

Balanced Methylation Support

Developed and reviewed by the clinical, chiropractic, and naturopathic members of the Standard Process team

Importance of Balanced Methylation

Methylation is a foundational biochemical process involving the transfer of a methyl group ($-CH_3$) to DNA, proteins, lipids, and other molecules. It occurs in many pathways and affects a wide range of physiological functions that include gene expression, detoxification, neurotransmitter synthesis, hormone metabolism, and cellular energy production. Methylation is catalyzed by methyltransferase enzymes and requires S-adenosylmethionine (SAM) as the universal methyl donor. The methylation cycle is tightly connected to homocysteine metabolism, as homocysteine must be remethylated to regenerate methionine and sustain SAM levels.

One of the most critical aspects of methylation is epigenetic regulation, where methyl groups added to DNA affect whether genes are turned on or off without altering the DNA sequence itself. This has implications for development, aging, and disease susceptibility.

Methylation depends on adequate intake and metabolism of key nutrients that include folate, vitamin B₁₂, methionine, and choline. Disruptions in the methylation cycle can lead to elevated homocysteine, impaired detoxification, mood disorders, cardiovascular disease, and cognitive decline.

In clinical practice, supporting methylation includes lifestyle interventions and repletion of key nutrients. Addressing genetic polymorphisms like MTHFR and ensuring functional homocysteine clearance pathways are intact are important elements of a methylation support plan.

Supportive Lifestyle Practices

Encourage patients to exercise regularly to support healthy methylation. Even a single bout of exercise has been shown to alter global DNA methylation and specific genes' promoter methylation in skeletal muscle.¹

Have patients aim for 7-9 hours of quality sleep nightly. Insufficient sleep is associated with DNA hypomethylation.² The use of blue light blockers and avoiding screens (television, computer, cellphone) can enhance natural melatonin production and promote healthy methylation.

Whole Foods Nutritional Recommendations

Encourage the consumption of beetroot, which is a rich source of betaine. Betaine is a key methyl group donor in transmethylation: a process catalyzed by the enzyme betaine-homocysteine methyltransferase. This reaction catalyzes homocysteine to form methionine and occurs primarily in the liver and kidneys.³

Encourage the intake of choline-rich foods such as egg yolks, beef and chicken liver, cod, salmon, and whole milk. Choline functions as a methyl donor that supports the remethylation of homocysteine and overall methylation capacity. When humans are choline deficient, they use more methyltetrahydrofolate (MTHF) to remethylate homocysteine in the liver and increase dietary folate requirements.⁴

Highlight the importance of eating folate-rich foods like dark leafy greens, legumes, and nuts. Folate plays an essential role in one-carbon transfer involving the remethylation of homocysteine to methionine, which is a precursor of S-adenosylmethionine (SAM) — the primary methyl group donor for most biological methylations. Insufficient folate intake can contribute to hypomethylation.⁴

Recommend foods high in magnesium like leafy greens, avocado, dark chocolate, nuts, and legumes. Magnesium is a cofactor for methionine adenosyltransferase 1A (MAT1A) — an enzyme that catalyzes the conversion of methionine and ATP into S-AdoMet. S-AdoMet is a crucial methyl donor in many cellular processes.⁵

Dietary Supplement Regimen



Whole Food Folate™

Suggested Use: **6 tablets per day**

- Contains a vegetarian whole food source of natural folate and vitamin B₁₂
- Supports red blood cell health*
- Supports central nervous system health*
- Supports healthy cellular processes such as DNA formation and replication*
- In combination with a healthy, folate-rich diet:
 - Supports homocysteine metabolism*
 - Supports healthy methylation capacity*



Betafood®

Suggested Use: **1 tablet per meal**

- Provides methyl donors to support the liver's natural detoxification processes*
- Contains naturally occurring betaine for liver and cardiovascular health*
- Supports normal processing of dietary fats*



E-Z Mg™

Suggested Use: **6 tablets per day**

E-Z Mg™ is a plant-based, organic magnesium (Mg) supplement developed to support patients with inadequate dietary magnesium intake.*

- Essential for central nervous system health*
- Helps to bridge the gap in dietary magnesium intake*
- Vegan and USDA organic magnesium supplement



Choline

Suggested Use: **1 tablet per meal per day**

- Provides support for methylation reactions*
- Supports healthy cell membrane structure and function*
- Supports healthy liver function*
- Supports a healthy nervous system*

Assessment of Methylation Capacity

In Office/Physical Exam

- Signs/Symptoms like fatigue, malaise, anxiety, depression, sleep disturbances, histamine intolerance and allergies, hormonal imbalances, cognitive issues
- Medical History: infertility, genetic polymorphism, cardiovascular disease, neuropsychiatric conditions

- Lab Testing: complete blood count (CBC), homocysteine, methylmalonic acid (MMA), RBC folate. Consider genetic testing (MTHFR, MTR, COMT, and CBS SNPs), SAM: SAH ratio, and/or advanced methylation panel

REFERENCES

1. Barrès, R., et al. (2012). Cell metabolism, 15(3), 405–411.
2. Lahtinen, A., et al. (2019) Sci Rep 9, 1193
3. Zhao, G., et al. (2018). Frontiers in immunology, 9, 1070.
4. Niculescu, M. D., & Zeisel, S. H. (2002). The Journal of nutrition, 132(8 Suppl), 2333S–2335S.
5. Cazzola, R., et al. (2024). Antioxidants, 13(8), 893.