Sublingual vitamin B12 tablets are a convenient and effective form of vitamin B12 supplementation, which rapidly raises serum cobalamin levels.

Main Actions
- Reduction of hyperhomocysteinaemia
- Supplementation of vegetarian diets
- Support of haemopoiesis
- Supplementation in malabsorption syndromes

Active Ingredients
Each tablet contains:

Cyanocobalamin (Vitamin B12) 1 mg*

* Contains lactose – however this amount will not cause the symptoms of lactose intolerance. This product can also be safely consumed by persons with allergy to dairy proteins (caseins).

Recommended Dosage
Adults and children over 12 years: Dissolve one tablet under the tongue once daily or as directed by your health care professional.
Children 6 to 12 years: dissolve half a tablet under the tongue once daily or as directed by your health care professional.

The active ingredients in the Nutrition Care formulations, when professionally prescribed, may assist patients suffering from specific conditions. This statement does not imply or make a claim for a cure for disorders treated with any Nutrition Care products and their use should be based on published and relevant scientific and clinical data.

Sublingual vitamin B12 as a viable alternative to parenteral and oral cobalamin supplementation
Oral cobalamin supplementation has shown to be as effective as, and possibly superior to intramuscular administration. [1, 2]
Furthermore, as was clearly demonstrated in a study published in The Lancet in 1999, sublingual B12 provides rapid restoration of serum cobalamin concentrations, and provides an effective, safe and convenient daily alternative to intramuscular injections. Absorption in sublingual preparations is very likely to be via the oromucosal route, although further research is required in this area. [3] For young or elderly patients, who may have difficulty swallowing, sublingual delivery is a particularly effective route of B12 administration.

Literature Review
Vitamin B12 is a cobalt-containing porphyrin called cobalamin, necessary for several metabolic pathways in the central nervous system. In the diet, it is bound to protein and gastric acid is required to separate the vitamin from its attached protein. Intrinsic factor, produced by the parietal cells of the stomach mucosa, is then required for its active transport in the small intestine.

Symptoms of vitamin B12 deficiency can include fatigue, shortness of breath, tingling sensations, difficulty walking, and diarrhoea. Vitamin B12 deficiency is most commonly caused by failure of intrinsic factor secretion. Other causes of vitamin deficiency include dietary insufficiency, vegetarian diets, hypochlorhydria and gastritis. Hypochlorhydria and gastritis may be associated with food intolerance. [5]

Vitamin B12 deficiency is associated with increased serum homocysteine levels. [6] High levels homocysteine of have been implicated as a risk factor for a number of conditions. Sufficient levels of vitamin B12 are essential to maintaining normal cognitive, neurological, and cardiovascular health, appropriate bone formation and reducing the risk of diabetic complications. [7-12]

Vitamin B12 can be administered orally, parenterally or as a sublingual preparation. Sublingual administration is effective and simple and avoids the problems associated with parenteral therapy, including non-compliance. [3, 13] Substitution with 1000 mcg of vitamin B12 twice daily raises serum vitamin B12 levels 4-fold to therapeutic values within 7-12 days. [3] Treatment needs to continue at high doses to maintain high serum vitamin B12. [14]

Vitamin B12 status
Levels of vitamin B12 are not an accurately predictor of the need for supplementation. Neuropathies and other consequences may occur when B12 status is borderline, as a consequence supplementation is indicated at such levels. [14, 15] Even in an early stage of B12 deficiency there may be subtle haematological or neuropsychiatric manifestations. [6]

Homocysteine levels may rise up to a year before there is a fall in serum vitamin B12. [15, 16] Measures of homocysteine and methylmalonic acid provide a more sensitive assessment of vitamin B12 status, as their elevated levels suggest intracellular deficiency, even in the absence of overt vitamin B12 deficiency.

Not only can folate mask haematologic symptoms of B12 deficiency, but also high serum folate has been associated with cognitive impairment and anaemia in elderly Americans with low vitamin B-12 status, and may aggravate neurologic symptoms. Conversely, when vitamin B-12 status was normal, high serum folate was protective against cognitive impairment. [17] In other words, the cognitive impairment and anaemia associated with low vitamin B-12 status are much worse with high folate status.

Vegetarians have been found to display metabolic features indicating vitamin B12 deficiency. The degree of deficiency correlates with the degree of animal product restriction (vegans more than ovolactovegetarians). This B12 deficiency led to a significant increase in total homocysteine concentrations, despite being folate replete. [18]

Cardiovascular Conditions
Haemopoiesis is impaired by vitamin B12 or folate deficiency because of their role in DNA synthesis. In erythrocytes, these changes are described as megaloblastic because the cells appear abnormally large, hence the term, megaloblastic anaemia.

