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Keep These B Vitamins on Your A-List

Analysis by Dr. Joseph Mercola Fact Checked | February 20, 2023

STORY AT-A-GLANCE

- B vitamins are a group of eight micronutrients that are not related to each other and play a significant role in maintaining optimal health. They are found in a variety of foods, but certain health factors may increase your body's requirement
- B vitamins are pivotal to regulating the immune system and helping to prevent a dangerous cytokine storm during a COVID-19 infection. Nicotinamide adenine dinucleotide (NAD+) plays an important role in this process and niacin is a building block of NAD
- They are also neuroprotective, playing a role in lowering depression and anxiety, lowering the potential risk of vincristine-induced peripheral neuropathy associated with chemotherapy agents and potentially playing a role in nerve regeneration by supporting cell structures
- Review this list of foods containing the B vitamins and consider limiting sugar and eating fermented foods to increase your production and absorption of the B vitamins in a healthy gut

One group of eight micronutrients is commonly called B vitamins or B-complex vitamins. These are water-soluble vitamins your body requires for normal functioning. Because they are water-soluble, the body does not store them. Any excess vitamin B you consume during the day is excreted in the urine.

This also means that you must consume these vitamins each day to meet your body's requirements. They are micronutrients because you only need them in small quantities,

yet they play a significant role in optimal health. Despite belonging to the same complex of vitamins, they are not related.

While they are found in a variety of foods, certain factors may increase your need for B vitamins. These factors include your age, dietary choices, genetics, medications, liver disease and alcohol use.[1] The eight B vitamins and their function include:[2]

B1 (thiamin) — Glucose metabolism and nerve function
B2 (riboflavin) — Metabolism, vision and skin health
B3 (niacin) — Skin health, carbohydrate and fat metabolism, nervous system and digestion
B5 (pantothenic acid) — Metabolism and red blood cell and steroid hormone production
B6 (pyridoxine) — Protein and carbohydrate metabolism, red blood cell production, creation of neurotransmitters and steroid hormone activity
B7 (biotin) — Carbohydrate and fat metabolism
B9 (folate) — Fetal nervous system, DNA synthesis, cell growth and forming red blood cells
B12 (cobalamin) — Neurological function, mental ability and red blood cell production

Irregulated Immune System Raises Risks Linked to COVID

Since 2020, the health condition that's been at the top of many people's minds has been COVID-19. I've written many articles reviewing how nutrients like vitamins C and D can

help prevent and play a role in the treatment of this illness. Another nutrient known to influence your immune system and immune competence is the group of B vitamins.

One factor that makes COVID-19 dangerous for people with underlying medical conditions is it overactivates your immune system and triggers a cytokine or bradykinin storm. B vitamins play a role in modulating immune function, which means the immune system functions more effectively and minimizes this risk. Dr. Uma Naidoo, a nutrition expert from Harvard Medical school, explains it this way to Yahoo! Life:[3]

> *"You can think of the immune system as an army. Its job is to protect the body. But if the immune system army isn't well-regulated, it can overreact and actually cause more damage — this overreaction is what often happens in COVID-19 and is referred to as the cytokine storm. Cytokines are inflammatory molecules released by immune cells. They are like the weapons of the immune system army.*
>
> *So, if immune cells are soldiers, cytokines are guns and grenades. And in a poorly regulated immune system, the body's cytokine storm induced by COVID causes lots of inflammation in the body, just as if little grenades were being tossed around. This is what causes the worst outcomes and death in COVID."*

A 2021 paper[4] stresses the need to highlight the importance of B vitamins as they play a pivotal role in proper immune function. They assist in the activation of both the innate and adaptive responses, as well as reducing proinflammatory cytokines and preventing hypercoagulability. B vitamins not only contribute to a healthy immune system but potentially could prevent or reduce severe symptoms of COVID-19.

The paper detailed the various functions B vitamins have that may be useful in managing COVID-19 symptoms. This includes vitamin B1 deficiency that creates an inadequate antibody response, vitamin B5 and B6 deficiencies that may affect inflammation and vitamin B9 deficiency that adversely affects your adaptive immune response as B9 helps prevent the virus from binding to and gaining entry into your cells.

Niacin may be another missing piece to the COVID-19 puzzle. A 2021 paper[5] awaiting peer review by Dmitry Kats, Ph.D., focuses specifically on niacin and raises the question of whether this vitamin may be a crucial player in the disease process.

