

Vitamin B-12; A Super Vitamin?

Vitamin B-12 is the largest and most complex, chemically, of all the vitamins. Consistent with its complexity is its need throughout the body. Every cell in the body requires B-12 in order to carry out some of its most important functions, like the expression of DNA, RNA and proteins; no small task. A substance of such complexity and importance is deserving of explanation and understanding.

At the turn of the 20th century, and well into the first few decades, a fatal medical condition (which still exists today) called pernicious anemia afflicted victims of all types. It developed gradually and couldn't be diagnosed or predicted until the anemia was entirely onset. The cause of the disease was entirely unknown, it was always fatal, and the diagnosis carried the same weight and seriousness as a leukemia diagnosis would be today.

The first major breakthrough in the treatment of pernicious anemia came from an unlikely source. George Whipple, an M.D. who graduated from John Hopkins University, was conducting medical research on typical anemia by bleeding dogs to induce anemia and then feeding them various substances to see which would heal them the fastest. He discovered that liver consumed in large amounts was the most effective substance. He also tested it on humans with pernicious anemia with positive results. Two other medical researchers, George Minot and William Murphy, decided to try to isolate and identify the particular

curative property and eventually narrowed it down to a substance in raw liver juice. These three men shared the Nobel Prize in Medicine in 1934 for discovering a cure to a previously fatal disease, the cause of which was still unknown.

The standard therapy for pernicious anemia from then on was to consume large amounts of liver and raw liver juice daily. Very few people I know enjoy the taste of liver cooked, say nothing about raw liver juice, but I guess when faced with mortal peril one will eat just about anything!

Today, thanks to modern technology and persistent research over the following decades, we have an essentially complete understanding of pernicious anemia that, thankfully, few people today have even heard of it. Pernicious anemia is an auto-immune disease where certain cells in the stomach that produce an essential metabolizing agent called "Intrinsic Factor, IF" are destroyed. IF is the substance that makes B-12 harvested from food absorbable in the body. Without this agent, B-12 deficiency is created, as well as a greatly reduced efficiency of folic acid, B-9, which relies on B-12 to keep it in an active form. The result of this compounded deficiency over time is an impairment of bone marrow to produce healthy blood cells and thus the anemia. Pernicious anemia is, essentially, a severe B-12 deficiency. In fact, a severe B-12 deficiency can create all the symptoms of pernicious anemia even if the person doesn't have the autoimmune condition.

The likelihood that you, or anyone you know will be afflicted or suffer from pernicious anemia today is incredibly small. It does, however, serve as a great subject to help understand the role B-12 plays in the body and what happens over time when B-12 is absent.

A look at the symptoms in order of severity of pernicious anemia (which could also be considered symptoms of B-12 deficiency) gives some interesting results.

- Fatigue
- Muscle weakness
- Depression
- Shortness of Breath
- Rapid heart
- High or Low blood pressure
- Mild cognitive impairment
- Difficulty in proprioception; the sense of personal muscle movement
- Paresthesias “pins and needles”
- Jaundice
- Swollen Tongue
- Frequent diarrhea
- Neuropathic pain
- Long term complications can even include gastric cancer

A thorough look at these symptoms shows some interesting similarities. One could simplify these symptoms into two or three categories. Nervous system and cardiovascular appear to make the most sense. Let's look at how B-12 affects these two important systems.

B-12 and Folic Acid (B-9) work together. In fact, one cannot function properly without the other. A folic acid deficiency creates very similar

symptoms to a B-12 deficiency. B-12 and folic acid together help prevent thrombosis and heart disease by regulating homocysteine levels. Homocysteine is an amino acid that is a by-product of normal metabolism, but requires B-12 and folic acid to turn into a useable and healthier form. Elevated homocysteine levels have been conclusively linked to greatly increased risk of developing heart disease. The exact relationship between homocysteine and heart disease is currently the subject of intense research but what is conclusively understood is that moderated homocysteine levels decrease risk and B-12 and folic acid are the means to accomplish that.

As far as the nervous system, the roles B-12 play are constantly expanding with each new research study that gets published. One of the key functions that B-12 controls is the integrity of the myelin, the whitish substance that coats nerve fibers, much like the rubber insulation on electrical wires. B-12 deficiency damages the myelin sheath that covers the spinal, cranial and peripheral nerves resulting in the numbness, tingling, difficulty walking, memory loss, disorientation and dementia that often associate with B-12 deficiency.

The reason B-12 is so crucial to the health of nerve cells, and almost every other cell as well, is because B-12 is a key component in the process of *methylation*. Trying to find a lay explanation of methylation is no easy task. Rather than drag you through several hours of college level biochemistry, think of

methylation as a type of chemical transportation system. Just like the buses and subways in a major city, methylation is a process where substances, information and such are transported from one area to another. I can already hear biochemists the world over wincing at this incredibly watered-down description, but that is the fundamental concept. B-12 is one of the components needed to perform methylation in the majority of cells in the body. Particularly when methylation occurs between the DNA and cell parts, proteins and their functions, and the RNA and its functions. When these are impaired, especially for prolonged periods, the results can be very serious.

In a study conducted on 370 elderly men and women, followed over three years, showed that those with low levels of B-12 had twice the risk of developing Alzheimer's disease than those with healthy levels. While low B-12 doesn't always mean Alzheimer's disease is the result, quite often the deficiency manifests as dementia, and in some cases even psychosis.

Since the 70s, it has been observed that emotional disturbances, neurological abnormalities and psychoses often accompany B-12 deficiencies. It is actually considered an obvious fact in the science of mental health that a large number of mental illnesses are rooted in vitamin B-12 deficiency. Disturbances in perception, emotions, thought, and memory, either severe or mild, are considered standard symptoms of a prolonged B-12 deficiency. Though controversial, some doctors and

medical professionals have claimed that the majority of hospitalized mental patients could be treated simply with B-12.

You may be asking yourself, "Why do I need to take B-12?" I'm not anemic, crazy or have heart problems. Why bother? Some would argue that B-12 supplementation is unnecessary unless you are older, in your 60's, when your gastro intestinal system is impaired and you cannot sufficiently process the B-12 from food, or if you are a vegetarian, or vegan, and do not eat sufficient animal proteins (the only natural food source of B-12). This is analogous to waiting until your sick to go see the doctor, or better, until your teeth hurt to go see the dentist.

Decades of research and use have shown that people who feel normal and are generally healthy can benefit from B-12 supplementation. Injections of B-12 with folic acid typically make people feel improved in their general well being and have more energy. In some cases, the increased energy reserves can last for up to five days. I know there are many of us that feel tired, can't concentrate, memory problems, and other common ailments that seem a natural part of leading an active lifestyle. B-12 is injectable, has almost no known toxicity (as long as it is taken with sufficient folic acid), is inexpensive and widely available. Does it get any better?



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