
Preface

The application of radiation therapy in the treatment of liver neoplasms presents multiple challenges. Treatment technique and dose prescription, the risk of normal tissue injury, and motion management represent some of the challenges for the radiation oncologist. Equally important, however, is patient selection within the context of the multidisciplinary approach. Appropriate treatment of liver tumors typically involves a true nexus of interactions amongst hepatologists, medical, surgical, and radiation oncologists, transplant surgeons, and diagnostic and interventional radiologists.

The purpose of this book is to address the details of radiation therapy for primary and secondary tumors of the liver as well as issues related to multidisciplinary management and the various treatment options offered by other specialties. To that end, in addition to chapters describing the details of radiation treatment planning, from external beam to brachytherapy, from photons to particles, there are also chapters written by expert surgeons, hepatologists, and radiologists. This approach is intended to familiarize the practitioner with the unique aspects of liver irradiation and also create a common understanding and language for fruitful interactions between the radiation oncologist and other specialists. The contents of this book reflect the multidisciplinary interactions seen at a liver tumor board.

A special emphasis of this book is the “how-to” or “nuts-and-bolts” aspects of radiation treatment for liver tumors. The goal is not only to provide information for the practitioner on the evidence that broadly drives our practice, but also to discuss practical details that arise in the day-to-day management. Finally, the authors also address the shortcomings of our present-day knowledge and look forward to future directions.

Treatment of liver tumors is a complex and dynamic area of oncology, and radiation therapy is playing an increasingly prominent role. Radiation oncologists can play an important role in the multidisciplinary care of liver cancer patients and also expand the frontiers of liver tumor management, and this book is intended as a foundational guide.

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Note Regarding Radiation Dose Constraints

One of the most important practical considerations in radiation treatment planning for liver malignancies or other types of tumors is sparing of normal tissues. To this point, various guidelines are in place to aid the radiation oncologist, medical dosimetrist, and physicist. The renowned paper by Emami et al. published in 1991 compiled available information, including clinician experience, regarding dose–volume relationships for various normal tissue injuries [1]. The Quantitative Analyses of Normal Tissue Effects in the Clinic (QUANTEC) effort, published in 2010, reported on and analyzed updated available literature on normal tissue toxicities and gave recommendations to physicians and the team of planners [2].

There are three tables in this textbook reporting on radiation dose constraints (Tables 4.2, 9.1 and 12.2), and further discussion of constraints in these and other chapters. Pathophysiology of radiation-induced injury to the normal liver is discussed in the text as well. In addition to information culled from the liver-specific QUANTEC paper, planning constraints from ongoing cooperative group trials, as well as institutional preferences, are presented [3]. *With specific respect to the liver*, the reader will see that both mean dose constraints as well as critical volume-based constraints, different conceptualizations of normal tissue sparing, are reported.

We emphasize to the reader that much remains to be known about normal tissue injury, and that the available dose–volume constraints, although grounded in clinical data and rational consideration, are incomplete, and thus, dose constraints should be used judiciously in the clinic. It should be noted that the dose constraints are largely derived from data that are not personalized for individual patients but rather across a population of patients. Patient-specific considerations will likely be further integrated in planning constraints in the future.

References

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