

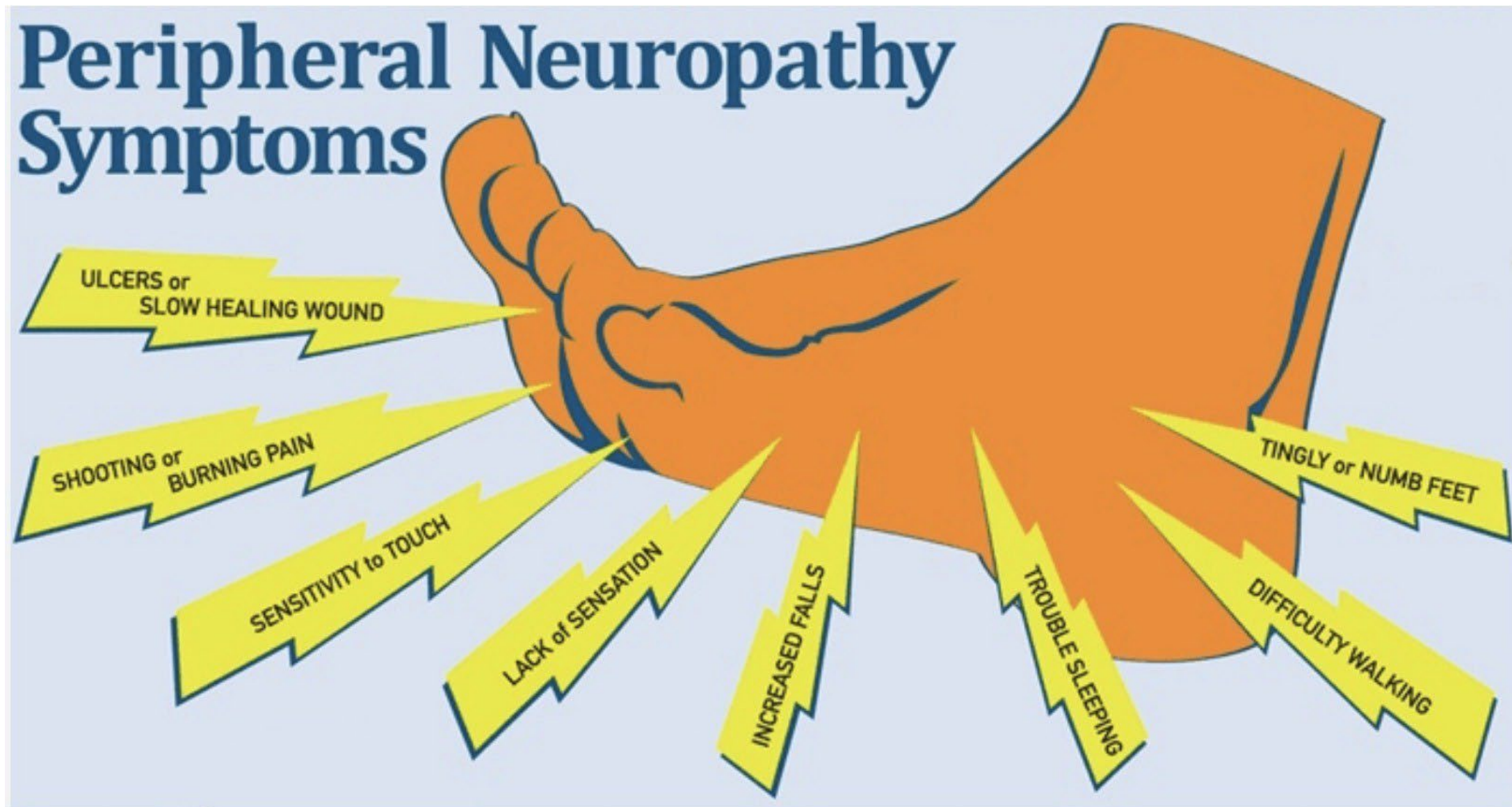
A Practical Approach to Diabetic Neuropathy

July 2, 2026

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Disclosure

In the past 24 months, I have NOT had any financial relationships with any ineligible companies.



Understanding Diabetic Neuropathy

Patient version

 American Diabetes Association

 Guidelines InSIGHT
Your visual guide to the guidelines

Don't Let Diabetes Get On Your Nerves

The nerves in your feet provide a natural alarm system. Diabetes can shut it off and result in undetected foot problems.

Signs and Symptoms



- Tingling, sharp, or burning feeling, sometimes worse at night
- Numbness or less ability to feel pain
- Decreased ability to feel temperature changes
- Dry skin, cracked skin
- Muscle weakness
- You have had foot ulcers, infections, changes in foot shape, or had bone or joint damage

Request a foot exam at every visit

Your health care provider should check for problems with:

- Circulation in your feet
- Toenails and skin
- Any deformities
- Footwear
- Nerves in your foot

Report any foot lesions, discoloration, or swelling as soon as possible to help avoid foot complications due to nerve damage

Help keep your feet healthy at home.

