# Types of vitamins and minerals

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**YouTube Video:** https://www.youtube.com/watch?v=LMJG3mx1dc8



## Vitamins

Vitamins are organic compounds that are essential in very small amounts for supporting normal physiologic function. We need vitamins in our diet, because our bodies can't synthesize them quickly enough to meet our daily needs.

Vitamins have three characteristics:

- They are natural components of foods; usually present in very small amounts.
- They are essential for normal physiologic function (eg. growth, reproduction, etc).
- When absent from the diet, they will cause a specific deficiency.

Vitamins are generally categorized into the following types

1. Water soluble
2. Fat soluble

### Water-soluble vitamins

#### Vitamin B1 (Thiamine)

- **Deficiency:** Symptoms include burning feet, weakness in extremities, rapid heart rate, swelling, anorexia, nausea, fatigue, and gastrointestinal problems.
- **Toxicity:** None known.
- **Sources:**Sunflower seeds, asparagus, lettuce, mushrooms, black beans, navy beans, lentils, spinach, peas, pinto beans, lima beans, eggplant, Brussels sprouts, tomatoes, tuna, whole wheat, soybeans

wheat, soybeans

### Vitamin B2 (Riboflavin)

- **Deficiency:** Symptoms include cracks, fissures and sores at corner of mouth and lips, dermatitis, conjunctivitis, photophobia, glossitis of tongue, anxiety, loss of appetite, and fatigue.
- **Toxicity:** Excess riboflavin may increase the risk of DNA strand breaks in the presence of chromium. High-dose riboflavin therapy will intensify urine color to a bright yellow (flavinuria) – but this is harmless.
- **Sources:** Almonds, soybeans/tempeh, mushrooms, spinach, whole wheat, yogurt, mackerel, eggs, liver

### Vitamin B3 (Niacin)

- **Deficiency:** Symptoms include dermatitis, diarrhea, dementia, and stomatitis.
- **Toxicity:** Niacin from foods is not known to cause adverse effects. Supplemental nicotinic acid may cause flushing of skin, itching, impaired glucose tolerance and gastrointestinal upset. Intake of 750 mg per day for less than 3 months can cause liver cell damage. High dose nicotinamide can cause nausea and liver toxicity.
- **Sources:** Mushrooms, asparagus, peanuts, brown rice, corn, green leafy vegetables, sweet potato, potato, lentil, barley, carrots, almonds, celery, turnips, peaches, chicken meat, tuna, salmon

### Vitamin B5 (Pantothenic acid)

- **Deficiency:** Very unlikely. Only in severe malnutrition may one notice tingling of feet.
- **Toxicity:** Nausea, heartburn and diarrhea may be noticed with high dose supplements.
- **Sources:** Broccoli, lentils, split peas, avocado, whole wheat, mushrooms, sweet potato, sunflower seeds, cauliflower, green leafy vegetables, eggs, squash, strawberries, liver

### Vitamin B6 (Pyridoxine)

- **Deficiency:** Symptoms include chelosis, glossitis, stomatitis, dermatitis (all similar to vitamin B2 deficiency), nervous system disorders, sleeplessness, confusion, nervousness, depression, irritability, interference with nerves that supply muscles and difficulties in movement of these muscles, and anemia. Prenatal deprivation results in mental retardation and blood disorders for the newborn.
- **Toxicity:** High doses of supplemental vitamin B6 may result in painful neurological symptoms.
- **Sources:** Whole wheat, brown rice, green leafy vegetables, sunflower seeds, potato, garbanzo beans, banana, trout, spinach, tomatoes, avocado, walnuts, peanut butter, tuna, salmon, lima beans, bell peppers, chicken meat

### Vitamin B7 (Biotin)

- **Deficiency:** Very rare in humans. Keep in mind that consuming raw egg whites over a long period of time can cause biotin deficiency. Egg whites contain the protein avidin, which

binds to biotin and prevents its absorption.
- **Toxicity:** Not known to be toxic.
- **Sources:** Green leafy vegetables, most nuts, whole grain breads, avocado, raspberries, cauliflower, carrots, papaya, banana, salmon, eggs

### 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.

- **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 B12 (Cobalamin)

Vitamin B12 must combine with intrinsic factor before it's absorbed into the bloodstream. We can store a year's worth of this vitamin – but it should still be consumed regularly. B12 is a product of bacterial fermentation, which is why it's not present in higher order plant foods.

