

STATEMENT

By Arthur H. Wolff, D.V.M., Division of Radiological Health, Public Health Service, before the Special Subcommittee on Radiation of the Joint Congressional Committee on Atomic Energy, May 6, 1959

Fallout and Uptake of Iodine-131

In considering the uptake mechanism for fallout, almost exclusive attention has been given to strontium-90. Strontium-90 as an environmental contaminant certainly deserves primary attention because the problem will persist for years following the cessation of nuclear weapons testing. Even though strontium-90 is the nuclide of major significance, the potential hazard of some of the shorter-lived nuclides should not be overlooked. Some of the other fission-product radionuclides are not necessarily insignificant just because they are short lived; they may present a contamination problem if they are sustained in the biosphere at relatively high levels.

Of particular importance in this regard is iodine-131, a fission-product radionuclide with a half-life of approximately 8 days. Iodine-131 is unique among the fission-produced radionuclides in that it concentrates in a small gland, the thyroid. Consequently, extremely small amounts of the nuclide taken into the animal body will result in relatively high dosages to a single gland as compared with equal amounts of other radionuclides more widely distributed in the body.

As a result of its 8-day half-life the concentration of iodine-131 in a gross fission-product mixture gradually diminishes, and the amount of iodine-131 reaches negligible proportions several weeks to months following its creation. It is likely, therefore, that any iodine-131 in the biosphere results primarily from rather fresh fallout.

Several investigators have measured the iodine-131 levels in the thyroid glands of grazing animals as an index of fresh fallout in various parts of the world. Much of the work in this

field has been done by Dr. Lester van Middlesworth, University of Tennessee, Memphis. Since 1954 he has collected thyroid glands from animals in slaughterhouses from various countries and particularly from Tennessee in this country. From 1955 to 1958, based on his data the average concentrations of iodine-131 sustained in U.S. cattle and sheep were in the order of 700 and 3,000 micromicrocuries per gram of thyroid respectively. The average weekly dose was about 60 millirad per week for cattle and 250 millirad per week for sheep. These concentrations are average values; considerable fluctuations occurred according to the type and location of weapons testing in progress just prior to the time of collection. Other investigators (1-4) have found similar levels in other parts of the United States.

It is apparent that despite its short half-life iodine-131 has been readily detectable as a biospheric contaminant reflecting current weapons tests. The levels found are quite likely innocuous insofar as the health of the animals is concerned. However, iodine-131 as a biospheric contaminant probably has resulted in a higher dosage level to any given volume of tissue than has any other fission-product nuclide.

The levels of iodine-131 in grazing animals are considerably higher than any levels concurrently found in humans because grazing animals consume large quantities of foliage upon which fallout and rainout are directly deposited.

The values in cattle are of particular interest because, theoretically, we should also expect detectable quantities of iodine-131 to be secreted into the milk. The Public Health Service has therefore included iodine-131 as well as certain other short-lived radionuclides in its milk sur-

Average iodine-131 concentrations in milk based on monthly sampling

Milkshed	June 1957– April 1958 ($\mu\text{mc./l.}$)	May 1958– January 1959 ($\mu\text{mc./l.}$)
Atlanta, Ga ¹ -----	-----	22
Austin, Tex ¹ -----	-----	39
Chicago, Ill ² -----	-----	38
Cincinnati, Ohio-----	136	41
Fargo, N. Dak ¹ -----	-----	38
New York, N.Y.-----	79	31
Sacramento, Calif-----	30	40
St. Louis, Mo-----	258	99
Salt Lake City, Utah-----	249	33
Spokane, Wash ³ -----	-----	32

¹ First sample June 1958.

² First sample July 1958.

³ First sample August 1958.

veillance program. The average iodine-131 levels detected in milk from various sampling stations are shown in the table.

Dr. E. B. Lewis, California Institute of Technology, has submitted a statement for the record which estimates the human dosages and possible biological significance that would be associated with consumption of milk containing the levels of iodine-131 reported here.

Iodine-131 levels in cattle thyroid may provide a presumptive index of the levels secreted

into milk in the same area. This is one parameter which the Public Health Service hopes to investigate in its future work in radiation surveillance of the environment.

The technique for measuring iodine-131 levels in thyroid glands is relatively simple. Perhaps greater reliance should be given to this technique, for it may serve not only as an early and sensitive index of the biological incorporation of iodine-131 but also may provide an index of the biological accumulation of other fission products. Iodine-131 as an index of environmental contamination, however, is only applicable to fission products of recent origin.

REFERENCES

- (1) Gunther, R. L., and Jones, H. B.: Confirmation of radioactivity in thyroids of various animals—July 15 to September 10, 1954. University of California Radiation Laboratory Report (UCRL 2689). Berkeley, 1954.
- (2) White, M. R., and Dobson, E. L.: California cattle thyroid activity associated with fallout: 1955. University of California Radiation Laboratory Report (UCRL 3355). Berkeley, 1956.
- (3) Comar, C. L., et al: Thyroid radioactivity after nuclear weapons tests. *Science* 126: 16–18, July 5, 1957.
- (4) Wolff, A. H.: Radioactivity in animal thyroid glands. *Pub. Health Rep.* 72: 1121–1126, December 1957.

Residence Requirements and Federal Aid

Both the Federal Government and our State governments must come to grips with some basic issues in connection with the administration of our Federal-State programs of public assistance. . . .

To the extent that funds are utilized for public assistance purposes, there should be no residence requirement by the States. The Federal Government is making funds available in order that persons who are in need may receive assistance. It has no concern and should not have any concern about how long persons have lived in a particular community or State. In fact, I feel that it is indefensible for the Federal Government to continue to permit the restriction of the use of its funds in this manner.—ARTHUR S. FLEMMING, *Secretary of Health, Education, and Welfare, at the Governors' Conference, San Juan, Puerto Rico, August 4, 1959.*