

AbstractID: 4872 Title: Evaluation of commercial QA software for independent IMRT dose calculations

Purpose: To evaluate the use of IMSure QA software for IMRT dose calculations by comparison with experimental ion chamber measurements.

Method and Materials: IMSure QA software (Standard Imaging) was used to calculate dose to isocenter for 80 dynamic IMRT patient plans: 50 prostate IMRT plans and 30 head and neck IMRT plans. The results were compared with patient-specific QA measurements where dose was measured in a 16x30x30cm solid water phantom using an Exradin A14 ion chamber. Plans were specifically chosen to include as large a fraction as possible that either failed our 3% criteria for agreement with ion chamber, or marginally passed it.

Results: Agreement between IMSure and ion chamber measurements was $-0.8\% \pm 1.5\%$ (overall agreement range $-3.7\% - +3.6\%$) and $0.2 \pm 2.0\%$ (range: $-4.2\% - +5.6\%$) for the prostate and head and neck cases, respectively. This is similar to agreement between Eclipse and ion chamber for the same patient group, which was $1.0 \pm 1.5\%$ and $0.1 \pm 2.1\%$. Based on 3% pass/fail criteria, IMSure correctly identified 5 of 9 prostate cases that failed the ion chamber measurement, and 1 of 5 head and neck cases. This gives an overall true positive rate (failures correctly identified) of 43%. IMSure also incorrectly identified 1 prostate and 2 head and neck cases (from 66 cases which passed the ion chamber QA) as failures, giving a false positive rate (passes identified as failures) of 5% for this set of plans.

Conclusion: Agreement between IMSure and ion chamber is sufficiently good that IMSure may be useful as a first check of the treatment planning dosimetry, but care is needed in determining an appropriate action level. Ion chamber or similar QA measurements will still be needed.