- ✓ Manage your blood glucose (blood sugar) and try to reach your A1C target
- ✓ Eat a healthy diet
- ✓ Regularly exercise or walk
- ✓ Don't smoke
- ✓ Moisturize your skin (not between toes)
- ✓ Inspect feet daily (visually or by touch, check bottoms and between toes)
- ✓ Never walk barefoot (including indoors)
- ✓ Wear proper fitting shoes and good socks
- ✓ Inspect shoes inside and out daily before putting on
- ✓ Do not use corn plasters or wart removal medication
- ✓ Do not soak your feet in water or with epsom salt
- ✓ Check water temperature of tub or shower with your elbow before entering

Learn more at diabetes.org | 1-800-DIABETES (800-342-2383)

Supported in part by Diabetes-Related Peripheral Neuropathy project, American Diabetes Association® (ADA)

Nerve Damage From High Blood Sugar

Diabetic neuropathy is caused by prolonged high blood sugar, leading to nerve damage throughout the body.

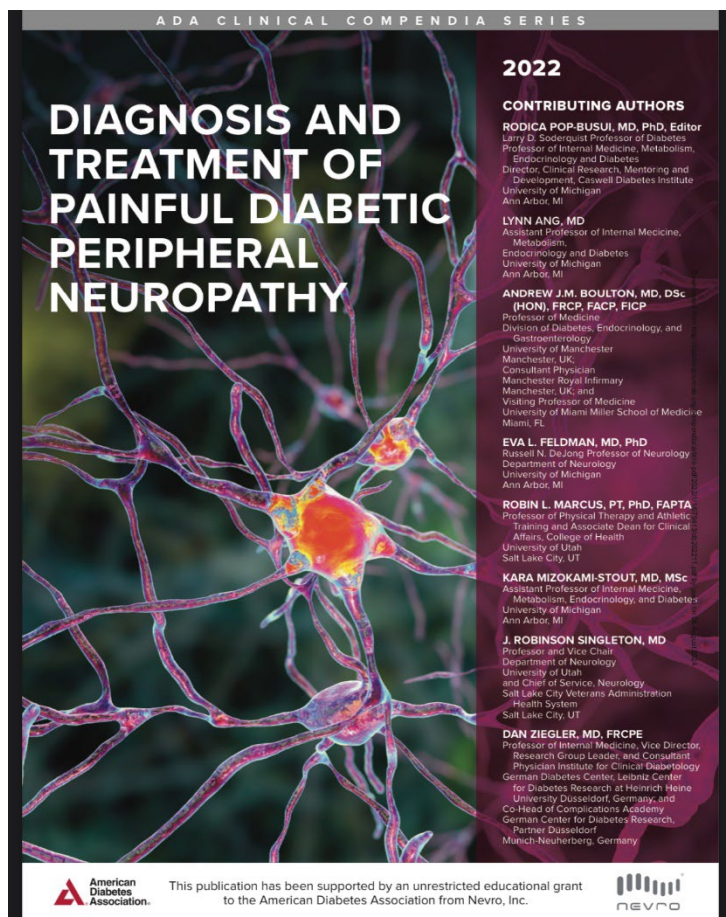
Common Symptoms and Areas Affected

Symptoms include numbness, tingling, and pain, most often in the hands and feet.

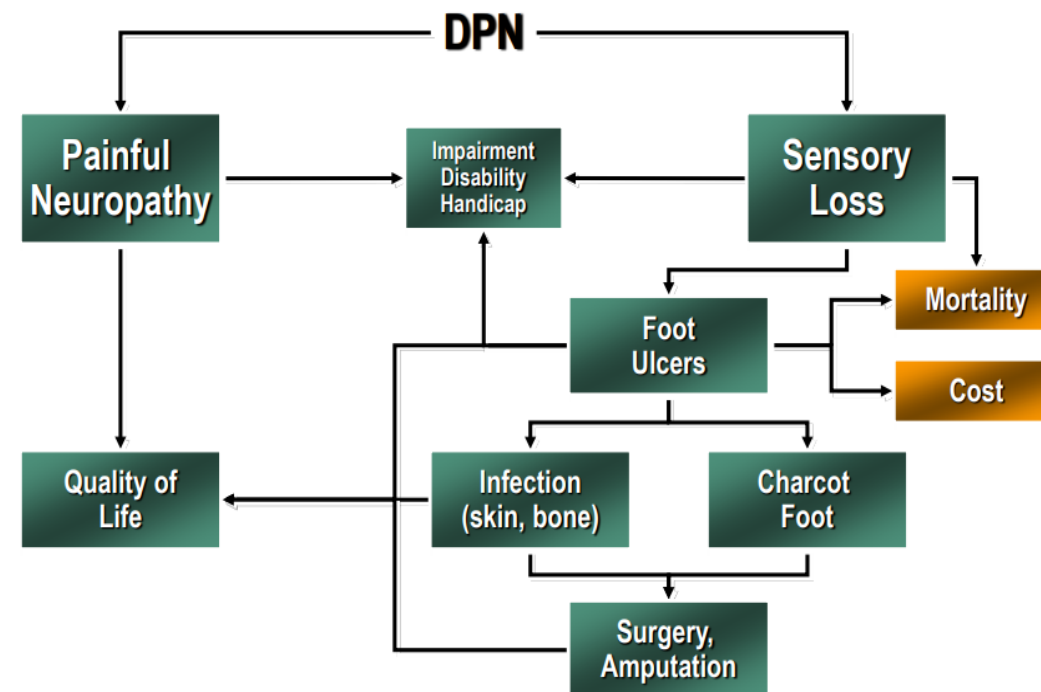
Prevention and Management Strategies

Managing blood sugar, a healthy lifestyle, and regular checkups are key to preventing and treating diabetic neuropathy.

