

List of Vitamins

Type of vitamin	Description
Fat-soluble	Fat-soluble vitamins, including vitamins A, D, E, and K, are stored in the body's liver, fatty tissue, and muscles. These vitamins are absorbed more efficiently when dietary fat is present.
Water-soluble	<p>Water-soluble vitamins, which include vitamin C and all the B vitamins, are not stored in the body. Any excess amounts of water-soluble vitamins are excreted through urine, so they need to be consumed regularly to avoid deficiencies.</p> <p>An exception to this is vitamin B12, which can be stored in the liver for several years.</p>

Vitamin	Description	Food sources
Vitamin A	<p>Vitamin A is a group of fat-soluble compounds, primarily retinol and retinyl esters, that are essential for various bodily functions, including immune function, cellular communication, and growth. It supports the normal formation and maintenance of organs such as the heart, lungs, and eyes and plays a critical role in male and female reproduction.</p> <p>A key function of Vitamin A is its involvement in vision, as it is a vital component of rhodopsin, the light-sensitive protein in the retina, and supports the healthy differentiation and functioning of the conjunctival membranes and cornea.</p>	<ul style="list-style-type: none">• Dark-colored fruits• Dark leafy vegetables• Egg yolk• Fortified milk and dairy products (cheese, yogurt, butter, and cream)• Liver, beef, and fish
Thiamin or vitamin B1	<p>Thiamin, also known as vitamin B1, is a water-soluble B vitamin that plays a crucial role in energy metabolism and supports cell growth, development, and function. It is naturally present in some foods, added to others, and available as a dietary supplement.</p> <p>Thiamin is absorbed in the small intestine through active transport at nutritional doses and by passive diffusion at pharmacologic doses. Most of the thiamin in the diet is in phosphorylated forms, which are hydrolyzed to free thiamin by intestinal phosphatases before absorption.</p> <p>Humans store small amounts of thiamin in the liver, but because it has a short half-life, a continuous dietary supply is necessary to meet the body's needs.</p>	<ul style="list-style-type: none">• Dried milk• Egg• Enriched bread and flour• Lean meats• Legumes (dried beans)• Nuts and seeds• Organ meats• Peas• Whole grains

Vitamin	Description	Food sources
Riboflavin or vitamin B2	<p>Riboflavin, also known as vitamin B2, is a water-soluble B vitamin that is naturally present in some foods, added to others, and available as a dietary supplement. It is an essential component of two major coenzymes, flavin mononucleotide (FMN) and flavin adenine dinucleotide (FAD), which are crucial for energy production, cellular function, growth, and development, as well as the metabolism of fats, drugs, and steroids.</p> <p>FAD is involved in converting the amino acid tryptophan to niacin (vitamin B3), while FMN is required for converting vitamin B6 to its active form, pyridoxal 5'-phosphate. Riboflavin also helps maintain normal levels of homocysteine, an amino acid in the blood.</p>	<ul style="list-style-type: none"> • Dairy milk • Yogurt • Cheese • Eggs • Lean beef and pork • Organ meats (beef liver) • Chicken breast • Salmon • Fortified cereal and bread • Almonds • Spinach
Niacin or vitamin B3	<p>Niacin, also known as vitamin B3, is a water-soluble B vitamin that includes nicotinic acid, nicotinamide (niacinamide), and derivatives such as nicotinamide riboside. It is naturally present in many foods, added to others, and available as a dietary supplement. Once absorbed, all tissues in the body convert niacin into its main metabolically active form, nicotinamide adenine dinucleotide (NAD).</p> <p>NAD is crucial for more than 400 enzymes that catalyze various biochemical reactions in the body, making it the most widely used vitamin-derived coenzyme. NAD can also be converted into another active form to support additional physiological functions.</p>	<ul style="list-style-type: none"> • Avocado • Eggs • Enriched breads and fortified cereals • Fish (tuna and salt-water fish) • Lean meats • Legumes • Nuts • Potato • Poultry
Pantothenic acid or vitamin B5	<p>Pantothenic acid, also known as vitamin B5, is an essential water-soluble nutrient found naturally in some foods, added to others, and available as a dietary supplement. Its primary function is in the synthesis of coenzyme A (CoA) and acyl carrier protein.</p> <p>CoA is crucial for fatty acid synthesis and degradation, the transfer of acetyl and acyl groups, and various other anabolic and catabolic processes. Acyl carrier protein plays a key role in fatty acid synthesis. These functions are vital for maintaining normal metabolic processes in the body.</p>	<ul style="list-style-type: none"> • Avocado • Broccoli, kale, and other vegetables in the cabbage family • Eggs • Legumes and lentils • Milk • Mushroom • Organ meats • Poultry • White and sweet potatoes • Whole-grain cereals

