

Meeting abstract

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## 2083 Women have higher left ventricular ejection fractions than men: a multivariable analysis in 4864 subjects using SSFP cine MRI

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### Introduction

Left ventricular ejection fraction (LVEF) is traditionally used as a clinical marker for prognosis and clinical risk stratification. Decisions for prescribing clinical therapies are frequently based on LVEF. The results from existing literature are conflicted with respect to the existence of a gender difference in LVEF. One explanation is that greatly varying magnetic resonance imaging techniques including SSFP, GRE, or hybrid echo planar cine methods were used or that small sample sizes were studied in the publications to date. Thus, it remains unclear whether statistically significant gender-specific differences between LVEF exist.

### Purpose

We retrospectively analyzed the clinical cardiac MRI scans that were performed at the National Institutes of Health, Suburban Hospital, and Icelandic Heart Association since 2001 for gender differences in left ventricular ejection fraction using steady state free precession cine cardiac magnetic resonance imaging.

### Methods

Categorical variables were compared with chi squared test, and continuous variables were compared using Wilcoxon rank sum test. The relation between gender and LVEF was adjusted for covariates using multivariable linear regression models. All cardiac MRI scans were performed using SSFP cine cardiac MRI. Variables assessed included gender, age, LVEF, percent LV delayed enhance-

ment, LVEDV indexed to BSA, and LVED Mass indexed to BSA.

### Results

We screened over 5000 subjects who had SSFP cine cardiac MRI scans performed and excluded those with missing fields for gender, LVEF, and body surface area (BSA) resulting in 4864 subjects within the collective database. Multivariable analysis showed that delayed enhancement, LVEDV indexed to BSA, age and gender were the strongest predictors of LVEF. However, LVED Mass indexed to BSA was not significantly predictive of LVEF. Since myocardial infarction and EDV were the two strongest predictors of abnormal ejection fraction, we excluded all patients with delayed LV enhancement and LVEDV/BSA exceeding two standard deviations beyond the normal accepted values for SSFP cine techniques in cardiac magnetic resonance imaging of normal subjects. In the remaining 3223 patients (1829 men and 1394 women), women subjects still had a significantly higher ejection fraction compared to men (63% versus 60%,  $p = < 0.001$ ).

### Conclusion

To the best of our knowledge, this is the largest study to date that used SSFP cine MRI and manual planimetry by cardiologists to measure gender related differences in LVEF. Despite the referral nature of the population, a group of 3223 subjects had diagnostic imaging to exclude the most common causes of abnormal LVEF. Thus, in

both overall multivariable analysis and in the subset of patients without CAD or dilated cardiomyopathy, women were found to have a higher LVEF than men.

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