Abstract

Vitamin A regulates hypothalamic-pituitary-adrenal axis status in LOU/C rats.

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OBJECTIVE: The aim of this study was to explore the involvement of retinoids in the hypoactivity and hyporeactivity to stress of the hypothalamic-pituitary-adrenal (HPA) axis in LOU/C rats.

METHODS: We measured the effects of vitamin A deficiency administered or not with retinoic acid (RA) on plasma corticosterone in standard conditions and in response to restraint stress and on hypothalamic and hippocampal expression of corticosteroid receptors, corticotropin-releasing hormone and 11β-hydroxysteroid dehydrogenase type 1 (11β-HSD1) in LOU/C rats.

RESULTS: Interestingly, under control conditions, we measured a higher plasma concentration of retinol in LOU/C than in Wistar rats, which could contribute to the lower basal activity of the HPA axis in LOU/C rats. Vitamin A deficiency induced an increased HPA axis activity in LOU/C rats, normalized by RA administration. Compared with LOU/C control rats, vitamin A-deficient rats showed a delayed and heightened corticosterone response to restraint stress. The expression of corticosteroid receptors was strongly decreased by vitamin A deficiency in the hippocampus, which could contribute to a less efficient feedback by corticosterone on HPA axis tone. The expression of 11β-HSD1 was increased by vitamin A deficiency in the hypothalamus (+62.5%) as in the hippocampus (+104.7%), which could lead to a higher production of corticosterone locally and contribute to alteration of the hippocampus. RA supplementation treatment restored corticosterone concentrations and 11β-HSD1 expression to control levels.

CONCLUSION: The high vitamin A status of LOU/C rats could contribute to their low HPA axis activity/reactivity and to a protective effect against 11β-HSD1-mediated deleterious action on cognitive performances during ageing.

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