

Purpose: To review IMRT QA measurements from several of the 50+ institutions for which we provide IMRT treatment plans and determine if institutional, anatomic site, or measurement biases exist.

Methods and Materials: For each patient receiving IMRT, the treatment plan is delivered to a solid water phantom and the dose measured using a small volume ion chamber and with a single EDR film placed 1 cm above the chamber plane. Of the almost 3000 IMRT treatment plans calculated and delivered in 2004, more than 1000 random, de-identified plans were reviewed. Ratios of chamber/calculated and film-center/calculated doses were tabulated for six anatomic sites (breast, prostate, pelvis, head & neck, brain, and other). Film dose distributions were compared to calculations using one of several commercially available QA packages.

Results: The institutions with the best results had average errors of less than $\pm 0.5\%$ (i.e. randomly distributed about zero) with standard deviations of 1.25-1.50%. A few centers had average errors and standard deviations approaching 3%, indicating a bias in which a systematic dose measurement error was found. Agreement between chamber and film center dose was also institution specific with the best results found for those centers that had the lowest errors compared to calculation. One institution had excellent agreement between chamber and calculation ($-0.2 \pm 1.7\%$), but 2-3% lower film dose. Although exceptions were found, little variation in the agreement between chamber measurement and calculation occurred as a function of anatomical site.

Conclusions: Since all treatment plans were calculated in one central location and many centers had excellent agreement between measurement and calculation, it is likely that the higher errors were due to measurement technique rather than errors in the dose calculation. Error was not anatomic site dependent possibly due to the purposeful placement of the ion chamber in a region of relatively uniform dose.