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Androgen and Spermatogenesis in the Hypophysectomized Guinea Pig.*

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In a number of species spermatogenesis has been maintained after hypophysectomy by androgens (the rat,[1-4] the mouse,[5] and the rabbit[6]). The only report on guinea pigs is that of Scowen,[7] who failed to maintain spermatogenesis with androsterone and testosterone in animals hypophysectomized for 20 days. The data which follow are not in agreement with those of Scowen, but show that the tubular tissue of the testis in the hypophysectomized guinea pig responds to androgen as does that of the rat, mouse and rabbit.

It should be stated that experiments on spermatogenic maintenance or on reëstablishment of spermatogenesis in the adult guinea pig must be continued for long periods to be valid. This is due to the fact that atrophy of the germinal epithelium after ablation of the pituitary is not rapid in this species. Allanson, *et al.*,[8] found sperm in testes of guinea pigs hypophysectomized for as long as 56 days. Observations on 2 untreated animals (Table I, Nos. 5 and 6) show that sperm may persist for as long as 66 and 84 days after removal of the hypophysis. Serial sections of the pituitary capsule were made to check completeness of the hypophysectomy.

Four adult guinea pigs (Nos. 1, 2, 3, and 4) were hypophysectomized for periods ranging from 60 to 155 days. Daily subcutaneous injections of 3 mg of testosterone propionate* were begun

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

2 Nelson, W. O., and Gallagher, T. F., *Science*, 1936, **84**, 230.

3 Cutuly, E., McCullagh, D. R., and Cutuly, E. C., *Am. J. Physiol.*, 1937, **119**, 121.

4 Nelson, W. O., and Merckel, C. G., PROC. SOC. EXP. BIOL. AND MED., 1937, **36**, 825.

5 Nelson, W. O., and Merckel, C. G., PROC. SOC. EXP. BIOL. AND MED., 1938, **38**, 737.

6 Greep, R. O., *Anat. Rec.*, 1939, **73** (suppl), 23.

7 Scowen, E. F., *Anat. Rec.*, 1938, **70** (suppl), 71.

8 Allanson, M., Hill, R. T., and McPhail, M. K., *J. Exp. Biol.*, 1935, **12**, 348.

* Testosterone propionate was supplied by Dr. Erwin Schwenk, Schering Corporation, Bloomfield, N.J.

TABLE I.
Effect of 3 mg Daily of Testosterone Propionate on the Hypophysectomized Male Guinea Pig.

No. of animal	Initial body wt, g	Body wt at autopsy, g	No. of days hypophysectomized	Autopsy wt		% loss in adrenal wt from normal avg
				Testes, g	Adrenals, g	
1	478	444	62	2.16	.043	88
2	500	616	60	1.12	.102	72
3	630	1010	127	2.76	.087	76
4	568	920	155	2.76	.064	83
5	560	780	66	1.69	.244	33
			Hypophysectomized control			
6	697	770	84	1.24	.162	56
			Hypophysectomized control			
7	440	730	Sham-operated control	3.57	.327	
8	—	805	Normal control	4.15	.418	
9	—	680	" "	3.30	.357	
			Avg normal control wt	3.67	.367	

the day after hypophysectomy and continued until the day preceding autopsy. In each instance the testes weighed less than those of normal controls. However, except in animal No. 2 where germ cell preservation was not so thorough, histological differences in the tubules of treated and normal animals were not easily discernible. In the testes of the androgen-treated hypophysectomized animals the majority of tubules exhibited active spermatogenesis at autopsy, although a few were profoundly atrophied. In the untreated hypophysectomized control animals, on the other hand, many tubules were markedly atrophic, some were degenerating, while others had an epithelium showing cells in all stages of gametogenesis, including spermatozoa. Testes of treated and untreated hypophysectomized pigs alike differed from normal testes in that interstitial cells were atrophied. At autopsy vast numbers of motile sperm were found in the epididymides of hypophysectomized guinea pigs injected with testosterone propionate, and considerable numbers were present in the epididymides of uninjected hypophysectomized animals.

Two additional facts may be ascertained from the data in Table I. First, there was shrinkage of the adrenal glands in treated and untreated hypophysectomized animals. The autopsy weights of the adrenals of these animals showed reductions ranging from 33 to 88% below the normal control average. Second, the adult hypophysectomized guinea pig, unlike the adult hypophysectomized rat, may gain considerably in body weight. This finding was unexpected, although it corroborates a similar observation made by Schweizer,[9]

[9] Schweizer, M., Charipper, H. A., and Kleinberg, W., *Endocrinology*, 1940, **26**, 979.

et al., who noted a weight increment in several hypophysectomized male pigs with unsuccessful ocular pituitary grafts.† Moreover, examination of the data published by Allanson, *et al.*,[8] indicates a post-operative weight gain in 3 of their hypophysectomized males, although no special mention was made of the fact. A possible explanation of the gain in body weight after hypophysectomy may lie in the fact that, shortly after the guinea pig has recovered from effects of the operation, it eats as voraciously as the normal animal. The rat, on the contrary, has a diminished food intake after hypophysectomy. Thus it would appear that appreciable gain in weight in the guinea pig, at least, is not necessarily dependent on a growth factor from the pituitary.

Summary. Spermatogenesis was maintained by subcutaneous injection of 3 mg daily of testosterone propionate in 4 guinea pigs hypophysectomized for 60 to 155 days. Tubular atrophy in the pig may not be complete as late as 84 days after hypophyseal ablation. Adrenal atrophy occurs after removal of the pituitary, but increase in body weight does not necessarily cease.

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Acetylation of Optical Isomers of S-benzylcysteine in Rats and Humans.

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We reported the conversion of S-benzyl-*l*-cysteine to the corresponding acetyl derivative in the rat, rabbit, dog[1] and man[2] and suggested the possibility of the inversion of S-benzyl-*d*-cysteine to the acetylated *l*-derivative *via* Knoop's acetylation mechanism[3] which postulates the formation of a keto acid from the *d*-amino acid followed by the interaction of the keto acid with ammonia and pyruvic acid to give the *l*-acetyl amino acid. duVigneaud, *et al.*,[4] reported

† Gains in body weight have been observed to occur also in hypophysectomized female guinea pigs with unsuccessful ocular grafts of pituitary (Haterius, H. O., and Cutuly, E., unpublished data).

1 Stekol, J. A., *J. Biol. Chem.*, 1938, **124**, 129; 1939, **128**, 199.

2 Stekol, J. A., *Proc. Am. Chem. Soc.*, 100th meeting, Detroit, Mich., 1940.

3 Knoop, F., *Z. physiol. Chem.*, 1910, **67**, 489; Knoop, F., and Kertess, E., *Z. physiol. Chem.*, 1911, **71**, 252; Knoop, F., and Blanco, J. G., *Z. physiol. Chem.*, 1925, **146**, 267.

4 du Vigneaud, V., Wood, J. L., and Irish, O. J., *J. Biol. Chem.*, 1939, **129**, 171.