3. Gamma- and x-ray channels each detecting the whole spectrum (0 — 187 keV):

$$N_\gamma = N_x = N_o[0.836\, t_\gamma + 0.748\, t_x + 0.115\, t_x - 0.748\, t_x(0.836\, t_\gamma + 0.115\, t_x)]$$
$$N_c = 2N_o(0.748\, t_x)\,(0.836\, t_\gamma + 0.115\, t_x)$$

in which t_γ and t_x are the total efficiencies. Table 1 gives the calculated correction value A in eq. (1) for different experimental conditions.

In practice we recommend the use of the total spectrum [total efficiency on top of a 60- by 60-mm NaI crystal is about 28% (*3*)].

In conclusion, the equation of Herman et al. can be used only at small SCD ($\leq$10 cm) and if e_γ and e_x are known for both crystals. In thyroid I-123 uptake studies, where the SCDs for the two crystals are not the same, the use of Herman's equation may lead to a deviation of 10% from the real value of N_o. With this restriction in mind, we agree with the reply of Hudson et al. (*1*) appended to the letter by Mpanias et al.

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REFERENCES

1. MPANIAS P, GOLLNICK DA, LEE WP, et al: Coincidence-counting assays of ^{123}I. *J Nucl Med* 17: 1111–1112, 1976

2. HERMAN MW, SPIEGLER P, KOONTZ R, et al: Coincidence counting of ^{123}I in pediatric thyroid studies. *Radiology* 113: 455–458, 1974

3. DOLLMAN LT, VON DER LAGE GC: *Radionuclide Decay Schemes and Nuclear Parameters for Use in Radiation-Dose Estimates, MIRD Pamphlet No 10*, New York, Society of Nuclear Medicine, Sept. 1975

4. BRINKMAN GA, LINDNER L, VEENBOER JTH: Sumpeak calibration of ^{123}I. *Int J Appl Radiat Isot* 28: 271, 1977

Reply

We would like to register our disagreement with the conclusions reached by Brinkman and Lindner in their letter "Two-Crystal Coincidence Counting of I-123," by making the following points:

1. The range for depth of the thyroid gland is between 1.5 and 2.2 cm, and the average thyroid depth is about 2 cm in neck tissue; the anatomical structures in the vicinity of the thyroid gland usually constrain the crystal-to-skin distances to more than 2 cm.

2. The amount of I-123 taken up by the thyroid gland is merely over 1 μCi. With these points in mind, we would like to focus attention on the assayed I-123 activity in contrast to SCD (source-to-crystal distance) for the 1.0-μCi nominal activity presented in our original article (*1*). Table 1 compares the measured activity at various SCDs with the asymptotic value of 1.09 μCi. It shows that for an SCD of 4 cm, the error in measuring the I-123 activity by employing the method of Herman et al. (*2*) is less than 5%. The in vivo measuring situation is more appropriately described by the phantom experiments of Herman et al. They find that for a source depth of 2.2 cm in phantom and a crystal-to-phantom distance of 2 cm, the error in measurement of the activity using their equation is less than 3%.

TABLE 1. PERCENT DIFFERENCES BETWEEN THE ASYMPTOTIC VALUE AND THE MEASURED VALUE AT VARIOUS SCDs FOR THE NOMINAL 1.10-μCi SOURCE

SCD (cm)	Activity (μCi)	Difference (%)
1	0.92	15
2	0.96	12
4	1.04*	5
5	1.06	3
8	1.06	3
10	1.08	1
Asymptote	1.09	0

* Interpolated value.

3. Therefore, in our thyroid-uptake studies the use of the equation for the calculation of the absolute activity, N_o, as derived by Herman et al., can contribute no more than 5% error to the value of the measured activity due to the γ-ray/x-ray summing effects, and usually less than 3%.

We believe that the realistic clinical situation closely resembles the conditions of measurement of Herman et al. Whereas Brinkman and Lindner may have more appropriately described the physical reasons for the decrease in activity as a function of SCD, these refinements in the calculation of I-123 activity, when considerable summing is present, bear no significance to the clinical application of the coincidence-counting measurement of I-123, as is employed in the thyroid-uptake studies.

For instance, in Table 1 the calculated values of A for $e_\gamma = e_x = 0.5$ are of no real physical or clinical importance. The values of A calculated with $e_\gamma = 0.2$ and $e_x = 0.07$ are of no practical significance. A calculation of A as function of SCD in centimeter increments might be of value. Such a calculation probably is better pursued by means of the data of Figure 1 in our original paper (*1*).

We have demonstrated that under the conditions of measurement of I-123 in the actual clinical situation, the equation used to calculate activity with the factor of 0.86 will have an error due to the "summing effect" of less than 5%. We have successfully applied the coincidence-counting method for the last 2 yr (*3*), and have found the procedure to be practicable and convenient.

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REFERENCES

1. MPANIAS P, GOLLNICK DA, LEE WP, et al: Coinci-

cidence-counting assays of ^{123}I. *J Nucl Med* 17: 1111–1112, 1976

2. HERMAN MW, SPIEGLER P, KOONTZ R, et al: Coincidence counting of ^{123}I in pediatric thyroid studies. *Radiology* 113: 455–458, 1974

3. WIMMER RJ, LEE WP, KAPLAN SA, et al: Estimation of Absolute Iodide Uptake (AIU) with ^{123}I by Coincidence Counting. In *The Radiological Society of North America Conference Proceedings*, Chicago, 1975, p 138

Film-Loop Method for Cardiac Motion Images

We have read the recent paper by Silverstein et al. (*1*) with great interest. Allow us to congratulate the authors on introducing this very useful technique.

