



NUTRITION

SCIENCE AND APPLICATIONS

Fourth Edition

S M O L I N



G R O S V E N O R



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Fourth Edition

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University of Connecticut

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To our sons, Zachary and Max and David and John.
Their view of the world helps us to keep life in perspective.

To our husbands, David Knecht and Peter Ambrose,
who have given their support, patience, and understanding
over the years as well as their expertise as
computer and literary consultants.

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About the Authors

Lori A. Smolin, Ph.D. Lori Smolin received her B.S. degree from Cornell University, where she studied human nutrition and food science. She received her doctorate from the University of Wisconsin at Madison. Her doctoral research focused on B vitamins, homocysteine accumulation, and genetic defects in homocysteine metabolism. She completed postdoctoral training both at the Harbor-UCLA Medical Center, where she studied human obesity, and at the University of California at San Diego, where she studied genetic defects in amino acid metabolism. She has published in these areas in peer-reviewed journals. Dr. Smolin is currently at the University of Connecticut, where she teaches both in the Department of Nutritional Sciences and in the Department of Molecular and Cell Biology. Courses she has taught include introductory nutrition, lifecycle nutrition, food preparation, nutritional biochemistry, general biochemistry, and biology. Dr. Smolin spent the 2001/2002 academic year in England where she was able to experience the food and nutrition culture on the other side of the Atlantic.



Mary B. Grosvenor, M.S., R.D. Mary Grosvenor received her B.A. degree in English from Georgetown University and her M.S. in Nutrition Science from the University of California at Davis. She is a registered dietitian who worked for many years managing nutrition research studies at the General Clinical Research Center at Harbor-UCLA Medical Center. She has published in peer-reviewed journals in the areas of nutrition and cancer and methods of assessing dietary intake. She has taught introductory nutrition at the community college level and currently lives with her family in a small town in Colorado. She is continuing her teaching and writing career and is still involved in nutrition research via the electronic superhighway.



Life is full of choices. Whether you choose plain vanilla ice cream, orange sorbet, or a fresh orange depends on many factors, including nutrition. How this choice affects your nutritional health depends on the other choices you make. This text conveys to students that each dietary choice makes up only one part of the total diet. So, no one choice is a bad one as long as the sum of food choices over a period of days or weeks makes up a healthy overall diet. Knowing how to make wise choices is the key to applying nutritional principles. The Fourth Edition of *Nutrition: Science and Applications* continues with and expands upon the theme of choice that was used in the previous editions.

The goal of the authors is to provide a text that teaches students both the basic principles of nutrition science and how to apply them to choices about the foods they eat and the nutrition information they encounter. Students frequently ask: Is this food good for me or bad for me? Should I be eating a lowfat diet? Should I take a protein supplement to improve my athletic performance? Are herbal supplements safe? How can I lose 10 pounds? The answers to all these questions involve choices. And it is these personal concerns that trigger student interest in nutrition. When introductory nutrition classes and textbooks present the basics—What is carbohydrate? Protein? Fat?—but fail to prepare students to make choices about foods and popular nutrition issues, it is difficult for students to apply what they have learned to their daily lives. *Nutrition: Science and Applications* presents a complete introduction to the science of nutrition while at the same time teaching students how to use a scientific approach in making decisions about the nutrition-related choices they face every day.

Approach

A scientific approach is employed throughout the text. The goal is to teach students how to apply the logic of science to their own nutrition concerns. We present the process of scientific inquiry and demonstrate how it is used to evaluate the role of nutrition in health. The text contains all of the information students need to analyze and modify their own diets to promote health and to reduce the risk of deficiencies and chronic diseases related to nutrition.

Several themes are used throughout the book to provide a broad view of both the science of nutrition and its applications. These include

- (1) An emphasis on the importance of the total diet, not just individual nutrients or food choices
- (2) Attention to health promotion and disease prevention
- (3) A focus on the methods of science to provide students with the tools needed to make healthy food and nutrition decisions
- (4) An emphasis on critical thinking, which guides students through the thought processes necessary to make nutrition decisions
- (5) A broad cultural view of our ethnically diverse population and food supply.

The Fourth Edition continues the integrated approach that was so successful in previous editions. Health and disease, metabolism, cultural diversity, and life-stage topics are incorporated into each chapter. For example, the relationship of dietary fat intake, lipid metabolism and transport, and heart disease is discussed in the lipids chapter. How this information applies to young children, pregnant women, and older adults is also presented. This integration engages students early on because it presents the topics of greatest interest to them, such as the role of nutrition in health and disease, along with basic nutrition principles. Students are then more motivated to learn the basics and are prepared to apply them to their personal health and nutrition.

Continuing and New Features of the Fourth Edition

The Fourth Edition continues with, enhances, and adds to the features of earlier editions. These features help to emphasize the importance of the total dietary pattern as well as individual nutrients in health and disease. They also support the scientific approach used throughout the text, encourage the students to learn and use critical thinking skills, and enhance the educational effectiveness and visual appeal of the book.

The Total Diet The more science discovers about nutrition, the more clear it becomes that it is not a single food or nutrient that determines our nutritional health. Rather it is the total diet, including the overall combination of nutrients, foods, and other health-promoting substances, that determines nutritional status. This concept is highlighted by chapter sections that address the role of a nutrient as one part of the total diet. These sections stress the importance of a diet based on whole grains, fruits, and vegetables and the importance of meeting nutrient needs with a variety of foods. This type of diet provides a variety of nonnutrient

X PREFACE

substances such as phytochemicals that are also important to health and are lacking when people rely on vitamin and mineral supplements, rather than foods, to meet their nutrient needs. Several of the Critical Thinking exercises help illustrate that each dietary choice we make affects more than one nutrient in the diet. This focus on the importance of the diet as a whole rather than on single foods or nutrients helps students understand that one choice does not make or break a diet.

