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DIFFERENCES IN THE LIPID PEROXIDES AND THE SUBSTANCES WITH
SUPEROXIDE-SCAVENGING ACTIVITIES IN SERA BETWEEN HOT-BRED
(THOROUGHBRED) AND COLD-BRED (CROSS-BRED) HORSES

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An excessive uptake of oxygen due to, for example, hard exercise brings about so-called oxidative stress. The oxidative stress is considered to be induced by overproduction of superoxide (O_2^-) through distortion of the mitochondrial electron transport system or reduction of oxygen by xanthine oxidase. The lipid peroxidation caused by reactions with O_2^- is usually regarded as a criterion of oxidative stress. Animals possess enzymatic and nonenzymatic antioxidants to suppress oxidative stress. Therefore, both lipid peroxides and O_2^- -scavenging abilities of substances in sera of animals are generally measured to estimate the degree of oxidative stress.

In the present study, since racing horses (thoroughbred) are subjected to much more hard exercise than the usual cold-bred horses (cross-bred) are, the lipid peroxides as well as O_2^- -scavenging abilities of substances contained in their sera were measured to observe the difference in the degree of oxidative stress. The thiobarbituric acid-reaction and spin trap-ESR methods were employed to measure the lipid peroxides and O_2^- -scavenging abilities, respectively. The results indicated that the amount of lipid peroxides in the sera of racing horses was significantly higher than that in the sera of cold-bred. The sera from the racing horses also exhibited a higher O_2^- -scavenging ability than those of cold-breds. The substances with O_2^- -scavenging activity were separated and identified using an HPLC apparatus equipped with a TSKgel column. EC-SOD, ceruloplasmin and albumin-bound bilirubin were identified in both groups. The O_2^- -scavenging abilities of all these substances from racing horses were significantly higher than those from the cold-bred horses. It is interesting to note that the activity of albumin-bound bilirubin in cold-breds was low. These results indicated that the racing horses had substances with high O_2^- -scavenging activity in their sera, though they contained a high amount of lipid peroxides.