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What Every Vegan Should Know about Vitamin B12

An Open Letter from Health Professionals and Vegan Organizations

Recommendations

Very low B12 intakes can cause anemia and nervous system damage.

The only reliable vegan sources of B12 are foods fortified with B12 (including some plant milks, some soy products and some breakfast cereals) and B12 supplements. Vitamin B12, whether in supplements, fortified foods, or animal products, comes from micro-organisms.

Most vegans consume enough B12 to avoid anemia and nervous system damage, but many do not get enough to minimize potential risk of heart disease or pregnancy complications.

To get the full benefit of a vegan diet, vegans should do one of the following:

1. Eat fortified foods two or three times a day to get at least three micrograms (mcg or μg) of B12 a day or
2. Take one B12 supplement daily providing at least 10 micrograms or
3. Take a weekly B12 supplement providing at least 2000 micrograms.

If relying on fortified foods, check the labels carefully to make sure you are getting enough B12. For example, if a fortified plant milk contains 1 microgram of B12 per serving then consuming three servings a day will provide adequate vitamin B12. Others may find the use of B12 supplements more convenient and economical.

The less frequently you obtain B12 the more B12 you need to take, as B12 is best absorbed in small amounts. The recommendations above take full account of this. There is no harm in exceeding the recommended amounts or combining more than one option.

This information sheet was prepared by Stephen Walsh, a UK Vegan Society trustee, and other members of the International Vegetarian Union science group (IVU-SCI), in October 2001. The information may be freely reproduced but only in its entirety (list of endorsers may be omitted).

Good information supports vegan health, pass it around.

If you don't read another word about B12, you already know all you need to know. If you want to know more, read on.

Endorsers include:

- [Association végétarienne de France](#)
- [Eating Together](#), European Lifelong learning programme
- [Ethisch Vegetarisch Alternatief \(EVA\)](#), Belgium
- [Farm Animal Rights Movement \(FARM\)](#)
- [People for the Ethical Treatment of Animals \(PETA\)](#)
- [Société végane](#), France
- [Vegan Action](#), USA
- [Vegan Outreach](#), USA
- [The Vegan Society](#), (UK)
- Paul Appleby, medical statistician, UK
- Luciana Baroni, Neurologist-Geriatrician, President of [Società Scientifica di Nutrizione Vegetariana](#), Italy
- Amanda Benham, R. D., Australia
- Dr Glynis Dallas-Chapman, M. B., B. S., UK
- Brenda Davis, R. D., Co-author of *Becoming Vegan*, www.brendadavisrd.com, B. C., Canada
- [William Harris](#), M. D., US
- Alex Hershaft, Ph. D., President, [FARM](#)
- Michael Greger, M. D., www.veganmd.org, USA
- Stephen R. Kaufman, M. D., USA
- Dr Gill Langley, M. A., Ph. D., M. I. Biol., author of *Vegan Nutrition*, UK
- Vesanto Melina, M. S., R. D., Co-author of *Becoming Vegan*, <http://www.nutrispeak.com/>
- Virginia Messina, M. P. H., R. D., Co-author of the *Dietitian's Guide to Vegetarian Diets*, <http://www.vegnutrition.com/index.html>
- Jack Norris, R. D., [Vegan Outreach](#) director and author of [Staying Healthy on Plant-Based Diets](#) and a [B12 Review](#)
- Dr John Wedderburn, M. B., Ch. B., Founder of the [Hong Kong Vegan Association](#)
- Mark Rifkin, M. S., R. D., L. D. N.

Lessons from History

B12 is an exceptional vitamin. It is required in smaller amounts than any other known vitamin. Ten micrograms of B12 spread over a day appears to supply as much as the body can use. In the absence of any apparent dietary supply, deficiency symptoms usually take five years or more to develop in adults, though some people experience problems within a year. A very small number of individuals with no obvious reliable source appear to avoid clinical deficiency symptoms for twenty years or more. B12 is the only vitamin that is not recognized as being reliably supplied from a varied wholefood, plant-based diet with plenty of fruit and vegetables, together with exposure to sun. Many herbivorous mammals, including cattle and sheep, absorb B12 produced by bacteria in their own digestive system. B12 is found to some extent in soil and plants. These observations have led some vegans to suggest that B12 was an issue requiring no special attention, or even an elaborate hoax. Others have proposed specific foods, including spirulina, nori, tempeh, and barley grass, as suitable non-animal sources of B12. Such claims have not stood the test of time.

