

Discovering

Nutrition

Fifth Edition

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Preface

Learning nutrition can be exciting and engaging. *Discovering Nutrition, Fifth Edition* takes students on a fascinating journey beginning with curiosity and ending with a solid knowledge base and a healthy dose of skepticism for the endless ads and infomercials promoting “new” diets and food products. We want students to learn enough about their nutritional and health status to use this new knowledge in their everyday lives. Our mission is to give students the tools to logically interpret the nutrition information provided by the evening news, on food labels, in popular magazines, and by government agencies. Our goal is to help them become sophisticated consumers of both nutrients and nutrition information. Hopefully, students will come to understand that knowledge of nutrition allows them to personalize information rather than follow every guideline issued for an entire population.

Discovering Nutrition is unique in its behavioral approach. It challenges students to act, not just memorize the material. Familiar experiences and choices draw students into each chapter, and analogies illuminate difficult concepts. In addition, we address important topics that students are curious about, such as ethnic diets, functional foods, nutrient supplements, phytochemicals, vegetarianism, diets for athletes, diet and chronic diseases, food safety, and fad diets. We focus attention on alcohol, eating disorders, obesity, and complementary nutrition. Some instructors may wish to cover metabolism, so we have included a *Spotlight on Metabolism and Energy Balance* to provide a friendly tour of the metabolic pathways. *Discovering Nutrition* brings up-to-date nutritional research into your classroom. It features the latest standards: the Dietary Reference Intakes, *2010 Dietary Guidelines for Americans*, and USDA’s Choose MyPlate.

Spotlight on Obesity and Weight Management

Obesity is a growing epidemic in the United States and worldwide, affecting over one-third of the American adult population and almost 20 percent of children and teens. New to the fifth edition of *Discovering Nutrition*, the *Spotlight on Obesity and Weight Management* takes an in-depth scientific, behavioral, and social look at this escalating problem. Rising rates of obesity resulting from overconsumption of energy-dense, sugar-laden, high-fat foods that are convenient, widely available, and inexpensive have be-

come a significant public health concern. Overconsumption in combination with low intakes of nutrient-dense foods such as whole fruits, vegetables, unrefined grains, and low-fat dairy products is creating a nutritional imbalance that favors weight gain and poor health. To make matters worse, an increasingly sedentary lifestyle and decreased exercise and physical activity pave a path toward obesity and other serious, chronic, degenerative conditions. The *Spotlight on Obesity and Weight Management* takes a candid look at the obesity crisis, including the causes and health consequences of excess weight, and provides guidance for moving toward a healthier lifestyle.

Diet and Health

New to the fifth edition, Chapter 10, *Diet and Health*, explores the connection between nutrition and chronic diseases, including cardiovascular disease, hypertension, cancer, diabetes, and osteoporosis. For some, the linkage is pronounced; for example, the dramatic surge in obesity rates in the United States is a major reason why the incidence of type 2 diabetes has tripled since 1970. For others, the link is more surprising, such as evidence that shows a generous intake of vegetables and fruits can reduce the risk of cancer.

Spotlight on Dietary Supplements and Functional Foods

The revised *Spotlight on Dietary Supplements and Functional Foods* takes a hard look at the latest science behind the potential benefits and harmful effects of dietary and herbal supplements, as well as the professed benefits of functional foods. Making decisions about nutrition and health requires both consumers and professionals to stay informed and consult reliable sources before trying a new product or embarking on a new health regimen. The *Spotlight on Dietary Supplements and Functional Foods* considers claims made for products and therapies in terms of current scientific knowledge, but it also takes into account the regulatory and safety issues that are present.

Dietary Guidelines for Americans

The seventh edition of the *Dietary Guidelines for Americans* places stronger emphasis on improving poor diets

and increasing physical activity, two of the most important factors for combating the obesity epidemic. Eating a healthy balance of nutritious foods continues as a central point in the *Dietary Guidelines*, but simply balancing nutrients is not enough for health. Total calories also count, especially as more Americans are gaining weight. Because almost two-thirds of Americans are overweight or obese and more than half get too little physical activity, the *2010 Dietary Guidelines* place a stronger emphasis on calorie control and physical activity. The report identifies several key recommendations. As you read the chapters, look for these recommendations highlighted in the margins.

