AbstractID: 7016 Title: Dose verification at the surface of air cavities during radiation therapy using the TomoTherapy Hi-Art system

Purpose: Air cavities are a significant inhomogeneity in radiation therapy. TomoTherapy, a helical dose delivery system, is dependent on a heterogeneity based treatment planning system. Plan optimization can be affected by changing the pitch of treatment delivery along with the modulation factor for the treatments. The system allows for calculations using a fine, normal, or coarse calculation grid. In this investigation, we assess the dose delivered to the surface and superficial regions of the cavity, the influence of the above parameters on dose delivery, and the accuracy of the planning system to represent the dose in these regions.

Method and Materials: Four different 3x3 cm^2 air cavities configurations in solid water were investigated-with 9 and 1cm solid water above the cavity, with the cavity open at the surface, and with no cavity to measure the surface dose. Each cavity had a reference plan, two plans changing pitch, and two plans changing modulation. We compared the predicted dose to measured dose using both the Attix chamber and TLD powder.

Results: A large variation in the percent difference between measured and expected dose depends on the location of the air cavity below the phantom surface. The accuracy of the delivered dose varied with both modulation factor and pitch dependent on the cavity location in the phantom. The Attix chamber and TLD powder showed essentially the same response, but the Attix chamber data was more precise.

Conclusions: The accuracy of the delivered to expected dose on the cavity surface was greater when the air cavity was far below the surface (0-5%). As the cavity moved closer to the surface, the deviations in measured to expected dose increased to minus 40-50% of the measured dose at the surface.