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Advances In Medical Linear Accelerator Technology

MR-Linac: Advanced Radiation Therapy for Cancer How a Linear Accelerator Works – Elekta Components of a medical linear accelerator LINAC Basics New Elekta Infinity Linear Accelerator at Johnston Health in Smithfield Linear Accelerators (LINAC) | Biomedical Engineers TV | New Linear Accelerators Make Radiation Therapy Fast and Painless Anatomy of a Linac with Dr Brendan Whelan Machine QA -- StarTrack based LINAC QA Task Group 142 report: Quality Assurance of Medical Linear Accelerators Linear Accelerator MedPhys - 9.1 - Medical Linear Accelerators: LINAC collimation system. The Linear Accelerator (LINAC) (1/5) IGRT Trilogy Medical Linear Accelerator (LINAC) Linac - Treatment Head IMRT Trilogy Medical Linear Accelerator (LINAC) Medical electron linear accelerators (LINAC) How Does a Linear Accelerator Work? Part 1: Understanding the Linear Accelerator in the Radiation Oncology Clinic Medical Linear Accelerators Techniques and Results

Carbon-Ion Radiotherapy
Radiation Oncology Advances
Principles and Practice of Gynecologic Oncology
Proton Therapy Physics
Advanced and Emerging Technologies in Radiation Oncology Physics
Accelerator Physics, Technology and Applications
New Technologies in Radiation Oncology
Cancer, Radiation Therapy, and the Market
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KIMBERLY LOGAN

Techniques and Results IOS Press

Appraising cancer as a major medical market in the 2010s, Wall Street investors placed their bets on single-technology treatment facilities costing $100-

$300 million each. Critics inside medicine called the widely-publicized proton-center boom "crazy medicine and unsustainable public policy." There was no valid evidence, they claimed, that proton beams were more effective than less costly alternatives. But developers expected insurance to cover their centers' staggeringly high costs and debts. Was speculation like this new to health care? Cancer, Radiation Therapy, and the Market shows how the radiation therapy specialty in the United States (later called radiation oncology) coevolved with its device industry throughout the twentieth-century. Academic engineers and physicians acquired financing to develop increasingly powerful radiation devices, initiated companies to manufacture the devices competitively, and designed hospital and freestanding procedure units to utilize them. In the process, they incorporated market strategies into medical organization and practice. Although palliative benefits and striking tumor reductions fueled hopes of curing cancer, scientific research all too often found serious patient harm and disappointing beneficial impact on cancer survival. This thoroughly documented and provocative inquiry concludes that public health policy needs to

re-evaluate market-driven high-tech medicine and build evidence-based health care systems.
Carbon-Ion Radiotherapy Springer Science & Business Media
This book focuses on the state of the art of Monte Carlo methods in radiation physics and particle transport simulation and applications. Special attention is paid to algorithm development for modeling, and the analysis of experiments and measurements in a variety of fields.
Radiation Oncology Advances Frontiers Media SA
This updated Fourth Edition provides comprehensive coverage of the biology of gynecologic cancer, the therapeutic modalities available, and the diagnosis and treatment of site-specific malignancies. Because of the importance of multimodality treatment, the site-specific chapters are co-authored by a surgical oncologist, a medical oncologist, a radiation oncologist, and a pathologist. A significant portion of this edition focuses on monoclonal antibodies, vaccines, and gene directed therapies and how they can greatly improve treatment outcomes. A new chapter on end-of-life care is also included. Three distinguished new editors—Richard R. Barakat, MD, Maurie Markman, MD, and Marcus E. Randall, MD—now join the editorial team.
Principles and Practice

of Gynecologic Oncology World Scientific

Linear particle accelerators (linacs) are essential for future discovery machines as well as many advanced medical and industrial applications. A linac is formed from a set of cascaded RF cavities (cells). For a typical electron linac, such as the SLAC linear accelerator, RF power is fed to the linac from one point and flows to adjacent cells through the beam tunnel. Consequently, the linac design process requires careful consideration of the coupling between adjacent cells. This limits the ability of the designer to optimize the cell shape for high RF-to-beam efficiency and/or craft the field on the surface for high-gradient operation. We introduce a novel particle accelerator technology that utilizes a periodic feeding network to feed every accelerating cell independently. This eliminates the need for the coupling between cells, giving considerable optimization flexibility for the shape of the accelerator cells. This dissertation discusses the concept behind this topology and presents how such a concept is developed and implemented through a set of key research milestones. The theory of the distributed-coupling linac is presented alongside the associated optimization techniques that take full benefit of the resultant design flexibility. Compared to

