

AbstractID: 4766 Title: Is there a Relationship between Body Mass Index, Treatment Set-up Errors, and the Development of Myocardial Perfusion Defects following Radiation Therapy for Left-Sided Breast Cancer?

Purpose: To assess whether body mass index (BMI) affects the rate of "deep" set-up errors (i.e. those that increase the volume of heart irradiated), resulting in an increased risk of RT-induced myocardial perfusion defects (PD) 6-60 months post-RT.

Materials and Methods: For 87 patients receiving RT for left-sided breast cancer, treatment set-up accuracy was determined by measuring the height of the lung shadow seen at the level of the central axis on simulation and serial medial tangent portal films. SPECT nuclear medicine scans were performed serially pre- and post-RT to assess for cardiac PD. The interaction among BMI, set-up error frequency, and the rate of PD was compared using a 1-tailed Fisher's Exact Test.

Results: The rates of deep set-up deviations were 9/32 vs. 24/51 in patients with BMI < 25 kg/m² and ≥ 25 kg/m², respectively (p=0.068) (Fig 1). When patients were stratified by volume of left ventricle (% LV) in the RT field, set-up deviations had an impact on the rate of PD in patients with >0% but ≤1% LV in the field (i.e. patients who are generally predicted to be at very low risk for RT-induced cardiac dysfunction). The rates of PD in these patients with deep vs. "shallow" set-up errors (i.e. those that decrease the volume of heart irradiated) were 5/6 vs. 3/10 (p=0.059) (Fig 2).

Conclusions: Patients with BMI ≥ 25 kg/m² tend to have a higher incidence of deep set-up errors, causing more heart to be irradiated than intended. In patients with very small volumes of heart in the RT field, those with deep set-up errors are more likely to have PD post-RT. Accurate patient set-up on the treatment machine is critical to minimize the risk of RT-induced cardiac injury, particularly in overweight and obese patients. Supported by grants 17-98-1-8071 and BC010663 from the DOD.