



CONTEMPORARY NUTRITION

i s s u e s a n d i n s i g h t s

second edition

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about the

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PAUL M. INSEL, Ph.D., is currently Clinical Associate Professor of Psychiatry and Behavioral Sciences at Stanford University. He has been the principal investigator on numerous NIH studies, is the senior author of a leading introductory health text, and is Editor-in-Chief of *Healthline* magazine.

MARCIA F. SEYLER, M.Phil., is a freelance science writer and editor. She has been involved in the development of many college textbooks, specifically *Perspectives in Nutrition* by Gordon M. Wardlaw and Paul M. Insel. She has written numerous articles for *Healthline* magazine and other publications.

As a professor, you undoubtedly already find nutrition a fascinating topic. However, it can also be quite frustrating to teach. There are countless claims and counter-claims about the need for certain constituents in our diet, such as sodium. One group of researchers promotes a reduction in dietary intake by all American adults, while other researchers show that many people can consume sodium freely without significantly increasing their blood pressure above desired levels.

We, too, are frustrated by conflicting data in our field, and so have continued to draw on as many sources as possible in writing the second edition of this textbook. Many major publications have guided us, such as the Surgeon General's Report on Nutrition and Health, the latest National Academy of Sciences Reports: Diet and Health, Nutrition During Pregnancy, and the tenth edition of the RDA. We have incorporated much of the material from these sources, as well as information from many current review articles and basic scientific reports.

We feel this textbook continues to make a break from all others in the field. Like any textbook should, it focuses on the latest research. But it goes further to document important recent research studies and list those references at the back of the chapters. Nutrition Issues in each chapter then reexamine the most controversial nutrition topics of our day. In all, we provide students with a well-rounded view of contemporary nutrition research so that they can more clearly understand and take part in the debate over current nutrition issues.

PERSONALIZING NUTRITION

One overriding theme in nutrition research today is individuality. Not all of us find that saturated fat in our diets raises our blood cholesterol levels over recommended standards. Sugar does not raise everyone's blood glucose levels above accepted guidelines. We often respond in an idiosyncratic manner to nutrients, a fact that is constantly pointed out in this textbook.

Even at this basic level we do not try to put every nutrition student through the same square hole. We constantly ask students to learn more about themselves and their health status and suggest they apply the information given in a manner appropriate to improving their health. After reading this textbook, students will have a much clearer understanding of how the nutrition information given on the evening news, on cereal box labels, in popular magazines, and by government agencies applies to them. Most importantly, they will become knowledgeable consumers of nutrients and nutrition information. They will come to understand that nutrition knowledge allows them to personalize their diet, rather than follow every guideline issued to a population—which by definition actually consists of separate individuals with separate genetic backgrounds and responses to diet.

In addition, we cover important questions that students often raise concerning vegetarianism, diets for athletes, the safety of our food supply, and fad diets. We emphasize the importance of behavior in terms of understanding one's food choices and changing one's diet. We discuss food behaviors in Chapter 1, behaviors that contribute to weight control in Chapter 10, and behavior modification in detail in Chapter 16.

AUDIENCE

This book has been designed for a nonmajors audience. The chemistry has been kept to a bare minimum. This book will be most suitable as a beginning textbook for any student interested either in an introduction to nutrition or in fulfilling a general science requirement. Health majors, Home Economics majors, Nursing students, Physical Education students, and students in other health-related areas will also find this text quite appropriate. Because of the flexibility of chapter organization and content, this book can be adapted to students of diverse backgrounds.

While the book is most suitable for a semester-length course, it can also be used in a quarter-length course by omitting chapters or multiple sections within chapters. A unique feature of this text is that it is presented in five segments:

PART I	NUTRITION: A Key to Health
PART II	NUTRIENTS: The Heart of Nutrition
PART III	ENERGY: Balance and Imbalance
PART IV	NUTRITION: A Focus on Life Stages
PART V	NUTRITION: Beyond the Nutrients

This organization facilitates tailoring the text to your specific course needs.

NEW TO THIS EDITION

The second edition of CONTEMPORARY NUTRITION incorporates several new features to enhance student learning:

Introduction of digestion and absorption. The discussion of digestion and absorption (in Chapter 4) continues to precede the energy-yielding nutrient chapters but is scaled down to include only the body functions involved in the digestion and absorption process. The digestion and absorption of the energy-yielding nutrients are discussed in the appropriate nutrient chapter to help students better understand these areas in the proper context.

