



The Benefits of Nutritional Supplements

FOURTH EDITION

Compiled by Annette Dickinson, Ph.D.

Introduction by Steve Mister



Council for Responsible Nutrition

The Science Behind the Supplements[®]



ABOUT THE AUTHOR

Annette Dickinson, Ph.D., worked in Washington, D.C., for over 30 years for the Council for Responsible Nutrition (CRN). She was CRN's original staff member at its founding in 1973 and her responsibilities evolved as the organization grew over the years. She was primarily responsible for scientific and regulatory affairs and served as CRN's President prior to her retirement and move to Minnesota (her husband's home state) in 2005.

She is currently a consultant to CRN and other clients on nutrition issues and dietary supplement regulation and is also an Adjunct Professor in the Department of Food Science and Nutrition at the University of Minnesota.

Dr. Dickinson has authored four editions of CRN's publication *The Benefits of Nutritional Supplements*, a comprehensive review of the evidence demonstrating the health benefits of core nutritional supplements including multivitamins. The first edition appeared in 1987, and this 2012 edition is the fourth.

She was appointed in 2002 to serve a three-year term on the U.S. Food and Drug Administration's Food Advisory Committee. She was appointed by President Clinton to the Commission on Dietary Supplement Labels (1995-1997) and has been a frequent witness before the U.S. Congress and at other public forums. Her expertise includes the legal and technical aspects of marketing dietary supplements, including provisions relating to labeling, advertising, and good manufacturing practices. She earned her Ph.D. in nutritional science and her M.S. in food science from the University of Maryland.



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INTRODUCTION BY STEVE MISTER

President and CEO, Council for Responsible Nutrition

The pursuit of health has never been more informed. We know more about the fields of medicine and nutrition than ever. Technological advances now allow scientists and clinicians to predict one's susceptibility to certain diseases or conditions by analyzing the DNA in cells obtained from a cheek swab. We know that the conditions a fetus is exposed to *in utero* can influence the risk of disease in adulthood. We've come so far in understanding the biology of our bodies and the biochemistry of the nutrients and other substances we ingest. The United States is recognized among the leaders of the world in technology and medicine. And yet, despite all these advances, Americans are more unhealthy, more overweight or obese, more prone to chronic disease than ever. Where did we go wrong?

Part of the answer may reside within the conflict currently being waged over healthcare reform—not the financing of healthcare, but the ways we care about health itself. The current paradigm of healthcare (or “disease care” is the better term) incentivizes physicians to treat symptoms of disease rather than preventing disease in the first place. Medical care is “siloed” by specialty area with specialists working independently of one another to treat individual symptoms rather than as a team to address the underlying causes of the symptoms. Consumers have been programmed to think there is a “magic pill” to address any and all ailments. This paradigm can no longer continue because it is ineffective, inefficient, and far too costly.

A new paradigm of healthcare is emerging: integrative healthcare, whose aim is to prevent disease in the first place and, when the need to treat the disease arises, to start treatment by addressing the underlying cause(s) or origin(s) of the disease, not the disease symptoms. At this intersection, we are discovering a new appreciation for nutrition—that what we put into our bodies (or fail to put into our bodies) on a routine basis can have lasting effects on health and wellness. Herein lies the benefit of nutritional supplements: the promise of health promotion and disease prevention. But this promise is also its greatest limitation. The “proof” required to demonstrate the promise of good health is difficult and costly to achieve; “proving” that something does not happen (i.e., demonstrating preventive

effects) is scientifically a far more difficult endeavor than demonstrating that something bad has gotten better (i.e., treatment). To study prevention is costly, sometimes impractical as it raises ethical issues, and is easily confounded by other variables that may also impact good health.

Science adds to this complexity too by constantly evolving, at times in unpredictable ways. Years of research may appear to be contradicted in a single study. Which one is right? Despite the seemingly insurmountable challenge of persuasively demonstrating the role of nutritional supplements in disease prevention, we must remain vigilant about two things: science, especially in the field of nutrition, is an ever evolving continuum of questions and answers so research must always continue because no one study is ever the “final word”; and nutritional supplements, for all their promise, are just that—supplements to, not substitutes for, a healthy diet and lifestyle. Like tools in a large toolbox, supplements are but one component of an overall approach to maintaining health and avoiding disease.

