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# REPORT

## Why People Supplement with B Vitamins

By Michael Downey

B vitamins have numerous vital functions *throughout* the body.

They aid in the assembly of your genetic blueprint, keep your nervous system healthy, turn food into energy, and more.<sup>1-13</sup>

Maintaining healthy **B vitamin** levels helps protect against problems ranging from cardiovascular disease and neurodegenerative disorders to UV-induced skin damage and vision loss.

A **deficiency** in B vitamins is common for multiple reasons:<sup>14</sup>

- They are not stored by the body. B vitamins are water-soluble and are quickly washed out of the body.
- They are impacted by low dietary intake, poor absorption associated with age, taking certain medications, alcohol, and following certain diets.

These factors make daily supplementation with a **B-complex** essential for aging individuals.

In this article, you'll learn how **B vitamins** can reduce the odds of a variety of serious disorders.

### Cardiovascular Disease

Without sufficient amounts of the B vitamins folate, riboflavin (B2), B6, and B12, there is a buildup of the amino acid **homocysteine**.

B vitamins help convert homocysteine into an important protein building block. When there's a shortage of the four B vitamins mentioned above, that conversion process isn't as efficient, causing homocysteine levels to increase.<sup>15,16</sup>

Elevated homocysteine is associated with **cardiovascular disease**.<sup>17</sup> Studies indicate lower blood homocysteine will reduce risk of coronary heart disease up to **16%** and risk of stroke up to **24%**.<sup>18</sup>

Research shows that different B vitamins play an important role in balancing homocysteine, demonstrating the necessity of supplementing with all of them, for example:

- Both B2 (riboflavin) and folate must be present in ample amounts for *optimal* homocysteine-lowering.<sup>18,19</sup>
- Even people whose B2 and folate levels are restored by supplementation may not significantly lower homocysteine until vitamin B6 is added to the equation.<sup>20</sup>
- Patients with coronary artery disease have, on average, **34.2%** lower levels of the bioactive form of B6 (pyridoxal 5'-phosphate) compared to those without heart problems, which may relate to its role in lowering homocysteine.<sup>21-23</sup>

**Folic acid** and **vitamin B12** detoxify homocysteine via the "methylation"<sup>24</sup> pathway, whereas vitamin B6 detoxifies homocysteine via the "transsulfuration"<sup>25</sup> pathway.

Activated forms of these vitamins (such as **5-MTHF**, **methylcobalamin**, and **pyridoxal-5-phosphate**) provide direct maintenance of these two homocysteine-detoxification pathways.

### Brain Shrinkage

A deficiency of B vitamins can cause the brain to *shrink*.

Close associations have been found between low **folate** levels and severe gray-matter (brain) damage, as well as atrophy of the *hippocampus*,<sup>26</sup> a main memory-processing center in the brain.

Similarly, people with lower **vitamin B12** levels have been shown to have progressive brain atrophy, with rates of brain volume loss **517% greater than those with higher B12 levels**.<sup>15,27</sup>

### Depression

Taking a **B-complex** supplement for 60 days has been shown to improve depression and anxiety symptoms, compared to

placebo.<sup>28</sup>

The active form of folate, **5-MTHF**, is especially beneficial against depression. It's been shown to boost the response rate of antidepressant drugs, and it can also help those drugs work more quickly.

In one study, only **7.04%** of subjects taking an antidepressant drug experienced major improvement on a standard depression score. But that number jumped to **18.5%** in patients taking 5-MTHF in addition to the drug.<sup>29</sup>

Even more impressive, those with the most severe depression improved by just **16.3%** when taking the drug by itself. But that number jumped to **40%** when they added 5-MTHF.<sup>29</sup>

In addition, it took **150 days** for the severely depressed patients taking just the antidepressant drug to experience improvement. But adding in 5-MTHF cut the time almost in half, with the patients seeing improvements in just **85 days**.<sup>29</sup>

**Inositol** is often included in quality B-complex products despite not being a B vitamin. Inositol has a long history of reducing general anxiety, panic, and OCD (obsessive-compulsive disorder) symptoms.<sup>30</sup>

In one study, researchers found inositol to be just as effective as a popular antidepressant for panic disorders, and volunteers tolerated it well even at extremely massive doses up to **18 grams** a day.<sup>30</sup>

#### WHAT YOU NEED TO KNOW

##### Are You Getting Enough B Vitamins?

- B vitamins have numerous functions in the body, including keeping your nervous system healthy, turning food into energy, protecting vision, and more.
- B vitamins also inhibit some diseases associated with aging, including cardiovascular disease and neurodegenerative disorders.
- B vitamins are not stored by the body, requiring daily replenishment.
- The need for B vitamins is more critical for specific individuals, such as older adults, those taking certain medications, or those following particular diets.
- At-risk individuals and all aging people can greatly benefit from a daily, high-quality, B-complex supplement.

