



## METHYL B-COMPLEX



Supplement Facts		
Serving Size: 1 mL (2 Pumps) Servings Per Container: 50	Amount Per Serving	% Daily Value
Thiamin (Vitamin B1) (Thiamine HCl)	12.5mg	1042%
Riboflavin (as Riboflavin-5-Phosphate)	5.6mg	451%
Niacin (as Niacin, Niacinamide)	10mg	63%
Vitamin B6 (as Pyridoxine HCl)	6.7mg	394%
Folate (as Calcium Folate)	850mcg DFE	213%
Vitamin B12 (as Methylcobalamin)	500mcg	20833%
Biotin	500mcg	1667%
Pantothenic acid (as Calcium D-Pantothenate)	25mg	500%
Trimethylglycine (from betaine)	20mg	**
Milk Thistle Seed Extract	50mg	**
Phosphatidylcholine (from purified sunflower seed lecithin)	68mg	**

\*\*Daily Value not established

**Other Ingredients:** Water, glycerin, ethanol, vitamin E (as tocopherol and natural mixed tocopherols), EDTA (as preservative), natural citrus oils and natural flavoring.

**Methyl B Complex** is a liposomal blend of eight B vitamins enhanced by trimethylglycine (TMG)<sup>1</sup> and milk thistle seed extract<sup>2</sup> to fully support energy, mood, cognition, immunity, cardiovascular health, methylation, detoxification, a healthy nervous system and optimal liver function.<sup>3,4,5,6,7,8,9</sup> The key to this exceptionally well-tolerated formula is the careful blend of methylated and nonmethylated B vitamins along with critical methyl donors, to promote optimal and yet balanced B vitamin activity. The centerpiece is methylcobalamin, the active form of B12 necessary for homocysteine metabolism and healthy methylation.<sup>10</sup> The entire suite of B vitamins works at a cellular level to facilitate RNA and DNA biosynthesis and repair, enzymatic reactions, gene expression, synthesis of neurotransmitters, steroid hormone activity, and immune, liver and mitochondrial function.<sup>11,12,13</sup> The unique addition of milk thistle and TMG facilitates the hepatic detoxification induced by the immediate flow of active B vitamins. Most important, the balanced blend of B's in a liposomal formula ensures rapid and complete absorption.<sup>14</sup>

### PREVALENCE OF B VITAMIN DEFICIENCY

Despite our era of food fortification, widespread deficiency of B vitamins—often subclinical—has been thoroughly documented.<sup>15</sup> B vitamins may be deficient due to age, hypochlorhydria, small intestinal bacterial overgrowth, a micronutrient-poor diet, excessive use of alcohol or medications such as proton-pump inhibitors, metformin or hormone-based contraceptives.<sup>16,17,18</sup> The National Institute of Health's (NIH) Dietary Office estimates that up to 15% of people in the U.S. are deficient in vitamin B12.<sup>19</sup> As many as 13% of elite endurance athletes can show vitamin B6 deficiency, as well as 10% of those playing team sports.<sup>20</sup> Niacin deficiency is twice as common in women as in men.<sup>21</sup> Genes encoding the transformation of B12 to its bioactive forms—adenosylcobalamin and methylcobalamin—also impact health.<sup>22</sup>

The effect of vitamin B status on wellbeing can be lifelong: higher B vitamin intake in young adulthood is correlated with better cognitive function many years later in midlife.<sup>23</sup>

### METHYL B12 IS CRITICAL TO LIFE, HEALTH, AND THE LIVER

Sufficient levels of all B vitamins are essential for optimal physiological and neurological functioning<sup>11</sup>, but the implications are especially profound when there is insufficient methyl B12 (methylcobalamin). B12 is already involved in the metabolism of every cell, as a cofactor in DNA synthesis, as well as fatty acid and amino acid metabolism. Low levels of methyl B12 have been linked to peripheral neuropathy, autism, multiple sclerosis and mercury toxicity.<sup>24,25,26,27,28</sup> Methylcobalamin also helps keep homocysteine in check.<sup>29</sup> High homocysteine levels, along with low levels of folate and B12, have been linked to an increased risk of cardiovascular disease, as well as Alzheimer's disease and oxidative stress.<sup>30,31,32,33</sup>

### BALANCED FORMULA FOR OPTIMAL METHYLATION

Efficient methylation regulates gene expression and activity, DNA and RNA synthesis and cell differentiation throughout the body.<sup>34</sup> Deregulation of methylation machinery – both hypomethylation and hypermethylation – has been well studied.<sup>35</sup> When methylation is slowed (hypomethylation), we can have trouble suppressing viruses<sup>36</sup>, processing toxins in the liver<sup>37</sup>, controlling

