EFFECTS OF EXERCISE AND ANTIOXIDANT INTAKE ON PROTEIN DAMAGE IN YOUNG AND OLD MICE

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Background:

The oxidative stress theory states that an increase in reactive oxygen species cause oxidative damage leading to systemic age-related decline, a hallmark of aging in both humans and rodents. Interventions, such as exercise and antioxidants, reducing oxidative stress should improve age-associated declines. While both interventions seem successful individually, it remains unknown as to how they might interact in the context of aging. We hypothesized that exercise or antioxidants alone would decrease oxidative damage, and combining them would further decrease oxidative damage.

Methods:

Groups of 4 and 20 month old C57Bl/6J mice were placed into one of four treatment groups: sedentary/ control diet, sedentary/ antioxidant diet, exercise/ control diet, and exercise/ antioxidant diet. The mice underwent 16 weeks of treatment prior to euthanization, during which cardiac and skeletal tissues were collected and stored at -80°C. Protein damage in their homogenates was assessed by measuring carbonyl levels by a 2,4-dinitrophenylhydrzine derivatization method (n=5-6/group). Samples were read spectrophotometrically and carbonyl content was calculated. The effects of age and treatment on protein carbonylation were analyzed by two-way ANOVA, followed by post-hoc comparisons.

Results:

There was no main effect of age on protein oxidation in heart or skeletal tissue. While there was no main effect of Treatment on skeletal muscle protein oxidation, all the treatments decreased protein oxidation in the heart, especially in the old mice.

Conclusion:

Overall, the effects of treatment were only observed in the heart muscle signifying a potential tissue-dependent response to exercise and antioxidants. Other tissues should be studied to strengthen this argument.

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