STATEMENT ON NUTRITIONAL ADEQUACY

The Dietary Reference Intakes (DRIs) of the Food and Nutrition Board of the Institute of Medicine, National Academy of Sciences, are used as the standard for determining the nutritional adequacy of the regular and modified diets outlined in this manual. DRIs reference values that are quantity estimates of nutrient intakes to be used for planning and assessing diets for healthy people. The DRIs consist of four reference intakes:

- Recommended Daily Allowances (RDA), a reference to be used as a goal for the individual.
- Tolerable Upper Intake Level (UL), the intake level given to assist in advising individuals of what intake levels may result in adverse effects if habitually exceeded.
- Estimated Average Requirement (EAR), the intake level which data indicates that the needs for 50% of individuals consuming this intake will not be met.
- Adequate Intake (AI), a recommended intake value for a group or groups of healthy people based on fewer data and substantially more judgment than used in establishing an EAR and subsequently the RDA.

An AI is given when the RDA cannot be set. Both of these reference intakes are to be used as goals in planning and assessing diets for healthy individuals (1,2). The DRIs do not cover special needs for nutrients due to various disease conditions. DRIs are reference values appropriate for both assessing population intakes and planning diets for healthy people (1,2).

When referring to energy, use Estimated Energy Intake (EER). EER is the average dietary energy intake that is predicted to maintain energy balance in a healthy adult of a defined age, gender, weight, height and level of physical activity, consistent with good health. For children, pregnant and lactating women, the EER includes the needs associated with deposition of tissues or the secretion of milk at rates consistent with good health (7).

The sample menus throughout this manual have been planned to provide the recommended DRIs for men, 31 to 50 years of age, unless indicated otherwise, and have been analyzed by a nutrient analysis software program. For specific values, refer to the following tables of recommended DRIs from the Food and Nutrition Board of the National Academy of Sciences,. However, it is acknowledged that nutrient requirements vary widely. The dietitian can establish an adequate intake on an individual basis.

The DRIs are provided in a series of reports (3-7). Full texts of reports are available at www.nap.edu.

References

1. Yates AA, Schlicker SA, Suitor CW. Dietary Reference Intakes: The new basis for recommendations for calcium and related nutrients, B vitamins, and choline. *J Am Diet Assoc*. 1998;98:699-706.
2. Trumbo P, Yates A, Schlicker S, Poos M. Dietary Reference Intakes: Vitamin A, Vitamin K, Arsenic, Boron, Chromium, Copper, Iodine, Iron, Manganese, Molybdenum, Nickel, Silicon, Vanadium, and Zinc. *J Am Diet Assoc*. 2001;101(3):294-301.
3. Institute of Medicine. *Dietary Reference Intakes for Calcium, Phosphorus, Magnesium, Vitamin D, and Fluoride.* Food and Nutrition Board, Washington, DC: National Academy Press;1997.
4. Institute of Medicine. *Dietary Reference Intakes for Thiamin, Riboflavin, Niacin, Vitamin B6, Folate, Vitamin B12, Pantothenic Acid, Biotin, and Choline.* Food and Nutrition Board, Washington, DC: National Academy Press;1998.
5. Institute of Medicine. *Dietary Reference Intakes for Vitamin C, Vitamin E, Selenium, and Cartotenoids*. Food and Nutrition Board, Washington, DC: National Academy Press;2000.
6. Institute of Medicine. *Dietary Reference Intakes for Vitamin A, Vitamin K, Arsenic, Boron, Chromium, Copper, Iodine, Iron, Molybdenum, Nickel, Silicon, Vandium and Zinc*. Food and Nutrition Board. Washington, DC: National Academy Press; 2001.
7. Institute of Medicine's Food and Nutrition Board. *Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids*. (Macronutrients). Washington, DC: National Academy of Sciences, 2005: 107-180.

ESTIMATED ENERGY REQUIREMENT (EER) FOR MALE AND FEMALES UNDER 30 YEARS OF AGE

Age	Sex	Body Mass Index (kg/m²)[a]	Median Reference Height[b] cm(in)	Reference Weight[a] kg (lb)	Kcal/day
2-6 mo	M		62(24)	6(13)	570
	F		62(24)	6(13)	520
7-12 mo	M		71(28)	9(20)	743
	F		71(28)	9(20)	676
1-3 y	M		86(34)	12(27)	1046
	F		86(34)	12(27)	992
4-8 y	M		115(45)	20(44)	1,742
	F		115(45)	20(44)	1,642
9-13 y	M	17.2	144(57)	36(79)	2,279
	F	17.4	144(57)	37(81)	2,071
14-18 y	M	20.5	174(68)	61(134)	3,152
	F	20.4	163(64)	54(119)	2,368
19-30 y	M	22.5	177(70)	70(154)	3,607[c]
	F	21.5	163(64)	57(126)	2,403[c]

[a]Taken from new data on male and female median body mass index and height-for-age data from the Centers for Disease Control and Prevention National Center for Health Statistics Growth Charts (Kuczmarski, et al., 2000).
[b]Calculated from CDC/NCHS Growth Charts (Kuczmarski et al., 2000); median body mass index and median height for ages 4 through 19 years.
[c]Subtract 10 kcal/day for males and 7 kcal/day for females for each year of age above 19 years.

Adapted from: Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids (Macronutrients). Washington, DC: National Academies Press, 2002.

ESTIMATED ENERGY REQUIREMENT (EER) FOR MEN AND WOMEN 30 YEARS OF AGE[a]

Height (m[in])	PAL[b]	Weight for BMI of 18.5 kg/m² (kg [lb])	Weight for BMI of 24.99 kg/m² (kg [lb])	EER, Men (kcal/day)		EER, Women (kcal/day)	
				BMI of 18.5 kg/m²	BMI of 24.99 kg/m²	BMI of 18.5 kg/m²	BMI of 24.99 kg/m²
1.50 (59)	Sedentary	41.6 (92)	56.2 (124)	1,848	2,080	1,625	1,762
	Low active			2,009	2,267	1,803	1,956
	Active			2,215	2,506	2,025	2,198
	Very Active			2,554	2,898	2,291	2,489
1.65 (65)	Sedentary	50.4 (111)	68.0 (150)	2,068	2,349	1,816	1,982
	Low active			2,254	2,566	2,016	2,202
	Active			2,490	2,842	2,267	2,477
	Very Active			2,880	3,296	2,567	2,807
1.80 (71)	Sedentary	59.9 (132)	81.0 (178)	2,301	2,635	2,015	2,221
	Low active			2,513	2,884	2,239	2.459
	Active			2,782	3,200	2,519	2,769
	Very Active			3,225	3,720	2,855	3,141

[a]For each year below 30, add 7 kcal/day for women and 10 kcal/day for men. For each year above 30, subtract 7 kcal/day for women and 10kcal/day for men.
[b]Physical activity level.
[c]Derive from the following regression equations based on doubly labeled water data:
Adult man: EER=661.8-9.53xAge (y)xPAx(15.91xWt [kg]+539.6xHt[m]
Adult woman EER=354.1 – 6.91xAge(y)xPAx(9.36xWt [kg] + 726xHt [m])
Where PA refers to coefficient for Physical Activity Levels (PAL)
PAL=total energy expenditure + basal energy expenditure.
PA=1.0 if PAL ≥1.0 < 1.4 (sedentary).
PA=1.12 if PAL ≥ 1.4<1.6 (low active).
PA=1.27 if PAL ≥ 1.6<1.9 (active).
PA=1.45 if PAL ≥ 1.9 < 2.5 (very active).

Source: Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids (2002). This report may be accessed via www.nap.edu.

ESTIMATED CALORIE REQUIREMENTS (IN KILOCALORIES) FOR EACH GENDER AND AGE GROUP AT THREE LEVELS OF PHYSICAL ACTIVITY (1) [a]

Estimated amounts of calories needed to maintain energy balance for various gender and age groups at three different levels of physical activity. The estimates are rounded to the nearest 200 calories and were determined using the Institute of Medicine equation.

		Activity Level [b,c,d]		
Gender	**Age (years)**	**Sedentary[b]**	**Moderately Active[c]**	**Active[d]**
Child	2-3	1,000	1,000-1,400[e]	1,000-1,400[e]
Female	4-8	1,200	1,400-1,600	1,400-1,800
	9-13	1,600	1,600-2,000	1,800-2,200
	14-18	1,800	2,000	2,400
	19-30	2,000	2,000-2,200	2,400
	31-50	1,800	2,000	2,200
	51+	1,600	1,800	2,000-2,200
Male	4-8	1,400	1,400-1,600	1,600-2,000
	9-13	1,800	1,800-2,200	2,000-2,600
	14-18	2,200	2,400-2,800	2,800-3,200
	19-30	2,400	2,600-2,800	3,000
	31-50	2,200	2,400-2,600	2,800-3,000
	51+	2,000	2,200-2,400	2,400-2,800

[a] These levels are based on Estimated Energy Requirements (EER) from the Institute of Medicine Dietary Reference Intakes macronutrients report, 2002, calculated by gender, age, and activity level for reference-sized individuals. "Reference size," as determined by IOM, is based on median height and weight for ages up to age 18 years of age and median height and weight for that height to give a BMI of 21.5 for adult females and 22.5 for adult males.

[b] Sedentary means a lifestyle that includes only the light physical activity associated with typical day-to-day life.

[c] Moderately active means a lifestyle that includes physical activity equivalent to walking about 1.5 to 3 miles per day at 3 to 4 miles per hour, in addition to the light physical activity associated with typical day-to-day life

[d] Active means a lifestyle that includes physical activity equivalent to walking more than 3 miles per day at 3 to 4 miles per hour, in addition to the light physical activity associated with typical day-to-day life.

[e] The calorie ranges shown are to accommodate needs of different ages within the group. For children and adolescents, more calories are needed at older ages. For adults, fewer calories are needed at older ages.

Reference

Dietary Guidelines for Americans 2005. Available at: www.healthierus.gov/dietaryguidelines. Accessed on May 25, 2005.

DIETARY REFERENCE INTAKES (DRIS): RECOMMENDED INTAKES FOR INDIVIDUALS, MACRONUTRIENTS

Food and Nutrition Board, Institute of Medicine, National Academies

Life Stage Group	Total Water [a] (L/d)	Carbohydrate (g/d)	Total Fiber (g/d)	Fat (g/d)	Linoleic Acid (g/d)	α-Linolenic Acid (g/d)	Protein [b] (g/d)
Infants							
0–6 mo	0.7*	60*	ND	31*	4.4*	0.5*	9.1*
7–12 mo	0.8*	95*	ND	30*	4.6*	0.5*	**11.0**[c]
Children							
1–3 y	1.3*	**130**	19*	ND	7*	0.7*	**13**
4–8 y	1.7*	**130**	25*	ND	10*	0.9*	**19**
Males							
9–13 y	2.4*	**130**	31*	ND	12*	1.2*	**34**
14–18 y	3.3*	**130**	38*	ND	16*	1.6*	**52**
19–30 y	3.7*	**130**	38*	ND	17*	1.6*	**56**
31–50 y	3.7*	**130**	38*	ND	17*	1.6*	**56**
51–70 y	3.7*	**130**	30*	ND	14*	1.6*	**56**
> 70 y	3.7*	**130**	30*	ND	14*	1.6*	**56**
Females							
9–13 y	2.1*	**130**	26*	ND	10*	1.0*	**34**
14–18 y	2.3*	**130**	26*	ND	11*	1.1*	**46**
19–30 y	2.7*	**130**	25*	ND	12*	1.1*	**46**
31–50 y	2.7*	**130**	25*	ND	12*	1.1*	**46**
51–70 y	2.7*	**130**	21*	ND	11*	1.1*	**46**
> 70 y	2.7*	**130**	21*	ND	11*	1.1*	**46**
Pregnancy							
14–18 y	3.0*	**175**	28*	ND	13*	1.4*	**71**
19–30 y	3.0*	**175**	28*	ND	13*	1.4*	**71**
31–50 y	3.0*	**175**	28*	ND	13*	1.4*	**71**
Lactation							
14–18 y	3.8*	**210**	29*	ND	13*	1.3*	**71**
19–30 y	3.8*	**210**	29*	ND	13*	1.3*	**71**
31–50 y	3.8*	**210**	29*	ND	13*	1.3*	**71**

NOTE: This table presents Recommended Dietary Allowances (RDAs) in **bold** type and Adequate Intakes (AIs) in ordinary type followed by an asterisk (*). 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 infants fed human milk, 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 or uncertainty in the data prevent being able to specify with confidence the percentage of individuals covered by this intake.

a Total water includes all water contained in food, beverages, and drinking water.

b Based on 0.8 g/kg body weight for the reference body weight.

c Change from 13.5 in prepublication copy due to calculation error.

Dietary Reference Intakes (DRIs): Additional Macronutrient Recommendations

Food and Nutrition Board, Institute of Medicine, National Academies

Macronutrient	Recommendation
Dietary cholesterol	As low as possible while consuming a nutritionally adequate diet
Trans fatty acids	As low as possible while consuming a nutritionally adequate diet
Saturated fatty acids	As low as possible while consuming a nutritionally adequate diet
Added sugars	Limit to no more than 25% of total energy

SOURCE: *Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids* (2002).

Dietary Reference Intakes (DRIs): Recommended Intakes for Individuals, Vitamins

Food and Nutrition Board, Institute of Medicine, National Academies

Life Stage Group	Vit A (µg/d)[a]	Vit C (mg/d)	Vit D (µg/d)[b,c]	Vit E (mg/d) [d]	Vit K (µg/d)	Thiamin (mg/d)	Riboflavin (mg/d)	Niacin (mg/d)[e]	Vit B_6 (mg/d)	Folate (µg/d)[f]	Vit B_{12} (µg/d)	Pantothenic Acid (mg/d)	Biotin (µg/d)	Choline[g] (mg/d)
Infants														
0–6 mo	400*	40*	5*	4*	2.0*	0.2*	0.3*	2*	0.1*	65*	0.4*	1.7*	5*	125*
7–12 mo	500*	50*	5*	5*	2.5*	0.3*	0.4*	4*	0.3*	80*	0.5*	1.8*	6*	150*
Children														
1–3 y	**300**	**15**	5*	**6**	30*	**0.5**	**0.5**	**6**	**0.5**	**150**	**0.9**	2*	8*	200*
4–8 y	**400**	**25**	5*	**7**	55*	**0.6**	**0.6**	**8**	**0.6**	**200**	**1.2**	3*	12*	250*
Males														
9–13 y	**600**	**45**	5*	**11**	60*	**0.9**	**0.9**	**12**	**1.0**	**300**	**1.8**	4*	20*	375*
14–18 y	**900**	**75**	5*	**15**	75*	**1.2**	**1.3**	**16**	**1.3**	**400**	**2.4**	5*	25*	550*
19–30 y	**900**	**90**	5*	**15**	120*	**1.2**	**1.3**	**16**	**1.3**	**400**	**2.4**	5*	30*	550*
31–50 y	**900**	**90**	5*	**15**	120*	**1.2**	**1.3**	**16**	**1.3**	**400**	**2.4**	5*	30*	550*
51–70 y	**900**	**90**	10*	**15**	120*	**1.2**	**1.3**	**16**	**1.7**	**400**	**2.4**[i]	5*	30*	550*
> 70 y	**900**	**90**	15*	**15**	120*	**1.2**	**1.3**	**16**	**1.7**	**400**	**2.4**[i]	5*	30*	550*
Females														
9–13 y	**600**	**45**	5*	**11**	60*	**0.9**	**0.9**	**12**	**1.0**	**300**	**1.8**	4*	20*	375*
14–18 y	**700**	**65**	5*	**15**	75*	**1.0**	**1.0**	**14**	**1.2**	**400**[i]	**2.4**	5*	25*	400*
19–30 y	**700**	**75**	5*	**15**	90*	**1.1**	**1.1**	**14**	**1.3**	**400**[i]	**2.4**	5*	30*	425*
31–50 y	**700**	**75**	5*	**15**	90*	**1.1**	**1.1**	**14**	**1.3**	**400**[i]	**2.4**	5*	30*	425*
51–70 y	**700**	**75**	10*	**15**	90*	**1.1**	**1.1**	**14**	**1.5**	**400**	**2.4**[h]	5*	30*	425*
> 70 y	**700**	**75**	15*	**15**	90*	**1.1**	**1.1**	**14**	**1.5**	**400**	**2.4**[h]	5*	30*	425*
Pregnancy														
14–18 y	**750**	**80**	5*	**15**	75*	**1.4**	**1.4**	**18**	**1.9**	**600**[j]	**2.6**	6*	30*	450*
19–30 y	**770**	**85**	5*	**15**	90*	**1.4**	**1.4**	**18**	**1.9**	**600**[j]	**2.6**	6*	30*	450*
31–50 y	**770**	**85**	5*	**15**	90*	**1.4**	**1.4**	**18**	**1.9**	**600**[j]	**2.6**	6*	30*	450*
Lactation														
14–18 y	**1,200**	**115**	5*	**19**	75*	**1.4**	**1.6**	**17**	**2.0**	**500**	**2.8**	7*	35*	550*
19–30 y	**1,300**	**120**	5*	**19**	90*	**1.4**	**1.6**	**17**	**2.0**	**500**	**2.8**	7*	35*	550*
31–50	**1,300**	**120**	5*	**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 (*). 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 needs of all individuals in the group, but lack of data or uncertainty in the data prevent being able to specify with confidence the percentage of individuals covered by this intake.

