

^{85}Kr was dissolved in normal saline to make a solution of approximately 3 mCi/ml., and about 10 ml. was injected rapidly into the vein. Radioactivity was counted either in the oral cavity or in the bronchus where CASRAD was introduced under the fluoroscopic control. The maximum count rates in the bronchus thus obtained are determined mainly by the amount of pulmonary arterial flow, and the ^{85}Kr washout rates reflect the ventilatory efficiency in the respective lobes, so that informations concerning both pulmonary blood flow and ventilation are obtainable from this ^{85}Kr count rate curve. We have tried this method for the measurement of ventilatory efficiency on a patient with chronic respiratory failure, for lobar function study on a patient with mediastinal mass, and for bronchspirometry on a patient with bronchiectasis and confirmed the usefulness of this method.

2. The application to the detection of pulmonary malignancies;

Malignant neoplastic tissues are known to have higher uptake of ^{32}P compared to the normal tissues. We have tried CASRAD for the detection of bronchial malignancies by measuring the radioactivities along the wall

of bronchial tree after systemic administration of ^{32}P in the form of sodium solution. About 20 hours after the intravenous injection of 0.4 mCi of ^{32}P , the detector was introduced into the bronchus and the radioactivities were counted along the bronchial wall. Eight patients of various lung diseases were selected for the study. The definite diagnosis was not made at the time of the study but was later confirmed in all by appropriate methods except in one where bronchogenic carcinoma was the presumptive diagnosis. In six cases there was no abnormal accumulation of radioactivities along the bronchial wall and in this group active tuberculosis; 1, middle lobe syndrome; 1, hilar vascular shadow; 1, post radiation pneumonitis; 2, and bronchogenic carcinoma, suspected; 1 are included. In two cases there were more than twice higher radioactivities at the site corresponding to the abnormal shadow in chest X-ray films and bronchogenic carcinoma was confirmed later in one by lobectomy and in the other by autopsy.

Both methods were compared with the corresponding conventional methods and the usefulness and limitations were discussed.

The Studies on Regional Pulmonary Function in Bronchial Asthma —The Studies on Pathophysiology of Bronchial Asthma—

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It is evident that the bronchial asthma shows various peculiar observations on pathophysiological aspects, but much still remains unknown, especially regarding regional pulmonary function during attack.

This time, for the sake of investigation on regional pulmonary function during attack, the radioisotope pulmography using ^{133}Xe , selective bronchography and selective pulmonary angiography were performed on asthmatic patients.

The following results were obtained.

1. In asthmatic attack, disturbances in wash out time, ventilation, RVr/TLCr ratio and perfusion were observed in pulmogram.

The grades of these disturbances caused variations in each area of the lung field. It was recognized that these represent so-called disturbances of regional pulmonary function.

2. In most cases, these disturbances of regional pulmonary function were improved with the abatement of attack, in other words, these findings showed reversibility.

3. The pulmogram was comparatively

closely related to the scintigram and in some findings, the depreciation of regional blood flow and ventilatory function were correlated, but the abnormality of blood flow in asthmatic attack were seen in some cases with the depreciation of blood flow, but in some, with the

increase of blood flow.

4. It was found that the disturbances of regional pulmonary function was closely related to selective bronchogram and selective pulmonary angiogram.

Studies on the Protein synthesitic system of the Lung and Bronchus The incorporation of ^{14}C -amino acids into proteins

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With a view to studying the non-respiratory functions of the lung, investigations have been made into the protein synthesitic system of the lung, with special reference to the incorporation of amino acids into proteins in vivo as well as in vitro. In the present study, comparison was made between the protein synthesitic systems of the lung and the liver of normal rats.

The results obtained were as follows:

1) The incorporation of ^{14}C -lysine in vivo was highest in the lung, followed by the bronchus, liver, spleen, and intestinal mucosa in consecutive order.

2) The incorporation of ^{14}C -lysine into protein was almost linearly increased in the lung and liver for the first 20 minutes. Newly synthesized protein was demonstrated in the lung, though its amount was about one third of that in the liver.

3) As a result of protein synthesis in vitro where ATP-generating system was added to the microsomes and the supernatant enzyme obtained through ultra centrifugation, it was found that the microsomes from the lung yielded less protein than that from the liver.

4) The RNA/protein ratio of the separated microsomes was smaller for the lung than for the liver.

5) The incorporation of ^{14}C -phenylalanine into microsomal protein in vitro, which is stimulated by polyuridylic acid, was remarkably expedited even when the lung microsome was used.

6) The microsomes obtained from the lung and the liver were comparatively studied by means of electron microscopy. As a result, it was confirmed that they were roughly uniform fractions containing, morphologically, ribosome (RNP).