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CPMA President & OPMA President





#### **Presentation to**



#### A Podiatric Perspective on Diabetic Foot Health

- Introduction to Podiatry
- Peripheral Neuropathy in the Diabetic Foot including Charcot Definitions, evaluation, treatment
- Opportunities for Collaboration
- Ontario Foot Health Needs
- Call to Action DPMs & CFCNs



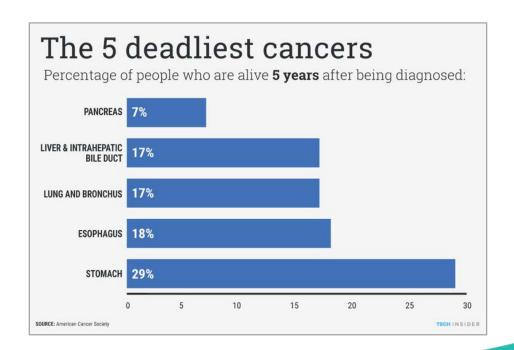
- Introduction to Podiatry
  - Education & Competencies
  - Podiatry and Chiropody Models of Care
  - Scopes of Practice across Canada
  - Vision for the Future of Podiatry in Canada



- Peripheral neuropathy caused by diabetes (DPN) is a result of microvascular complications affecting the nerves: sensory, motor, autonomic or all three.
  - Symptoms
  - Clinical presentation
  - Risk factors
  - Treatment



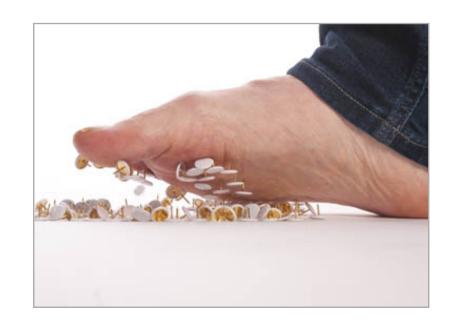
 MORTALITY: 5 years after developing a diabetic foot ulcer approaches 50%!





#### Diabetic Peripheral Neuropathy

The outpatient diagnosis of diabetic peripheral neuropathy is simply "the presence of symptoms and/or signs of peripheral nerve dysfunction in people with diabetes after the exclusion of other causes." Mild numbness to SEVERE pain



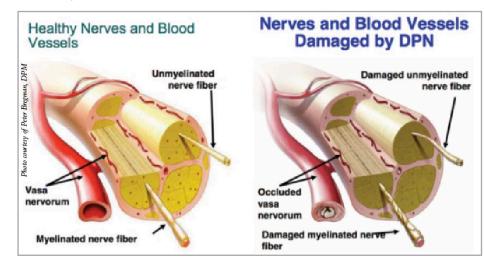
#### Reference:

Boulton AJM, Gries FA, Jervell JA: Guidelines for the diagnosis and outpatient management of diabetic peripheral neuropathy. Diabetic Med15: 508-514,1998



#### Painful Diabetic Peripheral Neuropathy

- Anxiety, depression, fatigue, sleep disturbance
- Diminished work ability, healthrelated quality of life



#### References:

- Sadosky, A., Schaefer, C., Mann, R., Bergstrom, F., Baik, R., Parsons, B., Nalamachu, S., Nieshoff, E., Stacey, B.R., Anschel, A., and Tuchman, M. Burden of illness associated with painful diabetic peripheral neuropathy among adults seeking treatment in the US: results from a retrospective chart review and cross-sectional survey. J Diabetes Metab Syndr Obes. 2013; 6: 79–92
- Shakher, J. and Stevens, M.J. Update on the management of diabetic polyneuropathies. J Diabetes Metab Syndr Obes. 2011; 4: 289–305



#### Diabetic Motor Neuropathy

- Intrinsic Muscle Atrophy
- Hammertoes
- Short Extensor Muscle Belly
- Hands
- Gait Instability, Walking, Stopping, Falling.



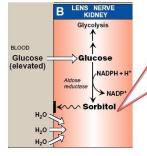
#### References:

Meier MR, Desrosiers J, Bourassa P, Blaszczyk J. Effect of type II diabetic peripheral neuropathy on gait termination in the elderly. Diabetologia 44(5):585-92, 2001.



