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Excretion of Radio-Sodium Following Intravenous Administration in Man.

JOSEPH G. HAMILTON AND ROBERT S. STONE. (Introduced by William J. Kerr.)

From the Divisions of Medicine and Roentgenology, University of California Medical School, San Francisco.

After the first extensive internal use of naturally radioactive compounds in man by Proescher and others,[1-5] Seil, *et al.*,[6] estimated that from 40% to 60% was lost from the body, chiefly through the feces. A progressive diminution in the rate of excretion was indicated by Schlundt and his group,[7] who found that patients retained 4.3% 6 months after administration and 1.9% 6 months later. Schlundt and Failla[8] found 24 μgm. and 14 μgm. respectively in 2 women 12 years after oral ingestion of radium, with respective coefficients of excretion of .005% and .0025%. Prolonged retention has been reported in many cases of industrial radium poisoning.[9, 10]

Following the announcement by Curie and Joliot[11] of the preparation of an artificial radioactive isotope of nitrogen in 1934, Lawrence and his co-workers[12] produced relatively large amounts of radioactive isotopes of many elements using their magnetic resonance accelerator. Radio-sodium became available for clinical study at the University of California Hospital in the Spring of 1936. It was felt that many of the disadvantages of internal radium therapy could be avoided by the use of radio-sodium, since this latter substance does not tend to become fixed in the body tissues and the

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2 Delano, S., *Radium*, 1915, **6**, 1.

3 Proescher, F., and Almquist, B. R., *Radium*, 1916, **6**, 85.

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6 Seil, H. A., Viol, C. H., and Gordon, M. A., *Radium*, 1915, **5**, 40.

7 Schlundt, H., Nerancy, J. T., and Morris, J. T., *Am. J. Roentgenology and Radium Therapy*, 1933, **30**, 515.

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10 Flinn, F. B., *Arch. of Phys. Ther., X-ray and Radium*, 1932, **13**, 476.

11 Curie, I., and Joliot, F., *Nature*, 1934, **133**, 201.

12 Henderson, M. C., Livingston, M. S., and Lawrence, E. O., *Phys. Rev.*, 1934, **45**, 428.

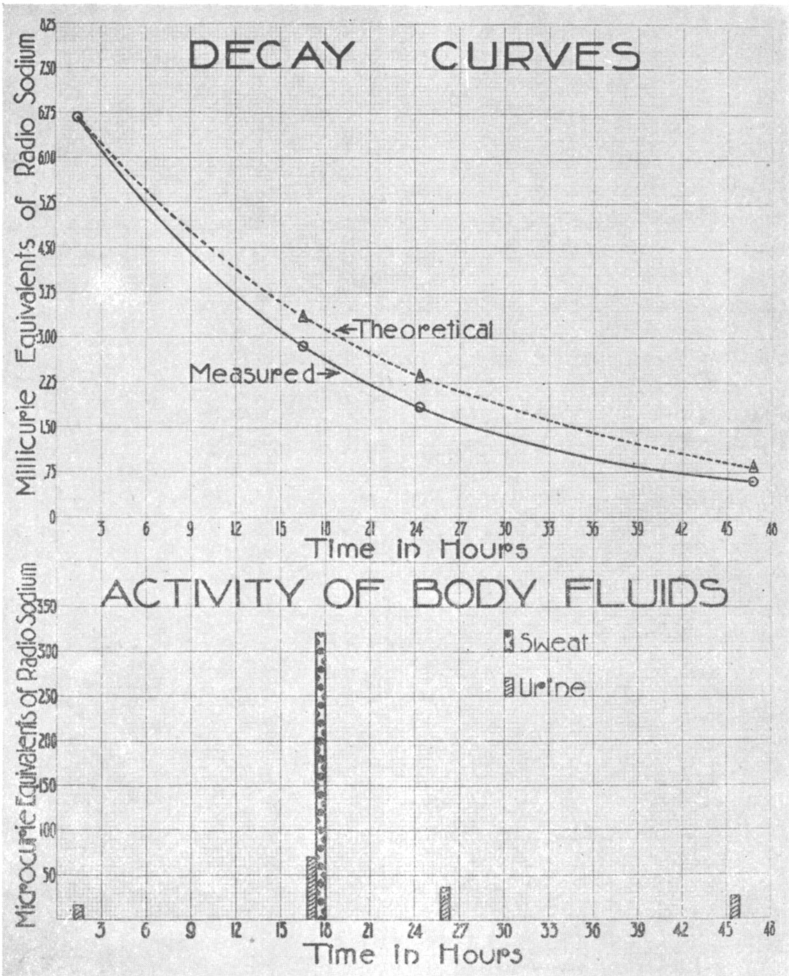

FIG. 1.

duration of its effect is limited by its short half-life of only 14.8 hours.

Initial investigations were made of the clinical effect and the rate of excretion of the radio-sodium following its intravenous administration to 2 human leukemic subjects.* An approximately isotonic solution of sodium chloride was used in each experiment.

