METHYL COMPLETE

NutraMedix

APPLICATIONS

- Methylation Support
- Metabolic Support
- Energy Support
- Neurological Support

INTRODUCTION

This formula contains ingredients to support healthy DNA methylation, a biochemical process involving the addition of a methyl group (-CH_3) to various essential biochemical compounds.* Healthy methylation is powered by efficient folate and methionine cycles, which depend on active folate (5-MTHF) and active vitamin B12 (methylcobalamin), essential cofactors such as vitamin B2 (riboflavin) and active B6 (P5P), adequate methyl donors, and effective conversion of homocysteine, either recycled back to methionine or converted to cysteine with the help of B6 (P5P) and eventually to glutathione. Fully active B vitamins and additional methyl donors may help to support healthy methylation.*

VITAMIN B2

Vitamin B2 is water-soluble and is required for flavin mononucleotide (FMN) and flavin adenine dinucleotide (FAD), two co-enzymes that are involved in energy production, cellular function, and metabolism.[1] FMN is needed for the conversion of B6 to its active form, pyridoxal 5′-phosphate, and FAD is required for the conversion of tryptophan to niacin.*[1] FAD is also needed for the **folate cycle**, to convert folic acid to active folate, which together with B12, helps to maintain homocysteine levels already within the normal range by recycling homocysteine back to methionine, facilitating sulfur amino acid metabolism.*[2]

Riboflavin can be obtained in the diet from pork, fish, and organ meats, as well as fortified foods such as grains and cereals.[2] The recommended dietary allowance (RDA) for individuals ages 19 and older is 1.3 mg/day for men and 1.1 mg/day for women.[2] The RDA during pregnancy is 1.4 mg/day, and the RDA during lactation is 1.6 mg/day, regardless of age. As adverse effects from riboflavin are extremely rare, an upper limit (maximum intake unlikely to cause adverse effects) has not been established.[2]

VITAMIN B6

Vitamin B6 is water-soluble and can be in one of six forms. In this formula, vitamin B6 is in the form of pyridoxal 5′-phosphate (P5P), an active coenzyme form that does not rely on the body for conversion. Conversion of regular B6 to active P5P requires FMN, which in turn, requires adequate riboflavin. Vitamin B6 is needed for over 100 enzyme reactions, most of which are related to protein metabolism.[3] It is also needed for the folate cycle. B6 in the form of P5P is a coenzyme for other enzymes in the transsulfuration pathway, converting homocysteine to cysteine.*[3] As with vitamin B2, vitamin B6 helps to maintain homocysteine levels already within the normal range.*[3] Vitamin B6 also helps support hemoglobin formation and neurotransmitter synthesis.*[3]

Vitamin B6 can be obtained in the diet from citrus, poultry, and beef, as well as fortified foods such as grains and cereals.[2] The RDA for ages 19 and older is 1.3 mg/day for both men and women, ages 19–50. The RDAs for ages 51 and older are 1.7 mg/day for men and 1.5 mg/day for women.[2] The RDA during pregnancy is 1.9 mg/day, and the RDA during lactation is 2.0 mg/day, regardless of age.[2] The upper limit, or maximum intake unlikely to cause adverse effects, is 100 mg/day for both men and women.[2]

FOLIC ACID

Folic acid in this formula is in the active form of Calcium L-Methylfolate. Folic acid is a water-soluble B vitamin formerly known as vitamin B9. It is needed for DNA and RNA synthesis, as well as amino acid metabolism.*[4] Folic acid is an important part of the **folate cycle**, which helps support the **methionine cycle**. The conversion of homocysteine to methionine in the form of S-adenosylmethionine (SAM-e), an important methyl donor for other reactions, is folate-dependent.*[4]

Folate or folic acid in the diet can be found in abundance in leafy green vegetables as well as in fortified foods such as bread and cereal.2 The RDA for individuals ages 19 and older, both men and women, is 400 mcg/day of dietary folate equivalents (DFE).[2] The RDA during pregnancy is 600 mcg/day DFE and the RDA during lactation is 500 mcg/day DFE, regardless of age.[2] The upper limit, or maximum intake unlikely to cause adverse effects, is 1,000 mcg/day.[2]

VITAMIN B12

Vitamin B12 in this formula is in the form of methylcobalamin, an active form that does not rely on the body's conversion for efficacy, the other active form being 5-deoxyadenosylcobalamin.[5] Vitamin B12 acts as a cofactor for the enzyme methionine synthase, which helps in the conversion of methyltetrahydrofolate to tetrahydrofolate in the folate cycle, as well as the conversion of homocysteine to methionine in the methionine cycle. It is also needed for S-adenosylmethionine (SAM-e) formation, the body's universal methyl donor.[2,5] In addition to methylation, vitamin B12 is needed for healthy central nervous system function, normal DNA synthesis, and healthy red blood cell formation.*[5]

