

The Effect of Type II Diabetes Mellitus on Oxygen Uptake Kinetics during Heavy Exercise

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ABSTRACT

The kinetics of oxygen uptake (Vo_2) during the rest to exercise transition are thought to be modulated by intracellular metabolic processes. Diabetes has been shown to slow Vo_2 kinetics, likely due to the impact of diabetes upon microvascular oxygen exchange (Padilla et al, 2007). However, to date, recovery from exercise has yet to be studied in these patients. Thus, the purpose of this study was to test the hypothesis that the existence of diabetes would hamper Vo_2 kinetics during transitions to and from heavy leg cycling (H: Supra-LT). Nine subjects (4 control, 5 diabetic) completed three separate H exercise bouts. Vo_2 was measured continuously at the mouth during exercise and recovery for each bout. During the on-transient, the total amplitude was decreased (Atot: Control 2.16 ± 0.29 vs Diabetic 1.33 ± 0.42 L/min, $p=0.01$). In an attempt to correct for differences in Atot, the rate of change in Vo_2 (A_1/T_1) was calculated. This variable was significantly reduced in diabetics during both the on- (A_1/T_1 : Control 0.059 ± 0.03 vs Diabetic 0.016 ± 0.01 , $p=0.02$), and off-transients (Control -0.10 ± 0.10 vs Diabetic 0.035 ± 0.012 , $p=0.09$). In addition, the time constant during the on-transition was greatly slowed in diabetes (Tau: Control 24.07 ± 8.39 vs Diabetic 76.76 ± 37.94 sec, $p=0.03$). These findings suggest strongly that diabetes and its sequelae lead to impairments in oxidative metabolism during both exercise and recovery, which would serve to cause a faster rate of fatigue and a longer temporal course of recovery.