New information from the U.S. Government. New information recently handed down from FDA on food labeling and USDA on the Food Guide Pyramid are discussed in detail to provide students with the most current nutrition information.

Later introduction of behavior change strategies. Chapter 16 encourages the student to plan his or her own diet to enhance health maintenance and then outlines how to do so. This chapter has been moved to the latter half of the text so students gain a full understanding of the major concepts in nutrition before considering strategies for behavior change.

New food composition tables. The food composition tables in Appendix A have been expanded to include more than 700 new foods (more than 1600 in all), which will give students an excellent resource within the text to use for diet analysis exercises.

ADDITIONAL FEATURES

We have organized this text in response to the needs of current instructors and students:

Detailed discussion of consumerism. In Chapter 2 the student will learn how to decipher the new food label. Chapter 3 discusses nutrition fads and fallacies in detail. These topics are often poorly covered by other nutrition textbooks.

Separate chapters on weight control and eating disorders. The student receives a thorough discussion on these very controversial and current topics.

Summary tables. The chapters dealing with vitamins and minerals contain detailed summary tables that include the major points made in the chapters. These tables provide convenient capsules for reference.

Content and controversial topics are well referenced. Approximately 80% of the referenced material is from sources published since 1990. As professors, we demand the latest information to present to our students. Providing this up-to-date research will not only give students the most accurate picture of nutrition today, but will also point them to current materials for further study.

DESIGN

Organizing the illustration program for this textbook continues to be quite exciting. We have drawn heavily from the nutrition expertise of Mosby, and especially from the illustrators under the direction of William Ober, M.D. This textbook remains far ahead of any in the field in depicting important nutrition-related phenomena—such as emulsification, vitamin D metabolism, digestion and absorption, the progression of cancer, and fetal development—in a nonthreatening way. The extensive, three-dimensional graphic presentations in this book will make nutrition come alive for students.

In addition, we draw on many sources to provide what we consider the best photographic program in any nutrition text. The numerous four-color photos for this text were researched and selected to reflect a modern view of food presentation and food consumption. This provides the student with the most outstanding and timely view of the nutrition arena today.

Humor again has been sprinkled throughout the text to aid the learning process. We have combed recent newspapers for the best work of our nation's leading cartoonists. The cartoons make important nutrition points in a way students will remember, such as Gary Larson's wolves hesitating to eat raw pork in Chapter 17.

PEDAGOGY

The following extensive pedagogical features were designed not only to interest the student but also to constantly reinforce the learning process:

Assess Yourself. This exercise at the beginning of each chapter helps students explore their food habits and ideally piques their interest in the nutritional information in the chapter. For example, the assessment in Chapter 6 is on saturated fat and cholesterol intake, which is a key discussion point in the chapter.

Another Bite. These are short paragraphs spaced throughout the book that examine the application of the material or provide another vantage point from which to view, and possibly better appreciate, the text material.

Margin Definitions. Important key terms are boldfaced at first mention. The more difficult terms are defined in the text's margin. All boldfaced terms are included in the glossary at the back of the text.

Margin Notes. A liberal use of margin notes appears throughout the book. These notes provide clinical examples, references to other chapters, clarification of ideas, and further details for important concepts.

Concept Check. This material summarizes recent chapter content every few pages, providing the student with the opportunity to monitor his or her understanding of the material presented.

Rate Your Plate. This activity at the end of each chapter provides the student with an opportunity to put theory into practice. The suggested assignments generally ask students to carefully analyze part of their current diet or nutrition-related lifestyle.

Nutrition Insight. Each chapter contains one or two short boxed essays, often on controversial topics in nutrition, such as bottled water and fat replacements.

Summary. Chapter content is summarized by highlighting 7 to 10 major points. This feature, together with the Concept Checks, should help students to study for examinations.

Study Questions. Five or so questions at the end of each chapter encourage the students to probe deeper into the chapter content, helping them make connections and experience new insights.

References. Each chapter contains approximately 20 current references, most published since 1990.

Nutrition Issue. This essay at the end of each chapter extends the chapter content by adding more detailed material on a specific topic.

Glossary. A comprehensive glossary of more than 500 words is included for the student's reference. The glossary contains a list of common medical terms and their root definitions, as well as pronunciation guides for many unfamiliar terms.

