

Nutrient	Function: Technical	Function: Common Language	Women ages 19-70 (100% RDA)	Clinical Effects of Inadequate Intake
Thiamin	Coenzyme in the metabolism of carbohydrates (notably glucose to fat) and branch-chained amino acids. Functions in pentose phosphate pathway to create NADP.	Essential for metabolizing carbohydrates and making energy from the food we eat. It plays an important, but not well understood role in the function of nerve membranes	1.1 mg/d	Most likely due to heavy alcohol use: early stages often missed due to non-specific symptoms that are overlooked or miss interpreted: anorexia, weight loss, mental changes, enlarged heart; beriberi
Riboflavin	Coenzyme in many oxidation-reduction reactions for metabolism of fats, carbohydrates and proteins; critical component of flavin adenine dinucleotide (FAD) in electron transport chain. Antioxidant function	Critical for driving the chemical reactions to get energy from foods, especially carbohydrates. .It is important for growth and red cell production.	1.1 mg/d	Called ariboflavinosis Usually with other nutrient deficiencies; cancer, cardiac disease and diabetes mellitus can precipitate or exacerbate ariboflavinosis; severe deficiency may impair B6 metabolism. Riboflavin deficiency alters iron metabolism perhaps through impaired absorption.
Niacin	Cosubstrate or coenzyme for transfer of the hydride ion with many hydrogenases. As many as 200 enzymes use NAD and NADP for redox reactions: catabolism of fats, carbs, and proteins to produce energy and anabolism of fatty acids and cholesterol.	Another critical nutrient for getting energy from foods. Plays a role in gene expression too	14 mg/d niacin equivalents	Pellagra (rash in areas exposed to sunlight, constipation or diarrhea, bright red tongue, neurological symptoms, including depression, apathy, headache, and memory loss
B6 (pyridoxine)	Coenzyme on metabolism of amino acids, glycogen and sphingoid bases. Is a coenzyme for more than 100 enzymes.	Key nutrient in metabolism of amino acids (protein building blocks) and glycogen (stored form of glucose). Helps make some neurotransmitters and involved in the metabolism of hemoglobin, which carries oxygen in the blood.	1.3 mg/d	Seborrheic dermatitis, microcytic anemia, epileptiform convulsions, depression, confusion; impaired platelet function and clotting mechanisms;

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Folate or Folic Acid	Coenzyme in single carbon transfers in metabolism of nucleic acids and amino acids.	Helps to make the building blocks of DNA, RNA and proteins. Essential to form heme and hemoglobin, the oxygen carriers in blood. Prevents neural tube birth defects.	400 mcg/d dietary folate equivalents	Decreased serum folate resulting in hyperhomocysteinemia, megaloblastic changes in bone marrow and rapid dividing cells; macrocytic anemia (all three measures of anemia are depressed) with weakness fatigue, headache, irritability, atrophic glossitis;
B12 (cobalamin)	Coenzyme in nucleic acid metabolism and for 2 key methyl transfer reactions.	Helps make DNA and is involved in protein, fat, and carbohydrate metabolism.	2.4 mcg/d	Pernicious anemia, neurological complications (sensory disturbances in extremities, abnormal gait, dementia, visual disturbances, insomnia, impotency, impaired bladder and bowel control), gastrointestinal effects (sore tongue, loss of appetite, flatulence, constipation),
Pantothenic acid	Component of coenzyme A and phosphopantetheine (fatty acid metabolism)	Important part of coenzyme A (CoA), which is a required substance to get energy from fats, carbs, and proteins; making so some hormones and fatty acids. Although it is often put in shampoo to restore gray hair, it doesn't work. Mice do get gray hair when they have a deficiency.	5 mg/d (AI)	Observed rarely only in diets devoid of pantothenic acid given experimentally or total parental nutrition, and when given pantothenic acid antagonists
Biotin	Coenzyme in bicarbonate-dependent carboxylations; synthesis of fat, glycogen, and amino acids	Does it really help hair and nails? Only if you have a deficiency, which is very, very rare (and involves eating a lot of raw eggs).	30 mcg/d (AI)	Observed rarely only with prolonged intake of raw eggs and total parenteral nutrition; dermatitis, conjunctivitis, alopecia, central nervous system abnormalities.
Vitamin C	Water-soluble antioxidant; electron donor for collagen hydroxylation, carnitine biosynthesis, hormone and amino acid biosynthesis	Important antioxidant that protects cells from damage. Essential to make collagen, the main component of ligaments, tendons, and cartilage and helping to keep skin elastic. Required in a reaction to make the neurotransmitter, serotonin.	75 mg/d	Scurvy is the classic sign of severe deficiency.

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Vitamin E	Fat-soluble, non-specific chain-breaking antioxidant.	Important antioxidant to protect cells from damage. May play a role in how signals come across the nervous system. It may affect the activity of some cells in the immune system and cause inflammation.	15 mg/d as α -tocopherol	Periherial neuropathy is observed rarely as result of genetic abnormalities and malabsorption syndromes
Vitamin A	Normal vision, integrity of epithelial cells in body, embryonic development, immune function, gene expression	Critical for growth, particularly cells in early (fetal) development and remains important through the rest of life for creating specialized types of cells like skin cells. Critical for normal vision, especially at night; nerve functions, and immune system. Too much vitamin A can cause birth defects. Also can act like an antioxidant.	700 mcg or 2330 International Units (IU)	Rarely in the US, often in the developing world: night blindness, xerophthalmia, dry skin, dry hair, broken fingernails, and decreased resistance to infections Subclinical forms of vitamin A deficiency, described as low storage levels of vitamin A that do not cause overt deficiency symptoms. This mild degree of vitamin A deficiency may increase children's risk of developing respiratory and diarrheal infections, decrease growth rate, slow bone development, and decrease likelihood of survival from serious illness
Iron	Component of proteins and enzymes, including hemoglobin, myoglobin and cytochromes		18 mg/d	Poor physical and cognitive work performance, developmental delay, cognitive impairment, poor pregnancy outcomes, microcytic anemia
Zinc	Cofactor for over 1200 enzymes affecting immune function ,wound healing, growth and development, smell, taste, and gene expression		8 mg	Growth retardation, hair loss, diarrhea, delayed sexual maturation and impotence, eye and skin lesions, and loss of appetite, some evidence that weight loss, delayed healing of wounds, taste abnormalities, and mental lethargy can occur
Magnesium	Needed for more than 300 biochemical reactions in the body		310 mg	Rarely seen in the US in healthy adults- associated with excessive alcohol use, uncontrolled diabetes, diuretic use: confusion, disorientation, loss of appetite, depression, muscle contractions and cramps, tingling, numbness, abnormal heart rhythms, coronary spasm, and seizures

Recommended Dietary Allowance (RDA)	The average daily intake level that is sufficient to meet the nutrient requirement of nearly all (97 to 98 percent) healthy individuals in a group or life-stage.
Adequate Intake (AI)	A values based on observation or experimentally determined approximations of nutrient intake by group or groups) of healthy people- used when the RDA cannot be determined
Tolerable Upper Limit (UL)	The highest level of daily nutrient intake that is likely to pose no risks of adverse reactions to almost all individuals in the general population. As intake increases above the UL, the risk of adverse effects increases
Estimated Average Requirement (EAR)	A nutrient intake value that is estimated to meet the requirement of half the healthy individuals in a group.

RDAs and AIs are levels of intake recommended for healthy individuals. For people with medical conditions or individuals who are already malnourished, the RDA may be not be sufficient. Qualified medical and nutritional personnel should make adaptations for special medical situations.