

Meeting abstract

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2041 Do linear and volumetric measures of left ventricular concentricity agree?

Carol J Salton^{*1}, Noriko Oyama¹, Daniel Levy², Elizabeth A Goddu¹, Christopher J O'Donnell², Warren J Manning¹ and Michael L Chuang¹

Address: ¹Beth Israel Deaconess Medical Center, Boston, MA, USA and ²The NHLBI's Framingham Heart Study, Framingham, MA, USA

* Corresponding author

from 11th Annual SCMR Scientific Sessions
Los Angeles, CA, USA. 1–3 February 2008

Published: 22 October 2008

Journal of Cardiovascular Magnetic Resonance 2008, **10**(Suppl 1):A310 doi:10.1186/1532-429X-10-S1-A310

This abstract is available from: <http://jcmr-online.com/content/10/S1/A310>

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Introduction

Increased left ventricular (LV) mass is an independent predictor of cardiovascular morbidity and mortality. Concentric LV geometry confers excess cardiac risk above that of increased LV mass alone. Concentricity is traditionally defined as an increased ratio of inferior wall thickness (IWT) to end-diastolic dimension (EDD, or LV diameter). This relative wall thickness (RWT) is determined using linear measurements at a single level of the ventricle and may not accurately reflect the relationship between LV mass and cavity size in the presence of focal abnormalities.

Purpose

Determine whether a volumetric extension of RWT, the ratio of LV mass to end-diastolic volume (EDV) ranks subjects in the same manner as RWT, particularly as many recent reports present the ratio of LV mass to EDV as a volumetric measure of concentricity.

Methods

Data from 200 adults (100 consecutively-scanned men and 100 consecutive women), aged 61 ± 8 years, from the Framingham Offspring cohort were analyzed for this study. Subjects underwent contiguous multislice ECG-gated SSFP breathhold cine CMR imaging in the LV short-axis orientation in a 1.5-T scanner using cardiac array coil for RF signal reception. Imaging parameters included a slice thickness of 10 mm without gap and in-plane resolution of 1.92×1.56 mm². RWT was defined in the standard manner as $2 \times \text{IWT}/\text{EDD}$, with measurements taken from

a short-axis slice just basal to the papillary muscle tips. "Relative total mass" or RTM was defined as the ratio of LV mass to EDV. Continuous variables are summarized as mean \pm SD. Differences between sexes were assessed by unpaired, 2-tailed t test, with $p < 0.05$ considered significant. On further analysis, subjects, divided by sex, were ranked by RWT and by RTM. We used Spearman correlation to assess agreement between linear (RWT) and volumetric (RTM) rankings. We also divided subjects into quartiles of concentricity by RWT and by RTM and tabulated the number of between-quartile changes when comparing the two measures, where Q0 indicates the same quartile (zero change), Q1 a one-quartile difference, and Q2 and Q3 two and three quartile changes respectively.

Results

RWT was greater in men (0.30 ± 0.4) than women (0.28 ± 0.05), $p < 0.0001$. Similarly, RTM was greater in men (0.95 ± 0.17 g/ml) than women (0.82 ± 0.13 g/ml), $p < 0.0001$. There was modest correlation between RWT and RTM for men ($r = 0.55$) and for women ($r = 0.52$), but there was wide variation in individual rankings as shown in Figure 1; if there were perfect agreement between RWT and RTM all data points would lie on the line of identity, but as can be seen there is wide scatter for both men and women. Stratification by quartile of concentricity (Figure 2) showed that approximately two-thirds of subjects were ranked in the same quartile (Q0) by RWT and RTM, but a quarter of subjects differed by 1 quartile and almost 10% of subjects differed by 2 or more quartiles.

