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CONCEPTS IN

Pharmacogenomics

Fundamentals and Therapeutic Applications in Personalized Medicine

Second Edition

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publications

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Dedication

*To my wife, Christine—my
soulmate, for her boundless
love and support.*

*To my children, Alex and Olivia,
for the love and joy they bring
into my life.*

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Preface

It was quite gratifying to hear then President Obama outline his precision medicine initiative during the 2016 State of the Union address. This initiative devotes \$215 million to “pioneer a new model of patient-powered research that promises to accelerate biomedical discoveries and provide clinicians with new tools, knowledge, and therapies to select which treatments will work best for which patients.”¹ Several key objectives were outlined in this initiative including improved treatments for cancer that are genetically based; creation of a voluntary national research cohort for precision medicine; strengthening of patient data privacy and security in the context of precision medicine; modernization of the current regulatory environment as it relates to the development of new genetic and genomic technologies; and enhanced public-private partnerships focused on precision medicine.

The release of our second edition is particularly timely given the renewed focus on precision or individualized medicine. As with the first edition, it was our goal to ensure that the chapters were written in a clear, simple, and organized manner. The material is presented at a level that would be easy to understand for students, residents, fellows, and practitioners looking to better comprehend the fundamentals of pharmacogenomics. Relevant clinical applications were also emphasized throughout the chapters to illustrate to our target audience how the science of pharmacogenomics is currently impacting their clinical practice and how it might help shape their practice in the future.

The new edition contains updates on current and next-generation genomic technologies that will be used to identify new drug targets and improve overall drug safety. Emphasis is placed on the role that pharmacogenomics plays in the individualization of cancer chemotherapy and the future development of new cancer drug targets. Two new chapters cover the pharmacogenomics of drug addiction and antidiabetic drugs.

The text is organized into three parts. The first focuses on the basic science involved in pharmacogenomics with an emphasis on methodologies as well as the general effects of genetic variability on the pharmacokinetics and pharmacodynamics of drug therapy. The second part presents a systems-based review of current pharmacogenomics applications to clinical practice. The third part focuses on relevant topics designed to give students and practitioners a richer background of the many aspects that impact the full understanding and application of pharmacogenomics.

The text incorporates numerous features that are designed to enhance its readability and usefulness as a teaching aid. Key definitions are included at the beginning of each chapter to help readers understand the terminology they will encounter as they review the chapters. Practical case studies are also embedded within each chapter to stimulate critical thinking and facilitate the reader’s clinical application. Clinical pearls, which are sprinkled throughout, highlight key concepts and applications. Numerous figures and summary tables are included within the text to enhance presentation of the material and facilitate the readers’ understanding.

I hope that you enjoy reading this text and that the material contained within enhances your understanding and appreciation for the impact pharmacogenomics is having and will continue to have on safe and effective pharmacotherapy.

Martin M. Zdanowicz

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1. Obama BH II. Remarks of President Barack Obama–State of the Union Address. Oral address presented at: State of the Union Address; January 12, 2016; Washington, DC. <https://www.whitehouse.gov/the-press-office/2016/01/12/remarks-president-barack-obama-%E2%80%93-prepared-delivery-state-union-address>. [July, 11, 2016].

