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Per-Fraction Deviation in Logfile Parameters Reported in a Single VMAT Arc

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and dimensions were optimized. Initially, a single ring of scintillator detectors surrounding a water phantom was created and validated. Following this, a cylindrical scintillator lattice was constructed. GEANT4 was used to evaluate the visible light emitted by all scintillators; this light signal was correlated with photon fluence before and after entering the water phantom, which was then used to determine the dose distribution. The dose at a point calculated using the light deconvolution algorithm was compared to the dose calculated by GEANT4**. Results:** For a monoenergetic 6 MeV photon beam, the dose at a point in the water phantom determined using scintillator light output was found to be 19.1% (+ 4.6%) less than the dose calculated by GEANT4. **Conclusion:** Preliminary results demonstrate this to be a potentially viable option to measure dose in real-time using PSDs. Future steps include further validation with complex shapes and beam arrangements, followed by the construction of a prototype.

PO-GePV-T-239, Per-Fraction Deviation in Logfile Parameters Reported in a Single VMAT Arc: M Snyder[1]*, D To[1], D Drake[1], J Liang[1], D Lack[2],(1) Beaumont Health, Royal Oak, MI, (2) Beaumont Health, Troy, MI

Purpose: Measurement-based QA identifies large deviations between planned and delivered dose, but subtle—yet clinically unacceptable—deviations can pass through the conventional QA process unnoticed. Incorporating logfile-based information into pre-treatment QA should result in more robust QA overall, provided such information is stable across the entire treatment course. We present here a case-study of logfile stability to investigate the potential of logfiles as useful adjuncts in the QA process**. Methods:** We analyzed logfiles from six fractions of a VMAT plan delivered on an Elekta Infinity linac with an Agility MLC. To simplify the analysis, we considered a single 52 control point VMAT field, which delivered 92 cGy in 294.5 MU between gantry angles of 182° and 30°. We used the first treatment logfile as the reference logfile and compared subsequent treatment fractions to it. As most parameters change during a VMAT control point, we focused the numerical results on the values at the beginning of each control point. We report day-to-day RMS differences in gantry angle, diaphragm position, MU/rate, MU delivered, and MLC leaf positions**. Results:** Day-to-day deviations between logfile parameters at the start of each control point existed but on average fell within TG-142 established limits. The maximum deviation of gantry position of any control in any treatment session was 1.4° with an RMS average of 0.4° over all control points. Other parameters (MAX, RMS): Diaphragm position (0.5 mm, 0.13 mm), MU/rate (47 MU/min, 11.2 MU/min) , MU (0.4 MU, 0.12 MU), and MLC position (2.0 mm, 0.14 mm). **Conclusion:** In this case, the small per-fraction differences indicate that logfile information was representative enough of future machine performance to have been useful in pre-treatment QA. However, notable outliers suggest that a broad survey of VMAT logfiles is required to firmly establish conditions under which logfile stability most suffers.

PO-GePV-T-240, IMRT QA Result Prediction by MLC Transmission Decomposition: J Stasko*, W Ferris, D Adam, W Culberson, S Frigo, University of Wisconsin-Madison, Madison, WI

Purpose: In radiation therapy, there are three primary explanations for why a plan may fail quality assurance (QA) testing: the beam model is inaccurate, the plan instructions are corrupted when they are transferred to the treatment machine, or the machine does not deliver the plan as intended by the treatment planning system. This work aims to address the first reason by computing metrics based on the relative fluence through different regions of a c-arm single layer multileaf collimator, and correlate those metrics to QA results**. Methods:** A novel computational tool was developed with Python to analyze DICOM RT-Plan files. First, it identifies zones of different transmission levels, as defined by the RayStation treatment planning system (RaySearch Laboratories, Stockholm, Sweden). For seven distinct regions, the corresponding relative fluence fractions were computed. These were averaged over the entire plan, weighted by the monitor units assigned to each control point. This process was completed for 17 plans. The plan-average fluence fractions were then compared to measured gamma pass rates and median dose deviations for each plan. The analysis was repeated for fluence fractions normalized by the fraction of the beam passing through open field**. Results:** There were no relationships between the fluence fractions and gamma analysis pass rates. However, those for the leaf tip and the leaf body zones were strongly correlated with median dose deviation. Normalizing fluence fractions by the open field fraction eliminated any observed correlation**. Conclusion:** Some metrics developed in this work were found to correlate with common QA results. Therefore, the tool has predictive power in determining QA results and may be useful in the clinic for forecasting which treatment plans are most likely to fail QA, given a specific RayStation beam model.

PO-GePV-T-241, A Simple and Cost-Effective System for Pre-Delivery Patient-Specific and Weekly Quality Assurance Based On Log File Analysis: A Fomujong[1]*, P Imandi[1], R Teboh Forbang[2], P Mobit[1],(1) Cameroon Oncology Center, (2) Hackensack University Medical Center, Hackensack, NJ

