

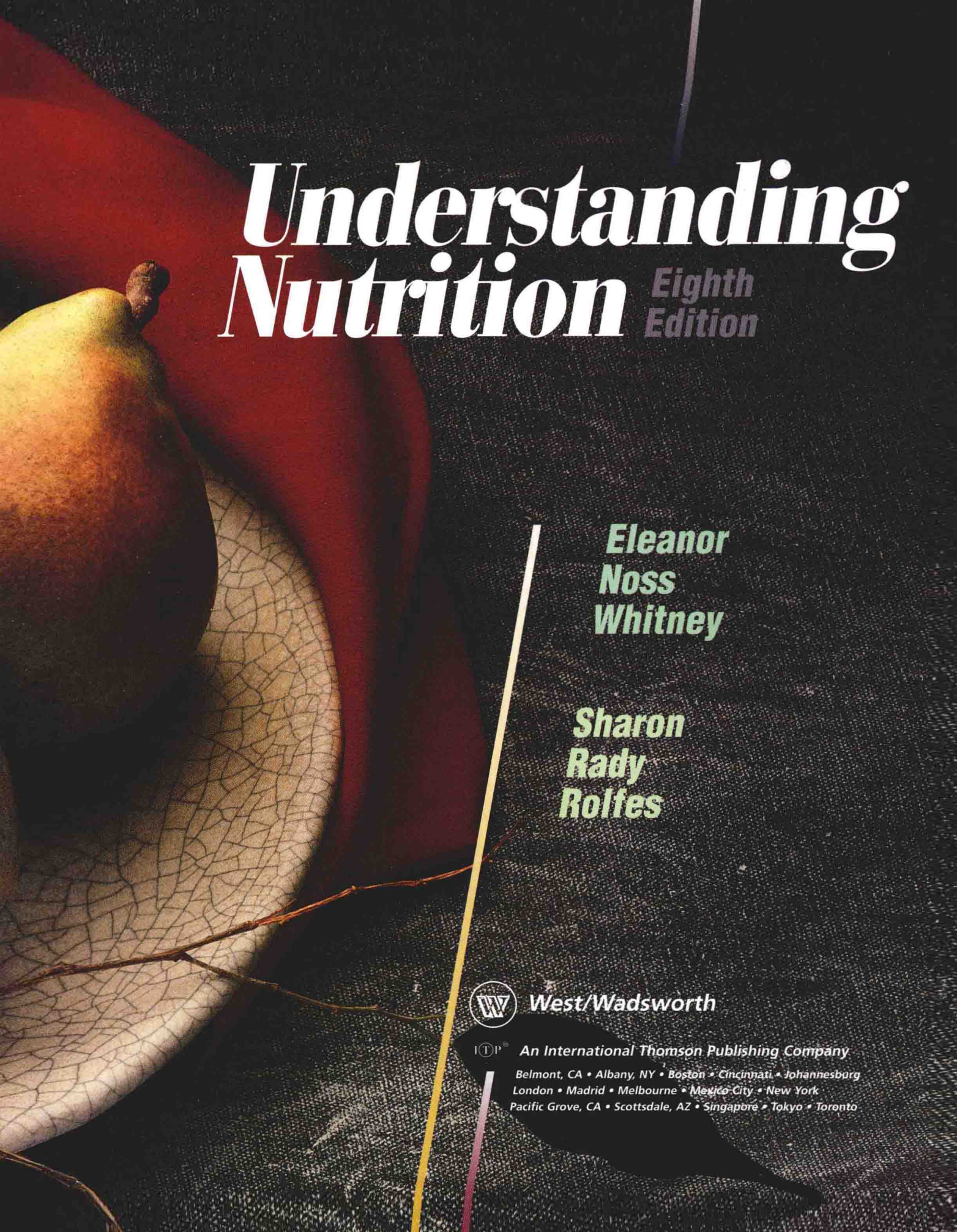


# *Understanding Nutrition*

*Eighth  
Edition*

*Eleanor  
Noss  
Whitney*

*Sharon  
Rady  
Rolfes*

A pear and a large leaf are shown on the left side of the cover. The pear is yellow and green, and the leaf is light green with a detailed vein pattern. The background is dark and textured.

