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A NOVEL ECHOCARDIOGRAPHIC PARAMETER FOR DYNAMIC ASSESSMENT OF DIASTOLIC FUNCTION IN ACUTE HEART FAILURE

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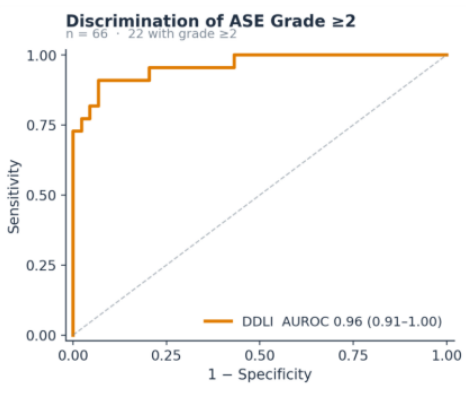
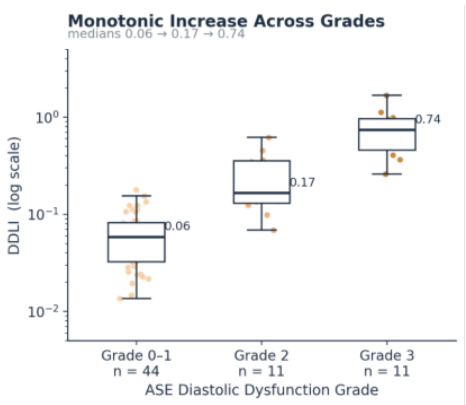
Value Proposition: *Doppler-derived parameter that can account for the preload condition dependency of diastolic function in acute heart failure.*

Technology Description

Researchers at Washington University in St. Louis have developed and validated the Dynamic Diastolic Loading Index (DDLI), a Doppler-derived parameter that quantifies the left ventricle's instantaneous balance between filling pressure and forward output. Diastolic dysfunction drives much of acute heart failure morbidity, yet existing echocardiographic indices of filling pressure were designed for chronic, steady-state assessment. The most widely used measure, E/e', requires tissue Doppler that is unreliable in atrial fibrillation, mitral annular calcification, and prior mitral valve intervention, and was not built to track moment-to-moment changes in loading during diuresis, ultrafiltration, or vasoactive therapy. Clinicians treating acutely decompensated patients lack a single, reproducible echo number that reflects the current balance between filling pressure and forward output.

This invention can provide information about various aspects of heart function that other echo-based parameters cannot. DDLI is positioned for two adoption pathways. In acute heart failure and cardiac intensive care, where active interventions render conventional indices unreliable, DDLI offers a dynamic readout suitable for serial bedside titration of diuresis, ultrafiltration, and vasoactive therapy. In ambulatory cardiology, DDLI provides a tissue-Doppler–independent alternative in patients with atrial fibrillation, mitral annular calcification, or prior valve replacement. Because DDLI is computed from measurements already acquired during standard echocardiography, deployment requires no additional acquisition time, hardware, or operator training; integration into existing reporting platforms or vendor-agnostic AI workflows is a software-only update.





Left: ROC for ASE diastolic dysfunction grade ≥2. Right: DDLI distribution by grade; medians rise monotonically from 0.06 to 0.74.

Stage of Research

Preliminary data has been developed. In a single-center cohort of 66 inpatient echocardiograms with assignable American Society of Echocardiography (ASE) diastolic dysfunction grade, DDLI discriminated grade ≥2 dysfunction with high accuracy and tracked grade severity across the full continuum (grade 0–1, 2, 3) with very high fidelity.

Applications

- Cardiac intensive care
- Acute heart failure

Key Advantages

- First parameter that accounts for the preload condition dependency of diastolic function in acute heart failure
- More accurate during intervention

Patents
Patent pending

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