Conclusion. FBP and Iterative algorithms can affect volumes and mean-dose calculations probably due to not appropriate homogeneity hypothesis. At voxel level lower discrepancies were found on patients but not in phantom.

Disclosure. The authors disclose any relationship that may bias their presentation.

http://dx.doi.org/10.1016/j.ejmp.2016.07.677

DOSIMETRY OF LESIONS IN RADIOIODINE THERAPY OF METASTATIC THROID CANCER: SPECT-TC CALIBRATION, VERIFICATION AND PRELIMINARY PATIENT RESULTS

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Introduction. ^{131}I is used in treatment of metastatic thyroid cancer. Higher activity seems to improve the outcome compared to multiple lower treatments. Patient-specific dosimetry avoids adverse effects and allows appropriate metastasis irradiation. SPECT-TC is more accurate to estimate activity than planar methods.

Purpose. To define quantitative SPECT-TC lesion dosimetry protocol.

Materials and methods. Three hollow spheres (11.5, 5.6 and 1.1 ml) and a cylinder (130 ml), filled with liquid ^{131}I (13 MBq/ml) and placed into a water phantom, were acquired (SPECT-TC SiemensIntevo, 64views, 20s/view, circular-orbit, 128 × 128 and 256 × 256) on successive days (dead time 26÷0.5%). Images were Iterative (Flash3D) scatter-attenuation corrected. Detectors counts-rates and dead-time were noted. Counts/activity were evaluated on volumes segmented with TC and threshold-method. Partial volume effects, radius dependence (25-33cm) and dead-time were evaluated; calibration's verification and a first patient dosimetry was also reported.

Results. Calibration factors (cylinder:25.4, smallest sphere:1.4 kcts/MBq) confirmed partial volume effects. Volume recovery coefficients (130 ml–100%, 11 ml–75%, 5.5ml-58%, 1.1 ml–6%) showed radius dependence (within 4.5 % for cylinder; up to 43% for the smallest sphere). The dead-time versus cts/MBq showed a linear dependence ($r^2 = 0.99$) that allowed the relative correction. According to literature (MIRD24), calibration's verification showed an accuracy within ±11 % (except for the smallest volume up to 36 %). Similar results were found for all segmentation methods but the CT-based was the most accurate one. This calibration was applied to a patient lung lesion (56 Gy).

Conclusion. SPECT-TC represents the more reliable system for lesion dosimetry, allowing accurate volumes and dead-time correction.

http://dx.doi.org/10.1016/j.ejmp.2016.07.678

OPTIMIZATION OF ACTIVITY AND ABSORBED DOSES CALCULATION TO TARGET/TUMOR AND NORMAL LIVER VOLUMES IN PATIENTS SUBMITTED TO YTTRIUM-90 RADIOEMBOLIZATION WITH GLASS MICROSPHERES

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Introduction. The model provided by manufacturers of the Y-90 microspheres does not consider dose restrictions to tumor and to normal liver volumes, but simply calculates activity to be administered based on a prescribed dose of 120 Gy corrected for liver volumes and hepato-pulmonary shunt. It is paramount to analyze data post Y-90 injection, creating dose volume histograms (DVH), to calculate the real absorbed dose distribution in liver segments with and without tumor.

Purpose. To investigate new algorithms to calculate activities during Y-90 glass microspheres liver radioembolization and optimizing absorbed doses to tumor/target and normal liver volumes.

Materials and methods. This is a retrospective study of eleven patients with multiple colorectal liver metastases submitted to liver radioembolization with Y-90 glass microspheres (Therasphere™). CT and Y-90 PET images were used together with Stratos™ software to obtain values for absorbed doses (based on distribution of Y-90) throughout the entire liver volume. Dose volume histograms (DVH) were created to stratify absorbed dose as percentage of total irradiated volume.

Results. Our results reveal that only 7% of the liver volume received twice and/or trice the intended prescribed dose of 120 Gy. 25% and 68% of the liver volume received respectively 120 and less than 50 Gy. All patients receiving less than 80 Gy in more than 50% of the liver volume are alive and well.

Conclusion. Our data suggest a relationship between patient clinical outcome and absorbed doses in liver volumes. Work to optimize administered activities according to tumor/target and normal liver volumes is underway.

Disclosure. None.

http://dx.doi.org/10.1016/j.ejmp.2016.07.679

SKIN DOSE EVALUATION FOR 3DCRT AND VMAT BREAST CANCER TECHNIQUES

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Introduction. Skin dose is a concern both in breast conservative and post-mastectomy irradiation. Although in most cases the skin is considered an organ at risk, in some there is the need to irradiate it with therapeutic doses. When Volumetric Modulated Arc Therapy (VMAT) technique is used for the treatments, because the Three-Dimensional Conformal Radiation Therapy (3DCRT) dose distribution is not clinically satisfactory, the issue about the skin dose arises.

Purpose. The purpose of this work is to evaluate the surface dose when each of these techniques is used, to compare the measured doses with the doses calculated by the Treatment Planning System (TPS) and to assess the need of using bolus during part or all the treatment fractions

Materials and methods. A MOSFET-based system was used. A complete characterization of the system performance was previously made. The skin dose was measured at two points tattooed on the skin, equally distanced from the breast/thoracic wall midline. Measurements were performed for 6MV 3DCRT and 6MV VMAT and compared with the dose values predicted by the TPS.

Results. The mean measured dose is higher for the 6MV 3DCRT technique than for VMAT (both without bolus). The surface dose difference between the two techniques is lower when bolus is used.