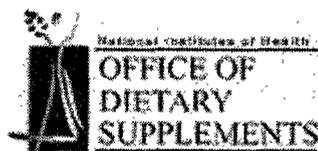


Brienza, Susan**Subject:** FW: Dietary Supplement Fact Sheet Vitamin B6

Dietary Supplement Fact Sheet: Vitamin B6

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Vitamin B₆: What is it?

✓ Vitamin B₆ is a water-soluble vitamin that exists in three major chemical forms: pyridoxine, pyridoxal, and pyridoxamine [1,2]. It performs a wide variety of functions in your body and is essential for your good health. For example, vitamin B₆ is needed for more than 100 enzymes involved in protein metabolism. It is also essential for red blood cell metabolism. The nervous and immune systems need vitamin B₆ to function efficiently, [3-6] and it is also needed for the conversion of tryptophan (an amino acid) to niacin (a vitamin) [1,7].

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Hemoglobin within red blood cells carries oxygen to tissues. Your body needs vitamin B₆ to make hemoglobin. Vitamin B₆ also helps increase the amount of oxygen carried by hemoglobin. A vitamin B₆ deficiency can result in a form of anemia [1] that is similar to iron deficiency anemia.

An immune response is a broad term that describes a variety of biochemical changes that occur in an effort to fight off infections. Calories, protein, vitamins, and minerals are important to your immune defenses because they promote the growth of white blood cells that directly fight infections. Vitamin B₆, through its involvement in protein metabolism and cellular growth, is important to the immune system. It helps maintain the health of lymphoid organs (thymus, spleen, and lymph nodes) that make your white blood cells. Animal studies show that a vitamin B₆ deficiency can decrease your antibody production and suppress your immune response [1,5].

Vitamin B₆ also helps maintain your blood glucose (sugar) within a normal range. When caloric intake is low your body needs vitamin B₆ to help convert stored carbohydrate or other nutrients to glucose to maintain normal blood sugar levels. While a shortage of vitamin B₆ will limit these functions, supplements of this vitamin do not enhance them in well-nourished individuals [1,8-10].

What foods provide vitamin B6?

Vitamin B6 is found in a wide variety of foods including fortified cereals, beans, meat, poultry, fish, and some fruits and vegetables [1,11]. The table of selected food sources of vitamin B6 suggests many dietary sources of B6.

What is the Recommended Dietary Allowance for vitamin B6 for adults?

The Recommended Dietary Allowance (RDA) is the average daily dietary intake level that is sufficient to meet the nutrient requirements of nearly all (97 to 98 percent) healthy individuals in each life-stage and gender group [12].

The 1998 RDAs for vitamin B6 [12] for adults, in milligrams, are:

Life-Stage	Men	Women	Pregnancy	Lactation
Ages 19-50	1.3 mg	1.3 mg		
Ages 51+	1.7 mg	1.5 mg		
All Ages			1.9 mg	2.0 mg

Results of two national surveys, the National Health and Nutrition Examination Survey (NHANES III 1988-94) [12,13] and the Continuing Survey of Food Intakes by Individuals (1994-96 CSFII) [12], indicated that diets of most Americans meet current intake recommendations for vitamin B6 [12].

When can a vitamin B6 deficiency occur?

Clinical signs of vitamin B6 deficiency are rarely seen in the United States. Many older Americans, however, have low blood levels of vitamin B6, which may suggest a marginal or sub-optimal vitamin B6 nutritional status. Vitamin B6 deficiency can occur in individuals with poor quality diets that are deficient in many nutrients. Symptoms occur during later stages of deficiency, when intake has been very low for an extended time. Signs of vitamin B6 deficiency include dermatitis (skin inflammation), glossitis (a sore tongue), depression, confusion, and convulsions [1,12]. Vitamin B6 deficiency also can cause anemia [1,12,14]. Some of these symptoms can also result from a variety of medical conditions other than vitamin B6 deficiency. It is important to have a physician evaluate these symptoms so that appropriate medical care can be given.

