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EDITORIAL COMMENT

# Echocardiography for the "Superior Doctor"

## A Call to Action in the Management of Heart Failure*

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*The superior doctor prevents sickness;*
*the mediocre doctor attends to impending sickness;*
*the inferior doctor treats actual sickness.*
—Extract from 1st Chinese Medical Text. Attributed to Huang Dee Nai-Chan, circa 2600 B.C. (1)

The burden of clinically overt heart failure is likely to increase with our aging population and escalating rates of obesity and diabetes in the community. Whether this burden can be effectively reduced by screening efforts remains to be determined. To be appropriate for screening, a disease should be serious, and the preclinical phase of the disease should have a sufficiently high prevalence among the population targeted for screening. Furthermore, screening initiated before a critical point in the natural history of the disease should result in treatment being initiated before the onset of symptoms. This treatment should be more beneficial in reducing morbidity or mortality than treatment given after symptoms develop. Finally, the screening for the disease should not result in a significant incidence of "pseudodisease." On the basis of these characteristics, it would appear that there is insufficient evidence to support widespread screening for preclinical (Stage B) heart failure in the community. In particular, although pharmacotherapy for patients with reduced left ventricular (LV) ejection fraction (EF) has been shown to reduce morbidity and mortality (2), the prevalence of this condition in the community is too low to justify a screening program in an unselected population (3). Furthermore, there is evidence from community-based studies to suggest a change in the epidemiology of heart failure to the extent that heart failure cases are increasingly likely to have preserved LVEF (4). This observation is sobering, given the findings from clinical trials, which indicate that, as opposed to heart failure with reduced LVEF, pharmacotherapy with a variety of neurohumoral modulating agents is not efficacious in reducing the morbidity and mortality in patients with heart failure and preserved LVEF (4).

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The clinical utility of a biomarker for heart failure screening can be judged according to the satisfaction of 3 key criteria (5). First, the proposed biomarker must be accessible, reliable, and affordable. Second, the marker must provide incremental information about cardiac function and prognosis that would not otherwise be available. Finally, patient management with the biomarker should result in improved clinical outcomes. Although observational studies have previously shown that structural heart disease and pre-clinical LV dysfunction detectable by echocardiography are strongly associated with elevated natriuretic peptide levels (6), and that both screening tools are highly predictive of risk for incident heart failure in large cohort studies (7,8), there are no studies that have assessed their incremental value for heart failure risk stratification when added to a validated clinical risk score.

In this issue of *iJACC*, Kalogeropoulos et al. (9) have taken an important step toward establishing the role of echocardiography in screening for heart failure. Using a CHS (Cardiovascular

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Heart Study) cohort of elderly adults in which prevalent heart failure cases were excluded (10), the authors examined the incremental value of echocardiographic measures and an elevated N-terminal pro–B-type natriuretic peptide (NT-proBNP) level when added to a clinical heart failure risk score for the prediction of hospitalization for incident heart failure over a 5-year period. This study adds to the body of work from the group, who have previously developed the "Health, Aging and Body Composition" (Health ABC) Heart Failure clinical risk score in a healthy elderly cohort (11), subsequently validated the clinical risk score in the CHS cohort (12), and identified the NT-proBNP level >190 pg/ml as the optimal discriminatory limit for the prediction of heart failure risk and cardiovascular mortality in the same cohort (8). In the current study (9), the authors elegantly demonstrate that echocardiographic findings of reduced LVEF, markers of LV diastolic dysfunction including abnormal mitral E/A ratio and an increased left atrial diameter, and increased LV mass; and an elevated NT-proBNP level were independent predictors of future hospitalization for heart failure. Importantly, the authors have established the enhanced discriminatory ability of adding the weighted sum of independent echocardiographic predictors to construct an echocardiographic score. They conclude that subjects at intermediate risk of hospitalization for incident heart failure according to the clinical risk score derived the most benefit through reclassification of heart failure by echocardiography and NT-proBNP. In contrast, echocardiographic screening with a "subclinical disease" approach or the inclusion of low-risk patients by clinical risk scoring in the echocardiographic screening strategy would add little to identify individuals at risk for heart failure. The authors acknowledge their limitations with regard to the echocardiographic methods, including the relatively crude estimation of diastolic function by Doppler methods and assessment of left atrial size by diameter rather than volume. Indeed, the inclusion of contemporary measures that constitute a more comprehensive assessment of diastolic function grade and the assessment of left atrial volume may have significantly attenuated the incremental value of NT-proBNP for the stratification of heart failure risk.

The findings from this study provide a solid platform for further research into the establishment of echocardiography as an essential tool for the "superior doctor," whose goal is to prevent "sickness" from clinically manifest heart failure. Specifically, randomized clinical trials will be required to assess whether the use of echocardiography in concert with natriuretic peptides can be used to identify patients who are at least intermediate risk for incident heart failure by clinical risk scoring, and would benefit from aggressive risk factor modification and pharmacotherapy with neurohumoral modulators. Given our growing challenge to maximize health gains with limited healthcare resources, such studies should be designed with a view to addressing the key question of "at what cost" through a robust economic evaluation. The observational component of these studies is likely to provide essential data on the natural history of heart failure, and to address the concern that the screening strategies may inadvertently result in a significant incidence of "pseudodisease" with the consequent negative effects on both physical and psychological health and well-being.

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