Purpose/Objective: Radiotherapy quality assurance (RTQA) is now a requirement of radiotherapy clinical trials since poor protocol compliance has been shown to impact on outcomes. We aim to determine the degree of variation in lung cancer target volume delineation using pre-accural benchmark cases.

Materials and Methods: The IDEAL-CRT trial which is investigating isotoe dose escalation and acceleration in lung cancer chemoradiotherapy requires all prospective principal investigators to submit pre-accural contouring benchmark cases. The cases are assessed for protocol compliance and if necessary clinicians are asked to resubmit their contours following amendment. We collected all of the benchmark cases that had been submitted by June 2012 by prospective trial centre principal investigators in DICOM format. Each exercise was analysed using a tumour management group (TMG) consensus contour and Dice coefficient (DC), Jaccard index (JI) and geographical miss index (GMI) was calculated for each individual structure. The data was pre-processed to ensure uniform structure nomenclature and then analysed using automated trial analysis tools built using MATLAB R2011a and CERR v4.0.

Results: Up until May 2012 11 clinicians had submitted a total of 21 benchmark cases; 11 for contouring case 1 and 10 for contouring case 2. In total approximately 160 individual structure contours were analysed. Structures analysed included GTV, CTV, PTV, spinal cord (SC), right lung (RL), left lung (LL), heart and oesophagus. All conformity indices showed varying levels of conformity in clinician contouring. For IDEAL-CRT case 1 the median JI for the SC was 0.40 (Interquartile Range (IQR) 0.04), the heart 0.90 (IQR 0.05), the GTV 0.65 (IQR 0.16) and the oesophagus 0.41 (IQR 0.08). For IDEAL-CRT case 2 the median JI for the SC was 0.46 (IQR 0.06), the heart 0.87 (IQR 0.04), the GTV 0.77 (IQR 0.07) and the oesophagus 0.48 (IQR 0.07).

Conclusions: Our results show that clinician target volume conformity varies significantly within the IDEAL-CRT trial. Our results also suggest that the degree of variation depends upon the target structures shape and complexity. Prospective individual case review for the first 1-3 cases is standard for this trial.

PO-0685
Functional imaging plus CT: is it useful for radiotherapy planning in patients with NSCLC?

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Purpose/Objective: To determine role of single photon emission tomography (SPECT) with 99mTc-MIBI and computerized tomography (CT) in selection of patients with non small cell lung cancer (NSCLC) for radiotherapy strategy.

Materials and Methods: SPECT with 99mTc-MIBI was performed after conventional staging in 84 NSCLC patients. Acquisition was started 15 min after 1/2 injection of 740 MBq of 99mTc-MIBI. SPECT images of the chest were acquired over 360° using the following parameters: a 64 - 64 word matrix, a 3° angular step, and 30 s/frame. Diagnostic results of SPECT and conventional CT staging were validated by histological examinations of operation material. Various diagnostic strategies were tested as a tools for radiotherapy strategy.

Results: According to histological verification 35 of 84 evaluated patients had lymph node (LN) invasion by NSCLC. Sensitivity (Sen), specificity (Sp) and accuracy (Ac) of SPECT in diagnosis of LN invasion by NSCLC were as follows: 80%, 67%, 72%. Diagnostic accuracy of CT for detection of LN involvement was inferior to SPECT: Sen - 70%, Sp - 63%, Ac - 66%.

Conclusions: Only combination of SPECT and CT data offer important diagnostic support. If LN involvement was detected by at least one of these methods Sen reached 94% with corresponded Sp -52%, Ac - 70%. This strategy was 88% sensitive for diagnosis of LN involvement. It means that patients with normal SPECT and CT are suitable for curative radiotherapy without additional invasive staging procedures. In patients without pneumonia or atelectasis and SPECT plus CT signs of LN involvement Sp reached 97%, N2 invasion was also detected with high Sp (88%). Patients from this group are candidates for palliative radiotherapy.

PO-0686
Non surgical new bio-radiosensitization treatment (KORTUC-BCT) for patients with stage I or II breast cancer

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Purpose/Objective: Tumor tissue can be re-oxygenated by inactivating peroxidase/catalase in the tumor tissue through the application of H2O2. This H2O2 is then degraded to produce oxygen. In this way, low-LET radioresistant tumors can be transformed into radioresistent ones. Recently, we have developed a new enzyme-targeting bio-radiosensitization treatment utilizing H2O2 for intratumoral injection (KORTUC II), and confirmed the safety & effectiveness of the treatment mainly for patients with locally advanced neoplasms (Ogawa Y et al. Int J Oncol 34: 609-618, 2009, 39: 553-560, 2011). Therefore, in the study, we applied KORTUC II for non-surgical treatment for patients with breast cancer of stages I or II (KORTUC-BCT). The purpose of the present study was to establish a non-surgical BCT utilizing KORTUC II radiosensitization treatment.

Materials and Methods: A new bio-radiosensitizing agent containing 0.5% H2O2 and 0.83% sodium hyaluronate (a CD44 ligand) has been developed for intra-tumoral injection. This new method, named KORTUC II, was approved by our local ethics committee for the treatment of breast cancer and metastatic lymph nodes. A total of early-stage breast cancer pts. (stage I, 17 pts; stage II, 31 pts) were enrolled in the KORTUC II trial after providing fully informed consent. Mean age of the pts. was 60.8 years. The agent was injected into breast tumor tissue twice a week under US guidance, just prior to each administration of radiotherapy (RT). Hyperfraction RT was administered for the breast & axilla using a tangential fields approach and field-in-field method; the energy level was 4 MV and the total RT dose was 44 Gy administered as 2.75 Gy/fraction. An electron boost of 3 Gy was added three times.

Results: Treatment was well tolerated with minimal adverse effects in all 48 pts. A total of 44 pts achieved cCR according to PET-CT and dynamic MRI study, and the study has not been performed for the remaining 4 patients yet. No patients showed any significant complications (excluding mild dermatitis: Grade I, 29 pts; Grade II, 19 pts), and cosmetic results were excellent/good for all (85.4%). Eighteen pts. under 75 years old with stage II breast cancer underwent induction chemotherapy prior to KORTUC II treatment, and 41 pts. with ER-positive tumors also received hormonal therapy following KORTUC II. The mean duration of follow-up as of the end of June 2012 was 33.6 months, at which time all 48 pts. were alive without any distant metastases. Only 1 pt. had local recurrence, which was discovered after 34 months of follow-up. The local control rate was 97.9%.

Conclusions: Non-surgical KORTUC-BCT can be performed using KORTUC II, which has three major characteristics: image-guidance by US; enzyme-targeting of peroxidase/catalase; and targeting of breast cancer stem cells via the CD44 receptor. KORTUC-BCT offers great potential as a viable non-invasive replacement for surgical BCT. Because KORTUC II is effective & safe, it has great potential to become a viable non-invasive replacement for surgical procedures and a valuable bio-radiosensitization method for low LET (linear energy transfer)-radioresistant neoplasms.

PO-0687
Technical feasibility of whole breast radiotherapy for local relapse after a previous partial breast irradiation

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Purpose/Objective: The present study is specifically addressed to investigate the feasibility of salvage radiotherapy treatment involving the whole breast in patients with local relapse managed with a second...