

Preface

The sequencing of the human genome has brought human genetics into a new era of study with an explosive amount of information. The application of genomics, functional genomics, proteomics, and bioinformatics technologies to the study of human genetics has made it possible for human genetic diseases to be studied on a large scale, which is unprecedented, both *in silico* and in the wet lab.

The primary goal of this book is to provide up-to-date coverage of the broad range of research topics in the genetic studies of human diseases. The book contains two major parts. In the first part, a whole spectrum of approaches to human genetics research is reviewed for both background and progress. In the second part, important topics related to the genetic research of various complex human diseases are elaborated. The robust content and diverse array of subjects are meant to allow the book to serve as a concise “encyclopedia” that introduces basic and essential concepts of human genetics, as well as an in-depth review of the current understanding of genetic research in human diseases.

Another important goal of this book is to foster scientific exchange among Chinese-speaking and non-Chinese-speaking scholars. Currently, there are many Chinese-speaking scientists who are doing excellent research in human genetics and have made significant contributions to the field. However, the lack of active communication among scholars and scientists impedes scientific understanding and efficient interaction and collaboration with one another. With this in mind, when we initiated this publication, we invited mainly Chinese-speaking scholars to contribute. As such, the majority of the contributors are scholars of Chinese origin who are active in human genetic research in institutions in the US, Europe, and China, or who are senior scientists from major US pharmaceutical companies. At the same time, we also invited an elite group of internationally renowned human geneticists of non-Chinese origin to contribute some of the important chapters.

This book consists of two parts. Part 1, which includes Chapters 1 To 20, covers the commonly used approaches in the gene identification of complex diseases. Chapters 1 to 10 describe the genetic epidemiology approaches, which include traditional and contemporary linkage and association mapping methods. Chapters 11 and 12 discuss the animal models that are helpful for human disease research. A succinct summary of the statistical methods for QTL mapping in experimental crosses and a detailed overview of the animal models used in the genetic study of human complex diseases are included. Chapters 13 to 17 discuss functional genomics, one of the most promising fields that is poised to boost our understanding of systems-level cellular behavior and the fundamental etiology of human diseases. This segment includes a detailed description on the technology and application of the microarray and proteomics approaches in human genetic studies. Chapters 18 to 20 present a comprehensive discussion of bioinformatics and its potential in human disease research, given that a wealth of molecular information is rapidly accumulating and that the convergence of biology, information science, and computation is becoming critically important. With these tools in hand, Chapters 21 to 33 in Part 2 review its applications in the genetic study of human complex diseases, including osteoporosis, diabetes, metabolic syndrome, obesity, psychiatric disorders, autoimmune diseases, and cancers.

Since the book covers both the basic concepts of human genetics and in-depth reviews updating the current understanding of the genetic dissection of human diseases, the primary audience of this book would be professors, research scientists, predoctoral and postdoctoral scientists, and clinicians who are interested or involved in the genetic research of human diseases, in both academia and industry. We believe the book will benefit scholars in China as well as around the world.

Hong-Wen Deng

Professor

Departments of Orthopaedic Surgery & Basic Medical Sciences

University of Missouri–Kansas City

USA