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## Effects of Short-Term Training Using Powercranks on Cardiovascular Fitness and Cycling Efficiency

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### ABSTRACT

Powercranks use a specially designed clutch to promote independent pedal work by each leg during cycling. We examined the effects of 6 wk of training on cyclists using Powercranks ( $n = 6$ ) or normal cranks ( $n = 6$ ) on maximal oxygen consumption ( $\dot{V}O_{2\max}$ ) and anaerobic threshold (AT) during a graded exercise test (GXT), and heart rate (HR), oxygen consumption ( $\dot{V}O_2$ ), respiratory exchange ratio (RER), and gross efficiency (GE) during a 1-hour submaximal ride at a constant load. Subjects trained at 70% of  $\dot{V}O_{2\max}$  for 1 h·d<sup>-1</sup>, 3 d·wk<sup>-1</sup>, for 6 weeks. The GXT and 1-hour submaximal ride were performed using normal cranks pretraining and posttraining. The 1-hour submaximal ride was performed at an intensity equal to approximately 69% of pretraining  $\dot{V}O_{2\max}$  with  $\dot{V}O_2$ , RER, GE, and HR determined at 15-minute intervals during the ride. No differences were observed between or within groups for  $\dot{V}O_{2\max}$  or AT during the GXT. The Powercranks group had significantly higher GE values than the normal cranks group ( $23.6 \pm 1.3\%$  versus  $21.3 \pm 1.7\%$ , and  $23.9 \pm 1.4\%$  versus  $21.0 \pm 1.9\%$  at 45 and 60 min, respectively), and significantly lower HR at 30, 45, and 60 minutes and  $\dot{V}O_2$  at 45 and 60 minutes during the 1-hour submaximal ride posttraining. It appears that 6 weeks of training with Powercranks induced physiological adaptations that reduced energy expenditure during a 1-hour submaximal ride.

*Reference Data:* Luttrell, M.D. and J.A. Potteiger. Effects of short-term training using Powercranks on cardiovascular fitness and cycling efficiency.

**Keywords:** cycling efficiency, energy expenditure, cardiorespiratory, submaximal exercise.