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-