Choose MyPlate

Choose MyPlate is part of an overall food guidance system that emphasizes the need for a more individualized approach to improving diet and lifestyle. MyPlate incorporates recommendations from the *Dietary Guidelines for Americans* and uses interactive technology found at www.ChooseMyPlate.gov. These interactive activities allow individuals to obtain more personalized recommendations for daily calorie levels based on the *Dietary Guidelines for Americans* and to find general food guidance and suggestions for making smart choices from each food group. Concepts from MyPlate and the *Dietary Guidelines* are covered throughout the text and are fully integrated into the text.

Accessible Science

Discovering Nutrition makes use of the latest in learning theory and balances the behavioral aspects of nutrition with an accessible approach to scientific concepts. This text is intended to be a comprehensive resource that communicates nutrition both graphically and personally.

We present technical concepts in an engaging, nonintimidating way with an appealing, stepwise, and parallel development of text and annotated illustrations. Illustrations in all chapters use consistent representations. Each type of nutrient, for example, has a distinct color and shape. Icons of an amino acid, a protein, a triglyceride, and a glucose molecule represent “characters” in the nutrition story and are instantly recognizable as they appear throughout the text.

This text is unique in the field of nutrition and leads the way in depicting important biological and physiological phenomena, such as emulsification, glucose regulation, digestion and absorption, and fetal development. Extensive graphic presentations make nutrition and physiological principles come alive. The illustrations use pictures to teach and are part of a multimedia package that coordinates the text with illustrations and software. The EatRight Analysis

program is a fully integrated ancillary designed to help students track their diets, make choices, and hone their nutritional skills.

New to This Edition

For this *Fifth Edition*, the latest scientific evidence, recommendations, and national standards have been incorporated throughout. Specific updates include the following:

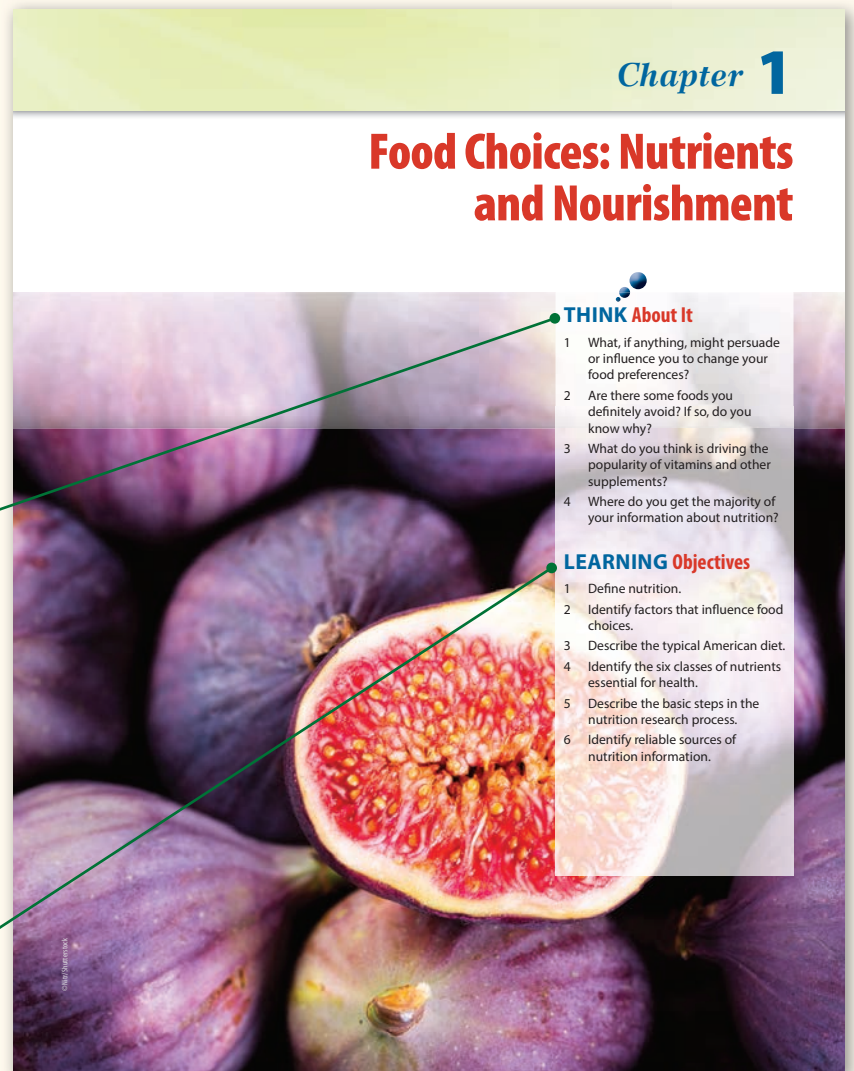
- New organization of the chapters allowing the material to flow in a more intuitive fashion
- New *Learning Objectives* clearly mapping to chapter content
- New *Spotlight on Obesity and Weight Management* offering a candid look at the obesity crisis
- New *Diet and Health* chapter examining the connection between nutrition and chronic disease
- New section on dietary guidelines around the world, including the Japanese Food Guide and Canadian recommendations
- Revised *Spotlight on Dietary Supplements and Functional Foods* providing a look at the professed benefits of dietary and herbal supplements as well as functional foods
- Revised and new *FYI* and *Quick Bite* features covering the Affordable Care Act, nutritional coaching, high protein diets, and more
- Updated *Position Statements* from the Academy of Nutrition and Dietetics (formerly the American Dietetic Association), the American Heart Association, the American College of Sports Medicine, and Dietitians of Canada
- Expanded discussion on preventing eating disorders, the impact of the college environment on eating disorders, and maladaptive coping patterns

