plans were automatically generated for each patient, one for CK with 3 mm PTV margin, and two for VMAT with 3 and 5 mm PTV margin, respectively.

Results: With automated planning, high quality CK and VMAT plans could be generated without user dependency and trial-and-error approach. PTV coverage was similar for the 3 approaches, with on average a V100% of 95.2, 95.4%, and 94.1% for CK, VMAT-3mm and VMAT-5mm. However, for some VMAT plans with 5mm margin, coverage > 95% was not feasible. Mean values for rectum D1cc were 26.1, 28.5, and 34.3 Gy, for rectum Dmean 6.3, 7.1, and 10.8 Gy, for bladder D1cc 37.7, 37.3, and 39.4 Gy, and for bladder Dmean 8.7, 7.5, and 9.2 Gy, for CK, VMAT-3mm and VMAT-5mm, respectively. Rectum doses were lower with CK compared to VMAT-3mm ($p = 0.015$ and $p = 0.08$ for rectum D1cc and Dmean) and highly decreased compared to VMAT-5mm ($p = 0.007$ and 0.008). Bladder sparing worsened slightly with CK compared to VMAT-3mm, but this was not statistically significant. No relevant differences were found for other OARs. With CK, the low-medium dose bath was reduced compared to VMAT: V10Gy = 1157.5, 1525.6, 1741.8 cc, V20Gy = 286.3, 325.5, 382.0 cc, for CK, VMAT-3mm and VMAT-5mm, respectively, with $p = 0.007$ and $p=0.008$ for CK comparing to VMAT 3 and 5 mm.

Conclusion: The first system for automated generation of clinically deliverable Cyberknife plans was built and used for unbiased plan comparison with VMAT at a linac. Optimized non-coplanar setups showed better rectum sparing compared to VMAT plans. This difference was especially large with the smaller CK CTV-PTV margin, possible with CyberKnife tumor tracking feature.

OC-0268

Fully automated VMAT plan generation – an international multi-institutional validation study

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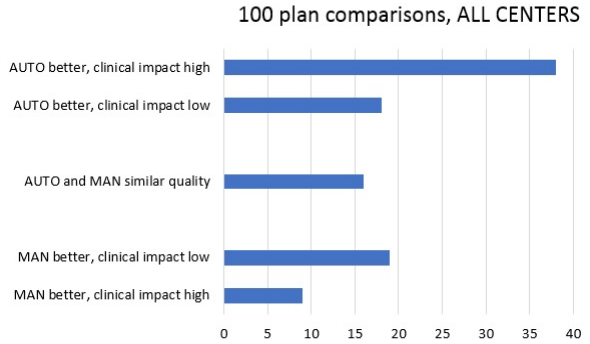
Purpose or Objective: Recently, iCycle/Monaco, a system for fully automated, multi-criterial plan generation, consisting of the in-house iCycle optimizer and Monaco (Elekta AB, Stockholm, Sweden) has been developed. Sofar, the system was only validated in a single institution. In this study, iCycle/Monaco was validated in 4 independent centers for prostate cancer VMAT. Hypothesis of the study was that automatically generated plans had similar or superior quality compared to plans generated by manual planning in clinical routine, using the Monaco TPS only.

Material and Methods: For each of the 4 centers, plans of 10 recently treated patients were used to configure iCycle/Monaco. For 20 independent patients, manually generated VMAT plans (MANplan) were then compared with automatically generated VMAT plans (AUTOplan). Plans were compared using dose-volume parameters and by 'blind' scoring by treating physicians. The scoring of the plans by physicians was performed in 2 sessions: A) the in total 40 anonymized plans (20 AUTO, 20 MAN) were evaluated in random order to assess clinical acceptability, B) for each of the 20 patients, the AUTOplan and MANplan were compared to select the most favorable plan. In these comparisons, plans could be scored as i) of higher quality with a clinically relevant difference, ii) of higher quality but with a low clinical impact, or iii) of similar quality. In one participating center, plan scoring was performed independently by 2 physicians.

Results: A total of 200 separate plan evaluations and 100 plan comparisons were made in this study. In the separate plan evaluations, 100% of MANplans and 98% of AUTOplans were clinically acceptable. The 2 AUTOplans that were not clinically acceptable had too high bowel dose, which was due to the absence of patients with small bowel delineation among the patients used for configuration of iCycle/Monaco in 2 centers. For 38/100 plan comparisons, the AUTOplan was considered superior to the MANplan, with high clinical relevance. Only in 9 comparisons, the MANplan was superior with high relevance for the patient. In all other comparisons, differences were absent or of minor clinical relevance (Figure). With similar PTV coverage, dose delivery to OARs was on average lower for the AUTOplans: -14.8%, -24.6%, and -14.6% for rectum V75, V60, and Dmean ($p=0.001$, $p<0.001$, $p<0.001$), and -5.1% for bladder Dmean ($p=0.009$).



Frequency histogram showing the scores for 100 comparisons of an automatically (AUTO) and a manually (MAN) generated plan.

Conclusion: In an international, multi-institutional setting, automatic planning for prostate cancer has proven to be overall superior to manual planning. Automated planning avoids planning workload and contributes to standardized radiotherapy treatment with high plan quality.

Proffered Papers: RTT 3: Ensuring quality in head and neck treatment

OC-0269

Comparison of dosimetric parameters of two techniques with VMAT for head and neck cancers

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Purpose or Objective: Simultaneously integrated boost (SIB) used in many sites, replanning is not made. In SIB of intensity-modulated radiotherapy (IMRT), doses per fraction are often unconventional, because of equal fractions treating multiple targets. We assessed sequential SIB (SEQ-SIB) to resolve the problem. The purpose of this study is to compare dosimetric parameters of SEQ-SIB with those of SIB using deformable imaging registration (DIR) for head and neck cancer patients.

Material and Methods: Subjects were 10 cases HNC treated with IMRT at our institute in 2014. In all cases, high-risk planning target volume (PTVboost) was based on the primary tumor and clinical lymph node metastases, while PTVelective(PTVel) included bilateral cervical nodal areas. The D95 was defined as the prescribed dose. For SIB, doses were 66 and 54 Gy in 30 fractions to PTVboost and PTVel, respectively. For SEQ-SIB, they were 55 Gy to PTVboost and 50 Gy to PTVel in 25 fractions using SIB, followed by 11 Gy in 5 fractions to PTVboost.We chose to maintain the size of the