AbstractID: 13956 Title: 3D Dose Reconstruction for Delivery Quality Assurance (DQA) from Multiple 2D Planes using the OCTAVIOUS Phantom

Purpose: To perform a 3D dose reconstruction for delivery quality assurance (DQA) from multiple 2D planes using the OCTAVIOUS phantom.
Method and Materials: Ten RapidArc patient treatment plans of different sites were delivered on two phantoms. Two different DQA plans were delivered for each of the 10 patients: 1) OCTAVIOUS phantom and 2) 30x30x30 cube solid water phantom in which the detector array (Seven29) was placed. The corresponding 3D dose of each of the DQA plans was exported. All DQA plans were delivered by means of a NovalisTX with the HD120 MLC. For the solid water phantom, the same plan was delivered six times with the array varying in the coronal plane in increments of 0.5cm. For the OCTAVIOUS, the same plan was delivered four times by rotating the phantom in 45˚ increments along its longitudinal axis. An in-house MATLAB code was used to read the planar dose information. A linear reconstruction was performed for the cube phantom while a circular reconstruction was used for the OCTAVIOUS. Dose statistics per plane were obtained to validate the reconstruction method.
Results: Both interpolation methods showed good agreement to the planned dose distribution in the high dose region (<1.0%) but showed discrepancies in the low dose region. A DAH comparison shows good agreement for the sagittal and coronal planes but demonstrates some discrepancies in the transversal plane.
Conclusion: A simple linear interpolation method is able to predict good matching in the high dose region between the reconstructed dose and the planned dose. This technique is a good starting point to establish a benchmark in the level of manipulation necessary to obtain good 3D dose delivery quality assurance using current technology.
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