

# Methylcobalamin™

## Methyl B12



Available in 60 and 120 quick-dissolve tablets

### Discussion

Vitamin B12 can be obtained through its synthesis by intestinal flora, from animal-based or fortified foods, or from supplementation. Unlike most other water-soluble vitamins, vitamin B12 (4 to 6 mg) is bound to a protein and stored in the liver as methylcobalamin or 5'-deoxyadenosylcobalamin. These are the coenzyme forms of B12 that are active in human metabolism. Reserve stores of B12 can become depleted due to poor dietary intake without supplementation, lack of intrinsic factor, or poor intestinal absorption.

Many vitamin B12 supplements on the market contain cyanocobalamin. The liver is able to convert a small amount of cyanocobalamin to methylcobalamin; however, methylcobalamin is the preferred form since it is the bioactive form and therefore better utilized. In a research study, tissue retention of cobalamin was greater when using the methyl- form versus the cyano- form. This was exemplified by the fact that urinary excretion of methylcobalamin was one-third less than that of cyanocobalamin.<sup>[1]</sup> Another point of interest regarding B12 supplementation is the commonly held belief that intramuscular injections of B12 are more effective than oral supplementation. In fact, oral supplementation is just as effective and carries the added benefits of lower cost and ease of administration.<sup>\*[2,3]</sup>

**Methylation** Methylcobalamin is required for the function of methionine synthase—the folate-dependent enzyme required for the synthesis of methionine, an amino acid, from homocysteine. Methionine, in turn, is required for the synthesis of S-adenosylmethionine (SAME), a methyl group donor used in many biological methylation reactions, including the methylation of a number of sites within DNA and RNA. As an example of its importance in homocysteine metabolism, one study showed that the addition of B12 to a folate regimen had a greater impact (7%) on homocysteine than did folate alone.<sup>\*[4]</sup>

**Neurologic Health** Methylcobalamin is necessary for the maintenance of a healthy nervous system. Chronic insufficiency can affect the

## Clinical Applications

- » Supports Healthy Methylation\*
- » Supports Neurological Health\*
- » Supports Red Blood Cell Formation\*
- » Supports Healthy Sleep Patterns\*
- » Supports a Healthy Immune System\*

*XYMOGEN's Methylcobalamin provides 5 mg (5,000 mcg) of vitamin B12 in each very small, pleasant-tasting tablet. Methylcobalamin, the form of B12 active in the body, appears to be better absorbed and stored in tissues in comparison to cyanocobalamin. Methylcobalamin has multiple supportive roles in the body, including red blood cell formation, nervous system health, homocysteine and folate metabolism, melatonin synthesis, and more.\**

spinal cord, peripheral nerves, optic nerve, and brain. This can be explained by methylcobalamin's role as a cofactor in myelin synthesis; in methylation of the toxic byproduct homocysteine, which is thought to damage neurons; and in the synthesis of monoamine neurotransmitters, such as serotonin, dopamine, and norepinephrine.<sup>[5-7]</sup> Methylcobalamin is the preferred form of cobalamin supplementation for neurologic health, and experimental research indicates that methylcobalamin shows better transport to organelles within nerve cells than does cyanocobalamin.<sup>\*[8]</sup>

**Red Blood Cell Formation** Like folate, erythroblasts require vitamin B12 for proliferation during their differentiation. Insufficient B12 levels will contribute to purine and thymidylate synthesis inhibition, impaired DNA synthesis, and erythroblast apoptosis, resulting in ineffective erythropoiesis.<sup>\*[9]</sup>

**Sleep Support** Methylcobalamin has been reported to affect the primary circadian rhythm associated with sleep.<sup>[8,10]</sup> Research supports a role for methylcobalamin supplementation in modulating melatonin secretion, enhancing light-sensitivity, normalizing circadian rhythms, and improving sleep-wake cycles.<sup>\*[1,12]</sup>

**Immune Health** Research suggests an important role for B12 in immune system regulation. Human research demonstrated that methylcobalamin supplementation in patients with inadequate B12 levels improved CD4/CD8 ratio and NK cell activity, and augmented CD3-CD16+ cells, suggesting an important role in cellular immunity.<sup>[13]</sup> In other research, among homologues studied, methylcobalamin was shown to have the strongest antibody production enhancement on an in vitro system.<sup>\*[14]</sup>

**Methylcobalamin™ Supplement Facts**

Serving Size: 1 Quick-Dissolve Tablet

	Amount Per Serving	%Daily Value
Vitamin B12 (as methylcobalamin)	5,000 mcg	208,333%

**Other Ingredients:** Xylitol, stearic acid, mannitol, citric acid, silica, natural orange flavor (no MSG), and magnesium stearate.