How to Use This Text

Discovering Nutrition focuses on teaching behavioral change, personal decision making, and up-to-date scientific concepts in a number of novel ways. This interactive approach addresses different learning styles, making it the ideal text to ensure mastery of key concepts. Beginning with Chapter 1, the material engages students in considering their own behavior in light of the knowledge they are gaining. The pedagogical aids that appear in most chapters include the following:

The **Think About It** questions at the beginning of each chapter present realistic nutrition-related situations and ask students to consider how they would behave in such circumstances.

Learning Objectives, new to the *Fifth Edition*, focus students on the key concepts of each chapter and the material they will need to learn.



DIETARY GUIDELINES 45

Portion Distortion

The prevalence of obesity is of increasing concern in the United States. A notable increase in obesity has occurred over the past 20 years. Studies that look at prevalence of Self-Reported Obesity among U.S. adults by state for 2013 indicate the following: No state had an obesity rate less than 20 percent; 7 states (Montana, California, Utah, Colorado, Hawaii, Vermont, and Massachusetts) and the District of Columbia had a prevalence of obesity between 20% and <25%; 23 states had a prevalence of obesity between 25% and <30%; 18 states had a prevalence of obesity between 30% and <35%; and 2 states (Mississippi and West Virginia) had a prevalence of obesity of 35% or greater. Southern states have the highest prevalence of obesity, followed by the Midwest, the Northeast, and the West.¹

Many factors are contributing to Americans' growing waistlines, but one observation in particular cannot be overlooked: the incidence of obesity has increased in parallel with increasing portion sizes.²⁻⁴ In almost every eating situation, we are now confronted by huge portions, which are perceived as "normal" or "a great value." This perception that large portion sizes are appropriate has created an environment of portion distortion.⁵ We find portion distortion in supermarkets, where the number of larger sizes has increased significantly over the past 30 years. We find portion distortions in restaurants, where the jumbo-sized portions are consistently 250 percent larger than the regular portions.⁶ We even find portion distortions in our homes, where the sizes of our bowls and glasses have steadily increased and where the surface area of the average dinner plate has increased 36 percent since 1960.⁷ Research shows that people unintentionally consume more calories when faced with larger portions. In addition, research also shows that portion distortion seems to affect the portion sizes selected by young adults and children for some foods.⁸ Consuming larger portion sizes can contribute to positive energy balance, which, over time, leads to weight gain and ultimately may result in obesity.