Vitamin	Description	Food sources
Vitamin B6	<p>Vitamin B6 is a water-soluble vitamin that is naturally found in many foods, added to others, and available as a dietary supplement. It encompasses six compounds, or vitamers, that exhibit vitamin B6 activity: pyridoxine (an alcohol), pyridoxal (an aldehyde), and pyridoxamine (which contains an amino group), along with their respective 5'-phosphate esters.</p> <p>The active coenzyme forms of vitamin B6 are pyridoxal 5'-phosphate (PLP) and pyridoxamine 5'-phosphate (PMP). A significant portion of the naturally occurring pyridoxine in fruits, vegetables, and grains is in glycosylated forms, which have lower bioavailability.</p>	<ul style="list-style-type: none"> • Avocado • Banana • Legumes (dried beans) • Meat • Nuts • Poultry • Whole grains (milling and processing removes a lot of this vitamin)
Biotin or vitamin B7	<p>Biotin, a water-soluble B vitamin, is an essential nutrient found naturally in some foods and available as a dietary supplement. It serves as a cofactor for five carboxylases—propionyl-CoA carboxylase, pyruvate carboxylase, methylcrotonyl-CoA carboxylase (MCC), acetyl-CoA carboxylase 1, and acetyl-CoA carboxylase 2—that play critical roles in the metabolism of fatty acids, glucose, and amino acids.</p> <p>Biotin also contributes to histone modifications, gene regulation through transcription factor activity, and cell signaling. Most biotin in foods is protein-bound, and gastrointestinal enzymes break it down into biocytin and biotin-oligopeptides, which are processed into free biotin by biotinidase in the intestines. The free biotin is then absorbed in the small intestine and primarily stored in the liver.</p>	<ul style="list-style-type: none"> • Chocolate • Cereal • Egg yolk • Legumes • Milk • Nuts • Organ meats (liver, kidney) • Pork • Yeast
Folate or vitamin B9	<p>Folate, also known as vitamin B9 or folacin, is a water-soluble B vitamin that is naturally present in some foods, added to others, and available as a dietary supplement. The term "folate" refers to the naturally occurring food folates and those in dietary supplements and fortified foods, including folic acid.</p> <p>Food folates typically exist in the tetrahydrofolate (THF) form, often with additional glutamate residues, making them polyglutamates. Folic acid, the fully oxidized monoglutamate form, is commonly used in fortified foods and most supplements.</p> <p>Some supplements also contain folate in the monoglutamyl form, such as 5-MTHF (5-methyl-tetrahydrofolate), which is also known by other names like L-5-MTHF, methylfolate, and L-methylfolate.</p>	<ul style="list-style-type: none"> • Asparagus and broccoli • Beets • Brewer's yeast • Dried beans (cooked pinto, navy, kidney, and lima) • Fortified cereals • Green, leafy vegetables (spinach and romaine lettuce) • Lentils • Oranges and orange juice • Peanut butter • Wheat germ