New: Dietary Reference Intakes (DRIs) for Energy, Carbohydrates, Fiber, Fat, Protein, and Amino Acids

This text incorporates the new DRI recommendations for energy and the macronutrients, which were released in September 2002. These new DRIs emphasize that carbohydrate, fat, and protein all serve as energy sources in the diet and must therefore be considered together. Acceptable Macronutrient Distribution Ranges (AMDR) of 45 to 65% of energy from carbohydrate, 20 to 35% from fat, and 10 to 35% from protein have been recommended. Adequate Intakes have been established for fiber and essential fatty acids; RDAs have been set for dietary carbohydrate and protein; Estimated Energy Requirements have been developed for four different activity levels; and new physical activity recommendations have been presented. The DRIs for nutrients involved in bone formation (calcium, phosphorus, magnesium, vitamin D, and fluoride), for B vitamins and choline, for antioxidants (vitamin C, vitamin E, selenium, and carotenoids), and for vitamins A and K and the trace elements are also included in this text and updates will be provided throughout the life of this edition for DRI sets that have not yet been completed.

New: A Separate Chapter on Meeting Nutrient Needs with Food, Fortified Foods, and Dietary Supplements

The modern food supply offers a variety of ways to meet nutrient needs. For many people, a well-planned diet made up of minimally processed foods can provide all their nutrient needs. For others, supplemental sources (that is, fortified foods and dietary supplements) may be desired or required to meet needs. For the first time, government recommendations on nutrient needs, the Dietary Reference Intakes, have recognized that these products may be the best way for certain life-stage groups to meet their needs. However, the increase in the availability of these products has also opened the door for toxicity. Even those who do not take supplements may consume more than the recommended amounts of certain nutrients in fortified products such as breakfast cereals and beverages. To address these issues, this edition has included a new chapter (12) that discusses the benefits and drawbacks of meeting needs with foods, fortified foods, and supplements as well as the role of many supplements that are not nutrients, including herbal supplements. A text that does not address this topic invites students to seek information from less reliable sources. Discussions of many popular dietary supplements are also integrated throughout the text with information

about individual nutrients and topics such as weight loss, exercise, and aging.

Staying Abreast of New Information The Fourth Edition continues to provide up-to-date coverage of the most recent advances in nutrition science, such as the relationship between genetics and body weight regulation, the ecological impact of genetically modified foods and organic food production, and the nutritional and health impact of phytochemicals and dietary supplements. The text is well referenced with the majority of references from the last five years. The authors would be happy to provide sources for information that is not referenced in the text. Recent public health messages are also included. For example, the Dietary Guidelines for Americans, 2000 are covered thoroughly in Chapter 2 and highlighted throughout the text. When one or more of the recommendations of the Dietary Guidelines applies to the topic being addressed, a graphic depicting these guidelines appears.

Easy-to-Understand Metabolism Information Metabolism is one of the most challenging topics for nutrition students. To prevent students from being overwhelmed, this text integrates coverage of metabolism with discussions of each of the macronutrients rather than concentrating it into one long chapter. This approach allows information on metabolism to build on and reinforce what was learned in the previous chapter. For example, the information on fat metabolism in Chapter 5 builds on the presentation of carbohydrates in Chapter 4. Chapter 7 integrates all of the information on energy production. Chapters 8 through 11 discuss the role of micronutrients in metabolism, and Chapter 13 provides an overview and review by applying this knowledge to a discussion of fitness and the exercising body.

Environmental Issues Discussions of environmental issues are included because they can have an impact on the nutrient composition of foods as well as on food choices. For example, the amounts of certain nutrients in a food, such as iodine and selenium, depend on the environmental conditions where that food is produced. In addition, the foods we choose are often affected by our concern for the environment. This is discussed in depth in Chapters 17 and 18 where the impact of food production on the environment and the benefits and risks of organic food production and genetically modified foods are discussed.

Ethnic Diversity This text uses statistics and examples to reflect the broad cultural base of a diverse student population. Incorporating ethnic foods in text examples and in Critical Thinking exercises throughout make the book more relevant for this audience. In addition, these examples expose students to the foods and eating patterns of other cultures. Differences in the disease risks of various ethnic groups in relation to their genetic makeup and their native diets are also addressed.

Concise, Easy-to-Read Style As the field of nutrition progresses, more and more information becomes available and textbooks get longer and longer. To help instructors and students cover the important and interesting aspects of macronutrients and micronutrients, the length of the Fourth Edition has been kept in check. The writing style is concise, consistent, engaging, and easy to read. The organization from chapter to chapter is uniform, each chapter starting with a “friendly” or familiar topic to capture students’ interest. Throughout the book, similar illustration designs—such as those depicting the metabolism of carbohydrate, fat, and protein; the nutrient content of foods; and the recommendations of the Dietary Guidelines—help students identify analogous information and reinforce and build upon knowledge acquired in previous sections. Colors are also used consistently to represent carbohydrate, fat, and protein and to identify certain steps in metabolism.

Critical Thinking Exercises These unique exercises appear in each chapter. They use case histories to introduce a nutritional problem and then guide students through the logical thought processes involved in solving the problem. Some questions are answered to provide a model for students, and others require students to critically think through the answers themselves (solutions are included in the Appendices). The Critical Thinking exercises also provide a guide for students to use when answering Application questions at the end of the chapter. In the Fourth Edition many Critical Thinking exercises have been revised to improve clarity and reflect changes in the field.

Off the Shelf These boxed features discuss issues that relate to items that can be obtained off the shelves of stores, such as foods, books, and supplements. They focus on consumer issues and choices and on evaluating nutrition information. Off the Shelf discussions are a unique aspect of this text, briefly highlighting topics of special interest that deserve more explanation. They can be read separately or in conjunction with the body of the text. In the Fourth Edition, new boxes have been added and old ones updated to reflect new information relating to the topic being discussed.

