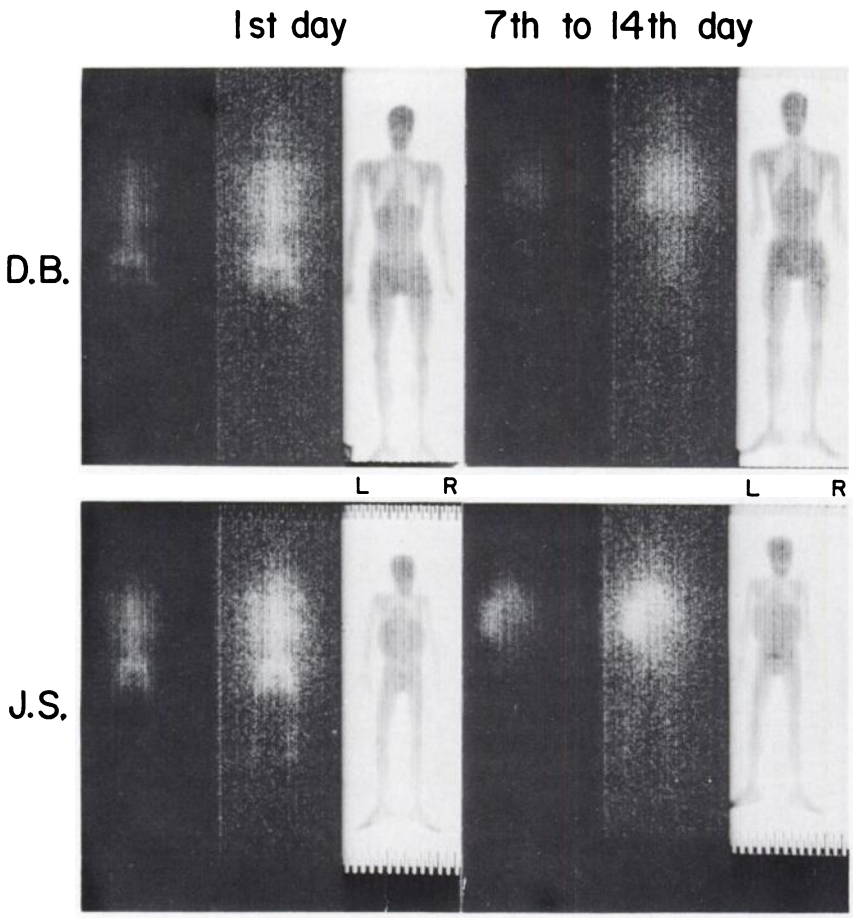

FIG. 1. Whole-body scans (posterior views obtained with Anger Mark II whole-body scanner) obtained during first day and 7–14 days following administration of 4–5 μCi of ^{59}Fe to two patients. Figure to right of each scan represents an ^{241}Am transmission picture showing body outline. Two figures on left of each scan represent images at two different intensities. Upper portion of figure shows results in patient DB with polycythemia secondary to chronic renal disease. Distribution of erythropoietic marrow (upper left) and distribution of labeled red cells in blood pool (upper right) are within normal limits. Lower portion of figure shows results in patient JS, a 9-year-old boy with cystic fibrosis and splenomegaly. Distribution of erythropoietic marrow is normal. However, scan at 7 days shows marked splenic sequestration of labeled red cells.

collimation. The pattern of distribution of erythropoietic marrow characteristic of various disease processes obtained by this method is identical to that previously published (*4,6*).

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A SAFE, RAPID PREPARATION METHOD FOR ^{99m}Tc-SULFUR COLLOID

Although commercially prepared ^{99m}Tc-sulfur colloid (*1*) is now being licensed for general use, the cost and short life of this material make daily availability for liver and spleen scans costly and difficult. For this reason, preparation of the colloid from eluates of pertechnetate (*2*) has become popular: several participants at the 1969 New Orleans meeting of the Society of Nuclear Medicine offered formulas for this purpose, and Hunter (*3*) has recently published his method.

Hunter and coworkers kindly shared their method with us some time ago, but we used this as only a starting point and have developed a formula and method for preparing ^{99m}Tc-sulfur colloid which usually requires less than 10 min time. In contrast to Hunter's method (*3*), the sterility of the pyrogen-free pertechnetate eluate from the generator is not broken throughout the preparation which uses presterilized, premeasured ingredients and is safely prepared by one of us (TH) as described below:

1. To a sterile empty vial add 10 cc of calibrated, sterile, pyrogen-free ^{99m}Tc-saline eluate.
2. Add 1 ml of sterile 0.2 *N* hydrochloric acid, leaving the needle in the vial as a vent.
3. Place on a boiling water bath and add 1 cc of a sterile solution containing 8 mg/ml of sodium thiosulfate and 1 mg/ml of EDTA.
4. Leave in the water bath for 1.5 min after colloid is formed (average of 3 min total).
5. Remove the vial from the water bath and cool for several minutes before adding 3 ml of 25% mannitol solution.
6. Now add 0.5 ml of phosphate buffer* and 1 cc of 0.2 *N*-NaOH solution.
7. Remove a small amount with a TB syringe and check pH with nitrazine paper; then check for aggregation and colloid size with a hemocytometer and microscope.
8. Label with total activity, time of calibration and final total volume.

The entire procedure is carried out in the pharmacy with the ^{99m}Tc vial kept in a special lead pig with a wire hanger attached and holes drilled on the bias to allow the passage of hot water without sacrificing shielding. Surveillance has shown a low level of radiation exposure to the pharmacist.

All solutions are prepared with C. P. grade chemicals using water for injection; the solutions are sterilized by autoclave except for the 1 *N*-NaOH solution which is sterilized with solvent resistant membrane filter.†

Originally tried by us in animals, the ^{99m}Tc-sulfur colloid prepared by this method has been used successfully in over 100 children during the past year without any evidence of toxicity or side effects of any sort. In no case has significant trapping in the lungs been observed, a good indication that the colloid has remained stable. The quality-control step of microscopic examination in a hemocytometer is most important in insuring the integrity of the colloid: in a few cases aggregation of the colloid was seen microscopically which later led to frank clumping being visible macroscopically: in these cases, mostly during the developmental stages of the method here described, a rerun of the synthesis was performed and the defective colloid not used.

We believe that use of EDTA to remove divalent contaminants, notably aluminum, may explain our unusual success with this formula. By using sterile EDTA, we can maintain the sterility of our preparation, in contrast to Hunter (*3*), who uses a nonsterile ion-exchange column to purify this eluate before beginning the synthesis.

We also feel that our buffer provides unique stability in our system and appears superior to the several other buffers tried. Variation in the pH of eluates from ^{99m}Tc in generators from different suppliers may sometimes require some quantitative adjustments although the present formula has been used with eluates from every ^{99m}Tc generator in general use in the United States.

The radiation safety of the present method is excellent: the total exposure during a preparation procedure is less than 1 mrad (under 5 mR/hr dose rate by survey meter, average 10-min exposure).

Summary. A method developed for rapid, easy preparation of sterile ^{99m}Tc-sulfur colloid is presented. Factors influencing the success of the preparation are discussed. The product has been well-proven in use with both children and adults.

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* pH 7.4 Phosphate Buffer contains 152.4 gm dibasic Sodium Phosphate ($Na_2HPO_4 \cdot 7H_2O$) and 9.2 gm monobasic Sodium Phosphate ($NaH_2PO_4 \cdot H_2O$) per liter.

† Solvinert (Millipore) UG-type filter.

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