Purpose: A software program (MU-EPID) has been developed to perform patient specific IMRT pre-treatment QA verification using an electronic portal imaging device.

Methods: The software converts measured images of intensity modulated beams delivered to an EPID, into fluence maps that can be imported in the treatment planning system. The dose can then be calculated in the patient anatomy and compared against the patient's treatment plan for QA purposes. We first benchmarked the software using as a patient a cylindrical phantom. An aSi-1000 EPID mounted on a Varian Novalis linear accelerator was used for the image acquisition. Finally, IMRT plans from different treatment sites were used to further validate this in-house software. QA analysis was performed by evaluation of isodose distributions, DVH comparison and 2D gamma analysis.

Results: The validation study with the cylindrical phantom showed that the dose to the ion chamber measurement point was in good agreement with both the original treatment plan and the MU-EPID reconstructed dose. Similar results were found for the clinical cases that we studied. A gamma analysis of the dose to the isocenter plane was performed for each plan. Using 3% and 3 mm as the evaluation criteria, resulted in an average of 97.44% of pixels passing the analysis (gamma<1). Good agreement was also observed for the DVH, isodose and profile comparisons between the clinically delivered IMRT plan and the MU-EPID derived dose calculation.

Conclusions: The results of the present investigation suggest that MU-EPID can be used in a clinical environment and can be used for patient specific QA for IMRT plans.

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