



PAIN RELIEF / PREVENTION

Understanding Peripheral Neuropathy

WHY ALTERNATIVE THERAPIES ARE FINALLY GETTING THE ATTENTION THEY DESERVE

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Peripheral neuropathy (PN) is a complex and poorly understood condition in which the body's peripheral nerves gradually deteriorate. Symptoms associated with this condition range from mild tingling and numbness to severe throbbing, stabbing and/or burning pain. Intense nerve pain affects as many as two-thirds of people afflicted with peripheral neuropathy and the symptoms are notoriously difficult to treat.

Unfortunately, peripheral neuropathy is surprisingly common, affecting 10% of middle-aged adults and nearly 40% of people over the age of 70.¹

While any peripheral nerve may be involved, the sensory nerves that go to the feet are the most prone to developing neuropathy. Part of the reason these nerves are preferentially targeted is because they are so long; a single nerve that goes to the bottom of the foot can be over 3 feet long, and the nerve's axon can be 20,000 times longer than the cell body.²

Because the cell body assists with nourishing and maintaining the axon, providing nutritional and metabolic support to such a long structure can be difficult under ideal conditions. The connection between nerve length and peripheral neuropathy is evidenced by the fact that tall people are significantly more likely to get neuropathy than their shorter peers.³

Some of the more common causes of this disease include various autoimmune disorders, alcoholism, kidney disease, exposure to toxins, vitamin deficiencies, and certain medications. Chemotherapy drugs are notorious for producing peripheral neuropathy.

While all of these conditions increase the risk of neuropathy, far and away the greatest risk factor for developing peripheral neuropathy is diabetes. An estimated 20 million Americans currently have diabetes-related neuropathy, and that number is expected to double as more Americans develop pre-and type 2 diabetes.⁴

According to Feldman, et al.,⁵ the neuropathic complications associated with diabetes places a tremendous burden not just on individuals affected, but also society as a whole. The authors emphasize that there is a pressing need to understand the cellular mechanisms responsible for the development of diabetic neuropathy in order to develop drugs that can effectively treat and prevent this disabling condition.

Unfortunately, despite 50 years of intense research, pharmacological interventions for peripheral neuropathy remain relatively ineffective.⁵

Exercise Interventions

Because pharmacological interventions have been unable to appreciably improve the quality of life for those suffering with peripheral neuropathy, researchers have begun focusing on alternative treatments, such as exercise,⁶ nerve glide stretches,⁷ vibration therapy,⁸ and nutrition.⁹ Of these interventions, exercise interventions have been studied most extensively.

In one of the first papers to evaluate the efficacy of exercises in the management of peripheral neuropathy, researchers from the University of Kansas had 17 peripheral neuropathy patients perform a 10-week program of aerobic and strengthening exercises.⁶ At the start and stop of the study, the authors evaluated pain levels using visual analog scales, performed nerve conduction velocities, and measured the density and branching patterns of cutaneous nerves located in skin taken from biopsies.

Participants performed light aerobic exercises on devices such as elliptical trainers and bicycles, and did a conventional strengthening protocol targeting all of the major muscle groups. The exercises were performed at a moderate intensity.

At the end of the 10-week study, the exercise group experienced significant reductions in pain and neuropathic symptoms, and they actually grew additional cutaneous nerve fibers following the intervention. This latter finding was consistent with prior research confirming that exercise can increase the number of sensory nerve fibers present in the skin,¹⁰ which is important, as the regeneration of cutaneous nerve fibers correlates with improved clinical outcomes.¹¹

The findings of these early research studies have been corroborated by more recent research confirming that exercise interventions can delay both the onset and progression of diabetes and diabetes-related peripheral neuropathies.¹²⁻²⁰ Exercise intervention has also been proven to be effective when managing chemotherapy-induced peripheral neuropathy.²¹⁻²²

One study found that just eight weeks of resistance and balance training produced statistically significant reductions in patient-reported pain, dynamic balance, range of motion, and quality of life in cancer survivors.²²

The positive effects of exercise have been related to improved glycemic control, increased blood flow, enhanced neurotrophic support and suppression of pro-inflammatory responses. According to Holmes, et al.,²³ a combination of aerobic and strength training gets the best results, and my favorite program is outlined in Figure 1.

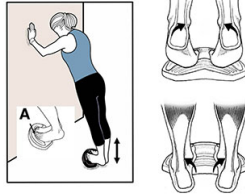
Figure 1. Peripheral neuropathy exercise routine.

WARM-UP EXERCISES: Choose between stationary or recumbent bike, elliptical or treadmill walking on incline. Start with 10 minutes and build up to 15-20 minutes.

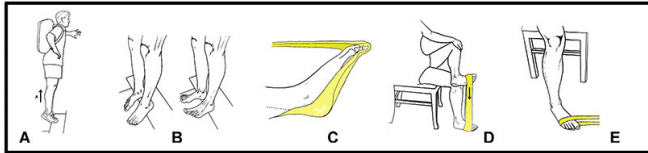
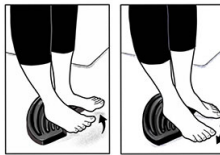
BALANCE EXERCISE: With shoes on, stand with one leg on foam pad with eyes open for 3 minutes. If difficult, consider wearing *Balance Buttons*. As balance improves, try closing eyes on occasion, making sure you're near a stable structure in case you lose balance.



