

Liquid B12 SAP

Science-based liquid B12 for optimal health

Liquid B12 SAP provides the essential water-soluble vitamin B₁₂ in its highly bioavailable methylcobalamin form for improved absorption and efficacy.* Methylcobalamin is crucial for carbohydrate, lipid, and protein metabolism as well as DNA biosynthesis.* Methylcobalamin supports healthy red blood cells and nervous system.* It is also required for maintaining optimal homocysteine levels for supporting cardiovascular health and improving symptoms associated with diabetic neuropathy.* Methylcobalamin could be very valuable in managing sleep-cycle disturbances and recurrent aphthous stomatitis as well as maintenance of health in vegetarians with low B₁₂ status.* Besides, methylcobalamin, being a methyl donor, is critical in enzyme reactions involving methylation and aids in the body's methylation-dependent detoxification process.* **Liquid B12 SAP** can help foster optimal metabolism, support neurological and cardiovascular health, and improve sleep quality.*

SUPPLEMENT FACTS

Serving Size: 6 Drops

Servings Per Container: 291

	Amount Per Serving	% Daily Value
Vitamin B ₁₂ (from methylcobalamin)	1000 mcg	41667%

This product is non-GMO.

Other ingredients: Glycerin, ethanol, and purified water.

Contains no: Gluten, soy, wheat, corn, eggs, dairy, yeast, citrus, preservatives, artificial flavor or color, or starch.

Liquid B12 SAP contains 50 mL.

DIRECTIONS FOR USE

Adults: Take 6 drops daily or as directed by your healthcare practitioner.

INDICATIONS

Liquid B12 SAP can:

- Help support neurological health.*
- Be used to maintain healthy homocysteine levels.*
- Be used to enhance sleep quality.*
- Help manage symptoms associated with diabetic neuropathy.*
- Help maintain optimal methylation and enhance detoxification.*
- Be used to manage recurrent aphthous stomatitis.*

CAUTIONS AND WARNINGS

Consult a health-care practitioner prior to use if you are pregnant or breast-feeding.

PURITY, CLEANLINESS AND STABILITY

All ingredients listed for each **Liquid B12 SAP** lot number have been tested by an ISO 17025-accredited third-party laboratory for identity, potency, and purity.

*** These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease.**

Scientific Advisory Panel (SAP):
adding nutraceutical research
to achieve optimum health



351, Rue Joseph-Carrier, Vaudreuil-Dorion, Quebec, J7V 5V5
T 1 866 510 3123 • F 1 866 510 3130 • www.nfh.ca

VITAMIN B₁₂

Vitamin B₁₂ is an essential water-soluble vitamin that is commonly found in a variety of foods such as fish, shellfish, meat, and dairy products, mostly bound to the protein.^{[1][2]} Unlike other vitamins, the cobalt-containing vitamin B₁₂ is fairly large and more complex in its structure.^{[1][2]} Vitamin B₁₂ is involved in lipid, carbohydrate, and protein metabolism via important enzymatic reactions in mammalian cells. In humans, the B₁₂-dependent enzymatic methyl group transfer is essential.^[1] Vitamin B₁₂ supports maintenance of healthy nerve cells and red blood cells, and is even required in DNA synthesis.^[2] The protein-bound B₁₂ is released during HCl-mediated digestion in the stomach, and upon release B₁₂ combines with a substance called intrinsic factor (IF) before it is absorbed into the bloodstream.^[1]

Vitamin B₁₂ is usually stored in the liver as methylcobalamin or 5'-deoxyadenosylcobalamin, which are the biologically active coenzyme forms of B₁₂.^[1] Methylcobalamin is the most-preferred form and is better utilized over the common cyanocobalamin form, given the fact that the liver manages to convert only a very small amount of cyanocobalamin to methylcobalamin.^{[1][3]} Specifically, research evidence indicates that methylcobalamin is transported to organelles within nerve cells more efficiently than does cyanocobalamin.^[4] Oral formulations, especially liquid B₁₂ forms, demonstrate improved absorption and efficacy.^{[2][3]} Vitamin B₁₂ stored in adults (~ 5 mg) lasts for several years. However, variations in these levels occur, depending on the diet as well as the amount secreted or absorbed, and with the type and presence of any disease or clinical condition.^[2]

A vegetarian diet is deficient in vitamin B₁₂, and the low B₁₂ status in vegetarians predisposes them to hyperhomocysteinemia. Hence, oral supplementation of vitamin B₁₂ in the form of methylcobalamin is crucial for maintaining healthy metabolism.^[5]

