Furthermore the results of the QA program did give us insight in the IGRT protocol. Based on the data, we have decided to create and perform a training program for all RTTs working on the linear accelerators.

**EP-1659**

Regions of interest analysis of setup uncertainties for post-mastectomy radiotherapy

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Purpose/Objective: Post-mastectomy radiotherapy (PMRT) reduces the recurrence rate of breast cancer patients, and the image-guide radiotherapy (IGRT) can reduce the setup uncertainties to approve the accuracy of dose delivery. In this study, we evaluate two different registration regions of cone-beam computed tomography (CBCT) to assess setup uncertainties for post-mastectomy radiotherapy.

Materials and Methods: All patients were positioned on the vacuum bag. After the weekly CBCT for IGRT, two regions of interests (ROI) -A-breast region only (the square extend 3 cm from PTV boundary, the yellow rectangle in figure 1) ; B- entire body(include spine & contralateral rib, the white rectangle in figure 1) for CBCT image registration were applied on the bony alignment software (Elekta Synergy XVI 4.5.1) to compute the setup shifts value of X, Y, and Z directions. Group mean μ, systematic error Σ (standard deviation of group mean), random errors σ (root-mean-square of random shift), and setup margin (2.5σ + 0.7σ) were calculated for all translations. Pearson correlation coefficients R and Pair-T test of breast region shift versus entire body registration along all translational directions. Group mean μ, systematic error Σ (standard deviation of group mean), random errors σ (root-mean-square of random shift), and setup margin (2.5σ + 0.7σ) were all listed in table 1. The estimated setup uncertainties for post-mastectomy radiotherapy.

Results: Fourteen breast cancer patients were enrolled in a retrospective study and 86 weekly CBCTs were analyzed. The μ, Σ, and σ were all listed in table 1. The estimated setup margins of breast region groups were slightly bigger than those of entire body and ranged between only 0.38-0.88 mm. The correlation coefficient results show there are high consistence in all translations (Rx=0.986; Ry=0.930; Rz=0.783, p<0.001). The Pair-T test shows the difference on each direction (diffx=-0.0007±0.074,p=0.931; diffy=0.054±0.162,p=0.003;diffz=-1.116±0.159,p=0.001).

Conclusions: In this study, the discrepancy between different registration ROI selections was significant on y and z directions, but it can be ignored since the value was very small (Margin difference < 0.088 cm). It might be attributed to that the chest walls of PMRT patients were thin, and the PTVs covered most part of bony structure, so it’s similar to the entire body bony alignment registration. These relative positional variations could be less considered when making setup corrections by different operators and registration ROIs.

**EP-1660**

Interfraction Internal Target Volume dose coverage in Stereotactic Body Radiotherapy for infradiafragmatic tumor

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Purpose/Objective: Infradiafragmatic tumors can be treated with Stereotactic Body Radiotherapy (SBRT). The movement of the lesions can be taken into account designing an Internal Target Volume (ITV) which frames different Gross Tumor Volumes (GTV). This ITV could be modified in several treatment fractions, affecting the dose coverage. Our objective was to analyze interfraction changes in the ITV and the prescribed dose coverage.

Materials and Methods: We analyze 14 patients and 15 treated tumoral lesions. Simulation: fusion of three CT studies in different respiratory phases (normal breathing, inspiration, expiration) was done for the planification and for each fraction of treatment. Immobilization devices for stereotactic conditions were used: vacuum matres, prostep system for legs. Three GTV were delineated and one ITV was designed to frame the boundaries of the three GTV. Margin of 5mm was added to the ITV for the Planning Target Volume (PTV). 3D planning was performed with Pinnacle System software (Phillips). One planning was designed before the first fraction (ITV_0_planning) and it was applied in every new volume designed for the other fractions and modified if necessary, resulting one ITV for each fraction (ITV_1; ITV_2,...). For the ITV coverage analysis and dosimetry we selected the 98% of the total prescribed dose. SBRT treatment was delivered with linear acceleraror CLINAC 2100 (Varian). Verifications were done in each fraction with Portal Vision images and cine mode.

