AbstractID: 13937 Title: An examination of the usefulness of films in addition to electronic methods in pre-treatment IMRT QA

Purpose: Using radiographs for IMRT QA carries many disadvantages. Electronic QA methods, e.g. diode arrays, have become standard for efficiently and accurately verifying dose distributions. Because diode arrays have relatively low resolution, radiographs might be used in addition to array measurements to qualitatively verify geometric accuracy of fluence delivery. However, the finite ability of the human eye to compare films and TPS printouts is unreliable: diode arrays may detect geometric inaccuracies before the errors are recognizable on film. Does qualitative use of films contribute significantly to the pretreatment verification process? **Methods and Materials:** Four IMRT fluences (varying modulation) were delivered both on film and MapCHECK1 (Sun Nuclear Corporation). Errors were systematically introduced by omitting portions of the fluence, simulating a communication error between planning and delivery systems. Diode array measurements were compared to the TPS verification plan using DTA (3%, 3mm). Films were compared to TPS printouts by light-box overlay. Increasingly larger portions of the fluence were omitted until the QA failed, either by errors observed on the film or MapCHECK DTA with <85% passing points. **Results**: For every modified fluence that failed QA, errors were apparent in MapCHECK before being observed on film. With up to 20% control points omitted, all radiographs appear virtually unchanged to the naked eye. On average, MapCHECK analysis of the same fluences failed due to omission of approximately 7% control points from the center of the fluences and 17% from the outer portions of the fluences. **Conclusions:** If an IMRT fluence is changed due to data transfer errors, qualitative analysis of radiographs does not improve upon the effectiveness of MapCHECK at detecting the error. Because such errors may not be detected if ≤20% control points are lost/corrupted, DTA analysis should always be accompanied by examination of isodose distributions and dose line profiles.