AbstractID: 13314 Title: Patient specific delivery quality assurance for robotic stereotactic radiosurgery of functional targets

Purpose: Develop and implement a patient-specific delivery QA (DQA) procedure for small functional targets treated with radiosurgery using a Cyberknife. The procedure verifies both the dose and targeting accuracy.

Method and Materials: Cyberknife treatment plans (Multiplan v3.5) for functional targets were created. Phantom overlay plans were created using a head and neck phantom with the BallCubeII insert to a maximum dose of 6Gy. Specially cut EBT2 GaFchromic film was oriented orthogonally within the BallCubeII. The target dose distribution was placed such that high dose was on both pieces of film. The phantoms overlay plan was delivered and the film analyzed using FilmQA (3cognition) with an automatic detection component specific for the BallCubeII. A dose calibration curve was created using film from the same lot. The differences between the planned and delivered doses for each user defined ROI were determined, along with the distance to agreement (DTA) and gamma index (γ) values.

Results: A number of different criteria were considered including γ (3%, 1mm), DTA (1mm) and dose difference (±5%, ±10%, ±15%). In general, all points (~100%) within the ROI passed the DTA (1mm) and scored highly for γ index (3%, 1mm). Dose differences (Δdose ±5) for plans using 5mm and 7.5mm cones scored worse (20-50% passing) than those using 7.5mm cones and larger. For Δdose ±10%, the 5mm cone plans scored ~80% pass rate. All plans passed Δdose ±15%.

Conclusion: We have developed a patient-specific delivery QA procedure using a phantom overlay plan delivered to EBT2 film in the BallCubeII insert and analyzed with FilmQA. Dose distributions and targeting accuracy were excellent. For small targets near an organ at risk, the dose discrepancy should be considered as well as the gamma index during patient specific delivery QA for small targets.

Conflict of Interest (only if applicable): None