SUPPLEMENTARY MATERIALS

Both the student and the instructor are provided with the latest materials to make better use of the text and the concepts of the course:

Instructor's Manual and Test Bank. Prepared by Jeffrey Harris, D.H.Sc., R.D., this comprehensive teaching aid includes chapter summaries with suggestions for teaching difficult material; activities; suggested readings; nutrition assessments; source lists of supplementary materials; and a unique "Survival" chapter addressed to the novice instructor that discusses class organization, scheduling, and problem areas such as cheating.

Extensively reviewed for clarity and accuracy, the test bank features approximately 1400 test items (multiple-choice, short-answer, and matching) coded for level of difficulty, the kind of knowledge being tested, topic, and text page reference. Test items in each chapter follow the sequence of chapter discussions to make selection easy. The resource manual also includes 75 transparency masters of key illustrations from the text and other sources.

Computest computerized test bank. Qualified adopters of the text receive a computerized test bank package compatible with the IBM and Macintosh computers. This software provides a unique combination of user-friendly aids and enables the instructor to select, edit, delete, or add questions, and to construct and print tests and answer keys.

Study guide. Prepared by Gordon M. Wardlaw, this student aid has been thoroughly reviewed by experienced instructors. This comprehensive guide reinforces concepts presented in the text and integrates them with study activities, such as the use of flash cards to reinforce key concepts. It features vocabulary review and sample exams structured to reflect the actual examinations students will face in the classroom. An ongoing dietary analysis highlights the content of each chapter.

Mosby Diet Simple 2.0 nutrient analysis software. This interactive software includes a unique food list with more than 2250 items, selected activities, and food exchange lists. The disk allows students to input food intake and physical activities to determine total kcalories consumed and expended in multiple 24-hour periods.

Transparency Acetates. Seventy-two full-color transparency acetates feature key illustrations from the text with large, easy-to-read labels.

ACKNOWLEDGMENTS

Text development

Barbara Fredin, M.S. aided the authors in the difficult task of tailoring the first edition content for a nonmajors audience. A scientist herself, she has extensive experience editing biology and general science textbooks. Sally Smith, R.D., L.D., took over this role for the second edition, especially helping the authors sift through the vast scientific literature published since the previous edition.

Reviewers

As with the first edition, our goal is to provide the most accurate, up-to-date, and useful introductory nutrition text available. We would like to recognize and thank those people whose direction and insight guided us in the first and second editions.

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CONTEMPORARY NUTRITION first began with a commitment to simplify nutrition science for the nonmajor student. This remains our goal. We feel that we are succeeding in reestablishing an innovative and exciting text that continues to set a standard for nonmajors nutrition textbooks.

GORDON M. WARDLAW

PAUL M. INSEL

MARCIA F. SEYLER

Oat bran, saturated fat, vegetarianism, high-fiber diets, cholesterol, anorexia nervosa, and Salmonella food poisoning—we suspect you have heard these terms. Which of these are important enough to be a consideration in your life?

Americans pride themselves on being individuals. Nutritional advice should be given in that manner. Not all of us have high cholesterol levels, and so don't face a high risk for heart disease. The need to tailor dietary advice to our individual nature is the basic philosophy behind this book. First, we give you a brief introduction to the study of nutrition and give you information on how to be a knowledgeable consumer. With so much information floating around—both accurate and inaccurate—you need to know how to make informed decisions about your nutritional well-being. Then, we give you the basics of nutrition and encourage you to discover how they specifically pertain to you.

We think you will find the study of nutrition fascinating. The text combines some of the most interesting and important aspects of nutrition and food consumption to help you understand both how your body works and how what you eat affects your health.

Features

We have included some features in this book that you should find especially interesting and valuable:

Becoming an informed consumer. In Chapter 3, we discuss the critical information you will need to sort nutritional advice. With so much misleading information being published today, this chapter gives you, the consumer, the tools you will need to separate nutrition fact from fiction.

Planning a new way of eating. Chapter 16 provides you with useful advice on how to improve your dietary patterns. You will follow Alan, a typical college student, as he attempts to improve his diet. We'll show you how to set nutritional goals and design a diet plan to help you attain those goals.

Understanding the world around us. In a college environment, it is often difficult to envision how real the problem of world hunger is. Chapter 18 examines the problem of undernutrition and the conditions that create it. The chapter allows you to examine possible solutions and visualize hope for the future of our planet.

Pedagogy

Contemporary Nutrition: Issues and Insights incorporates some important tools (called pedagogy) to help you learn nutrition. The next few pages graphically point out how to use these study aids to your best advantage.

