

Energy+

CoQ10, NADH & B12



INGREDIENTS

Coenzyme Q10 (CoQ10)

Coenzyme Q10 is a vitamin-like nutrient central to energy production at the cellular level, essential for generating metabolic energy in the form of ATP. Coenzyme Q10 levels decrease with age, a factor that may contribute to the aging process.* Since food content of CoQ10 can be very low, many healthcare providers recommend supplementing with Coenzyme Q10.

NADH stands for nicotinamide adenine dinucleotide (NAD) + hydrogen (H).

Nicotinamide adenine dinucleotide exists in two forms: an oxidized and reduced form abbreviated as NAD⁺ and NADH respectively. NADH occurs naturally in the body and plays a role in generating energy. Because of its role in energy production, NADH is used for improving athletic performance and for help with fatigue. NADH is also used for improving mental clarity, alertness, concentration, and mood.

Vitamin B-12 (cobalamin)

Vitamin B-12 is a water-soluble vitamin that plays essential roles in red blood cell formation, cell metabolism, nerve function and DNA production. Humans cannot make Vitamin B-12 so we must get it through diet or supplementation. Food sources of vitamin B-12 include poultry, meat, fish and dairy products. Vitamin B-12 is also added to some foods and is available as an oral supplement. Older adults, vegans, vegetarians and people with digestive tract conditions that affect absorption of nutrients are susceptible to vitamin B-12 deficiency. Left untreated, a vitamin B-12 deficiency can lead to anemia, fatigue, muscle weakness, intestinal problems, nerve damage and mood disturbances.

BENEFITS

Supports

- Energy production and stamina.*¹⁻¹²
- Healthy metabolic function.*¹⁻¹²
- A balanced mood.*^{1-3,13-17}

EXTENDED BENEFITS

Coenzyme Q10 (CoQ10) is an endogenous lipid-soluble benzoquinone compound that functions as a diffusible electron carrier in the electron transport chain. It is prevalent in all human tissues and organs, though

it is mainly biosynthesized and concentrated in tissues with high energy turnover. Loss of function in mitochondria, the key organelle responsible for cellular energy production, can result in excess fatigue and other symptoms that are common complaints in almost every chronic disease. At the molecular level, a reduction in mitochondrial function occurs because of the following changes: (1) a loss of maintenance of the electrical and chemical transmembrane potential of the inner mitochondrial membrane, (2) alterations in the function of the electron transport chain, or (3) a reduction in the transport of critical metabolites into mitochondria. In turn, these changes result in reduced efficiency of oxidative phosphorylation and a reduction in adenosine-5'-triphosphate (ATP) production. Several components of this system require routine replacement, which can be facilitated with natural supplements. Clinical trials have shown the utility of using oral replacement supplements, such as coenzyme Q10 (CoQ10 [ubiquinone]), reduced nicotinamide adenine dinucleotide (NADH) and other supplements. Combinations of these supplements can significantly reduce fatigue and other symptoms associated with chronic disease and can naturally restore mitochondrial function, even in long-term patients with intractable fatigue.¹

NADH is vital for many human body processes including muscle energy production. Skeletal muscle enables posture, breathing, and locomotion. Skeletal muscle also impacts systemic processes such as metabolism, thermoregulation, and immunity. Skeletal muscle is energetically expensive and is a major consumer of glucose and fatty acids. Metabolism of fatty acids and glucose requires NADH, which functions as a hydrogen/electron transfer molecule. Therefore, NADH plays a vital role in energy production. In addition, NADH also functions as a cosubstrate for post-

Supplement Facts

Serving Size 1 Veggie Capsule
Servings Per Container 60

	Amount Per Serving	% Daily Value
Vitamin B12 (as methylcobalamin)	1000 mcg	41,667%
Coenzyme Q10 (Ubiquinone)	200 mg	†
NADH (from reduced β-nicotinamide adenine dinucleotide disodium salt)	20 mg	†

† Daily Value not established.

Other Ingredients: Rice flour, hypromellose (vegetarian capsule), rice hull concentrate, magnesium stearate (vegetable source).

Suggested Adult Use: Take 1 capsule daily or as recommended by a nutritionally informed physician.

WARNING: Do not take if pregnant or nursing. Consult your physician before using this product if you are under medical supervision, taking prescription medication, or suffer from a serious medical condition.

USP Verified, Naturally Fermented CoQ10

Non-GMO / Gluten Free / Soy Free / Vegan

Store in a cool dry place.

