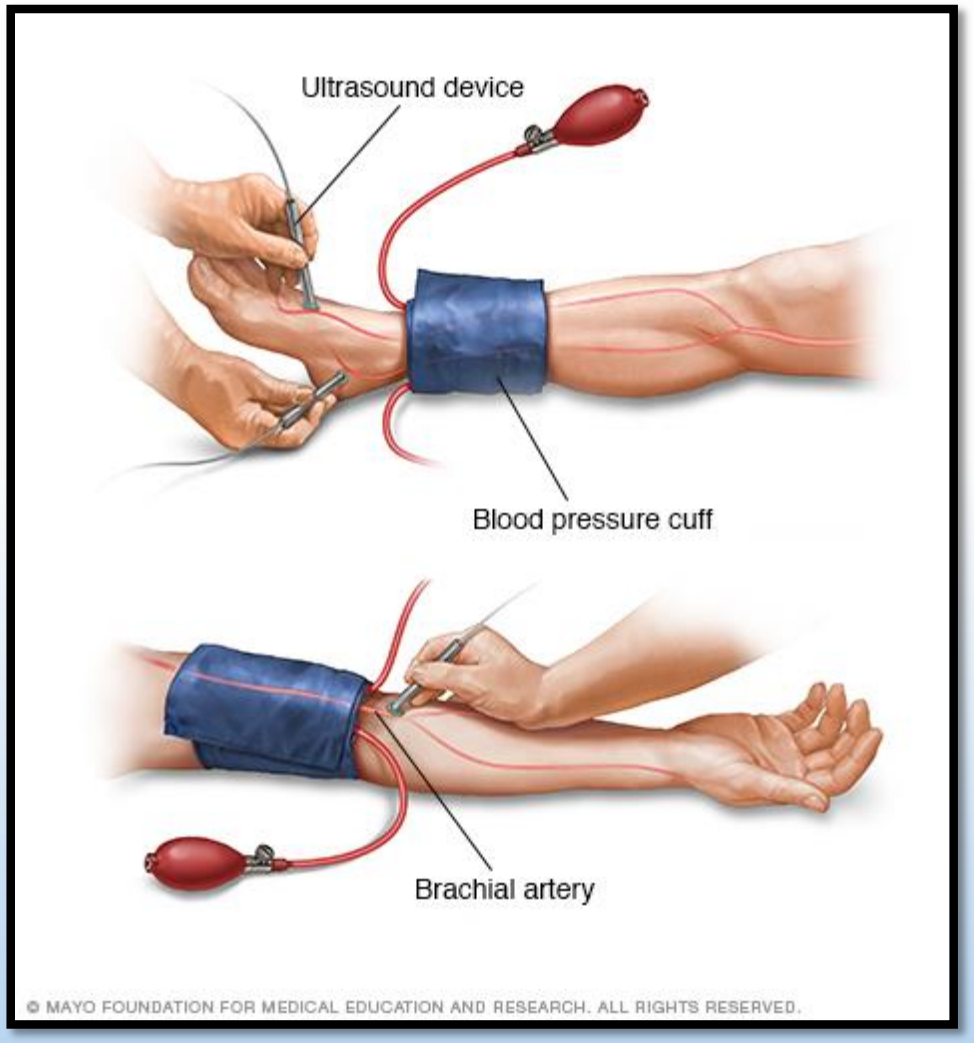
Peripheral Neuropathy



Differential Diagnosis

- Diabetes
  - Age
  - Duration of disease
  - Glycemic control
- Tobacco use
- Inflammatory conditions
- Neurovascular conditions
- Hyperlipidemia
- Hypertension
- Mechanical injury

Peripheral Arterial Disease



Multifactorial

- **Macrovascular**
- **Microvascular**

Non-invasive testing:

- **ABI (?)**
  - **>1.3 = calcified vessels**
  - **0.9 – 1.3 = Normal**
  - **0.7 – 0.9 = Mild (50% occl.)**
  - **0.5 – 0.7 = Moderate (Claudic)**
  - **<0.5 = Severe (Multi-segment)**

Peripheral Arterial Disease

Toe-Brachial Index (?)

