

## Behavior of $^{131}\text{I}$ -labeled Antipyrine in Pulmonary Capillary

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Since Chinard & Enns in 1954 elucidated the transcapillary exchange of water using labeled water compared with T-1824, pulmonary extravascular water volume (PEV) has been measured by THO. We had presented at the 7th meeting that  $^{131}\text{I}$ -labeled antipyrine (AP) has a longer circulation time of lungs than that of RISA from the observation of clinical cases.

This study reported here was done to examine the behavior of AP in pulmonary capillaries, using triple indicator dilution technique RISA ( $^{125}\text{I}$ ),  $\text{H}_2\text{O}$  ( $^3\text{H}$ ), and AP ( $^{131}\text{I}$ ).

### Method:

Anesthetized mongrel dogs were employed (15Kg & 17Kg). The catheters were inserted into right ventricle and aorta. 0.5 ml of injectate containing triple indicators was rapidly flushed into right ventricle and samples of blood were collected from aorta every second on the rotating turntable. Activity of  $^{131}\text{I}$  and  $^{125}\text{I}$  was determined separately by Well type scintillation counter and tritium labeled water was counted by liquid scintillation spectrometer after the decline of  $^{131}\text{I}$  activity.

### Results:

1. It was apparent from dilution curves of triple indicators that AP and THO always have the longer circulation time than that of RISA, and that AP behaves almost identical with THO in pulmonary capillaries.

2. Area under dilution curve of each indicator was measured and compared each other. Ratio of areas of diffusible indicators to area of RISA was 0.97 ~ 1.03 in AP and 0.96 ~ 1.04 in THO respectively. No overall loss of AP as well as THO was found in lungs.

3. Pulmonary extravascular water volume (PEV) in normal dog was 3.9 ml/Kg with AP and 3.6 ml/Kg with THO. There was a close linear relationship between PEV detected by AP and THO.

### Conclusion:

It was evidenced that AP had the same behavior as THO in pulmonary capillaries. AP was as desirable for an estimation of perivascular water contents of lungs as THO. Moreover, AP has an advantage over THO in that the determination of activity is not only simple but also it can be carried out by external scanning.

## The application of catheter-type semiconducting radiation detector (CASRAD) for the measurement of pulmonary functions and for the detection of pulmonary malignancies

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Catheter-type semiconducting radiation detector (CASRAD) was applied for the measurement of pulmonary function studies and

for the detection of pulmonary malignancies.

1. The application to the pulmonary function studies.

$^{85}\text{Kr}$  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  $^{85}\text{Kr}$  washout rates reflect the ventilatory efficiency in the respective lobes, so that informations concerning both pulmonary blood flow and ventilation are obtainable from this  $^{85}\text{Kr}$  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  $^{32}\text{P}$  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  $^{32}\text{P}$  in the form of sodium solution. About 20 hours after the intravenous injection of 0.4 mCi of  $^{32}\text{P}$ , 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  $^{133}\text{Xe}$ , 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,  $\text{RVr}/\text{TLCr}$  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