The Truebeam System Varian Medical Systems International

Breast cancer, its causes, early detection and treatment have received considerable attention, since this widespread disease is one of the most important health concerns for women. This book provides a comprehensive overview of the diagnostic and therapeutic aspects of the management of early-stage breast cancer, including essential information on basic topics like pathology, and radiology, as well as the latest developments. Further, it discusses all aspects of surgical care, chemotherapy and radiation therapy, together with the controversies and current management guidelines. Helping readers acquire a deep, holistic understanding of the topic, the book is a valuable resource for practitioners and postgraduate students in the field of gynecologic oncology. Moreover, it is a useful aid to decision-making in day-to-day practice for oncologists, residents, fellows and experienced practitioners.

A comprehensive, multidisciplinary resource for the entire radiation oncology team, Gunderson & Tepper's Clinical Radiation Oncology, 5th Edition, thoroughly covers all aspects of this complex and dynamic field. Concise, templated chapters cover the basic biology of oncologic disease processes as well as updated treatment algorithms, the latest clinical guidelines, and state-of-the-art techniques and modalities. More than 1,000 images—detailed anatomy drawings, radiographic images, and more—provide outstanding visual support for every area of the text. Divides content into three distinct sections for quick access to information: Scientific Foundations, Techniques and Modalities, and Disease Sites. Disease Site chapters include overviews summarizing the most important issues and concluding discussions on controversies and problems. Features new and expanded content on molecular and cellular biology and its relevance in individualized treatment approaches, stereotactic radiation therapy, radiosurgery, proton therapy, biologic therapy, precision radiation therapy, targeted radiation, dosing guidelines for better quality of life and improved patient outcomes, and more. Includes new chapters on Radiation Physics: Particle Therapy, Interventional Radiology, Radiation Therapy in the Elderly, Palliative Care, Quality and Safety, and Immunotherapy with Radiotherapy. Provides guidance on single-modality and combined-modality approaches, as well as outcome data including disease control, survival, and treatment tolerance. Includes access to videos on Intraoperative Irradiation, Prostate Brachytherapy, Penile Brachytherapy, and Ocular Melanoma.

This book begins with the basic terms and definitions and takes a student, step by step, through all areas of medical physics. The book covers radiation therapy, diagnostic radiology, dosimetry, radiation shielding, and nuclear medicine, all at a level suitable for undergraduates. This title not only describes the basics concepts of the field, but also emphasizes numerical and mathematical problems and examples. Students will find An Introduction to Medical Physics to be an indispensible resource in preparations for further graduate studies in the field.

This book provides a first authoritative text on radiochromic film, covering the basic principles, technology advances, practical methods, and applications. It focuses on practical uses of radiochromic film in radiation dosimetry for diagnostic x-rays, brachytherapy, radiosurgery, external beam therapies (photon, electron, protons), stereotactic body radiotherapy, intensity-modulated radiotherapy, and other emerging radiation technologies. The expert authors address basic concepts, advantages, and the main applications including kilovoltage, brachytherapy, megavoltage, electron beam, proton beam, skin dose, in vivo dosimetry, postal and clinical trial dosimetry. The final chapters discuss the state of the art in microbeam, synchrotron radiation, and ultraviolet radiation dosimetry.

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.

Perfect for radiation oncologists, medical physicists, and residents in both fields, Practical Radiation Oncology Physics provides a concise and practical summary of the current practice standards in therapeutic medical physics. A companion to the fourth edition of Clinical Radiation Oncology, by Drs. Leonard Gunderson and Joel Tepper, this indispensable guide helps you ensure a current, state-of-the art clinical practice. Covers key topics such as relative and in-vivo dosimetry, imaging and clinical imaging, stereotactic body radiation therapy, and brachytherapy. Describes technical aspects and patient-related aspects of current clinical practice. Offers key practice guideline recommendations from professional societies throughout — including AAPM, ASTRO, ABS, ACR, IAEA, and others. Includes therapeutic applications of x-rays, gamma rays, electron and charged particle beams, neutrons, and radiation from sealed radionuclide sources, plus the equipment associated with their production, use, measurement, and evaluation. Features a "For the Physician" box in each chapter, which summarizes the key points with the most impact on the quality and safety of patient care. Provides a user-friendly appendix with annotated compilations of all relevant recommendation documents. Medicine eBook is accessible on a variety of devices.

Over the last 4 years, IMRT, IGRT, SBRT: Advances in the Treatment Planning and Delivery of Radiotherapy has become a standard reference in the field. During this time, however, significant progress in high-precision technologies for the planning and delivery of radiotherapy in cancer treatment has called for a second edition to include these new developments. Thoroughly updated and extended, this new edition offers a comprehensive guide and overview of these new technologies and the many clinical treatment programs that bring them into practical use. Advances in intensity-modulated radiotherapy (IMRT), and 4D and adaptive treatment planning are clearly presented. Target localization and image-guided radiotherapy (IGRT) systems are comprehensively reviewed as well. Clinical tutorials illustrate target definitions for the major cancer sites, and useful techniques for organ motion management are described and compared. There are also several chapters that explore the technical basis and latest clinical experience with stereotactic body radiotherapy (SBRT) and summarize practical treatment recommendations. Furthermore, the significant and increasing contributions of proton therapy to cancer care are also highlighted, alongside the practical allocation of all these new technologies from an economic perspective. As a highlight of this volume, a number of images can be viewed online in time-elapse videos for greater clarity and more dynamic visualizationWritten by leading authorities in the field, this comprehensive volume brings clinical and technical practitioners of radiotherapy fully up to date with the key developments in equipment, technologies and treatment guidelines.

