

Letter by Bandera et al Regarding Article, “Value of Peak Exercise Oxygen Consumption Combined With B-Type Natriuretic Peptide Levels for Optimal Timing of Cardiac Transplantation”

To the Editor:

We read with interest the article by Kato et al¹ recently published in *Circulation: Heart Failure*. Findings add to the series of reports suggesting that combining cardiopulmonary exercise test and natriuretic peptide levels in a population of potential heart transplant candidates strengthens risk stratification accuracy. Especially for comparable levels of peak $\dot{V}O_2$, patients with lower brain natriuretic peptide (BNP) exhibited a prognosis similar to heart transplant recipients.

To further emphasize the importance of this double functional/biomarker approach, we would like to point out some few notes.

It is interesting that BNP levels although adding to $\dot{V}O_2$ prediction did not correlate with peak $\dot{V}O_2$, probably reflecting different hemodynamic loads unrelated, at least in part, to the overall functional capacity.

An interesting question is how many patients with both low and high BNP levels presented with right ventricular dysfunction and left-sided group 2 pulmonary hypertension, given that right heart function and pulmonary vascular disease critically determines heart transplant indications and timing. Recent observations have indeed suggested and confirmed that in the majority of patients with left-sided pulmonary hypertension who are potentially candidates for heart transplant, cardiopulmonary exercise test–derived variables that tightly mirror right heart hemodynamic impairment and dyspnea sensation are of pulmonary origin, such as ventilator efficiency (VE/V_{CO_2} slope), end-tidal of CO_2 at rest and peak exercise and oscillatory ventilatory pattern.²

BNP levels consistently parallel abnormalities in the ventilator phenotype of patients with heart failure at different disease stages^{3,4} and the high-risk subset of patients with exercise oscillatory ventilation are clearly separated by N-terminal pro-BNP levels measured both at rest and at peak exercise.⁴ Thus, inclusion of cardiopulmonary exercise test ventilatory and gas exchange variables could likely have been improving the patients' categorization and their relative risk.

Accordingly, it is tempting to suggest that future efforts should be finalized at obtaining a true multiparametric cardiopulmonary

exercise test–derived approach as far as abnormalities in exercise ventilation are confirmed to be meaningful and highly predictive markers of the disease.⁵

Disclosures

None.

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References

1. Kato TS, Collado E, Khawaja T, Kawano Y, Kim M, Farr M, Mancini DM, Schulze PC. Value of peak exercise oxygen consumption combined with B-type natriuretic peptide levels for optimal timing of cardiac transplantation. *Circ Heart Fail*. 2013;6:6–14.
2. Murphy RM, Shah RV, Malhotra R, Pappagianopoulos PP, Hough SS, Systrom DM, Semigran MJ, Lewis GD. Exercise oscillatory ventilation in systolic heart failure: an indicator of impaired hemodynamic response to exercise. *Circulation*. 2011;124:1442–1451.
3. Passino C, Poletti R, Bramanti F, Prontera C, Clerico A, Emdin M. Neuro-hormonal activation predicts ventilatory response to exercise and functional capacity in patients with heart failure. *Eur J Heart Fail*. 2006;8:46–53.
4. Guazzi M, Boracchi P, Labate V, Arena R, Reina G. Exercise oscillatory breathing and NT-proBNP levels in stable heart failure provide the strongest prediction of cardiac outcome when combining biomarkers with cardiopulmonary exercise testing. *J Card Fail*. 2012;18:313–320.
5. Arena R, Myers J, Abella J, Peberdy MA, Bensimhon D, Chase P, Guazzi M. Development of a ventilatory classification system in patients with heart failure. *Circulation*. 2007;115:2410–2417.

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