

**Purpose:**

Possible underestimations of the dosimetrical impact of Gamma-Index detected dose deviations due to the choice of the maximum dose in the analysis plane as the reference value are analyzed. It is shown that clinical relevant deviations can be thereby missed in possible projections of organs-at-risk as low dose regions. Furthermore global criteria based on the number of points passing a verification procedure may be not sufficient to guarantee the detection of dose deviations within relevant areas of the patient.

**Methods:**

Clinical relevant dose deviations are introduced in some IMRT plans. Measurements are performed with the 2D-ARRAY and analyzed by the Gamma Index method by normalization to the maximum and local dose in the plane. The acceptance procedure is performed according to guidelines recommending a fraction of approximately 95% accepted points to accept the plan. A point-by-point evaluation is performed to further analyze if the failing chambers may have a relevant impact on organs-at-risk.

**Results:**

Referencing relative doses to the "maximum dose in plane" tends to underestimate the deviations in the low dose regions. These regions are often in the beam projection of organs-at-risk, therefore possible impacts may be overseen. Even under tight acceptance criteria for the "global fraction" of points failing the analysis, relying on only this criterium may not be sufficient. We have started to re-evaluate the dose deviations on a chamber-by-chamber basis, regarding them as screening values for detection of relevant deviations.

**Conclusions:**

In situations in which deviations in low dose regions may indicate a dosimetrical impact on critical structures, a local normalization procedure should be used. In addition to the global acceptance criterion of an IMRT treatment plan verification, we consider the single-chamber failings of the Gamma-Index analysis as screening values for actual dosimetrical impacts in the patient.

**Funding Support, Disclosures, and Conflict of Interest:**

One of the co-authors works for PTW. However there was no funding for this study.