Time to redefine post-exercise pressure decrease and post-exercise ankle-brachial index to diagnose peripheral artery disease

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Article type : Letter to Editor

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A letter to the editor regarding the recently published paper in *Scandinavian Journal of Medicine and Science in Sports* entitled: "Post-exercise ankle blood pressure and ankle to brachial index after heavy load bicycle exercise".

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Dear Editor,

We read with interest the paper from Godet *et al.* entitled. "Post-exercise ankle blood pressure and ankle to brachial index (ABI) after heavy load bicycle exercise".[1] In this paper, the authors suggest that the American Heart Association (AHA) criteria after an heavy load test on a cycle ergometer are inadequate for the diagnosis of lower extremity peripheral artery disease (LEPAD). According to the AHA statement in order to diagnose LEPAD, the use of post-exercise ABI decrease greater than 20% or the post-exercise ankle pressure decrease greater than 30mmHg are recommended in patients with normal resting ABI and a clinical suspicion of LEPAD[2]. It seems important to remember for the readers how and when these criteria were defined because this can probably explain why they are potentially inadequate especially in asymptomatic patients. These criteria are based on two studies that have used treadmill for the exercise test[3,4]. The post-exercise ABI decrease > 20% was suggested by Ouriel *et al.*[3]. Ouriel *et al.* studied 3 groups of subjects: healthy subjects, patients with claudication, and patients with rest pain/ulcer/gangrene. In this study, the authors assessed the post-ABI decrease in these 3 groups. Control subjects (resting ABI of 1.10+/-0.01; mean+/-SEM) with a maximal age of 30 years old were used to define the normal range of ABI decrease. This control group was said to be "normal" meaning that they had no history of smoking, diabetes, or lower trauma. In the population of claudicants, the mean resting ABI was 0.62+/-0.01 whereas it was 0.46+/-0.01 in the group of rest pain/ulcer/gangrene. The mean post-exercise ABI was 1.01+/-0.01 in the control limbs whereas the mean post-ABI was 0.37+/-0.02 in the claudicants, and 0.22+/-0.04 in rest pain/ulcer/gangrene group[3].

Therefore, as the study did not assess the decrease of post-exercise ABI in patients suspected of LEPAD with normal resting ABI we cannot ascertain that the post-exercise ABI decrease would be similar in a group of patients with a normal resting ABI. Furthermore, Laing and Greenhalgh defined the post-exercise ankle pressure decrease criterion in 1983[4]. They used a group of 67 healthy young subjects (from 20 years old to 34 years old) without any symptoms and with a resting ABI equal to 1.23+/-0.13 to define the normal range of the post-exercise ankle pressure decrease. In this study, “the ankle pressure change after exercise ranged from -27 mmHg to +35 mmHg, 95 per cent of the post-exercise results were between -25 mmHg et +22 mmHg.”[4] Thus, post-exercise ankle pressure decrease was based on young subjects and the normal range of post-exercise ankle pressure decrease in older subjects is probably not similar to the young subjects.

Second the readers have to know that mean age as well as clinical risk factors (diabetes, smoking…) were not reported in these two studies[3,4]. Third, both studies used a particular treadmill protocols that are not currently used nowadays. The Ouriel *et al.* treadmill test was 1.5mph and 7% grade and the Laing and Greenhalgh treadmill test was 4km/h and 10% for 1 minute. However, current protocol tests are most of the time 3.2km/h and 10% grade. The effect of the workload on the post exercise pressure is also debated [5,6]. Godet et al. reported that the changes in post-exercise ankle systolic pressure or ABI are highly dependent on the intensity level of exercise[1]. These results seem true in healthy subjects or athletes but Laing and Greenhalgh found different results in patients with LEPAD[5]. In this study, they evaluated several different protocols. In a first experiment, comparing 1min exercise test (4km/h; 10% grade) with 1 min exercise test (6km/h; 10% grade), they showed that the post-exercise pressure 1 min after exercise were similar. In a second experiment, they compared 2 different durations (1min vs 2min) of exercise and found that post-exercise pressures were also similar. Skinner and Strandness found on 4 patients that post-exercise pressures were linked to the workload intensity in patients with claudication but pressure measurements were performed two minutes after the exercise[6]. Laing and Greenhalgh measured the post-exercise pressure decrease one minute after the end of exercise and two minutes after. They showed that the increase of the workload had no effect on the post-exercise pressures measured at one minute after the end of the test whereas they found a statistically different ankle pressure two minutes after the end of exercise[5]. It should be noted that the decrease of post-exercise ankle pressure after 1 or two minutes of walking without symptoms might be different than the decrease or post-exercise ankle pressure after a more longer walking time with symptoms. Fourth, we have previously demonstrated that the AHA criteria did not identify the same group of patients and this was found whatever the workload of exercise[7]. Therefore, post-exercise pressure and ABI should be redefined in the population in whom they should be used in clinical practice.

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