nm/ LETTER TO THE EDITOR

DOSIMETRY OF ^{132}I

In their recent article in the *Journal of Nuclear Medicine* (*1*), Levy and Ashburn rightly encourage the use of short-lived ^{132}I for diagnostic thyroid function studies. Unfortunately, their radiation dosimetry is incorrect and overestimates the thyroidal dose by a factor of four. Although the authors fail to state the principles upon which they base their estimate, I was able to arrive at the same answer by substituting the values for gamma dose-rate constant and average beta energy for ^{132}I given in their Table 1 into the Marinelli-Quimby-Hine formula (*2*). Presumably, the authors did the same. This formula, however, assumes instantaneous deposition of the radionuclide in the target organ, a valid approximation only when the uptake rate is rapid and the physical half-life long (*2*). This situation occurs when the thyroid gland concentrates ^{131}I iodide. The unmodified formula is not applicable when the rates of uptake and decay are similar, as happens with ^{132}I. With this radionuclide, fewer than 0.4% of the original radioactive atoms remain when equilibrium is finally reached 18–24 hr postdose; the others have decayed, and the radiation dose has already been delivered prior to establishment of the conditions necessary for the application of the Marinelli formula.

The dosimetry of short-lived radionuclides has received the attention of several groups (*2,3*), and a practical solution to the problem has been given by Greenfield (*3*). If one assumes that the handling of ^{131}I and ^{132}I by the thyroid gland is identical, then certain parameters relating to ^{132}I dosimetry can be developed from an analysis of the metabolism of ^{131}I. Space precludes a complete solution to Greenfield's equations in this letter (*4*); suffice it to say that in this formulation $\alpha_o = 0.005$/day; $\alpha_i =$ 1.1088/day; and $\alpha_{ex} = 4.349$/day, assuming a radioiodide uptake of 20% and a biologic half-life in the gland of 90 days. The radiation dose to the thyroid gland from ^{132}I will therefore be 7.6 rads/mCi administered. This is $1/150$ the radiation dose delivered by the same millicurie dose of ^{131}I, and about ¼ the dose for ^{132}I calculated by Levy and Ashburn.

^{132}I is thus even less hazardous than the authors claim.

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REFERENCES

1. Levy, B. S. and Ashburn, W.: Thyroid-uptake studies using ^{132}I. *J. Nucl. Med.* **10**:286, 1969.

2. Loevinger, R., Holt, J. G. and Hine, G. J.: Internally administered radioisotopes. In *Radiation Dosimetry*, Hine, G. J. and Brownell, G. L., eds., Academic Press, New York, 1956, p. 803.

3. Greenfield, M. A.: Radioisotope dosimetry. In *Nuclear Medicine*, W. H. Blahd, ed., 2nd ed., McGraw-Hill, New York, 1965, p. 116.

4. A complete solution to these equations will be supplied upon request.

THE AUTHORS' REPLY

We appreciate Dr. Charkes endorsement of the use of short-lived ^{132}I for diagnostic thyroid function and his calling to the readers' attention a logical method for computing the radiation dose of ^{132}I which gives an even more favorable reason for its use.

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