

AbstractID: 2956 Title: Patient Quality Assurance Analysis for Tomotherapy

Purpose: IMRT plans developed for conventional Linac equipped with dynamic MLC can be independently verified using a number of commercially available software packages. For the HiArt TomoTherapy unit however, the only dose verification mechanism is by measurement. The purpose of this investigation is to analyze the patient specific quality assurance results for the HiArt TomoTherapy intensity modulated radiotherapy treatment planning and delivery system in our clinic.

Method and Materials: We have developed a systematic patient specific IMRT QA program that was implemented in April of 2004. Once a QA plan is calculated, the dose to a phantom is measured using ion chamber and film. The ion chamber is placed 5 mm below the film which in turn is placed in the equator of a cylindrical solid water phantom. After the plan is delivered to the phantom, the point dose is recorded and the film is processed. Film calibration is performed daily using an in-house developed protocol and software tool. Dosimetric analysis is performed after the film and planar dose are co-registered in the TomoTherapy planning station. In total, 63 patients were analyzed.

Results: Dosimetric analysis was performed based on both film and ion chamber measurements. The median and mode discrepancy is below 2% for the point measurements. Similar results are found for the film analysis which provides not only absolute dosimetry but also isodose distribution and profile comparison between measured and calculated planar dose distributions. The plane and points of calculation can introduce small errors in the analysis.

Conclusions: A comprehensive patient QA program has been developed and the results of 63 patients are analyzed in this paper. Given the novel approach of TomoTherapy towards IMRT, it is important to see that for the majority of the patients the deviation between planned and delivered doses is less than 2%.