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Xe-133-LUNG FUNCTION STUDY USING FOURIER ANALYSIS WITH TERMS UP-TO THE HIGH FREQUENCY.
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Sequential image data were collected using a camera-computer system in a 64×64 matrix form with frame time of 150 to 300 msec. for about 3 minutes, while the patient taking tidal breath. Images being same phase in each respiratory cycle of sequential images were summed to obtain a single breath data based on the global time-activity curve over the whole lung field. The three groups consisted of normal, restrictive and obstructive lung function group have been evaluated with a fundamental-harmonic Fourier analysis and demonstrated the delay of phase angle in the obstructive group. In this study, using terms up to the second harmonics, the difference of phase angle among the three groups was reduced. The values of the expiratory phase angle over the whole lung among the three groups were 211.4±16.6° (N=8),202.0±18.1°(N=4) and 243.0±24.6°(N=6) respectively. Its prolongation in the obstructive group may explain the delay of phase angle which was shown with a fundamental-harmonic analysis. The value of the ventilation fraction over the whole lung amang the three groups were 13.3±4.3% 16.0±2.0% and 9.7±3.2% respectively and it increased in the restrictive group and decreased in the obstructive group.

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A STUDY ON THE HIGH FREQUENCY JET VENTILATION(HFJV) IN THE LUNG MODEL.
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A total 4 types of lung models with diameter of airway of 24mm was constructed,i.e.,those with compliance of 50ml/cmH2O with (N+R lung) and without (N lung) stenotic region of diameter being 6 mm and those with compliance of 250ml/cmH2O with (E+R lung) or without (E lung) stenosis of the same degree. Washin and washout of Xe-133 gas into and from the lung model was campared between HFJV and conventional mechanical ventilator(CMV). Washin was obtained by counting the radioactivity of Xe-133 gas from the lung model during the upstroke of washin curve and washout was obtained by approximating the washout curve to the curves expressed by Fxe(t)=Fxe(0)e− t. 1)There occured insignificant difference in washin count of Xe-133 in about 4 types of lung model between HFJV and CMV. 2)Under HFJV, was markedly decreased in E+R lung than in E lung and the decreased value was significant in HFJV as compared with CMV. 3)Compliance under CMV was at variance with that under HFJV and it was hard to simply compared the efect of compliance on between CMV and HFJV.

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A COMPARATIVE STUDY OF INHALATION METHOD AND VENOUS INJECTION METHOD ON ANALYSIS OF THE INSPIRED GAS DISTRIBUTION BY Xe-133 WASHOUT TEST.
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We have reported about improved method of inspired gas distribution analysis by Xe-133 inhalation. Intravenous administation of Xe-133 is better than inhalation method on a point that the injection method secure high density of Xe-133 in the lung. But the density flactuate in relation with regional blood flow. Therefore, the scintigramm shows blood flow distribution.
However we think that T1/2 or V1/2, the parameter of inspired gas distribution have no relation with initial counts, thus the result of inspired gas distribution by injection method correspond to inhation method.
About a case of pulmonary infarction, we have noticed that there is no difference between inhaltion method and injection method. About several other cases of C.O.P.D. and pneumoconiosis, we have confirned the same result.

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BACKGROUND CORRECTION IN XENON-133 GAS WASHOUT STUDIES.
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The purpose of this study was to assess the effects of background count-rate (BGC) on the ventilation indexes (VI's), and to establish a reasonable method to correct it. Xe-133 was inhaled with semi-equilibrium method and washed out with air. Three ROI's were made for BGC correction; an entire thorax (ROI1), and an area covering radioactivity within the lungs and its scatter (ROI2), and the area over the genuine lungs (ROI3). We calculated the mean BGC per matrix in the region between ROI1 and ROI2 in each frame data, and the total BGC during the entire period of study, and defined them as sequential and overall BGC, respectively. The washout curves over the ROI3 and/or any lung region of interest were analyzed between the end of semi-equilibrium and 120 sec after washout started. There T1/2R, T1/2exp, and T(A/H) previously reported were calculated with and without subtracting the BGC. The VI's without BGC correction showed larger values than the corrected ones. When VI's were once calculated without considering BGC, the true VI's could not be calculated by using simple formulae or coefficients. Calculation of T1/2R and T1/2exp required sequential BGC correction, but T(A/H), simply a correction of either sequential or total BGC correction. In conclusion the best VI was the T(A/H) as simply calculated after a correction of the total BGC.