Off the Label These features present in-depth information on food labels as they apply to specific nutrients or issues. The most up-to-date information is included. For example, in Chapter 3 the box “Antacids: Getting the Drug Facts” points out that taking medications can add nutrients to the diet and explains how the drug facts label can be used to assess the nutrient contribution made by a medication. Other new Off the Label boxes show how to use labels to get enough calcium in your diet and how to understand the information about micronutrients that is given on the label.

Life Stage Icons In each chapter, life stage icons highlight issues and recommendations that apply to specific stages and circumstances of life. This information helps students understand how nutrient requirements are affected by one’s

life stage as well as offering information relevant to students in all phases of life. These topics are also covered in depth in separate chapters (14, 15, 16).

The Fourth Edition, Chapter-by-Chapter

The text includes five parts. The first part, “Nutrition: Sorting Fact from Fantasy,” introduces the reader to the basic concepts of nutrition, the scientific method, and the principles of digestion and absorption necessary to understand issues presented throughout the book. The second part, “Energy-Yielding Nutrients,” includes chapters on carbohydrates, lipids, and proteins, as well as a chapter that covers energy balance, weight control, and eating disorders. The third part, “Water and the Micronutrients,” examines the non-energy-yielding nutrients: water, vitamins, and minerals as well as supplemental sources of nutrients. The fourth part, “Applying Nutrition to Life,” applies the basics of nutrition to different lifestyle issues and stages of development. The final part, “Nutrition in Today’s World,” addresses food safety and discusses issues related to malnutrition in North America and the world. The material is presented in a consistent and logical order, but the chapters and sections can be taught in any order.

Chapter 1, “Nutrition: Everyday Choices,” provides an overview of the nutrients and their roles in the body, and introduces the scientific method. Chapter 1 also teaches students how to sort accurate from inaccurate nutrition information. A mock ad featuring a protein supplement for athletes is used to help students learn how to interpret nutrition information from many sources.

Chapter 2, “Applying the Science of Nutrition,” shows how the results of scientific studies are used to develop dietary standards and guidelines. The Dietary Reference Intakes (DRIs) are introduced here, and tools for diet planning, including the Food Guide Pyramid, Exchange Lists, and food labels, are presented so that students can begin applying them to their own diets. The Dietary Guidelines for Americans, 2000 are discussed and help tie together other recommendations and guidelines. The final section of this chapter discusses how these and other tools can be used to assess the nutritional health of populations and individuals. Information from the most up-to-date surveys (NHANES IV) and programs (Healthy People 2010) is provided here and throughout the text. The Critical Thinking exercises in this chapter demonstrate how to plan diets using the Food Guide Pyramid and how nutritional assessment can be used to identify nutrition-related health problems.

Chapter 3, “The Human Body: From Meals to Molecules,” presents digestion and absorption by showing how a particular meal is digested, its nutrients absorbed into the body and transported to the cells where metabolism occurs, and finally how wastes are removed. A new Off the Label box discusses the potential nutritional impact of over the counter medications.

Chapters 4, 5, and 6 discuss carbohydrates, lipids, and proteins, respectively. Each begins with information about

the types of foods that contain these nutrients, followed by a discussion of their basic structures. Key points about the digestion and absorption of these nutrients are followed by a section addressing their role in the body. In each chapter, energy production is summarized using a figure that illustrates how the metabolism of each nutrient interfaces with that of others. A separate section on health and disease is followed by a section that discusses the role of each individual nutrient as one part of the total diet. Nutrient requirements and how they vary through life, as well as how to make dietary choices to meet recommendations, are presented. To teach students how to select a healthy diet, the recommendations of the DRIs and Dietary Guidelines are integrated with the information provided by food labels and the Food Guide Pyramid.

In Chapter 4 information on diabetes has been updated and expanded to provide students with a better understanding of the long-term consequences of this growing public health problem. The DRI recommendations, including the RDA and Acceptable Macronutrient Distribution Range (AMDR) for carbohydrate intake and the AI fiber, are presented and discussed. Chapter 5 has been updated to reflect the new DRI recommendations and the most recent recommendations regarding blood cholesterol levels. Improvements and additions to the art program help students to better understand lipid structure, digestion, absorption, and metabolism. In Chapter 6, the discussion of protein synthesis and gene expression has been strengthened, and intake recommendations have been updated to reflect the new DRIs. A new vegetarian Food Guide Pyramid has been added, and information on the potential health benefits of soy protein has been updated.

Chapter 7, “Energy Balance and Weight Management,” presents the concept of energy balance and applies it to weight management. This chapter includes the new DRI Estimated Energy Requirements (EERs), which are based on physical activity levels. The presentation of obesity reflects the newer view that it is a disease that should be treated using an individualized plan that includes diet, exercise, behavior modification, and, when appropriate, medication. Information on assessing body weight using body mass index (BMI) has been updated to include the recommendations of the Dietary Guidelines for Americans, 2000. Updated information is also included on how body weight is regulated and the role of genetic versus environmental factors in determining body fatness. A new Off the Shelf feature discusses the risks of using weight-loss supplements called fat burners. The health risks of too much or too little body fat as well as of eating disorders are addressed.

Chapter 8, “The Water-Soluble Vitamins,” begins with a general overview of vitamins—where they are found in the diet, factors affecting bioavailability, and how they function. Each of the B vitamins and vitamin C are discussed individually, but the B vitamins are grouped according to common roles as coenzymes in energy production, amino acid metabolism, and cell division. Discussions of each of the water-soluble vitamins include sources in the diet, func-

tions in the body, impact on health, recommended intakes, supplement use, and potential for toxicity. This chapter also discusses choline, a substance that is not currently classified as a vitamin but one for which DRIs have been established. Improved line art helps identify Food Guide Pyramid Groups that are good sources of these vitamins and point out functional relationships among the B vitamins. The section on vitamin C includes an expanded discussion of the role of antioxidants in protecting the body from damage.

