

AbstractID: 1289 Title: TG-60 Based Dosimetric Characterization for TheraSource<sup>TM</sup> 103 Pd Intravascular Brachytherapy Source

TheraSource<sup>TM</sup>, a Pd-103 Intravascular Brachytherapy Source, was used following PTA to deliver 20 Gy to the target tissue in the superficial femoral and popliteal arteries in the TheraP Trial (a phase I safety and feasibility study). The source consists of a 40-mm active segment of high specific activity Pd-103 coated on a nitinol wire. The Monte Carlo Code MCNP4C was used to perform the TG-60 based dosimetric characterization. Monte Carlo calculated dose rate combined with measured activity results in a dose calculation on average within 10% of the TLD measured results for locations from 2 to 20 mm. Source uniformity within  $\pm 10\%$  along the center 2/3 of the source is confirmed using Gafchromic<sup>TM</sup> film. The source was manually stepped to treat interventional treatment lengths up to 134 mm with margins of at least 10-mm. Of the 10-mm margin 3-mm is within 90% or greater of the prescription dose, while the additional 7-mm is from 90%-50% of the prescription dose. In order to minimize the possibility of gaps during manual stepping of the source, 2-mm overlap was used. The dose profile along the length of the source assuming 2-mm overlap as well as realistic permutations was calculated. A centering balloon 1-mm smaller than the vessel inner diameter was used to minimize dose variation at the prescription point due to non-centering. In the 2-mm overlap regions the worst case dose variation due to non-centering and a 2-mm overlap ranges from 17 to 30 Gy.

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