This well-received book, now in its fifth edition, is unique in providing a detailed examination of the technological basis of radiation therapy. Another unique feature is that the chapters are jointly written by North American and European authors. This considerably broadens the book's contents and increases its applicability in daily practice throughout the world. The book is divided into two sections. The first section covers basic concepts in treatment planning and explains the various approaches to radiation therapy, such as intensity-modulated radiation therapy, tomotherapy, stereotactic radiotherapy, and high and low dose rate brachytherapy. The second discusses in depth the practical clinical applications of the different radiation therapy techniques in a wide range of cancer sites. All chapters have been written by leaders in the field. This book will serve to instruct and acquaint teachers, students, and practitioners with the basic technological factors and approaches in radiation therapy.

This book provides detailed, state-of-the-art information and guidelines on the latest developments, innovations, and clinical procedures in image-guided and adaptive radiation

therapy. The first section discusses key methodological and technological issues in image-guided and adaptive radiation therapy, including use of implanted fiducial markers, management of respiratory motion, image-guided stereotactic radiosurgery and stereotactic body radiation therapy, three-dimensional conformal brachytherapy, target definition and localization, and PET/CT and biologically conformal radiation therapy. The second section provides practical clinical information on image-guided adaptive radiation therapy for cancers at all common anatomic sites and for pediatric cancers. The third section offers practical guidelines for establishing an effective image-guided adaptive radiation therapy program.

"Kavanaugh (radiation oncology, University of Colorado Comprehensive Cancer Center) and Timmerman (image guided stereotactic radiation therapeutics, University of Texas Southwestern Medical Center) demonstrate the power of stereotactic body radiation therapy (SBRT) as a weapon in the cancer-fighting arsenal, and give advice on building a clinical SBRT program. Intended as a primer for radiation oncologists, physicists, radiobiologists, dosimetrists, and other members of the cancer team, and the book covers the radiobiology, physics, and dosimetry of SBRT, and gives practical details on procedures for specific conditions. B&w photos and medical images are included. Annotation: 2004 Book News, Inc., Portland, OR (booknews.com)"--[source inconnue].

This book presents the proceedings of the IUPESM World Biomedical Engineering and Medical Physics, a tri-annual high-level policy meeting dedicated exclusively to furthering the role of biomedical engineering and medical physics in medicine. The book offers papers about emerging issues related to the development and sustainability of the role and impact of medical physicists and biomedical engineers in medicine and healthcare. It provides a unique and important forum to secure a coordinated, multileveled global response to the need, demand and importance of creating and supporting strong academic and clinical teams of biomedical engineers and medical physicists for the benefit of human health.

With the added complexity of current radiation treatment dose delivery modalities such as IMRT (Intensity Modulated Radiation Therapy) and VMAT (Volumetric Modulated Arc Therapy), quality assurance (QA) of these plans become multifaceted and labor intensive. To simplify the patient specific quality assurance process, 2D or 3D diode arrays are used to measure the radiation fluence for IMRT and VMAT treatments which can then be quickly and easily compared against the planned dose distribution. Because the arrays that can be used for IMRT and VMAT patient-specific quality assurance are of different geometry (planar vs. cylindrical), the same IMRT or VMAT treatment plan measured by two different arrays could lead to different measured radiation fluences, regardless of the output and performance of linear accelerator. Thus, the purpose of this study is to compare patient specific QA results as measured by the MapCHECK 2 and ArcCHECK diode arrays for the same IMRT and VMAT treatment plans to see if one diode array consistently provides a closer comparison to reference data. Six prostate and three thoracic spine IMRT treatment plans as well as three prostate and three thoracic spine VMAT treatment plans were produced. Radiotherapy plans for this study were generated using the Pinnacle TPS v9.6 (Philips Radiation Oncology Systems, Fitchburg, WI) using 6 MV, 6 MV FFF, and 10 MV x-ray beams from a Varian TrueBeam linear accelerator (Varian Medical Systems, Palo Alto, CA) with a 120-millenium multi-leaf collimator (MLC). Each IMRT and VMAT therapy plan was measured on Sun Nuclear's MapCHECK 2 and ArcCHECK diode arrays. IMRT measured data was compared with planned dose distribution using Sun Nuclear's 3DVH quality assurance software program using gamma analysis and dose-volume histograms for target volumes and critical structures comparison. VMAT arc plans measured on the MapCHECK 2 and ArcCHECK were compared using beam-by-beam analysis with the gamma evaluation method with Sun Nuclear's SNC Patient analysis software. MapCHECK 2 showed a slightly better agreement with planned data for IMRT verifications with a mean pass rate of 99.4% for clinically used acceptance criteria of 3%/3mm. MapCHECK 2's 99.4% mean pass rate for IMRT verifications was 1.4% higher than ArcCHECK's mean pass rate. For VMAT verifications, the MapCHECK 2 had a mean pass rate of 99.6% and 100% for each arc respectively, resulting in a 1.25% to 1.92% higher mean passing rates than those measured by the ArcCHECK using an acceptance criteria of 3%/3mm. MapCHECK 2 showed consistently higher ROI-specific mean gamma passing rates, ranging from +0.2% to +5.6%. While neither diode array showed any advantage in regards to D95 measurements within the PTV, MapCHECK 2 again showed closer comparison data in the CTV/GTV with an absolute deviation of -1.14 Gy compared to -3.39 Gy as measured by the ArcCHECK. Lastly, while the MapCHECK 2 and ArcCHECK both closely matched with the reference doses within the PTV and CTV/GTV, the ArcCHECK consistently overestimated the maximum absolute dose to all ROI, from 0.026 Gy to 2.243 Gy. In conclusion, the MapCHECK 2 diode array measured data more closely matched with planned data compared to the ArcCHECK diode array for IMRT verifications. While MapCHECK 2 showed a marginally better gamma passing rates over the ArcCHECK diode array, the ArcCHECK's ability to simultaneously measure flatness, symmetry, output, and MLC positional accuracy as a function of gantry angle make it a more realistic and efficient measurement device for VMAT verifications.