Chapter 9, “The Fat-Soluble Vitamins,” presents each of the fat-soluble vitamins and discusses sources in the diet, functions in the body, impact on health, recommended intakes, supplement use, and potential for toxicity. A discussion (with line art) of how vitamins A and D act by affecting gene expression is presented in this chapter.

Chapter 10, “The Internal Sea: Water and the Major Minerals,” presents information on where these nutrients are found and discusses their function in the body, their relationship to health and disease, and recommended intakes. Water is discussed first, followed by the electrolytes sodium, potassium, and chloride, which interact closely with water. Some general information about minerals is followed by a discussion of the minerals involved in bone formation—calcium, phosphorus, and magnesium. The impact of diet and lifestyle on hypertension and osteoporosis is also addressed here. Advances in our understanding of the impact of total dietary patterns on hypertension is stressed by an expanded discussion of the DASH diet, a dietary pattern that has been shown to lower blood pressure.

Chapter 11, “The Trace Minerals: Our Elemental Needs,” discusses the trace elements in a format similar to that used for other micronutrients. An emphasis is placed on the unique roles of some minerals and on the similarities in function and the interactions that exist among them. Discussions of the health issues related to these nutrients help create interest, as do discussions of the pros and cons of trace element supplements. For example, the discussion of iron has been expanded to place emphasis on the problems of iron overload as well as iron deficiency, and an Off the Shelf feature on the effectiveness of zinc lozenges for treating cold symptoms has been updated.

The new Chapter 12, “Meeting Our Needs: Food, Fortified Food, and Supplements,” addresses the fact that Americans today get their nutrients from fortified food and dietary supplements as well as food. This new chapter has been added to address the role that fortified foods and supplements have in the diet and the advantages and disadvantages of using these products. We emphasize the fact that food sources of nutrients also provide other substances, such as phytochemicals, which, although they are not nutrients, may have health benefits. An expanded section on dietary supplements uses a risk-benefit approach to help students evaluate all products defined as dietary supplements. We have added an Off the Shelf feature that discusses foods that have been highly fortified with micronutrients and herbs. A new Critical Thinking exercise helps students learn how to evaluate the safety and efficacy of dietary supplements.

Discussions of dietary supplements are also integrated throughout the book, with applicable topics.

Chapter 13, “Fueling Fitness: Nutrition and Exercise,” is designed to emphasize the importance of fitness to nutritional health as well as to provide information on nutrition and athletic performance. This chapter includes the new DRI exercise recommendations and serves as a review of metabolism and energy production. By this point in the text, students have studied all the essential nutrients, so a complete discussion of the macronutrient and micronutrient needs for energy production can be included. An expanded discussion of ergogenic aids for more competitive athletes directs students to use a risk-benefit analysis of these products before deciding whether or not to use them. A new Off the Shelf feature discusses anabolic steroids, androstenedione, and other ergogenic hormones.

Chapter 14, “In the Beginning: Nutrition for Mothers and Infants,” addresses the role of nutrition in development by discussing the nutritional needs of the mother during pregnancy and lactation as well as the nutritional needs of the infant. Current recommendations and practical information about breast and formula feeding of infants are given. The DRI recommendations for pregnancy and lactation are included.

Chapter 15, “The Growing Years: Infancy to Adolescence,” begins by discussing the importance of learning healthy eating habits early in life. The chapter discusses nutrient needs from the first solid foods offered to infants to the independent choices of adolescents. Exercise recommendations and an activity pyramid for children are included. A discussion of nutrition and alcohol consumption is included in this chapter because adolescents are often faced with the important choice of whether or not to use alcohol.

Chapter 16, “Nutrition and Aging: The Adult Years,” addresses how nutrition affects aging and how aging affects nutrition. It includes updated information on the interrelationships between aging and nutritional status. It discusses nutrient-drug interactions, including an expanded discussion of the risks and benefits of alcohol consumption. Also presented are nutrition programs such as the Older Americans Act and the Nutrition Screening Initiative. The chapter includes a new Critical Thinking exercise that shows how the DETERMINE checklist can be used to identify and prevent malnutrition in the elderly.

Chapter 17, “How Safe Is Our Food Supply?” discusses the risks and benefits associated with the U.S. food supply and includes information on the impact of microbial hazards, chemical toxins, food additives, irradiation, and genetically modified foods. The directives of the Food Safety Initiative are addressed, including the use of HACCP (Hazard Analysis Critical Control Point) to ensure safe food and advances in technology that help identify the sources of food-borne illness. Information on genetically modified food production and the debate surrounding its benefits and risks has been expanded. A new Off the Shelf box has been added discussing Mad Cow disease and the potential risk associated with consuming meat from affected animals.

Chapter 18, “The Global View: Feeding the World,” deals with the problems of hunger and malnutrition both at home and globally. It discusses the issue of providing enough of the right kinds of food and distributing it equitably. It examines the causes of world hunger, along with potential solutions. Updated information on the status of world hunger and micronutrient deficiencies is presented. The health impact of the “Westernization” of the diet in many developing countries is discussed.

Ancillaries

This Fourth Edition of *Nutrition: Science and Applications* is accompanied by a complete set of supplementary teaching and learning materials. The materials available for *students* are as follows:

Diet Analysis Software The diet analysis software package includes values for energy and 25 nutrients for about 4000 foods. It includes a feature that allows users to add 30 foods to the database to keep pace with the ever-growing market of available products. The database has been designed to incorporate the foods mentioned throughout the text, including foods from a variety of cultures. The database includes updated folate values for all non-brand-name foods and for many brand-name items. The software includes an analysis of the diet based on the number of servings recommended by the Food Guide Pyramid.

Study Guide This guide, written by Melanie Burns of Eastern Illinois University, includes chapter outlines, multiple-choice questions, matching exercises, short-answer review questions, and a variety of learning activities designed for use by individual students and by groups in the classroom.

