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## **Dietary Reference Intakes**

The Dietary Reference Intakes (DRIs) are a more complete set of reference values than the former Recommended Dietary Allowances (RDAs; National Research Council). The collective DRIs, which have been periodically issued by the Institute of Medicine since 1997, are recommend daily intakes intended to maintain health for people of all ages. DRIs include Recommended Dietary Allowances (RDAs) and Adequate Intakes (AIs). They also include ceilings on intake to help reduce risk of harm from excess intakes. These are called Tolerable Upper Intake Levels (ULs). Unlike former RDAs, the new DRIs identify persons for whom supplements may be appropriate.

**RDAs** are average daily dietary intake levels that meet the needs of almost all individuals in a specific life stage and gender group. Almost no deficiencies should occur at these intake levels.

**AIs** are set to be dietary intake levels that appear to sustain a defined nutritional state, such as growth, appropriate body levels of the nutrient, or some other measure of health. That is, they are assumed to be adequate based on data available at this time - data not sufficient enough to set a RDA. Nearly all recommendations for infants are AIs.

**ULs** are the highest level of daily nutrient intake that is likely to not increase risk of adverse effects for almost all individuals. The risk of adverse effects increases as intake exceeds the UL for a nutrient. The UL is not intended to be a level of recommended intake. For most nutrients, the UL was set based on intake from food, water and supplements if adverse effects are associated with total intake. However, for some nutrients, the UL was set based on intake from supplements and fortified foods, only. These are noted on the tables.

## Special Calculations

**Vitamin A.** Vitamin A is supplied in two forms. One form is retinol, from animal foods such as liver, fatty fish, eggs, and milk, and from fortified foods. Retinol is considered pre-formed vitamin A. The other form is three carotenoids from plant foods (  $\beta$ -carotene,  $\alpha$ -carotene and  $\beta$ -cryptoxanthin). These convert to vitamin A in the body and are called provitamin A carotenoids. Retinol and carotenoids have different vitamin A activity; it takes greater amounts of carotenoids to equal the activity of retinol. The Institute of Medicine developed conversion factors to address this when it revised the RDA for vitamin A. Vitamin A recommendations are in  $\mu\text{g}/\text{day}$  as Retinol Activity Equivalents (RAE). Here are the conversions:

$$\begin{aligned} 1 \text{ RAE} &= 1 \mu\text{g retinol} \\ &= 12 \mu\text{g } \beta\text{-carotene} \\ &= 24 \mu\text{g } \alpha\text{-carotene or } \beta\text{-cryptoxanthin} \end{aligned}$$

Some food value databases/tables still list vitamin A in Retinol Equivalents (RE), the former way of expressing vitamin A activities of carotenoids. To calculate RAEs from REs of provitamin A carotenoids in food, divide the REs by 2. For retinol in foods or supplements, and for provitamin A carotenoids in supplements, 1 RE = 1 RAE.

Many food and supplement labels still list vitamin A in International Units (IUs). This measure can be converted to RAEs with some calculations. If all the vitamin A activity is from retinol, then 3.33 IU vitamin A (retinol) = 1 RAE. Otherwise, Use these conversions:

$$\begin{aligned} 1 \text{ IU vitamin A activity} &= 0.3 \mu\text{g retinol} \\ &= 3.6 \mu\text{g } \beta\text{-carotene} \\ &= 7.2 \mu\text{g } \alpha\text{-carotene or } \beta\text{-cryptoxanthin} \end{aligned}$$

For example, one multivitamin/mineral supplement supplies 5000 IU vitamin A (20% as  $\alpha$ -carotene).

1.  $5000 \text{ IU} \times 20\% = 1000 \text{ IU}$  (thus 4000 IU as retinol, 1000 IU as  $\alpha$ -carotene)
2.  $4000 \times 0.3 \mu\text{g retinol}$  (or  $4000 \div 3.33$ ) = roughly 1200  $\mu\text{g}$  as retinol (= 1200  $\mu\text{g RAE}$ )
3.  $1000 \times 3.6 =$  roughly 3600  $\mu\text{g}$  as  $\alpha$ -carotene ( $3600 \mu\text{g} \div 12 \mu\text{g/RAE} = 300 \mu\text{g RAE}$ )
4.  $1200 \mu\text{g RAE} + 300 \mu\text{g RAE} = 1500 \mu\text{g RAE}$  supplied by this supplement

