the day in HT treatments for HN cancer. This study represents the first proof of the dosimetric accuracy of DIR from KVCT to MVCT. The suggested method is sufficiently quick and reliable to be considered as an appropriate tool for dose of the day calculation in clinical strategies for adaptive Tomotherapy of head and neck cancer.

EP-1816
A hybrid approach for head-neck cancer using on-line image guidance and off-line adaptive planning

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Purpose or Objective: A prospective study to evaluate the dosimetric benefits of treatment plan adaptation for patients who had undergone Repeated CT (ReCT) and replanning due to treatment-induced anatomical changes during radiotherapy.

Material and Methods: Five patients of head and neck cancer, who have undergone rescanning and replanning due to weight loss and tumour shrinkage, were selected for the study. For each patient, ReCT has been taken at mid treatment. The ReCT image for each patient was registered with the initial planning CT image and CBCT image of mid treatment fraction individually. The rigid registration was performed automatically and final manual adjustment was used for better alignment. After the rigid registration, a deformable registration was also performed automatically using vertex-vertex correspondence between the reference image set and the target image sets. Contours were conducted for target volumes and OARs (Organ at risk). The initial treatment plan was created on initial CT using Eclipse treatment planning system (v. 11.0). This initial treatment plan was transferred to ReCT and CBCT and the dose recalculated. The replanning has been done on ReCT and this replan was delivered as a modified plan to the patient. The initial CT plan, which was optimized and calculated on initial CT, was compared dosimetrically with initial CT plan calculated on ReCT & CBCT and ReCT plan optimized and calculated on ReCT.

Results: Rescanning in mid treatment shows 27% (13%-42%) reduction in parotid volumes and therefore 21% (7%-35%) increase in parotid mean doses. Initial plan calculated on ReCT and CBCT found 15% (9%-26%) increase in PRV spine maximum doses which was reduced by replanning on ReCT. The body maximum doses increased by 6.5% (4%-8%) in four patients and 22% in one patient when initial CT plan was calculated on ReCT and CBCT.

Conclusion: Adaptive radiotherapy involves the modification of the initial plan to account for patient specific anatomical changes (replan). Replanning on ReCT in head and neck patients during the course of radiotherapy is an ultimate solution with regard to doses of spinal cord, parotid glands and skin.

EP-1817
Dosimetric evaluation of new method for patient specific CBCT scan calibration

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Purpose or Objective: The dose delivered in radiotherapy can be influenced by several factors such as patient setup variations and anatomical changes. Generally CT scans are carried at fixed interval times to verify the presence of anatomical changes but this is time consuming and frequently it cannot assure a timely control. The Cone Beam CT (CBCT), generally carried out during the fractionated radiotherapy, allows a more timely verification of morphological changes. The calibration in terms of relative electron densities (RED) of CBCT images allows their use for hybrid plan calculation needed to decide for an eventual adaptive strategy. However the CBCT calibration suffers of some problems such as time stability and patient variability. This work reports the dosimetric assessment of an original patient-specific CBCT calibration method.

Material and Methods: A homemade software was developed to automate the HU calibration of CBCT in terms of RED adopting the following procedure: 1) two CT and CBCT scans with negligible morphological changes are selected for a patient, 2) in these images the HU values of different ROIs, relative to correspondent anatomical regions, are acquired to obtain a correlation function between CBCT and CT HUs, 3) the correlation function is used to determine the CBCT calibration curve HUs versus RED from the CT calibration curve; 4) finally the CBCT calibration curve is optimized by an algorithm that minimize the differences of patient’s radiological thicknesses measure on the CT and CBCT patient’s slices. This procedure has been verified for H&N, lung and pelvic body regions in a Rando phantom and for 5 patients for VMAT irradiations by a linac Varian TrueBeam STx with the on-board imager (140 kV x-ray tube). Using Eclipse TPS the dosimetric assessment of the method was based on comparisons between: isocenter doses; y-gamma analysis between dose matrices of planes passing through the isocentre and DVH comparisons.

Results: The calibration procedure required about 5 minutes for each patient. Dosimetric comparison supplied agreements (i) within 2% for the isocenter doses; (ii) 5% greater than 0.97% for head and neck, 98% for lung and 99% for pelvic regions and the ymean values were all within 0.4. The PTV V95 and mean dose were within 2%. While the mean dose of principal OARs was within 3%.

Conclusion: The CBCT calibration method used here seems to be accurate enough to calculate hybrid planes, useful to discuss and to evaluate the opportunity of an adaptive radiotherapy strategy.

EP-1818
Using ROIs projected on EPID as a predictor of plan deterioration due to anatomical changes

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Purpose or Objective: One of the side effects of radiotherapy is the patient’s anatomical changes. 2D relative γ analysis from daily EPID images is a fast and simple method to detect anatomical changes that could have a strong dosimetric impact on the treatment plan. An action threshold determines if the error relative to the first fraction is significant or not, and thus requires a replanning. The aim of this study is to validate the threshold for lung cancer and to assess the relevance of including additional information from regions of interest (ROIs) from EPID images.

Material and Methods: EPID images were acquired for every beam and all fractions of 24 lung cancer patients. Of these, 8 patients were selected to evaluate the dosimetric impact of these changes. The PTW V95(%) was computed for both the planning CT and original contours deformed onto CBCT acquired at the last fraction. These values were then compared with 2D image relative γ analysis of EPID images when the PTW anatomical structure is projected on these images or not.

Results: The results of γ analysis were classified into 4 different categories using a k-means clustering analysis. These categories indicate the degree of discrepancy between the EPID image acquired on a treatment day and the reference from the first fraction. The first category