The teaching materials available to *instructors* include the following:

Instructor's Manual The Instructor's Manual, available online from the text Web site, is written by the authors and includes key concepts, complete chapter outlines, new Critical Thinking exercises, diet assessment forms, key terms, student self-assessment forms, and sources of other materials, including useful Web sites.

Test Bank The Test Bank, written by Kathy Beerman and Lois Jensen, both of Washington State University, includes multiple-choice and short-answer questions as well as short case studies with attendant questions that encourage students to apply what they have learned.

Overhead Transparencies This set of 100 full-color overheads helps instructors illustrate the book's more complicated concepts in the classroom.

Instructor's Resource CD-ROM for Nutrition This dual-platform presentation CD-ROM (for Macintosh and

Windows) features all of the illustrations and tables from the text in both jpeg and PowerPoint formats.

Both students and instructors will find additional resources on the text's companion Web site: www.wiley.com/college/smolin.

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Ice cream on the cover of a nutrition text, what were they thinking? Most nutrition texts choose to put a photo of fruits, vegetables, or grain products on the cover. These foods make up the basis of a healthy diet. We choose to put ice cream on our cover to emphasize the concept of choice—any food can be part of a healthy diet. Your diet is made up of all the food choices you make throughout the course of a day. And no one food makes or breaks a diet. If you choose ice cream, the nutrients you get are different than if you choose to eat an orange. Even the choice of fruit sorbet instead of mocha almond fudge makes a different nutrient contribution. Fresh fruit may provide more nutrients with fewer kcalories than ice cream, but ice cream can be part of a healthy diet as long as all of your choices put together provide an overall diet that promotes health, protects you from disease, and provides enjoyment. Each food and lifestyle choice you make must be balanced with other choices you have made or intend to make. Good nutrition does not mean giving up all the foods you like; it means making wise choices. To help you with nutrition choices, we have provided a text that bridges the gap between popular nutrition and nutrition science. Our goal is not to tell you, for instance, that you should or should not eat ice cream or potato chips. Instead, we have provided you with the information you need to make your own informed decisions. This text takes nutrition science out of the classroom and allows you to apply it to the choices you make about foods, dietary supplements, and other lifestyle factors important to your health.

How to Use This Book to Make Informed Choices

In order to help you understand and apply the principles of nutrition, we have designed and incorporated some very useful learning aids. From the menu of features below, you can choose which will be most helpful to you in learning, retaining, and applying the information presented in this text.

Just a Taste What do you know, or think you know? Find out by answering these questions at the beginning of each chapter. They offer a simple self-test that targets common nutrition misconceptions.

Chapter Outline What's in store? This outline of the chapter's content provides you with an overview of all the material presented in this chapter.

Chapter Concepts Need a concept check? Each chapter opens with a checklist of the concepts to be explored. These help you preview how the material will be covered. You can go back and review them once you have completed the chapter to see how well you have digested the material in the chapter.

Boldfaced Terms and Margin Definitions See an unfamiliar term? Important terms are shown in boldfaced type throughout the text. These help point out words that may be new to you. Each boldfaced term is defined in the margin for easy reference. These terms and many others are also included in the main glossary at the back of the book.

Off the Shelf Intrigued by an idea in the chapter? We have chosen some of the most common consumer choices related to products available off the shelves of stores and presented the pros and cons of selecting them. These Off the Shelf discussions will help you think more logically and scientifically about nutrition decisions in your life. They can be read separately or in conjunction with the body of the text.

Off the Label Trying to figure out which breakfast cereal is better for you? Try reading the Nutrition Facts label. Food labels provide a wealth of information on dietary recommendations and the nutritional contributions made by specific foods. Off the Label features will teach you how to choose low-kcalorie items, how to figure out how much vitamin C is in a food, and how to tell if a food is low in fat. This practical knowledge about food labels will help you choose foods wisely and know what you are choosing.

Critical Thinking You think you understand the concept? Now, try applying it. Use the Critical Thinking exercises in each chapter to see if you can apply the concepts covered. Following the thought processes outlined in these exercises can help you to better address your own nutrition concerns.

Applications Try again. These exercises at the end of each chapter give you an opportunity to apply the critical thinking skills developed in Critical Thinking exercises and the knowledge gained throughout the chapter to your own diet and lifestyle.

Art and Photography Are you a visual learner? The art was carefully developed and the photography chosen to enhance your understanding of and interest in the material

discussed in the text. Use these to complement and enhance the information in the text.

On the Web Need more information? The On the Web feature offers the names and web addresses of sites where you can find additional information about topics discussed in the chapter.

Chapter Summary Have you remembered the most important concepts? A summary at the end of each chapter parallels but provides more detail about the concepts used to introduce each chapter. Use this summary of important information to review the chapter topics.

Review Questions Check your knowledge. If you can answer the review questions at the end of each chapter, you have grasped the most important concepts covered in the chapter. They are designed to review in a simple manner the key points of each chapter and to serve as a study guide.

Inside the Covers Need a quick reference? Opening the front and back covers will give you instant access to the DRI values. Tables that include the RDAs and AI values for vitamins and minerals as well as those that list the recommendations for carbohydrate, fat, protein, and energy can be found here.

Appendices We tried, but we couldn't fit everything in the text. Additional information has been put in appendices at the end of the text. These include a comprehensive food composition table containing information on energy and 25 nutrients in about 4000 foods, including fast foods and con-

venience foods. Other appendices include standards for nutritional indices, such as height and weight charts for infants through the elderly; normal blood values used in nutrition assessment; reliable sources of nutrition information; dietary recommendations from the United States, Canada, and the World Health Organization; recommendations for risk reduction from various special interest groups, such as the American Heart Association; the Exchange Lists; versions of the Food Guide Pyramid that reflect ethnically diverse food choices; an extensive review of food labeling guidelines; energy expenditure values; and answers to Critical Thinking exercises.

Glossary Forgot what the term means? An extensive glossary of terms is included at the end of the text to provide a quick reference for terminology with which you may be unfamiliar or for which you may need review.