In over 60 years of vegan experimentation only B12 fortified foods and B12 supplements have proven themselves as reliable sources of B12, capable of supporting optimal health. It is very important that all vegans ensure they have an adequate intake of B12, from fortified foods or supplements. This will benefit our health and help to attract others to veganism through our example.

Getting an Adequate Amount of B12

National recommendations for B12 intakes vary significantly from country to country. The US recommended intake is 2.4 mcgs a day for ordinary adults rising to 2.8 mcgs for nursing mothers. The German recommendation is 3 mcgs a day. Recommended intakes are usually based on 50% absorption, as this is typical for small amounts from foods. To meet the US and German recommendations you need to obtain sufficient B12 to absorb 1.5 mcgs per day on average. This amount should be sufficient to avoid even the initial signs of inadequate B12 intake, such as slightly elevated homocysteine and methylmalonic acid (MMA) levels, in most people. Even slightly elevated homocysteine is associated with increased risk of many health problems including heart disease in adults, preeclampsia during pregnancy and neural tube defects in babies.

Achieving an adequate B12 intake is easy and there are several methods to suit individual preferences. Absorption of B12 varies from about 50%, if about 1 mcg or less is consumed, to about 0.5% for doses of 1000 mcgs (1 mg) or above. So the less frequently you consume B12, the higher the total amount needs to be to give the desired absorbed amount.

Frequent use of foods fortified with B12 so that about one microgram of B12 is consumed three times a day with a few hours in between will provide an adequate amount. Availability of fortified foods varies from country to country and amounts of B12 vary from brand to brand, so ensuring an adequate B12 supply from fortified foods requires some label reading and thought to work out an adequate pattern to suit individual tastes and local products.

Taking a B12 supplement containing 10 mcgs or more daily provides a similar absorbed amount to consuming 1 mcg on three occasions through the day. This may be the most economical method as a single high potency tablet can be consumed bit by bit. 2000 mcgs of B12 consumed once a week would also provide an adequate intake. Any B12 supplement tablet should be chewed or allowed to dissolve in the mouth to enhance absorption. Tablets should be kept in an opaque container. As with any supplement it is prudent not to take more than is required for maximum benefit, so intakes above 5000 mcg per week should be avoided despite lack of evidence for toxicity from higher amounts.

All three options above should meet the needs of the vast majority of people with normal B12 metabolism. Individuals with impaired B12 absorption may find that the third method, 2000 mcg once a week, works best as it does not rely on normal intrinsic factor in the gut. There are other, very rare, metabolic defects that require completely different approaches to meeting B12 requirements. If you have any reason to suspect a serious health problem seek medical advice promptly.

Symptoms of B12 Deficiency

Clinical deficiency can cause anemia or nervous system damage. Most vegans consume enough B12 to avoid clinical deficiency. Two subgroups of vegans are at particular risk of B12 deficiency: long-term vegans who avoid common fortified foods (such as raw food vegans or macrobiotic vegans) and breastfed infants of vegan mothers whose own intake of B12 is low.

In adults, typical deficiency symptoms include loss of energy, tingling, numbness, reduced sensitivity to pain or pressure, blurred vision, abnormal gait, sore tongue, poor memory, confusion, hallucinations and personality changes. Often these symptoms develop gradually over several months to a year before being recognized as being due to B12 deficiency and they are usually reversible on administration of B12. There is however no entirely consistent and reliable set of symptoms and there are cases of permanent damage in adults from B12 deficiency. If you suspect a problem then get a skilled diagnosis from a medical practitioner as each of these symptoms can also be caused by problems other than B12 deficiency.

Infants typically show more rapid onset of symptoms than adults. B12 deficiency may lead to loss of energy and appetite and failure to thrive. If not promptly corrected this can progress to coma or death. Again there is no entirely consistent pattern of symptoms. Infants are more vulnerable to permanent damage than adults. Some make a full recovery, but others show retarded development.

The risk to these groups alone is reason enough to call on all vegans to give a consistent message as to the importance of B12 and to set a positive example. Every case of B12 deficiency in a vegan infant or an ill informed adult is a tragedy and brings veganism into disrepute.

