

Purpose: Two common methods of performing patient-specific IMRT QA are the composite dose (ion chamber and film) and beam-by-beam dose measurement (diode array). Neither method by itself gives a complete enough measure of the dose distribution. DVH+Mapcheck2 was evaluated for its ability to provide both types of doses with just the array measurement.

Methods: The dosimetric results from 15 patient-specific IMRT QA tests performed by composite irradiation of ion chamber and EDR film (in coronal plane) in phantom were compared to the predicted doses for the same locations based on Mapcheck 2 measured doses of each beam within each plan and interpretation by 3DVH software. The ratio of the measured to predicted ion chamber doses was calculated and the Gamma metric was used to compare the relationship between the film doses to the Eclipse or 3DVH predicted planar doses. Also, the 3D gamma value was calculated in the 3DVH software which compares the Eclipse to 3DVH predicted dose distributions. For the 2D and 3D Gamma metrics, 2% dose and 2mm DTA were used. In addition, a simple dose difference was performed using either a 2% or 3% dose difference tolerance.

Results: The mean ratio(SD) of the chamber to 3DVH predicted dose was 1.013(.015) while the ratio of the measured to Eclipse calculated dose to the chamber was 1.003(.012). The mean percentage of pixels failing the 3D gamma=1 metric was 1.2%(1.4%) while the failure rate for the 2D Gamma metric (3DVH to Eclipse) was 1.1%(1%). The Gamma failure rate for the film vs. Eclipse was 1.6%(2%). Mean dose differences, highly sensitive measures of dosimetric difference when not paired with DTA, were not significantly different between 3DVH+Mapcheck2 or film vs. Eclipse.

Conclusions: 3DVH+Mapcheck2 accurately predicts the doses one would have measured had one instead used an ion chamber and coronal film in plastic phantom.

Funding Support, Disclosures, and Conflict of Interest:

Sun Nuclear has provided support for this project