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Each sample was measured with an electroscope just prior to administration and periodic determinations of the degree of activity of the patient's body was carried out. At the same time all the stool and urine samples were collected and their activities measured. The activity of 100 cc. of blood from the second patient was determined. The first patient received 13 mc.e. (milli-Curie equivalents) of radio-sodium and in Fig. 1 are shown the measured and theoretical decay curves in the upper portion of the chart. The theoretical values were computed from the first measurement of the patient's activity. The lower portion of each chart illustrates

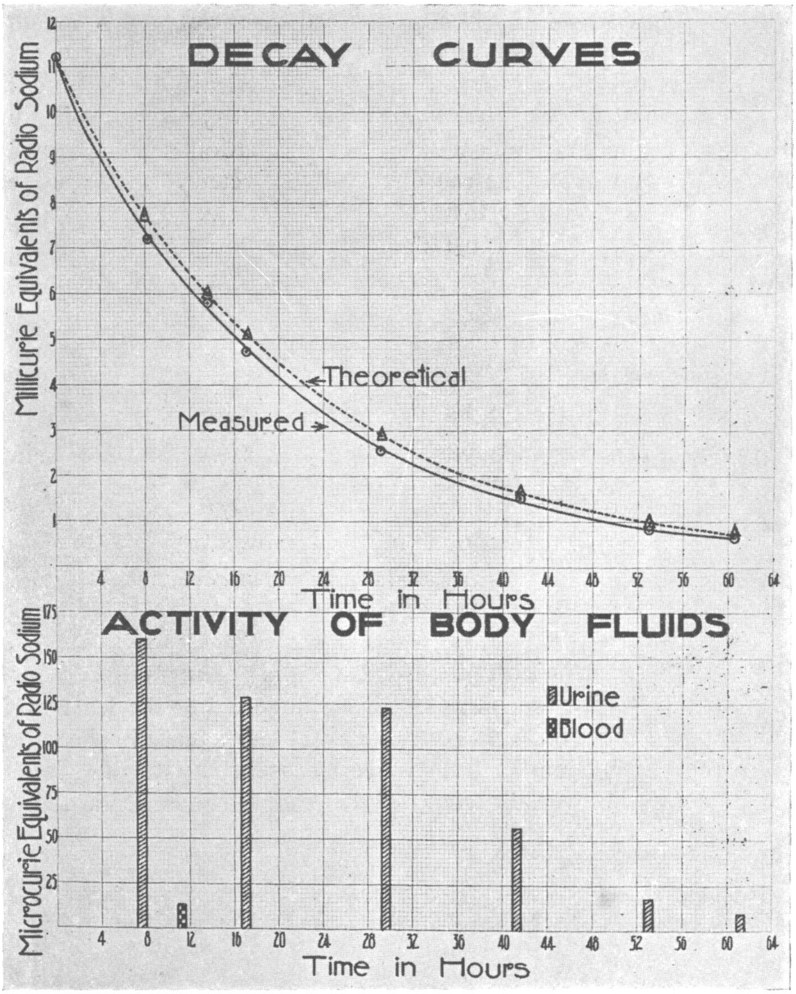

FIG. 2.

the amount of activity observed in the various body fluids. The values in Fig. 2 were observed following the administration of 15 mc.e. of radio-sodium to the second patient. The abscissa indicates the intervals of time following injection, and the ordinates the degree of activity.

The difference between the activity of the sample of radio-sodium just before administration and the initial activity measurement of the patient is felt to be due to the absorption of the gamma rays by the patient's body. In Fig. 1 it will be noted that a relatively large proportion of the radio-sodium was eliminated in the sweat, while in the second case the activity of the sweat was too small to be determined. This can possibly be explained by the fact that the first patient had frequent drenching sweats.

The interval between the actual and theoretical decay curves in each experiment is felt to represent the quantity of radio-sodium lost through the various channels of elimination. This view is borne out by the fact that the quantities excreted by each subject correspond approximately to the difference between the two curves in Figs. 1 and 2. In each instance the activity of the feces was too feeble to be measured.

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Sedimentation of Erythrocytes in Solutions of Albumin, Fibrinogen and Peptone.*

S. P. LUCIA AND J. W. BROWN.

From the Department of Medicine, University of California Medical School, San Francisco.

Fahraeus[1,2] has shown that the most rapid sedimentation of erythrocytes takes place in solutions of fibrinogen, and the least rapid in solutions of albumin. He concluded that an increase in the serum globulin and fibrinogen "stands in direct causality" with the rapidity of sedimentation. Westergren[3,4] stated that there exists a definite

* Aided by a grant from the Christine Breon Fund.

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[2] Fahraeus, R., *Physiol. Rev.*, 1929, **9**, 255.

[3] Westergren, A., Theorell, H., and Widström, G., *Z. f. d. g. exp. Med.*, 1931, **75**, 668.

[4] Westergren, A., Juhlin-Dannfelt, C., and Schnell, R., *Acta Med. Scand.*, 1932, **77**, 469.