**DIRECTIONS:** Take one quick-dissolve tablet as directed by your healthcare practitioner.

Consult your healthcare practitioner prior to use. Individuals taking medication should discuss potential interactions with their healthcare practitioner. Do not use if tamper seal is damaged.

**STORAGE:** Keep closed in a cool, dry place out of reach of children.

**DOES NOT CONTAIN:** Wheat, gluten, yeast, soy, animal or dairy products, fish, shellfish, peanuts, tree nuts, egg, ingredients derived from genetically modified organisms (GMOs), artificial colors, artificial sweeteners, or artificial preservatives.

**References**

1. Methylcobalamin. *Altern Med Rev.* 1998 Dec;3(6):461-3. Erratum in: *Altern Med Rev* 1999 Feb;4(1):9. [PMID: 9855571]
2. Kuzminski AM, Del Giacco EJ, Allen RH, et al. Effective treatment of cobalamin deficiency with oral cobalamin. *Blood.* 1998 Aug 15;92(4):1191-98. [PMID: 9694707]
3. Kim HI, Hyung WJ, Song KJ, et al. Oral vitamin B12 replacement: an effective treatment for vitamin B12 deficiency after total gastrectomy in gastric cancer patients. *Ann Surg Oncol.* 2011 Dec;18(13):3711-17. [PMID: 21556950]
4. Lowering blood homocysteine with folic acid based supplements: meta-analysis of randomised trials. Homocysteine Lowering Trialists' Collaboration. *BMJ.* 1998 Mar;316(7135):894-98. [PMID: 9569395]
5. Puri V, Chaudhry N, Goel S, et al. Vitamin B12 deficiency: a clinical and electrophysiological profile. *Electromyogr Clin Neurophysiol.* 2005 Jul-Aug;45(5):273-84. [PMID: 16218195]
6. Hemendinger RA, Armstrong EJ 3rd, Brooks BR. Methyl Vitamin B12 but not methylfolate rescues a motor neuron-like cell line from homocysteine-mediated cell death. *Toxicol Appl Pharmacol.* 2011 Mar 15;251(3):217-25. [PMID: 21237187]
7. Valizadeh M, Valizadeh N. Obsessive compulsive disorder as early manifestation of B12 deficiency. *Indian J Psychol Med.* 2011 Jul;33(2):203-04. [PMID: 22345852]
8. Mayer G, Kröger M, Meier-Ewert K. Effects of vitamin B12 on performance and circadian rhythm in normal subjects. *Neuropsychopharmacology.* 1996 Nov;15(5):456-64. [PMID: 8914118]
9. Koury MJ, Ponka P. New insights into erythropoiesis: the roles of folate, vitamin B12, and iron. *Annu Rev Nutr.* 2004;24:105-31. [PMID:15189115]
10. Yamadera W, Sasaki M, Itoh H, et al. Clinical features of circadian rhythm sleep disorders in outpatients. *Psychiatry Clin Neurosci.* 1998 Jun;52(3):311-16. [PMID: 9681583]
11. Kiuchi T, Sei H, Seno H, et al. Effect of vitamin B12 on the sleep-wake rhythm following an 8-hour advance of the light-dark cycle in the rat. *Physiol Behav.* 1997 Apr;61(4):551-54. [PMID: 9108574]
12. Honma K, Kohsaka M, Fukuda N, et al. Effects of vitamin B12 on plasma melatonin rhythm in humans: increased light sensitivity phase-advances the circadian clock? *Experientia.* 1992 Aug 15;48(8):716-20. [PMID: 1516676]
13. Tamura J, Kubota K, Murakami H, et al. Immunomodulation by vitamin B12: augmentation of CD8+ T lymphocytes and natural killer (NK) cell activity in vitamin B12-deficient patients by methyl-B12 treatment. *Clin Exp Immunol.* 1999 Apr;116(1):28-32. [PMID: 10209501]
14. Takimoto G, Yoshimatsu K, Isomura J, et al. The modulation of murine immune responses by methyl-B12. *Int J Tissue React.* 1982;4(2):95-101. [PMID: 6214503]

Additional references available upon request

All XYMOGEN® Formulas Meet or Exceed cGMP Quality Standards.

\*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.