

Key Features:

- Pyrroloquinoline quinone (PQQ)** facilitates nerve regeneration and acts as a neuro-protectant via its antioxidant and mitochondrial biogenesis effects
- Active forms of vitamins B2/6/12 and 5-MTHF** support methylation and promote neurotransmitter metabolism
- Benfotiamine** improves nerve conduction in the treatment of diabetic neuropathy, and blocks the production of advanced glycation end-products (AGEs)
- Contains **R-alpha lipoic acid**, which provides additional antioxidant effects and protects mitochondria from damage
- Phosphatidylserine** has been shown to enhance memory and cognitive function in elderly patients ¹³

Description:

Neuromin is a comprehensive formula to support nerve regeneration and repair and prevent cognitive decline. Working via various mechanisms to protect neurons from damage with aging and restore function in various disease processes.

Pyrroloquinoline quinone (PQQ)

Mitochondrial Biogenesis

Pyrroloquinoline quinone (PQQ) has long been known to enhance mitochondrial function, as researchers found that animals fed a PQQ-deficient diet had reduced mitochondrial content, and as a result grew poorly and failed to reproduce.^{1,2} PQQ was later found to directly stimulate mitochondrial biogenesis in humans, and supplementation results in significant decrease in inflammatory markers such as CRP and IL-6.³ In a recent open-label trial, **PQQ supplementation led to significant improvements in stress, fatigue, sleep and quality of life in patients suffering from sleep disorders or fatigue.**¹⁰

Nerve Regeneration

PQQ facilitates nerve regeneration by enhancement of nerve growth factor. Japanese researchers found PQQ promoted nerve growth factor growth by 40-fold compared with controls.⁴ In animal models of sciatic-nerve deficit, PQQ produced more mature and high-density regenerated nerve cells,⁵ suggesting that PQQ is a potent enhancer for regeneration of peripheral nerves and could be an effective treatment for peripheral neuropathy and other forms of nerve damage.

Protection from Ischemic Injury

PQQ has a protective effect in ischemic damage such as from stroke. In animal models of stroke, PQQ was able to enhance mitochondrial respiratory ratios in both ischemic and non-ischaemic myocardium. PQQ also showed better protection of mitochondria from ischemia/ reperfusion oxidative damage as compared with

Quantity: 56 Vegetarian Capsules

Ingredients (per capsule):

Pyrroloquinoline quinone (BioPQQ®).....	5 mg
Coenzyme Q10 (ubiquinone) (KanekaQ10®).....	37.5 mg
R-alpha-lipoic acid (sodium salt) (stabilized).....	75 mg
Benfotiamine.....	35 mg
5-MTHF (from calcium 5-methyltetrahydrofolate).....	100 mcg
Niacinamide.....	25 mg
Vitamin B2 (from sodium riboflavin-5'-phosphate).....	5 mg
Vitamin B6 (pyridoxal 5'-phosphate).....	5 mg
Vitamin B12 (methylcobalamin).....	100 mcg
Mixed Phospholipids (<i>Glycine max</i>) (seed).....	50 mg (phosphatidylserine, phosphatidylcholine, phosphatidylinositol, phosphatidylethanolamine)

Non-medicinal Ingredients: Silicon dioxide, L-Leucine, pullulan/ hypromellose (capsule)

Suggested Use: Adults - Take 2 capsules, 2 times per day, or as directed by your health care practitioner. Use for a minimum of 3 months to see beneficial effects. For prolonged use over 24 weeks, consult a health care practitioner.

the commonly used beta-blocker metoprolol.⁶

Neuro-Protectant

PQQ has been shown to play a role as an antioxidant in neuronal cells and to prevent neuronal cell death in animal models. PQQ also protects against the neurotoxicity of aggregated beta-amyloid,⁸ **suggesting a possible role in the prevention and treatment of amyloid-associated diseases such as Alzheimer's and Parkinsons.** PQQ is far more stable than most other antioxidants and can carry out more redox cycling reactions as a result of this. For example, **PQQ can undergo up to 20,000 redox cycles, compared to 800 for quercetin and 700 for epicatechin.**

PQQ + CoQ10

PQQ alone has been found to improve memory and attention, and studies have shown that the benefits of are further enhanced by the addition of CoQ10. A randomized, double-blind study released in 2009 looked at the effect of PQQ and CoQ10 supplementation over a 3 month period on 71 middle aged individuals. What they found is that memory, attention, and cognition improved in individuals supplementing with PQQ and this effect was enhanced even more when taking both PQQ and CoQ10 together.⁷



Active Forms of B-Vitamins, Methylation and MTHFR Deficiency

Methylation is one of the most important biochemical reactions in our nervous system. Proper methylation of DNA is vital for healthy neural development and differentiation. Methylation also yields key metabolites, such as tetrahydrobiopterin-4, that are used in various neurotransmitter syntheses (eg. serotonin, epinephrine).¹⁹

One of the leading causes of “undermethylation” is the deficiency of methylenetetrahydrofolate reductase (MTHFR), which is a rate-limiting enzyme that converts folate into the active 5-methyltetrahydrofolate (5-MTHF). 5-MTHF plays a pivotal role in homocysteine metabolism of the methylation cycle. **Common symptoms of MTHFR deficiency may include insomnia, fatigue, depression, anxiety, and pain (eg. fibromyalgia).**

Neuromin provides bioactive forms of B-vitamins involved in the methylation pathway, such as **pyridoxal-5-phosphate, riboflavin-5-phosphate, 5-MTHF, and methylcobalamin**, to help treat individuals with MTHFR deficiency and promote healthy neurotransmitter synthesis.

Benfotiamine

Benfotiamine is a lipid-soluble derivative of thiamine (vitamin B1) that is absorbed much faster than water-soluble thiamine salt. It is quickly **metabolized into thiamine pyrophosphate (TPP) - the active form - to exert physiological effects in the body.**

Neuropathy

Benfotiamine has been shown to be effective in the treatment of neuropathy. It does so mainly by blocking multiple destructive biochemical pathways, such as the production of advanced glycation end-products (AGEs).⁹ Benfotiamine also demonstrates direct antioxidant activity in vitro,¹⁶ and has been shown to prevent hyperglycemia-induced endothelial dysfunction following meals in diabetic patients.¹⁴ Numerous animal and human trials have shown benfotiamine to be effective in reducing neuropathic pain.^{17,18}

Benfotiamine Combinations

Benfotiamine has been shown to have additive effects with other nutrients in a number of studies. In one RCT, benfotiamine combined with folate and B12 resulted in significant improvement in nerve conduction velocity and is efficacious in the treatment of diabetic neuropathy.¹² Another study showed that benfotiamine combined with R-alpha lipoic acid improved pathways causing complications in type 1 diabetes.¹⁵

Mixed phospholipids (ie. phosphatidyl-choline/ serine/ inositol/ ethanolamine) are important components in the synthesis of sphingomyelins, which are essential in myelin sheath regeneration

in neuro-degenerative diseases, such as multiple sclerosis and Guillain-Barre syndrome.

Reference:

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