

HANDBOOK
of
NUTRITION
and
FOOD

HANDBOOK *of* NUTRITION *and* FOOD

Edited by
CAROLYN D. BERDANIER

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Preface

A number of years ago, Harvey Kane, an editor for CRC Press, approached me to organize a reference text for nutrition along the lines of the *CRC Handbook of Chemistry and Physics*. Little did I realize what a mammoth undertaking this would be. An initial Advisory Board was convened and consisted of Ronald Entmiller, William P. Flatt, Terrance Yen, Mario DiGirolamo, Malcolm Watford, Mary Francis Picciano, and myself. Once the Advisory Board had outlined the Table of Contents, its work was complete. Together with Elaine Feldman, Sachiko St. Joer, and William Flatt, the details of the book were finalized, authors identified and contacted, and the book was put together. It was a four-year effort.

The Advisory Board met several times to discuss the target audience and what information that audience would want in a reference book. We decided to include as much material as possible that could be accessed using the World Wide Web. Hence, a number of Web addresses are used in which large databases can be found. In the first section, for instance, the data on food composition that has been accumulated by the United States Department of Agriculture is not provided. Rather, the web addresses are given so that the reader can find the specific information desired from this electronic alternative. A number of uses exist for food composition data, and each user will have specific objectives that we felt could be met if the electronic version was identified. In addition to these large data sets, smaller tables of food composition are provided that may not be in the larger data sets. Thus, the reader can find information about a food additive, tagatose, trans-fatty acids, vitamin terminology, or tocopherol and tocotrienol content of selected foods. In this first division of the book, the reader will also find several tables on food additives, food contaminants, and toxins. These tables are supplemented by Section 55, prepared by Venkitanarayanan and Doyle, that addresses food-borne illness and contains tables describing bacterial, viral, fungal, and parasitic pathogens sometimes present in food. These pathogens can cause a variety of clinical conditions; notably symptoms in the digestive tract. The mechanisms of infection as well as how to avoid such infestation is complemented by Sections 56 and 57, which describe nutrition and the hollow organs (the upper and lower gastrointestinal tract). These sections, prepared by Mutlu et al., review not only the anatomy and physiology of the gastrointestinal tract but also some of the diseases that involve these organs with respect to nutrition.

In Section 1, the reader will find tables on plants — not only those that are edible and those that are toxic, but also plants that some people believe have medicinal uses. Herbal medicine is gaining popularity, and the reader should note that these tables contain certain plants that meet all three definitions. They may have edible parts, they may have toxic parts, and they may also be herbal remedies. The lines between these properties are blurred mainly because the information about plants other than the traditional food plants is minimal.

There are five tables in this section on vitamins and minerals. Summary tables give the essentials of their use, chemical and physical properties, and so forth. These tables are supplemented by Section 64 on vitamin deficiencies, Section 65, which describes the rationale for the use of vitamin and mineral supplements, and Section 71, on trace mineral deficiencies. These sections, prepared by Rivlin, Perelson and Ellenbogen, and Nielsen, respectively, are in turn supplemented by sections that address the needs of humans at various periods in the normal life cycle (Sections 5 through 10) and people who have

nutrition-related illnesses. In addition, the assessment of human nutritional status is described using a variety of techniques, from food intake questionnaires to actual assessment of body chemistry and physiology (Sections 15 through 26 and Sections 29 through 39). These sections provide not only the techniques for assessment but also some commentary on the use of such data. The division on assessment also contains sections on the use of assessment data in nutrition action programs. These programs are designed to improve the health and wellbeing of the population through the use of a variety of nutrition education tools.