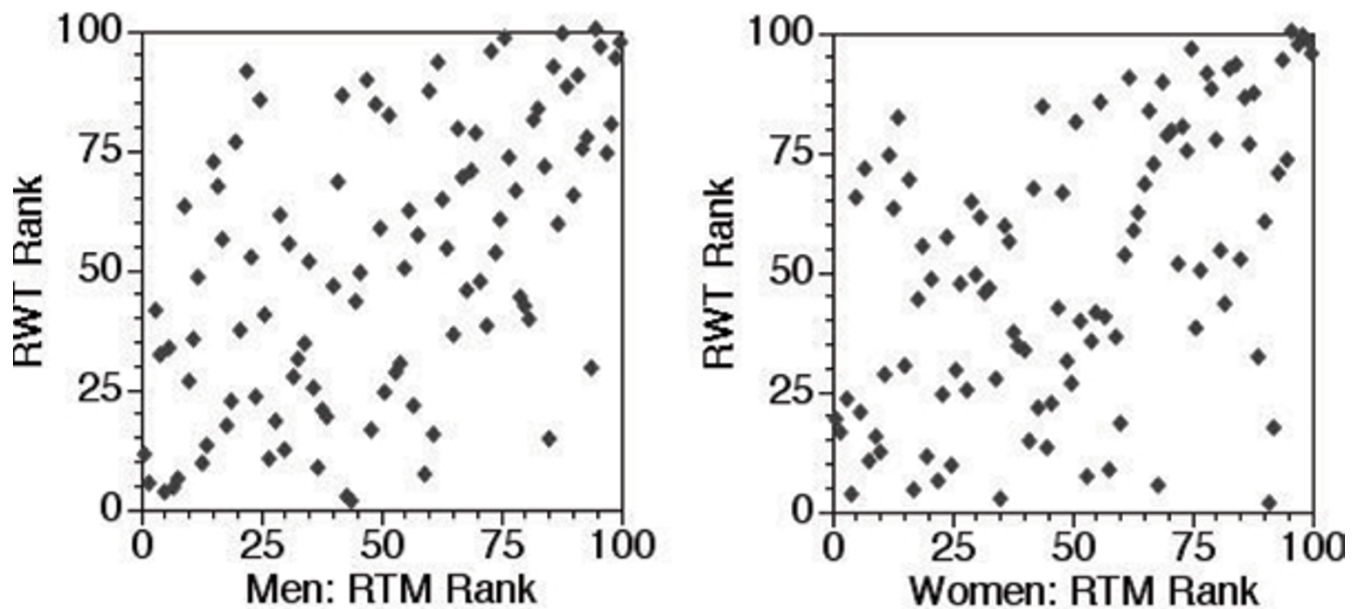


Figure 1

Conclusion

We compared linear (RWT) and volumetric (RTM) measures of LV concentricity. Both RWT and RTM were greater in men than women. There was only modest concordance between RWT and RTM with respect to ranking subjects by LV concentricity. Further, when subjects were stratified by quartile of concentricity, approximately one-third of subjects differed by at least 1 quartile and 10% of subjects differed by 2 or more quartiles. Linear concentricity (RWT) has been shown to predict excess morbidity and mortality based on echocardiographic studies. Further work is needed to determine whether RTM better predicts excess cardiac risk than does RWT, but RWT and RTM do not provide identical, or even very similar rankings of adult subjects by concentricity.

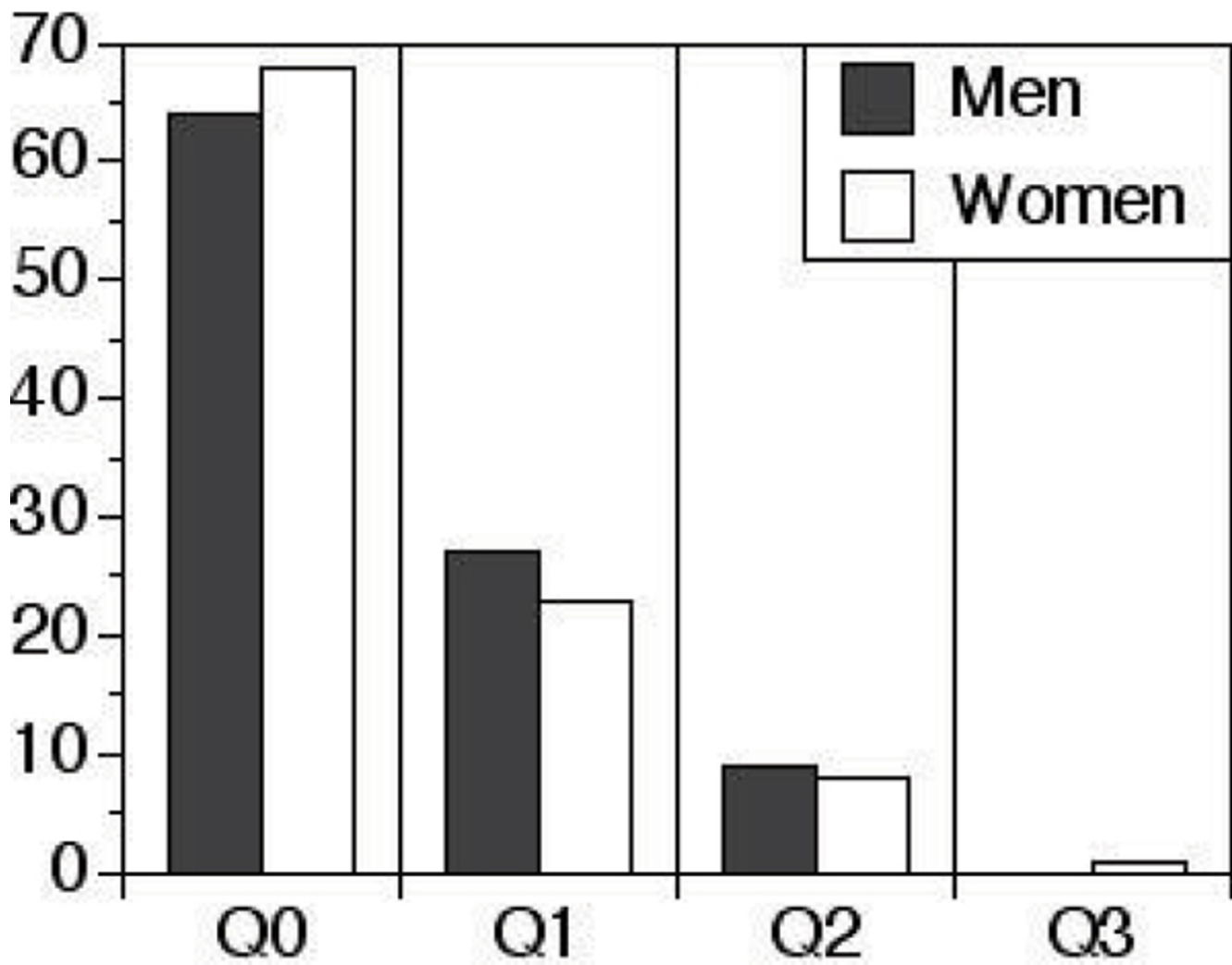


Figure 2

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