Strength training and determinants of VO2max in older men

W. R. Frontera, C. N. Meredith, K. P. O'Reilly and W. J. Evans
US Department of Agriculture Human Nutrition Research Center on Aging, Tufts University, Boston, Massachusetts 02111.

The effects of strength training on maximal aerobic power (VO2max) and some of its determinants were studied in 12 healthy older men (60-72 yr). They underwent 12 wk of strength conditioning of extensors and flexors of each knee with eight repetitions per set, three sets per session, and three sessions per week at 80% of the one repetition maximum (1 RM). Left knee extensors showed a 107% increase in 1 RM, a 10% increase in isokinetic strength at 60 degrees/s, and a 23% increase in total work performed during 25 contractions on an isokinetic dynamometer. Strength measurements of the untrained left elbow extensors showed no change. Leg cycle ergometer VO2max per unit fat-free mass increased by an average 1.9 ml (P = 0.034) whereas arm cycle VO2max was unchanged. Pulmonary function, hemoglobin concentration, erythrocyte volume, plasma volume, and total blood volume did not change. Biopsies of the vastus lateralis showed a 28% increase in mean fiber area, no change in fiber type distribution, a 15% increase in capillaries per fiber, and a 38% increase in citrate synthase activity. The data suggest that the small increase in leg cycle VO2max in older men may be due to adaptations in oxidative capacity and increased mass of the strength-trained muscles.

Journal of Applied Physiology, Vol 68, Issue 1 329-333,

http://jap.physiology.org/cgi/content/abstract/68/1/329