UNDERSTANDING NUTRITION 4E

Whitney & Hamilton

Understanding Nutrition

Fourth Edition

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with
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Understanding Nutrition

Fourth Edition

To the world's children, born and to be born—may they be nourished both with the understanding of nutrition and with love

Ellie Whitney
Marie Boyle

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 from Washington University, St. Louis, in 1970. Formerly on the faculty at the Florida State University, she now devotes full time to research, writing, and consulting in nutrition and health. She is president of Nutrition and Health Associates, a nutrition information resource center in Tallahassee, Florida. Her previous publications include articles in *Science,* the *Journal of Nutrition, Genetics,* and other journals, and the textbooks *Nutrition: Concepts and Controversies, Understanding Normal and Clinical Nutrition,* and *Nutrition and Diet Therapy.*

Marie Ann Boyle, M.S., R.D., received her B.A. in Psychology from the University of Maine in 1975 and her M.S. in nutrition at the Florida State University in 1985. She has worked in the outpatient and dietetics departments of the Maine Medical Center, Portland, in the operation of a health-oriented restaurant in New York, and as the nutritionist for a children's weight-loss camp in Florida. She currently teaches Food and Nutrition at Tallahassee Community College, acts as a consultant-dietitian for Apalachee Mental Health Services, and is presently co-authoring a basic nutrition textbook entitled *Personal Nutrition* with Eleanor Whitney.

Preface

With this edition of *Understanding Nutrition,* we are celebrating the book's tenth birthday. It's a happy event for us. We have continued to enjoy monitoring the changes that have taken place in the field of nutrition and in our reader's needs, and we hope this edition reflects them.

Among new and substantially revised subject matter are many sections of the chapters, and many of the highlights. Chapter 1 has been expanded to two chapters, so that it can accommodate information on food labels and the U.S.RDA in close proximity to the RDA. New discussions appear in the first twelve chapters on the glycemic effect of foods, diabetes, protein quality, stress and nutrition, common digestive problems, the assessment and treatment of obesity, B vitamin roles and interactions, drug-nutrient interactions, toxicity of micronutrients, fluid and electrolyte balance and imbalance, acid-base balance, water balance, blood pressure regulation, calcium and osteoporosis, milk substitutes, calcium supplements, iron supplements and contamination iron, marginal iron deficiency, behavioral effects of iron deficiency, and many other subjects. Chapter 13 on foods and food safety is new: it brings together information on food additives, pesticide residues in foods, engineered and convenience foods, natural food toxicants, food contaminants, and food poisoning. Chapter 14 contains a new section comparing human milk with other milks and infant formula; the remaining chapters have also been updated. At the ends of the chapters are self-study sections, permitting students to analyze their own diets; the needed forms are all in Appendix K.

Many of the highlights are also new, delving into such fascinating topics as the ways in which the body maintains homeostasis, natural foods, nutrition and cancer, vegetarianism, nutrition and the brain, nutrition and fitness, controversial uses of vitamin B_6, nutrition and premenstrual syndrome (PMS), vitamin-mineral supplements, cancer and the Delaney Clause, nutrition and children's behavior, and more. Especially notable is Highlight 8, which gives an expanded treatment of anorexia nervosa and bulimia, commensurate in extent and depth with students' interest in these eating disorders.

The appendixes are also all revised, and we are pleased to present several new ones. Appendix A provides background on the endocrine and nervous systems, complementing B and C on basic chemistry, chemical structures, and metabolic pathways. Appendix D assists the student with routine nutrition calculations. Appendix E contains the newest information on assessment, and Appendix F our recommendations on nutrition books and journals. Appendix G contains the elegant, revised Food Exchange System first presented at the American Dietetic Association's annual meeting in October, 1986 (and the chapters incorporate the new system). Most pleasing to us is that Appendix H contains a new nutrient data base assembled by ESHA Research, Inc. of Salem,

Oregon: it presents the composition of over 1,000 foods with respect to 19 nutrients, including for the first time dietary fiber, magnesium, phosphorus, and vitamin B_6. This appendix also includes sodium, potassium, cholesterol, and the fatty-acid breakdown of foods, eliminating the necessity to present this information in separate appendixes.

The concept of nutrient density has received greater emphasis in this edition than in previous editions. It's an old term, now, but its applications are still new and surprising. Tables throughout the chapters on vitamins and minerals present the nutrient contents of foods in two ways: the left side of each table does it the old way (ranked by nutrient per serving); the right side does it the new way—ranked by nutrient per 100 kcalories of the food. This puts foods into a new perspective, and together with the color photographs of foods rich in various nutrients, helps the reader to appreciate the value of certain foods—especially vegetables—more realistically than ever before. The impact is heightened by a presentation that begins by contrasting two meals in Chapter 2, discusses those two meals in chapter after chapter thereafter, and culminates with a synthesis in Chapter 13.

As before, one of the main missions of the book is to assist the reader who wants not only to learn nutrition "facts," but also to become a discriminating consumer of newly emerging nutrition information. "How can I decide what to believe?" the reader wants to know. Portions of every chapter—the digressions—and most of the Highlights are devoted to constructing a sieve through which readers can filter new nutrition claims and separate the valid ones from the rest. The book continues to deliver the message that there is no absolute certainty, even in science's "facts," and that human critical thinking and judgment must always be applied in assessing claims. Students often find this news difficult to accept, but we cannot make it otherwise. Selections from the original Note to the Student, which expanded on this statement in the first edition, are appended right after this Preface.

