

Book Review

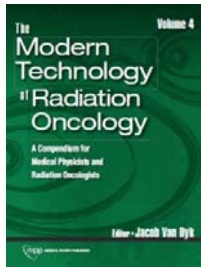
The Modern Technology of Radiation Oncology (Volume 4)

Editor: Jacob van Dyk,

ISBN:

book 978-1-951134-02-0, e-book 978-1-951134-03-7

Medical Physics Publishing



The book “The Modern Technology of Radiation Oncology” is the 4th volume in this series and has several new advances in Radiation Oncology included in it. The first volume had several technological advances in Radiation Oncology in precise detail, that I have used this volume extensively for teaching the advanced technology, probably the mostly used Medical Physics book by me after H E Johns and Cunningham’s book of “The Physics of Radiology”. This book, the volume 4, of this series again goes in to the details of the advanced and also newer technologies in Radiation Oncology, that would be useful not only for the students, but also for the teachers in Radiation Oncology Physics. This is mainly because the contributors to this volume are experts in the respective subjects discussed in this book.

Though this book is part of the series in The Modern Technology of Radiation Oncology, the more appropriate title would be “Emerging Technologies in Radiation Oncology” as several of the topics discussed in this volume are just getting into the Radiation Oncology space. This volume starts with an introduction to the technological evolution in Radiotherapy and to the new and evolving technologies discussed in this book. The chapter on Surface Guidance in Radiation Therapy comprehensively discusses all aspects such as historical evolution of the technology, technical details, its application, commissioning and quality assurance procedures. An interesting and useful addition is the chapter on PET/MRI as a tool in Radiation Oncology in which information on the common isotopes and tracers used in PET scanning for oncology, details on standardized uptake value and spatial resolution are provided. The chapter also provides details of MRI for oncology, on MRI contrast / maps useful for oncology. Other useful inclusions are the discussion on PET/MRI, its use in oncology, the considerations for housing a PET/MRI and the limitations of

MRI in providing electron density data of tissue for attenuation correction necessary for PET.

It is very encouraging to see that one of the recent advances in Image Guided Radiotherapy (IGRT) systems, the Magnetic Resonance for real time image guidance in radiotherapy has been covered in a great detail in this volume. In addition to providing details of technological development by various researchers, this chapter also discusses important aspects such as the influence of the magnetic field on the dose distribution and also on the reference dosimetry which I am sure would be very useful for the students. Several radiotherapy centers are now practicing Stereotactic Body Radiotherapy (SBRT) either with conventional linear accelerator or with dedicated units such as the cyber knife. The MR linear accelerator which is one of the preferred units for SBRT and its essential details have been well brought out in this chapter on SBRT. The discussions on the GTV to CTV margin, CTV to PTV margin and the discussion on margin recipe for SBRT much needed topics for radiation oncologists and physicists.

The chapter on adaptive radiation therapy (ART) deals with several aspects of ART such as imaging, segmentation, plan adaptation, quality assurance and also deals both with offline and online ART. Automated planning, and knowledge based planning are now getting into clinical use and the need of the hour is to have a good quality assurance program for these and I am pleased to note that the failure mode and effect analysis of automated planning is discussed in detail in this book. Artificial intelligence, machine learning, Radiomics and Big Data are other emerging fields that are finding applications in radiotherapy and the discussions on the application of these in various stages of radiotherapy process is a welcome inclusion. For the sake of continuity, the chapters could have been arranged so that ART follows the one on SBRT and the chapter on machine learning follows the one on artificial intelligence.

This book covers not only the advanced technologies but also the emerging technologies in radiotherapy such as artificial intelligence and machine learning. To conclude, this volume is a welcome addition to the series on advanced technology of radiation Oncology and should be in the library of every radiotherapy department and would be an asset for both the teachers and the taught.

Reviewed by:

Prof. Paul Ravindran B Ph.D.,Dip.R.P.,FCCPM
Chief Medical Physicist and Principal NERMPI
Christian Institute of Health Sciences and Research
Dimapur, Nagaland,797 115 , India

Chapters and Authors

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Jacob Van Dyk

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Jonathan D. Thiessen, Stewart Gaede, and Glenn Bauman

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