Preface

We are pleased to present our textbook *Molecular Epidemiology: Principles and Practices*. As noted in prefaces by Christopher Wild and Joseph Fraumeni, Jr., this is an extremely exciting time in molecular epidemiology. Advanced tools and platforms have facilitated new efforts to be launched that are enabling a broad approach to studying the impact of a wide range of environmental exposures, broadly defined, and the inherited contribution to disease. These platforms are undergoing rapid evolution in the areas of exposure assessment and genomics and promise further advances in the near future. At the same time, there exist fundamental and basic principles of epidemiological study design: biologic sample collection, processing, and storage; and analysis of biological samples to ensure that reliable and accurate data are generated. The goal of our book is to provide a broad overview of these fundamental principles and their application to a wide range of diseases to help build a foundation that will allow the reader to appreciate, interpret and utilize these new technologies as they arise in the coming years.

We envision this collection of chapters as an orientation to the exciting opportunities that exist in molecular epidemiology. We also hope it will motivate readers to translate this information and harness these tools in meaningful ways that have a positive impact at the broadest public health level as well as at the personalized level. As noted in Chapter 1, “Knowledge is the basis for action.”

The text is meant for graduate and post-graduate students in public health and the biologic sciences, as well as seasoned practitioners interested in the striking advances that have occurred in molecular epidemiology in recent years. The book represents an update and extension of its forerunner, by the same title, published in 1993 by Frederica Perera and Paul Schulte. In that ground-breaking effort, a broad approach was taken that included a discussion of the full range of biologic markers available to investigators carrying out molecular epidemiologic research and how these tools had been and could be applied to a wide range of diseases. In the current text, we have continued and expanded upon this approach.

The book begins with providing a contextual framework for molecular epidemiology focusing on both historical and ethical components of molecular epidemiology research. It then discusses practical aspects of using biomarkers including collection, processing and storage of biologic samples; the major types of biologic markers used in molecular epidemiology research; and measurement error. Next, examples are provided of biomarkers used in characterizing exposure to environmental and occupational toxins and infectious agents, and to assessing nutritional and hormonal status and the immune response. The integration and analysis of biomarkers in a spectrum of study designs, including population- and family-based studies and clinical trials, is presented, as well as a discussion of approaches to summarizing data across studies. Examples of the application of biomarkers to the study of several major diseases and conditions are given, including cancer, coronary heart disease, lung disease, neurodegenerative disease, infectious disease, reproductive disorders and obesity. Also discussed is the conduct of molecular epidemiology studies in children. The book concludes with a discussion of future directions in molecular epidemiologic research.

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