- **0.7 – 0.9 is Normal**

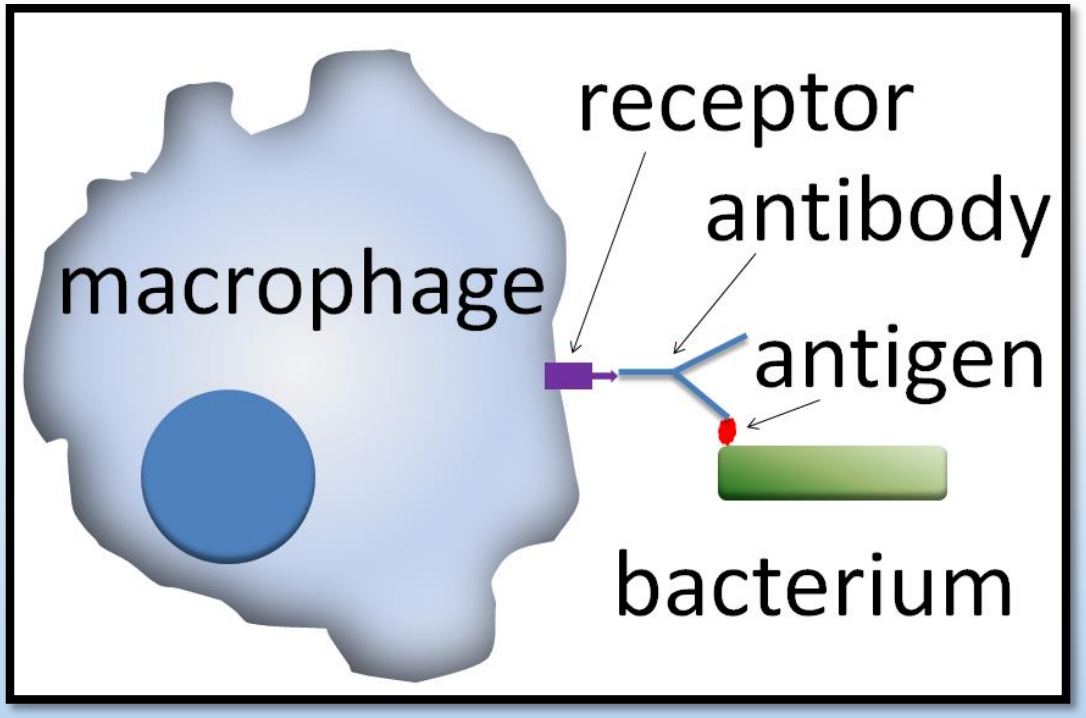
Great Toe Pressures (+)

- **>40mmHg: +healing prognosis**
- **30-40mmHg: ? healing prog.**
- **<30mmHg: - healing prognosis**