For general reference, Section 2 provides metabolic maps for intermediary metabolism. These are not as complete and detailed as one might want in biochemistry, but they provide a frame of reference for the individual needing information to interpret the results of clinical assessments of biological function. Section 3 provides a number of tables of clinical interest to the reader. In keeping with today's high interest in the genetic basis of health and disease, this section contains several tables that list some genetic mutations associated with diseases of nutritional interest. The reader will find lists of genetic diseases in carbohydrate, lipid, and protein metabolism as well as tables listing mutations that associate with obesity, diabetes, and lipemia. These tables are complemented by later sections that describe the nutritional aspects of some of these diseases. For example, diabetes-associated mutations (Table 3.7, Section 3) is complemented by Section 53, prepared by Lopes-Virella et al., which describes the disease and its complications as well as the nutrition strategies needed to optimize the health of the person with this disease. Similarly, Section 3, Table 3.5 (Mutations that Phenotype as Obesity) is complemented by several additional sections dealing with various aspects of obesity. In Section 8, on nutrition for healthy children and adolescence, Baxter discusses the problem of obesity in this age group. Obesity is addressed in Section 9, by Read, which describes nutrition for the adult. Obesity assessment is discussed and described extensively in Part V. Section 27 deals with the genetics of energy and nutrient intake, and Sections 29 through 38 describe various ways to assess body composition as well as energy intake and expenditure. Sections 69 and 70 address the treatment of obesity in children and adults. Altogether the clinician can acquire considerable information about the obesity problem, and each aspect is presented as a discrete section. The same is true for lipemia. Table 3.1 lists the lipid transport proteins, and Table 3.6 in Section 3 gives mutations that phenotype as lipemia. These tables are supplemented by Sections 26, 51, and 52, all prepared by Feldman. These sections address the assessment of blood lipids and the role blood lipids have in the pathophysiology of heart disease.

Section 3 contains some other tables that may be of interest to both the clinician and the researcher. Table 3.22 shows how to convert clinical data into Standard International (SI) units. Many research journals now require the use of SI units in their publications, yet many researchers are still using assays that give results in mg/dl or some other traditional unit. Hence, there is a need to convert these traditional units to the SI unit. Tables 3.21 and 3.22 should be quite useful in this respect. Lastly, although this is not a drug handbook, there are some drugs that are of interest to the nutritionist, dietitian, and clinician. Table 3.12 is a list of drugs that influence nutrient use, and Table 3.23 is a list of drugs that have anti-obesity properties. Drugs useful in the management of lipemia and diabetes are described in the relevant sections, but the reader should consult a drug handbook for additional information.

A number of large data sets exist describing the nutrient needs of non-human species. These data sets have been compiled by the National Academy of Sciences. A list of the web addresses for these data sets is provided in Part III, Section 4, by Flatt. Scientists wishing to use any of these species in their nutrition research will find these data sets particularly useful.

The nutrient needs of humans throughout the life cycle, from gestation to the later years, are represented in Part IV. Each of these periods of life has special considerations and these are summarized in Sections 5 through 10. Kolasa and Weismiller have discussed the food and nutrition needs of the pregnant woman and her fetus. Bhatia et al. continue with a description of the nutrition of the premature and full term infant (Sections 6 and 7). Baxter addresses the nutrition concerns of the child and adolescent. This is followed by an extensive discussion of a health-promoting diet throughout life (Section 9) and the later years (Section 10).

Part VI contains information about modified diets. Included is a section on vegetarian diets, sections on enteral and parenteral nutrition support, and a section devoted to the elite athlete.

Lastly, Part VII, the largest division, is devoted to the clinical conditions that have a nutrition component in either their management or development. The anemias are addressed by Hendricks and Kutlar, alcoholism is described by Lieber, hypertension by Prisant, diabetes, obesity, lipemias, and heart disease as mentioned above; cancer is discussed in Sections 49 and 50, and nutrition as related to oral medicine; the pancreas, liver, kidney, skeletal system, teeth, and eyes are all given special treatment.

Altogether this broad range of nutrition concerns should be of interest to the clinician, the dietician, the nutrition scientist, and the pharmacist. There is a degree of unavoidable redundancy in the book since there are several different uses for the materials provided. Rather than deleting these duplications, we felt that their inclusion with interpretive text made sense. We hope that you, the reader, enjoy this book and find it a useful reference.

Carolyn D. Berdanier

Editors

Carolyn D. Berdanier, Ph.D., is Professor Emerita of Nutrition at the University of Georgia (UGA) in Athens. She earned a B.S. degree from the Pennsylvania State University, and M.S. and Ph.D. degrees from Rutgers University. After a postdoctoral fellowship with Dr. Paul Griminger at Rutgers, she served as a Research Nutritionist with the United States Department of Agriculture Human Nutrition Institute in Beltsville, Maryland. She also served the University of Maryland in the graduate nutrition program while she was with USDA. In 1975 she relocated to the University of Nebraska College of Medicine, and then in 1977 assumed the post of department head for nutrition at the University of Georgia. After eleven years in this position, she stepped down to continue her research in nutrient-gene interactions, with a special interest in diabetes. Her research has been supported by the National Institutes of Health, the U.S. Department of Agriculture, the Bly Fund, the National Livestock and Meat Board, the U.S. Department of Commerce, the Southeast Poultry and Egg Association, and the UGA Diabetes Research Fund.

