

中文題目：人工智能心電圖預測低左心室收縮功能的信賴區間

英文題目：Artificial Intelligence-enabled Electrocardiogram Screens Low Left Ventricular Ejection Fraction with Degree of Confidence

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Background:

Left ventricular ejection fraction (EF) measurement is important in clinical practice, and artificial intelligence (AI)-enabled electrocardiogram (ECG) may be a reliable tool to provide functional assessment.

Method:

A total of 76,081 and 11,771 ECGs corresponding to the EF measured by transthoracic echocardiography (TTE) were collected from an academic medical center and a community hospital, respectively, to establish the DLM and validate the performance. The proposed DLM predicted the point estimation of the actual EF, and its standard deviation (SD) was based on the maximum probability density function of a normal distribution. Left ventricular dysfunction (LVD) was defined as an EF \leq 35%, and the primary analysis focused on identifying patients with LVD. We further used the estimated SD as the degree of confidence and explored the clinical application, and we followed the new-onset LVD in patients with initially normal EF to reveal the importance of AI-identified false-positive LVD.

Results:

The Pearson correlation coefficient of estimated EF and actual EF reached 0.61 in the continuous analysis, while the actual EF and estimated SD independently presented a Pearson correlation coefficient of 0.04. The AUC of detecting LVD showed further improvements from

0.9621 to 0.9776 with a standard deviation less than 10 in the internal validation sets. The gender and age-adjusted HR was 7.69 (95% CI: 4.42-13.37) corresponding to the C-index of 0.770 for the high-risk group in the internal validation sets, which was significantly improved from the HR of 14.51 (95% CI: 7.96-26.44) corresponding to the C-index of 0.797 for the high-risk group with an SD <10 in the internal validation sets.

Conclusion:

The DLM with degree of confidence can provide advanced improvements in identifying LVD and serve as a decision support and management-guided screening tool for prognosis.