

AbstractID: 2792 Title: Commissioning a 5 mm circular cone for linac-based stereotactic radiosurgery using microMOSFET and polymer gel

Purpose: The accuracy of measured small cone parameters is important in the treatment of certain disorders like trigeminal neuralgia, where a single large dose is delivered via a small cone. The purpose of this presentation is to identify practical dosimeters for commissioning the cone accurately and efficiently in a community clinic.

Method and Materials: Relative output factors for 5, 12.5, and 15 mm cones were measured using microMOSFET, Kodak EDR2 film, and TLD microcubes. TMRs for the 5 mm cone were measured using microMOSFET and BANG[®] polymer gel. OARs for the 5 mm cone were measured using radiographic and radiochromic films.

Results: The output factor for the 5 mm cone measured with microMOSFET was 0.654 for a 6 MV beam and agreed with data published elsewhere. MicroMOSFET measurements agreed with EDR2 film and TLD microcubes measurements within 4.3% and 3.2% respectively for the 5 mm cone. All techniques were within 2.5% agreement for the 12.5 and 15 mm cones. TMR values measured with microMOSFET and polymer gel agreed within 3%. Radiographic and radiochromic film off-axis ratio measurements showed differences not exceeding 1% above the 10% relative dose level. The measurements were verified using a MD Anderson Cancer Center phantom for a single static beam and polymer gel for a clinical set of three arcs. The doses reported by the institution and MDACC at d_{max} and 7.5 cm depth agreed within 4% and 3% respectively. The volumetric doses between the treatment planning system and the polymer gel were within 4%.

Conclusion: The overall precision and accuracy of microMOSFET-based measurement techniques are clinically acceptable. The microMOSFET is a feasible alternative with some advantages to TLD microcubes for dosimetric measurements of very small cones and fields. The polymer gel was found to be the only commercially available 3D-dimensional verification dosimeter for these cones.