Index Want to review a specific concept? The text is well indexed to allow easy cross-reference to material of interest.

We have offered plenty of choices on how to absorb and apply this material. We hope that you benefit from the variety of options while learning to apply your knowledge and enjoy a healthy diet chosen from the diversity of flavors, textures, and tastes that are available in today's food supply.

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October 2002

Brief Contents

NUTRITION: SORTING FACT FROM FANTASY

- 1** Nutrition: Everyday Choices 1
- 2** Applying the Science of Nutrition 25
- 3** The Human Body: From Meals to Molecules 54

ENERGY-YIELDING NUTRIENTS

- 4** Carbohydrates: Sugars, Starches, and Fiber 79
- 5** Lipids: How Much of a Good Thing? 113
- 6** Protein: The Privileged Nutrient 145
- 7** Energy Balance and Weight Management 176

WATER AND THE MICRONUTRIENTS

- 8** The Water-Soluble Vitamins 216
- 9** The Fat-Soluble Vitamins 249
- 10** The Internal Sea: Water and the Major Minerals 270
- 11** The Trace Minerals: Our Elemental Needs 308

APPLYING NUTRITION TO LIFE

- 12** Meeting Our Needs: Food, Fortified Food, and Supplements 335
- 13** Fueling Fitness: Nutrition and Exercise 361
- 14** In the Beginning: Nutrition for Mothers and Infants 394
- 15** The Growing Years: Infancy to Adolescence 426
- 16** Nutrition and Aging: The Adult Years 458

NUTRITION IN TODAY'S WORLD

- 17** How Safe Is Our Food Supply? 483
- 18** The Global View: Feeding the World 516

APPENDICES A-I

GLOSSARY G-I

INDEX I-I

NUTRITION: SORTING FACT FROM FANTASY

1 Nutrition: Everyday Choices 1

What Is Nutrition? 2

What Are Nutrients? 2

What Do Nutrients Do? 4

How Much of Each Nutrient Do We Need? 5

Effects of Poor Nutrient Intake 5

What Are We Choosing? 6

How Healthy Is the American Diet? 7

Off the Shelf Can “Bad” Foods Be Part of a Healthy Diet? 8

How Do We Make Food Choices? 8

What Is Reliable Nutrition Information? 10

Sources of Nutrition Information 10

Understanding the Process of Science:

The Scientific Method 10

Off the Label Read the Whole Label to Know What

You Are Choosing 12

Types of Nutrition Research Studies 14

Judging Nutrition Information 18

CRITICAL THINKING What Is Wrong with This Experiment? 20

Applications 23

Summary 23

Review Questions 23

References 24

2 Applying the Science of Nutrition 25

Nutrition Recommendations 26

Dietary Reference Intakes:

Defining Nutrient Needs 27

Development of the Dietary Reference Intakes 27

Dietary Reference Intake Values 28

Life-Stage Groups 28

How the Dietary Reference Intakes Are Determined 29

Applications of Dietary Reference Intakes 29

The Food Guide Pyramid:

A Tool for Diet Planning 29

Why Use a Pyramid Shape? 30

Planning Diets Using the Food Guide Pyramid 31

CRITICAL THINKING Using the Food Guide Pyramid 33

Food Labels: Knowing What You Choose 35

What Must Be Labeled 35

What Must Be Listed 35

Off the Shelf Choosing Off the Menu 36

Nutrient Content Claims 38

Health Claims 39

Off the Label Using Food Labels to Choose a Diet That Meets Recommendations 40

The Dietary Guidelines for Americans:

