

AbstractID: 7183 Title: Delta4 – A new IMRT QA device

Purpose:

The capabilities of a 4D dosimetry and quality control device were evaluated in a clinical setting. QA measurements of dynamic treatment modalities such as IMRT, 4DRT, ARC, IMAT, gating and TomoTherapy were performed. Dose delivered was measured in short time intervals allowing for a comparison of the total dose delivered with the treatment plan.

Method and Materials:

Simultaneous measurements were performed with a Delta⁴ QA-device of absolute dose and dose distribution in 4-dimensions including time. Monitoring units and segment weighting in IMRT, fields, beams and composite plan were verified. Errors were quantized and analyzed; leaf sequence files were also verified.

Results:

The p-Si diodes in the Delta⁴ QA-device showed a very small field and depth dependency of less than 1.5%, a decrease in sensitivity of less than 1% per kGy, and a temperature dependency of less than 0.4% per degree C°. The overall accuracy of measurement in the primary field was better than 2%. Its application software allowed to display semi-measured data in the transversal planes and in DVH to distinguish deviations in critical organs and tumor from other less sensitive tissue.

Conclusion:

The Delta⁴ measures each dose pulse individually making it possible to view data in any time increment as: plan, beam, segment, control point, respiratory phase, and angle increment. Measurements were directly compared with the dose distribution for a composite treatment, saving extensive time in evaluation of good plans. Data analysis can be refined to beam and sub beam level using the data acquired during one single delivery and thereby significant time is saved. No restrictions or changes have to be introduced to the patient treatment plan because the QA-device is placed on the couch and irradiated with the same plan. Also effects like couch attenuation can be re-viewed.