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Comparative analysis ventilation-perfusion ratio using Kr-81m and that using Xe-133. T.Suzuki, O.Kubomura and M.Iio. Nakano National Chest Hospital, Tokyo.

We investigated to compare the method of Xe133 and the method of Kr-81m to study regional ventilation-perfusion ratio. Objects are 4 normal volancia, 4 constrictive lung disease patients.and 4 obstructive lung disease patients. The study of Xe is following. Patients breath Xe with oxygen in closed circle spirometer. After equilibrium status, patients expirate deeply until residual volume and then inspirate deeply until TLC level. Next Xe is washed out from lung by room air. Washout curve is fitted by monoexponential regression curve.Exponential Coefficiency means ventilation turnover rate. Equilibrium staus means pulmonary volume. After Xe is washed out completely, Xe-saline is injected intravenously. When Xe is reached to lung, patients are hold breath. This Xe distribution means perfusion. From these three parameter(V/V,V,Q), we calculate regional ventilation-perfusion ratio. Kr study is performed to the same patients on another day. Steady State Method is used for study of ventilation -perfusion ratio using Kr. Comparing with two data, we found more high grade gradient of ventilation-perfusion from apex to base in Xe study than in Kr study. Xe image was larger than Kr image.

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EVALUATION OF REGIONAL VENTILATION AND PERFUSION IN DUCHENNE MUSCULAR DYSTROPHY BY 133Xe VENTILATION AND PERFUSION LUNG SCAN. S.Tomiguchi*, H.Naoe*, O.Shimomura*** A., Tsuji***, Y.Hirota***, M.Takahashi*** * Department of Radiology, ** Department of Internal Medicine, Saishunso Byoin National Sanatrium *** Department of Radiology, Kumamoto University School of Medicine, Kumamoto.

Regional ventilation and perfusion in Duchenne muscular dystrophy (DMD) was evaluated in 11 patients using 133Xe ventilation and perfusion lung scan. Quantitative parameters of DMD were compared with normal controls.
1. $\dot{V}/V$ and $\dot{Q}/V$ decreased in the lower lung zone and $\dot{Q}/V$ increased in the upper lung zone. $\dot{V}/\dot{Q}$ was nearly equal to all lung zones.
2. MTT was prolonged in all lung zones and correlated well with %VC ($r = -0.72$). It was suggested that prolonged MTT was due to alveolar hypoventilation.
3. The contraction of the diseased diaphragm was decreased in DMD on chest radiograph. The pressure - volume curve in the lower lung zone was shifted to less compliant side in DMD. These facts might explain the abnormal ventilation and perfusion in DMD.
4. Perfusion abnormalities were observed in patients with decreased RVEF and LVEF.

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FACTOR ANALYSIS OF Kr-81m LUNG VENTI-LATION STUDIES. K.Miyakawa,H.Moromizato, M.Ozaki,H.Sueyama,Y.Ohta,T.Sekiya, N.Katsuyama,M.Nakano,Y.Mori and K. Kawakami.Ryukyu and Jikei University School of Medicin

Factor analysis summarizes data depending on time and space in a few elementary components. This study was undertaken to evaluate the patterns and their possible link to physiology when factor analysis was applied to Kr-81m ventilation scintigram. Three factors study was mainly appreciated. In 12 normal volunteers, a first factor (F1) was distributed mainly in the lung base, characterized a regular variation of the activity as in a respiratory volume-time curve. A second factor(F2) was a lower amplitude time activity curve as compared with F1, and had the same phase with F1. The last factor(F3) demonstrated an increase in activity during expiration and a decrease during inspiration. F3 was distributed in large airways. In 29 patients with pathology(16 COPD, 7 pulmonary fibrosis, 6 others), the distribution of each factor was different from normal, and asymmetrical. Differences in COPD were more significant than in pulmonary fibrosis. The phase shifts between F1 and F2 were commonly seen.

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PRINCIPAL COMPONENT ANALYSIS OF LUNG PERFU-SION IMAGE DATA. T. Teshima, T. Isawa, T. Hirano, A. Ebina, Y. Anazawa and K. Konno. Dept. Medicine, Tohoku Univ., Sendai

The purpose of the study was to quantify the unevenness of perfusion distribution in the lungs to correlate with underlying lung pathology. Twenty-one parameters as described previously were defined out of longitudinal and horizontal count profiles on perfusion lung image data in 64x64 matrices. Principal component analysis has revealed that the 1st component or Z1 indicates the shape of the lung or the lung volume, Z2, the degree of unevenness of the count profiles, Z3 and Z4, the longitudinal and horizontal distribution of perfusion, respectively, Z5, the maximal count and Z6, the degree of variance of count distribution. A limited number of parameters was selected for each component to correlate them with lung pathology. For example, for Z1, AREA, the area of the lung , and ANG, the slope of the mean count profile, for Z2, N, the number of peaks, for Z3 and Z4, YG and XG, the centroid coordinates of spatial radioactive distribution, for Z5, MAC, the maximal count and for Z6, CSD, the degree of scatter in count from the peak count. How these parameters differ in each lung pathology has been determined from 657 lung perfusion image data. In pulmonary emphysema, ANG, N, YG and XG were significantly different from normal subjects and in DPB, ANG, N, MAC , in fibrosis, AREA , ANG and N, and in valvular CHF, AREA, ANG, YG, and XG were significantly different.