Preface

This book, which commemorates the 50th anniversary of autophagy, is designed to provide an overview and in-depth discussion of the latest scientific accomplishments in the field of autophagy and cancer research. The term autophagy, which literally means self-eating in Greek, was first coined by Christian de Duve in 1963. Autophagy is a lysosomal catabolic pathway that plays essential roles in intracellular quality control, cell survival, immunity, and homeostasis. Evidence suggesting that dysregulation of this self-defense mechanism may contribute to the development of cancer can be traced to early studies during the late 1970s and throughout the 1980s. In the past decade, following discoveries by the laboratory of Beth Levine connecting the molecular basis of autophagy with tumorigenesis, research interests in the field of autophagy and cancer have experienced rapid growth. The current explosion of information on autophagy in cancer sets the stage to speed efforts to translate our current knowledge about autophagy regulation into better cancer prevention and treatment.

This monograph starts with a historical overview highlighting the field of autophagy research from its beginnings through the key discoveries that have advanced the field into mainstream science today (Chap. 1 by W.A. Dunn Jr. and colleagues). This is followed by a summary of the roles and regulation of the core molecular machinery of autophagosome formation in both yeast and mammalian systems (Chap. 2 by M. Jin and D.J. Klionsky), a perspective on the origin of autophagosomal membranes (Chap. 3 by F. Reggiori and colleagues), and an in-depth discussion of signal transduction regulation of autophagy (Chap. 4 by P.-M. Wong and X. Jiang).

The next chapters are devoted to the roles of autophagy in tumorigenesis. The relationship between autophagy and tumor development is complex and context dependent. Two chapters (Chap. 5 by S. Jin and colleagues and Chap. 6 by Y. Ichimura and M. Komatsu) deal with the complexity of how autophagy can function in both tumor suppression and tumor promotion through a thorough discussion of the roles that autophagy plays in intracellular quality control, cell survival, cell death, cell growth, oxidative stress, DNA damage, and genomic stability during tumor development. This is followed by an in-depth review of autophagy regulation

by oncogenes and tumor suppressor genes (Chap. 7 by M.E. Murphy and colleagues), a chapter on the role of autophagy as an intracellular defense mechanism in innate and adaptive immunity and how pathogens modulate the autophagy pathway (Chap. 8 by L.M. Silva and J.U. Jung), and a thorough discussion on the complex interplay between the tumor microenvironment and autophagy, with implications for cancer prevention and treatment (Chap. 9 by D. Tang and M.T. Lotze).

The remaining chapters cover the topics of autophagy and cancer therapy. These pages serve as a comprehensive description of how autophagy affects tumor cell response to treatment and how to best modulate autophagy to improve cancer therapy (Chap. 10 by A. Thorburn and M.J. Morgan), and as a discussion of the crosstalk between autophagy and apoptosis with future attempts at modulating autophagy for maximum therapeutic benefit (Chap. 11 by M.M. Young and H.-G. Wang). The final chapter is on autophagy and drug discovery (Chap. 12 by W.-X. Ding and colleagues), which discusses potential drug targets that may be pharmacologically manipulated to modulate autophagy and summarizes the newly discovered compounds that can either inhibit or promote autophagy.

There are still major questions that need to be resolved in order to develop better strategies for cancer prevention and treatment by modulating autophagy. I hope that readers will enjoy reading these timely reviews by experts from around the world in their respective fields. I would like to extend my appreciation to all the authors for their superb contributions. Written in accessible language by experts in the field, this monograph is intended for wide use in research environments, student education, and the proliferation of interest in the field of autophagy and cancer. We hope that this comprehensive collection of reviews on autophagy and cancer will stimulate fresh thinking and new experimentation at regulating autophagy to improve cancer care.

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