Thermocline for the study of behavioral thermoregulation in small animals

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1995 Fiscal Year Final Research Report Summary

Thermocline for the study of behavioral thermoregulation in small animals

Research Project

Project/Area Number

05557005

Research Category

Grant-in-Aid for Developmental Scientific Research (B)

Allocation Type

Single-year Grants

Research Field

Environmental physiology (including Physical medicine and Nutritional physiology)

Research Institution

Kanazawa University

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Project Period (FY)

1993 – 1995

Keywords

Thermocline / Preferred ambient temperature / Body temperature / Pyrogen / Behavioral thermoregulation / Diurnal rhythm / Feeding / Rat

Research Abstract

The purpose of this study was to design a thermocline for accurate measurements of preferred ambient temperature of small animals such as rats in various conditions. The dimensions of the thermocline were 200 x 16 x 18 (H) cm, whose both ends were welded with cupper tubings in which cold and hot water was independently circulated and a thermal, gradient was maintained along the axis of the thermocline. With this instrument the preferred temperature of rats was estimated. Body temperature was continuously measured by telemetry. 1) Behavioral thermoregulation and its diurnal change during fever. The preferred temperature was higher in the inactive phase and lower in the active phase. After a pyrogen was injected the preferred temperature rose before the riso of body temperature and fell before the thermolysis began. 2) Behavioral thermoregulation in FOK rats. Body and preferred temperatures were always lower in FOK rats. The critical temperatures for the increase in metabolic rate and for the skin vasodilatation were also lower. 3) Endotoxin shock. A large dose of endotoxin caused a fall in body temperature as well as the preferred temperature. 4) Behavioral thermoregulation after feeding. Shortly after feeding the rats selected a lower ambient temperature. 5) In the rats naive to the experimental condition maintained higher body and preferred temperatures for at least 3 days. 6) Effects of restraint and exercise. During restraint, the rats maintained higher body temperature and the critical temperatures for thermoregulatory responses. In exercise-trained rats nonevaporative heat loss was always higher than control rats.

Research Products (19 results)

All | Other

All | Publications (19 results)

[Publications] Shido,O.: "Increase in plasma thyroid hormone levels during the previous heat exposure time in heat-acclimated rats." Can.J.Physiol.Pharmacol.71. 904-909 (1993)

[Publications] Sakurada S.: "Shivering and nonshivering thermogenic responses of rats subjected to different patterns of heat acclimation." Can.J.Physiol.Pharmacol.71. 576-581 (1993)

[Publications] Shido,O.: "Day-night changes of body temperature and feeding activity in heat-acclimated rats." Physiol.Behav.55. 935-939 (1994)

[Publications] Sakurada,S.: "Changes in hypothalamic temperature of rats after daily exposure to heat at a fixed time." Pflugers Arch.429. 291-293 (1994)

[Publications] Shido,O.: "Shifts of thermoeffector threshold in heat-acclimated rats." J.Physiol.(Lond.). 432. 491-497 (1995)

[Publications] Sugimoto N.: "Thermoregulatory responses of rats acclimated to heat given daily at afixed time." J.Appl.Physiol.78. 1720-1724 (1995)

[Publications] O.Shido et. al.: "Increase in plasma thyroid hormone levels during the previous heat exposure time in heat-acclimated rats." Can. J.Physiol. Pharmacol. 71. 904-909 (1993)

[Publications] S.Sakurada and O.Shido: "Shivering and nonshivering thermogenic responses of rats subjected to different patterns of heat acclimation." Can. J.Physiol. Pharmacol. 71. 576-581 (1993)

[Publications] O.Shido et. al.: "Alternation of nyctohemeral changes in body core temperature by repeated cold exposure given at a fixed time daily in rats." Jpn. J.Physiol. 43. 685-696 (1993)

[Publications] S.Sakurada et al.: "Relationship between body core and peripheral temperatures at the onset of thermoregulatory responses in rats." Jpn. J.Physiol.43. 659-667 (1993)

[Publications] O.Shido et. al.: "Day-night changes of body temperature and feeding activity in heat-acclimated rats." Physiol. Behav. 55. 935-939 (1994)

[Publications] O.Shido et. al.: "Fall in body core temperature during the previous heat exposure time in rats after subjection to heat loads at a fixed time daily." In : Temperature Regulation. Ed. A.S.Milton (Advanced in Pharmacological Sciences) Birkhauser. 207-211 (1994)

[Publications] S.Sakurada et. al.: "Changes in hypothalamic temperature of rats after daily exposute to heat at a fixed time." Pflugers Arch.429. 291-293 (1994)

[Publications] N.Sugimoto et. al.: "Persisting changes in the 24-hour profile of locomotor activity by daily activity restriction in rats." Jpn. J.Physiol.44. 735-742 (1994)

[Publications] O.Shido et. al.: "Shifts of thermoeffector threshold in heat-acclimated rats." J.Physiol.(Lond.). 432. 491-497 (1995)

[Publications] N.Sugimoto et. al.: "Thermoregulatory responses of rats acclimated to heat given daily at a fixed time." J.Appl. Physiol.78. 1720-1724 (1995)

[Publications] O.Shido et. al.: "Behavioral and autonomic thermoregulation of rats injected with a large dose of LPS." In : Body Temperature and Metabolism. Eds. T.Nagasaka & A.S.Milton, IPEC. 71-73 (1995)

[Publications] O.Shido et. al.: "Downward shifts of threshold body core temperatures for heat loss and heat production in rats after heat exposure given for hours at a fixed time once a day." In : Body Temperature and Metabolism. Eds. T.Nagasaka & A.S.Militon, IPEC. 92-94 (1995)

[Publications] N.Sugimoto et. al.: "Thermoragulatory responses to intraperitoneal heating in exercise trained rats." In : Body Temperature and Metabolism. Eds. T.Nagasaka & A.S.Milton, IPEC. 95-97 (1995)

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