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ASSESSMENT OF UNEVEN VENTILATION BY THE USE OF FUNCTIONAL IMAGE OF VENTILATION: COMPARISON WITH PULMONARY FUNCTION TESTS. H.Kobayashi, T.Yokoyama, H.Nakamura, K.Suga, K.Yamakawa, S.Katayama and T.Nakanishi. Dept. of Radiology, Yamaguchi University School of Medicine. Yamaguchi. T.Shintomi, Saiseikai Shimonoseki General Hospital. Yamaguchi.

Assesment of uneven ventilation is important for early detection and pathophysiology of lung disease. In this study, using Xe-133 washout curve, functional image of ventilation ( $\dot{V}$ ), lung volume (V) and  $\dot{V}/V$  were obtained in the normal subjects and patients with various lung diseases. By use of functional image, the fractional  $\dot{V}$  was plotted against  $\dot{V}/V$  ratio on a logarithmic abscissa. The s.d. and the fraction of relative slow compartment ( $\dot{V}_s$ ) were calculated and compared with pulmonary function tests ( $\dot{V}_{25}/H_t$ ,  $N_2$  and FEV1.0%). The s.d. and  $\dot{V}_s$  were small in normal subjects and large in patients with obstructive lung disease. There was correlation between FEV1.0% and the s.d.,  $\dot{V}_s$ .

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LUNG FUNCTION STUDY WITH Xe-133 -EVALUATION WITH PHASE ANALYSIS- Y.Okuda, T.Kitano, H.Maeda, T.Nakagawa and N.Yamaguchi. Department of Radiology, School of Medicine Mie University, Tsu, Mie.

During the regional lung function study with Xe-133, 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 was taking tidal breath through a closed circuit after equilibrium. Each of the cycle of the regional time-activity curve over each of the elements of the matrix was synchronized with the respective cycle of global time-activity curve over the whole lung field and summed to obtain a representative cycle. A first-harmonic Fourier analysis of the cycle provided functional images displaying distribution of amplitude and phase-shift values. In normal cases the phase image showed diffuse distribution, while the amplitude showed marked increase of the value in lower lung fields. In cases with restrictive lung disease, phase distribution was more diffuse than that of normal cases, and the values had a tendency to advance. Amplitude was increased in middle to upper lung fields as compared to normal cases. In cases with obstructive lung disease, phase distribution was irregular with multifocal regions of delayed values. Amplitude also showed irregular distribution.

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FUNCTION OF THE LUNG USING RADIONUCLIDE METHOD. T.Ishikawa, M.Nakatani, Y.Mashima, Y.Mori, K.Kawakami. Department of Radiology Jikei Univ. School of Medicine, Tokyo. H.Itoh, T.Shimada, 3rd Department of Internal Medicine Jikei Univ. School of Medicine, Tokyo

The following parameters have been studied.

- 1) Regional distribution of residual volume by Xe-133.
- 2) Xe-133 gas washout time.
- 3) Ventilation perfusion ratio by Kr-81m.
- 4) Distribution of bolus Kr-81m gas.

The subjects are 130 normal volunteers and are divided into 3 age groups.

In the case of elderly people, RV/TLC is increased in each lung fields. The washout times, for all groups presents the same tendency. It is longer in the apex than at the lung bottom, and increases with age in each lung fields. There is no difference in closure level of the air way in the groups, at RV level. The ratio V/Q at the top and bottom of lung is slightly decreased with age.

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T.Shimada, H.Ito, N.Saito, H.Ishogai, Y.Mori, Y.Mashima, K.Kawakami. The Jikei University School of Medicine, Tokyo.