Heightened Sensitivity

Sensitization of Cancer Cells for Chemo/Immuno/Radiotherapy

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Cancer is among the most common causes of death in the world. Various approaches have been explored to obtain curative effects in patients. Recently developed treatments and their use in combination therapies have resulted in significant clinical responses and prolongation of life. However, complete cure has been achieved for very few cancer types. Acquired resistance to common therapies is considered to be an obstacle to the successful treatment of cancer. Investigation of cells resistant to existing chemo/immuno/radiotherapies has uncovered the mechanisms of action, and illuminated possible future approaches to overcome the resistance. This book introduces emerging strategies, potential signaling pathways and biomolecules as key targets to sensitize resistant cancers.

The chapters cover the topics of molecular targets, signaling pathways, or therapeutic tools, including antibodies, oligonucleotides (decoy, antisense RNA or siRNA), peptide mimetics, small molecules or natural products. Membrane-bound receptors, kinases, and transcription factors, in addition to enzymes like histone deacetylase and proteasomes, are covered as the molecular targets. Cell survival signaling and apoptotic signaling are described in several chapters as pathways responsible for the development of resistance in cancer cells. Besides the biological viewpoints, chemical and immunological aspects are also focused on in chapters, introducing efficient small molecules (natural products) and antibodies that induce apoptosis in resistant cells. In order to include the huge amount of the research on overcoming cancer resistance, this book provide a large 'cast' weaved with signaling pathways or molecular targets as the 'warp' and therapeutic agents as the 'weft'.

Each chapter is independently written by different contributors, hence overlaps are observed in the chapter contents. Some chemicals and treatments are repeatedly described in more than one chapter. Additional chapters describing inhibitors of mTOR and hsp90 would have attracted the interests of readers. Key molecules in survival or apoptosis pathway, like NK-κB, caspases, bcl-2 family members, PI3-K, Akt, and death receptors appear frequently in several chapters, indicating the importance of these proteins or signaling pathways as promising targets in solving the issue of cancer cell sensitization. On the contrary, this may also suggest that only a limited number of resistance mechanisms have been disclosed so far, and there are further resistance mechanisms to be revealed.

To maximize drug potency and minimize toxicity, treatment approaches based on pharmacogenetics have been extensively studied in cells and in patients. This topic is described in the last part of the book with a view toward future tailored or individualized medication.

Topics and points of interest can be easily accessed through the keyword index at the end of the book, and detailed information and data can be obtained from the references listed at the end of each chapter. This book helps chemists to enrich their biological insight, and biologists to acquire new chemical strategies in reversing cancer resistance. Fundamental concepts in medicinal chemistry and biology are described in the chapters so the book is also recommended to students in these fields. For scientists in industry and academia, and clinicians, this book provides an overview of current approaches and will inspire novel strategies toward curing cancer.

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