繰返し温熱負荷による体温日内変動の修飾

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1992 Fiscal Year Final Research Report Summary

EFFECT OF HEAT EXPOSURE ON THE DIURNAL CHANGE OF BODY TEMPERATURE

Research Project

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03670074

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Allocation Type

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環境生理学(含体力医学･栄養生理学)

Research Institution

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heat acclimation / body temperature / circadian rhythm / heat production / thyroid hormone / energy substrates / feeding

Research Abstract

After the rats were exposed to heat loaded for about 5 h during the last half of the dark phase for 10 consecutive days, body temperature of the rats significantly decreased during the period corresponding to that of the previous heat exposure time (Shido et al., 1991). The objective of this project was to clarify the mechanism of characteristic fall in body temperature. The heat-exposed (HE) rats were subjected to 33.0°C for about 5 h in the last half of the dark phase for more than 2 weeks and control (CN) rats were kept at 24°C. After the completion of the schedule, the levels of hypothalamic temperature (Thy), heat loss, heat production, feeding activity (FA) and body movement were significantly lower in the HE than in the CN during the period when the HE

rats had been exposed to heat. Even in fasting condition from 6 h before the start of the experiment, significant difference in Thy still existed. These results suggest that the characteristic fall in Thy is partly mediated by the decrease in FA, however, there are also another contributors. To investigate the contribution of plasma levels of thyroid hormones and energy substrates, plasma levels of triiodothyronine (T3), free T3 (FT3), thyroxin (T4), free T4 (FT4), triglyceride, non esterified fatty acid, total protein and glucose were measured at 3 h interval between 0000 and 1800 h (dark phase, 0300-1500 h). Plasma levels of T3 and FT3 during the previous heat exposure period were significantly higher in the HE than in the CN. Similar differences were observed in T4 and FT4 levels. Plasma levels of energy substrates did not differ between 2 groups. These results suggest minimum contributions of thyroid hormones to the characteristic falls in Thy in the HE rats. Farther studies are required to clarify the mechanisms of the characteristic fall in Thy.

Research Products (12 results)

All Other

All Publications (12 results)

[Publications] SHIDO,Osamu: "Shifts in the hypothalamic temperature of rats acclimated to direct internal heat load with different schedules." Journal of Thermal Biology. 16. 267-271 (1991)

[Publications] SHIDO,Osamu: "Effect of heat acclimation on diurnal changes in body temperature and locomotor activity in rats." Journal of Physiology(London). 433. 59-71 (1991)

[Publications] SHIDO,Osamu: "Temperature regulation during acute heat loads in rats after short-term heat exposure." Journal of Applied Physiology. 71. 2107-2113 (1991)

[Publications] SHIDO,Osamu: "Modification of nycthermal changes in body temperature by repeated cold exposure in rats."

[Publications] SHIDO,Osamu: "Increase in plasma thyroid hormone levels during the previous heat exposure time in rats acclimated to heat loaded for hours at a fixed time daily."

[Publications] SAKURADA,Sohtaro: "Shivering and nonshivering thermogenic responses of rats subjected to different patterns of heat acclimation." Canadian Journal of Physiology and Pharmacology.(1993)

[Publications] Shido, O., Yoneda, Y. and Nagasaka, T.: "Shifts in the hypothalamic temperature of rats acclimated to direct internal heat load with different schedules." J. therm. Biol.16. 267-271 (1991)

[Publications] Shido, O., Sakurada, S. and Nagasaka, T.: "Effect of heat acclimation on diurnal changes in body temperature and locomotor activities in rats." J. Physiol. (London). 433. 59-71 (1991)

[Publications] Shido, O., Sakurada, S., Tanabe, M. and Nagasaka, T.: "Temperature regulation during acute heat loads in rats after short-term heat exposure." J. Appl. Physiol.71. 2107-2113 (1991)

[Publications] Shido, O., Sakurada, S., Fujikake, K. and Nagasaka, T.: "Modification of nycthemeral changes in body temperature by repeated cold exposure in rats."

[Publications] Shido, O., Sakurada, S., Hashimoto, T., Fujikake, K. and Nagasaka, T.: "Increase in plasma thyroid hormone levels during the previous heat exposure time in rats acclimated to heat for hours at a fixed time daily."

[Publications] Sakurada, S. and Shido, O.: "Shivering and nonshivering thermogenic responses of rats subjected to different patterns of heat acclimation." Canadian P. Physiol. Pharmacol.

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