成長発達過程におけるサイロトロピン放出ホルモンの生理的役割

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The physiological role of thyrotropin-releasing hormone in the homeothermic development of growing rats.

Research Project

Project/Area Number

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Pediatrics

Research Institution

Kanazawa University

Principal Investigator

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Research Abstract

The effects of thyrotropin-releasing hormone (TRH) and its metabolite, cyclo-histidine-proline (cHP), on the homeothermic development of neonatal rats were studied. The intrathecal administration of 10 - 10 moles of TRH during the second week of age produced a hyperthermia by 3 weeks of age; this was followed by a transient period of hypothermia. This effect was abolished by the simultaneous administration of 6-hydroxydopamine. In contrast, cHP decreased thermogenesis. TRH accelerated brain norepinephrine (NE) and dopamine (DA) release, resulting in a reduction of cerebral NE and DA at 4 weeks of age. In addition, mitochondrial [<^3H>]-guanosine diphosphate(GDP) binding capacity and -glycerophosphate dehydrogenase activity in brown adipose tissue (BAT) were reduced. Liver cytochrome C reductase activity was also reduced. These results indicate that TRH stimulates central NE release, thereby enhancing thermogenesis while cHP decreases heat production.
Since TRH stimulates both catechol amine (CA) and thyroid hormone release, the next experiment was investigated for the interrelation between CA and thyroid hormone during cold acclimation in rats. Hypothyroidism was induced by the administration of propylthiouracil and hyperthyroidism by the injection of thyroxine. Although hypothyroid rats maintained their body temperature within the normal range during cold exposure, the body weight gain was markedly impaired. They had increased cerebral DA, adrenal CA and BAT NE, enhanced cerebral tyrosine hydroxylase and adrenal DA- -hydroxylase activities and elevated [<^3H>]-dihydroalprenolol (DHA) binding to liver plasma membranes. In contrast, BAT NE, [<^3H>]-GDP binding and hepatic [<^3H>]-

DHA binding in hyperthyroid rats were reduced after 4 weeks of cold acclimation. These results indicate that thyroid hormone deficiency is associated with an accelerated CA synthesis and release, whereas the hyperthyroid state suppresses CA release, hepatic DHA binding and BAT heat production. Thus there is a close interrelationship between TRH, thyroid hormone and CA. TRH may play the role of a modulator in thermogenesis via CA and thyroid hormone regulation.▲ Less

Research Products (8 results)

All | Other

All | Publications (8 results)

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