- **Deficiency:** Symptoms include pernicious anemia, neurological problems and sprue.
- **Toxicity:** None known from supplements or food. Only a small amount is absorbed via the oral route, thus the potential for toxicity is low.
- **Sources:** Fortified cereals, liver, trout, salmon, tuna, haddock, egg

### Vitamin C (Ascorbic acid)

- **Deficiency:** Symptoms include bruising, gum infections, lethargy, dental cavities, tissue swelling, dry hair and skin, bleeding gums, dry eyes, hair loss, joint paint, 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.

**Fat soluble vitamins**

**Vitamin A (Retinoids)**

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)**

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)**

- **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**

- **Deficiency:** Tendency to blood or hemorrhage and anemia

- **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

## Minerals

Dietary elements (commonly known as dietary minerals or mineral nutrients) are the chemical elements required by living organisms, other than the four elements carbon, hydrogen, nitrogen and oxygen present in common organic molecules.

Vitamins are generally categorized into

1. Macrominerals
2. Microminerals

### Macrominerals

### Calcium

- **Deficiency:** Long-term inadequate intake can result in low bone mineral density, rickets, osteomalacia and osteoporosis.
- **Toxicity:** Will cause nausea, vomiting, constipation, dry mouth, thirst, increased urination, kidney stones and soft tissue calcification.
- **Sources:** Green leafy vegetables, legumes, tofu, molasses, sardines, okra, perch, trout, Chinese cabbage, rhubarb, sesame seeds

### Phosphorus

- **Deficiency:** Very rare. Those at risk include premature infants, those who use antacids, alcoholics, uncontrolled diabetes mellitus and refeeding syndrome.
- **Toxicity:** Very rare. May result in soft tissue calcification.
- **Sources:** Legumes, nuts, seeds, whole grains, eggs, fish, buckwheat, seafood, corn, wild rice

### Potassium

- **Deficiency:** Not a result of insufficient dietary intake. Caused by protein wasting conditions. Diuretics can also cause excessive loss of potassium in the urine. Low blood potassium can result in cardiac arrest.
- **Toxicity:** Occurs when the intake of potassium exceeds the kidneys capacity for elimination. Found with kidney failure and potassium sparing diuretics. Oral doses greater than 18 grams can lead to toxicity. Symptoms include tingling of extremities and muscle weakness. High dose potassium supplements may cause nausea, vomiting and diarrhea.
- **Sources:** Sweet potato, tomato, green leafy vegetables, carrots, prunes, beans, molasses,

squash, fish, bananas, peaches, apricots, melon, potatoes, dates, raisins, mushrooms

### Magnesium

- **Deficiency:** Very rare due to abundance of magnesium in foods. Those with gastrointestinal disorders, kidney disorders, and alcoholism are at risk.
- **Toxicity:** None identified from foods. Excessive consumption of magnesium containing supplements may result in diarrhea (magnesium is a known laxative), impaired kidney function, low blood pressure, muscle weakness, and cardiac arrest.
- **Sources:** Legumes, nuts, seeds, whole grains, fruits, avocado

### Salt (sodium chloride)

- **Deficiency:** Does not result from low dietary intake. Low blood sodium typically results from increased fluid retention. One may notice nausea, vomiting, headache, cramps, fatigue, and disorientation.
- **Toxicity:** Excessive intake can lean to increased fluid volume, nausea, vomiting, diarrhea and abdominal cramps. High blood sodium usually results from excessive water loss.
- **Sources:** Any processed foods, whole grains, legumes, nuts, seeds, vegetables

## Microminerals

Consume iron rich foods with vitamin C rich foods to enhance absorption.

