

## The Six-Minute Step Test as an Alternative for Functional Capacity Assessment in Patients with Cardiovascular Diseases

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Short Editorial related to the article: *The Six-Minute Step Test as a Predictor of Functional Capacity according to Peak VO<sub>2</sub> in Cardiac Patients*

Functional capacity is an important morbimortality marker in patients with cardiopulmonary diseases.<sup>1,2</sup> Although the direct measurement of peak oxygen consumption (VO<sub>2peak</sub>), using cardiopulmonary tests (the gold standard), is the most adequate method for assessing functional capacity, its use in clinical practice is still restricted due to its high cost.<sup>1,2</sup>

The 6-minute step test (6MST), in addition to being fast, has as its main advantage the need for minimum space for its performance. These factors, added to the fact that it does not require audible signals, become very attractive for its use in clinics and hospitals. Step tests have been used for a long time to assess functional capacity, especially in healthy individuals or those with lung diseases.<sup>3</sup> In patients with pulmonary diseases, a positive correlation ( $r = 0.76$ ) was observed between the 6MST and the 6-minute walk test<sup>4</sup> (6MWT), a test that requires more space to be carried out.<sup>5</sup> Interestingly, correlation data between the 6MST and the direct measurement of functional capacity are scarce, especially in patients with cardiovascular diseases.

The study by Ritt et al.<sup>6</sup> seeks to fill this gap by submitting 171 patients with heart failure and coronary artery disease to the 6MST and to the cardiopulmonary test on a treadmill. The results showed a significant correlation between VO<sub>2peak</sub> obtained in the treadmill test and the performance at the 6MST ( $r = 0.69$ ). Moreover, a prediction equation for VO<sub>2peak</sub> estimation was developed for men [ $VO_{2peak} = 19.6 + (0.075 * 6MST) - (0.10 * age)$ ] and for women [ $VO_{2peak} = 19.6$

+ (0.075 \* 6MST) - (0.10 \* age) - 2], based on the step test results. Finally, the authors identified 105 climbs as the cutoff point for VO<sub>2peak</sub> > 20 mL/kg\*min, which in cardiac patients is considered a good indicator of cardiovascular prognosis.

Despite the interesting results, it is important to highlight aspects that still deserve to be elucidated in future studies. Important psychometric indicators of the 6MST are still lacking, such as reproducibility, sensitivity to change. The identification of cutoff points is highly relevant and applicable in clinical practice. However, to identify individuals with low functional aptitude, it is necessary that new points be established, considering age, gender, height, among other factors. Cutoff points based on a single and heterogeneous sample are possibly identifying those who are older and female. However, it may be that compared to peers of the same age and gender, they have functional capacity within the expected range. These aspects have already been widely discussed regarding the 6-minute walk test and could be considered for the 6MST.<sup>7-9</sup>

In summary, the work by Ritt et al.<sup>6</sup> shows interesting initial evidence of the use of the 6MST to assess the functional aptitude in patients with coronary artery disease and heart failure. As this is a test with great potential for use in clinical practice, future studies on the 6MST as a prognostic marker, on its psychometric characteristics, as well as reference values according to gender and age, will be welcome.

### Keywords

Hypertension; Blood Pressure; Heredity/genetic; Exercise; Sports; Football; Endothelium; Athletes.

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### References

1. Fletcher GF, Ades PA, Kligfield P, Arena R, Balady GJ, Bittner VA, et al. Exercise standards for testing and training: a scientific statement from the American Heart Association. *Circulation*. 2013; 128(8): 873-934.
2. Task Force of the Italian Working Group on Cardiac R. Statement on cardiopulmonary exercise testing in chronic heart failure due to left ventricular dysfunction: recommendations for performance and interpretation part III: interpretation of cardiopulmonary exercise testing in chronic heart failure and future applications. *Eur J Cardiovasc Prev Rehabil*. 2006; 13(4): 485-94.
3. Andrade CH, Cianci RG, Malaguti C, Corso SD. The use of step tests for the assessment of exercise capacity in healthy subjects and in patients with chronic lung disease. *J Bras Pneumol*. 2012; 38(1): 116-24.
4. Pessoa BV, Arcuri JF, Labadessa IG, Costa JN, Sentanin AC, Di Lorenzo VAP, et al. Validity of the six-minute step test of free cadence in patients with chronic obstructive pulmonary disease. *Braz J Phys Ther*. 2014; 18(3): 228-36.
5. ATS committee on proficiency standards for clinical pulmonary function laboratories. ATS statement: guidelines for the six-minute walk test. *Am J Respir Crit Care Med*. 2002; 166(1): 111-7.
6. Ritti LEF, Darzé ES, Feitosa GF, Porto JS, Bastos G, Albuquerque RBL, et al. The Six-Minute Step Test as a Predictor of Functional Capacity according to Peak  $\text{VO}_2$  in Cardiac Patients. *Arq Bras Cardiol*. 2021; 116(5):889-895.
7. Ritti-Dias RM, Sant'anna FS, Braghieri HA, Wolosker N, Puech-Leão, Lanza FC, et al. Expanding the use of six-minute walking test in patients with intermittent claudication. *Ann Vasc Surg*. 2021; 70: 258-62.
8. Casanova C, Celli BR, Barria P, Casas A, Cote C, de Torres JP, et al. The 6-min walk distance in healthy subjects: reference standards from seven countries. *Eur Respir J*. 2011; 37(1): 150-6.
9. Farah BQ, Ritti-Dias RM, Montgomery P, Cucato GC, Gardner A. Exercise intensity during 6-minute walk test in patients with peripheral artery disease. *Arq Bras Cardiol*. 2020; 114(3): 486-92.



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