

Radiation remains the mainstay of therapy for a wide range of cancers. Modern radiotherapy has made rapid advances, and one of the major goals has been to leverage the vulnerabilities of a tumor that makes it susceptible to killing by radiation. These advances have been driven by information gleaned from extensive tumor profiling data. A lot of research has gone into figuring out unique ways to radiosensitize the tumor while sparing normal tissue by taking into consideration the unique molecular signature of a tumor. This collection of articles is really as broad-ranging as the many unique features displayed by a particular tumor. These articles not only delve into a large number of therapeutic approaches to precisely treat the cancer with radiation but also discuss these approaches for many different types of cancers.

Precision radiation oncology cannot be effective without a focus on tumor heterogeneity and on the DNA repair status of the tumors. Moreover, bioinformatic analysis to leverage the database of tumor mutations and adequate imaging platforms are essential for the development of effective radiotherapy regimens. The recent adoption of heavy ion particle therapy and stereotactic body radiotherapy for the treatment of cancers adds yet another layer of complexity to the field of radiotherapy. Targeted nanoparticles for radiosensitization of tumors have also generated a lot excitement in the field. Genetically engineered mouse models that accurately mimic the development of human tumors have provided very important tools to evaluate the benefits of precision radiation therapy. These topics, and much more, have been dealt with at great length in a number of articles in this collection. Radiosensitizing the tumor (especially the radioresistant cancer stem cell population) while sparing normal tissue can be achieved by a wide range of approaches that include but are not limited to targeted nanoparticles, DNA repair inhibition, targeting tumor specific genetic markers, exploiting tumor hypoxia, growth factor inhibition, immune modulation of host cells, etc. —the list is really endless.

As the readers will quickly realize upon going through the various chapters of this book, we are poised to see immense growth in the field of precision radiation oncology led by insightful experimental approaches and personalized therapeutic decisions that take into account the genetic profile of a tumor.



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