*a*As retinol activity equivalents (RAEs). 1 RAE = 1 mg retinol, 12 mg b-carotene, 24 mg a-carotene, or 24 mg b-cryptoxanthin. The RAE for dietary provitamin A carotenoids is twofold greater than retinol quivalents (RE), whereas the RAE for preformed vitamin A is the same as RE.

*b*As cholecalciferol. 1 µg cholecalciferol = 40 IU vitamin D.

*c*In the absence of adequate exposure to sunlight.

*d*As a-tocopherol. a-Tocopherol includes *RRR*-a-tocopherol, the only form of a-tocopherol that occurs naturally in foods, and the *2R*-stereoisomeric forms of a-tocopherol (*RRR*-, *RSR*-, *RRS*-, and *RSS*-a-tocopherol) that occur in fortified foods and supplements. It does not include the *2S*-stereoisomeric forms of a-tocopherol (*SRR*-, *SSR*-, *SRS*-, and *SSS*-a-tocopherol), also found in fortified foods and supplements.

*e*As niacin equivalents (NE). 1 mg of niacin = 60 mg of tryptophan; 0–6 months = preformed niacin (not NE).

f As dietary folate equivalents (DFE). 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.

*g*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.

*h*Because 10 to 30 percent of older people may malabsorb food-bound B12, it is advisable for those older than 50 years to meet their RDA mainly by consuming foods fortified with B12 or a supplement containing B12.

*i*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.

*j*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 periconceptional period—the critical time for formation of the neural tube.

Dietary Reference Intakes (DRIs): Recommended Intakes for Individuals, Elements

Food and Nutrition Board, Institute of Medicine, National Academies

Life Stage Group	Calcium (mg/d)	Chromium (µg/d)	Copper (µg/d)	Fluoride (mg/d)	Iodine (µg/d)	Iron (mg/d)	Magnesium (mg/d)	Manganese (mg/d)	Molybdenum (µg/d)	Phosphorus (mg/d)	Selenium (µg/d)	Zinc (mg/d)	Potassium (g/d)	Sodium (g/d)	Chloride (g/d)
Infants															
0–6 mo	210*	0.2*	200*	0.01*	110*	0.27*	30*	0.003*	2*	100*	15*	2*	0.4*	0.12*	0.18*
7–12 mo	270*	5.5*	220*	0.5*	130*	**11**	75*	0.6*	3*	275*	20*	**3**	0.7*	0.37*	0.57*
Children															
1–3 y	500*	11*	**340**	0.7*	**90**	**7**	**80**	1.2*	**17**	**460**	**20**	**3**	3.0*	1.0*	1.5*
4–8 y	800*	15*	**440**	1*	**90**	**10**	**130**	1.5*	**22**	**500**	**30**	**5**	3.8*	1.2*	1.9*
Males															
9–13 y	1,300*	25*	**700**	2*	**120**	**8**	**240**	1.9*	**34**	**1,250**	**40**	**8**	4.5*	1.5*	2.3*
14–18 y	1,300*	35*	**890**	3*	**150**	**11**	**410**	2.2*	**43**	**1,250**	**55**	**11**	4.7*	1.5*	2.3*
19–30 y	1,000*	35*	**900**	4*	**150**	**8**	**400**	2.3*	**45**	**700**	**55**	**11**	4.7*	1.5*	2.3*
31–50 y	1,000*	35*	**900**	4*	**150**	**8**	**420**	2.3*	**45**	**700**	**55**	**11**	4.7*	1.5*	2.3*
51–70 y	1,200*	30*	**900**	4*	**150**	**8**	**420**	2.3*	**45**	**700**	**55**	**11**	4.7*	1.3*	2.0*
> 70 y	1,200*	30*	**900**	4*	**150**	**8**	**420**	2.3*	**45**	**700**	**55**	**11**	4.7*	1.2*	1.8*
Females															
9–13 y	1,300*	21*	**700**	2*	**120**	**8**	**240**	1.6*	**34**	**1,250**	**40**	**8**	4.5*	1.5*	2.3*
14–18 y	1,300*	24*	**890**	3*	**150**	**15**	**360**	1.6*	**43**	**1,250**	**55**	**9**	4.7*	1.5*	2.3*
19–30 y	1,000*	25*	**900**	3*	**150**	**18**	**310**	1.8*	**45**	**700**	**55**	**8**	4.7*	1.5*	2.3*
31–50 y	1,000*	25*	**900**	3*	**150**	**18**	**320**	1.8*	**45**	**700**	**55**	**8**	4.7*	1.5*	2.3*
51–70 y	1,200*	20*	**900**	3*	**150**	**8**	**320**	1.8*	**45**	**700**	**55**	**8**	4.7*	1.3*	2.0*
> 70 y	1,200*	20*	**900**	3*	**150**	**8**	**320**	1.8*	**45**	**700**	**55**	**8**	4.7*	1.2*	1.8*
Pregnancy															
14–18 y	1,300*	29*	**1,000**	3*	**220**	**27**	**400**	2.0*	**50**	**1,250**	**60**	**12**	4.7*	1.5*	2.3*
19–30 y	1,000*	30*	**1,000**	3*	**220**	**27**	**350**	2.0*	**50**	**700**	**60**	**11**	4.7*	1.5*	2.3*
31–50 y	1,000*	30*	**1,000**	3*	**220**	**27**	**360**	2.0*	**50**	**700**	**60**	**11**	4.7*	1.5*	2.3*
Lactation															
14–18 y	1,300*	44*	**1,300**	3*	**290**	**10**	**360**	2.6*	**50**	**1,250**	**70**	**13**	5.1*	1.5*	2.3*
19–30 y	1,000*	45*	**1,300**	3*	**290**	**9**	**310**	2.6*	**50**	**700**	**70**	**12**	5.1*	1.5*	2.3*
31–50 y	1,000*	45*	**1,300**	3*	**290**	**9**	**320**	2.6*	**50**	**700**	**70**	**12**	5.1*	1.5*	2.3*

NOTE: This table presents Recommended Dietary Allowances (RDAs) in **bold type** and Adequate Intakes (AIs) in ordinary type followed by an asterisk (*). 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 needs of all individuals in the group, but lack of data or uncertainty in the data prevent being able to specify with confidence the percentage of individuals covered by this intake.

SOURCES: *Dietary Reference Intakes for Calcium, Phosphorous, Magnesium, Vitamin D, and Fluoride* (1997); *Dietary Reference Intakes for Thiamin, Riboflavin, Niacin, Vitamin B_6, Folate, Vitamin B_{12}, Pantothenic Acid, Biotin, and Choline* (1998); *Dietary Reference Intakes for Vitamin C, Vitamin E, Selenium, and Carotenoids* (2000); *Dietary Reference Intakes for Vitamin A, Vitamin K, Arsenic, Boron, Chromium, Copper, Iodine,*
Iron, Manganese, Molybdenum, Nickel, Silicon, Vanadium, and Zinc (2001); and *Dietary Reference Intakes for Water, Potassium, Sodium, Chloride, and Sulfate* (2004). These reports may be accessed via http://www.nap.edu.

Dietary Reference Intakes (DRIs): Estimated Average Requirements for Groups

Food and Nutrition Board, Institute of Medicine, National Academies

Life Stage Group	CHO (g/d)	Protein (g/d)*a*	Vit A (mg/d) *b*	Vit C (mg/d)	Vit E (mg/d) *c*	Thiamin (mg/d)	Ribo-flavin (mg/d)	Niacin (mg/d) *d*	Vit B6 (mg/d)	Folate (mg/d) *b*	Vit B12 (mg/d)	Copper (mg/d)	Iodine (mg/d)	Iron (mg/d)	Magnes-ium (mg/d)	Molyb-denum (mg/d)	Phos-phorus (mg/d)	Sele-nium (mg/d)	Zinc (mg/d)
Infants																			
7–12 mo		9*												6.9					2.5
Children																			
1–3 y	100	11	210	13	5	0.4	0.4	5	0.4	120	0.7	260	65	3.0	65	13	380	17	2.5
4–8 y	100	15	275	22	6	0.5	0.5	6	0.5	160	1.0	340	65	4.1	110	17	405	23	4.0
Males																			
9–13 y	100	27	445	39	9	0.7	0.8	9	0.8	250	1.5	540	73	5.9	200	26	1,055	35	7.0
14–18 y	100	44	630	63	12	1.0	1.1	12	1.1	330	2.0	685	95	7.7	340	33	1,055	45	8.5
19–30 y	100	46	625	75	12	1.0	1.1	12	1.1	320	2.0	700	95	6	330	34	580	45	9.4
31–50 y	100	46	625	75	12	1.0	1.1	12	1.1	320	2.0	700	95	6	350	34	580	45	9.4
51–70 y	100	46	625	75	12	1.0	1.1	12	1.4	320	2.0	700	95	6	350	34	580	45	9.4
> 70 y	100	46	625	75	12	1.0	1.1	12	1.4	320	2.0	700	95	6	350	34	580	45	9.4
Females																			
9–13 y	100	28	420	39	9	0.7	0.8	9	0.8	250	1.5	540	73	5.7	200	26	1,055	35	7.0
14–18 y	100	38	485	56	12	0.9	0.9	11	1.0	330	2.0	685	95	7.9	300	33	1,055	45	7.3
19–30 y	100	38	500	60	12	0.9	0.9	11	1.1	320	2.0	700	95	8.1	255	34	580	45	6.8
31–50 y	100	38	500	60	12	0.9	0.9	11	1.1	320	2.0	700	95	8.1	265	34	580	45	6.8
51–70 y	100	38	500	60	12	0.9	0.9	11	1.3	320	2.0	700	95	5	265	34	580	45	6.8
> 70 y	100	38	500	60	12	0.9	0.9	11	1.3	320	2.0	700	95	5	265	34	580	45	6.8
Pregnancy																			
14–18 y	135	50	530	66	12	1.2	1.2	14	1.6	520	2.2	785	160	23	335	40	1,055	49	10.5
19–30 y	135	50	550	70	12	1.2	1.2	14	1.6	520	2.2	800	160	22	290	40	580	49	9.5
31–50 y	135	50	550	70	12	1.2	1.2	14	1.6	520	2.2	800	160	22	300	40	580	49	9.5
Lactation																			
14–18 y	160	60	885	96	16	1.2	1.3	13	1.7	450	2.4	985	209	7	300	35	1,055	59	10.9
19–30 y	160	60	900	100	16	1.2	1.3	13	1.7	450	2.4	1,000	209	6.5	255	36	580	59	10.4
31–50 y	160	60	900	100	16	1.2	1.3	13	1.7	450	2.4	1,000	209	6.5	265	36	580	59	10.4

NOTE: This table presents Estimated Average Requirements (EARs), which serve two purposes: for assessing adequacy of population intakes, and as the basis for calculating Recommended Dietary Allowances (RDAs) for individuals for those nutrients. EARs have not been established for vitamin D, vitamin K, pantothenic acid, biotin, choline, calcium, chromium, fluoride, manganese, or other nutrients not yet evaluated via the DRI process.

a For individual at reference weight (Table 1-1). *indicates change from prepublication copy due to calculation error.

b As retinol activity equivalents (RAEs). 1 RAE = 1 mg retinol, 12 mg b-carotene, 24 mg a-carotene, or 24 mg b-cryptoxanthin. The RAE for dietary provitamin A carotenoids is two-fold greater than retinol equivalents (RE), whereas the RAE for preformed vitamin A is the same as RE.

c As a-tocopherol. a-Tocopherol includes *RRR*-a-tocopherol, the only form of a-tocopherol that occurs naturally in foods, and the *2R*-stereoisomeric forms of a-tocopherol (*RRR*-, *RSR*-, *RRS*-, and *RSS*-a-tocopherol) that occur in fortified foods and supplements. It does not include the *2S*-stereoisomeric forms of a-tocopherol (*SRR*-, *SSR*-, *SRS*-, and *SSS*-a-tocopherol), also found in fortified foods and supplements.

d As niacin equivalents (NE). 1 mg of niacin = 60 mg of tryptophan.

e As dietary folate equivalents (DFE). 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.

Dietary Reference Intakes (DRIs): Tolerable Upper Intake Levels (UL[a]), Vitamins

Food and Nutrition Board, Institute of Medicine, National Academies

Life Stage Group	Vitamin A (µg/d)[b]	Vitamin C (mg/d)	Vitamin D (mg/d)	Vitamin E (mg/d)[c,d]	Vitamin K	Thiamin	Ribo-flavin	Niacin (mg/d)[d]	Vitamin B_6 (mg/d)	Folate (mg/d)[d]	Vitamin B_{12}	Pantothenic Acid	Biotin	Choline (g/d)	Carote-noids[e]
Infants															
0-6 mo	600	ND[f]	25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
7-12 mo	600	ND	25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Children															
1-3 y	600	400	50	200	ND	ND	ND	10	30	300	ND	ND	ND	1.0	ND
4-8 y	900	650	50	300	ND	ND	ND	15	40	400	ND	ND	ND	1.0	ND
Males, Females															
9-13 y	1,700	1,200	50	600	ND	ND	ND	20	60	600	ND	ND	ND	2.0	ND
14-18 y	2,800	1,800	50	800	ND	ND	ND	30	80	800	ND	ND	ND	3.0	ND
19-70 y	3,000	2,000	50	1,000	ND	ND	ND	35	100	1,000	ND	ND	ND	3.5	ND
> 70 y	3,000	2,000	50	1,000	ND	ND	ND	35	100	1,000	ND	ND	ND	3.5	ND
Pregnancy															
14–18 y	2,800	1,800	50	800	ND	ND	ND	30	80	800	ND	ND	ND	3.0	ND
19-50 y	3,000	2,000	50	1,000	ND	ND	ND	35	100	1,000	ND	ND	ND	3.5	ND
Lactation															
14–18 y	2,800	1,800	50	800	ND	ND	ND	30	80	800	ND	ND	ND	3.0	ND
19-50 y	3,000	2,000	50	1,000	ND	ND	ND	35	100	1,000	ND	ND	ND	3.5	ND

[a] UL = 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, riboflavin, vitamin B_{12}, pantothenic acid, biotin, carotenoids. In the absence of ULs, extra caution may be warranted in consuming levels above recommended intakes.

[b] As preformed vitamin A only.

[c] As a-tocopherol; applies to any form of supplemental a-tocopherol.

[d] The ULs for vitamin E, niacin, and folate apply to synthetic forms obtained from supplements, fortified foods, or a combination of the two.

[e] b-Carotene supplements are advised only to serve as a provitamin A source for individuals at risk of vitamin A deficiency.

[f] ND = 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 B_6, Folate, Vitamin B_{12}, 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 http://www.nap.edu.

