

## 小動物用の運動時体熱出納測定システムの開発

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# 1996 Fiscal Year Final Research Report Summary

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## Direct Calorimetry of Small Animals during Exercise

Research Project

### Project/Area Number

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07557186

### Research Category

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Grant-in-Aid for Scientific Research (B)

### Allocation Type

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Single-year Grants

### Section

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試験

### Research Field

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Environmental physiology (including Physical medicine and Nutritional physiology)

### Research Institution

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Kanazawa University

### Principal Investigator

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### Project Period (FY)

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1995 – 1996

### Keywords

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direct calorimetry / indirect calorimetry / exercise / biotelemetry / circadian rhythm / 日内リズム

### Research Abstract

The present project aimed to develop a direct calorimetry system for measuring heat balance and locomotor and feeding activities of small mammals simultaneously during voluntary exercise. Briefly, the system comprised of a direct calorimeter, a cage with a running wheel, various sensors and analyzers, water-perfusion devices, air temperature control equipment, data logging system and soft-ware for data processing. The direct calorimeter was made of a alminum box covered by insulating meterial. Copper tubes were tightly and directly attached to the outside of the box and temperature-controlled water was perfused through the tubes. Also, temperature-controlled fresh dry air was sent into the calorimeter at a constant rate with a mass flow controller. Then, the wall and air temperatures inside the calorimeter were maintained at a stable level even when an ambient temperature varied. The outputs (sensitivity) of the calorimenter were 0.63,0.61 and 0.63 mV/W at wall temperatures of 18.0,24.0 and 28.6° C, respectively. The cage and wheel were mainly constructed by stainless steal but one side of them were made of clear acrylic plate to allow radiowave from a biotelemetry system pass through the cage. A shutter was placed between the cage and wheel, which enabled to restrict running activity of animals. Three photoelectric sensors were installed on the cage to monitor running and feeding activities and body movement in the cage of animals. After the whole system was calibrated and ckecked, we confirmed that this system could be useful for investigating heat balance of small animals during exercise.

## Research Products (6 results)

All Other

All Publications (6 results)

- [Publications] Shido O. et al: "Body core temperature of rats subjected to daily exercise limited to a fixed time." Int. J. Biometeor. (in press). (1997) ▼
- [Publications] N. Sugimoto et al.: "Day-night variations of behavioral and autonomic thermoregulatory responses to lipopolysaccharide in rats." Jpn. J. Physiol.46. 451-456 (1996) ▼
- [Publications] O. Shido.: "Can our thermoregulatory system anticipate temperature exposure?" Med. Hypotheses. (in press). (1997) ▼
- [Publications] O.Shido et.al.: "Body core temperature of rats subjected to daily exercise limited to a fixed time." Int.J.Biometeor. (in press). ▼
- [Publications] N.Sugimoto et al.: "Day-night variations of behavioral and autonomic thermoregualtory responses to lipopolysaccharide in rats." Jpn.J.Physiol.46. 451-456 (1996) ▼
- [Publications] O.Shido: "Can our thermoregulatory system anticipate temperature exposure?" Med.Hypotheses. (in press). ▼

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