

TABLE 95e-1 DIETARY REFERENCE INTAKES (DRIs): RECOMMENDED DIETARY ALLOWANCES AND ADEQUATE INTAKES FOR VITAMINS

Life-Stage Group	Vitamin A (μg/d) ^a	Vitamin C (mg/d)	Vitamin D (μg/d) ^{b,c}	Vitamin E (mg/d) ^d	Vitamin K (μg/d)	Thiamin (mg/d)	Riboflavin (mg/d)	Niacin (mg/d) ^e	Vitamin B ₆ (mg/d)	Folate (μg/d) ^f	Vitamin B ₁₂ (μg/d)	Pantothenic Acid (mg/d)	Biotin (μg/d)	Choline (mg/d) ^g
Infants														
Birth to 6 mo	400*	40*	10	4*	2.0*	0.2*	0.3*	2*	0.1*	65*	0.4*	1.7*	5*	125*
6–12 mo	500*	50*	10	5*	2.5*	0.3*	0.4*	4*	0.3*	80*	0.5*	1.8*	6*	150*
Children														
1–3 y	300	15	15	6	30*	0.5	0.5	6	0.5	150	0.9	2*	8*	200*
4–8 y	400	25	15	7	55*	0.6	0.6	8	0.6	200	1.2	3*	12*	250*
Males														
9–13 y	600	45	15	11	60*	0.9	0.9	12	1.0	300	1.8	4*	20*	375*
14–18 y	900	75	15	15	75*	1.2	1.3	16	1.3	400	2.4	5*	25*	550*
19–30 y	900	90	15	15	120*	1.2	1.3	16	1.3	400	2.4	5*	30*	550*
31–50 y	900	90	15	15	120*	1.2	1.3	16	1.3	400	2.4	5*	30*	550*
51–70 y	900	90	15	15	120*	1.2	1.3	16	1.7	400	2.4^h	5*	30*	550*
>70 y	900	90	20	15	120*	1.2	1.3	16	1.7	400	2.4^h	5*	30*	550*
Females														
9–13 y	600	45	15	11	60*	0.9	0.9	12	1.0	300	1.8	4*	20*	375*
14–18 y	700	65	15	15	75*	1.0	1.0	14	1.2	400ⁱ	2.4	5*	25*	400*
19–30 y	700	75	15	15	90*	1.1	1.1	14	1.3	400ⁱ	2.4	5*	30*	425*
31–50 y	700	75	15	15	90*	1.1	1.1	14	1.3	400ⁱ	2.4	5*	30*	425*
51–70 y	700	75	15	15	90*	1.1	1.1	14	1.5	400	2.4^h	5*	30*	425*
>70 y	700	75	20	15	90*	1.1	1.1	14	1.5	400	2.4^h	5*	30*	425*
Pregnant women														
14–18 y	750	80	15	15	75*	1.4	1.4	18	1.9	600^j	2.6	6*	30*	450*
19–30 y	770	85	15	15	90*	1.4	1.4	18	1.9	600^j	2.6	6*	30*	450*
31–50 y	770	85	15	15	90*	1.4	1.4	18	1.9	600^j	2.6	6*	30*	450*
Lactating women														
14–18 y	1200	115	15	19	75*	1.4	1.6	17	2.0	500	2.8	7*	35*	550*
19–30 y	1300	120	15	19	90*	1.4	1.6	17	2.0	500	2.8	7*	35*	550*
31–50 y	1300	120	15	19	90*	1.4	1.6	17	2.0	500	2.8	7*	35*	550*

Note: This table (taken from the DRI reports; see www.nap.edu) presents recommended dietary allowances (RDAs) in **bold type** and adequate intakes (AIs) in ordinary type followed by an asterisk (*). An RDA is the average daily dietary intake level sufficient to meet the nutrient requirements of nearly all healthy individuals (97–98%) in a group. The RDA is calculated from an estimated average requirement (EAR). If sufficient scientific evidence is not available to establish an EAR and thus to calculate an RDA, an AI is usually developed. For healthy breast-fed infants, an AI is the mean intake. The AI for other life-stage and sex-specific groups is believed to cover the needs of all healthy individuals in those groups, but lack of data or uncertainty in the data makes it impossible to specify with confidence the percentage of individuals covered by this intake.

