

## Prospective evaluation of normal tissue toxicity associated with breast boost in early-stage breast cancer radiotherapy

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## Abstract

The addition of a tumour-bed boost following whole breast radiotherapy (RT) can reduce local recurrence, but is associated with increased toxicity. The objective of this study was to prospectively record toxicities in women treated with whole breast RT with or without a sequential boost, and determine the associated with breast-related late toxicities.

This REB approved study included women with breast tumours previously treated with 50Gy/25±10Gy boost, 40Gy/16±12.5Gy boost, or 42.40Gy/16±10 boost. Breast RT was delivered using intensity modulated RT (IMRT). The tumour bed was contoured for boost treatment (delivered using a mixed photon and electron direct appositional technique). Breast-related toxicities were prospectively evaluated at 3, 6, 12, and 24 months, and were defined by CTCAE v3.0. Chemotherapy, RT dose, age, time since RT, and boost parameters were assessed for association with late toxicity. Multivariable marginal logistic regression analysis was performed on all patients and the boost cohort.

From Jan 2007 to Dec 2009, 125 post-lumpectomy women were included. Fifty-eight (46%) women had breast RT only and 67 (54%) had a subsequent boost. Patients who attended and had one or more toxicities at 3, 6, 12, or 24 months were 59/94 (63%), 61/100 (61%), 51/104 (49%), and 47/104 (45%), respectively. Adjuvant chemo, age, and RT tangential dose were not significant for side-effects. The addition of a boost increased the odds of having at least one side-effect by nearly 2-fold (OR=1.97; 95%CI: 1.14-3.4, p=.015). The odds of any side-effect did reduce over time (OR=0.67 per year; 95%CI: 0.48-0.91, p=.012). Within the boost cohort, the odds of side-effects increased with electron energies >9MeV (OR=2.66, 95%CI: 1.1-6.41); while no impact was observed with chest wall thickness, depth of seroma, hotspot, nipple in-field, and boost field size. Compared to the lower outer quadrant, upper inner (OR=4.82) and upper outer quadrant boosts (OR=3.37) increased the odds of side-effects.

Whole breast RT treated with standard fractionation or hypofractionation were not significantly different with respect to late toxicity. The addition of a breast boost nearly doubled the risk of any breast-related late toxicity, with reduction in these side effects over time. Where possible, boost treatments should be tailored to avoid sensitive normal breast regions and omit high electron energy to minimize late toxicities.

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#### Abstract

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