AbstractID: 13593 Title: A Novel Technique for Correcting Interleaf Edge Modeling Errors

Purpose: Evaluate MLC interleaf edge modeling errors using a dual interleaf edge correction to predict and correct calculated IMRT dose distributions, allowing more accurate IMRT QA and prediction of patient dose distributions. **Materials and Methods:** Interleaf edge profiles from a Varian Millenium-120 MLC were measured using Kodak EDR2 film. Films were compared to interleaf dose profiles predicted using the Photon_AAA_8117 algorithm in Varian's Eclipse Treatment Planning System(VETPS). Differences between the measured and predicted edge profiles were modeled in user-generated Matlab software MEDIC(Multifunctional Environment for Dual Interleaf Corrections) to create a mechanism for correcting VETPS dose distributions. 7 IMRT cases(47 fields) which failed departmental QA standards were chosen for correction. Dynamic MLC leaf positions were used to determine locations of exposed interleaf edges during delivery where corrections were applied. In addition, calculated dose distributions were corrected using a traditional T&G correction for comparison with our novel dual-correction method. The original and modified distributions were compared to distributions measured with a diode matrix, using a 3mm/3% gamma index to test the correction accuracy. **Results:** The dual interleaf edge corrections combine to produce traditional T&G underdosing throughout the distributions, while single interleaf edge corrections appeared at high dose gradient locations. Modifying the VETPS-calculated distributions resulted in average gamma index increases of 1.48% using traditional T&G corrections and 3.23% using dual interleaf edge corrections. **Conclusion:** Application of the MEDIC software quickly determines whether failing IMRT QA results are caused by interleaf edge modeling errors. Dual interleaf edge corrections were more than twice as effective at improving gamma indices compared to traditional T&G corrections and were better at predicting delivered dose in high gradient regions. MEDIC provides corrected dose distributions which are more representative of that delivered to the patient and can be used to asses clinical acceptability of the plan.