^aAs retinol activity equivalents (RAEs). 1 RAE = 1 μg retinol, 12 μg β-carotene, 24 μg α-carotene, or 24 μg β-cryptoxanthin. The RAE for dietary provitamin A carotenoids is twofold greater than the retinol equivalent (RE), whereas the RAE for preformed vitamin A is the same as the RE. ^bAs cholecalciferol. 1 μg cholecalciferol = 40 IU vitamin D. ^cUnder the assumption of minimal sunlight. ^dAs α-tocopherol. α-Tocopherol includes *RRR*-α-tocopherol, the only form of α-tocopherol that occurs naturally in foods, and the *2R*-stereoisomeric forms of α-tocopherol (*RRR*-, *RSR*-, *RRS*-, and *RSS*-α-tocopherol) that occur in fortified foods and supplements. It does not include the *2S*-stereoisomeric forms of α-tocopherol (*SRR*-, *SSR*-, *SRS*-, and *SSS*-α-tocopherol) also found in fortified foods and supplements. ^eAs niacin equivalents (NEs). 1 mg of niacin = 60 mg of tryptophan; 0–6 months = preformed niacin (not NE). ^fAs dietary folate equivalents (DFEs). 1 DFE = 1 μg food folate = 0.6 μg of folic acid from fortified food or as a supplement consumed with food = 0.5 μg of a supplement taken on an empty stomach. ^gAlthough 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. ^hBecause 10–30% of older people may malabsorb food-bound B₁₂, it is advisable for those >50 years of age to meet their RDA mainly by consuming foods fortified with B₁₂ or a supplement containing B₁₂. ⁱIn view of evidence linking inadequate folate intake with neural tube defects in the fetus, it is recommended that all women capable of becoming pregnant consume 400 μg of folate from supplements or fortified foods in addition to intake of food folate from a varied diet. ^jIt 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 periconceptional period—the critical time for formation of the neural tube.

Source: Food and Nutrition Board, Institute of Medicine, National Academies (<http://www.iom.edu/Activities/Nutrition/SummaryDRIs/DRI-Tables.aspx>).

level (UL). The DRIs also include acceptable macronutrient distribution ranges (AMDRs) for protein, fat, and carbohydrate. The current DRIs for vitamins and elements are provided in **Tables 95e-1 and 95e-2**, respectively. **Table 95e-3** provides DRIs for water and macronutrients. **EERs are discussed in Chap. 97 on energy balance in health and disease.**

Estimated Average Requirement When florid manifestations of the classic dietary-deficiency diseases such as rickets (deficiency of vitamin D and calcium), scurvy (deficiency of vitamin C), xerophthalmia (deficiency of vitamin A), and protein-calorie malnutrition were common, nutrient adequacy was inferred from the absence of their clinical signs. Later, biochemical and other changes were found to be evident long before the deficiency became clinically apparent. Consequently, criteria of adequacy are now based on biologic markers when they are available. Priority is given to sensitive biochemical, physiologic, or behavioral tests that reflect early changes in regulatory processes;

maintenance of body stores of nutrients; or, if available, the amount of a nutrient that minimizes the risk of chronic degenerative disease. Current efforts focus on this last variable, but relevant markers often are not available.

The EAR is the amount of a nutrient estimated to be adequate for half of the healthy individuals of a specific age and sex. The types of evidence and criteria used to establish nutrient requirements vary by nutrient, age, and physiologic group. The EAR is not an effective estimate of nutrient adequacy in individuals because it is a median requirement for a group; 50% of individuals in a group fall below the requirement and 50% fall above it. Thus, a person with a usual intake at the EAR has a 50% risk of inadequate intake. For these reasons, other standards, described below, are more useful for clinical purposes.

Recommended Dietary Allowances The RDA is the average daily dietary intake level that meets the nutrient requirements of nearly all healthy persons of a specific sex, age, life stage, or physiologic condition