

Effect of antioxidant supplementation on insulin sensitivity in response to endurance exercise training

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Abstract

While production of reactive oxygen and nitrogen species (RONS) is associated with some of the beneficial adaptations to regular physical exercise, it is not established whether RONS play a role in the improved insulin-stimulated glucose uptake in skeletal muscle obtained by endurance training. To assess the effect of antioxidant supplementation during endurance training on insulin-stimulated glucose uptake, 21 young healthy (age 29 ± 1 y, BMI 25 ± 3 kg/m²) men were randomly assigned to either an antioxidant [A0; 500 mg vitamin C and 400 IU vitamin E (α -tocopherol) daily] or a placebo (PL) group that both underwent a supervised intense endurance-training program 5 times/wk for 12 wk. A 3-h euglycemic-hyperinsulinemic clamp, a maximal oxygen consumption ($\dot{V}O_{2max}$) and maximal power output (Pmax) test, and body composition measurements (fat mass, fat-free mass) were performed before and after the training. Muscle biopsies were obtained for determination of the concentration and activity of proteins regulating glucose metabolism. Although plasma levels of vitamin C ($P < 0.05$) and α -tocopherol ($P < 0.05$) increased markedly in the A0 group, insulin-stimulated glucose uptake increased similarly in both the A0 (17.2%, $P < 0.05$) and the PL (18.9%, $P < 0.05$) group in response to training. $\dot{V}O_{2max}$ and Pmax also increased similarly in both groups (time effect, $P < 0.0001$ for both) as well as protein content of GLUT4, hexokinase II, and total Akt (time effect, $P \leq 0.05$ for all). **Our results indicate that administration of antioxidants during strenuous endurance training has no effect on the training-induced increase in insulin sensitivity in healthy individuals.**

This study is basically in direct contradiction to [this study](#), whose authors find that antioxidants abolish the effect of endurance training on insulin sensitivity. Personally, I have quit taking vitamins C and E for that reason. ROS seem to be needed for induction of mitochondrial production too.