a conventional linac, our designed and tested structures provide approximately double the shunt impedance. A novel manufacturing technique is enabled by observing that both the cells and the feeding network have planes with no currents passing through them. This allowed the manufacturing of the structure from two blocks. From an economical point of view, this reduces the part count by about two orders of magnitude in comparison to traditional ways of building the structures from half-cell cups. Additionally, this method allows us to assemble the structure without the necessary brazing steps typically needed for traditional linacs. Hence, the copper or doped-copper material hardness properties can be maintained, further enhancing the ability of the surface to resist damage due to cyclic fatigue. Cryogenic operation of normal-conducting linacs substantially reduces their surface resistance and hence improves RF-to-beam efficiency. The reduced losses also reduce the transient temperature rise on the surface, which is the root cause of the surface cyclic fatigue that leads to surface distortions and consequently breakdown events. That cyclic fatigue is further reduced because the copper yield strength is increased at lower temperatures. In this work, we present the

first demonstration of high-gradient acceleration of an electron-beam at a cryogenic temperature of 77 K. Experimental operation of the distributed-coupling structure at 77 K resulted in a reduction in the breakdown rates by two orders of magnitude. Furthermore, the concept of distributed-coupling is extended to superconducting accelerators. Compared to conventional designs, the provided optimization flexibility of the distributed-coupling topology leads to optimized geometries with a reduced surface magnetic field and RF power loss. This reduction should allow for high-gradient operation and reduced system cost. We present our initial attempts to build and test a superconducting distributed-coupling linac. Finally, the concept of distributed-coupling is extended to utilize two accelerating modes that operate simultaneously in the same linac. Dual-mode acceleration enhances the shunt impedance while allowing the structure to operate at much higher gradients. The latter advantage is due to the fact that a given point on the cavity surface does not experience the sum of the peak fields from the two modes at the same time. An extra degree of freedom is obtained by not requiring the operating frequencies to be harmonically related; it is sufficient to have a common sub-harmonic.

The value of this sub-harmonic determines the distance between the bunches that can be accelerated. The proposed dual-mode architecture prevents the leakage of the high-frequency mode through the coupling ports of the low-frequency mode by introducing a choke feature in the low-frequency port. Moreover, this architecture preserves the structure symmetry and allows for manufacturing the structure from quadrant copper blocks.

Proton Therapy Physics CRC Press
This book provides an up-to-date comprehensive overview of the exciting new developments shaping the current and future practice of radiation oncology. Advances in treatment planning and delivery, in biological targeted therapies combined with radiation and in functional and molecular imaging are all covered in a single volume. All of these advances are discussed by leading experts in the field and with a critical evaluation of their clinical relevance throughout.

Advanced and Emerging Technologies in Radiation Oncology Physics

Artech House
This study guide will be a reliable support and easy-to-use source of information for students in the fields of dosimetry, physics,

radiation oncology, and therapy as they progress through the educational levels in preparation for board examinations. The theoretical and practical knowledge gained by students on previous courses or in clinical settings is reinforced by means of almost 1200 questions and accompanying detailed analytical answers. In order to cater for the needs of all students, the questions are arranged according to three levels of difficulty. The level 1 questions are mainly intended for those hoping to pass the Medical Dosimetrist Certification Board (MDCB) exam but will also be beneficial for Medical Physics candidates taking written exams and for Radiation Oncology residents. The level II questions are in general clinically related and will be relevant for any student, while the level III questions are advanced and are especially suitable for American Board of Radiology candidates or those taking equivalent exams elsewhere in the world. The study guide is broken down into different subject areas, with provision of multiple questions and answers on each subject. In addition, the mathematical and physics questions include brief explanations of how the student can solve each problem. At the end of the guide, three practice tests are included with the same number of questions as are found in the MDCB

exam. These tests will help students to test their knowledge and improve their test-taking speed.