# **Understanding Nutrition** *Eighth Edition*

**Eleanor  
Noss  
Whitney**

**Sharon  
Rady  
Rolfes**



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To

*The memory  
of my beloved  
husband, my hero,  
Jack Yaeger, Jr.*

*Ellie*

To

*My wonderful  
husband, Tom, and  
our delightful  
children, Kristen,  
Lyle, and Marni.*

*Sharon*

## About the Authors

*Eleanor Noss Whitney, Ph.D.*, received her B.A. in biology from Radcliffe College in 1960 and her Ph.D. in biology from Washington University, St. Louis, in 1970. Formerly on the faculty at Florida State University, and a dietitian registered with the American Dietetic Association, she now devotes full time to research, writing, and consulting. Her earlier publications include articles in *Science*, *Genetics*, and other journals. Her textbooks include *Understanding Normal and Clinical Nutrition*, *Nutrition Concepts and Controversies*, *Life Span Nutrition: Conception through Life*, *Nutrition and Diet Therapy*, and *Essential Life Choices* for college students and *Making Life Choices* for high school students. Her most intense interests currently include energy conservation, solar energy uses, alternatively fueled vehicles, and ecosystem restoration.

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# Preface

**T**his eighth edition of *Understanding Nutrition* shares the same goals established over 20 years ago in writing the first edition: to provide a textbook that would both reveal the fascination of the science of nutrition and share the fun and excitement of nutrition with the reader. Readers want more than just facts—they want an understanding of how the scientific facts apply to their daily lives. While the goals for this edition remain unchanged, every chapter has been substantially revised to reflect the many changes that have occurred in the field of nutrition over the years.

To the person reading this text, it will be obvious that, like most sciences, nutrition possesses no absolute certainties. Nutrition scientists simply do not have all the answers yet; in some cases, we have not even asked all the questions yet. This is true in many areas of nutrition; it is a growing, young science dating only from around the turn of the twentieth century. One of the missions of this text, beginning in Chapter 1, is to show readers how researchers ascertain the “facts.”

• **The Chapters** • This book presents the core information of an introductory nutrition course. Chapter 1 wastes no time in exploring why we eat the foods we do and continues with a brief overview of the nutrients, the science of nutrition, recommended nutrient intakes, assessment, and important relationships between diet and health. Chapter 2 describes the diet-planning principles and food guides used to create diets that support good health and includes instructions on how to read a food label. In Chapter 3, readers follow the journey of digestion and absorption as the body transforms foods into nutrients. Chapters 4 through 6 describe carbohydrates, fats, and proteins—their chemistry, health effects, roles in the body, and places in the diet. Then Chapter 7 shows how the body derives energy from these three nutrients. Chapters 8 and 9 continue the story with a look at energy balance, the factors associated with overweight and underweight, and the benefits and dangers of weight loss and weight gain. Chapters 10 through 13 complete the introductory lessons by describing the vitamins, the minerals, and water—their roles in the body, deficiency and toxicity symptoms, and sources.

The next seven chapters weave that basic information into practical applications, showing how nutrition influences people’s lives. Chapter 14 describes how physical activity and nutrition work together to support health. Chapters 15, 16, and 17 present the special nutrient needs of people through the life cycle—pregnancy and lactation; infancy, childhood, and adolescence; and adulthood and the later years. Chapter 18 focuses on the dietary risk factors and recommendations associated with chronic diseases, and Chapter 19 addresses consumer concerns about the safety of the food supply. Chapter 20 closes the book with a look at hunger and global environmental problems and offers suggestions for establishing sustainable foodways.

• **The Features** • The chapters in this edition have been designed with special features to enhance learning. For example, definitions are provided whenever new terms are introduced. These definitions often include pronunciations and derivations to facilitate understanding. A glossary at the end of the text includes all defined terms.