Who may need extra vitamin B6 to prevent a deficiency?

Individuals with a poor quality diet or an inadequate B6 intake for an extended period may benefit from taking a vitamin B6 supplement if they are unable to increase their dietary intake of vitamin B6 [1,15]. Alcoholics and older adults are more likely to have inadequate vitamin B6 intakes than other segments of the population because they may have limited variety in their diet. Alcohol also promotes the destruction and loss of vitamin B6 from the body.

Asthmatic children treated with the medicine theophylline may need to take a vitamin B6 supplement [16]. Theophylline decreases body stores of vitamin B6 [17], and theophylline-induced seizures have been linked to low body stores of the vitamin. A physician should be consulted about the need for a vitamin B6 supplement when theophylline is prescribed.

What are some current issues and controversies about vitamin B6?

Vitamin B6 and the nervous system

Vitamin B6 is needed for the synthesis of neurotransmitters such as serotonin and dopamine

[1]. These neurotransmitters are required for normal nerve cell communication. Researchers have been investigating the relationship between vitamin B₆ status and a wide variety of neurologic conditions such as seizures, chronic pain, depression, headache, and Parkinson's disease [18].

Lower levels of serotonin have been found in individuals suffering from depression and migraine headaches. So far, however, vitamin B₆ supplements have not proved effective for relieving these symptoms. One study found that a sugar pill was just as likely as vitamin B₆ to relieve headaches and depression associated with low dose oral contraceptives [19].

Alcohol abuse can result in neuropathy, abnormal nerve sensations in the arms and legs [20]. A poor dietary intake contributes to this neuropathy and dietary supplements that include vitamin B₆ may prevent or decrease its incidence [18].

Vitamin B₆ and carpal tunnel syndrome

Vitamin B₆ was first recommended for carpal tunnel syndrome almost 30 years ago [21]. Several popular books still recommend taking 100 to 200 milligrams (mg) of vitamin B₆ daily to treat carpal tunnel syndrome, even though scientific studies do not indicate it is effective. Anyone taking large doses of vitamin B₆ supplements for carpal tunnel syndrome needs to be aware that the Institute of Medicine recently established an upper tolerable limit of 100 mg per day for adults [12]. There are documented cases in the literature of neuropathy caused by excessive vitamin B₆ taken for treatment of carpal tunnel syndrome [22].

Vitamin B₆ and premenstrual syndrome

Vitamin B₆ has become a popular remedy for treating the discomforts associated with premenstrual syndrome (PMS). Unfortunately, clinical trials have failed to support any significant benefit [23]. One recent study indicated that a sugar pill was as likely to relieve symptoms of PMS as vitamin B₆ [24]. In addition, vitamin B₆ toxicity has been seen in increasing numbers of women taking vitamin B₆ supplements for PMS. One review indicated that neuropathy was present in 23 of 58 women taking daily vitamin B₆ supplements for PMS whose blood levels of B₆ were above normal [25]. There is no convincing scientific evidence to support recommending vitamin B₆ supplements for PMS.

Vitamin B₆ and interactions with medications

There are many drugs that interfere with the metabolism of vitamin B₆. Isoniazid, which is used to treat tuberculosis, and L-DOPA, which is used to treat a variety of neurologic problems such as Parkinson's disease, alter the activity of vitamin B₆. There is disagreement about the need for routine vitamin B₆ supplementation when taking isoniazid [26,27]. Acute isoniazid toxicity can result in coma and seizures that are reversed by vitamin B₆, but in a group of children receiving isoniazid, no cases of neurological or neuropsychiatric problems were observed regardless of whether or not they took a vitamin B₆ supplement. Some doctors recommend taking a supplement that provides 100% of the RDA for B₆ when isoniazid is prescribed, which is usually enough to prevent symptoms of vitamin B₆ deficiency. It is important to consult with a physician about the need for a vitamin B₆ supplement when taking isoniazid.

