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Imaging radiation response 319 Am J Nucl Med Mol Imaging 2015;5(4):317-332 requires the injection of an exogenous probe, 13C-MRSI uses hyperpolarized agents to in-crease the detection sensitivity of injected 13C labeled molecules by greater than 10,000 fold [28]. 13C-labeled molecules such as [1-C]- pyruvate [29], [1, 4-13C]-fumarate [30], and L-[5-

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Review Article Imaging Radiation Response Review Article Imaging radiation response in tumor and normal tissue Marjan Rafat, Rehan Ali, Edward E Graves Department of Radiation Oncology, Stanford University, Stanford, CA 94305, USA Received April 6, 2015; Accepted May 8, 2015; Epub June 15, 2015; Published July 1, 2015 Abstract: Although X-ray ...

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This review article focuses on the currently used imaging modalities for response assessment in radiation oncology and gives an overview of new and promising techniques within this field. Copyright © 2019 Elsevier Inc. All rights reserved. PMID: 31739950. Publication Types: Review

Imaging for Response Assessment in Radiation Oncology ...

This review article focuses on the currently used imaging modalities for response assessment in radiation oncology and gives an overview of new and promising techniques within this field. AB - Imaging in radiation oncology is essential for the evaluation of treatment response in tumors and organs at risk.

Imaging for Response Assessment in Radiation Oncology ...

Abstract. Patients with metastatic disease are routinely serially imaged to assess disease burden and response to systemic and local therapies, which places ever‐expanding demands on our healthcare resources. Image interpretation following stereotactic body radiotherapy (SBRT) for spine metastases can be challenging; however, appropriate and accurate assessment is critical to ensure patients are managed correctly and resources are optimised.

Imaging response assessment following stereotactic body ...

Medical Imaging—Radiation Oncology—Review Article. ... Here, we take a critical review of the merits and pitfalls of various imaging modalities, current response assessment guidelines, and explore novel imaging approaches and the potential for radiomics to add value in imaging assessment.

Imaging response assessment following stereotactic body ...

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In this pictorial review, we discuss the strengths and weaknesses of modern MR imaging, including functional imaging sequences such as diffusion-weighted MRI, for response evaluation after chemoradiation treatment and provide the main pearls and pitfalls for image interpretation.

Response evaluation after ... - Insights into Imaging

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in the management of lung cancer. This review article aims to discuss the role of imaging in precision radiotherapy. Imaging for precision decision making in radiotherapy The aim of curative-intent precision RT in lung cancer is to control all sites of gross disease by the delivery of an anatomically targeted radiation dose sufficient to cause the

670-688 Review Article Anatomic, functional and molecular ...

This review gives an overview of the molecular and functional imaging modalities of tumour hypoxia and tumour cell metabolism, proliferation and perfusion as predictive biomarkers for radiation treatment response in head and neck tumours and in lung tumours.

Validation of functional imaging as a biomarker for ...

In this review, we describe the association of systemic lymphopenia with poor tumor outcome, present evidence that radiotherapy is an important contributing cause of lymphodepletion, describe the systemic immune context of tumor and brain injury that contributes to immunosuppression, describe other contributing factors to lymphopenia including concomitant medications and treatments, and speculate about the role of the normal physiologic response to brain injury in the immunosuppressive ...

Radiation Oncology Review Series | Neurosurgery | Oxford ...

Articles are typically published online within 2.73 weeks after acceptance Physics and Imaging in Radiation Oncology is an international, open access journal which is focused on medical physics and imaging in radiation oncology. Submissions from areas related to physics and imaging in radiation oncology are also considered.

Physics & Imaging in Radiation Oncology - Journal - Elsevier

The current standard of care to determine radiation response is an anatomical assessment of tumor volume shrinkage. This evaluation is typically performed 6 – 8 weeks after completion of treatment using X-ray Computed Tomography (CT) or Magnetic Resonance Imaging (MRI).

Optical Imaging Approaches to Investigating Radiation ...

The integration of 18 F-FDG PET/CT fusion imaging into radiation treatment planning by taking into account the metabolic and biological characteristics of tumours has been demonstrated to have significant impact on the selection and delineation of irradiation treatment volumes in HNSCC and NSCLC. 46,58 – 64 However, integration of PET images into the radiotherapy planning process in routine ...

Validation of functional imaging as a biomarker for ...

Acoustic radiation force based elasticity imaging methods are under investigation by many groups. These methods differ from traditional ultrasonic elasticity imaging methods in that they do not require compression of the transducer, and are thus expected to be less operator dependent. Methods have been developed that utilize impulsive (i.e.

Acoustic Radiation Force Impulse (ARFI) Imaging: A Review ...

Review Article Vitamin E Analogs as Radiation Response Modifiers . ... The potentially life-threatening effects of total body ionizing radiation exposure have been known for more than a century. Despite considerable advances in our understanding of the effects of radiation over the past six decades, efforts to identify effective radiation ...

Review Article Vitamin E Analogs as Radiation Response ...

This systematic review summarizes the current applications of 18 F-FDG PET imaging in the diagnosis, staging, radiation treatment response assessment, and outcome prognostication of head and neck cancers. For head and neck cancers of unknown primary origin, 18 F-FDG PET/CT increases the likelihood of identifying the primary tumor and establishing the diagnosis.

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.

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.