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translational modifications such as deacetylation and ADP-ribosylation. Therefore, NADH levels influence a myriad of cellular processes including mitochondrial biogenesis, transcription, and organization of the extracellular matrix. Clearly, NADH is a major player in skeletal muscle development, regeneration, aging, and disease. The vast majority of studies indicate that lower NADH levels are deleterious for muscle health and energy and higher NADH levels augment muscle health and energy.²

Biosynthesis of Vitamin B-12, involving up to 30 different enzyme-mediated steps, only occurs in bacteria. Thus, most eukaryotes, including humans, require an external source of B-12. Vitamin B-12 appears to have two main functions in humans: as a cofactor for the enzymes methionine synthase and methylmalonylCoA mutase. Yet, these two functions are critical for normal health in humans, and in particular, the formation of methionine is essential in providing methyl groups for over 100 methylation processes. Interference with the methionine synthase reaction not only depletes the body of methyl groups but also leads to homocysteine accumulation, a risk factor for many diseases. The syndrome pernicious anemia, characterized by lack of intrinsic factor, leads to a severe, sometimes fatal form of B-12 deficiency. However, there is no sharp cutoff for B-12 deficiency; rather, there is a continuous inverse relationship between serum B-12 and a variety of undesirable outcomes, including neural tube defects, stroke, dementia and fatigue. The brain is particularly vulnerable, inadequate B-12 can stunt brain and intellectual development and affect mood. Suboptimal B-12 status (serum B-12 < 300 pmol/L) is very common, occurring in 30%-60% of the population, in particular in pregnant women, vegans and vegetarians. Tens of millions of people in the world may suffer harm from having a poor B12 status. Supplementing with Vitamin B12 can help improve B12 status.^{3,4}

CLINICAL STUDIES

Several studies show that the ingredients in Energy+ promote healthy energy and reduce fatigue*

A meta-analysis of 13 clinical trials examined the influence and effects of CoQ10 supplementation on parameters related to exercise in healthy humans. An exhaustive literature search yielded 372 citations. Finally, 13 studies met all the inclusion criteria and were incorporated in the review. The studies showed that CoQ10 has properties related to bioenergetic and antioxidant activity. Moreover, the studies found that CoQ10 is intimately involved in energy production and prevention of peroxidative damage to membrane phospholipids and of free radical-induced oxidation. The researchers concluded that these properties make CoQ10 suitable as a dietary supplement to improve cellular bioenergetics and to inhibit certain age-related pathologies.⁵

Similarly, a clinical trial attempted to determine the effects of oral coenzyme Q10 (CoQ10) supplementation on performance during repeated bouts of supramaximal exercise. The randomized, double-blind, crossover study was composed of two 8-week periods of supplementation with either 100 mg per day CoQ10 or placebo. Fifteen healthy and sedentary men participated in the study. Five Wingate tests (WTs) with 75 g.kg (-1) body weight load with 2-minute intervals between tests were performed 3 times at baseline, after CoQ10, or placebo supplementation during the study period. Peak power (PP), mean power (MP), and fatigue index were calculated. The researchers concluded that CoQ10 shows performance-enhancing effects during repeated bouts of supramaximal exercises and CoQ10 might be used as an ergogenic aid (i.e., to enhance physical performance, stamina, and/or recovery).⁶

Another clinical trial evaluated the effects of a finished form of CoQ10 at a dose of 200 mg x 2/day in 22 female subjects with a diagnosis of fibromyalgia in a randomized, open-label, cross-over study. The results showed that, compared to a control group, administration of CoQ10 significantly improved fatigue (by ~22%) and sleep disturbance (by ~33%). The researchers conclude that their results confirm the considerable role played by CoQ10 in reducing fatigue, and sleep disturbance in subjects affected by fibromyalgia.⁷

A separate randomized, double-blind, placebo-controlled trial evaluated clinical and gene expression effects from forty days of CoQ10 supplementation (300 mg/day) on 20 fibromyalgia (FM) patients. An important clinical improvement was evident after CoQ10 versus placebo treatment, showing a reduction of fatigue and morning tiredness. Furthermore, the researchers observed mitochondrial biogenesis and AMPK gene expression levels associated with phosphorylation of AMPK activity. The researchers concluded that their results indicate CoQ10 has

potential therapeutic effects.⁸

To evaluate the role of oxidative stress in fibromyalgia (FM), researchers measured plasma levels of ubiquinol-10 and ubiquinol-10 in patients with juvenile FM (n=10) and in healthy control subjects (n=67). The plasma ubiquinol-10 level was significantly decreased and the ratio of ubiquinol-10 to total coenzyme Q10 (%CoQ10) was significantly increased in juvenile FM relative to healthy controls, suggesting that FM is associated with coenzyme Q10 deficiency and increased oxidative stress. The researchers examined the effect of ubiquinol-10 supplementation (100 mg/day for 12 weeks) in FM patients. This resulted in increased coenzyme Q10 levels and a decrease in %CoQ10. Importantly, ubiquinol-10 supplementation improved chronic fatigue scores as measured by the Chalder Fatigue Scale.⁹

Other researchers reviewed the evidence for nutritional interventions that may assist in alleviating symptoms of chronic fatigue syndrome/myalgic encephalomyelitis (CFS/ME). The scientists searched Medline, Cinahl and Scopus systematically from 1994 to May 2016. All studies on nutrition intervention were included where CFS/ME patients modified their diet or supplemented their habitual diet on patient-centered outcomes (fatigue, quality of life, physical activity and/or psychological well-being). Seventeen studies were included that met the inclusion criteria. Of these, 14 different interventions were investigated on study outcomes. The researchers found that improvements in fatigue were observed for nicotinamide adenine dinucleotide hydride (NADH) and a combination of NADH and coenzyme Q10.¹⁰