That’s what makes this latest edition of *The Benefits of Nutritional Supplements* (Fourth Edition) so valuable and so salient. Even in the past ten years, there has been so much research that further explains the role of nutrients for good health and the prevention of disease. Sometimes the research has validated what we already thought we knew, and other times it has sent our understanding of nutrition in a different direction. Is it possible that antioxidants can have a protective effect for some and be a catalyst for disease in others? Do variations in other behaviors impact how well we absorb and make use of certain nutrients? With so much of the knowledge base being updated, CRN wants to be sure we are providing our audiences with the most current information possible. *The Benefits of Nutritional Supplements* provides readers with objective information about the benefits of these products. It tracks the research suggesting previously unknown effects of a healthy diet and concedes areas where the prior thinking just hasn’t held up in studies. We hope that by creating a more informed, health-conscious consumer, we are doing our part for real healthcare reform—the kind of reform that helps people live longer, more robust, and more fulfilling lives.

A WORD ABOUT DEFINITIONS

Dietary supplements are defined in the Food, Drug and Cosmetic Act, in Section 201(ff), as products “intended to supplement the diet.” They may contain a variety of ingredients including vitamins, minerals, amino acids, herbs or other botanicals, or other dietary substances “for use by man to supplement the diet by increasing the total dietary intake.”

This paper will focus on a subset of dietary supplements which we shall designate as “nutritional supplements,” by which we mean primarily supplements of essential nutrients such as vitamins and minerals, plus related compounds such as omega-3 fatty acids and fiber. The author of this paper is a nutritionist whose area of expertise includes these dietary components and does not extend to the category of herbs and botanicals. Readers are referred to other sources of information regarding the botanical category, including information on CRN’s website and the numerous publications of the American Botanical Council.

A WORD ABOUT METRIC MEASURES

Several vitamins and minerals are required and recommended in very small quantities, measured in micrograms. These include folic acid, vitamin B-12, selenium, chromium, and iodine, among others. For purposes of nutrition labeling of dietary supplements and other foods, the official abbreviation of the term “microgram” is “mcg.” The scientific notation for a microgram is “ μg .” In this paper, we will use the labeling abbreviation rather than the scientific notation for microgram quantities.

UNITS OF MEASURE

g	Gram (1 g = 1000 mg)
mg	Milligram (1000 mg = 1 g)
mcg, μg	Microgram (1000 mcg = 1 mg)
IU	International Units (used for vitamins A, D, and E)
nmol/L	Measure of blood concentration of some nutrients (nanomoles per liter)

ABBREVIATIONS USED IN THIS DOCUMENT

AHA	American Heart Association
AI	Adequate Intake (DRI value)
AMD	Age-related macular degeneration
ATBC	Alpha-Tocopherol Beta-Carotene clinical trial
BMI	Body Mass Index
BMR	Basal Metabolic Rate
CDC	Centers for Disease Control and Prevention
CRN	Council for Responsible Nutrition
DRI	Dietary Reference Intakes (RDA, AI, EAR, UL)
DNA	Building block of genes (deoxyribonucleic acid)
EAR	Estimated Average Requirement (DRI value)
FDA	Food and Drug Administration
GISSI	Multicenter study on omega-3s, vitamin E and heart disease
HHS	Department of Health and Human Services
HOPE	Multicenter trial on vitamin E and heart disease
HOPE-2	Multicenter trial on B vitamins and cardiovascular disease
HOPE-TOO	Extension of multicenter trial on vitamin E and heart disease
IOM	Institute of Medicine
MI	Myocardial infarction (heart attack)
MVM	Multivitamin/multimineral dietary supplements
NHANES	National Health and Nutrition Examination Survey
NIH	National Institutes of Health
NOF	National Osteoporosis Foundation
NTDs	Neural tube birth defects
RDA	Recommended Dietary Allowances (DRI value)
RR	Relative Risk
SELECT	Multicenter trial on selenium, vitamin E, and prostate cancer risk
UL	Upper Level of Tolerable Intake (DRI value)



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