

# An Investigation of Using Logfile Analysis for Automated Patient Specific Quality Assurance in MRgRT

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## Presentations

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### Room: AAPM ePoster Library

**Objective:** Adaptive radiation therapy (ART) is an integral part of MR-guided RT (MRgRT), requiring a new RT plan for each treatment fraction and resulting in a significant increase in patient specific quality assurance (PSQA). This study investigates the possibility of using treatment log file for automated PSQA.

**Method:** All treatment plans were delivered in 1.5T Unity MR-Linac (Elekta, Stockholm, Sweden). A Unity compatible version of LinacView (Standard Imaging, Middleton, WI) was commissioned to automatically monitor and analyze the log files. A total of 66 fields were delivered and measured by ArcCheck®-MR (Sun Nuclear, Melbourne, FL) and LinacView. Eleven incorrectly matched fields were also delivered to check for error detection sensitivity. The gamma,  $\gamma$ , with 3%, 3mm criteria was used in both ArcCheck®-MR and LinacView. Additionally, the gantry angle, jaws, and multi-leaf collimators (MLC) positions reported in the log file were compared with plan positions using TG-142 criteria.

**Result:** The  $\gamma$ (3%, 3mm) for the 55 correct plans were found to be [94.7%, 100.0%] and [95.4%, 100.0%] for ArcCheck®-MR and LinacView respectively. All the delivered gantry angle and jaws were found to be within 0.2° and 2mm. MLCs that were outside the guard leaves or under the diaphragms were found to have more than 1.0mm discrepancy. This was attributed to the linac internal override for these MLCs and had no dosimetric impact. Excluding these discrepancies, all MLC positions were found to be within 1.0mm. The  $\gamma$ (3%, 3mm) for the 11 incorrectly matched fields were found to be [3.9%, 84.8%] and [1.2%, 21.7%] for ArcCheck®-MR and LinacView respectively. The overall ranked-correlation between them was found to be 86.0% with p-value<0.01.

**Conclusion:** Significant ranked-correlation demonstrates the automated logfile analysis can be used for PSQA and expedite the ART workflow. Ongoing PSQA will be compared with logfile analysis to investigate the longer-term reproducibility and correlation.