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The clinical usefulness of lung scanning is, firstly, its graphic demonstration of regional disturbances in distribution of the pulmonary circulation and ventilation, and, secondly its safe applicability even to a severe patient.

For past several years, scanning apparatus and new radioactive isotopes have been investigated and lung scanning has been applied to patients with various lung diseases in our clinic. Here, recent progress in scanning techniques and results of our recent studies are presented, and the clinical usefulness as well as limitations of lung scanning are evaluated.

In this study perfusion scanning was carried out by the use of ^{113m}In in normal subjects and patients with lung diseases. The results showed that the lung scan thus obtained was almost similar to those by ^{131}I -MAA. Inhalation scanning was made by the use of ultrasonic nebulizer (DeVilbiss Co., Model 802), because this scanning by the use of IPPB with the positive pressure breathing, although only 8 to 10 mmH₂O, might modify the scan. Although, there was no principal difference between these two methods at least in normal subjects, inhalation scanning by ultrasonic nebulizer is preferable in patients with bronchoconstriction.

The extreme usefulness of perfusion scanning in the diagnosis of pulmonary embolism now appears to be established, but in other lung diseases, such as pulmonary emphysema, similar scans are not infrequently observed. Consequently, definite diagnosis of pulmonary embolism has to be made with clinical symptoms combined with results of diagnostic tests which are available.

The perfusion scan of lung cancer shows frequently greater ischemic area than expected from plain X-ray film. But, sometimes normal scan pictures are shown in the lung

cancer, even though X-ray film reveals definite shadow of lung cancer. Therefore, the usefulness of perfusion scanning for the diagnosis of lung cancer may be limited. The availability of this technique for early diagnosis of lung cancer is doubtful. For this purpose further investigation is needed.

To follow the disturbance of pulmonary circulation in pleural diseases and pre- and postoperative thoracic operation, the perfusion scanning is of course very important and useful tool.

The diagnosis of pulmonary emphysema can be made by X-ray, pulmonary function testing and clinical symptoms, but the regional disturbance in distribution of both pulmonary circulation and ventilation is only estimated from overall pulmonary function and X-ray. In this study inhalation and perfusion scans were carried out in 20 cases with pulmonary emphysema. By the perfusion scanning pulmonary emphysema can be classified as follows: 1. bilateral basal ischemic type. 2. bilateral upper zone ischemic type. 3. bilateral or unilateral patchy ischemic type. 4. normal distribution type. Combining with the inhalation scanning these four types are divided further two types respectively, i.e. 1. coincident pattern of perfusion and inhalation. 2. discordant pattern of each parameter. But these patterns are not always correlated with the values of pulmonary function and arterial blood gas.

The clinical limitation of RI scanning of lung therefore lies in difficulties in quantitation of disturbances and also in difficulties in etiological diagnosis with these methods, though semi-quantitative and regional functional disorder of the lung can be shown ingeniously by these methods. These problems have to be investigated and resolved in the near future.