

Purpose: To present an online IMRT verification method based on flat panel measured entrance doses.

Method and Materials: A prototype Siemens linear accelerator (Siemens Med OCS) with entrance flat panel imager (EPI) was used to measure MLC field shapes during an IMRT delivery. The flat panel software was modified to write an integral signal to a file for each step and shoot MLC field. A communication record file on the linac is checked online for new IMRT deliveries by an IDL (Research Systems) written software. Monitor Units (MU) and MLC positions are extracted from the corresponding treatment plan file.

These parameters are used to calculate the planned IMRT fields, which are compared to the primary fluence and the field size dependent corrected flat panel images. The planned fluence images are converted into the EPI images using a convolution kernel taking into account the leakage and the scatter contributions. The comparison can be done either segment or field based by a software tool. Usually leaf positions and delivered monitor units are checked, but there are also profiles and a Gamma evaluation for further comparison.

Results: Three patients were selected to prove the feasibility of the system and the first results are promising. The comparison showed that for all 288 segments the deviation between calculated and the measured MU were less than 0.5 MU. The difference between leaf positions were within 1.5 mm after the sagging of the detector was corrected.

Conclusions: The presented method has the potential to eliminate the time consuming pre-treatment IMRT verification procedure currently used. It can be applied during the first treatment fraction or whenever information about the delivered MLC shapes and doses are needed. Further plans are to completely overcome any user interaction and automatically generate a QA report for each verified patient treatment.