

# Vitamin B12

## Early Signs of B12 Deficiency

According to Crane et al. (1994, USA), the usual vegan patient has no clinical symptoms or signs of inadequate B12. Early manifestations are unusual fatigue, faulty digestion (no appetite or nausea) and loss of menstruation. Other symptoms are nervousness, numbness and tingling of the hands and feet, mild depression, striking behavioural changes, paranoia, hyperactive reflexes, fever of unknown origin, frequent upper respiratory infections, impotence, impaired memory, infertility, sore tongue, and diarrhoea.

## Vitamin B12

The term B12 encompasses a group of related substances known as cobalamins. It is commonly but inaccurately believed that animal foods are the only source. In fact, active B12 is thought to be unique among vitamins in being made only by bacteria. The B12 found in meat (especially offal), eggs and dairy milk derives from the activity of bacteria living within the animals. Prolonged cooking, including boiling of cow's milk, destroys B12.

Deficiency is rare but may lead to abnormally enlarged red blood cells which characterize megaloblastic anaemia. Vitamin B12 is also crucial for a healthy nervous system, and a chronic lack can eventually cause neurological symptoms.

Most cases of B12 deficiency occur in the general population and are due to a lack of intrinsic factor (a protein which is produced in the stomach and which ferries the B12 into the bloodstream), without which little of the vitamin can be absorbed. This type of deficiency leads to pernicious anaemia; causes include small bowel disorders, the effects of some drugs, smoking and alcohol, gastric atrophy due to aging, and some parasitic infections. Pernicious anaemia occurs in nearly 1% of the general population over the age of 60 years.

## Vitamin B12 Requirements

In 1991 the UK's Department of Health recommended Reference Nutrient Intake (RNI) for B12 was: The RNI is a daily amount that is enough or more than enough for 97% of people. The RNI is similar to the Recommended Daily Amount used previously in the UK.

### Type of Person (Amount Required)

Infants (0.3ug-0.4ug/day)

Aged 1-10 years (0.5ug increasing to 1ug/day)

Teenagers & adults (1.2-1.5ug/day)

Breast-feeding women (2ug/day)

UK official recommendations have decreased in recent years; the body's needs having been previously over-estimated. Indeed, the Department of Health recognises that some people have lower than average requirements of B12. A whole lifetime's requirement of B12 add up to a 40 milligram speck of red crystals, about one-seventh the size of an average tablet of aspirin! Taking large doses of the vitamin by mouth is pointless because 3ug is the most that can be absorbed at any one time.

Vitamin B12 can be stored in the liver, which normally contains sufficient (2-5 milligrams) for a period of 3-6 years, even in the total absence of a food source. For this reason, although official recommendations are expressed as a daily amount, it is not actually necessary to consume the vitamin every day. A regular intake, at least three times a week, is adequate. Furthermore, our bodies do recycle the vitamin from the bile as it passes through the small intestine. The vitamin is also conserved in the kidneys. At times of lower dietary intake of B12, its rate of absorption from food into the bloodstream rises, thus maximising available supplies.

## Active B12 & Analogues

Measuring the B12 content of foods is complicated by the active B12 and related substances (analogues) which resemble the vitamin. For many years, it was thought that edible seaweeds, fermented soya foods and spirulina contained high levels of B12. The amount of B12 in these foods was measured using bacterial growth as an indicator and it measured a

whole family of 'chemical look-alikes'. A newer test, called a differential radioassay, is thought to specifically measure the forms of the vitamin which the body can use. Re-analysis by this newer method of testing indicates much lower levels of B12 in many foods e.g. tempeh, which was believed to contain several micrograms of B12 per 4 ounce portion, was found on re-analysis to contain virtually no active vitamin(1)(3).