“Pain” versus the “Loss of Sensation”



Clinical Impact of DPN TOTAL Symptoms



Clinical Signs of Diabetic Neuropathy

TABLE 1 Symptoms and Clinical Signs of Diabetic Peripheral Neuropathy

	Symptoms	Function	Signs on examination (clinically diagnostic)*
Large, Myelinated Nerve Fibers	• Numbness • Tingling • Poor balance	• Pressure • Balance	• Ankle reflexes: • Reduced • Absent • Vibration perception:* • Reduced • Absent • 10-g monofilament sensation:* • Reduced • Absent • Proprioception: • Impaired
Small Nerve Fibers	• Pain: • Burning • Electric shocks • Stabbing • Hyperalgesia • Allodynia	• Nociception • Protective sensation	• Thermal (cold/hot) discrimination:* • Reduced • Absent • Pinprick sensation:* • Reduced • Absent

*Document impairment/loss in symmetrical, distal-to-proximal pattern.

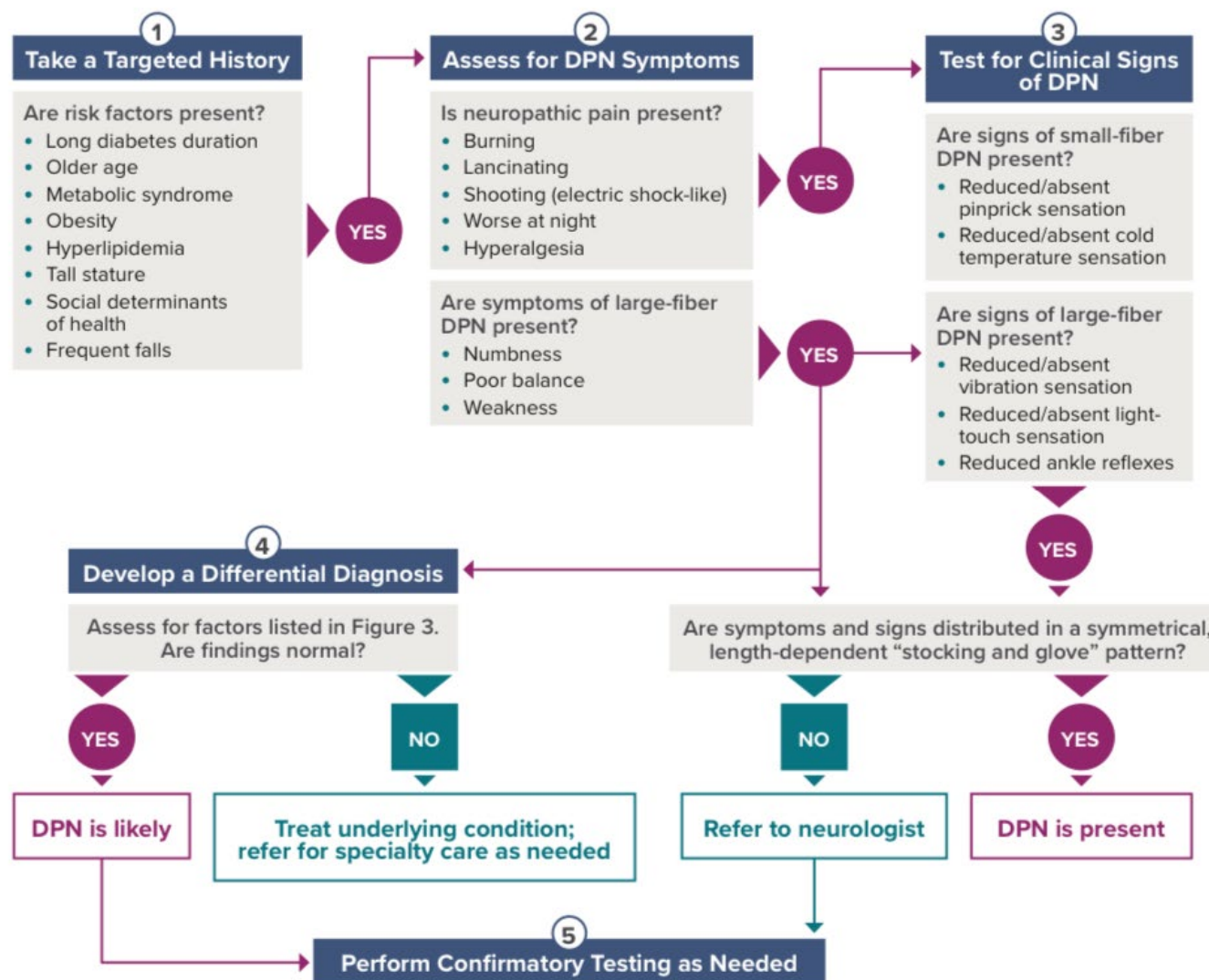


FIGURE 4 A stepwise approach to screening and diagnosing diabetic peripheral neuropathy.

