quantify the registration error based on the delimitation of the spheres on the CT and PET. Our study compared the results for two different types of software.

**Materials and Methods:** A Siemens Biograph64 mCT was used to acquire CT and PET images of the IEC Body Phantom. Following EANM guidelines for tumour PET imaging, we filled 6 spheres (of diameters from 1.0 to 3.7 cm) with $^{18}$F concentration of approximately 20 kBq/ml and the body compartment with a concentration ten times lower. A whole concentration of approximately 20 kBq/ml and the body protocol was applied with matrix size of 512x512 (CT) and 200x200 (PET), leading to a pixel size of 1.52 mm (CT) and 4.07 mm (PET). Plane spacing was set to 1 mm.

After the acquisition, PET/CT images were exported to the software MultiModality WorkStation (MMWS, Siemens) and, independently, to the treatment planning system Eclipse v11 (Varian).

The spheres in the CT image were manually contoured in Eclipse. For PET images, the delimitation of the spheres was performed - in both MMWS and Eclipse - with an automatic tool, creating a volume containing pixels with standardized uptake value (SUV) higher than a threshold of 20% SUVmax.

The centre of the spheres was determined by creating a tool, creating a volume containing pixels with SUV higher than a threshold of 20% SUVmax. The centre of the spheres was determined by creating a treatment plan in Eclipse for each sphere. The isocentre is automatically placed in the centre of mass of the sphere. To calculate the registration error, the differences of Cartesian coordinates between the centre of mass of the CT-spheres and the corresponding PET-spheres were measured for both PET images contouring systems.

**Results:** Mean (range) registration errors for all the spheres are summarized in the following table:

<table>
<thead>
<tr>
<th></th>
<th>LEFT(+)&amp;RIGHT</th>
<th>ANTERIOR(+)&amp;POSTERIOR(-)</th>
<th>CRANIAL(+)&amp;CAUDAL(-)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CT-Eclipse (mm)</strong></td>
<td>0.55 (0.20–0.90)</td>
<td>0.47 (0.30–0.90)</td>
<td>0.72 (0.30–1.20)</td>
</tr>
<tr>
<td><strong>CT-MMWS (mm)</strong></td>
<td>-0.08 (-0.50–0.20)</td>
<td>-0.03 (-0.40–0.30)</td>
<td>0.85 (0.40–1.20)</td>
</tr>
</tbody>
</table>

**Conclusions:** As it is shown in the previous table, results were below 1 mm in all directions. The main difference was obtained in crania-caudal direction for both PET images contouring systems.

MMWS showed a better agreement between CT and PET images than Eclipse, for left-right and antero-posterior direction. Although both kind of software are suitable for contouring, results suggest that MMWS could be a better tool for contouring in PET.

**EP-1535**

**Planning quality Variations : for IMRT lung cancer based on treatment plan database**

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**Purpose/Objective:** There have been consistent studies on QA with development of RT technique, but there is a weakness of current QA that there are always some possibilities of accident if human-induced factors were not controlled. And among human factors, planning error is critical to patients. So we focused on plan quality as a main treatment quality determination factor and analyzed 45 lung cancer IMRT plans to verify fluctuation of plan quality as a preliminary study of developing planning QA algorithm.

**Materials and Methods:** In purpose of verifying plan quality deviations, we collected 45 solitary lung cancer IMRT plans. Volume, length and width were considered to compare cancer sizes of solitary cancers. Cancer position determining factors were vertical distance from lung apex and median line. Organs in or near thoracic cavity, lung, heart, liver, esophagus, cord, and bronchus, were selected as OARs. PTV-OAR surface to surface vertical distance was measured to analyze correlation of distance and irradiation. CVI, HI, EUD, V10, V20, Dmax, Dmean were used to compare and RT plans. Average normalization point was 94.5%.

**Results:** Among total 45 cases, esophagus, cord, heart, bronchus, and liver were separated from PTV in 24, 43, 21, 13, 40 plans and respectively. EUD showed a slightly downward tendency as CI decrease and distance increase in most OARs. But heart had a singular value and liver showed a lightly growing tendency when distance from PTV was above 15cm. In PTV-OAR overlapped cases, Bronchus and heart EUD had a growing tendency as an increase in overlapped volume. But it was hard to find a general tendency in PTV-overlapped cord and liver cases because overlapped cases were not enough. Esophagus also barely showed tendency. HI value was 0.19±0.12 and CVI ranged from 0.8 to 1, mostly between 0.9 and 1(0.92±0.04).

**Conclusions:** In absence of standard quality assurance system for planning, substantial discrepancy of plan quality for similar cases is inevitable. By establishing quantitative references for treatment planning, such as algorithms, deviations of treatment quality from planner to planner could be reduced considerably. Considering that specimens of this study were from one department, which means not many people were involved in making decision, imbalance of treatment result for same patient would be much more severe if many departments were involved. For these reasons, research on planning QA is needed and planning QA may result in upward leveling of radiation treatment.

**EP-1536 X-ray pulse time matters in CBCT imaging**

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**Purpose/Objective:** The Elekta XVI CBCT system provides a range of different combinations of x-ray pulse current (mA) and time (ms) when acquiring a CBCT scan. For a range of nominal scan doses (mAs), there is more than one combination of x-ray pulse current and time which provides...