

METHYLCOBALAMINE

by Margy Squires

to B12 or Not to B12

B12

B AWARE

The word vitamin comes from the word *vita* meaning life and *mines* meaning *chemical structures*. Vitamins are considered critical to life as the body does not make them and thus need to be supplied daily by diet. Interestingly, the first vitamin was marketed in 1925. In 1934, two Boston researchers (Minot & Murphy) received the Nobel Prize in Medicine for discovering a treatment for pernicious anemia, a fatal anemia at that time. We now know that liver contains the best source for vitamin B12 and it's the treatment of choice for today. You will soon find out why the B vitamins, and specifically B12, are the chemical structures of life.

Normally when you talk about B vitamins, it's a family affair as they work in harmony for the health of the heart, brain and nervous system, eyes, skin and other organs. It's the entire family involvement that helps you metabolize carbohydrates, fats and proteins for energy, promote red blood cell and bone development, and assist in the growth and repair of tissues. What the B family is most known for, however, is their reputation for peppering up energy and thinking, plus destressing frazzled nerves. Like other families, each has a different chemical structure and individual function, but the absence of one affects the collective whole. Taking a B complex insures that you keep a proper balance and not play favorites. But like other families, there's always one who's a little bit, shall we say, *different*. B12 is the *different* B in the family.

B DIFFERENT

B12 is the beautiful one in the family, with strikingly dark red crystals. It's also the most chemically complex; a large molecule wrapped around a tiny amount of the mineral cobalt. There are actually four different forms of B12 but for food and nutritional supplementation, the stable form of cyanocobalamin is the principal form used and will be the one represented in this article. While excess of other B vitamins are excreted via the kidneys, B12 differs again by storing excess in the liver for future use. In spite of this unusual behavior from a water soluble vitamin, B12 deficiency still occurs. Danger zones for deficiency adversely affect the heart, brain and nervous system.

B ENERGETIC & STRONG

B12's principle role is in stimulating stem cells in bone marrow which make red blood cells (RBC). If adequate B12 is not available, RBCs are released misshapen and immature and unable to function properly. Without these oxygen supplying cells, you face eventual anemia, fatigue, mental confusion and, if left untreated, death. Recently, B12's role in stimulating osteoblasts for bone strength has been discovered as well.

B SMOOTH: BLOOD VESSELS

In the natural process of breaking down proteins, the amino acid byproduct, *homocysteine*, is formed. Too much homocysteine can cause damage to endothelial cells that line vessel walls of arteries and veins, making them rough. It also makes blood stickier and form clots easier. When sticky blood and/or clots travel through rough walls, you run the risk of developing cholesterol blocking coronary artery disease, phlebitis (problems with leg vein circulation), varicose veins or stroke. B12 needs the help of folic acid and B6 to help break down and clear out excess homocysteine.

B CAREFUL: MULTIPLE SCLEROSIS

B12 helps MS in two ways. First, it is needed to build myelin, the protective sheath around nerve cells that gets damaged in MS and causes visual problems, muscle weakness and lack of coordination. There is no satisfactory treatment, even with drugs. Low level folic acid and B12 is documented in numerous studies. MS patients also have a mild form of *macrocytosis*, immature red blood cells commonly found—but which in MS seldom develop into—pernicious anemia that could account for their fatigue. Treatment with B12 injections or sublingual B12 can be helpful for both the myelin, fatigue, and possibly other symptoms of MS.

B WARY VEGANS

Low B12 can be found in anyone with decreased meat consumption since most dietary sources are from liver, fish and dairy. For pure vegans, getting enough dietary B12 is a problem and they would definitely benefit from supplementation. Babies breast fed from vegan mothers risk being B12 deficient as well, which will affect the health of their nervous system, plus their ability to grow and develop properly.