Accelerator Physics, Technology and Applications

Springer Science & Business Media
Originally invented for generating the first artificial nuclear reactions, particle accelerators have undergone, during the past 80 years, a fascinating development that is an impressive example of the inventiveness and perseverance of scientists and engineers. Since the early 1980s, accelerator science and technology has been booming. Today, accelerators are the prime tool for high energy physics to probe the structure of matter to an unknown depth. They are also, as synchrotron radiation sources, the most versatile tool for characterizing materials and processes and for producing micro- and nanostructured devices. The determination of the structure of large biomolecules is presently among the best examples of the application of synchrotron radiation. Finally, accelerators have grown more and more important for medicine, which is relying on them for advanced cancer therapy and radio-surgery. And there are more applications, including the generation of neutrons for materials science,

the transmutation of nuclear waste with simultaneous production of electrical power, the sterilization of medical supplies and of foodstuff, and the inspection of trucks by customs or security services. This book is meant to provide basic training in modern accelerators for students, teachers, and interested scientists and engineers working in other fields. It is a result of the 3rd International Accelerator School, held in 2002 in Singapore under the auspices of the Overseas Chinese Physics Association (OCPA). Reputable experts, including a recent prize-winner, cover the field of cyclic and linear accelerators from the basic theoretical tools to forefront developments such as the X-ray free electron laser or the latest proton therapy facilities under construction. Accelerators, the art of building them, and the science for understanding their function have become a very exciting field of research. This book conveys the excitement of the experts to the reader. The proceedings have been selected for coverage in: • Index to Scientific & Technical Proceedings® (ISTP® / ISI Proceedings) • Index to Scientific & Technical Proceedings (ISTP CDROM version / ISI Proceedings) • CC Proceedings — Engineering & Physical Sciences Contents:Particle Accelerators: An Introduction (C

Zhang)A Guided Survey of Synchrotron Radiation Sources (H O Moser)Transverse Beam Dynamics: Linear Optics (Q Qin)Transverse Beam Dynamics: Closed Orbit Correction and Injection (C-C Kuo)Transverse Beam Dynamics: Dynamic Aperture (Q Qin)Longitudinal Beam Dynamics — Energy Oscillation in an Electron Storage Ring (Y Jin)Photoinjectors (I Ben-Zvi)Synchrotron Radiation (C T Lee)Lattice Design for Synchrotron Radiation Source Storage Rings (Y Jin)Spallation Neutron Source and Other High Intensity Proton Sources (W Chou)RF Electron Linac and Microton (S-H Wang)Collective Beam Effects in Storage Rings (Z Guo)Designing Superconducting Cavities for Accelerators (H Padamsee)Accelerator Magnets: Dipole, Quadrupole and Sextupole (C S Hwang)Emittance and Cooling (C T Lee)RF Systems for Light Source Storage Rings (Z T Zhao)Vacuum System (J R Chen)RFQ Design and Performance (J Fang)Insertion Devices: Wigglers and Undulators (C S Hwang)Medical and Industrial Applications of Electron Accelerators (Y Lin)High Gain Free Electron Lasers (L H Yu)Proton Therapy: Accelerator Aspects and Procedures (H-U Klein & D Krischel)Introduction to Synchrotron Radiation Applications (H O Moser et al.)

Readership: Researchers, practitioners, academics and graduate students in accelerator physics. Keywords:Accelerator Physics;Particle Accelerators Synchrotron Radiation;Micro and Nanostructured Devices;Electron Laser X-Ray Free

New Technologies in Radiation Oncology

Medical Physics Publishing Corporation International radiation oncologists, surgeons, and scientists comprehensively review the techniques, indications, and results of using intraoperative electrons (IOERT) and high-dose rate brachytherapy (HDR-IORT). State-of-the-art topics range from methods and techniques of treatment and issues of normal tissue/organ tolerance to IORT, to techniques and results by disease-site, as well as future possibilities. The disease-site chapters cover every body part for which the potential merit of IORT has been demonstrated, with disease-specific treatment factors presented by a radiation oncologist and a surgeon. The diseases range from GI cancers to CNS and breast malignancies. International in authorship and comprehensive in scope, Intraoperative Irradiation: Techniques and Results offers a cutting-edge resource and reference for surgeons, radiation oncologists, physicists,

anesthesiologists, medical oncologists, and all others involved in providing IORT and HDR-IORT procedures and cancer care today.