Scintillation Dosimetry delivers a comprehensive introduction to plastic scintillation dosimetry, covering everything from basic radiation dosimetry concepts to plastic scintillating fiber optics. Comprised of chapters authored by leading experts in the medical physics community, the book: Discusses a broad range of technical implementations, from point source dosimetry scaling to 3D-volumetric and 4D-scintillation dosimetry Addresses a wide scope of clinical applications, from machine quality assurance to small-field and in vivo dosimetry Examines related optical techniques, such as optically stimulated luminescence (OSL) or ?erenkov luminescence Thus, Scintillation Dosimetry provides an authoritative reference for detailed, state-of-the-art information on plastic scintillation dosimetry and its use in the field of radiation dosimetry.

This book, written by leading international experts, describes alternate fractionation strategies in which technology-driven precise targeting and dosing allow for improved

conformance and decreased volumes, with concordant lessening of toxicity, reduction in treatment time, and lower overall health care expense. The aim is to provide the advanced clinician with an up-to-date evidence-based reference that will assist in the delivery of enhanced patient care in daily practice. Traditional multi-week fractionation schedules were established at a time when the inclusion of relatively large amounts of normal tissue was unavoidable owing to the lack of accurate target localization during treatment. Such schedules are time and resource consuming, difficult for patients, and expensive. Nevertheless, acceptance of alternate fractionation strategies has been slow in some countries. The paradigm is, however, changing as evidence accumulates to demonstrate improved local control, equivalence of tolerance, or both. In documenting these alternate strategies, this book will be of value for radiation oncologists, medical physicists, and oncologists worldwide.

In May 1904, the residents of Halcyon—a small utopian community on California's central coast—invited their neighbors to attend the grand opening of the Halcyon Hotel and Sanatorium. As part of the entertainment, guests were encouraged to have their hands X-rayed. For the founders and members of Halcyon, the X-ray was a demonstration of mysterious spiritual forces made practical to human beings. Radiance from Halcyon is the story not only of the community but also of its uniquely inventive members' contributions to religion and science. The new synthesis of religion and science attempted by Theosophy laid the foundation for advances produced by the children of the founding members, including microwave technology and atomic spectral analysis. Paul Eli Ivey's narrative starts in the 1890s in Syracuse, New York, with the rising of the Temple of the People, a splinter group of the theosophical movement. After developing its ideals for an agricultural and artisanal community, the Temple purchased land in California and in 1903 began to live its dream there. In addition to an intriguing account of how a little-known utopian religious community profoundly influenced modern science, Ivey offers a wide-ranging cultural history, encompassing Theosophy, novel healing modalities, esoteric architecture, Native American concepts of community, socialist utopias, and innovative modern music.

This first dedicated overview for beam's eye view (BEV) covers instrumentation, methods, and clinical use of this exciting technology, which enables real-time anatomical imaging. It highlights how the information collected (e.g., the shape and size of the beam aperture and intensity of the beam) is used in the clinic for treatment verification, adaptive radiotherapy, and in-treatment interventions. The chapters cover detector construction and components, common imaging procedures, and state of the art applications. The reader will also be presented with emerging innovations, including target modifications, real-time tracking, reconstructing delivered dose, and in vivo portal dosimetry. Ross I. Berbeco, PhD, is a board-certified medical physicist and Associate Professor of Radiation Oncology at the Dana-Farber Cancer Institute, Brigham and Women's Hospital and Harvard Medical School.

