

Effects of supplementation with free glutamine and the dipeptide alanyl-glutamine on parameters of muscle damage and inflammation in rats submitted to prolonged exercise.

Cruzat VF, Rogero MM, Tirapegui J.

Source

Department of Food Science and Experimental Nutrition, University of São Paulo, Brazil.

Abstract

In this study, we investigated the effect of the supplementation with the dipeptide L-alanyl-L-glutamine (DIP) and a solution containing L-glutamine and L-alanine on plasma levels markers of muscle damage and levels of pro-inflammatory cytokines and glutamine metabolism in rats submitted to prolonged exercise. Rats were submitted to sessions of swim training for 6 weeks. Twenty-one days prior to euthanasia, the animals were supplemented with DIP (n = 8) (1.5 g.kg⁻¹), a solution of free L-glutamine (1 g.kg⁻¹) and free L-alanine (0.61 g.kg⁻¹) (G&A, n = 8) or water (control (CON), n = 8). Animals were killed at rest before (R), after prolonged exercise (PE-2 h of exercise). Plasma concentrations of glutamine, glutamate, tumour necrosis factor-alpha (TNF-alpha), prostaglandin E2 (PGE2) and activity of creatine kinase (CK), lactate dehydrogenase (LDH) and muscle concentrations of glutamine and glutamate were measured. The concentrations of plasma TNF-alpha, PGE2 and the activity of CK were lower in the G&A-R and DIP-R groups, compared to the CON-R. Glutamine in plasma (p < 0.04) and soleus muscle (p < 0.001) was higher in the DIP-R and G&A-R groups relative to the CON-R group. G&A-PE and DIP-PE groups exhibited lower concentrations of plasma PGE2 (p < 0.05) and TNF-alpha (p < 0.05), and higher concentrations of glutamine and glutamate in soleus (p < 0.001) and gastrocnemius muscles (p < 0.05) relative to the CON-PE group. We concluded that supplementation with free L-glutamine and the dipeptide LL-alanyl-LL-glutamine represents an effective source of glutamine, which may attenuate inflammation biomarkers after periods of training and plasma levels of CK and the inflammatory response induced by prolonged exercise.