MOLECULAR TARGETING
AND SIGNAL TRANSDUCTION
MOLECULAR TARGETING AND SIGNAL TRANSDUCTION

edited by

Rakesh Kumar, Ph.D.
The University of Texas
M. D. Anderson Cancer Center
Houston, TX
USA

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PREFACE

Epidemiological studies suggest that cancer is the most common cause of mortality in the western world. Our limited understanding of cellular signal-transduction-networks, the molecular pathways that control the expression and function of critical regulatory gene products in the physiology of normal and cancerous cells, has been a barrier to progress in improving the overall cure-rate of human cancers. Many current clinical interventions focus on the use of cytotoxic and cytostatic agents as cancer therapies, but these treatments are not necessarily specific to a given tumor type. Although such broad therapeutic approaches have been very fruitful in the management of human cancers, it is now clear that further significant gain will only come from a more complete understanding of key signaling pathways feeding into phenotypic alterations characteristic of cancer cells. Delineation of the physiologic roles of the specific regulatory signaling components, with known association with metastatic phenotypes, is a highly promising area which will likely provide the next generation of targeted strategies in the future of molecular cancer medicine. These signaling components are likely to be used in diagnosis, prognosis, and as novel targets for therapeutic development.

Cancer cells harbor characteristic changes that are directly linked to enhanced cell division, survival, and movement. A finely coordinated balance between cell survival and programmed cell death is critical for the normal development and maintenance of tissue homeostasis. Alteration of this balance is one of the underlying mechanisms behind diseases of cell proliferation, including cancers. Cancer mortality usually stems from the propensity for tumor cells to metastasize, rather than from the primary tumor itself, which may remain small and undetected. The process of cancer metastasis requires, among other steps, alterations in target gene products, increased angiogenesis, increased directional motility, dysfunction in the expression and functions of cell adhesion components, enhanced cell survival, resistance to therapeutic apoptosis, and increased energy requirement. Since each of these phenotypic changes are dependent on a key signaling nodule which is generally hyperactivated in cancer, new molecular therapeutic strategies are aimed to develop small inhibitory molecules to target these critical signal transduction integrators. These
approaches are likely to offer an added arsenal to effectively fight cancers, and improve the efficacy of currently used anti-cancer agents when combined.

In this book, we bring together major principles of cancer cell biology: survival, apoptosis, adhesion, and cell cycle deregulation. Research leaders from prominent cancer centers in the United States and around the world summarize up-to-date accounts of major discoveries that highlight the significance of signal transduction in cancer cell physiology and in the treatment of human cancers. This book is directed at clinicians and scientists working in the areas of experimental and molecular therapeutics, molecular medicine, translation cancer research, and bio-medical sciences in general.

Rakesh Kumar, Ph.D.
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