

Liquid-filled intravascular balloons reliably produce dose uniformity for intravascular brachytherapy (IVBT). With beta  $E_{max} = 2.1$  MeV, 17h half-life and on-site production of isotope via W188/Re188 radionuclide generator, Re-188 is an ideal and practical isotope for IVBT. Direct radiochromic film (RCF) measurements for various balloon sizes, wall thicknesses and source configurations can be difficult and time consuming. Monte Carlo and point dose kernel calculations based on emission spectra can be used to investigate the absolute dose per unit activity with various source configurations, but until recently there has been no validated calibration for Re-188 activity measurements. Thus, comparison of direct RCF dosimetry with calculations based on the emission spectrum is a needed verification of both measurements and calculations. We present dosimetry calculations based on a new NIST activity calibration, cross-validated with NIST-traceable (Gafchromic) RCF measurements. Conclusions: 1) Differences as large as 10-25% have been found between the new NIST activity standard and suggested dose calibrator settings for some instruments. 2) We have two methods for determining percent depth dose that agree from 0.13 to 3.0 mm depth: a) direct measurement with RCF calibrated against NIST-traceable Co-60 and NIST-traceable activity measurement; and b) calculation from emission spectrum. 3) RCF measurement gave absolute doses consistently 13% lower than calculated. This work provides a firm basis for Re-188 balloon dosimetry. Partial support was provided to CSMC by Vascular Therapies, for whom Drs. Whiting and Knapp are also consultants. Time and materials for the activity calibration were provided by NIST and ORNL.