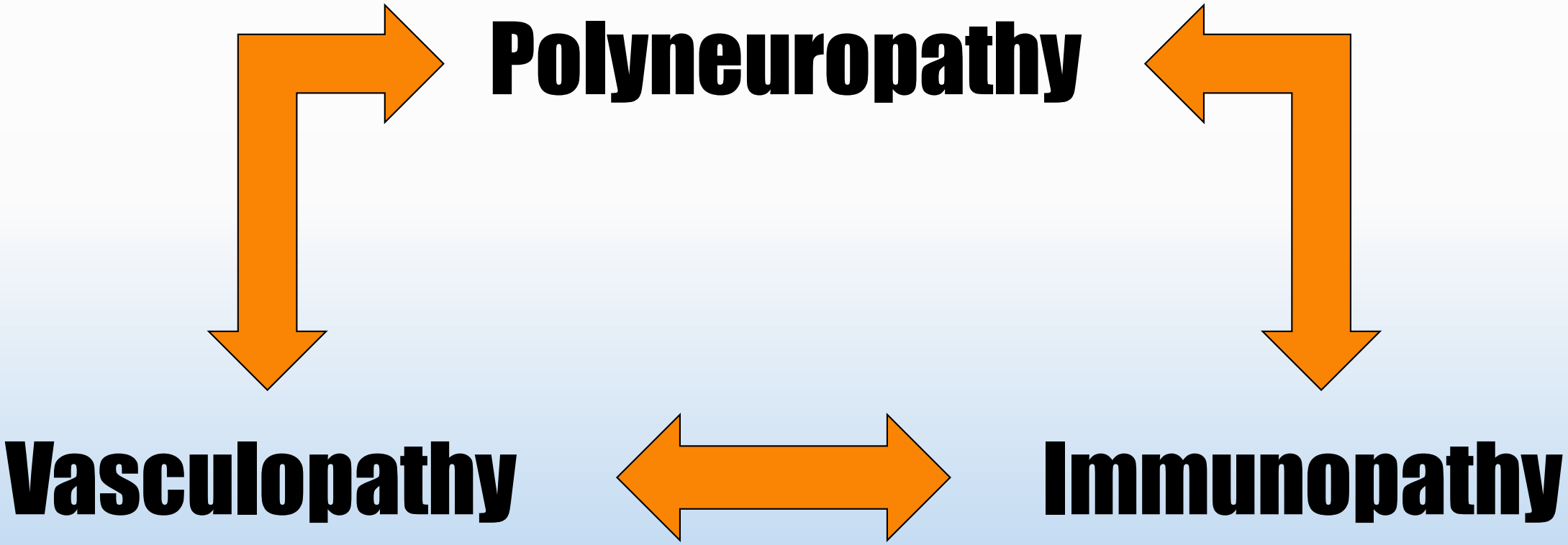
Immunopathy

Hyperglycemia-related impairment of Immune response

- ↓ Neutrophil chemotaxis
- ↓ Phagocytosis
- ↓ Intracellular bactericidal activity
- ↓ Opsonization
- ↓ Cell-mediated immunity



