

## **Assessment of LVEF by CMR versus MUGA in Breast Cancer Patients Receiving Trastuzumab: A Blinded Prospective Observational Pilot Study**

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### **Background**

Multiple gated acquisition scanning (MUGA) is limited in detecting subtle LV function and structure changes for early detection of cardiac dysfunction. Although cardiac MRI (CMR) is considered the gold standard, it is not routinely used to monitor patients receiving trastuzumab. In addition, the association between CMR LVEF and cardiac biomarkers, brain natriuretic peptide (BNP) and Troponin-I, is not well studied. The aim of this study is to compare CMR and MUGA for LVEF assessment in breast cancer (BC) patients receiving trastuzumab, and to examine the association between biomarkers and LVEF by CMR and MUGA.

### **Methods**

This was a prospective study between January 2010 and December 2013, where BC patients initiating trastuzumab as per standard of care were eligible. MUGA and CMR were performed at baseline and 6, 12, and 18 months after trastuzumab initiation, with biomarkers collected concurrently. Scans were analyzed by two experienced readers.

### **Results**

The final cohort included 41 patients (mean age  $51.7 \pm 10.6$ ), of which 23 had anthracyclines. Bland-Altman analysis displayed wide agreement limits between MUGA and CMR LVEF, with MUGA consistently lower (Table 1). The results were further validated by concordance correlation coefficients ( $r = 0.46$  at baseline;  $r = 0.29$  at 6 months;  $r = 0.42$  at 12 months;  $r = 0.39$  at 18 months). Interestingly, LVEF decreased during treatment and returned to near baseline after completion at month 18 ( $p=0.0114$  and  $0.0014$  by MUGA and CMR, respectively). Spearman correlations between biomarkers and MUGA or CMR LVEF were not statistically significant.

### **Conclusion**

CMR is an alternative modality for serial monitoring of LVEF. Agreement between CMR and MUGA is limited by different normal reference ranges, with MUGA found to be consistently lower. Further validation in a larger cohort is warranted.

Table 1. LVEF measurements and agreement limits

	Baseline (n =41)	6 mo. (n =38)	12 mo. (n =35)	18 mo. (n =33)
LVEF (%) MUGA	58.2 ± 5.8	55.1 ± 7.3	54.5 ± 7.8	57.9 ± 8.5
LVEF (%) CMR	60.5 ± 4.3	58.3 ± 4.8	58.1 ± 4.8	60.2 ± 5.8
Mean difference (MUGA LVEF - CMR LVEF)	-2.3 ± 5.1	-3.1 ± 6.8	-3.4 ± 6.8	-2.9 ± 7.8
Bland Altman 95% agreement limits	-12.3 to 7.7	-16.3 to 10.1	-16.7 to 9.9	-18.1 to 12.2

*Data as mean ± standard deviation*

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