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PREGNANCY AND BREAST-FEEDING

PREGNANCY CAN BE A VERY SPECIAL TIME FOR A COUPLE. Along with the responsibility of shaping a child's health and personality comes the prospective exhilaration of watching the child develop and grow. Prospective parents often feel an overriding desire to produce a healthy baby, which opens them up to new nutrition and health information.² The parents-to-be usually want to do everything possible to maximize their chances of having a healthy baby.

Despite these possibilities, the infant mortality rate in the United States is higher than that of 23 other industrialized nations. In the United States about 9 of every 1000 infants per year die before their first birthday. One of three pregnant women receives inadequate prenatal care. These are alarming statistics for the country that has the highest per capita expenditure for health care in the world.

Producing a healthy baby is not a matter of luck. True, some aspects of fetal and newborn health are beyond a parent's control. Still, conscious decisions about social, health, and nutritional factors significantly determine the baby's health and future. What the parents do relates directly to the likelihood of having a healthy newborn. Let's examine the practices that build toward a healthy baby.

Each chapter begins with an **ASSESS YOURSELF**. This exercise will help you determine how much you already know about the chapter content. Review this again when you finish the chapter and you will see how much you have learned or how your opinions have changed.

WHAT DO YOU BELIEVE ABOUT VITAMIN SUPPLEMENTS?

Below is a brief article about vitamins, typical of one you might find in a popular health and fitness or women's magazine. As you read it, decide whether you think the claims are true or false. A blank is provided next to each claim to record your answers. Write "T" if you think the statement is true or "F" if you think it is false.

Vitamins: Our Health-Promoting Allies by Dr. Wilbert Grunfald

Do you take vitamins? If not, you probably aren't doing all you can to promote your health. There are some hidden truths about vitamins that the medical community rarely discloses. Do you suffer from frequent colds and flu? Many people spend their hard-earned dollars for cold medicines and lose a number of workdays because of these ailments. We now know that certain vitamin supplements can prevent colds and flu.

Do you eat a relatively poor diet because of all the responsibilities you must handle? Vitamin supplements can completely make up for a poor diet. Do you feel tired and fatigued frequently? You may be one of those people who requires very high intakes of vitamins to be healthy. In addition, vitamin supplements will give you extra energy, especially during times of increased stress. Most of us can't get all the vitamins we need from the food we eat. Plants, potentially rich sources of vitamins, are vitamin deficient today because the soil is so depleted of the nutrients needed for healthy plant growth. Worried about the negative health effects of chemical pollutants in our air and water? Vitamin supplements can protect you.

See all the benefits vitamin supplements can bring you? Our Vitablast pack can provide you with all the vitamins you need. These vitamins are from natural sources and therefore safer and much better than synthetic ones. We at Vitablast Distributors can provide you with a regular supply of vitamins and other supplements for a nominal fee.

Can you afford not to take vitamin supplements? Decide for yourself. Vitamin supplements are harmless, so taking extra amounts will just give extra benefits and security. So what do you have to lose?

Check the answers you gave above against Table 8-1. Should you spend your money on vitamin supplements? Read on to find out.

ASSESS

TEST

YOUR

KNOWLEDGE

yourself

RATE

WHERE DO YOU STAND IN TERMS OF FAT?

How do your food practices compare to guidelines that have been suggested for fat, saturated fat, and cholesterol? Refer to the nutritional assessment you completed at the end of Chapter 2, and compare it to the guidelines issued by the American Heart Association and the National Cholesterol Education Program listed below:

- limit or reduce total fat intake to less than 30% of total calories.
- reduce saturated fat intake to 7% to 10% of calories or less.
- limit cholesterol to less than 200 to 300 milligrams per day.

To compare your nutritional assessment with these guidelines, the following pieces of information are needed from your assessment (write the numbers in the blanks given):

TOTAL KCALORIE INTAKE _____

TOTAL GRAMS OF FAT _____

GRAMS OF SATURATED FAT _____

MILLIGRAMS OF CHOLESTEROL _____

Now complete the following steps:

1. Multiply your total grams of fat by 9 (kcal/gram of fat). Then divide the result by your total calorie intake. Next multiply this number by 100. **THIS WILL GIVE YOU THE % OF KCALORIES YOU CONSUMED FROM FAT.**

