

Dietary Reference Intakes: Vitamins

| Nutrient | Function | Life Stage Group | RDA/AI ^a | UL ^a | Selected Food Sources | Adverse effects of excessive consumption | Special Considerations |
|-----------|---|------------------|---------------------|-----------------|---|---|---|
| Biotin | Coenzyme in synthesis of fat, glycogen, and amino acids | Infants | (µg/d) | | Liver and smaller amounts in fruits and meats | No adverse effects of biotin in humans or animals were found. This does not mean that there is no potential for adverse effects resulting from high intakes. Because data on the adverse effects of biotin are limited, caution may be warranted. | None |
| | | 0–6 mo | 5* | ND ^b | | | |
| | | 7–12 mo | 6* | ND | | | |
| | | Children | | | | | |
| | | 1–3 y | 8* | ND | | | |
| | | 4–8 y | 12* | ND | | | |
| | | Males | | | | | |
| | | 9–13 y | 20* | ND | | | |
| | | 14–18 y | 25* | ND | | | |
| | | 19–30 y | 30* | ND | | | |
| | | 31–50 y | 30* | ND | | | |
| | | 50–70 y | 30* | ND | | | |
| | | > 70 y | 30* | ND | | | |
| | | Females | | | | | |
| | | 9–13 y | 20* | ND | | | |
| | | 14–18 y | 25* | ND | | | |
| | | 19–30 y | 30* | ND | | | |
| | | 31–50 y | 30* | ND | | | |
| 50–70 y | 30* | ND | | | | | |
| > 70 y | 30* | ND | | | | | |
| Pregnancy | | | | | | | |
| ≤ 18 y | 30* | ND | | | | | |
| 19–30y | 30* | ND | | | | | |
| 31–50 y | 30* | ND | | | | | |
| Lactation | | | | | | | |
| ≤ 18 y | 35* | ND | | | | | |
| 19–30y | 35* | ND | | | | | |
| 31–50 y | 35* | ND | | | | | |
| Choline | Precursor for acetylcholine, phospholipids and betaine | Infants | (mg/d) | (mg/d) | Milk, liver, eggs, peanuts | Fishy body odor, sweating, salivation, hypotension, hepatotoxicity | Individuals with trimethylaminuria, renal disease, liver disease, depression and Parkinson's disease, may be at risk of adverse effects with choline intakes at the UL. Although AIs have been set for choline, there are few data to assess whether a dietary supply of choline is needed at all stages of the life cycle, and it may be that the choline requirement can be met by endogenous synthesis at some of these stages. |
| | | 0–6 mo | 125* | ND | | | |
| | | 7–12 mo | 150* | ND | | | |
| | | Children | | | | | |
| | | 1–3 y | 200* | 1000 | | | |
| | | 4–8 y | 250* | 1000 | | | |
| | | Males | | | | | |
| | | 9–13 y | 375* | 2000 | | | |
| | | 14–18 y | 550* | 3000 | | | |
| | | 19–30 y | 550* | 3500 | | | |
| | | 31–50 y | 550* | 3500 | | | |
| | | 50–70 y | 550* | 3500 | | | |
| | | > 70 y | 550* | 3500 | | | |
| | | Females | | | | | |
| | | 9–13 y | 375* | 2000 | | | |
| | | 14–18 y | 400* | 3000 | | | |
| | | 19–30 y | 425* | 3500 | | | |
| | | 31–50 y | 425* | 3500 | | | |
| 50–70 y | 425* | 3500 | | | | | |
| > 70 y | 425* | 3500 | | | | | |
| Pregnancy | | | | | | | |
| ≤ 18 y | 450* | 3000 | | | | | |
| 19–30y | 450* | 3500 | | | | | |
| 31–50 y | 450* | 3500 | | | | | |
| Lactation | | | | | | | |
| ≤ 18 y | 550* | 3000 | | | | | |
| 19–30y | 550* | 3500 | | | | | |
| 31–50 y | 550* | 3500 | | | | | |

NOTE: The table is adapted from the DRI reports, see www.nap.edu. It represents Recommended Dietary Allowances (RDAs) in **bold type**, Adequate Intakes (AIs) in ordinary type followed by an asterisk (*), and Tolerable Upper Intake Levels (ULs)^a. RDAs and AIs may both be used as goals for individual intake. RDAs are set to meet the needs of almost all (97 to 98 percent) individuals in a group. For healthy breastfed infants, the AI is the mean intake. The AI for other life stage and gender groups is believed to cover the needs of all individuals in the group, but lack of data prevent being able to specify with confidence the percentage of individuals covered by this intake.

