

Vitamin B12 and Your Health

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Vitamin B12 is vitally important for good health and longevity and a deficiency becomes more common as we become older. We will examine dietary sources of vitamin B12, the most common reasons for a deficiency, which organ reflexes and muscles first show up the body's need for vitamin B12.

Bush sickness in New Zealand

As I was doing my PhD in geology at Victoria University in Wellington, New Zealand I became aware of a condition referred to as *bush sickness* that was widespread among cattle and sheep in the 1930s on the pumice soils of the central part of the North Island of New Zealand. These animals were experiencing appetite loss, poor growth, wasting, failure to thrive and death. Also, neurological damage such as stumbling.

Yet if such animals were moved to pasture on different, non-pumice, soils they recovered. It was discovered that bush sickness was related to a deficiency of the mineral cobalt within the pumice. Once cobalt was added to superphosphate fertiliser and applied to these soils, bush sickness disappeared and the animals thrived once again. These pumice soils were also deficient in phosphorus, potassium, magnesium, sulphur and selenium so compounds containing these minerals were added to fertilisers to prevent other deficiency problems arising within animals grazed on these soils.

A cobalt deficiency means a vitamin B12 deficiency

Ruminant animals such as sheep, cattle, and deer require the mineral cobalt to synthesise vitamin B12 in their gut. They pick the cobalt up from the soil. However, if they don't get this cobalt from the soil, they cannot make vitamin B12, they fail to thrive and die.

Researchers have also identified bush sickness in many parts of the world but gave it local names before it was recognised for what it was – either a deficiency of cobalt in the soil or an inability for the vegetation to pick up adequate cobalt from the soil.

- *Bush sickness* in New Zealand
- *Wasting disease* in Australia (Western Australia: granite).
- *Salt sick* or *neck ail* in the United States
- *Mal de colete* or *pest de secar* in Brazil
- *Pining disease* in Great Britain
- *Ovine white liver disease* in Norway
- *Coast disease* in sheep in South Australia
- *Cobalt pine* in Northwest Scotland
- *Nakuruitis* in Kenya
- *Lecksucht* in Netherlands and Germany
- *Grand Traverse disease* in Michigan
- Each of these conditions is related to a **cobalt deficiency**.

Neurological symptoms such as blindness and locomotor disturbances are seen in lambs that are deficient in vitamin B12. Similar symptoms occur in Nova Scotian moose in eastern Canada and have been observed for decades. In retrospect, we now know that these moose have been suffering from a vitamin B12 deficiency related to a cobalt deficiency.

One wonders how many other animals or people are suffering from the symptoms of vitamin B12 deficiency without recognising it?

Is it Alzheimer's, dementia, or a vitamin B12 deficiency?

Memory loss, behavioural changes, and increased agitation are symptoms of Alzheimer's Disease. But they are also symptoms of a vitamin B12 deficiency! So if a client or friend is experiencing these symptoms, do they have Alzheimer's Disease or could they be deficient in vitamin B12? In fact, some people with "Alzheimer's" have recovered after receiving Vitamin B12 injections!

There are only a few types of reversal dementia and vitamin B12 deficiency is one of them (Greger 2023, p. 358). So, if a friend or loved one develops dementia have them checked out. It could be a vitamin B12 deficiency.

Other symptoms of vitamin B12 deficiency include weight loss, fatigue, weakness, constipation, poor balance, tingling or numbness in hands or feet, depression, sore mouth or tongue. A number of these are accepted as part of the aging process. But they could be declaring an unrecognised and quite common nutrient deficiency.

What causes a vitamin B12 deficiency?

1. Vitamin B12 comes mainly from animal foods.

Researchers in New Zealand decided to check vitamin B12 levels in four different ethnic groups living within New Zealand. These groups were Maoris and Pacific Islanders, New Zealand Europeans, East and South-East Asian, and South Asians. The South Asians had the lowest vitamin B12 levels. The researchers concluded that this was because the South Asians had the lowest red meat consumption. Vitamin B12 is available in milk and the South Asians had adequate milk in their diet. However, in Indian cuisine milk is commonly heated which makes the B12 unavailable (Devi et. al., 2018). Researchers in Toronto, Canada and London, United Kingdom have found similar results.