Cancer, Radiation Therapy, and the Market World Scientific

Modern medical imaging and radiation therapy technologies are so complex and computer driven that it is difficult for physicians and technologists to know exactly what is happening at the point-of-care. Medical physicists responsible for filling this gap in knowledge must stay abreast of the latest advances at the intersection of medical imaging and radiation therapy. This book provides medical physicists and radiation oncologists current and relevant information on Adaptive Radiation Therapy (ART), a state-of-the-art approach that uses a feedback process to account for patient-specific anatomic and/or biological changes, thus delivering highly individualized radiation therapy for cancer patients. The book should also benefit medical dosimetrists and radiation therapists. Adaptive Radiation Therapy describes technological and methodological advances in the field of ART, as well as initial clinical experiences using ART for selected anatomic sites. Divided into three sections (radiobiological basis, current technologies, and clinical applications), the book covers: Morphological

and biological biomarkers for patient-specific planning Design and optimization of treatment plans Delivery of IMRT and IGRT intervention methodologies of ART Management of intrafraction variations, particularly with respiratory motion Quality assurance needed to ensure the safe delivery of ART ART applications in several common cancer types / anatomic sites The technology and methodology for ART have advanced significantly in the last few years and accumulated clinical data have demonstrated the need for ART in clinical settings, assisted by the wide application of intensity modulated radiation therapy (IMRT) and image-guided radiation therapy (IGRT). This book shows the real potential for supplying every patient with individualized radiation therapy that is maximally accurate and precise.

Clinical Radiation Oncology Springer Thoroughly revised and updated, the 2nd Edition presents all of the latest advances in the field, including the most recent technologies and techniques. For each tumor site discussed, readers will find unparalleled coverage of multiple treatment plans, histology and biology of the tumor, its anatomic location and routes of spread, and utilization of specialized techniques. This convenient source

also reviews all of the basic principles that underlie the selection and application of radiation as a treatment modality, including radiobiology, radiation physics, immobilization and simulation, high dose rate, intraoperative irradation, and more. Comprehensively reviews each topic, with a distinct clinical orientation throughout. Serves as a foundation for the basic principles that underlie the selection and application of radiation as a treatment modality, including radiobiology, radiation physics, immobilization and simulation, high dose rate, intraoperative irradation, and more. Guides readers through all stages of treatment application with step-by-step techniques for the assessment and implementation of radiotherapeutic options. Presents latest information on brachytherapy * 3-dimensional conformal treatment planning * sterotactic radiosurgery * and radiolabeled antibodies. Discusses the recent use of radiotherapy in the treatment of primary lymphoma, leukemia, multiple myeloma, and cancers of the prostate and central nervous system. Includes the latest AJCC staging system guidelines. Offers the latest advances in techniques, allowing you to deliver doses precisely to areas affected by malignancy and spare healthy tissue. Presents new chapters on the hottest

topics including Three Dimensional Conformal Radiotherapy * Intensity Modulated Radiotherapy * Breathing Synchronized Radiotherapy * Plasma Cell Tumors: Multiple Myeloma and Solitary Plasmacytoma * Extracranial Stereotactic Radioablation * and [Imaging of the] Head and Neck * Thorax * Abdomen * and Pelvis.

Advancing Nuclear Medicine Through Innovation

Springer Science & Business Media
Organized to serve as a ready reference, this book covers the design & principles of operation of microwave electron linear accelerators for the radiation treatment of cancer. Designed for use by persons without extensive knowledge & experience of accelerator technology, the book assumes a knowledge of elementary physics & mathematics & places its emphasis on how accelerators actually function & how they are used in cancer treatment. Coverage includes the history of development & application, general theory of acceleration, accelerator systems, radiation beam systems & associated equipment, performance characteristics, testing & use. The major modules of a representative medical accelerator are described, including principles of operation & how these models function collectively to

produce electron & X-ray beams for radiotherapy.

A Compendium for Medical Physicists and Radiation Oncologists

Springer
By the mid-1950s, a linear accelerator suitable for treating deep-seated tumors was built in the Stanford Microwave Laboratory and installed at Stanford Hospital. It served as a prototype for commercial units that were built later. Since that time, medical linear accelerators gained in popularity as major radiation therapy devices, but few basic training materials on their operation had been produced for use by medical professionals. C.J. Karzmark, a radiological physicist at Stanford University, was involved with medical linacs since their development, and he agreed to collaborate with Robert Morton of the Center for Devices and Radiological Health (formerly the Bureau of Radiological Health), U.S. Food and Drug Administration, in writing the first edition of this primer.