New to this edition are notations of Web site addresses. These sites offer additional information and resources on the topic discussed in the accompanying text.

Many of the chapters include “How to” sections that guide readers through problem-solving tasks. For example, the “How to” in Chapter 1 shows readers how to calculate energy intake from the grams of carbohydrate, fat, and protein in a food; another “How to” in Chapter 13 describes how to calculate iron absorption from a meal.

Many chapters close with a “Making It Click” section. These sections reinforce the “How to” lesson and provide practice in doing nutrition-related calculations. The problems enable readers to apply their skills to hypothetical situations and then check their answers (found in Appendix K). Readers who successfully master these exercises will be well prepared for “real-life” nutrition-related problems.

Each major section within a chapter concludes with a summary paragraph that reviews the key concepts. Similarly, summary tables, figures, and margin lists cue readers to important reviews.

Also featured in this edition are the Healthy People 2000 nutrition-related priorities, which are presented whenever their subjects are discussed (Appendix G presents them in full). Healthy People 2000 is a report developed by the U.S. Department of Health and Human Services that establishes national objectives in health promotion and disease prevention for the year 2000.

Each chapter closes with study questions in essay and multiple-choice format. Study questions offer readers the opportunity to review the major concepts presented in the chapters in preparation for exams. The page numbers after each essay question refer readers to discussions that answer the question; multiple-choice answers appear in Appendix K.

- **The Highlights** • Every chapter is followed by a Highlight. Each Highlight provides readers with an in-depth look at a current, and often controversial, topic that relates to its companion chapter. New Highlights in this edition examine the use of the Internet in finding reliable nutrition information, the science and science fiction behind high-protein weight-loss diets, and the possible benefits and potential harms of alternative therapies.
- **The Appendixes** • The appendixes are valuable references for a number of purposes. Appendix A summarizes background information on the hormonal and nervous systems, complementing Appendixes B and C on basic chemistry, the chemical structures of nutrients, and major metabolic pathways. Appendix D assists readers with calculations and conversions. Appendix E provides detailed coverage on nutrition assessment, and Appendix F lists nutrition resources, including book and journal recommendations as well as addresses, phone numbers, and Websites. Appendix G presents the Recommended Dietary Allowances (1989 RDA), the nutrition-related priorities of Healthy People 2000, the United States Exchange System, and recommendations from the World Health Organization (WHO). Appendix H is a 2000-item food composition table made from the latest nutrient database assembled by ESHA Research, Inc., of Salem, Oregon. Appendix I presents information for Canadians: the Recommended Nutrient Intakes (1990 RNI), the Exchange System, and instructions on reading food labels. Appendix J describes measures of protein quality, and Appendix K presents the answers to the “Making It Click” sections and multiple-choice questions that appear at the ends of chapters.
- **The Inside Covers** • The inside covers put commonly used information at your fingertips. The front covers presents the current nutrient recommendations (introduced in Chapter 1); the inside back cover (left) features the nutrient values used on food labels (described in Chapter 2); and the inside back cover (right) shows the suggested weight ranges for various heights (discussed in Chapter 8).
- **Closing Comments** • We have tried to keep the number of notes to a minimum. Many statements that have appeared in previous editions with notes now appear without them, but every statement is backed by research, and the authors will supply references upon request. We have not provided a separate list of suggested readings, but have tried to include references that will provide readers with additional details or a good overview of the subject. Nutrition is a fascinating subject, and we hope our enthusiasm for it comes through on every page.

Eleanor Noss Whitney  
Sharon Rady Rolfes  
October 1998

# Acknowledgments

To produce a book requires the coordinated effort of a team of people—and, no doubt, each team member has another team of support people as well. We salute, with a big round of applause, everyone who has worked so diligently to ensure the quality of this book.