Detecting Diabetic Neuropathy



Recognizing Early Symptoms

Physicians look for numbness, tingling, and pain in the hands and feet to identify early signs of diabetic neuropathy.

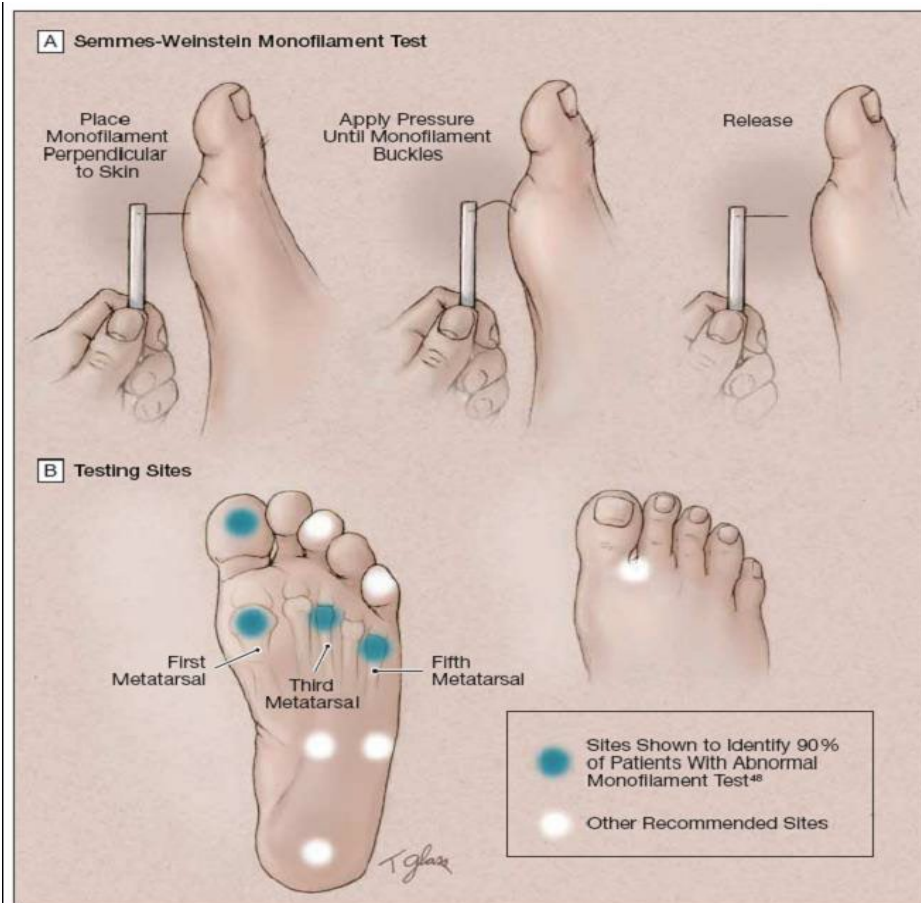
Diagnostic Methods

Diagnosis uses nerve conduction studies and clinical tests like the monofilament test to detect sensory loss in patients.

Importance of Regular Screening

Routine screenings help prevent complications and lead to better patient outcomes by catching neuropathy early.

Using a Monofilament Tool



Patient Preparation

Ask the patient to close their eyes and relax to ensure accurate sensory testing results.

Monofilament Application

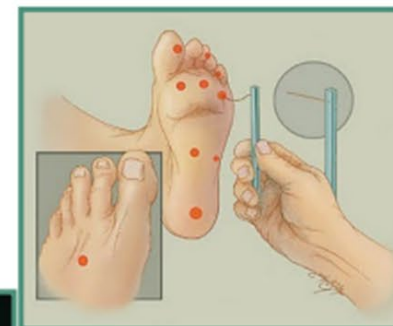
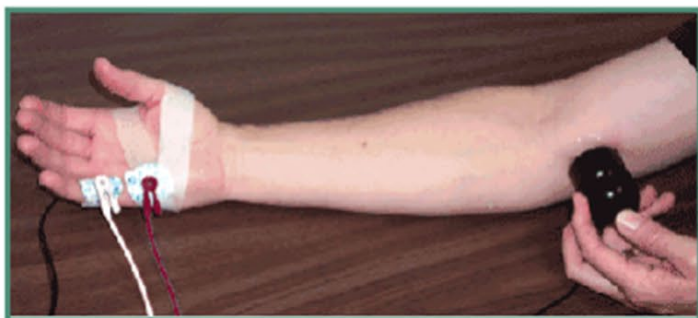
Gently press the monofilament perpendicularly to the skin until it bends, holding for 1-2 seconds.