The Modern Technology of Radiation Oncology

Springer
Nearly 20 million nuclear medicine procedures are carried out each year in the United States alone to diagnose and treat cancers, cardiovascular disease, and certain neurological disorders. Many of the advancements in

nuclear medicine have been the result of research investments made during the past 50 years where these procedures are now a routine part of clinical care. Although nuclear medicine plays an important role in biomedical research and disease management, its promise is only beginning to be realized. Advancing Nuclear Medicine Through Innovation highlights the exciting emerging opportunities in nuclear medicine, which include assessing the efficacy of new drugs in development, individualizing treatment to the patient, and understanding the biology of human diseases. Health care and pharmaceutical professionals will be most interested in this book's examination of the challenges the field faces and its recommendations for ways to reduce these impediments.

Review of Medical Dosimetry Lippincott Williams & Wilkins

Comprehensive Biomedical Physics is a new reference work that provides the first point of entry to the literature for all scientists interested in biomedical physics. It is of particularly use for graduate and postgraduate students in the areas of medical biophysics. This Work is indispensable to all serious readers in this interdisciplinary area where physics is applied in medicine and biology. Written by leading scientists who have evaluated and

summarized the most important methods, principles, technologies and data within the field, Comprehensive Biomedical Physics is a vital addition to the reference libraries of those working within the areas of medical imaging, radiation sources, detectors, biology, safety and therapy, physiology, and pharmacology as well as in the treatment of different clinical conditions and bioinformatics. This Work will be valuable to students working in all aspect of medical biophysics, including medical imaging and biomedical radiation science and therapy, physiology, pharmacology and treatment of clinical conditions and bioinformatics. The most comprehensive work on biomedical physics ever published Covers one of the fastest growing areas in the physical sciences, including interdisciplinary areas ranging from advanced nuclear physics and quantum mechanics through mathematics to molecular biology and medicine Contains 1800 illustrations, all in full color

Advanced Monte Carlo for Radiation Physics, Particle Transport Simulation and Applications W B Saunders Company

In many Laboratories, great emphasis now is placed on the development of linear accelerators with very large ion currents. To achieve this goal, a primary concern must be the low-velocity part of the accelerator, where the current limit

is determined and where most of the emittance growth occurs. The use of magnetic focusing, the conflicting requirements in the choice of linac frequency, and the limitations of high-voltage dc injectors, have tended to produce low-velocity designs that limit overall performance. The radio-frequency quadrupole (RFQ) linear accelerator, invented in the Soviet Union and developed at Los Alamos, offers an attractive solution to many of these low-velocity problems. In the RFQ, the use of RF electric fields for radial focusing, combined with special programming of the bunching, allows high-current dc beams to be captured and accelerated with only small beam loss and low radial emittance growth. Advantages of the RFQ linac include a low injection energy (20 to 50 keV for protons) and a final energy high enough so the beam can be further accelerated with high efficiency in a Wideroee or Alvarez linac. These properties have been confirmed at Los Alamos in a highly successful experimental test performed during the past year. The success of this test and the advances in RFQ design procedures have led to the adoption of this linac for a wide range of applications. The beam-dynamics parameters of three RFQ systems are described. These are the final design for the

protytype test of the Fusion Materials Irradiation Test (FMIT) accelerator, the final design for the prototype test of the Pion Generator for Medical Irradiations (PIGMI), and an improved low-velocity linac for heavy ion fusion.

A New Linear Accelerator Springer Science & Business Media

Computerized medical imaging and image analysis have been the central focus in diagnostic radiology. They provide revolutionarizing tools for visualization of physiology as well as the understanding and quantitative measurement of physiological parameters. This book provides a unique depth of knowledge from the principles to recent advanced methods in medical imaging instrumentation and techniques as well as multidimensional image analysis and classification methods for research, education and applications in computer-aided diagnostic radiology. Internationally renowned researchers and experts in their respective areas provide detailed description of the basic foundation as well as the most recent developments in medical imaging. This book helps readers to understand theoretical and advanced concepts for important research and clinical applications.

