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### **Comparison of surface dose resulting from SMLC and compensator-based IMRT for breast radiotherapy**

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**Purpose:** To compare the surface dose to the ipsilateral breast between compensator and MLC-based IMRT for breast radiotherapy both with and without simulated respiratory motion.

**Methods & Materials:** An anthropomorphic polystyrene breast phantom mounted on a moving platform was used to simulate the human breast and its respiration-induced motion during radiotherapy. MOSFET dosimeters were placed on the surface of the phantom at 5 approximately uniformly spaced positions in the central axial plane. Two common IMRT treatment techniques were then used to deliver a uniform dose of 1.8 Gy to the simulated breast both with and without simulated respiratory motion with 1 cm amplitude and a period of 4 seconds. Both techniques used the same parallel-opposed half-beam-blocked tangential beams, but one used bismuth polyethylene compensators to create the modulation while the other used the segmental MLC (SMLC) delivery technique to create the modulation. The segment shapes and weights for the SMLC delivery were created from the fringe lines of the compensator maps so that the plans delivered essentially identical dose distributions to the phantom beyond the build-up region.

**Results:** Respiratory motion did not significantly alter the surface dose for either technique. All five dosimeters measured lower surface doses from the SMLC plans in comparison to the compensator plans. The average surface dose for SMLC delivery of 127 cGy was 6% lower than the average dose of 135 cGy measured for compensator delivery.

**Conclusion:** The secondary and scattered radiation produced in the compensator increases surface dose. The use of SMLC IMRT results in lower dose to the skin than that from compensator-based IMRT and this fact should be considered when planning breast IMRT cases.