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ASSESSMENT OF PERMEABILITY MECHANISM FOR PULMONARY EXTRAVASCULAR WATER ACCUMULATION USING GAMMA-CAMERA.

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We developed a method to estimate pulmonary microvascular permeability as the rate constant (ken) of pulmonary transvascular albumin flux labeled with Tc-99m using gamma-camera. In the present study, we have measured pulmonary extravascular volume (PEV) in addition to the permeability measurement in patients with idiopathic fibrosing alveolitis and cardiogenic pulmonary edema, and analyzed mechanism for abnormal accumulation of extravascular water. The PEV was estimated by using Tc-99m labeled DTPA administered intravenously to a supine subject following the permeability measurement. A ratio of PEV to pulmonary blood volume (PEV/PBV) was obtained from the distribution volumes of DTPA and HSA in the lungs. The ken and PEV/PBV (mean $\pm$ SD) were $0.60 \pm 0.22 \times 10^{-3}/\text{min}$ and 0.57 ± 0.11 in healthy subjects ($n=13$), $1.60 \pm 0.82 \times 10^{-3}/\text{min}$ and 0.86 ± 0.22 in idiopathic fibrosing alveolitis ($n=12$), $0.86 \pm 0.28 \times 10^{-3}/\text{min}$ and 1.08 ± 0.34 in cardiogenic pulmonary edema ($n=8$), respectively. Both disease showed increased in PEV/PBV, however only the patients with alveolitis showed significant increase in ken compared with the healthy subjects. It was suggested that the increased microvascular permeability to albumin contributes to the abnormal lung water accumulation in idiopathic fibrosing alveolitis.

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A STUDY OF THE VALIDITY AND THE INFLUENCE ON THE REGIONAL VENTILATION OF HIGH FREQUENCY JET VENTILATION USING Xe-133.

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This study was performed using Xe-133 to evaluate the validity of High Frequency Jet Ventilation(HFJV) and the influence of HFJV on the regional ventilation. Sixteen patients with unilateral pulmonary diseases were included in this study. The examination was performed in the "healthy" side of lung in supine position and its basal(B),middle(M),apical(A) region under HFJV with analysing the changes in three parameters, including the distribution of Xe-133 washin($\dot{V}$), that of perfusion($\dot{Q}$) and the rate constant (λ) of washout curve, which was approximated as an exponential curve. As a control, $\dot{V}$, $\dot{Q}$ and λ , obtained from the same patients as those described above under spontaneous respiration, were used.

1) Irrespective of frequency, $\dot{V}$ and $\dot{Q}$ were in the order of B>M>A under HFJV, as was the case with spontaneous respiration. 2) a) The rate constant(λ) of Xe-133 washout curve was decreased with increasing frequencies. b) In 4 patients, when tidal volume(V_t) was kept constant, the washout constant(λ) appeared to show a constant value irrespective of frequency. 3) Under spontaneous respiration, both $\dot{V}$ (washin) and λ (washout) tended to decrease concurrently from B to A, whereas $\dot{V}$ and λ were distributed in a slightly different way at any frequencies under HFJV.

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RI REGIONAL LUNG FUNCTION STUDIES IN THE CHILDREN WITH CONGENITAL DIAPHRAGMATIC HERNIA (BOCHDALEC HERNIA).

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Since 1975, twenty cases with congenital diaphragmatic hernia had this tests to show the recovery of the lung function, and in several cases phase analysis were performed to show the movement of the diaphragm and thoracic wall. The improvement of the lung volume(V) and lung blood flow($\dot{Q}$) was satisfactory within a few months after the repair of the diaphragmatic defect in the majority of the cases operated in newborn period, but was poor in the newborn cases with the complication of the lung and trachea and the cases over 6 years old in more than 1 year after the operation. Regional lung function test with Xe-133 gas and Tc-99m MAA is the safety and effective method to know the lung function in infants and children, and phase analysis of the lung was able to be performed in the newborn and infants.

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EFFECT OF COUGH LOADING TO Xe-133 VENTILATION STUDY IN A PATIENT WITH BULLOUS DISEASE.

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To evaluate the degree of air trapping from the bullae, we added cough loading on wash out phase of Xe-133 ventilation study.

By cough loading, Xe-133 gas from the normal region was washed out faster and $T_{1/2}$ of washout curve was significantly reduced compared to $T_{1/2}$ of breathing at rest. In a case with giant bullae, air trapping from the bullae by cough loading was more clearly visualized on earlier phase than the washout by breathing at rest.

This method may be useful to evaluate the pathological conditions of a bullae.