Presentation Number: 1012-147

Abstract Title: A Novel Two-Dimensional Echocardiographic Image Analysis System Using Artificial Intelligence Shape and Pattern Recognition for Rapid Automated Ejection Fraction

Presentation Start/End Time: Tuesday, Mar 14, 2006, 11:00 AM -12:00 PM

Topic: Biomedical Computing/Information Technology

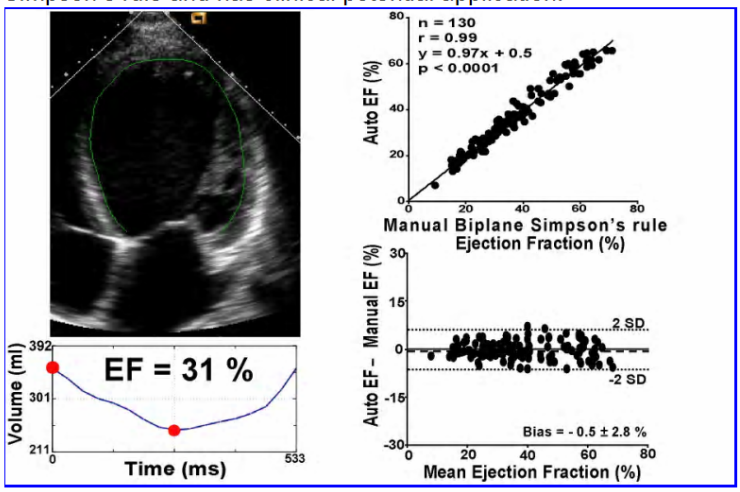
Author Block: Maxime Cannesson, Matthew S. Suffoletto, Masaki Tanabe, Dennis M. McNamara, John Gorcsan, III, University of Pittsburgh, Pittsburgh, PA

Background: Ejection fraction (EF) by two-dimensional echo is important clinically but manual tracing is time-consuming and routine visual assessment is inherently subjective. The aim of this study was to test the hypothesis that a novel 2D echocardiographic image analysis system using artificial intelligence pattern and shape recognition can rapidly and reproducibly calculate EF.

Methods: We studied 137 patients including 107 with abnormal left ventricular (LV) function (67% ischemic disease). Auto EF (Siemens Corp), applied to routine digital images, incorporated programming previously "trained" on >500 human EF tracings to automatically locate the LV, track the endocardium, and calculate EF in < 15 sec. Results were independently compared with manually traced biplane Simpson's rule by another investigator blinded to the Auto EF results.

Results: Auto EF was possible in 130 of 137 (95%) consecutive patients. Auto EF correctly traced and tacked endocardium completely automatically in 83% of patients and required some manual editing in only 17% despite a wide range of LV volumes (from 46 to 446 ml) and functions (EF ranged from 9 to 71 %). Auto EF correlated well (r=0.99, bias=0.5%, limits of agreement=6%) with manual tracing and required less time (55±32 vs. 102±21 sec, respectively p<0.01).

Conclusions: Auto EF can automatically and rapidly calculate EF similar to results by manual biplane Simpson's rule and has clinical potential application.



Keywords: Ejection fraction,Echocardiography, transthoracic,Heart failure