% OF KCALORIES FROM FAT _____

IS IT LESS THAN 30% OF YOUR TOTAL KCLS? YES ____ NO ____

2. Multiply your grams of saturated fat by 9 (kcal/gram of fat). Divide the result by your total calorie intake. Now multiply this number by 100. **THIS WILL GIVE YOU THE % OF KCALORIES YOU CONSUMED FROM SATURATED FAT.**

% OF KCALORIES FROM SATURATED FAT _____

IS IT 10% OF YOUR KCALORIES OR LESS? YES ____ NO ____

3. Look at your milligrams of cholesterol.

IS IT LESS THAN 300 MILLIGRAMS? YES ____ NO ____

4. Look back at the foods you ate and notice the foods that contributed the most fat, saturated fat, and cholesterol. If you didn't meet one or more of the guidelines, how could you change what you ate that day to improve your diet?

5. Now take the next step. Do you know your HDL and LDL cholesterol levels? If not, have them checked soon. All adults should know if their levels are in the abnormal ranges.

6. Finally, fill in the following assessment of your risk for developing premature heart disease. Decide today how you could modify your diet and lifestyle, if necessary, to reduce your risk.

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At the end of each chapter is a **RATE YOUR PLATE** section that will help you put a major concept in each chapter into focus for your own life. The activity encourages you to look more carefully at your diet, examine your family history, or apply information learned to help others.

16 WEIGHT CONTROL

obesity—the major type of energy imbalance in America—goes a long way (Table 10-1). Since 1948 the Framingham Heart Study has followed thousands of residents of Framingham, a small Massachusetts town, and found that carrying an excess of 20% or more above one's desirable weight increases the risk of heart disease, (1) the more likely problems and (2) the more serious these problems generally study supports other studies that show excess weight raises the

- dependent diabetes
- Various forms of cancer—colon, rectal, and prostate cancer in men and breast, uterine, and ovarian cancer in women
- Pregnancy risks
- Sleep disturbances
- Early death

TABLE 10-1

Health Problems Associated with Excess Body Fat

Health Problem	Partially Attributed To:
Adult-onset diabetes (NIDDM)	Enlarged fat cells, which then poorly bind insulin and also poorly respond to the message insulin sends to the cell
Surgical risk	Increased anesthetic needs and greater risk of wound infections
Pulmonary disease	Excess weight over lungs
Hypertension	Increased miles of blood vessels found in the fat tissue; however, no validated cause is yet known
Coronary heart disease	Increases in serum cholesterol and triglyceride levels, as well as a decrease in physical activity
Bone and joint disorders	Excess pressure put on knee, ankle, and hip joints
Gallbladder stones	An increase in cholesterol content of bile
Skin disorders	The trapping of moisture and microbes in fat folds
Various cancers	Estrogen production by fat cells; animal studies suggest excess energy intake encourages tumor development
Shorter stature (in some forms of obesity)	An earlier onset of puberty
Pregnancy risk	More difficult delivery and increased anesthetic needs (if the latter is used)
Early death	A variety of risk factors for disease listed above

The greater the degree of obesity, the more likely and the more serious these health problems generally become. They are much more likely to appear in people who are greater than twice their desirable body weight.

CONCEPT CHECK

Genetic background plays a role in obesity via body shape and rate of basal metabolism. The role of nurture is exhibited in similar eating habits, activity levels, and degrees of fatness in families. Men's tendency to develop obesity after age 30 and women's pattern of having both childhood and adult roots for obesity suggest the powerful influence of nurture in men. Because both factors have an impact, we speculate that nurture may serve as a catalyst for expressing or denying a genetic tendency toward obesity.

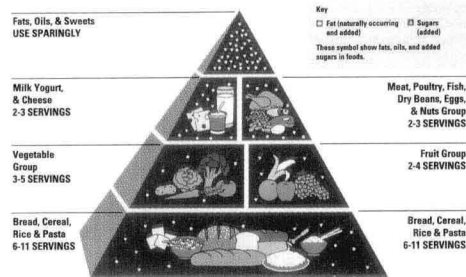
The numerous **tables** throughout the text provide convenient capsules of information for your reference.

The **CONCEPT CHECKS** list the major points made in each chapter section. If you don't understand what the Concept Check says, you should reread the preceding section in the textbook.

You'll find that the numerous full-color, 3-dimensional **illustrations** almost jump off the page. No other nutrition textbook provides you with such effective, detailed drawings that virtually "come alive."

