

Heart rate recovery and methodological issues

To the Editor,

We read with great interest the article, entitled "Heart rate recovery may predict the presence of coronary artery disease" by Akyüz et al. (1) published in *Anatolian J Cardiol* 2014; 14: 351-6.

They observed in a retrospective analysis that abnormal heart rate recovery at 1 min (HRR1) was associated with the presence of angiographically proven coronary artery disease. This study strengthens previous research that the heart rate information gleaned from a standard exercise test can be used to supplement prognostic and diagnostic data. There are some methodological issues that need to be clarified in order to understand how these data were obtained. The authors' statement that "post-exercise HRR was measured in the sitting position during the cool-down period after the cessation of peak exercise" might lead to misunderstandings and is inappropriate with regard to terminology. Exercise testing can be terminated (cessation of exercise) abruptly with the patient in the standing or sitting position (no 'cool-down' period), or the patient keeps walking in a predetermined speed and incline (cool-down period), which can be a 2-minute cool-down at 1.5 mph on a 2.5° grade or a 1-minute cool-down at 1 mph at 0% incline (2, 3). In protocols using cool-down, heart rate recovery at 1 minute is calculated by taking the difference between the heart rate at peak exercise and heart rate 1 minute later, which is 1 minute after the beginning of the cool-down period (2). Similarly, in exercise tests that stop abruptly, heart rate recovery at 1 minute is calculated by taking the difference between the heart rate at peak exercise and heart rate 1 minute later, at which time the patient is at complete rest in the supine or sitting position. Abnormal HRR1 is usually defined as heart rate that declines ≤ 12 beats/min in the first minute after exercise for protocols that use a post-exercise cool-down or ≤ 18 beats/min in the first minute

postexercise for protocols that stop exercise abruptly (2, 4). Since the authors defined abnormal HRR1 as ≤ 21 beats, we assume that there was no cool-down period in their study. Although the authors mentioned heart rate reserve in the results section and tables, they did not define it in the methods. It is not clear whether heart rate reserve is in beats per minute or in percentages. Heart rate reserve in beats per minute is calculated as $[(220 - \text{age in years}) - \text{resting heart rate in beats per min}]$, while heart rate reserve in percentages is calculated as $(\text{peak heart rate} - \text{resting heart rate in beats per min}) / [(220 - \text{age in years}) - \text{resting heart rate in beats per min}]$ multiplied by 100 (2). Heart rate reserve in percentages is also an indicator of chronotropic response. Heart rate reserve below 80% is considered to be evidence of an impaired chronotropic response, which is a powerful indicator of mortality (5). We believe that caregivers should be familiar with these parameters and consider for routine incorporation into exercise test interpretation.

Göknur Tekin, Abdullah Tekin

Department of Cardiology, Faculty of Medicine, Başkent University; Ankara-Turkey

References

1. Akyüz A, Alpsoy S, Akkoyun DC, Değirmenci H, Güler N. Heart rate recovery may predict the presence of coronary artery disease. *Anadolu Kardiyol Derg* 2014; 14: 351-6. [\[CrossRef\]](#)
2. Cole CR, Blackstone EH, Pashkow F, Snader CE, Lauer MS. Heart-rate recovery immediately after exercise as a predictor of mortality. *N Engl J Med* 1999; 341: 1351-7. [\[CrossRef\]](#)
3. Maddox TM, Ross C, Ho PM, Masoudi FA, Magid D, Daugherty SL, et al. The prognostic importance of abnormal heart rate recovery and chronotropic response among exercise treadmill test patients. *Am Heart J* 2008; 156: 736-44. [\[CrossRef\]](#)
4. Lauer MS, Mehta R, Pashkow FJ, Okin PM, Lee K, Marwick TH. Association of chronotropic incompetence with echocardiographic ischemia and prognosis. *J Am Coll Cardiol* 1998; 32: 1280-6. [\[CrossRef\]](#)
5. Wilkoff BL, Miller RE. Exercise testing for chronotropic assessment. *Cardiol Clin* 1992; 10: 705-17.

Address for Correspondence: Dr. Abdullah Tekin, Başkent Üniversitesi Tıp Fakültesi, Kardiyoloji Anabilim Dalı, Yüreğir, Adana-Türkiye
Phone: +90 322 327 27 27

Fax: +90 322 327 12 86

E-mail: tekincardio@yahoo.com

Available Online Date: 25.12.2014

©Copyright 2015 by Turkish Society of Cardiology - Available online at www.anakarder.com
DOI:10.5152/akd.2014.6021

