

TMG, (Trimethylglycine)

Betaine-TMG

A necessary and critical substance necessary for liver metabolism, Betaine-TMG is a natural extract from sugar beets. Generally derived from choline and functions to synthesize the essential amino acid L-methionine from homocysteine. It has been shown to increase hepatic glutathione, which in turn lowers homocysteine, and thus the nutritional material of choice for lowering homocysteinuria.

TMG, with a molecular weight of 118, is a methyl donor (-CH₃) which successfully converts the powerful oxidizer and free radical generator homocysteine to safe methionine in the liver by giving up one of its three methyl groups. When TMG converts homocysteine to methionine it is reduced to DMG, which has only two methyl groups. DMG is also capable of reducing homocysteine to methionine, as well as reducing lactic acid buildup which allows more stamina for athletes. Homocysteine is almost exactly like methionine except that it lacks one methyl group.

Research has shown that high homocysteine levels are correlated with cardiac arrest and stroke. Due to its bipolar nature, TMG helps osmotic pressure in cells. In humans TMG apparently helps to maintain normal cellular electrolyte concentrations, and help to conserve water and electrolyte losses during exercise. TMG is thought also to aid in the metabolizing of fats, allowing greater endurance and less cramping when it converts to DMG in the body. In animal husbandry, TMG has been used to increase meat yield while decreasing fat.

In human studies, TMG has shown to add muscle mass while decreasing fat stores. Although yet to be proven, using TMG more than DMG may help conserve the body's choline reserves for conversion to acetylcholine, the important neurotransmitter often depleted in Alzheimer's victims. Generally, both should be of value.

Results of a recent meta-analysis in Oxford, England at the Radcliffe Infirmary demonstrated that Vitamin B12 and Folic Acid (and to lesser extent) by Vitamin B6, whose presence is necessary to convert homocysteine to the amino acid L-cysteine) were necessary vitamins involved in the body's cleansing process called methylation, wherein dangerous homocysteine levels are reduced. Lowering homocysteine levels has been shown to reduce the risk of cardiovascular disease, for as much as 30%-40%. Folic acid can be increased to 0.5 mg up to 5 mg with adequate amounts of B12 for these purposes.

Trimethylglycine is a compound known as a methyl donor. Other nutrients such as choline, vitamin B12, folic acid and S-adenosylmethionine (SAMe) are also methyl donors. Methyl donors are critically important to help detoxify the harmful effects of homocysteine. Homocysteine is an amino acid that is produced in our body as part of normal metabolism.

Elevations in homocysteine, however, can have devastating effects, increasing the risk of heart attack, stroke, phlebitis (inflammation of the vein), and with more recent research indicating that it can actually be a neurotoxin now implicated in Alzheimer's disease. By donating its methyl groups TMG is able to neutralize the harmful effects of homocysteine.

TMG also appears to have another excellent use. Previous studies have shown that chronic intake of alcohol inhibits a particular enzyme called methionine synthase. This can result in impaired liver function. In the current addition of the journal Nutrition researchers fed rats alcohol and then tested the liver cells in the test tube. A particular toxic compound was noted to be elevated in the liver cells from these alcohol-fed rats. With the addition of TMG, this toxic compound was neutralized. The researchers concluded that TMG appears to overcome the detrimental effects of alcohol consumption on methionine metabolism and may be effective in correcting not only methylation defects but also treating liver diseases.

Although this may be an interesting study in theory, does TMG actually have a beneficial effect on liver disease? In the American Journal of Gastroenterology from September 2001, a small group of patients with a particular form of hepatitis were enrolled in a one-year study receiving TMG twice daily. At the end of the one-year study, a significant improvement was noted in liver enzymes indicating a reduction in liver inflammation. The results from this small study indicated that betaine was a safe and well tolerated agent that led to a significant biochemical and histological improvement in patients with a particular form of hepatitis.

In another study published in the American Journal of Clinical Nutrition last year, 42 obese men and women were randomly assigned to receive 6 grams of TMG per day for 12 weeks with a control group receiving placebo. At the end of the study, those treated with TMG had a statistically significant reduction in plasma homocysteine concentrations compared to the placebo group.

The standard treatment for elevations in homocysteine is a combination of B6 (up to 200 mg daily), B12 (up to 4 mg daily) and folic acid (up to 4 mg daily). Despite these significant dosing regimens, there are many individuals who can still not lower their homocysteine level into an acceptable range. In such cases adding trimethylglycine to the vitamin regimen has produced marked results by inducing a sharp decline in homocysteine levels. The ideal homocysteine level range is 5 - 8.