As before, we have tried to keep the number of footnotes to a minimum. Most statements that have appeared in the previous editions with footnotes now appear without them, but every statement is backed by evidence and the authors will supply them on request. Also, as before, we have retained our informal, conversational writing style, hoping this will make the reader's study of nutrition as enjoyable as possible. It is a fascinating subject; we hope our enthusiasm for it comes through on every page.

Eleanor N. Whitney
Marie A. Boyle
January 1987

Note to the Student (excerpt from first edition)

You may have some questions in mind as you approach the study of nutrition. In getting to know students over the years, we have some idea of what your concerns may be.

I Keep Hearing Exciting News about Nutrition. How Can I Tell What to Believe? This is the complaint we hear most often from students. Because of it, we have designed this book not to be just a book of facts but also a book of principles that you can use to assess the nutrition information you encounter

elsewhere. Today's nutrition science stands firmly on the principles of chemistry and molecular biology. This book is based on those principles.

Even with the principles clearly in mind, however, it is sometimes hard to tell whether a statement made in the marketplace is a valid fact or a myth. Some major controversies currently raging in our field concern sugar, fiber, cholesterol, vitamin C and cancer, additives, and many other issues. It would not be fair to present these issues to you in textbook fashion as if they were settled, but it makes the study of our lively science needlessly dull to omit them. Our decision has been to reserve the **chapters** mostly for solid information, on which the experts in our field largely agree, and to present separate **highlights** on the current issues, for more speculative material. The highlights alternate with the chapters and are printed on colored pages to remind you that they convey more tentative information.

Even though we are scientists, in some cases we have no facts. Researchers in nutrition are earnestly endeavoring to learn more, but there are many areas where we are still in the dark. Students can be infuriated when a teacher seems to weasel: "I want the facts, and you are hedging. Give me the answer, straight and simple." It is frustrating to ask why and have a cautious scientist reply, "Well, we know this, and this, and . . ." but leave your question dangling. It is insulting to be told, "It's too complicated to understand," which sounds suspiciously like what mother used to say: "Wait until you are older, dear." But the truth of the matter is that there are a great many things we do not understand. One of the most exciting, as well as frustrating, experiences for students can be the dawning realization that they are approaching the outer bounds of human knowledge. The answers are simply not all in yet; no one knows what they all are; no one ever has. This is true in many areas of nutrition; it is a growing, young science. Although its questions are immensely important and fascinating, that is all they are—questions. We have tried to be honest in this respect: to show you what we do know (with a high probability) and to admit what we don't.

In attempting to present a fair picture of current nutrition research in the highlights, we have found ourselves at times confused, frustrated, angered, and amused. If you too respond this way in reading the maybes and probablys of today's nutrition issues, then be assured that you are close to the reality of our science. Any book that claims at this time to present absolute answers to all questions is actually only presenting one person's prejudices. The writer may be proved right in years to come, but some of the winners have not yet been declared. If you wish to be informed on the current issues, you will have to accept the ambiguities and contradictions in the evidence and the disagreements among the experts as an instrinsic part of scientific research in progress.

But Then How Can I Choose What to Believe? In the absence of all the facts, we still have to live and make decisions. Should you eat polyunsaturated fats? Avoid tuna? Beef? Sugar? It would not be fair to answer simply "We don't know" to all these questions. Where the answers are uncertain today, we owe it to you to help in developing the skill to evaluate new information as it appears tomorrow. Our field is beset with claims and appeals, and all of us as consumers need to be equipped to deal with them.

There are some guidelines that would help you discriminate between reliable information and false advertising. It seems to us that a separate chapter devoted to this subject would not serve the purpose. You need continuous, repeated exposure to the kinds of claims made to consumers, and you need practice in

assessing them. We offer frequent opportunities, by way of **digressions** throughout the text, for you to examine such sources of nutrition information and to assess their reliability against the criteria of accurate scientific reporting. In these digressions we have identified the most common characteristics of fraudulent advertising and the most common misunderstandings that arise from reading about nutrition research.

> The digressions are set off with color like this; if they prove too distracting you can skip them and possibly come back to them later. But they constitute a theme that runs throughout the book.

In some cases we have clear-cut evidence that a claim being made on the marketplace is fraudulent. We feel obligated to explain and elaborate these cases. It is not enough to tell you these are myths and provide nothing to replace them. But there is another problem. It seems to us that it is also not enough to say "That is a myth, and this is a fact." After all, aren't "they" saying their myth is a fact? Confronted with a choice between what "they" say and what "we" (in a nutrition text) say, you are in the bind of having to choose whom to believe, with nothing further to go on. We hope, by providing relevant information, to show you that what we say is more probably true than the myth you might otherwise believe. We believe it is important to develop the incentive and ability to identify reliable nutrition information on your own. Armed with this skill, you can continually gather and apply the information that is relevant to your own particular concerns.

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