Recent Advancements and Applications in Dosimetry

**Editor:** Maria F. Chan, Ph.D. (Memorial Sloan Kettering Cancer Center, New York, NY, US)

**Series:** Radiation Oncology: Clinical, Translational and Laboratory Research

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**Book Description:**

**Features**
- Provides unique dosimetry for high intensity MR-guided ultrasound treatment, gold nanoparticle-enhanced radiotherapy, photodynamic therapy, thermal imaging in Brachytherapy, MR-guided radiotherapy, proton beam treatment, and high-definition end-to-end patient-specific dose verification
- Offers clinical applications for all varieties of modern radiation detectors, and evolving dosimetry techniques including innovative calorimetry, TLD, One-scan film dosimetry, transmission detectors, real-time EPID dosimetry, best feasible DVH planning, 3D printing, 5D planning and delivery, as well as machine learning

**Summary**

This book provides a comprehensive collection of the newly emerging treatment modalities, covering high intensity ultrasound treatment, photodynamic therapy, MR-guided treatment machines, nanoparticle-enhanced radiotherapy, and proton beam therapy. The invited expert authors cover a wide range of the latest advancements and developments in dosimetry techniques as well as their clinical implications, including calorimetry, radiochromic film, transmission detectors, real-time portal dosimetry, TLD, thermal imaging dosimetry, 3D dosimetry, best feasible DVH planning, 5D planning and delivery, 3D printing, as well as machine learning in medical dosimetry. This book will bring the reader up-to-date with the state of the art in radiation dosimetry and best clinical practices using such advanced detectors.

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Table of Contents

Preface

Chapter 1. Dosimetry for High-Intensity Ultrasound Treatment
(Lili Chen, PhD and C-M Charlie Ma, PhD, Department of Radiation Oncology, Fox Chase Cancer Center, Philadelphia, PA, US)

Chapter 2. Monte Carlo Nanodosimetry in Gold Nanoparticle-Enhanced Radiotherapy
(James Chun Lam Chow, PhD, Radiation Medicine Program, Princess Margaret Cancer Centre, University Health Network, Toronto, ON, CA, and others)

Chapter 3. Photodynamic Therapy Explicit Dosimetry
(Yi Hong Ong, PhD, Michele M. Kim, PhD, and Timothy C. Zhu, PhD, Department of Radiation Oncology, University of Pennsylvania, PA, US)

Chapter 4. Thermal Imaging Applications in HDR Brachytherapy Dosimetry
(Xiaofeng Zhu, PhD and Dandan Zheng, PhD, Department of Radiation Medicine, Medstar Georgetown University Hospital, Washington, DC, US, and others)

Chapter 5. Proton Dosimetry, Commissioning and Applications
(Yin Zhang, PhD, Irina Vergalasova, PhD, Ning Yue, PhD, and Ke Nie, PhD, Department of Radiation Oncology, Rutgers Cancer Institute of New Jersey, New Brunswick, NJ, US)

Chapter 6. Dosimetric Impact of Magnetic Field in MRI Guided Radiotherapy
(Victoria Y. Yu, PhD, and Minsong Cao, PhD, Department of Radiation Oncology, University of California, Los Angeles, CA US)

Chapter 7. Innovations in Calorimetry
(Humza Nusrat, James Renaud, Ph.D and Arman Sarfehnia, Ph.D., Department of Physics, Ryerson University, Toronto, ON, CA, and others)

Chapter 8. One-Scan Film Dosimetry across Multimodalities of Delivery
(Maria F. Chan, PhD, Department of Medical Physics, Memorial Sloan Kettering Cancer Center, New York, NY, US)

Chapter 9. Time-Resolved Dosimetry and Quality Assurance Using Real-Time EPID Imaging
(Benjamin Zwan and Peter B. Greer, PhD, Central Coast Cancer Centre, Gosford Hospital, Gosford, NSW, Australia, and others)

Chapter 10. High-Definition 3D Dosimetry for End-To-End Patient-Specific Treatment Delivery Verification
(Marek J. Maryanski, PhD, MGS Research, Inc., Madison, CT, USA)

