



# Methylation Support

DIETARY SUPPLEMENT

## Supports healthy homocysteine levels\*

- Helps to promote vitamin B<sub>12</sub> intake\*
- Provides 1500 mg of betaine and 75 mg of choline per day
- Includes 50 mg of vitamin B<sub>6</sub>, 800 mcg of vitamin B<sub>12</sub> and 400 mcg of folate (from Metafolin®) per day

GENESTRA BRANDS Methylation Support provides a combination of betaine, choline, and B vitamins in their physiologically active form to help support homocysteine metabolism.<sup>1,2</sup> Homocysteine is an amino acid that can be further metabolized into methionine or cysteine, and normal homocysteine levels are necessary for the methylation of nucleic acids, proteins and lipids, as well as protein production.<sup>1</sup> A randomized, double-blind trial involving 76 adults demonstrated that supplementation with 1.5 g of betaine daily for six weeks significantly better maintained homocysteine levels when compared to a placebo treatment.<sup>3</sup> As a result of their interrelated pathways, it is important to have metabolic balances between choline, betaine, homocysteine, vitamin B<sub>6</sub>, vitamin B<sub>12</sub> and folate.<sup>4</sup> Methylation Support is ideal for vegans, who tend to consume low levels of vitamin B<sub>12</sub>.<sup>2</sup>



## Supplement Facts

Serving Size 3 Capsules/ Servings per Container 30

Each Capsule Contains	%DV
Vitamin B <sub>6</sub> (pyridoxal 5-phosphate)	50 mg 2500%
Folate (Calcium L-5-methyltetrahydrofolate, Metafolin®)	400 mcg 100%
Vitamin B <sub>12</sub> (methylcobalamin)	800 mcg 13 333%
Betaine (from beet root)	1500 mg ◆
Choline (choline bitartrate)	75 mg ◆

◆ Daily Value (DV) not established

Other ingredients: Hypromellose, cellulose, silica

†Metafolin® is a registered trademark of Merck KGaA, Darmstadt, Germany

**Recommended Adult Dose:** Take three capsules daily or as recommended by your healthcare practitioner.

**Product Size:** 90 Vegetable Capsules

**Product Code:** 02372



## REFERENCES

1. Selhub, J. Public health significance of elevated homocysteine. Food and Nutrition Bulletin. 2008; 29(2 Suppl): S116-S125.
2. Combs, GF. (2012). The Vitamins (4th ed.). USA: Elsevier.
3. Olthof, MR, van Vliet, T, Boelsma, E, Verhoeve, P. Low Dose Betaine Supplementation Leads to Immediate and Long Term Lowering of Plasma Homocysteine in Healthy Men and Women. J. Nutr. 2003; 133: 4135-4138.
4. Michel, V, Yuan, Z, Ramsdubir, S, Bakovic, M. Choline Transport for Phospholipid Synthesis. Exp Biol Med. 2006; 231: 490-504.

\*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.

This information is for practitioner use only.

Copyright © 2015 Seroyal. All rights reserved. No part of this information may be used or reproduced in any form or by any means, or stored in a database or retrieval system, or be distributed or replicated without express permission of Seroyal. Making copies of any part of this information for any purposes other than your own personal use is a violation of copyright law.

3368. Version 1.

US: (888) 737-6925 | [www.seroyal.com](http://www.seroyal.com)

**Seroyal**

## Scientific Rationale:

Vitamin B<sub>6</sub>, vitamin B<sub>12</sub>, folate, choline and betaine are all involved in homocysteine metabolism.<sup>1,2</sup> Homocysteine is an amino acid involved in both remethylation and transsulfuration reactions.<sup>3</sup> In all tissues, the vitamin B<sub>12</sub>-dependent remethylation reaction occurs when folate donates a methyl group to homocysteine in order to form methionine.<sup>3</sup> Specifically in the liver, betaine donates the methyl group to promote methionine formation.<sup>3</sup> A large proportion of methionine produced from homocysteine is further metabolized to form S-adenosylmethionine (SAM); SAM is the universal methyl donor to many compounds, including DNA, RNA, hormones, lipids and proteins.<sup>3</sup> In transsulfuration, homocysteine is involved in the formation of cysteine through a vitamin B<sub>6</sub>-dependent reaction; cysteine is a conditionally essential amino acid involved in the synthesis of protein and other compounds including glutathione and taurine.<sup>3,4</sup> Therefore, normal homocysteine levels are required for the production of important biological molecules.<sup>3</sup> As homocysteine can also be cytotoxic at high concentrations, research has investigated methods of promoting healthy homocysteine levels.<sup>3</sup> Recent studies have demonstrated that betaine supplementation increases the availability of betaine, which results in increased remethylation of homocysteine into methionine.<sup>5,6</sup>

