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Chronic iodine deprivation attenuates stress-induced and diurnal variation in corticosterone secretion in female Wistar rats

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Abstract

Many millions of people throughout the world are at risk of developing iodine deficiency-associated disorders. The underlying effects of iodine deficiency on neuroendocrine function are poorly defined. We have studied stress-induced and diurnal variation in corticosterone secretion in female rats rendered chronically hypothyroid by feeding them an iodine-free diet for 6 months. Corticosterone secretory responses in iodine deficient animals were compared to those seen in animals rendered hypothyroid with propylthiouracil and untreated controls. By using a well-validated, automated blood sampling system to collect small samples of blood over the complete daily cycle in unrestrained animals, we have demonstrated for the first time that the normal diurnal rhythm of corticosterone secretion is lost in chronic iodine deficiency and that the corticosterone secretory response to the psychological stress of 10 min exposure to white noise is attenuated. Despite restoration of circulating triiodothyronine and thyrotropin releasing hormone- and thyroid stimulating hormone beta-transcript prevalence in the hypothalamus and pituitary, respectively, 1 month after restoration of normal iodine-containing diet both the diurnal variation in corticosterone levels and the corticosterone secretory response to the noise stress remained reduced in amplitude compared to control animals. Thus, chronic hypothyroidism induced by iodine deficiency significantly attenuates hypothalamo-pituitary-adrenal axis activity, an effect that persists after functional recovery of the thyroid axis.

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