

A Fully Automated Echocardiography Software Can Accurately Quantify Left Ventricular Ejection Fraction in Patients with Segmental Wall Motion Abnormalities From a Single Plane

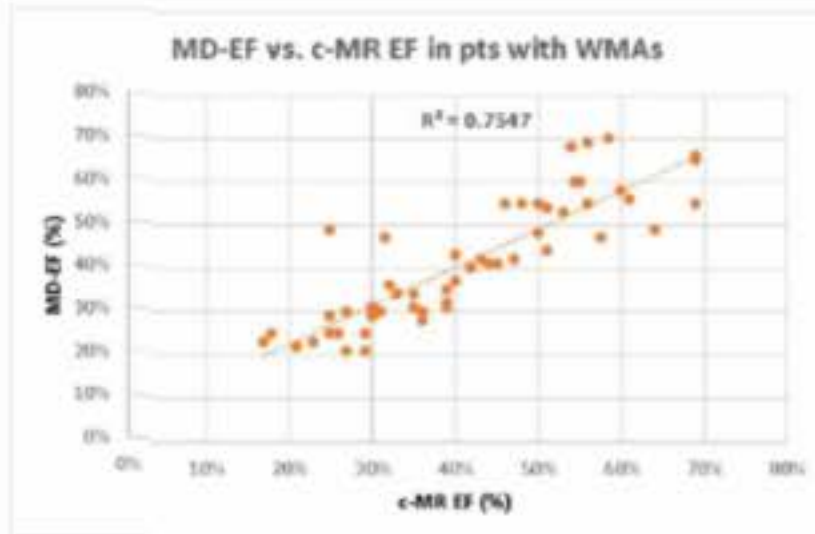
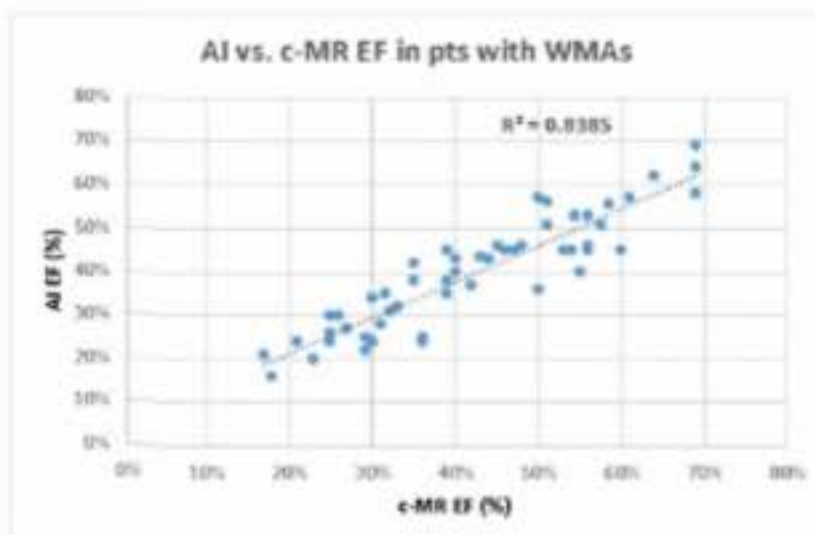
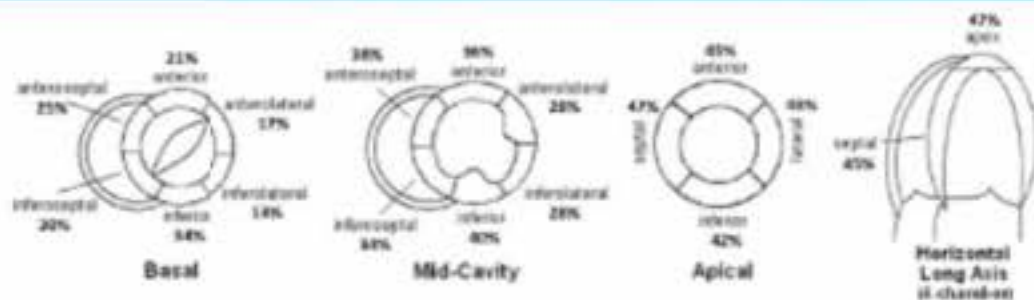
Solomon Bienstock, Rajeev Samtani, Ashton C. Lai, Lon Croft, Steve Liao, Eric Stern, Martin E. Goldman
Icahn School of Medicine at Mount Sinai, New York, NY

Background

- LVivoEF by DIA® is a novel artificial intelligence (AI) TTE software that tracks the endocardial border in a single plane 4-chamber view or biplane, instantaneously generating a LVEF.
- We have previously demonstrated a strong correlation between the single plane 4 chamber AI-derived LVEF and the LVEF as determined by the gold standard cardiac magnetic resonance imaging (c-MR).
- Given the potentially problematic single plane approach of AI LVivoEF, we sought to validate the accuracy of AI-derived LVEF in the setting of wall motion abnormalities (WMAs).

Methods

- Retrospective single center study of 53 patients (pts) with segmental WMAs as reported by physician-read TTE who underwent both TTE (70% with ultrasound enhancing agents) and c-MR within 6 months without interval clinical events was performed.
- The single plane 4-chamber images were analyzed by the AI software and compared to both physician-reported LVEF (MD-EF) and c-MR-derived LVEF. Using Fisher's r to z transformation, the correlation between AI and c-MR was compared to the correlation between MD-EF and c-MR.
- A total of 17 segments were analyzed for hypokinesis. Septal dyskinesia due to conduction, right ventricular overload or post-operation was analyzed separately



Results

- In the 53 pts (70% men; mean age 59.5 years), a total of 901 segments analyzed (17 x 53). Thirty-eight percent (mean of 6.5 segments/pt) of pts had segmental WMAs distributed throughout the LV: 47% LV apex; 43% lateral apex; 42% infero-apex; 28% mid inferolateral; 34% inferoseptal (see figure). Abnormal septal wall motion was found in 24 of the pts (45%); seven pts (13%) had isolated abnormal septal wall motion without hypokinetic segments.
- Despite the 4-chamber view not being optimized for the anterior, inferior, basal inferior walls, the correlation between AI and c-MR was $R^2 = 0.8385$ while the correlation between the MD-EF and c-MR was $R^2 = 0.7547$.
- However, the difference in Pearson's r between AI/c-MR and MD-EF/c-MR was not significant ($p = 0.123$).

Conclusions

- LVivoEF by DIA®, which derived the LVEF from a single plane apical 4-chamber TTE view, correlated well with volumetric c-MR LVEF even in the presence of WMAs.
- Thus, LVivoEF single 4 chamber view analysis can be reliably applied to pts with wall motion abnormalities for rapid LVEF quantification.