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B SIDES

Besides the above, B12 is believed to help cancer (with assistance from folic acid) by protecting DNA material. Genetic mutations may contribute to cancer's development and subsequent replication. Low levels of the B vitamins are found in diabetes as the disease process uses more of them, which may account for peripheral nerve damage. B12 and B6 put on neuro-protective armor. Other nerve related disorders that B12 benefits include tinnitus, shingles, and Alzheimer's. Additionally, the neurotransmitters acetylcholine (memory and learning), serotonin (pain, mood, sleep) and dopamine (movement, emotion) all require B12 for proper functioning.

Deficiency symptoms

Given some of the disorders listed, the initial symptoms of B12 deficiency can include pallor, fatigue, confusion and then progress to tingling and numbness in arms and legs, muscle weakness, tinnitus, hearing loss and low mood. System wide, B12 deficiency can contribute to or aggravate symptoms in coronary artery disease, diabetes, Alzheimer's, cancer and multiple sclerosis, bone disorders, and psychoses.

How much is enough?

The recommended daily allowance (RDA) now known as the daily value

(DV) for B12 is a mere 2-6 mcg. The problem with such a low dose is that it was established when Americans were consuming lots of whole grain breads and cereals and less chemically processed foods. When therapeutic B12 is given, oral doses minimally start at 500-1000 mcg; weekly injections at 1000 mcg. Deficiency can occur for two major reasons. *Intrinsic factor* is a stomach enzyme which helps transport B12 to the intestines. This enzyme decreases with age. The second factor involves a proper amount of bacteria in the intestines to breakdown B12 for its ultimate absorption into the bloodstream. Altering either of these factors affects the availability of B12.

B12 robbers include a number of drugs: alcohol, antidepressants, diuretics, cardiac or cholesterol lowering drugs and antibiotics in particular (which reduce intestinal bacteria). Certain disease processes interfere with B12 absorption, especially those involving the stomach (ulcers, low digestive enzymes or hydrochloric acid) and intestines (Crohn's, Celiac sprue, candida).

B SMART

Since B12 is stored in the liver, it can take 5-6 years for deficiency symptoms to show up. Given its safety, even at daily amounts of 500-1000 mcg, supplementation seem smart for the many health benefits B12 provides. As you've read, malabsorption of B12 is a problem, especially through the gut. Sublingual B12 allows for more direct absorption. For more serious problems,

health care professionals often offer high dose B12 by intra-muscular injection to rapidly restore levels to normal.

B WARNED

B12 is well tolerated even at large doses and there are no reported cases of overdose. Those with Leber's optic atrophy, a congenital disorder associated with chronic cyanide intoxication, however, should not use B12. If a B12 deficiency is suspected, folic acid should be checked as well. These two B's are like fraternal twins, often packaged together since taking one affects the balance of the other. If you do decide to take single B's such as B12, make sure you also take along the rest of the family either in a B complex or as part of a multiple vitamin group.

Summary

There's no doubt that B12 fits the *chemical structure of life* definition for a vitamin. Its role in keeping the blood in your vessels oxygenated and moving, your brain and nervous system in order, and your genetic material intact make it one beautiful member of the family.

Resources

1. Berkson, Burt MD. *All About B Vitamins*. FAQ. 1998, Avery.
2. Lieberman, Shari, PhD. *The Real Vitamin & Mineral Book* (2nd Edit). 1997, Avery.
3. *PDR for Nutritional Supplements*. 2001, Medical Economics.
4. Ricker, Ruth PhD. *Smart Guide to Vitamins & Healing Supplements*. 1998, Wiley & Sons.

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THE B FAMILY

Thiamin (B1) • Riboflavin (B2)
Niacin (B3) • Pantothenic Acid (B5)
Pyridoxine (B6) • Cobalamin (B12)
Folic Acid • Biotin • Choline Inositol
Paraminolenzoic (PABA)

**No one is sure why there is no B4, B8-B11. Most researchers prefer to call them by their names rather than numbers for clarity.*

