Journal of Radiology and Oncology

Volume - 7, Issue - 2

Review Article **Published Date:-2023-08-28 12:51:18**

Environmental Modeling for Radiation Safety

The newly launched IAEA project MEREIA (MEthods for Radiological and Environmental Impact Assessment; 2021-2025), MEREIA continues some activities of previous IAEA exercises in the field of radioecological modelling and focuses on areas where the probabilistic approach determines the predictive capability of environmental models. The program offered the opportunity to set up well-designed and verified scenarios to collect and compare exposures predicted by particular models based on this scenario and then perform a validation study of contributing models. It consists of the comparison of model prediction with observed data or in the case where there is a lack of measurement data to perform a comparison within model prognoses. The previous international works have brought significant improvement in environmental modeling in terms of better understanding and mathematical description of complex physical and chemical phenomena that occur in various environmental media and also have promoted new areas for experimental investigations. The new experimental results yielded updated handbooks of a large number of environmental parameters for less-known elements. Moreover, the principal objective of the activities in environmental modelling was an integrated risk assessment of the reference group of population and biota associated with radionuclides releases from various kinds of nuclear facilities as from different types and power nuclear reactors, radioactive waste disposal and more complex nuclear research facility. This reflects recent international recommendations to extend protection against radiation hazards of humans to wildlife flora and fauna. However, the statistics supported knowledge on some essential environmental parameters still remain small. Therefore, one could be aware of some limitations of the probabilistic approach that required advanced methods of probabilistic prognosis Monte Carlo.

Case Presentation **Published Date:-2023-08-24 12:42:46**

A Novel Strategy to Improve Radiotherapy Effectiveness: First-in-Human MR-guided Focused Ultrasound-Stimulated Microbubbles (MRgFUS+MB) Radiation Enhancement Treatment

Background and aim: Preclinical in vitro and in vivo experiments suggest that radiation-induced tumour cell death can be enhanced 10- to 40-fold when combined with focused-ultrasound (FUS)-stimulated microbubbles (MB). The acoustic exposure of MB in the tumour volume causes vasculature perturbation, activation of the acid sphingomyelinase (ASMase) ceramide pathway, and resultant endothelial cell apoptosis. When the tumour is subsequently treated with radiation, there is increased endothelial cell death and anoxic tumour killing. Here we describe a first-in-human experience treating patients with magnetic resonance (MR)-guided FUS-stimulated MB (MRgFUS+MB) radiation enhancement.
Case presentation: A head and neck cancer patient with recurrent disease underwent radiotherapy for 5 separate sites of locoregional disease followed by systemic therapy. The first consisted of a course of 45 Gy in 5 fractions alone, the second of 30 Gy in 5 fractions with hyperthermia, and the three others of 20-30 Gy in 5 fractions along with MRgFUS+MB treatment. The treatment methodology used an MR-coupled FUS-device operating at 500 KHz and 540 kPa peak negative pressure with an insonification time of 750 ms spread over 5 minutes to stimulate intravenously administered MB within tumour target. All sites treated with stimulated MB had a complete radiological response, and subsequently, the patient's other cutaneous metastatic disease disappeared. The patient has been under surveillance for over two years without active treatment or disease progression.
Discussion: MRgFUS+MB was well-tolerated with no reported treatment-related adverse events, which can be attributed to the capability of FUS to selectively stimulate MB within the tumour volume while sparing the surrounding normal tissue. Sustained local control at all target sites aligns with earlier preclinical findings suggesting the radiation enhancement potential of FUS+MB.
Conclusion: MRgFUS+MB represents a novel and promising therapy for enhancing radiation efficacy and improving therapeutic index with potential improvements in disease control.

Literature Review **Published Date:-2023-08-22 15:28:16**

Retroperitoneal Bronchogenic Cyst: Imaging and Pathophysiological Review

Bronchogenic cysts are rare lesions that form during early embryogenesis and are commonly located in the mediastinum. Retroperitoneally located bronchogenic cysts are an exceptionally rare entity. These are most commonly found incidentally on imaging. We will review the unique imaging and histopathological findings of this entity and discuss why prophylactic surgery is considered the treatment of choice. By reviewing retroperitoneal bronchogenic cysts, we aim to educate clinicians regarding the presentation, investigations, imaging characteristics, and treatment of this exceeding rare entity.

Research Article **Published Date:-2023-06-24 16:46:14**

[The Impacts of Angiotensin Receptor Blockers (ARBs) or Angiotensin-Converting Enzyme Inhibitors (ACEIs) on Patients with Stereotactic Body Radiation Therapy (SBRT) for Early-Stage NSCLC]

Purpose: Stereotactic body radiation therapy (SBRT) has emerged as an alternative to surgery for patients with inoperable early-stage non-small cell lung cancer (NSCLC). The majority of inoperable NSCLC patients are elderly and frequently have comorbidities including cardiovascular diseases for which they frequently receive angiotensin receptor blockers (ARBs) or angiotensin-converting enzyme inhibitors (ACEIs). The interactions of these medications with SBRT are not clear. The objective of the current study is to investigate the interaction of ARBs and ACEIs with SBRT for the outcomes of early-stage NSCLC.
Methods and Materials: A retrospective chart review of patients treated with SBRT for Stage I and II NSCLC (AJCC 7th edition) at a single institution between 2006 and 2017 was conducted. Information on the use of ARBs, ACEIs, demographics, and tumor-related factors was collected. Kaplan-Meier and Cox proportional hazard analyses were performed to assess the impact of ARBs and ACEIs combined with SBRT respectively on the treatment outcomes of these patients.
Results: In total, 116 patients were included in the study, among whom 38/116 (32.76%) received ACEIs, and 20/116 (17.24%) received ARBs. In the multivariable analysis, the use of ARBs, but not ACEIs, with SBRT, was significantly associated with the increased risk of dissemination (Hazard Ratio (HR): 2.97; CI: 1.40-6.27; $p < 0.004$) compared to SBRT without ARBs. The tumor size of > = 3 cm was associated with significantly decreased time to local failure and OS compared to tumor size <3cm.
Conclusion: In the current retrospective study, the use of ARBs, in combination with SBRT, was associated with a significantly increased risk of disease dissemination in early-stage NSCLC compared to SBRT alone. The findings warrant further investigations on the concurrent use of ARBs, ACEIs, and other medicines used for chronic diseases with SBRT for early-stage NSCLC.

Research Article **Published Date:-2023-06-20 16:42:29**

[Neurointerventional Radiology: History, Present and Future]

Neurointerventional Radiology (NIR), encompassing neuroendovascular surgery, endovascular neurosurgery, and interventional neurology, is an innovative and rapidly evolving multidisciplinary specialty focused on minimally invasive therapies for a wide range of neurological disorders. This review provides a comprehensive overview of NIR, discussing the three routes into the field, highlighting their distinct training paradigms, and emphasizing the importance of unified approaches through organizations like the Society of Neurointerventional Surgery (SNIS). The paper explores the benefits of co-managed care and its potential to improve patient outcomes, as well as the role of interdisciplinary collaboration and cross-disciplinary integration in advancing the field. We discuss the various contributions of neurosurgery, radiology, and neurology to cerebrovascular surgery, aiming to inform and educate those interested in pursuing a career in neurointervention. Additionally, the review examines the adoption of innovative technologies such as robotic-assisted techniques and artificial intelligence in NIR, and their implications for patient care and the future of the specialty.
By presenting a comprehensive analysis of the field of neurointervention, we hope to inspire those considering a career in this exciting and rapidly advancing specialty, and underscore the importance of interdisciplinary collaboration in shaping its future.