Dietary Reference Intakes (DRIs): Tolerable Upper Intake Levels (UL[a]), Elements

Food and Nutrition Board, Institute of Medicine, National Academies

Life Stage Group	Arsenic [b]	Boron (mg/d)	Calcium (g/d)	Chromium	Copper (µg/d)	Fluoride (mg/d)	Iodine (µg/d)	Iron (mg/d)	Magnesium (mg/d)[c]	Manganese (mg/d)	Molybdenum (µg/d)	Nickel (mg/d)	Phosphorus (g/d)	Potassium	Selenium (µg/d)	Silicon [d]	Sulfate	Vanadium (mg/d)[e]	Zinc (mg/d)	Sodium (g/d)	Chloride (g/d)
Infants																					
0-6 mo	ND[f]	ND	ND	ND	ND	0.7	ND	40	ND	ND	ND	ND	ND	ND	45	ND	ND	ND	4	ND	ND
7-12 mo	ND	ND	ND	ND	ND	0.9	ND	40	ND	ND	ND	ND	ND	ND	60	ND	ND	ND	5	ND	ND
Children																					
1-3 y	ND	3	2.5	ND	1,000	1.3	200	40	65	2	300	0.2	3	ND	90	ND	ND	ND	7	1.5	2.3
4-8 y	ND	6	2.5	ND	3,000	2.2	300	40	110	3	600	0.3	3	ND	150	ND	ND	ND	12	1.9	2.9
Males, Females																					
9-13 y	ND	11	2.5	ND	5,000	10	600	40	350	6	1,100	0.6	4	ND	280	ND	ND	ND	23	2.2	3.4
14-18 y	ND	17	2.5	ND	8,000	10	900	45	350	9	1,700	1.0	4	ND	400	ND	ND	ND	34	2.3	3.6
19-70 y	ND	20	2.5	ND	10,000	10	1,100	45	350	11	2,000	1.0	4	ND	400	ND	ND	1.8	40	2.3	3.6
>70 y	ND	20	2.5	ND	10,000	10	1,100	45	350	11	2,000	1.0	3	ND	400	ND	ND	1.8	40	2.3	3.6
Pregnancy																					
14–18 y	ND	17	2.5	ND	8,000	10	900	45	350	9	1,700	1.0	3.5	ND	400	ND	ND	ND	34	2.3	3.6
19-50 y	ND	20	2.5	ND	10,000	10	1,100	45	350	11	2,000	1.0	3.5	ND	400	ND	ND	ND	40	2.3	3.6
Lactation																					
14–18 y	ND	17	2.5	ND	8,000	10	900	45	350	9	1,700	1.0	4	ND	400	ND	ND	ND	34	2.3	3.6
19-50 y	ND	20	2.5	ND	10,000	10	1,100	45	350	11	2,000	1.0	4	ND	400	ND	ND	ND	40	2.3	3.6

[a] UL = 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 arsenic, chromium, silicon, potassium, and sulfate. In the absence of ULs, extra caution may be warranted in consuming levels above recommended intakes.

[b] Although the UL was not determined for arsenic, there is no justification for adding arsenic to food or supplements.

[c] The ULs for magnesium represent intake from a pharmacological agent only and do not include intake from food and water.

[d] Although silicon has not been shown to cause adverse effects in humans, there is no justification for adding silicon to supplements.

[e] Although vanadium in food has not been shown to cause adverse effects in humans, there is no justification for adding vanadium to food and vanadium supplements should be used with caution. The UL is based on adverse effects in laboratory animals and this data could be used to set a UL for adults but not children and adolescents.

[f] ND = 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 B_6, Folate, Vitamin B_{12}, Pantothenic Acid, Biotin, and Choline* (1998); *Dietary Reference Intakes for Vitamin C, Vitamin E, Selenium, and Carotenoids* (2000); *Dietary Reference Intakes for Vitamin A, Vitamin K, Arsenic, Boron, Chromium, Copper, Iodine, Iron, Manganese, Molybdenum, Nickel, Silicon, Vanadium, and Zinc* (2001); and *Dietary Reference Intakes for Water, Potassium, Sodium, Chloride, and Sulfate* (2004). These reports may be accessed via http://www.nap.edu.

FOOD FORTIFICATION AND DIETARY SUPPLEMENTS
POSITION OF THE AMERICAN DIETETIC ASSOCIATION (ADA)

"It is the position of the American Dietetic Association (ADA) that the best nutritional strategy for promoting optimal health and reducing the risk of chronic disease is to wisely choose a wide variety of foods. Additional vitamins and minerals from fortified foods and/or supplements can help some people meet their nutritional needs as specified by science-based nutrition standards such as the Dietary Reference Intakes (DRIs) (1)."

Recommendations regarding supplementation and the therapeutic use of vitamins and minerals for treating specific conditions may be found in the corresponding sections of this manual. The latest recommendations from the Food and Nutrition Board for the first time include recommendations that supplements or fortified foods be used to obtain desirable amounts of some nutrients, eg, folic acid and calcium, in certain population groups.

Under the Dietary Supplement Health and Education Act of 1994, manufacturers must adhere to restrictions regarding the types of claims that are allowed on product labels. Statements regarding the efficacy of specific products in the treatment or prevention of particular conditions are prohibited. A claim statement is allowed if the "statement claims a benefit related to a classical nutrient deficiency disease and discloses the prevalence of such disease in the United States, describes the role of a nutrient or dietary ingredient intended to affect the structure or function in humans, characterizes the documented mechanism by which a nutrient or dietary ingredient acts to maintain such structure or function, or describes general well-being from consumption of a nutrient or dietary ingredient (1)."

The manufacturer must specify that the claims are truthful and not misleading. The following statement must also accompany any claims, "This statement has not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease (1)". In addition, all supplements must have the identity and strength of contents listed on the label, and meet appropriate specifications for quality, purity and composition (2).

References
1. Position of the American Dietetic Association: Food fortification and dietary supplements. *J Am Diet Assoc.* 2001; 101:115-125.
2. Dietary Supplement Health and Education Act of 1994. Public Law (S.784)(1994)(codified at 42 USC 287C-11).

DIETARY GUIDANCE FOR THE HEALTHY UNITED STATES POPULATION

Title and Organization

		Federal Agencies				Other Agencies
		Dietary Guidelines for Americans 2005 (1) [based on 2000 kilocalorie level]	Food, Nutrition and the Prevention of Cancer: a Global Perspective (2)	American Heart Association (AHA) Guidelines for General Population (>2 years): Revision 2000 (3)	Report of the Expert Panel on Blood Cholesterol Levels in Children and Adolescents (4)	Dietary Reference Intakes (5,6)
Type of Guidance (General or Specific)		General	Cancer	Heart Disease	Heart Disease	General and Life stage specific
Maintain Reasonable Body Weight		Yes	Yes	Yes	Yes	Yes
Fats (%kcal)	Total	20 to35%	To <30%	<30%	<35%	20-35%
	Saturated	<10%	*	<10%	<7%	Intake as low as possible
	Polyunsaturated	*	*	*	<10%	*
	Monounsaturated	10-15%	*	*	<10%	*
Cholesterol-Limit or Reduce		<300 mg/day	*	<300 mg/day	<300 mg/day	Intake as low as possible
Carbohydrates	Complex-Increase	Eat more fruits, vegetables (>9 servings/day) Whole grains >3 ounce serving/day others grains > 3 ounce serving/day	≥7 servings grains and legumes and ≥5 servings fruits and vegetables/day	Eat more fruits, vegetables (>5 servings/day) Grain products and legumes, nuts (>6 servings/day)	*	45 to 65% of total calories. Minimum 130 g/day for adults and children
	Fiber-Increase	Eat more foods with fiber	*	>25 g/day	*	Men 38 g/day Women 35 g/day
	Refined Sugar-Limit or Reduce	Yes	Yes	Limit if high triglycerides and low HDL-C	*	≤ 25% of total calories
Sodium-Limit or Reduce		2,300 mg sodium/day	2,400 mg sodium or ≤6 g salt/day	2,400 mg sodium/day	2,400 mg sodium or ≤6 g salt/day	Minimum of 0.5 g/day
Alcohol-in Moderation if at all		No more than 1 drink/day for women and 2 drinks/ day for men	Not recommended. If consumed, limit to 1 ounce/day	Yes	*	*
Other		Consume three cups per day of fat-free or low-fat milk or equivalent milk products			Fish meals >2/week Dairy products 2 – 3 servings/day	Limit intake of trans fatty acids

References

1. *Dietary Guidelines for Americans 2005.* Available at: www.healthierus.gov/dietaryguidelines. Accessed on January 31, 2005.
2. *Food, Nutrition and the Prevention of Cancer: A Global Perspective*. Washington, DC: American Institute for Cancer Research; 1997.
3. AHA Dietary Guidelines Revision 2000: A Statement for Healthcare Professionals from the Nutrition Committee of the American Heart Association. *Circulation*. 2000; 102: 2284-2299.
4. Kavey RE, Daniels SR, Lauer RM, Atkins DL, Hayman LL, Taubert K. American Heart Association Scientific Statement: Guidelines for Primary Prevention of Atherosclerotic Cardiovascular Disease Beginning in Childhood. *Circulation*. 2003;107:1562-1566.
5. Yates AA, Schlicker SA, Suitor CW. Dietary Reference Intakes: The new basis for recommendations for calcium and related nutrients, B vitamins, and choline. *J Am Diet Assoc.* 1998; 98: 699-706.
6. Institute of Medicine's Food and Nutrition Board. *Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids*. (Macronutrients). Washington, DC: National Academy of Sciences, 2005: 107-180.

REGULAR DIET – ADULT

Description
The diet includes a wide variety of foods to meet nutritional requirements and individual preferences of healthy adults. It is used to promote health and reduce the risks of developing major, chronic, or nutrition-related disease.

Indications
The diet is served when specific dietary modifications are not required.

Nutritional Adequacy
The diet can be planned to meet the Dietary Reference Intakes (DRIs) as outlined in *Statement on Nutritional Adequacy* in Section IA. The diet uses the 2,000 kilocalorie level as the standard reference level for adults. Specific calorie levels may need to be adjusted based on age, gender and physical activity.

How to Order the Diet
Order as "Regular Diet," indicating any special instructions.

Planning the Diet
The *Dietary Guidelines* and portion sizes use the USDA Food Guide and the DASH (Dietary Approaches to Stopping Hypertension) Eating Plan as the basis for planning the menu (1). Since the Dietary Guidelines are for healthy Americans, modifications may be required in health care settings that treat ill patients. While patients are hospitalized, the main goal is to encourage food intake, which frequently requires "comfort foods," such as soup, sandwiches, and other foods the patient is accustomed to. With that consideration, the number of servings of foods from each food group may differ from the recommendations. However, the meal will still be planned to meet the DRIs whenever possible.
Dietary Guidelines for Americans (1):

- consume a variety of nutrient-dense foods and beverages within basic food groups while staying within calorie needs
- control calorie intake to manage body weight
- be physically active every day
- increase daily intake of fruits and vegetables, whole grains, and nonfat or low-fat milk and milk products
- choose fats wisely for good health
- choose carbohydrates wisely for good health
- choose and prepare foods with less than 2,300 mg (1 teaspoon of salt) per day. At the same time, consume potassium-rich foods, such as fruits and vegetables (4,700mg/day).
- if you drink alcoholic beverages, do so in moderation
- keep food safe to eat

FOOD GUIDE FOR AMERICANS (1800-2000 calorie pattern) (2)

Food Group	Recommended Daily	Serving Size
Fruits	3 – 4 servings	
	Consume citrus fruits, melons, berries, and other fruits regularly	Medium-size orange, apple, or banana ½ cup of chopped, cooked, or canned fruit (no sugar added) ½ cup of 100% fruit juice
Vegetables	5 servings	
	Dark-green leafy vegetables: 3 Orange vegetables: 2 cups/week Legumes: 3 cups/week Starchy vegetables: 3 cups/week Other vegetable: 6 ½ cups/week	1 cup of raw leafy vegetables: spinach, lettuce ½ cup of other vegetables, cooked or chopped raw ½ cup of vegetable juice
Grains	6 servings	
	Whole-grain products: 3 daily Other grains: 3 daily	1 slice of bread 2 large or 4 small crackers ½ cup cooked cereal, rice, or pasta 1 cup ready-to-eat cereal 1 small roll or muffin ½ English muffin, bagel, hamburger bun, or large roll

Food Guide For Americans (Cont.)

Food Group	Recommended Daily	Serving Size
Meat, Poultry, Fish, Dry Beans, Eggs, and Nuts	5-5 ½ ounces day Choose fish, dry beans, peas, poultry without skin, and lean meat	1 ounce of cooked fish, poultry, or lean meat ¼ cup cooked dry beans or tofu 1 egg 1 Tbsp peanut butter ½ ounce nuts or seeds
Milk, Yogurt, and Cheese	3 servings Choose skim milk and nonfat yogurt Choose part-skim and lowfat cheeses	1 cup of milk or yogurt 1 ½ ounces of natural cheese (Mozzarella, Swiss, Cheddar) 2 ounces of processed cheese (American)
Oils	5 tsp daily Oils and soft margarines include vegetables oils and soft vegetable oil table spreads that are low in saturated fat and are trans-free	

SAMPLE MENU

Breakfast	Noon	Evening
Orange Juice	Rotisserie Baked Chicken	Braised Beef and Noodles
Oatmeal	Rice Pilaf	Seasoned Green Beans
Scrambled Egg	Steamed Broccoli with Carrots	Sliced Tomato Salad
Biscuit	Whole-wheat Roll	French Dressing
Margarine	Margarine	Peach halves
Jelly	Fruit Cup	Dinner Roll
Lowfat Milk	Lowfat Milk	Margarine
Coffee	Iced Tea	Lowfat Milk

References

1. *Dietary Guidelines for Americans 2005.* Available at: www.healthierus.gov/dietaryguidelines. Accessed January 31, 2005.
2. Table D1-13: Revised USDA Food Intake Patterns for Meeting Recommended Nutrient Intake. In: *2005 Report of the Dietary Guidelines Advisory Committee.* Available at: www.health.gov/dietaryguidelines/dga2005/report. Accessed on August 27, 2004.

HIGH-PROTEIN, HIGH-CALORIE DIET

Description
Additional foods and supplements are added to meals or between meals to increase protein and energy intake.

Indications
A high-protein, high-calorie diet is served when protein and energy requirements are increased by stress, protein loss (protein losing enteropathy, nephrotic syndrome), and catabolism. This diet may be indicated in patients with:

- protein-energy malnutrition
- failure to thrive
- cancer
- burns
- cystic fibrosis
- human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS)
- chronic gastrointestinal diseases

This diet may also be indicated in preparation for surgery. An increase in energy is required to promote the efficient utilization of proteins for anabolism.

Nutritional Adequacy
The diet can be planned to meet the Dietary Reference Intakes (DRIs) as outlined in *Statement on Nutritional Adequacy* in Section IA.

How to Order the Diet
Order as "High-Protein, High-Calorie Diet." The dietitian determines a target level of protein and energy to meet individual needs based on guidelines as stated in Estimation of Protein Requirements in Section II.

Planning the Diet
The diet is planned as a Regular Diet with addition of between-meal supplements that increase energy intake by at least 500 kcal and protein intake by 25 g for adults. Examples of high-protein, high-energy supplements are milk shakes, eggnogs, puddings, custards, and commercial supplements.

For children, the diet generally should provide 120% to 150% of the Dietary Reference Intakes (DRIs) for energy and protein. The actual amounts of energy and protein provided will depend on the child's or adolescent's age, height, weight, medical status, and nutrition goals.

IMMUNOCOMPROMISED DIET (Neutropenic Diet)

Description
The Immunocompromised Diet eliminates certain foods in order to serve a diet requiring a lower level of bacteria than is present in a typical hospital diet. Foods from the Regular Diet are served with the exception of unwashed raw fruits and vegetables, meat cooked less than well done, cured meats, yogurt, aged cheese and prepared salads.

Indications
Persons with decreased immune function due to chemotherapy or radiation are at a higher risk of developing a food-related infection. There are not controlled studies that document the efficacy of this diet. The premise of the diet is to avoid specific foods that could potentially introduce infection causing organisms into the gastrointestinal tract. When the diet is being considered, the length of time the patient has been neutropenic (absolute neutrophil count of <2,000/mm3), the patient's current nutritional status, and anticipated nutrition related side effects that will occur from the treatment should be considered (1). .

