Preface

MicroRNAs (miRNAs), endogenous noncoding regulatory mRNAs of ~22-nucleotides, have rapidly emerged as the central players in gene expression regulation. Owing to their ever-increasing implications in the control of various biological and pathological processes, miRNAs have now been considered novel biomarkers of various human diseases including, cancer, viral disease, cardiovascular disorders, metabolic disturbances, etc. Particular expression profiles have been associated with particular pathological states. Expression profiling of miRNAs have therefore become extremely important not only for fundamentalists but also for clinicians. However, the methodologies used for detecting protein-coding mRNAs cannot be directly applied to miRNAs because of their small size. Over the past years, researchers have made great efforts to developing techniques suitable for miRNA detection and quantification; a wide spectrum of creative and innovative techniques (more than 30 different methods) have been invented and validated. It has come to the time now to summarize these methods and present them in an orderly manner for better understanding and utilization of these methods to miRNA research and applications. In particular, the development of methods for quantifying circulating miRNAs opens up a fascinating opportunity for realizing miRNA as diagnostic and prognostic biomarkers of human disease. A book on this subject may help boosting up the passion of researchers to further improve the existing techniques and develop more new methods to fit to new application needs. These considerations prompted us and urged us to undertake the work: writing a book focusing on miRNA expression detection methods.

This book is aimed to target a wide range of readers from graduate students to post-doctoral fellow and senior researchers involving miRNA research of any fields in universities and research institutions. The contents of the book are also suitable for medical practitioners from residents to professors of various types of medical fields, who are interested in developing or utilizing miRNA profiling as a complementary and an alternative strategy for clinical diagnosis of human disease. It provides state-of-the-art approaches, cutting-edge methods, and practical protocols as powerful, efficient tools for miRNA detection, profiling and quantification for
both basic research and diagnostic analysis of miRNA-related diseases. The contents of chapters are organized essentially based on the hands-on laboratory experience from many outstanding investigators worldwide.

In *microRNA Expression Detection Methods*, the authors provide comprehensive descriptions of the innovative strategies and methodologies for detecting miRNA expression, and their applications to miRNA research and their potential as tools for clinical diagnosis and prognosis. The book is divided into 11 sections that include a total of 33 chapters. The book begins with Sect. 1 introducing the overall concept and strategies of miRNA expression detection methods emphasizing the need of a wide variety of miRNA detection methods to suit specific requirements for research and clinical examination in the laboratories. From Sect. 2 to Sect. 11, each of the 32 chapters is focused on an independent, unique method of miRNA detection. Each single chapter contains five subsections: Summary, Introduction, Protocol (including Materials, Instrument, Reagent, and Procedure), Application and Limitation, and Reference. The development of the technique, ideas behind it, and mechanisms underlying the method are given in Introduction of each chapter. The step-by-step protocols are detailed in Protocol section. Then, the applications and limitations of the methods are discussed. Finally, the literature citations are listed in Reference section. Schematic diagrams are included where needed and appropriate for better illustrating the principle of the methodologies. In addition, flowcharts are also provided to outline the protocols for each of miRNA expression detection methods.

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