- Diabetic Sensorimotor Neuropathy
  - Neuropathic Pain and Weakness are due to Compression of the Peripheral Nervehyperglycemia in DM > sorbitol > edema, myelin swelling (polyol pathway activity is increased)
  - High levels of sorbitol leads to
    - Axonal Degeneration
    - Demyelinization

- -Elevated intracellular gluc conc's & an adequate supply of NADPH cause aldose reductase to produce a sufficient increase in the amount of sorbitol, which can't pass efficiently through CMs &, therefore, remains trapped inside cell.
  - -This is exacerbated when sorbitol dehydrogenase is low or absent, e.g., in retina, lens, kidney & nerve cells. As a result, sorbitol accumulates in these cells, causing strong osmotic effects &, therefore, cell swelling as a result of water retention

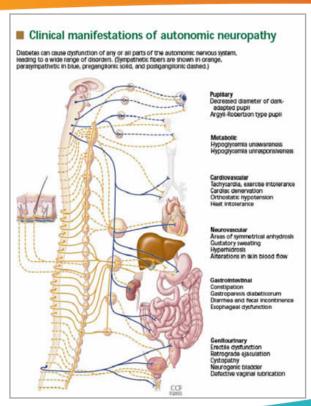


#### References:

- 1. Vinik, A.I. Diabetic neuropathy: pathogenesis and therapy. Am J Med. 1999; 107: 17S-26S
- 2. Llewelyn, J.G. The diabetic neuropathies: types, diagnosis and management. J Neurol Neurosurg Psychiatry. 2003; 74: ii15-ii19



- Diabetic Autonomic Neuropathy
  - Disrupt organ systems: cardiovascular, GI and GU



#### References:

Vinik Al, Maser RE, Mitchell BD, Freeman R. Diabetic autonomic neuropathy. Diabetes Care 26(5):1553-79, 2003.





Diabetic Autonomic Neuropathy

Disruption of microvascular skin blood flow and sudomotor function

- Dry Skin, Loss Of Sweating, and The Development Of Fissures And Cracks
- Ulcers, Gangrene, and Limb Loss



#### Charcot Neurogenic Osteoarthropathy

- Insidious non-infective, progressive destruction of bones and joints, resulting in pathologic fractures, dislocations or subluxations that almost exclusively affects the foot and ankle.
- Most commonly caused by diabetes mellitus. Other less common causes include leprosy, alcohol abuse, multiple sclerosis and congenital neuropathy.
- In patients with diabetic neuropathy, the prevalence of the disorder ranges from 0.8% to 7.5%.

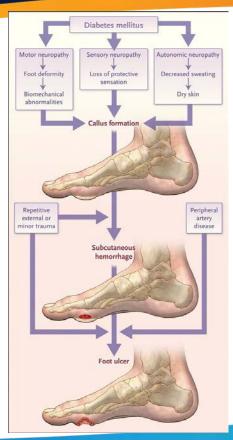
#### References:

- 1. Charcot J-M. Sur quelaques arthropathies qui paraissent depender d'une lesion du cerveau ou de la moele epiniere. Arch Des Physiol Norm et Path 1868;1:161–71
- 2. Armstrong DG, Todd WF, Lavery LA, et al. The natural history of acute Charcot's arthropathy in the diabetic foot specialty clinic. Diabet Med 1997;14:357–63



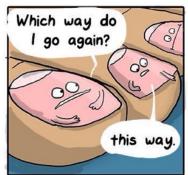


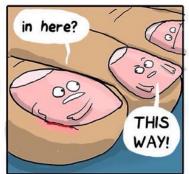
Recap





So now what do we do?

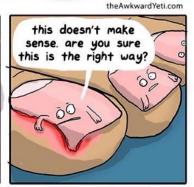




in here?

are you for real?

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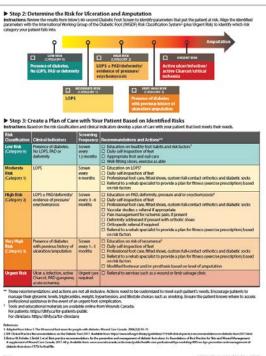


Podiatric

Association

Inlow's 60-second Diabetic Foot Screen





#### References:

Orsted HL, Botros M. Inlow's 60-Second Diabetic Foot Screen gets a new look! Wound Care Canada. 2018;16(1):26–29.





- Type 2 diabetic risk level 2
  - Routine foot care every 3 months





Healed ulcer



Ankle Equinus



#### References:

Searle A, Spink M, Ho A, Chuter VH. Association between ankle equinus and plantar pressures in people with diabetes. A systematic review and meta-analysis. Clinical Biomechanics. 2017 Mar;43:8-14.





Equinus Brace



References: www.fixequinus.com



There are 2 Feet!!





- Type 2 diabetic risk level 3
  - Routine foot care every 3 months
  - Looking good! stable foot, quality accommodation



#### There are 2 Feet!!





Acute Charcot with PVD



Acute or Chronic Charcot?





- Charcot with healing ulceration
  - How did we get here?





Offloading Devices



- Wheelchair
  - Non-weight bearing is the GOLD STANDARD!





