Pituitary dopamine in rats after decreased water intake

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The neuro-intermediate lobe of the pituitary gland of vertebrates is innervated by dopaminergic neurons. In the rat these neurons originate in the rostral part of the arcuate nucleus (Björklund, Moore, Nobin & Stenevi, 1973). A turnover of hypophyseal dopamine was suggested by results of experiments in which dopamine synthesis was inhibited with α-methyl-p-tyrosine (Godden, Holzbauer & Sharman, 1977). Investigations are now in progress to test a possible involvement of pituitary dopamine in the release of hormones from the gland.

In this demonstration results will be shown of experiments on rats in which a large and prolonged release of antidiuretic hormone (ADH) and oxytocin (OXY) was provoked by keeping them on a dry diet (Oxoid B41) for 72 h, followed by 1–5 days during which a 2.5% solution of sodium chloride was offered. This treatment resulted in a severe loss of Gomori positive substance from the neural lobe and the hypothalamus. A hypertrophy of the adrenal glands indicated a simultaneous increase in ACTH secretion. The dopamine content of the neurointermediate lobes of the pituitary glands from rats on a reduced water intake was approximately doubled when compared with litter-mate controls. There was also a significant rise in the catecholamine concentrations of the 'basal hypothalamus' (a structure of about 25 mm^3 including the median eminence and the arcuate, the supraoptic, and the paraventricular nuclei). There was no rise in the dopamine concentrations in the corpora striata. The reduction in water intake caused hyperaemia in the neural lobe, but not in the intermediate or the anterior lobe of the pituitary gland. Fluorescence microscopy showed a striking increase in the catecholamine-containing neurons surrounding the distended blood vessels and of non-vasomotor fibres in the posterior lobe when compared with controls.

The question whether the observed increase in pituitary dopamine concentrations is the result of the increased ADH and OXY secretion or whether dopamine plays an instrumental role in the release of ADH and OXY cannot yet be answered. It is, however, unlikely that it is the unspecific effect of an altered NaCl-water balance or of stress on dopamine-containing neurons, because the striatal dopamine content remained unchanged. In *in vitro* experiments, Bridges, Hillhouse & Jones (1976) observed a two-fold rise in the release of ADH and OXY from the superfused neurohypophysis of the rat when dopamine in a concentration of 6.5×10^{-6} M was added to the superfusion medium.

References

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A denervated dog's kidney preparation for studying renin release into blood and lymph

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A method has been described previously for measuring the flow rates and composition of renal blood and lymph (Wilcox, 1976, 1977). It has been evaluated for the study of renin release.

Greyhounds are anaesthetized with pentobarbitone sodium. The experimental kidney is acutely transposed across the animal's own carotid artery and jugular vein. Lymphatic vessels are opened, lymph collected and its flow rate (LFR) measured directly. Renal venous blood is sampled through a cannula in the renal vein. A needle in the anastomosed carotid-renal artery transmits 0.154 M saline at 0.1 ml min^{-1} kg^{-1}.

Renin activity is expressed as p mole of angiotensin I generated from 1 ml of plasma or lymph during a 1 h incubation in the presence of added dog's renin substrate. Angiotensin I is measured by radioimmunoassay.