

L-Arginine attenuates xanthine oxidase and myeloperoxidase activities in hearts of rats during exhaustive exercise

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Abstract

The present study was to investigate the effects of L-arginine (L-Arg) supplementation on cardiac oxidative stress and the inflammatory response in rats following acute exhaustive exercise on a treadmill. Rats were randomly divided into four groups: sedentary control (SC); SC with L-Arg treatment (SC+Arg); exhaustive exercise (E); exhaustive exercise with L-Arg treatment (E+Arg). Rats in groups SC+Arg and E+Arg received a 2% L-Arg diet. Rats in groups E and E+Arg performed an exhaustive running test on a treadmill at a final speed of 30m/min, 10% grade, at approximately 70–75% VO₂max. The results showed a significant increase in cardiac xanthine oxidase (XO) and myeloperoxidase activities and membrane lipid peroxidation endproduct (malondialdehyde; MDA) levels of exercised rats compared with SC rats. The increased cardiac XO activity and MDA levels in exercised rats were significantly decreased in exercised rats supplemented with L-Arg. Myocardial GSSG content increased whereas the GSH:GSSG ratio was depressed in exercised rats compared with SC rats. Cardiac GSSG levels significantly decreased, whereas total glutathione, GSH and the GSH:GSSG ratio increased in exercised rats supplemented with L-Arg compared with exercised rats. The activities of creatinine kinase (CK) and lactate dehydrogenase (LDH), and lactate, uric acid, and nitrite and nitrate levels in the plasma significantly increased in exercised rats compared with SC rats. The activities of plasma CK and LDH were significantly decreased in L-Arg-supplemented plus exercised rats compared with exercised rats. These findings suggest that L-Arg supplementation reduces the oxidative damage and inflammatory response on the myocardium caused by exhaustive exercise in rats.