2 TOOLS FOR DIET DESIGN

FOOD GUIDE PYRAMID
A Guide to Daily Food Choices

FIGURE 2-4
Food Guide Pyramid

The Dietary Guidelines and You

It is best to consider your own state of health when using the dietary guidelines. Make specific changes and see if they are effective (Table 2-5). Note that results are sometimes disappointing, even when you are following a diet change very closely.¹ Some people can eat a lot of saturated fats and still keep desirable blood cholesterol levels. Other people, unfortunately, have high blood cholesterol levels even if they eat a diet low in saturated fats. Such people don't benefit from the same diet that helps other people. Again, differences in genetic background are a key cause.

Still, most nutrition and health researchers agree with the guidelines set by our major health and science institutions.^{2,3} The need for varying food choices, controlling body weight, reducing total fat intake for adults, choosing a diet with plenty of fruit, vegetable, and grain products, using salt and sugar in moderation, and moderating alcohol intake is widely-accepted advice.¹⁰ Although everyone has individual nutritional needs and risks of developing diseases, it is unrealistic to tailor a unique nutrition message to every American citizen. The Guide to Daily Food Choices and the 1990 Dietary Guidelines provide all Americans over 2 years of age with simple advice that can be actively practiced by individuals willing to take a step toward good health.¹⁰ In effect, the guidelines promise our nation a healthful future at minimum cost (sacrifice) to society. Reaping the many benefits of good health requires only a small effort and a little knowledge—we urge you to continue the challenge of understanding more about how nutrition relates to you.



Do you know your blood cholesterol level? Blood pressure values? Although you may feel you are not susceptible to the problems listed above, it is still a good idea to have your blood cholesterol levels and blood pressure measured every few years to verify you are right.

ANOTHER BITE boxes are short paragraphs within the text designed to provide you with a different perspective on chapter material. You'll discover new and different ways to apply information.



The full-color **photos** reflect a modern view of food consumption and food presentation.

STUDY QUESTIONS

1. John walks into physician's office and his body status is assessed using the 1983 Metropolitan Life Insurance Table. Provide one advantage and one disadvantage of using this method.
2. What are the two most convincing pieces of evidence that both genetic and environment factors play significant roles in the development of obesity?
3. What are the major psychological and physiological problems associated with rapid weight loss?
4. When searching for a sound weight-loss program, what six characteristics would you look for? Give four characteristics of fad diets for weight loss.
5. You are following a nutritional plan for weight loss. What are five specific ways you could save calories?
6. Describe the term *behavior modification*. Relate it to the terms *stimulus control*, *self-monitoring*, *chain-breaking*, *relapse prevention*, and *cognitive restructuring*. Give examples of each in the latter group.

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We also include approximately five **STUDY QUESTIONS** per chapter. These provide an excellent review for studying for examinations.

Throughout each chapter are **boldfaced key terms**. These are terms you will need to be familiar with throughout your study. The more difficult terms will include a definition in the text's margins. All boldfaced terms will appear with their definitions and pronunciations in the **glossary** at the end of the text.

2 TOOLS FOR DIET DESIGN

U.S. RDAs AND RDIs

The practical application of the RDA is the **U.S. Recommended Daily Allowances** (U.S. RDAs). Note the "D" stands for "daily," not "dietary" as in RDA. This standard was first set in 1974 by the U.S. Food and Drug Administration (FDA) to be used on nutrition labels on foods and vitamin/mineral supplements (Figure 2-2). It replaced the minimum daily requirements determined in 1968 for this specific age-group. For example, the 1968 RDA for iron for adult men was 10 milligrams per day; for adult women it was 18 milligrams per day. The U.S. RDA for adults uses the higher value of 18 milligrams per day. Appendix D lists U.S. RDA values. The values set for children over 4 years of age and adults are commonly listed on food products.

Mainly for economic reasons, the U.S. RDAs have not been updated since they were first set, but new food labeling laws will soon lead to changes.¹⁴ The National Labeling and Education Act of 1990 established the task for our government to increase regulation of food labels.⁴ As part of this process, the U.S. RDAs will be updated and the new name will be Reference Daily Intakes (RDIs). RDI values will be based on the 1989 RDAs and represent an average value of the RDAs for that nutrient (rather than the highest RDA over the age range to which the RDIs are applied (Appendix D). In addition, RDI and DRV will be combined under one heading on new

U.S. Recommended Daily Allowances (U.S. RDAs)

Nutrient standards established by the FDA for use on nutrition labels. Generally, the four existing versions use the highest nutrient recommendation in the appropriate age and gender category from the 1968 publication of the RDA. The version that includes children over 4 years of age and adults is most commonly seen on nutrition labels.

