USANA Technical Bulletin

Vitamin B_6

Technical Background

- Vitamin B_6 is one of the essential, water-soluble B vitamins. It exists in plants and animals in several forms (termed "vitamers") that are interchangeable and comparably active. The chemical form typically provided in vitamin supplements is pyridoxine hydrochloride (or pyridoxine HCl).[1]
- Like all true vitamins, B_6 functions as a coenzyme, meaning that it works in tandem with one or more enzymes to catalyze metabolic reactions in our cells. Vitamin B_6 serves as a cofactor for over 100 enzymes in the human body, many of which are involved in amino acid metabolism.[1,2] Because these types of reactions are central to the function of all cells, vitamin B_6 ultimately plays a central role in general human metabolism and health.
- Primary processes mediated by vitamin B_6 include the generation of lipid metabolism, nervous system function, hormone modulation, and immune function.[1,2]
- Vitamin B_6 affects nervous system function largely through its role in the synthesis of neurotransmitters (e.g. serotonin, taurine, norepinephrine, and dopamine). It also appears to be involved in development of the myelin sheath around nerve cells.[1] Animal studies suggest that vitamin B_6 deficiency may affect brain function.[3]
- Vitamin B_6 may play a role in regulating homocysteine levels in blood, something that constitutes an important risk factor for cardiovascular disease and stroke.[4,5,6]
- A large longitudinal study recently identified an inverse relationship between long-term intake of dietary vitamin B_6 and colorectal cancer. This relationship was especially pronounced in women who drank alcohol.[7]

Sources and Recommended Intake

- The Recommended Dietary Allowance (RDA) for vitamin B_6 is 1.3 mg/day for adults, 0.5 mg/day for children, and 1-1.3 mg/day for adolescents.[8] Requirements increase with age, increasing protein intake, and during pregnancy and lactation.[1] Alcoholism, smoking, and chronically high caffeine intake may also boost vitamin B_6 requirements.[3]
- Vitamin B_6 is available in a wide variety of foods. Best sources include potatoes, spinach, legumes, nuts and seeds, avocados, whole grains, wheat bran, rice bran, chicken, and pork.[1]
- Food processing and storage can reduce vitamin B_6 content by 10-50%. Vitamin B_6 is particularly unstable in light, and during cooking under alkaline conditions.[1]
- Vitamin B_6 is readily (>75%) absorbed.[1]
- Too much vitamin B_6 can be toxic. The Tolerable Upper Intake level has been set at 100 mg/day.[7]

Abstracts

Larsson SC, Giovannucci E, Wolk A. Vitamin b6 intake, alcohol consumption, and colorectal cancer: a longitudinal population-based cohort of women. Gastroenterology. 2005 Jun;128(7):1830-7. Background & Aims: Vitamin B 6 has a crucial role in 1-carbon metabolism, which involves DNA synthesis and DNA methylation. Aberrations in these processes have been implicated in colorectal carcinogenesis. We examined the association between long-term dietary vitamin B 6 intake and risk of colorectal cancer and whether this association is modified by consumption of alcohol, which may disrupt 1-carbon metabolism. Methods: Our study population comprised 61,433 women in the population-based Swedish Mammography Cohort. The women were aged 40 to 76 years, had no history of cancer, and completed a food-frequency questionnaire at baseline in 1987-1990. Dietary information was updated in 1997. During a mean follow-up of 14.8 years, 805 incident colorectal cancer cases were diagnosed. Results: After controlling for age and other potential confounders, long-term intake of dietary vitamin B 6 was significantly inversely associated with risk of colorectal cancer (P value for trend = .002). Compared with women in the lowest quintile of vitamin B 6 intake, those in the highest quintile had a 34% lower risk (multivariate rate ratio, 0.66; 95% confidence interval, 0.50-0.86). The association was most pronounced among women with moderate to high alcohol consumption. The multivariate rate ratio of colorectal cancer comparing extreme quintiles of vitamin B 6 intake was 0.28 (95% confidence interval, 0.13-0.59) among women who consumed >/=30 g/wk of alcohol (approximately equivalent to 2 drinks per week). Conclusions: Findings of this study suggest that vitamin B 6 may play a role in the prevention of colorectal cancer, particularly among women who drink alcohol.

References

[1] Leklem JE. Vitamin B-6. In Ziegler EE,Filer LJ (eds). Present Knowledge in Nutrition. Washington (DC): ILSI Press 1996. p 174-183.

[2] Groff JL, Gropper SS, Hunt SM. Advanced Nutrition and Human Metabolism. New York:West Publishing Co. 1995. 575 p.

[3] Wei IL, Huang YH, Wang GS. Vitamin B6 deficiency decreases the glucose utilization in cognitive brain structures of rats. J Nutr Biochem. 1999 Sep;10(9):525-31.

[4] Ellis JM and KS McCully. Prevention of myocardial infarction by vitamin B6. Res Commun Mol Pathol Pharmacol (1995) 89: 208-20.

[5] Lalouschek W and others. Hyperhomocysteinemia - an independent risk factor of stroke. Fortschr Neurol Psychiatr (1996) 64: 271-7.

[6] Vanuzzo D, Pilotto L, Lombardi R, Lazzerini G, Carluccio M, Diviacco S, Quadrifoglio F, Danek G, Gregori D, Fioretti P, Cattaneo M, De Caterina R. Both vitamin B6 and total homocysteine plasma levels predict long-term atherothrombotic events in healthy subjects. 2007. Eur Heart J 28(4):484-91.

[7] Larsson SC, Giovannucci E, Wolk A. Vitamin B6 intake, alcohol consumption, and colorectal cancer: a longitudinal population-based cohort of women. Gastroenterology. 2005 Jun;128(7):1830-7.

[8] Institute of Medicine. Dietary Reference Intakes for Thiamin, Riboflavin, Niacin, Vitamin B6, Folate, Vitamin B12, Pantothenic Acid, Biotin, and Choline (1998). National Academies Press: Washington, D.C.