NEUROLOGICAL HEALTH

Methylcobalamin acts as a cofactor in myelin synthesis—synthesis of neurotransmitters, such as serotonin, dopamine, and norepinephrine—and the methylation of the toxic byproduct homocysteine, known to negatively affect neurons.^[6] Methylcobalamin is therefore very crucial for the maintenance of a healthy nervous system, and any deficiency usually affects the brain, the spinal cord, and the peripheral and optical nervous system.^{[6][7]} Adequate intake is necessary for promoting normal reflexes, vibration sense, and motor neuron function, as well as for improving sensitivity to pain.^{[6][7]} Methylcobalamin supplementation imparts a balancing effect on sympathetic and parasympathetic nervous systems, and regulates heart rate variability.^[8] Hypomethylation in the central nervous system can contribute to vitamin B₁₂ deficiency-related neuropathy, specifically diabetic neuropathy.^[9] Methylcobalamin has been suggested to promote injured nerve and axonal regeneration, and to negate glutamate-induced neurotoxicity.^[10] In an open-labeled, single arm, observational clinical study, patients who received a fixed dose of combination of 75 or 150 mg sustained-release pregabalin combined with 1500 µg immediate-release methylcobalamin experienced significant reductions in neuropathic pain, along with substantial improvement of neuropathy-associated symptoms.^[11]

HOMOCYSTEINE AND VASCULAR DISEASE

An elevated total plasma homocysteine is a risk factor for vascular disease as well as adverse pregnancy outcomes. Excessive intake of folic acid, though, can mask an undiagnosed vitamin B₁₂ deficiency.^[6] The biologically active 5-methyltetrahydrofolate may be a viable alternative to folic acid, because it is unlikely to mask vitamin B₁₂-deficiency symptoms.^[6]

In a double-blind, randomized study, researchers looked at the outcome of supplementing either folic acid or 5-MTHF or placebo on tHcy levels.^[6] One hundred and forty-four (144) female patients were divided into four groups and received 400 mcg folic acid, 416 mcg 5-MTHF, 208 mcg 5-MTHF, or placebo.^[6] The concentration of tHcy and plasma folate was measured at baseline and at four-week intervals.^[6] All three treatment groups saw a decrease in tHcy and did not differ significantly. The increase in plasma folate was significantly lower in the group receiving 208 mcg 5-MTHF.^[6] Researchers concluded that 5-MTHF was an adequate alternative to folic acid for tHcy reduction, and for this purpose 208 mcg and 416 mcg of 5-MTHF had similar efficacy.^[6]

EYE HEALTH

Chronic administration of methylcobalamin has been reported to protect retinal neurons against N-methyl-D-aspartate-receptor-mediated glutamate neurotoxicity in in vitro studies.^[10] Also, the neuroprotective role of methylcobalamin following optic-nerve crush injury has been demonstrated in an animal study.^[10]

DIABETIC COMPLICATIONS

Metformin has for long been shown to decrease vitamin B₁₂ levels in diabetic patients, and the risk of developing such deficiency is largely influenced by increasing age, metformin dosage, and duration of use.^[12] As discussed previously, methylcobalamin supplementation alleviates symptoms of diabetic neuropathy. Clinical evidence shows that methylcobalamin administration profoundly improves paresthesia, nerve reflection and conduction velocity, heart rate variations, burning pains, and heaviness in the legs of diabetic patients.^[9] It can therefore be concluded that methylcobalamin supplementation is a valuable aid in addressing diabetes-associated B₁₂ deficiency and pathological symptoms.

CARDIOVASCULAR DISEASES

It is well-known that elevated plasma homocysteine levels are a risk factor for cardiovascular diseases (CVD).^[13] Increased plasma homocysteine is associated with endothelial dysfunction, arterial intima media thickening, arterial wall stiffening, and procoagulant activity.^{[9][13]} Substantial clinical evidence shows that methylcobalamin supplementation (1000 µg/d) as monotherapy significantly decreased plasma homocysteine levels in diabetic patients.^[9] An open-label study demonstrated the potential benefits of oral methylcobalamin (1500 µg) in the treatment of carpal tunnel syndrome (CTS) in elderly hemiplegic patients following stroke. Significant decreases in the number of patients meeting the criteria for CTS assigned to the methylcobalamin group and improvement in electrophysiological indices were found compared to the untreated group after two years of treatment.^[14] In another study, oral vitamin B₁₂ supplementation (500 µg/d) improved arterial function in vegetarian individuals with low B₁₂ status.^[15]

METHYLATION

Methylcobalamin is essential for the activity of methionine synthase in the synthesis of methionine, which is required for S-adenosylmethionine (SAMe) synthesis, a major methyl-group donor required for various crucial biological methylation reactions.^{[1][2]} Methylation is a critical component of the biological detoxification process. Therefore, methylcobalamin supplementation could be very useful for detoxification in individuals with methylation detoxification problems.

