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Validation of an Artificial Intelligence Left Ventricular Ejection Fraction Quantification Software with Cardiac Magnetic Resonance Imaging in Consecutive Non-Selected Patients

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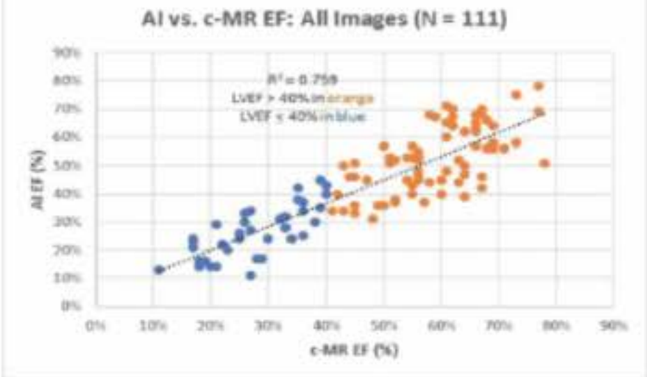
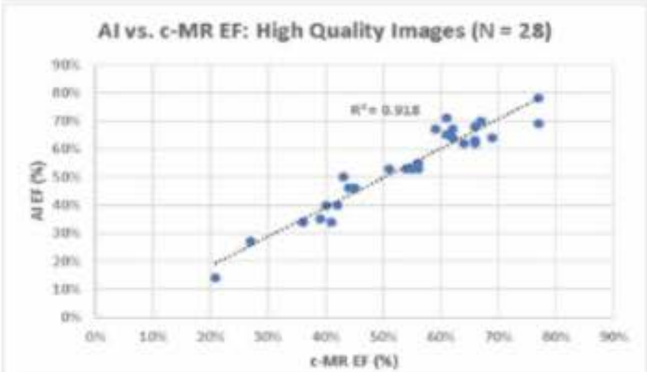
Background

- Current quantification of LVEF is subjective, time-consuming, and error-prone.
- Automated artificial intelligence (AI) programs have been developed to reduce variability and increase throughput.
- LVivoEF by DIA®, new artificial intelligence (AI) software, provides an almost instantaneous LVEF quantification f rom a single-plane apical 4-chamber view.
- We sought to assess the ability of LVivoEF to track and quantify routine clinical TTEs.

Methods

- Retrospective single center study of 111 non-selected random patients (pts) who underwent both TTE and c-MR within 6 months (mean 28 ± 40.3 days) with no interval significant clinical events
- AI-derived LVEF from a single plane 4-chamber view was compared to to c-MR in 111 pts. Using linear regression and chi square, the AI 4-chamber LVEF were compared to the cMRI-derived LVEF.
- High-quality images were defined based on endocardial definition, lack of apical foreshortening, lack of wall "dropout," overall signal-to-noise, and vertical axis by two independent physicians.





Results

- Of the 111 pts (53% men; mean age 54.5 years), 59 had a normal EF (>51%), 16 mildly abnormal (41-51%), 15 moderately abnormal (30-40%), and 21 severely abnormal (<30%) while 29 had wall motion abnormalities.
- The correlation between AI and c-MR was highly significant with $R^2 = 0.759$. When only high-quality images were utilized, the correlation between AI and c-MR was $R^2 = 0.918$.
- Finally, AI was highly sensitive (91.67%) and specific (81.33%) for detecting reduced LVEF ≤ 40% versus LVEF > 40% ($\chi^2 = 53.09$, $p < 0.00001$).

Conclusions

- Using a single plane apical 4-chamber view, LVivoEF by DIA® can quantify LVEF and categorize reduced LVEF regardless of image quality in non-selected pts.
- Thus, AI has the ability to dramatically improve and expedite LVEF quantification in routine clinical practice.