

AbstractID: 13560 Title: Consistency and Reproducibility of the VMAT plan delivery using three independent validation methods

Purpose: The aim of the study is to evaluate the consistency and reproducibility of a prostate and a lung VMAT plans case for 31 consecutive days using three different approaches.

Materials and methods: For each plan, a pre-treatment delivery was performed and the measurements obtained (dynalog files, planar dose with seven29, and the fluence from DAVID) were used as reference measurements. The remaining thirty (n=30) consecutive daily measurements were compared against the reference. The analysis of these DynaLog files have been carried out by in-house programming in MATLAB, by converting these ASCII files in to a 552 x 552 matrix that can be visualized as a gray level fluence image of the corresponding QA plan. In this work, we used the DAVID system, which is able to perform such quality assurance measurement while the patient is treated. The evaluation software compares the dose measured during radiotherapy to a reference dose, which was taken for each leaf pair during a reference measurement. In the third method, OCTAVIUS phantom with the Seven29 ion chamber array were used for comparing fluence verification.

Results:

The Dynalog files analysis showed that the variations between the reference fluence and the daily fluence were very low and the mean gamma index was as low as 0.01+/- 0.08. In our 30 days period of measurements using DAVID, the maximum variations were within 3% for both plans. Similar results observed in the analysis of the delivered dose as recorded by the seven29 ionization chamber array.

Conclusions:

All methods showed minimal daily deviations that contributed to clinically insignificant dose variations from day to day. Based on our results, we conclude that the VMAT delivery using a Varian 2100CD linear accelerator equipped with 120MLC is highly reproducible.

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