non-rigid registration in very large regions of the prostate. Furthermore, the maximal deviation of non-rigid registration was superior to the inter-observer variability in the three directions. Elastic target volume propagation is an attractive strategy which merits further investigations and clinical implementation in the treatment workflow for the purpose of adaptive RT.

EP-1284
Replanning on Cone-Beam CT: HU conversion method and application on patients
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Purpose/Objective: IGRT with on-board cone-beam CT (CBCT) for radiation therapy delivery devices offers the potential for adaptive therapy and dose replanning. In order to use the CBCT images to calculate the dose distribution, it is necessary to convert image pixels from an arbitrary gray scale to Hounsfield Unit (HU). A method for this conversion is reported together with its validation and some preliminary patient’s applications.

Materials and Methods: The treatment unit was an Elekta Synergy equipped with an XVI (v.n.4.2.1) on board CBCT imager. All images were analysed with ImageJ v.n.1.44 and the dose distribution was calculated on a RTPS Elekta Oncentra External Beam (OEB) v.n.4.1. The gray level to HU conversion for CBCT images was obtained using a Catphan 600 phantom (The Phantom Laboratory, USA) with a reference acquisition protocol with medium FOV (M20), 120kV, 360° and 621mAs. CBCT images were analyzed and the mean value of the ROIs centred in the middle of the insert was plotted versus the expected HU, thus obtaining a conversion function. This function was tested on a CBCT image of a cylindrical phantom filled with water with three inserts of different materials (PTFE, PMMA, LDPE). Two opposite square beams centred in the middle of the phantom were applied and the dose distribution was calculated with a fixed number of monitor units. The horizontal and vertical dose profiles traced through the centre of the inserts in the axial plane were compared in terms of absolute dose with the same obtained from a standard CT phantom image. The mean dose (Dmean) of each insert was also evaluated. The conversion function was applied on CBCT images of ten patients treated with complex 3D CRT and IMRT HHN plans too. CT- and CBCT-based plans were compared as proposed by ICRU 50/62 and ICRU 83 in terms of Conformity Index (CI) for PTV and dose near maximum (D2%) and the Dmean for OARs. The mean percentage differences (Δ%) between each parameter were evaluated.

Results: The conversion function (Fig.1) was found linear with a correlation coefficient greater than 0.99. Replanning on the cylindrical phantom shows a mean percentage difference for each profile ≤1.1% and a variation on Dmean in all inserts ≤3%. The mean percentage difference (Δ%) between parameters characterizing CT- and CBCT-based plans is summarized in table 1; all values are less than 5%.

Conclusions: CBCT images can be converted in terms of HU, even if it needs a dedicated procedure. Re-planning on patients using CBCT images showed a substantial agreement with doses evaluated on the reference CT image. Differences are present on very small organs, (i.e. optic nerve) mainly due to the difficulty to re-draw the same contours on the CBCT images. A simple recalculation of a plan on a CBCT can be a good indicator of the need for replanning if changes in patient’s anatomy are unacceptable.

EP-1285
Assessing response to radiochemotherapy treatment on 18F-FDG PET images in NSCL cancer using histogram and texture analysis
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Purpose/Objective: Cancer response to treatment is mainly assessed by the methods of visual assessment, measuring anatomic tumor size reduced and classifying tumor shrinkage according to standard criteria. Accumulating studies suggested that 18F-FDG PET SUV can be used in assessing response to combined radiochemotherapy. The aim of this study was to propose and evaluate gray level histogram and texture features information provided by 18F-FDG PET to assess patient’s response to radiochemotherapy in non-small cell lung cancer.

Materials and Methods: Twelve patients with newly diagnosed NSCLC treated with combined radiochemotherapy were involved in this study. Patients were categorized under three headings (nonresponders, partial responders or complete responders) by experienced radiologists according to Response Evaluation Criteria. We analyzed the percentage variation of gray value in each gray level or on the whole using histogram approach and describing tumor region global change on PET. Texture parameters' variation between pretreatment and 1 month after treatment completion which describe local voxel-spatial distribution were computed on gray level co-occurrence matrix (GLCM) were investigated. Correlation between characteristics' variation and three types response status were analyzed.

Results: The uniformity degree of gray level histogram on the whole and the maximum percentage decrease of histogram was well associated with tumor shrinkage and response status. These derived indices were capable to differentiate three groups tumor response to radiochemotherapy. Texture parameters' variation characterizing local tumor metabolism were able to differentiate the response considering their correlation with regional response to radiochemotherapy.

Conclusions: We demonstrated that histogram and texture analysis methods on baseline 18F-FDG PET scans provided robust, discriminative stratification in assessing response to combined radiochemotherapy and may have a good application prospect in clinical practice.

EP-1286
Validation of deformable dose accumulation algorithm by calculating 3D dose distribution in different phantoms
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Purpose/Objective: Because of temporal variations of the anatomy of the patients during radiotherapy treatments, may be necessary to deform images so as to merge them into a cohesive dataset for applying all different dose distributions relative to each series. We explore a technique to experimentally validate deformable dose algorithms by calculating 3D dose distributions under the condition of deformation in different phantoms, using a commercial software for deformable image registration.

Materials and Methods: Firstly, two cylindrical phantoms were compared and deformable fusion was performed on the bigger phantom to the smaller one. Both cylindrical phantom images were acquired with a slice thickness of 3 mm and sent to VelocityAI imaging system software to perform the deformable registration between the two series of images. At the inner of the bigger phantom two artificial structures, simulating respectively a Planning Target Volume and an Organ at Risk, were contoured. A simple box technique on the bigger phantom was planned delivering 2 Gy at the isocenter with Masterplan Treatment Planning System and 6 MV photons beam was used. Another treatment plan with the same intent (i.e. deliver 2 Gy at isocenter with same planning technique) was performed on the smaller phantom on the structures modified by deformable registration (Planned Dose, PD). Resulting isodoses were compared with that created by deforming isodoses on the smaller phantom (Deformable Dose, DD).