Vitamin	Description	Food sources
Cobalamin or vitamin B12	<p>Vitamin B12, a water-soluble vitamin, is naturally present in some foods, added to others, and available as a dietary supplement or prescription medication. As it contains the mineral cobalt, compounds with vitamin B12 activity are collectively called cobalamins.</p> <p>The metabolically active forms of vitamin B12 are methylcobalamin and 5-deoxyadenosylcobalamin. Two other forms, hydroxycobalamin and cyanocobalamin, become biologically active after conversion into methylcobalamin or 5-deoxyadenosylcobalamin in the body.</p>	<ul style="list-style-type: none"> • Meat • Eggs • Fortified foods such as soymilk • Milk and milk products • Organ meats (liver and kidney) • Poultry • Shellfish
Vitamin C	<p>Vitamin C, or L-ascorbic acid, is a water-soluble vitamin that is essential for humans, as they cannot synthesize it naturally. It plays a critical role in the biosynthesis of collagen, L-carnitine, and certain neurotransmitters and is involved in protein metabolism.</p> <p>Vitamin C's antioxidant properties may help prevent or delay diseases linked to oxidative stress, such as cancer and cardiovascular disease. Additionally, it supports immune function and enhances the absorption of nonheme iron from plant-based foods.</p> <p>A Vitamin C deficiency leads to scurvy, which is characterized by fatigue, connective tissue weakness, and capillary fragility.</p>	<ul style="list-style-type: none"> • Broccoli • Brussels sprouts • Cabbage • Cauliflower • Citrus fruits • Potatoes • Spinach • Strawberries
Vitamin D	<p>Vitamin D, also known as calciferol, is a fat-soluble vitamin that is naturally found in a few foods, added to others, and available as a dietary supplement. It is also produced in the skin when ultraviolet (UV) rays from sunlight trigger its synthesis.</p> <p>Vitamin D obtained from sun exposure, foods, and supplements is biologically inert and requires two hydroxylations in the body for activation. The first occurs in the liver, converting vitamin D into 25-hydroxyvitamin D (calcidiol), and the second occurs primarily in the kidneys, producing the physiologically active 1,25-dihydroxyvitamin D (calcitriol).</p>	<ul style="list-style-type: none"> • Fish (fatty fish such as salmon, mackerel, herring, and orange roughy) • Fish liver oils (cod liver oil) • Fortified cereals • Fortified milk and dairy products (cheese, yogurt, butter, and cream)

Vitamin	Description	Food sources
Vitamin E	<p>Vitamin E is a fat-soluble antioxidant found naturally in some foods, added to others, and available as a dietary supplement. It is a collective name for a group of compounds, including eight chemical forms: alpha-, beta-, gamma-, and delta-tocopherol and alpha-, beta-, gamma-, and delta-tocotrienol.</p> <p>These forms vary in their biological activity, with alpha-tocopherol being the only form recognized to meet human requirements.</p>	<ul style="list-style-type: none"> • Avocado • Dark green vegetables (spinach, broccoli, asparagus, and turnip greens) • Margarine (made from safflower, corn, and sunflower oil) • Oils (safflower, corn, and sunflower) • Papaya and mango • Seeds and nuts • Wheat germ and wheat germ oil
Vitamin K	<p>Vitamin K is a fat-soluble vitamin comprising a family of compounds with a common chemical structure of 2-methyl-1,4-naphthoquinone. It is naturally present in some foods and available as a dietary supplement.</p> <p>The main forms of vitamin K are phylloquinone (vitamin K1) and a series of menaquinones (vitamin K2), which have unsaturated isoprenyl side chains and are designated MK-4 through MK-13 based on the length of their side chains. Among these, MK-4, MK-7, and MK-9 are the most well-studied menaquinones.</p>	<ul style="list-style-type: none"> • Cabbage • Cauliflower • Cereals • Dark green vegetables (broccoli, Brussels sprouts, and asparagus) • Dark leafy vegetables (spinach, kale, collards, and turnip greens) • Fish, liver, beef, and eggs
Additional notes		

Manetti, S. (2023, January 19). *Vitamins: MedlinePlus medical encyclopedia*. MedlinePlus. <https://medlineplus.gov/ency/article/002399.htm>

National Institutes of Health. (2017). *Vitamin and mineral supplement fact sheets*. <https://ods.od.nih.gov/factsheets/list-VitaminsMinerals/>

The Nutrition Source. (2020, July 24). *Riboflavin – Vitamin B2*. Harvard TH Chan School of Public Health. <https://nutritionsource.hsph.harvard.edu/riboflavin-vitamin-b2/>