Nutritional Adequacy
The Immunocompromised Diet can be planned to meet the Dietary Reference Intakes (DRIs) as outlined in the *Statement on Nutritional Adequacy* in Section IA.

How to Order the Diet
Order as "Immunocompromised Diet" or "Neutropenic Diet."

Planning the Diet
The diet does not differ significantly from the Regular Diet except it eliminates foods that are higher in pathogenic organisms. Although raw fruits and vegetables are eliminated, the Fred Hutchinson Cancer Research Center (2) allows raw fruits and vegetables (including peel) if they have been washed under "running water," except raw vegetable sprouts.

There is little evidence in the literature to support the "Immunocompromised Diet." The diet outlined below is the consensus of staff members of individual hospitals, not a consensus from the literature.

Foods to Exclude (1-4)

Vegetables	all raw vegetables; prepared salads
Fruits	all raw fruits; prepared salads
Meats, Poultry, Fish, and Eggs	raw or undercooked products; cured, smoked or pickled meats, such as bacon, sausage, luncheon meats, and lox; shellfish
Milk, Yogurt, and Cheese	raw milk/milk products, unpasteurized yogurt, aged cheese, such as Brie, Camembert, blue, sharp cheddar, and feta
Fats and Oils	refrigerated cheese-based salad dressing, such as blue cheese, that is not shelf stable
Beverages	cold-brewed tea made with warm or cold water

References
1. Neutropenia. In: *American Dietetic Association Nutrition Care Manual*. Chicago, Ill: American Dietetic Assoication; 2004. Available at: nutritioncaremanual.org. Accessed November 14, 2005.
2. Diet Guidelines for Immunosuppressed Patients. Fred Hutchinson Research Center, 2005. Available at: www.fhcrc.org. Accessed November 14, 2005.
3. L Fanning. Written communication. Charlottesville, Va: University of Virginia Health Science Center; December 1999.
4. M Kockley. Written communication. St Louis, Mo: St. Louis Children Hospital; December 1999.

NUTRITION MANAGEMENT DURING PREGNANCY AND LACTATION

Description
Diets for pregnant and lactating women include additional servings of food from the Regular Diet to meet the increased requirement for nutrients during pregnancy and lactation.

Nutritional Adequacy
The food patterns given will meet the Dietary Reference Intakes (DRIs) for pregnancy and lactation, as outlined in the *Statement on Nutritional Adequacy* in Section IA, except for iron during the second and third trimesters of pregnancy. Factors that may increase nutritional requirements above the estimated demands of pregnancy include poor nutritional status; young maternal age; multiple pregnancy; closely spaced births; breast-feeding one or more children during pregnancy; continued high level of physical activity; certain disease states; and use of cigarettes, alcohol, and legal or illegal drugs. Dietary intake of iron, folate, zinc, protein, and calcium should be carefully assessed for adequacy (1). Supplementation is justified when evidence suggests inadequate intake of specific nutrients that increase the risk of an adverse effect on the mother, fetus, or pregnancy outcome. Vegetarians who exclude all animal products need 2 mg of vitamin B_{12} daily (1).

How to Order the Diet
Order as "Regular Diet – Pregnancy" or "Regular Diet – Lactation." Any special instructions should be indicated in the diet order.

Planning the Diet

Daily Food Group Guidelines (2)

	No. of Servings	
Food Group	**Pregnant**	**Lactating**
Grains, Breads, and Cereals	9	6-11
Fruits	3	2 -4
Vegetables	4	3-5
Low-fat Meat, Poultry, Fish, and Eggs	2 or more (6 oz)	2 or more (7-8 oz)
Low-fat Milk, Yogurt, Cheese	3-4	4-5
Fats, Oils, and Sweets	As needed to provide energy	

Specific Nutrient Requirements During Pregnancy
Weight gain during pregnancy: The National Academy of Sciences' Food and Nutrition Board (FNB) has stated that the optimal weight gain during pregnancy depends on the mother's weight at the beginning of pregnancy (1). The target range for weight gain is associated with a full-term, healthy baby, weighing an average of 3 to 4 kg (6.6 lb to 8.8 lb) (3). The optimum weight gain for a woman of normal prepregnancy weight, for her height, carrying a single fetus is suggested at 25 to 35 lbs, however individual differences vary based on maternal anthropometry and ethnic decent (3). The pattern of weight gain is of greater significance than the absolute weight gain. The desired pattern of weight gain is approximately 3 to 8 lb in the first trimester and about 1 lb per week during the last two trimesters.

Body mass index (BMI), defined as weight/height squared (kg/m^2) (2), is a better indicator of maternal nutritional status than is weight alone. Recommendations for weight gain during pregnancy should be individualized according to prepregnancy body mass index. See Body Mass Index in Section II. To identify the weight for height categories and appropriate weight gain, use Table A-1 (1).

Table A-1 Guidelines for Weight Gain After the First Trimester of Pregnancy (1,4)

BMI	Recommended Rate of Weight Gain	Intervention Suggested	Overall Weight Gain
<19.8 (underweight)	1 lb/wk	<2 lb/mo	28-40 lb
19.8-26 (normal weight)	1 lb/wk	<2 lb/mo >6.5 lb/mo	25-35 lb
>26-29 (overweight)	0.66 lb/wk	>3.5 lb/wk <1 lb/wk	15-25 lb
>29 (obese)	Individualized	<l lb/wk >2.5 lb/wk	15 lb
Twins	1.5 lb/wk	Individualized	34-45 lb
Triplets	Individualized	Individualized	50 lb

Women with a height under 62 inches should strive for a weight gain at the lower end of the range (2). For twins, a woman should gain 35 to 45 lb (or a rate of 0.7 kg/week after the first trimester); for triplets, more than 50 lb (4).

On average, each successive birth contributes an additional 2 lb above that normally gained with age. However, women with high gestational weight gains may surpass this average (1).

Energy: The total energy needs during pregnancy range between 2,400 and 2,800 kcal/day for most women (3,5). However, the mother's age, pre-pregnant BMI, rate of weight gain, and physiologic appetite must be considered in determining individual needs (3). Based on the review of evidence, the average additional intake of approximately 300 kcal/day is suggested after the first trimester in addition to normal energy needs (5,6). For normal and overweight women in developed countries, the additional energy need may actually be less than the 300 kcal/day usually recommended, especially in sedentary women (3). Appropriate weight gain and appetite are better indicators of energy sufficiency than the amount of energy (calories) consumed (3). The additional 500 kcal/day for a twin pregnancy after the first trimester are added to calculated needs. There is no absolute recommendation in the literature for the number of additional calories for a multiple pregnancy. The indication is to add 500 kcal/day in the first trimester as soon as the multiple pregnancy is diagnosed, as these pregnancies usually do not go to term and the goal is to maximize the weight gain early (4)

Protein: The 2002 DRIs list the Recommended Daily Allowances (RDA) for protein for all age groups during pregnancy and lactation to be 1.1 g/kg per day of protein *or* an additional 25 g/day of protein in addition to the 0.8 g/kg per day for a nonpregnant state (5). On average this equates to approximately 71 g, but for some women with greater energy needs, protein needs may need to be adjusted. For twin pregnancy, an additional 50 g/day of protein above the RDA of 0.8 g/kg per day for a nonpregnant state is suggested during the second and third trimesters (5). Protein utilization depends on energy intake. Therefore, adequate energy intake is important so that protein may be spared.

Vitamins and minerals: A multivitamin and mineral supplement is recommended during pregnancy in several circumstances (1,3). Pregnant women who smoke or abuse alcohol or drugs should take a multivitamin and mineral supplement (3). A multivitamin and mineral supplement is also recommended for women with iron deficiency anemia or poor-quality diets and for those who consume animal products rarely or not at all (3). B_{12} supplementation is recommended in persons who follow a vegetarian diet pattern (3). Additional nutrients that may require the need for supplementation include folic acid, iron, zinc, copper, and calcium. The Nutrition Board recommends supplements or fortified foods be used to obtain desirable amounts of some nutrients, such as iron, and recommends 400 μg/day of synthetic folic acid from fortified foods, supplements, or both in persons wanting to become pregnant, and 600 μg/day for persons who are pregnant (7).

Iron: So that a woman meets the required additional 30 mg of ferrous iron per day during pregnancy, a low-dose supplement is recommended beginning with the first prenatal visit (1,3,6). An iron supplement containing 150 mg of ferrous sulfate, 300 mg of ferrous gluconate, or 100 mg of ferrous fumarate can provide this additional need. Iron deficiency anemia is the most common anemia during pregnancy. If the maternal iron stores are low, 60 to 120 mg of iron may be recommended (4), in addition to a multivitamin supplement containing 15 mg of zinc and 2 mg of copper, since iron may interfere with absorption of zinc and copper (3). If the laboratory values indicate macrocytic anemia, vitamin B_{12} and folate levels should be assessed (1).

Zinc and copper: Iron can interfere with the absorption of other minerals. Therefore, women taking supplements with more than 30 mg of iron a day should add 15 mg of zinc and 2 mg of copper (3). These amounts of zinc and copper are routinely found in prenatal vitamins.

Folate: The DRI for folate for women 19 to 50 years of age is 600 μg/day (7-8). This level of folate is to be consumed through synthetic folic acid from fortified food or supplements or both, in addition to intake of folate from a varied diet (3,6). Compared to naturally occurring folate found in foods, the folic acid contained in fortified foods and supplements is almost twice as well absorbed, so that 1 μg from these sources is equivalent to 1.7 μg dietary folate equivalents (3). Studies have documented that women taking folic acid at the time of conception are less likely to give birth to a child with neural tube defects (9-12). To ensure that blood vitamin levels are adequate at the time of neural tube closure, supplementation should begin at least 1 month before conception (3). It also has been reported that women taking multivitamins containing folic acid

1 to 2 months before conception have a reduced risk of having a child with orofacial clefts (13). Research also indicates that abnormal folate metabolism may play a role in Down syndrome and other birth defects (3). It has been suggested that women who have delivered an infant with neural tube defects may need to consume more than the recommended amount of dietary folate equivalents (3). Until more information becomes available, it is recommended that women older than 19 years of age not exceed the tolerable upper limit of 1,000 μg/day of folate from foods, fortified foods, and supplements (3).

Calcium: Due to the increased efficiency of calcium absorption, calcium requirements are similar to those in the nonpregnant state. A daily intake of 1000 mg is recommended for pregnant and lactating women (13) older than 19 years (<19 years, 1,300 mg/day) (13).

Sodium: Sodium is required during pregnancy for the expanding maternal tissue and fluid compartments and to provide fetal needs. Routine sodium restriction is not recommended (6).

Vitamin A: High doses of vitamin A during pregnancy have resulted in children with birth defects of the head, heart, brain, or spinal cord. The Food and Drug Administration (FDA) and the Institute of Medicine recommend that vitamin A intake be limited to DRIs of 5,000 IU during pregnancy (14-16). In addition, pregnant women should limit their intake of liver and fortified cereals. The FDA recommends that women of childbearing age choose fortified foods that contain vitamin A in the form of beta carotene rather than preformed vitamin A whenever possible. A high intake of fruits and vegetables rich in beta carotene and other carotenoids is not a concern (15).

Fluids: Adequate fluid intake is extremely important. It is recommended that pregnant women drink 8 to 10 cups of water and other fluids a day or 35 to 40 mL/kg of pregravid weight (3,17).

Fiber: Ingestion of fiber is important to speed digestion and help prevent constipation and hemorrhoids. The 2002 DRI for Adequate Intake (AI) of total fiber is 28 g/day for all age groups during pregnancy (5).

Other Substances

Alcohol: The consumption of alcohol during pregnancy may result in fetal alcohol syndrome (FAS). Studies suggest that even light to moderate drinking may cause neurologic abnormalities not detectable at birth. Since a safe level has not been determined, it is recommended that pregnant women abstain from alcohol (3,18).

Caffeine: Studies on caffeine consumption are inconclusive. Caffeine can readily cross the placenta and can affect fetal heart rate and breathing (3). Some studies have found no adverse effects as a result of moderate caffeine consumption, while others noted an increase in stillbirths, spontaneous abortions, and malformations in pregnant women who consumed high levels of caffeine (>300 to 500 mg/day) (19-21). Until further evidence provides guidelines for setting a specific limit on caffeine intake, it is recommended to limit caffeine during pregnancy to moderate consumption (<200 mg/day) (2,19-21).

Olestra: Studies of the fat substitute olestra conclude that pregnant or breast-feeding women should not consume products containing olestra. Olestra has been shown to cause gastrointestinal distress and diarrhea, which may lead to the loss of the necessary fat-soluble vitamins A, D, E, and K (22).

Sugar substitutes: The FDA has approved five nonnutritive sweeteners for general use: saccharin, aspartame, acesulfame-K, neotame, and sucralose. The studies on the effects of these sweeteners on reproductive abilities in females and males as well as on the developing fetus have been reviewed and deemed safe by numerous regulatory bodies and expert communities around the world (23). Thus, consumption of acesulfame-K, aspartame, saccharin, sucralose, and netotame within the acceptable daily intakes is safe during pregancy (23). Research continues to indicate that aspartame is safe during pregnancy, although women with phenylketonuria should exercise caution with this sweetener because they need to monitor their intake of phenylalanine closely (3,23). There is limited evidence that saccharin can pass through the placenta and that it remains in fetal tissues; therefore, women should moderate their intake of this sweetener (3). Acesulfame K crosses the placenta, but it has shown no adverse effect on the fetus and is considered safe (23).

Herbal and alternative therapies: Very few randomized clinical trials have examined the safety and efficacy of alternative therapies during pregnancy (3). Several identified herbal and botanical supplements have been identified to be harmful if used during pregnancy (3). The American Academy of Pediatrics recommends that pregnant women limit the consumption of herbal teas. If women opt to consume herbal teas, it is recommended to limit intake to two 8-oz servings per day and to choose herbal teas in filtered tea bags (3).

Risk Factors During Pregnancy (1,21)

Women should be evaluated for factors that may put them at risk while they are pregnant. If any of the following risks are identified, appropriate medical and nutritional monitoring should be provided throughout the pregnancy.

Risk factors at the onset of pregnancy:

- Adolescence: younger than 15 years at time of conception or less than 3 years of age since onset of menses
- Older than 35 years of age
- Three or more pregnancies within 2 years
- History of poor obstetric or fetal performance
- Economic deprivation
- Unusual dietary practices
- Smoker
- Excessive alcohol intake
- Recreational drug use[a]
- Chronic systemic disease
- Pre-pregnancy BMI under 19.8 or over 29
- Multiple gestation

[a]Recreational drug use or use of over-the-counter medications or dietary supplements having adverse affects, eg, laxatives, antacids, or herbal remedies containing teratogens.