**RDA for vitamin A (IU)**  
**adult men = 3000 IU**  
**adult women = 2300 IU**  
**pregnancy = 2500 IU**  
**lactation = 4000 - 4300 IU**

**UL for Vitamin A (IU) = 10,000 IU**

**Folate.** The folate RDA is expressed in terms of  $\mu\text{g}/\text{day}$  of Dietary Folate Equivalents (DFEs). DFEs adjust for the significantly lower bioavailability of food folate compared to that of synthetic folic acid. That means it adjusts for the fact that synthetic folic acid is easier for the body to absorb and use. Our diets should include a variety of foods naturally rich in food folate plus fortified foods to help meet our folate needs.

1  $\mu\text{g}$  DFE = 0.6  $\mu\text{g}$  of folic acid from fortified food  
= 0.6  $\mu\text{g}$  of folic acid as a supplement taken with meals  
= 0.5  $\mu\text{g}$  of a folic acid supplement taken on an empty stomach  
= 1  $\mu\text{g}$  of food folate

**Vitamin E.** The RDA for vitamin E is based only on the  $\alpha$ -tocopherol form of vitamin E (former RDAs included other tocopherols and tocotrienols). Food and supplement labels still list vitamin E in International Units (IUs) of *dl*- $\alpha$ -forms or *d*- $\alpha$ -forms, whereas the new RDAs are  $\text{mg } \alpha$ -tocopherol/day. The Institute of Medicine revised the formulas for converting IUs of vitamin E to milligrams  $\alpha$ -tocopherol activity. They are as follows:

**Synthetic Vitamin E & Esters**  
( $\text{mg } \alpha$ -tocopherol = 0.45 x IU)

*dl*- $\alpha$ -tocopheryl acetate  
*dl*- $\alpha$ -tocopheryl succinate  
*dl*- $\alpha$ -tocopherol

**Natural Vitamin E & Esters**  
( $\text{mg } \alpha$ -tocopherol = 0.67 x IU)

*d*- $\alpha$ -tocopheryl acetate  
*d*- $\alpha$ -tocopheryl succinate  
*d*- $\alpha$ -tocopherol

**RDA for vitamin E for adults = 22 IU vitamin E from foods**  
**= 33 IU synthetic vitamin E**

**UL for vitamin E for adults = 1500 IU natural form vitamin E**  
**= 1100 IU synthetic vitamin E**

**Basic measurements & abbreviations.**

microgram - $\mu\text{g}$ or mcg	1000 micrograms (1000 $\mu\text{g}$ ) = 1 milligram (1 mg)
milligram - mg	1000 milligrams (1000 mg) = 1 gram (g)
grams - g	1000 grams (1000 g) = 1 kilogram (kg)

## **Who May Need Supplements and/or Fortified Foods?**

There are cases in which vitamin/mineral supplements and/or fortified foods are needed to help certain individuals meet their nutrient needs. All are encouraged to discuss whether they need supplements with their health care providers.

### **I. Persons with limited food intake (usually 1,200 calories/day)**

- A. Dieters**
- B. Persons with chronic illnesses**
- C. Persons with chronic poor appetite**
  - 1. Older adults**
  - 2. Persons treated with chemotherapy/radiation**
  - 3. Persons with chronic illnesses**

### **II. Persons who avoid certain food groups**

- A. Vegans or strict vegetarians**
  - 1. Special attention to vitamin A, iron, calcium, zinc, vitamin B<sub>12</sub>**
- B. Persons who avoid/allergic to/do not tolerate milk and other dairy foods**
  - 1. Special attention to calcium and vitamin D**
- C. Persons whose diet patterns do not remotely follow Food Guide Pyramid**

### **III. Pregnant or lactating women (under health care provider's supervision)**

### **IV. Persons with malabsorption disorders (gut disorders where some nutrients are lost)**

### **V. Persons with diagnosed deficiencies (follow health care provider's instructions)**

### **VI. Specific Recommendations**

- A. All women of childbearing age**
  - 1. 400 µg folic acid from supplement and/or fortified foods, in addition to a varied diet with adequate food folate**
- B. All adults 50 years age**
  - 1. 25% or more of RDA for vitamin B<sub>12</sub> from B<sub>12</sub>- fortified breakfast cereals or B<sub>12</sub>-containing multivitamin**
  - 2. calcium and vitamin D if have inadequate intake from diet and limited time spent in sunlight (depending on dietary intake, may need 500 - 1,000 mg supplemental calcium & 400 IU supplemental vitamin D daily)**
- C. Persons on strict weight loss diets ( 1,200 calories/day)**