Dr. Berdanier has authored over 150 publications in peer-reviewed scientific journals, contributed 35 chapters to multiauthored books, and has edited/authored nine books. She has served on the Editorial Boards of *The FASEB Journal*, *The Journal of Nutrition*, *Biochemical Archives*, *Nutrition Research*, *Nutrition Reviews*, and the *International Journal for Diabetes Research*. She also serves as an ad hoc reviewer for numerous other journals in her field of metabolism and nutrient-gene interactions.

Elaine Bossak Feldman holds M.D., A.B. (magna cum laude) and M.S. degrees from New York University, where she was elected to Phi Beta Kappa and Alpha Omega Alpha. She trained in internal medicine, metabolism, and nutrition at the Mount Sinai Hospital in New York, held research fellowships from the New York Heart Association and the National Institutes of Health (Career Development Award, Department of Physiological Chemistry, Lund University, Sweden), and served on the faculty of the Department of Medicine, State University of New York Medical School in New York City. She is board certified in internal medicine and clinical nutrition.

Dr. Feldman is Professor Emeritus of Medicine, Physiology, and Endocrinology at the Medical College of Georgia in Augusta; she is Chief Emeritus of the Section of Nutrition and Director Emeritus of the Georgia Institute of Human Nutrition. She was the founding director of the Southeastern Regional Medical Nutrition Education Network of 15 medical schools in the Southeast. At the Medical College she was the principal investigator of a curriculum development grant from the Department of Health and Human Services, and of a Clinical Nutrition Research Unit, as well as a number of diet and drug studies in hyperlipidemia.

A noted author and lecturer on nutrition and lipidology, Dr. Feldman has published 82 articles in peer-reviewed biomedical journals and 56 invited articles. She currently serves on the editorial boards of *Nutrition Reviews*, *Nutrition Today*, and *Nutrition Update*. She has edited or written 32 books, book chapters, and monographs, including a textbook, *Essentials of Clinical Nutrition*. Dr. Feldman is a Fellow of the American Heart Association's Council on Arteriosclerosis, the American College of Physicians, and the American Society for Nutrition Sciences. She serves as a consultant for the American Institute for Cancer Research and the American Medical Women's Association.

Dr. Feldman served on the Nutrition Study Section of the National Institutes of Health and is listed in *Who's Who in America*. She has received the Goldberger Award in clinical nutrition from the American Medical Association, the Calcium Nutrition Education Award from the American Medical Women's Association, the Special Recognition Award of the Council on Arteriosclerosis, and the National Dairy Council's award for Excellence in Medical Nutrition Education from the American Society for Clinical Nutrition.

Sachiko T. St. Jeor, Ph.D., R.D. is Director of the Nutrition Education and Research Program and Professor of Clinical Medicine at the University of Nevada School of Medicine in Reno, Nevada. Her research interests are in the areas of obesity, weight management, nutrition assessment, and nutrition in medical education. Dr. St. Jeor has been honored as an outstanding alumna from both the College of Human Development at the Pennsylvania State University and the College of Health at the University of Utah. She has also received the Medallion Award and Excellence in the Practice of Dietetic Research and chaired the Council of Research of the American Dietetic Association. She is a founding member of the Council on Renal Nutrition of the National Kidney Association. Dr. St. Jeor was a member of the 1995 U.S. Dietary Guidelines Committee, and the Institute of Medicine's Committee on Opportunities in the Nutrition and Foods Sciences and Committee to Develop Criteria for Evaluating the Outcomes of Approaches to Prevent and Treat Obesity. She has also served on the Behavioral Medicine Study Section, Epidemiology and Disease Prevention Study Section, and Clinical Applications and Prevention Advisory Committee for the National Institutes of Health. She has served on the editorial boards of the *Topics in Applied Nutrition*, *Journal of the American Dietetic Association*, *Behavioral Medicine Abstracts*, *Obesity Research*, and *Weight Control Digest*. Dr. St. Jeor holds a B.A. in Nutrition from the University of Utah, Salt Lake City, an M.S. in Nutrition from the University of Iowa, Iowa City; and a Ph.D. in Nutrition from Pennsylvania State University, University Park.

William P. Flatt, Ph.D. is Professor Emeritus, Department of Foods and Nutrition, and D.W. Brooks Distinguished Professor, University of Georgia.