Risk factors during pregnancy (1,21,24):

- Hemoglobin level <11 g/dL (first and third trimesters); <10.5 g/dL (second trimester); or hematocrit below 33% (first and third trimesters), <32% (second trimester)
- Inadequate weight gain: Below 1 lb/month for very overweight women
  Below 2 lb/month for normal or slightly overweight women
  Below 4 to 8 lb/month for women with multiple gestation and underweight women
- Excessive weight gain (more than 6.6 lb/month after first trimester), possibly associated with fluid retention
- Ferritin below 20 μg/dL (24)
- Serum folate level below 3 mg/dL
- Serum albumin level below 2.5 g/dL
- Total serum protein level below 5.5 g/dL
- Vitamin B_{12} level below 80 pg/mL

Nausea and Vomiting of Pregnancy

Nausea and vomiting, known as nausea and vomiting of pregnancy (NVP), are the most common symptoms experienced in early pregnancy, with nausea affecting 70% to 85% of women, and about 50% experiencing vomiting (25). Current recommendations for managing nausea include consumption of lemonade, potato chips, or foods with a mild salt flavor (26). Increased olfactory senses often are the leading cause of nausea during early pregnancy and can be minimized by avoiding strong or sensitive odors (26). Other management techniques include the following:

- Eat small frequent meals and snacks
- Eat low-fat protein foods and easily digested carbohydrate foods
- Eat dry crackers before rising in the morning
- Avoid spicy food and gas-forming fruits and vegetables
- Drink fluids between meals
- Avoid drinks with caffeine and alcohol

When nausea and vomiting are persistent and severe, causing dehydration, fluid and electrolyte abnormalities, acid-base disturbances, weight loss, and ketonuria, a diagnosis of hyperemesis gravidarum is

made (27-29). Hyperemesis gravidarum (HG) occurs in approximately 1% to 2% of pregnant women (27). Studies indicate that women with hyperemesis have similar demographic characteristics to the general obstetric population (racial status, marital status, age, and gravidity) (30). The pathogenesis of HG is not well understood. Potential causes include hormonal changes, thyroid changes (eg, hyperthyroidism), bacterial infection (eg, underlying *Helicobacter pylori* infection), and increasing levels of human chorionic gonadotrophin (27,31,32)

Often HG spontaneously resolves after the first trimester (27). Treatment depends on the risk level of the patient and severity of symptoms, such as the inability to meet nutrition needs orally and dehydration. Intensive nutrition counseling and individualized meal planning is the first line of treatment (25-33). In patients in whom nutrition and behavior modification does not alleviate symptoms, medication is often prescribed, such as metoclopramide (Reglan), ranitidine (Zantac), prochlorperazine (Compazine), and ondansetron (Zofran) (27). In patients whose symptoms are severe, hydration with intravenous fluids, electrolyte replacement, and in some cases vitamin replacement is needed (27,31,32). Nutrition interventions for severe hyperemesis gravidarum may include nasogastric, gastrostomy, and jejunostomy feedings or total parenteral nutrition (TPN). The percentage of women requiring TPN is low but varies from 2% to 5% (27). Nearly all of the literature regarding nutrition support during pregnancy is anecdotal, consisting of case studies. Treatment and intervention strategies are based on experience and patient needs. If nutrition support is indicated, treatment is consistent with standards outlined for nonpregnant adults or in managing coexisting disease states, as outlined in Section B: Specialized Nutrition Support and as outlined in Specific Nutrient Requirements During Pregnancy.

Pregnancy-Induced Hypertension (3,16-18)

Hypertension ($\geq$140mg systolic blood pressure or $\geq$90 mg diastolic blood pressure), proteinuria (>300mg/24 hour) (34), and edema characterize pregnancy-induced hypertension (PIH), also called preeclampsia. Preeclampsia occurs more often in primigravid women and in women over 35 years old with chronic hypertension and/or renal disease.

Pregnancy-induced hypertension is associated with marked changes in renal function that may lead to excessive extracellular fluid retention. When PIH is accompanied by convulsions, it is called eclampsia. Preeclampsia usually occurs after the 20th week of conception. It is more common in women with chronic hypertension, and renal disease, and among adolescents, underweight women who fail to gain weight properly, women from low-income populations, and women carrying multiple fetuses.

No specific nutrition therapy has been proven to be effective in preventing or delaying preeclampsia and improving pregnancy outcomes (3,34). Adequate calcium, protein, energy, and potassium may be necessary. A meta-analysis of 17 randomized controlled trials concluded that calcium supplements (1 to 2 g/day) reduced blood pressure and the risk of preeclampsia but had no significant effect on reducing maternal and infant morbidity and mortality (35). Other nutrients have been studied (eg, vitamins C and E); however, inconclusive results were found. Dietary modifications, including sodium restriction, magnesium supplements, zinc supplements, and consumption of fatty fish oils have not been proved effective (3). Diuretics should be avoided unless given under strict medical supervision.

Specific Nutrient Requirements During Lactation

Energy: The average energy costs of lactation are an additional 500 kcal/day (5) in the first 6 months and 400 kcal/day in the second 6 months (5). Excessive restriction of energy may compromise milk production. Consumption of less than 1800 kcal/day may result in a decrease in milk production.

Fluids: Intake of 2 to 3 qt of fluid daily is encouraged to compensate for the volume of milk produced.

Alcohol: Discourage consumption of alcohol unless permitted by the physician.

Caffeine: Limit consumption to two 5-oz cups of coffee (<200 mg) daily (16,21).

Fiber: The 2002 DRI for Adequate Intake of total fiber is 29 g/day for all age groups during lactation (5).

References

1. Subcommittee on Nutritional Status and Weight Gain During Pregnancy, Committee of Nutritional Status During Pregnancy and Lactation, Food and Nutrition Board, Institute of Medicine, National Academy of Sciences: *Nutrition During Pregnancy*. Washington, DC: National Academy Press; 1992.

2. *Food Guide Pyramid: A Guide to Daily Food Choices*. Washington, DC: US Dept of Agriculture, Human Nutrition Information Service. Home and Garden Bulletin No. 252.
3. Position of the American Dietetic Association: Nutrition and lifestyle for a healthy pregnancy outcome. *J Am Diet Assoc*. 2002;102:1479-1490.
4. Brown JE, Carlson M. Nutrition and multifetal pregnancy. *J Am Diet Assoc*. 2000;100:343-348.
5. Institute of Medicine's Food and Nutrition Board. *Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids*. National Academy of Sciences; 2002:265-334. Preprint available at: http://www.nap.edu.books/0309085373/html/index.html. Accessed September 16, 2002.
6. Food and Nutrition Board. *Recommended Dietary Allowances*. 10th ed. Washington, DC: National Academy Press; 1989.
7. Yates AA, Schlicker SA, Suitor CW. Dietary Reference Intakes: the new basis for recommendations for calcium and related nutrients, B vitamins, and choline. *J Am Diet Assoc*. 1998;98:699-706.
8. Institute of Medicine, Food and Nutrition Board. *Dietary Reference Intakes for Thiamin, Riboflavin, Niacin, Vitamin B6, Folate, Vitamin B12, Pantothenic Acid, Biotin, and Choline*. Washington, DC: National Academy Press; 1998.
9. MRC Research Group. Prevention of neural tube defects: results of the Medical Research Council vitamin study. *Lancet.* 1991;338:131-137.
10. Department of Health and Human Services, Public Health Service. Recommendations for the use of folic acid to reduce the number of cases of spina bifida and other neural tube defects. *MMWR*. 1992;41/RR-14:1-7.
11. American College of Obstetricians and Gynecologists. Folic acid for the prevention of recurrent neural tube defects. Washington, DC: American College of Obstetricians and Gynecologists; 1993 (Level III). ACOG Committee Opinion 120.
12. American College of Obstetricians and Gynecologists. *Nutrition and Women*. Washington, DC: American College of Obstetricians and Gynecologists; 1996. Technical Bulletin No. 229.
13. Shaw GM, Lammer EJ, Wasserman CR, O'Malley CD, Tolarova MM. Risks of orofacial clefts in children born to women using multivitamins containing folic acid periconceptionally. *Lancet*. 1995;346:393-396.
14. Institute of Medicine, Food and Nutrition Board. *Dietary Reference Intakes for Calcium*, *Phosphorus, Magnesium, Vitamin D, and Fluoride*. Washington, DC: National Academy Press; 1997.
15. Food and Drug Administration. Vitamin A and birth defects [press release]. October 6, 1995.
16. Institute of Medicine. *Nutrition During Pregnancy*. Washington, DC: National Academy Press; 1990:19.
17. Nutrition Management During Pregnancy. *Manual of Clinical Dietetics*. Chicago, Ill: American Dietetic Association; 2000.
18. Escott-Stump S. *Nutrition and Diagnosis-Related Care*. 5th ed. Baltimore, Md: Lippincott Williams & Wilkins; 2002:5.
19. Fagen C. Nutrition during pregnancy and lactation. In: Mahan K, Escott-Stump S, eds. *Krause's Food, Nutrition & Diet Therapy*. Philadelphia, Pa: WB Saunders Co; 2000:181.

19. Klebanoff MA, Levine RJ, DerSimonian R, Clemens JD, Wilkins DG. Maternal serum paraxanthine, a caffeine metabolite, and the risk of spontaneous abortion. *N Engl J Med*. 1999;341:1639-1644.
20. Dlugosz L, Belanger K, Hellenbrand K, Holford TR, Leaderer B, Bracken MB. Maternal caffeine consumption and spontaneous abortion: a prospective cohort study. *Epidemiology*. 1996;7:250-255.
21. Suitor CW. Nutrition for woman in their childbearing years: a review of the literature and summary of expert recommendations. *Nutr Clin Care*. 1999;2:11-45.
22. Middleton SJ, Dwyer J, Peters JC. An indirect means of assessing potential nutritional effects of dietary olestra in healthy subgroups of the general population. *J Nutr*. 1997;127(suppl 8):17105-17185.
23. Position of the American Dietetic Association: use of nutritive and nonnutritive sweeteners. *J Am Diet Assoc*. 2004;104:255-275.
24. Institute of Medicine (IOM). *Iron Deficiency Anemia: Recommended Guidelines for the Prevention, Detection, and Management Among US Children and Women of Childbearing Age*. Washington, DC: National Academy Press; 1993.
25. Jewell D, Young G. Interventions for nausea and vomiting in early pregnancy. *Cochrane Database Syst Rev*. 2000; CD000145.
26. Erick M. Battling morning (noon and evening) sickness: new approaches for an age-old problem. J Am Diet Assoc. 1994;94:147.
27. Wagner BA, Worthington P. Nutrition management of hyperemesis gravidarum. *Nutr Clin Pract*. 2000;15:65-76.
28. Chevreau N, Anthony PS, Kessinger K. Managing hyperemesis gravidarum with home parenteral nutrition: treatment parameters and clinical outcomes. *Infusion*. 1999;2:22-28.
29. Cowan MJ. Hyperemesis gravidarum: implications for home care and infusion therapies. *J Intravenous Nurs*. 1996;19:46-58.
30. Tsang IS, Katz VL, Wells SD. Maternal and fetal outcomes in hyperemesis gravidarum. *Int J Gynaecol Obstet*. 1996;55:231-235.
31. Jacoby EB, Porter KB. *Helicobacter pylori* infection and persistent hyperemesis gravidarum. *Am J Perinatol*. 1999;16:85-88.
32. Nelso-Percy C. Treatment of nausea and vomiting in pregnancy. When should it be treated and what can be safely taken? *Drug Safety*. 1998;19:155-164.
33. Erick M. Hyperolfaction and hyperemesis gravidarum: what is the relationship? *Nutr Review*. 1995;53:10:289-295.
34. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL, Jones DW, Materson BJ, Oparil S, Wright JT, Roccella EJ, and the National High Blood Pressure Education Program Coordinating Committee. Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. *Hypertension*. 2003;42:1206-1252.
35. Buchner HC, Cook RJ, Guyatt GH, Lang JD, Cook DJ, Hatala R, Hunt DL. Effects of dietary calcium supplementation on blood pressure: a meta-analysis of randomized controlled trials. *JAMA*. 1996;275:1016-1022.

NUTRITION AND THE OLDER ADULT

Aging is a process that occurs throughout life. Its impact, however, is often ignored until adulthood. Progressive changes in body composition, sensory perception, functional status and physiologic functioning occur at all ages. The rate of change is strongly influenced by the genetic background and life experiences of the individual (1-3).

Older adults display wide individual variations in aging processes and thus in nutritional needs and concerns. Maximizing and maintaining adult potential becomes the major health care objective. The nutritional care goal is to provide education and support to achieve this objective as decreases in metabolic needs, declining activity levels, illness, infirmity, economic hardship, loss of social support systems, and other variables mandate adjustments in food intake.

Each older adult should be viewed as a unique individual. Chronological age and functional capacity do not directly correlate. Diversity increases with age (4). Provision of quality nutritional care requires the regular, systematic, longitudinal assessment of each older individual as well as a nutritional care plan based on specific needs identified. The least restrictive regimen possible should be implemented.

Dietary Considerations for the Older Adult

When planning the diet for older adults, the Dietary Reference Intakes (DRIs) and *Dietary Guidelines for Americans* (5-8) provide population specific guidelines. The DRIs divide the adult population older than 50 years into 2 life-stage groups: 51 through 70 years and older than 70 years (5-7). Overall nutrient requirements are similar between these age groups with the exception of vitamin D, which increases with age. To ensure adequate consumption of vitamin B12 and vitamin D, the *Dietary Guidelines for Americans* recommends consuming vitamin B12 in its crystalline form, e.g., fortified foods or supplements, and consuming extra vitamin D from vitamin-D-fortified foods and/or supplements (8).

In addition, taste and smell dysfunction tends to begin at around 60 years of age and becomes more severe in persons over 70 which can effect nutritional intake (5,9). Two thirds of persons over 75 years of age are edentulous. Therefore, more sweet flavorings or salty foods may be required to satisfy the appetite of elderly individuals and improve nutritional intake. When planning nutrient restrictions to accompany medical care in this population, moderate to mild restrictions, of such nutrients as sodium, are recommend to ensure overall adequate nutrition intake (10) .

Energy and Nutrient Considerations

Basal metabolic rate (BMR) decreases 2% with each decade of life; lean body mass declines 6% with each decade and is usually replaced with fat. As BMR decreases with advancing age and physical activity is reduced, energy needs decrease. The current DRIs suggest an average gradual reduction of kilocalories after the age of 19 years by deducting 10 kcal/day for males, and 7 kcal/day for females for each year of age above 19 years. For a 51 year old male, this would equate to a 320 kilocalorie reduction from the baseline DRI (11). Refer to Section IA for Dietary Reference Intake Values for Energy by Active Individuals (11). Meeting the nutritional needs of the older adult is challenging because although caloric needs decrease, protein, vitamins and minerals remain the same or increase. The average daily calorie intake for persons over 51 years of age is 2400 calories for men and 2000 calories for women (11). With decrease in calorie intake there is a decline in micronutrient intakes, especially calcium, zinc, iron and vitamins (5). Health problems arise when the caloric intake is less than 1500 kcal per day (12).

The 2002 DRIs recommend that the RDA for protein should be 0.8 g/kg daily for adults of all ages (10). However, other studies recommend protein be increased to 1.0 to 1.25 g/kg daily (11-14) or 12% to 14% of total energy intake for the elderly.

Metabolic and physical changes that affect the status of vitamin B_6, B_{12}, and folic acid may alter behavior and general health, whereas adequate intake of these nutrients prevents some decline in cognitive function associated with aging (5,15). Deficiencies of these nutrients, along with inadequate intake of vitamin C and riboflavin, may result in poor memory (5,15). Immune function affected by nutritional status may be improved by an increased intake or supplementation of protein, vitamins B_6 and E, and zinc (5,15). It is recommended that persons 51 years of age and older consume foods fortified with vitamin B_{12} or take a supplement containing crystalline form of vitamin B_{12}, as 10% to 30% of older adults have protein-bound

vitamin B_{12} malabsorption (5, 8,15-16). In addition, inadequate intake of folate and vitamins B-6 and B-12 status may result in hyperhomocysteinemia, a significant risk factor for atherosclerotic vascular disease (5).

Vitamin D levels may be reduced in the elderly even with adequate exposure to the sunlight, and deficiency may be exacerbated by homebound status, use of sun block, poor dietary intake, decreased capabilities to synthesize cholecalciferol in the skin, and decreased number of gastrointestinal receptors (12,18-20). Decreased capacity to absorb calcium is also observed because of reduced estrogen levels, low circulating 25 (OH)D, partial intestinal resistance to 1,25(OH)D, and impaired renal conversion of 25(OH)D to 1,25(OH)2D (5). Supplementation of 1.0 to 1.7 g calcium along with vitamin D (400 IU) is shown to reduce the incidence of age-related hip fractures and decrease the rate of age-related bone loss (5). The *Dietary Guidelines* suggest that individuals who are considered high-risk for vitamin D deficiency may need to consume higher intakes of vitamin D (e.g., 25 micrograms or 1,000 IU) to reach and maintain 25-hydroxyvitamin D values at 80 nmol/L (8). Other nutrients, including vitamin A and K, magnesium, and phytoestrogens are also involved in maintaining bone health and should also be evaluated for adequate intake (5).

