put together. The robustness was assessed by applying Hounsfield unit (HU) perturbations of 3.5% and isocenter shifts of 5mm. Single beam optimisation (SBO) using a horizontal beam line was used when possible. PTV constraints were D2% < 107%, D98% > 90% and V95% > 95% (ICRU). Limits to organs-at-risk (OAR) were the dose-surface area for the skin A60Gy (RBE) < 20cm2 [2], maximum dose to the bones DRBE, 2% < 60 Gy (RBE), maximum dose to the nerves and vessels DRBE, 2% < 70 Gy (RBE).
[1] Haas et al 2012 IJROBP 84: 572-580
[2] Sugahara et al 2012 RadiotherOncol 105: 226-231

**Results:** Patients with field lengths < 18cm (PTV volumes: 164-659 cm3) could be treated with SBO using 2 horizontal beams and table rotation. In the nominal plan, PTVV95% ranged from 96.3-98.9%. SkinA60Gy (RBE) was 10±7.5cm2. Treatment plans were robust against HU perturbations and 5mm shifts in sup-inf and right-left direction with V95 never dropping below 93%. D2% and D98% of the PTV and OAR doses never exceeded the limits. Shifts of 5mm in ant-post direction caused severe underdosage in the PTV down to V95% of 68%. Robust optimisation in ant-post direction could increase these values up to 91%.
For larger PTVs (420 cm3-2240cm3) field lengths ranged from 25-34 cm. The length of the field overlapping region essentially influenced the robustness of the treatment plans. Isocenter shifts of 5mm to each other or apart resulted in a PTVD2% change of 7% for an overlap >6cm increasing up to 15% for ≤ 6cm (Figure 1).

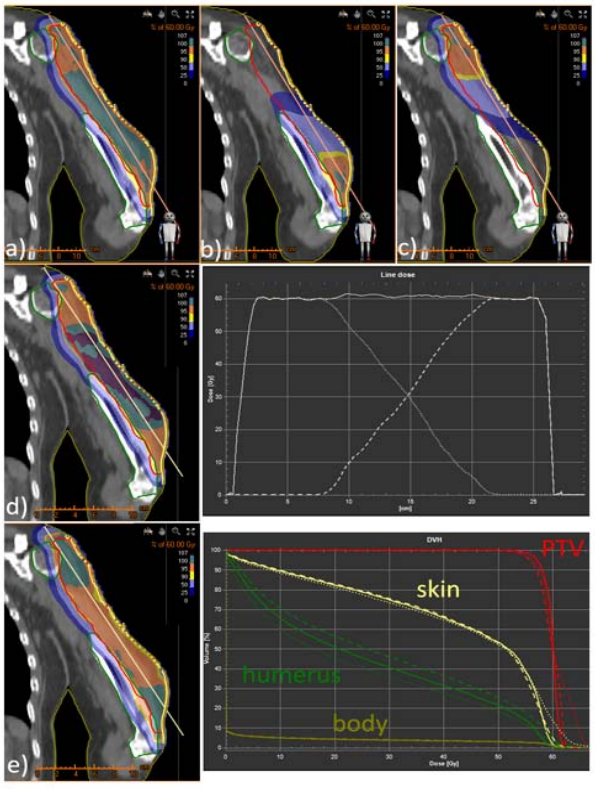


Figure 1
a) nominal plan with one matching boarder of a representative patient with a field overlap > 6cm with the respective line doses ; b) caudal field; c) cranial field
d) + e) isocenters of the two matching fields shifted by 1 cm to each other and apart with the corresponding DVH curves (solid: nominal plan; dotted: isocenters shifted to each other; dashed: isocenters shifted apart)

**Conclusion:** Robust treatment plans could be achieved for ESTS patients employing a horizontal beam line only. Before clinical implementation, dosimetric monitoring of skin doses should be performed to verify the calculated values. If field matching is needed a maximal overlap of the matching fields should be guaranteed to avoid hot or cold spots in the overlapping area.

**EP-1635**

**Volumetric modulated arc therapy optimization including dynamic collimator rotation**

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**Purpose or Objective:** During the last couple of years, volumetric modulated arc therapy (VMAT) is a treatment modality of increasing interest in radiation oncology. Thereby VMAT utilizes dynamic gantry rotation, dynamic MLC and varying dose rate. However, in addition the collimator angle could be changed dynamically, thus, increasing the degrees of freedom for the optimization, which might lead to improved dose distributions. This work investigates the feasibility of VMAT optimization including a dynamic collimator rotation.

**Material and Methods:** In this work a 20 x 20 x 20 cm^3 homogeneous water phantom with a cigar shaped target volume and a close-by spherical shaped critical structure was used. By means of the Eclipse Research Scripting a predefined collimator rotation was included to a partial arc in a not yet optimized treatment plan. For this purpose a different collimator angle was assigned for each dicom control point. Thereby the collimator rotation takes into account the physical limitations for the dose delivery. This treatment plan was then imported into the treatment planning system Eclipse using the Eclipse Research Scripting interface. Then the VMAT optimization was performed applying the PRO3 optimization algorithm in a research version of Eclipse. For the dose calculation of the optimized treatment plan the Swiss Monte Carlo Plan (SMCP) was used [1]. Similarly, a dose distribution was determined using a static collimator angle as typically applied in conventional VMAT applications. The resulting DVHs for the target and the critical structure were compared for the treatment plans.

**Results:** The optimization of a VMAT treatment plan with a dynamically rotating collimator was successfully performed. The comparison of the DVHs for the target volume showed a slight improvement of the coverage as well as the dose homogeneity for the treatment plan using dynamic collimator rotation compared to the plan applying a fixed collimator angle. Additionally, the dose to the critical structure could be reduced when using the dynamic collimator rotation instead of a fixed collimator angle.

**Conclusion:** The usage of a dynamic collimator rotation for VMAT is feasible and has the potential to improve the dose distribution for the target while reducing the dose to critical structures. This work was supported by Varian Medical Systems.
References:
[1] M.K. Fix, P. Manser, D. Frei, W. Volken, R. Mini, E.J. Born, *An efficient framework for photon Monte Carlo treatment planning,* Phys. Med. Biol., 52:N425-437, 2007.

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**Clinical validation of Automated Planning process in rectal cancer IMRT treatment**

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**Purpose or Objective:** Several studies suggest that IMRT can reduce toxicity in rectal cancer patients. A preconfigured plan model might improve daily clinical activity outcomes. Aim of this study was the evaluation of the performances of RapidPlan®Varian Medical System, a commercial model-