AbstractID: 8615 Title: Statistical Process Control and Independent MU Calculations as a Surrogate for IMRT QA Measurements

Purpose: To evaluate the use of independent monitor unit (MU) calculation software and statistical process control (SPC) as a surrogate for physical measurements in intensity-modulated radiotherapy (IMRT) quality assurance (QA). **Method and Materials:** Physical measurements were compared with the results from an independent commercial MU calculation software program (IMSURE v3.0.2, Standard Imaging, Middleton WI) for patients treated with IMRT. Treatment plans for delivering IMRT were computed for 25 patients using a commercial treatment planning system (TPS). A "phantom plan" was calculated for each patient by replacing the patient's virtual simulation CT data set with a CT scan of an ellipsoidal water equivalent phantom. Measurements of dose were made at two locations using a calibrated 0.2 cc Farmer-type ionization chamber in the phantom. The dose was delivered using the same computer files and linear accelerator parameters that were to be used for treating the patient. The doses measured at two points in the phantom were compared with the doses computed by the TPS at the same points in the "phantom plan". Independent calculations of dose were computed using IMSURE at the same points and compared with doses computed by the TPS. The dose differences were analyzed using the methods of SPC and linear regression correlation statistics. **Results:** The SPC parameters calculated for the dose measurements and the IMSURE dose calculations were 0.5% average, 3.3% upper limit, -2.4% lower limit and 1.2% average, 3.8% upper limit, -1.4% lower limit, respectively. IMSURE calculated doses and measured doses both demonstrated a significant correlation ($P < 0.001$) with TPS calculated doses. **Conclusion:** IMSURE dose calculations and physical dose measurements produced similarly stable SPC charts and both were significantly predictive of TPS dose calculations. IMSURE dose calculations can be used as a surrogate for physical dose measurements in IMRT QA.