

AbstractID: 10925 Title: Analysis of Dosimetric Quantities Associated with Partial Breast Brachytherapy

Purpose: Radiation dose to the heart and lung are a concern in accelerated partial breast irradiation (APBI). This work presents an analysis of the metrics inherent to high dose rate APBI using a ^{192}Ir brachytherapy source.

Method and Materials: Five patients receiving APBI brachytherapy, and 4 patients, who were simulated in both supine and prone position for XRT, were contoured. Dose to the heart and lung were calculated for all potential dwell locations within the contoured breast for a range of potential dwell times. Summary volume and dose metrics were calculated for heart and lung as function of minimum distance (d_{min}) to the normal structures. The distribution of minimum distances was then compared for the prone and supine patients.

Results: Dose metrics such as the $D_{10\text{cc}}$ were patient specific and not well suited to parameterization. Volume metrics such as $V_{10\text{Gy}}$ tend to have similar behavior and may be characterized as a function of d_{min} . The characterization provides a measure of the normal tissue dose parameters that are achievable as a function of d_{min} . While prone position shift the distribution of lung to breast distances towards greater value, the distribution of heart to breast distances is shifted to smaller distances.

Conclusion: Characteristic curves of the achievable volume metrics as a function of minimum distance from implant to normal structures are presented. These curves may be helpful in the decision to use APBI brachytherapy based on the location of the cavity. The choice of treatment position affects the distribution of breast tissue, though the effect on distance to heart and lung differs.

Conflict of Interest (only if applicable):