

NUTRITION: BASIC AND APPLIED SCIENCE

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*A Series of Monographs*

# NUTRITIONAL TOXICOLOGY

Volume II

Edited by  
John N. Hathcock

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# Nutritional Toxicology

VOLUME II

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Edited by

**JOHN N. HATHCOCK**

Experimental Nutrition Branch  
Food and Drug Administration  
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# Nutritional Toxicology

VOLUME II

# **NUTRITION: BASIC AND APPLIED SCIENCE**

A SERIES OF MONOGRAPHS

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## Preface

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During the past few years nutritional toxicology has become increasingly recognized as an important new discipline with unique value as a scientific viewpoint. This perspective that nutrition and toxicology are fundamentally linked has led and continues to lead to a new and deeper understanding of each discipline. The intensity and diversity of interactions between nutritional phenomena and toxicologic processes and end points require extensive specification of experimental conditions for results to be predictable. Nutrients modify toxic responses and toxicants modify nutritional requirements and responses.

The purpose of this book is to expand on the topics covered in Volume I of Nutritional Toxicology. More specifically, it addresses particular subjects that have become substantially more important through the development of new knowledge, significant increases in knowledge, or increased awareness of potential effects on human health and well-being. The implications of such knowledge have impact on basic research, toxicity testing, public health, food and agriculture programs, and food safety regulation.

*John N. Hathcock*





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VOLUME II

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## I. INTRODUCTION

Humans and animals are continuously exposed to wide varieties of chemical compounds which have some deleterious effects on well-being. The requirement of riboflavin for reduction of carcinogenic azo dye 4-methylaminobenzene by liver homogenates was the stimulating observation of Mueller and Miller (1950), which attracted a broad spectrum of scientists to investigate the role of nutrients on the metabolism and detoxification of foreign compounds. Chemical compounds foreign to the body, such as natural food products, food additives, pesticides, and industrial products, by-products, and pollutants are collectively named xenobiotics. Xenobiotics, after entry into the body, undergo metabolic changes whereby lipid-soluble compounds are converted into polar, water-soluble products and excreted from the body.

Several groups of enzymes participate in the biotransformation and detoxification of xenobiotics as well as in the metabolism of the endogenous substances such as fatty acids, prostaglandins, cholesterol, steroids, and vitamins. Some of the biotransformation process may take place in one tissue such as the liver and