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-

tion camera. The subjects breathed naturally in an open circuit system. A solution of xenon in saline was infused for 10 minutes at a rate of 2 m*l* per minute into an anticubital vein by a Harvard pump. After steady radioactive count rates in the lungs had been obtained, the infusion pump was turned off and the subjects cleared the xenon from the lungs. When washout was judged complete, 3 mCi of xenon was infused into antecubital vein and while breath-holding was performed during 20 seconds, perfusion pattern was obtained. Then the subjects breathed from a closed spirometer circuit until count rates in the lungs was constant, when the subjects were turned out of the closed circuit and allowed to breathe room air. In order to obtain ventilation pattern, the subject inhaled 800–1000 m*l* of xenon gas from FRC level and held breath during 20 seconds.

Theoretically, if a solution of xenon is infused intravenously at a constant rate, and if steady state is attained, regional alveolar xenon washed in from regional blood flow is equal to the xenon washed out with regional alveolar ventilation. In other words, regional $\dot{V}_A/\dot{Q}$ is the reciprocal of regional xenon concentration and regional $\dot{V}_A/\dot{Q}$ distribution is geographycally obtained by dividing regional count rates under constant infusion by the regional lung volume. Regional $\dot{V}_A/\dot{Q}$ obtained by this method was compared with the geographycal figure obtained by dividing regional ventilation count rates by regional perfusion count rates. The geographical difference was pointed out, which seemed to be originated from the neglect of vertical $\dot{V}_A/\dot{Q}$ uneveness against sintillation camera.

Studies on Regional Blood Flow of Delayed Deltopectoral Flap Using the Local Clearance Method of Xenon-133 —Comparison with Medical Thermography—

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In the surgical treatment of head and neck cancer, reconstructive surgery has been able to repair surgical defect safely with a skin flap, especially deltopectoral flap. Nevertheless, delayed deltopectoral flaps resulted in major necrosis in some cases and the cause has been thought to be closely associated with insufficient blood supply.

Recently, the relationship between skin blood flow and skin temperature has been studied generally by thermography as the measurement of circulation of a skin flap.

This problem was studied using the local clearance method of Xenon-133 for these three years at the Cancer Institute Hospital.

Skin temperature on both sides of the deltoid region was measured in cases of delayed deltopectoral flap after the operation. Regional blood flow of delayed deltopectoral flaps decreased once, and mostly recovered to preoperative level 3 weeks later. On the contrary, skin temperature of delayed deltopectoral flap was high in a week and the difference of skin temperature was not found on both sides of the deltoid region 3 weeks later.

Consequently the relationship between skin temperature and regional blood flow of delayed deltopectoral flap was not corresponded, and the change of skin temperature after the operation was thought to be associated with the reaction of the tissue.