1. at least multivitamin-mineral supplement daily
2. calcium and/or vitamin D if calcium-rich foods limited

D. Persons on chronic corticosteroid therapy (oral or inhaled steroids; prednisone, cortisone, dexamethasone, triamcinolone, etc.)

1. need both supplemental calcium and vitamin D to prevent steroid-induced bone loss;
  - a. may require up to 1,000 mg supplemental calcium daily and 400 - 800 IU vitamin D daily
  - c. strongly encouraged to discuss corticosteroid effects on bone health with healthcare provider

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## I. Dietary Reference Intakes - Recommended Dietary Allowances (RDAs) & Adequate Intakes (AIs): Vitamins

Life stage group	Vitamin A (µg/day) <sup>a</sup>	Vitamin C (mg/day) <sup>b</sup>	Vitamin D (IU/day) <sup>c,d</sup>	Vitamin E (mg/day) <sup>e</sup>	Vitamin K (µg/day)	Thiamin (mg/day)	Riboflavin (mg/day)	Niacin (mg/day) <sup>f</sup>
<b>Infants</b>								
0-6 months	400*	40*	200*	4*	2.0*	0.2*	0.3*	2*
7-12 months	500*	50*	200*	5*	2.5*	0.3*	0.4*	4*
<b>Children</b>								
1-3 y	300	15	200*	6	30*	0.5	0.5	6
4-8 y	400	25	200*	7	55*	0.6	0.6	8
<b>Males</b>								
9-13 y	600	45	200*	11	60*	0.9	0.9	12
14-18 y	900	75	200*	15	75*	1.2	1.3	16
19-30 y	900	90	200*	15	120*	1.2	1.3	16
31-50 y	900	90	200*	15	120*	1.2	1.3	16
51-70 y	900	90	400*	15	120*	1.2	1.3	16
> 70 y	900	90	600*	15	120*	1.2	1.3	16
<b>Females</b>								
9-13 y	600	45	200*	11	60*	0.9	0.9	12
14-18 y	700	65	200*	15	75*	1.0	1.0	14
19-30 y	700	75	200*	15	90*	1.1	1.1	14
31-50 y	700	75	200*	15	90*	1.1	1.1	14
51-70 y	700	75	400*	15	90*	1.1	1.1	14
> 70 y	700	75	600*	15	90*	1.1	1.1	14
<b>Pregnancy</b>								
18 y	750	80	200*	15	75*	1.4	1.4	18
19-30 y	770	85	200*	15	90*	1.4	1.4	18
31-50 y	770	85	200*	15	90*	1.4	1.4	18
<b>Lactation</b>								
18 y	1,200	115	200*	19	75*	1.4	1.6	17
19-30 y	1,300	120	200*	19	90*	1.4	1.6	17
31-50 y	1,300	120	200*	19	90*	1.4	1.6	17

\* Denotes AI

<sup>a</sup> As retinol activity equivalents (RAEs). <sup>b</sup> Smokers require additional 35 mg/day. <sup>c</sup> As cholecalciferol; 40 IU vitamin D = 1 µg cholecalciferol; <sup>d</sup> In absence of adequate sunlight exposure. <sup>e</sup> As  $\alpha$ -tocopherol. <sup>f</sup> As niacin equivalents (NE); 1 mg niacin = 60 mg tryptophan; 0-6 months age = preformed niacin, not NE.

