(PTV) was created adding a margin of 5 mm to the ITV. The dose distribution was optimized on the average CT prescribing a dose of 20 Gy per fraction delivering a total dose of 60 Gy to the PTV. The plans were calculated in a Phillips Pinnacle 9.10 planning system using conformal 3DRT and heterogeneity correction. The parameters obtained in the average CT optimized plan, were copied to the different image sets with identical monitor units to analyze the differences.

Results: The average GTV volume was 1.6 ± 1.1 cc. The ITV size is twice the lesion size in most of the cases except in those with higher breathing amplitude. The ITVs outlined in the average CT were smaller than those outlined in the 4DCT ranging from 0.1 cc, where there hardly was lesion movement, to 0.6 cc. The differences between the volumes were usually found in the cranio-caudal direction due to the higher movement of the lesion in this direction. The ITVs outlined in the MIP CT were equivalent to the 4DCT except in the cases where there was a higher density organ in the vicinity of the tumor. Respect to dose distribution, the dose of the organs at risk shows no significant differences in the different image sets. The V100 of the ITV presents significant variations up to 15% due to the variation in electron densities depending on the CT mode chosen. The V100 of the GTV calculated in each phase is greater than 97%.

Conclusion: We recommend using the ten phases of the 4DCT study for proper delineation of ITV. If the institution does not have the technology the CT average (low pitch CT) could be used selecting the appropriate window level and increasing margins. There is no significant difference in dose to organs at risk between the images modalities studied. Optimized planning in the average CT provides adequate coverage of GTV at different breathing phases.

Material and Methods: Ten previously treated patients were selected representing a variable number of lesions (1-8), range of target sizes and shapes most frequently observed in the practice of SRS for brain metastases. The original multi-isocenter DCA (MIDCA) were replanned with both single-isocenter VMAT approach and the novel brain metastases tool (Elements, Brainlab AG, Germany). The treatment dose was 20 Gy at the 80% prescription isodose. For all the plans, the dose to the surrounding healthy brain tissue (brainstem, cochlea, optical nerve, eyes and lens) was optimized to minimize normal tissue complications. The plans were evaluated by calculation of Paddick conformity and gradient index, and the volume receiving 10 and 12 Gy indicating risk of radionecrosis.

Results: All plans were judged clinically acceptable, but differences were observed in the dosimetric parameters. The mean conformity of the automated single-isocenter planning tool (SIDCA) compared similarly to the established MIDCA and VMAT treatment techniques (CISIDCA = 0.65 ± 0.08, CIMIDCA = 0.66 ± 0.07 and CMVMAT = 0.67 ± 0.16). Comparable mean dose fall off was observed between MIDCA and SIDCA (GISIDCA = 3.9 ± 1.4 and GIMIDCA = 4.5 ± 1.6). On the other hand, the GI of the VMAT plans (GIVMAT = 7.1 ± 3.1) were significantly higher compared to the SIDCA. The V10 and V12 were significantly higher for VMAT plans (V10VMAT = 67.9 ± 55.9cc, V12VMAT = 46.3 ± 35.9cc) (p<0.05) compared to MIDCA (V10MIDCA = 49.0 ± 38.1cc, V12MIDCA = 35.6 ± 26.4cc) and SIDCA (V10 = 48.5 ± 35.9cc, V12 = 36.3 ± 27.1cc).

Conclusion: The automated brain metastases treatment planning optimization for radiosurgery, based on an inversely-optimized SIDCA approach, revealed comparable results to the established MIDCA technique. By reducing the time on planning, patient and treatment setup, this software tool improves the planning and delivery efficiency while preserving the plan quality of the MIDCA technique and lowering low dose spread of the VMAT approach, suggesting that this novel software offers the best of the both worlds (i.e. efficient single-isocenter DCA delivery).

PO-0855
Flattening Filter Free VMAT for extreme hypofractionation of prostate cancer
M. Ahlström1, H. Benedek2, P. Nilsson3, T. Knöös3, C. Ceberg1
1Lund University, Department of Medical Radiation Physics - Clinical Sciences, Lund, Sweden
2Skåne University Hospital and Lund University, Department of Oncology and Radiation Physics, Lund, Sweden

Purpose or Objective: To examine the feasibility of flattening filter free (FFF) volumetric modulated arc therapy (VMAT) for extreme hypofractionation of prostate cancer and investigate the potential decrease in treatment time per fraction while preserving or improving the treatment quality. To investigate the impact of intrafractional prostatic displacement.

Material and Methods: Single arc treatment plans with photon beam qualities 10 MV with flattening filter (FF), 6 MV FFF and 10 MV FFF were created for nine patients treated with conventional fractionation (78 Gy, 2 Gy/fraction) and hypofractionation (42.7 Gy, 6.1 Gy/fraction), respectively. Dose-volume histograms (DVH) for all beam qualities were statistically evaluated using paired sample Student’s t-test. Treatment delivery was evaluated through measurements on a Varian TrueBeam™ using a Delta4 PT system (ScandiDos AB). The beam-on time for each plan was recorded. A motion study, including one FF and one FFF hypofractionated treatment plan, was also performed using the HexaMotion (ScandiDos AB) and with trajectory data from six authentic prostate movement patterns.

Results: All treatment plans were approved by a senior radiation oncologist. Evaluating the DVHs, no significant differences between beam qualities or between fractionation schedules were observed. All objectives were met for all plans. At the treatment delivery all plans passed the gamma criterion 3%, 2 mm with a pass rate of 98.8% or higher. The beam-on time for all conventional treatment plans was 1.0 minute. The mean beam-on time was 2.3 minutes for the hypofractionated 10 MV FF plan, 1.3 minutes for the 6 MV FFF and 1.0 minute for the 10 MV FFF. In the motion study, no or little effect was observed on the pass rate for displacements.