uncertainty. Our data recommend daily kV CBCT imaging and setup corrections for this group of patients.

**PO-0895**

Intraprostatic calcifications as IGRT fiducial markers: analysis of 646 CBCT images in 35 patients

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**Purpose or Objective:** To review CBCT images of 35 pts receiving radical irradiation for localized prostate cancer, according to an IGRT protocol based on the use of intraprostatic calcifications as natural fiducial markers for the evaluation of inter-fraction organ motion.

**Material and Methods:** Between 2013 and 2014, 646 KVCBCT images of 35 pts radically irradiated with moderately hypofractionated VMAT (2.5 Gy/fraction - 70 Gy in 28 fraction) for localized prostate cancer were acquired according to an IGRT protocol aimed at evaluating the role of intraprostatic calcifications as natural fiducial markers. All the evaluated pts presented at least 3 calcifications of >2 mm located inside or at the borders of the CTV and contoured on high resolution CT-simulation scans and on each CBCT (mean: 18 CBCT/patient). In order to assess the internal stability of the calcifications the distances between them were measured for each patient on both CT-simulation scans and each CBCT, then mean ± SD of differences between distances was calculated. Distances between calcifications and the center of mass of CTV were also calculated in 21 patients by drawing CTV on 360 CBCT images, contoured by a same physician. The center of CTV mass spatial coordinates (X, Y, Z) was determined for each CTV and finally the distances between the center of the CTV and the center of each calcification were measured. Stability of calcifications in respect of CTV was assessed by calculating mean values ± SD of measured distances.

**Results:** The mean value of differences in distances between calcifications was -0.04 mm ± 1.54 SD, with 95% of values contained inside 3 mm (μ ± 2SD). The mean value of differences in distances between calcifications and center of mass of CTV (Fig. 1) was -0.03 mm ± 1.55 SD, with 95% of values contained inside 3 mm (μ ± 2SD).

**Conclusion:** Our results derived from the analysis of a large data set of CBCT images confirm that intraprostatic calcifications, when >2 mm and present at least Nc=3, properly selected and contoured, can be used as very reliable natural fiducials, with potential reduction of iatrogenic risks and costs associated with the implantation of fiducial markers for prostate cancer IGRT.

**PO-0896**

The effect of bladder volume on bowel dose in the treatment of anal cancer using VMAT

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**Purpose or Objective:** Bony anatomy is used to match anal cancer patients treated using volumetric modulated arc therapy (VMAT). Only extreme volume changes due to bladder, rectum or bowel filling are currently highlighted to the responsible clinician. This study aims to determine the impact that changes in bladder volume has on the dose to the small bowel over the course of the treatment by comparing the dose to volumes outlined on cone-beam CT (CBCT) to the initial planned dose statistics. A more representative value of accrued dose to the small bowel over the course of treatment can also be gained.

**Material and Methods:** Ten patients who were treated with VMAT for anal cancer were selected for this study. Weekly cone beam CT images were acquired to monitor extreme changes in bladder and rectum filling. Patients were asked at both planning CT and treatment to have a comfortably full bladder. The bladder and small bowel (contained within the scan) were outlined on three CBCTs by one clinician; week one, mid treatment and final week. The bladder volumes were compared over the course of the treatment and the maximum small bowel dose, amount of small bowel receiving 30Gy (V30Gy) and 40Gy (V40Gy) were recorded.

**Results:** The results in Table 1 show the variation in bladder volume. The V40Gy bowel volume was plotted against the difference between the bladder volume at CBCT and the initial planning scan with the intercept for the linear trends set to the planning CT volume for each patient (see Fig. 1). A similar trend was found for the V30Gy measurement. There was less impact on maximum dose to small bowel with changing bladder size.

**Table 1 - Bladder Volumes**

<table>
<thead>
<tr>
<th>Patient</th>
<th>Bladder Volumes</th>
<th>Planning CT bladder volumes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>579</td>
</tr>
<tr>
<td></td>
<td></td>
<td>426</td>
</tr>
<tr>
<td></td>
<td></td>
<td>618</td>
</tr>
</tbody>
</table>

**Conclusion:** In eight cases a smaller bladder at CBCT resulted in a greater volume of small bowel receiving clinically relevant doses compared to the initial planning CT. There were two patients where the trend indicated that a larger bladder increased small bowel dose. Limitations of this study