Radiomics and Radiogenomics: Technical Basis and Clinical Applications provides a first summary of the overlapping fields of radiomics and radiogenomics, showcasing how they are being used to evaluate disease characteristics and correlate with treatment response and patient prognosis. It explains the fundamental principles, technical bases, and clinical applications with a focus on oncology. The book's expert authors present computational approaches for extracting imaging features that help to detect and characterize disease tissues for improving diagnosis, prognosis, and evaluation of therapy response. This book is intended for audiences including imaging scientists, medical physicists, as well as medical professionals and specialists such as diagnostic radiologists, radiation oncologists, and medical oncologists. Features Provides a first complete overview of the technical underpinnings and clinical applications of radiomics and radiogenomics Shows how they are improving diagnostic and prognostic decisions with greater efficacy Discusses the image informatics, quantitative imaging, feature extraction, predictive modeling, software tools, and other key areas Covers applications in oncology and beyond, covering all major disease sites in separate chapters Includes an introduction to basic principles and discussion of emerging research directions with a roadmap to clinical translation

This book provides, for the first time, a unified approach to the application of MRI in radiotherapy that incorporates both a physics and a clinical perspective. Readers will find detailed information and guidance on the role of MRI in all aspects of treatment, from dose planning, with or without CT, through to response assessment. Extensive coverage is devoted to the latest technological developments and emerging options. These include hybrid MRI treatment systems, such as MRI-Linac and proton-guided systems, which are ushering in an era of real-time MRI guidance. The past decade has witnessed an unprecedented rise in the use of MRI in the radiation treatment of cancer. The development of highly conformal dose delivery techniques has led to a growing need to harness advanced imaging for patient treatment. With its flexible soft tissue contrast and ability to acquire functional information, MRI offers advantages at all stages of treatment. In documenting the state of the art in the field, this book will be of value to a wide range of professionals. The authors are international experts drawn from the scientific committee of the 2017 MR in RT symposium and the faculty of the ESTRO teaching course on imaging for physicists.

This book describes the basics, the challenges and the limitations of state of the art brain tumor imaging and examines in detail its impact on diagnosis and treatment monitoring. It opens with an introduction to the clinically relevant physical principles of brain imaging. Since MR methodology plays a crucial role in brain imaging, the fundamental aspects of MR spectroscopy, MR perfusion and diffusion-weighted MR methods are described, focusing on the specific demands of brain tumor imaging. The potential and the limits of new imaging methodology are carefully addressed and compared to conventional MR imaging. In the main part of the book, the most important imaging criteria for the differential diagnosis of solid and necrotic brain tumors are delineated and illustrated in examples. A closing section is devoted to the use of MR methods for the monitoring of brain tumor therapy. The book is intended for radiologists, neurologists, neurosurgeons, oncologists and other scientists in the biomedical field with an interest in neuro-oncology.

Part II of the important issue on Contribution of FDG to Modern Medicine. Articles will include: FDG in infectious/inflammatory diseases, FDG in cardiovascular disease, Assesment of treatment response using PET, PET based chemotherapy response assessment, PET based radiation therapy planning, PET based interventional radiology, PET/MRI, Evolving and upcoming applications of FDG-PET in medicine, and more.

This book serves as a practical guide for the use of carbon ions in cancer radiotherapy. On the basis of clinical experience with more than 7,000 patients with various types of tumors treated over a period of nearly 20 years at the National Institute of Radiological Sciences, step-by-step procedures and technological development of this modality are highlighted. The book is divided into two sections, the first covering the underlying principles of physics and biology, and the second section is a systematic review by tumor site, concentrating on the role of therapeutic techniques and the pitfalls in treatment planning. Readers will learn of the superior outcomes obtained with carbon-ion therapy for various types of tumors in terms of local control and toxicities. It is essential to understand that the carbon-ion beam is like a two-edged sword: unless it is used properly, it can increase the risk of severe injury to critical organs. In early series of dose-escalation studies, some patients experienced

serious adverse effects such as skin ulcers, pneumonitis, intestinal ulcers, and bone necrosis, for which salvage surgery or hospitalization was required. To preclude such detrimental results, the adequacy of therapeutic techniques and dose fractionations was carefully examined in each case. In this way, significant improvements in treatment results have been achieved and major toxicities are no longer observed. With that knowledge, experts in relevant fields expand upon techniques for treatment delivery at each anatomical site, covering indications and optimal treatment planning. With its practical focus, this book will benefit radiation oncologists, medical physicists, medical dosimetrists, radiation therapists, and senior nurses whose work involves radiation therapy, as well as medical oncologists and others who are interested in radiation therapy.

This book provides a comprehensive, state-of-the-art overview of imaging modalities used in the diagnosis, staging, and management of pancreatic cancer. In addition to profiling the most commonly-used imaging modalities for pancreatic cancer, the text reviews recent advances in endoscopic ultrasound, staging characteristics utilized in determining appropriate treatment options, and reviews the role of imaging in pancreatic cancer screening in specialized patient populations. The book also spotlights the use of radiation therapy for pancreatic cancer in patients who cannot have surgery, as well as when fiducial marker placement should be considered in targeting a malignancy. Written by experts in the field, Imaging Diagnostics in Pancreatic Cancer: A Clinical Guide is a valuable resource for gastroenterologists, surgeons, oncologists, radiologists, and other practitioners who manage patients with pancreatic cancer.