AbstractID: 11513 Title: A new IMRT/RapidArc QA procedure utilizing MLC dynalog files

Purpose: To develop a quick and efficient patient-specific QA procedure for both IMRT and RapidArc using MLC dynalog files. **Method and Materials:** MLC dynalog files record both planned and actual MLC leaf positions, actual fractional MU and gantry angle. The in-house software was developed to process MLC log files to find leaf position and MU errors. The Monte Carlo simulation has shown a linear correlation between average leaf position error mean target dose error. However, dose error was also caused by MU error that was not considered in average position error. In this study, we defined weighted position error (ΔXw) and weighted position-MU error (ΔXMw) to estimate the dose error caused by MLC leaf position and MU errors. **Results:** Ten IMRT and two RapidArc prostate QA plans were used in this study. Point dose was measured with ion chamber, which agreed with the plans within 3%. MLC dynalog files were taken during plan delivery and processed with in-house software. The dose errors were estimated with various parameters. The results indicated that ΔXw and ΔXMw were equivalent and increased with ΔXave. Compared with conventional IMRT, RapidArc had less MLC motion error and thus less dose error. The results from Monte Carlo and MapCheck supported ΔXw and ΔXMw as dose error indicators and can be used for IMRT/RapidArc QA. With the comparable ΔXave values, HDMLC was more sensitive to MLC position error than Millennium MLC. **Conclusions:** We have developed an easy and effective patient-specific QA procedure for IMRT/RapidArc. ΔXw and ΔXMw were defined as dose error indicators that can be used to estimate dose errors in plan delivery, although more accurate dose error calculation needs the Monte Carlo simulation. Using this method, we can quickly perform pre-treatment QA, post-treatment QA, and real-time-treatment QA with or without patient present.