The phenomenon of portion distortion has the potential to hinder weight loss, weight maintenance, and health improvement efforts. Food and nutrition professionals must develop ways to "undistort" what people perceive to be typical portion sizes and help individuals recognize what is an appropriate amount to eat at a single eating occasion.⁹

To see whether you know how today's portions compare to the portions available 20 years ago, take the interactive portion distortion quizzes on the National Heart, Lung, and Blood Institute's Portion Distortion website (www.nhlbi.nih.gov/health/public/heart/obesity/wecan/eat-right/distortion.htm). You can also learn about the amount of physical activity required to burn off the extra calories provided by today's portions.

FYI Figure 2.1A Prevalence of obesity.

FYI Figure 2.1B 45 kcal, 8 oz with milk and sugar.

FYI Figure 2.1C 350 kcal, 16 oz mocha coffee.

- Centers for Disease Control and Prevention. U.S. obesity trends: Trends by state, 1985–2010. <http://www.cdc.gov/obesity/data/trends.html>. Accessed May 2, 2014.
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For Your Information offers more in-depth treatment of controversial and timely topics, such as unfounded claims about the effects of sugar, whether athletes need more protein, nutritional coaching, and the usefulness of the glycemic index.

CARBOHYDRATES AND HEALTH 119

Figure 4.13 Comparing the sweetness of sweeteners. Non-nutritive sweeteners are much sweeter than table sugar.

sweeteners offer an alternative. Also, non-nutritive sweeteners do not contribute to tooth decay. In the U.S., our consumption of artificial sweeteners in foods and beverages has increased; however, only 15% of the population regularly consume foods with artificial sweeteners and average intakes are consistently below the acceptable daily intakes set by the FDA.²⁵

Saccharin Discovered in 1879 and used in foods ever since, saccharin tastes about 300 times sweeter than sucrose. In the 1970s, research indicated that very large doses of saccharin were associated with bladder cancer in laboratory animals. As a result, in 1977, the U.S. Food and Drug Administration (FDA) proposed banning saccharin from use in food. Widespread protests by consumer and industry groups, however, led Congress to impose a moratorium on the saccharin ban. Every few years, the moratorium was extended, and products containing saccharin had to display a warning label about saccharin and cancer risk in animals. In 2000, convincing evidence of safety led to saccharin's removal from the National Toxicology Program's list of potential cancer-causing agents,²⁶ and the U.S. Congress repealed the warning label requirement. In Canada, although saccharin is banned from food products, it can be purchased in pharmacies and carries a warning label.

Aspartame The artificial sweetener **aspartame** is a combination of two amino acids, phenylalanine and aspartic acid. When digested and absorbed, it provides 4 kilocalories per gram. However, aspartame is so many times sweeter than sucrose that the amount used to sweeten foods contributes virtually zero calories to the diet, and it does not promote tooth decay. The FDA approved aspartame for use in some foods in 1981 and for use in soft drinks in 1983. More than 90 countries allow aspartame in products such as beverages, gelatin desserts, gums, and fruit spreads. Because heating destroys the sweetening power of aspartame, this sweetener cannot be used in products that require cooking.

Acesulfame K Marketed under the brand name Sunette, **acesulfame K** is about 200 times sweeter than table sugar. The FDA approved its use in the

Position Statement:
Academy of Nutrition and Dietetics

Use of Nutritive and Non-nutritive Sweeteners

It is the position of the Academy of Nutrition and Dietetics that consumers can safely enjoy a range of nutritive and non-nutritive sweeteners when consumed in a diet that is guided by current federal nutrition recommendations, such as the *Dietary Guidelines for Americans* and the *Dietary Reference Intakes*, as well as individual goals and personal preference.

Source: Reproduced from Position of the American Dietetic Association: Use of nutritive and non-nutritive sweeteners. *J Am Diet Assoc*. 2012;112(5):739–758.

saccharin (SAK-ah-reen) An artificial sweetener that tastes about 300 to 700 times sweeter than sucrose.

aspartame (AH-spar-tame) An artificial sweetener composed of two amino acids. It is 200 times sweeter than sucrose and sold by the trade name NutraSweet.

acesulfame K (ay-see-SUL-fame) An artificial sweetener that is 200 times sweeter than common table sugar (sucrose). Because it is not digested and absorbed by the body, acesulfame contributes no calories to the diet and yields no energy when consumed.