## II. Dietary Reference Intakes - Recommended Dietary Allowances (RDAs) & Adequate Intakes (AIs): B Vitamins, Choline, Calcium & Chromium

Life stage group	Vitamin B <sub>6</sub> (mg/day)	Folate (µg/day) <sup>a</sup>	Vitamin B <sub>12</sub> (µg/day)	Pantothenic Acid (mg/day)	Biotin (µg/day)	Choline (mg/day)	Calcium (mg/day)	Chromium (µg/day)
<b>Infants</b>								
0-6 months	0.1*	65*	0.4*	1.7*	5*	125*	210*	0.2*
7-12 months	0.3*	80*	0.5*	1.8*	6*	150*	270*	5.5*
<b>Children</b>								
1-3 y	0.5	150	0.9	2*	8*	200*	500*	11*
4-8 y	0.6	200	1.2	3*	12*	250*	800*	15*
<b>Males</b>								
9-13 y	1.0	300	1.8	4*	20*	375*	1,300*	25*
14-18 y	1.3	400	2.4	5*	25*	550*	1,300*	35*
19-30 y	1.3	400	2.4	5*	30*	550*	1,000*	35*
31-50 y	1.3	400	2.4	5*	30*	550*	1,000*	35*
51-70 y	1.7	400	2.4 <sup>d</sup>	5*	30*	500*	1,200*	30*
> 70 y	1.7	400	2.4 <sup>d</sup>	5*	30*	550*	1,200*	30*
<b>Females</b>								
9-13 y	1.0	300	1.8	4*	20*	375*	1,300*	21*
14-18 y	1.2	400 <sup>b</sup>	2.4	5*	25*	400*	1,300*	24*
19-30 y	1.3	400 <sup>b</sup>	2.4	5*	30*	425*	1,000*	25*
31-50 y	1.3	400 <sup>b</sup>	2.4	5*	30*	425*	1,000*	25*
51-70 y	1.5	400 <sup>b</sup>	2.4 <sup>d</sup>	5*	30*	425*	1,200*	20*
> 70 y	1.5	400 <sup>b</sup>	2.4 <sup>d</sup>	5*	30*	425*	1,200*	20*
<b>Pregnancy</b>								
18 y	1.9	600 <sup>c</sup>	2.6	6*	30*	450*	1,300*	29*
19-30 y	1.9	600 <sup>c</sup>	2.6	6*	30*	450*	1,000*	30*
31-50 y	1.9	600 <sup>c</sup>	2.6	6*	30*	450*	1,000*	30*
<b>Lactation</b>								
18 y	2.0	500	2.8	7*	35*	550*	1,300*	44*
19-30 y	2.0	500	2.8	7*	35*	550*	1,000*	45*
31-50 y	2.0	500	2.8	7*	35*	550*	1,000*	45*

\* Denotes AI.

<sup>a</sup> As dietary folate equivalents (DFE). <sup>b</sup> All women capable of becoming pregnant should consume 400 µg from supplements or fortified foods + adequate food folate from varied diet. <sup>c</sup> Women should continue to consume 400 µg from supplements or fortified foods prenatal care starts. <sup>d</sup> People 50 years should meet RDA mainly by consuming foods fortified w/ B<sub>12</sub> or a supplement containing B<sub>12</sub>.

### III. Dietary Reference Intakes - Recommended Dietary Allowances (RDAs) & Adequate Intakes (AIs): Minerals

Life stage group	Copper (µg/day)	Fluoride (mg/day)	Iodine (µg/day)	Iron (mg/day) <sup>a</sup>	Magnesium (mg/day)	Manganese (mg/day)	Molybdenum (µg/day)	Phosphorus (mg/day)
<b>Infants</b>								
0-6 months	200*	0.01*	110*	0.27*	30*	0.003*	2*	100*
7-12 months	220*	0.5*	130*	11 <sup>b</sup>	75*	0.6*	3*	275*
<b>Children</b>								
1-3 y	340	0.7*	90	7	80	1.2*	17	460
4-8 y	440	1*	90	10	130	1.5*	22	500
<b>Males</b>								
9-13 y	700	2*	120	8	240	1.9*	34	1,250
14-18 y	890	3*	150	11	410	2.2*	43	1,250
19-30 y	900	4*	150	8	400	2.3*	45	700
31-50 y	900	4*	150	8	420	2.3*	45	700
51-70 y	900	4*	150	8	420	2.3*	45	700
> 70 y	900	4*	150	8	420	2.3*	45	700
<b>Females</b>								
9-13 y	700	2*	120	8	240	1.6*	34	1,250
14-18 y	890	3*	150	15	360	1.6*	43	1,250
19-30 y	900	3*	150	18	310	1.8*	45	700
31-50 y	900	3*	150	18	320	1.8*	45	700
51-70 y	900	3*	150	8	320	1.8*	45	700
> 70 y	900	3*	150	8	320	1.8*	45	700
<b>Pregnancy</b>								
18 y	1,000	3*	220	27	400	2.0*	50	1,250
19-30 y	1,000	3*	220	27	350	2.0*	50	700
31-50 y	1,000	3*	220	27	360	2.0*	50	700
<b>Lactation</b>								
18 y	1,300	3*	290	10	360	2.6*	50	1,250
19-30 y	1,300	3*	290	9	310	2.6*	50	700
31-50 y	1,300	3*	290	9	320	2.6*	50	700

