AbstractID: 8922 Title: A software tool for IMRT and EPI dosimetry research

Purpose: To develop a software tool for intensity modulated radiotherapy (IMRT) and electronic portal imaging (EPI) dosimetry research. The software tool implements correction factors to a commercially available EPI dosimetry model to account for the change in EPI response to multileaf collimator (MLC) transmitted beam as compared to open beam in IMRT fields. **Method and Materials:** Software was designed to perform the following tasks: i) Read MLC files from IMRT treatment plans and calculate a matrix of open beam and MLC transmission components. ii) Read portal dose image prediction (PDIP) files exported from the Eclipse treatment planning system (Varian Medical Systems, Palo Alto, CA). iii) Interpolate correction factors from look-up tables for each PDIP based on the MLC transmission components of the corresponding MLC file. iv) Calculate and write a corrected PDIP that can be imported back into the planning system. The software tool was developed using the Microsoft Visual Studio.NET framework with the C# compiler. The software tool was validated for functionality and accuracy with a series of test IMRT fields. **Results:** The software tool correctly calculated the open and MLC beam components for different MLC models and collimator rotations. The corrected PDIP pixel values agreed with manual calculations to within 1% in all cases. Artifacts in the corrected PDIP in regions of high dose gradients were avoided when the MLC transmission matrix was sampled with pixel size ≤ PDIP pixel size. Additional functions available with the software tool include the ability to write the open beam matrix to file, perform arithmetic operations on images, display and save image files, and to plot profile comparisons across images and open beam matrices. **Conclusion:** A software tool was developed and validated for IMRT and EPI dosimetry investigations. The software tool is being developed further for EPI dosimetry using transit IMRT beams.