## **Reliable Vegan Sources of B12 (for UK)**

### **Type of Food (Amount of B12)**

Yeast extracts (Between 2-50ug/100g)  
Margarines (5.0ug/100g)  
Granovita Sojagen (soya powder) (5.0/100g)  
Plamil concentrated soya milk (3.2ug/100ml)  
Plamil ready to use soya milk (1.6ug/100ml)  
Breakfast cereals (0.8ug/100g)  
Unisoy Gold soya milk (1.6ug/100ml)  
Soya mince/chunks (Label claims are probably reliable)  
Other Products fortified with B12  
All Plamil soya milks  
Plamil's Veeze  
Marmite & other yeast extracts  
TVP (textured vegetable protein) products  
All Granovita margarines  
Weightwatchers Baked Beans with Vegetable Sausages  
Kellogg's: Frosties, Fruit & Fibre, Common Sense Oat Bran Flakes, Common Sense Oat Bran Flakes with Raisins & Apple  
B12 Supplements

### **B12 & Chewing**

Researchers at Loma Linda University in California studied 78 vegans and B12 supplementation. They found that vegans with low serum B12 levels increased their levels by 150% if they chewed rather than swallowed the supplement. Supplements were given once a week and those that swallowed instead of chewing only increased their levels by 12%. The researchers also questioned the efficiency of B12 absorption from multi-vitamin tablets, suggesting other constituents such as copper and iron may inhibit B12 absorption.

### **Other Sources of B12**

Grains, nuts, pulses, vegetables and other natural plant foods do not contain B12, unless they are contaminated with B12-producing bacteria from the soil. Vegans using lightly-washed home-grown produce may obtain useful amounts of the vitamin in this way. In the 1950s a research investigated why a group of Iranian vegans did not develop B12 deficiency (1). He discovered that they grew their vegetables in human manure, did not wash them carefully, and thus obtained the vitamin from bacterial contamination. Some drinking water may also contain B12.

There is also some evidence that bacteria in our intestines make B12 which our bodies can use. Adequate active B12 is produced by intestinal bacteria but generally in the colon, where it cannot be absorbed, rather than higher up in the small intestine. In some people, B12-producing bacteria certainly exist in the small intestine where the vitamin manufactured can, in theory at least, be absorbed. Exactly what contribution this makes to the daily B12 intake of vegans remains to be clarified.

### **Pregnancy, Children & B12**

A well-planned vegan diet provides adequate quantities of this vitamin for infants and children. B12 problems remain rare and thousands of children have been reared as healthy vegans. In cases where a mother has low current intake of the vitamin, deficiency can develop after a few months in solely breast-fed infants because the baby does not receive enough of the vitamin to build up its own liver stores. Ten definite reports of serious B12 deficiency in breast-fed infants of vegan mothers have appeared in the medical literature worldwide since the late 1970s. It is very important that vegan women ensure they have an adequate intake of B12 during pregnancy and breast feeding. For further information see the

section Vegan Mothers & Children in Vegan Nutrition by Dr Gill Langley (see Further Details).

### **B12 Deficiency in Vegans**

Despite the notoriety of this vitamin, dietary B12 deficiency in adult vegans is rare: some 15 cases have been recorded in the medical press worldwide since the 1980s. Not all cases will be published but it is significant that B12 deficiency is so uncommon that single case reports are still thought worthy of publication in medical journals.

### **Further Details**

The B12 story is still not fully unravelled, and more knowledge of the availability and function of different forms of the vitamin is urgently needed. Research that has been carried out on B12 and the vegan diet is documented in *Vegan Nutrition* by Dr Gill Langley.

For more details on vitamin B12 and the vegan diet in general see *Vegan Nutrition* by Gill Langley. This book is the most comprehensive survey of scientific research on vegan diets. It is ideal for vegans, would-be vegans and health care professionals. It includes highlighted key points, easy-to-follow tables and chapter summaries.

### *References*

(1) Herbert, V. (1988). *Vitamin B12: plant sources, requirements, and assay*. *Am. J. Clin. Nutr.* 48:852-858.

(2) Herbert, V., Drivas, G., Foscaldi, R., Manusselis, C., Colman, N., Kanazawa, S., Das, K., Gelernt, M., Herzlich, B. & Jennings, J. (1982). *Multivitamin/mineral food supplements containing vitamin B12 may also contain analogues of vitamin B12*. *New Engl. J. Med.* 307:255-256.

(3) Herbert, V., Drivas, G., Manusselis, C., Mackler, B., Eng, J. & Schwartz, E. (1984). *Are colon bacteria a major source of cobalamin analogues in human tissues? 24-hour human stool contains only about 5ug of cobalamin but about 100ug of apparent analogue (and 200ug of folate)*. *Trans. Assoc. Am. Physiol.* 97:161-171.

***The above report reproduced from The Vegan Society web page at [www.vegansociety.com](http://www.vegansociety.com).***

### **For more info on B12**

Go to <http://www.veganoutreach.org/health/b12.html>