Vitamin B12 is only synthesised by certain bacteria. It is concentrated by predators higher in the food chain, thus best sources include red meat, milk, eggs, fish and shell fish. While certain types of sea weed such as nori (purple laver) and sea lettuce do contain active vitamin B12, the levels vary widely. Many seaweeds contain "pseudo-B12", which can mimic B12 in tests but is inactive in human metabolism. Consequently, many health organisations do not recommend relying on seaweed as a safe source for preventing B12 deficiency.

Because vitamin B12 is absent from almost all plants, vegetarians and vegans are highly recommended to take vitamin B12 supplements, or eat foods such as nutritional yeast that have been fortified with B12. When vitamin B12 levels become depressed levels of homocysteine

become elevated increasing the risk of stroke, for example. The elevated homocysteine is likely why vegetarians and vegans produce less collagen in the skin and have slower wound healing than others (Greger, 2023, p. 448).

2. B12 has a complex journey into the body

In the mid-19th century, many people suffered from **pernicious anaemia** characterised by the appearance of enlarged and irregularly shaped red blood cells in the bloodstream. Anaemia is often the first sign of vitamin B12 deficiency. This condition was often fatal up until the 1920s. In 1926, George Minot and William Murphy discovered that beef liver was effective in treating pernicious anaemia. Eventually a water-soluble substance called the **extrinsic factor** was isolated in beef liver, and a protein produced in the stomach was called the **intrinsic factor**. In 1948, the extrinsic factor was named **vitamin B12** or cobalamin. The intrinsic factor was needed to help transport vitamin B12 into the small intestine where it could be absorbed through the intestinal lining and taken to the liver for storage.

Subsequent research has shown that the transport of vitamin B12 is even more complicated than once thought.

Microorganisms, primarily bacteria, are the only organisms known to manufacture B12. These bacteria are believed to live within water, soil and the digestive systems of animals. Bacteria within the human colon do produce vitamin B12, but this is not a significant source of B12 for humans because B12 is only absorbed through the lining of the small intestine.

When humans eat animal foods, particularly red meat, the B12 (**cobalamin**) is protein-bound. Our stomach secretes hydrochloric acid and pepsin that detach the B12 from the protein. Another protein, called **R-protein** or **haptocorrin** (found in saliva and stomach secretions), then binds with the B12 to protect it from the acidic environment and transports it from the stomach and into the small intestine. Within the small intestine, pancreatic enzymes disconnect the B12 from the R-protein so that the B12 can then attach to another protein produced by the stomach called the **intrinsic factor (IF)**. In the ileum, the final portion of the small intestine, we have receptors in the cell membrane that can receive the **B12-IF complex**. Once inside the small intestine cells, B12 attaches to **transcobalamin II (TC2)**; made in the intestinal cells) so that it can be transported throughout the blood circulation and cerebrospinal fluid. In body tissues B12 is released from the B12-TC2 complex in the form of **hydroxocobalamin** where it is converted into **methylcobalamin** or **adenosylcobalamin**.

3. Does pernicious anaemia have an autoimmune origin?

Formerly pernicious anaemia (PA) was regarded as a vitamin B12 deficiency. Now PA is regarded as an autoimmune condition called **Autoimmune Atrophic Gastritis (AAG)**.

In AAG your body produces antibodies (anti-parietal cell antibodies and anti-intrinsic factor antibodies) that attack and destroy the parietal cells in the upper (fundus) and large central portion (body) of the stomach. The destruction of parietal cells decreases production of **intrinsic factor** which then decreases transport of vitamin B12 out of the small intestine leading to a vitamin B12 deficiency. The chronic inflammation and autoimmune damage result in the thinning of the stomach lining (atrophy) and the destruction of gastric glands.

AAG is commonly associated with other autoimmune conditions, most commonly Hashimoto's thyroiditis, type-1 diabetes, and celiac disease. It is estimated that up to 15% of the American population has atrophic gastritis and between 0.5-2% have AAG.