^aUL = The maximum level of daily nutrient intake that is likely to pose no risk of adverse effects. Unless otherwise specified, the UL represents total intake from food, water, and supplements. Due to lack of suitable data, ULs could not be established for vitamin K, thiamin, riboflavin, vitamin B₁₂, pantothenic acid, biotin, or carotenoids. In the absence of ULs, extra caution may be warranted in consuming levels above recommended intakes.

^bND = Not determinable due to lack of data of adverse effects in this age group and concern with regard to lack of ability to handle excess amounts. Source of intake should be from food only to prevent high levels of intake.

SOURCES: *Dietary Reference Intakes for Calcium, Phosphorous, Magnesium, Vitamin D, and Fluoride* (1997); *Dietary Reference Intakes for Thiamin, Riboflavin, Niacin, Vitamin B₆, Folate, Vitamin B₁₂, Pantothenic Acid, Biotin, and Choline* (1998); *Dietary Reference Intakes for Vitamin C, Vitamin E, Selenium, and Carotenoids* (2000); and *Dietary Reference Intakes for Vitamin A, Vitamin K, Arsenic, Boron, Chromium, Copper, Iodine, Iron, Manganese, Molybdenum, Nickel, Silicon, Vanadium, and Zinc* (2001). These reports may be accessed via www.nap.edu. Copyright 2001 by The National Academies. All rights reserved.

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|--|--|------------------|---------|-----------------|---|--|--|
| Folate Also known as: Folic acid Folacin Pteroylpolyglutamates Note: Given as dietary folate equivalents (DFE). 1 DFE = 1 µg food folate = 0.6 µg of folate from fortified food or as a supplement consumed with food = 0.5 µg of a supplement taken on an empty stomach. | Coenzyme in the metabolism of nucleic and amino acids; prevents megaloblastic anemia | Infants | (µg/d) | (µg/d) | Enriched cereal grains, dark leafy vegetables, enriched and whole-grain breads and bread products, fortified ready-to-eat cereals | Masks neurological complication in people with vitamin B ₁₂ deficiency. No adverse effects associated with folate from food or supplements have been reported. This does not mean that there is no potential for adverse effects resulting from high intakes. Because data on the adverse effects of folate are limited, caution may be warranted. The UL for folate applies to synthetic forms obtained from supplements and/or fortified foods. | In view of evidence linking folate intake with neural tube defects in the fetus, it is recommended that all women capable of becoming pregnant consume 400 µg from supplements or fortified foods in addition to intake of food folate from a varied diet. It is assumed that women will continue consuming 400 µg from supplements or fortified food until their pregnancy is confirmed and they enter prenatal care, which ordinarily occurs after the end of the periconceptual period—the critical time for formation of the neural tube. |
| | | 0–6 mo | 65* | ND ^b | | | |
| | | 7–12 mo | 80* | ND | | | |
| | | Children | | | | | |
| | | 1–3 y | 150 | 300 | | | |
| | | 4–8 y | 200 | 400 | | | |
| | | Males | | | | | |
| | | 9–13 y | 300 | 600 | | | |
| | | 14–18 y | 400 | 800 | | | |
| | | 19–30 y | 400 | 1,000 | | | |
| | | 31–50 y | 400 | 1,000 | | | |
| | | 50–70 y | 400 | 1,000 | | | |
| | | > 70 y | 400 | 1,000 | | | |
| | | Females | | | | | |
| | | 9–13 y | 300 | 600 | | | |
| | | 14–18 y | 400 | 800 | | | |
| | | 19–30 y | 400 | 1,000 | | | |
| | | 31–50 y | 400 | 1,000 | | | |
| | | 50–70 y | 400 | 1,000 | | | |
| | | > 70 y | 400 | 1,000 | | | |
| Pregnancy | | | | | | | |
| ≤ 18 y | 600 | 800 | | | | | |
| 19–30y | 600 | 1,000 | | | | | |
| 31–50 y | 600 | 1,000 | | | | | |
| Lactation | | | | | | | |
| ≤ 18 y | 500 | 800 | | | | | |
| 19–30y | 500 | 1,000 | | | | | |
| 31–50 y | 500 | 1,000 | | | | | |

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