10585 P

Rôle of Pituitary Stalk in Regulation of Thyrotropic and Thyroid Activity.

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Several features of the etiology and symptomatology of thyrotoxicosis have given rise to the assumption that the central nervous system somehow controls thyroid function, possibly through the pituitary stalk which transmits the diencephalo-hypophyseal system. Experimentally, after pituitary stalk section, irregular histological depression of thyroid function was found in rats by Westman and Jacobsohn,[1] whereas Brooks[2] failed to find any histological abnormalities in rabbits. In diabetes insipidus of rats the basal metabolism is normal accompanied by some enlargement of the thyroid (Swann and Johnson[3]).

In a previous study it was observed (Uotila[4]) that the thyroid stimulation caused by cold depends on an intact anterior pituitary. In a search for a possible nervous mediation of the cold stimulation of thyrotropic function, the rôle of the cervical sympathetics was studied. It was found that bilateral cervical sympathectomy causes a mild and temporary hypofunction of the thyroid. Sympathectomy also modifies the cold reaction of the thyroid, but does not prevent it. Since unilateral sympathectomy has no direct effect on the ipsilateral thyroid lobe at room temperature or after cold stimulation, it was concluded that the effect of bilateral sympathectomy is apparently mediated through the anterior pituitary. These experiments indicated that the sympathetics are not necessary for the continued maintenance of thyroid function and that the temporary changes following sympathectomy are promptly compensated for through some other pathway.

In a further search for the pathway mediating the cold reaction of the anterior pituitary and thyroid in rats the following studies were made: (1) the effect of pituitary stalk section on the thyroid

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1 Westman, A., and Jacobsohn, D., *Acta pathol. et microbiol. scand.*, 1938, **15**, 435.

2 Brooks, C. M., *Am. J. Physiol.*, 1937, **119**, 280.

3 Swann, H. G., and Johnson, P. E., *Endocrin.*, 1939, **24**, 397.

4 Uotila, U. U., *Endocrin.*, 1939, in press.

at room temperature; and (2) the effect of pituitary stalk section on the cold reaction of the thyroid. The Cell Height Index (CHI) was used as an indicator of thyroid activity. CHI equals the average height of cells in approximately one hundred thyroid follicles. Similar methods have been approved as sensitive indicators of thyrotropic hormone (Uhlenhuth,[5] Rawson and Starr[6]). The pituitary stalk was cut under ether anesthesia by the parapharyngeal approach of Smith-Selye. The completeness of the stalk section was checked by serial sections.

In the first series (A) the rats were placed in the cold (5-6°C) for 7 days, beginning on the 46th day after operation. On the 53rd postoperative day all the rats were killed. Table I shows the results. In animals kept at room temperature after stalk section, the CHI was normal (+12.5%). Upon stimulation by cold, after complete stalk section, no appreciable increase in CHI was observed (+5.5%). However, in blank operation controls and in one animal where the pituitary stalk was incompletely cut, cold stimulation did cause an average of 60% increase in CHI.

In a second series of experiments (B), the rats were subjected to cold on the 14th postoperative day for 4 days. The results were

TABLE I.

Treatment	Series	No. of rats	CHI, avg and variations	Avg changes of CHI in %
Operative controls, room temp.	A	15	4.0 (3.1-7.3)	—
	B	7	3.0 (2.1-4.1)	—
Pituitary stalk section room temp.	A	5	4.5 (3.6-5.5)	+12.5
	B	5	3.1 (2.3-3.9)	+ 3.3
Blank control operation; A, 7 days; B, 4 days in cold	A	7	6.2 (4.9-7.6)	+56.0
	B	5	5.1 (3.0-6.3)	+88.0
Complete pituitary stalk section; A, 7 days; B, 4 days in cold	A	6	4.2 (3.7-4.9)	+ 5.5
	B	4	2.5 (2.1-2.8)	—17.0
Incomplete pituitary stalk section; A, 7 days; B, 4 days in cold	A	1	6.2	+55.0
	B	2	7.0 (6.4-7.6)	+133.0

[5] Uhlenhuth, E., *Transact. Am. Assn. Goiter*, 1936.

[6] Rawson, R. W., and Starr, P., *Arch. Int. Med.*, 1938, **61**, 726.

similar to those obtained in the first series. Five blank operation controls gave a CHI of +88% after cold; 4 complete stalk section animals gave a CHI of −17%, whereas 2 rats with incomplete stalk section, subjected to the same period of cold, exhibited a CHI of +133%.

The weights of adrenals and testicles were about normal, showing that the lack of thyrotropic and thyroid response is not due to a general pituitary insufficiency.

Summary. In rats with intact pituitary stalks, exposure to cold stimulates the thyrotropic function of the anterior pituitary and the thyroid gland. After pituitary stalk section, rats at room temperature produce enough thyrotropic hormone to keep the thyroid histologically normal. In rats similarly operated on, but exposed to cold, the thyroid reaction is lacking. It is concluded that the pathways in the pituitary stalk transmit impulses regulating the secretion of thyrotropic hormone in the emergency state of exposure to cold.

10586 P

Effect of Testosterone Propionate on Ovulation and Luteinization in the Rabbit.

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A number of observers have reported a luteinizing action of testosterone propionate on the ovaries of rats and mice. A recent report by Freed, Greenhill and Soskin[1] suggests that small doses cause suppression of follicle formation in mice and rats while large doses cause stimulation. Mazer and Mazer[2] consider duration of treatment the determining factor, short treatment producing stimulation and prolonged treatment depression. In monkeys and in women this hormone seems to have a depressing effect on the ovaries. It seemed of interest to determine therefore whether ovulation in the rabbit in response to pregnancy urine would be influenced by testosterone propionate. The controls have indicated something of the effect of this hormone alone on the rabbit's ovary.

[1] Freed, S. G., Greenhill, J. P., and Soskin, S., PROC. SOC. EXP. BIOL. AND MED., 1938, **39**, 440.

[2] Mazer, M., and Mazer, C., *Endocrinol.*, 1939, **24**, 175.