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LETTER TO THE EDITOR

COMMENT: Bilateral Limb Remote Ischemic Preconditioning Improves Anaerobic Power

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DEAR EDITOR,

The study by Kraus *et al*. is the first study which investigated difference between RIPC protocols [1]. In the medical field, RIPC was mainly applied to the upper limb prior to surgery [2]. Although the use of RIPC was mainly applied to the lower limb before exercise performance: one thigh [3-8] and bilateral thigh [9-16]. None of these RIPC protocols compared the effect of RIPC on different limbs, sets or time of occlusion/reperfusion. The finding of Kraus *et al*. on a single arm RIPC protocol is consistent with our finding on a Wingate test which we did not observe to have significant change in power (mean and peak) with the same RIPC protocol (4 * 5 minutes occlusion (at 50 mm Hg above systolic blood pressure) for 5 minutes of reperfusion) [17]. Future researches on RIPC and sports could: 1- compare both unilatartel and bilaterral RIPC in the same group of subjects; 2- compare unilateral and bilateral RIPC on the arm *vs* the thigh in the same group of subjects ;and 3- when using RIPC, it is also important to indicate the amount of pressure used in the ischemia cycle.

Another point is that future research on RIPC should make distinction between well-trained amateur athletes and professional/elite athlete. Only Jean-St-Michel *et al*. ref selected high competitive athletes (even though they were university athlete which is different than professional athletes) compares to other studies in the field that made their experiment on highly trained participants. The point here is that indeed at a high competition level, a difference of a few seconds improvement could lead to a top 3 position. Kraus *et al*. translated their results obtained on amateur participants on an example such as Usain Bolt in 100 m dash pointing that there is only a difference of 2% between the first and second place. We also speculated on the potential outcome of an athlete (1km cycling) in the 2012 London games using RIPC to enhance their performance without publishing those data in our report (unpublished data). We used the analytic cycling web page (http://www.analyticcycling.com/ForcesPower_Page.html) [18]. We imposed an increase of 1.018% of the mean power on anaerobic lactic performance, as per our results, to observe if RIPC could have made a difference in that race. Indeed, if only the athlete who arrived in third place had used RIPC, he may have won a silver medal (Table **1**). If we used the maximal power output of 2-3% as suggested by Kraus *et al*., the results in Table **1** would be clearly better, and thus giving a chance to an athlete to access to the higher step of the podium. Therefore, RIPC does not seem to offer major change in performance but it could clearly be beneficial for little gains that are the thin line between the 1st and second place. It would also be important to identify the potential sports that could benefit from RIPC; from now on, the

Table 1. Speculation upon 1km results in the London game for the 1 km time trial in indoor cycling if athletes used RIPC. If Glenn O'Shea was the only one using RIPC, he could have been in second place instead of third. The same speculation could be calculated with the 2-3% of Kraus *et al*.

Cyclist	Time	Weight	Average Speed	Watts	RIPC Upgrade	RIPC Speed Upgrade
Edward Clancy	60.981 s	77 kg	59.034 km/h or 16.398 m/s	1137.7 W	1158.2 W	59.508 km/h or 16.53 m/s
Hansen Lasse Norman	62.314 s	73 kg	57.771 km/h or 16.048 m/s	1064.1 W	1083.3 W	58.248 km/h or 16.180 m/s
O'Shea Glenn	62.513 s	76 kg	57.588 km/h or 15.997 m/s	1072.7 W	1092 W	58.068 km/h or 16.13 m/s
Coquard Bryan	63.078 s	58 kg	57.072 Km/h or 15.853 m/s	956.8 W	973.8 W	57.492 km/h or 15.97 m/s

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longest event in which RIPC provided significant results is a 5 km running time trial [9].

Finally, another interesting point addressed at the end of Kraus *et al*.'s report is the potential effect of RIPC on older adults. From now on, all the researches who investigated the relation of RIPC to sports had similar age group sample and the oldest age mean was by Crisfulli *et al*. (35.2 ± 9.1 years old) who did report improvement on maximal aerobic power [14]. The use of RIPC in older age should be more of medical or cardiac rehabilitation concern. As an example, Saes *et al*. reported that RIPC increased the initial claudication distance in patients (65.8 ±7.9 years old) with intermittent claudication [19]. We then think that RIPC could have different purpose at any age span from sports performance to exercise rehabilitation [20, 21]. We also would like to congratulate the work of Kraus and his team in the development of understanding of RIPC in sports performance.

CONFLICT OF INTEREST

The authors confirm that this article content has no conflict of interest.

ACKNOWLEDGEMENTS

Declared none.

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Received: March 6, 2015 Revised: April 21, 2015 Accepted: April 21, 2015