Testing and Recording

Test several areas, avoiding calluses, and record if the patient feels each touch to assess nerve function.

Diagnostic Tools for DPN: Large Fiber

- 5.07 Semmes-Weinstein Monofilament
- Biosthesiometer[®]
- Calibrated Tuning Fork
- Nerve Conduction Velocity

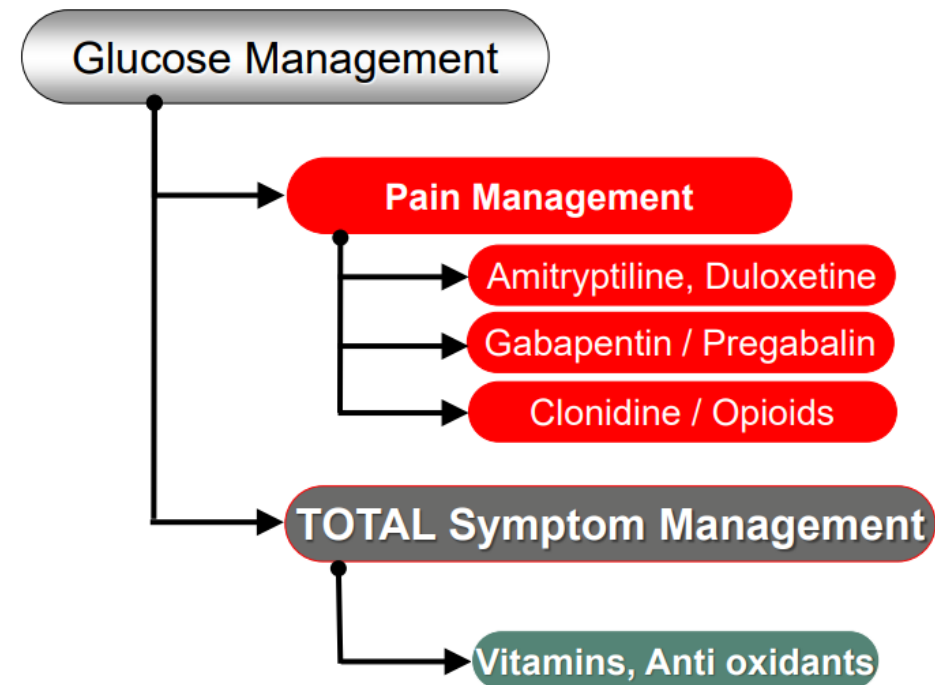


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Treatment Options for Diabetic Neuropathy

- Pain medications.
- Anti-seizure medications.
- Antidepressants.
- **Topical creams.**
- **Transcutaneous electronic nerve stimulation (TENS) therapy.**
- **Hypnosis.**
- **Relaxation training.**
- **Biofeedback training.**
- **Acupuncture.**

