^{51}Cr LUNG SCAN IN IDIOPATHIC PULMONARY HEMOSIDEROSIS

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Chromium-51 has been used widely in labeling red blood cells for studying red-cell volume (*1*) and, after heat treatment, for spleen scanning (*2*). This report describes the use of ^{51}Cr for lung scanning to identify pulmonary sequestration of red blood cells and to support the diagnosis of idiopathic pulmonary hemosiderosis, a use for which no previous reports have been found. The case reported briefly here will be published in detail elsewhere (*3*).

Case report. The patient was a 14-year-old Caucasian girl who had a history of upper respiratory infection 3 months before admission. Following this she developed migratory polyarthritis for which she was hospitalized for evaluation, diagnosed as having rheumatoid arthritis and discharged with instructions to take aspirin as therapy. Arthralgia, lethargy and malaise persisted, and she was rehospitalized 10 days later and subsequently transferred to Columbus Children's Hospital with the admitting diagnosis of possible rheumatoid arthritis. The chief symptom at the time of admission was a chronic cough.

Physical examination on admission revealed a pale, thin girl who appeared both acutely and chronically ill. Her pulse was 114, respiration 24, blood pressure 125/75 and temperature 100.2°F. Both ankle joints were swollen and tender, but no other joints appeared abnormal. There was a yellow-gray pseudomembrane over the left tonsillar pillar which bled when the membrane was stripped off. Her chest moved freely with respiration and was clear to auscultation and percussion. Her heart was unremarkable except for a short systolic flow-type murmur. Neither liver nor spleen were palpably enlarged.

Laboratory examinations showed a hemoglobin of 7.2 gm, hematocrit of 24 and white blood count of 13,050; platelet count was 660,000 and reticulocyte count was 5.4%; sedimentation rate was 70, ASO titre was 1:833, CRP was 3+ and latex fixation was positive. Chest x-ray on admission revealed a faint shadow of apparent infiltrate over the lower ⅔ of both lung fields which appeared increased on subsequent examinations 10 days later when the ^{51}Cr scans were performed.

During the initial week of hospitalization, three blood transfusions were given without any lasting improvement in hemoglobin despite no evidence of bleeding except for slight hemoptysis. Radioisotope consultation on the ninth hospital day suggested that a unit of blood be labeled with ^{51}Cr and the patient scanned to follow the fate of the transfused labeled cells. A unit of about 300 cc of freshly obtained blood cells in plastic was incubated with 300 μCi of ^{51}Cr, unbound ^{51}Cr was reduced to the trivalent state with 200 mg of ascorbic acid and the labeled cells were infused over a 3-hr period. Immediately afterwards and 20 hr later, thoracoabdominal scans were performed from anterior and posterior aspects with an Ohio Nuclear Model 54F scanner equipped with a 93-hole, 3-in. focal-depth collimator on a 5-in. NaI crystal moving at 100 cm/min. Counting rate was recorded over the spleen, liver, heart and lung fields.

Received Aug. 12, 1968; original accepted Oct. 10, 1968.

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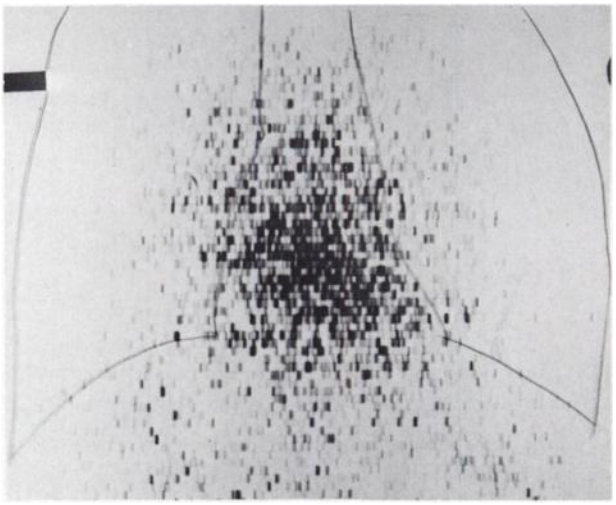

FIG. 1. Anterior thoracic scan made immediately after infusion of ^{51}Cr-labeled red cells. Concentration is primarily in cardiac blood pool.