In this third edition of Intracranial Stereotactic Radiosurgery, Drs. Sheehan and Lunsford provide an updated assessment of the practice of stereotactic radiosurgery. Topics include benign and malignant tumors, cerebrovascular abnormalities, and functional disorders. Several new topics are now included and focus on immunotherapy, hypofractionation, and repeat radiosurgery. Each chapter contains key figures and tables to illustrate the critical concepts of the work. Contributors to the book represent many of the most prestigious stereotactic radiosurgery centers across the world. This book is comprised of 36 chapters and represents a comprehensive update to prior editions. It is intended to be a readable, credible, and accessible reference on stereotactic radiosurgery. Editors Jason Sheehan, MD, PhD, FACS, FAANS, is the Vice Chair and Harrison Distinguished Professor of Neurological Surgery at the University of Virginia (UVA). He also serves as the Neurosciences Service Line Director at UVA. Dr. Sheehan is the current chair of the American Association of Neurological Surgeons (AANS) and Congress of Neurological Surgeons (CNS) Section on Tumors. He serves as the Editor-In-Chief of the Journal of Neuro-Oncology. L. Dade Lunsford, MD, serves as the Lars Leksell Professor and Distinguished Professor at the Department of Neurological Surgery at the University of Pittsburgh. He is also director of the Center for Image-Guided Neurosurgery at the University of Pittsburgh Medical Center and an internationally recognized authority on stereotactic surgery, radiosurgery, and minimally invasive surgery. He has authored or coauthored more than 1,000 scientific reports and 16 books.

Clinical conformal radiotherapy is the holy grail of radiation treatment and is now becoming a reality through the combined efforts of physical scientists and engineers, who have improved the physical basis of radiotherapy, and the interest and concern of imaginative radiotherapists and radiographers. Intensity-Modulated Radiation Therapy describes in detail the physics germane to the development of a particular form of clinical conformal radiotherapy called intensity modulated radiation therapy (IMRT). IMRT has become a topic of tremendous importance in recent years and is now being seriously investigated for its potential to improve the outcome of radiation therapy. The book collates the state-of-the-art literature together with the author's personal research experience and that of colleagues in the field to produce a text suitable for new research workers, Ph.D. students, and practicing radiation physicists that require a thorough introduction to IMRT. Fully illustrated, indexed, and referenced, the book has been prepared in a form suitable for supporting a teaching course.

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).

The ProBeam proton therapy system offers CBCT imaging for patient setup with a Feldkamp-Davis-Kress (FDK) algorithm with a kernel-based scatter correction. For the TrueBeam radiotherapy system, Varian Medical Systems commercially offers for Head and Pelvis protocols additionally an advanced reconstruction technique u2013 Iterative CBCT (iCBCT), using a statistical reconstruction and in the case of pelvis protocol a deterministic Boltzmann Transport Equation solver-based scatter correction. Preliminary results from an early evaluation of ProBeam clinical head/neck and pelvis scans reconstructed with iCBCT show a significant improvement of image quality. iCBCT reconstructions show a reduction of cone-beam, streak and shading artifacts and noise, resulting in enhancements of soft-tissue definition. iCBCT will be implemented at ProBeam and ProBeam 360u00b0 to improve visualization and facilitate more precise patient setup. The improved image quality is expected to enable new applications like usage of CBCT images for replanning and adaptive radiotherapy at ProBeam and ProBeam 360u00b0.

Written by internationally known experts in the field, Stereotactic Radiosurgery and Stereotactic Body Radiation Therapy examines one of the fastest-developing subspecialties within radiation oncology. These procedures deliver large doses of radiation in one to five sessions to a precisely determined target. Often these techniques have proven to be as or more effective than traditional radiation therapy techniques, while at the same time being cost-efficient and convenient for the patient. These techniques, however, require careful planning, specialized equipment, and well-trained staff. This volume provides a cutting-edge look at the biological and technical underpinnings of SRS and SBRT techniques. It includes a history of the development of SRS and SBRT; clinical applications of the techniques; dedicated devices for delivering precisely shaped, high doses of radiation; use of in-room imaging for treatment planning and treatment guidance; immobilization techniques for accurate targeting; and future developments that will continue to evolve and refine existing techniques. A valuable introduction to those just learning about these specialized techniques, and an ideal reference for those who are already implementing them, this book covers a wide variety of topics, with clear discussions of each aspect of the technology employed.

This book gives a comprehensive overview on the use of image-guided radiation therapy (IGRT) in the treatment of lung cancer, covering step-by-step guidelines for clinical implementations, fundamental principles and key technical advances. It covers benefits and limitations of techniques as well as quality and safety issues related to IGRT practice. Addresses imaging simulation, treatment planning, verification, and delivery Discusses important quality assurance issues Describes current methods using specialized machines and technologies Jing Cai, PhD, is an Associate Professor of Radiation Oncology at Duke University Medical Center. Joe Y. Chang, MD, PhD, is Professor in the Department of Radiation Oncology at The University of Texas MD Anderson Cancer Center in Houston. Fang-Fang Yin, PhD, is Chief of the Division of Radiation Physics, Professor of Radiation Oncology, and Director of the Medical Physics program at Duke University.