DPN Treatment Options



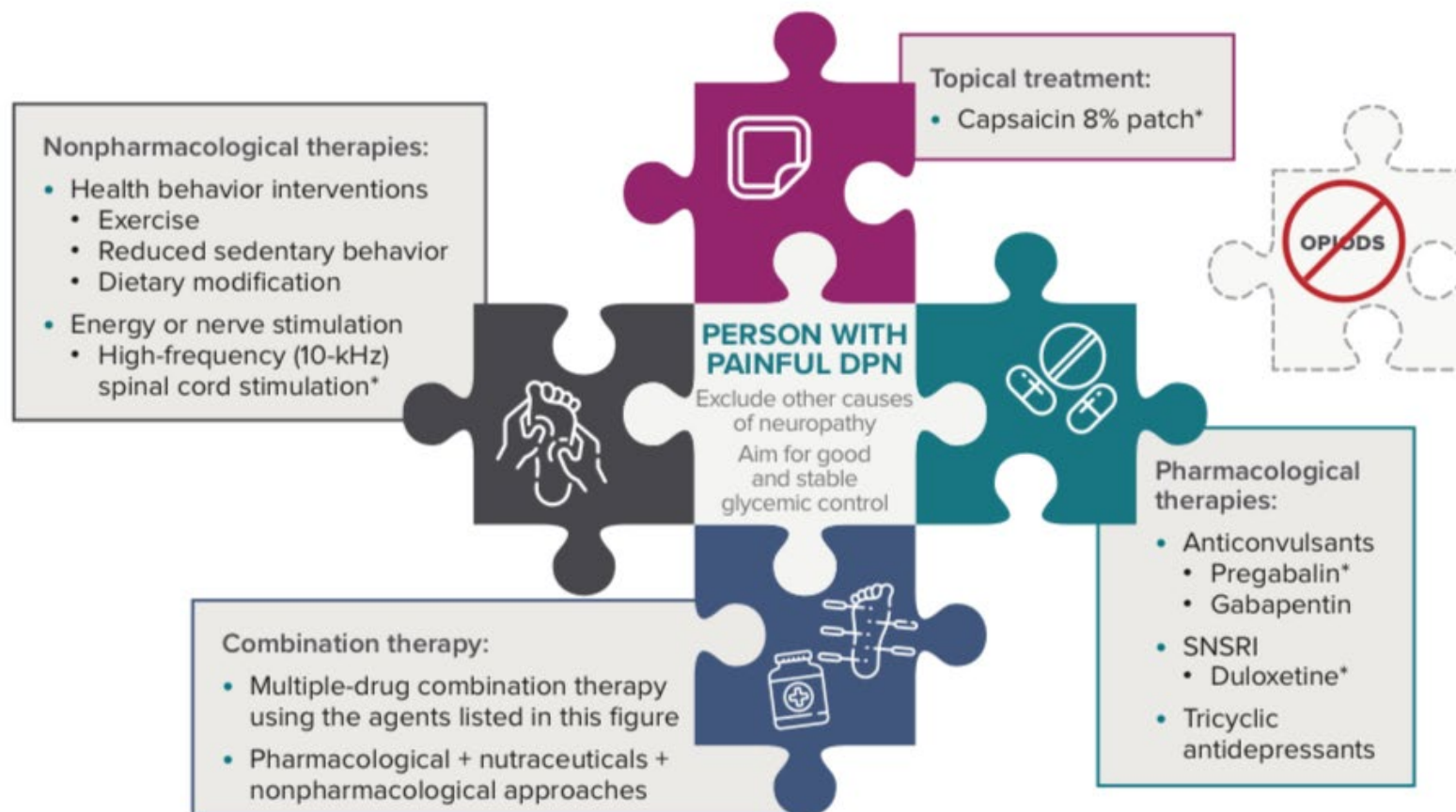


FIGURE 8 Recommended therapeutic approaches to painful diabetic peripheral neuropathy. Pharmacological therapy selection should be individualized based on factors such as comorbidities, cost, potential drug-drug interactions, and potential for adverse effects. Opioids are not recommended because of their high risk of addiction, abuse, and adverse effects. Topical capsaicin and a variety of nonpharmacological approaches are also available, and combination therapy may be needed. Not depicted are the nutraceuticals α -lipoic acid and benfotiamine, which are used in some countries but not approved in the United States. Individuals with severe pain that is refractory to other therapies should be referred to a specialist pain clinic. *U.S. Food and Drug Administration–approved for the treatment of painful diabetic peripheral neuropathy. SNSRI, selective norepinephrine and serotonin reuptake inhibitor.

Prevention!!!





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Beware!!!



Thermal Injury – Heating Blanket



DIABETIC NEUROPATHY

Signs & Management

Signs & Management

Tingling in feet
Many people feel tingling or pins and needles.

Numbness
The feet may lose normal feeling over time.

Burning pain
Some people feel burning, stabbing, or electric-like pain.

Reduced sensation
Hot, cold, or touch may be harder to feel.

Foot ulcer
Nerve damage increases the risk of serious foot wounds.

Foot injury
Foot injury may go unnoticed.

Foot weakness
Weakness can affect walking and daily activities.

Balance problems
Less feeling in the feet can make balance worse.

Unnoticed foot injury
Cuts, blisters, or sores may go unnoticed.

MANAGEMENT

- Control blood sugar well.** Good sugar control helps slow nerve damage.
- Check feet every day.** Look daily for cuts, blisters, redness, or sores.
- Wear proper footwear.** Protective well-fitting shoes help prevent injury.
- Treat pain properly.** Doctors may prescribe medicine for nerve pain.
- Regular foot exams.** Routine checkups help catch problems early.
- Get help for any foot wound.** Even small foot sores need early medical care.

*Diabetic neuropathy is nerve damage caused by diabetes, most often affecting the feet and legs.

FOOT PROBLEMS DIABETES CAN HIDE

Neuropathy, poor circulation, pressure stress, and delayed healing can allow serious foot problems to develop silently before they are noticed.

Diabetes can hide foot problems by reducing pain and slowing healing. Because sensation may fade and blood flow may become reduced, small injuries, pressure points, skin changes, and deeper tissue damage can develop without the usual warning signs.

STAGE 1: Sensation Starts to Fade

Tingling/Numbness/Burning
Early nerve damage
Reduced ability to feel pain
Foot appears normal

STAGE 2: Pressure and Skin Changes Build Quietly

Callus formation
Pressure damage and skin changes
Repeated plantar pressure
Dry skin/Cracking
Early skin changes may go unnoticed

STAGE 3: Hidden Damage Develops Beneath the Surface

Blister/Crack worsening
Deep tissue damage
Reduced circulation
Underlying tissue damage develops
Deeper tissue pressure injury

STAGE 4: Serious Foot Problems Finally Appear

Ulcer/infection risk
Ulcer formation
Skin breakdown
Deep tissue injury
Delayed healing
High risk for serious infection

