AbstractID: 13643 Title: Objective Approach to Report Planner-Independent Skin and Rib Distance and Maximal Dose in Contura® HDR Breast Brachytherapy Planning

**Purpose:** To demonstrate an objective approach to determine planner-independent skin and rib distance and maximal dose in Contura® high dose rate brachytherapy planning. **Method and Materials:** A virtual skin volume was produced by expanding the skin surface in three dimensions (3D) external to breast with a certain thickness. Therefore, the maximum dose to this volume occurs on the skin surface as with manual selection method. A 3D rib volume was reconstructed from rib contours on axial CT images. The maximal dose to skin and rib was extracted from their dose volume histograms. Minimum skin and rib distance from the balloon surface was objectively calculated using the inverse square law assuming that the balloon was a sphere and the prescribed dose was located on the surface of a 1-cm expansion from the balloon. For the calculation, three different plans were utilized: single dwell position with single lumen (SDSL), multiple dwell position with single lumen (MDSL) and multiple dwell position with multi-lumen (MDML) plans. Those estimated minimum distance of skin and rib were compared for 24 patients with 48 manual measurements taken by a comprehensive review of 3D planning CT images. **Results:** The average ± standard deviation (maximum) of estimated skin and rib distance in comparison with manual measurement was 0.4 mm ± 0.4 (1.8) for SDSL, 0.6 mm ± 0.5 (2.5) for MDSL and, 1.3 mm ± 1.2 (5.5) for MDML plans. Agreement within ± 1 mm difference was observed in 46/48 cases for SDSL, 40/48 cases for MDSL, and 25/48 cases for MDML plans. **Conclusion:** Volumetric information of skin and rib was used to objectively determine their maximal dose. The SDSL plan is better for skin and rib distance measurement because of its spherically symmetric dose distribution. However, asymmetric dose distribution in the MDML plan should be used for treatment.