

Book Review

Stereotactic Radiosurgery and Stereotactic Body Radiation Therapy

Edited by Stanley H. Benedict, David J. Schlessinger, Steven J. Goetsch, Brian D. Kavanagh

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The rapid advances made in the already well-established worlds of stereotactic radiosurgery (SRS) and stereotactic body radiation therapy (SBRT) in the last few years mean this book arrives at an opportune time for the student of and the expert in this form of radiation treatment. This specialist area of radiation therapy, with its ability to precisely deliver larger doses of radiation over shorter fractionated periods than conventional radiotherapy techniques, is becoming more common place in radiotherapy departments. What may be a surprise to the reader is just how long such treatment techniques have been in use and how such treatments gave rise to the common use of the linear accelerator in the 1980s.

The historical timeline, roll out and locations of SRS and SBRT developments are clearly and chronologically laid out throughout this work. The self-contained nature of the chapters make the book (which forms part of the *Imaging in Medical Diagnosis and Therapy* collection) highly navigable. Each chapter begins with a detailed content guide and ends with an overview conclusion of the subject covered which helps inform both the committed and selective reader. Informative and detailed diagrams, charts, tables and images are used throughout which act as a visual aids and help emphasize understanding for what can be a very complex subject.

The historical content, at the start of the book, dovetails well with the concluding chapters on the new directions this style of treatment is currently taking and may well take. The history of this aspect of radiotherapy is covered with a

thorough eye for detail including the impact of Rontgen and Currie on the advent of early radiotherapy planning, the pivotal role played by Lars Leksell (the godfather of SRS) and some of the more unusual brain imaging techniques employed pre CT such as suspending patients from the ceiling in a body harness. This section of the book gives a good world overview and would be a sound starting point for the novice in explaining how we have arrived at where we are today with SRS and SBRT. The coverage of the pioneering work with proton and neutron therapy is also timely with the advent of particle treatment within the UK.

Part 2 of the book details how stereotactic radiation systems have developed from delivering a single fraction from stationary sources with a predominant focus on brain tumours. Issues surrounding the use of relocatable frames are covered though more detail could have been given to the impact of such devices upon the patient. Other early chapters in the book cover the progress to linear accelerators dedicated to stereotactic radiotherapy and how the differing manufacturers have adapted their equipment to radiosurgery. Helpful analysis is given here as to what is currently available on the market as well as individual specifications, characteristics and limitations. These chapters cover cyberknife as well as the latest hybrid technologies such as MRI guided radiotherapy. The final chapter in this section is a fascinating insight into the role of animal experimentation and how via the use of features such as small animal irradiators our understanding of SBRT radiobiology, beam

collimation, doses and fractionation have been enhanced and influenced.

The vital role of effective immobilization and its critical function in the delivery of such precision treatment is covered in part three of the book. Again the role of Leksell as a pioneer in this particular area of SRS and SBRT is made apparent. Frames for extracranial treatments, body frames, customised head cushions, vacuum bags and abdominal compression devices are amongst the equipment covered in this section. At times it seems the list of devices is quite descriptive and perhaps greater evaluation of such devices could have been incorporated. Chapters on motion management and frameless immobilization, with their emphasize on intrafraction organ motion tracking and synchronized respiratory techniques, demonstrate to good effect the significance of such features in effective image guided radiotherapy.

The challenges presented to treatment planning and dosimetry by stereotactic delivery are addressed to an in-depth level in part four. Again the pioneering aspects of this style of technology, as a forgoer of what was to come, are emphasized. In terms of treatment the gamma knife (with its 'beamlet-based' approach to delivery) is mooted as a stepping stone to the now common-place intensity modulated radiation therapy (IMRT). Such evolutionary progression is demonstrated in the planning approaches adopted toward intensity modulated, arc-based forms of SBRT as are

the concepts and intricacies of stereotactic treatment planning. A sound evaluative comparison of conventional and stereotactic treatment planning systems is another highlight in this chapter of the book.

The book concludes with an overview of the new directions stereotactic radiation therapy is taking and may well take in the future. The final chapters discuss the radiobiological effects of SRS and SBRT and how these differ from and to some extent defy the traditional conventions applied to standard radiotherapy delivery. Clinical outcomes of various trials are explored, as are the differing treatment paradigms applied to differing anatomical treatment areas. With features such as 6D imaging using robotic couch systems, integrated MRI platforms - supported by biological and cytotoxic radiation sensitizers and enhancers such as nanoparticles - the multi-disciplinary approach to compliment the pinpoint precision of SRS and SBRT would seem secured.

Though the complex nature of the themes discussed in this book mean it is not always an easy read it is non the less a worthwhile and informative addition to this increasingly important branch of radiotherapy.

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