

車椅子競技者の寒冷下運動時における 自律性体温調節とホルモン応答

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Thermoregulation and Hormonal Responses During Cold Exposure in Wheelchair Athletes

by

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ABSTRACT

The purpose of this study was to clarify the characteristics of thermoregulation and physiological responses during exercise in a cold environment in wheelchair athletes with spinal cord injury. The subjects were male wheelchair athletes with spinal cord injury and healthy male college students. The maximal oxygen intake as a parameter of endurance exercise ability was higher in the wheelchair athletes than in the college students. Measurements were performed at an environmental temperature of 12 °C with a mean

relative humidity of 60% at a mean air stream of 0.5m/sec. After rest for 30 minutes, the subjects performed arm cranking exercise at 20 watts (50 rpm) for 60 minutes. The measurement items were tympanic temperature, mean skin temperature, heat production, catecholamine, and cold-induced vasodilation. During exercise under exposure to cold, the tympanic temperature, heat production, and catecholamine more markedly increased in the wheelchair athletes than in the college students. The resistance index as a value of cold-induced vasodilation was higher in the wheelchair athletes than college students during cold exposure. On the other hand, the decrease in the mean skin temperature was less in the wheelchair athletes than in the college students. The thermoregulation sensitivity and heat production responses to exercise in a cold environment were more markedly increased in the wheelchair athletes than in the college students.

要 旨

本研究は、脊髄損傷を有する車椅子マラソン競技者の寒冷環境下での運動に対する生理学的反応を主として体温調節反応特性から明らかにすることである。被験者は、脊髄損傷の男子車椅子マラソン競技者（車椅子競技者）と一般男子大学生（大学生）であり、持久的運動能力の指標である最大酸素摂取量は、車椅子競技者が大学生より大きかった。測定条件と運動負荷は、平均環境温度 12℃、平均相対湿度 60% そして平均気流 0.5m/sec の測定室で 30 分間安静の後、arm cranking エルゴメータ運動を 20watts (50rpm) で 60 分間負荷した。測定項目は、安静と運動中の鼓膜温、平均皮膚温、産熱量そしてカテコールアミン、寒冷血管拡張反応である。寒冷暴露下運動中の鼓膜温、平均皮膚温、産熱量およびカテコールアミンは、大学生より車椅子競技者が亢進していた。寒冷下での寒冷血管拡張反応は、車椅子競技者が大学生より抗凍傷指数が高かった。寒冷下での運動に対して体温調節の感受性・熱産生および末梢血管反応は、車椅子競技者が一般大学生より優れていた。

緒 言