Dehydration is a major problem for the elderly. Water intake needs are the same for the young and the old, but the elderly are prone to inadequate water intake. Frequently, diseases will reduce the ability to recognize thirst, create an inability to express thirst, or decrease access to water (5,21). Even healthy elderly persons appear to have reduced thirst in response to fluid deprivation. Fear of incontinence and difficulty making trips to the toilet, due to arthritic pain or other immobility, may also interfere with adequate fluid consumption (5). The elderly should be encouraged to ingest about 2 L of fluid per day or 30 ml/kg body weight.

Contributors to Poor Nutritional Status in the Elderly

A variety of factors may contribute to poor nutritional status as individuals age (22-26). Table A-4 lists some of the factors frequently identified as potential causes of malnutrition. These must be kept in mind when evaluating nutritional status and when developing a care plan to prevent, delay, or correct problems identified. For some conditions, cure is not possible but ameliorative or palliative nutritional interventions are often indicated (25, 26). Improvement in the quality of life will frequently ensue.

Table A-4: Contributors to Malnutrition in Older Adults (22-26)

Nutritional	Psychological
Alcohol/addictive substances	Bereavement
Decreased appetite	Change in body habits
Drug-nutrient interactions (prescription/over-the-counter drugs)	Confusion
	Depression
Inappropriate food intake	Fear
Increased nutrient requirements	Withdrawal
Overly restrictive dietary prescriptions	
Physical	**Social**
Acute/chronic disease	Fixed income/poverty
Changes in body composition	Ignorance
Changes in organ system structure/function	Isolation
Changes in sensory perception	Limited food procurement, preparation, storage
Dependence/disability	
Infirmity/immobility	Capability
Poor dentition/ill-fitting dentures	Reliance on economic assistance programs

Other Dietary Considerations (5)

- Minimize dietary restrictions to encourage better food intake. Maintaining the desire to eat and the enjoyment of food minimizes the risks of weight loss and undernutrition, especially in elders in long-term care. For these people, a more liberalized nutrition intervention, rather than a therapeutic diet, may be warranted to maintain quality of life (5, 10). Refer to Section C: Medical Nutrition Therapy for Diabetes Mellitus for specific recommendations for older adults with diabetes mellitus.
- Encourage adequate intake of foods high in fiber. The 2002 DRI for Adequate Intake (AI) of total fiber is 30 g/day for men, and 21 g/day for women for adults over 50 years (10). Include foods that can be easily

chewed and not cause gastrointestinal discomfort.

- Hyponatremia is often seen in the hospitalized patient. Sodium-restricted diets should be used with caution in the elderly.
- The hospitalized elderly patient frequently has a low level of albumin. Response to medical nutrition therapy to improve the albumin level is longer in the older individual.
- Failure to thrive is a growing problem in the aging population. Depression, use of many medications, underlying medical illnesses, and other factors should be addressed to correct this condition.

References

1. Dwyer J. *Screening Older American's Nutritional Health: Current Practices and Future Possibilities*. Washington, DC: Nutrition Screening Initiative; 1991.
2. White JV. Risk factors for poor nutritional status. *Primary Care*. 1994;21:19-32.
3. Gopalan C. Dietetics and nutrition: impact of scientific advances and development. *J Am Diet Assoc*. 1997;97:737-741.
4. National Research Council. *Recommended Dietary Allowances.* 10th ed. Washington, DC: National Academy Press; 1989.
5. Position of The American Dietetic Association: nutrition across the spectrum of aging. *J Am Diet Assoc*. 2005;105: 616-633.
6. Institute of Medicine, Food and Nutrition Board. Dietary Reference Intakes for Calcium, Phosphorus, Magnesium, Vitamin D, and Fluroide. Washington, DC: National Academy Press; 1997.
7. Institute of Medicine, Food and Nutrition Board. Dietary Reference Intakes for Thiamin, Riboflavin, Niacin, Vitamin B6, Folate Vitamin B12, Panthothenic Acid, Biotin and Choline. Washington, DC: National Academy Press; 1998.
8. *Dietary Guidelines for Americans 2005.* Available at: www.healthierus.gov/dietaryguidelines. Accessed January 31, 2005.
9. Schiffman SS. Changes in taste and smell: drug interactions and food preferences. *Nutr Rev*. 1994;52:S11
10. Position of The American Dietetic Association: liberalized diets for older adults in long-term care. *J Am Diet Assoc*. 2002;102:1316.
11. Institute of Medicine's Food and Nutrition Board. *Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids*. National Academy of Sciences, 2002: 265-334; preprint at http://www.nap.edu.books/0309085373/html/index.html. Accessed September 16, 2002.
12. Campbell WW, Crim MC, Dallal GE, et al. Increased protein requirements in elderly people: new data and retrospective reassessments. *Am J Clin Nutr*. 1994;60:501-509.
13. Harris NG. Nutrition in Aging. In: Mahan LK, Escott-Stump S. *Krause's Food, Nutrition, and Diet Therapy*. 10th ed. Philadelphia, Pa: WB Saunders Co; 2000:294.
14. Evans WJ, Cyr-Campbell D. Nutrition, exercise, and healthy aging. *J Am Diet Assoc*. 1997;97:632-638.
15. Tripp F. The use of dietary supplements in the elderly: current issues and recommendations. *J Am Diet Assoc*. 1997;97: S181-S183.
16. Rosenberg IH, Miller JW. Nutritional factors in physical and cognitive functions of elderly people. *Am J Clin Nutr*. 1995;55(suppl):1237S-1243S.
17. Ho C, Kauwell GPA, Bailey LB. Practitioners' guide to meeting the vitamin B-12 Recommended Dietary Allowance for people aged 51 years and older. *J Am Diet Assoc*. 1999;99:725-727.
18. Bogden JD, Bendrich A, Kemp FW, et al. Daily micronutrient supplements enhance delayed hyposensitivity skin test responses in older people. *Am J Clin Nutr*. 1994;60:437-447.
19. Morley JE, Soloman DH. Major issues in geriatrics over the last five years. *J Am Geriatr Soc*. 1994;42:218-225.
20. Chapuy MC, Arlot ME, Deboeuf F. Vitamin D-3 and calcium to prevent hip fractures in elderly women. *N Engl J Med*. 1992;327:1637-1642.
21. Gloth MF, Gundberg CM, Hollis BW, et al. Vitamin D deficiency in homebound elderly persons. *JAMA*. 1995;327:1637-1642.
22. Weinburg AD, Menaker KL. Dehydration: evaluation and management in older adults. Council on Scientific Affairs, American Medical Association. *JAMA.* 1995;274:1552-1556.
23. White JV. Risk factors associated with poor nutritional status. Niedert K, ed. *Nutrition Care of the Older Adult.* Chicago, Ill: American Dietetic Association; 1998.
24. White J. Risk factors associated with poor nutritional status in older Americans. In*: Nutrition Screening 1: Toward a Common View*. Washington, DC: Nutrition Screening Initiative; 1991.
25. White J, Ham R, Lipschitz D, Dwyer J, Wellman N. Consensus of the Nutrition Screening Initiative: risk factors and indicators of poor nutritional status in older Americans. *J Am Diet Assoc*. 1991;91:783-787.
26. Goodwin J. Social, psychological and physical factors affecting the nutritional status of elderly subjects: separating cause and effect. *Am J Clin Nutr*. 1989;50:1201-1209.

MECHANICAL SOFT (DENTAL SOFT) DIET

Description
The diet is a modification of the Regular Diet for the edentulous resident who has difficulty chewing or swallowing, or for the resident who has undergone temporomandibular joint (TMJ) surgery. For the greatest variety of foods, all foods that are easily masticated are included in the diet.

Indications
The Mechanical Soft Diet is indicated for the resident who has difficulty chewing or swallowing.

Nutritional Adequacy
The diet can be planned to meet the Dietary Reference Intakes as outlined in the *Statement on Nutritional Adequacy* in Section IA.

How to Order the Diet
Order as "Mechanical Soft Diet" or "Dental Soft Diet."

"Non-chewing Diet" or "TMJ Diet" needs to be indicated to identify this variation of the Mechanical Soft Diet.

Planning the Diet
The menu selection and the individual resident's tolerances should be considered when planning a Mechanical Soft Diet.

SAMPLE MENU

Breakfast	Noon	Evening
Orange Juice	Honey Glazed Chicken, Chopped	Braised Beef (chopped) and Noodles
Cream of Wheat	Buttered Potatoes	Seasoned Green Beans
Scrambled Egg	Soft Cooked Broccoli	Peach Slices
Biscuit	Orange Mousse	Dinner Roll
Margarine	Dinner Roll	Margarine
Jelly	Margarine	Soft Cookie
Milk	Frosted Banana Cake	Iced Tea
Coffee	Milk	Sugar
Sugar	Tea	
Creamer	Sugar	

FOOD GUIDE – MECHANICAL SOFT (DENTAL SOFT) DIET

FOOD GROUP	RECOMMENDED	AVOID
Beverages	All	None
Breads and Crackers	Soft breads, rolls Plain crackers softened in soup or beverage Pancakes, plain muffins Biscuits	Breads with nuts, thick crusts Dry bread, toast, or tough bread Breads with raisins if not tolerated Hard crackers
Cereals and Grains	Cooked cereals Dry cereals Pasta, noodles, rice Moist bread dressing	Cereals with raisins or nuts Granola-type cereals Coarse or dry cereals, such as shredded wheat or All Bran
Vegetables and Potatoes	Tender soft-cooked vegetables Vegetable juices	Raw or cooked vegetables with tough skins or seeds; fried or raw vegetables; cooked corn
Fruits and Juices	Fruit juices Ripe banana, melon, peeled peaches, pears, strawberries Cooked or frozen fruit; applesauce Citrus sections Stewed prunes; other tender stewed dried fruit Canned peaches, pears, apricots, pineapple, fruit cocktail	Fruit with tough skin if not tolerated (e.g., raw apple, dried fruit)
Meat, Meat Substitutes, Entrees	Tender meat, fish, or poultry Soft cheese Chopped or ground meats, poultry Soft casseroles Meat, fish, or egg salads Hard cooked or scrambled eggs Smooth peanut butter; liverwurst Yogurt without nuts or coconut	Tough fibrous meats (e.g., sausage casings) Fried eggs Yogurt with nuts or coconut
Fats	All except those to avoid	Fats with coarse, difficult-to-chew, or chunky additives
Soups	Most soups	Soups with tough meats or vegetables
Desserts	Cake, tender cookies Ice cream, sherbet, gelatin, custard, pudding, frozen yogurt Pie: cream, custard, pumpkin, soft fruit Flavored yogurt	Desserts containing nuts, coarse dried fruit, or tough fruit Deserts baked to a hard consistency
Sugar and Sweets	Soft candy Jelly, smooth jams	Candy containing tough fruits or nuts, hard candy

Diet following temporomandibular joint surgery: Foods such as breads, crackers, and cookies should be broken into small pieces before eating to avoid biting down or widely opening the mouth. Foods that may not be tolerated include: toast, unground meat, snack chips, foods containing coconut, and corn.

PUREED DIET

Description
The diet is soft in texture and mechanically nonirritating. Foods prepared on the Pureed Diet follow the standards of the Morrison *Classic Puree* program: smooth and pudding-like.

Indications
The Pureed Diet is used for residents who have problems chewing and swallowing and residents who have esophageal inflammation or varices.

Nutritional Adequacy
The diet can be planned to meet the Dietary Reference Intakes as outlined in the *Statement on Nutritional Adequacy* in Section IA.

How to Order the Diet
Order as "Pureed Diet."

Planning the Diet

FOOD GUIDE – PUREED DIET

FOOD GROUP	FOODS ALLOWED	FOODS EXCLUDED
Beverages and Milk	All smooth, as desired	Beverages with seeds, lumps, or pulp
Cereals and Grains	All farina-type cooked cereals; strained oatmeal Pregelled or slurried through the entire thickness: doughnuts, pancakes, waffles, French toast, and bread Pasta, rice, and dressing that are pureed to smooth consistency Regular soft bread if resident's swallowing ability permits	Coarse cooked cereal; dry cereals; cereals with seeds or nuts All other breads Crackers
Vegetables and Potatoes/Soups	Pureed or strained vegetables without chunks or seeds; mashed white potatoes All smooth cream soups or broth-type soups with pureed or strained ingredients	Regular cooked or raw vegetables Potato skins and chips Fried or french-fried potatoes or vegetables Regular soups with rice, corn, peas, or large chunks of meat and vegetables
Fruits and Juices	Applesauce, pureed fruits, well-mashed bananas, fruit juices	Regular canned, fresh, or frozen fruits; fruit juice with pulp
Meats, Meat Substitutes, Entrees	Pureed or strained meats, poultry, or fish Soufflés that are smooth and homogenous Cottage cheese Scrambled egg Cheese sauce	Regular or chopped meats or casseroles Cheese slices or cubes Hard cooked egg Peanut butter Sandwiches Pizza

FOOD GROUP	FOODS ALLOWED	FOODS EXCLUDED
Desserts	Custard, pudding, ice cream, sherbet, gelatin, fruit whips Cakes, cobblers, and pies pureed to a smooth and moist consistency Soft cookies and plain cakes, such as vanilla wafers or sugar cookies, prepared in a slurry Smooth custard and pudding; plain or custard-style yogurt	Regular cake, pie, cookies Bread and rice pudding Fruited yogurt
Fats	Butter, margarine, smooth gravy, cream sauces, mayonnaise, salad dressings, cream cheese, sour cream, whipped toppings	Fats with coarse or chunky additives
Miscellaneous	Sugar, jelly, honey, syrup Ketchup, mustard, smooth sauces	Jams and preserves Coarsely ground pepper and spices

SAMPLE MENU

Breakfast	Noon	Evening
Orange Juice	*Classic Puree* Chicken	*Classic Puree* Beef and Noodles
Cream of Wheat	Mashed Potatoes with Gravy	*Classic Puree* Green Beans
Scrambled Egg	*Classic Puree* Carrots	Tomato Juice
Biscuit with Slurry	*Classic Puree* Rosy Pears	*Classic Puree* Peaches
Milk	Pudding	Milk
Coffee	Tea	
Sugar	Sugar	
Creamer		

NUTRITION MANAGEMENT OF FLUID INTAKE AND HYDRATION

Description
Adequate fluid intake is necessary to maintain optimum hydration or to correct a state of dehydration or overhydration. The amount of fluid required to maintain the optimum hydration level varies with the medical condition of the patient. The vast majority of healthy people adequately meet their daily hydration needs (1). It is generally recommended by The Food and Nutrition Board that water come from both food and beverage choices (1). Recommendations for total water intake for women is approximately 2.7 liters (91 ounces daily) and 3.7 liters (125 ounces daily) for men (1).

Indications
In the healthy individual, normal sensations of thirst promote the consumption of adequate fluid and the maintenance of optimum hydration (1). However, some patients may not recognize thirst, may not be able to communicate thirst, or may not freely consume liquids. Risk factors for dehydration include any of the following:

- unconscious; semiconscious and confused state
- severe depression
- tranquilizer or sedative use
- enteral feeding
- must be fed or require assistance with feeding
- diarrhea
- poor appetite
- immobility
- diuretic use
- frequent laxative use
- perspiration (in hot weather where air conditioning is unavailable)
- increased respiratory rate
- salivation decreased by medications or radiation therapy
- fever
- fistulous drainage
- high output ileostomy
- vomiting
- severe burns
- polyuria (eg, glycosuria, ketonuria)
- high renal solute load (eg, High-Protein Diet)
- denuded body surface
- hyperpnea

While consumption of beverages containing caffeine and alcohol have been shown in some studies to have diuretic effects, available information indicates that this may be transient in nature, and that such beverages can contribute to total water intake and thus can be used in meeting recommendations for dietary intake of total water (1). Evidence indicates that consuming up to six mg of caffeine per kilogram of body weight per day does not impact the hydration status of healthy adults, above that of a placebo or non-caffeine-containing beverage (Grade I) (2).

Nutritional Adequacy
See statement pertaining to diet order.

How to Order the Diet
The patient's usual diet can be amended as follows: _____ diet, force fluids to _____ ml/day, or _____ diet, restrict fluids to _____ ml/day. Order should include amount of fluid to be given by Food and Nutrition Services with meals and snacks and amount of fluid to be given by nursing (i.e., with medications or between meals).

