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Quantitative Methods for Precision Medicine: Pharmacogenomics in Action.

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Rongling Wu. Boca Raton, FL: Chapman & Hall/CRC Press, 2023, xv+289 pp., \$110.00(H), ISBN: 978-1-482-21945-6.

This book, a valuable addition to the Chapman & Hall/CRC Biostatistics Series, caters to researchers and graduate students with an interest in advanced statistical genetics models and methods. The author, distinguished Professor Rongling Wu, leverages his extensive experience in the field to build upon the pioneering research presented in his previous works, *Statistical Genetics of Quantitative Traits* and *Statistical and Computational Pharmacogenomics*. This book offers a comprehensive array of statistical models and methods tailored specifically for pharmacogenomic research, equipping practitioners with innovative genetic research tools that contribute significantly to the evolution of precision medicine.

The book is structured into two main sections, each consisting of several chapters. The first section, “Pharmacokinetic–Pharmacodynamic Pharmacogenetics,” underscores the importance of integrating pharmacokinetic-pharmacodynamic (PK-PD) responses into pharmacogenetic characterization. This integration enhances the biological and clinical relevance of pharmacogenetic analyses and addresses the complexities in optimizing drug efficacy and toxicity due to intricate pleiotropic genetic control.

The second part, “Network Pharmacogenetics,” presents recent conceptual and methodological developments in pharmacogenomics from a systems-oriented perspective. This section equips practitioners with analytical tools designed to decipher the pharmacogenetic mechanisms that underpin variations in drug responses, side-effects, and resistance among individuals. It elucidates pharmacogenomic modeling research through detailed model derivations, practical examples, and comprehensive result interpretations.

Chapter 8, “A Game-Theoretic Model of Cell Crosstalk in Drug Response,” is particularly noteworthy for its innovative application of game-theoretic principles. This chapter delves into the complex world of tumor-microenvironment interactions and cell-cell interaction networks, employing a game-theoretic approach to model these intricate systems. The author

meticulously explains how this approach can provide a fresh perspective on understanding the dynamics of these interactions, thereby offering new insights into drug responses. This chapter is a testament to the author's ability to blend advanced mathematical concepts with biological phenomena, resulting in a unique approach to pharmacogenomic research.

Chapter 10, the concluding chapter, titled "Pharmacogenomics as a Cornerstone of Precision Medicine: Methodological Leveraging," provides an in-depth exploration of the mechanisms of drug action, examining how genetic variations can influence an individual's response to medication. It also discusses the importance of family-based designs in pharmacogenomic studies, highlighting how familial genetic data can enhance our understanding of drug responses. Furthermore, the chapter delves into the emerging field of pharmacosystems biology, which integrates pharmacogenomics with other 'omics' technologies to provide a more holistic view of drug action. This chapter underscores the pivotal role of pharmacogenomics in the advancement of precision medicine, emphasizing its potential to revolutionize healthcare by tailoring treatment strategies to individual genetic profiles.

In summary, Wu's *Quantitative Methods for Precision Medicine: Pharmacogenomics in Action* offers an in-depth exploration of quantitative methods in precision medicine, with a particular emphasis on pharmacogenomics. The book addresses a wide array of theoretical and practical issues within precision medicine, targeted towards readers with a strong statistical background working in diverse fields such as biology, medicine, bioinformatics, and drug design. Serving as an indispensable resource for those interested in statistical and computational modeling of biological systems, its self-contained chapters make it ideal for individual study, as a source of graduate-level project topics, or as a reference for professionals seeking to apply statistical and computational modeling to foster innovation.

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