

Vitamin B9 (Folic acid)

Folate is the naturally occurring form found in foods. Folic acid is the synthetic form used in commercially available supplements and fortified foods. Inadequate folate status is associated with neural tube defects and some cancers.

Folate (folacin/folic acid) is one of the B vitamins. Folate helps prevent neural tube birth disorders such as spina bifida. Neural tube damage occurs during the first weeks of pregnancy, before a woman may realize she is pregnant. Meeting the folate requirement before becoming pregnant is essential for prevention.

Deficiency: One may notice anemia (macrocytic/megaloblastic), sprue, Leukopenia, thrombocytopenia, weakness, weight loss, cracking and redness of tongue and mouth, and diarrhea. In pregnancy there is a risk of low birth weight and preterm delivery.

Toxicity: None from food. Keep in mind that vitamin B12 and folic acid deficiency can both result in megaloblastic anemia. Large doses of folic acid given to an individual with an undiagnosed vitamin B12 deficiency could correct megaloblastic anemia without correcting the underlying vitamin B12 deficiency.

Sources: Green leafy vegetables, asparagus, broccoli, Brussels sprouts, citrus fruits, black eyed peas, spinach, great northern beans, whole grains, baked beans, green peas, avocado, peanuts, lettuce, tomato juice, banana, papaya, organ meats

Vitamin C (Ascorbic acid)

Vitamin C helps to form collagen, which holds the cells together, and aids in healing. It also prevents scurvy.

Deficiency: Symptoms include bruising, gum infections, lethargy, dental cavities, tissue swelling, dry hair and skin, bleeding gums, dry eyes, hair loss, joint pain, pitting edema, anemia, delayed wound healing, and bone fragility. Long-term deficiency results in scurvy.

Toxicity: Possible problems with very large vitamin C doses including kidney stones, rebound scurvy, increased oxidative stress, excess iron absorption, vitamin B12 deficiency, and erosion of dental enamel. Up to 10 grams/day is safe based on most data. 2 grams or more per day can cause diarrhea.

Sources: Guava, bell pepper, kiwi, orange, grapefruit, strawberries, Brussels sprouts, cantaloupe, papaya, broccoli, sweet potato, pineapple, cauliflower, kale, lemon juice, parsley

Vitamin A (Retinoids)

Vitamin A enhances hair, skin and helps prevent night blindness. Sources: Red, orange and dark green vegetables.

Carotenoids that can be converted by the body into retinol are referred to as provitamin A carotenoids.

Deficiency: One may notice difficulty seeing in dim light and rough/dry skin.

Toxicity: Hypervitaminosis A is caused by consuming excessive amounts of preformed vitamin A, not the plant carotenoids. Preformed vitamin A is rapidly absorbed and slowly cleared from the body. Nausea, headache, fatigue, loss of appetite, dizziness, and dry skin can result.

Excess intake while pregnant can cause birth defects.

Sources: Carrots, sweet potato, pumpkin, green leafy vegetables, squash, cantaloupe, bell pepper, Chinese cabbage, beef, eggs, peaches

Vitamin D (Calciferol, 1,25-dihydroxy vitamin D)

Vitamin D: Manufactured by the body with exposure to sunlight. Works with the body to build and maintain healthy bones and teeth; usually added to milk products. It is also called the "sunshine vitamin".

Cholecalciferol = vitamin D3 = animal version; ergocalciferol = vitamin D2 = plant version

Deficiency: In children a vitamin D deficiency can result in rickets, deformed bones, retarded growth, and soft teeth. In adults a vitamin D deficiency can result in osteomalacia, softened bones, spontaneous fractures, and tooth decay. Those at risk for deficiency include infants, elderly, dark skinned individuals, those with minimal sun exposure, fat malabsorption syndromes, inflammatory bowel diseases, kidney failure, and seizure disorders.

Toxicity: Hypervitaminosis D is not a result of sun exposure but from chronic supplementation. Excessive supplement use will elevate blood calcium levels and cause loss of appetite, nausea, vomiting, excessive thirst, excessive urination, itching, muscle weakness, joint pain and disorientation. Calcification of soft tissues can also occur.

Sources: Sunlight, fortified foods, mushrooms, salmon, mackerel, sardines, tuna, eggs

Vitamin E (tocopherol)

Protects membranes of white and red blood cells.

Deficiency: Only noticed in those with severe malnutrition. However, suboptimal intake of vitamin E is relatively common.

Toxicity: Minimal side effects have been noted in adults taking supplements in doses less than 2000 mg/day. There is a potential for impaired blood clotting. Infants are more vulnerable.

Sources: Green leafy vegetables, almonds, sunflower seeds, olives, blueberries, most nuts, most seeds, tomatoes, avocado

Vitamin K

Helps blood to clot.

Deficiency: Tendency to bleed or hemorrhage and anemia.

Toxicity: May interfere with glutathione. No known toxicity with high doses.

Sources: Broccoli, green leafy vegetables, parsley, watercress, asparagus, Brussels sprouts, green beans, green peas, carrots