

AbstractID: 6774 Title: Dose Effects of Guide Wires for Catheter-based Intravascular Brachytherapy

Guide wires with high torquability and steerability are commonly used to navigate through a tortuous and/or branching arterial tree in a catheter-based Intravascular Brachytherapy (IVBT) procedure. The dosimetric effects due to the presence of metallic guide wires have not been addressed. This work investigates these dose effects for the three most commonly used β and γ sources (NOVOSTE ^{90}Sr , Guidant ^{32}P and Cordis ^{192}Ir). The EGS4 Monte Carlo codes were used to calculate the dose distributions with and without a guide wire in place. Guide wires of various thicknesses and compositions were studied. The dose perturbations due to the presence of guide wires were found to be far more significant for $^{90}\text{Sr}/^{90}\text{Y}$ and ^{32}P sources than those for ^{192}Ir source. A dose reduction of up to 60% behind a guide wire was observed for the beta sources, while the dose perturbation was found to be negligible for the γ source. For a β source, the dose perturbations depend on the thickness and the material of the guide wire. When the region behind a guide wire is part of IVBT target, the presence of the guide wire results in a significant under-dosing for β sources if no consideration is given in dose prescription. The under-dose region can extend a few mm behind the guide wire and up to 1 mm in other directions. These dose effects may be considered in the dose prescription and/or in analyzing the treatment outcome. Such precautions may not be necessary if using a gamma source.