The main result of this thesis is a software system, called PRIMO, which simulates clinical linear accelerators and the subsequent dose distributions using the Monte Carlo method. PRIMO has the following features: (i) it is self- contained, that is, it does not require additional software libraries or coding; (ii) it includes a geometry library with most Varian and Elekta linacs; (iii) it is based on the general-purpose Monte Carlo code PENELOPE; (iv) it provides a suite of variance-reduction techniques and distributed parallel computing to enhance the simulation efficiency; (v) it is graphical user interfaced; and (vi) it is freely distributed through the website http://www.primoproject.net In order to endow PRIMO with these features the following tasks were conducted: - PRIMO was conceived with a layered structure. The topmost layer, named the GLASS, was developed in this thesis. The GLASS implements the GUI, drives all the functions of the system and performs the analysis of results. Lower layers generate geometry files, provide input data and execute the Monte Carlo simulation. - The geometry of Elekta linacs from series SU and MLCi were coded in the PRIMO system. - A geometrical model of the Varian True Beam linear accelerator was developed and validated. This model was created to surmount the limitations of the Varian distributed phase-space files and the absence of released information about the actual geometry of that machine. This geometry model was incorporated into PRIMO. - Two new variance-reduction techniques, named splitting roulette and selective splitting, were developed and validated. In a test made with an Elekta linac it was found that when both techniques are used in conjunction the simulation efficiency improves by a factor of up to 45. - A method to automatically distribute the simulation among the available CPU cores of a computer was implemented. The following investigations were done using PRIMO as a research tool : - The configu ration of the condensed history transport algorithm for charged particles in PENELOPE was optimized for linac simulation. Dose distributions in the patient were found to be particularly sensitive to the values of the transport parameters in the linac target. Use of inadequate values of these parameters may lead to an incorrect determination of the initial beam configuration or to biased dose distributions. - PRIMO was used to simulate phase-space files distributed by Varian for the True Beam linac. The results were compared with experimental data provided by five European radiotherapycenters. It was concluded thatthe latent variance and the accuracy of the phase-space files were adequate for the routine clinical practice. However, for research purposes where low statistical uncertainties are required the phase-space files are not large enough. To the best of our knowledge PRIMO is the only fully Monte Carlo-based linac and dose simulation system , addressed to research and dose verification, that does not require coding tasks from end users and is publicly available.

This book provides a first comprehensive summary of the basic principles, instrumentation, methods, and clinical applications of three-dimensional dosimetry in modern radiation therapy treatment. The presentation reflects the major growth in the field as a result of the widespread use of more sophisticated radiotherapy approaches such as intensity-modulated radiation therapy and proton therapy, which require new 3D dosimetric techniques to determine very accurately the dose distribution. It is intended as an essential guide for those involved in the design

and implementation of new treatment technology and its application in advanced radiation therapy, and will enable these readers to select the most suitable equipment and methods for their application. Chapters include numerical data, examples, and case studies.

Stereotactic Radiosurgery and Stereotactic Body Radiation Therapy (SBRT) is a comprehensive guide for the practicing physician and medical physicist in the management of complex intracranial and extracranial disease. It is a state-of-the-science book presenting the scientific principles, clinical background and procedures, treatment planning, and treatment delivery of SRS and SBRT for the treatment of tumors throughout the body. This unique textbook is enhanced with supplemental video tutorials inclusive to the resource. Beginning with an overview of SRS and SBRT, Part I contains insightful coverage on topics such as the evolving radiobiological principles that govern treatment, imaging, the treatment planning process, technologies and equipment used, as well as focused chapters on quality assurance, quality management, and patient safety. Part II contains the clinical application of SRS and SBRT for tumors throughout the body including those in the brain, head and neck, lung, pancreas, adrenal glands, liver, prostate, cervix, spine, and in oligometastatic disease. Each clinical chapter includes an introduction to the disease site, followed by a thorough review of all indications and exclusion criteria, in addition to the important considerations for patient selection, treatment planning and delivery, and outcome evaluation. These chapters conclude with a detailed and site-specific dose constraints table for critical structures and their suggested dose limits. International experts on the science and clinical applications of these treatments have joined together to assemble this must-have book for clinicians, physicists, and other radiation therapy practitioners. It provides a team-based approach to SRS and SBRT coupled with case-based video tutorials in disease management, making this a unique companion for the busy radiosurgical team. Key Features: Highlights the principles of radiobiology and radiation physics underlying SRS and SBRT Presents and discusses the expected patient outcomes for each indicated disease site and condition including a detailed analysis of Quality of Life (QOL) and Survival Includes information about technologies used for the treatment of SRS and SBRT Richly illustrated with over 110 color images of the equipment, process flow diagrams and procedures, treatment planning techniques and dose distributions 7 high-quality videos reviewing anatomy, staging, treatment simulation and planning, contouring, and management pearls Dose constraint tables at the end of each clinical chapter listing critical structures and their appropriate dose limits Includes access to the fully-searchable downloadable eBook