Tying It All Together 40

Development of the Dietary Guidelines 40

ABCs for Good Health 41

Exchange Lists 43

Other Guidelines for Health Promotion and Disease Prevention 44

The Healthy People Initiative 44

Recommendations for Reducing Risks for Specific Diseases 45

Assessing Nutritional Health 45

Nutritional Health of the Population 45

Individual Nutritional Health 47

CRITICAL THINKING Nutritional Assessment 50

Applications 51

Summary 52

Review Questions 52

References 53

3 The Human Body: From Meals to Molecules 54

The Chemistry of Life 55

The Digestive System: An Overview 57

Digestion and Absorption 59

Sights, Sounds, and Smells 59

Mouth 60

Pharynx 60

Esophagus 60

Stomach 61

Small Intestine 63

Large Intestine 65

Off the Shelf Should You Feed Your Flora? 66

Digestive Problems and Solutions 67

Off the Label Antacids: Getting the Drug Facts 68

Differences in the Digestive System

Throughout Life 69

CRITICAL THINKING Gastrointestinal Problems Can Affect Nutrition 71

Paths of Absorbed Nutrients 73

Cardiovascular System 73

Hepatic Portal and Lymphatic Circulation 74

Destination: The Cell 75

Metabolism: Making and Breaking Molecules 76

Elimination of Wastes 76

Applications 77

Summary 77

Review Questions 78

References 78

ENERGY-YIELDING NUTRIENTS

4

Carbohydrates: Sugars, Starches, and Fiber 79

What Are Carbohydrates? 80

Carbohydrates in the Diet 80

Simple Carbohydrates 81

Complex Carbohydrates 83

Off the Label Fiber on Food Labels 85

Carbohydrates in the Digestive Tract 86

Sugars and Starches 86

Lactose Intolerance 87

Fiber 88

Carbohydrates in the Body 88

Carbohydrate Metabolism 88

Abnormal Glucose Regulation 92

CRITICAL THINKING Losing Weight on a Low-Carbohydrate Diet 95

Carbohydrates and Health 96

Dental Caries 96

Hyperactivity 96

Body Weight 96

Heart Disease 97

Diabetes 97

Chronic Bowel Disorders 97

Colon Cancer 98

Problems with Excessive Fiber Intake 99

Carbohydrate: One Part of the Total Diet 99

Recommendations for Carbohydrate Intake 100

Determining Your Carbohydrate Intake 100

Off the Shelf Are “Natural” Sugars Better? 103

*A Diet to Meet Recommendations: Choose More Grains,
Fruits, and Vegetables 104*

CRITICAL THINKING Building a Healthy Base 105

Carbohydrates and Food Technology 107

Complex Carbohydrates as Additives 107

Simple Carbohydrates as Additives 108

Artificial Sweeteners: Sugar Substitutes 108

Applications 110

Summary 110

Review Questions 111

References 111

5

Lipids: How Much of a Good Thing? 113

What Are Lipids? 114

Lipids in the Diet 114

Types of Lipids 114

Lipids in the Digestive Tract 119

Lipids in the Body 120

Transporting Lipids in the Body 121

Lipid Metabolism: Fat for Fuel and for Storage 123

Lipids and Health 125

Essential Fatty Acid Deficiency 125

Dietary Fat and Heart Disease 125

Off the Shelf Are Supplements a Safe Way to Reduce

Blood Cholesterol? 130

Dietary Fat and Cancer 132

CRITICAL THINKING Dietary Fat and

Heart Disease Risk 133

Lipids: One Part of the Total Diet 134

Recommendations for Fat Intake 134

Determining Your Fat Intake 135

Off the Label Using Food Labels

to Choose Your Fats 137

*A Diet to Meet Recommendations: Choose Fats
Wisely 138*

CRITICAL THINKING Fitting Fat into Your Diet 140

Lipids and Food Technology 141

Hydrogenated Vegetable Oils 141

Artificial Fats 142

Applications 142

Summary 143

Review Questions 143

References 144

6

Protein: The Privileged Nutrient 145

What Is Protein? 146

Protein in the Diet 146

Proteins Are Made of Amino Acids 146

Protein Structure 148

Protein in the Digestive Tract 149

Protein in the Body 150

Protein Metabolism: Amino Acids

for Synthesis and Energy 151

Functions of Proteins in the Body 154

Protein and Health 156

Protein Deficiency 156

Protein Excess 157

Protein: One Part of the Total Diet 158

Recommendations for Protein Intake 158

CRITICAL THINKING What Does Nitrogen Balance Tell Us? 161

Determining Your Protein Intake 162

A Diet to Meet Recommendations:

Vegetarian or Not? 164

Off the Shelf Soy Protein for Your Health? 166

CRITICAL THINKING Choosing a Vegetarian Diet 170

Proteins, Amino Acids, and Food Technology 171

Proteins in Processed Foods 171

Off the Label Identifying Protein Sources 172

Amino Acids Added to Foods 172

Applications 174

Summary 175

Review Questions 175

References 175

7

Energy Balance and Weight Management 176

What Is Energy? 177

Energy Intake 178

The Energy in Food 178

Off the Label Knowing Your Kcalories 180

Energy Stores in the Body 181

Energy Output 182

Basal Needs 182

Physical Activity 182

The Thermic Effect of Food 183

Energy Requirements 183

Measuring Energy Expenditure 183

Estimated Energy Requirements (EER) 184

Body Weight and Health	186
<i>What's Wrong with a Few Extra Pounds?</i>	186
<i>A Few Pounds Too Few?</i>	186
<i>Guidelines for Healthy Body Weight</i>	187
How Is Body Fatness Regulated?	191
<i>Short- and Long-Term Regulation</i>	192
<i>Heredity Versus Environment</i>	193
<i>Do Obese People Eat More?</i>	195
CRITICAL THINKING	Balancing Intake and Expenditure 196
Achieving a Healthy Weight	198
<i>Weight-Loss Guidelines</i>	198
<i>Approaches to Weight Management</i>	199
Options for Reducing Energy Intake	201
<i>Low-Kcalorie Diets</i>	202
<i>Diets That Modify Macronutrient Intake</i>	204
<i>Weight-Loss Drugs</i>	204
Off the Shelf	<i>Fat Burners: The Hot and the Cold</i> 206
	<i>Weight-Loss Surgery</i> 207
CRITICAL THINKING	Do You Think This Diet Will Work? 207
Eating Disorders	209
<i>What Causes Eating Disorders?</i>	209
<i>Anorexia Nervosa</i>	210
<i>Bulimia Nervosa</i>	211
<i>Other Eating Disorders</i>	212
Applications	213
Summary	213
Review Questions	214
References	214

WATER AND THE MICRONUTRIENTS

8	The Water-Soluble Vitamins	216
	What Are Vitamins?	217
	<i>Vitamins in the Diet</i>	218
	<i>Vitamins in the Digestive Tract</i>	218
	<i>Vitamins in the Body</i>	219
	<i>How Much of Each Vitamin Do We Need?</i>	220
	<i>Vitamins and Health</i>	220
	The B Vitamins and Energy Metabolism	221
	<i>Thiamin</i>	221
	<i>Riboflavin</i>	223
	<i>Niacin</i>	226
	<i>Biotin</i>	228
	<i>Pantothenic Acid</i>	229
	Vitamin B₆ and Protein Metabolism	229
	<i>Vitamin B₆ in the Diet</i>	230
	<i>Vitamin B₆ in the Body</i>	230
	<i>How Much Vitamin B₆ Do We Need?</i>	230
	<i>Vitamin B₆ and Health</i>	231
	Folate, Vitamin B₁₂, and Cell Division	233
	<i>Folate or Folic Acid</i>	233
	<i>Vitamin B₁₂</i>	236
	Off the Label	<i>Figuring Micronutrients from Food Labels</i> 237
	CRITICAL THINKING	Four Hundred of Fortified Folate 240

Vitamin C	241
<i>Vitamin C in the Diet</i>	242
<i>Vitamin C in the Body</i>	242
<i>How Much Vitamin C Do We Need?</i>	244
<i>Vitamin C Deficiency</i>	244
<i>Vitamin C Toxicity</i>	245
<i>Vitamin C Supplements</i>	245
Choline: Is It a Vitamin?	246
Applications	246
Summary	247
Review Questions	247
References	248

