AbstractID: 10610 Title: Eye Plaque Dosimetry: Report of the AAPM Therapy Physics Committee Task Group No. 129

Purpose: The AAPM Eye Plaque Dosimetry Task Group 129 presents an update of the dosimetry calculations for the Collaborative Ocular Melanoma Study (COMS) plaques. Results from a multi-center comparison using several brachytherapy treatment planning systems (BTPSs) are presented. **Method and Materials**: Dose distributions around 16-mm diameter COMS plaques loaded with I-125 (model 6711) or Pd-103 (model 200) were determined using three TG43-based BTPSs (Pinnacle v8.0d, BrachyVision v6.1 and v8.1, PlaqueSimulator v5.3.7), and two Monte Carlo codes (MCNP5 and BrachyDose). TG-43 plans assumed an unbounded homogeneous medium. Monte Carlo plaque simulations included the Modulay (gold alloy) backing, Silastic (silicone polymer) insert, and interseed interactions. Doses along tumor central axis (-1 to 20 mm) and to defined critical structures such as fovea, optic disc, lens center, and lacrimal gland center in a standard eye model were calculated. **Results**: Agreement among all TG-43 based plans on the central axis was within ±2% for both point- and line-source approximations. However, for off-axis points, BrachyVision v 6.1 had a truncation error in coordinates, which resulted in dose deviation of about 5% relative to other plans. As expected, the doses at off-axis points were lower for the line source approximation than the point source approximation. The largest deviations were found at the lacrimal gland center, where the line source model resulted in 10% and 20% less dose than the point source model for I-125 and Pd-103 sources, respectively. Monte Carlo simulations predicted dose values are about 20-30% lower than the average of TG-43 plan values, due to full plaque geometry; with the exception of few off-axis points up to 90% lower. **Conclusions**: This multi-center comparative analysis of BTPSs dose results indicated the importance of careful selection of TG-43 parameters, source model assumptions, and the BTPS coordinate resolution limits, and the value of complete Monte Carlo calculations.