Spine Radiosurgery, Second Edition , is a comprehensive text that includes discussions of the latest devices, treatment planning techniques, target definition, and patient selection in this specialty. Written by leading experts in the fields of neurosurgery, radiation oncology, and medical physics, this book is the definitive reference for clinical applications of state-of-the-art radiosurgery of the spine. Key Features: Six new chapters on such topics as histopathological examination of spinal lesions, minimally invasive techniques, and treatment of spinal chordomas More than 100 full-color illustrations demonstrate key concepts Discussion of new treatments for metastatic spine disease and spinal cord compression This book is a must-have resource for clinicians, fellows, and residents in neurosurgery and radiation oncology. Spine surgeons, orthopaedists, medical physicists, and oncologists at all levels will also benefit from the wealth of information provided.

Use the GPU Successfully in Your Radiotherapy Practice With its high processing power, cost-effectiveness, and easy deployment, access, and maintenance, the graphics processing unit (GPU) has increasingly been used to tackle problems in the medical physics field, ranging from computed tomography reconstruction to Monte Carlo radiation transport simulation. Graphics Processing Unit-Based High Performance Computing in Radiation Therapy collects state-of-the-art research on GPU computing and its applications to medical physics problems in radiation therapy. Tackle Problems in Medical Imaging and Radiotherapy The book first offers an introduction to the GPU technology and its current applications in radiotherapy. Most of the remaining chapters discuss a specific application of a GPU in a key radiotherapy problem. These chapters summarize advances and present technical details and insightful discussions on the use of GPU in addressing the problems. The book also examines two real systems developed with GPU as a core component to accomplish important clinical tasks in modern radiotherapy. Translate Research Developments to Clinical Practice Written by a team of international experts in radiation oncology, biomedical imaging, computing, and physics, this book gets clinical and research physicists, graduate students, and other scientists up to date on the latest in GPU computing for radiotherapy. It encourages you to bring this novel technology to routine clinical radiotherapy practice.

How many men does it take to find true love? When Delilah Darling reads a survey revealing that most people have 10.5 sexual partners in their lifetime, she begins to feel like a tramp. She’s slept with nineteen men so far—almost twice the national average. During a self-help moment, she vows to cap her “number” at twenty, swearing she’ll save her last spot for the right guy. But after losing her job and having a wild night on the town, she falls into bed with Mr. Wrong. Unwilling to up her number, but also unable to imagine a life of celibacy, Delilah does the only thing a girl in her situation can do: she tracks down every man she’s ever slept with in a last-ditch effort to make it work with one of them. A hilarious romp through Delilah’s past loves, What’s Your Number? shines a spotlight on every woman’s dirty little secret and proves that, when it comes to matters of the heart, sometimes numbers tell only a fraction of the story.

"In this third edition of Intracranial Stereotactic Radiosurgery, Drs. Lunsford and Sheehan provide a contemporary assessment of the practice of stereotactic radiosurgery. Topics include benign and malignant tumors, cerebrovascular abnormalities, and functional disorders. There are also several new chapters including ones focused on immunotherapy, hypofractionation, and repeat radiosurgery. Chapters contain many figures and tables to illustrate the key concepts of the work. Contributors to the book represent many of the luminary stereotactic radiosurgery centers throughout the world. The current book which is comprised of 34 chapters represents a major update to prior editions. It is intended to

be both very readable and also to serve as an accessible and comprehensive reference on stereotactic radiosurgery"--

Advances in Lymphatic System Research and Application / 2012 Edition is a ScholarlyEditions™ eBook that delivers timely, authoritative, and comprehensive information about Lymphatic System. The editors have built Advances in Lymphatic System Research and Application / 2012 Edition on the vast information databases of ScholarlyNews.™ You can expect the information about Lymphatic System in this eBook to be deeper than what you can access anywhere else, as well as consistently reliable, authoritative, informed, and relevant. The content of Advances in Lymphatic System Research and Application / 2012 Edition has been produced by the world's leading scientists, engineers, analysts, research institutions, and companies. All of the content is from peer-reviewed sources, and all of it is written, assembled, and edited by the editors at ScholarlyEditions™ and available exclusively from us. You now have a source you can cite with authority, confidence, and credibility. More information is available at http://www.ScholarlyEditions.com/.

This book is a comprehensive review of image guided interventions of the spine. Beginning with a chapter dedicated to the history of image guided spinal interventions, authors set the stage for the role these procedures have and will play in the field. Chapters cover the key procedures, techniques, and considerations to maximize effectiveness and patient care. Some major topics covered include: imaging osseo-ligamentous spine anatomy, percutaneous vertebroplasty, image guided tumor ablation, and vascular spine intervention. Additional features include high-quality illustrations with concise descriptions and clinical cases discussions. This is an ideal guide for interventional neuroradiologists, radiologists, pain management physicians, neurosurgeons, orthopedic spine surgeons, and related residents, fellows, and students wanting in depth information on image guided interventions of the spine.