Another clinical trial assessed the effects of CoQ10 plus NADH supplementation on age-predicted maximum heart rate (max HR) during a cycle ergometer test. Secondary measures included fatigue, pain and sleep. A proof-of-concept, 8-week, randomized, controlled, double-blind trial was conducted in 80 chronic fatigue syndrome (CFS) patients assigned to receive either CoQ10 plus NADH supplementation or matching placebo twice daily. Maximum HR was evaluated at baseline and at end of the run-in period using an exercise test. Fatigue, pain and sleep were evaluated at baseline, and reassessed at 4- and 8-weeks through self-reported questionnaires. The researchers concluded that CoQ10 plus NADH supplementation for 8 weeks is safe and potentially effective in reducing max HR during a cycle ergometer test and on fatigue in CFS.¹¹

A similar, separate study utilized an 8-week, randomized, double-blind placebo-controlled trial to evaluate the benefits of oral CoQ10 (200 mg/day) plus NADH (20 mg/day) supplementation on fatigue and biochemical parameters in 73 Spanish chronic fatigue syndrome (CFS) patients. The researchers concluded that oral CoQ10 plus NADH supplementation could confer potential therapeutic benefits on fatigue and biochemical parameters in CFS.¹²

Many studies demonstrate the ingredients in Energy+ promote healthy mood*

There is now evidence that major depression is accompanied by inflammatory and oxidative and nitrosative stress (IO&NS) pathways and by a lowered antioxidant status. Coenzyme Q10 (CoQ10) is a strong antioxidant. One study examined plasma concentrations of CoQ10 in 35 depressed patients and 22 normal volunteers and the relationships between plasma CoQ10 and treatment resistant depression (TRD), and the presence of chronic fatigue syndrome (CFS). The researchers found plasma CoQ10 was significantly lower in depressed patients than normal controls. The results show that lower CoQ10 plays a role in the pathophysiology of depression and in TRD and CFS accompanying depression. The authors conclude that depressed patients may benefit from CoQ10 supplementation.¹³

Another clinical trial investigated the effects of coenzyme Q10 (CoQ10) supplementation on fatigue and depression in patients with MS. Researchers performed a randomized, double-blinded, placebo-controlled trial to determine the effect of CoQ10 supplement (500 mg/

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day) vs. placebo for 12 weeks. Fatigue symptoms were quantified by means of fatigue severity scale (FSS) and the Beck depression inventory (BDI) was used to assess depressive symptoms. The study concluded that CoQ10 supplementation (500 mg/day) can improve fatigue and depression in patients with multiple sclerosis.¹⁴

Given the known relationships between white matter lesions and depression and between depression and fatigue after stroke, researchers studied both depression and fatigue in lacunar stroke patients with and without vitamin B12 deficiency. In 40 first-ever lacunar stroke patients, vitamin B12 levels were determined and self-report questionnaires for fatigue and depression were completed three months after stroke. The researchers concluded that their results suggest a relationship between vitamin B12 deficiency and increased levels of fatigue and depression in lacunar stroke patients.¹⁵

Vitamin B12 and homocysteine have long been implicated in mental illness, and growing evidence suggests that they may play a role in positive mental health. Elucidation of these relationships is confounded due to the dependence of homocysteine on available levels of vitamin B12 and folate. Therefore, cross-sectional and longitudinal relationships between vitamin B12, folate, homocysteine and subjective well-being were assessed in a sample of 391 older, community-living adults without clinically-diagnosed depression. Levels of vitamin B12, but not folate, influenced homocysteine levels 18 months later. Vitamin B12, folate and their interaction significantly predicted levels of positive affect (PA) 18 months later but had no impact on the levels of negative affect or life satisfaction. Cross-sectional relationships between homocysteine and PA were completely attenuated in the longitudinal analyses, suggesting that the cross-sectional relationship is driven by the dependence of homocysteine on vitamin B12 and folate. This is the first study to offer some evidence of a causal link between levels of folate and vitamin B12 on PA in a large, non-clinical population.¹⁶

Another group of researchers investigated whether different intake levels of folate, vitamin B6 and B12 were associated with a 3-year depression incidence among generally healthy, community-dwelling older men and women. Participants free of depression (30-item Geriatric Depression Scale (GDS) <11) at baseline (N=1368; 74 ± 4 years old; 50.5% women), were screened annually for incident depression (GDS ≥ 11) or antidepressant medication. Tertiles of intakes (food only and food-supplements) were obtained from the mean of three non-consecutive 24-h recalls at baseline. Gender-stratified multiple logistic regression models were adjusted for age, physical activity, physical functioning, stressful life events and total energy intake. The researchers concluded that their study provides some evidence of decreased depression risk among men with higher intakes of B12 from food.¹⁷

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