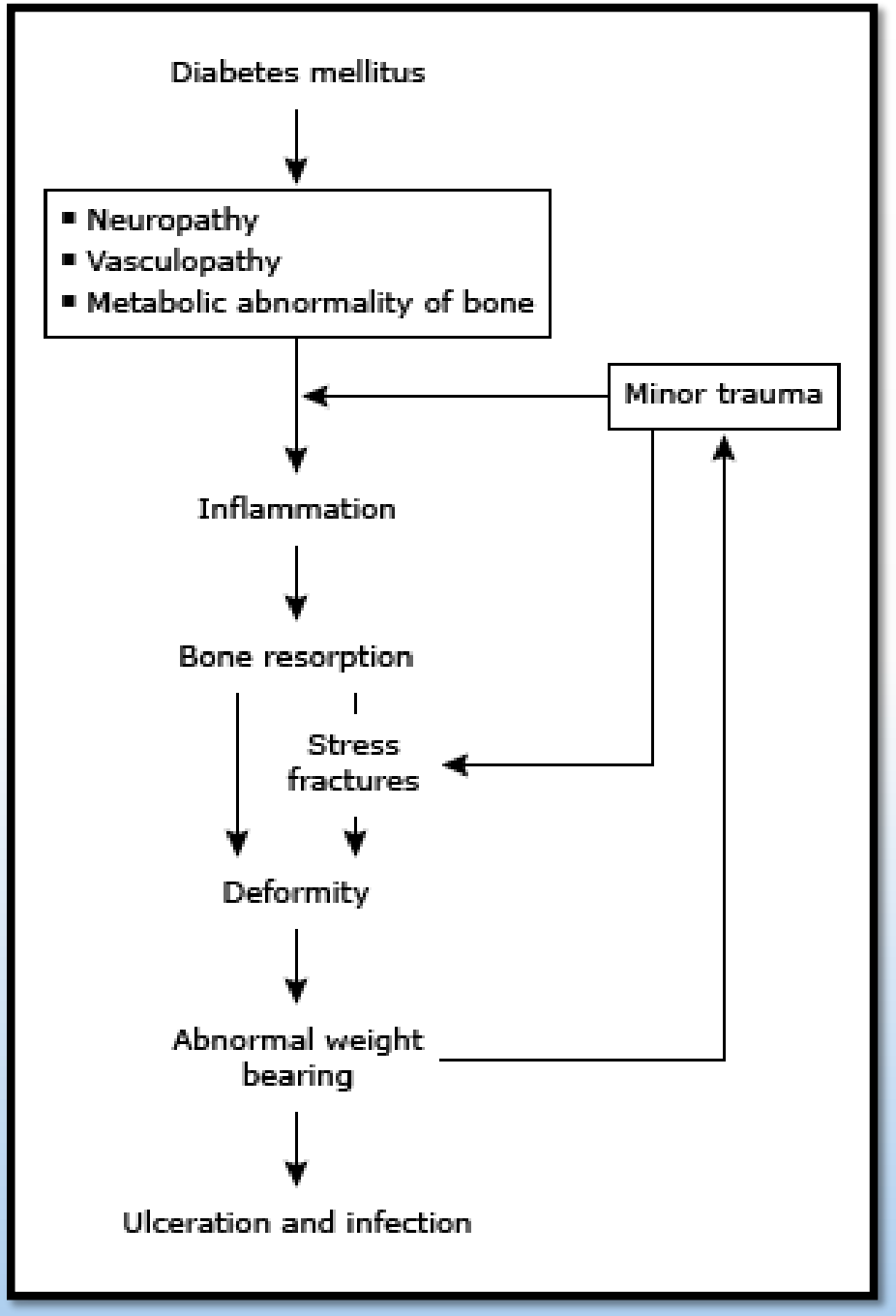
Cruel Synergy



Charcot Foot

Diabetic neuropathic osteoarthropathy

- **Multifactorial**
  - **Polyneuropathy**
    - **Autonomic: chronic vasodilation**
    - **Proprioceptive: ↓balance, sense of self**
    - **Protective sensation: no pain sensation**
  - **Metabolic abnormality of bone**
  - **Mechanical deformities of foot & ankle**


Diabetes mellitus
Neuropathy
Vasculopathy
Metabolic abnormality of bone
Minor trauma
Inflammation
Bone resorption
Stress fractures
Deformity
Abnormal weight bearing
Ulceration and infection


X-TABLE

Charcot Foot: Diagnosis

Clinical Exam

- **+Rubor**
- **+Tumor**
- **+Calor**
- **-Dolor**

Plain film Xrays

- **Look <u>closely</u> at LisFranc's Tarsometatarsal Jt.**

Charcot Foot: Differential

- Cellulitis (find portal of entry)
- Osteomyelitis (portal of entry?)
- Septic arthritis
- Crystal induced arthropathy
- Arthritis
- CRPS

Charcot Foot: Staging

Stage 0: "Early", or "Inflammatory"

- **Negative XR findings**
- **Focal signs of inflammation**

Stage 1: "Developmental"

- **Persistent inflammation**
- **Positive XR findings; fracture / bone lysis**

Stage 2: "Coalescence"

- **Decreasing inflammation;**
- **XR findings of bony resorption and formation**

Stage 3: "Remodeling"

- **Resolved inflammation; XR = bony consolidation**

Charcot Foot: Treatment

Stage 0: "Early", or "Inflammatory"

- **Non-weightbearing IMMEDIATELY; Cast**
- **Bone turnover inhibitors (?)** e.g. Bisphosphonates, Calcitonin

Stage 1: "Developmental"

- **Non-weightbearing IMMEDIATELY; Cast; BTI's (?)**

Stage 2: "Coalescence"

- **Non-weightbearing IMMEDIATELY; Cast; BTI's (?)**

Stage 3: "Remodeling"

- **Slow return to WB in protective custom gear**
- **Bone resection "Planing"**
- **Reconstruction: goal = plantigrade foot**

Crow Brace

Arizona Boot

Mt. Emey Charcot Gear

Diabetic Foot Ulcers

- **Neuropathic**
- **Ischemic**
- **Combined**

- **25% of all diabetics will form an ulcer**
- **Most common cause of DM hospitalizations**
- **Precede 80%+ of L.Extremity amputations**

- **Preventable in most cases!**

Diabetic Foot Ulcers

- Most common sites
  - Plantar metatarsal heads
  - Plantar 1st digit
  - Plantar lesser metatarsal heads
  - Tops of toes
  - Tips (pulps) of toes
  - Plantar 5th metatarsal base
  - Interdigital

