

VITAMINS

Vitamins Defined

Vitamins were originally named “vital amines” in 1912 because they were thought to be comprised primarily of amine groups and seemed important for life. The “e” was dropped when it was known that the amine groups were not representative of the organic compounds. They are needed in relatively small amounts and found naturally in foods for the regulation of the body’s metabolic functions, providing for normal growth and maintenance. Vitamins are not optional, as the body exhibits deficiency symptoms when they are not provided. There are 13 known “vitamins”. With the wide variety of foods available in America, it is possible to obtain enough of the absorbable forms of these needed vitamins without taking added vitamin supplements, providing one eats a variety of nutrient-rich foods.

Water Soluble Vitamins

The B-vitamin complex, along with Vitamin C and Folic Acid, are generally not stored in body tissue. As such, there is less risk of toxicity but also the need to obtain a regular, on-going intake of these vitamins.

Vitamin C (Ascorbic Acid): Unlike some of the other vitamins needed by our bodies, we do not have the ability to make any of vitamin C on our own. We are completely dependent upon the diet for Vitamin C. It is primarily known for its antioxidant properties, its role in collagen synthesis and the creation of cell integrity. Vitamin C also is needed for healthy gums, blood vessels and teeth. It improves iron absorption and helps the body resist infection. The DRI (daily recommended intake) for Vitamin C in adults is 90 milligrams (mg). Smokers are advised to take at least 120 mg daily. **Sources:** Fresh fruits and vegetables (including citrus fruits), berries, pineapple, broccoli, green and red peppers, collard greens, Brussels sprouts, cabbage, tomatoes, cantaloupes, baked potato and cauliflower. Since Vitamin C is susceptible to destruction by heat, oxygen and water, fresh or fresh-frozen is preferred. No more than 1 gram/ day is stored in liver tissue. Body reserves may provide up to a 30-40 day supply. Excessive supplement intake has been linked to oxalate kidney stones in susceptible people. Vitamin C-rich foods can increase absorbability of iron and calcium in foods eaten at the same meal.

Folic Acid (Folic Acid or Folate): Is an essential compound for the production of red blood cells, preventing megaloblastic and macrocytic anemias. It is also needed for growth and the promotion of normal digestion. Folic Acid seems to prevent the build-up of homocysteine in the body, which is the precursor to atherosclerosis, or the narrowing and hardening of the arteries. Low levels of Folic Acid have also been detected in lungs of smokers. Adequate folic acid prevents neural tube defects such as spina bifida and anencephaly in newborns. Supplementation in women who **could** become pregnant is generally advised. Its possible roles in protecting against colon and cervical cancer are being studied. **Sources:** yeast, dark green vegetables, including leafy vegetables (think “foliage”), legumes (25% of daily needs, on average, are available in 1/2 c. legumes), nuts, liver, avocados, papaya, boysenberries, whole grains, bananas, oranges, grapefruit, beets and fortified cereals.

Vitamin B-1 (Thiamin): An essential co-factor for energy metabolism and the overall functioning of the nervous system. **Sources:** whole grains, soybeans, peas/legumes, lean cuts of pork and seeds/nuts.

Vitamin B-2 (Riboflavin): Riboflavin, another key co-factor in energy metabolism (the processing of food calories), is also involved in maintaining good vision and tissue synthesis. **Sources:** dairy products, lean meats (including fish and poultry), enriched grains, broccoli, turnip greens, asparagus and spinach.

Vitamin B-3 (Niacin): Is involved in energy metabolism, proper digestion and a healthy nervous system. It is a critical co-factor in the metabolism of fatty acids, serum cholesterol and triglycerides. **Sources:** lean meats and poultry, canned salmon, salt water fish, nuts/legumes, coffee/tea, enriched breads/cereals, liver, milk and leafy green vegetables.

Vitamin B-5 (Pantothenic Acid): As a coenzyme, it is involved with metabolism, synthesis of cholesterol and fatty acids and the maintenance of normal blood glucose levels. It assists with electrolyte control and needed hydration of the body. It is also essential for healthy red blood cells and prevents premature graying in some animals. **Sources:** egg yolks, legumes, peanuts, yeast, salmon, mushrooms, broccoli, avocado, whole grains, lean meats and milk.

Vitamin B-6 (Pyridoxine): Is needed for cell growth and protein, fat, and carbohydrate metabolism. B-6 is also necessary for healthy red blood cells. It helps produce folic acid and is needed for antibody production and immunity. Deficiency is rare, except in alcoholics and women taking oral contraceptives. **Sources:** chicken, fish, pork, organ meats, whole grains, nuts and legumes.

Vitamin B-12 (cobalamine): B-12 is needed for the building of proteins in the body as well as red blood cells. It is also needed for the normal function of nerve tissue. **Sources:** yogurt and other dairy products, fish, clams, oysters, salmon, sardines, lean meats, eggs, soy milk and soy sauce.

