

Preface

Cancer is a complex and multistep process involving the accumulation of multiple changes that eventually transform normal cells into cancer cells. These changes include structural and expression abnormalities of both coding and non-coding genes. Most cancer-related deaths are not caused by primary tumors but by the spread of cancer cells from the original site to distant sites. In the year 1993, Ambros and colleagues first discovered a gene for *lin-4*, which did not code for protein, in *C.elegans*, and it was named as microRNAs. Since then several microRNAs have been discovered in various organisms. MicroRNAs have regulatory roles in several biological processes. In cancer, microRNAs function as regulatory molecules acting as oncogenes and tumor suppressors resulting in them having very significant roles in cancer biology. Thus when Springer asked me to work on this book, I accepted the invitation without any second thoughts. Many outstanding investigators have done great amounts of work on microRNA in cancer so we could not cover every study because of space limitations for which we apologize. Our understanding of microRNA's role in cancer is great due to the advent of several genetic engineering approaches through making transgenic and knockout animals for microRNAs. Furthermore, several novel therapeutic modalities for microRNA have reinvigorated many hopes for the cure to cancer. In the last few years microRNA research has grown tremendously, allowing us to get closer to the development of microRNA targeted therapies the usage of microRNAs as diagnostic and prognostic markers. Some microRNAs are detected in the plasma of cancer patients and can serve as diagnostic markers, prognostic markers, therapeutic targets, and causal factors in cancers. The novel microRNA based therapies will likely reduce the incidence of death from cancers. In this book, my goal is to comprehensively review the fundamental knowledge of microRNAs in cancer.

This book is composed of eight chapters that give basic information of the role of microRNAs in cancers. The first chapter describes the general functions of microRNAs and other non-coding RNAs in cancers. Here, authors effectively describe the pivotal role of microRNAs in various malignancies. More importantly, the authors introduce novel non-coding RNAs including MALAT1, HOTAIR and others. The second chapter describes how microRNAs regulate cell proliferation in which authors provide a detailed list of microRNAs that are important in cell

proliferation and discuss, in detail, various therapeutic approaches describing the restoration of tumor suppressor microRNA expression and suppression oncogenic microRNAs expression. In the third chapter, the author elucidates the importance of microRNAs in cancer stem cells. He elegantly narrates the cancer stem cell hypothesis, shows links between cancer stem cells and epithelial-mesenchymal transition, and depicts the important role of microRNAs in normal as well as cancer stem cells. The fourth chapter describes how microRNAs regulate viral pathogenesis and cancers including the methods by which viruses regulate microRNA and viral microRNAs regulate host genes. The fifth chapter deals exclusively with oncogenic microRNAs and describes how they function in normal cells and in cancer cells. It also discusses the cell specific microRNAs and shows the importance of microRNAs in resistance to chemotherapy and radiation therapy. The sixth chapter mainly focuses on metastasis specific microRNAs. The seventh chapter highlights the role of microRNAs in Leukemias. Finally, the eighth chapter describes various novel approaches for making small molecule modifiers of microRNAs that can be used as molecular probes or in therapeutics and the various methods of the delivery of such small molecules. This chapter is a completely new twist from the current thinking concerning microRNAs.

The authors have done a fantastic job in presenting these complex topics in an easy, understandable manner. I am very thankful to the authors who have written these chapters and unselfishly assisted me in my first editing of a book. I would also like to thank the staff at Springer Science located in the Netherlands, especially Ilse Hensen for her assistance in this process. Finally, I would like to dedicate this book to my father, the late Venkaiah Alahari, and my mother, Saraswathi Alahari, who have supported me in every step of my life with whatever little resources they had and without their help I would not be the individual I am today.



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