JAMES T. WILLERSON
University of Texas Health Science Center
Dallas, Texas

REFERENCES

1. KULKARNI PV, PARKEY RW, WILSON JE, et al: Modified technetium-99m heparin for the imaging of acute experimental myocardial infarcts. *J Nucl Med* 21: 117-121, 1980
2. KULKARNI PV, PARKEY RW, BUJA LM, et al: Technetium labeled heparin: Preliminary report of a new radiopharmaceutical with potential for imaging damaged coronary arteries and myocardium. *J Nucl Med* 19: 810-815, 1978

Re: Ventilation-Perfusion Studies and the Diagnosis of Pulmonary Embolism: Concise Communication

An article in this *Journal* (*1*) linking the scintigraphic results and clinical findings in patients suspected of pulmonary embolism suggests that the information provides the referring physician with a rational basis for patient management. Other recent reports on the role of nuclear medicine in the diagnosis of pulmonary embolism have provided sophisticated analyses of their data, and the most commonly used perfusion scan parameters include: the size of the largest perfusion lesion, the degree of involvement of individual segments, and the correlation of the perfusion defects with radiographic and ventilation scan abnormalities (*2-4*). One important pattern recognition feature of perfusion images has been ignored, however, and we believe that knowledge of the frequency distribution pattern of segmental defects would be helpful as a diagnostic criterion of pulmonary embolic disease. Furthermore, this pattern may explain some of the reported advantages of different imaging techniques.

We reviewed our recent experience of six-view perfusion lung scans in patients suspected of having pulmonary embolic disease. Twenty-two patients with the typical scan findings were treated for pulmonary embolism. The frequency distribution of the 121 segmental perfusion defects is shown in Table 1, with some liberties taken in grouping various bronchopulmonary segments. The average number of perfusion defects per patient was 5.5; 67% were located in the lower lobes, 15% in the right middle lobe or lingulae of the left upper lobe, and 18% in the upper lobes.

TABLE 1. FREQUENCY DISTRIBUTION OF SEGMENTAL PERFUSION DEFECTS. TABULATION OF THE OBLIQUE OR LATERAL VIEW IN WHICH A DEFECT IS BETTER VISUALIZED

Segment*	Total defects	Oblique better visualizes defect	Lateral better visualizes defect
Posterobasal	25	12	—
Medial and/or anterobasal	20	10	—
Lateral basal	17	11	—
Superior	19	7	6
Medial/inf. lingula†	5	1	2
Lateral/sup. lingula†	12	—	—
Apical and/or posterior	13	—	2
Anterior	9	—	1
Total	120	41	11

* Individual or groups of bronchopulmonary segments.
† The right middle lobe and the lingular segments of the left upper lobe are grouped together.

The posterior oblique views were compared with the lateral views to determine which resulted in better lesion definition. As seen in Table 1, if lower-zone defects are better visualized in any one view, then the posterior oblique view is superior, whereas in the upper zones the lateral view is superior. In the middle zone of either lung field no one view was found to be superior. Fifty-two (43%) of all segmental defects were better visualized in one view, and in 41 (79%) the oblique view gave superior results.

Table 1 indicates that the superiority in visualization by the oblique view, a similar finding in other studies (*5*), is directly related to the distribution of these perfusion defects. Since the majority of perfusion defects are located in the lower lung zones and are better defined in the posterior oblique views, this view is more productive for visualizing defects. These data indicate, however, that when the perfusion abnormality is in the middle or upper lung zone (superior segment of lower lobes, middle lobe or upper lobes), then the posterior oblique view may not be the view to best define the lesion.

In summary, we believe that the frequency distribution of segmental defects is an important feature of pattern recognition of the scan findings in pulmonary embolism and should be included among the diagnostic criteria currently used. Based on our findings this distribution pattern explains the superiority of posterior oblique views in defining scan lesions in pulmonary embolism.

MICHAEL A. WILSON
BEHRAM PASTAKIA
ROBERT E. POLCYN
LINDELL GENTRY
University of Wisconsin
Madison, Wisconsin

REFERENCES

1. MCNEIL BJ: Ventilation-perfusion studies and the diagnosis of pulmonary embolism: Concise communication. *J Nucl Med* 21: 319-323, 1980
2. MCNEIL BJ: A diagnostic strategy using ventilation-perfusion studies in patients suspect for pulmonary embolism. *J Nucl Med* 17: 613-616, 1976
3. ALDERSON PO, RUJANAVECH N, SECKER-WALKER RH, et al: The role of ^{133}Xe ventilation studies in the scintigraphic detection of pulmonary embolism. *Radiology* 120: 633-640, 1976
4. BIELLO DR, MATTAR AG, OSEI-WUSU A, et al: Interpretation of indeterminate lung scintigrams. *Radiology* 133: 189-194, 1979
5. NEILSON PE, KIRCHNER PT, GERBER FH: Oblique views in lung perfusion scanning: Clinical utility and limitations. *J Nucl Med* 18: 967-973, 1977

Reply

Dr. Wilson and his colleagues are right in indicating that patterns of perfusion defects may be helpful as diagnostic criteria in pulmonary embolic diseases. I am not sure, however, that the data in their table are useful for this purpose. First, such data would be useful only if the relative frequency of perfusion defects in various bronchial pulmonary segments was known for patients with pulmonary embolism *as well as* for patients without pulmonary em-