

NUTRITION

Concepts &
Controversies



Fourth Edition
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Nutrition: Concepts and Controversies

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Fourth Edition Prepared by

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RDA Table 1

Recommended Dietary Allowances (RDA), 1980

Age (years)	Weight		Height		Protein (g)	Vitamin A (RE)	Vitamin D (μ g)	Vitamin E (mg)	Vitamin C (mg)	Thiamin (mg)	Riboflavin (mg)	Niacin (mg equiv.)	Vitamin B ₆ (mg)	Folacin (μ g)	Vitamin B ₁₂ (μ g)	Calcium (mg)	Phosphorus (mg)	Magnesium (mg)	Iron (mg)	Zinc (mg)	Iodine (μ g)
	(kg)	(lb)	(cm)	(inches)																	
Infants																					
0.0-0.5	6	13	60	24	kg \times 2.2	420	10	3	35	0.3	0.4	6	0.3	30	0.5	360	240	50	10	3	40
0.5-1.0	9	20	71	28	kg \times 2.0	400	10	4	35	0.5	0.6	8	0.6	45	1.5	540	360	70	15	5	50
Children																					
1-3	13	29	90	35	23	400	10	5	45	0.7	0.8	9	0.9	100	2.0	800	800	150	15	10	70
4-6	20	44	112	44	30	500	10	6	45	0.9	1.0	11	1.3	200	2.5	800	800	200	10	10	90
7-10	28	62	132	52	34	700	10	7	45	1.2	1.4	16	1.6	300	3.0	800	800	250	10	10	120
Males																					
11-14	45	99	157	62	45	1000	10	8	50	1.4	1.6	18	1.8	400	3.0	1200	1200	350	18	15	150
15-18	66	145	176	69	56	1000	10	10	60	1.4	1.7	18	2.0	400	3.0	1200	1200	400	18	15	150
19-22	70	154	177	70	56	1000	7.5	10	60	1.5	1.7	19	2.2	400	3.0	800	800	350	10	15	150
23-50	70	154	178	70	56	1000	5	10	60	1.4	1.6	18	2.2	400	3.0	800	800	350	10	15	150
51+	70	154	178	70	56	1000	5	10	60	1.2	1.4	16	2.2	400	3.0	800	800	350	10	15	150
Females																					
11-14	46	101	157	62	46	800	10	8	50	1.1	1.3	15	1.8	400	3.0	1200	1200	300	18	15	150
15-18	55	120	163	64	46	800	10	8	60	1.1	1.3	14	2.0	400	3.0	1200	1200	300	18	15	150
19-22	55	120	163	64	44	800	7.5	8	60	1.1	1.3	14	2.0	400	3.0	800	800	300	18	15	150
23-50	55	120	163	64	44	800	5	8	60	1.0	1.2	13	2.0	400	3.0	800	800	300	18	15	150
51+	55	120	163	64	44	800	5	8	60	1.0	1.2	13	2.0	400	3.0	800	800	300	10	15	150
Pregnant					+30	+200	+5	+2	+20	+0.4	+0.3	+2	+0.6	+400	+1.0	+400	+400	+150	^a	+5	+25
Lactating					+20	+400	+5	+3	+40	+0.5	+0.5	+5	+0.5	+100	+1.0	+400	+400	+150	^a	+10	+50

^aSupplemental iron is recommended (30 to 60 mg).

Note: The allowances are intended to provide for individual variations among most normal, healthy people in the United States under usual environmental stresses. They were designed for the maintenance of good nutrition. Diets should be based on a variety of common foods in order to provide other nutrients for which human requirements have been less well defined. See the text for a more detailed discussion of the RDA and of nutrients not tabulated. The FDA has published a special table of selected RDA values for use on food labels: these, the U.S. RDA, appear on the inside back cover. For the Canadian equivalent to the RDA, the RNI, see Appendix B.

Source: Reproduced from *Recommended Dietary Allowances*, 9th ed. (1980), with the permission of the National Academy of Sciences, Washington, D.C.

