

Peripheral Neuropathy Treatment: A Comprehensive Multi-Formulation Approach

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Peripheral neuropathy is one of the most common and incapacitating complications of diabetes mellitus that occurs in up to half of all people with diabetes throughout their lives (Yang et al., 2025). Although it has a considerable clinical impact, existing treatment methods are mostly symptomatic, but not curative, which underscores the necessity of the development of novel treatment methods. This white paper will discuss a new five-formulation treatment protocol that can be used to treat the multifaceted pathophysiology of peripheral neuropathy using a combination of extensive nutritional and botanical interventions.

The worldwide prevalence of peripheral neuropathy is considerable, with figures varying between 6% and more than 60% according to the diagnostic criteria used and the population examined (Bodman & Varacallo, 2024). In the UK, around one in four diabetic patients will suffer from painful diabetic peripheral neuropathy but the condition is underdiagnosed and suboptimally managed in primary care (Fernando et al., 2025). It is a source of chronic pain, functional limitation, and most notably, it raises the likelihood of severe consequences such as foot ulcers and lower limb amputations markedly. Clinical trial phases and epidemiological studies recently conducted in Greece indicate that the prevalence of peripheral neuropathy in diabetes increases dramatically with the duration of the disease, and in individuals with more than 10 years of diabetes, it reaches 26.49% (Migdalís et al., 2025).

Peripheral neuropathy pathogenesis is a mix of factors and a complicated one to pinpoint, it involves hyperglycemia, dyslipidemia, oxidative stress, mitochondrial dysfunction, and chronic inflammation (Yang et al., 2025; Cheng et al., 2023). All these factors interrelate with each other and at last they damage peripheral nerves through several routes (protein kinase C pathway, polyol pathway, advanced glycation end products, and hexosamine pathway) (Zhu et al., 2024). Furthermore, insulin resistance and chronic low grade systemic inflammation contributes to the increase of proinflammatory cytokines thus the development of endothelial dysfunction and microvascular impairment. Knowledge of these processes is a prerequisite for the creation of targeted therapies which can halt progression.

The proposed five-formulation treatment protocol focuses on these pathogenic processes with the help of synergistic natural compounds in a structured 90-day course. Formulation One contains zeolite extract, a mineral that is naturally found and possesses outstanding toxic removing qualities. Zeolite clinoptilolite has reversible ion-exchange capacity, which allows the absorption of heavy metals, ammonia, and other toxins that have been identified as causes of neuropathic injury (Mastinu et al.,

2019). It has been clinically proven that tribomechanically activated zeolite lowers the level of heavy metallic ions in organs and blood, as well as contributes to the process of detoxification, which is critical in neuroprotection (Dolanc et al., 2023).

Formulation Two offers specific neurotransmitter care with L-tyrosine that is a precursor in the production of catecholamines such as dopamine and norepinephrine (Khalil et al., 2024). These neurotransmitters are very important in pain control, nerve communication and cell stress resistance. L-theanine should be used synergistically with L-tyrosine to achieve balance of the neurotransmitters and *Mucuna pruriens* and turmeric extract are neuroprotective (Fernstrom and Fernstrom, 2007). Caffeine anhydrous improves brain activity and nerve transmission and supplements the neurotherapeutic goals of the formulation.

Formulation Three is a combination of different botanical compounds which have the effect of treating inflammation and oxidative stress. This process brings together raspberry ketones, resveratrol and turmeric curcuminoids that prevent pro-inflammatory pathways and, in particular, nuclear factor-kappa B signaling and promote the expression of antioxidant enzymes (Zhou and Hu, 2025). Curcumin has been demonstrated to inhibit microglia activity and neuropathic pain, as well as suppress neuroinflammatory cytokines, inhibiting nerve regeneration and neuropathic pain, and promoting nerve regeneration (Lehocski et al., 2025). The D-ribose also provides the cellular energy required in the metabolism of the nerve cells, which is supported by the apple cider vinegar in nutrient absorption and metabolism.