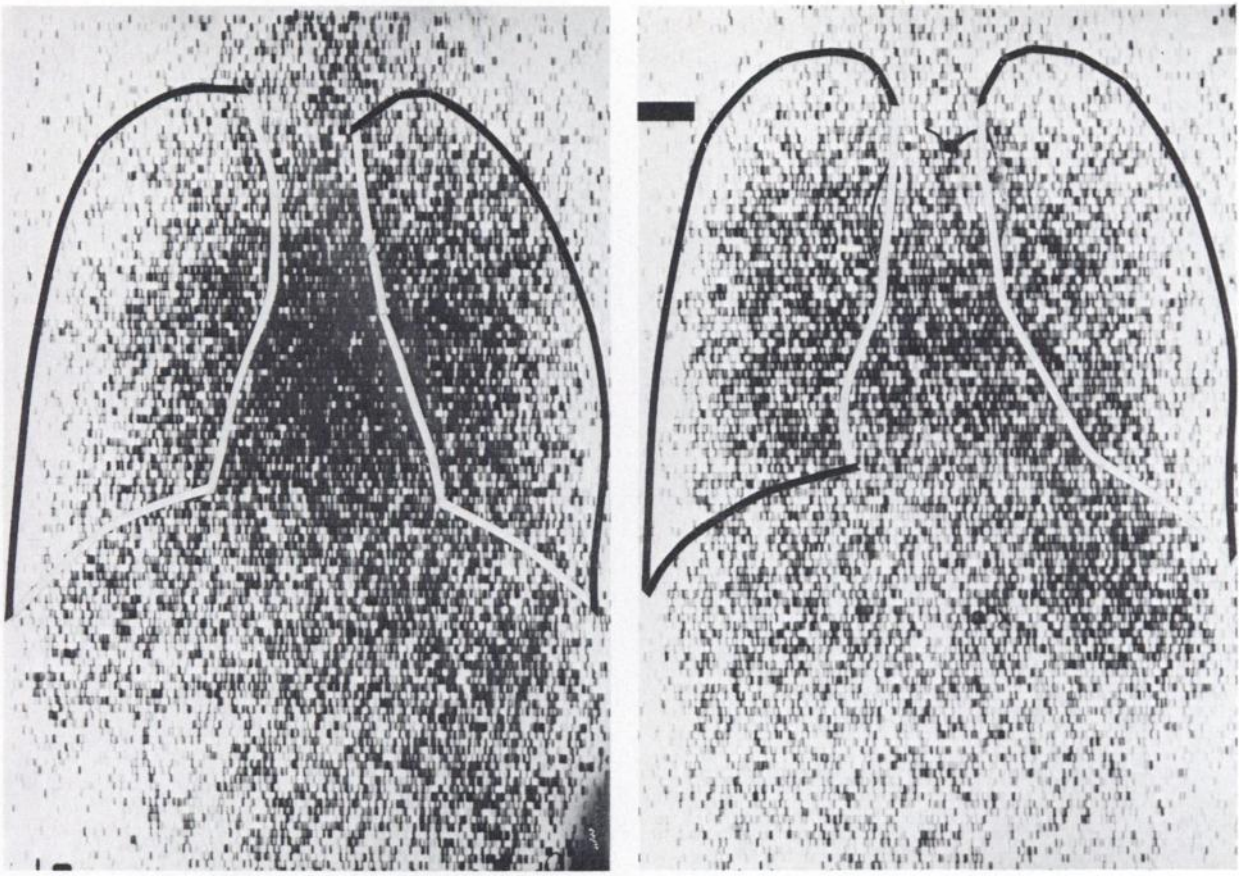

FIG. 2. Anterior (left) and posterior (right) thoracoabdominal scans made 20 hr after infusion of ^{51}Cr-labeled red cells. Label has migrated into peripheral lung fields, corresponding to areas of infiltration visible on roentgenogram.

The initial scan immediately after infusion (Fig. 1) showed the distribution of the circulating cardiac blood pool. By contrast the delayed scan (Fig. 2) revealed significant migration from the spleen and liver and vascular structures of the heart and mediastinum into the peripheral lung fields, providing graphic evidence of sequestration in the lung parenchyma, interpreted as indicative of idiopathic pulmonary hemosiderosis.

Subsequently a thoracotomy was performed for lung biopsy which revealed changes typical of idiopathic pulmonary hemosiderosis, confirming the impression obtained with the simple procedure of ^{51}Cr lung scanning.

The usual quantity of ^{51}Cr used to label red cells for survival studies allows area counting over spleen and liver but does not allow scintillation scanning for precise localization. Consequently, the usual 50 μCi of ^{51}Cr for 50 cc of cells was increased six-fold, and a 300-cc unit of fresh, loosely packed cells was incubated with 300 μCi of ^{51}Cr. This allowed thoracoabdominal scans to be performed in a reasonable time. It appears that lung scanning with ^{51}Cr-labeled red cells affords a useful test for pulmonary sequestration of red cells and should be put to further trial.

ADDENDUM

Since this paper was submitted, a second patient has been successfully investigated for idiopathic pulmonary hemosiderosis using this technique and the diagnosis confirmed by biopsy. The second patient's relatively-latent disease required a 96-hr interval for significant pulmonary sequestration to become apparent on scan.

REFERENCES

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