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Secretion of Radio-active Sodium in Human Milk.

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The use of artificially activated substances provides an accurate method whereby labeled particles can be traced throughout the body. The passage of the isotope of sodium across the placenta has been described by Flexner and co-workers.[1,2,3] The authors[4] have recently been able to recover radio-active iron in the fetal cord plasma and fetal tissues within less than one hour after it had been fed the mother.[5]

Clinically there is no doubt that the suckling child may in varying degree be physiologically influenced by foods given the mother. Perlman and Dannenberg[6] have recently reported that nicotine is excreted in the milk and urine of all the mothers who smoked cigarettes. By

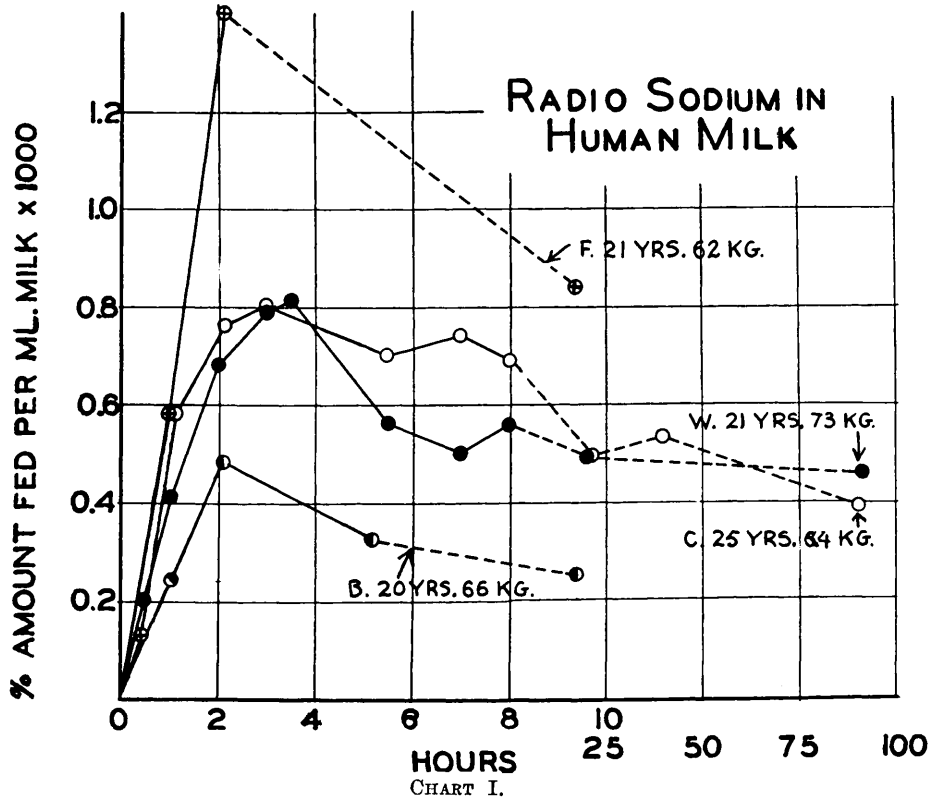

CHART I.

Showing values of radio-sodium output expressed as per cent of the amount ingested per liter of the mother's milk, plotted against time following ingestion.

1 Flexner, L. B., and Pohl, H. A., *J. Cell. Physiol.*, 1941, **18**, 49.

2 Pohl, H. A., Flexner, L. B., and Gellhorn, E., *Am. J. Physiol.*, 1941, **134**, 338.

3 Flexner, L. B., and Pohl, H. A., *Am. J. Physiol.*, 1941, **134**, 344.

4 Pommerenke, W. T., Hahn, P. F., Bale, W. F., and Balfour, W. M., *Am. J. Physiol.*, 1942, **137**, 164.

5 Unpublished data of authors.

6 Perlman, H. H., and Dannenberg, A. M., *J.A.M.A.*, 1942, **120**, 1003.

the use of radio-active sodium* the authors have determined the speed with which a substance given by mouth to woman may be recovered in her milk.

Method. Four normal young women in the early postpartum state and varying in age from 20 to 25 years, and in weight from 62 to 73 kg, served as subjects. Only one breast of each subject was employed in this study, the other breast being used to nurse the baby. At the beginning of each experiment the selected breast was emptied with an electric pump. The subject was then given a single dose of about 65 mg of the radio-active sodium, as the chloride, in orange juice. A routine house diet was given, but no other drug was administered throughout the experiment. The breast was then emptied by means of a pump at frequent intervals so that the milk secretion for any particular period of time could be determined. Determination of radio-activity was made directly upon 2 ml of milk with a dipping type of tube[7] in conjunction with a Geiger-Muller counter. An aliquot of the radio-sodium fed was reserved in each case as a pilot sample and its activity was determined at frequent intervals. The resultant decay curve was used to establish the purity of the isotope preparation as well as to refer the individual activity measurements of milk to a convenient empirical zero time.

Results. In Chart 1 are shown the various values of radio-sodium output in the 4 cases expressed as percent of the amount ingested by the mother appearing in 1.0 liter of milk plotted against time following ingestion.

It is apparent from the results, as shown in Chart 1, that radio-sodium must be very rapidly assimilated since appreciable amounts of this substance may be recovered in the breast milk within 20 minutes after ingestion. The concentration of the isotope in the milk reaches a peak in about 2 hours, after which it drops off somewhat; and in about 6 to 8 hours it levels off to a fairly constant value. In 2 instances in which the concentration of the sodium was followed for as long periods as the half life of the isotope permitted, the concentration in the milk was about the same at 96 hours as it was at 20 hours.

In 2 of the cases the level of the radio sodium in the plasma was determined simultaneously with that of the milk on 2 occasions, *i.e.,* 16 and 66 hours respectively after ingestion. The ratios of plasma to milk labeled sodium can be seen in Table I.

TABLE I.

Subject	Time after ingestion, hr	Plasma sodium / Milk sodium
F	16	7.5
F	66	5.7
B	16	18.0
B	66	7.7

Summary. Radio-active sodium may be recovered in milk within 20 minutes after its ingestion. Its peak concentration in the milk is reached in about 2 hours. Subsequent secretion slowly tapers off, some of the sodium being recoverable after 96 hours.

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[7] Bale, W. F., Haven, F. L., and LeFevre, M. L., *Rev. Scient. Instruments,* 1939, **10**, 193.