What is the relationship between vitamin B₆, homocysteine, and heart disease?

A deficiency of vitamin B₆, folic acid, or vitamin B12 may increase your level of homocysteine, an amino acid normally found in your blood [28]. There is evidence that an elevated homocysteine level is an independent risk factor for heart disease and stroke [29-37]. The evidence suggests that high levels of homocysteine may damage coronary arteries or make it easier for blood clotting cells called platelets to clump together and form a clot. However, there is currently no evidence available to suggest that lowering homocysteine level with vitamins will reduce your risk of heart disease. Clinical intervention trials are needed to determine whether supplementation with vitamin B₆, folic acid, or vitamin B12 can help protect you against developing coronary heart disease.

What is the health risk of too much vitamin B₆?

Too much vitamin B₆ can result in nerve damage to the arms and legs. This neuropathy is usually related to high intake of vitamin B₆ from supplements, [28] and is reversible when supplementation is stopped. According to the Institute of Medicine, "Several reports show sensory neuropathy at doses lower than 500 mg per day" [12]. As previously mentioned, the Food and Nutrition Board of the Institute of Medicine has established an upper tolerable intake level (UL) for vitamin B₆ of 100 mg per day for all adults [12]. "As intake increases above the UL, the risk of adverse effects increases [12]."

Selected Food Sources of vitamin B₆

As the 2000 *Dietary Guidelines for Americans* states, "Different foods contain different nutrients and other healthful substances. No single food can supply all the nutrients in the amounts you need" [38]. As the following table indicates, vitamin B₆ is found in a wide variety of foods. Foods such as fortified breakfast cereals, fish including salmon and tuna fish, meats such as pork and chicken, bananas, beans and peanut butter, and many vegetables will contribute to your vitamin B₆ intake. If you want more information about building a healthful diet, refer to the *Dietary Guidelines for Americans* and the *Food Guide Pyramid*.

Table of Food Sources of Vitamin B₆ [11]

Food	Milligrams (mg) per serving	% DV*
Ready-to-eat cereal, 100% fortified, ¾ c	2.00	100
Potato, Baked, flesh and skin, 1 medium	0.70	35
Banana, raw, 1 medium	0.68	34
Garbanzo beans, canned, ½ c	0.57	30
Chicken breast, meat only, cooked, ½ breast	0.52	25
Ready-to-eat cereal, 25% fortified, ¾ c	0.50	25
Oatmeal, instant, fortified, 1 packet	0.42	20
Pork loin, lean only, cooked, 3 oz	0.42	20
Roast beef, eye of round, lean only, cooked, 3 oz	0.32	15
Trout, rainbow, cooked, 3 oz	0.29	15
Sunflower seeds, kernels, dry roasted, 1 oz	0.23	10
Spinach, frozen, cooked, ½ c	0.14	8
Tomato juice, canned, 6 oz	0.20	10
Avocado, raw, sliced, ½ cup	0.20	10
Salmon, Sockeye, cooked, 3 oz	0.19	10
Tuna, canned in water, drained solids, 3 oz	0.18	10
Wheat bran, crude or unprocessed, ¼ c	0.18	10
Peanut butter, smooth, 2 Tbs.	0.15	8
Walnuts, English/Persian, 1 oz	0.15	8
Soybeans, green, boiled, drained, ½ c	0.05	2
Lima beans, frozen, cooked, drained, ½ c	0.10	6

* DV = Daily Value. DVs are reference numbers based on the Recommended Dietary

Allowance (RDA). They were developed to help consumers determine if a food contains a lot or a little of a specific nutrient. The DV for vitamin B6 is 2.0 milligrams (mg). The percent DV (%DV) listed on the nutrition facts panel of food labels tells you what percentage of the DV is provided in one serving. Percent DVs are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs. Foods that provide lower percentages of the DV also contribute to a healthful diet.

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