registration was performed. The VMAT plan was transferred to the pseudo-CT and dose calculation was performed using Pinnacle (V9.10). Pass rate of the Gamma index was used to evaluate the similarity of the dose distributions. The dose acceptance criterion was evaluated as a percentage of the prescribed dose applying 2%/2 mm and 1%/1mm criteria.

Results: MRCAT was generated for six of the seven patients. One patients’ pelvic anatomy was not correctly recognized by the software model, which prohibited MRCAT reconstruction. Pass rates for both acceptance criteria are summarized in table 1. For 2%/2 mm, pass rates are high, above 97.6% for all analyzed structures. Even for the 1%/1 mm criterion, pass rates are generally above 97%. In patient 3, lower pass rates in PTV78, seminal vesicles and rectum are observed. For this patient the gamma values above one are located mainly in and around an air cavity in the rectum (see figure 1). MRCAT does not assign air density to air cavities inside the patient, leading to the observed dose differences. However, in the pelvic region it might be at least as good an approximation to treat air cavities as water due to the mobility of the rectal air during the treatment course. As seen in figure 1, gamma values above one are also present close to the surface of the patient, which is caused by differences in definition of the outer contour of the patient.

Conclusion: Overall the pseudo-CT based dose calculations are very similar to the CT based calculation for prostate cancer patients. The MRCAT software classifies internal air cavities as water density leading to dose differences compared directly to CT. In terms of the dose precision observed in this study the MRCAT is able to substitute the standard CT simulation, but a larger cohort of patients is needed to validate this finding. This will also reveal whether bone recognition capability is sufficiently versatile for standard clinical use.

OC-0083
When using gating in left tangential breast irradiation? A planning decision tool
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Purpose or Objective: The use of gating in tangential breast irradiation has shown to reduce the dose delivered to the heart, resulting in the possibility of decreasing heart toxicity in long time surviving patients. The use of gating allows to identify which patients could be addressed to this methodic by comparing planning results of gated and not-gated simulation CT based plans. However, the required double CT scan (with and without gating technology), for patients undergoing to left-breast tangential radiation treatment, can result in working overhead for RTTs executing CTs and for planners that have to produce two opponent plans for allowing final gated, or not-gated treatment decision. In this work a tool for deciding which patients could be selected for gating procedures by using only not gated CT scan is presented.

Material and Methods: Patients addressed to left-breast tangential irradiation without need to irradiate supra-clavicular nodes have been retrospectively recruited in this study. Both gated and not-gated simulation CT were available for all of them. Two series of opponent, gated and not-gated, treatment plans have been produced and analyzed using Varian™ Eclipse workstation. DVHs have been extracted from plans and have been analyzed in order to detect which dosimetrical parameters are able to predict the final outcome: mean heart dose in gated treatment plan. Maximum heart distance (MHD) has been also recorded. A multiple linear regression model has been used to predict the final outcome.

Results: 100 patients have been enrolled in this study and 200 plans on 100 gated-CT and 100 not-gated CT have been produced. 10 patients showed mean not-gated CT heart dose (MNGHD) > 5 Gy (institutional threshold for addressing the patient to gating), resulting in a 90% overhead in terms of performed gated-CTs and plans. The final model shows the possibility to predict mean heart dose in gated treatment plan with a p-value < 2.2e-16, adjusted R-squared = 0.5486, using not gated CT based planning and geometrical parameters summarized as follows:

Coefficients name: $B$ value $P$-val - Pr(>|t|)
Intercept 0.92151 2.27e-11
V31.5 Gy Lung Basal -4.20188 0.000299
Mean Basal CT Heart Dose 0.54065 1.29e-13
Basal MHD -0.44137 0.000748

In order to easily predict which gated-CT mean heart dose would result if patients underwent to this scanning procedure a nomogram has been produced allowing the users to manually calculate this value without scanning the patients with gated CT (figure 1).
Conclusion: The use of gated treatment in left breast tangential radiotherapy can result in high quantity of unrequested CT scans and plans for patients not needing to be addressed to this kind of delivery method. Our decision tool is able to evaluate patients that will benefit from using gating technology without the need to acquire a double CT scan and producing a double treatment plan, so making the whole workflow easier and faster.

OC-0084
Hybrid RapidArc for breast with locoregional lymph node irradiation spares more normal tissue
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Purpose or Objective: The conventional radiotherapy technique for breast cancer with locoregional lymph nodes consists of half beam tangential fields for the breast, junctioning a 3-field AP-PA half beam block for the supraclavicular nodes. The AP-PA fields treat a considerable volume of healthy tissue to high doses, and the lack of slip zone makes it unsuitable for deep inspiration breathhold where some variation of breathhold is expected. Full volumetric modulated arc would lead to an unwanted low-dose spread. We therefore investigated the improvements of a novel hybrid RapidArc (hRA) technique which is now standard in our hospital.