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# Brief Contents

---

## PREFACE

---

- CHAPTER 1 AN OVERVIEW OF NUTRITION 2**  
*Highlight Finding Nutrition Information—Sites and Sources 23*
- 
- CHAPTER 2 PLANNING A HEALTHY DIET 30**  
*Highlight Ethnic Cuisines and Healthy Choices 55*
- 
- CHAPTER 3 DIGESTION, ABSORPTION, AND TRANSPORT 62**  
*Highlight Common Digestive Problems 83*
- 
- CHAPTER 4 THE CARBOHYDRATES: SUGARS, STARCHES, AND FIBERS 90**  
*Highlight Alternatives to Sugar 118*
- 
- CHAPTER 5 THE LIPIDS: TRIGLYCERIDES, PHOSPHOLIPIDS, AND STEROLS 124**  
*Highlight Alternatives to Fat 156*
- 
- CHAPTER 6 PROTEIN: AMINO ACIDS 160**  
*Highlight Vegetarian, Mediterranean, and Other Meat-Restricted Foodways 187*
- 
- CHAPTER 7 METABOLISM: TRANSFORMATIONS AND INTERACTIONS 196**  
*Highlight Alcohol and Nutrition 221*
- 
- CHAPTER 8 ENERGY BALANCE AND BODY COMPOSITION 230**  
*Highlight The Latest and Greatest Weight-Loss Diet—Again 251*
- 
- CHAPTER 9 WEIGHT CONTROL: OVERWEIGHT AND UNDERWEIGHT 254**  
*Highlight Eating Disorders 281*
- 
- CHAPTER 10 THE WATER-SOLUBLE VITAMINS: B VITAMINS AND VITAMIN C 290**  
*Highlight Vitamin and Mineral Supplements 329*
- 
- CHAPTER 11 THE FAT-SOLUBLE VITAMINS: A, D, E, AND K 336**  
*Highlight Antioxidant Nutrients and Nonnutrients in Disease Prevention 359*
- 
- CHAPTER 12 WATER AND THE MAJOR MINERALS 366**  
*Highlight Osteoporosis and Calcium 396*
- 
- CHAPTER 13 THE TRACE MINERALS 404**  
*Highlight Our Children's Daily Lead 432*
- 
- CHAPTER 14 FITNESS: PHYSICAL ACTIVITY, NUTRIENTS, AND BODY ADAPTATIONS 436**  
*Highlight Supplements and Ergogenic Aids Athletes Use 462*

---

<b>CHAPTER 15</b>	<b>LIFE CYCLE NUTRITION: PREGNANCY AND LACTATION</b>	<b>468</b>
<i>Highlight</i>	<i>Fetal Alcohol Syndrome</i>	<i>497</i>

---

<b>CHAPTER 16</b>	<b>LIFE CYCLE NUTRITION: INFANCY, CHILDHOOD, AND ADOLESCENCE</b>	<b>500</b>
<i>Highlight</i>	<i>Childhood Obesity and the Early Development of Chronic Diseases</i>	<i>530</i>

---

<b>CHAPTER 17</b>	<b>LIFE CYCLE NUTRITION: ADULTHOOD AND THE LATER YEARS</b>	<b>536</b>
<i>Highlight</i>	<i>Nutrient-Drug Interactions</i>	<i>556</i>

---

<b>CHAPTER 18</b>	<b>DIET AND HEALTH</b>	<b>560</b>
<i>Highlight</i>	<i>Alternative Therapies</i>	<i>591</i>

---

<b>CHAPTER 19</b>	<b>CONSUMER CONCERNS ABOUT FOODS</b>	<b>598</b>
<i>Highlight</i>	<i>Consumer Concerns about Water</i>	<i>625</i>

---

<b>CHAPTER 20</b>	<b>HUNGER AND GLOBAL ENVIRONMENTAL PROBLEMS</b>	<b>628</b>
<i>Highlight</i>	<i>Progress Toward Sustainable Agriculture</i>	<i>642</i>

