

AbstractID: 7630 Title: Calculation of the dose distribution around a commercially available ^{125}I brachytherapy source via a Multi-group discrete ordinates method

Purpose: To calculate the dose distribution around a commercially available ^{125}I source by a multi-group discrete ordinates code and compare with a Monte Carlo calculated dose distribution.

Methods and Materials: The multi-group discrete ordinates code, Attila™ version 6.1.1 (Transpire Inc., Gig Harbor, WA) was used to calculate the dose distribution around the IsoAid IAI-125 (IsoAid LLC., 7824 Clark Moody Blvd, Port Richey, Florida 34668). MCNPX 2.4.k was used to benchmark the deterministic calculations. The source was constructed with Solidworks (Solidworks Corp., Concord, MA), a mechanical design software. The constructed geometry of the source, dose scoring plane and sphere were exported in Parasolid® file format so that it could be imported into Attila.

MCNPX 2.4.k was used to compute the Monte Carlo dose distribution. 295 million histories were simulated resulting in standard errors of the mean of approximately 3% at a point 5 cm from the source. The source geometry was identical to that of the Attila run. Dose rate matrices were exported from both codes and imported into an in-house data analysis software.

Results: The qualitative agreement between Attila and MCNPX is excellent. The Attila calculations required approximately 13 minutes of CPU versus 1701 minutes for MCNPX.

Conclusions: The Attila code accurately captured the anisotropy from the IsoAid IAI-125 source. Attila can calculate dose in an efficient manner for low energy photon sources.