

運動開始前に過ごす明るさが超最大運動での エネルギー供給機構に及ぼす影響

名古屋工業大学 大 桑 哲 男
(共同研究者) 名古屋市立大学 穂 丸 武 臣

Influence of Bright and Dim Light Exposures on Energy Supply During Supramaximal Exercise

by

Tetsuo Ohkuwa
Nagoya Institute of Technology
Takeomi Akimaru
Nagoya City University

ABSTRACT

The purpose of this study was designed to examine the effect of exposure to two levels of light intensity (bright; 5000 lux and dim; 50 lux) prior to supramaximal cycle exercise on performance and energy supply. Double determinations were carried out for each subject at the same time on separate days. One day, supramaximal exercise after bright light exposure for ninety-minutes and the other day, after dim light exposure. Eight male long-distance runners, who aged 20.1 ± 0.6 (M \pm SD) years old volunteered to take part in the present study. They performed 45-sec supramaximal exercise using a cycle ergometer in a light intensity of 500 lux. The mean power output was measured during supramaximal exercise, and blood glucose, lactate, ammonia, adrenaline and noradrenaline concentrations were measured at rest, immediately after bright or dim light exposure, and immediately after, and 2.5, 5.0, 7.5 min after the supramaximal exercise. The mean power output of supramaximal exercise was $467.7 \pm$

39.6 (M ± SD) watt for bright light exposure and 461.7 ± 40.0 (M ± SD) watt for dim light exposure. It was observed that the bright and dim light exposures prior to exercise do not affect in power output of supramaximal cycle exercise. Blood glucose concentration immediately after supramaximal exercise was significantly lower after bright light exposure compared to dim light ($p < 0.05$). There was no effect of bright and dim light exposures on blood lactate concentration following supramaximal exercise. No significant difference was found in blood ammonia concentration after supramaximal exercise between bright and dim light exposures. From these results, it was cleared that the bright light stimulation prior to supramaximal exercise appeared to decrease the glucose level, but not related to prine nucleotide cycle and physical performance.

要 旨

本研究は超最大運動前に明るい環境 (5000 lux) と暗い環境 (50 lux) に暴露した際に作業成績とエネルギー供給, 特にプリンヌクレオチドサイクルと解糖系からのエネルギー供給に及ぼす影響について検討した。男子陸上長距離選手 8 名を対象に 90 分間にわたって 5000 lux と 50 lux の光環境に暴露した後, 45 秒間の超最大自転車駆動作業を 500 lux の照度にて行わせ, 作業中の仕事率, 両光環境暴露前後, 及び運動後の血中乳酸, グルコース, アンモニア, アドレナリン, ノルアドレナリン濃度を測定した。運動前に明るい環境と暗い環境で過ごした後の自転車運動での仕事率に有意差は認められなかった。運動前の明るい環境と暗い環境への暴露は超最大運動での血中アンモニア濃度に影響を与えなかった。運動前に暗い環境で過ごすよりも明るい環境で過ごした時に比べて運動直後の血糖値は有意に高い値が認められた。運動前の明るい環境と暗い環境への暴露は超最大運動での血中乳酸濃度に影響を与えなかった。以上の結果から明るい光刺激は超最大運動での仕事率やプリンヌクレオチドサイクル系のエネルギー供給に影響しないが, 糖代謝に影響することが明らかとなった。