

# EFFECT OF UNILATERAL PULMONARY HYPOVASCULARITY ON THE BONE SCAN: CASE REPORT

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**Two patients who had decreased pulmonary artery blood flow to the right lung showed increased clarity of rib detail on a bone scan over the affected hemithorax as contrasted with the uninvolved side. Decreased blood background is postulated to result in enhancement of rib detail on the affected side.**

The clarity with which bones are visualized by scintigraphy depends on the quantity of the radiopharmaceutical in the bones and the amount of background radioactivity present. A sufficiently high background will severely degrade image resolution regardless of the amount of skeletal uptake of the radiopharmaceutical. Conversely, a decreased background should enhance image clarity, with the count rate in the bones remaining constant. This report describes two patients with decreased arterial blood flow to the right lung. Bone scintigrams in each of these patients showed increased clarity of rib detail over the affected hemithorax when contrasted with the uninvolved side.

## CASE REPORT

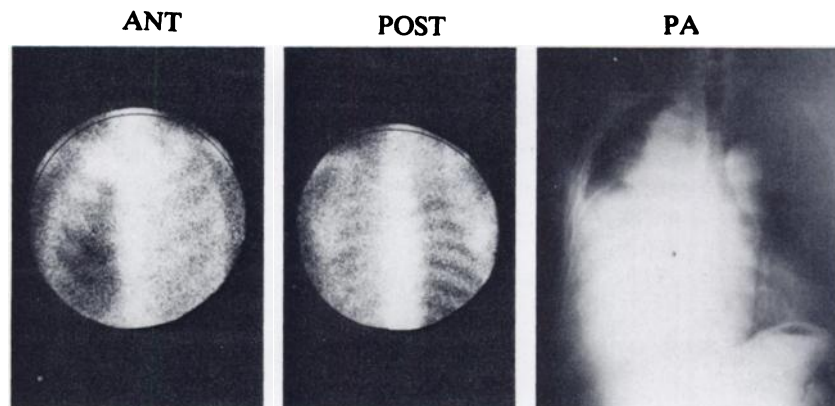
**Case 1.** An 88-year-old man was admitted with a history of pleuritic right chest pain for 1 week and

vague right anterior chest pain for approximately 1 year. He had a cough productive of sputum streaked with bright-red blood. Chest roentgenograms (Fig. 1) showed a dense opacity of the right lung with small amounts of aerated lung anterosuperiorly. No bony abnormalities were identified. A thoracentesis yielded serosanguineous fluid containing malignant cells. Bronchoscopy revealed obstruction of the right main-stem bronchus. Bone scintigraphy (Fig. 1) showed much better rib detail, on both the anterior and posterior views, for the right hemithorax than for the left. No focal areas of increased  $^{99m}\text{Tc}$ -pyrophosphate uptake were noted in any of the ribs, nor elsewhere in the body.

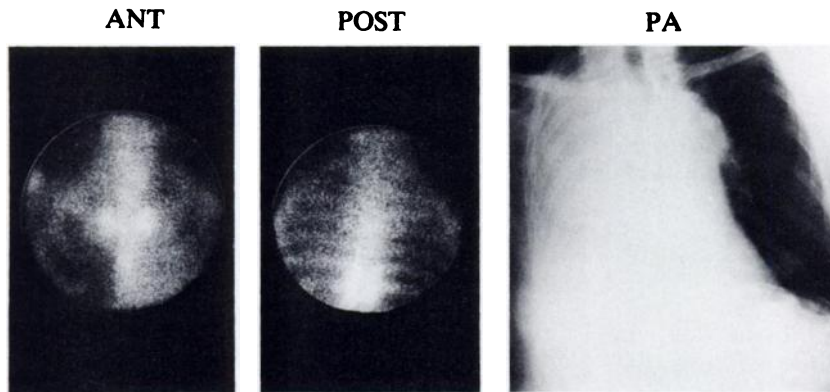
**Case 2.** A 68-year-old man was hospitalized in 1972 for pulmonary tuberculosis and was treated with pneumothorax. Since that time, regular examinations failed to show any evidence of recurrence of his tuberculosis. His chest roentgenograms (Fig. 2) have repeatedly shown opacity of the right hemithorax with deviation of the trachea towards the right. These findings had been thought to be sec-

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**FIG. 1.** Man (88 years old) with right lung carcinoma obstructing the right main-stem bronchus. Bone scan showed increased rib detail on affected side (scintillation camera technique).



**FIG. 2.** Chronic collapse of right lung secondary to past therapy for tuberculosis. Bone scan shows increased clarity of ribs on affected side, and vertebral uptake (scintillation camera technique).

ondary to chronic collapse of the right lung with associated pleural thickening. Bone scintigraphy using  $^{99m}\text{Tc}$ -diphosphonate was performed to evaluate pain in his thoracic spine after roentgenograms of the area showed only degenerative arthritis and moderate scoliosis (Fig. 2). Rib detail over the right hemithorax was enhanced compared to the left. The lesion seen in the midthoracic spine was a tuberculous abscess. No other areas of increased uptake were noted in the study. Chest roentgenograms failed to show any evidence of disease in the ribs.

#### DISCUSSION

These patients almost certainly had a unilateral decrease in pulmonary arterial blood flow. Bone scans of each showed a decreased tissue background with resultant enhancement of rib detail on the af-

ected side. A localized increase in rib detail following mastectomy is frequently observed on bone scans, presumably due to the removal of the background radiation contributed by soft tissue. Since the overlying tissue remained intact in our patients, this factor can be eliminated as a reason for the described phenomenon. Since the unaffected lung is required to carry a much greater percentage of the output of the right heart, however, the left-side blood background should be greater than under normal physiologic conditions. This appears to be the most likely explanation for our findings. Since the plasma levels of  $^{99m}\text{Tc}$ -diphosphonate and  $^{99m}\text{Tc}$ -pyrophosphate diminish more rapidly than many other radiopharmaceuticals ( $^{67}\text{Ga}$ -citrate, for instance), blood background could account for problems in the detection of pulmonary lesions.

### DECISION MAKING IN DIAGNOSTIC MEDICINE

January 25, 1976

Atlanta, Georgia

Omni International Hotel

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This meeting will focus on the theoretical, economic, technical, and clinical aspects of medical decision making with particular emphasis on the utilization of nuclear medicine and radiographic procedures. The morning session will be didactic and will cover a model of the diagnostic process, techniques to quantitate medical decision making, statistical aspects of data acquisition and analysis, and economic considerations of health services. The afternoon session will be devoted to several clinical examples illustrating these concepts. A panel discussion on the problems of translating these concepts into medical practice will conclude the program. Program chairman is Barbara J. McNeil, and the faculty consists of Russell Bell, Robert M. Elashoff, Robert N. Grosse, Leonard Jarett, Emmett B. Keeler, Lee B. Lusted, E. James Potchen, William R. Schonbein, and Henry N. Wagner, Jr.

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