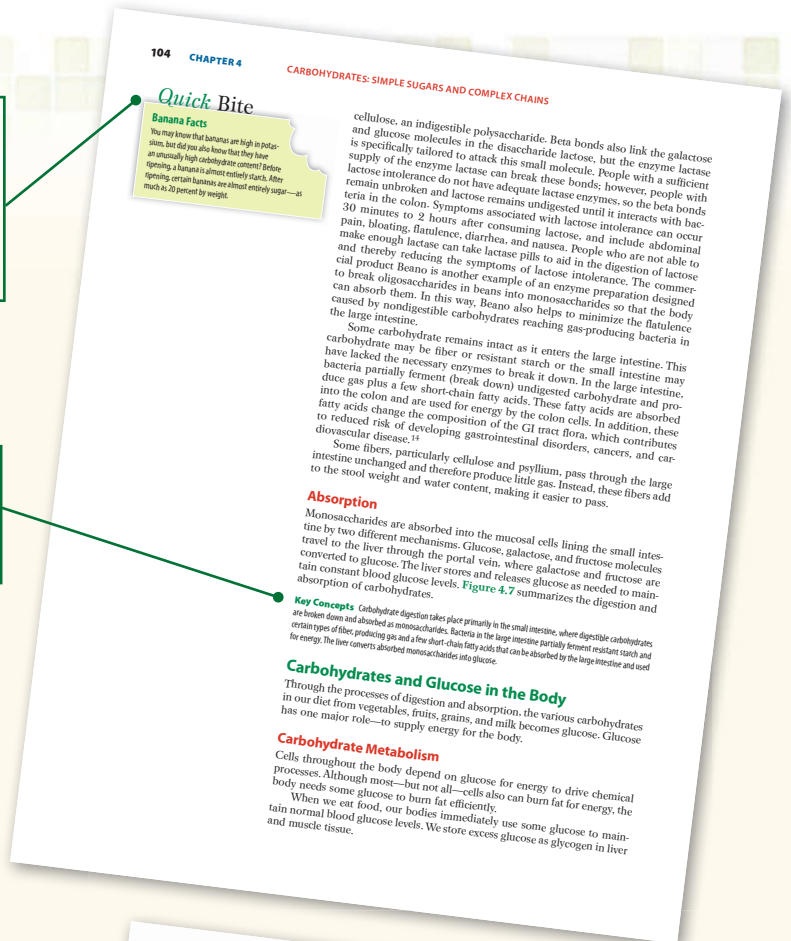
Position Statements from distinguished organizations such as the Academy of Nutrition and Dietetics, the American College of Sports Medicine, and the American Heart Association relate to the chapter topics and bolster the assertions made by the authors by showcasing concurrent opinions held by some of the leading organizations in nutrition and health.

Key Terms appear in boldface type the first time they are mentioned, with the accompanying definitions in the margin, making it easy for students to comprehend and retain material.

Quick Bites sprinkled throughout the book offer fun facts about nutrition-related topics such as exotic foods, social customs, origins of phrases, folk remedies, medical history, and so on.

Key Concepts summarize previous content as well as highlight important information.

Label to Table helps students apply their new decision-making skills at the supermarket. It walks students through the various types of information that appear on food labels, including government-mandated terminology, misleading advertising phrases, and amounts of ingredients.



The **Learning Portfolio** at the end of each chapter collects—in one place—all aspects of nutrition information students need to solidify their understanding of the material. The various formats will appeal to students according to their individual learning and studying styles.

