



PREFACE

Infectomics has become one of the original members of the medical “omics” family since the completion of the Human Genome Project. The first paper that was accepted for publication on this emerging discipline was in 2001 in the first issue of *Functional and Integrative Genomics*. It was also published in *Nature Encyclopedia of Human Genome* in 2003. These early publications serve as the foundation of this book, along with papers I have published over the past 18 years while studying Infectomics. This book focuses on holo-omic studies of microbial infections, and is structured into five parts that explore the history of Infectomics, its major issues, and various approaches. 1) The first part provides an overview of Infectomics by addressing the fundamentals and recent progress relating to the development of this discipline using omics technologies, mathematical tools, and experimental approaches (1 - 7). 2) The second part addresses the most important issue in Infectomics, the theory of the paradigm shift from the conventional one-way (unidirectional) (Pat = pathogenesis) to the two-way (bidirectional) paradigm (Sym-Pat) (Sym = symbiosis). The focal point theory-based game models are discussed as a resolution of the Sym-Pat duality problems of microbial infections (8 - 9). What then follows are three parts devoted to the major research paradigms—ecoinfectomics, immunoinfectomics, and chemoinfectomics. 3) Part three addresses the issues of the research paradigm ecoinfectomics, which is the ecological study of infectomes. The main

ecoinfectomic approaches explored are phage therapy and probiotics (10 - 12). 4) Part four addresses the second major research paradigm: Immunoinfectomics (13 - 14). Research on microbial infections using infectomic signatures and immunomic approaches falls within the field of immunoinfectomics. 5) Chemoinfectomics, another major research paradigm, is discussed in the final part of this book (15 - 18). This is the growing area of infectomics, relating to chemogenomics, chemoproteomics, chemoglycomics and chemolipidomics. The chemoinfectomics-based new drug discovery paradigm focuses on identifying and targeting host factors essential for microbial infections.

Infectomics is still in its infancy and much is to be learned and developed. The future development of this discipline rests on the integration of computation, holo-omics and experimental approaches that are the three pillars of systems biology into holistic research on microbial infections. Interdisciplinary research needs range from the continuing development of new theoretical methods to characterize infectomic signatures and networks, to insights into the dynamic duality of microbial infections within the holobiont, a single unit of host–microbiome. This book may serve as a modest spur to inspire researchers to devote themselves to systems biology studies and publish their findings in order to continue to make valuable contributions to research and clinical practice of infectious diseases. This book also attempts to appeal to both basic and clinical scholars in the entire science community for draw their attention to the research of infectomics.

Developing this book from a mere idea into a publication on microbial infec-

tions has been challenging, but more rewarding than I could have ever imagined during the global pandemic of COVID-19. I would like to acknowledge the contributions made by all the individuals who have collaborated with me on this endeavor. First, I would like to thank all the authors for their contributions, without their help none of what follows in this book would have been possible. Most notable are the following: Prof. Timothy Triche, Prof. Ambrose Y. Jong, Ms. ChunHua Wu, Prof. James T. Summersgill, Prof. Hong Cao, Prof. Bai-Lian Li, Prof. David Warburton, Dr. Changjiang Long, Dr. Jing-Yi Yu, Dr. Qiqi Zhu, Prof. Huan Qi, and Prof. Yanhong Zhou. Lastly, I would like to extend my thanks to everyone at Scientific Research Publishing for their efforts in bringing this work to fruition.

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