

# Validation of a Novel Artificial Intelligence Left Ventricular Ejection Fraction Quantification Software (LVivo EF by DIA®) by Cardiac MRI

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**Background:** The diagnosis of left ventricular (LV) function and ejection fraction (EF) is the most frequently requested transthoracic echo (TTE) diagnosis, but its quantification can be patient habitus, machine, sonographer, and interpreter dependent. Application of a rapid, on-line artificial intelligence technology to quantify LVEF would remove reader subjectivity and would be an invaluable tool for improving TTE interpretation. Our study aims to determine if artificial intelligence with LVivoEF by DiA® (which can be run across several electronic platforms), correlates well with Cardiac Magnetic Resonance Imaging (cMRI) LVEF, as the gold standard.

**Methods:** We performed a retrospective single center study of 76 patients (pts) who underwent both routine TTE and cMRI within 6 months with no interval cardiac intervention or clinical event. Pts 4-chamber LVEF's were analyzed by a novel artificial intelligence software, LVivoEF by DiA®, which provides fully automated LV analysis and generates LVEF through pattern recognition, machine learning, and image processing algorithms for automated detection and tracking displaying the endocardial border as an overlay on the moving image.

Using linear regression and chi square, the DIA 4-chamber EF's were compared to the cMRI EFs.

**Results:** There were 76 patients (59% male, mean age 54.3 years, range 20-88 years), mean LVEF by cMRI was 48.6%, range 14.6 to 73.0%. Using the ASE classification, 42 had a normal EF (>51%), 14 had mildly abnormal (41-51%), 8 moderately abnormal (30-40%), and 13 severely abnormal EF's (<30%) by their cMRI. The correlation between LVivo EF and cMRI derived EF for all pts was  $R^2=0.890$  ( $p<0.00001$ ), and for those with abnormal cMRI EF (<52%),  $R^2=0.821$  ( $p<0.00001$ ) (Figure). LVivoEF also accurately separated EF  $\leq 40\%$  and  $>40\%$ ,  $\chi^2=51.1$ ,  $p<0.00001$ .

**Conclusion:** Compared to cMRI as the gold standard, LVivo EF AI software provides accurate LVEF over a wide range of cardiac function. By providing the endocardial border overlay on the moving images, LVivo EF facilitates immediate confirmation by the reader of its accuracy. The strong correlation between LVivo EF AI may expedite more accurate TTE LVEF quantification, particularly in pts with low EF's in whom accuracy has clinical and therapeutic implications.

