

## AbstractID: 5218 Title: Development of a More Objective and Accurate Film Verification Tool for Stereotactic Radiosurgery

**Purpose:** To develop a more objective and accurate quality assurance (QA) tool for use in spatial verification of patient treatment isocenter(s) to be used in conjunction with a commercial linear accelerator based stereotactic radiosurgery (SRS) system.

**Method and Materials:** A plastic positioning device was constructed to house an open-ended cylindrical lead foil ring approximately 0.3 [mm] thick and 1.0 [cm] in diameter. The cylindrical design was used for comparison versus the vendor supplied radio-opaque ball design. Verification films were acquired using a 1.75 [cm] SRS cone with the same set-up used for a SRS patient treated at our clinic. Films were acquired at gantry angles of 0°, 90°, and 270° for both the radio-opaque ball and cylindrical device and repeated three (3) times. The objectivity of the film QA evaluation was determined by calculating the variance in the measurement of the radial offset distance for each gantry angle. In addition, five (5) additional sets of verification film data were acquired to evaluate the detection of a range of deliberate erroneous incremental offsets (0.0, 0.5, 1.0, 1.5, and 2.0 [mm]). The accuracy of the film QA evaluation was determined by measuring the isocenter offsets in the QA films and comparing those results to the known offset using linear regression analysis.

**Results:** Calculated variance values from the QA films acquired at three (3) gantry angles measuring radial offset showed a reduction in user variability from 28% to 21% when the cylindrical device was used. Similarly, linear regression analyses of the incremental offset QA films demonstrated a slightly better correlation to the expected values when using the cylindrical device.

**Conclusion:** The cylindrical SRS positioning device improves the objectivity of the QA procedure for isocenter verification and detects critical set-up errors more accurately thus improving the ability of the physicist to assess patient set-up.