Purpose: The purpose of this study was to compare dose distribution and normal tissue sparing in the treatment of left chest wall, as well as supraclavicular nodes (SCV), and, in one case, internal mammary nodes (IMN) for patients undergoing post mastectomy radiation using three-dimensional conformal radiotherapy (3D-CRT) vs. multi-beam intensity-modulated radiotherapy (IMRT).

Methods: To date, a total of five patients were randomly selected for comparison. All the planning target volumes (PTV) were contoured according to the Breast Cancer Atlas for the Radiation Therapy Planning from Radiation Therapy Oncology Group (RTOG). A dose of 5040cGy was prescribed in 28 fractions to each PTV. Two plans were evaluated for each patient, one with beam split tangents and an additional supraclavicular field for 3D-CRT, and the other one with five inverse-planned IMRT beams. To obtain the desired skin dose, bolus was used every other day. Dose comparison metrics included: PTV homogeneity index (HI) and conformity index (CI), V30 and V5, and mean and maximum doses to normal tissue structures, such as heart, left lung, right lung, contralateral chest wall, and V20 to both lungs.

Results: Compared to a conventional 3D-CRT plan, the five-field IMRT significantly improved PTV HI and CI, and marginally reduced heart and left lung maximum doses without compromising PTV coverage, but at the same time increased contralateral chest wall and lung dose, and heart V5.

Conclusions: Five-field IMRT plan provides far superior target volume coverage and comparable heart V30 and lung V20 to a conventional plan, while increasing low dose to contralateral side. The use of five beams – instead of 9 or 11, as recommended by other studies – reduces the treatment time and, consequently, possible setup and internal organ motion errors. Further clinical studies are needed to determine whether IMRT improves tumor control or reduces acute or late toxicities when compared to 3D-CRT.