4. Declining hydrochloric production

As we get older, we commonly underproduce stomach hydrochloric acid which interferes with our ability to extract the vitamin B12 from red meats helping to promote vitamin B12 deficiency in the elderly.

Testing for a vitamin B12 deficiency

Riddler point

Test an indicator muscle (IM) while your client touches the tip of their tongue with two of their fingers. This is a generalised test for individual B vitamins. If your IM unlocks, hold vitamin B12 over the navel or on the cheek to see if it changes the muscle test.

Organ reflex

Spleen: In a direct line under the nipple, at the base of the rib cage. An area about 26 mm across, on the left side only.

Muscle tests

I am still researching to find suitable muscle tests that first show the body's need for vitamin B12. The most promising one, at the time I am writing this paper, is vastus intermedius. Serratus anterior #4 is also looking promising.

1) Vastus intermedius (Topping 1996)

This is one of the four muscles making up the quadriceps.

Origin: Anterior and lateral surfaces of proximal two-thirds of shaft of femur.

Insertion: Forms deep part of quadriceps femoris tendon, inserting into superior border of the patella.

Muscle test

Client lies supine on a massage table. Raise femur of the right leg 45° and keep the foot on the table. Raise the left leg 50°. Practitioner places arm under the raised left leg so that their hand rests on the right knee and the left leg is supported by the arm. Client keeps foot in neutral (vertical) position while practitioner presses the lower left leg downwards.



2) Serratus anterior #4 (Biokinesiology Institute 1981)

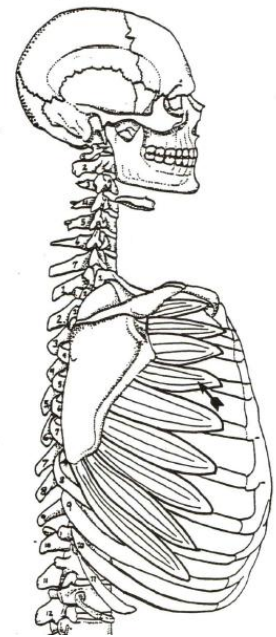
In Touch for Health, we have an **anterior serratus** muscle test related to the lung meridian. In Biokinesiology, John Barton has nine muscles making up the anterior serratus muscle group, numbered from the top down. #3 – the muscle test we have in Touch for Health - is associated with the lung meridian. Muscle #4 is associated with the thymus and mobility yang meridian.

Origin: Outer surface and upper border of 4th rib.

Insertion: Upper vertebral border of scapula.

Muscle test

Left arm horizontal, thumb up, 5° lateral of forward. Press wrist down gently while other hand is under tip of scapula (to feel for movement).



Natural sources of vitamin B12

Organ meats (lamb and beef kidneys; lamb, beef, calf, and pork livers are the richest sources); beef, herring, mackerel, egg yolk, cheese, milk, sardines, salmon, crab, oysters, and brewer's yeast (fortified only).

How much B12 does the body need?

In Michael Greger, MD's authoritative book (over 13,000 citations) *How Not to Age* (2023, pp. 210-11), Greger refers to research showing that those eating plant-based diets got more of almost every nutrient than people following other diets. But he describes B12 deficiency as the 'Vegetarians' Achilles' heel'. Vegetarians must eat B12-fortified foods or supplements otherwise they are potentially headed for big problems!

For vegans and vegetarians, Greger recommends taking supplements containing at least 50 mcg of cyanocobalamin (the most stable form) each day or at least 2,000 mcg each week. He also recommends this for everyone between age 50 and 65, regardless of diet, to compensate for reduced ability to extract B12 from our diets as we get older. After age 65, he recommends 1,000 mcg of cobalamin a day, ideally as a chewable, sublingual, or liquid supplement. Chewing a B12 tablet can increase our B12 levels ten times more than just swallowing the tablet. Haptocorrin or R-factor in our saliva can combine with the B12 and usher it through the gastrointestinal tract into the small intestine.

References

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