AbstractID: 13720 Title: Commissioning compensator-based IMRT for a 3D diode array on the Pinnacle treatment planning system.

Purpose: To describe a detailed method of commissioning Pinnacle treatment planning system (TPS) for compensator-based IMRT and subsequently to validate a 3D bi-planar diode array (Delta4, ScandiDOS AB) as a tool for compensator QA. **Methods and Materials:** 50 commercial (.decimal Inc.) compensators were evaluated for the most probable compensator thickness (MPCT). Output factors, scatter factor, effective attenuation, energy spectrum, and incident fluence are all Pinnacle parameters that were evaluated and optimized. Orthogonal dose profiles and point doses were measured in a water phantom to validate the model. The absolute calibration of the Delta4 was performed with the MPCT slab of brass in the beam. The absolute dose agreement was verified for a variety of field sizes and brass thicknesses. The energy dependence of the Delta4 diodes was investigated by comparison to the ion chamber measurements. **Results:** The thickness of the variable portion of the compensators ranges from 1 to 3 cm, with 2 cm being the most probable one. Relative output factors have to be measured for filtered beams, otherwise errors of up to 4% can be expected on the central axis. With the optimized parameters, the error does not exceed 1.1% for 2cm thick brass. Scanned cross-beam profiles generally agreed with calculations to better than 2%. Delta4 measurements for the 4-field box arrangements of different field sizes exhibited gamma(3%/2mm) passing rates >97%. The diodes at shallow depths in the large fields demonstrated an over-response of 1.5% compared to the ion chamber. **Conclusion:** Beam model modifications are recommended for commissioning compensator-based IMRT in the Pinnacle TPS. The Delta4 absolute calibration should be performed with the MPCT brass slab. The diode over-response due to scattered radiation from brass is limited to the largest field size and shallow depths. Middle of the phantom error is minimal.

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