\* Denotes AI.

<sup>a</sup> See expanded table for iron requirements under different circumstances

<sup>b</sup> If breastfeeding continues after 6 months age, infants should also be fed iron-fortified foods and/or iron-fortified formula to meet iron needs.

#### IV. Dietary Reference Intakes - Recommended Dietary Allowances (RDAs) & Adequate Intakes (AIs): Minerals & Trace Elements

Life stage group	Selenium (µg/day)	Zinc (mg/day)	Arsenic	Boron	Nickel	Silicon	Vanadium
<b>Infants</b>			ND <sup>b</sup>	ND <sup>b</sup>	ND <sup>b</sup>	ND <sup>b</sup>	ND <sup>b</sup>
0-6 months	15*	2*					
7-12 months	20*	3 <sup>a</sup>					
<b>Children</b>			ND <sup>b</sup>	ND <sup>b</sup>	ND <sup>b</sup>	ND <sup>b</sup>	ND <sup>b</sup>
1-3 y	20	3					
4-8 y	30	5					
<b>Males</b>			ND <sup>b</sup>	ND <sup>b</sup>	ND <sup>b</sup>	ND <sup>b</sup>	ND <sup>b</sup>
9-13 y	40	8					
14-18 y	55	11					
19-30 y	55	11					
31-50 y	55	11					
51-70 y	55	11					
> 70 y	55	11					
<b>Females</b>			ND <sup>b</sup>	ND <sup>b</sup>	ND <sup>b</sup>	ND <sup>b</sup>	ND <sup>b</sup>
9-13 y	40	8					
14-18 y	55	9					
19-30 y	55	8					
31-50 y	55	8					
51-70 y	55	8					
> 70 y	55	8					
<b>Pregnancy</b>			ND <sup>b</sup>	ND <sup>b</sup>	ND <sup>b</sup>	ND <sup>b</sup>	ND <sup>b</sup>
18 y	60	13					
19-30 y	60	11					
31-50 y	60	11					
<b>Lactation</b>			ND <sup>b</sup>	ND <sup>b</sup>	ND <sup>b</sup>	ND <sup>b</sup>	ND <sup>b</sup>
18 y	70	14					
19-30 y	70	12					
31-50 y	70	12					

\* Denotes AI.

<sup>a</sup> If breastfeeding continues after 6 months age, infants should also be fed zinc-rich foods and/or fortified formula.

<sup>b</sup> Data insufficient to set recommended intake levels

## V. Dietary Reference Intakes - Tolerable Upper Intake Levels (UL<sup>1</sup>)

Life stage group	Vitamin A (µg/day) <sup>a</sup>	Vitamin C (mg/day)	Vitamin D (IU/day) <sup>b</sup>	Vitamin E (mg/day) <sup>c,d</sup>	Vitamin K	Thiamin	Riboflavin	Niacin (mg/day) <sup>d</sup>
<b>Infants</b>								
0-6 months	600	ND <sup>e</sup>	1000	ND	ND	ND	ND	ND
7-12 months	600	ND	1000	ND	ND	ND	ND	ND
<b>Children</b>								
1-3 y	600	400	2,000	200	ND	ND	ND	10
4-8 y	900	650	2,000	300	ND	ND	ND	15
<b>Males, Females</b>								
9-13 y	1,700	1,200	2,000	600	ND	ND	ND	20
14-18 y	2,800	1,800	2,000	800	ND	ND	ND	30
19-70 y	3,000	2,000	2,000	1,000	ND	ND	ND	35
> 70 y	3,000	2,000	2,000	1,000	ND	ND	ND	35
<b>Pregnancy</b>								
18 y	2,800	1,800	2,000	800	ND	ND	ND	30
19-50 y	3,000	2,000	2,000	1,000	ND	ND	ND	35
<b>Lactation</b>								
18 y	2,800	1,800	2,000	800	ND	ND	ND	30
19-50 y	3,000	2,000	2,000	1,000	ND	ND	ND	35

<sup>1</sup> Unless otherwise specified, the UL reflects total intake from food, water and supplements. ULs could not be set for vitamin K, thiamin and riboflavin.

