

Preface

Over the past decades, secretion of proteins that bind to receptors on neighboring cells was considered a primary mode for communication between cells. Recently, the release of membrane vesicles including exosomes/microvesicles has become recognized as an important mode of intercellular communication. Unlike a single soluble factor secreted by cells, exosomes can carry a group of functional molecules enriched with particular proteins, lipids, and microRNAs (miRNAs) and provide an increased stability of the transported molecules. Therefore, exosomes can serve as intercellular communicators not only locally but also systemically. Exosomes are released by many different cell types, and their biological effects on the recipient cells are dependent on the composition of the exosomes and the microenvironment where the recipient cells are residents.

This book will focus on exosomes as they relate to tumor cells and cancer. The first four chapters will cover the basic biology of exosomes and the roles of specific components of exosomes, primarily focusing on proteins, mRNAs/miRNA, and lipids. In the first chapter, Dr. Graça Raposo provides an introduction to exosomes, describes the composition, biogenesis, function of exosomes in general, and the methodology for isolation and characterization of exosomes/microvesicles. Chapter 2 written by Dr. Jan Lötvall further elucidates the role of exosomal shuttle RNA in cell-to-cell communication. Dr. Lötvall's group discovered that miRNAs are encapsulated in exosomes and that they play a critical role in cell-cell communication and also as potential markers for prodiagnosis of diseases. Dr. Michel Record wrote Chapter 3 and he focuses on the effects of exosomal lipids in cell-cell communication. Development of cutting-edge lipidomic technology has provided a means to recognize the biological and pathobiological effects of lipids on many different cell types and diseases. Exosomes carrying lipids can function in exosomal lipid mediated targeting as well as carrying lipids to recipient cells. The final chapter in this section by Dr. Margot Zöller will cover the mechanisms underlying the selective recruitment of molecules into exosomes. Dr. Zöller uses tetraspanin as an excellent example to demonstrate how tetraspanins regulate protein assembly of exosomes and the possible recruitment of miRNA.

Book Chapters 5–9 focus on the effects of exosomes at the cellular and molecular levels, on tumor cell proliferation, on metastasis, and on immunosuppression. Topics in these chapters deal with the role of tumor exosomes in the progression of tumor development (Drs. Huang-Ge Zhang, William Grizzle, and Douglas Taylor);

the mechanisms underlying tumor exosome-mediated immunosuppression including induction of regulatory T cells and myeloid cells, immune modulation of T cells, and natural killer cells by tumor-derived exosomes (Dr. Theresa Whiteside), tumor-stroma interactions (Dr. Johan K. O. Skog), and microenvironment regulation of metastasis by exosomes (Dr. David Lyden).

The final chapter deals with the future of exosome biology and more specifically the induction of stem cells in regenerative medicine (Dr. Mariusz Ratajczak).

There are many individuals I wish to thank, without whose efforts this book would not have become a reality. First and foremost, my thanks go to all the authors who contributed material for publication in this book. Their expertise and scientifically informed viewpoints, coupled with a collaborative spirit under tight time constraints, has made working with them a pleasure. I also wish to thank our acquisitions editor, Fiona Sarne for her patience, encouragement, and support. This book marked a lot of firsts for me, so in the process of learning the ins and outs of publishing a book of this nature, I also developed a very strong friendship with her. I look forward to working with her again in the future.

Last, but not least, I thank my wife Lifeng Zhang, and my twin daughters Shuangqin Zhang and Shuangyin Zhang for their support and understanding during the many times that book-writing took precedence over family matters.

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