

AbstractID:9546 Title : Dosimetric Study of HDR 192Ir and LDR 125I brachytherapy sources using the Penelope Monte Carlo Code

Purpose: To determine the dosimetric parameters of two HDR models 192Ir (microSelectron, and M-19), and LDR 125I brachytherapy sources. **Methods and Materials:** In this study we used the ¹⁹²Ir microSelectron and M-19 models, and also ¹²⁵I source (Amersham OncoSeed model 6711). Penelope Monte Carlo transport code was used. All the photo-nuclear interactions were taken into account. A APM TG-43 was followed to determine the dosimetric properties. 2D dose distribution, dose rate constant, anisotropy and radial dose functions were determined. **Results:** For both Iridium models, the 2D-dose distribution agrees very well with published data for radius $1 \leq r \leq 5$ cm, the difference was less than 3%. The dose rate constant is $1.11654 \text{ cGy h}^{-1} \text{ U}^{-1}$ for microSelectron and $1.12456 \text{ cGy h}^{-1} \text{ U}^{-1}$ M-19 model. Less than 3% difference was observed for the radial dose function for radius $1 < r < 5$ cm for both Iridium models. The DRC for ¹²⁵I was found to be $0.984 \text{ cGy h}^{-1} \text{ U}^{-1}$, and less than 3% difference for the radial dose function in comparison with published data in TG-43. **Conclusion:** Extensive work had been done on ¹⁹²Ir and ¹²⁵I brachytherapy sources. Daskalov *et al*², Medich *et al*³, and Granero *et al*⁴, used different ¹⁹²Ir source models and different Monte Carlo transport codes, but the difference for the dosimetric parameters between all these studies was less than 5%. In this study we used Penelope Monte Carlo code to determine the dosimetric parameters. The results showed 3% difference for 2D dose distribution, DRC, and radial dose function for Iridium sources and 3% difference for Iodine source.