AbstractID: 13367 Title: Investigation on Fading of MAGIC Gel Dosimeter

Purpose: To characterize the fading of MAGIC gel dosimeters by simple measurements using a He-Ne laser and photodiode detector. **Method and Materials:** A normoxic polymer gel known as MAGIC gel was prepared, using hydroquinone as a free radical scavenger. The MAGIC gel-containing phantoms were irradiated by 110 kVp x-rays from six different directions (rotation of 60˚) and 4 different dose levels of 10 Gy increments. Gel fading was monitored by measuring the voltage drop (as a measure of optical density) due to the presence of irradiated gel between a He-Ne laser source and photodiode detector at three different time points (i.e., 24, 48, and 72 hours) post-irradiation. Laser light was directed along the transverse axis of the cylindrical gel phantoms. The gel phantoms were immersed in a water bath to provide a better optical impedance matching during the laser measurements. Also, they were randomly rotated to several angular positions to check the uniformity in optical density along the radial direction. Two independent trials of reading session were conducted. **Results:** Measured voltage drop remained inversely linear with delivered dose up to 48 hours, with decreasing linearity at 72 hours and beyond. Detectable non-uniformity in optical density was noted along the radial direction of the phantom. This non-uniformity was more pronounced for the phantoms irradiated with larger doses, which contributed more fluctuation in the measured data. **Conclusion:** Statistically significant gel fading up to 10% was noted between 24 and 48 hour post-irradiation. However, no significant gel fading was observed between 48 and 72 hours post-irradiation.