<sup>a</sup> As preformed vitamin A (retinol) only. <sup>b</sup> 40 IU vitamin D = 1µg cholecalciferol.

<sup>c</sup> As  $\alpha$ -tocopherol; applies to any form of supplemental  $\alpha$ -tocopherol.

<sup>d</sup> ULs for vitamin E and niacin apply to synthetic forms obtained from supplements, fortified foods, or a combination of the two.

<sup>e</sup> ND = not determinable due to lack of data of adverse effects; source of intake should be from food only to prevent high levels of intake.

## VI. Dietary Reference Intakes - Tolerable Upper Limits (UL <sup>1</sup>)

<b>Life stage group</b>	<b>Vitamin B<sub>6</sub> (mg/day)</b>	<b>Folate (µg/day) <sup>a</sup></b>	<b>Vitamin B<sub>12</sub></b>	<b>Pantothenic Acid</b>	<b>Biotin</b>	<b>Choline (g/day)</b>	<b>Calcium (mg/day)</b>	<b>Chromium</b>
<b>Infants</b>								
0-6 months	ND <sup>b</sup>	ND	ND	ND	ND	ND	ND	ND
7-12 months	ND	ND	ND	ND	ND	ND	ND	ND
<b>Children</b>								
1-3 y	30	300	ND	ND	ND	1.0	2,500	ND
4-8 y	40	400	ND	ND	ND	1.0	2,500	ND
<b>Males, Females</b>								
9-13 y	60	600	ND	ND	ND	2.0	2,500	ND
14-18 y	80	800	ND	ND	ND	3.0	2,500	ND
19-70 y	100	1,000	ND	ND	ND	3.5	2,500	ND
> 70 y	100	1,000	ND	ND	ND	3.5	2,500	ND
<b>Pregnancy</b>								
18 y	80	800	ND	ND	ND	3.0	2,500	ND
19-50 y	100	1,000	ND	ND	ND	3.5	2,500	ND
<b>Lactation</b>								
18 y	80	800	ND	ND	ND	3.0	2,500	ND
19-50 y	100	1,000	ND	ND	ND	3.5	2,500	ND

<sup>1</sup> Unless otherwise specified, the UL reflects total intake from food, water and supplements. ULs could not be set for B<sub>12</sub>, pantothenic acid, biotin and chromium.

<sup>a</sup> The UL for folate applies to synthetic forms obtained from supplements, fortified foods, or a combination of the two.

<sup>b</sup> Not determinable due to lack of data of adverse effects; source of intake should be from food only to prevent high levels of intake.

## VII. Dietary Reference Intakes - Tolerable Upper Limits (UL<sup>1</sup>)

<b>Life stage group</b>	<b>Copper (µg/day)</b>	<b>Fluoride (mg/day)</b>	<b>Iodine (µg/day)</b>	<b>Iron (mg/day)</b>	<b>Magnesium (mg/day)<sup>a</sup></b>	<b>Manganese (mg/day)</b>	<b>Molybdenum (µg/day)</b>	<b>Phosphorus (mg/day)</b>
<b>Infants</b>								
0-6 months	ND <sup>b</sup>	0.7	ND	40	ND	ND	ND	ND
7-12 months	ND	0.9	ND	40	ND	ND	ND	ND
<b>Children</b>								
1-3 y	1,000	1.3	200	40	65	2	300	3,000
4-8 y	3,000	2.2	300	40	110	3	600	3,000
<b>Males, Females</b>								
9-13 y	5,000	10	600	40	350	6	1,100	4,000
14-18 y	8,000	10	900	45	350	9	1,700	4,000
19-70 y	10,000	10	1,100	45	350	11	2,000	4,000
> 70 y	10,000	10	1,100	45	350	11	2,000	3,000
<b>Pregnancy</b>								
18 y	8,000	10	900	45	350	9	1,700	3,500
19-50 y	10,000	10	1,100	45	350	11	2,000	3,500
<b>Lactation</b>								
18 y	8,000	10	900	45	350	9	1,700	4,000
19-50 y	10,000	10	1,100	45	350	11	2,000	4,000

<sup>1</sup> Unless otherwise specified, the UL reflects total intake from food, water, and supplements.

