Conclusions: Our results indicate that both techniques are able to produce plans with a good coverage of PTVs and an acceptable sparing of the contralateral parotid gland for OPE, despite a slight advantage of RA for dosimetric analysis of PTV. In addition, the NTID was significantly lower with RA. However, the clinical benefit of these techniques for dosimetric analysis of PTVs was not fully confirmed. In conclusion, the NTID was significantly lower with RA. However, the clinical benefit of these techniques for dosimetric analysis of PTVs was not fully confirmed.

Conclusions: RapidArc® plans are superior compared to 3D-CRT for dose homogeneity to the PTV, heart dose and V20 and mean dose of the lung. This goes at the expense of a slightly increased dose to the contralateral breast. We confirm a decrease in heart dose using combined with conformal or RapidArc® plans is 17.3% for 3D-CRT. The average doses to the total lung, heart and contralateral breast are displayed in the table for the first 3 patients.

Conclusions: The significance of breath hold for reducing heart and lung dose for RT of left sided breast cancer, especially when internal mammary (IM) nodes are included, has been established by many investigators. In contrary, the role of volumetric modulated arc therapy (VMAT) is still debated; although the dose to the ipsilateral lung and heart may be decreased compared to conformal RT, the dose delivered to the contralateral breast and lung may be increased. In our study, we investigate the dose distribution of VMAT (RapidArc®) in combination with voluntary moderately deep inspiration breath hold (vmDIBH) for left-sided breast cancer patients treated to breast/chest wall and IM and pericardiac nodes.

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Materials and Methods: A planning study of free breathing (FB) and vmDIBH in combination with conformal or RapidArc® plans is conducted on 10 patients, giving 4 possible combinations per patient. The following dosimetric parameters were compared: homogeneity index (HI) for PTV, dose to heart, lung, and contralateral breast. Results: RapidArc® plans had a better HI: 0.82 for FB and 0.81 for vmDIBH vs. 0.73 for 3D-CRT. The average doses to the total lung, heart and contralateral breast are displayed in the table for the first 3 patients.

Conclusions: RapidArc® plans are superior compared to 3D-CRT for dose homogeneity to the PTV, heart dose and V20 and mean dose of the lung. This goes at the expense of a slightly increased dose to the contralateral breast. We confirm a decrease in heart dose using vmDIBH combined with 3D-CRT. Since the addition of vmDIBH to RapidArc® leads to a slight further improvement in heart dose, as well as a reduction of the dose to the contralateral breast, we conclude that the combination of RapidArc® and vmDIBH is a promising technique for locoregional RT for left sided breast cancer patients.

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Conclusions: This study indicates that it is possible to construct pseudo-CT images by converting the MRI intensity values into electron density values in pelvis, and to use these images for accurate MRI-based prostate RTP. The examinations illustrated that by including the heterogeneous soft tissues into the pseudo-CT images the dose calculation accuracy can be improved especially with obese patients.

Figure 1: A constructed MRI-based pseudo-CT image of a prostate cancer patient.
and NTD90, rep.). NTD parameter was evaluated in a virtual structure consisting of an adjacent tissue shell surrounding the target volume by adding a 1 cm margin. A two tailed Student t-test (α = 0.05) was performed for comparison of each parameter.

**Results:** Small differences were found between the two MLCs for the average values of the dosimetric parameters analysed: C12= 1.45 vs C16= 1.41 (p = 0.119); G12=5.8 vs G16= 5.6 mm (p = 0.0002) ; V12=5.77 cc vs V16= 5.49 cc (p = 0.02); NTD50= 43.41 cc vs NTD50= 41.16 cc (p = 0.01); NTD70= 22.62 cc vs NTD70= 21.19 cc (p = 0.002); and NTD90= 9.52 cc vs NTD90= 8.84 cc (p = 0.02).

**Conclusions:** While the 2.5 mm HD MLC gives slightly better values than the 5 mm MLC for all parameters analysed, the differences seem clinically not relevant.

