

## Letter To Editor

# A normal and particularly small left atrial size measured during echocardiography MAY NOT suggest low likelihood of moderate or severe left ventricular systolic dysfunction

Gregory Mints<sup>1</sup>, Jina Bai<sup>2</sup>, Arthur Evans<sup>2</sup>

<sup>1</sup>Department of Medicine, Division of Hospital Medicine, Kings County Hospital and SUNY Downstate Medical University, Brooklyn, NY, USA; <sup>2</sup>Department of Medicine, Division of Hospital Medicine, Weill Cornell Medicine, New York, NY, USA

Received September 6, 2025; Accepted December 9, 2025; Epub December 15, 2025; Published December 30, 2025

**Abstract:** This is letter to the editor: we point to a statistical error in a recent article published in the journal by Movahed MR, Soltani Moghadam A. *A normal and particularly small (<35 mm) left atrial size measured during echocardiography suggests low likelihood of moderate or severe left ventricular systolic dysfunction*, which may have resulted in a biased conclusion.

**Keywords:** LA size, systolic function, negative predictive value, likelihood ratio

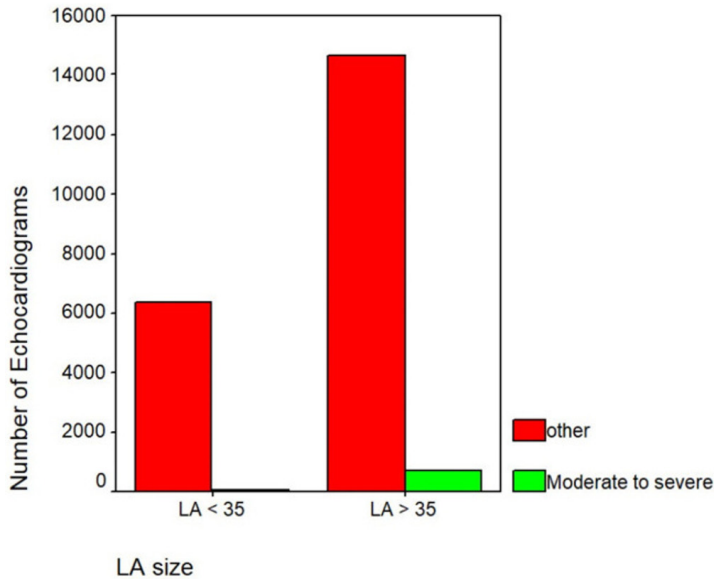
We read with interest the article by Movahed and Soltani published in the *Journal* [1]. The authors investigated the association between the left atrial (LA) size and left ventricular (LV) systolic function, suggesting that a small LA diameter (<35 mm) may reliably rule out severe or moderate LV systolic dysfunction. They report a negative predictive (NPV) value of 97.5% for small LA size in excluding abnormal LV systolic function, concluding that a small LA is a useful echocardiographic marker for ruling out severe or moderate LV systolic dysfunction. While we commend the authors for attempting to shed light on this highly clinically relevant topic, we would like to highlight an important concern regarding the presented data.

The authors make the mistake of considering NPV an inherent test characteristic which is misleading. NPV is not a metric that quantifies test performance in isolation, like sensitivity, specificity, and likelihood ratios (LR). Rather, it is a combined measure that reflects both the performance of the test and the prevalence of the condition in the population. On an individual patient level, NPV combines the effect of a (negative) test with baseline risk of the condi-

tion. Varying baseline risk (prevalence) with the use of the same test will result in drastically different NPV. Conversely, a very high NPV will be seen after application of a useless, non-discriminating test to a population at very low risk of the condition in question. The following is the technical explanation of this.

According to Bayes' theorem, the likelihood of a condition after a test is determined by two factors: performance of the test and the initial, pre-test likelihood ( $ODDS_{post-test} = LR \times ODD_{Spretest}$ ). NPV is defined as the proportion of the patients with a negative test who are free of disease, and, therefore, 1-NPV is the proportion of the patients with a negative test who do have the disease. It follows that 1-NPV is nothing but a post-test probability after a negative test, and, just like any other post-test probability, is determined not only by the test characteristics, but by the pretest probability (or prevalence) as well. Therefore, an excellent NPV may simply be a result of a low disease prevalence, even if the test itself performs poorly. As such, NPV in isolation is insufficient to establish the diagnostic utility of LA size for excluding impaired LV function.

## Small LA in ruling out severe LV dysfunction



**Figure 1.** Prevalence of moderate to severely depressed LV function based on LA size ( $\geq 35$  vs.  $< 35$ ).

**Table 1.** Patients with different LA size with various systolic function (EF)

	LA size <35 mm	LA size >35 mm	Total
LV EF <35%	19	354	373
LV EF 35-45%	32	350	382
LV EF 46-50%	42	928	970
LVEF >50%	6,322	14,343	20,665
Total	6,415	15,975	22,390

**Table 2.** Likelihood calculation from the data

	Data			Likelihood ratio	
	LA size <35 mm	LA size >35 mm	total	Prob LA <35 mm	LR
Severe	19	354	373	0.051	0.17
Moderate+Severe	51	704	755	0.068	0.23
mild and normal EF	6364	15271	21635	0.294	
Total sample	6415	15975	22390		

A standard metric to assess the usefulness of a test itself is the LR, which is the proportionality constant between pre-test and post-test odds. Although the data necessary for calculation of LRs were not explicitly provided in the original article, we were able to extract approximate values from **Figure 1** of the article (**Table 1**) [1]. We calculated LRs (**Table 2**) to be approximately 0.2. To illustrate the practical impact of such a modest LR, consider two scenarios. In a low pre-test probability setting (e.g.,

baseline odds of 1:19, i.e., probability of 5%), a negative test result yields post-test odds of 1:95 (i.e., probability of approximately 1%). In a high pre-test probability setting (e.g., baseline odds of 50:50, i.e., probability of 50%), the same negative result leads to post-test odds of 10:50 (i.e., probability of 16%). These translate to NPVs of 99% and 84%, respectively. In the reported cohort, the NPV of 97.5% means that 2.5% of patients with small atria will still have cardiomyopathy. A different pretest probability (prevalence) would yield much less reassuring results.

We believe that, contrary to the authors' assertions, the ability of a small LA size to "rule out" cardiomyopathy of any severity is quite limited. We therefore urge caution in applying the conclusions offered by Movahed and Soltani regarding the utility of the small LA size in decreasing the likelihood of cardiomyopathy and emphasize the importance of appropriate statistical measures in diagnostic research.

### Disclosure of conflict of interest

None.

**Address correspondence to:** Jina Bai, Department of Medicine, Division of Hospital Medicine, Weill Cornell Medicine, 525 East 68th Street, Box 130, New York, NY 10065, USA. Tel: 212-746-4071; Fax: 212-746-4734; E-mail: jib9010@nyp.org

### Reference

- [1] Movahed MR and Soltani Moghadam A. A normal and particularly small ( $< 35$  mm) left atrial size measured during echocardiography suggests low likelihood of moderate or severe left ventricular systolic dysfunction. *Am J Cardiovasc Dis* 2024; 14: 236-241.