RDA Table 2

Estimated Safe and Adequate Daily Dietary Intakes of Additional Selected Nutrients (United States)^a

Age (years)	Vitamins			Trace Elements ^b		
	Vitamin K (μ g)	Biotin (μ g)	Pantothenic Acid (mg)	Copper (mg)	Manganese (mg)	Fluoride (mg)
0-0.5	12	35	2	0.5-0.7	0.5-0.7	0.1-0.5
0.5-1.0	10-20	50	3	0.7-1.0	0.7-1.0	0.2-1.0
1-3	15-30	65	3	1.0-1.5	1.0-1.5	0.5-1.5
4-6	20-40	85	3-4	1.5-2.0	1.5-2.0	1.0-2.5
7-10	30-60	120	4-5	2.0-2.5	2.0-3.0	1.5-2.5
11+	50-100	100-200	4-7	2.0-3.0	2.5-5.0	1.5-2.5
Adults	70-140	100-200	4-7	2.0-3.0	2.5-5.0	1.5-4.0

RDA Table 2 (continued)

Age (years)	Trace Elements ^b			Electrolytes		
	Chromium (mg)	Selenium (mg)	Molybdenum (mg)	Sodium (mg)	Potassium (mg)	Chloride (mg)
0-0.5	0.01-0.04	0.01-0.04	0.03-0.06	115-350	350-925	275-700
0.5-1.0	0.02-0.06	0.02-0.06	0.04-0.08	250-750	425-1275	400-1200
1-3	0.02-0.08	0.02-0.08	0.05-0.10	325-975	550-1650	500-1500
4-6	0.03-0.12	0.03-0.12	0.06-0.15	450-1350	775-2325	700-2100
7-10	0.05-0.20	0.05-0.20	0.10-0.30	600-1800	1000-3000	925-2775
11+	0.05-0.20	0.05-0.20	0.15-0.50	900-2700	1525-4575	1400-4200
Adults	0.05-0.20	0.05-0.20	0.15-0.50	1100-3300	1875-5625	1700-5100

^aBecause there is less information on which to base allowances, these figures are not given in the main table of the RDA and are provided here in the form of ranges of recommended intakes.

^bSince the toxic levels for many trace elements may be only several times usual intakes, the upper levels for the trace elements given in this table should not habitually be exceeded.

RDA Table 3

Recommended Energy Intakes for Individuals of Average Height, Weight, and Activity Levels

Age (years)	Weight		Height		Energy Needs ^a	
	(kg)	(lb)	(cm)	(inches)	(cal)	(MJ) ^b
Infants						
0-0.5	6	13	60	24	kg × 115(95-145)	kg × 0.48
0.5-1.0	9	20	71	28	kg × 105(80-135)	kg × 0.44
Children						
1-3	13	29	90	35	1300 (900-1800)	5.5
4-6	20	44	112	44	1700 (1300-2300)	7.1
7-10	28	62	132	52	2400 (1650-3300)	10.1
Males						
11-14	45	99	157	62	2700 (2000-3700)	11.3
15-18	66	145	176	69	2800 (2100-3900)	11.8
19-22	70	154	177	70	2900 (2500-3300)	12.2
23-50	70	154	178	70	2700 (2300-3100)	11.3
51-75	70	154	178	70	2400 (2000-2800)	10.1
76+	70	154	178	70	2050 (1650-2450)	8.6
Females						
11-14	46	101	157	62	2200 (1500-3000)	9.2
15-18	55	120	163	64	2100 (1200-3000)	8.8
19-22	55	120	163	64	2100 (1700-2500)	8.8
23-50	55	120	163	64	2000 (1600-2400)	8.4
51-75	55	120	163	64	1800 (1400-2200)	7.6
76+	55	120	163	64	1600 (1200-2000)	6.7
Pregnant					+ 300	
Lactating					+ 500	

^aThe energy allowances for the young adults are for men and women doing light work. The allowances for the two older age groups represent mean energy needs over these age spans, allowing for a 2% decrease in basal (resting) metabolic rate per decade and a reduction in activity of 200 cal/day for men and women between 51 and 75 years, 500 cal for men over 75, and 400 cal for women over 75. The customary range of daily energy output, shown in parentheses, is based on a variation in energy needs of ± 400 cal at any one age, emphasizing the wide range of energy intakes appropriate for any group of people. Energy allowances for children through age 18 are based on median energy intakes of children of these ages followed in longitudinal growth studies. The values in parentheses are 10th and 90th percentiles of energy intake, to indicate the range of energy consumption among children of these ages.

^bMJ stands for megajoules (1 MJ = 1000 kJ).

