TABLE 1. SUMMARY OF PATIENT DATA

Patient	Cisternographic findings	Time following injection (days)	^{169}Yb-DTPA injected (mCi)	^{169}Yb-DTPA remaining (mCi)	Activity remaining (%)
0803	Delayed flow over convexities	9	1.007	0.028	2.80
5917	Delayed flow over convexities	10	1.020	0.009	0.91
0123	Normal	17	1.000	0.007	0.74
6129	Normal	24	1.000	0.011	1.09
3583	Delayed flow over convexities	87	0.935	0.002	0.20

Chicago Pho/Gamma HP) using a 4,000-hole straight bore collimator. To ascertain quantitatively the amount of activity present in the head of each patient, a semi-circular Lucite standard (radius 10 cm, height 2.4 cm), was filled with 0.06 mCi of ^{169}Yb-DTPA and counted with 3.75 cm of pressed wood between the collimator and head standard. Images obtained from Patient 0803 and the standard are shown for comparison (Fig. 1). Left lateral head counts were obtained for each patient, corrected for room background, and residual activity was determined by comparison with the standard counts (Table 1). The percent of injected activity that remained in the head ranged from 2.8% at 9 days to 0.2% at 87 days following administration (Table 1). These values do not appear "significant" as presented by Barbizet, et al (*1*).

In a recent study (*4*), the elimination rate of ^{169}Yb-DTPA from the CNS following intrathecal administration was comparable to that reported by DeLand (*2*). Radiation dose estimates have been calculated (*4*) according to the MIRD method (*5*), assuming elimination after the last datum point (48 hr following injection) equal to the physical decay rate of ^{169}Yb (the most conservative assumption). In patients with delayed cerebrospinal fluid flow, the most conservative dosimetry assumptions yield surface CNS doses in the order of 30 rads (for 500 μCi of ^{169}Yb-DTPA).

Central nervous system clearance of ^{169}Yb-DTPA is similar to that obtained with ^{131}I-IHSA (*6*) and postinjection aseptic meningitis has not been encountered. Our findings based on data obtained from both humans and animals indicate that ^{169}Yb-DTPA is a safe radiopharmaceutical for cisternographic use and can be recommended for these studies.

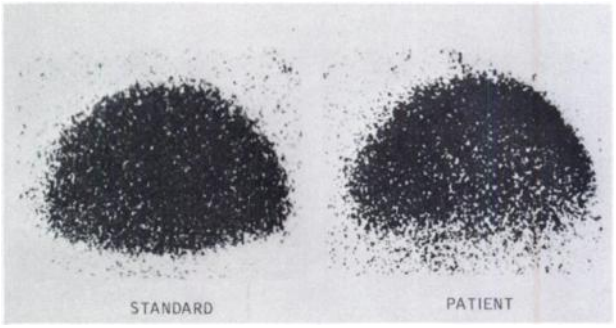

FIG. 1. Scintiphotos of lateral head standard containing 0.06 mCi ^{169}Yb-DTPA and lateral view of patient 0803 imaged 9 days following intrathecal injection of 1.0 mCi ^{169}Yb-DTPA.

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STANDARD TECHNIQUES FOR THE MEASUREMENT OF RED CELL AND PLASMA VOLUME

The expert panel on the Diagnostic Applications of Radioisotopes in Hematology which was established by the International Committee for Standardization in Hematology has prepared a document which deals with the technical and analytical aspects of red cell and plasma volume measurements. After an introduction which deals with general principles and draws attention to the areas of particular difficulty in these methods, the document contains the following sections:

1. Techniques for the estimation of red cell volume;
2. Techniques for the estimation of plasma volume;
3. The measurement of packed cell volume;
4. The assessment of automated blood volume equipment;
5. Sequential blood volume estimations;
6. Estimation of total blood volume as the sum of red cell plasma volumes;
7. Presentation and analysis of results;
8. The radiation dose which the patient receives during these investigations.

The purpose of the document is to enable measurements obtained in different centers to be reliably compared with each other. The document has been published (*Br J Haematol* 25: 801–814, 1973) and will also be published in a number of national journals.

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SECTION SCANNING USING ORTHOGONAL TANGENT CORRECTION

I read with interest the article by Kuhl, et al, Quantitative Section Scanning Using Orthogonal Tangent Correction (*J Nucl Med* 14: 196–200, 1973). The OTC technique has been developed with the aim of producing a matrix which is compatible with all of the tangent values, and preliminary reports of this work (*1,2*) suggested that the method would give much better pictures than conventional section scans. This has not been convincingly demonstrated.

The authors' description of the technique is so abbreviated that it is difficult to see how to apply it in practice. For example, the formula for the orthogonal tangent correction factor is given explicitly only for the center cell P_{33}. There is no statement of which tangent values to choose in the general case P_{ij}, nor any suggested method of dealing with those matrix cells whose positions correspond with junctions between tangent cells. In addition, in Fig. 6, scans at 45 and 135 deg of the matrix resulting from the first step are shown as giving uniform tangent values. This is clearly wrong. Scanning a uniform square distribution at 45 deg gives a triangular response which leads to a final matrix very different from Fig. 8. Thus either the tangent values of Fig. 6, or the OTC formula, or both, are incorrect.

The example in Figs. 1 through 8 may give the misleading impression that in the absence of noise etc., the OTC technique can calculate the original distribution exactly. However, a single line of activity at right angles to one of the tangents is a very special case, possibly the only one (apart from a point source) where this can be done. In the general case, the final pattern is only one of a large number of solutions which are compatible with all of the tangent values and this introduces the possibility of significant distortions in the final picture. A hollow square or at least an L-shaped distribution would have been a more realistic pattern with which to test the accuracy of reconstruction.

It is unfortunate that the authors did not investigate the problem of statistical noise. However, the magnitude of the errors involved in a scan of the bottle phantom can easily be estimated. Each correction factor in the OTC technique requires multiplication by four independent tangent values giving a total of 46 multiplications, each of which involves a significant error (about $\pm 3\%$ for a typical tangent value of 1,000 counts). In contrast to this, the DSA technique requires simple addition of 12 tangent values. Thus the OTC method could generate significant artifacts and will certainly give a much noisier picture than the DSA method. This is borne out by the results in Fig. 11, where a bottle which contributes 10,000 counts to the scan has a range of $\pm 50\%$ in estimated contents. Even this large range is an underestimation of the errors which could occur in practice because the fractional counts per bottle were calculated by comparison with a uniform-concentration phantom. This maneuver not only allows for attenuation in a way which would be difficult to repeat in a clinical situation but conceals any possible systematic distortion of the final picture caused by the processing.

The clinical scans of Fig. 10 appear to demonstrate the superiority of the OTC technique. However, Kuhl (*3*) has previously shown brain section scans, using the DSA technique with 15 deg interval angle, which were incomparably better than the DSA scan of Fig. 10 and considerably smoother than the OTC scan. Figure 10 in fact proves very little about the OTC technique because it is impossible to tell how much of the apparent detail is due to real structures and how much is due to the high noise level produced by the processing. A more meaningful comparison would have been between DSA and OTC