Results: Our results indicate that HT provides better sparing of spinal cord in treating thyroid cancers. No significant advantage of sparing larynx, oesophagus or oral cavity could be found in any of the treatment techniques. All treatment techniques have similar target homogeneity and conformity. Limiting the arc span from posterior neck in VMAT planning does not help in spinal cord sparing but scarifying target homogeneity slightly.

OC-0090
Clinical introduction of an all-in class solution for prone breast hypofractionated SIB with multibeam IMRT
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Purpose/Objective: To develop a robust treatment planning approach for hypofractionated simultaneously integrated boost (SIB) using multibeam IMRT for breast cancer patients in proneposition.

Materials and Methods: Eighteen patients were included in this study (15 were planned and 3 treated with SIB) positioned on the Sagittilt© (Orfit, Wijnegem, BE) system for treatment. Classical (CLA) and SIB techniques were used for the treatment planning using Pinnacle 9.0 (Philips, Best, NL). Both approaches consisted of two tangential field-in-field beams for the treated breast (PTV1). For the boost (PTV2) two mimo-tangent beams were used in CLA while for SIB two additional beams (35-40° and 70-90°) from the internal and external tangents towards posterior direction were planned. SIB was optimized using inverse planning taking into account the dose contribution of the initial breast tangents and limiting the total number of segments to 10. For adequate comparison both plans were normalized for 45.77 Gy and 55.86 Gy mean dose for PTV1 and PTV2 in 21 fractions (2.17 and 2.66 Gy/fraction). Ipsilateral lung, heart, contralateral breast were contoured as OARs. The following DVH parameters were used for comparison: V6-V95, V95% of breast prescription dose) for PTV1 and PTV2, and V5, V6-Gy treated volume for PTV1 excluding the PTV2 volume), V53.06-Gy (95% of boost prescription) for PTV1-2 and PTV2, and V5, V6-Gy for PTV2 (100% of the boost prescription). For the ipsilateral lung V20, V30, for the heart Dmean and D2 were compared using two tailed t-test with the significance level p<0.05.

Results: Our finding are summarized in Figure 1. The SIB technique showed statistically significantly improvement for PTV1-2:48.76 (29.7 vs. 37.7%), PTV1-2:53.06 (71 vs. 62.5%) and PTV1-2:53.06 (39.1 vs.23.5%) with p<0.05. The GI (Paddick) was smallest for DCA delivery (p<0.01). The GD was only slightly lower for DCA compared to VMAT plans (p>0.01). Of potential clinical importance, both VMAT techniques decreased the V20 (3.1 vs. 2.9%, p>0.03), heart Dmean (2.1 vs. 1.2 Gy) and heart D2 (7.3 vs. 5.5 Gy, both P>0.05) in comparison to DCA.

Figure 1. Comparison of classical (CLA) and SIB treatment planning for breast cancer patients with hypofractionated, multibeam IMRT in prone position.

Conclusions: Both CLA-VMAT and NC-VMAT resulted in improved target conformity and a decrease in the normal brain dose compared to DCA plans, at the cost of a higher number of MU and more shallow dose gradients. At the time of the meeting, proton treatment plans will be included and compared with the above rotational techniques.

PD-0092
Comparison of dose delivery accuracy in two Leaf Motion control algorithms in DMLC IMRT
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Purpose/Objective: Dosimetric comparison of two leaf motion control algorithms (Shapecore and RapidArc) in DMLC IMRT. The dose optimization of the 2 algorithms were performed using the Eclipse™ 9.8 TPS and the delivery of the plans were performed with a Varian 2100C linac. The clinical target volume (CTV) and the planning target volume (PTV) were prescribed with 54 Gy in 30 fractions.

Materials and Methods: 20 IMRT plans were delivered including 10 plans for prostate (6-10 fractions) and 10 plans for head and neck (15-20 fractions). The delivered dose was prescribed for CTV and PTV respectively. All plans were designed using RapidArc (VMAT) and RapidArc (NC-VMAT). The VMAT plans were compared with the NC-VMAT plans. In both plans, the number of MU and the dose delivered for the IMRT fields were within 1% of the calculated dose. The dosimetric parameters were calculated using the ACUROS XB algorithm. The following parameters were calculated: CTV conformity index (CI), planning target volume (PTV) conformity index (Papick conformity index (CI), Papick conformity index (Papick conformity index (CI), Papick gradient index (PI), gradient index (GI), dose gradient index (GI), dose gradient index (GI). The conformity index (CI), PTV1-2 (PTV1 excluding the PTV2 volume) and Dmean (95% of boost prescription) for PTV1 and PTV2, and V5, V6-Gy for PTV2 (100% of the boost prescription). The GD was calculated as the dose difference between the 80% and 40% isodose. The V20 was calculated as the volume receiving 20 Gy.

Results: The planning results are shown in the table. The number of MU needed to deliver the dose was a factor 1.9 higher for both VMAT techniques compared to DCA. Of potential clinical importance, both VMAT techniques significantly improved the conformity of plans compared to DCA (p<0.01). In contrast, the GI (Papick) was smallest for DCA delivery (p<0.01). The GD was only slightly lower for DCA compared to VMAT plans (p>0.01). Of potential clinical importance, both VMAT techniques decreased the V20 (3.1 vs. 2.9%, p>0.03), heart Dmean (2.1 vs. 1.2 Gy) and heart D2 (7.3 vs. 5.5 Gy, both P>0.05) in comparison to DCA.

Conclusions: Both CLA-VMAT and NC-VMAT resulted in improved target conformity and a decrease in the normal brain dose compared to DCA plans, at the cost of a higher number of MU and more shallow dose gradients. At the time of the meeting, proton treatment plans will be included and compared with the above rotational techniques.