Dr. Flatt earned his Ph.D. in Animal Nutrition at Cornell University in 1955. He has served on the faculty of the University of Georgia since 1974, during which time he was department head for Animal Sciences, Experiment Station Director, and Dean of the College of Agriculture. Following his tenure as dean, he affiliated with the Department of Foods and Nutrition, where he maintains an active research agenda in energy metabolism, calorimetry, and obesity.

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Contributors

Kelly Adams

Department of Nutrition
University of North Carolina
Chapel Hill, North Carolina

Maria Alexander

Division of Nutrition and Physical
Activity
National Center for Chronic Disease
Prevention and Health Promotion
Centers for Disease Control and
Prevention
Atlanta, Georgia

M. Joao Almeida

The Cooper Institute
Dallas, Texas

Ross E. Andersen

Johns Hopkins School of Medicine
Division of Geriatric Medicine and
Gerontology
Baltimore, Maryland

Judith Ashley

University of Nevada School of
Medicine
Nutrition Education and Research
Program
Reno, Nevada

Paule Barbeau

Medical College of Georgia
Augusta, Georgia

Stephen Barrett

Allentown, Pennsylvania

Suzanne Domel Baxter

Medical College of Georgia
Georgia Prevention Institute
Department of Pediatrics
Augusta, Georgia

Carolyn D. Berdanier

Department of Nutrition
University of Georgia
Athens, Georgia

Michael Bergeron

Medical College of Georgia
Georgia Prevention Institute
Augusta, Georgia

Bryan C. Bergman

University of Colorado Health Sciences
Center
Center for Human Nutrition
Denver, Colorado

Odilla I. Bermudez

New England Medical Center Hospital
Boston, Massachusetts

Jatinder Bhatia

Department of Pediatrics
Medical College of Georgia
Augusta, Georgia

Karil Bialostosky

National Centers for Disease Control and
Prevention
U.S. Senate Committee on Agriculture,
Nutrition, and Forestry
Aide to Senator Harkin
Washington, D.C.

Amy Binkoski

Department of Nutrition
The Pennsylvania State University
University Park, Pennsylvania

Steven N. Blair

The Cooper Institute
Dallas, Texas

Claude Bouchard

The Pennington Biomedical Research
Center
Baton Rouge, Louisiana

Susan Bowerman

UCLA Center for Human Nutrition
Los Angeles, California

George A. Bray

The Pennington Biomedical Research
Center
Baton Rouge, Louisiana

Ronette R. Briefel

Mathematics Policy Research Inc.
Washington, D.C.

Colleen Bucher

Department of Pediatrics
Medical College of Georgia
Augusta, Georgia

Chantrapa Bunyapen

Department of Pediatrics
Medical College of Georgia
Augusta, Georgia

Ritva Butrum

American Institute for Cancer Research
Washington, D.C.

G. Franklin Carl

V.A. Medical Center
Augusta, Georgia

Ronni Chernoff

Geriatric Research Education and Clinical
Center
Arkansas Geriatric Education Center
Little Rock, Arkansas

Chin-Ling Chen

New England Medical Center Hospital
Boston, Massachusetts

Leh Chii Chwang

New England Medical Center Hospital
Boston, Massachusetts

Stacie Coval

Department of Nutrition
The Pennsylvania State University
University Park, Pennsylvania

Gail A. Cresci

Department of Surgery
Medical College of Georgia
Augusta, Georgia

Gary R. Cutter

Center for Research Methodology and
Biometrics
AMC Cancer Research Center
Denver, Colorado

Mark T. De Meo

University Gastroenterologists
Rush-Presbyterian-St. Luke's Medical
Center
Rush University
Chicago, Illinois

Dominick P. DePaola

The Forsyth Institute
Boston, Massachusetts

Michael P. Doyle

Center for Food Safety and Quality
Enhancement
University of Georgia
Griffin, Georgia

Johanna Dwyer

Frances Stern Nutrition Center
New England Medical Center
Hospital
Boston, Massachusetts

Alan R. Dyer

Department of Preventive Medicine
Northwestern University Medical
School
Chicago, Illinois

Leon Ellenbogen

Whitehall-Robbins
Madison, New Jersey

Elaine B. Feldman

Medical College of Georgia
Department of Internal Medicine
Augusta, Georgia

Valerie Fishell
Department of Nutrition
The Pennsylvania State University
University Park, Pennsylvania

William P. Flatt
Department of Nutrition
University of Georgia
Athens, Georgia

Kim M. Forde
Johns Hopkins School of Medicine
Division of Geriatric Medicine and
Gerontology
Baltimore, Maryland