Kats notes that a hallmark of COVID-19 is the cytokine storm, which can lead to multiple organ failure and death. By decreasing and controlling these damaging cytokines, you stand a good chance of thwarting the cytokine storm and the downstream damage that it causes. Nicotinamide adenine dinucleotide (NAD+) plays an important role in this process and niacin is a building block of NAD. As researchers in the 2021 paper explain:[6]

> *"NAD+ is released during the early stages of inflammation and has immunomodulatory properties, known to decrease the pro-inflammatory cytokines, IL-1β, IL-6 and TNF-α. Recent evidence indicates that targeting IL-6 could help control the inflammatory storm in patients with COVID-19."*

In addition to markedly decreasing proinflammatory cytokines, niacin has also been shown to:[7]

- Reduce the replication of several viruses, including vaccinia virus, human immunodeficiency virus, enteroviruses and hepatitis B virus
- Reduce neutrophil infiltration
- Have anti-inflammatory effect in patients with ventilator-induced lung injury

Lower Symptoms of Depression and Anxiety With B Vitamins

The need for strategies to lower anxiety and depression rose dramatically during the COVID-19 pandemic. Since it's likely not the last pandemic in the coming months and years, this need will presumably not dissipate. Developing strategies to improve resilience is an important step to protecting your health and the health of your family.

A double-blind 2022 study[8] engaged 478 college students over a five-year period during which the participants received one of three options: a lactose placebo pill, 1,000

microgram vitamin B12 tablet or 100 milligrams (mg) vitamin B6 tablet for one month. The researchers used questionnaires and specific visual tests that gave evidence of GABAergic inhibitory interactions to evaluate the symptoms of anxiety and depression.

Gamma-aminobutyric acid (GABA) is a chemical known to inhibit nerve impulses in the brain and thus lower excitability. Vitamin B6 is a coenzyme in the production of GABA and in other pathways that help reduce neural excitability. The participants consumed vitamin B6 or B12 at 50 times higher than the recommended daily dose.

However, as the researchers pointed out, recent evidence demonstrates that while the optimum level of vitamin B has not been established, it "certainly exceeds the Recommended Daily Allowance (RDA) and many individuals are borderline deficient."[9]

The researchers found that B6 supplementation lowered anxiety and produced a trend toward lower levels of depression, and B12 supplementation also helped lower anxiety. While there were some limitations to the study, such as not doing a baseline or post-test serum analysis to determine if the participants were deficient or if the supplements raised the serum level, the researchers found that:[10]

> *"... nutrition-based interventions produce far fewer unpleasant side effects than drugs, and so in the future people might prefer them as an intervention. To make this a realistic choice, further research is needed to identify other nutrition-based interventions that benefit mental wellbeing, allowing different dietary interventions to be combined in future to provide greater results."*

Magnesium is another nutrient that has a powerful effect on depression and anxiety; so much so that Psychology Today calls it the "original chill pill."[11] Researchers have demonstrated that magnesium has a beneficial effect on an individual's subjective perception of anxiety,[12] and that magnesium was effective in the treatment of mild to moderate depression in adults without the need for monitoring for toxicity.[13]

Magnesium and vitamin B6 work even better in combination. A 2018 study[14] highlighted the importance of these two nutrients on mental health. When taken together, animal studies have demonstrated they have a complementary effect on stress reduction.

The research was a Phase IV investigator-blinded trial in healthy adults who received either magnesium alone or a combination of magnesium and vitamin B6. They found those taking the combination had a 24% improvement in stress scores.

Improves Cardiovascular and Neurological Systems

B vitamins are powerhouse nutrients also known to protect your brain and heart. Two that are frequently studied are vitamins B6 and B12. According to Drugs.com,[15] one function of vitamin B6 is to help the body maintain normal levels of homocysteine. This is an amino acid that has been associated with dementia, stroke, osteoporosis and heart disease when it is above normal levels.[16]

A preliminary study[17] in 2007 demonstrated that high levels of vitamin B6 helped lower levels of homocysteine in men with schizophrenia and schizoaffective disorder but not women. The data have not consistently shown that reducing homocysteine levels using vitamins B6 and B12 could reduce cardiovascular events.

However, a 2021 study[18] assessed the effect of vitamins B6, B9 and B12 on homocysteine levels as it is also related to the risk of stroke, cardiovascular disorders and vascular death. The intervention demonstrated a risk reduction of 11% among stroke patients for the three risks, a 13% reduction for stroke and a 17% reduction for vascular death.

In addition to the effect on mental health, vitamins B6 and B12 have demonstrated properties that protect against peripheral neuropathy. A 2021 study[19] sought to evaluate if B6 and B12 could prevent vincristine-induced peripheral neuropathy which occurs in 40% to 45% of patients receiving this chemotherapeutic agent.

Of the 102 patients enrolled, 81 completed the study during which the researchers found a significant difference in the incidence of peripheral neuropathy between the intervention and placebo groups. Data showed an absolute risk reduction of 30% and a relative risk reduction of 54% in the intervention group.

A 2021 paper[20] published in BioMed Research International proposed that vitamins B1, B6 and B12 are key players in the protection of the neurological system against environmental influences. They suggest these vitamins may help nerve regeneration by supporting the development of cell structures.

