AbstractID: 12754 Title: Dosimetric comparisons of a Contura multi-lumen and a MammoSite single-lumen in accelerated partial breast brachytherapy

**Purpose:** To investigate the dosimetric improvement of Contura multi-lumen balloon (MLB) compared to the traditional MammoSite single-lumen balloon (SLB) in partial breast high-dose-rate (HDR) brachytherapy. **Method and Materials:** Twelve women with earlier stage of breast carcinomas treated post-lumpectomy with HDR brachytherapy using a Contura MLB (SenoRx Inc., Aliso Viejo, CA) were selected in this study. For the dosimetric comparisons, hypothetical MammoSite SLB (Cytyc Corp, Marlborough, MA) treatment plans (both single- and multi-dwell positions) were created in the same CT images. The percentages of prescribed dose to 95 % of the planning target volume for plan evaluation (PTV_EVAL) were optimized within 1 % for 3 different plans (MLB & single/multi-dwells of SLB). The minimum balloon-to-skin distance ranged from 3 to 21 mm and the minimum balloon-to-rib distance ranged from 0.5 to 52 mm. **Results:** Optimizations of asymmetric dose distributions were performed to protect the critical structures (skin and rib) for both balloon studies. For cases with less than 6 mm of the minimum skin distance, the maximum skin doses of MammoSite plans were 126 - 162 % (428.4 – 550.5 cGy) of the prescribed dose (340 cGy per fraction), resulting in severe overdosage to the skin. All MammoSite plans did not satisfy the treatment planning goal (less than 425 cGy) for the maximum skin dose, but only one of five Contura plans did not reach the goal. Also, for cases with less than 4 mm of the minimum rib distance, the maximum rib doses of MammoSite plans were up to 799.7 cGy which was 235 % of the prescribed dose, resulting in severe overdosage to rib. **Conclusion:** Contura MLB provides important dosimetric advantages over a MammoSite SLB, which allows avoidance of a radiation hot spot in the skin and/or rib.