



Acupuncture and Nutritional Counseling Centre

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Nutrition Information Series

To B or not to B. It is not a question. It is a vitamin.

The human body requires certain macronutrients (proteins, fats and carbohydrates) and micronutrients (minerals and vitamins) for survival. One class of vitamins, the B Vitamins, serves many functions in the human body. Conversely, being deficient in one or more of these vitamins can lead to a variety of health issues.

What is a vitamin?

Vitamins are organic (carbon containing) compounds that aid metabolic processes in a particular way. Enzymes speed up chemical reactions in the body; without enzymes the chemical processes could not occur fast enough to sustain life. Some enzymes, known as apoenzymes, require helper molecules to function. Coenzymes are one class of helper molecules and are either derived from vitamins or the vitamins themselves. When bound with an apoenzyme, the new molecule is called a holoenzyme.

Vitamins are either water-soluble (dissolvable in water) or fat-soluble (dissolvable in fat). The water-soluble vitamins – the B Vitamins and Vitamin C - act as coenzymes. The body cannot store most water-soluble vitamins and any excess is excreted in the urine (the body can store Vitamins B9 and B12 for years in the liver). Taking mega-doses of water-soluble vitamins can be seen as peeing your money away. Because the body does not store them, water-soluble vitamins need to be consumed throughout the day from whole-food sources.

The fat-soluble vitamins – A, D, E and K – have diverse functions in the body. The body stores these vitamins and excess consumption can lead to toxicity and resulting health effects.

The B Vitamins

There are eight B Vitamins, the cohort being the B Vitamin Complex. Their primary roll is in energy production, red blood cell synthesis and cell division. The B Complex does not provide energy; that is the roll of the macronutrients. Rather, the body uses B Vitamins, as coenzymes, to extract the energy from these foods. While the list of B Vitamins below provides the sources of each B Vitamin, the single best food source for both fat and water soluble vitamins (except C) and other micronutrients is beef liver from grass fed, hormone and antibiotic free cows:

- **Thiamin (B1):** Helps to convert glucose to energy, strengthens the immune system, helps the body's ability to withstand stress and plays a key roll in the cardiovascular and nervous systems' functions. Food sources include whole meal cereal grains, seeds (especially sesame seeds), legumes, wheat germ, nuts, yeast and pork.
- **Riboflavin (B2):** Involved in energy production and eye and skin health. Sources include milk, yogurt, cottage cheese, wholegrain breads and cereals, egg whites, leafy green vegetables, meat, yeast, liver and kidney.
- **Niacin (B3):** Essential for energy extraction from the carbohydrates, fat and alcohol, maintains skin health and supports the digestive and nervous systems. Good sources of niacin include meats, fish, poultry, milk, eggs, wholegrain bread and cereals, nuts, mushrooms and all protein-containing foods.

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- **Pantothenic acid (B5):** Needed to metabolize macronutrients and alcohol, produce red blood cells and steroid hormones. It is found in a variety of foods including liver, meats, milk, kidneys, eggs, yeast, legumes and peanuts.
- **Pyridoxine (B6):** Required for carbohydrate and protein metabolism, red blood cell synthesis, formation of certain brain chemicals, influences brain development, assists the immune system and steroid hormone activity. Food sources include grains and legumes, green and leafy vegetables, fish and shellfish, meat, poultry, nuts, liver and fruit.
- **Biotin (B7):** Needed for energy metabolism, fat synthesis, protein metabolism and glycogen production. Good sources include cauliflower, egg yolks, peanuts, chicken, yeast and mushrooms.
- **Folic Acid (B9):** Needed for red blood cell formation, DNA synthesis, cell growth and the development of the fetal nervous system while *in utero*. Folic Acid is found in green leafy vegetables, legumes, seeds, liver, poultry, eggs, cereals and citrus fruits.
- **Cyanocobalamin (B12):** Helps to produce and maintain the insulator sheath (myelin) that surrounds nerve cells, mental ability, red blood cell formation, and fat and protein metabolism. B9 and B12 depend on each other to work properly. Food sources include liver, meat, milk, cheese and eggs.

There is an additional B Vitamin, Vitamin B4, which is not recognized as a B Vitamin by conventional medicine. It is particularly important to DNA and RNA formation. It is water-soluble and acts as a coenzyme in the body. It is consumed in the food sources that contain the other B Vitamins.

B Vitamin deficiencies

Because they are water-soluble, boiling easily washes away and destroys B Vitamins. Some of the earliest signs of B Vitamin deficiency occurred when canned vegetables were introduced. Packing them in water and then sitting in a can for months almost completely strips away the B Complex. There are numerous physical symptoms associated with a lack of B Vitamins including: muscle weakness and soreness, spasms or loss of muscle control, lack of stamina, drowsiness after eating (can also be from blood sugar issues), nerve conductivity and integrity issues, tachycardia, hyperirritability, feeling of a band around one's head, melancholia, ankle swelling, diminished urination, blurred vision, numbness (particularly in the hands and feet), night sweats, forgetfulness, thinning hair, noise sensitivity, and visible veins in the chest and abdomen. Alcoholics are especially susceptible to Vitamin B1 deficiency, which leads to Wernicke-Korsakoff syndrome, also known as wet brain.

There are also behavioral signs of B Vitamin deficiency, many of which mimic neuropsychiatric disorders. These include fears, fatigue, depression, paranoia, confusion, hostility, rage and anxiety. Individuals with any of these conditions may want to see a whole foods nutritionist.

Pellagra is a specific Vitamin B3 deficiency and manifests as sensitivity to sunlight, aggression, dermatitis, hair loss, edema, inflamed tongue, insomnia, weakness, mental confusion, chronic diarrhea lack of coordination and dementia. Pellagra was historically seen in populations that had corn as its major food source. Today, the majority of processed foods contain ingredients made from #2 field corn: artificial flavors and colors (most including cola flavor and coloring), ascorbic acid, baking powder, caramel, citric acid, confectioner's sugar, corn flour, corn oil, corn syrup, dextrin, dextrose, gluconic acid lactone (cured meats), high-fructose corn syrup, hydrolyzed vegetable protein, MSG, saccharin, sorbic acid, sorbitol and sucrose. Individuals who eat a lot of processed foods and exhibit some or all of the signs of pellagra should consider dietary changes.

Beriberi is caused by B1 deficiency and manifests in two forms: dry and wet. Dry beriberi affects the nervous system and has these symptoms: difficulty walking, loss of feeling in the hands and feet, loss of muscle function in lower legs, mental confusion, speech difficulties and strange eye movements. Wet Beriberi affects the cardiovascular system and manifests as increased heart rate, shortness of breath with activity, swelling of the lower legs and awakening at night short of breath. There is research that indicates some heart disease may be a form of beriberi of the heart muscle, and the proper nutrition, including the B Complex plus B4, can aid in recovering the heart muscle.

Note: this information is for educational purposes only and is not intended to diagnose, treat, or cure any diseases. Please consult a qualified healthcare professional for nutritional advice.