which the outer pie-charts show the results with 3%/3mm and the inner pie-charts illustrate results with 2%/2mm.

Conclusion: The results showed that Octavius 4D phantom, with 2D-Array seven29, can be an adequate verification system both for simple and more complex cases. Additionally, the merge capability of the VeriSoft software, which can increase spatial resolution, is a useful tool for more complex VMAT plans.

EP-1563
Study of the characteristic of enhanced dynamic wedged depth dose profiles in non-homogenous media
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Purpose or Objective: The aim of this study is to utilize the EGSnrc based Monte Carlo code in order to assess the EclipseTM (AAA) calculated dose estimation at the Water-Lung (WL) interfaces when irradiated by 6 MV photon beams at 15°, 30°, 45° and 60° wedge angles and multiple field sizes of 5 x 5 cm², 10 x 10 cm² and 20 x 20 cm².

Material and Methods: EGSnrc sub codes are used for Monte Carlo dose simulation. BEAMnrc is used to simulate the linear accelerator head, whereas DOSXYZnrc is employed to perform phantom dose estimation. For simulating dynamic wedges the BEAMnrc component module DYNJAWS was employed. Phantom geometry includes a 10 cm layer of lung (r=0.250 g/cc) sandwiched between 5 cm and 10 cm water layers. Doses were calculated in exactly the same geometry and same density distribution by Monte Carlo and AAA algorithm. The overall dimension of the phantom was 30 cm x 30 cm x 25 cm. A 5 mm grid size (voxel width) along depth and field size was used for calculating PDDs. The nominal source to surface distance (SSD) of 100 cm was used in both setups.

Results: The dose perturbation effect was found to be field size dependent. It increases with decreasing field size. No clear dependence for the wedge angles was observed. No dose deviation between AAA and EGSnrc was observed at the water—tissue interface. However a lower dose in the lung was estimated by AAA. Whereas at the lung—tissue junction a highest dose discrepancy was observed by AAA, estimating higher dose towards the water layer.

Conclusion: We have demonstrated the limitation of AAA in dose calculation at the water-tissue-water interfaces for four wedge angles. There was no significant wedge angle dependence on the dose perturbation. However an increase in perturbation was observed with decreasing field sizes for all angles.

EP-1564
Impact of dose calculation algorithm on SBRT and normofractionated lung radiotherapy in breath hold
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Purpose or Objective: Modern dose calculation algorithms only model absence of lateral charged particle equilibrium to a limited extent. The resulting uncertainties are largest in strongly heterogeneous regions, such as the thorax, and will potentially increase in deep inspiration breath hold (DIBH) due to decreased lung tissue density.

Material and Methods: Ten patients with stage I and ten with stage III lung cancer were included. For all patients, a plan in free breathing (FB, based on midventilation) and in DIBH were made with the clinically used Anysotropical Analytical Algorithm (AAA). Stage I disease was treated stereotactically (SBRT) using 3D conformal technique (9-10 fields), 45 Gy in 3 fractions, prescribed to 95% isodose covering 95% of PTV and aiming for 140% dose in the isocenter. Stage III disease was treated with VMAT (2 arcs), 66 Gy in 33 fractions, prescribed to mean PTV dose. 6 MV energy was used for all plans. Calculation grid size was 1 mm for stage I and 2.5 mm for stage III. Plans were recalculated in more advanced Acurus with same MU as in AAA.

Plans were compared for target coverage (GTV, CTV, PTV), estimated from mean dose, near minimum (D98) and near maximum doses (D2), as defined in ICRU 83, and for SBRT also for the fraction of PTV covered by prescription dose (V45). Organs at risk parameter for stage I was fraction of lung receiving more than 13 Gy (V13), and for stage III, mean lung dose, lung V5, V20 and V40 and also mean heart dose and heart V50.

Results: In DIBH, lung density decreased by median 6% (47.6 HU) reduction for stage I and 12% (88.5 HU) for stage III. In stage III, AAA overestimated mean target doses for FB and DIBH GTV and DIBH CTV (by median <0.8 Gy; p<0.05 Wilcoxon signed-rank test) and had no impact on D2. AAA overestimated D98 by median ~1 Gy for GTV and CTV (p<0.05), and more for PTV (by 1.5 Gy and 2.1 Gy, in FB and DIBH respectively; p<0.01).

In stage I, AAA had similar effect on GTV as in stage III. However, differences between the two algorithms were substantial for PTV and more pronounced in DIBH: AAA overestimated all PTV parameters (p<0.01), with largest impact on V45 (up to 41.4% in FB and 66.3% in DIBH), while mean dose and D98 were overestimated by 2.0 Gy and 2.3 Gy in FB and 3.1 Gy and 4.0 Gy in DIBH. These clinically relevant differences may be a combination of small targets and large dose gradients in the SBRT treated volume.

Lung and heart dose parameters decreased in DIBH compared to FB, but were similar for both algorithms and both disease stages (median differences ±0.3% for volumetric parameters and ±0.2 Gy for mean doses). More details on actual dosimetric parameters are presented in the table.