Learning Portfolio

Key Terms

adipocytes	133	lipoprotein	146
adipose tissue	133	lipoprotein lipase	147
alpha-linolenic acid	128	low-density lipoproteins (LDLs)	148
atherosclerosis	148	metabolic syndrome	157
cancer	157	micelles	130
cardiovascular disease (CVD)	149	monoglyceride	128
chain length	127	monounsaturated fatty acid	129
cholesterol	140	nonessential fatty acids	156
choleine	138	obesity	153
chylomicron	146	olestra	130
cis fatty acid	129	omega-3 fatty acid	130
conjugated linoleic acid (CLA)	128	omega-6 fatty acid	134
diglyceride	130	oxidation	138
eicosanoids	130	phosphate group	126
essential fatty acids (EFAs)	133	phospholipids	142
fat replacers	126	phytosterols	128
fatty acids	130	polyunsaturated fatty acid	128
glycerol	130	saturated fatty acid	142
high-density lipoproteins (HDLs)	148	squalene	139
hydrogenation	129	sterols	133
intermediate-density lipoproteins (IDLs)	147	subcutaneous fat	129
lanugo	134	trans fatty acid	128
lecithin	139	unsaturated fatty acid	128
linoleic acid	128	very-low-density lipoproteins (VLDLs)	147
		visceral fat	133

Study Points

- There are three main classes of lipids: triglycerides, phospholipids, and sterols.
- Fatty acids are components of both triglycerides and phospholipids.
- Saturated fatty acids have no double bonds between carbon atoms in their carbon chains, monounsaturated fatty acids have one double bond, and polyunsaturated fatty acids have more than one double bond in their carbon chains.
- Two polyunsaturated fatty acids, linoleic acid and alpha-linolenic acid, are essential and must be supplied in the diet. Phospholipids and sterols are made in the body and do not have to be supplied in the diet.
- Essential fatty acids are precursors of hormone-like compounds called eicosanoids. These compounds regulate many body functions, including blood pressure, heart rate, inflammation, and immune response.

Study Questions

- What do the terms *saturated*, *monounsaturated*, and *polyunsaturated* mean with regard to fatty acids?
- What does the hardness or softness of a fat typically signify?
- Name the two essential fatty acids.
- What is the most common form of lipid found in food?
- List the many functions of triglycerides.
- What are the positive and negative consequences of hydrogenating a fat?
- Which foods contain cholesterol?
- Describe the difference between LDL and HDL in terms of cholesterol and protein composition.
- List the recommendations for intake of total fat, saturated fat, and cholesterol.

Try This

The Fat = Fullness Challenge

The goal of this experiment is to see whether fat affects your desire to eat between meals. Do this experiment for two consecutive breakfasts. Each meal is to include only

Key Terms lists all new vocabulary alphabetically with the page number of the first appearance. This arrangement allows students to review any terms they do not recall and turn immediately to the definition and discussion of it in the chapter. This approach promotes the acquisition of knowledge rather than simple memorization.

Study Questions encourage students to probe deeper into the chapter content, making connections and gaining new insights. Although these questions can be used for pop quizzes, they also will help students review the chapter, especially students who study by writing out material.

Study Points summarize the content of each chapter with a synopsis of each major topic. The points are in the order in which they appear in the chapter, so related concepts flow together.

Try This activities provide suggestions for hands-on activities that encourage students to put theory into practice. It will especially help students whose major learning style is experiential.

The Integrated Learning and Teaching Package

Qualified instructors can receive extensive Instructor Resources by contacting their Nutrition Account Specialist. Available resources include:

- Test Bank, including more than 850 questions
- Slides in PowerPoint format, featuring more than 500 slides
- Instructor's Manual, containing lecture outlines, discussion questions, and answers to the in-text Study Questions
- Image Bank, supplying key figures from the text
- Sample Syllabus, showing how a course can be structured around this text
- Transition Guide, providing guidance in switching from the previous edition

EatRight Analysis

Dietary analysis software is an important component of the behavioral change and personal decision-making focus. **EatRight Analysis**, developed by ESHA Research and available through Jones & Bartlett Learning, provides software that enables students to analyze their diets by calculating their nutrient intake and comparing it to recommended intake levels. EatRight Analysis offers dietary software online at eatright.jblearning.com. With this online tool, you and your students can access personal records from any computer with Internet access. Through a variety of reports, students learn to make better choices regarding their diet and activity levels.



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The *Discovering Nutrition* author team represents a culmination of years of teaching and research in nutrition science and psychology. The combined experience of the authors yields a balanced presentation of both the science of nutrition and the components of behavioral change.

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