RECURRENT APHTHOUS STOMATITIS

Recurrent aphthous stomatitis (RAS) is a common problem present in up to 25% in the general population. A randomized, double-blind, placebo-controlled trial evaluated the effectiveness of sublingual vitamin B₁₂ supplementation (1000 µg/d) in treating RAS in primary-care patients. The study results showed that the duration of outbreaks, number of ulcers, and level of pain were significantly reduced at five and six months after treatment with vitamin B₁₂, regardless of initial B₁₂ levels in the blood.^[16]

SLEEP ISSUES

Methylcobalamin is needed for the synthesis of melatonin, as melatonin formation requires the donation of a methyl group. Methylcobalamin supplementation has been suggested to regulate melatonin secretion, improve light sensitivity, and normalize circadian and sleep-wake rhythms.^{[4][17]}

REFERENCES

- [No authors listed]. "Methylcobalamin." *Alternative Medicine Review*. Vol. 3, No. 6 (1998): 461-463.
- Manzanares, W., and G. Hardy. "Vitamin B₁₂: The forgotten micronutrient for critical care." *Current Opinions in Clinical Nutrition and Metabolic Care*. Vol. 13, No. 6 (2010): 662-668.
- Shipton, M.J., and I. Thachil. "Vitamin B₁₂ deficiency—A 21st century perspective." *Clinical Medicine*. Vol. 15, No. 2 (2015): 145-150.
- Mayer, G., M. Kröger, and K. Meier-Ewert. "Effects of vitamin B₁₂ on performance and circadian rhythm in normal subjects." *Neuropsychopharmacology*. Vol. 15, No. 5 (1996): 456-644.
- Pawlak, R. "Is vitamin B₁₂ deficiency a risk factor for cardiovascular disease in vegetarians?" *American Journal of Preventive Medicine*. Vol. 48, No. 6 (2015): 11-26.
- Hemendinger, R.A., E.J. Armstrong, and B.R. Brooks. "Methyl vitamin B₁₂ but not methylfolate rescues a motor neuron-like cell line from homocysteine-mediated cell death." *Toxicology and Applied Pharmacology*. Vol. 251, No. 3 (2011): 217-225.
- Valizadeh, M., and N. Valizadeh. "Obsessive compulsive disorder as early manifestation of B₁₂ deficiency." *Indian Journal of Psychological Medicine*. Vol. 33, No. 2 (2011): 203-204.
- Yoshioka, K., and K. Tanaka. "Effect of methylcobalamin on diabetic autonomic neuropathy as assessed by power spectral analysis of heart rate variations." *Hormone and Metabolic Research*. Vol. 27, No. 1 (1995): 43-44.
- Zhang, Y.F., and G. Ning. "Mecobalamin." *Expert Opinion on Investigational Drugs*. Vol. 17, No. 6 (2008): 953-964.
- Zhang, M., et al. "Methylcobalamin: A potential vitamin of pain killer." *Neural Plasticity*. (2013): 1-6.
- Dongre, Y.U., and O. C. Swami. "Sustained-release pregabalin with methylcobalamin in neuropathic pain: An Indian real-life experience." *International Journal of General Medicine*. Vol. 6 (2013): 413-417.
- Kbirige, D., and R. Mwebaze. "Vitamin B₁₂ deficiency among patients with diabetes mellitus: Is routine screening and supplementation justified?" *Journal of Diabetes and Metabolic Disorders*. Vol. 7, No. 12 (2013): 1-6.
- Mangoni, A.A., and S.H.D. Jackson. "Homocysteine and cardiovascular disease: Current evidence and future prospects." *American Journal of Medicine*. Vol. 112, No. 7 (2002): 556-565.
- Sayo, Y., et al. "Amelioration by mecobalamin of subclinical carpal tunnel syndrome involving unaffected limbs in stroke patients." *Journal of Neurological Sciences*. Vol. 231, No. 1-2 (2005): 13-18.
- Kwok, T., et al. "Vitamin B₁₂ supplementation improves arterial function in vegetarians with subnormal vitamin B₁₂ status." *Journal of Nutrition, Health and Aging*. Vol. 16, No. 6 (2012): 569-573.
- Volkov, I., et al. "Effectiveness of vitamin B₁₂ in treating recurrent aphthous stomatitis: A randomized, double-blind, placebo-controlled trial." *Journal of American Board of Family Medicine*. Vol. 22, No. 1 (2009): 9-16.
- Hashimoto, S., et al. "Vitamin B₁₂ enhances the phase-response of circadian melatonin rhythm to a single bright light exposure in humans." *Neuroscience Letters*. Vol. 220, No. 2 (1996): 129-132.