---

<b>APPENDIX A</b>	<b>CELLS, HORMONES, AND NERVES</b>	
-------------------	------------------------------------	--

---

<b>APPENDIX B</b>	<b>BASIC CHEMISTRY CONCEPTS</b>	
-------------------	---------------------------------	--

---

<b>APPENDIX C</b>	<b>BIOCHEMICAL STRUCTURES AND PATHWAYS</b>	
-------------------	--	--

---

<b>APPENDIX D</b>	<b>AIDS TO CALCULATION</b>	
-------------------	----------------------------	--

---

<b>APPENDIX E</b>	<b>NUTRITION ASSESSMENT</b>	
-------------------	-----------------------------	--

---

<b>APPENDIX F</b>	<b>NUTRITION RESOURCES</b>	
-------------------	----------------------------	--

---

<b>APPENDIX G</b>	<b>UNITED STATES: RECOMMENDATIONS AND EXCHANGES</b>	
	<b>WORLD HEALTH ORGANIZATION: RECOMMENDATIONS</b>	

---

<b>APPENDIX H</b>	<b>TABLE OF FOOD COMPOSITION</b>	
-------------------	----------------------------------	--

---

<b>APPENDIX I</b>	<b>CANADA: RECOMMENDATIONS, CHOICE SYSTEM, AND LABELS</b>	
-------------------	---	--

---

<b>APPENDIX J</b>	<b>MEASURES OF PROTEIN QUALITY</b>	
-------------------	------------------------------------	--

---

<b>APPENDIX K</b>	<b>MAKING IT CLICK AND MULTIPLE CHOICE ANSWERS</b>	
-------------------	--	--

---

<b>GLOSSARY</b>		
-----------------	--	--

---

<b>INDEX</b>		
--------------	--	--

# Contents

---

## Chapter 1 AN OVERVIEW OF NUTRITION 2

### Food Choices 3

#### Introducing the Nutrients 5

- The Six Classes of Nutrients 5
- The Energy-Yielding Nutrients 6
- The Vitamins 9
- The Minerals 9
- Water 9

#### The Science of Nutrition 10

- Nutrition Research 10
- Research Versus Rumors 12

#### Dietary Reference Intakes 13

- Establishing Nutrient Recommendations 13
- Using Nutrient Recommendations 15
- Comparing Nutrient Recommendations 16

#### Nutrition Assessment 16

- Nutrition Assessment of Individuals 17
- Nutrition Assessment of Populations 18

#### Diet and Health 19

- Chronic Diseases 20
- Risk Factors for Chronic Diseases 20

#### HIGHLIGHT Finding Nutrition Information—Sites and Sources 23

---

## Chapter 2 PLANNING A HEALTHY DIET 30

### Principles and Guidelines 31

- Diet-Planning Principles 31
- Dietary Guidelines for Americans 32

### Diet-Planning Guides 33

- Food Group Plans 33
- Exchange Lists 38
- Combining Food Group Plans and Exchange Lists 42
- From Guidelines to Groceries 43

### Food Labels 46

- The Ingredient List 48
- Serving Sizes 48
- Nutrition Facts 48



- The Daily Values 49
- Descriptive Terms 50
- Health Claims 50
- Consumer Education 52

#### HIGHLIGHT Ethnic Cuisines and Healthy Choices 55

---

## Chapter 3 DIGESTION, ABSORPTION, AND TRANSPORT 62

### Digestion 63

- Anatomy of the Digestive Tract 63
- The Muscular Action of Digestion 66
- The Secretions of Digestion 68
- The Final Stage 70

