Serum homocysteine and oxidative stress evaluation during exercise in horse

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Abstract

The aim of the present work was to evaluate the influence of exercise on serum homocysteine and oxidative stress in Thoroughbreds during official races. For our study, ten Thoroughbred mares, 5 years old and clinically healthy, were used. The horses were trained to take part in an official 2100 meter race. Reactive oxygen species (dROMs), antioxidant barrier (Oxy-adsorbent), thiol antioxidant barrier (SHp) and homocysteine (sHcy) were investigated. Blood samples, collected from each horse at rest, immediately after the race, and 30 and 180 min after the end of the race, were collected by jugular venipuncture using vacutainer tubes with no additive for the assessment of dROMs, Oxy-adsorbent and SHp by means of a UV spectrophotometer, while serum total Hcy values were determined by high performance liquid chromatography with fluorimetric detection and isocratic elution. Statistical analysis, one way repeated measures analysis of variance (ANOVA), followed by Bonferroni’s test, showed statistical differences (P < 0.05 was considered statistically significant) for all parameters studied. Moreover, a coefficient of linear correlation (r) was computed for values of dROMs and sHcy for all sampling times but a significant linear regression (r = 0.94) was found only after the race. The variations of sHcy, dROMs, Oxy-adsorbent and SHp during the experimental period considered suggest the important role of oxidative status in the athletic horse. The systematic analysis of oxidative stress and its influence on homocysteine levels contribute to the clinical evaluation and assessment of the athletic performance of the horse.

Key words: antioxidant barrier, athletic horse, homocysteine, physical exercise, reactive oxygen species, thiol antioxidant barrier

Introduction

Oxidative stress is a particular kind of “chemical stress” that is induced by the presence in a living organism of excessive amounts of free radicals and other reactive species, due to an excessive production of them and/or to a reduced effectiveness of the physiological antioxidant systems (Soffler et al. 2007).

Oxidative stress is extremely dangerous because it does not exhibit symptoms and is recognizable with great difficulty by means of common methods of analysis (Piccione et al. 2007a).

The alteration of oxidative balance, if not adequately restored by the antioxidant barrier, induces an oxidative stress with cellular damage (Trevisan et al. 2001) which makes the organism sensitive to seri-