Planning the Diet
When the dietitian calculates the intake of fluids, foods that are liquid at room temperature should be counted by millileters. Such foods include water, carbonated beverages, coffee and tea, gelatin, milk, water ices and popsicles, soups, supplements, eggnog, ice cream and sherbet, and milk shakes.

Fluid is usually ordered in the form of cubic centimeters (ml) (1 mL = 1 cc). This can be converted to cups or ounces as follows:

30 ml = 1 fl oz
120 ml = 4 fl oz or ½ cup
180 ml = 6 fl oz or ¾ cup
240 ml = 8 fl oz or 1 cup
960 ml = 32 fl oz or 1 qt

FLUID CONTENT OF THE REGULAR DIET - Sample
(Container Size and Menus May Vary)

Breakfast		
	Juice (4 oz)	120 ml
	Milk (8 oz)	240 ml
	Coffee (6 oz)	180 ml
	Water (8 oz)	240 ml
Noon		
	Soup (6 oz)	180 ml
	Tea (8 oz)	240 ml
	Water (8 oz)	240 ml
Evening		
	Milk (8 oz)	240 ml
	Tea (8 oz)	240 ml
	Water (8 oz)	240 ml
	TOTAL	**2160 ml**

Treatment and Prevention of Fluid Deficit

An appropriate assessment is made by the physician to determine if water depletion alone (dehydration) or the more common sodium/water (volume) depletion is present. Treatment is accomplished by increasing oral intake of fluid and electrolytes as needed. Patients with more severe cases and those who are unable to take fluids by mouth are treated by appropriate intravenous fluid replacement. (Note: Internal sequestering, also known as third spacing, may create a deficit of water in some compartments, although total body water is unaltered. Replacement water requirements may be greatly increased in peritonitis, pancreatitis, enteritis, ileus, or portal vein thrombosis.)

An evaluation of fluid requirements should be made on an individual basis. Urinary specific gravity (Usg) and urinary osmolality (Uosm) are good indicators of hydration or dehydration in young, healthy and active adult males and females (Grade II) (2). Urine color (Ucol) correlates well with urinary specific gravity and urinary osmolality and can be used as an indicator of hydration status (Grade II) (2). In addition, body mass loss of over 3% is another good indicator of dehydration (Grade II) (2). In some cases, a precise intake and output record may be necessary to determine and meet fluid requirements. There are several methods to determine fluid requirements (2). Currently, no evidence exists comparing which methods are best to use when estimating fluid needs in adults (Grade V) (2). Various methods include:

General guidelines for calculating fluid needs based on age are:

1. Pediatrics (1-6)

Weight (kg)[a]	Fluid Requirement (ml/kg/day)
First 10 kg	100
11 – 20 kg	1000 + 50 ml for each kg above 10 kg
>20 kg	1500 + 20 ml for each kg >20 kg

[a]This method referred to as Holliday-Segar Method, original citation: Holliday MA, Seger WE. The maintenance need for water in parenteral fluid therapy. *Pediatrics*. 1957;19:823-832.

2. Adults (7-9)

Weight (kg)	Fluid Requirement (ml/kg/day)
First 10 kg of body weight	100
Second 10 kg of body weight	50
Each additional kilogram	20 mL/kg(<50 years of age) 15 mL/kg(>50 years of age)

[*]In obese patients, actual weight for height is used

Other Suggested Methods (6,7,8)

Children over 20 kg: 1500 ml/day + 20 ml/kg above 20 kg
Active young adults with large muscle mass: 40 ml/kg per day (6)
Adults between 18 – 55 years: 35 ml/kg per day (8)
For persons 55 – 65 years old with no major cardiac or renal diseases: 30 ml/kg actual weight per day (7)

For persons >65 years old: 25 ml/kg
For residents of long-term care facilities, minimum 1500 ml – 2000 ml daily (9,10)
Patients with pressure ulcers: 30 – 35 ml/kg of body weight
Patients with heart failure: 20 – 25 ml/kg of body weight
RDA: 1 ml/kcal (1,7)

3. Calculating fluid deficit (5)
   Calculated Water Deficit = (% TBW) × (BW) × [1 – (Na Predicted/Na Measured)] where TBW = total body water
   % TBW, normal adult male = 60
   % TBW, lean adult male = 70
   % TBW, obese adult male = 50
   % TBW, normal adult female = 50
   % TBW, lean adult female = 60
   % TBW, obese adult female = 42
   BW = actual body weight in kilograms
   Na Predicted = constant average serum sodium of 140 mEq/L
   Na Measured = patient's actual measured serum sodium
4. One bed change due to perspiration represents approximately 1 L of fluid lost (12).
5. Patients receiving mechanical ventilation or other source of humidified oxygen can absorb up to an additional 1000 ml of fluid daily, whereas unhumidified oxygen therapy can result in a net loss of fluid (12).
6. Patients treated on air-fluidized beds set at higher temperatures are at greater risk of dehydration due to an increase in insensible water loss associated with the warmer bed temperatures. Patients who require air-fluidized beds set at a higher temperature will need additional fluids, estimated to be approximately 10 to 15 mL/kg (13,14). For beds set at temperatures (86°F), fluid loss is similar to that on a conventional bed (480 ml/m2/24 h). However, when the bed temperature is high (94°F), fluid loss may increase up to 80% (938 ml/m2/24 h) in a 70-kg person (13). (Bed temperatures are adjustable and usually set between 88° and 93°F.)
7. Minimal fluid requirements:
   2000 to 3000 ml/day intake is necessary to yield approximately 1000 to 1500 ml/day in urine output.

Assessment of Fluid Status

The clinical assessment of total body water (TBW) is generally inaccurate (Grade II) (2). A body mass loss of over 3% is a good indicator of dehydration (Grade II) (2). More than 10% of TBW may be lost before evidence of hypovolemia appears. The thirst mechanism is activated when the decrease in TBW reaches approximately 2%. Serial assessment of body weight is probably the most reliable parameter, especially because water makes up such a large proportion of total body weight (2,12). Along with serial assessment, the following physical alterations can be assessed to help determine hydration status (15,16).

Volume deficit

- Decreased moisture in the oral cavity
- Decreased skin and tongue turgor (elasticity); skin may remain slightly elevated after being pinched
- Flattened neck and peripheral veins in supine position
- Decreased urinary output (<30 ml/h without renal failure)
- Acute weight loss (>1 lb /day)

Volume excess

- Clinical apparent edema is usually not present until 12 – 15 L of fluid has accumulated
- 1 L fluid = 1 kg weight
- Pitting edema, especially in dependent parts of the body (eg, feet, ankles, and sacrum)
- Distended peripheral and neck veins
- Symptoms of heart failure or pulmonary edema
- Central venous pressure >11 cm H_20

Laboratory values used to evaluate fluid status include urine specific gravity, urine osmolality, serum electrolytes; serum osmolality; hematocrit; blood, urea nitrogen (BUN); and urine specific gravity. Serum sodium is the best indicator of intracellular fluid disorders. The hematocrit reflects the proportion of blood plasma to red blood cells. Fluid loss causes hemoconcentration and serum osmolality; fluid gain causes

hemodilution and decreases serum osmolality. A rise in BUN level frequently reflects a fluid deficit state and a fluid deficit causes urine to be concentrated (specific gravity >1.030); a fluid excess dilutes urine (specific gravity <1.010) (12).

Aging increases the risk for dehydration based on the physical and psychological changes. The elderly often lack the ability to recognize thirst, have aged kidneys that may have a decreased ability to concentrate urine, fear urinary incontinence and thus do not drink sufficient fluids, have acute or chronic illnesses that alter fluid and electrolyte balance (17), and have a decrease in total body water from 60% to 45%.

Refer to the following section for further information:
See Enteral Nutrition, in Section IB for discussion of calculation of free water in tube feeding.

Fluid Restriction

In heart failure, ascites, end-stage renal disease, and other disorders, patients retain fluid. A fluid restriction is often useful in the management of these conditions.

See Section III: Clinical Nutrition Management
HEART FAILURE
END-STAGE RENAL DISEASE

References

1. Institute of Medicine. *Dietary Reference Intakes: Water, Potassium, Sodium, Chloride, and Sulfate*. Washington, D. C: National Academy Press; 2004.
2. *Hydration Evidence-Analysis Project.* American Dietetic Association Evidence Analysis Library. American Dietetic Association; 2007. Available at: http://www.adaevidencelibrary.com. Accessed November 9, 2007.
3. Kleiner SM, Water an essential but overlooked nutrient. *J Am Diet Assoc*. 1999;99:200-205.
4. Hendricks KM, Walker WA. *Manual of Pediatric Nutrition*. 2nd ed. Philadelphia: Pa: BC Becker Inc;1990.
5. Blackburn G, Bell SJ, Mullen JL. Appendix B: Macronutrient requirements. In: Blackburn GL, Bell SJ, Mullen JL, eds. *Nutritional Medicine: A Case Management Approach.* Philadelphia, Pa: W. B. Saunders Co; 1989.
6. *Pediatric Manual of Clinical Dietetics*. 2nd ed. Chicago: Il: The American Dietetic Association; 2003.
7. Food and Nutrition Board, National Academy of Sciences. *Recommended Dietary Allowances*. 10th ed. Washington, DC: National Academy Press; 1989.
8. Chidester JC, Spangler AA. Fluid intake in the institutionalized elderly. *J Am Diet Assoc*. 1997;97:23-28.
9. Dietitians in nutrition support: fluid requirements. *Support Line*. 1991;13:18.
10. Chernoff R. Meeting the nutritional needs of the elderly in the institutionalized setting. *Nutr Rev*. 1994;52:132-136.
11. Holben DH, Hassell JT, Williams JL, Helle B. Fluid intake compared with established standards and symptoms of dehydration among elderly residents of a long-term care facility. *J Am Diet Assoc*. 1999;99:1447-1449.
12. Dolan JT. Fluid and Electrolyte Physiology and pathophysiology. In: Dolan JT, ed. *Critical Care Nursing*. Philadelphia, Pa: FA Davis Co.; 1991:434.
13. Ayello EA, Thomas Dr, Litchford MA. Nutrition aspects of wound healing. *Home Healthc Nurse*. 1999;17:719-729.
14. Breslow RA. Nutrition and air-fluidized beds: a literature review. *Adv Wound Care*. 1994;3:57-60.
15. Methany NM. Fundamental concepts and definitions. In: Methany NM, ed. *Fluid and Electrolyte Balance: Nursing Considerations*. Philadelphia, Pa: JB Lippincott; 1989:29-34.
16. Lysen L. *Quick Reference to Clinical Dietetics.* Gaithersburg, Md: Aspen Publishers; 1997.
17. Position of The American Dietetic Association: nutrition, aging, and the continuum of care. *J Am Diet Assoc*. 2000;100:580-595.

VEGETARIAN DIETS

Description
A Vegetarian Diet is a variation of the Regular Diet in which certain or all foods of animal origin are excluded (1). A wide spectrum of dietary practices is considered vegetarian.

Lacto-ovovegetarian: Milk, milk products, and eggs are the only animal products included in the diet.
Lactovegetarian: Milk and milk products are the only foods of animal origin included in the diet.
Ovovegetarian: Eggs are the only animal product included in the diet.
Total vegetarian (vegan): The diet consists of foods of plant origin only.

Indications
Vegetarian diets are adopted for a variety of health, ecological, economical, philosophical, and ethical reasons (1). Vegetarian diets offer a number of advantages, including lower levels of saturated fat, cholesterol, and animal protein and higher levels of carbohydrates, fiber, magnesium, boron, folate, antioxidants (eg, vitamins C and E), carotenoids, and phytochemicals (1). Many epidemiologic studies suggest a positive relationship between vegetarian lifestyles and reduced risks of several chronic degenerative diseases, such as obesity, coronary artery disease, hypertension, type 2 diabetes, and some cancers. However, this relationship is likely due to lifestyle factors in addition to diet (1).

Nutritional Adequacy
Vegetarian diets are healthful and nutritionally adequate when appropriately planned (1). The diet can be planned to meet the Dietary Reference Intakes (DRIs) as outlined in the *Statement on Nutritional Adequacy* in Section IA. Nutrients that are often of concern in vegans are vitamins B_{12} and D, calcium, zinc, and occasionally riboflavin and iron (1). All vegan children should have a reliable source of vitamin B_{12}, and if sun exposure is limited, vitamin D supplements or fortified foods should be emphasized (1-4). Pregnant and lactating vegans should receive, respectively, supplements of 2 mg and 2.6 mg of vitamin B_{12} daily, and if sun exposure is limited, should have their diet supplemented with 10 mg of vitamin D (1). Because of the variability of dietary practices among vegetarians, individual assessment of dietary intakes of vegetarians is necessary (1).

How to Order the Diet
Order as "Regular Diet – Vegetarian." The patient's particular dietary constraints will be considered.

Planning the Diet
A Vegetarian Diet can be made adequate by careful planning and by giving attention to the following guidelines (1):

- Keep to a minimum the intake of foods with low-nutrient density, such as sweets and fatty foods.
- Choose a variety of foods, including fruits, vegetables, whole grains, legumes, nuts, seeds, tofu/soy, and, if desired, dairy products and eggs.
- Choose whole or unrefined grain products whenever possible, instead of refined products.
- If milk products are consumed, use lower fat versions.
- Include a regular source of vitamin B_{12}, along with a source of vitamin D if sun exposure is limited.

In addition to these guidelines, refer to the Vegetarian Food Guide Pyramid (5) and Tips for Meal Planning in Table 1 (5).

Protein: Although vegetarian diets usually meet or exceed requirements for protein, they typically provide less protein than nonvegetarian diets. The body's need for essential amino acids can be met by consumption of animal or plant sources of protein. Although plant foods contain less of the essential amino acids than do equivalent quantities of animal foods, a plant-based diet can provide adequate amounts of amino acids when a varied diet is consumed on a daily basis. A mixture of different proteins from unrefined grains, legumes, seeds, nuts, and vegetables will complement each other in their amino acid profiles to meet nutritional needs.

Different types of protein that complement each other should be eaten over the course of the day. However, since after absorption, amino acids from exogenous and endogenous sources combine in the body's protein pool, it is not necessary that complementation of amino acid profiles be precise and present in the same meal (1). Isolated soy protein can meet protein needs as effectively as animal protein, whereas wheat protein eaten alone

may be 50% less usable than animal protein (1). Cereals tend to be low in lysine, which is an essential amino acid; therefore, evaluating the sources of protein consumed in the diet is important to ensure adequacy (6)

Vitamin B_{12}: Unless fortified, no plant food contains significant amounts of active vitamin B_{12}. A vegan should supplement his or her diet with vitamin B_{12} by using a cobalamin supplement or by selecting fortified foods, such as fortified soy milk or breakfast cereals, to ensure an adequate intake of the active form of the nutrient. Although the requirement for vitamin B_{12} is relatively small, vegetarians must include a reliable source of vitamin B_{12} in their diets to reduce their risk of developing a deficiency. Supplements are advised for all vegetarians older than 50 years, because absorption of vitamin B_{12} becomes less efficient as the body ages (1). Also, breast-fed vegan infants should receive a source of vitamin B_{12} if the mother's diet is not supplemented (7). If B_{12} foods are not consumed regularly (at least three servings per day), patients are advised to take a daily vitamin B_{12} supplement of 5 to 10 μg or a weekly B_{12} supplement of 2,000 μg (5).

Calcium: Calcium is present in many plant foods and fortified foods. The calcium intake of lactovegetarians is comparable to or higher than that of nonvegetarians (1). However, the calcium intake of vegans is generally lower than that of lactovegetarians and nonvegetarians and is often below recommended intakes (1). A diet that provides foods with relatively high ratios of sulfur-containing amino acid proteins (eg, eggs, meat, fish, poultry, dairy products, nuts, and many grains) may increase calcium loss from the bones (1). Excessive sodium intake may also promote calcium loss from the bones (1). Studies show that the ratio of dietary calcium to protein is more predictive of bone health than calcium intake alone (1). Typically, this ratio is high in lacto-ovovegetarian diets and favors bone health. However, vegan diets have calcium-to-protein ratios that are similar to or lower than those of nonvegetarian diets (8) If vegans do not meet calcium requirements from food, dietary supplements and fortified foods are recommended (1).

