vive the controls, although only 2 of the 7 rats of the treated group survived the entire experimental period. Gains in body weight were also less pronounced in this than in the corresponding group in Experiment 1. Comparison of oral and parenteral administration indicated that the latter was slightly superior. However, the number of completely adrenalectomized animals receiving the hormone by injection was too small to warrant foregoing quantitative conclusions in this regard (adrenal tissue was found in 3 rats of this group).

Summary. Desoxycorticosterone acetate was found to be beneficial to adrenalectomized rats upon oral administration, *i.e.*, mixed with food and/or drinking water. Dosages of 0.09 to 0.33 mg daily favored survival and growth in such rats on a salt-free diet.

13948 P

Partial Maintenance of Adrenal Weight in Hypophysectomized Immature Male Rats by Testosterone Injections.*

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In the course of certain experiments involving the use of hypophysectomized male rats, where routinely it has always been customary to weigh the adrenals, it was noted that after male hormone treatment, the adrenals did not regress to the same degree as did those of litter mate controls. After hypophysectomy, the adrenals always atrophy and lose weight[1] and this observation has been one of the criteria indicating completeness of the operation. Since no mention of a maintenance effect of male hormone on the adrenals of hypophysectomized rats has been made in the literature, a preliminary note on this finding is here presented.

All the rats used in these experiments were from the Long-Evans strain, between the ages of 22 and 35 days at the time of hypophysectomy. There were fed a dry ration of dog and calf meal,[2] water and a 25% solution of corn syrup *ad libitum*. A part of each litter of hypophysectomized males were injected once daily with .05 cc = 1.25 mg of testosterone propionate (Peranderen, Ciba)† for 10 days, the operated litter mate controls received no injections. At autopsy on the 11th day, the adrenals were removed, carefully trimmed of the surrounding fat and were weighed fresh. Some of the glands were prepared for histological study. Serial sections of all the sellæ turcicæ were made and all incompletely operated animals were discarded. In all, 8 litters, involving 22 injected and 14 control rats, were used.

TABLE I.

Testosterone Inhibition of the Adrenal Atrophy Which Follows Hypophysectomy.

Exp.	Age	Avg adrenal wt (mg) Injected	Controls	% Difference
I	34	10.4 (4)	8.5 (1)	22
II	35	17.5 (4)	9.5 (2)	84
III	24	11.9 (5)	7.4 (4)	60
IV	25	12.2 (4)	8.0 (1)	53
	22	11.6 (2)	6.4 (2)	81
V*	23	13.4 (3)	6.4 (4)	109

*Total dose of testosterone 6.9 mg in 10 days, all others received 12.5 mg.

Numbers in ( ) indicate number of animals. Results on litters of same age combined.

A comparison of the average adrenal weights of the injected and control rats within the separate litters is given in Table I, together with the percentage difference of the

*Aided by a grant from the Sackett Research Fund.

1 Smith, P. E., *Am. J. Anat.*, 1930, **45**, 205.

2 Maynard, L. A., *Science*, 1930, **71**, 192.

† Acknowledgment is made to Dr. R. MacBrayer of Ciba, Summit, N.J., for a generous supply of hormone.

averages. The latter varied from 22% to 109%. The individual adrenal weights of the injected rats were consistently heavier than the control weights within a given litter. Some atrophy of the adrenals of the injected rats did occur because glands from normal rats at the time of operation weighed from 16 to 20 mg, depending on the age of the rat. Most all of the injected rats gained in body weight or lost only a few grams. There did not seem to be any definite correlation between body weight changes and the degree of adrenal involution in these preliminary experiments. Histologically, the cortex appeared more normal in the injected rats, and the general appearance and yellowish color of the fresh adrenals were like that of normal rats.

Three similar experiments were carried out except that an interval of 7-9 days was allowed before beginning injections. The results were rather equivocal as adrenal weight differences in 3 litters of 5, 4 and 4 rats were respectively 0%, 33% and 56%. The adrenals of the injected rats were heavier than those of the controls in the two latter cases.

Male hormone substances have been reported not to affect the adrenals of hypophysectomized rats,[3] or mice[4] which is similar to the reported non-effect of progesterone[5] and cortical hormones.[6,7] Atwell[8] stated that the adrenal cortical cells of hypophysectomized larval *Rana sylvatica* were somewhat restored by cortical extract. In the annual breeding ground squirrel, the adrenal cortex hypertrophied along with sex organs on experimentally induced sexual recrudescence.[9]

Summary. Injections of large doses of male hormone partially prevent the atrophy of the adrenal cortex which normally follows hypophysectomy in the immature male rat.

[3] Walsh, E. L., Cuyler, W. K., and McCullagh, D. R., *Am. J. Physiol.*, 1934, **107**, 508.

[4] Nelson, W. O., and Merckel, C. E., PROC. SOC. EXP. BIOL. AND MED., 1938, **38**, 737.

[5] Selye, H., *Anat. Rec.*, 1940, **78**, 253.

[6] Atwell, W. J., PROC. SOC. EXP. BIOL. AND MED., 1932, **29**, 1259.

[7] Ingle, D. J., *Am. J. Physiol.*, 1938, **124**, 369.

[8] Atwell, W. J., PROC. SOC. EXP. BIOL. AND MED., 1932, **29**, 621.

[9] Moore, C. R., Simmons, G. F., Wells, L. J., Zalesky, M., and Nelson, W. O., *Anat. Rec.*, 1934, **60**, 279.

13949

Nitrogen Balance in Human Tryptophane Deficiency

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Many reports on the inadequacy of tryptophane-deficient protein hydrolysates in animal nutrition are available. With the exception of the recent report of Holt and coworkers,[1] we have been unable to find any report of tryptophane deficiency in man.

In February, 1940, we had the opportunity of studying a patient with a gastrostomy. The patient, a 65-year-old woman with cancerous occlusion of the esophagus, had, of necessity, reduced her food intake progressively during the 6 months prior to admission to the hospital. Difficulty in swallowing was progressive. For the week preceding operation she had been unable to swallow any food by mouth; and could retain but little fluid. A gastrostomy opening was made under local anesthesia on January 27th and the second day thereafter studies on nitrogen balance were begun.

Because of the long-continued protein starvation, nitrogen was not given at a basal level. None the less, we hoped to make observations on tryptophane deficiency in a

[1] Holt, L. E., Jr., Albanese, A. A., Brumback, J. E., Jr., Kadji, C., and Wangerin, D. M., PROC. SOC. EXP. BIOL. AND MED., 1941, **48**, 726.