

Vitamin B₁₂ in Health: A Review

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Abstract:

Vitamin B-12 was discovered in 1948 in the liver of animals, as a result of three scientists—Whipple, Minot and Murphy, looking into what caused pernicious anemia, which until the time of their discovery was deadly. In 1934 they discovered that a liver, a very rich source of B12, could be used to treat pernicious anemia (inability of the bloodstream to carry oxygen). When the discovery was made this deadly disease became treatable, if caught in time. The substance found in the liver, later became identified as vitamin B-12. It was not until 1960's, however, that the full chemical structure of B12 was not identified.

Vitamin B12 [or B-12], also called cobalamin, is a water soluble vitamin with a key role in the normal functioning of the brain and nervous system, and for the formation of blood. It is normally involved in the metabolism of every cell of the human body, especially affecting DNA synthesis and regulation, but also fatty acid synthesis and energy production.

Keywords:

Vitamin b12, cobalamine, anemia

INTRODUCTION:

It's the only vitamin that contains trace element-cobalt, hence the name cobalamine. It is the only vitamin that cannot be synthesized by plants. It is thought to believe that B-12 is produced in the gut of animals, making it the only vitamin you cannot get from plants of sunlight.

Dietary sources:

Vitamin B₁₂ can be found in large quantities in animal products, including meat, poultry, fish, seafood, eggs, and dairy products; and the consumption of these products is the most longstanding method by which human beings have taken vitamin B₁₂ into their systems. Bioavailability of B₁₂ in eggs is low (<9%) compared to other animal food sources [1]

People Who Are Prone To B12 Deficiency:

Those who had undergone gastric surgery [gastric bypass], those who had partial or complete stomach resections, those with Crohn's disease, with enteritis, those with hyperthyroidism, pregnancy, extreme stress, alcohol and recreational drugs cause B-12 malabsorption and, thus, deficiency, those who have been exposed to nitrous oxide [drug used in surgeries as anesthetic, even in dental surgeries, toxins such as mercury, found in some vaccination shots, inborn errors of B-12 metabolism [sometimes hereditary], vegans, vegetarians [2], women who had to have C-section, breastfeeding mothers, malnutrition, eating disorders, malabsorption syndrome [3], inflammatory bowel disease, advanced liver disease, genetic mutations etc.

Megaloblastic anemia:

Vitamin B-12 contributes to healthy blood cells, and low levels of the vitamin lead to blood disorders. Under normal conditions, vitamin B-12 contributes to the formation of healthy red blood cells by helping your body produce hemoglobin, the primary protein involved in oxygen transport. In the absence of sufficient vitamin B-12, your body can no longer produce fully developed red blood cells, leading to megaloblastic anemia, also called pernicious anemia. This type of anemia occurs due to the

abnormal development of red blood cells, the oxygen-carrying cells in your bloodstream, and causes difficulty walking, fatigue, weight loss and diarrhea. Patients with megaloblastic anemia display misshapen and underdeveloped red blood cells that prove less capable of transporting oxygen to their tissues. [4]

Vitamin b12 and neural tube defects”

Deficient or inadequate maternal vitamin B12 status is associated with a significantly increased risk for neural tube defects [5]. A significant reduction in NTD has been reported since folate fortification of the US food supply [6] Vitamin B12 (B12), as methylcobalamin, is the key cofactor for methionine synthase, co-contributing with folate to the capacity for remethylation of tHcy. What remains unknown is the degree to which low maternal B12 status increases the risk of NTDs [7] Improving vitamin B12 intakes might result in higher functioning of the Enzyme methionine synthase that converts homocysteine to methionine [8]

Vitamin B12 and Cardiovascular Disease (CVD)

Increased level of plasma homocysteine is been recognized as an important risk factor for CVD. Supplementation with folic acid and other B vitamins, a relatively inexpensive way of reducing plasma homocysteine levels, might be a way to lower CVD risk.[9][10]

Vitamin b12 and myelination:

Vitamin B-12 is necessary for the production of myelin in your body. Myelin is a type of fat that coats the nerve branches that extend to your organs, bones, muscles and connective tissues. It also coats the nerve bundles that make up your spinal cord. Myelin forms a protective sheath that helps protect nerves against damage from toxins in your body.

Deficiency of dietary vitamin B-12 may result in demyelination, or loss of the myelin sheaths that coat nerve cells. Demyelination may impair psychomotor activity, which involves speed or cognitive activity and physical reaction. Vitamin B-12 deficiency may cause neurological symptoms such as numbness and tingling sensations, particularly in your extremities. A severe deficiency of this

vitamin may result in permanent neurological damage, according to the University of Maryland Medical Center.

Malabsorption:

Malabsorption of vitamin B-12 from food is the main cause of deficiency in the elderly and explains why depletion occurs with aging. The condition is caused by atrophy of the gastric mucosa and the gradual loss of gastric acid, which releases the vitamin from food. In its early stages, gastric inflammation and elevated serum gastrin concentrations are common. In elderly persons in the Framingham Offspring Study, 24% of those aged 60–69 y and 37% of those aged ≥80 y had elevated serum gastrin [11]

Vitamin B12 and cancer:

The important function of vitamin b12 is the repair of DNA that is damaged by radiation or oxidation thus it helps in protection against cancer. Low levels of b12 are associated with cancer of the cervix [12] and the breast [13] in humans. But their effect on cancer is contradictory.

Effect on fertility:

it has a role in replication so its deficiency can cause low sperm count. as it a cause of pernicious anemia it leads to infertility. The supplements of b12 can help in conception in women[14]. Hypercoagulability due to raised homocysteine levels may lead to fetal loss when vitamin B12 deficiency first develops. A more prolonged deficiency results in infertility by causing changes in ovulation or development of the ovum or changes leading to defective implantation.[15]

CONCLUSION:

Our bodies need 13 different vitamins to stay alive and remain healthy. B12 is one of them. B12 helps maintain the nervous and reproductive systems. Vitamin B12 levels might modestly influence the development of cancer owing to genetic polymorphisms. Recent studies show that b12 can help cure infertility and miscarriages.

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