Vitamin A Metabolism in Nephrectomized Rats.* (20916)

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Kagan *et al.*(1) found that in children with the nephrotic syndrome the serum vit. A levels are elevated and test doses of vit. A cause a rise in the serum vit. A which is 5 to 10 times higher than in normal subjects. The role of the kidney in vit. A metabolism, however, is not clear.

To obtain information on the role of the kidney, the following studies were made to determine the effect of nephrectomy on serum and liver vit. A in rats.

Methods. Bilateral nephrectomy was performed on normal mature white male rats. With each group of nephrectomized rats, sham operated rats were used as controls. All rats were fed Purina dog checkers, containing 8 U.S.P. units of vit. A/g. Control and experimental animals were fed the same amounts. Vit. A test doses were given orally 3 hours after the nephrectomy. The test doses consisted of 6000 units of vit. A alcohol† in aqueous dispersion per lb body weight. Blood samples were taken for vit. A and urea nitrogen determination before the operation and 3 and 24 hours afterward. The animals were sacrificed about 27 hours after the nephrectomy and the livers were analyzed for vit. A. Serum vit. A was determined by the method of Bessey *et al.*(2) and liver vit. A by the method previously described by Kagan and Kaiser(3). Blood urea nitrogen was analyzed by the ultra-micromethod described by Sobel *et al.*(4).

TABLE II. Effect of Nephrectomy on Blood Urea Nitrogen in the Rats. Blood urea N, mg %, avg (range).

	Time after operation		
	0 hr	6 hr	27 hr
Nephrectomized	31.2 (27.5-45)	72.3 (50.2-93.6)	166.9 (120-207)
Sham operated	33.3 (27.5-40.6)	33.4 (27.2-37.6)	29.9 (26.4-34.4)

Results. Serum vit. A levels following test doses of vit. A are shown in Table I. Fifteen of 23 animals were subjected to bilateral nephrectomy and 8 were sham operated.

There was no significant difference between the average vit. A levels in the nephrectomized and sham operated rats at any of the time intervals. The nephrectomized rats not given vit. A test doses showed no significant change at the same time intervals.

Table II shows the blood urea nitrogen values in the same animals. In most of the nephrectomized animals, the urea nitrogen level at 6 hours was about double the zero hour level.

These results show that in such acute experiments the absence of the kidneys in rats does not influence the serum vit. A levels. This does not, of course, rule out the possibility that renal function over a longer period of time may play a role in vit. A metabolism. It suggests, however, that the high serum vit. A levels and the abnormal rise in serum vit. A after test doses in the nephrotic syn-

TABLE I. Effect of Nephrectomy on Serum Vitamin A Levels after Test Doses of Vitamin A in Rats. Serum vit. A, μg %, avg (range).

	No. of rats	0 hr	3 hr	24 hr
Nephrectomized	12	23.8 (12-45)	184.4 (76-336)	40.4 (27-68)
Sham operated	8	21.1 (17-28)	184.3 (127-280)	33.6 (20-67)
Nephrectomized but not given vit. A test dose	3	26.7 (24-28)	34 (29- 38)	29.3 (25-32)

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TABLE III. Effect of Nephrectomy on Liver Vitamin A.

	No. of rats	Vit. A, μg/g, avg (range)	No. of rats	Wt of liver, g, avg (range)	μg vit. A/liver, avg (range)
Nephrectomized	9	60.7 (45.8- 75.1)	7	12.7 (11 -14)	746.8 (560 - 902)
Sham operated	7	70.7 (50.4-101)	5	11.7 (10 -13.2)	831.5 (630 -1013.6)
Nephrectomized but not given vit. A test dose	3	25.8 (14 - 36)	2	10.4 (10.2-10.5)	326 (365.5- 287)

drome may be attributed to a change in the function of some organ other than the kidneys. Previous work(3) in this laboratory showed that the liver may be responsible for the changes in vit. A metabolism observed in the nephrotic syndrome. The present study suggests that this may be independent of the kidney.

Table III shows that absence of the kidneys in these short term experiments had no significant effect on liver vit. A content or concentration.

Summary. Mature white male rats were subjected to bilateral nephrectomy and the serum and liver vit. A concentrations and liver vit. A content were studied with and without test doses of vit. A. No differences were observed between the serum vit. A values in nephrectomized and sham operated control rats. There was also no difference in the liver vit. A concentrations or content. The results are interpreted as indicating that the normal mature kidney plays no significant role in vit. A metabolism in such short term experiments in the rat.

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Hexose-6-Phosphatase Activity in the Seminal Vesicles and Prostate Gland of the Rat.* (20917)

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Spermatozoa, according to Mann(1) appear to utilize fructose rather than glucose as an energy source. The fructose of seminal fluid is produced in the glands of the male reproduction tract.

Chiquoine(2) has demonstrated histochemically that glucose-6-phosphatase is located in hepatic cells and in renal convoluted tubules. This enzyme, according to Cori(3,4) is necessary for the transformation of cellular stores of carbohydrate into blood glucose, and in its absence, excessive cellular storage of glycogen occurs. By analogy, a hexose-6-phosphatase capable of transforming a phosphorylated precursor into fructose might be expected in the seminal vesicles and prostate gland of the rat, since these are the glands which furnish the fructose of the seminal fluid. Using suitable modifications of Chiquoine's method, these accessory glands have been tested for their capacity to hydrolyze fructose-6-phosphate, glucose-6-phosphate and fructose-1-6-diphosphate.

Material and method. Mature male rats were killed by a blow on the head. The seminal vesicles and prostate gland were removed and immediately frozen in containers maintained at —20°C. Pieces of tissue were sectioned at 10 μ in a Linderstrøm-Lang

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