

The New Observation of Regional Pulmonary Function Using ^{133}Xe and Scintillation Camera.— ^{133}Xe Rebreathing Technique

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^{133}Xe -rebreathing technique using the scintillation camera was useful for determining regional pulmonary function in 80 patients with conditions such as large bulla, bronchial asthma or pulmonary cancer suffering dyspnea and cardiac disease. As the method, an anterior or posterior scintiphoto of the lungs was obtained at every 2 minutes from immediately after injection of ^{133}Xe -solution (1–4 mCi) intravenously. In ^{133}Xe -rebreathing technique, three phases of lung scintiphotos can be obtained. The first image of serial scintiphotos shows the perfusion phase (0–2

minutes exposure after injection of ^{133}Xe -solution) of the lung. The second image shows the ventilation phase (exposure time is 3–6 minutes after), and the third image shows the wash-out phase (3 minutes after washed out). In case 3 mCi of ^{133}Xe is administered, tissue absorption dose is calculated to be 21–31 millirads at the gonads and 572–593 millirads at the lungs. It was thought that this technique was more useful for determining regional pulmonary function than other other pulmonary function methods.

Studies on the Lung Scintigram by Means of Scinticamera

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The diagnostic value of lung scintigram by I-labeled MAA is great in determining the disturbance of blood flow. However, the decision of size and localization of the disturbance has not perfectly been done.

Chest phantom experiments were carried out, in which lung simulated sponge imbibed with iodine solution (300 μCi of ^{131}I) was kept in the chest made of wax. Scintigrams of this normal lung were obtained from eight directions; anterior, posterior, two lateral and

four oblique.

The same procedures excepting to cut off a lobe or a segment were compared with the normal in their scintigrams. At least one out of the eight directions was able to demonstrate the deficient segment anywhere in the lung, and it was able to determine the localization from eight scintigrams.

Clinical application was done to bronchial asthma and found the lesion being almost partially occurred in the lung.

Effect of Unilateral Hypoxia on Pulmonary Blood Flow Distribution

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In eight patients with various diseases involving lung cancer unilateral airway hypoxia

was produced by having them breathe low oxygen gas (8% oxygen and 92% nitrogen)