High homocysteine levels are an independent risk factor for cardiovascular disease, especially atherosclerosis and heart attack. [9] Where hyperhomocysteinaemia is caused by
homocysteine levels can be reduced by their supplementation. [19]

**Maternal vitamin B12 status**

Maternal homocysteine levels predict foetal homocysteine levels and so optimal vitamin B12 status is important to prevent pregnancy complications. [20]

Low plasma B12 is an independent risk factor for neural tube defects including spina bifida and supplementation with both vitamin B12 and folate is recommended. [21, 22]

As discussed above, vitamin B12 deficiency symptoms can be aggravated with administration of folic acid, which is routine for women during peri-conception and pregnancy. Therefore it seems prudent to consider B12 status in these women. Routine co-supplementation of B12 is probably advisable when folate is administered. This is, of course, especially pertinent for vegetarian women.

**Nervous System**

Vitamin B12 deficiency is associated with mood changes. In older women with B12 deficiency this is more pronounced. [23] Vitamin B12 is essential to the role of the folate cycle in the remethylation of homocysteine to regenerate methionine, the precursor for the body’s most important methyl donor S-adenosylmethionine (SAME). Decreased levels of SAME impacts negatively throughout the body. SAME plays a pivotal role in the nervous system, in phospholipid methylation and cellular integrity, and the production of monoamine neurotransmitters. [24, 25]

Multiple sclerosis patients have low vitamin B12 levels and supplementation may improve their neurologic and fatigue symptoms. [7, 26]

Deficiency of vitamin B12 may lead to polyneuropathies and their associated problems. [4, 27, 28] A systematic review of clinical controlled trials, found that vitamin B12 supplementation conferred beneficial effects on somatic symptoms, such as pain and paresthesia in subjects with diabetic neuropathy. [29]

B12 deficiency may affect the auditory pathway leading to increased incidence of tinnitus. [30]

Some patients diagnosed with Alzheimer’s disease or senile dementia may have an unrecognised B12 deficiency. Patients with Alzheimer’s disease demonstrate a direct relationship between vitamin B12 status and severity of cognitive impairment. [31] Vitamin B12 improves daytime vigilance of patients with Alzheimer’s disease. [32]

**Vitamin B12 deficiency in seniors**

Vitamin B12 deficiency is relatively common in the elderly, often as a result of decreased absorption from dietary sources. [23, 33] Low stomach acid may contribute to this deficiency. [8] In view of the complications of vitamin B12 deficiency, such as the neurological effects described above, and the potential of folate to mask clinical signs such as macrocytic anaemia, B12 status is an important consideration in elderly patients.

**Other**

In addition to hypochlorhydria or lack of intrinsic factor, other digestive disturbances can also negatively affect vitamin B12 status. A study of 86 children with intestinal parasitic infections showed that plasma B12 levels increased after 3 months of anti-parasitic treatment. [34]

Inflammatory bowel disease due to reduced absorption, [5] and is common in celiac disease and may be the presenting manifestation. [5, 35]

Low levels of vitamin B12 have been found in patients with chronic idiopathic urticaria. [36]

Patients receiving methotrexate therapy for rheumatoid arthritis may also be receiving folate to reduce the toxic effects of methotrexate. Folate can mask symptoms and even exacerbate the effects of vitamin B12 deficiency, which has been associated with rheumatoid arthritis. [37]

A possible explanation of the relationships between vitamin B12 deficiency and certain disorders, such as Alzheimer’s disease and rheumatoid arthritis, is its association with elevated levels of tumor necrosis factor-alpha and decreased levels of epidermal growth factor, suggesting a mechanism for the neuropathology of vitamin B12 deficiency. [38]

It is not surprising, given the relationship between poor digestion and vitamin B12 deficiency, that patients receiving losec (omeprazole), ranitidine or cimetidine treatment to reduce gastric acid secretion in heartburn or peptic ulcer would have decreased vitamin B12 absorption. [39, 40]

**Complementary considerations**

Folic acid is synergistic with vitamin B12, and supplementation of folic acid should always be accompanied by vitamin B12 supplementation to avoid masking a vitamin B12 deficiency and worsening its deleterious effects e.g. aggravating neurologic symptoms. [17] In hyperhomocysteinemia, supplement with vitamin B12, B6, folate, choline and betaine hydrochloride.

**References**