## Neurodegenerative Disorders

**Thiamine** (vitamin B1) is critical to healthy brain function.<sup>31</sup> A thiamine deficiency triggers a cascade of events that lead to oxidative stress and inflammation, which are major contributors to Alzheimer's, Parkinson's, and other dementia-producing disorders.<sup>32</sup>

Researchers have used experimental thiamine deficiency for years to model many of these age-related brain diseases. And research shows that a deficiency in thiamine leads to many of the same brain abnormalities associated with those disorders.<sup>32</sup>

Finally, supplementation with **folate** has been shown to decrease blood levels of molecules involved in forming brain-damaging **beta-amyloid** plaques.<sup>33</sup> The presence of these plaque-forming molecules may predict early Alzheimer's disease or cognitive decline.<sup>33-36</sup>

## UV-Induced Skin Damage

A form of vitamin B3 called **nicotinamide** helps prevent skin damage caused by the sun's rays.

Ultraviolet rays cause the body to lose **ATP** (*adenosine triphosphate*), the cellular energy that the body needs to repair damaged DNA.<sup>37</sup> Nicotinamide helps prevent the loss of ATP.

Not surprisingly, studies also show that nicotinamide helps directly prevent UV-induced **DNA damage**.

In one study, researchers pretreated skin cells with nicotinamide and then exposed them to ultraviolet radiation. The nicotinamide removed and replaced damaged DNA and increased the number of cells undergoing DNA repair. It also reduced the production of damaging DNA photoproducts in cell cultures and in human skin.<sup>38</sup>

Nicotinamide has also been shown to protect against UV-induced **immune suppression**.<sup>39</sup>

Taken together, the two actions of repairing DNA and protecting immune suppression contribute to nicotinamide's ability to reduce the risk of **skin cancer**.<sup>40</sup>

## Vision Loss

An epidemiological study found that a deficiency of **folate** was associated with an **89%** higher risk of age-related **macular**

**degeneration**, a leading cause of blindness. Deficiency of **vitamin B12** was associated with **2.56-fold** greater odds of developing the condition.<sup>41</sup>

Supplementation with vitamin B12 was associated with *reduced* odds of developing age-related macular degeneration.<sup>41</sup>

In a randomized, placebo-controlled trial, women who took folic acid, vitamin B6, and vitamin B12 for an average of 7.3 years had a **34%** reduced risk of **macular degeneration** compared to the placebo group. When scientists looked only at those cases of macular degeneration that were causing vision problems, the protection level with treatment rose to **41%**.<sup>42</sup>

These were impressive results, especially considering the levels of daily supplementation are readily obtainable: just **2,500 mcg** of folate, **50 mg** of B6, and **1,000 mcg** of B12.<sup>42</sup>

#### WHAT THE B VITAMINS DO

B vitamins provide vital support for numerous fundamental and critical body functions:

- B1 (thiamine) helps convert food into energy, playing an essential role in metabolism.<sup>1</sup>
- B2 (riboflavin) helps convert nutrients into energy and provides antioxidant activity.<sup>2</sup>
- B3 (niacin) plays a role in DNA repair, cellular signaling, and metabolism.<sup>3</sup>
- B5 (pantothenic acid) helps produce hormones and converts food to energy.<sup>4</sup>
- B6 (pyridoxine) helps metabolize amino acids and produces neurotransmitters and red blood cells.<sup>5</sup>
- B7 (biotin) regulates gene expression and is required for metabolism of fat and carbohydrates.<sup>6</sup>
- B9 (folic acid, or for superior absorption,<sup>7</sup> 5-MTHF) is vital for cell growth, amino acid metabolism, production of red and white blood cells, healthy cell division, and proper fetal growth and development to reduce the risk of birth defects.<sup>8-11</sup>
- B12 (cobalamin or methylcobalamin) is important for neurological function, development of red blood cells, production of DNA, and promoting healthy homocysteine levels.<sup>12,13,48</sup> Methylcobalamin is the form of B12 that is biologically active in the brain.
- Inositol is not a B vitamin, but it is often added to higher quality B-complex supplements. Inositol is essential for calcium and insulin signal transduction.<sup>67,68</sup>

## Who Is at Risk?

Getting sufficiently high dosages of all B vitamins daily not only ensures an adequate supply to meet the body's vital needs, but also enhances protection against an array of diseases.