**PO-0808**

Dosimetric impact of extended 16-bit depth CT images for helical irradiation with metallic implants

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**Purpose/Objective:** The use of 16-bit depth scanner images (CT) for dose calculation in radiotherapy allows considering the density of high-Z material, while12-bit depth CT images saturates. However, for helical treatment, due to the large variety of indexes used (conformity, gradient, ...). Furthermore in clinical studies, only one dose is reported most of the times which do not permit to precisely describe the dose distribution. In 2010 the report of AAPM TG 101 suggests to report SBRT with 'prescription ICRU reference point or dose/volume e.g., isodose covering PTV to a particular percentage,(…), plan conformity (…), heterogeneity index (…)' is the unavailability of data that allow unambiguous determination of the parameters for fractionation schemes and dose prescriptions. A plea for the GTV D50% appears to be a convenient way to describe the dose distributions, whatever the % of maximum dose used for prescription, and may help for treatment comparison in SBRT. For a better understanding of the dose distributions, every team should report PTV D98%, PTV D95%, PTV D2% and GTV median dose like ICRU report 83 recommends for IMRT, in order to compare clinical studies.

**Materials and Methods:** Theoretical plans with Cyberknife, in anthropomorphic phantom, for spherical GTV of 2, 3, 4 and 5 mm with a PTV margin of 1 mm were created with prescription of 10 Gy on 74%, 65%, 54% and 47% of maximum dose respectively, perfectly adjusted to cover 95% of PTV. GTV median doses were collected. Plans with a shift equal to the PTV margin, in the direction of the minimum observed in the dose distribution, were created and the GTV median doses were again collected. The same exercise was made with GTV of 21, 23, 25, 27 mm and a PTV margin of 2 mm. And again with GTV of 57, 59, 61, 63 mm and a PTV margin of 3 mm. 3 different clinical situations: brain metastases, prostate and lung lesion were assessed with different percentage of maximum dose used for prescription and again applying a shift.

**Results:** The GTV median dose is little sensitive to the minimum in the PTV, and thus remains almost constant with the shift of the isocenter in all cases i.e. when we imagine a systematic error equal to the PTV margin. With the 6 mm PTV and a prescription isodose of 54%, i.e. with a fall-off of 20%/mm at the edge of the PTV, the GTV median dose is 14.77 Gy and 14.75 Gy with the shift. For the particular case of lung where the PTV includes a low density region, using Monte-Carlo calculation, the GTV median dose is also stable with the shift. In case of a steep dose gradient, even with heterogeneity, the GTV median dose is stable when the GTV moves within the PTV. Using the GTV median dose we have a good description of the actually dose delivered.

Theoretical plans with a PTV margin of 2 mm

<table>
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<tr>
<th>PTV diameter (mm)</th>
<th>31</th>
<th>29</th>
<th>27</th>
<th>25</th>
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<tr>
<td>GTV diameter (mm)</td>
<td>27</td>
<td>25</td>
<td>23</td>
<td>21</td>
</tr>
<tr>
<td>prescription isodose in % of max</td>
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<td>71%</td>
<td>81%</td>
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<tr>
<td>PTV D95% = 10 Gy</td>
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<tr>
<td>GTV median dose (Gy)</td>
<td>17.9</td>
<td>15.4</td>
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</tr>
</tbody>
</table>

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**PO-0810**

A plea for the GTV median dose reporting in SBRTCan the ICRU 83 reporting way be applied to SBRT plans?

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**Purpose/Objective:** In 2008 Papiez and Timmerman have written: The main obstacle for safe application of the SBRT (...), is the unavailability of data that allow unambiguous determination of the parameters for fractionation schemes and dose prescriptions.’ Plan comparison is difficult with various prescriptions (80% of maximum dose, on the 70% or 50%), a large variety of indexes are used (conformity, gradient, ...). Furthermore in clinical studies, only one dose is reported most of the times which do not permit to precisely describe the dose distribution. In 2010 the report of AAPM TG 101 suggests to report SBRT with ‘prescription ICRU reference point or dose/volume e.g., isodose covering PTV to a particular percentage,(…), plan conformity (…), heterogeneity index (…). At the same time ICRU report 83 for IMRT was published, because of inherent heterogeneities of IMRT plans the ICRU point is abandoned and prescription is based on median target dose. Can we concatenate these 2 reports?

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