AbstractID: 13829 Title: Dose distribution of small fields through MAGIC-f gel dosimetry and PENELOPE-Monte Carlo Simulation

Purpose: Evaluate the response of MAGIC-f gel dosimeter after submitted to a conformal irradiation technique using small fields and to compare the results to Monte Carlo simulation with PENELOPE. **Method and Materials:** The gel was poured in a cylindrical phantom of 12 cm diameter and 18 cm height. The phantom containing the gel was irradiated with 9 fields of 6 MV photon beam, each one of 1 x 1 cm^2, totalizing a prescribed dose of 16 Gy. The gel reading was performed through MRI using a 3 T scanner and head coil. Relaxometry images were obtained using a multi spin echo sequence with 16 echos times multiples of 22.5 ms, a repetition time of 3000 ms and a matrix size of 256 × 256 pixels. The slice thickness was 2mm and a FOV of 150 mm was used. The transverse relaxation rate R2 was calculated by fitting the signal intensities versus the echo time pixel by pixel. The R2 maps were related to absorbed dose using a specially designed software, which provides the dose distributions. PENELOPE simulations were used to mach faithfully the irradiation and geometry conditions as the experimental irradiation. The spatial resolution for the simulations was 0.5 mm. The two dose distributions were compared through beam profiles for each irradiated field. Both distributions were compared with the treatment planning system (TPS). **Results:** The comparisons between gel and PENELOPE and gel and the TPS showed maximum differences of 0.51% and 4.18%, respectively, both comparisons performed inside the volume of the 50% of isodose. **Conclusions:** From the results obtained it can be preliminary inferred that the response of the MAGIC-f polymeric gel could be suitable and used as a dosimeter in clinical procedures using small fields, especially in radiosurgery. Besides of the concordance found, more measurements will be done.