Surface Guided Radiation Therapy CRC Press

Surface Guided Radiation Therapy provides a comprehensive overview of optical surface image guidance systems for radiation therapy. It serves as an introductory teaching resource for students and trainees, and a valuable reference for medical physicists, physicians, radiation therapists, and administrators who wish to incorporate surface guided radiation therapy (SGRT) into their clinical practice. This is the first book dedicated to the principles and practice of SGRT, featuring: Chapters authored by an internationally represented list of physicists, radiation oncologists and therapists, edited by pioneers and experts in SGRT Covering the evolution of localization systems and their role in quality and safety, current SGRT systems, practical guides to commissioning and quality assurance, clinical applications by anatomic site, and emerging topics including skin mark-less setups. Several dedicated chapters on SGRT for intracranial radiosurgery and breast, covering technical aspects, risk assessment and outcomes. Jeremy Hoisak, PhD, DABR is an Assistant Professor in the Department of Radiation Medicine and Applied Sciences at the University of California, San Diego. Dr. Hoisak's clinical expertise includes radiosurgery and respiratory motion

management. Adam Paxton, PhD, DABR is an Assistant Professor in the Department of Radiation Oncology at the University of Utah. Dr. Paxton's clinical expertise includes patient safety, motion management, radiosurgery, and proton therapy. Benjamin Waghorn, PhD, DABR is the Director of Clinical Physics at Vision RT. Dr. Waghorn's research interests include intensity modulated radiation therapy, motion management, and surface image guidance systems. Todd Pawlicki, PhD, DABR, FAAPM, FASTRO, is Professor and Vice-Chair for Medical Physics in the Department of Radiation Medicine and Applied Sciences at the University of California, San Diego. Dr. Pawlicki has published extensively on quality and safety in radiation therapy. He has served on the Board of Directors for the American Society for Radiology Oncology (ASTRO) and the American Association of Physicists in Medicine (AAPM).

Medical Electron Accelerators

Routledge

This book concisely reviews important advances in radiation oncology, providing practicing radiation oncologists with a fundamental understanding of each topic and an appreciation of its significance for the future of radiation oncology. It explores in detail the impact of newer imaging modalities, such as

multiparametric magnetic resonance imaging (MRI) and positron emission tomography (PET) using fluorodeoxyglucose (FDG) and other novel agents, which deliver improved visualization of the physiologic and phenotypic features of a given cancer, helping oncologists to provide more targeted radiotherapy and assess the response. Due consideration is also given to how advanced technologies for radiation therapy delivery have created new treatment options for patients with localized and metastatic disease, highlighting the increasingly important role of image-guided radiotherapy in treating systemic and oligometastatic disease. Further topics include the potential value of radiotherapy in enhancing immunotherapy thanks to the broader immune-stimulatory effects, how cancer stem cells and the tumor microenvironment influence response, and the application of mathematical and systems biology methods to radiotherapy.

Proceedings of the 1st Congress of the International Stereotactic Radiosurgery Society, Stockholm 1993

CRC Press
The Topics Every Medical Physicist Should Know Tutorials in Radiotherapy

Physics: Advanced Topics with Problems and Solutions covers selected advanced topics that are not thoroughly discussed in any of the standard medical physics texts. The book brings together material from a large variety of sources, avoiding the need for you to search through and digest the vast research literature. The topics are mathematically developed from first principles using consistent notation. Clear Derivations and In-Depth Explanations The book offers insight into the physics of electron acceleration in linear accelerators and presents an introduction to the study of proton therapy. It then describes the predominant method of clinical photon dose computation: convolution and superposition dose calculation algorithms. It also discusses the Boltzmann transport equation, a potentially fast and accurate method of dose calculation that is an alternative to the Monte Carlo method. This discussion considers Fermi–Eyges theory, which is widely used for electron dose calculations. The book concludes with a step-by-step mathematical development of tumor control and normal tissue complication probability models. Each chapter includes problems with solutions given in the back of the book. Prepares You to Explore Cutting-Edge Research This guide provides you with the

foundation to read review articles on the topics. It can be used for self-study, in graduate medical physics and physics residency programs, or in vendor training for linacs and treatment planning systems.

Principles, Practices, and Treatment Planning CRC Press Stereotactic body radiation therapy (SBRT) has emerged as an important innovative treatment for various primary and metastatic cancers. This book provides a comprehensive and up-to-date account of the physical/technological, biological, and clinical aspects of SBRT. It will serve as a detailed resource for this rapidly developing treatment modality. The organ sites covered include lung, liver, spine, pancreas, prostate, adrenal, head and neck, and female reproductive tract. Retrospective studies and prospective clinical trials on SBRT for various organ sites from around the world are examined, and toxicities and normal tissue constraints are discussed. This book features unique insights from world-renowned experts in SBRT from North America, Asia, and Europe. It will be necessary reading for radiation oncologists, radiation oncology residents and fellows, medical physicists, medical physics residents, medical oncologists, surgical oncologists, and cancer scientists.

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