### Absorption 71

- Anatomy of the Absorptive System 71
- A Closer Look at the Intestinal Cells 74

### The Circulatory Systems 75

- The Vascular System 75
- The Lymphatic System 78

### Regulation of Digestion and Absorption 79

- Gastrointestinal Hormones and Nerve Pathways 79
- The System at Its Best 81

#### HIGHLIGHT Common Digestive Problems 83

---

## Chapter 4 THE CARBOHYDRATES: SUGARS, STARCHES, AND FIBERS 90

### The Chemist's View of Carbohydrates 91

### The Simple Carbohydrates 92

- Monosaccharides 92
- Disaccharides 93

### The Complex Carbohydrates 95

- Glycogen 95
- Starches 96
- The Fibers 96

### Digestion and Absorption of Carbohydrates 98

- The Processes of Digestion and Absorption 98
- Lactose Intolerance 101

### Glucose in the Body 102

- A Preview of Carbohydrate Metabolism 102
- The Constancy of Blood Glucose 104

**Health Effects and Recommended Intakes of Sugars 106**

- Health Effects of Sugars 107
- Accusations against Sugars 109
- Recommended Intakes of Sugars 110

**Health Effects and Recommended Intakes of Starch and Fibers 110**

- Health Effects of Starch and Fibers 110
- Recommended Intakes of Starch and Fibers 112

**HIGHLIGHT Alternatives to Sugar 118**

**Chapter 5 THE LIPIDS: TRIGLYCERIDES, PHOSPHOLIPIDS, AND STEROLS 124**

**The Chemist's View of Triglycerides and Fatty Acids 125**

- The Fatty Acids 126
- Fats in Foods 128
- Roles of Triglycerides and Fatty Acids 130
- Essential Fatty Acids 130

**The Chemist's View of Phospholipids and Sterols 132**

- The Phospholipids 133
- The Sterols 134

**Digestion, Absorption, and Transport of Lipids 135**

- Lipid Digestion 136
- Lipid Absorption 138
- Lipid Transport 139

**Lipids in the Body 141**

- Triglycerides in the Blood 141
- A Preview of Lipid Metabolism 141

**Health Effects and Recommended Intakes of Lipids 143**

- Health Effects of Lipids 143
- Recommended Intakes of Fat 146

**HIGHLIGHT Alternatives to Fat 156**

**Chapter 6 PROTEIN: AMINO ACIDS 160**

**The Chemist's View of Proteins 161**

- Amino Acids 161
- Proteins 162

**Digestion and Absorption of Protein 164**

- The Process of Digestion 164
- The Process of Absorption 164

**Proteins in the Body 166**

- Protein Synthesis 166
- Roles of Proteins 168
- A Preview of Protein Metabolism 172



**Protein in Foods 174**

- Protein Quality 174
- Measures of Protein Quality 175
- Protein Regulations for Food Labels 176

**Health Effects and Recommended Intakes of Protein 177**

- Protein-Energy Malnutrition 177
- Health Effects of Protein 179
- Recommended Intakes of Protein 180
- Protein and Amino Acid Supplements 182

**HIGHLIGHT Vegetarian, Mediterranean, and Other Meat-Restricted Foodways 187**

**Chapter 7 METABOLISM: TRANSFORMATIONS AND INTERACTIONS 196**

**Chemical Reactions in the Body 197**

**Breaking Down Nutrients for Energy 201**

- Glucose 202
- Glycerol and Fatty Acids 206
- Amino Acids 207
- The Final Steps of Catabolism 211

**The Body's Energy Budget 214**

- The Economics of Feasting 215
- The Transition from Feasting to Fasting 216
- The Economics of Fasting 216

**HIGHLIGHT Alcohol and Nutrition 221**

**Chapter 8 ENERGY BALANCE AND BODY COMPOSITION 230**

**Energy Balance 231**

**Energy In: The kCalories Foods Provide 232**

- Food Composition 232
- Food Intake 233

**Energy Out: The kCalories the Body Spends 236**

- Components of Energy Expenditure 236
- Estimating Energy Requirements 239

**Body Weight, Body Composition, and Health 240**

- Defining Healthy Body Weight 240
- Body Fat and Its Distribution 242
- Health Risks Associated with Body Weight and Body Fat 246

