

The effects of dietary N-3 and antioxidant supplementation on erythrocyte membrane fatty acid composition and fluidity in exercising horses.

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Abstract

REASONS FOR PERFORMING STUDY: Fatty acid supplementation could modulate erythrocyte membrane fluidity in horses at rest and during exercise, but information is lacking on the effect of exercise. **OBJECTIVES:** To assess the effect of exercise with, and without, an oral antioxidant supplementation enriched with n-3 fatty acids on erythrocyte membrane fluidity (EMF) and fatty acid composition in eventing horses. **METHODS:** Twelve healthy and regularly trained horses were divided randomly into 2 groups: group S received an oral antioxidant cocktail enriched in n-3 fatty acid (alphatocopherol, eicosapentaenoic acid [EPA] and docosahexaenoic acid [DHA]) whereas group P was placebo-treated. At the end of 4 weeks, all horses performed a standardised exercise test (ET) under field conditions. Venous blood was sampled before starting treatment (TO), immediately before (T1) as well as 15 min (T2) and 24 h (T3) after ET. Spin labelled (16-DOXYL-stearic acid) red blood cell membranes were characterised using the relaxation correlation time (Tc in inverse proportion to EMF). Fatty acid composition (%) of the membrane was determined by gas-liquid chromatography. **RESULTS:** Supplementation did not induce changes in EMF (T1 vs. TO) but significant changes in membrane composition were observed and there were increases in n-3 polyunsaturated fatty acid PUFA, n-3/n-6 ratio, and total n-3 fatty acids. Exercise (T2 vs. T1) induced a significant decrease of EMF in group P (Tc: +19%, P<0.05) and nonsignificant decrease in group S (Tc: +5%), whereas membrane fatty acid composition did not change in either group. During the recovery period (T3 vs. T2), EMF decreased significantly in group S (Tc: +29%, P<0.05) and nonsignificantly in group P (Tc: +18%) without any significant changes in fatty acid composition.

CONCLUSION AND POTENTIAL RELEVANCE: An enriched oral antioxidant supplementation induced changes in membrane composition, which modulated the decrease in EMF induced by exercise. Long chain n-3 fatty acid supplementation might therefore be beneficial.