vitamin

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Vitamin

- Vitamin merupakan komponen mengandung karbon yang membantu proses-proses di dalam tubuh secara luas
- Merupakan mikronutient yang sangat diperlukan tubuh
- Membantu tubuh agar tetap berfungsi,seperti metabolisme energi, pemeliharaan dan pembentukan sel dan jaringan yang sehat
- C. Eijkman

Klasifikasi vitamin

- Ada 13 jenis vitamin yang dikenal esensial
- Hanya vitamin D dan K yang bisa diproduksi oleh tubuh manusia, sehingga vitamin yang lain harus tersedia dalam menu kita
- Vitamin A,D,E,K termasuk vitamin yang larut dalam lemak, terdapat di semua makanan yang mengandung lemak. (buah?)

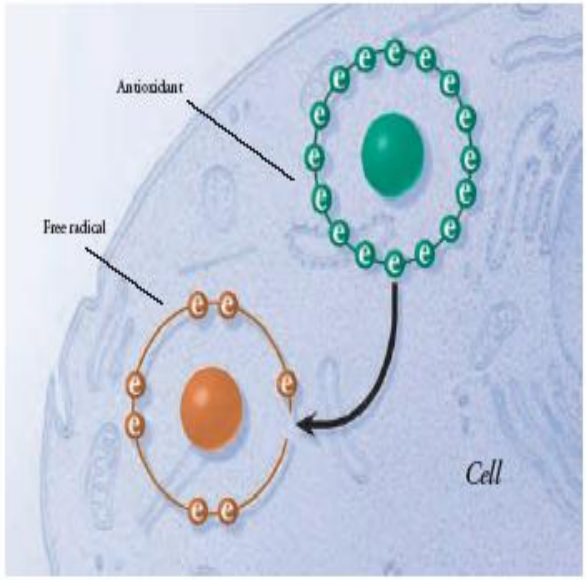
- Terdapat di jaringan adiposa
- Kelebihan: Megadosing?
- Kekurangan: osteoporosis, gangguan penglihatan di malam hari dan bahkan kematian

Vitamin larut lemak

Table 1 Fat-Soluble Vitamins

Vitamin Name	Primary Functions	Recommended Intake*	Reliable Food Sources	Toxicity/Deficiency Symptoms
A (retinol, retinal, retinoic acid)	Required for ability of eyes to adjust to changes in light Protects color vision Assists cell differentiation Required for sperm production in men and fertilization in women Contributes to healthy bone Contributes to healthy immune system	RDA: Men = 900 µg/day Women = 700 µg/day UL = 3,000 µg/day	Preformed retinol: Beef and chicken liver, egg yolks, milk Carotenoid precursors: Spinach, carrots, mango, apricots, cantaloupe, pumpkin, yams	*Toxicity*: Fatigue; bone and joint pain; spontaneous abortion and birth defects of fetuses in pregnant women; nausea and diarrhea; liver damage; nervous system damage; blurred vision; hair loss; skin disorders *Deficiency*: Night blindness, xerophthalmia; impaired growth, immunity, and reproductive function
D (cholecalciferol)	Regulates blood calcium levels Maintains bone health Assists cell differentiation	AI (assumes that person does not get adequate sun exposure): Adult aged 19 to 50 = 5 µg/day Adult aged 50 to 70 = 10 µg/day Adult aged > 70 = 15 µg/day UL = 50 µg/day	Canned salmon and mackerel, milk, fortified cereals	*Toxicity*: Hypercalcemia *Deficiency*: Rickets in children; osteomalacia and/or osteoporosis in adults
E (tocopherol)	As a powerful antioxidant, protects cell membranes, polyunsaturated fatty acids, and vitamin A from oxidation Protects white blood cells Enhances immune function Improves absorption of vitamin A	RDA: Men = 15 mg/day Women = 15 mg/day UL = 1,000 mg/day	Sunflower seeds, almonds, vegetable oils, fortified cereals	*Toxicity*: Rare *Deficiency*: Hemolytic anemia; impairment of nerve, muscle, and immune function
K (phylloquinone, menaquinone, menadione)	Serves as a coenzyme during production of specific proteins that assist in blood coagulation and bone metabolism	AI: Men = 120 µg/day Women = 90 µg/day	Kale, spinach, turnip greens, brussels sprouts	*Toxicity*: None known *Deficiency*: Impaired blood clotting; possible effect on bone health

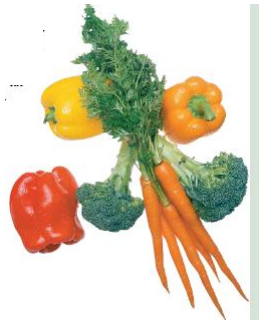
*Abbreviations: RDA, Recommended Dietary Allowance; UL, upper limit; AI, Adequate Intake.



