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Foreword*

Editors: Rose and Fernandes

The safety of our food is a primary concern. However, with increased industrialization and globalization of world economies and food supplies, ensuring the safety of our food presents huge regulatory challenges. Chemical contamination of the food supply is perhaps one of the more difficult challenges. Persistent organic pollutants and toxic metals are ubiquitous environmental pollutants. Following their release into the air, water or soil, these chemicals slowly degrade and bioaccumulate in the food chain. The bioaccumulation results in low-level contamination of our food supply. Because of the long biological half-life of these chemicals in humans, even contamination at parts per trillion in the food can result in human body burdens approaching those in which adverse effects are observed in experimental studies in animals, and in observational studies in people. At present, detecting most chemical contaminants in food at parts per trillion levels can only be done with the most sophisticated, and costly, analytical techniques. In addition, because of the perishable nature of food, most analytical techniques are too time consuming to allow data generation in a real-time manner. The development of cost effective screening and intervention approaches for these chemicals are subjects of intense scientific and regulatory debates.

Low-level contamination of the food supply with persistent organic pollutants and toxic metals is an excellent example of the interaction of science and public policy. The ubiquitous microcontamination of our environment with these chemicals presents complex scientific and regulatory problems. In contrast to microbiological contaminates in food, typical hygienic practices

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and thermal processes are often ineffective in preventing or removing chemical contaminants. Because of their ubiquitous presence in the environment, these chemicals get into the food on our tables through complex and often unknown pathways. Thus, in order to understand the level of contamination of our food, our only alternative is to measure these chemicals in the food. However, methods of detecting chemical contaminates are chemical-class specific and due to the large number of potential environmental chemicals that may get into our food, we must prioritize which chemicals we evaluate. In addition, as interest in a specific chemical class increases, analytical chemists develop better and more sensitive methods of detection, resulting in the discovery that these chemicals are present in a greater percentage of our food than previously understood. Analytical methods have increased sensitivity by orders of magnitude over the past several decades. Chemicals that were once "not present" in our foods are now commonly found. To complement these advances in analytical chemistry, we must refine our risk assessment methods to better interpret the chemical contaminants occurrence and concentration data. Finally, given the wide range of foods, food sources and chemical contaminants, we would need much larger screening programs to ensure the safety of our food supply, with respect to chemical contaminants. However, the sizes of these screening programs are limited by the costs associated with them. Thus, developing cost effective screening programs that combine statistical approaches to sample selection, and analytical sensitivity and specificity are necessary.

In their book, '*Persistent organic pollutants and toxic metals in food*', editors, Dr Martin Rose and Dr Alwyn Fernandes, present both the regulatory and scientific challenges in ensuring our food supply is safe from these chemicals. This book is one of the few that presents both of these important issues. The first section of the book covers regulatory efforts to screen and control for persistent organic pollutants and toxic metals. It also includes case studies on regulatory responses to accidental contamination incidences for dioxins. These examples nicely set the stage for the second section of the book that describes the occurrence, exposure and toxicity of individual chemicals and chemical classes. This book provides the scientific and policy foundations for those interested in chemical contaminants and food safety.

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Preface

Editors: Martin Rose and Alwyn Fernandes

It has been our great pleasure to work with so many distinguished experts to put together a book that deals with the immensely important subject of chemical contamination of food. The fundamental concept behind this work was to bring together a range of perspectives on this subject – to include analytical, scientific, risk assessment and regulatory issues – and collate a useful resource for those with interests crossing these perspectives. We wanted to demonstrate how the best scientific evidence gets used for risk assessment and in turn translated into regulation. The wealth of experience and different backgrounds of our contributors has enabled us to collect together topics that cover not only a range of inorganic and organic contaminants, but also a range of viewpoints on their consequences in terms of exposure and human health.

The topics covered in this book also demonstrate two further aspects of the subject: the diversity of disciplines that are fundamental to our understanding of food safety, and the diversity of contaminants – some arising inadvertently, some through our purposeful anthropogenic activity – that analytical chemists, toxicologists, risk assessors and regulators are increasingly having to deal with. And although new and emerging issues surface regularly, new findings, improvements in measurement techniques and toxicological updates on older contaminants continue to provide insights into the interaction and influence of these chemicals on human health. Thus for example, decades after originally being alerted to the immediate toxicity of PCBs experienced by victims of acute exposure, we learn latterly about more subtle and long-term effects such as endocrine-disrupting activity and the dioxin-like toxicity of these food contaminants. Similarly, evolving knowledge of the toxicity of the different species of arsenic and mercury, combined with the advances in analytical methodology that allow speciation of these elements, has allowed refinement of the risk assessment and regulation.

We hope that the breadth of topics will also provide a useful introduction to students, a helpful resource for regulators and a general text for all those seeking further knowledge on the complex subject of food safety and human health. All that remains is for us to thank both the contributors and the staff at Woodhead for making the project so interesting and rewarding for us. We hope that you enjoy reading the book as much as we enjoyed the editing process.