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## SEROTONIN CONCENTRATION IN THE HYPOTHALAMUS DURING CHANGES IN PITUITARY THYROTROPIC FUNCTION

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The serotonin concentration in the hypothalamus was determined in sexually mature male rabbits during changes in pituitary thyrotropic function. No clear parallel was observed between the intensity of the pituitary thyrotropic function and the hypothalamic serotonin concentration. Stimulation of pituitary thyrotropic function by injection of 6-methylthiouracil or by partial thyroidectomy was accompanied by an increase in the serotonin concentration, whereas during aseptic inflammation in the thyroid gland or after a combination of removal of the superior cervical sympathetic ganglia and administration of chlorpromazine, the increase in thyrotropic function occurred without any significant changes in the hypothalamic serotonin concentration.

KEY WORDS: serotonin; hypothalamus; pituitary thyrotropic function.

The hypothalamus differs from other parts of the brain in having a high concentration of serotonin [1-3, 5, 7]. Serotonin is known to participate directly in the hypothalamic regulation of the gonadotropic and adrenocorticotrophic functions of the pituitary. The question of its role in the regulation of pituitary thyrotropic function has not been settled. According to Grimm and Reichlin [8], serotonin has an inhibitory action on pituitary thyrotropic function.

The object of this investigation was to examine the role of serotonin in hypothalamic regulation of pituitary thyrotropic function.

### EXPERIMENTAL METHOD

Sexually mature male rabbits were used. The serotonin level in the hypothalamus [4, 9] was determined during exposure to factors stimulating or inhibiting pituitary thyrotropic function. The concentration of thyrotropic hormone in the pituitary was estimated from the height of the thyroid epithelial cells of guinea pigs into which a suspension of acetone-treated pituitary glands from the experimental rabbits was injected.

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TABLE 1. Changes in Serotonin Concentration in Hypothalamus and Thyrotropic Hormone in Pituitary under Different Conditions

Experimental conditions	Number of animals	Serotonin concentration in hypothalamus (in $\mu\text{g/g}$ )		Height of thyroid epithelial cells in (in $\mu$ ) of test animals	
		$M \pm m$	$P$	$M \pm m$	$P$
Intact rabbits (control)	5	$0,75 \pm 0,034$		$8,09 \pm 0,079$	
6-methylthiouracil	5	$1,12 \pm 0,142$	$<0,05$	$9,69 \pm 0,099$	$<0,001$
Partial thyroidectomy	7	$1,24 \pm 0,114$	$<0,001$	$9,30 \pm 0,095$	$<0,001$
Aseptic inflammation of thyroid gland	7	$0,88 \pm 0,197$	$>0,1$	$9,31 \pm 0,10$	$<0,001$
Chlorpromazine	6	$0,48 \pm 0,065$	$<0,02$	$7,98 \pm 0,069$	$>0,1$
Chlorpromazine + removal of superior cervical sympathetic ganglia	5	$0,44 \pm 0,039$	$<0,01$	$8,60 \pm 0,085$	$<0,001$
Chlorpromazine + stimulation of superior cervical sympathetic ganglia	6	$0,76 \pm 0,116$	$>0,1$	$8,13 \pm 0,066$	$>0,1$
Chlorpromazine + partial thyroidectomy	11	$0,73 \pm 0,036$	$>0,1$	$8,14 \pm 0,073$	$>0,1$

## EXPERIMENTAL RESULTS

The height of the thyroid epithelial cells in the recipient guinea pigs after receiving an injection of suspension of pituitary glands from rabbits receiving 6-methylthiouracil or partially thyroidectomized rabbits was much higher than after injection of a pituitary suspension from intact animals (Table 1).

Although in both series of experiments the serotonin concentration in the hypothalamus of the rabbits rose sharply, no parallel could be established between the intensity of pituitary thyrotropic function and the hypothalamic serotonin concentration. Moreover, in aseptic inflammation of the thyroid gland produced by passing a viscose thread through the thyroid parenchyma, the pituitary thyrotropic function of the rabbits was greatly increased, whereas there was virtually no change in the serotonin concentration in the hypothalamus. Conversely, after administration of chlorpromazine (especially combined with cervical sympathectomy) the hypothalamic serotonin concentration fell sharply whereas the pituitary thyrotropic hormone level either remained normal or increased. In response to a combination of chlorpromazine with stimulation of the superior cervical sympathetic ganglia or with partial thyroidectomy, the hypothalamic serotonin concentration and the intensity of pituitary thyrotropic function remained unchanged.

Under different conditions [6] serotonin can evidently have either an inhibitory or an activating influence on the activity of different neurons [2], including hypothalamic neurons responsible for production of thyrotropin-releasing hormone.

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