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Effects of Antioxidant Supplementation and Repetitive Loading on Biomarkers of Oxidative Stress in Aged Rats: 2718: Board #226 4:PM - 5:PM

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PURPOSE: The purpose of this study was to characterize the effects of two different dietary antioxidant supplementations and chronic repetitive loading exercise on biomarkers of oxidative stress in aged rats.

METHODS: Aged Fischer 344 Brown × Norway rats (30 months) were randomly assigned to either a diet supplemented with Vitamin C (2% by weight) and Vitamin E (30,000 I. U.) (N = 4), curcumin (1% by weight) (N = 5) or normal (unsupplemented) rat chow (N=4). The dorsiflexors of one limb in all animals was loaded 3 times per week for 4.5 weeks. The contralateral limb served as the intra-animal control. Additional control aged (30 months, N=4) and young adult rats (6 weeks of age, N=6) underwent the training protocol, but received the non-supplemented diet. The tibialis anterior muscle (TA) was removed and assayed for biomarkers of oxidative stress that included: the ratio of reduced glutathione to oxidized glutathione (GSH/GSSG), which is a measure of redox status, malondialdehyde (MDA) which is a biomarker for lipid peroxidation, 8-hydroxy-2'-deoxyguanosine (8-OHdG), which is a marker of oxidative damage to DNA, catalase concentration, and cytosolic hydrogen peroxide (HO) levels.

RESULTS: The data indicate that compared to control muscles, repetitive loading significantly increased catalase activity and lowered MDA levels in the TA. Non-supplemented chronic exercise significantly increased cytosolic H_2O_2 levels in the TA of old rats, but decreased the cytosolic H_2O_2 levels in the TA of young adult rats. Supplementation with Vitamin E & C significantly increased the GSH/GSSG ratio and decreased cytosolic HO levels in muscles of old rats. Supplementation with either Vitamins E & C or curcumin attenuated the increase H_2O_2 levels in the exercised TA muscle of old rats. Supplementation had no effect on catalase concentration.

CONCLUSION: The results suggest that both antioxidant supplementation and repetitive loading exercise can improve the pro-oxidant status in muscles of old rats, but that they may work via different mechanisms.