

Abstract ID: 9517 Title: Improved Technique for Determining ⁹⁰Y-90 Glass Microsphere Activity Delivered

Purpose: Radioembolization of hepatic metastases with ⁹⁰Y microspheres requires that the user can accurately measure the source activity and consistently determine the completion of dosed delivery. To determine the most effective technique for determining the completion of a single dose application, we have respectively examined dosed measurements and source vial assays from 263 radioembolizations using ⁹⁰Y glass microspheres.

Methods and Materials: ⁹⁰Y glass microspheres were measured in an At-10 dose calibrator. Unit doses were supplied in 0.6 mL of sterile water contained in a vial with a 12 mm clear acrylic shield. Assays were obtained for the point source configuration (microspheres concentrated in the 0.3 mL vial) and for a distributed source configuration (microspheres distributed in 0.6 mL). Assayed vials were compared to nominal activity. Source doses were measured using Invision 451P. Manufacturer's recommended measurements were followed. In addition, the betas dose rate of the unshielded source vial was measured using Thermo Eberline RO7B Mini ionization chamber. Initial and final dose rate measurements were compared to the measured residual activity.

Results: The axial dependence of the dose calibrators ranged from 0 to 5%. Measured activity in the point source configuration was on average 94.5% of the decayed calibrated activity ($R^2=0.996$). However, measured activity in the distributed source configuration was on average 84.5% of the decayed calibrated activity ($R^2=0.998$). Residual activity as a function of the betas dose rate measurements was linear ($r^2=0.4$).

Conclusion: This study has shown that in a point source configuration for source vial assays and using the betas specific dose rate measurements to accurately determine dose delivery does provide a more consistent and accurate determination of ⁹⁰Y glass microsphere activity delivered and improve radioembolization quality assurance.

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