The problem is that many older adults are deficient in their Bs for multiple reasons.

First, unlike *fat-soluble* vitamins that are stored by the body (such as vitamins K and D), the *water-soluble* **B vitamins** must be resupplied daily.

Additionally, some circumstances either boost the body's demand for B vitamins or greatly inhibit vitamin B absorption, making supplementation necessary.

The following information highlights those individuals with the greatest risk of a deficiency. For these individuals, the need for a daily, *high-potency* B-complex supplement can be much more critical.

## Older adults

Deficiencies in vitamins B6, folate, and B12 are common in the elderly.<sup>43-46</sup>

Many older adults experience a decline in their appetite, reducing their overall dietary intake of *all* B vitamins.

Even when they do consume B vitamins, older individuals may be unable to *absorb* naturally occurring vitamin B12. That's because adequate stomach acid is required for B12 to be released from food, and many aging adults do not produce enough stomach acid.<sup>47</sup>

Deficiencies of B12 are associated with a host of symptoms, including sore tongue, depression, weakness, digestive disturbances, cognitive problems, and tingling in the limbs.<sup>47,48</sup>

## Those Who Take Certain Medications

Commonly prescribed drugs that reduce stomach acid production (called proton pump inhibitors) decrease absorption of vitamin B12.<sup>49</sup>

Metformin, the popular diabetes drug, is known to interfere with the absorption of vitamin B12.<sup>50,51</sup>

Birth control pills can deplete vitamins B2, B6, folic acid, and B12.<sup>52</sup>

## Pregnant or Breastfeeding Women

B vitamins, especially vitamin B12, are important for healthy fetal development. A deficiency in either vitamin B12 or folate in breast-feeding or pregnant women can result in severe neurological damage or birth defects in the infant or fetus.<sup>53,54</sup>

## Patients with Certain Medical Conditions

People suffering from alcoholism, hypothyroidism, anorexia, celiac disease, and Crohn's disease have a much greater risk of developing a deficiency in B vitamins.<sup>55-59</sup>

Also, a certain genetic mutation (called **MTHFR**) can affect how the body metabolizes folate, leading to a folate deficiency.<sup>60</sup> This mutation can also cause elevated levels of serum homocysteine,<sup>60</sup> which vitamin B supplementation can help prevent.<sup>61</sup>

Weight-loss surgery also increases the risk of a deficiency in B vitamins.<sup>62</sup>

## Vegetarians and Vegans

Because they avoid meat and animal products, vegans and strict vegetarians may be at risk of a B12 deficiency unless they take a supplement.<sup>63</sup>

This deficiency can lead to digestive disturbances, anemia and blood disorders, and fatigue, but it principally affects the peripheral nerves. In later stages, it may target the spinal cord.<sup>48,64,65</sup>

Impaired mental function is the usual result, often manifesting as slower thinking, attention deficits, and memory lapses.<sup>65</sup>

## Those Who Consume Alcohol

In those who abuse alcohol, thiamine (B1) deficiency occurs in up to **80%** of cases and is a key mechanism for the brain-damaging effects of chronic alcohol intake. The reasons for thiamine deficiency in alcoholics have been theorized to include:<sup>66</sup>

- Inadequate nutrition (as a result of alcohol replacing a quality diet),
- Decreased thiamine absorption from the gastrointestinal tract and reduced cell uptake, and
- Impaired utilization of thiamine within the cells.

## Summary

B vitamins are required for critical body functions.

The body does not store B vitamins, and some circumstances, such as older age, significantly boost the body's demand for B vitamins.

These factors make daily supplementation with **B-complex vitamins** an important component of a comprehensive wellness program.

If you have any questions on the scientific content of this article, please call a Life Extension® Wellness Specialist at 1-866-864-3027.

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