The Homocysteine Connection

This is not however the end of the story. Most vegans show adequate B12 levels to make clinical deficiency unlikely but nonetheless show restricted activity of B12

related enzymes, leading to elevated homocysteine levels. Strong evidence has been gathered over the past decade that even slightly elevated homocysteine levels increase risk of heart disease and stroke and pregnancy complications. Homocysteine levels are also affected by other nutrients, most notably folate. General recommendations for increased intakes of folate are aimed at reducing levels of homocysteine and avoiding these risks. Vegan intakes of folate are generally good, particularly if plenty of green vegetables are eaten. However, repeated observations of elevated homocysteine in vegans, and to a lesser extent in other vegetarians, show conclusively that B12 intake needs to be adequate as well to avoid unnecessary risk.

Testing B12 Status

A blood B12 level measurement is a very unreliable test for vegans, particularly for vegans using any form of algae. Algae and some other plant foods contain B12-analogues (false B12) that can imitate true B12 in blood tests while actually interfering with B12 metabolism. Blood counts are also unreliable as high folate intakes suppress the anemia symptoms of B12 deficiency that can be detected by blood counts. Blood homocysteine testing is more reliable, with levels less than 10 $\mu\text{mol/litre}$ being desirable. The most specific test for B12 status is methylmalonic acid (MMA) testing. If this is in the normal range in blood (<370 nmol/L) or urine (less than 4 $\mu\text{g/mg}$ creatinine) then your body has enough B12. Many doctors still rely on blood B12 levels and blood counts. These are not adequate, especially in vegans.

Is There a Vegan Alternative to B12-Fortified Foods and Supplements?

If for any reason you choose not to use fortified foods or supplements you should recognize that you are carrying out a dangerous experiment - one that many have tried before with consistently low levels of success. If you are an adult who is neither breast-feeding an infant, pregnant nor seeking to become pregnant, and wish to test a potential B12 source that has not already been shown to be inadequate, then this can be a reasonable course of action with appropriate precautions. For your own protection, you should arrange to have your B12 status checked annually. If homocysteine or MMA is even modestly elevated then you are endangering your health if you persist.

If you are breast feeding an infant, pregnant or seeking to become pregnant or are an adult contemplating carrying out such an experiment on a child, then don't take the risk. It is simply unjustifiable.

Claimed sources of B12 that have been shown through direct studies of vegans to be inadequate include human gut bacteria, spirulina, dried nori, barley grass and most other seaweeds. Several studies of raw food vegans have shown that raw food offers no special protection.

Reports that B12 has been measured in a food are not enough to qualify that food as a reliable B12 source. It is difficult to distinguish true B12 from analogues that can disrupt B12 metabolism. Even if true B12 is present in a food, it may be rendered ineffective if analogues are present in comparable amounts to the true B12. There is only one reliable test for a B12 source – does it consistently prevent and correct

deficiency? Anyone proposing a particular food as a B12 source should be challenged to present such evidence.

A Natural, Healthy and Compassionate Diet

To be truly healthful, a diet must be best not just for individuals in isolation but must allow all six billion people to thrive and achieve a sustainable coexistence with the many other species that form the “living earth.” From this standpoint the natural adaptation for most (possibly all) humans in the modern world is a vegan diet. There is nothing natural about the abomination of modern factory farming and its attempt to reduce living, feeling beings to machines. In choosing to use fortified foods or B12 supplements, vegans are taking their B12 from the same source as every other animal on the planet – micro-organisms – without causing suffering to any sentient being or causing environmental damage.

Vegans using adequate amounts of fortified foods or B12 supplements are much less likely to suffer from B12 deficiency than the typical meat eater. The Institute of Medicine, in setting the US recommended intakes for B12 makes this very clear. “Because 10 to 30 percent of older people may be unable to absorb naturally occurring vitamin B12, it is advisable for those older than 50 years to meet their RDA mainly by consuming foods fortified with vitamin B12 or a vitamin B12-containing supplement.” Vegans should take this advice about 50 years younger, to the benefit of both themselves and the animals. B12 need never be a problem for well-informed vegans.

Good information supports vegan health, pass it around.

Further Information :

- [*Dietary Reference Intakes for Thiamin, Riboflavin, Niacin, Vitamin B6, Folate, Vitamin B12, Pantothenic Acid, Biotin, and Choline*](#), National Academy Press, 1998, ISBN 0-309-06554-2.
- [*Vitamin B12: Are You Getting It?*](#), Jack Norris (Registered Dietitian).
- *Homocysteine in Health and Disease*, éd. Ralph Carmel et Donald W. Jacobsen, Cambridge University Press, 2001, ISBN 0-521-65319-3.