To solve the problem of viewing gated images without the aid of a minicomputer or a multiformat imager, we are using a film-loop technique that enables us to obtain inexpensive motion-picture images of cardiac contraction—albeit only for the end-systolic and end-diastolic phases of the cardiac cycle.

After registering standard gated end-systolic and end-diastolic gamma-camera images directly on 35-mm film, we enlarge them onto ordinary x-ray film to facilitate subsequent photocopying with a motor-driven 35-mm camera. First the end-systolic image is photographed on a full film roll (36 frames). The film is then rewound inside the camera, advanced half a frame, and the end-diastolic image photographed in the same way. This results in alternating half-frame end-diastolic and end-systolic images on a film loop that can be projected with a 35-mm projector, which is available in most cardiac laboratories. Needless to say, special care should be exercised to ensure proper overlapping of the images. Marks placed at identical spots on both x-ray films before photocopying will alert the viewer if overlapping was imperfect, since these will then oscillate during projection.

A film-loop method has been used previously by photographing the images obtained with the aid of a minicomputer (*2*). With our method, ventricular wall motion can be screened effectively in centers where only the basic gamma-camera units are available.

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REFERENCES

1. SILVERSTEIN EA, TURNER DA, FORDHAM EW, et al: Cardiac blood pool imaging over the complete cardiac cycle with a multiformat imager. *J Nucl Med* 18: 159–162, 1977

2. REESE IC, MISHKIN FS: Technique for producing cardiac radionuclide motion images. *J Nucl Med* 16: 368–369, 1975

New Tl-201 Nuclear Decay Data

To establish a consistent system of radioactivity measurements for the radiopharmaceutical industry—one traceable to the national radioactivity measurements system—the National Bureau of Standards has been supervising and administering a research associate program on behalf of seven contributing members of the Atomic Industrial Forum.

The program entails:

1. Continuous availability of radioactivity standard reference materials, at 0.1–100 mCi levels, of those radionuclides used in radiopharmaceuticals.

2. Continuous demonstration of traceability to the national radioactivity measurements system through the distribution of radioactivity samples of known but undisclosed activity, in the same range of activity levels.

3. Assessment of decay-scheme parameters necessary for the correct application of these radionuclides.

Since April 1975, the contributing member companies have been supplied with radioactivity standard reference materials of 17 different radionuclides together with the nuclear decay data from the Evaluated Nuclear Structure Data File (ENSDF) of the ORNL Nuclear Data Project. (ENSDF, which was designed and implemented by the Nuclear Data Project, is a system for standard organization and computer storage of nuclear structure and decay data. The master evaluated file is maintained by the Nuclear Data Project in support of the U.S. Nuclear Data Network under the sponsorship of the U.S. Energy Research and Development Administration.) Whenever NBS measurements of photon intensities (probabilities per decay) or half-lives differ from those tabulated in the Nuclear Data Project's compilation, they are reported to both the Nuclear Data Project and the member companies as soon as possible. The Nuclear Data Project evaluates these and all other available data to derive an updated set of decay-scheme parameters.

The member companies, upon acceptance of updated

TABLE 1. Tl-201 EC DECAY (3.044 D 9)*

Radiation type	Energy (keV)	Intensity (%)	Δ (gr-rad/μCi-h)
Ce-NOP- 1	0.78 4	38 22	0.0006
Auger-L	7.6	78 6	0.0123
Ce-L- 2	15.76 3	11.4 6	0.0038
Ce-L- 3	17.35 3	9.1 5	0.0033
Ce-MNO- 2	27.04 3	3.63 16	0.0021
Ce-MNO- 3	28.63 3	2.85 12	0.0017
Ce-K- 4	52.24 4	7.5 4	0.0083
Auger-K	53.8	3.3 20	0.0038
Ce-K- 5	82.78 7	0.29 4	0.0005
Ce-K- 6	84.33 7	15.5 4	0.0278
Ce-L- 4	120.50 4	1.27 6	0.0033
Ce-MNO- 4	131.78 4	0.397 15	0.0011
Ce-L- 6	152.59 7	2.62 7	0.0085
Ce-MNO- 6	163.87 7	0.810 14	0.0028
X-ray L	10	47 6	0.0099
γ 2	30.60 3	0.310 13	0.0002
γ 3	32.19 3	0.285 12	0.0002
X-ray $K\alpha_2$	68.8950 20	27.4 9	0.0402
X-ray $K\alpha_1$	70.8190 20	46.6 14	0.0704
X-ray $K\beta$	80.3	20.5 7	0.0351
γ 4	135.34 4	2.65 10	0.0076
γ 5	165.88 7	0.180 20	0.0006
γ 6	167.43 7	10.00 17	0.0357

* I (min) = 0.10%.
The intensity entry 10.00 17 is to be read as 10.00 ± .17; similarly, the energy entry 167.43 7 is to be read as 167.43 ± 0.07.