Table 5 **Wagner Classification System**

Grade	Lesion
0	No open lesions: may have deformity or cellulitis
1	Superficial ulcer
2	Deep ulcer to tendon or joint capsule
3	Deep ulcer with abscess, osteomyelitis, or joint sepis
4	Local gangrene - forefoot or heel
5	Gangrene of entire foot

Diabetic Foot Ulcers: Grading

Grade 0: Pre-ulcerative Stage

- **Intact skin**
- **Redness of skin**
- **Heme stained calluses**

Diabetic Foot Ulcers: Staging& Treatment

Grade 1: Partial Thickness

- **Skin is open**
- **No tendon, ligament or bone exposure**
- **Debridement**
- **Off-load pressure**
- **Abx?**
- **Shoe gear**

Diabetic Foot Ulcers: Staging & Treatment

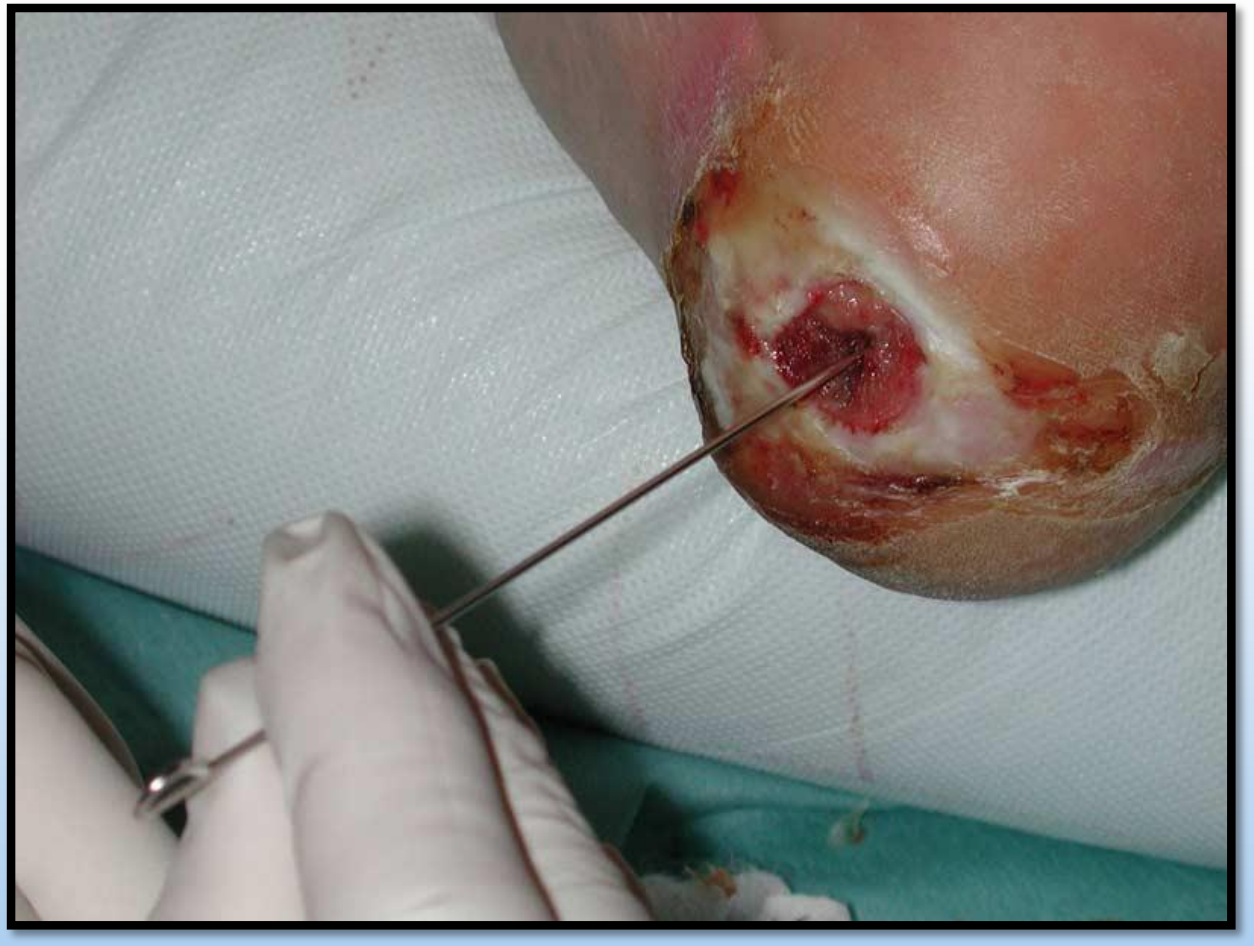
Grade 2: Full Thickness

- **Skin is open**
- **Tendon, ligament and/or bone are exposed**