<sup>a</sup> ULs for magnesium reflect intake from a pharmacological agent only and do not include intake from food and water.

<sup>b</sup> ND = not determinable due to lack of data of adverse effects; source of intake should be from food only to prevent high levels of intake.

## VIII. Dietary Reference Intakes - Tolerable Upper Limits (UL <sup>1</sup>)

<b>Life stage group</b>	<b>Selenium (µg/day)</b>	<b>Zinc (mg/day)</b>	<b>Arsenic <sup>a</sup></b>	<b>Boron (mg/day)</b>	<b>Nickel (mg/day)</b>	<b>Silicon <sup>b</sup></b>	<b>Vanadium (mg/day) <sup>c</sup></b>	<b>Carot-enoids <sup>d</sup></b>
<b>Infants</b>								
0-6 months	45	4	ND <sup>e</sup>	ND	ND	ND	ND	ND
7-12 months	60	5	ND	ND	ND	ND	ND	ND
<b>Children</b>								
1-3 y	90	7	ND	3	0.2	ND	ND	ND
4-8 y	150	12	ND	6	0.3	ND	ND	ND
<b>Males, Females</b>								
9-13 y	280	23	ND	11	0.6	ND	ND	ND
14-18 y	400	34	ND	17	1.0	ND	ND	ND
19-70 y	400	40	ND	20	1.0	ND	1.8	ND
> 70 y	400	40	ND	20	1.0	ND	1.8	ND
<b>Pregnancy</b>								
18 y	400	34	ND	17	1.0	ND	ND	ND
19-50 y	400	40	ND	20	1.0	ND	ND	ND
<b>Lactation</b>								
18 y	400	34	ND	17	1.0	ND	ND	ND
19-50 y	400	40	ND	20	1.0	ND	ND	ND

<sup>1</sup> Unless otherwise specified, the UL reflects total intake from food, water and supplements.

<sup>a</sup> No justification exists for adding arsenic to food or supplements even though the UL was not determined.

<sup>b</sup> There is no justification to add silicon to supplements, even though silicon has not been shown to cause adverse effects.

<sup>c</sup> There is no justification for adding vanadium to food, even though vanadium in food has not been shown to cause adverse effects in humans; vanadium supplements should be used with caution. The UL for adults is based on adverse effects observed in laboratory animals; however this data could not be used to set ULs for children and adolescents.

<sup>d</sup> -carotene supplements are advised only to serve as a provitamin A source for individuals at risk for vitamin A deficiency.

<sup>e</sup> ND = not determinable due to lack of data of adverse effects; source of intake should be from food only to prevent high levels of intake.

## Special Considerations for Iron Requirements <sup>1</sup>

<b>Variables <sup>a</sup></b> <b>Life stage group</b>	<b>Menstruation <sup>b</sup></b> <b>mg Iron/day</b>	<b>Oral Contraceptive Use <sup>c</sup></b> <b>mg Iron/day</b>	<b>Vegetarians <sup>f</sup></b> <b>mg Iron/day</b>
<b>Females</b>			
13 y	10.5		
14-18 y	15 <sup>c</sup>	11.4	26
19-30 y	18 <sup>c</sup>	10.9	33
31-50 y	18 <sup>c</sup>	10.9	33
51 y	- <sup>d</sup>	- <sup>d</sup>	
<b>Males</b>			
19 y	N/A	N/A	14

<sup>1</sup> National Academy of Science, Institute of Medicine, 2001.

<sup>a</sup>Others who may have increased iron needs include frequent blood donors and people who exercise intensely or who endurance train for athletic events. These individuals may require iron supplementation to maintain proper iron status. A basic multivitamin-mineral supplement may be adequate to help those with increased iron needs, but not clinical iron-deficiency anemia. Most multivitamin-mineral supplements contain 18 mg of iron. These individuals should be encouraged to discuss their iron status with their health care providers.

