

AbstractID: 1168 Title: Longitudinal Dose Profile at Vessel Wall and Prescription Depths for an Intravascular Brachytherapy System

The Novoste Beta-Cath is a catheter-based Intravascular Brachytherapy (IVBT) delivery system. In this study, a 3.5F 40 mm jacketed radiation source train (JRST) was used to investigate dose uniformity at vessel wall and prescription depths for a reference lumen diameter (RLD) of 3 mm. Stacks of MD-55 radiochromic film strips were sandwiched between β -rail delivery catheter and solid water slabs. The setup simulates various effective depths from $\text{Sr}^{90}/\text{Y}^{90}$ JRST, ranging from 0.8 mm to 2.31 mm. 18.4 Gy was delivered to the prescription depth of 2 mm. Exposed films were scanned using Vidar-16 Dosimetry Pro scanner. Quantitative analysis was performed using RIT 113 Radiation Therapy Film Dosimetry software. The net optical density measurements of each film were converted into 2D dose map. Longitudinal dose profiles, which are vertically below source axis, were obtained for each film. Relative longitudinal dose uniformity within 32 mm of the therapeutic length at 0.8 mm, 1.015 mm, 1.23 mm, 1.456 mm (vessel wall), 1.67 mm, 1.88 mm, 2.095 mm (prescription depth) and 2.31 mm effective depths are within +/- 8.9, 5.1, 4.1, 4.3, 4.8, 4.5, 3.8, and 5.5 %, respectively. Higher longitudinal dose non-uniformity (+/- 8.9 %) was observed at 0.8 mm effective depth due to non-continuity nature of the JRST. Cold spots between individual source are visible at this shadow depth. Dose non-uniformity at vessel wall (+/- 4.3%) and prescription depth (+/- 3.8%) verify that intended dose can be delivered to the entire therapeutic length of 32 mm.