Conclusion: We registered an higher PTV dose coverage between MRIdian’s and the RapidArc and IMRT plans for cervical cancer, with a HI advantage for the PTVI. Differences were described for OARs, especially for low dose areas (V5 Body). The MRIdian’s planning platform showed to be user friendly and allowed to reach dosimetric goals comparable to RapidArc and IMRT gold standards. The evaluation of a possible reduction in PTV margins and a proper target coverage by MRI based gating will be analyzed when the system will become operative.

PO-1009 VMAT planning approach to avoid superficial underdosage for accelerated partial breast irradiation
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Purpose or Objective: Accelerated Partial Breast Irradiation (APBI) is a RT approach that treats only the lumpectomy bed plus a margin, rather than the whole breast. The dose fluence outside the breast contour to account for breathing and residual motions can be manually increased with RapidArc/VMAT. At this aim, a 10 mm virtual expansion of the breast with soft-tissue equivalent HU is usually applied to the CT series (CT_E) and the optimization is performed on the APBI target is required to account for involuntary motions. A simple procedure was showed to fully cover the APBI target.

Material and Methods: Ten patients treated by APBI were randomly selected from the internal database (41 patients since 06/14). PTV_O was defined on CT_O as the tumor bed + 1-2cm, cropping it of 5 mm to the body. Dose prescription was 30 Gy in 5 fractions. Plans were normalized to PTVO mean dose. PTVE was defined on CT_E, expanding PTVO of 10 mm in anterior/lateral directions. PTVE was subdivided in three parts: PTVEI (PTVE cropped of 7 mm from the CT_O body - internal), PTVEES (PTVE cropped 5-7 mm - superficial), PTVEE (PTVE minus PTVEI and PTVEE - external). Two plans were optimized on the CT_E: (i) prescribing the same dose to the three PTVs; (ii) PTVEI = 30 Gy, PTVEES = 32 Gy, PTVEE = 33 Gy. Final dose calculations for the two optimizations were performed on the CT_O. Plan objectives were: D98% (dose received by 98% of the target volume) > 95% and D2% < 10% for PTV, minimizing the homogeneity index (HI=D2%-D98%); V15Gy (volume of the organ receiving 15Gy) < 50% for breast minus PTV; V10Gy < 20% for ipsilateral lung; V5Gy < 10% for contralateral lung; V3-5Gy < 10% for heart, Dmax < 1.2 Gy for contralateral breast. Plans were compared in terms of dosimetric plan objectives findings.

Results: Figure 1 shows the different dose distribution for the two optimizations on the CT_O and CT_E. Opposite dose distributions outputs were obtained on the two CT series. On the CT_E, D98%, D2%, and HI were favorable to the (i) (respectively, 94.9% vs 94.5%, 103.7% vs 105.9%, 8.8% vs 11.5%). On the CT_O, D98%, D2%, and HI were favorable to the (ii) (respectively, 92.3% vs 94.2%, 104.3% vs 104.2%, 12.1% vs 10.1%). In particular, the superficial volume (i.e. PTV_ES) was the region of highest underdosage (D98%= 85.4 ± 3.3% for the first approach). Regarding the OAR, minimal changes were found between the two approaches.

Conclusion: A virtual overdosage on the superficial part of the APBI target is required to account for involuntary motions. A simple procedure was showed to fully cover the target.