## HANDLING OF RADIOACTIVE $^{133}$Xe DISSOLVED IN SALINE

With the increasingly widespread use of $^{133}$Xe dissolved in saline, difficulties in the handling and storage of this radiopharmaceutical have frequently been encountered (*1–3*). The major problems reported by users of injectable $^{133}$Xe include: (A) loss of $^{133}$Xe into air spaces which tend to result as individual doses are removed from multidose vials (it is extremely difficult to eliminate *all* air bubbles when replacing the volume withdrawn); (B) diffusion of $^{133}$Xe into rubber components at the ends of cylindrical glass carpules (rubber septa on multidose vials present a comparable problem); and (C) diffusion of $^{133}$Xe into both the plastic and rubber components of disposable syringes which are often used for injection. We have developed a simple technique for the storage and dispensing of $^{133}$Xe in saline solution which has proven to be free from these difficulties.

Regardless of how the $^{133}$Xe is supplied, the solution is transferred into a tight, sterile, glass syringe of a suitable volume. Any bubbles which form in the syringe during the transfer are removed in the usual manner, and the storage syringe is closed by means of a sterile, disposable, three-way stopcock (Pharmaseal Laboratories, #K-75). The sterile three-way stopcock serves a triple purpose: (A) in the closed position the stopcock seals the storage syringe; (B) individual patient doses are dispensed into secondary syringes which connect directly to the female Luer fitting; and (C) the storage syringe itself is filled by means of the male Luer fitting. Fittings on the stopcock are kept sterile by capping with disposable needles and syringes or, alternatively, a fresh disposable stopcock is employed each time $^{133}$Xe is dispensed.

Although $^{133}$Xe cannot diffuse into a glass, some diffusion (about 5%/day) between the barrel and plunger surfaces of the storage syringe can occur. The extent of this loss is reduced to less than 1%/day if the storage syringe is kept at 5°C. Diffusion of $^{133}$Xe into the disposable stopcock is negligible.

We have found that it is possible to use disposable plastic syringes and inject 97% of $^{133}$Xe if patient doses are drawn directly from the shielded, refrigerated storage syringe *immediately* before use. If $^{133}$Xe remains in the plastic syringe 5 min before injection, about 10% will be lost by sticking to the walls.

The shielded glass syringe can be stored up to 5 days at low temperature with no danger of leakage. A busy department can therefore carry out $^{133}$Xe studies any day of the week.

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## ADVANTAGE OF MINIFICATION FOR RAPID, LOW INFORMATION DENSITY SCANNING

Recently scan minification has been advocated for improving the interpretation of images by increasing the contrast at lesion borders by decreasing the angle of the image as projected on the retina. The simplest method of obtaining scan minification is by interposing a minifying lens between the observer and the image (*1*). Another method that has recently been suggested is the use of a Polaroid picture taken of the scan image (*2*). A commercially available rectilinear scanner offers scan minification by means

of an electromechanical reduction between the scanner probe and the photo display. In those procedures where lesion detection is the primary goal (e.g., bone scans), the concept of a low information density (ID), rapid survey scan would seem suitable. Interpretation of the low ID scan is difficult because of the statistical fluctuation, but by minifying the images and increasing the apparent data per unit area viewed, interpretation is greatly improved. Using the commercially available scanner with minification, Mishkin, et al (*3*) performed scans using high scan speeds and low information density. Because of minification, they were able to obtain interpretable images. Unfortunately, there are many instruments which do not permit scan minification due to a direct one-for-one correspondence between the scanner head and the photo display. We have used the method of secondary scan minification on one-for-one scans (optical-10 diopter lens, or photo-optical Polaroid pictures), and compared low-ID "minified" scans with images obtained at a "high ID" in 23 patients undergoing bone scan. There were no lesions present on the high-ID scan that were not similarly detectable on the low-ID scan. In all of the low-ID scans, the scanner was run at a 500-cm scan speed. Thus, a total-body bone survey could be obtained within 1½ hr in the posterior view with a single anterior pelvic view. Additional views were obtained as indicated clinically.

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## ADVERSE REACTIONS TO RADIOPHARMACEUTICALS

We believe the Survey of Adverse Reactions to Radiopharmaceuticals sponsored by the Society of Nuclear Medicine has produced useful information which had not been previously available. Several limitations are apparent however:

1. A number of major institutions did not reply to the survey. Others put down round figures for total examinations thus diminishing the accuracy.
2. Many respondents have not kept records of reactions and were relying on memory.
3. Minor reactions probably are often not reported.
4. Some of the reactions reported are questionably related to the administered radiopharmaceutical.
5. We do not know the actual incidence of reactions for each of the radiopharmaceuticals because we do not know the total number of examinations performed with each pharmaceutical. The last Public Health Service survey for radiopharmaceutical utilization was in 1966. The utilization of radiopharmaceuticals has changed markedly since then.

A review of the results of the survey is of interest (Tables 1, 2). Most numerous are the reactions to technetium and indium colloids. These reactions are most likely secondary to the stabilizers used.

Intrathecal $^{131}$I-IHSA is next in line in order of frequency. However, considering the probable frequency of the performance of cisternography, this most likely represents a very high incidence, possibly the highest of all radiopharmaceuticals. These reactions were aseptic meningitis except for one case which resulted in death 2 weeks later attributed to the performance of a lumbar puncture.

Two reactions to $^{32}$P as chromic phosphate were severe, one due to suppression of marrow activity and the other to rapid reaccumulation of pleural fluid. One fatal reaction to $^{131}$I-macroaggregates of human serum albumin was encountered immediately

**TABLE 1. SURVEY OF ADVERSE REACTIONS**

| | | | | |
|---|---|---|---|---|
| Survey forms mailed | | | 4,505 | |
| Number with M.D. degree | | | 2,502 | |
| Institutions or offices replying | | | 327 | |
| | 1967 | 1968 | 1969 | 1970 |
| Total number of examinations | 295,972 | 361,685 | 449,964 | |
| Number of reactions* | 24 | 55 | 32 | 26 |
| Incidence | 1/12,332 | 1/6,576 | 1/14,061 | |
| Total examinations 1967–69 | | | 1,107,621 | |
| Total reactions | | | 111 | |
| Incidence | | | 1/9,979 | |

* Six reactions were not specified as to year of occurrence.