

## In this issue

In this issue there are 10 original articles on a wide range of topics and two literature reviews.

In the first article, Diggins and Chesson, investigate the levels and sources of job stress, job satisfaction and burnout experienced by 113 Radiation Therapists (RTs) in an Australian cancer hospital, and determine the factors of emotion-focussed patient care and communication that contribute to RTs' stress and burnout. The authors conclude that emotion-focussed care and patient communication contributes to both job stress and burnout, as well as job satisfaction. RTs' experience of job stress, satisfaction or burnout are likely to vary according to a range of personal, demographic and organisational factors.

In the next article, Chalimou et al., undertake a clinical survey for registering treatment decision criteria in advanced non-small cell lung cancer (NSCLC) radiotherapy and determination of the dose-response relationship for one year survival. In this study, different treatment methodologies have been explored using management plans proposed by radiation oncologists regarding general questions and theoretical case histories for patients with advanced NSCLC. The survey was conducted by sending a questionnaire to 24 radiotherapy centers in Europe. This survey demonstrates a range of treatment strategies for advanced and inoperable NSCLC within Europe. There are a number of factors that influence the perceived aims of treatment and treatment planning. These factors should be taken into account when evaluating the effectiveness of different irradiation techniques, especially in the determination of radiobiological parameters and dose-response relations. The majority of patients should be treated with short courses of palliative radiotherapy, of one or two fractions. The use of high dose palliative regimens using many fractions should be considered for selected patients.

In the third article, Bayliss, Balogh, Burrowes, Brunet and Jensen undertake a quality review of

the occurrence of non-fatal venous air embolism event following CT contrast enhanced administration for the purpose of radiation therapy planning. The incidence of venous air embolism during and following diagnostic and interventional radiographic procedures utilizing contrast media has been well documented in the literature. However to date a case report of a venous air embolism occurring within an outpatient healthcare facility during a contrast enhanced computer tomography radiation therapy planning procedure remains under reported. A review of the etiology and associated pathophysiology of venous air embolism is provided. This is followed by a detailed case report of the occurrence of a non fatal venous air embolism event.

In the next article, Hellebust et al., outline the process of setting up a national QA radiotherapy programme in Norway to facilitate implementation of QA activity at hospital level-the KIST initiative. Outcomes of this initiative include, several national consensus documents have been produced and systems for incident handling and activity reporting have been established and clinical audits have been implemented in Norwegian radiotherapy. Guidelines for radiotherapy of various diagnoses have also been prepared in collaboration with National Cancer groups. The authors conclude that the KVIST programme has been well acknowledged in the Norwegian radiotherapy community and has succeeded in creating a positive attitude towards quality assurance and improved the communication between centres and the various professions.

Islam et al., present their study of dosimetric characteristics for in-vivo dosimetry with cylindrical n-type Isorad diode. The objective was to determine diode characteristics before actual dose verification on human phantom and patients. The reliability and stability of equipment, signal stability, precision, dose response linearity, field flatness, perturbation of radiation dose, plastic to water conversion factor (Kpl),

ionization chambers (ICs) and diode calibration were determined. Correction factors for tray (CFtray), wedge (CFwedge), field size (CFFS), SSD (CFSSD), angle (CFangle) & block (CFblock) were found. Patient Dose Monitor, Isorad Diode (n-type) and IC (PTW Frieburg, USA), Co-60 unit (Theratron), ATOM Adult male human phantom (Model 701-D, CIRS, USA) were used.

In the next article, Pettit, Sanghera, Glaholm and Hartley, present their study into the use of mugard (TM), caphosol (R) and episil (R) in patients undergoing chemoradiotherapy for squamous cell carcinoma of the head and neck. This prospective audit aimed to record mucositis and dysphagia toxicity and the level of analgesia prescribed when recent products: MuGardTM, CaphosolR and EpisilR are compared with our standard departmental mouth care regimen.

Patients undergoing concurrent chemoradiotherapy for locally advanced squamous cell carcinoma of the head and neck prospectively audited weekly for eight consecutive weeks starting from week 1 of chemoradiotherapy from June 2009 until January 2011. Patients received either standard oral care regimen of aspirin, glycerin and sucralfate, or, MuGardTM, CaphosolR or EpisilR. Grade of mucositis, dysphagia and analgesia score were prospectively recorded using the common toxicity criteria v3.0. The authors conclude there is no evidence from this audit that MugardTM, CaphosolR or EpisilR improves mucositis and dysphagia toxicity or the level of analgesia prescribed compared with our standard departmental mouth care regimen. Randomised trials comparing these approaches are required to detect any meaningful clinical benefit.

In the article by Chanana et al., authors present a pilot study undertaken to find significance of vascular endothelial growth factor (VEGF) and cancer antigen (CA-15.3) in breast cancer patients. A total 70 patients with breast cancer were divided into triple negative breast cancer (TNBC) and non-TNBC depending on ER, PR, or HER-2 neu receptors status. Serum CA 15.3 and VEGF levels were evaluated with Enzyme Linked Immunoassay at the time of diagnosis and were co related with age, tumor size and stage of the

disease in both the groups. Spearman's test was used to find the correlation. The paper concludes that expression profile of VEGF was high in TNBC than non-TNBC patients. VEGF serves to be a better biomarker as compared to CA 15.3 in TNBC patients.