When oxygen is used by cells, by-products called free radicals are naturally formed. Free radicals are molecules with a missing electron. Simply put, free radicals "want" their full share of electrons. They will take electrons from vital cell structures, causing damage and leading to disease. Antioxidants are able to donate electrons. Nutrients such as vitamin C, vitamin E, or beta-carotene are antioxidants that block some of this damage by donating electrons to stabilize and neutralize the harmful effects of free radicals.

Vitamin larut air

- Vitamin C (ascorbic acid) dan vitamin B (thiamin, riboflavin, niacin, vitamin B6, vitamin B12, folate, pantothenicacid, and biotin) adalah vitamin larut air.
- Terdapat di sayuran, buah, biji-bijian, daging dan produk susu.
- Mudah diserap



Conts.

Water-soluble vitamins can be found in a variety of foods.

- Tidak bisa disimpan dalam jumlah besar
- Kelebihan akan dikeluarkan melalui urin
- Harus ada dalam menu sehari-hari
- Kasus keracunan jarang, jika kekurangan akan merusak saraf dan luka pada kulit.

Vitamin Name	Primary Functions	Recommended Intake*	Reliable Food Sources	Toxicity/Deficiency Symptoms
Thiamin (vitamin B_1)	Required as enzyme cofactor for carbohydrate and amino acid metabolism	RDA: Men = 1.2 mg/day Women = 1.1 mg/day	Pork, fortified cereals, enriched rice and pasta, peas, tuna, legumes	*Toxicity:* None known *Deficiency:* Beriberi; fatigue, apathy, decreased memory, confusion, irritability, muscle weakness
Riboflavin (vitamin B_2)	Required as enzyme cofactor for carbohydrate and fat metabolism	RDA: Men = 1.3 mg/day Women = 1.1 mg/day	Beef liver, shrimp, milk and dairy foods, fortified cereals, enriched breads and grains	*Toxicity:* None known *Deficiency:* Ariboflavinosis; swollen mouth and throat; seborrheic dermatitis; anemia
Niacin, nicotinamide, nicotinic acid	Required for carbohydrate and fat metabolism Plays role in DNA replication and repair and cell differentiation	RDA: Men = 16 mg/day Women = 14 mg/day UL = 35 mg/day	Beef liver, most cuts of meat/fish/poultry, fortified cereals, enriched breads and grains, canned tomato products	*Toxicity:* Flushing, liver damage, glucose intolerance, blurred vision differentiation *Deficiency:* Pellagra; vomiting, constipation, or diarrhea; apathy
Pyridoxine, pyridoxal, pyridoxamine (vitamin B_6)	Required as enzyme cofactor for carbohydrate and amino acid metabolism Assists synthesis of blood cells	RDA: Men and women aged 19 to 50 = 1.3 mg/day Men aged >50 = 1.7 mg/day Women aged >50 = 1.5 mg/day UL = 100 mg/day	Chickpeas (garbanzo beans), most cuts of meat/fish/poultry, fortified cereals, white potatoes	*Toxicity:* Nerve damage, skin lesions *Deficiency:* Anemia; seborrheic dermatitis; depression, confusion, and convulsions
Folate (folic acid)	Required as enzyme cofactor for amino acid metabolism Required for DNA synthesis Involved in metabolism of homocysteine	RDA: Men = 400 µg/day Women = 400 µg/day UL = 1,000 µg/day	Fortified cereals, enriched breads and grains, spinach, legumes (lentils, chickpeas, pinto beans), greens (spinach, romaine lettuce), liver	*Toxicity:* Masks symptoms of vitamin B_{12} deficiency, specifically signs of nerve damage *Deficiency:* Macrocytic anemia; neural tube defects in a developing fetus; elevated homocysteine levels
Cobalamin (vitamin B_{12})	Assists with formation of blood Required for healthy nervous system function Involved as enzyme cofactor in metabolism of homocysteine	RDA: Men = 2.4 µg/day Women = 2.4 µg/day	Shellfish, all cuts of meat/fish/poultry, milk and dairy foods, fortified cereals	*Toxicity:* None known *Deficiency:* Pernicious anemia; tingling and numbness of extremities; nerve damage; memory loss, disorientation, and dementia
Pantothenic acid	Assists with fat metabolism	AI: Men = 5 mg/day Women = 5 mg/day	Meat/fish/poultry, shiitake mushrooms, fortified cereals, egg yolk	*Toxicity:* None known *Deficiency:* Rare
Biotin	Involved as enzyme cofactor in carbohydrate, fat, and protein metabolism	RDA: Men = 30 µg/day Women = 30 µg/day	Nuts, egg yolk	*Toxicity:* None known *Deficiency:* Rare
Ascorbic acid (vitamin C)	Antioxidant in extracellular fluid and lungs Regenerates oxidized vitamin E Assists with collagen synthesis Enhances immune function Assists in synthesis of hormones, neurotransmitters, and DNA Enhances iron absorption	RDA: Men = 90 mg/day Women = 75 mg/day Smokers = 35 mg more per day than RDA UL = 2,000 mg	Sweet peppers, citrus fruits and juices, broccoli, strawberries, kiwi	*Toxicity:* Nausea and diarrhea, nosebleeds, increased oxidative damage, increased formation of kidney stones in people with kidney disease *Deficiency:* Scurvy; bone pain and fractures, depression, and anemia