### Iron

- **Deficiency:** Anemia with small and pale red blood cells. In children it is associated with behavioral abnormalities.
- **Toxicity:** Common cause of poisoning in children. May increase the risk of chronic disease. Excessive intake of supplemental iron is an emergency room situation. Cardiovascular disease, cancer, and neurodegenerative diseases are associated with iron excess.
- **Sources:** Almonds, apricots, baked beans, dates, lima beans, kidney beans, raisins, brown rice, green leafy vegetables, broccoli, pumpkin seeds, tuna, flounder, chicken meat, pork

### Zinc

Zinc deficiency results in decreased immunity and increases the susceptibility to infection. Supplementation of zinc has been shown to reduce the incidence of infection as well as cellular damage from increased oxidative stress. Zinc deficiency has also been implicated in diarrheal disease, supplementation might be effective in the prophylaxis and treatment of acute diarrhea.

- **Deficiency:** Symptoms include growth retardation, lowered immune statue, skeletal abnormalities, delay in sexual maturation, poor wound healing, taste changes, night blindness and hair loss. Those at risk for deficiency include the elderly, alcoholics, those with malabsorption, vegans, and those with severe diarrhea.
- **Toxicity:** Symptoms that result are abdominal pain, diarrhea, nausea, and vomiting. Long

- **Toxicity:** Symptoms that result are abdominal pain, diarrhea, nausea, and vomiting. Long-term consumption of excessive zinc can result in copper deficiency.
- **Sources:** Mushrooms, spinach, sesame seeds, pumpkin seeds, green peas, baked beans, cashews, peas, whole grains, flounder, oats, oysters, chicken meat

### Copper

- **Deficiency:** Relatively uncommon. Clinical sign is hypochromic anemia unresponsive to iron therapy. Neutropenia and leucopenia may also result. Hypopigmentation of skin and hair is also noticed. Those at risk for deficiency include premature infants, infants fed only cow's milk formula, those with malabsorption syndromes, excessive zinc consumption and antacid use.
- **Toxicity:** Rare. Symptoms include abdominal pain, nausea, vomiting, and diarrhea. Long-term exposure to lower doses of copper can result in liver damage.
- **Sources:** Mushrooms, green leafy vegetables, barley, soybeans, tempeh, sunflower seeds, navy beans, garbanzo beans, cashews, molasses, liver

### Chromium

- **Deficiency:** Symptoms include impaired glucose tolerance and elevated circulating insulin
- **Toxicity:** Generally limited to industrial exposure. Long-term supplement use may increase DNA damage. Rare cases of kidney failure have also been documented.
- **Sources:** Lettuce, onions, tomatoes, whole grains, potatoes, mushrooms, oats, prunes, nuts, brewer's yeast

### Fluoride

- **Deficiency:** Increased risk of dental caries.
- **Toxicity:** Children can develop mottled tooth enamel. Swallowing toothpaste with fluoride is typically the cause of this problem. Symptoms include nausea, abdominal pain, and vomiting.
- **Sources:** Water, tea, fish

### Iodine

- **Deficiency:** Impairs growth and neurological development. Deficiency can also result in the decreased production of thyroid hormones and hypertrophy of the thyroid.
- **Toxicity:** Rare and occurs in doses of many grams. Symptoms include burning mouth, throat and stomach. Fever and diarrhea can also result.
- **Sources:** Sea vegetables, iodized salt, eggs, strawberries, asparagus, green leafy vegetables

### Selenium

- **Deficiency:** Can cause limited glutathione activity. More severe symptoms are juvenile cardiomyopathy and chondrodystrophy.
- **Toxicity:** Multiple symptoms including dermatologic lesions, hair and nail brittleness, gastrointestinal disturbances, skin rash, fatigue, and nervous system abnormalities.

- **Sources:** Brazil nuts, mushrooms, barley, salmon, whole grains, walnuts, eggs

### Manganese

- **Deficiency:** Not typically observed in humans.
- **Toxicity:** Generally from industrial exposure.
- **Sources:** Green leafy vegetables, berries, pineapple, lettuce, tempeh, oats, soybeans, spelt, brown rice, garbanzo beans

### Molybdenum

- **Deficiency:** Never been observed in healthy people.
- **Toxicity:** More likely than deficiency. Still very rare.
- **Sources:** Legumes, whole grains

**Source:** *Precision Nutrition*

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