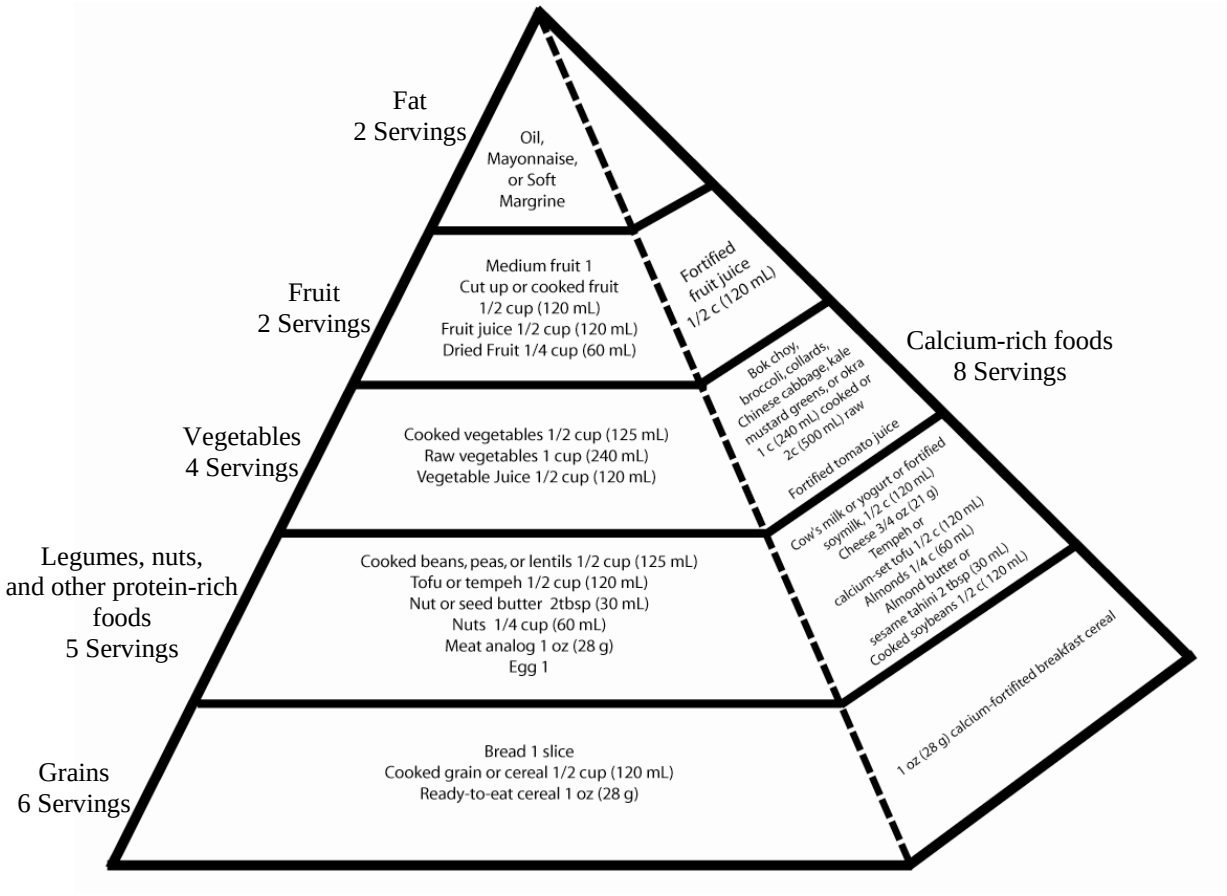
Vitamin D: Vitamin D status depends on sunlight exposure and intake of vitamin D–fortified foods or supplements. A vitamin D supplement may be necessary for persons, especially dark-skinned individuals, who do not ingest vitamin D–fortified milk products or cereals or do not obtain 5 to 15 minutes of exposure to sunlight daily (1,2). Vitamin D_3 (cholecalciferol) is from an animal origin and may not be used by vegans. Vitamin D_2 (ergocalciferol) is a form that may be used by vegans. Because the bioavailability of vitamin D_2 is less than that of vitamin D_3, vegetarians who depend on vitamin D_2 supplements may have increased requirements (9).

Energy: Because vegan diets tend to be high in bulk, it can be challenging for vegans, especially infants, children, and adolescents, to meet their energy needs. Frequent meals and snacks and eating foods higher in fat can help vegetarian children meet their energy needs (1).

Iron: The non-heme iron found in plant foods is more sensitive than heme iron to both inhibitors and enhancers of iron absorption (1). The inhibitors of iron absorption include phytate, calcium, teas (including some herb teas), coffee, cocoa, some spices, and fiber (10). Western vegetarians have a relatively high intake of iron from plant foods, such as dark-green leafy vegetables, iron-fortified cereals, and whole grains. Although vegetarian diets are higher in total iron than nonvegetarian diets, iron stores are lower because iron from plant foods is not absorbed as well as iron from animal sources (1). However, the frequency of anemia is not higher in the vegetarian population than in the nonvegetarian population (1). The higher vitamin C intake of vegetarians may improve their iron absorption (1).

Zinc: Because phytate binds zinc, and animal protein is believed to enhance zinc absorption, total zinc bioavailability appears to be lower in vegetarian diets (11). Vegetarians should strive to meet or exceed the DRI for zinc due to the low bioavailability of zinc from plant sources and the high phytate content of a vegetarian diet (1).

N-3 fatty acids: Diets that do not include fish or eggs may lack the long-chain n-3 fatty acids docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA) (1). It has been shown that vegans have lower levels of DHA and EPA (1). Diets that do not include fish, eggs, or sea vegetables generally lack direct sources of DHA and EPA (1). It is recommended that vegetarians include good sources of alpha-linolenic acid, a precursor to DHA and EPA, in their diets. Good sources of alpha-linolenic acid include walnuts, flaxseed, flaxseed oil, and canola oil. Vegetarians with increased n-3 fatty acid requirements (eg, pregnant and lactating women) or with diseases, such as diabetes mellitus, associated with poor conversion may benefit from direct sources of long-chain n-3 fatty acids (eg, cod liver oil, mackerel, salmon, as well as crab, shrimp and oyster). Recently, DHA derived from microalgae has become available as a supplement in nongelatin capsules. Algae sources of DHA may be beneficial because they positively affect blood levels of DHA and of EPA (1,12-13).



Vegetarian Food Guide Pyramid
Adapted from: Messina V, Melina V, Mangels AR. A new food guide for North American vegetarians. *J Am Diet Assoc*. 2003;103:773.

Table 1 Eight Tips for Meal Planning (5)

1 Choose a variety of foods.
2 The number of servings in each group is the minimum daily intake. Choose additional foods from any groups to meet energy needs.
3 A serving from the calcium-rich food group provides approximately 10% of adult daily requirements. Choose eight or more servings per day. These also count towards servings from the other food groups in the guide. For example, ½ cup (120 mL) of fortified fruit juice counts as both a calcium-rich food and a serving from the fruit group.
4 Include two servings every day of foods that supply n-3 fatty acids. Foods rich in n-3 fatty acids are found in the legumes/nuts group and in the fats group. A serving is 1 tsp (5 mL) of flaxseed oil, 3 tsp (15 mL) of canola or soybean oil, 1 tbsp (15 mL) of ground flaxseed, or ¼ cup (60 mL) walnuts. For the best balance of fats in your diet, olive and canola oils are the best choices for cooking.
5 Servings of nuts and seeds may be used in place of servings from the fats group.
6 Be sure to get adequate vitamin D from daily sun exposure, fortified foods, or supplements. Cow's milk and some brands of soy milk and breakfast cereals are fortified with vitamin D.
7 Include at least three servings every day of foods rich in vitamin B_{12}. These include 1 tbsp (15 mL) of Red Star Vegetarian Support Formula nutritional yeast, 1 cup (240 mL) fortified soy milk, ½ cup (120 mL) cow's milk, ¾ cup (180 mL) yogurt, one large egg, 1 oz of fortified breakfast cereal, or 1½ oz of fortified meat analogue. If you don't eat these foods regularly (at least three servings per day), take a daily vitamin B_{12} supplement of 5 to 10 µg or a weekly B-12 supplement of 2,000 µg.
8 If you include sweets or alcohol in your diet, consume these foods in moderation. Get most of your daily calories from the foods in the Vegetarian Food Guide Pyramid**]**.

References

1. Position of the American Dietetic Association and Dietitians of Canada: vegetarian diets. *J Am Diet Assoc*. 2003;103:748-765.
2. Holick MF. Vitamin D and bone health. *J Nutr.* 1996:126(suppl):1159S-1164S.
3. Subcommittee on Nutritional Status and Weight Gain During Pregnancy, Committee on Nutritional Status During Pregnancy and Lactation, Food and Nutrition Board, Institute of Medicine, National Academy of Sciences. *Nutrition During Pregnancy*. Washington, DC: National Academy Press; 1992.
4. Subcommittee on Nutrition During Lactation, Committee on Nutritional Status During Pregnancy and Lactation, Food and Nutrition Board, Institute of Medicine, National Academy of Sciences. *Nutrition During Lactation*. Washington, DC: National Academy Press; 1991.
5. Messina V, Melina V, Mangels AR. A new food guide for North American vegetarians. *J Am Diet Assoc*. 2003;103:771-775.
6. Food and Nutrition Board, Institute of Medicine. *Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids*. Washington, DC: National Academy Press; 2002.
7. Mangels AR, Messina V. Considerations in planning vegan diets: infants. *J Am Diet Assoc*. 2001;101:670-677.
8. Remer T. Influence of diet on acid-base balance. *Semin Dial*. 2000;13:221-226.
9. Trang HM, Cole DE, Rubin LA, Pierratos A, Siu S, Vieth R. Evidence that vitamin D-3 increases serum 25-hydroxyvitamin D more efficiently than does vitamin D-2. *Am J Clin Nutr*. 1998;68:854-858.
10. Hurrell RF, Reddy M, Cook JD. Inhibition of non-haem iron absorption in man by polyphenolic-containing beverages. *Br J Nutr*. 1999;81:289-295.
11. Hunt JR, Matthys LA, Johnson LK. Zinc absorption, mineral balance, and blood lipids in women consuming controlled lactoovovegetarian and omnivorous diets for 8 weeks. *Am J Clin Nutr*. 1998;67:421-430.
12. Davis B, Kris-Etherton P. Achieving optimal essential fatty acid status in vegetarians: current knowledge and practical implications. *Am J Clin Nutr*. In press.
13. Specker BL. Nutritional concerns of lactating women consuming vegetarian diets. *Am J Clin Nutr*. 1994;59(suppl 5):1182S-1186S.

KOSHER GUIDELINES

Description
Kosher is a Hebrew word that means "fit" or "wholesome." Kosher dietary laws define foods and combinations of foods that are allowed or forbidden. The collective term for the Jewish laws and customs relating to the types of foods permitted for consumption and their preparation is *kashruth.* The observance of kosher dietary laws varies according to the traditions of the individual and interpretations of the dietary laws.

In a nonkosher food service facility, observance of dietary laws usually involves service of commercially prepared kosher dinners on disposable plastic ware for the patient following a strict kosher diet. For patients not following a strict kosher diet or if the patient so wishes, the foods usually prepared by the Food and Nutrition Services Department can be served, as long as milk and milk products are separated from meat and meat products and certain forbidden foods are excluded (see the following list).

The strict observance of the kashruth by the kosher food service requires separate sets of equipment, dishes, and silverware, as well as kosher food suppliers for many items. Dairy foods are stored and prepared separately from meat and meat products.

Indications
Kosher diets may be ordered for individuals of the Jewish faith if they so desire.

Nutritional Adequacy
The diet can be planned to meet the Dietary Reference Intakes (DRIs) as outlined in the *Statement on Nutritional Adequacy* in Section IA.

How to Order the Diet
Order as "Kosher Diet." Any additional dietary modifications that may be warranted should be stated in the diet prescription (eg, "Kosher Diet, Sugar in Moderation").

Guidelines for Food Selection:
1. Kosher meats and poultry may come only from animals that have cloven hooves, chew their cud, and are slaughtered according to the humane and specific guidelines prescribed by the Jewish dietary laws. In addition, kosher meats undergo a process called koshering, in which blood is extracted by soaking in salt or broiling on a regular grill. (Pan grilling is not acceptable.)
2. Foods are classified as dairy, meat, or pareve. Meals are classified either as dairy or meat. Meat and meat products are not to be combined with any dairy products in recipe, food preparation, or service. Pareve foods may be served at dairy or meat meals.
3. The strict observance of the Kashruth requires separate sets of equipment, dishes, and silverware for dairy or meat meals. In a kosher kitchen, dairy foods are stored and prepared separately from meat and meat products.
4. In a nonkosher food service facility, observance of dietary laws usually involves service of commercially prepared kosher dinners on disposable plastic ware for the patient following a strict kosher diet. For patients not following a strict kosher diet or if the patient so wishes, the usual foods prepared by the Food & Nutrition Services Department can be served, as long as milk and milk products are separated from meat and meat products and certain forbidden foods are excluded (see the following list).
5. Processed foods: No product should be considered kosher unless so certified by a reliable rabbinic authority whose name of insignia appears on the sealed package. The insignia, Ⓤ which is the copyrighted symbol of the Union of Orthodox Jewish Congregations of America, indicates that the product is certified as to its kosher nature. Packages marked with other symbols may be suitable for certain but not all kosher diets. It is important that a kosher food package remains sealed when presented to the user. The package should be opened only under these circumstances: by the user, in the user's presence, or by someone authorized by the religious authorities to open the food package.
6. Nonkosher foods may be used if considered essential in the treatment of an ill person. However, a rabbi should be consulted before waiving dietary restrictions.

FOOD GUIDE – KOSHER DIET

	FOOD GROUP	FOODS ALLOWED	FOODS EXCLUDED
Dairy	Milk Products	All foods containing milk or white sauces Note: Foods containing milk derivatives such as sodium caseinate and lactose are considered dairy	
Meat	Meat	Only meat from an animal that chews its cud and has split hooves Beef: chuck, brisket, plate, shank, rib up to and including 12th rib Broiled liver Veal/lamb: shoulder, rack, shank, breast	Pork and pork products Beef: loin, rump, flank, shank, hindquarter Veal: loin, leg, flank, shank, Lamb: loin, leg, hind quarter
	Fowl	Most domesticated fowl are by tradition considered to be kosher: chicken, turkey, domestic duck	Wild fowl that is hunted
Pareve	Breads, Cereals, and Grains	All except listed in Foods Excluded column	Bread made with lard or animal shortening. Note: Breads and cereals containing any dairy products are classified as dairy
	Eggs	Eggs from domestic fowl	Eggs containing blood spots
	Fish and Seafood	Fish having *both* fins and scales: halibut, flounder, cod, tuna, haddock, pollack, turbot, salmon, trout, whitefish, herring, etc.	Catfish, eel, marlin, sailfish, shark, sturgeon, swordfish, lumpfish, scallops, and shellfish such as lobster, shrimp, crab and oysters
	Vegetables and Fruit	All, prepared with pareve certification and allowed ingredients; fresh do not require Kashruth certification. Baked beans, catsup, chick peas, chow mein noodles, dehydrated or canned soup and bases, prepared sauces, tomato juice, tomato products, frozen fruits and vegetables in sauce, grape juice, blended fruit juice drinks and punches, must have Kashruth certification	
	Fats	Pure vegetable oil Margarine made with vegetable shortening and without milk	Lard or animal shortening Margarine with added milk Butter
	Sweets	Imitation sour cream or whipped topping with pareve certification Sugar, jam, jelly (grape jelly only if has Kashruth certification), syrup Candy without milk	
	Beverages	Coffee, tea, carbonated beverages Alcoholic beverages Nondairy creamer with pareve certification Those made with milk or milk products are considered to be a part of the dairy group	
Other	Desserts	Desserts made without milk or animal products are considered to be pareve certified	Desserts made with lard or animal shortening Monoglycerides and diglycerides and emulsifiers that may be from animal fats