9	The Fat-Soluble Vitamins	249
	Vitamin A: A Vitamin That Turns on Our Genes	250
	<i>Vitamin A in the Diet</i>	250
	<i>Vitamin A in the Digestive Tract</i>	251
	<i>Vitamin A in the Body</i>	252
	<i>How Much Vitamin A Do We Need?</i>	254
	<i>Vitamin A and Health</i>	255
	CRITICAL THINKING	How Much Vitamin A Is In Your Fast-Food Meal? 257
	Vitamin D: The Sunshine Vitamin	258
	<i>Vitamin D in the Diet</i>	258
	<i>Vitamin D in the Body</i>	259
	<i>How Much Vitamin D Do We Need?</i>	260
	<i>Vitamin D and Health</i>	260
	Vitamin E: A Fat-Soluble Antioxidant	261
	<i>Vitamin E in the Diet</i>	261
	Off the Shelf	<i>Will Antioxidant Supplements Keep Us Healthy?</i> 262
	<i>Vitamin E in the Body</i>	263
	<i>How Much Vitamin E Do We Need?</i>	264
	<i>Vitamin E and Health</i>	264
	Vitamin K: Coagulation	265
	<i>Vitamin K in the Diet</i>	265
	<i>Vitamin K in the Body</i>	265
	<i>How Much Vitamin K Do We Need?</i>	266
	<i>Vitamin K and Health</i>	266
	Applications	268
	Summary	268
	Review Questions	268
	References	268

10	The Internal Sea: Water and the Major Minerals	270
	Water: The Internal Sea	271
	<i>Water in the Diet</i>	271
	<i>Water in the Body</i>	271
	Off the Shelf	<i>Is Bottled Water Better?</i> 273
	<i>How Much Water Do We Need?</i>	279
	<i>Water and Health</i>	279
	What Are Minerals?	280
	<i>Minerals in the Diet</i>	281
	<i>Minerals in the Digestive Tract</i>	281
	<i>Minerals in the Body</i>	282
	<i>How Much of Each Mineral Do We Need?</i>	282
	<i>Minerals and Health</i>	283

Electrolytes: Salts of the Internal Sea 283*Electrolytes in the Diet 284**Electrolytes in the Body 284**Electrolytes: How Much Do We Need? 286**Electrolyte Deficiency and Toxicity 287**Hypertension 287***CRITICAL THINKING A Diet for Health 290****Minerals Involved in Bone Health 294***Bone: A Living Tissue 294**Osteoporosis 295**Calcium 296***Off the Label Getting Enough Calcium 300***Phosphorus 301**Magnesium 302***Sulfur 304****Applications 304****Summary 305****Review Questions 305****References 306**

11 The Trace Minerals: Our Elemental Needs 308

Trace Element Functions 309**Iron (Fe) 310***Iron in the Diet 310**Iron in the Gastrointestinal Tract 310**Iron in the Body 312**How Much Iron Do We Need? 312**Iron Deficiency 313**Iron Toxicity 314**Meeting Iron Needs: Consider the Total Diet 315***CRITICAL THINKING Increasing Iron Intake 317****Zinc(Zn) 318***Zinc in the Diet 318**Zinc in the Gastrointestinal Tract 318**Zinc in the Body 320**How Much Zinc Do We Need? 320**Zinc Deficiency 320***Off the Shelf Will Zinc Cure***the Common Cold? 321**Zinc Toxicity and Supplements 321***Copper (Cu) 322***Copper in the Diet 322**Copper in the Gastrointestinal Tract 322**Copper in the Body 322**How Much Copper Do We Need? 322**Copper Deficiency 323**Copper Toxicity 323***Manganese (Mn) 323***How Much Manganese Do We Need? 323**Manganese and Health 323***Selenium (Se) 324***Selenium in the Diet 324**Selenium in the Body 324**How Much Selenium Do We Need? 325**Selenium Deficiency 325**Selenium and Cancer 325**Selenium Toxicity and Supplements 325***Iodine (I) 325***Iodine in the Diet 326**Iodine in the Body 326**How Much Iodine Do We Need? 326**Iodine Deficiency 326**Iodine Fortification 327**Iodine Toxicity 327***Chromium (Cr) 327***Chromium in the Diet 327***Off the Label Should You Choose***Iodized Salt? 328**Chromium in the Body 329**How Much Chromium Do We Need? 329**Chromium Deficiency 329**Chromium Toxicity and Supplements 329***Fluoride (F) 329***Fluoride in the Diet 330**Fluoride in the Body 330**How Much Fluoride Do We Need? 330**Fluoride and Health 331***Molybdenum (Mo) 321****Other Trace Elements 332****Applications 332****Summary 332****Review Questions 333****References 333**

12 Meeting Our Needs: Food, Fortified Foods, and Supplements 335

Meeting Your Nutrient Needs 336**Getting It All from Food 337***Choosing Wisely 337**Fortified Foods 339**Functional Foods 340**Phytochemicals 342***Off the Label Labeling Dietary Supplements 344****Off the Shelf Are They Foods?***Should You Choose Them? 346***CRITICAL THINKING Supplemental Choices 348****Dietary Supplements 349***Regulation of Dietary Supplements 349**Vitamin and Mineral Supplements 350**Nonvitamin/Nonmineral Supplements 352***Off the Shelf Are You Choosing an Herbal Benefit
or an Herbal Risk? 354****Do You Need Supplemental Nutrients? 357***Toxicity Concerns 357**If You Choose to Supplement 357***Applications 359****Summary 359****Review Questions 359****References 360**

APPLYING NUTRITION TO LIFE

13 Fueling Fitness: Nutrition and Exercise 361

Fitness in Your Life 362*The Many Faces of Fitness 362**The Health Benefits of Exercise 364**Exercise Recommendations 365***CRITICAL THINKING Incorporating Exercise
Sensibly 369**