**HIGHLIGHT The Latest and Greatest Weight-Loss Diet—Again 251**

**Chapter 9 WEIGHT CONTROL: OVERWEIGHT AND UNDERWEIGHT 254**

**Overweight 255**

- Fat Cell Development 255
- Fat Cell Metabolism 256
- Set-Point Theory 256

**Causes of Obesity 257**

- Genetics 257
- Overeating 258
- Physical Inactivity 259

**Controversies in Obesity Treatment 260**

- Elusive Goals 260
- Dangers of Weight Loss 261

**Aggressive Treatments of Obesity 262**

- Drugs 262
- Very-Low-kCalorie Diets 265
- Surgery 265

**Reasonable Treatments of Obesity 266**

- Eating Plans 268
- Physical Activity 269
- Behavior and Attitude 271
- Weight Maintenance 273
- Prevention 274

**Underweight 274**

- Problems of Underweight 274
- Weight-Gain Strategies 275

**HIGHLIGHT Eating Disorders 281****Chapter 10 THE WATER-SOLUBLE VITAMINS: B VITAMINS AND VITAMIN C 290****The Vitamins—An Overview 291****The B Vitamins—As Individuals 294**

- Thiamin 295
- Riboflavin 296
- Niacin 299
- Biotin 302
- Pantothenic Acid 304
- Vitamin B<sub>6</sub> 304
- Folate 306
- Vitamin B<sub>12</sub> 312
- Non-B Vitamins 314

**The B Vitamins—In Concert 315**

- B Vitamin Roles 316
- B Vitamin Deficiencies 316
- B Vitamin Toxicities 318
- B Vitamin Food Sources 318

**Vitamin C 319**

- Vitamin C Roles 319
- Vitamin C Recommendations 321
- Vitamin C Deficiency 321
- Vitamin C Toxicity 322
- Vitamin C Food Sources 324

**HIGHLIGHT Vitamin and Mineral Supplements 329****Chapter 11 THE FAT-SOLUBLE VITAMINS: A, D, E, AND K 336****Vitamin A and Beta-Carotene 337**

- Roles in the Body 338
- Vitamin A Deficiency 340
- Vitamin A Toxicity 342
- Vitamin A Recommendations 343
- Vitamin A in Foods 343

**Vitamin D 345**

- Roles in the Body 347
- Vitamin D Deficiency 347
- Vitamin D Toxicity 349
- Vitamin D Recommendations and Sources 349

**Vitamin E 350**

- Vitamin E as an Antioxidant 350
- Vitamin E Deficiency 351
- Vitamin E Toxicity 351
- Vitamin E Recommendations 351
- Vitamin E in Foods 352

**Vitamin K 354**

- Roles in the Body 354
- Vitamin K Deficiency 354
- Vitamin K Toxicity 355
- Vitamin K Recommendations and Sources 355

**The Fat-Soluble Vitamins—In Summary 355****HIGHLIGHT Antioxidant Nutrients and Nonnutrients in Disease Prevention 359****Chapter 12 WATER AND THE MAJOR MINERALS 366****Water and the Body Fluids 367**

- Water Balance and Recommended Intakes 367
- Blood Volume and Blood Pressure 369
- Fluid and Electrolyte Balance 370
- Fluid and Electrolyte Imbalance 372
- Acid-Base Balance 373

**The Minerals—An Overview 374****Sodium 375****Chloride 378****Potassium 379****Calcium 382**

- Calcium Roles in the Body 382
- Calcium Recommendations and Sources 383
- Calcium Deficiency 387

**Phosphorus 387****Magnesium 389****Sulfur 390****HIGHLIGHT Osteoporosis and Calcium 396**



**Chapter 17 LIFE CYCLE NUTRITION: ADULTHOOD AND THE LATER YEARS 536****Nutrition and Longevity 537**

- Observation of Elderly People 538
- Manipulation of Diet 539

**The Aging Process 540**

- Physiological Changes 540
- Other Changes 541

**Energy and Nutrient Needs of Older Adults 542**

- Water 542
- Energy and Energy Nutrients 543
- Vitamins and Minerals 544
- Nutrient Supplements 545