In the next paper McGarry et al., investigate inverse planned constant dose rate volumetric modulated arc therapy (VMAT) as an efficient alternative to five-field intensity modulated radiation therapy (IMRT) for prostate cancer. The aim of this work was to determine if VMAT plans, created for constant dose-rate (cdrVMAT) delivery are a viable alternative to step and shoot five-field IMRT. The cdrVMAT plans, inverse planned on a treatment planning system with no solution to account for couch top or rails, were created for delivery on a linear accelerator with no variable dose rate control system. A series of 5-field IMRT and cdrVMAT plans were created using dual partial arcs (gantry rotating between 2600 and 1000) with 40 control points for ten prostate patients with the average rectal constraint incrementally increased. Pareto fronts were compared for the PTV homogeneity and average rectal dose between the two techniques for each patient. Also investigated were TCP and NTCP values for each technique. The delivery parameters (MU and time) and delivery accuracy of the IMRT and VMAT plans were also compared. Pareto fronts showed that the dual partial arc plans were superior to the five-field field IMRT plans, particularly for the clinically acceptable plans where average rectal doses were less for rotational plans ( $p = 0.009$ ) with no statistical difference in target homogeneity. The cdrVMAT plans had significantly more MU ( $p = 0.005$ ) but the average delivery time was significantly less than the IMRT plans by 42%. All clinically acceptable cdrVMAT plans were accurate in their delivery (gamma  $99.2 \pm 1.1\%$ , 3%3 mm criteria). Accurate delivery of dual partial arc cdrVMAT avoiding the couch top and rails has been demonstrated.

In the study by Mc parland et al., involves the use of Cone-Beam CT (CBCT) datasets from five patients to investigate the concordance between the dose prediction from the initial treatment plan and the dose delivered during

treatment. The IMRT distribution used for treatment was superimposed on alternate day CBCT images for each patient. Dose metrics and absolute volumes for the prostate, rectum and bladder were extracted from the CBCT-based DVH. Differences in dose and volumes were compared to the P-CT values and significance was tested using the Wilcoxon Signed-Rank test. The study found that the DVH from P-CT was unable to consistently predict the dose delivered to the bladder and rectum. The current bowel and bladder preparation protocols used at our institution did not eliminate variation in bladder and rectum volumes for the five patients included in this study.

Vargas et al., present their study on the efficacy and safety of external beam radiation therapy in non-functioning pituitary adenomas. Recurrence is frequent in surgically treated non-functioning pituitary adenomas (NFPA). The use of radiation therapy (RT) to prevent recurrence has to be weighted against the potential side effects, particularly, hypopituitarism. The objective of the study was to evaluate the efficacy and safety of RT in postoperative patients with NFPA with adenoma remnant. The 3- and 5 year-outcome of 51 patients with NFPA with a remnant after surgery that received RT (cases) was compared to that of 61 subjects who did not receive RT (controls). Cases and controls were matched for postoperative remnant size, cavernous sinus invasion, age and gender. The authors conclude: postoperative RT is effective in preventing tumor re-growth in NFPA patients with postoperative remnants. The fact that hypopituitarism is highly prevalent even in non-irradiated patients should allow a more generalized use of this treatment modality.

The first literature review is presented by Lynne Gordon on the advice given to patients on use of cranberry in radiotherapy. The aim of this review was to investigate whether there is a place for cranberry as part of the management of radiation cystitis caused by radiotherapy treatment of pelvic cancers, in order to aid therapeutic radiographers in tailoring their advice regarding pelvic side effects. A structured literature search was carried out using PubMed, CINAHL, Scopus and Cochrane Library databases.

25 articles were selected for review. The author concludes the lack of high quality data was identified in the literature reviewed and no firm evidence was found to support the continued recommendation of cranberry as part of management of radiation induced urinary tract side effects. Well-designed RCT are required before further recommendations regarding the use of cranberry in radiotherapy are made.

The second literature review is presented by Stuart McCaighy, who undertakes a systematic literature review to critically examine patient selection for patients undergoing stereotactic body radiotherapy (SBRT) to the spine and pancreas on the CyberKnife robotic radio-surgical system (CK). Online databases were searched and data was collected and ranked using a system from the Scottish Intercollegiate Guideline Network. The quality of the evidence analysed was insufficient to generate universal recommendations. However, the conclusions reached do help to demonstrate the safety and efficacy of CK treatment to both pancreatic and spinal patients. Excellent local control rates and minimal acute toxicity were reported within the spinal literature with uncertainties remaining with regard to the precise tolerance of the spinal cord and the reliability of current toxicity prediction methods. For pancreatic patients prognosis remains dismal due to the tendency for patients to present with advanced or inoperable disease. Combinations of CK SBRT and Gemcitabine chemotherapy are given though regimes vary and overall survival is not extended due to the rapid onset of distant metastases. New chemotherapy agents are required as well as better means of predicting response to treatment. No randomised controlled trials or meta-analyses were identified in the review and these are required in order to generate universal guidelines.

To complete this issue, there are two short communications, one by Fred Ampil on post-operative radiotherapy for advanced head and neck cancer in patients with cardiac pacemakers, and a communication by Syed Akber on the subject of tissue weighting factors and its clinical relevance.

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