clinical constraints) and overdose comparable to the nominal case. Doses to organs at risk were similar for the three plans in both patients.

Conclusion: The proposed strategies achieved robust plans in term of target coverage without increasing the dose to the CTV nor to the organs at risk. Full robust optimization gives better results than the mixed strategy, but the latter can be useful in cases where a MC engine is not available or too computationally intensive for beamlets calculation.

OC-0266
Automated treatment plan generation for advanced stage NSCLC patients
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Purpose or Objective: The aim of the study was to develop a fully automated treatment planning procedure to generate VMAT plans for stage III/IV non-small cell lung cancer (NSCLC) patients, treated with curative intent, and to compare them with manually generated plans.

Material and Methods: Based on treatment plans of 7 previously treated patients, the clinical protocol, and physician’s treatment goals and priorities, our in-house developed system for fully automated, multi-criterial plan generation was configured to generate VMAT plans for advanced stage NSCLC patients without human interaction. For 41 independent patients, treated between January and August 2015, automatic plan generation was then compared with manual plan generation, as performed in clinical routine. Differences in PTV coverage, dose conformity R50 (the ratio between the total volume receiving at least 50% of the prescribed dose and the PTV volume) and sparing of organs at risk were quantified, and their statistical significance was assessed using a Wilcoxon test.

Results: For 35 out of 41 patients (85%), the automatically generated VMAT plans were clinically acceptable as judged by two physicians. Compared to the manually generated plans, they considered the quality of automatically generated plans superior for at least 67% of patients, due to a combination of better PTV coverage, dose conformity and sparing of lungs, heart and oesophagus (positive values in figure). For the other acceptable plans plan quality was considered equivalent. On average, PTV coverage (V95) was improved by 1.1 % (p<0.001), the near-minimum dose in the PTV (D99) by 0.55 Gy (p=0.006) and the R50 by 12.4% (p<0.001). The mean lung dose was reduced by 0.86 Gy (4.6%, p=0.001), and the V20 of the lungs by 1.3 % (p=0.001). For some patients it was possible to improve PTV V95 by 3.8%, D99 by 3.3 Gy, to reduce mean lung dose by 3.0 Gy and V20 by 6.2%. All plans fulfilled the planning constraints for the spinal cord, heart and plexus.

For the 6 automated VMAT plans that were initially not acceptable, it took a dosimetrist less than 10 minutes hands-on time to manually fine-tune the VMAT plan in our TPS to make it acceptable. In contrast, to generate a VMAT plan from scratch 3-4 hours were required.

Conclusion: Using our fully automated treatment planning procedure, clinically deliverable, high quality VMAT plans for advanced stage NSCLC patients may be generated without human interaction for the far majority of patients. When manual adjustments were required, they took very little hands-on time only. With automated planning, a higher tumour dose could be achieved for a subgroup of patients. Clinical introduction has been started.

OC-0267
Fully automated planning for non-coplanar CyberKnife prostate SBRT - comparison with automatic VMAT
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Purpose or Objective: In stereotactic body radiation therapy, high accuracy is required to deliver high fraction doses with steep dose gradients. Non-coplanar beam setups may improve plan quality. This can be realized with a robotic CyberKnife (CK, Accuray Inc, Sunnyvale, USA). Due to its tumor tracking features, CTV-PTV margins may be reduced compared to linac treatment. In previous works we have built and validated a system for fully automated, multi-criterial VMAT plan generation (iCycle/Monitor). Recently, we have extended the system with an option for fully automated plan generation for the CK (iCycle/ValidationError). In this study we have used fully automated plan generation for un-biased comparison of non-coplanar CK with coplanar VMAT at a linac, for prostate SBRT.

Material and Methods: Our in-house iCycle system was first coupled to the Multiplan TPS that comes with the CK treatment unit. The iCycle/Multiplan and iCycle/Monaco systems were then configured for automated prostate SBRT plan generation for CK and linac-VMAT, respectively. Plans were then generated for 10 prostate SBRT patients, delivering 38 Gy in 4 fractions. Three clinically deliverable