



**UNDERSTANDING
NUTRITION**

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SIXTH EDITION

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UNDERSTANDING NUTRITION



Eleanor Noss Whitney
Sharon Rady Rolfes



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**TO THE MEMORY OF MAY
HAMILTON, WHOSE WIT, GRIT, AND
WISDOM HELPED LAUNCH THE FIRST
TWO EDITIONS OF THIS BOOK**

Ellie and Sharon

ABOUT THE AUTHORS



Eleanor Noss Whitney, Ph.D., R.D., received her B.A. in biology from Radcliffe College in 1960 and her Ph.D. in biology with an emphasis on genetics from Washington University, St. Louis, in 1970. Formerly an associate professor at the Florida State University, she now devotes full time to research, writing, and consulting on nutrition, health, and the environment. Her textbooks include *Nutrition: Concepts and Controversies*, *Nutrition and Diet Therapy*, *Life Choices*, and *The Fitness Triad*, among others. She serves on the editorial board of *Topics in Clinical Nutrition*, a quarterly series published by Aspen. She is president of Nutrition and Health Associates, an information resource center in Tallahassee.

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- H** Table of Food Composition
- I** Recommended Nutrient Intakes and Other Nutrition Recommendations
- J** Measures of Protein Quality
- K** Self-Study Forms

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Daily Values for Food Labels

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Body Mass Index Tables

inside back covers

When we wrote the first edition of *Understanding Nutrition*, our goal was to provide a textbook that would both reveal the fascination of the science of nutrition and share the fun and excitement of nutrition with the reader—to provide more than just facts. We also wanted readers to understand how the scientific facts apply to people in daily life. Our goals for this sixth edition are basically unchanged. We have revised every chapter substantially, however, to reflect the many changes that have occurred in the field of nutrition over the years.

This book presents the core information of an introductory nutrition course. Based on the principles of chemistry and molecular biology, the first 12 chapters describe the nutrients and how the body handles them. Chapter 1 wastes no time in introducing the nutrients and their importance to the human body; it continues with a brief discussion of recommendations, assessment, and guidelines. Chapter 2 shifts from recommendations to food choices and illustrates how to use diet-planning principles to create diets that support good health. In Chapter 3, readers follow the journey of digestion and absorption as the body transforms foods into nutrients. Chapters 4 through 6 describe carbohydrates, fats, and proteins—their chemistry, health effects, roles in the body, and places in the diet. Then Chapter 7 shows how the body derives energy from these three nutrients. Chapter 8 continues the story with a look at energy balance, the factors associated with overweight and underweight, and the benefits and dangers of weight loss and weight gain. Chapters 9 through 12 complete the introductory lessons by describing the vitamins, the minerals, and water—their roles in the body, their deficiency and toxicity symptoms, and their sources.

The next six chapters weave that basic information into practical applications, showing how nutrition influences people's lives. Several of these chapters reflect the public's interest in promoting good health through optimal nutrition. Chapter 13 recognizes that the partnership of physical activity and nutrition enhances health and shows how the nutrients work together to support fitness. Chapters 14 and 15 show the special nutrient needs of people through the life span—pregnancy, infancy, childhood, adolescence, and adulthood. Chapter 16 describes the relationships between diet and health, and Chapter 17 addresses consumer concerns about the safety of the food supply. Chapter 18 examines foods from the environmental point of view and offers suggestions for establishing sustainable foodways.

To the person reading this text, it will be obvious that, like even the most exact sciences, nutrition possesses no absolute certainties. Nutrition is a young science dating only from around the turn of the century. Consequently, nutrition scientists simply do not have all the answers yet; in some cases, we have not even asked all the questions yet. One of the missions of this text is to show readers how researchers ascertain the "facts." For example, Highlight 9 uses the topic of vitamin C and the common cold to describe methods used in research.

Many of the chapters in this edition include skill boxes that guide readers through problem-solving tasks. For example, one box shows readers how to calculate niacin intake from a given protein and niacin intake; another shows how to calculate iron absorption from a meal.

This edition presents the Healthy People 2000 nutrition-related priorities wherever their subjects are discussed. Healthy People 2000 is a report developed by the U.S. Department of Health and Human Services that establishes national objectives in health promotion and disease prevention for the year 2000.

Each chapter closes with study questions, and many chapters include self-study exercises. Study questions offer readers the opportunity to review the major concepts presented in the chapters. The self-study exercises assist readers in examining their own diets; one, for example, shows how to calculate nutrient intakes from a day's meals.

Highlights on current issues of interest alternate with the chapters. Each highlight provides readers with a brief look at a topic that relates to its companion chapter. New highlights in this edition address current food labeling regulations, osteoporosis, caffeine, and the impact of agriculture on the environment.

The appendixes provide valuable references for a number of purposes. Appendix A summarizes background information on the hormonal and nervous systems, complementing Appendixes B and C on basic chemistry, the chemical structures of nutrients, and major metabolic pathways. Appendix D assists readers with calculations and conversions. Appendix E provides detailed coverage on nutrition assessment, and Appendix F lists nutrition resources, including book and journal recommendations as well as addresses. Appendix G presents the U.S. Exchange System, the Canadian Exchange System, and the Canadian Food Guide and Guidelines. Appendix H is a 1600-item food composition table prepared from the latest nutrient data base assembled by ESHA Research, Inc., of Salem, Oregon. Appendix I presents the Recommended Dietary Allowances (1989 RDA), the Canadian Recommended Nutrient Intakes (1990 RNI), Nutrition Recommendations for Canadians, and Nutrition Recommendations from the World Health Organization. Appendix J describes measures of protein quality, and Appendix K provides the forms needed to complete the self-study exercises presented at the ends of chapters.

We have tried to keep the number of footnotes to a minimum. Most statements that have appeared in previous editions with footnotes now appear without them, but every statement is backed by evidence, and the authors will supply references upon request.

We hope our informal, conversational writing style makes the study of nutrition an enjoyable experience. Nutrition is a fascinating subject, and we hope our enthusiasm for it comes through on every page.

Eleanor Noss Whitney
Sharon Rady Rolfes
December 1992

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

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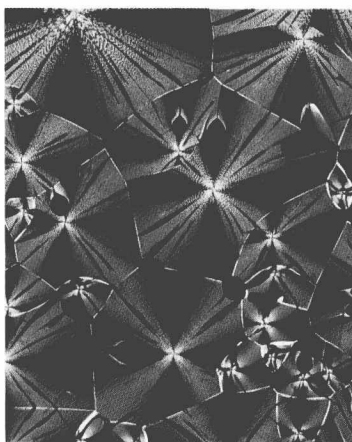
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