Mineral

- Merupakan substansi yang tidak mengandung karbon, an organik
- Tidak bisa disintesis, baik oleh manusia, hewan maupun tumbuhan.
- Diklasifikasikan menjadi

1. mineral makro (major mineral)
2. mineral mikro (trace mineral)

1. Major mineral

- Major mineral merupakan mineral yang dibutuhkan oleh tubuh dalam jumlah paling sedikit 100 mg per hari.
- Terdapat di dalam tubuh manusia sebanyak 5 g atau lebih
- Ada tujuh major mineral: sodium, potassium, phosphorus, chloride, calcium, magnesium, dan sulfur.

Major mineral

Mineral Name	Primary Functions	Recommended Intake*	Reliable Food Sources	Toxicity/Deficiency Symptoms
Sodium	Fluid balance Acid–base balance Transmission of nerve impulses Muscle contraction	AI: Adults = 1.5 g/day (1,500 mg/day)	Table salt, pickles, most canned soups, snack foods, cured luncheon meats, canned tomato products	*Toxicity:* Water retention, high blood pressure, loss of calcium in urine *Deficiency:* Muscle cramps, dizziness, fatigue, nausea, vomiting, mental confusion
Potassium	Fluid balance Transmission of nerve impulses Muscle contraction	AI: Adults = 4.7 g/day (4,700 mg/day)	Most fresh fruits and vegetables: potatoes, bananas, tomato juice, orange juice, melons	*Toxicity:* Muscle weakness, vomiting, irregular heartbeat *Deficiency:* Muscle weakness, paralysis,mental confusion, irregular heartbeat
Phosphorus	Fluid balance Bone formation Component of ATP, which provides energy for our bodies	RDA: Adults = 700 mg/day	Milk/cheese/yogurt, soy milk and tofu, legumes (lentils, black beans), nuts (almonds, peanuts and peanut butter), poultry	*Toxicity:* Muscle spasms, convulsions, low blood calcium *Deficiency:* Muscle weakness, muscle damage, bone pain, dizziness
Chloride	Fluid balance Transmission of nerve impulses Component of stomach acid (HCl) Antibacterial	AI: Adults = 2.3 g/day (2,300 mg/day)	Table salt	*Toxicity:* None known *Deficiency:* Dangerous blood acid–base imbalances, irregular heartbeat
Calcium	Primary component of bone Acid–base balance Transmission of nerve impulses Muscle contraction	AI: Adults aged 19 to 50 = 1,000 mg/day Adults aged >50 = 1,200 mg/day UL = 2,500 mg/day	Milk/yogurt/cheese (best-absorbed form of calcium), sardines, collard greens and spinach, calcium-fortified juices	*Toxicity:* Mineral imbalances, shock, kidney failure, fatigue, mental confusion *Deficiency:* Osteoporosis, convulsions, heart failure
Magnesium	Component of bone Muscle contraction Assists more than 300 enzyme systems	RDA: Men aged 19 to 30 = 400 mg/day Men aged >30 = 420 mg/day Women aged 19 to 30 = 310 mg/day Women aged >30 = 320 mg/day UL = 350 mg/day	Greens (spinach, kale, collard greens), whole grains, seeds, nuts, legumes (navy and black beans)	*Toxicity:* None known *Deficiency:* Low blood calcium, muscle spasms or seizures, nausea, weakness, increased risk of chronic diseases such as heart disease, hypertension, osteoporosis, and type 2 diabetes
Sulfur	Component of certain B-vitamins and amino acids Acid–base balance Detoxification in liver	No DRI	Protein-rich foods	*Toxicity:* None known *Deficiency:* None known

*Abbreviations: RDA, Recommended Dietary Allowance; UL, upper limit; AI, Adequate Intake; DRI, Dietary Reference Intake .