Chapter 11. A Priori Estimation of Best Feasible DVH in Radiotherapy Planning
(David V. Fried, PhD, and Greg Robinson, Department of Radiation Oncology, University of North Carolina at Chapel Hill, Chapel Hill, NC, US, and others)

Chapter 12. Of Mice and Men: Applications of Thermoluminescent Dosimetry
(Yvonne Dzierna, PhD, and Frank Nuesken, PhD, Department of Radiotherapy and Radiation Oncology, Saarland University Medical Center, Homburg, Germany)

Chapter 13. Design, Characteristics, and Applications of Transmission Detectors for Advanced Quality Assurance
(Taoran Li, PhD, Jennifer O’Daniel, PhD, and Q. Jackie Wu, PhD, Department of Radiation Oncology, University of Pennsylvania, Philadelphia, PA US, and others)

Chapter 14. 3D Printing Applications in Dosimetry
(Takeshi Kamomae, PhD, Department of Radiology, Nagoya University Graduate School of Medicine, Nagoya, Aichi, Japan)

Chapter 15. 3D Dosimetry in Radiotherapy Planning and Delivery
(Chengyu Shi, PhD, and Bingqi Guo, PhD, Department of Medical Physics, Memorial Sloan Kettering Cancer Center, New York, NY, US, and others)

Chapter 16. Machine Learning Applications in Medical Dosimetry
(Nataliya Kovalchuk, PhD and Lei Xing, PhD, Department of Radiation Oncology, Stanford University School of Medicine, Stanford, CA, US)

Index
BOOK REVIEW

All interested medical physicists are encouraged to have their names added to a list of available reviewers. Please rank your interest among radiation therapy, x-ray imaging, nuclear medicine imaging, ultrasound imaging, MR imaging, radiation injury, radiation protection, and others. Make your interest known to Dimitris Mihailidis, Ph.D., Book Review Editor (dimitris@charlestonradiation.com). Include your name and email address in the body of the response.


Description

This is a multiauthor book that reviews dosimetry for several newly emerging radiation treatment modalities. It consists of 16 chapters, each covering a specific topic, with a total of 33 authors. All the authors are respected experts in their specific fields.

Purpose

This book fills a niche in the radiation dosimetry literature. No other single book covers this wide range of new technologies, so it provides a single site for readers to gain knowledge of all these recent developments in dosimetry.

Audience

This book is intended not only for practicing radiation oncology physicists and physicians but also for graduate students and residents.

Content/features

The topics covered in this book are Dosimetry for high intensity ultrasound treatment; Monte Carlo nanodosimetry in gold nanoparticle enhanced radiotherapy; Photodynamic therapy explicit dosimetry; Thermal imaging applications in HDR brachytherapy dosimetry; Proton dosimetry, commissioning, and applications; Dosimetric impact of magnetic field in MRI-guided radiotherapy; Innovations in calorimetry; One-scan film dosimetry across multimodalities of delivery; Time-resolved dosimetry and quality assurance using real-time EPID imaging; High-definition 3D dosimetry for end-to-end patient-specific treatment delivery verification; A priori estimation of best feasible DVH in radiotherapy planning; Of mice and men: applications of thermoluminescent dosimetry; Design, characteristics, and applications of transmission detectors and advanced quality assurance; 3D printing applications in dosimetry; 5D dosimetry in radiotherapy planning and delivery; and Machine learning applications in medical dosimetry.

Assessment/comparison

I found “Recent Advancements and Applications in Dosimetry,” edited by Maria Chan, to be an excellent source of information on a number of topics that are either rarely published in other books dealing with dosimetry in radiation therapy or which need to be updated. All topics have very good introductions for readers not familiar with the subjects, followed by in-depth reviews of practical applications and potential future developments. Although these topics can be found in the research literature, I had only superficial knowledge of most of them. This book brought my knowledge up-to-date and was a pleasure to read. Again, the chapters are well written by world experts on the topics. This is an excellent and timely book, and I recommend it to anyone wishing to review the latest developments in radiation therapy dosimetry.

Reviewed by Colin G. Orton, Ph.D.

Colin Orton is Professor Emeritus at Wayne State University in Detroit.