Material and Methods: Previously contoured CT scans from 10 patients with breast tumors including locoregional lymph nodes were used for planning (Eclipse, Varian Medical Systems). Prescription was 16 fractions of 2.67 Gy. Clinically treated hRA plans consisted of 2 tangential open fields with a 2 cm cranial slip zone delivering 85% of breast dose and 3 partial RapidArc arcs of each 80°, delivering the remaining dose to the breast and slipzone and full dose to the cranial lymph nodes. A range of organs at risk (OAR) constraints volume of healthy tissue to high doses, and the lack of slip zone makes it unsuitable for deep inspiration breathhold where some variation of breathhold is expected. Full volumetric modulated arc would lead to an unwanted low-dose spread. We therefore investigated the improvements of a novel hybrid RapidArc (hRA) technique which is now standard in our hospital.

Results: Compared to hIMRT, hRA provided better PTV coverage and OAR sparing (see Table). V107% of PTV reduced from 5% to 2%. V5Gy to the IL lung.

Table. dosimetric data averaged over 10 patients

<table>
<thead>
<tr>
<th>Metric</th>
<th>hRA</th>
<th>hIMRT</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTV volume=1222 cm³</td>
<td>90.0</td>
<td>96.0</td>
<td>0.05</td>
</tr>
<tr>
<td>PTV V5Gy (%)</td>
<td>3.2</td>
<td>4.9</td>
<td>0.001</td>
</tr>
<tr>
<td>PTV Dmean (%)</td>
<td>101.3</td>
<td>101.3</td>
<td>0.36</td>
</tr>
<tr>
<td>PTV Dmax (%)</td>
<td>111.9</td>
<td>114.9</td>
<td>0.011</td>
</tr>
<tr>
<td>PTV D2% (%)</td>
<td>96.2</td>
<td>95.1</td>
<td>0.013</td>
</tr>
<tr>
<td>PTV D2% (%)</td>
<td>106.3</td>
<td>108.5</td>
<td>2e-4</td>
</tr>
<tr>
<td>IL-Lung Dmean (Gy)</td>
<td>12.3</td>
<td>14.3</td>
<td>0.004</td>
</tr>
<tr>
<td>IL-Lung V20Gy (%)</td>
<td>26.4</td>
<td>32.2</td>
<td>2e-4</td>
</tr>
<tr>
<td>IL-Lung V15Gy (%)</td>
<td>33.1</td>
<td>39.1</td>
<td>0.13</td>
</tr>
<tr>
<td>CL-Breast V10Gy (%)</td>
<td>6.2</td>
<td>2.4</td>
<td>0.002</td>
</tr>
<tr>
<td>Esophagus V10Gy (%)</td>
<td>2.0</td>
<td>9.0</td>
<td>0.005</td>
</tr>
<tr>
<td>Esophagus V15Gy (%)</td>
<td>0.2</td>
<td>3.2</td>
<td>0.12</td>
</tr>
<tr>
<td>Throat Dmean (Gy)</td>
<td>11.7</td>
<td>12.3</td>
<td>0.29</td>
</tr>
<tr>
<td>Throat V20Gy (%)</td>
<td>14.1</td>
<td>21.8</td>
<td>0.05</td>
</tr>
<tr>
<td>Body minus PTV V10Gy</td>
<td>1440</td>
<td>2014</td>
<td>8e-8</td>
</tr>
<tr>
<td>(cm³)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Body minus PTV V15Gy</td>
<td>312</td>
<td>789</td>
<td>40-7</td>
</tr>
</tbody>
</table>

Conclusion: The novel hRA technique had dosimetric advantages for almost all investigated OAR. hRA spared significantly the healthy tissue around the supraclavicular lymph nodes. The 2cm slip zone in the hRA plan, which is not possible to create when using junctioning half beams, makes this technique also suitable for breathhold treatment.

Poster Viewing: 2: Clinical: Health economics, urology and brain

PV-0085
The level of innovations routinely implemented in Dutch radiotherapy centers: a cross-sectional study
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Purpose or Objective: Radiotherapy centres have the complex task to simultaneously improve patient outcomes (survival and toxicity), safety, service (such as shared decision making) and efficiency. To address this multi headed challenge, centres are forced to innovate. The objective of our study is to investigate how well Dutch Radiotherapy centres have implemented innovation within the care environment. Our two research questions are: 1. What is the annual number of treatment -, technological - and organisational innovations? And 2. Are there differences between the centres?

Material and Methods: A descriptive cross-sectional study was conducted. Two investigators started with semi structured interviews in participating centres, generally with the head of physics and the head of the department.

Innovations in the annual policy plans from 2011 - 2013 (3 years) were classified into 3 distinct categories based on literature: new or significantly improved 1) treatment, 2) technology, or 3) organisational processes, implemented in clinical routine. Incremental improvements to existing treatments, technologies, or organisational processes were not included in the results below. Centres without annual policy plans were asked to create their own inventory, or to tick listed innovations from other centres. Finally, all participating centres received the listed innovations from