

AbstractID: 8169 Title: A Simple Optimization Method for Multi-Lumen Balloon Breast Brachytherapy and Comparisons with Single Dwell Position Balloon Breast Brachytherapy

Introduction: Some patients who could benefit from balloon brachytherapy are excluded due to proximity of skin to lumpectomy cavity. Of those treated, some have noticeable damage in the ribs on follow up MRI images, which may be due to high rib dose. Recently, Multi-Lumen Balloon (MLB) applicators have been used clinically. We have developed a simple optimization method for MLB breast brachytherapy to reduce high skin and rib dose, and compared treatment plans from this method with traditional single dwell position (SP) treatment plans.

Method and Materials: SenoRx Contura™ MLB applicators and Varian Eclipse are used. Following the RTOG 0413 protocol, PTV is contoured. Following the guidelines of SenoRx, volume within 5 mm of skin and lung is auto contoured as Body_Wall, PTV minus Body_Wall gives the PTV_EVAL. We then introduced a PTV_and_Wall volume delineated as the intersection of Body_Wall with the PTV. All dwell positions in all lumen inside the balloon are activated, treatment plan is developed by running optimization with objectives on PTV_EVAL and PTV_and_Wall. Maximum dose to skin and rib, some DVH values of PTV_EVAL and PTV_and_Wall are studied and compared.

Results: MLB plans 1) have better coverage to PTV_EVAL, mean dose to 99% of PTV_EVAL is 3073 cGy vs 2790 cGy; 2) reduce maximum skin dose for patients with minimum skin distance of 15 mm or less, mean maximum skin dose of 2934 cGy vs 3417 cGy; 3) reduce maximum rib dose dramatically for patients with minimum rib distance of 5 mm or less, which account for about 50% of patients studied, mean maximum rib dose of 4613 cGy vs 5950 cGy.

Conclusion: MLB plans from this optimization method are better than SP plans, especially when minimum skin distance is 15 mm or less, or minimum rib distance is 5 mm or less.