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Poster presentation

L-arginine supplementation improves aortic vascular relaxation via NO-independent sGC/cGMP signaling in exercised rats

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Background

It is well established that physical training promotes beneficial effects on the vascular reactivity by improving the NO/cGMP signaling pathway [1]. L-Arginine (L-Arg) is a non-essential amino acid which plays a critical role in many organism functions such as pH regulation and endothelial cell membrane depolarization. Moreover, the benefits of the oral supplemention with L-Arg have been shown in hypercholesterolemic patients by inhibition of platelet aggregation and reduction of monocytes adhesion. In hypertensive rats, L-Arg supplemention reduces cardiac noradrenergic neurotransmission and enhanced angiogenesis in the hypoxic pulmonary hypertension. Although in human subjects the acute administration of L-Arg did not change hemodynamic and vascular responses to resistance exercise, no studies exist investigating the effect of chronic administration of L-Arg associated with dynamic exercise in the vascular responsiveness in rats. Thus, the aim of this work was to investigate the effect of L-Arg supplementation on the responsiveness of aortic rings in trained rats.

Methods

Male Wistar rats (344 ± 6 g) were divided into three groups: sedentary (SD), trained (TR) and trained supplemented (TRS). Animals were trained in a treadmill with an intensity of 70–80% of maximal oxygen consumption, in sessions of 60 minutes, 5 days a week. Run training (RT) was performed simultaneously to L-Arg intake (0.25 g/kg daily, given in the drinking water) for 4 weeks. Concentration-response curves were obtained for acetylcholine (ACh) and sodium nitroprusside (SNP) in isolated aortic rings. Plasma SOD and catalase concentrations were measured.

Results

A lower body weight gain was found in TRS group (315 ± 9 g) as compared to SD (434 ± 10 g) and TR (392 ± 6 g) groups. Functional assays showed increase in the potency of the relaxing response to ACh in aortic rings in TR group (pEC_{50}: 7.72 ± 0.03) and TRS group (pEC_{50}: 7.53 ± 0.05), approximately 3.5 and 2.2-fold, respectively, as compared to SD (pEC_{50}: 7.18 ± 0.06) without changes in the maximal responses (E_{MAX}). The potency for SNP was markedly increased in TRS (pEC_{50}: 9.21 ± 0.07) as compared to TR group (pEC_{50}: 8.61 ± 0.10) and (pEC_{50}: 7.90 ± 0.13). Plasma SOD activity was not changed in all groups (8.60 ± 4 U/ml, 7.75 ± 3 U/ml and 13 ± 2 U/ml, for SD, TR and TRS, respectively) whereas catalase level were reduced in TR and TRS groups (29 ± 6 μM and 19 ± 3 μM, respectively) as compared to SD group (44 ± 14 μM).

Conclusion

L-Arg supplementation associated with run training was effective to promote lower body weight gain. Furthermore, L-Arg supplementation associated with RT

improved the relaxing response in aortic rings via NO-independent sGC/cGMP signaling.

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