Details technology associated with radiation oncology, emphasizing design of all equipment allied with radiation treatment. Describes procedures required to implement equipment in clinical service, covering needs assessment, purchase, acceptance, and commissioning, and explains quality assurance issues. Also addresses less common and evolving technologies. For medical physicists and radiation oncologists, as well as radiation therapists, dosimetrists, and engineering technologists. Includes b&w medical images and photos of equipment.

Perfect for radiation oncologists, medical physicists, and residents in both fields, Practical Radiation Oncology Physics provides a concise and practical summary of the current practice standards in therapeutic medical physics. A companion to the fourth edition of Clinical Radiation Oncology, by Drs. Leonard Gunderson and Joel Tepper, this indispensable guide helps you ensure a current, state-of-the art clinical practice. Covers key topics such as relative and in-vivo dosimetry, imaging and clinical imaging, stereotactic body radiation therapy, and brachytherapy. Describes technical aspects a.

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.

Purpose: To determine the limit of detectability and resolution of the ArcCheck QA Phantom (Sun Nuclear, Inc.) for quality assurance of volumetric-modulated arc therapy and stereotactic radiosurgery procedures when used in small field sizes. Methods: Eight different square field sizes (0.6x0.6, 1x1, 2x2, 3x3, 5x5, 7x7, 10x10, 15x15 cm2) were measured on the ArcCheck QA phantom at three different gantry angles: 0, 90, and 270 degrees, using a 6 MV beam at its maximum dose rate of 600 MU/min and a dose computed from a 200 MU beam from the Varian Edge linear accelerator (Varian Medical Systems, Palo Alto, CA) at the University of Toledo Dana Cancer Center. Four different types of errors were introduced into quality-assurance analysis procedures. Measured square field sizes were compared against the same measured square field sizes with induced collimator and MLC errors. Induced collimator errors were defined by an expansion of the jaw-defined field size by 1 mm on all axes, a collimator shift of 1 mm on the X2 and Y2 axes, a table shift by 1 mm vertically and longitudinally at 270 and 90 degrees and a table shift of 1mm laterally and longitudinally for angles of 0 and 180 degrees. MLC induced errors included the addition of one and subsequently two opposing MLC leaves in the center of each square field. Dose distributions for the normal square fields and square fields with induced errors were imported into SNC patient software (Sun Nuclear Corporation, Melbourne, FL) in the form of DICOM RT dose files and measured dose distributions were compared between the normally measured square fields and fields containing induced errors. Percent pass rates were computed using gamma analysis criteria of 2 mm/2% with a threshold value of 20%. Point dose ratios were also analyzed for fields with induced MLC errors and output factors were calculated in order to determine the magnitude of the effect that these induced errors had on output measurements as compared with the ability of gamma criteria analysis in SNC to catch errors. A point dose calibration pertaining to each field size at each photon energy of the TrueBeam and Edge linear accelerators (Varian Medical Systems, Palo Alto, CA) was calculated by measuring a point dose at a range of field sizes at each energy (6 MV, 6 FFF and 10FFF for the Edge and 6 MV, 6FFF, 10 MV, and 18 MV for the TrueBeam) and dividing this number by the treatment planning system calculated point dose (calculated in Pinnacle) to obtain a cGy/MU dose calibration. An Extradin A16 Micropoint chamber (Extradin A1SL, Standard Imaging, Inc., Middleton WI) was placed in the center of the plug insert in the center of the ArcCheck phantom and a CNMC 206 electrometer (CNMC Instruments, Nashville, Tn) reading pertaining to a beam of 200 MU at different field sizes for each energy. The dose calibration factor for each energy was calculated and applied to six different patient-specific point dose QA analyses in order to determine the field size dependence of the dose calibration and to determine if the calibration improved the overall QA pass rate as well as the pass rate for individual fields for SRS QA. Finally, MLC errors were induced into three different patient-specific QA procedures performed on the Edge and TrueBeam linear accelerators. Two opposing MLC leaves were extended into the middle of the field (leaf position 30) at each control point of the first 180-180 degree clockwise field in each of the two patient QAs on the Edge and TrueBeam linear accelerators. The effect of extending

