AbstractID: 5544 Title: Comparison of Ion Chamber and EPID Portal Dosimetry for Dynamic IMRT QA

Purpose:

The feasibility of replacing film and ion chamber measurements for dynamic IMRT QA with EPID is investigated. Analytical corrections are explored to account for energy variation and beam hardening not accounted for in the EPID dosimetry software.

Method & Materials:

The IMRT QA process involves a *qualitative* check of the fluences with film and a *quantitative* check of the full plan with an ion chamber (a PTV and OAR point are checked). The difference must be below 5% to pass QA.

The predicted and acquired dose fluences to the EPID were *qualitatively* compared to the predicted and acquired film fluence.

Quantitative comparison of the EPID point dose to the ion chamber point dose was done by finding the percent difference between the acquired and predicted EPID point dose, and comparing it to the percent difference of the acquired and predicted ion chamber point dose at the same 3D point.

Based on the difference between the predicted and acquired fluence of a test field, an analytical 2D energy response matrix was created to account for the radial energy variation of the beam.

A correction based on open and closed fields that accounts for beam hardening due to leaf transmission was developed.

Fourteen points were analyzed.

Results:

EPID and film measurements were equivalent.
The ion chamber measurements have a 1-sigma uncertainty of 2.0%.
Point dose comparisons with the standard EPID calibration gives an average difference from the ion chamber measurement of -6.09% with a standard deviation of (stdev) 3.15%. 2D energy correction gives -5.26%, stdev 3.18%. Beam hardening correction gives -1.67%, stdev 3.15%. Both corrections together give -1.46% with 2.78% stdev.

Conclusions:

The EPID system can replace film; ion chamber replacement is promising but more failure points must be tested.

Conflict of Interest:

Partial funding provided by Varian Medical Systems.