

AbstractID: 13958 Title: Potential for Target Underdosing with Small Skin Bridges in Balloon HDR Brachytherapy of the Breast

Purpose:

Multi-lumen balloons give the planner the ability to shape isodoses, potentially reducing dose to skin and ribs. This dose shaping may allow treatment of patients with smaller skin bridges between the surgical cavity and the skin surface. As skin bridge thickness is reduced, however, it is expected that dose to the portion of the intended treatment volume closest to the skin will be reduced due to loss of backscatter. This dose reduction will not be modeled by treatment planning systems (TPS) that do not account for inhomogeneities. In this study we have performed measurements to investigate the reduction in dose to tissue at the balloon surface with varying skin bridge thicknesses.

Method and Materials:

An HDR catheter was embedded at a depth of 2.5cm in a stack of water equivalent material, and a MOSFET dosimeter was placed on the surface. When a single dwell position is used directly below the MOSFET, this approximates the breast HDR geometry, with a single dwell position at the center of a water-filled balloon in the surgical cavity, and the measurement point on the cavity surface. Various thicknesses of additional water equivalent material were then placed above the detector to simulate different skin bridge thicknesses, and relative dose measurements were taken.

Results:

With a 5mm skin bridge, dose at the cavity surface was 4.5% below dose in a full-scatter geometry. With a 3mm skin bridge, the reduction was 9.5%.

Conclusion:

Care should be taken when treating patients with skin bridges smaller than those typical with a single lumen balloon, since loss of backscatter can result in significant underdose of the portion of the target closest to the skin. This reduction may not be reflected in TPS calculations. Target underdosing can be avoided if the planner is cognizant of TPS limitations during the planning process.