

from a deficiency of sodium but which have an adequate potassium intake, suggests that the mechanism for the control of potassium and sodium excretion has been seriously disturbed. This alteration in function resembles that seen in untreated adrenalectomized rats.⁴ Furthermore, the giving of cortin to the sodium-deficient animals caused the excretion rate of sodium to return to normal, and to increase the rate of excretion of potassium over that of the normal. It is apparent that sodium-deficient animals are more sensitive to cortin than are normal rats. The retention of the radioactive potassium in the potassium-deficient rats might be interpreted as due to the need of the body for more potassium.

Summary. (1) Rats which have been reared on a low-sodium diet excrete radioactive sodium more rapidly than normal rats, and retain radioactive potassium in greater amounts than normal. In this respect they resemble untreated adrenalectomized rats. The giving of cortin corrected this disturbance. (2) Rats deficient in potassium excrete radioactive sodium at a normal rate but retain radioactive potassium.

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Urinary Excretion of Radioactive Na and K in Adrenalectomized Rats, With and Without Salt.* †

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Radioactive sodium and potassium‡ have been administered to adrenalectomized rats and the rate of urinary excretion of these substances determined. The advantage of using "tagged atoms" for studying the metabolism of sodium and potassium is that it offers a rapid and highly accurate method for detecting in the body and in the excretions the identical atoms of sodium and potassium which have been administered.

⁴ Unpublished data by the authors.

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† We wish to thank Dr. John H. Lawrence of the Radiation Laboratory for providing us with the radioactive isotopes used in this study.

‡ The preparation of the radioactive isotopes has been described previously by Hamilton (*Am. J. Physiol.*, 1938, **124**, 667).

The excretion studies on the radioactive sodium and potassium were carried out under identical conditions. For each isotope 3 groups of animals were used. Group I consisted of 6 adult male rats 8 months of age, which had been adrenalectomized 9 days previously and had been maintained on a standard diet, the animals having access also to tap water since operation. Group II consisted of 6 rats of the same age and sex which had been adrenalectomized 8 days previously and since then had been kept on the same standard diet but instead of tap water, were given 1.0% NaCl solution to drink. In the potassium studies only 4 rats were used in this group. The control group consisted of 6 unoperated rats for the sodium studies and 7 for the potassium studies. These animals were of the same sex and age and were maintained on standard diet and tap water. Twenty-four hours before the radioactive isotope was given, the animals were taken off their regular food and drink and were given by stomach tube Locke's solution fortified with 6% glucose in amounts of 10 cc each 3 times a day. One cc of an isotonic solution of the isotope in the form of NaCl or KCl was given to each rat intraperitoneally. The Locke's solution with glucose was continued in 10 cc amounts by stomach tube 3 times a day during the 48-hour observation period when the excretion of the radioactive isotope was being followed. The urine was collected in 24-hour samples for 2 days and the amount of the radioactive isotope which had been excreted was determined as follows: The urine was evaporated to dryness and the amount of radioactivity in the sample was measured by a Lauritsen electroscope.

The results of this study are shown in Table I. Only excretion figures for the entire 48-hour period are recorded, in order to simplify the table, since the first 24-hour period showed excretion figures comparable to the total 48-hour period. The excretion of the radioactive isotope is expressed in percent of the total amount administered. The total sodium and total potassium which the animals excreted in the 48-hour period were determined in 3 animals of each group given the radioactive isotope.

It will be seen that the adrenalectomized rats of Group I which had not been treated with NaCl postoperatively excreted almost 3 times as much sodium in the 48-hour period as the normal animals. This is in accord with previous observations by others. Furthermore, this group of rats excreted 60% of the total amount of the administered radioactive sodium as compared with 43.8% in the normal animals. On the other hand, the animals of Group II which had been treated with NaCl postoperatively showed excretion figures for sodium

TABLE I.
Urinary Excretion of Sodium²⁴ and Potassium⁴² and of Total Sodium and Potassium in Adrenalectomized Rats.

	No. days post-op.	No. of animals	Na ²⁴ 48 hr %	Total Na* 48 hr mg	No. of animals	K ⁴² 48 hr %	Total K* 48 hr mg
Control group: Normal rats	0	6	43.8 (40.5-49.0)	87	7	9.5 (8-11.5)	41
Exper. group I: Adrenalectomized rats given tap water to drink	9	6	60.0 (53.8-64.7)	232	6	5.0 (4.0-6.4)	15
Exper. group II: Adrenalectomized rats given 1% NaCl to drink	8	6	45.0 (38.3-55.9)	81	4	10.7 (8.8-11.5)	40

*In each instance, total sodium and potassium figures are averages secured from 3 animals only of the respective group.

which were practically the same as those for normal animals. The potassium excretion studies show that the adrenalectomized rats maintained on salt excrete potassium as the normal intact animal, while those not given salt have a diminished excretion of the total potassium and furthermore they retained a greater percentage of the administered radioactive potassium than did the normal animals.

Summary. (1) Radioactive isotopes of sodium and potassium furnish a new method of study of the physiology of the adrenal cortex. (2) Adrenalectomized rats, unsupported by salt treatment, have an increased total sodium excretion and increased rate of excretion of administered radioactive sodium when contrasted with normal animals; the reverse is true of potassium. (3) Simple access to a 1% solution of table salt enables adrenalectomized rats to handle sodium and potassium in a way resembling that of normal rats.

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I. A Murine Typhus Virus Isolated from a Patient in Peiping, China.*

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Although Gajdos and Tchang^{1, 2} and Wu and Zia³ worked on several local orchitic strains of typhus fever virus, their studies were chiefly limited to observations on guinea pigs. In view of the fact that slight scrotal swelling may occur in from 2 to 22% of male guinea pigs infected with the "epidemic" or human virus,^{4, 5} and that the latter virus and the "endemic" or murine virus are known to have a definite cross immunity in guinea pigs, we feel that before the local orchitic strains are identified with the murine virus, it would be of some importance to study the behavior of these strains in the

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¹ Gajdos, E., and Tehang, J., *Studies on Typhus Fever in China*, Catholic University Press, Peiping, 1933.

² Gajdos, E., and Tchang, J., *Arch. Inst. Pasteur, Tunis*, 1934, **23**, 37.

³ Wu, C. J., and Zia, S. H., *Chinese Med. J.*, 1938, Suppl. II, 221.

⁴ Biraud, Y., and Deutschman, S., *League of Nations Epidem. Report*, 1936, **15**, 99.

⁵ Mooser, H., Varela, G., and Pilz, H., *J. Exp. Med.*, 1934, **59**, 137.