ventromedial area (Group 3F) showed no significant hyperphagia until the 12th week of life.

It appears that lesions placed in certain areas of the hypothalamus of the weanling rat in both sexes result in derangements of food intake patterns which, depending upon sex and location, either cause a transitory or persistent increase or decrease of food intake. Puberty seems to be a period in the life cycle during which some lesions cause hypophagia and in others hyperphagia. Then, following puberty, this effect either persists or subsides. Other hypothalamic lesions have no effect on feeding behavior. How significantly the endocrine correlates of puberty, coupled with the hypothalamic lesions, are responsible for these changes in food intake is open to speculation. It is conceivable that the striking endocrine alterations of puberty may affect energy balance or the degree of utilization of ingested food for anabolic processes. This may then involve a feed-back mechanism in relation to appropriate centers regulating caloric intake.

In young rats with lesions in the ventromedial area the absence of a degree of hyperphagia which transcends that correlated with growth may be consistent with the thesis that growth *per se* provides maximal hyperphagia. Growing animals, as KENNEDY[11] has shown, eat about twice as much as mature rats in proportion to their body weight; their food intake appears to be unaffected by hypothalamic lesions until the age at which the food intake relative to body weight begins to decrease. Lesions in the posterior hypothalamus thus far reported did not cause hyperphagia[11]. But such lesions did result in hyperphagia in both sexes in the present study. On the other hand, HETHERINGTON and RANSON[5] found that lesions in the caudal hypothalamus dorsolateral to the mammillary bodies did cause obesity in rats weighing about 95–130 g. Food intake, however, had not been measured in their study.

The findings of the present study suggest that effects of hypothalamic lesions on food intake cannot be properly evaluated without taking into account the age of the rat at the time lesions are produced. Ablations which may cause changes in food intake if placed after maturity may not do so shortly before puberty or at still an earlier age. The converse of the foregoing may also obtain. Fluctuations in energy requirements during growth and puberty may cause transient fluctuations in food intake which can be evident only in continuous studies from weaning through adulthood[13].

Zusammenfassung. Änderungen in der Futteraufnahme von Ratten mit hypothalamischen Läsionen sind nicht nur vom Locus, sondern auch vom Geschlecht und dem Alter abhängig, in welchem sie beigebracht wurden. Pubertät scheint eine Zeit zu sein, in welcher Änderungen in der Futteraufnahme eintreten. Läsionen im hinteren Hypothalamus, die bisher nicht als hyperphagisch bekannt waren, wenn sie in erwachsenen Ratten plaziert wurden, verursachten Hyperphagie in beiden Geschlechtern, wenn die Operation kurz nach Ablaktation durchgeführt wurde.

L. L. BERNARDIS

Department of Pathology, State University of New York, Buffalo (U.S.A.), June 17, 1963.

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Acute Effect of Thyrotrophic Hormone on the Concentration of Succinic Acid Dehydrogenase and Sulfhydryl Groups in the Thyroid Gland of the Rat[1]

A great variety of methods have been evolved for the measurement of thyroid function[2]. A feature that most of them have in common is that they require a fairly long-term effect on the thyroid gland. Some methods have been developed, however, to elicit the acute changes in thyroid function. They are based on the determination of intracellular colloid granules[3,4], percentage of epithelium[2], radioactive P^{32} uptake[5], or radioactive I^{131} uptake[6].

It has been suggested recently that the determination of succinic acid dehydrogenase[7] and sulfhydryl groups[8] can be used to measure thyroid function in long-term tests. The purpose of this work is to ascertain whether these methods can be applied in the measurement of acute changes in thyroid function.

Sixty-four Long-Evans male rats were employed as the test animals. They were divided into 8 groups of 8 animals each. The rats of 7 groups were given 15 IU of thyrotrophic hormone (Ambinon, Organon) subcutaneously, the eighth group serving as controls. The thyrotrophic hormone (TSH) groups were killed 1, 2, 4, 6, 8, 12, and 16 h after the injection simultaneously with the controls. To eliminate possible diurnal variation the injections were arranged so that the animals of all the groups were sacrificed at the same time before noon. The animals were killed by rapid decapitation, the thyroid glands were removed and weighed by torsion balance. One lobe of the thyroid was homogenized and the succinic acid dehydrogenase concentration was determined by the method of VILLAREAL and BURGOS[9]. The SH-groups were determined by the mercury-orange method of BENNETT and WATTS from the other half of the gland[10]. 'Student's' *t*-test was used in the statistical analysis of the results[11].

