

Thermoregulatory Mechanisms - from Cellular Process to Organism Response -

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1990 Fiscal Year Final Research Report Summary

Thermoregulatory Mechanisms - from Cellular Process to Organism Response -

Research Project

Project/Area Number

63304033

Research Category

Grant-in-Aid for Co-operative Research (A)

Allocation Type

Single-year Grants

Research Field

環境生理学(含体力医学・栄養生理学)

Research Institution

Kanazawa University (1989-1990)
Osaka University (1988)

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Project Period (FY)

1988 - 1990

Keywords

Temperature regulation / Thermosensitive neurons / Preoptic area / Fever / Cold acclimation / Heat acclimation / Sweating / Skin circulation

Research Abstract

The followings have been clarified by this three-year co-operative research.

(1) Thermoreceptive mechanisms within the hypothalamus using an isolated tissue.

Modullary neurons receive cold information and control shivering. Control of higher brain activity by thermosensitive neurons in the hypothalamus.

(2) Importance of the OVLT to induce fever by endogenous pyrogens. Acute phase response is controlled by thermoregulatory neurons in the hypothalamus.

(3) Unilateral control of thermal saliva secretion by the hypothalamus. No unilateral control of thermal saliva secretion by skin warming. Tympanic temperature rises before thermal sweating by emotional stress. Sweat expulsion would be an indicator of central sweating activity. Unilateral suppression of sweating and fall of tympanic temperature after stellate ganglion blockade.

(4) Selective brain cooling is evident in humans during hyperthermia. Importance of inward flowing of venous blood from the head and face skin to the intracranium.

(5) Cross acclimation between cold and non-thermal stress. Importance of BAT for the cross acclimation. Negative feed back mechanisms from the central circulatory system to skin blood flow. Exercise at high temperatures suppress metabolism. pH and K-ion concentration change in blood after hypo- and hyperthermia.

(6) Heat shock protein and species difference. Temperature dependency of NK-cells.

Close relation of immune responses to temperature regulation.

Research Products (12 results)

All Other

All Publications (12 results)

- [Publications] Nagasaka,T.: "Role of the veins of the face on brain cooling during body warming in human subjects." Jpn.J.biometeor.27. (1990) ▼
- [Publications] Kuroshima,A.: "Cold- and moradrenaline- induced changes in ganglioside GM_3 levels of rat brown adipose tissue." J.therm.Biol.16. 37-40 (1991) ▼
- [Publications] Morimoto,T.: "Thermoregulation and body fluids: role of blood volume and central venous pressure." Jpn.J.Physiol.40. 165-179 (1990) ▼
- [Publications] Iriki,M.: "Action site of circulating interleukin—1 on the rabbit brain." Brain Res.540. 217-223 (1991) ▼
- [Publications] Hori,T.: "Immune cytokines and regulation of body temperature,food intake and cellular immunity." Brain Res.Bull.26. (1991) ▼
- [Publications] Murakami,N.: "Central action sites of interleukin—1 β for inducing fever in rabbits." J.Physiol.(Lond). 428. 299-312 (1990) ▼
- [Publications] Nagasaka, T., Hirashita, M., Tanabe, M., Sakurada, S. and Brinnel, H.: "Role of the veins of the face on brain cooling during body warming in human subjects." Jpn. J. Biometeor.27-3. (1990) ▼
- [Publications] Kuroshima, A. and Ohno, T.: "Cold-and noradrenalineinduced changes in ganglioside GM_3 levels of rat brown adipose tissue." J. therm. Biol.16. 37-40 (1991) ▼
- [Publications] Morimoto, T.: "Thermoregulation and body fluids : role of blood volume and central venous pressure." Jpn. J. Physiol.40. 165-179 (1990) ▼
- [Publications] Hashimoto, M., Ishikawa, Y., Yokota, S., Goto, F., Bando, T., Sakakibara, Y. and Iriki, M.: "Action site of circulating interleukin-1 on the rabbit brain." Brain Res.540. 217-223 (1991) ▼
- [Publications] Hori, T., Nakashima, T., Take, S., Kaizuka, Y., Mori, T. and Katafuchi, T.: "Immune cytokines and regulation of body temperature, food intake and cellular immunity." Brain Res. Bull.26. (1991) ▼
- [Publications] Murakami, N., Sakata, Y. and Watanabe, T.: "Central action sites of interleukin-1beta for inducing fever in rabbits." J. Physiol. (Lond). 428. 299-312 (1990) ▼

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