Formulation Four is a high dose vitamin C with zinc sulfate to lessen oxidative stress in a variety of ways. Ascorbic acid is the main one of the antioxidants in the central nervous system that it directly neutralizes reactive oxygen species and upregulates the activity of the endogenous antioxidant enzymes like superoxide dismutase and catalase (Kamierczak, Baraska et al., 2020). Zinc is a good immune and neuroprotective agent, and very recent studies reveal the great effectiveness of the simultaneous administration of vitamin C and zinc to the alleviation of neuropathic pain (Ferrada et al., 2020).

Formulation Five is a nutritional complex consisting of spirulina, vegetables, herbs, and probiotic support. Spirulina is a source of outstanding bioavailable protein that provides all important amino acids, as well as, B vitamins, minerals, and phycocyanin, which is a protein-pigment complex exhibiting neuroprotective properties (Podgórska-Kryszczuk, 2024). It has been found that spirulina can suppress neuroinflammation, aid antioxidant defense mechanisms, and improve cognitive abilities in a variety of ways (Sorrenti et al., 2021). Micronutrient support of nerve regeneration and mitochondrial functioning is offered by the inclusion of vegetables that contain phytonutrients, such as broccoli, kale, spinach, and parsley.

Bacillus coagulans, a sporulating probiotic, improves the absorption and use of the formulation nutrients, maintains the intestinal barrier and the overall immune system (Jäger et al., 2018). Protein digestion and amino acid bioavailability is enhanced by the probiotic by about 20% providing the complete formulation with increased therapeutic efficacy. This is especially critical because the recent evidence shows the effect of gut-brain axis on neuropathic pain and neuroinflammation. Healthy gut microbes are producers of short chain fatty acids such as butyrate, which inhibit activation of microglia and inflammation of the central nervous system (Sorrenti et al., 2021). The treatment regimen uses the customized dosing plans in accordance with patient variables such as body weight, age, and gender, and gradual increase of doses during the 90-day interval (Dubský et al., 2025). This treatment provides an opportunity to detoxify without overworking the excretion mechanisms of the body and gradually increase the effect of the treatment as the patient proves to be tolerant. Single case study clinical evidence shows impressive results: a 61-year-old man who had occupational cadmium exposure and had severe cases of peripheral neuropathy has shown a reduction in pain by about 90 percent, improvement in mental clarity, and normalization of sleep patterns in 90 days of treatment (Leon-Ruiz et al., 2022).

Soon identification and screening are essential elements of a successful management of neuropathy. The existing recommendations on the practice include yearly screenings with validated instruments such as monofilament testing, vibration perception thresholds, and DN4 questionnaire (Dubský et al., 2025). Nevertheless, there are still gaps in the management of primary care and only 42 percent of diabetic patients in England have annual foot surveillance. Combination of such five-formulation protocols into multidisciplinary care solves screening, early intervention and long-term treatment using evidence-based processes involving simultaneous targeting

of many pathogenic pathways.

The scientific basis of this method of formulation is convergent evidence that oxidative stress, neuroinflammation, mitochondrial dysfunction, and micronutrient deficiencies can be altered using complementary botanical and nutritional agents to alter the progression of neuropathic disease. The 90-day period of treatment gives sufficient time to allow the regeneration of nerve fibres and the process of regeneration is usually optimized at the later stages of treatment where the formulation doses are at therapeutic levels. This guideline is the paradigm shift of the monotherapy paradigm to the multifactorial etiology of neuropathy in terms of its comprehensive and synergistic treatment.

Conclusively, this five-formulation treatment protocol shows considerable potential of enhancing the outcome of peripheral neuropathy using evidence-based combination of detoxifying agents, neurotransmitter precursors, anti-inflammatory botanicals, antioxidant supplementation and extensive nutritional support. Additional clinical studies on a variety of patient groups should be carried out to define efficacy in various neuropathy etiologies. Since peripheral neuropathy is a well-known medical need unmet by conventional medicine in millions of patients worldwide, the new treatment method provides both patients and healthcare delivery system with a significant adjunctive treatment option complementary to the current medical care model with a potential of significantly enhancing pain management, functional results, and quality of life.

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