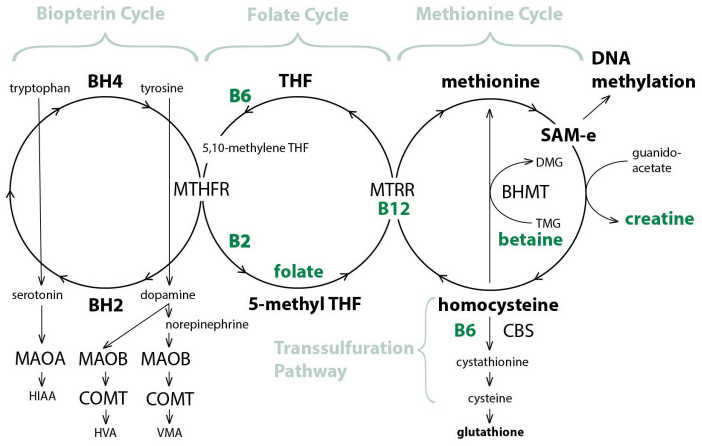
Vitamin B12 can be obtained in the diet from animal foods such as dairy and meat, as well as in some fortified foods. Vegetarians may obtain some B12 from nutritional yeast.[2] The RDA for both men and women is 2.4 mcg/day in ages 19–50 and 2.0 mcg/day in ages 51 and older.[2] The RDA in pregnancy is 2.6 mcg/day and the RDA in lactation is 2.8 mcg/day, regardless of age.[2] Because adverse effects from vitamin B12 are so rare, an upper limit has not been established.[2]

CREATINE MONOHYDRATE

Creatine Monohydrate is commonly used to support healthy skeletal muscle energy metabolism and ATP production.*[6] It may also help to facilitate healthy methylation and detoxification.*[7] It can be obtained in the diet through eating meats and other animal foods.[6] Supplying creatine as an ingredient in this formula may help to spare SAM-e generated by the methionine cycle for other purposes.

BETAINE ANHYDROUS

Betaine anhydrous is also known as trimethylglycine (TMG) and occurs naturally in the body from the oxidation of choline. It can be obtained in the diet from seafood, wheat bran, and spinach.[8] As a methyl donor in the methionine cycle, it may help to recycle homocysteine back to methionine, maintaining levels of homocysteine already within the normal range.*[9,10]



METHYLATION SUPPORT

Methylation, the addition of methyl groups ($-CH_3$), is essential to processes as varied as DNA replication, neurotransmitter production, antioxidant activity, and healthy detoxification, among others.* Normal methylation can be challenged by various factors, including a lack of B vitamins and cofactors; an inability to convert B vitamins and cofactors to their active forms, resulting in a lack of methyl donors; and various single-nucleotide polymorphisms (SNPs) which may affect methylation efficiency.

Supplementation with B vitamins, particularly in their active forms, may help to support normal methylation, bypassing the need for conversion; help maintain homocysteine levels already within the normal range; and help maintain glutathione levels already within the normal range, supporting normal detoxification.* Efficient methylation may support normal cellular metabolism, as well as healthy energy production and storage.* Normal levels of homocysteine are associated with normal antioxidant activity, a healthy inflammatory response, and normal cognitive and cardiovascular health.*[11]

Vitamin B2 is required for the conversion of vitamin B6 to the active form P5P;[1] it is also a cofactor for MTHFR, the enzyme that converts folic acid to active methylfolate in the folate cycle. Both methylfolate and methylcobalamin (B12) help to recycle homocysteine to methionine, which is then converted to S-adenosylmethionine (SAM-e), the body's universal methyl donor.[12] Adequate levels of SAM-e may help to stabilize BH4 in the biopterin cycle, maintaining neurotransmitters such as MAO and serotonin already within the normal range.*[13] SAM-e may also help to maintain homocysteine levels already within the normal range.*[14] After donating a methyl group, SAM-e converts to homocysteine, which can either be recycled back to methionine with the help of methylfolate or methylcobalamin (B12),[15] or converted to cysteine through the transsulfuration pathway with the help of cofactor P5P (B6), supporting normal glutathione production and helping with healthy antioxidant support.*[16]

Vitamin B6 is needed for the folate cycle, the transsulfuration pathway, and methylation.[17] In this formula, it is present in the active form of pyridoxal 5′-phosphate (P5P), which does not rely on the body's ability to convert it. Vitamin B6 may help with folate recycling and may help to maintain homocysteine levels already within the normal range.*[18,19]