NUTRITION INSIGHTS are boxes within the text that allow you to explore timely topics that should be of interest to you.

To briefly clarify and expand concepts presented, **margin notes** are provided for you. These help reinforce concepts you'll learn in every chapter.

SUMMARY

- ▶ Bacteria and other microbes in foods are the agents most likely to cause food-borne illness. To guard against this in the past, people used salt, sugar, smoke, fermentation, and drying to preserve foods. Today, we also recognize the importance of proper cooking and of keeping hot foods hot and cold foods cold. Pasteurization has also greatly improved the safety of dairy products.
- ▶ Cross-contamination commonly causes food-borne illness. It occurs when bacteria on raw animal products reach other foods that can support bacterial growth. Because of the risk of cross-contamination, no food should be kept at room temperature for more than 2 hours if it has come in contact with raw animal products and can support bacterial growth.
- ▶ Treatment for food-borne illness usually requires drinking a lot of fluids, avoiding food handling while diarrhea is present, thorough hand washing, and bed rest.
- ▶ The major causes of food-borne illness today are the bacteria *Salmonella*, *Staphylococcus aureus*, and *Clostridium perfringens*. To protect against these agents, cover cuts on the hands, do not sneeze on foods, avoid contact between raw meat or poultry products and other food products, and rapidly cool and then thoroughly reheat leftovers. Thorough cooking of foods and the use of pasteurized dairy products further protects against other problem microbes. Viruses, molds, and parasites also account for many cases of food-borne illness. Again, taking care to select, handle, and cook foods properly can prevent problems.
- ▶ Food additives are used primarily to extend shelf life by preventing microbial growth and destruction of food components by oxygen, certain chemical ions, and other substances. Food additives are classed as those intentionally added to foods and those that incidentally end up as contaminants in foods. An additive to a food is limited by the FDA to at most 1/100 of the greatest amount that causes no observable effects in animals. In most cases, the Delaney Clause bans the use of any intentional food additive introduced after 1958 in the United States if it causes cancer.
- ▶ Antioxidants, such as vitamin E and sulfites, prevent oxygen and enzyme destruction of food products. Emulsifiers suspend fat in water, improving the uniformity, smoothness, and body of foods, such as ice cream. Common antimicrobial agents include sodium benzoate and sorbic acid, which prevent bacterial growth. Sequestrants bind free chemical ions, preventing them from causing fats to become rancid.
- ▶ A variety of environmental contaminants can be found in food. Because most of them dissolve in fat, trimming fat from meats and discarding fat that is rendered during cooking of meats, fish, and poultry are good steps to minimize exposure. In addition, it is helpful to wash fruits and vegetables thoroughly and to discard the outer leaves of leafy vegetables.
- ▶ Toxic substances occur naturally in a variety of foods, such as green potatoes, moldy grains, raw soybeans, and raw egg whites. Cooking foods limits their toxic effects. Over the centuries, people have purposely avoided some of these foods, such as moldy grains and the green parts of potatoes.

NUTRITION i n s i g h t

DIET PILLS

Over-the-counter medications that claim to help weight loss sell briskly. Though some can be effective, none matches diet moderation and physical activity for long-term weight loss. Diet aids include caffeine, fiber pills, phenylpropanolamine, and benzocaine. Caffeine tends to blunt appetite. Benzocaine numbs the tongue and affects the sense of taste, so a person tends to eat less. Fiber pills can increase bulk in the stomach and ideally lead to satiety. A typical side effect is significant intestinal gas. Can you guess why? (See Chapter 5.)

Phenylpropanolamine is an epinephrine-like drug that can cause a slight decrease in food intake.¹¹ At a typical dose of 76 milligrams per day, the degree of appetite suppression varies among people. FDA recommends phenylpropanolamine be used with caution in people with hyperthyroidism, cardiovascular disorders (including hypertension), and diabetes. Adverse reactions may also occur among those taking various other medications at the same time.

Prescription medications

Physicians sometimes prescribe amphetamines for weight loss.²² Amphetamines decrease appetite, but they can have a hook: addiction. In addition, amphetamines can increase heart rate and nervousness and lead to insomnia. Thyroid hormone preparations, once popular, caused significant loss of lean tissue.

