HomocysteineBalance

Code: FE2210 – 285 g

HomocysteineBalance is a combination of 7 ingredients that contribute to homocysteine regulation.

Homocysteine is a sulfur amino acid that is important for cell metabolism. It is produced in the body as a residual substance of certain chemical reactions such as cell renovation, and it's involved in the development of cardiovascular and cerebrovascular diseases. It occurs as a result of the normal metabolism of methionine which is obtained through food intake. High homocysteine levels are associated with coronary heart disease [(1)] and especially cerebrovascular accidents [(2)], neurological diseases [(3-4)] and reproductive problems [(5-8)].

Factors that increase blood homocysteine levels:
- Genetic factors.
- Dietary deficiency of folate, vitamins B6 or B12.
- Renal or hepatic insufficiency, hypothyroidism, neoplasia, etc.
- Medications and toxins (excessive consumption of coffee and/or alcohol, smoking, etc.).
- The consumption of animal products that increase cholesterol oxides (oxysterols) in the blood. Meat has a lot of methionine which is a precursor to homocysteine.

Homocysteine is considered high (hyperhomocysteinemia) at levels of over 10.4 µmol/L in women and 11.4 µmol/L in men.

Ingredients: Betaine, natural lemon/lime flavour, inositol, choline (bitartrate), acidity regulator (malic acid), zinc bisglycinate, anticaking agent: silicon dioxide, sweetener (steviol glycosides from *Stevia rebaudiana* and isomaltulose), methylcobalamin (vit. B12), calcium-L-methylfolate (folate), pyridoxal 5'-phosphate (vit. B6).

Nutricional information:	**½ scoop (2,344 g)**
Betaine	1 g
Inositol	0,375 g
Choline (bitartrate)	0,25 g
Zinc (from zinc bisglycinate)	7,5 mg (75%*)
Vitamin B6 (pyridoxine) (from 2,5 mg pyridoxal 5'phosphate)	1,7 mg (121%*)
Vitamin B12 (methylcobalamin)	375 µg (15.000 %*)
Folate (from calcium-L-methylfolate)	250 µg (125%*)

*NRV: Nutrient Reference Value in %.

Size and format:
285 g

Recommended daily dose:
½ scoop daily with food. Mix with 150-250 ml of water (dilute to taste).
Do not exceed the recommended daily dose.

Indications and uses:
- Hyperhomocysteinemia.
- Prevention of cardiovascular disease (ischemic cerebrovascular accident, atherosclerosis, etc.).
- Prevention of neurological diseases (cerebral atrophy, depression, etc.).
- Reproductive problems (polycystic ovary syndrome).

Cautions: Consult a health-care practitioner prior to use if you are pregnant or breast-feeding, or if you have a special medical condition (high cholesterol). A daily intake of over 4 g of betaine can considerably increase blood cholesterol levels.

BETAINE: homocysteine concentrations can be reduced through greater remethylation of homocysteine into methionine. Betaine (trimethylglycine) acts as a methyl group donor in this relationship. The administration of betaine supplements reduces plasma homocysteine concentrations [(9-10)]. In the case of hypochlorhydria, an insufficiency of the gastric secretion of hydrochloric acid, supplementing with betaine HCl helps maintain optimal levels of hydrochloric acid, improving digestion and associated symptoms [(11-12)].

FOLATE: 5-methyltetrahydrofolate (calcium L-methylfolate) is a substrate for the enzyme methionine synthase, which remethylates homocysteine in order to form methionine. Diverse studies indicate a strong association between the intake of dietary folate and plasma homocysteine concentrations [(13)]. A 2007 meta-analysis found that the administration of folic acid supplements significantly reduced the risk of cerebrovascular accidents by 18% and had an even greater benefit, a risk reduction of almost 30 %, in studies where folic acid was administered for over 36 months [(14)]. Another study in patients with a high risk for cardiovascular disease revealed that the administration of folic acid supplements for 18 months reduced carotid intima-media thickness, which is a risk measurement for atherosclerosis [(15)]. VITAMIN B12: the remethylation of

homocysteine into methionine requires vitamin B12 as a cofactor for the enzyme methionine synthase. In a meta-analysis[16], it was found that vitamin B12 is less effective for decreasing total homocysteine than folic acid. The effect of vitamin B12 is generally decreased by the greater role that folate plays in homocysteine determination. Once folate levels are optimized, a clear dependence appears between plasma homocysteine levels and supplementation with vitamin B12[17].

VITAMIN B6 the metabolically active form of vitamin B6, pyridoxal 5´-phosphate, is an enzymatic cofactor of cystathionine β-synthase, which participates in the catabolism of homocysteine into cystathionine in the transsulfuration pathway. In diverse studies, the effect of the administration of vitamin B6 along with folate and vitamin B12 on plasma homocysteine levels has been seen [18-22]. Low vitamin B6 levels are strongly related to an increased risk of cardiovascular disease [23]. This finding backs studies on animals with vitamin B6 deficiency and epidemiological studies [24] in which an association has been seen between low vitamin B6 levels and vascular diseases, which could be explained by the relationship between inflammation and low levels of vitamin B6 [25]. It is known that a low intake of folate, vitamin B12 and vitamin B6 raises plasma homocysteine [2], while their supplementation can reduce it. Vitamins B6 and B12 act as coenzymes in homocysteine metabolism. There are several studies showing that the administration of folate and/or a combination of folate, B12 and B6 not only reduces homocysteine, but also significantly reduces the risk of a cerebrovascular accident [26-27].

INOSITOL: involved in cell membrane integrity, it transports fats from the liver and increases the action of insulin in patients with polycystic ovary syndrome, improving ovulation and decreasing serum androgen concentrations, blood pressure and plasma triglyceride concentrations. Inositol can also be involved in depression. People who are depressed can have lower inositol levels than normal in their spinal fluid. Inositol also participates in the action of serotonin, a neurotransmitter known for its important role in depression [28-31].

CHOLINE: is related to blood homocysteine concentrations. Homocysteine can catabolize to cysteine through the transsulfuration pathway or remethylate into methionine. Choline can be oxidized in the body in order to produce betaine (trimethylglycine, TMG) through the enzyme betaine-homocysteine methyltransferase (BHMT) [32]. Choline is also essential for synthesizing the structural components of cell membranes, is involved in cell signaling, is a precursor to the neurotransmitter acetylcholine and helps eliminate fat and cholesterol from the liver [33]. Choline deficiency is associated with high plasma homocysteine concentrations after methionine administration [34]. One study examined the relationship between choline intake and homocysteine levels as measured by food frequency questionnaires and blood analyses. The highest intake of choline and betaine was related to the lowest levels of homocysteine, regardless of other determining factors, such as folate and other B vitamins [35]. Several studies show the effectiveness of choline at reducing homocysteine levels [35-36].

ZINC: the enzymes betaine-homocysteine methyltransferase and methionine synthase are metalloenzymes of zinc. Zinc is also needed for the conversion of homocysteine into cysteine and glutathione. In a randomized, double-blind, controlled, crossover study, 50 patients with type II diabetes and microalbuminuria were subdivided into two groups and were supplemented with 30 mg per day of zinc (group 1) or placebo (group 2) for three months with a washout period of four weeks. The researchers concluded that zinc supplementation reduced serum homocysteine and increased concentrations of vitamin B12 and folate in type II diabetic patients with microalbuminuria [37]. Other studies confirm that zinc supplementation reduces plasma homocysteine levels [38].

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