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Degree of Compensatory Renal Hypertrophy Following Unilateral Nephrectomy.* III. Influence of Testosterone Propionate.

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Selye[1] has found the administration of testosterone propionate to lead to an increase in the size of the kidneys in the mouse. He found that in the rat the kidneys were affected in the same way but to a lesser degree. The report presented here is concerned with the influence of the male sex hormone on the degree of compensatory renal hypertrophy following unilateral nephrectomy. The effect of castration was also observed.

The experimental details are similar to those of related studies.[2, 3] The diet was composed of Casein 20, sucrose 45, brewer's yeast 5, Osborne and Mendel standard salt-mixture 5, cod-liver oil 5 and Crisco 20. In the nephrectomized rats the left kidney was always

TABLE I.

Influence of Gonadectomy and Administration of Testosterone Propionate upon Degree of Compensatory Renal Hypertrophy in Male Rats.

	Untreated		Gonadectomized		Testosterone treated	
	Controls	Nephrectomy	Controls	Nephrectomy	Controls	Nephrectomy
Body weight						
Initial, g	317	320	308	313	314	314
Death, g	364	344	319	300	332	321
Body surface						
Sq. dm.	5.8	5.6	5.3	5.1	5.4	5.3
Heart weight						
Actual, mg	991	938	895	798	982	890
Per sq.dm, mg	171	168	169	157	180	167
Right kidney weight						
Actual, mg	1021	1279	913	1161	1029	1486
Per sq.dm.	177	229	172	232	188	280
Per 100 mg heart	103	136	102	145	105	167
*Food intake, g	10.0	9.2	10.0	8.6	10.1	10.5
†Compensatory renal hypertrophy, %		29.4		34.9		48.9

*Average in g per rat per day for the 10-day period preceding death.

†The degree of compensatory renal hypertrophy is calculated from the kidney weight in relation to body surface.

* We are indebted to the Schering Corporation, Bloomfield, New Jersey, for the supply of testosterone propionate ("Oreton") used in these experiments.

1 Selye, H., *J. Urol.*, 1939, **42**, 637.

2 MacKay, L. L., and MacKay, E. M., *Am. J. Physiol.*, 1927-28, **83**, 179.

3 MacKay, E. M., MacKay, L. L., and Addis, T., *J. Exp. Med.*, 1932, **56**, 255.

removed. In the gonadectomized groups the rats were castrated at the same time. The hormone treated rats were given testosterone propionate subcutaneously in a concentration of 2.5% in sesame oil. Each rat was given 12.5 mg on the *1st, 4th* and *6th* and 25 mg on the *14th* and *29th* day after the beginning of the experiment. Thirty-four days after the nephrectomies the rats were sacrificed and the degree of compensatory renal hypertrophy determined. All of the animals were of the same age and paired litter mates. There were 4 male rats in each group and since there was no overlapping of the individual figures presentation of the averages will suffice.

The average data in Table 1 suggests no effect of castration on the size of the kidneys in the 2 kidney control rats or the degree of compensatory renal hypertrophy. The testosterone propionate in the doses used did not cause a significant enlargement of the kidneys in the control rats but did cause a very definite increase in the degree of compensatory renal hypertrophy following unilateral nephrectomy. This is of interest in itself and there is the possible applied aspect because the outcome of the damaged kidney in Bright's Disease depends upon the hypertrophy of those renal units which have not been destroyed.[4] Such an application of hormone therapy to improve kidney function would be possible only if the testosterone exerts a specific physiological trophic influence on kidney tissue.[1] Functional studies on larger animals will be necessary to determine this.

Summary. Gonadectomy exerted no influence on the degree of compensatory renal hypertrophy in the male albino rat. Testosterone propionate administration produced a marked increase in compensatory renal hypertrophy.

[4] Addis, T., *J. Urol.*, 1939, **41**, 126.