AbstractID: 8382 Title: Dosimetric Verification of Dose Calculation Algorithms for IMRT treatment plan

Purpose: The purpose of this study was to determine the accuracy of dose calculation in penumbra region from two different commercial IMRT treatment planning systems (TPS). The accuracy of IMRT calculations with a convolution/superposition and a pencil-beam algorithm was tested using commission data with the modified values from Gaussian fitting approaches the real doses to correct for the spatial response of finite-sized ionization chamber against measurement. **Method and Materials:** The IMRT head and neck phantom used in this study was housed in a custom-designed package for efficient evaluation of the measured doses with different materials and various detectors. The Varian 21EX linear accelerator with 6 MV beam was used. The Pinnacle and the Ecilpse TPSs were calculated based on commissioning data that included beam profiles collected with a 0.125 cm^3 ionization chamber. We have modified the commissioning data by a Gaussian function of an ionization chamber kernel to the real profile. Dose measurements made by ionization chamber, and glass dosimeter positioned within the phantom's target insert were compared with the calculated doses. **Results:** The differences for these algorithm results in average PTV doses were within 1.0%. Ionization chamber results showed approximately 1.7% better agreement than the glass dosimeters and the differences between measured and calculated doses were more than 3.0% for both algorithms. However, calculations using these algorithms after it were re-commissioned from Gaussian fitting gave better agreement with measurements of IMRT field. A main reason of these results was attributed to detector size effects in the commissioning data. **Conclusion:** These results show that accurately measuring the penumbra region improves the accuracy of the dose calculations predicted by the TPS and thus is important to choose an appreciate detector.