How to Improve Your Vitamin B Status

I generally recommend getting most if not all your nutrition from locally and organically sourced real food. Depending on your situation and condition, however, you may need to consider supplements. Start by reviewing the following list of foods that contain B vitamins. If you find that you rarely or never eat foods rich in one or more of these nutrients, you may want to consider taking a high-quality, ideally food-based supplement.

Also, consider limiting sugar and eating fermented foods. B vitamins are produced within a healthy gut environment. Eating real food, including plenty of leafy greens and fermented foods, will provide your microbiome with important fiber and beneficial bacteria to help optimize your internal vitamin B production.

Vitamin B1 — Pork, fish, nuts and seeds, beans, green peas and brown rice.[21] The RDA is 1.1 mg for adult women and 1.2 mg for adult men.

Vitamin B2 — Eggs, organ meats, lean meats, green vegetables such as asparagus, broccoli and spinach.[22] The RDA is 1.1 mg for adult women and 1.3 mg for men. Your body cannot absorb more than about 27 mg at a time, and some multivitamins or B-complex supplements may contain unnecessarily high amounts.

Vitamin B3 — Chicken, pork, brown rice, peanuts, avocados, sunflower seeds and pumpkin seeds.[23] The dietary reference intake established by the Food and Nutrition Board ranges from 14 to 16 mg per day for adults.

Vitamin B5 — Beef, poultry, seafood, organ meats, eggs, milk, mushrooms, avocados, potatoes, broccoli, peanuts, sunflower seeds, chickpeas and brown rice.[24] The RDA is 5 mg for adults over the age of 19.

Vitamin B6 — Turkey, beef, chicken, wild-caught salmon, sweet potatoes, potatoes, sunflower seeds, pistachios, avocados, spinach and bananas.[25] Nutritional yeast is an excellent source of B vitamins, especially B6.[26] One serving (2 tablespoons) contains nearly 10 mg of vitamin B6.

Not to be confused with Brewer's yeast or other active yeasts, nutritional yeast is made from an organism grown on molasses, which is then harvested and dried to deactivate the yeast. It has a pleasant cheesy flavor and can be added to several different dishes.

Vitamin B9 — Fresh, raw, organic leafy green vegetables, especially broccoli, asparagus, spinach and turnip greens, and a wide variety of beans, liver, black-eyed peas and avocados.[27] Folic acid is a synthetic type of B vitamin used in supplements; folate is the natural form found in foods.

For folic acid to be of use, it must first be activated into its biologically active form (L-5-MTHF). Nearly half the population has difficulty converting folic acid into the bioactive form due to a genetic reduction in enzyme activity. For this reason, if you take a B-vitamin supplement, make sure it contains natural folate rather than synthetic folic acid. Nutritional yeast is an excellent source.[28]

Vitamin B12 — Vitamin B12 is found almost exclusively in animal tissues, including foods like beef and beef liver, lamb, snapper, venison, salmon, shrimp, scallops, poultry, eggs and dairy products.[29] Nutritional yeast is high in B12,[30] and is highly recommended for vegetarians and vegans. One serving (2 tablespoons) provides nearly 8 mcg of natural vitamin B12.

Sources and References

- [1] Nutrients, 2016;8(11) Table 1
- [2] Better Health Channel, Vitamin B
- [3] Yahoo! Life, August 27, 2020
- [4] Maturitas, 2021; 144 para 3
- [5] OSF Preprints, Sufficient Niacin Supply: The Missing Puzzle Piece to COVID-19
- [6, 7] Maturitas, 2021; 144 Section 1.3, para 1, 45% DTP
- [8, 9] Human Psychopharmacology, 2022; doi: 10.1002/hup.2852
- [10] EurekAlert! July 19, 2022
- [11] Psychology Today, June 12, 2011
- [12] Nutrients, 2017;9(5)
- [13] PLOS ONE June 27, 2017
- [14] PLOS ONE, 2018;13(12)
- [15] Drugs.com, January 19, 2023, subhead 1 top 2 paras
- [16] Harvard Health, March 9, 2014 Para 1
- [17] Clinical Neuropharmacology, 2007 30(1) Results and Concl
- [18] Cureus, 2021;13(5)
- [19] Pharmaceutics and Pharmacology Research, 2021; doi: 10.31579/2693-7247/080
- [20] BioMed Research International, 2021; doi: 10.1155/2021/9968228
- [21] NIH, Thiamin
- [22] NIH.gov Riboflavin
- [23] NIH, Niacin
- [24] NIH, Pantothenic Acid
- [25] NIH, Vitamin B6
- [26, 28, 30] Nutrition Data, Nutritional Yeast
- [27] NIH, Folate
- [29] NIH, Vitamin B12