EFFECT OF THYROID ON OXYGEN CONSUMPTION AND GROWTH OF YOUNG RATS RECEIVING PROLONGED COURSES OF RESERPINE

A. B. Elantsev

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Thyroid prevents the manifestation of some metabolic effects of reserpine in young rats.

Blocking adrenergic sympathetic regulatory mechanisms in rats between the ages of 7 and 23 days by means of chloropromazine [7, 8] and reserpine [4] lowers the oxygen consumption and inhibits growth processes. During further administration of reserpine, its inhibitory effect on growth is reduced. Meanwhile, hypertrophy of the thyroid gland is observed in these animals [5].

Because thyroid function is closely connected with adrenergic sympathetic mechanisms [1, 6], the present investigation was undertaken to examine the role of the gland in compensation of the reduction in basal metabolism and intensity of growth produced by reserpine.

EXPERIMENTAL METHOD

Thyroid (50 μg/kg) was given together with reserpine (3.5 mg/kg) by mouth to 36 albino rats from the seventh until the 30th days of life. Animals of the same litters were used as controls. Throughout the experiment the rats were regularly weighed and their growth index (K) was determined [9]. At the ages of 14, 20, and 28 days, their O_2 consumption was measured. The blood acetcholinesterase activity of the rats also was determined at the age of 1 month [6].

RESULTS

During simultaneous administration of reserpine and thyroid to the rats, in the first week the experimental animals showed retardation in weight compared with the controls. Inhibition of growth was approximately the same as when reserpine alone was given. Later, however, rats receiving reserpine and thyroid increased more in weight than those receiving reserpine alone (Table 1). Calculation of the value of K showed that simultaneous administration of reserpine and thyroid produces the same decrease in intensity of growth until the age of 16 days as administration of reserpine alone. Starting from the 15th-17th day, K of the experimental rats began to exceed its value for animals of the control group. Fluctuating changes in the value of K were observed, and these also were present in the control rats. They reflect irregular growth during the first month of life.

The O_2 consumption in animals receiving reserpine and thyroid simultaneously was the same as in the control rats ($P > 0.1$), and it was much greater than values obtained for animals receiving reserpine alone ($P < 0.001$). At the age of 14 days, for instance, the O_2 consumption of rats receiving reserpine and thyroid was 82.1 ± 1.3 mg/kg/min; in animals receiving reserpine alone it was 62.0 ± 1.64

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TABLE 1. Changes in Body Weight and Growth Index (K) for Rats in Early Ontogenesis

Age (in days)	Control		Reserpine		Reserpine + thyroid	
	wt. (in g) M ± m	K	wt. (in g) M ± m	K	wt. (in g) M ± m	K
7	10,9 ± 0,3		11,0 ± 0,2*		10,8 ± 0,2*	
		2,85		1,02		1,02
9	14,3 ± 0,5		12,1 ± 0,6		12,1 ± 0,2*	
		0,97		0,66		0,66
11	15,5 ± 0,6		12,8 ± 0,5		12,8 ± 0,1	
		2,09		2,03		2,03
13	18,3 ± 0,5		15,0 ± 0,4		15,0 ± 0,3	
		1,56		1,38		1,38
15	20,6 ± 0,7		16,6 ± 0,7		16,6 ± 0,2	
		2,10		2,17		3,52
17	23,6 ± 0,6		19,2 ± 0,7		21,0 ± 0,5	
		0,70		2,00		1,19
19	31,0 ± 0,7		21,7 ± 0,7		28,4 ± 0,6	
		2,85		2,92		1,62
21	36,8 ± 1,0		25,9 ± 0,8		31,3 ± 0,4	
		0,42		0,71		1,75
23	37,7 ± 1,0		26,9 ± 0,8		34,5 ± 0,6	
		1,22		2,69		1,00
25	40,1 ± 0,8		31,0 ± 0,7		36,4 ± 0,8	
		1,82		2,72		1,09
27	44,1 ± 0,9		35,6 ± 0,9		38,4 ± 1,0	
		2,62		3,91		3,24
29	50,0 ± 0,6		43,0 ± 1,2		46,0 ± 0,9	

*Values not differing from control ($P > 0.05$). In all other cases, $P < 0.05$.

(control 81.1 ± 1.55). At the age of 20 days the corresponding values were: 67.2 ± 1.5, 53.0 ± 1.52, and 68.7 ± 0.66 ml/kg/min, while at the age of 28 days they were 65.3 ± 0.9, 52.1 ± 1.89, and 60.1 ± ±.62 ml/kg/min.

Following administration of thyroid and reserpine, no decrease in acetylcholinesterase activity occurred, as was observed after administration of reserpine alone: in the control 1.53 ± 0.05; after administration of reserpine 1.36 ± 0.08 ($P < 0.05$), reserpine + thyroid 1.55 ± 0.12 μmole/ml/min ($P > 0.1$).

The results suggest that the hypertrophy of the thyroid gland observed during prolonged administration of reserpine is a compensatory reaction in response to the low level of catecholamines in the body.

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