Diabetic Foot Ulcers: Staging & Treatment

Grade 3: Full thickness with exposed bone

- **Deep abscesses**
- **Bone infection**



Diabetic Foot Ulcers: Staging & Treatment

Grade 4: Local gangrene

- **May *or may not* require amputation**

Diabetic Foot Ulcers: Staging & Treatment

Grade 5: Global gangrene

- **Usually requires leg amputation**

Diabetic Foot Ulcers: Offloading Techniques

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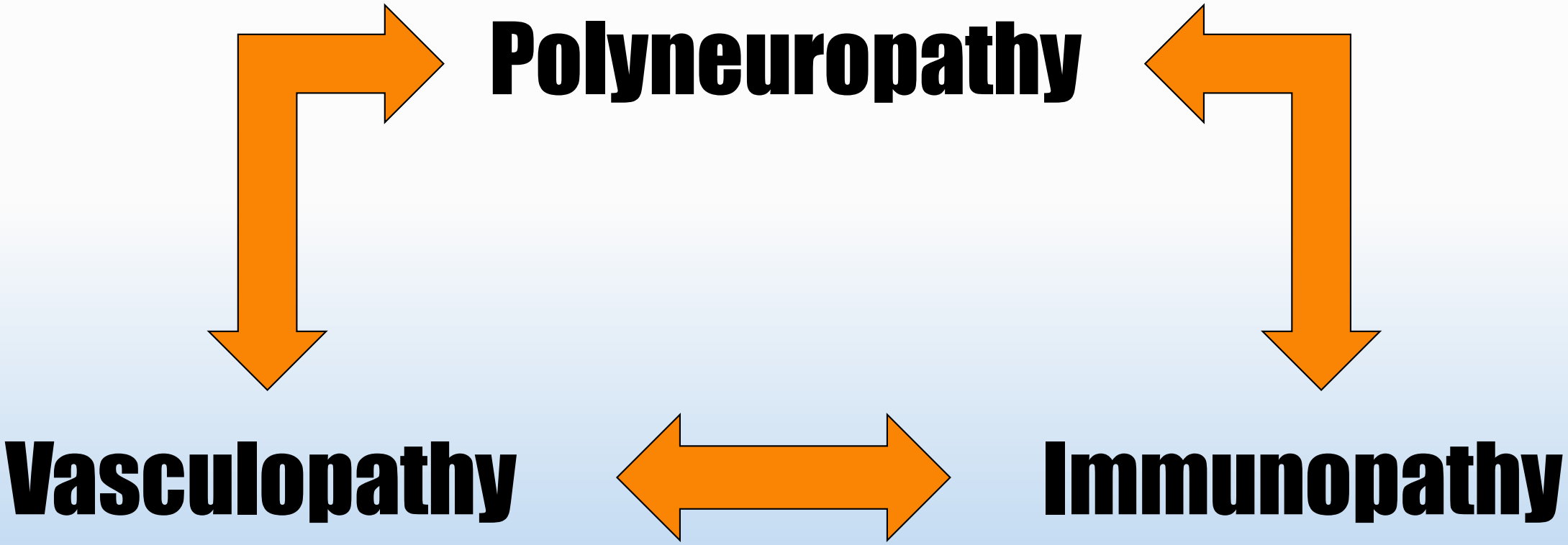
Diabetic Foot Ulcers: Offloading Techniques

Cruel Synergy



Telepodiatry

Telepodiatry is very appropriate for may conditions in Podiatry; feel free to use this resource!

Relevant clinical information and quality digital photographs are appreciated. If X-rays were taken; digital photographs of those are also appreciated.


Thank you!