

**Purpose:** A linac-based SRS system with a stereotactic mask was implemented. This work aims at selecting a proper detector for small-field beam commissions, setting up a specially designed phantom for patient-specific plan QA, and validating the dosimetric accuracy of SRS plans based on the Varian MLC-120 and BrainLAB cones.

**Methods:** Four different detectors -- diode, micro ion chamber, IBA chamber, and Farmer chamber, were evaluated for small field commissioning. PDD, profile, and output measurements of fields from  $5\times 5\text{mm}$  to  $150\times 150\text{mm}$  were compared and discussed. A micro-chamber was selected based on its good spatial resolution (0.016cc sensitive volume) and higher stability and sensitivity (3 and 1.5 times greater, respectively, than a diode). To reduce measurement uncertainties, both PDD and profile scans were iterated (more iterations were used for smaller fields) and summed up using commercial software. The shift of reference-field readings was within 0.3% during the output measurements. A Lucy phantom was set up in the SRS frame and CT scanned. Treatment plans were mapped to the CT image and measured with a calibrated micro-chamber. The implemented SRS system was validated by comparing the planned and measured doses for targets with different volumes and shapes.

**Results:** For a typical SRS target (1.26cc), the dose differences were 0.71% for a dynamic arc/MLC plan and 0.75% for an arc plan using a 20mm cone. For a small and spherical target (0.50cc), the differences were 2.13% for a dynamic arc/MLC plan and 0.17% for an arc plan using a 15mm cone. For a very small and irregular target (0.35cc), the differences were 2.60% for a dynamic arc/MLC plan and 4.72% for an arc plan using a 10mm cone.

**Conclusions:** Considering its dosimetric accuracy for different targets and the availability of a safety-interlock, MLC based SRS treatment is highly recommended.