John P. Foreyt
Behavioral Medicine Research Center
Baylor College of Medicine
Houston, Texas

Gary D. Foster
University of Pennsylvania
Philadelphia, Pennsylvania

Shawn C. Franckowiak
Johns Hopkins School of Medicine
Division of Geriatric Medicine and
Gerontology
Baltimore, Maryland

Naomi K. Fukagawa
Department of Medicine
University of Vermont College of Medicine
Burlington, Vermont

Constance J. Geiger
Geiger and Associates
Salt Lake City, Utah

Jane M. Greene
Nutrition Consultant
Augusta, Georgia

Sue Grossbauer
The Grossbauer Group
Chesterton, Indiana

Bernard Gutin
Medical College of Georgia
Augusta, Georgia

David Heber
Division of Clinical Nutrition
Department of Medicine
UCLA School of Medicine
Los Angeles, California

Linda K. Hendricks
Section of Hematology and Oncology
Department of Medicine
Medical College of Georgia
Augusta, Georgia

Victor Herbert
Bronx V.A. Medical Center
Bronx, New York

James O. Hill
University of Colorado Health Sciences
Center
Center for Human Nutrition
Denver, Colorado

Deanna M. Hoelscher
University of Texas — Houston Health
Science Center
School of Public Health
Human Nutrition Center
Houston, Texas

Mary Horlick
Institute of Human Nutrition
Department of Pediatrics
Columbia University, College of Physicians
and Surgeons
New York, New York

Carolyn H. Jenkins
Division of Endocrinology, Diabetes, and
Medical Genetics
Department of Medicine
Medical University of South Carolina
Charleston, South Carolina

Eileen Kennedy
Great Falls, Virginia

Karin Koehn
Frances Stern Nutrition Center
New England Medical Center
Hospital
Boston, Massachusetts

Kathryn M. Kolasa
Nutrition Education and Services
Department of Family Medicine
The Brody School of Medicine
East Carolina University
Greenville, North Carolina

Jessica Krenkel
University of Nevada School of
Medicine
Nutrition Education and Research
Program
Reno, Nevada

Penny Kris-Etherton
Department of Nutrition
Pennsylvania State University
University Park, Pennsylvania

Abdullah Kutlar
Section of Hematology and
Oncology
Department of Medicine
Medical College of Georgia
Augusta, Georgia

Jenny H. Ledikwe
Diet Assessment Center
Department of Nutrition
The Pennsylvania State University
University Park, Pennsylvania

Christian R. Lemmon
Eating Disorders Program
Medical College of Georgia
Augusta, Georgia

Sandra B. Leonard
Nutrition Consultant
Augusta, Georgia

Charles S. Lieber
Mount Sinai School of Medicine
Alcohol Research and Treatment Center
Section of Liver Disease and Nutrition
Bronx V.A. Medical Center
Bronx, New York

Kiang Liu
Department of Preventive Medicine
Northwestern University Medical
School
Chicago, Illinois

Maria F. Lopes-Virella
Ralph H. Johnson V.A. Medical Center
Division of Endocrinology, Diabetes and
Medical Genetics
Medical University of South Carolina
Charleston, South Carolina

Robert G. Martindale
Department of Surgery
Medical College of Georgia
Augusta, Georgia

Susie McPherson
University of Texas School of Public
Health
Human Nutrition Center
Houston, Texas

Marina Mironova
Division of Endocrinology, Diabetes, and
Medical Genetics
Medical University of South Carolina
Charleston, South Carolina

Diane C. Mitchell
Diet Assessment Center
Department of Nutrition
The Pennsylvania State University
University Park, Pennsylvania

Sohrab Mobarhan
Division of Gastroenterology, Hepatology,
and Nutrition
Loyola University Medical Center
Maywood, Illinois

Connie Mobley

University of Texas Health Science
Center
San Antonio, Texas

Marlene M. Most

The Pennington Biomedical Research
Center
Baton Rouge, Louisiana

Ece A. Mutlu

Division of Gastroenterology and
Hepatology
Rush-Presbyterian-St. Luke's Medical
Center
Chicago, Illinois

Gokhan M. Mutlu

Division of Respiratory and Critical Care
Medicine
University of Chicago
Chicago, Illinois

Forest H. Nielsen

USDA, ARS, GFHNRC
Grand Forks, North Dakota

Scott Owens

Department of Health and Human
Performance
Western Carolina University
Cullowhee, North Carolina