**Nutrition-Related Concerns of Older Adults 545**

- Cataracts and Macular Degeneration 546
- Arthritis 546
- The Aging Brain 547

**Food Choices and Eating Habits of Older Adults 549**

- Food Assistance Programs 551
- Meals For Singles 551

**HIGHLIGHT Nutrient-Drug Interactions 556****Chapter 18 DIET AND HEALTH 560****Nutrition and Chronic Diseases 561****Heart Disease and Strokes 563**

- How Atherosclerosis Develops 563
- Risk Factors for Cardiovascular Disease 564
- Recommendations for Reducing Cardiovascular Disease Risk 566

**Hypertension 570**

- Blood Pressure Regulation 570
- How Hypertension Develops 571
- Risk Factors for Hypertension 572
- Recommendations for Reducing Hypertension Risk 572

**Cancer 574**

- How Cancer Develops 574
- Recommendations for Reducing Cancer Risk 577

**Diabetes Mellitus 577**

- Complications of Diabetes 578
- Dietary Recommendations for Type 1 Diabetes 580

- Dietary Recommendations for Type 2 Diabetes 580

**Recommendations for Chronic Diseases 581****Nutrition and Infectious Diseases 583**

- The Immune System 583
- Nutrition and Immunity 584

**Human Immunodeficiency Virus (HIV) Infection and Acquired Immune Deficiency Syndrome (AIDS) 584**

- How AIDS Develops 585
- The HIV Wasting Syndrome 585
- Nutrition Support for People with HIV Infections 586

**HIGHLIGHT Alternative Therapies 591****Chapter 19 CONSUMER CONCERNS ABOUT FOODS 598****Food-Borne Illnesses 599**

- Food-Borne Infections and Food Intoxications 599
- Food Safety in the Marketplace 600
- Food Safety in the Kitchen 602
- Food Safety while Traveling 605
- Advances in Food Safety 607

**Nutritional Adequacy of Foods and Diets 608****Environmental Contaminants 608**

- Harmfulness of Environmental Contaminants 608
- Examples of Environmental Contaminants 608

**Natural Toxicants in Foods 610****Pesticides 611**

- Hazards and Regulations of Pesticides 611
- Monitoring Pesticides 612
- Consumer Concerns 613

**Food Additives 615**

- Regulations Governing Additives 615
- Intentional Food Additives 616
- Indirect Food Additives 619

**Food Biotechnology 621**

- Genetic Engineering 621
- Regulations and Labeling 622

**HIGHLIGHT Consumer Concerns about Water 625**



---

**Chapter 20 HUNGER AND GLOBAL ENVIRONMENTAL PROBLEMS 628****Hunger in the United States 629**

Defining Hunger in the United States 629

Relieving Hunger in the United States 630

**World Hunger 632****Poverty and Overpopulation 634****Environmental Degradation and Hunger 635**Environmental Limitations in Food  
Production 635

Other Limitations in Food Production 636

**Solutions 636**

Sustainable Development Worldwide 637

Activism and Simpler Lifestyles at Home 638

---

**HIGHLIGHT Progress toward Sustainable  
Agriculture 642**

---

**Appendix A CELLS, HORMONES, AND NERVES**

---

**Appendix B BASIC CHEMISTRY CONCEPTS**

---

**Appendix C BIOCHEMICAL STRUCTURES AND PATHWAYS**

---

**Appendix D AIDS TO CALCULATION**

---

**Appendix E NUTRITION ASSESSMENT**

---

**Appendix F NUTRITION RESOURCES**

---

**Appendix G UNITED STATES: RECOMMENDATIONS AND  
EXCHANGES****WORLD HEALTH ORGANIZATION: RECOMMEN-  
DATIONS**

---

**Appendix H TABLE OF FOOD COMPOSITION**

---

**Appendix I CANADA: RECOMMENDATIONS, CHOICE  
SYSTEM, AND LABELS**

---

**Appendix J MEASURES OF PROTEIN QUALITY**

---

**Appendix K MAKING IT CLICK AND MULTIPLE CHOICE  
ANSWERS**

---

**GLOSSARY**

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**INDEX**