

AbstractID: 10216 Title: Dose perturbation study in a multichannel breast brachytherapy device

Purpose: To determine the dosimetric effects due to air pockets and high Z contrast within a new multichannel breast brachytherapy device **Method and Materials:** The 5-6cm diameter Contura brachytherapy device was inflated using 37cm³ of saline to a 40 mm diameter. Baseline dose falloff from an HDR Iridium-192 source was measured in water using a Markus parallel plate chamber supported on a motorized vertical drive. Ionization measurements with the Iridium source centered in the central Contura channel and an anterior off-center channel were performed. Data were collected at distances from 1 to 50 mm. Comparison studies were conducted with identical inflated volume containing varying air pocket volumes (1-4 cm³) and varying concentrations of Isovue contrast solution (3, 6, and 9% by volume). Dose perturbation factors (DPF) were computed and evaluated. **Results:** Dose perturbations due to air pockets and contrast solutions were observed. As the volume of air increased the DPF caused increased dose at a rate of approximately 2.25%/cm³. The effect was relatively consistent for both channels throughout the distance range. The effects due to contrast were more complex. Increased dose was observed from the 3% solution, by 2% from the source in the central channel (#5) and by 4% with the source in the off-center channel (#1). A dose reduction of 1.0% from channel #5 and 1.5% dose increase from channel #1 occurred from the 6% contrast solution. The 9% contrast solution caused dose reductions by 3.5% (channel #5) and 2.5% (channel #1). The DPF from all contrast solutions moderated with increasing distance. **Conclusion:** Dose perturbations due to air pockets and high Z contrast solution can be significant. Treatment planning systems do not account for these. It is important to minimize internal air pockets and limit contrast solution concentration to avoid dose errors to the target and normal tissue.