were increased compared with other three groups. However, it made little difference between them.

$PGF_{2\alpha}$-MUM levels in pulmonary tuberculosis were decreased markedly compared with other three groups ($0.01<p<0.02$).

4. There were significant correlationship between plasma $PGF_{2\alpha}$ levels and $PGF_{2\alpha}$-MUM levels ($\gamma=0.65$).

The Evaluation of the Index about the Ventilation Disturbance with the Xenon-133 Washout Process

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It is very difficult to make a differential diagnosis between the COPD and the normal lung with the chest-Xray and the ordinary spirometry, but it is easy to do it by detecting the delay of the Xenon-133 washout process.

We analysed the Xenon-133 washout curves, which were bi-exponential, comparing time constants and intercepts about each compartment in about fifty cases, but could not find out the significant difference between the COPD and the normal Lung, with regard to each parameter. As the Xenon-133 washout process by the ventilation, is affected with the respiratory rate, the height, the minute volume and the dead space, we analysed the washout curves, paying attention to those factors. Then we calculated 70% washout ventilation volume, 3 minutes clearance rate by the H/A method, Tl/2 by the initial slope method, the ventilation index ($\phi=Vt/RFC$), and the compartment analysis with the background subtraction by the least square curve fitting. We compared them with the functioanl images of the regional ventilation time constant distribution.

The best significant index was the ventilation index, which was calculated by the clearance rate of the initial slope method and the respiratroy rate. Significant differences ($P<0.01$) between the COPD and the normal lung were found. The functional image of the regional ventilation was showed by the initial slope method. The good index next to the ventilation index was 3 minutes clearance rate by the H/A method, and it was very simple, but the H/A method masks the pathological delay of the Xenon-133 washout process by the background subtraction. This index was compared with the functional image by the H/A method.

The compartment analysis with the background subtraction by the least square method was very complicated but the parameters given by it had no significant confidecne.

Analysis of ^{133}Xe Wash Out Curve —Supposing the Curve as an Impulse Response of the Regional Pulmonary System—

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In order to grasp the physiological condition of the regional pulmonary ventilation, ^{133}Xe wash out curve is obtained with a scintillation camera-Minicomputer on line System. To find out a good index, which represents the regional pulmonary ventilation system itself, the curve is analyzed and simulated as a transfer function of the tenth order IIR digital system,

$$H(Z)=\frac{1}{1+a_1z^{-1}+\cdots\cdots+a_{10}z^{-10}}$$

We select the value, $|a_1|-(|a_2|+a_3|+|a_4)$, as an index, which represents the regional

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pulmonary ventilation system well. The first order denominator $|a_1|$ is understood as the ability of the regional pulmonary ventilation and the value, $(|a_2|+|a_3|+|a_4|)$, is understood as the delay factor in removing the ^{133}Xe from the regional pulmonary ventilation system. This index is calculated clinically in various cases, such as lung cancer, chronic obstructive pulmonary disease and chronic pneumonia and proved to be the very characteristic index of representing the system of the regional pulmonary ventalation.

Studies on Slopes of Washout Curve of Innert Gases

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Distribution of inspired gas in the lungs has been studied by analysing N_2 washout curves. It was very interesting to find that the slope fo N_2 washout curve was quite different from the slope of xenon washout curve, even if the count rates of xenon uptake by the chest wall was corrected.

In this paper the difference in the slope of two washout curves was discussed.

Method; For obtaining N_2 washout curve the subject inspired pure oxgen gas and then expired into a flow meter while the N_2 meter recorded continuously N_2 concentration. For obtaining xenon washout curve the subject were studied while seated erect with his back against a scintillation camera and was administered intravenously 5 mCi of xenon in saline and rebreathed xenon gas in a closed circuit spirometer until concentration of xenon was stable. Then the subject was turned out of the closed circuit and exhaled into an open circuit system.

Results and conclusions; (1) Comparison of the slopes of two different curves was made. $T_{1/2}$ or $T_{1/3}$ values of xenon washout curve were larger than those of N_2 washout curve. It was strongly suggested that the difference of the slopes of two washout curves was originated from the difference in the methodology, that is to say, N_2 concentration was measured in the expired gas and count rates of xenon was measured in the lungs. (2) In order to clarify the above assumption, mathematical approach was induced by using compartment analysis, in which model slow and fast spaces were contained. It was theoretically concluded that the slopes of washout curves obtained in oral and pulmonary regions should be different, if the lungs consisted of multicompartments. (3) Count rates of xenon in expired gas and in the lungs were measured simultaneously. The difference in the slopes of xenon washout curves obtained in the two different regions was confirmed.

Studies on Measurement of Radiology Ventilation to Perfusion Ratios by Using a Radioactive Gas

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In this paper a method for direct measurement of regional $\dot{V}_A/\dot{Q}$ during continuous infusion with a radioactive gas under steady state condition was discussed.

Patients with emphysema were studied while seated erect with their back s against a scintilla-

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