



Understanding Nutrition

FIFTH EDITION

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Understanding Nutrition

FIFTH EDITION

*Eleanor Noss Whitney
Eva May Nunnelley Hamilton
Sharon Rady Rolfes*



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*Understanding
Nutrition*

FIFTH EDITION

*To Tom, with gratitude for the support
and the laughter*

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 in nutrition and health. Her earlier publications include articles in *Science*, *Genetics*, and other journals. Her textbooks include *Nutrition: Concepts and Controversies*, *Understanding Normal and Clinical Nutrition*, *Nutrition and Diet Therapy*, and *Essential Life Choices*, among others. She is editor of *Nutrition Clinics*, a bimonthly monograph series published by J. B. Lippincott, and she serves as president of the Nutrition and Health Associates, an information resource center in

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Preface



Writing this text combines the best of two worlds—learning and teaching. We continually monitor the changes that take place in the field of nutrition and work that information into a text that provides readers with a clear, accurate, and current picture.

This book, which includes the 1989 RDA, presents the core information of an introductory nutrition course. Based on the principles of chemistry and molecular biology, Chapters 1–11 describe the nutrients and how the body handles them; sufficient detail is given to enable readers to grasp the basics of nutrition. Chapter 1 provides an overview of the nutrients, and Chapter 2 presents current recommendations and guides for diet planning. 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, their health effects, their roles in the body, and their place in the diet. Then Chapter 7 shows how the body yields energy from these three nutrients. Chapters 8 through 11 complete the introductory lesson by describing water, the vitamins, and minerals—their roles in the body, their deficiency and toxicity symptoms, and their sources.

The remaining seven chapters weave that basic information into pieces that illustrate how nutrition influences people's lives. Several of these chapters are new to this edition and reflect the trend toward promoting optimal health through optimal nutrition. Chapter 12 looks at the energy balance equation and explores the possible causes and treatments of obesity and underweight. New to this edition, Chapter 13 recognizes that the partnership of nutrition with fitness enhances health, and the chapter shows how the nutrients work together during exercise. Chapters 14 and 15 show the special nutrient needs of people through the life span—pregnancy, infancy, childhood, adolescence, and adulthood. Chapter 16, another new chapter, answers the question, What nutrition steps can we take to best prevent disease? Chapter 17 addresses consumer concerns about the safety of the food supply. Finally, and also new to this edition, Chapter 18 looks at domestic and world hunger with the hope that by understanding the problems, we might find the solutions.

To the person reading this text, it will be obvious that, as in even the most exact sciences, there are no absolute certainties in nutrition. Nutrition scientists simply do not have all the answers yet; in some cases, we have not even asked all the questions yet. This is true in many areas of nutrition; it is a growing, young science dating only from around the turn of the century. One of the missions of this text is to show readers how researchers ascertain the "facts." Scattered throughout this edition's chapters, "Nutrition Detective Work" boxes step behind the scenes to explain the workings of research. In

addition, Highlight 8 uses the topic of vitamin C to describe methods used in research.

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. The new highlights in this edition address such subjects as nutrition experts, artificial fats, the health aspects of vegetarian diets, dental health, lead toxicity in children, supplements used by athletes to enhance performance, fetal alcohol syndrome, the aging brain, living with AIDS, and relationships between nutrition and the environment.

The appendixes provide valuable references in a number of areas. Appendix A summarizes background information on the hormonal and nervous systems, complementing Appendixes B and C on basic chemistry, chemical structures of nutrients, and metabolic pathways. Appendix D assists readers with calculations and conversions. Appendix E contains information on nutrition assessment, and Appendix F lists nutrition resources, including book and journal recommendations as well as addresses. Appendix G contains the exchange system. Appendix H offers the latest nutrient data base assembled by ESHA Research, Inc., of Salem, Oregon. Appendix I presents the 10th edition of the Recommended Dietary Allowances (1989 RDA) and the Canadian Recommended Nutrient Intakes. Appendix J describes measures of protein quality and Appendix K provides the forms needed to complete the self-study exercises presented at the end 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.

Sharon Rady Rolfes
Eleanor Noss Whitney
January 1990

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The cover of this book lists three authors, but the truth is that many others have been involved in its creation. The new chapter on fitness reflects the research and writing of our associate Fran Sizer; another of our associates, Linda DeBruyne, provides a current and expert summary in the life cycle chapters; and the final chapter, prepared by Marie Boyle, shows her education and experience in the area of domestic and world hunger. In addition to these contributing authors, we thank Valerie West and Elisa Malo for their patient attention to round after round of word processing; Ledean Joyner for her enthusiastic and efficient assistance with a variety of production tasks; Betty and Bob Geltz for their meticulous effort in assembling the food composition appendix; Sandra Silvers for her beautiful electron micrographs that open some of the chapters; Lori Turner for her work on the Instructor's Manual, Student Study Guide, and Test Bank that accompany this text; Stan Winter for his thoughtful comments and criticisms; Linda Patton for her

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