

AbstractID: 3796 Title: MammoSite dosimetry under condition of insufficient buildup and the proximity of the balloon to the lung

Purpose:

Brachytherapy dose planning for MammoSite assumes full scatter buildup. Clinically, MammoSite dosimetry is affected by the buildup condition between the balloon and the skin and the reduced backscatter contribution from the lung. We attempted to answer the following questions: what is the effect of insufficient buildup? What is the dose to the lung ?

Materials and Methods:

A breast phantom consisting of polystyrene slabs and Styrofoam blocks is constructed. The thickness of slabs may vary to simulate the varying tissues thickness between the balloon surface and skin. Kodak EDR2 films are mounted parallel to the MammoSite catheter between the polystyrene slabs and the Styrofoam blocks. For each thickness of polystyrene slab above the base, the films are irradiated with the same dose. The films are scanned and analyzed by the RIT software.

Results:

The insufficient dose buildup and the lack of backscatter contribution may lead to underdosage at the prescription depth. With only 1 cm tissue above the balloon surface, the minimum dose at the prescription depth is only 75% of the dose under full scatter buildup. Even with 3.5 cm tissue, the dose at 10 mm is only 85%. The lung dose, on the other hand, exhibits a buildup behavior, which varies with the thickness of tissue. As much as 180% of the prescribed dose may be delivered to the lung in the vicinity to the balloon surface.

Conclusion

The insufficient dose buildup and the presence of lung lead to undersage at the prescription distance which is not revealed in all existing planning system since full scatter buildup without heterogeneity correction is assumed. For correct MammoSite dosimetry, the above issues should be addressed properly. The excessive lung dose even under insufficient dose buildup is may be avoided in some cases by careful placement of the balloon.