HEAT SHOCK PROTEIN RESPONSES TO EXERCISE IN STANDARDBRED TROTTERS: EFFECTS OF ALPHA-LIPOIC ACID

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Increased oxygen metabolism results in induced formation of reactive oxygen species (ROS), leading to oxidative stress and inducing lipid, protein and DNA damage. Organisms cope with oxidative insults via a wide variety of defence systems. In addition to antioxidant protection, heat shock protein (HSP) expression is considered as an adaptive mechanism and a marker of certain cellular insults, including exercise-induced oxidative stress. The information regarding the induction pattern, timing, and the dose-response characteristics of HSP induction during exercise is not fully understood. Understanding of the role and expression pattern of stress proteins and their association with oxidative insults may provide valuable information on tissue protection mechanisms, and may help to reduce the deleterious effects of physical exercise. Several antioxidant supplementation strategies have been used to cope with exercise-induced oxidative stress and adaptation for exercise. While antioxidant supplementation apparently diminishes exercise-induced oxidative stress there is also a risk of decreasing the normal response of tissues to exercise and blunting adaptations. In this study we examined the protective role of natural thiol antioxidant, alpha-lipoic acid (LA) supplementation at rest, after exercise and at different recovery points in skeletal muscle of the horse. Six standardbred trotters were examined on the treadmill and exercised 75 min at individually defined aerobic level. Muscle biopsy samples from the middle gluteal muscle were taken before exercise and after 6-, 24- and 48-hour recovery. LA supplementation (25 mg kg\textsuperscript{-1} day\textsuperscript{-1}) for five weeks augmented the HSP response in gluteus medius muscle. LA increased the pre-exercise levels of HSP90 and the post-exercise levels of inducible HSP70 in skeletal muscle. Furthermore, LA increased the oxidative capacity of the muscle measured by citrate synthase activity and lowered the blood lactate concentration during exercise. Our results suggest that LA supplementation enhances tissue protection without impairing the athletic capacity and increases the oxidative capacity of the muscle in horse.

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