

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

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

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 (P_{max}) 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 P_{max} 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.