The results are tabulated. The Table shows that the succinic acid dehydrogenase concentration of the thyroid gland rises fairly sharply under the influence of TSH. It reaches its maximum within 4 h of the injection and returns to the control level in 12 h. The increase is statistically significant. The elevation in the concentration of the

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Weight, succinic acid dehydrogenase, and SH-group concentration of the thyroid glands after single injection of 15 IU of thyrotrophic hormone

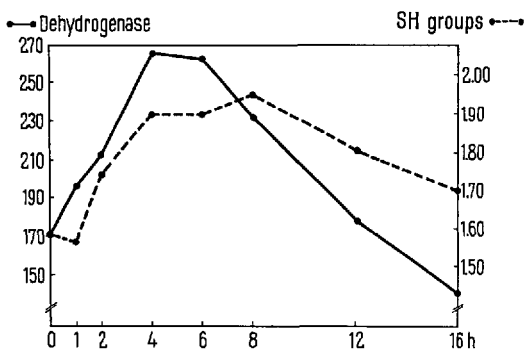
h after injection	Number of animals	Body weight g		Thyroid gland Weight mg		Succinic dehydrogenase[a]			SH-groups 10^{-5} moles/g		
		Mean	S.D.	Mean	S.D.	Mean	S.D.	P[b]	Mean	S.D.	P[b]
0	8	280	25.4	16.9	2.92	171	48.2		1.58	0.168	
1	8	286	25.5	17.9	1.78	198	62.5	> 0.05	1.56	0.158	> 0.05
2	8	283	18.9	17.4	2.17	211	65.6	> 0.05	1.74	0.218	> 0.05
4	8	280	48.6	15.8	4.83	265	94.3	< 0.01	1.90	0.304	< 0.05
6	8	284	30.9	16.6	1.84	262	91.4	< 0.05	1.90	0.202	< 0.01
8	8	287	22.7	18.0	1.67	232	58.6	< 0.05	1.95	0.221	< 0.001
12	8	286	54.0	16.8	3.30	178	54.7	> 0.05	1.80	0.245	< 0.05
16	8	279	45.5	18.3	3.20	140	20.3	> 0.05	1.70	0.283	> 0.05

[a] µg of reduced tetrazolium salt/100 mg of fresh weight.
[b] P value compared with controls.

SH-groups is slower, reaching its maximum in 8 h. The drop is also slower. The difference from the control level is still significant 12 h after the injection, but no longer after 16 h. These results are also plotted in the graph. No statistically significant differences can be demonstrated in the weight of the thyroid in the different groups.

It has been established in recent long-term experiments that succinic acid dehydrogenase activity is a sensitive indicator of thyroid activity[7]. Succinic acid dehydrogenase participates in the oxidative processes of the cell as an enzyme associated with the cycle of Krebs. On the other hand, it has been shown that TSH increases the oxygen consumption of thyroid cells[12]. The succinic acid dehydrogenase concentration is thus illustrative of the effect of TSH on the oxidative metabolism of the thyroid cell.

A correlation has been stated between SH-groups and the percentage of epithelium of the thyroid[8]. This, in turn, gives a reliable picture of the function of thyroid cells[13].



Changes in thyroid succinic acid dehydrogenase and SH-group concentration of the rat after single injection of TSH.

Both the succinic acid dehydrogenase and the SH-groups are thus good indicators of the activity of thyroid cells. The methods introduced earlier for the measuring of acute changes of thyroid function[2,5–7] are laborious or demand special apparatus. The results obtained in the present work show that it is possible to measure the TSH-induced change in the activity of thyroid cells by the relatively simple methods of determining succinic acid dehydrogenase and SH-groups. It is suggested that these methods could be used generally for the determination of thyroid function in acute experimental conditions.

Zusammenfassung. Es wurde die Wirkung einer TSH-Injektion auf den Gehalt der Bernsteinsäuredehydrogenase und der SH-Gruppen in der Schilddrüse der Ratte untersucht. 4 h nach der Injektion von TSH erfolgte ein signifikanter Anstieg der Bernsteinsäuredehydrogenase und SH-Gruppen. Die Methode ist deshalb zur Untersuchung der Schilddrüsenaktivität im kurzfristigen Versuch geeignet.

O. KYTÖMÄKI und U. K. RINNE

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An Extrarenal Effect of Hydrochlorothiazide

Chlorothiazide and its analogues, well known for their saluretic effect, have been reported to decrease the urinary volume in patients with *Diabetes insipidus*[1–3]. This effect has also been demonstrated in experimental animals[4,5]. No satisfactory explanation of the antidiuretic action has been given, although some authors have pointed to a renal mechanism[2,6]. Recently an indirect effect of chlorothiazide has been suggested, *viz.* attenuation of thirst through sodium depletion[7]. Although the mechanism of thirst is not yet finally established, some evidence is available for an osmotic-sensitive region in the hypothalamus[8,9]. Activation of this area presumably depends on sodium movement across the cell membrane and therefore may be modified by drugs which impede sodium transport. To