

# 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  $29 \pm 1$  y, BMI  $25 \pm 3$  kg/m<sup>2</sup>) men were randomly assigned to either an antioxidant [A0; 500 mg vitamin C and 400 IU vitamin E ( $\alpha$ -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  $\alpha$ -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.