Vitamin B12 is in the active form of methylcobalamin, the other active form being adenosylcobalamin. As a methyl donor, methylcobalamin may help to maintain normal methylation, independent of MTHFR status, as it is not reliant on the body's ability to convert it. B12 is needed for both the folate cycle and the methionine cycle, the latter of which is responsible for making SAM-e.[20]

In the active form of Calcium L-Methylfolate, folate helps to make SAM-e, the body's universal methyl donor, via the methionine cycle.[12,17] As such, SAM-e is involved in a number of processes, including the synthesis of creatine, which is made from the transamination of amino acids arginine, glycine, and methionine.[21] This methylation support formula includes creatine, which may help to spare SAM-e for other purposes.*

Creatine monohydrate may also help with methylation support.*[7] It is generated by the methionine cycle, and both rat and human studies have found that it may help to maintain homocysteine levels already within the normal range and may help with antioxidant support.*[22,7] A double-blind, placebo-controlled human study found that creatine may help to maintain normal energy homeostasis in the brain, supporting healthy cognition.*[23] As 40% of the methyl groups produced as SAM-e are used for creatine synthesis, supplemental creatine may help spare some of these to be used for other purposes.*[24]

Betaine anhydrous, also known as trimethylglycine (TMG), occurs naturally in the body from the oxidation of choline and is a cofactor in the recycling of homocysteine to methionine.*[25] As such, betaine anhydrous may act on the methionine cycle to maintain levels of homocysteine already within the normal range.*[9,10]

SAFETY AND CAUTIONS

Riboflavin is generally well tolerated. The most common adverse effects are bright yellow urine and dose-dependent nausea. Theoretically, taking riboflavin with tetracycline antibiotics may decrease their effects.[26]

Vitamin B6 is generally well tolerated in doses less than 100 mg/day. Common adverse effects include gastrointestinal symptoms such as heartburn, abdominal pain, loss of appetite, nausea, and vomiting, though somnolence and headache have also been reported. Theoretical interactions with B6 include additive effects with antihypertensive medications as well as decreased levels and effects of phenobarbital and phenytoin.[27]

Vitamin B12 is generally well tolerated in oral form and side effects are uncommon. There are no currently known drug interactions. While large doses of folic acid can mask a B12 deficiency, this would not be expected at the dosages recommended for this product.[28]

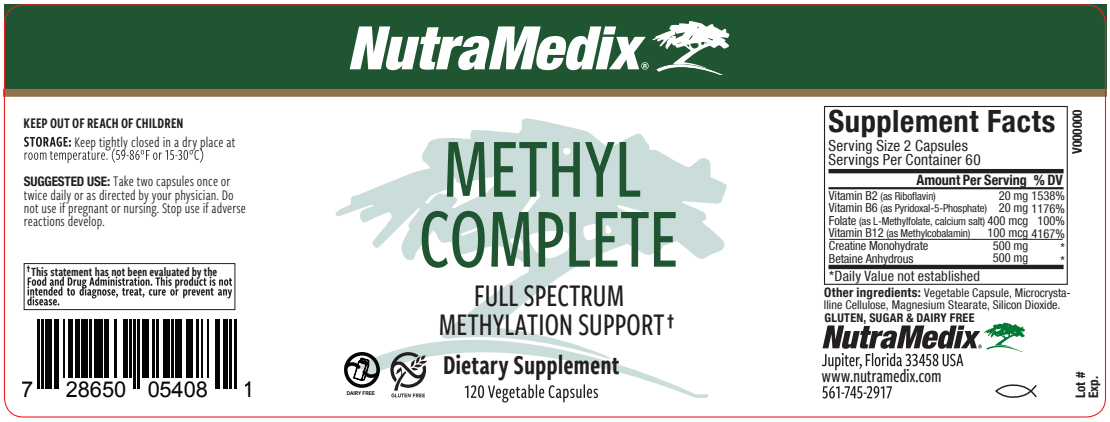
Folic acid is generally well tolerated under doses of 1 mg/day. It may reduce the effectiveness of methotrexate. When taken with phenobarbital or primidone, it may increase the risk of seizures. When taken with phenytoin, it may reduce serum levels and effectiveness.[29]

Creatine monohydrate is generally well tolerated.[30] Common side effects include gastrointestinal effects such as diarrhea and stomach upset, muscle cramps, and dehydration.[31] There are no currently known drug interactions.[31]

Betaine anhydrous is generally well tolerated. It may cause gastrointestinal side effects such as nausea, vomiting, or diarrhea. There are currently no known drug interactions.[32]

Safety not documented in breastfeeding or pregnant women, or in children under 3 years of age due to insufficient safety research.

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



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