Vitamin H (Biotin): As a coenzyme, it is involved in the synthesis of fatty acids, carbohydrate metabolism and other aspects of the energy metabolism process. Biotin is actually made by intestinal bacteria and raw egg white decreases biotin availability. A supplement may be necessary with long-term antibiotic use. **Sources:** milk, egg yolk, yeast, nuts, legumes, chocolate, fish, soy flour and organ meats.

Fat Soluble Vitamins

Vitamins A, D, E, and K can be stored in the body for long periods of time and therefore can be more harmful in excessive amounts. They are delivered to the GI tract for absorption via dietary fats. This is why fat free diets are not advisable.

Vitamin A (Retinol, Retinal, or Retinoic Acid): Contributes to skin integrity, night vision, as well as proper bone, tooth and nerve development. It boosts immunity against infections and helps prevent early miscarriages. **Sources:** egg yolks, fish liver oils (such as cod liver oil), dairy products, butter and fortified margarine.

Vitamin D (Ergocalciferol/ D-2, cholecalciferol/ D-3): Allows for the absorption and utilization of calcium and phosphorus. It aids in tooth formation and bone calcification. It is more accurately a "prohormone" than a vitamin. Vitamin D-3 is made in the body when skin is exposed to ultraviolet-B radiation (UVB) from sunlight. Dark skin, sunscreen, lack of outdoor activity, aging and obesity can all decrease the availability of Vitamin D. Supplementation with 200-600 I.U. Vitamin D may be advisable. Current study findings are also suggesting that a combination of calcium and Vitamin D may decrease cancer risks in postmenopausal women. **Sources:** eggs, liver, salmon, cod liver oil, tuna, vitamin-D fortified milk and margarine.

Vitamin E (alpha-tocopherol): Functions as an antioxidant, along with vitamin C and the trace mineral Selenium. It has an important role in muscular, vascular, reproductive and central nervous systems. Neutralizes free radicals and maintains cell membranes. **Sources**: vegetable oils, margarine, grains, nuts, green leafy vegetables and wheat germ.

Vitamin K (Menaquinone): Provides for normal blood coagulation and is an anti-hemorrhagic factor. It may be involved in bone mineralization. **Sources**: kale, Brussels sprouts, spinach, cauliflower, cabbage, deep green leafy vegetables, fish, liver, meat, eggs and cereal. Note: a sterile gut or malabsorption can lead to a deficiency.

Up Close and Personal: Getting to Know Your B-Vitamins More Intimately

Thiamine (B-1): I'm needed in greater amounts when you eat carbs. Luckily, I am packaged in generous amounts in whole grain carbohydrates. If your carbs mostly come from sweets and sodas, you might want to think more of me! I can also be lost rapidly from foods when cooked in large amounts of water or with alkaline ingredients such as baking soda. Heavy antibiotic use can also increase your need for me. Health care professionals might recommend more of me to cardiac patients and those being treated for alcoholism.

Riboflavin (B-2): Light destroys me. That's one reason milk comes in opaque containers. I am found in greater amounts in high protein foods, but remember to drink more water when you eat more protein. Too much of my buddy Niacin can make me less available to you.

Niacin (B-3): The more calories and protein you eat, the more you need of me. About one-third of your need for B-3 is obtained through consuming the amino acid tryptophan, which is rich in foods such as milk and eggs. Nicotinic acid, which is one of my forms, is often used to dilate blood vessels.

Pantothenic Acid (B-5): You'll absorb only about 50% of what is in your food, but deficiencies of me are rare.

Pyridoxine (B-6): I can be made in the gut of healthy people by enteric (intestinal) bacteria. I'm very efficient at being absorbed into your blood stream (no wasting of me). Maybe that's why deficiencies are rare, except with women who take oral contraceptives or people who consume excessive alcohol.

Cobalamine (B-12): I'm not found in plant foods. For me to be absorbed well I need to be in the company of buddies B-2, B-3, and B-6, as well as magnesium. Since an "intrinsic factor" converts me to an absorbable form in the stomach, people who have had part or all of their stomachs removed need me in an injectable form.

Additional Reading & Resources

- <http://www.eatright.org>
- <http://www.nutrition4texas.org>
- <http://lpi.oregonstate.edu/infocenter/vitamins/vitaminC/>
- <http://www.ext.vt.edu/pubs/nutrition/348-071/348-071.html>
- <http://www.medicineonline.com/articles/F/2/Folacin/Folate.html>
- <http://lpi.oregonstate.edu/infocenter/vitamins/vitaminD/>
- <http://www.ajcn.org/cgi/content/abstract/85/6/1586> (Vitamin D)

Bowes & Church's Food Values of Portions Commonly Used, 18th edition by Jean Pennington and Judith S. Douglass. Published by Lippincott, Williams & Wilkins, 2005.

Nutrition and Diagnosis-Related Care, 6th edition by Sylvia Escott-Stump. Published by Lippincott, Williams & Wilkins, 2007