THE FOOT PROBLEMS DIABETES CAN HIDE

- Nerve damage reduces warning pain
- Poor circulation slows repair
- Calluses hide deeper damage
- Blisters/cracks unnoticed
- Small wounds worsen before felt
- Infection/ulcer risk when missed

PREVENTION AND EARLY-ACTION

- Inspect feet daily even without pain
- Do not ignore numbness/tingling/burning
- Check for calluses/redness/cracks/blisters
- Wear supportive properly fitted shoes
- Seek podiatric care early for changes
- Regular diabetic foot exams catch hidden problems

DIABETES CAN HIDE SERIOUS FOOT PROBLEMS UNTIL THEY BECOME DANGEROUS. DAILY CHECKS AND EARLY CARE HELP REVEAL PROBLEMS BEFORE BIGGER COMPLICATIONS BEGIN.

Impact of Diabetic Neuropathy



- 60-70% of foot ulcers are preceded by Neuropathy
- 85% of diabetes related lower limb amputations are preceded by a foot ulceration
- Most Common Proximate, Nontraumatic Cause of Amputations
- Largest number of diabetes related hospital bed-days

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*Today's Podiatrist: Physician, Surgeon, Specialist*

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Expensive and Deadly: The Real Cost of Diabetes

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Diabetic foot complications cost more than the five most costly forms of cancer

WASHINGTON—For Americans, the cost of diabetes has never been greater. Not only does the disease cause detriment to the well-being of citizens, it also puts a tremendous financial burden on the country. More than 29.1 million people in the US suffer from diabetes, and diabetes costs us upwards of \$245 billion per year.

A major cost associated with diabetic medical care is lower-limb amputation. Diabetes can cause patients to lose sensation in their extremities, so an individual may not immediately notice injuries to his or her feet. This condition can cause diabetic ulcers—wounds on the feet that are slow to heal and prone to infection—which often require amputation. In 2013, about 73,000 Americans with diabetes needed amputations. The average cost for each amputation is over \$70,000.

“For those who have diabetes or are at risk for the disease, regular checkups by a podiatrist are one of the easiest ways to prevent most foot complications,” said American Podiatric Medical Association (APMA) President Frank Spinosa, DPM. “Including a podiatrist in your care can reduce amputation rates by as much as 85 percent.”

A study by APMA found that among patients with commercial insurance, each \$1 invested in care by a podiatrist results in \$27 to \$51 of savings for the health-care system. Among Medicare-eligible patients, each \$1 invested in care by a podiatrist results in \$9 to \$13 of savings.

“With proactive foot care, diabetes patients can reduce the risk of infection and amputation, improve function and quality of life and reduce health care costs,” Dr. Spinosa added.

To learn more, and to find a podiatrist in your area, visit www.apma.org.

View an [infographic](#) on the cost of diabetes nationwide.

The American Podiatric Medical Association (APMA) is the nation's leading professional organization for today's podiatrists. Doctors of Podiatric Medicine (DPMs) are qualified by their education, training, and experience to diagnose and treat conditions affecting the foot, ankle, and structures of the leg. APMA has 53 state component locations across the United States and its territories, with a membership of more than 12,000 podiatrists. All practicing APMA members are licensed by the state in which they practice podiatric medicine. For more information, visit www.apma.org.

Preventing Diabetes-Related Amputations

[Print](#)

Lower-limb amputations (LLA), which is surgery to remove a toe, foot, or leg, are increasing in the US, and 80% are a result of complications from diabetes. From 2009 to 2019, the number of diabetes-related hospitalizations due to amputation doubled.

But the good news is that most diabetes-related amputations can be prevented with lifestyle changes, blood sugar management, regular foot checks, and prompt wound care when needed.

How Diabetes Can Lead to an LLA

High blood sugar over time can cause diabetes complications that raise the chance of an LLA:

- **Peripheral arterial disease (PAD)** can narrow the blood vessels that carry blood to your legs and feet. Poor blood supply can make even a tiny cut heal slowly or not at all.
- **Peripheral nerve damage** can cause loss of sensation so you may not notice cuts, sores, or ulcers on your feet.



A small cut on the foot can become a serious infection that could require amputation if left untreated.

