



# READ IT BEFORE YOUR PATIENTS

## Breast

### Is Radiation-Induced Cardiac Toxicity Reversible? Prospective Evaluation of Patients With Breast Cancer Enrolled in a Phase III Randomised Controlled Trial

*Aswin Abraham, Karan Paul Sanghera, Farshid Gheisari, Stella Koumna, Terence Riauka, Sunita Ghosh, Heather Warkentin, Zsolt Gabos, Susan Chafe, Keith Tankel, Fleur Huang, Siham Sabri, David Ian Paterson, Bassam Abdulkarim, Kurian Joseph*

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#### PURPOSE

Myocardial perfusion defects after breast radiation therapy (RT) correlate with volume of irradiated left ventricle (LV). We aimed to determine the relationship between myocardial perfusion, LV dosimetry, and grade  $\geq 2$  late cardiac events in patients with breast cancer undergoing adjuvant RT.

#### METHODS AND MATERIALS

A randomised study evaluated the benefit of inverse-planned intensity modulated radiation therapy over forward-planned intensity modulated radiation therapy for radiation toxicity in breast cancer. A secondary endpoint was evaluating cardiac perfusion by single-photon emission computed tomography done at baseline, six months, one year, two years, and five years post-RT. We used receiver operating curve and regression analysis to identify association between perfusion, radiation dose-volumes, and the risk of late cardiac events.

#### RESULTS

Of 181 patients who received adjuvant RT, 102 were patients with cancer in the left breast (called in this study the left-sided group) and 79 were patients with cancer in the right breast (called in this study the right-sided group). Median follow-up was 127 months (range, 19-160 months). A significant worsening of perfusion defects occurred after RT in the left-sided group, which improved by one year. Late cardiac events were found among 16 patients (17.2%) in the left-sided group and four patients (5.5%) in the right-sided group. Perfusion changes did not correlate with late cardiac events, but LV dose-volumes correlated with late cardiac events. Maintaining the LV volume receiving 5.0 Gy and 10 Gy to  $<42$  cc and  $<38$ cc, respectively, can reduce the risk of radiation-related late cardiac events at 10 years to  $<5\%$  over baseline.

#### CONCLUSIONS

RT was associated with short-term perfusion defects that improved within one year and was not correlated with late cardiac events. The ventricular volumes receiving 5.0 Gy and 10 Gy were correlated with late cardiac events.