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The Relationship between Exercise Intensity and Lactate Concentration on the Skin Surface

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We examined the relationship between skin surface lactate concentration on working muscle and heart rate during continuous graded cycling exercise. Sixteen healthy male volunteers participated in this study. A plastic container with 100 μl 1% ethanol was put on the skin surface on the belly of rectus femoris muscle. The workloads were 300, 600, 900 and 1080 (or 990) kpm/min, and each stage was 5 min in duration. Sample collections were performed at rest, during exercise, and recovery. The lactate concentration during exercise significantly increased compared to the basal level ($p<0.05$ or $p<0.001$). Skin surface lactate concentration was found to correlate significantly with heart rate at the exercise intensity of 360 kpm/min ($r=-0.52$, $p<0.05$), 720 kpm/min ($r=-0.74$, $p<0.01$) and 900 kpm ($r=-0.53$, $p<0.05$). This study confirmed that 1) the increase in lactate concentration on the skin surface on working muscle is associated with increase in exercise intensity (heart rate), and 2) the skin surface lactate concentration on the working muscle can be used as a parameter of exercise intensity in each subject.