<sup>b</sup> Women who menstruate need more iron to offset iron loss.

<sup>c</sup>RDAs for females 14 years age are set to account for iron losses through menstruation.

<sup>d</sup> Post-menopausal women who experience periodic bleeding due to hormone replacement therapy may have slightly higher iron needs than other post-menopausal women (i.e., slightly greater than the RDA of 8 mg/day).

<sup>e</sup> Women who use oral contraceptives typically bleed less when menstruating and thus may require less iron than other women.

<sup>f</sup> Vegetarians primarily consume non-heme sources of iron and have diets high in food components that interfere with iron use. Thus, vegetarians need to consume approximately twice as much iron as non-vegetarians to meet needs.

**Estimated Sodium, Chloride and Potassium Minimum Requirements <sup>1</sup>**

<b>Age (male &amp; female)</b>	<b>Sodium (mg) <sup>a,b,c</sup></b>	<b>Chloride (mg) <sup>a,b</sup></b>	<b>Potassium (mg) <sup>d</sup></b>
<b>Months</b>			
0 - 5	120	180	500
6 - 11	200	300	700
<b>Years</b>			
1	225	350	1,000
2 - 5	300	500	1,400
6 - 9	400	600	1,600
10 - 18	500	750	2,000
>18 <sup>e</sup>	500	750	2,000
<b>Pregnancy</b>	569 <sup>f</sup>	750 <sup>f</sup>	2,000 <sup>f</sup>
<b>Lactation</b>	635 <sup>f</sup>	750 <sup>f</sup>	2,000 <sup>f</sup>

<sup>1</sup> From Recommended Dietary Allowances, 10th edition (1989)

<sup>a</sup> No allowance considered for large, extensive losses from the skin through sweat.

<sup>b</sup> There is no evidence that higher intakes provide any health benefit.

<sup>c</sup> The American Heart Association and the National Institutes of Health recommend intakes be 2400 mg/day to help reduce risk of high blood pressure and stroke.

<sup>d</sup> Desirable intakes of potassium, that is levels that may benefit blood pressure, are much greater; experts recommend intakes 3,500 mg/day - easily met by consuming 5 servings of vegetables and fruits daily.

<sup>e</sup> No allowance for growth

<sup>f</sup> Increased needs for these electrolytes during pregnancy and lactation are met through typical food intakes.

## Daily Values % on Food Labels (% DV)

### Daily Reference Values (DRVs) <sup>1</sup>

Nutrient	Amount	Nutrient	Amount
Fat	65 g	Fiber	25 g
Saturated fat	20 g	Sodium	2,400 mg
Cholesterol	300 mg	Potassium	3,500 mg
Total carbohydrate	300 g	Protein <sup>a</sup>	50 g

<sup>1</sup> Based on 2,000 calories/day for adults and children over 4 years only.

<sup>a</sup> DRV for protein is different for these groups: infants under 1 year = 14 g children 1 - 4 years = 16 g; pregnant women = 60 g; nursing mothers = 65 g.

### Reference Daily Intakes (RDIs) <sup>2</sup>

Nutrient	Amount	Nutrient	Amount
Vitamin A	5,000 IU	Biotin	300 µg
Vitamin C	60 mg	Pantothenic Acid	10 mg
Calcium	1,000 mg	Phosphorus	1,000 mg
Iron	18 mg	Iodine	150 µg
Vitamin D	400 IU	Magnesium	400 mg <sup>a</sup>
Vitamin E	30 IU	Zinc	15 mg
Vitamin K	80 µg	Selenium	70 µg
Thiamin	1.5 mg	Copper	2 mg
Riboflavin	1.7 mg	Manganese	2 mg
Niacin	20 mg	Chromium	120 µg
Vitamin B <sub>6</sub>	2.0 mg	Molybdenum	75 µg
Folic Acid	400 µg	Chloride	3,400 mg
Vitamin B <sub>12</sub>	6 µg		

<sup>2</sup> Based on National Academy of Sciences' 1968, 1980 and/or 1989 Recommended Dietary Allowances

<sup>a</sup> DV for magnesium exceeds UL for magnesium; UL for magnesium is based on intake from a pharmacological agent; it is not advised to regularly consume supplements or medicines that contains magnesium at levels that exceed UL.