“Pain is the gift that nobody wants.” - Dr. Paul Brand



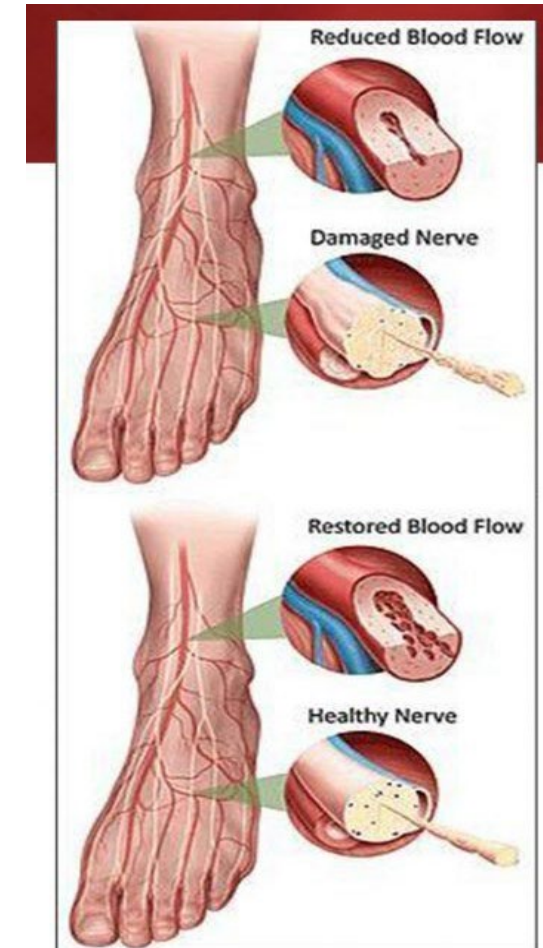
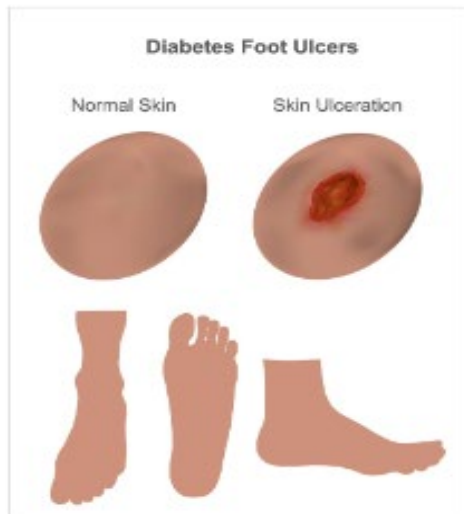
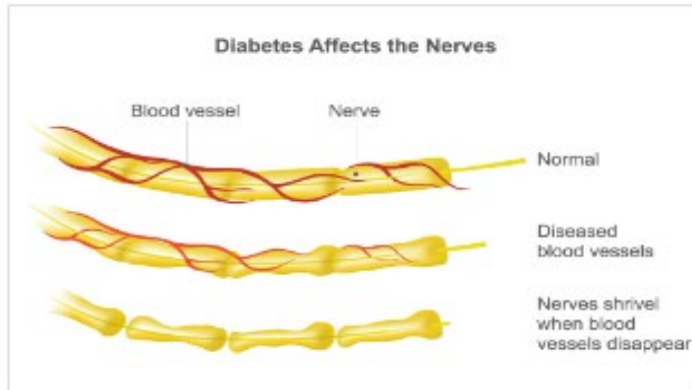
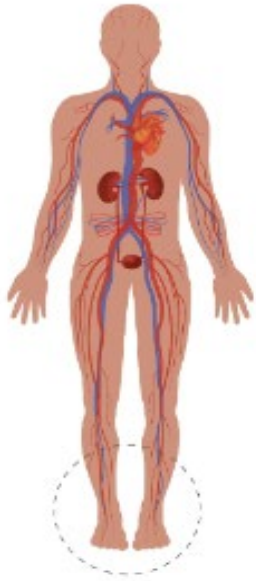
About **50% of patients with critical limb ischaemia (CLI)** the advanced stage of PAD associated with lower-extremity amputation and significant mortality, also have diabetes and they fare worse than non-diabetics.

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Diabetes Affects

(reduced blood flow and damaged nerve)



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The Risk of Subsequent Amputation Following An Initial Lower Extremity Amputation: A Systematic Review

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Comparative Study

Fate of the contralateral limb after lower extremity amputation

Julia D Glaser et al. J Vasc Surg. 2013 Dec.

[Free PMC article](#)

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Cite



Abstract

Objective: Lower extremity amputation is often performed in patients where both lower extremities are at risk due to peripheral arterial disease or diabetes, yet the proportion of patients who progress to amputation of their contralateral limb is not well defined. We sought to determine the rate of subsequent amputation on both the ipsilateral and contralateral lower extremities following initial amputation.

Risk of reamputation in diabetic patients stratified by limb and level of amputation: a 10-year observation.

[Diabetes Care. 2006; 29\(3\):566-70 \(ISSN: 0149-5992\)](#)

Izumi Y; Satterfield K; Lee S; Harkless LB



Commentary | [Open Access](#) | [Published: 24 March 2020](#)

Five year mortality and direct costs of care for people with diabetic foot complications are comparable to cancer

[David G. Armstrong](#) , [Mark A. Swerdlow](#), [Alexandria A. Armstrong](#), [Michael S. Conte](#), [William V. Padula](#) & [Sicco A. Bus](#)

Journal of Foot and Ankle Research **13**, Article number: 16 (2020) | [Cite this article](#)

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Abstract

Background

In 2007, we reported a summary of data comparing diabetic foot complications to cancer. The purpose of this brief report was to refresh this with the best available data as they currently exist. Since that time, more reports have emerged both on cancer mortality and mortality associated with diabetic foot ulcer (DFU), Charcot arthropathy, and diabetes-associated lower extremity amputation.

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THANK YOU!!!