Podiatric Surgery



#### Podiatric Surgery

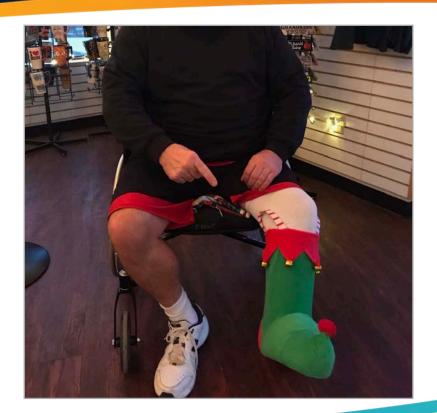








 Best Efforts can still lead to Worst Outcome



Podiatric Surgery





- Podiatric Surgery
  - Offloading Device





- Podiatric Surgery
  - International Offloading Device









#### Neuropathy Treatment | Recommendations

In people with type 2 diabetes, screening for peripheral neuropathy should begin at diagnosis of diabetes and occur annually thereafter [Grade D, Consensus].

In people with type 1 diabetes, annual screening should commence after 5 years' post-pubertal duration of diabetes [Grade D, Consensus].

Screening for peripheral neuropathy should conducted by assessing loss of sensitivity to the 10 g monofilament or loss of sensitivity to vibration at the dorsum of the great toe [Grade A, Level 1 (31,34)] (see Appendices 11B. 11A and Rapid Screening for Diabetic Neuropathy).

People with diabetes should be treated with intensified glycemic control to prevent the onset and progression of neuropathy [Grade A, Level 1A (3,35) for type 1 diabetes; Grade B, Level 2 (38) for type 2 diabetes].



#### Neuropathy Treatment | Recommendations

- The following agents may be used alone or in combination for relief of painful peripheral neuropathy:
  - Anticonvulsants (pregabalin [Grade A, Level 1 (47,52)], gabapentin† [Grade B, Level 2 (46,74)], valproate† [Grade B, Level 2 (50,51)]
  - Antidepressants (amitriptyline†, duloxetine, venlafaxine†) [Grade B, Level 2 (56,57,60,61,63,75)]
  - Topical nitrate spray† [Grade B, Level 2 (65,66,70)]
- In people not responsive to the above agents, opioid analgesics (tramadol, tapentadol ER, oxycodone ER) may be used [Grade B, Level 2 (41,43,44)]. Prescribers should be cautious due to risks of abuse, dependency and tolerance, and follow the recommendations of the 2017 Canadian Guidelines for Opioids for Chronic Non-Cancer Pain (54) [Grade D, Consensus].

Notes: †Denotes that this drug is not currently approved by Health Canada for the management of neuropathic pain associated specifically with diabetic peripheral neuropathy. Most studies failed to achieve Grade A, Level 1 due to a <80% completion rate (39). Abbreviations: A1C, glycated hemoglobin; BG, blood glucose; BMI, body mass index; CAD, cardiac autonomic neuropathy; DAN, diabetic autonomic neuropathy; DPN, diabetic peripheral neuropathy; PDN, painful diabetic neuropathy.

#### Reference:

Diabetes Canada Clinical Practice Guidelines Expert Committee. Diabetes Canada 2018 Clinical Practice Guidelines for the Prevention and Management of Diabetes in Canada. Can J Diabetes. 2018;42(Suppl 1):S1-S325.



#### Risk Stratification

LEVEL	TYPE	RISK	Visits
Level 0	No Neuropathy	5.1% Risk of Ulceration	Yearly Visit
Level 1	Neuropathy	14.3%	6 months
Level 2	Neuropathy, PVD and/or Deformity	18.8%	3-6 months
Level 3	History of Ulcer of Amputation	55.8%	1-3 months

#### References:

Orsted HL, Botros M. Inlow's 60-Second Diabetic Foot Screen gets a new look! Wound Care Canada. 2018;16(1):26–29.



- Ontario Foot Health Needs
  - Greying of Canada's Population
  - Diabetes Epidemic
  - Avoiding Amputations
  - Wound Care



- Opportunities for Collaboration
  - Virtual Collaboration & Physical Collaboration
  - Sharing Research & Data
  - Supporting Education, Certification & Competencies
  - Sharing Best Practices / Evidence-Based Care



- Patient-Centred Care Driving Call to Paradigm Shift
  - De-Institutionalization of Foot Care
  - Seamless Continuum of Foot Care & Increased Access to Competent Practitioners
  - Emphasis on Prevention
  - Making Foot Health a Priority



#### FOOT CARE CONTINUUM IN ONTARIO

- Call to Action DPMs & CFCNs
  - Joint Conferences / Seminars / Professional Development
  - Implement Collaborative & Joint Practices
  - Unity in Advocacy
  - Mutual Support in Standards of Practice (e.g. Infection Control)













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