Ruth E. Patterson

Fred Hutchinson Cancer Research
Center
Seattle, Washington

Victor Pendleton

Behavioral Medicine Research Center
Baylor College of Medicine
Houston, Texas

Jean Pennington

Division of Nutrition Research
Coordination
National Institutes of Health
Bethesda, Maryland

Allen M. Perelson

Buckingham, Pennsylvania

Louis Perusse

Division of Kinesiology
Department of Preventative Medicine
Laval University
Quebec, Canada

Suzanne Perumean-Chaney

University of Nevada School of Medicine
Nutrition Education and Research
Program
Reno, Nevada

Suzanne Phelan

University of Pennsylvania School of
Medicine
Philadelphia, Pennsylvania

Stephen D. Phinney

Galileo Labs
Santa Clara, California

Claudia S. Plaisted

Department of Nutrition
University of North Carolina
Chapel Hill, North Carolina

L. Michael Prisant

Hypertension Unit
Section of Cardiology
Medical College of Georgia
Augusta, Georgia

Marsha Read

Department of Nutrition
University of Nevada
Reno, Nevada

Rebecca S. Reeves

Behavioral Medicine Research Center
Baylor College of Medicine
Houston, Texas

Treva Rice

Division of Biostatistics
Washington University School of Medicine
St. Louis, Missouri

Richard S. Rivlin

American Health Foundation
New York, New York

Kelly S. Scanlon

Division of Nutrition and Physical Activity
National Center for Chronic Disease
Prevention and Health Promotion
Centers for Disease Control and Prevention
Atlanta, Georgia

Barbara J. Scott

University of Nevada School of Medicine
Department of Pediatrics
Reno, Nevada

Mary Serdula

Division of Nutrition and Physical Activity
National Center for Chronic Disease
Prevention and Health Promotion
Centers for Disease Control and Prevention
Atlanta, Georgia

Christopher T. Sempos

Department of Social and Preventive
Medicine
SUNY-Buffalo
Buffalo, New York

Denise Shaffer Taylor

Department of Nutrition
The Pennsylvania State University
University Park, Pennsylvania

Scott H. Sicherer

Division of Allergy and Immunology
Department of Pediatrics
Jaffe Food Allergy Institute
Mount Sinai School of Medicine
New York, New York

Diane K. Smith

CSRA Partners in Health
Augusta, Georgia

Helen Smiciklas-Wright

Diet Assessment Center
Department of Nutrition
The Pennsylvania State University
University Park, Pennsylvania

Sachiko T. St. Jeor

University of Nevada School of
Medicine
Reno, Nevada

Margaret Tate

Office of Nutrition Services
Arizona Department of Health Services
Phoenix, Arizona

Nicky Teuffel-Shone

University of Arizona
Arizona Prevention Center
Tucson, Arizona

Lynn Thomas

Department of Family and Preventative
Medicine
University of South Carolina
Columbia, South Carolina

Riva Touger-Decker

Department of Clinical Nutrition
School of Health Related Professions
University of Medicine and Dentistry of
New Jersey
Newark, New Jersey

Marta D. Van Loan

USDA-WHNR
University of California
Davis, California

Kumar S. Venkitanarayanan

Department of Animal Science
University of Connecticut
Storrs, Connecticut

Stanley Wallach

American College of Nutrition
Clearwater, Florida

Elizabeth K. Weisburger

Rockville, Maryland

David G. Weismiller

Department of Family Medicine
The Brody School of Medicine
East Carolina University
Greenville, North Carolina

Christine L. Williams
Columbia University
Babies and Childrens Hospital
New York, New York

Guixiang Zhao
Department of Nutrition
The Pennsylvania State University
University Park, Pennsylvania

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Charles S. Lieber

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Elaine B. Feldman

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Maria F. Lopes-Virella, Carolyn H. Jenkins, and Marina Mironova

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Dominick P. DePaola, Connie Mobley, and Riva Touger-Decker

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Ece A. Mutlu, Gökhan M. Mutlu, and Sohrab Mobarhan

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Ece A. Mutlu, Gökhan M. Mutlu, and Sohrab Mobarhan

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Mark T. DeMeo

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Mark T. DeMeo

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Jane M. Greene and Lynn Thomas

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Stanley Wallach

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Richard S. Rivlin

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Allen M. Perelson and Leon Ellenbogen

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Vitamin B₁₂

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Diane K. Smith and Christian R. Lemmon

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