Purpose:
Age-related macular degeneration (AMD), the leading cause of severe vision loss and blindness among those over age 65, is a chronic, progressive disease of the macula. The performance of a plastic scintillation dosimeter (PSD) system was benchmarked for real-time dose monitoring and measurement of a diagnostic-energy (100 kVp) level stereotactic radiosurgery device, IRay^{TM}, developed for AMD treatment.
Method and Materials:
The 0.4 mm^3 PSD was optically coupled to a plastic waveguide attached to a shielded photomultiplier tube. Dose linearity and percent-depth-dose in solid water was measured using a portable x-ray unit, in lieu of the off-site IRay^{TM}, and compared with an ion chamber. The calibration factor between counts and exposure was tested at high dose and high dose rates using a mobile c-arm fluoroscopy unit.
Results:
Real-time measurements were obtained with bins as small as 10 ms. A calibration factor (CF) from PSD percent-depth-dose to ion chamber percent-depth-dose was 1.06 at a depth of 1.5 cm in solid water, the typical macular target depth. High dose CF varied less than 1% from 0.862 to 15.26R. High dose rate CF remained linear with R^2 of 0.999 up to 16R.
Conclusion:
The IRay^{TM} can accommodate the small volume PSD in order to obtain linear dose measurements at high doses and high dose rates in addition to providing real-time monitoring of dose delivered.
Conflict of Interest (only if applicable):
This work was supported by Oraya Therapeutics.