Purpose: To evaluate the dosimetric impact of MammoSite Multi-Lumen (MSML) rotation in phantom and patient studies.

Methods and Materials: A MSML phantom with an asymmetric dose distribution was created. Target volume coverage and dose at a fixed point 1 cm from the MSML were evaluated as functions of rotation about three orthogonal axes (where the origin was set at the center of the MSML and axis one ran along the central catheter). Additionally, for three MSML patients that were set-up by aligning the stem of the MSML to skin marks, CT scans were acquired before each fraction. Rotation about three axes and maximum point dose to skin and chestwall were evaluated.

Results: In phantom, 10° rotations about the central, second, and third axes give average absolute point dose changes with respect to the maximum dose of 1.9%, 3.7%, and 4.2%, respectively; and changes in PTV coverage of 0.9%, 1.0%, and 0.8%, respectively.

For patients 1-3 the average absolute rotation about the central axis was 13.60, 9.50, and 7.20, respectively; axis two was 7.00, 3.20, and 11.40, respectively; axis three was 2.90, 2.90, and 3.80, respectively. For cases 1-3 the average absolute change per fraction in maximum point dose to the skin was 0.29 Gy, 0.14 Gy, and 0.39 Gy, respectively; to the chestwall was 0.17 Gy, 0.20 Gy, and 0.21 Gy, respectively.

Conclusion: Phantom studies showed change in point dose and PTV coverage for a 10° rotation about the central catheter yields < 2% variance. Patient data indicates skin mark alignment is capable of positioning the MSML with 10° accuracy about the central axis. Thus, central axis rotation can be adequately accounted for by skin mark alignment. However, review of the patient data shows that rotations about the other axes are equally important and should be considered and managed.