In a crossover trial involving healthy male adults, acute betaine intake significantly mediated homocysteine levels. Participants were randomized into either a control or betaine group (where they consumed 560 mg of betaine). Fasted blood samples were collected at baseline and hourly for 8 hours, as well as 24 hours after the treatment was consumed. Plasma homocysteine levels were analyzed at baseline, and four and six hours after the treatment period commenced. Urine samples were collected at baseline and every 2 hours for eight hours, after which an overnight urine collection occurred. The study days were one day per week, and the rest of the week acted as the washout period. After six hours, betaine supplementation significantly increased plasma betaine levels and decreased plasma homocysteine levels when compared to the control group's values. In the second part of the study, participants underwent a methionine load

test, which determines an individual's ability to metabolize a test dose of methionine. It reflects the activity of the transsulfuration pathway as the methionine consumed orally is first converted to homocysteine, which can be further metabolized to cysteine. Participants received a methionine load (0.1 g of methionine per kg body weight) in addition to their betaine treatment. Supplementation with betaine significantly increased betaine levels and decreased homocysteine levels after the methionine load. As little betaine appeared in the urine of the participants, the authors noted that dietary betaine replenished tissue betaine stores, and also lowered homocysteine levels – even after a methionine load.<sup>7</sup> This is worthwhile to note as elevated homocysteine levels after methionine load tests have been associated with impaired endothelial function in adults.<sup>8,9</sup>

Similarly, in a double-blind, placebo-controlled trial involving 76 adults, supplementation with betaine for six weeks significantly decreased homocysteine levels. Participants were randomized to consume betaine treatments twice daily (totalling 1.5, 3 or 6 g of betaine daily) for six weeks. A methionine load test was completed four times over the course of the study (before the trial, on the first trial day, after two weeks of treatment, and after 6 weeks of treatment). During this test, after a fasted blood sample was taken, participants consumed 100 mg of methionine, and another blood sample was collected after 6 hours. Fasting homocysteine levels and homocysteine levels after the methionine load test were significantly decreased by all three betaine doses after two and six weeks of supplementation.<sup>5</sup>

## B vitamins

Vegan diets tend to provide low levels of vitamin B<sub>12</sub> and malabsorption of the vitamin from food, but not supplements, increases with age.<sup>10</sup> This is because elderly individuals may not produce enough gastric acid to release the vitamin when it is bound to food.<sup>10</sup> In addition promoting vitamin B<sub>12</sub> intake, Methylation Support also helps promote the intake of folate and vitamin B<sub>6</sub>.

For educational purposes only. Do not distribute.

## REFERENCES

1. Combs, GF. (2012). The Vitamins (4th ed.). USA: Elsevier.
2. Michel, V, Yuan, Z, Ramsdubir, S, Bakovic, M. Exp Biol Med. 2006; 231: 490–504.
3. Selhub, J. Food and Nutrition Bulletin. 2008; 29(2 Suppl): S116–S125.
4. Williams, KT, Schalinski, KL. Biofactors. 2010; 36(1): 19–24.
5. Otthof, MR, van Vliet, T, Boelsma, E, Verhoeve, P. J. Nutr. 2003; 133: 4135–4138.
6. Schwab, U, Torronen, A, Merinnee, E, Saarninen, M, Alfthan, G, Aro, A, Uusitupa, M. J. Nutr. 2006; 136: 34–38.
7. Atkinson, W, Emslie, J, Lever, M, Chambers, ST, George, PM. Am J Clin Nutr. 2008; 87: 577–585.
8. Bellamy, MF, McDowell, IFW, Ramsey, MW, Brownlee, M, Bones, C, Newcombe, RG, Lewis, MJ. Circulation. 1998; 98: 1848–1852.
9. Chambers, JC, Obeid, OA, Kooner, JS. 1999; 19: 2922–2927.
10. Allen, LH. Am J Clin Nutr. 2009; 89(suppl): 693S–696S.

\*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.

This information is for practitioner use only.

Copyright © 2015 Seroyal. All rights reserved. No part of this information may be used or reproduced in any form or by any means, or stored in a database or retrieval system, or be distributed or replicated without express permission of Seroyal. Making copies of any part of this information for any purposes other than your own personal use is a violation of copyright law.

3368. Version 1.

# Methylation Support

Companion products



### Col-Sterol

- Supports optimal cardiovascular health\*
- Promotes healthy total and low density lipoprotein (LDL) cholesterol levels already within the normal range\*
- Provides 1,300 mg of plant sterol esters per day



### Liv Complex

- Includes extracts from globe artichoke, dandelion, milk thistle, bupleurum, fringetree and rosemary
- Supports liver health and function\*



### Omega EFA Liquid

- Helps to maintain healthy serum triglyceride levels already in the normal range and promote cardiovascular health\*
- Provides 1915 mg of EPA and 1005 mg of DHA per teaspoon
- Delicious natural orange flavor

\*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.

This information is for practitioner use only.

Copyright © 2015 Seroyal. All rights reserved. No part of this information may be used or reproduced in any form or by any means, or stored in a database or retrieval system, or be distributed or replicated without express permission of Seroyal. Making copies of any part of this information for any purposes other than your own personal use is a violation of copyright law.

3368. Version 1.