Fenfluramine and fluoxetine have been prescribed by physicians to promote weight loss. By increasing the action of a neurotransmitter in the brain, they may lead to less food craving, especially for high-carbohydrate foods. Note some people complain of rapid weight gain after discontinuing the drug, and fenfluramine worsens depression in those people who already show signs of this disorder.

The experimental medications naltrexone and bupropion significantly decrease food intake in laboratory animals. Results from human studies, however, have proved discouraging. Development of related drugs is continuing.

Overall, in skilled hands, prescription medications can aid weight loss when coupled with diet control; however, they do not substitute for the more conservative approaches of reducing energy intake, modifying problem behaviors, and increasing physical activity.

Useless medications

The hormone cholecystokinin (CCK) may regulate food intake within the body, but bought in a bottle, it wastes money. It is widely available in health-food stores in the form of ground up animal intestines (recall CCK is produced in the small intestine). However, the amount of CCK in each pill is almost too small to detect, let alone suppress appetite. In addition, CCK is a protein and so is destroyed by digestion in the stomach; little is absorbed as such from an oral dose. It must be injected to be effective, and you can't buy a form that is safe to inject.

Another class of useless and potentially harmful diet aids is diuretics or "water pills." They have a legitimate medical use in the treatment of hypertension, but they cannot control body fatness. Obesity is not primarily caused by excess water accumulation in healthy people.

A history of yo-yo dieting, the repeated loss and regain of weight, also bears consideration. This pattern can predispose a person to subsequent heart disease.

Each chapter ends with a **SUMMARY**. These summary points convey the major ideas of each chapter.

N

Nutrition

ISSUE

FOOD ALLERGIES AND INTOLERANCES

Adverse reactions to foods—indicated by sneezing, coughing, nausea, vomiting, diarrhea, hives and other rashes—are broadly classed as food allergies or food intolerances.¹⁵ Allergies are reactions linked to immune system responses, such as the rapid increase in heart rate and shortness of breath that occur when susceptible people eat shrimp. The immune system senses what it considers “foreign proteins” and attempts to eliminate these. The symptoms experienced are the result of the battle.

On the other hand symptoms of food intolerances—which include many of those listed above—are not linked to immune system processes. For example, symptoms of food-borne illness, such as *Salmonella* from infected egg products, are caused by toxins produced by bacteria in food. These toxins directly affect intestinal cells, for example. The immune system is not part of the process. Let's examine each process, allergies and intolerances, separately so you can learn how to reduce your risk of becoming a victim.

Allergic reactions to foods are commonly reported, and more frequently by females. The most common ages for food allergies are infancy and young adulthood. Allergic-related disease appears in about 30-40 million Americans. Types of reactions associated with food ingestion are:

Classic allergy—Itching, reddening skin, asthma, and a runny nose.

Gastrointestinal—Nausea, vomiting, diarrhea, intestinal gas, bloating, pain, constipation, and indigestion.

General—Headache, skin reactions, tension and fatigue, tremors, and psychological problems.

Allergic reaction symptoms vary with the location in the body as noted above. Timelines include from seconds to a few days. A generalized, all-systems reaction is called anaphylactic shock. This severe allergic response results in lowered blood pressure and respiratory and gastrointestinal tract distress. This can be fatal. A person with extreme sensitivity to a food may not be able to touch the food or even be in the same room where it is being cooked without responding to it.

About 90% of food allergies (also called hypersensitivities) are caused by milk, eggs, nuts (especially peanuts), corn, seafood, soy, and wheat. Other foods frequently identified with adverse reactions include alcoholic beverages, meat and meat products, vegetables, sugars, cereals, fish, fats and oils, fruits, chocolate, and cheese.¹⁵ A family history of allergies greatly increases the risk.

Why do food allergies occur?

A food allergy is caused by an immune response to a food substance. *Food sensitivity* is a term often used today to describe milder reactions. Again, the word *allergy* specifies a disorder of the immune system. Allergens are usually large proteins with specific sizes and configurations.

When an allergen enters an allergic-prone host for the first time, a specific immune reaction takes place, although it is not apparent. Subsequent exposures can then trigger various muscles to contract, increase permeability of blood vessels, and lead to nasal secretions, itching, and changes in dilation of the airways.

NUTRITION ISSUES are boxes at the end of chapters that develop current topics in nutrition in greater detail than the chapter can. Topics include nutrition and alcohol, heart disease, cancer, fad diets, and nutrition labeling.