

The accuracy of monitor unit calculation and associated absolute dose calculation are of paramount importance for IMRT fields modulated by MLC. IMRT monitor unit calculation depends heavily on the treatment head model, i.e. if the MLCs act as a tertiary collimator or jaw replacement, the geometric location of the collimator jaws, the existence of backup jaws, closed leaf gap limitations, and collimator transmission factors. Particularly important is the accurate modeling of small field S_c factors. In this work we present IMRT delivery verification results for a commercial IMRT system for Varian, Siemens, and Elekta linear accelerators with MLC. The measurements for each IMRT field were: 1) a full 2D film scan, and 2) two to four absolute dose measurements measured with an ionization chamber. Absolute point dose measurements were compared directly with the treatment planning system's QA plan results, and also used to correctly normalize the measured and calculated "QA films" to represent absolute dose. Calculated dose planes vs. film dosimetry was analyzed for each full field at 1 mm resolution, using a variety of percent difference and distance to agreement criteria. We analyzed the following vendor/energy combinations: four Varian/6MV and four Varian/18MV fields; six Siemens/6MV and six Siemens/23MV fields; and six Elekta/6MV and six Elekta/15MV fields. In all, we analyzed 32 IMRT fields for monitor unit and absolute dose calculation accuracy. The results were excellent for the three different treatment head models.

Research partially supported by Computerized Medical Systems, Inc.