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Fourth Edition



*To the Quakers at Monteverde
who showed me the rainforest.*

Ellie Whitney

*To the people whose work changes
the world, Ellie, Gordie, Sharon,
Linda, Marie and all the others.*

Fran Sizer



About the Authors

Eleanor Noss Whitney, PhD, RD, received her BA in biology from Radcliffe College in 1960 and her PhD in biology with an emphasis on genetics from Washington University, St. Louis, in 1970. Formerly an associate professor at the Florida State University, she now devotes full time to research, writing, and consulting in nutrition and health. Her publications include articles in *Science*, the *Journal of Nutrition*, *Genetics*, and other journals, and the textbooks *Understanding Normal and Clinical Nutrition*, *Understanding Nutrition*, *Nutrition and Diet Therapy*, and *Life Choices: Health Concepts and Strategies*. She is president of Nutrition and Health Associates, an information resource center in Tallahassee, Florida.

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Preface

This edition of *Nutrition Concepts and Controversies* has come about in response to the requests and suggestions of users. The writing allowed us to enjoy discovering the new findings in research areas we first explored years ago, in the early editions. We see, too, that the research stories do not end, that seeming endings turn out to be beginnings, and that the field of nutrition continues to change. It is our hope that you will enjoy the new information and the new features of this text, and that beneath the new full-color format, you will recognize the old tradition of accurate and thorough information presented in a personally inviting style.

The order of the chapters has changed. Chapter 1 describes the body's basic needs for nutrients and gives the details of many of the body systems as they relate to nutrition. Chapter 2 brings together the concept of diet planning through food grouping systems, the nutrient density concept, and exchange systems. Chapters 3 through 5 are devoted to the energy-yielding nutrients—carbohydrates, lipids, and proteins. Chapters 6 and 7 present the vitamins, minerals, and water. Chapter 8 relates energy balance to the problems of overweight, obesity, and underweight. Chapter 9 is new to this edition, and presents the relationships between fitness, exercise, and nutrition, with specific suggestions for both the casual exerciser and the serious athlete. Chapter 10 delves into topics related to food (food processing, the safety of the food supply, how to avoid foodborne illness, and reading labels). Chapters 11, 12, and 13 develop nutrition themes important throughout life, from conception to old age. Chapter 14 describes the enormity of world food problems, with a focus on personal action.

The optional reading sections, the “Controversies” of this book's title, are printed on colored paper. Many are new to this edition, others are newly revised. These topics tantalize us with new research struggles appearing everywhere we look. We hope you enjoy those we selected for inclusion. Several deserve special mention here. Controversy 1 asks the question of whether modern people should strive to eat as their ancient ancestors did, and tells just what that diet might have been. Controversy 2 gives emphasis to a traditional topic of this book, how to become a sophisticated consumer of nutrition information. It defines explicitly how to tell the wheat from the chaff, the experts from the charlatans. Controversy 10 explores the fascinating contributions *non*nutrients make to the diet. Controversy 14 touches on a topic so vast that it may well shape the future of the world.

The Food Feature sections of Chapters 1 through 10 are much updated and offer new bridges between theory and practice; they are personal applications of the concepts in the chapters. The Self-Study sections at the ends of the chapters

offer you a means of inspecting your own diet, to maximize your benefits from the study of nutrition. A new feature, repeated in every chapter, is the boxes for consumers on supplements and other nutrition-related products, including amino acids, vitamin-mineral supplements, calcium supplements, diet pills, supplements for the athlete, and more.

Glossary definitions of terms now appear on the pages where the terms are used in the text. This new format should ease learning new or major terms. Each new term appears in **boldface type** in the text, to call attention to its importance.

The appendixes are for your reference. Notice especially Appendix A, which presents the nutrient contents of over 1000 foods, including many fast foods not included earlier, and Appendix C, which offers help with nutrition calculations. Appendix I presents details of digestion and absorption beyond those given in the chapters.

Excitement leads us to want to write more about everything, but space constrains us (perhaps fortunately for the reader with limited time). To save space, we have included footnotes only where new information is presented. Anyone with an older edition of the book can find earlier notes, or you can request any reference from us through the publisher.

Thank you for your many good ideas that helped to shape this edition of *Nutrition: Concepts and Controversies*. We hope you enjoy it.

Eleanor N. Whitney
Frances S. Sizer
February, 1988.

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Chapter One

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The Cells and Their
Inheritance

Human Food Behavior

Food Feature: Managing it All

Controversy: Our Ancestors'
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*Seated Odalisque, Left Knee Bent,
Ornamental Background and
Checkerboard* by Henri Matisse.

The Baltimore Museum of Art:
The Cone Collection, formed by
Dr. Claribel Cone and Miss Etta
Cone of Baltimore, Maryland
(Photograph by Tennant). BMA
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