

AbstractID: 2529 Title: Dosimetry of Beta Emitting Intravascular Brachytherapy Sources

Purpose: To verify the accuracy of current intravascular brachytherapy (IVBT) Sr-90 calibration standards and to generate accurate and detailed IVBT beta dosimetry by analyzing dose distributions in a liquid water medium

Method and Materials: High Sensitivity radiochromic film as well as lithium fluoride thermoluminescent dosimeter (TLD) 1x1x1mm microcubes were exposed in liquid water to a Novoste Beta-Cath Sr-90 IVBT source pellet. Calibration exposures were performed with a Tracerlab RA-1 Sr-90/Y-90 ophthalmic applicator directly traceable to the National Institute of Standards and Technology (NIST) absorbed dose to water standard. Film and TLDs were read 24 hours post-exposure using a Molecular Dynamics Personal Densitometer SI scanner (633nm HeNe laser light source) and a Harshaw 5500 unit, respectively. All exposures were made in a custom built water tank with computer controlled high precision Velmex tracks providing three axes for movement of measurement devices.

Results: Preliminary radial depth dose measurement results with film and TLDs correspond within uncertainty estimates to data published by Soares et al, which is the current NIST standard for IVBT beta sources. The TLDs showed significant volume averaging over their 1mm thickness, requiring Monte Carlo correction to determine the effective point of measurement for each dosimeter.

Conclusion: Liquid water measurements of IVBT beta dosimetry validate the results from previously published studies conducted solely in plastics and in air. These measurements also reduce experimental uncertainty by eliminating the conversion to water from data taken in water mimicking media.