TOEPRO EXERCISES: Place toes on front of *ToePro* and raise then lower heels while tilting your heels in and out (arrows). While raising heels, push down vigorously with your toes (A). Do 3 sets of 25 reps. If difficult, perform next to a table and push down with hands. As you get stronger consider holding a weight in one hand.



ANKLE DORSIFLEXION: Stand with heels behind top crest of *ToePro* with your forefeet on the floor. Do 2 sets of 15 reps raising and lowering your forefeet and toes. Build to 3 sets of 15 reps.



ALTERNATE TOEPRO EXERCISES: To strengthen your feet without using a *ToePro*, do 2 sets of 15 reps of each of the above exercises. A) Heel raises on stair. B) Toe raises on stair. C) Toe pushdowns with elastic band. D) Invertor elastic band exercise and E) Everton exercise. To increase resistance, add weight with stair exercises and/or switch to heavier resistance band.

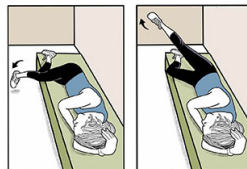
HIP AND KNEE EXTENSORS: Stand on a 4-inch step and do a curtsy step-up while holding onto a wall. Start with 2 sets of 15 reps on each leg. As you get stronger, increase to 3 sets of 15 reps while holding onto a weight.



HAMSTRINGS: While holding onto wall for support, pivot forward at the hip while standing on one leg. Do 2 sets of 15 reps and maintain a straight spine while performing these exercises. Progress to 3 sets of 15 reps while holding a weight.



HIP ABDUCTORS: Lie on your side with your top leg hanging off of a workout bench (or any soft surface) with your toes pointing down. Raise your foot towards the ceiling while rotating your leg so your toes point up slightly. Do 2 sets of 15 reps on each leg, gradually building up to 2 sets of 25 repetitions.



ANKLE INVERTORS/EVERTORS: Place a 2:1 *Rockboard* near a wall with your foot positioned over the abrasive strip so that your arch points towards the long side of the board (A). While keeping your hip and knee straight, use your ankle to rotate the rockboard so the edges touch the ground on all sides. Do 30 clockwise rotations with your left foot and 30 counterclockwise rotations with your right foot. Repeat this 2 times. Gradually build up to 3 sets of 30 reps on each foot.



ALTERNATE EXERCISES FOR THE 2:1 ROCKBOARD: If you do not have a rockboard, just stand with your feet separated slightly with an elastic band wrapped around your knees. In this position, raise and lower your arches as far as possible (A and B). Do 2 sets of 15 repetitions and gradually build to 3 sets of 15 reps.

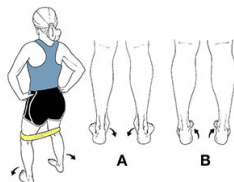


FIG 1 The Peripheral Neuropathy Exercise Routine. These exercises can be done on a slant board, a ToePro or similar exercise platform, and/or with elastic resistance bands.

In addition to exercise, gentle nerve glide stretches have also been shown to improve nerve function in people with neuropathy. Performing range-of-motion and specific nerve glide stretches just 3 times daily for 10 minutes appreciably reduced nerve pain while improving strength and sensation in patients suffering from chemotherapy-induced peripheral neuropathy.²⁴ (Figure 2)



FIG 2 Common Nerve Glide Techniques. Alternating movements of the head and extremities move the long peripheral nerves back and forth, stretching adhesions between nerve fibers and neighboring connective tissues. Nerve glides also improve the flow of nutrients through the nerves' axons. A series of nerve glides that effectively improve function in the upper extremity are described by Hammond, et al.²⁴

The authors claim that nerve glide exercises improve nerve function by decreasing neural edema as stretching the nerve enhances axoplasmic flow. Other authors speculate that nerve glide techniques work because they loosen adhesions that restrict proper nerve motion.

Regardless of the mechanisms, gently moving peripheral nerves back and forth can reduce pain and improve function. In fact, many of the exercises in the peripheral neuropathy strengthening program were included because they mobilize branches of the sciatic nerve, such as the tibial and superficial peroneal nerves, which are the longest nerves in the body and are almost always affected by peripheral neuropathy.

Clinical Pearls

Given the diverse mechanisms responsible for the development of peripheral neuropathy, it is clear

that alternative interventions can play a pivotal role in the management of this complex and often painful condition. Unlike many pharmacological interventions, alternative interventions such as exercise and nerve glide mobilizations are safe, effective, and inexpensive. Research shows these techniques can reduce pain, enhance balance, and improve the overall quality of life for those afflicted with this painful condition.

People dealing with this difficult condition deserve efficacious alternate treatment approaches, because according to Feldman, et al.,⁵ “All clinical trials aimed at altering the progressive course of diabetic neuropathy have failed.” The authors go on to state: “Large pharma has now walked away from diabetic neuropathy as a result of our lack of a basic understanding of the disease, whereas the enormity of the problem has reached epidemic proportions. The societal costs are only dwarfed by the individual cost to each patient that include pain and inability to work along with poor quality of life.”

Given that these statements come from some of the world’s leading experts on pharmacological management of peripheral neuropathy, it’s time to start focusing on alternative therapies, particularly exercises, stretches, and nutritional interventions.

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