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Antioxidant Supplementation May Partially Ameliorate Apoptosis in the Extensor Digitorum Longus Muscle of Aged Fischer 344 Brown x Norway Rats

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Abstract

The purpose of this study was to determine the effects of dietary antioxidant supplementations on markers of apoptosis in repetitively loaded skeletal muscles of young (3mo) and aged (30mo) FBNX344 rats. Animals received a diet supplemented with vitamin C (2% by BW) and vitamin E (30,000 I.U.) (N = 12), curcumin (1% by BW) (N = 12) or standard rat chow (N=12). The dorsiflexors of the left limb in all animals were loaded 3 times a week for 4.5 weeks using 80 maximal stretch-shortening contractions per session. The extensor digitorum longus muscle (EDL) was removed for analysis. There was no effect of repetitive loading on any markers of apoptosis. Caspase 3 was 15% and 18% lower in muscles of aged rats supplemented with both Vit C&E and curcumin respectively, compared to unsupplemented animals. Basal levels of caspase 3 activity in aged animals was 17% higher than their young counterparts ($p \leq 0.05$). Neither supplementation altered caspase 8 or caspase 9 activity, however the basal activity of caspase 8 was 1.3 fold higher in aged animals ($p \leq 0.05$). DNA fragmentation was 24.6% greater in aged vs. young adult animals ($p \leq 0.05$). Vit E&C and curcumin supplementation attenuated DNA fragmentation in aged muscles by 19% and 17%, respectively ($p \leq 0.05$). In conclusion, antioxidant supplementation can partially attenuate apoptosis in EDL muscles of aged rodents; possibly by improving their pro-oxidant status.

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