Results: The numbers of fractions administered were: 1 fraction in 8 cases; 3 fractions in 6 cases; 5 fractions in 1 case. Interfraction interval time was: minimum 24 hours, maximum 48 h. Interfraction ITV variations: fig.1
The range of variation of the ITV between each treatment fraction was 0.6 - 38.6 cc. The percentage of volume variation comparing (relative) to the ITV_0 planning volume was between 10.5% - 83%, with a mean of 36.6% and a median of 30%. 

**Interfraction ITV coverage:** fig 2

The ITV interfraction variation coverage calculated to the 98% of the total prescribed dose ranged between 0 and 13.3%. The mean variation was 2.86%; median: 0%; min: 0%; max: 14.7%. Only two cases showed >10% of coverage variation.

**Conclusions:** There is a variation in the interfraction ITV in SBRT treatments of infradiafragmatic lesions. The percentage changes in this volume reached a mean of 36.6% relative to the initial ITV. Dosimetry from the initial planning (unmodified for the new ITV’s) yielded a mean variation in the ITV interfraction coverage of 2.86%. In the majority of cases, the ITV coverage variation was within 98% of the total prescribed dose. We can conclude that a new planification for every fraction according to the new ITV’s is not necessary. The PTV coverage and OARS constraints could be those which define the need for changes in the initial planning.

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**EP-1662**

The imaging dose and number of images taken during the CyberKnifeÆ treatment for brain and prostate tumors

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**Purpose/Objective:** To evaluate the six degree setup errors of tumors of cervical vertebra, thoracic vertebra and lumbar vertebra by image guided radiotherapy.

**Materials and Methods:** From May 2013 to June 2014, 30 patients with spinal malignant tumors (10 patients of cervical vertebra, thoracic vertebra and lumbar vertebra respectively) were treated with Elekta Synergy accelerator. Six degree set up errors were corrected using HexaPODevo RT bed and under image of on board cone beam computed tomography (CBCT) guided. All patients received kilovoltage CBCT before receiving radiotherapy and after correction. The acquired images were co-registered with planning CT with bone window. The data of 838 CT images were analyzed and the errors of translational directions X (Lateral,Lat), Y(Longitudinal,Lng), Z(Vertical,Ver) and rotational directions Rx(Pitch, Rotation X), Ry(Roll, Rotation Y), Rz(Yaw, Rotation Z) were recorded. To compare the data by t-test using SPSS 13.0.

**Results:** The absolute translational setup errors (mean ±SD) in X (Lateral, L), Y(Longitudinal, Lng), Z(Vertical, Ver) axes of cervical vertebra before correction were 1.71±0.10mm, 1.81±0.11mm and 1.94±0.09mm respectively. 3.17±0.19mm, 4.26±0.28mm, 2.18±0.12mm for thoracic vertebra and 2.69±0.24mm, 3.33±0.26mm±0.21mm for lumbar vertebra. T-test of paired data of set up errors before and after CBCT showed significant difference in X (t=-5.785, P=0.00), Y(t=4.717, P=0.00), Z(t=2.876, P=0.01)axes of cervical vertebra, X(t=1.451, P=0.05), Y(t=2.6, P=0.01), Z(t=5.194, P=0.00) for thoracic vertebra and Z(t=3.518, P=0.00) for lumbar vertebra. The absolute rotational setup errors (mean ±SD) in RX(Pitch), Y(Roll), Z(Yaw) axes of cervical vertebra before correction were 0.67±0.04°, 1.06±0.06° and 0.78±0.05° respectively. 0.62±0.05°, 0.75±0.06°, and 0.84±0.06° for thoracic vertebra, 0.59±0.06°, 0.80±0.07°, and 0.73±0.06° for lumbar vertebra. T-test of paired data of set up errors before and after CBCT showed significant difference in RX(t=-2.27, P=0.03),RY(t=4.109, P=0.00), Z(t=2.057, P=0.04) axes of cervical vertebra, RY(t=7.106, P=0.00) for thoracic vertebra and RX(t=3.518, P=0.00),RY(t=6.946, P=0.00),RZ(t=2.653, P=0.01) for lumbar vertebra.

**Conclusions:** Six degree setup errors of spine tumors were corrected effectively with HexaPODevo RT bed under CBCT Image guided and its feasibility in day-to-day clinical practice has been demonstrated.