# Homocysteine Metabolite Formula

(Hypoallergenic)

Item # 72580
Available in bottles of 90 capsules

**The Possible Benefits of Homocysteine Metabolite Formula, a Dietary Supplement**

- Provides necessary nutrients to regulate homocysteine levels
- Nutritionally supports liver detoxification pathways

## Description

Homocysteine Metabolite Formula helps lower homocysteine levels by providing nutrients that facilitate the breakdown of homocysteine into methionine and other metabolites. Folic acid, vitamin B12 (cobalamin), vitamin B6 and the active form of B6, pyridoxal 5'-phosphate (P5P) play significant roles in homocysteine metabolism. Trimethylglycine (TMG) and serine are also involved in homocysteine pathways.

Homocysteine is a normal breakdown product of the essential amino acid methionine. Research has shown that high homocysteine levels may have a possible association with many conditions, including osteoporosis, stroke, thromboembolism, inflammatory bowel disease, hypothyroidism, Alzheimer's disease and complications of pregnancy including miscarriage. Elevated levels of homocysteine have shown a clear correlation with risk of cardiovascular disease, independent of other known risk factors, such as elevated serum cholesterol and hypertension. Theories involving coagulation mechanisms have been proposed to explain homocysteine's role in cardiovascular conditions. Another theory proposes that homocysteine thiolactone may promote the aggregation of low density lipoprotein, leading to increased uptake by macrophages in the blood vessel lumen.

Homocysteine is a thiol-containing amino acid that is degraded through two pathways of liver detoxification, sulfation and remethylation. The transsulfuration pathway requires both vitamin B6 and P5P, and involves interaction of homocysteine with serine to form cystathionine, that is subsequently converted to cysteine and then taurine. The remethylation pathway has two intersecting biochemical pathways, each resulting in the formation of methionine. Remethylation can occur via either the enzyme betaine homocysteine methyltransferase, to form methionine and dimethylglycine, or via the enzyme N-5-methyltetrahydrofolate homocysteine methyl-transferase, to produce methionine and tetrahydrofolate. The process transfers a methyl group to homocysteine from methylcobalamin, which receives its methyl group from either S-adenosylmethionine (SAMe), from the active form of folic acid (5-methyltetrahydrofolate), or from TMG (betaine). The methionine formed from either reduction can be used in protein synthesis or converted to SAMe, which may be further used for polyamine synthesis or for resynthesis of homocysteine via S-adenosyl-homocysteine.

One controlled human study looked at the nutritional status of vitamin B12, vitamin B6, and folate in a group of males with mild hyperhomo-cysteinemia, defined as plasma homocysteine concentrations in excess of 16.3 μmol/liter. These men had statistically significant lower mean plasma levels of all three nutrients compared to control subjects. When they took the nutrients for 6 weeks, their mean plasma homocysteine levels were significantly lowered. Because a weak negative correlation between folate and plasma homocysteine levels was found and no significant correlations were found for cobalamin or P5P, the possibility that a combined deficiency may be responsible for high homocysteine levels was considered. Another study of homocysteine metabolism and risk of myocardial infarction found significantly higher plasma homocysteine levels in individuals who had previous heart attacks compared to control subjects, and that folate and B12, but not B6, correlated inversely with plasma homocysteine levels. The authors concluded that

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impairment of the remethylation pathway (dependent predominantly on folate and B12), rather than transsulfuration (dependent on B6), was the major determinant of increased homocysteine levels. An analysis of elderly subjects from the original Framingham Heart Study group further implicates nutritional factors in elevated homocysteine plasma levels. In this group, plasma homocysteine levels were inversely correlated with plasma folate, and to a lesser extent, with B12 and B6. Inverse correlations were also found between plasma homocysteine levels and dietary intake of folate and B6, but not B12.

Elevated plasma homocysteine levels associated with vitamin deficiencies of folate and B12 can be rapidly normalized by correction of the deficiency. Vitamin B6 deficiency alone does not appear to result in elevated homocysteine levels. Folic acid is able to lower homocysteine levels even in the absence of folate deficiency, probably as a result of conversion of excess folic acid to methyltetrahydrofolate, which increases the homocysteine remethylation rate. Excess vitamin B6 and B12 do not have the same effect because, unlike methyltetrahydrofolate, they serve as cofactors rather than as cosubstrates. Hyperhomocysteinemia due to vitamin B12 deficiency does not respond to folate therapy alone because of the dependence on vitamin B12 for N-5-methyltetrahydrofolate homocysteine methyltransferase activity and remethylation. Whereas high basal homocysteine levels are believed to be due to impaired remethylation pathways, impaired P5P dependent transsulfuration is believed to be responsible for abnormally high homocysteine levels observed in methionine loading tests. This reasoning suggests pyridoxine in combination with folic acid is likely to be more effective in lowering hyperhomocysteinemia due to contributions from both pathways.

TMG has been shown to be helpful when other nutrients did not improve elevated homocysteine levels. TMG can stimulate remethylation of homocysteine to dimethylglycine in humans with pyridoxine-resistant homocysteinuria and hyperhomocysteinemia due to cystathione b-synthase deficiency. Additionally, TMG's methyl donating activity is crucial to liver function and detoxification, and TMG may protect against chemical damage to the liver.

Administration of combined folic acid and vitamin B12 has been recommended because of the potential for folic acid to correct hematological abnormalities and compromise or mask any existing vitamin B12 deficiency that could lead to irreversible neuropathic conditions. Many studies indicate that risk of cardiovascular disease is correlated with homocysteine levels. While we may not yet know all the factors that contribute to regulation of homocysteine metabolism, folate, vitamin B12, vitamin B6, serine and TMG play significant roles. The importance of avoiding deficiencies in these nutrients and cofactors seems clear.

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**Each capsule contains:**

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| Vitamin B6 (83% as Pyridoxine Hydrochloride and 17% as Pyridoxal-5-Phosphate) | 30 mg |
| Folic Acid | 400 mcg |
| Vitamin B12 (as Cyanocobalamin) | 400 mcg |
| Trimethylglycine | 500 mg |
| L-Serine | 100 mg |

**Other ingredients:** Silicon dioxide, magnesium stearate.

**Suggested Use:** As a dietary supplement, 1 to 2 capsules per day with a meal, or as directed by a healthcare practitioner.

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**References available upon request**

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