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Effects of Antioxidant Supplementation and Repetitive Loading on Biomarkers of Oxidative Stress in Aged and Young Adult Rats

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Abstract

Antioxidant supplementation has been suggested as an intervention against the deleterious effects of increased oxidative stress (OS) associated with aging. The purpose of this study was to determine the effects of different dietary antioxidant supplements on biomarkers of OS in repetitively loaded (RL) muscles in aged rats. Aged and young adult (YA) FBNxF344 rats were randomly assigned to a diet supplemented with Vit C & Vit E, curcumin, or normal non-supplemented (NS) rat chow. The dorsiflexors of the left limb in all animals were loaded 3x/wk for 4.5 wks using 80 maximal stretch-shortening contractions per session. Biomarkers of OS were measured in the tibialis anterior muscle (TA). RL increased the concentration of cytosolic H_2O_2 in TA muscles from aged and YA animals, but both supplements attenuated this increase. The GSH/GSSG ratio increased in the exercised limb of supplemented animals. Mn SOD activity increased with supplementation in the YA animals. CuZn SOD activity increased with supplementation in YA and aged animals and GPx activity increased with exercise in the NS YA and aged animals. Catalase activity increased with supplementation in the YA and aged animals. GPx-1, SOD-1, and catalase mRNA expression were lower in TA muscles of aged supplemented animals. These data suggests that antioxidant supplementation may improve muscle levels of OS with aging under conditions of RL.

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