the MLC leaves was analyzed using gamma analysis in SNC patient software. A point dose analysis of each QA was also taken into account and compared with the result measured using gamma criteria. Results: Examination of results in SNC patient software between measured normal fields and those with induced jaw field size errors indicate that the gamma criteria percent pass rates decrease significantly when errors are induced in the quality assurance analysis. Pass rates for a table shift and increase in field sizes by 1 mm on all axes of the square field indicate the greatest average errors for all gantry angles measured. Evidence of normal error detection was seen at a field size of 3x3 cm2 for a table shift at a 0-degree gantry angle. The field size at which normal error detection was seen by the ArcCheck was indicated at 2x2 cm2 for the 1mm margin errors induced at 90 degree and 270 degree gantry angles. The field size at which normal error detection was seen by the ArcCheck with MLC error induction into square field sizes was indicated at a field size of 2x2 cm2. Two QA procedures that did not improve by applying the field-size specific calibration factor decreased by an average of 0.44%. Three patient-specific quality assurance procedure dose distributions measured with an induced MLC error indicate that errors in MLC leaf position when applied to all control points of a full 360-degree arc are indicated with a lower percent gamma/DTA criteria pass rate. These pass rates were 77.4% and 96.1% on the Edge and 96.5% on the TrueBeam accelerator, respectively, when a measured normal dose distribution and a dose distribution with an induced MLC error were compared in SNC patient software. Of the six patient-specific quality assurance procedures for which a field-size specific point dose calibration factor was applied, four were improved significantly by an average of 87.6% with the application of a field-size specific calibration factor. Discussion and Conclusion: This work indicates the potential for having the ability to detect potential errors in VMAT quality assurance for small field sizes using the ArcCheck QA phantom. The ability of the ArcCheck to detect uncertainties in quality assurance procedures is based on the size of the field and the position and spacing of the diode detectors. Gamma analysis and point dose measurements indicate a 3x3 cm2 field size as the smallest field size at which accurate quality assurance is analyzed. Pass rates resulting in an induction of MLC errors in square field sizes can be utilized to predict pass rates resulting from the induction of MLC errors in patient-specific quality assurance procedures. It is suggested that a field-size specific CGy/MU calibration factor is utilized in order to more accurately predict patient-specific point dose measurements.

A Comparative Analysis for Verification of IMRT and VMAT Treatment Plans Using a 2-D and 3-D Diode Array

Expand your understanding of the physics and practical clinical applications of advanced radiation therapy technologies with Khan's The Physics of Radiation Therapy, 5th edition, the book that set the standard in the field. This classic full-color text helps the entire radiation therapy team—radiation oncologists, medical physicists, dosimetrists, and radiation therapists—develop a thorough understanding of 3D conformal radiotherapy (3D-CRT), stereotactic radiosurgery (SRS), high dose-rate remote afterloaders (HDR), intensity modulated radiation therapy (IMRT), image-guided radiation therapy (IGRT), Volumetric Modulated Arc Therapy (VMAT), and proton beam therapy, as well as the physical concepts underlying treatment planning, treatment delivery, and dosimetry. In preparing this new Fifth Edition, Dr. Kahn and new co-author Dr. John Gibbons made chapter-by-chapter revisions in the light of the latest developments in the field, adding new discussions, a new chapter, and new color illustrations throughout. Now even more precise and relevant, this edition is ideal as a reference book for practitioners, a textbook for students, and a constant companion for those preparing for their board exams. Features Stay on top of the latest advances in the field with new sections and/or discussions of Image Guided Radiation Therapy (IGRT), Volumetric Modulated Arc Therapy (VMAT), and the Failure Mode Event Analysis (FMEA) approach to quality assurance. Deepen your knowledge of Stereotactic Body Radiotherapy (SBRT) through a completely new chapter that covers SBRT in greater detail. Expand your visual understanding with new full color illustrations that reflect current practice and depict new procedures. Access the authoritative information you need fast through the new companion website which features fully searchable text and an image bank for greater convenience in studying and teaching. This is the tablet version which does not include access to the supplemental content mentioned in the text.

This comprehensive book covers the everyday use and underlying principles of radiation dosimeters used in radiation oncology clinics. It provides an up-to-date reference spanning the full range of current modalities with emphasis on practical know-how. The main audience is medical physicists, radiation oncology physics residents, and medical physics graduate students. The reader gains the necessary tools for determining which detector is best for a given application. Dosimetry of cutting edge techniques from radiosurgery to MRI-guided systems to small fields and proton therapy are all addressed. Main topics include fundamentals of radiation dosimeters, brachytherapy and external beam radiation therapy dosimetry, and dosimetry of imaging modalities. Comprised of 30 chapters authored by leading experts in the medical physics community, the book: Covers the basic principles and practical use of radiation dosimeters in radiation oncology clinics across the full range of current modalities. Focuses on providing practical guidance for those using these detectors in the clinic. Explains which detector is more suitable for a particular application. Discusses the state of the art in radiotherapy approaches, from radiosurgery and MR-guided systems to advanced range verification techniques in proton therapy. Gives critical comparisons of dosimeters for photon, electron, and proton therapies.

This book provides a comprehensive overview of brain metastases, from the molecular biology aspects to therapeutic management and perspectives. Due to the increasing incidence of these tumors and the urgent need to effectively control brain metastatic diseases in these patients, new therapeutic strategies have emerged in recent years. The volume discusses all these innovative approaches combined with new surgical techniques (fluorescence, functional mapping, integrated navigation), novel radiation therapy techniques (stereotactic radiosurgery) and new systemic treatment approaches such as targeted- and immunotherapy. These combination strategies represent a new therapeutic model in brain metastatic patients in which each medical practitioner (neurosurgeon, neurologist, medical oncologist, radiation oncologist) plays a pivotal role in defining the optimal treatment in a multidisciplinary approach. Written by recognized experts in the field, this book is a valuable tool for neurosurgeons, neuro-oncologists, neuroradiologists, medical oncologists, radiation oncologists, cognitive therapists, basic scientists and students working in the area of brain tumors.