

FEATURE

Recent Advances in research

VITAMIN B12

With Dr Bevan Hokin (Ph.D) Director, SAH Pathology & Member
ARI Research Advisory Committee



As more and more people recognise the advantages of a vegetarian diet and reduce their animal product intake, there has been an increasing awareness of the dangers that can result from B12 deficiencies. Dr Bevan Hokin is an authority on this subject, having been an active researcher in this area for the past 15 years. Dr Hokin is a researcher with the Australasian Research Institute and is currently Director of Clinical Laboratories at Sydney Adventist Hospital. In this edition of ARI-News, he shares with us the latest information regarding this important topic.

Vitamin B12 is involved in two critical processes within the body – maintenance of the myelin sheath in the nervous system and a specialised reaction that is required for DNA formation synthesis. It is crucial for all cell division.

There is also an integral relationship between the vitamin B12 and Folate. A deficiency in one can mimic or mask a deficiency in the other.

All vitamin B12 is made by bacterial action. The usual dietary source of vitamin B12 for meat eaters (omnivores) is 'second hand' from the consumption of flesh foods, fish and other seafoods.



Lacto-ovo vegetarians (vegetarians who consume eggs and dairy products) source vitamin B12 from milk, yoghurt, cheese and eggs. Vegans (who consume no animal products) may source vitamin B12 from fortified foods such as Soy-based dairy milk alternatives and supplemented meat alternatives. Alternatively, vegans can consume a vitamin B12- containing tablet. The recommended daily intake (RDI) of vit B12 is 2.4 Ug per day.

Causes of vitamin B12 deficiency:

- An inadequate dietary intake;
- A failure of the stomach to make adequate functional intrinsic factor. Intrinsic factor binds to vitamin B12 in consumed food and is essential for its absorption. This condition has been called pernicious anaemia; or
- A decreased ability of the small intestine to absorb vitamin B12.

Consequences of vitamin B12 deficiency:

These can be serious and include neurological dysfunction, megaloblastic anaemia, spinal cord degeneration, dementia and death.

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Diagnosis of vitamin B12 deficiency:

This includes a diet history, and blood tests for both serum Vitamin B12 and homocysteine. Homocysteine is a metabolic marker of body reserves of Vitamin B12. As serum concentration of Vitamin B12 falls and body stores are depleted, homocysteine levels increase.

Research into vitamin B12:

While research associated with the identification and characterisation of vitamin B12 and its relationship to disease has already resulted in the award of three Nobel prizes, much is still unknown about this important vitamin. Researchers worldwide still continue with their investigations.

The Australasian Research Institute (ARI) at Sydney Adventist Hospital has been involved directly and peripherally in several areas of vitamin B12 research. These include the incidence of vitamin B12 deficiency in several at-risk groups, including vegans, vegetarians, the elderly and during pregnancy.

These studies involved following a large group of vegetarians (vegans and lacto-ovo vegetarians) from 1992. Vitamin B12 deficiency was observed in 90% of vegans, and 73% of lacto-ovo vegetarians. The latter incidence was a surprise, and further enquires found the cause to be that lacto-ovo vegetarians had significantly reduced their eggs and dairy intake in order to limit cholesterol consumption (a risk factor for heart disease). In doing so these subjects had largely removed their primary source of vitamin B12.

B12 and the elderly:

The incidence of vitamin B12 deficiency amount among the elderly was 65%. Surprisingly there was minimal interest in vitamin B12 shown by medical staff caring for their elderly patients, with few tested or treated, and little follow-up if treatment initiated. This is significant, because it has been shown that *if a patient has a dementia caused by a vitamin B12 deficiency, and it is treated within 1-2 years of onset, the dementia is fully reversible.*



B12 and pregnancy:

In pregnancy, serum vitamin B12 levels fall progressively over each trimester. Of the 40 ladies studied, none displayed a negative impact on body reserves of the vitamin.

It appears that if body reserves of vitamin B12 are high - adequate at the beginning of a pregnancy, a falling serum vitamin B12 is of little consequence over the nine months.

We are currently looking to both raise awareness of B12 deficiency and expand our understanding of B12 requirements in vulnerable populations. Future studies will include: a) expanded study of B12 in the elderly followed by dietary/supplemental intervention studies and progressive cognitive performance, b) The effect of intestinal inflammation disorders (e.g. Coeliac disease) on B12 absorption and serum B12 levels.

Oral flora and vitamin B12 production:

Initially, a popular American researcher in the 1970's (Dr Mervyn Hardinge) observed that normal bacteria found in the mouth produced significant amounts of vitamin B12. Unfortunately he never published his data.

We repeated some of his work and showed that some individuals are capable of producing up to 10% of the RDI for vitamin B12 from their mouth flora alone. This is a very significant finding. The reason for the variation in B12 production between individuals still requires further investigation.



A pro-biotic to treat and prevent vitamin B12 deficiency:

Many people prefer 'natural' sources of vitamins such as B12 rather than taking a tablet supplement. Dr Michelle Adams from the University of Newcastle, in association with the Sydney Adventist Hospital Pathology Department and the ARI have identified a naturally occurring micro-organism found in some foods, that not only produces large amounts of vitamin B12, but adheres to the upper small intestine above where vitamin B12 is adsorbed.

This organism meets the criteria to be considered a probiotic – and not only corrects vitamin B12 deficiency in laboratory animals, but reduces their cholesterol levels as well! This pro-biotic is currently under trial in human subjects – and more participants are needed.

Participants must be vegetarian (consuming less than 1 serving of flesh foods per week), have a low range vitamin B12 and be willing to not take any B12 supplements or B12-fortified foods for the duration of the trial. If you are interested, please contact Dr Bevan Hokin on 02 487 9511 for an information pack.

Common treatments for B12 deficiency:

This generally involves injections (for severe deficiency or if the patient has impaired absorption) or tablets. We compared the efficacy of different treatments, to raise vitamin B12 in patients with a dietary deficiency - daily low dose tablets, weekly high-dose tablets, monthly injections and two food supplements consisting of a vitamin B12-fortified meat substitute and a vitamin B12-fortified soy milk-alternative.

Interestingly we found the most effective treatment in this study was the B12 supplemented Soy beverage regimen (i.e. two x 250 mL glass of Sanitarium So-Good per day, one in the morning, and one in the evening). The next most effective was the low-dose tablet followed by injections, high-dose tablet and finally the meat analogue.

Staff Happenings



Over the past year we have been privileged to have a number of people making a huge contribution to our various projects. At this time, we would like to say farewell to Dr Yael Azrael (pictured). Yael has taken up a post doctoral position at Royal North Shore Hospital in the Pain Management Research Institute to work on Opioid Receptors. We wish Yael all the best.

Others who have supported and helped out over the past year includes Rohani LeRossignol (art work and graphics), Lynn Youlden (data entry), Daniel Livingston (website, still under construction) and Dr Heidi Federow.

ARI Corporate Members:

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