THE EFFECT OF PEDALING RATE ON THERMOREGULATORY RESPONES TO DYNAMIC CYCLE EXERCISE IN HUMANS

N. Kondo, Y. Yamaguchi, Y. Shuji, M. Inoue, Y. Inoue[1] and S. Koga,[2] Laboratory for Applied Human Physiology, Faculty of Human Development, Kobe University, [1]Osaka International University for Women, [2]Kobe Design University, Japan.

Heat The heat loss response during dynamic exercise is important for the control of internal temperature. Work efficiency during a cycle ergometer exercise depends on pedaling rate, and the heat produced at a given work load during such an exercise differs with pedaling rate; thus, the pedaling rate while cycling may influence the thermoregulatory response during dynamic exercise. This study examined the effect of pedaling rate on heat loss responses in humans during a dynamic cycle ergometer exercise. Seven healthy male subjects performed on a cycle ergometer at low (L: 45 rpm) and medium (M: 75 rpm) pedaling rates at a constant work load (110 W) for 40 min. These experiments were performed in random order, and conducted at an ambient temperature of 25 °C and a relative humidity of 50% with minimum air movement. Heart rate, rating of perceived exertion, and oxygen uptake were significantly greater in condition M than in condition L. Mean arterial pressure did not differ between the conditions. Esophageal temperature did not differ with the pedaling rate during the exercise, while mean skin temperature 20 min after the onset of exercise was significantly lower in M than in L. Although sweating rates and the skin blood flow on the chest and forearm during the exercise did not differ markedly between L and M, the sweating rates on the thigh and palm were significantly greater in M than in L. Furthermore, the mean sweating rate of three parts (chest, forearm, and thigh) of the body tended to be greater in M than in L during the exercise. In addition, the slope of the relationship between esophageal temperature and sweating rate on the thigh tended to be greater in M than in L. Thus, total heat production during the exercise was greater in M than in L, while Tes did not differ with pedaling rate, indicating that the degree of heat loss during exercise may be greater in M than in L. Especially, this difference between pedaling rates is shown in sweating rate on the lower sites of the body. These results indicate that pedaling rate during dynamic cycle exercise influences both heat production and heat loss, and that these parameters increase with a rise in pedaling rate.

kondo@kobe-u.ac.jp