

AbstractID: 11436 Title: Delta4: 3D dose validation using point dose measurements

Purpose: To validate a 3D dose calculation methodology used by the 3D Delta4™ phantom.

Method and materials: Measurements were performed using a TomoTherapy™ HiArt™ and a Varian 2300C/D™. A pinpoint PTW N31006 chamber with a sensitive volume of 0.016cc was used for point dose measurements. The Delta4™ phantom (ScandiDos AB, Uppsala, Sweden) was modified to accept the ion chamber. Eight (n=8) quality assurance plans were created in both planning systems. Plans covered a range of doses from 20% to 160% (20% steps) of the prescribed dose using Pinnacle³ TPS. Tomotherapy plans covered doses from 20% to 100% (20% steps) and a DQA plan with 200% of the prescribed dose. Treatment plan, DQA plan, DQA dose and structures were exported via DICOM RT to the Delta4™ software. At each delivery, a point dose measurement was recorded. Point dose measurements and calculated doses by the Delta4™ were compared against the calculated dose of the treatment planning systems. Furthermore, point dose measurements were compared against the Delta4™ calculated dose.

Results: The preliminary results showed that chamber measurements agree with Pinnacle³ within 0.3% to 2%. The Delta4™ system has an excellent response at higher doses while at lower doses the percent differences are compared to the ones obtained by the pinpoint chamber. Tomotherapy delivery results showed good agreement between the pinpoint chamber and Delta4™ with percent differences ranging from 0.03% to 5% with better response at high doses.

Conclusion: Delta4™ showed good agreement with the pinpoint chamber in the dose calculation, which shows that the system 3D dose calculation methodology is able to predict the same or better doses compared to the pinpoint chamber measurements.