^{81m}Kr-generator is high in proportion to eluting speed at 1.94~19.7 m*l* per minute, but is almost same at 1~41 per minute.

4) Effect of ^{81}Rb on lung images using Scintillation Camera is not observed, when generator is located at the side of detector.
5) Perfusion images obtained with ^{81m}Kr is less apparent than ones obtained with ^{99m}Tc-MAA in the same patients.
6) Rebreathing method is more stable than single breath holding method for ventilation lung images.
7) The method, that performs perfusion study using ^{99m}Tc-MAA and ventilation study using ^{81m}Kr at the same time, is most available for clinical application.
8) Inhalation washout study using ^{81m}Kr is no significant for clincal application.

Pulmonary Ventilation Studies of Asthmatic Children with Kr-81m

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Krypton-81m gas was eluted from the ^{81}Rb—^{81m}Kr generator by using compressed air as an eluting agent. The continuous inhalation of mixed gas of ^{81m}Kr and air with a scintillation camera produced the pulmonary image of which activity was proportional to regional ventilation. Because of short half life of ^{81m}Kr (13 seconds), the exhaled gas was not necessary to be trapped by the charcoal filter, and the several pulmonary views of a patient could readily be available in a short period of time. The great advantage of ^{81m}Kr generator was found in use for the studies of small children who were not usually cooperative to the medical examination. Thrity two patients with bronchial asthma of any state were so far studied. Their ages ranged from 3 to 13 years old. Studies revealed the definite ventilation defects in the scans of patients with asthmatic attack. Re-scans right after the medications such as the use of bronchodilators showed marked improvement of the ventilation defects. Exercise induced asthma (EIA) can be easily identified by the ^{81m}Kr ventilation study. After the medicines for EIA such as a disodium cromoglicate was administered to the patients, next exercise did not produce the ventilation defects, and the preventive effect can be objectively examined for each patient.

The ^{81m}Kr ventilation study is now being used for identifying the provokative substances of bronchial asthma. The house dust of several densities were inhaled with ^{81m}Kr gas by the patient.

The threshold dose of disclosing the ventilation defects in the scans was remarkably less than that of provokating the symptom of asthmatic attack. The sensitive ^{81m}Kr ventilation study could be another provokative test which does not induce the real asthmatic attack.

Studies on the Spirometry and Regional Ventilatory Function in Patients with Bronchial Asthma

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Comparison between spirometry and regional pulmonary ventilatory function at an asthmatic condition and at a clinically symptom-free condition was studied in thirteen patients with bronchial asthma.

In order to estimate the regional ventilatory

function, the washout curves of each regional area after the attainment of equilibrium with a closed circuit using xenon-133 were analyzed by the backward projection method. As soon as the examination with xenon was over, the spirometry was performed.

Abnormal regional ventilatory function values were found in ten out of thirteen patients with FEV1.0% over 70, that is, the radioactive technique was more sensitive than routine spirometry. Morphologically mosaic patterns were found in the attack phase of bronchial asthma. Sometimes the similar mosaic patterns were seen even in the non-attack phase.

The following conclusions were obtained as compared with two asthmatic and non-asthmatic conditions.

1) Regional ventilatory function in all regions was increased in one case with asthmatic condition, that is, hyperventilation was found in the attack phase.

2) Region ventilatory function in all regions was decreased in one case with asthmatic condition, that is hypoventilation was found in the attack phase.

3) In the majority, regional ventilatory function in some regions were increased and in other regions were decreased in asthmatic phase. The unevenness of regional ventilatory function was markedly found.

4) As a general rule regional residual capacity as well as total residual capacity were increased in asthmatic phase. However the increasing rates of the regional residual capacity were strikingly uneven.

Studies on Correction of Xenon-133 Uptake by Chest Wall for Analysis of a Washout Curve

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It is necessary to correct the xenon-133 uptake by the chest wall for analysis of a washout curve after the equilibrium of xenon concentration was obtained in a closed circuit.

In this paper, to evaluate the effect of xenon uptake by the chest wall, a patient with right pneumonectomy, a patient with bronchial asthma and healthy subjects were studied. The subjects were instructed to rebreathe in a closed circuit until the concentration of xenon was stable. Then, the subjects were switched over to an open circuit system and xenon in the lungs was washed out by room air. The xenon washout curve was obtained from the decay of time-sequential counts and the backward projection method was used for analysis of the curve.

In the patient with right pneumonectomy one of interesting areas was supposed to be composed of the chest wall alone, another was of the chest wall with lung. Only one component was found from the washout curve in the interesting area of the chest wall alone. The slope of the curve equal to that of the slowest component of the washout curve in the interesting area composed of the chest wall with lung.

In the washout curve of the patient with bronchial asthma, it was recognized that the xenon in an extremely slow space of the lungs had remained at 12–13 minutes after washout began.

From the above data it was concluded that in patient with a very slow space it was inadequate for correction the effect of chest wall uptake to use the washout curve for 5–7 minutes after washout.