

Exercise duration and blood lactate concentrations in moderate and low intensity of cycle ergometry

J. Yamauchi,^{1,2,3} K.E. Kobayashi,¹ N. Morita⁴ and T. Hashimoto,^{2,5} ¹Graduate School of Human Health Sciences, Tokyo Metropolitan University, Tokyo, Japan, ²Future Institute for Sport Sciences, Sogo-kenkyukikou Waseda University, Tokyo, Japan, ³Khon Kaen University, Khon Kaen, Thailand, ⁴Department of Sport and Health Science, Hokkaido University of Education, Hokkaido, Japan and ⁵Department of Sport and Health Science, Ritsumeikan University, Shiga, Japan.

Introduction: There have been many studies analyzing lactate accumulation and clearance following the high intensity exercise; however, there has been little research that examines blood lactate dynamics with relatively long duration of exercise at moderate intensity over the level of lactic threshold. The purpose of this study was to investigate the responses in the concentration of blood lactate at moderate intensity of cycle ergometer exercise for 1 hour.

Methods: Eleven healthy young subjects performed cycling exercise on the ergometer at low (LOW: 20% $\text{VO}_{2\text{max}}$) and moderate (MOD: 55% $\text{VO}_{2\text{max}}$) for 1 hour in non-consecutive days. Subjects cycled at a cadence of 60 revolutions per minute. Blood lactate, glucose, salivary amylase, ratings of perceived exertion (RPE) were measured. A salivary amylase was used for quantifying the physiological stress or fatigue caused by exercise. Also, expired air was obtained throughout the exercise and was analyzed by a gas analyzer in order to determine energy expenditure (EE), oxygen consumption (VO_2), carbon dioxide production (VCO_2) and respiratory exchange ratio (RER). VO_2 and VCO_2 were used to calculate substrate oxidation rate.

Results and Discussion: Blood lactate for MOD significantly increased at 30 min of exercise as compared to rest, but not significantly different at the end (60 min.) of exercise and the recovery, while glucose did not show any significant changes throughout the experimental period. On the other hand, blood lactate and glucose for LOW did not show any significant changes throughout the experiment. About physiological and psychological fatigues, salivary amylase significantly increased after the exercises and RPE scores significantly increased at the end of the exercise for both LOW and MOD. VO_2 and HR increased at the onset and maintained the steady levels throughout the exercise for both LOW and for MOD. These results suggest that the duration and intensity of the exercise influence lactate accumulation and that during the late period of 1-hour longed exercise at moderate intensity, lactate may be oxidized in muscles.