Conclusion: RapidPlan has been found to produce good quality plans more efficiently than class-solution based methods in the majority of cases. Continual monitoring of model behaviour is recommended to allow refinement in order to ensure optimum performance for all patients.

**EP-1642**

Comparison between a conventional IMRT planning method and a new automated planning method.


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Purpose or Objective: The inverse planning for IMRT is variable due to a high number of parameters to be defined by the operator. So the quality of treatment plan depends on the level of operator expertise. The aim of this study was to evaluate the automatic AutoPlanning planning tool implemented in Pinnacle v9.10 TPS (Philips) for IMRT Step&Shoot (S&S) and VMAT techniques for three localisations: prostate, pelvis and head and neck (H&N) with integrated boost technique with three dose level.

Material and Methods: Twelve patient cases, four by localisation, were planned both for S&S and VMAT. The AutoPlanning method (AP) was compared with those obtained with a conventional manual planning method. The plan quality evaluation was based on the dose distributions (HDV and isodose), the dose homogeneity (HI), dose conformity (Conformal Number (NC) and COnformal INdex (COIN)) and complexity indexes (Plan Area (PA)) and Monitor Units (MU) number. The agreement between planned and measured doses was evaluated with Gamma index test with criteria of 3% and 3mm; the mean gamma value and the percentage of accepted points were also compared. The dosimetric QA was performed by Octavius 4D device (PTW).

Results: HDV AP plans showed equivalent quality compared to the manual plan. With AP for pelvis case, the median dose for bladder decreased by 6% and 4% for S&S and VMAT techniques respectively. With AP for H&N case, the parotids were better saving: the dose received by 30% of the volume decreased by 12% and 14% for S&S and VMAT techniques respectively; this sometimes causes a deteriorate of intermediate risk PTV coverage (PTV 63 Gy). The homogeneity index showed a lower interpatient variation for AP against 0.030 for S&S with manual method. In case of prostate and pelvis, plans computed from the automated method showed greater conformity than those issued by the manual method but not in case of H&N. With regard to complexity of plan, the decrease in the area of the irradiation field (- 9.2 cm² on average) and the increase of the MU number (+ 104.5 MU on average) showed worse efficiency of automated plans than manual plans. The agreement between planned and measured doses was similar between the two planning methods.

**Conclusion:** We validated the feasibility of the automated planning AutoPlanning method in S&S and VMAT in three localisations. However, intake of AutoPlanning can be considered variable according to the center experience. The manual actions are limited with Autoplanning because the operator does not restart the optimization once the process is finish, unlike the manual planning, where the operator re optimizes the plan sometimes several times according to his own expertise.

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Rapidplan: ‘knowledge-based’ model with Tomotherapy plans


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Purpose or Objective: In the radiotherapy planning process the expertise and experience of the operator is essential. This represents a critical element which can limit the quality of a therapy especially when using advanced technologies such as volumetric modulated arc therapy (VMAT). The automation of ‘knowledge-based’ planning procedures stands as a possible solution to improve the consistency of the plans. RapidPlan (RP) (Varian Medical Systems, USA), uses libraries of plans to create models that, basing on the delivery technique and patient’s anatomy, predicts the dose-volume histograms of the organs at risk (OAR) and propose optimization constraints, avoiding long and multiple interactive optimization processes for new patients. In this scenario, it is useful to understand whether knowledge-based models, created using plans with consolidated technique, could supply the lack of the planning experience for a new treatment technique. In this study, HT (Hi-Art, Accuray, USA) plans of prostate cancer patients were used to create two RP models suitable for RapidArc (RA) plans. The aim of the work was to evaluate the feasibility and the performance of these models.

Material and Methods: In order to create the RP models, 2 groups of HT plans for prostate cancer patients, that included sparing of the rectum, bladder, and femoral heads, were selected: low risk group (LR), consisting of 35 plans, aimed to deliver 70 Gy to prostate PTV (PTVp) in 28 fractions - intermediate risk group (IR) consisting of 30 simultaneous integrated boost (SIB) plans with a prescribed dose of 70 Gy to PTVp and 56 Gy to vesicles PTV (PTVv) in 28 fractions. In order to prevent outliers, for all selected plans, structures and dose distributions were verified and validated by a radiation oncologist. The dose distributions of each plan were agreement between planned and measured doses was similar between the two planning methods.

Table 1: Comparison of dose values, dosimetric and efficiency indexes for the prostate, pelvis and head&neck cases calculated with a conventional planning method (S&S and VMAT) and with AutoPlanning method (S&S AP and VMAT AP). The bold and underlined values are those most favorable.