2. Trace mineral

- Merupakan mineral yang dibutuhkan oleh tubuh dalam jumlah kurang dari 100 mg per hari.
- Di dalam tubuh manusia terdapat trace mineral kurang dari 5 g.
- Ada delapan mineral esensial yang dibutuhkan tubuh kita: selenium, fluoride, iodine, chromium, manganese, iron, zinc, dan copper

Trace mineral

Mineral Name	Primary Functions	Recommended Intake*	Reliable Food Sources	Toxicity/Deficiency Symptoms
Selenium	Required for carbohydrate and fat metabolism	RDA: Adults = 55 µg/day UL = 400 µg/day	Nuts, shellfish, meat/fish/poultry, whole grains	*Toxicity:* Brittle hair and nails, skin rashes, nausea and vomiting, weakness, liver disease *Deficiency:* Specific forms of heart disease and arthritis, impaired immune function, muscle pain and wasting, depression, hostility
Fluoride	Development and maintenance of healthy teeth and bones	RDA: Men = 4 mg/day Women = 3 mg/day UL = 2.2 mg/day for children aged 4 to 8; 10 mg/day for children aged >8	Fish, seafood, legumes, whole grains, drinking water (variable)	*Toxicity:* Fluorosis of teeth and bones *Deficiency:* Dental caries, low bone density
Iodine	Synthesis of thyroid hormones Temperature regulation Reproduction and growth	RDA: Adults = 150 µg/day UL = 1,100 µg/day	Iodized salt, saltwater seafood	*Toxicity:* Goiter *Deficiency:* Goiter, hypothyroidism, cretinism in infant of mother who is iodine deficient
Chromium	Glucose transport Metabolism of DNA and RNA Immune function and growth	AI: Men aged 19 to 50 = 35 µg/day Men aged >50 = 30 µg/day Women aged 19 to 50 = 25 µg/day Women aged >50 = 20 µg/day	Whole grains, brewers yeast,	*Toxicity:* None known *Deficiency:* Elevated blood glucose and blood lipids, damage to brain and nervous system
Manganese	Assists many enzyme systems Synthesis of protein found in bone and cartilage	AI: Men = 2.3 mg/day Women = 1.8 mg/day UL = 11 mg/day for adults	Whole grains, nuts, leafy vegetables, tea	*Toxicity:* Impairment of neuromuscular system *Deficiency:* Impaired growth and reproductive function, reduced bone density, impaired glucose and lipid metabolism, skin rash
Iron	Component of hemoglobin in blood cells Component of myoglobin in muscle cells Assists many enzyme systems	RDA: Adult men = 8 mg/day Women aged 19 to 50 = 18 mg/day Women aged >50 = 8 mg/day	Meat/fish/poultry (best-absorbed form of iron), fortified cereals, legumes, spinach	*Toxicity:* Nausea, vomiting, and diarrhea; dizziness, confusion; rapid heart beat, organ damage, death *Deficiency:* Iron-deficiency microcytic (small red blood cells), hypochromic anemia
Zinc	Assists more than 100 enzyme systems Immune system function Growth and sexual maturation Gene regulation	RDA: Men 11 mg/day Women = 8 mg/day UL = 40 mg/day	Meat/fish/poultry (best-absorbed form of zinc), fortified cereals, legumes	*Toxicity:* Nausea, vomiting, and diarrhea; headaches, depressed immune function, reduced absorption of copper *Deficiency:* Growth retardation, delayed sexual maturation, eye and skin lesions, hair loss, increased incidence of illness and infection
Copper	Assists many enzyme systems Iron transport	RDA: Adults = 900 µg/day UL = 10 mg/day	Shellfish, organ meats, nuts, legumes	*Toxicity:* Nausea, vomiting, and diarrhea; liver damage *Deficiency:* Anemia, reduced levels of white blood cells, osteoporosis in infants and growing children

*Abbreviations: RDA, Recommended Dietary Allo wance; UL, upper limit; AI, Adequate Intake.

Air

- Merupakan nutrient yang paling dibutuhkan
- Tujuh puluh lima persen dari berat tubuh kita adalah air
- Berkontribusi terhadap setiap proses yang ada di dalam tubuh kita
- Air menjaga kestabilan suhu tubuh, mengatur kimia tubuh pada konsentrasi yang tepat, membawa nutrient dan oksigen ke dalam sel dan membuang sisa/kotoran dari tubuh.
- Air juga menjaga organ dan jaringan

- Terima kasih