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Zinc-deficiency decreases adenohypophyseal TRH-degrading enzyme (pyroglutamyl-aminopeptidase II) and increases TSH serum levels in pre or post-weaned adult rats

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Pyroglutamyl aminopeptidase II (PPII), located in adenohypophysis and medial-basal-hypothalamus degrades the hypothalamic peptide thyrotropin-releasing hormone (TRH), which is synthesized in the para-ventricular nucleus and released from the median eminence to the portal blood. TRH acting through its receptor in adenohypophysis induces thyrotropin release to the circulation thus maintaining the serum Thyroid hormones concentration. PPII is a Zn-dependent metallopeptidase that may participate in the regulation of the hypothalamus-pituitary-Thyroid (HPT) axis function, however, it is unknown whether dietary Zn deficiency down-regulates PPII and whether it would impact TSH release from the adenohypophysis affecting metabolic rate in adult rats. Adult rats fed a Zn-deficient diet (2 ppm) throughout their lifespan (DD), prenatally (DC) or after weaning (CD); the CC group ate a control diet (20 ppm). We analyzed adenohypophyseal and medial-basal-hypothalamic PPII activity of dams and male offspring when adults; median eminence TRH, serum thyrotropin, leptin and Thyroid hormones concentration. Offspring ate the same diet as their dams (CC, DD) or were switched from dietary regime after weaning (CD, DC) and until 2.5 months of age. DD males showed decreased adenohypophyseal and medial-basal-hypothalamic PPII activity, along with high thyrotropin serum concentration. Post-weaning Zn-deficiency (CD) decreased PPII activity only in adenohypophysis and increased thyrotropin circulating levels. Zn-replenishment (DC) normalized PPII activity in both regions and serum thyrotropin concentration. Adenohypophyseal PPII activity decreased and prolactin levels increased in Zn-deficient dams. We concluded that long-term changes in dietary Zn down-regulate PPII activity independently of T_3, increasing thyrotropin serum concentration, overall resembling sub-clinical hypoThyroidism.

Biography

Patricia de Gortari completed Master of Science in Biotechnology and PhD degree in Physiology at the National University of Mexico. Since 1999, he has been working at the Laboratory of Molecular Neurophysiology at the Neuroscience Research Division at the National Institute of Psychiatry Ramón de la Fuente in México City. His research line is related to different neuroendocrinological alterations in the hypothalamic-pituitary-Thyroid axis in different mood and metabolic alterations, as well as the neuro-modulatory role of TRH as an anorexigenic factor.

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