A New Impedance Cardiographic Technology for Simple Ambulatory Detection of Asymptomatic Left Ventricular Systolic Dysunction

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Objectives: Asymptomatic Left Ventricular Systolic Dysfunction (ALVSD), also termed Stage B Heart Failure, is a precursor of CHF. Data from population screenings indicate that when ALVSD is discovered before ejection fraction (EF) is <40%, the prognosis is incomparably better. However, no new diagnostic methods have been developed to exploit this knowledge for the benefit of patients.

Methods: By using an arm-leg electrode configuration of impedance cardiographic technology, a totally new Systolic Time Interval-based algorithm was recently developed to provide the Granov Factor (GF) as an indicator of myocardial performance. The entire system can replace the CD ROM in a regular computer, transforming any laptop into a diagnostic medical instrument which is called Non-Invasive Cardiac System-Cardiac Dysfunction Surveyor (NICaS CDS). This NICaS CDS was used to predict ALSVD in 100 asymptomatic patients selected from outpatient cardiac clinic. The predictive accuracy was determined using the area under curve (AUC) of the receiver operating characteristic (ROC) curve. ALSVD was defined from 2-D echocardiogram either qualitatively (QL) by an experienced reader, or quantitatively (QN) as an EF<50% by the modified Simpson's rule.

Results: The prevalence of ASLVD was 12% (QL) and 13% (QN). The AUC of GF as a predictor of ASLVD was 0.980 (QL) and 0.964 (QN). A cut-off value of GF=9.6 was 100% (QN) and 92.3% (QL) sensitive, and 91.0% (QN) and 90.8% (QL) specific for ASLVD.

Conclusions: NICaS CDS is a simple, portable, readily available system for detection of ALVSD, either by means of a physical examination performed by a GP, or alternatively, through screening the Community population.