### BENEFITS & APPLICATIONS:

- Energy production<sup>10</sup>
- Methylation<sup>10,32</sup>
- Detoxification<sup>81,82</sup>
- Inflammation<sup>7,32,74,76,77,78</sup>
- Cognition<sup>6,28,50,52,56</sup>
- Depression & anxiety<sup>12,52, 53, 54, 55</sup>
- Neurological health<sup>60,61,62</sup>
- Immunity<sup>74,75,78</sup>
- Healthy aging<sup>26,64,65</sup>
- Cardiovascular health<sup>3,4,57</sup>
- Liver function<sup>31,82</sup>

inflammation and oxidation<sup>38</sup>, and generating sufficient neurotransmitters in the brain, which can lead to depression.<sup>11</sup> In contrast, hypermethylation results in higher levels of inflammatory cytokines as well as excess dopamine, norepinephrine, and serotonin, leading to irritability and anxiety.<sup>39</sup> Our balanced blend offers methylated B2 and B12, metabolically active folinic acid (folate) that is not fully methylated, as well as thiamin, niacin, pantothenic acid, and biotin. This careful formula offers ample metabolic activity without driving the system too hard, and is especially suited to those with common gene variations such as the gene that codes for the important enzyme, methylenetetrahydrofolate reductase, or MTHFR.<sup>40,41</sup> This can lead to hypomethylation of folate, but intermediate active forms such as folinic acid may be better tolerated than the final active form, methylfolate. Supplementation with folinic acid bypasses the deconjugation and reduction steps utilized with folic acid. Human absorption studies of folinic acid show a bioavailability of 92%.<sup>42</sup>

## **BRAIN PROTECTION: COGNITION, NEURODEGENERATION, MIGRAINE, STROKE AND DEPRESSION**

B vitamins have shown measurable benefit in stroke, cognitive decline, dementia and depression.<sup>43,44,45</sup> High dietary intake of B vitamins, particularly vitamin B6, has been associated with better cognitive function in older adults.<sup>46,47</sup> B complex vitamins significantly improve depression and anxiety in adults diagnosed with major depression.<sup>48</sup> Meanwhile, low folate intake has been linked to increased risk of mild cognitive impairment and dementia.<sup>49</sup> Serum vitamin B12 concentrations in the low normal range are present in about 30% of stroke patients over 70 years old.<sup>50</sup> Riboflavin and niacin may be neuroprotective and helpful in Parkinson's disease.<sup>51,52,53</sup> High-dose riboflavin has been shown to reduce migraine severity and frequency<sup>54</sup> while high dose biotin has improved symptoms in some patients with multiple sclerosis.<sup>55</sup> Deficiency of thiamine has been linked to dementia, Alzheimer's disease, Parkinson's disease and Huntington's disease.<sup>56</sup>

## **ENERGY, EXERCISE, AND ENDURANCE SUPPORT**

B vitamins are critical to meet daily energy needs as well as to maintain and repair muscle mass in elite athletics and endurance sports.<sup>57</sup> Studies show that B6, riboflavin and folate are frequently low in the diets of women who exercise regularly.<sup>58</sup> Up to 60% of male and female athletes can have poor vitamin B6 levels<sup>59,60</sup>, and over half of athletes may have low levels of riboflavin.<sup>61</sup> Even after taking a multivitamin and mineral supplement for 8 months, 10% of athletes were still low in vitamin B6.<sup>62,63</sup> B5, also known as pantothenic acid, is a significant component of the Krebs cycle and energy metabolism.

## **OPTIMAL IMMUNITY AND HEALTHY LEVELS OF INFLAMMATION**

Suboptimal levels of B vitamins can lead to chronic inflammation and reduced immune function. Thiamine (B1) deficiency is associated with an increase in neuroinflammation and increased production of pro-inflammatory cytokines such as IL-1, TNF-alpha and IL-6.<sup>64</sup> Riboflavin prevents lipid peroxidation and reduces some forms of oxidative injury.<sup>65</sup> Niacin has been shown to lessen pro-inflammatory cytokines and lessen the effects of inflammation.<sup>66</sup> Vitamin B6 can reduce NF-kappa B activation by macrophages, dampening inflammation<sup>67</sup>; it modulates immunity and gene expression.<sup>68,69</sup> Trimethylglycine (betaine) and milk thistle seed extract are both anti-inflammatory.<sup>70,71</sup>

## **UTILIZES NANOSCALE LIPOSOMES FOR FAST, COMPLETE UPTAKE**

The liposomes in this formula contain pure phosphatidylcholine, a lipid that is the primary building block of all cell membranes, including brain cells.<sup>72</sup> Lipids are the liquid gold of the brain: about 60% of brain tissue is composed of fats that keep cell walls flexible and fluid, yet structurally sound.<sup>73</sup>

Uptake and absorption of B vitamins can vary and can be limited by breakdown in the digestive tract. Liposomal delivery systems protect molecules from breakdown while enabling more rapid uptake. Liposomal formulations improve absorption of many molecules in the gastrointestinal tract, avoiding hepatic first-pass metabolism and resulting in higher bioavailability.<sup>74</sup>

**Quicksilver Delivery Systems®** brings the power of intravenous therapy into convenient oral delivery. Our Quicksilver Delivery Systems® improve upon liposomal and emulsification technology with smaller, more stable particles made from the highest-grade ingredients available. In addition to exceptional absorption rates, these tiny liposomal and nanoemulsified particles increase diffusion across mucus membranes, enhance lymphatic circulation of nutrients and support cellular delivery.<sup>75,76</sup>

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