VITAMIN B12

There are 4 common forms of Vitamin B12:

1. **Methylcobalamin, which is biologically active without conversion; naturally occurring it is found in meat, fish, milk and eggs. It is the most active form of Vitamin B12 and used mainly in the liver, brain and nervous system.**
2. **Hydroxocobalamin is a naturally produced by bacteria in the digestive tract when food sources are broken down and it is developed in laboratory by extracting it from microorganism and often used in injections**
3. **Cyanocobalamin which requires conversion in the body to become active. Cyanocobalamin is a synthetic form of Vitamin B12, not found in nature and is more frequently used in supplements, is considered more stable than other forms. Cyanocobalamin requires conversion in the body; when cyanocobalamin enters the body it is converted into either methylcobalamin and/or adenosylcobalamin (active mitochondrial form) for use.**
4. **Adenosylcobalamin is also a naturally occurring, co-enzyme form of Vitamin B12. Consider it a 'partner in crime' with Methylcobalamin, as they work in synergy to give pretty much 100% 'B12 cover' for your body. Adenosylcobalamin is particularly important to supporting and protecting the mitochondria in your cells (which the Methylcobalamin can't do). The mitochondria are like 'powerhouses' in each cell and Adenosylcobalamin helps them burn food efficiently to produce energy and boost metabolism**

Vitamin B12 protects your nerves, maintaining the myelin sheath down your spine which is the insulation around nerve cells that keeps information running smoothly. When B12 runs so low that insulation starts to fray, leading to numbness or weakness. It also supports the production **of healthy red blood cells, preventing anemia and the fatigue that comes with it. It fuels your metabolism and brain, keeps your mind sharp and energy steady throughout the day.**

Wikipedia reports the most common cause of deficiency in developed countries is impaired absorption due to loss of gastric intrinsic factor that is required for absorption. It is a common deficiency in the elderly (over 65) and many have no idea they are suffering from this. The reason is often reduced stomach acid production with age or from long term use of proton pump inhibitors, H2 blockers or other antacids and interaction with metformin that is prescribed for diabetes. Deficiency in the elderly is related to dementia so it is important to address this issue. Elderly people, due to impaired intestinal absorption, and children, premenopausal women, and pregnant women whose diets are low in animal foods are all at increased risk.

Deficient can lead to neuropathy, megaloblastic anemia, pernicious anemia, increased risk of miscarriage, neural tube defects and delayed development in offspring. Symptoms of low B12 might be fatigue, memory slipping, tingling in your hands and feet. You might lose your balance more easily or your legs feel weak for no particular reason. Some people have mood changes **or depression. It is sometimes diagnosed as neuropathy or early cognitive decline.**

The daily dose recommended is between 500-1000 mcg per day. Folate levels may modify the symptoms and you will often see B12 coupled with folate (folic acid) on labels of supplements.

Poor absorption from the stomach and small intestine can hinder B12 for a number of reasons:

1. **your are aging – over 60 years old, things are changing.**
2. **you have had stomach stapling or by-pass surgery to lose weight**
3. **the stomach and small intestine have been compromised due to improper eating, or taking certain medical drugs.**
4. **you are celiac or have similar problem with your digestion.**
5. **your upper GI is compromised or damaged due to intake of poor foods, medical drugs etc.**

Deficiency is mostly seen as pernicious anemia, an anemia with bone marrow promegaloblastosis. Gastro problems show as constipation or diarrhea, loss of bladder or bowel control. There can be other reasons for these problems. Neurological symptoms present as reflex weakness, spinal cord degeneration. There can also be an autoimmune attack on the parietal cells of the stomach causing pernicious anemia.

Although Vitamin B12 deficiency is most commonly caused by malabsorption, it can also result from low intake, immune gastritis, low presence of binding proteins, or use of certain medications. Vegans—people who choose to not consume any animal-sourced foods—are at risk because plant-sourced foods do not contain the vitamin in sufficient amounts to prevent vitamin deficiency. Vegetarians—people who consume animal byproducts such as milk and eggs, but not meat or organs—are also at risk. Vitamin B12 deficiency has been observed in between 40% and 80% of the vegetarian population who do not also take a vitamin B12 supplement or consume vitamin-fortified food. In Hong Kong and India, vitamin B12 deficiency has been found in roughly 80% of the vegan population. As with vegetarians, vegans can avoid this by consuming a dietary supplement or eating B12 fortified food such as cereal, plant-based milks, and nutritional yeast as a regular part of their diet. The elderly are at increased risk because they tend to produce less stomach acid as they age, a condition known as achlorhydria, thereby increasing their probability of B12 deficiency due to reduced absorption.

The best way to get B12 into your body is by eating foods high in B12, but if you have to take supplementation because of inability to absorb B12, then B12 spray into the mucosal lining of the mouth is the most effective way which by-passes the need for a digestive system. The next best way is by taking it sublingually (dissolving under the tongue). Best ones to look for are Methycobalamin or Cynocobalamin both of which are easily absorbed by the body. Medical doctors usually suggest injections, but we understand the sprays are equally effective (or so say the physician's manual). Don't ignore this problem, it can be corrected easily but we have also heard people dying from lack of B12 so it is a serious problem. Hydroxocobalamin can be injected intramuscularly.

B12 is water soluble which means the body flushes out any excess therefore toxicity is extremely rare.

How Does Plant Based/Vegetarian/Vegan Eating Get Enough Vitamin B12

Many of the plant milks (soy, oat, almond) are now fortified with Vitamin B12. Make sure they don't contain sugars when buying them.
Some breakfast cereals are also fortified with Vitamin B12, especially if you use the fortified plant milk with them.
Plant based meat alternatives often include B12. Tofu and Tempeh are a good source of protein and some have B12.
Certain gut bacteria (e.g., Lactobacillus reuteri, Propionibacterium freudenreichii) can synthesize B12. However, absorption happens in the ileum, while it is synthesized in the colon, too far downstream for effective uptake.
A vegan diet is most recommended to help heal the body naturally for many disorders such as cancer. The vegan diet takes all the pressure off the digestive tract as well as chemical ingestions that can tax the body's ability to heal. If you are going to do this diet, you should take B12 supplements. Most people return to eating small amounts of animal protein within a year or so after doing the diet.