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PRODUCTION OF MONODISPERSE HISTAMINE AEROSOL
H. Itoh, G. Todo, K. Murata, K. Torizuka, T. Tamachi, and K. Takahashi. Kyoto University, Kyoto.

Techniques to generate monodisperse histamine aerosols were described. Histamine droplets were produced in an ultrasonic nebulizer, and the aerosols were dried to mix with heated vapor of dioctyl sebacate. The mixture was cooled in a column exposed in room temperature, leading sebacate vapor to condense on the surface of each histamine particulate. Despite heterogeneity of original histamine aerosols, DOS-histamine aerosols were monodisperse in size distribution. The quality of the DOS-histamine aerosols was best with heating temperature of DOS at around 150 C. The generator was stable more than 5 hr. producing constant aerosol amount. The concentration of histamine in DOS aerosols was proven to be dependent on carrier gas flow and concentration of histamine in original solution in the nebulizer. With the carrier gas flow of 1 lpm, the amount of histamine in the aerosols ranged from 50 to 220 micrograms /l-aerosol, which would be enough to produce pharmacologic action to an animal lung.

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ESTIMATION OF LUNG FUNCTION FROM RADIOAEROSOL INHALATION LUNG IMAGES. T.Teshima, T.Isawa, T.Hirano, A.Ebina and K.Konno. Tohoku Univ., Sendai.

The purpose of this study was to derive an estimated multiple regression function to estimate lung function data from analysis of radioaerosol inhalation lung images.

Twelve variables for unevenness of inhaled aerosol distribution in the lungs were calculated from the count-profile of each row and column of the lungs in the matrices of 64 x 64, and 9 more were calculated for the shape of the lungs. Several most suitable variables were selected from them by using maneuvers of "linear multiple regression analysis" and "selection of variable" to establish an estimated multiple regression function for each of lung function data.

To estimate FEV_{1.0}%, for example, 4 of the 21 variables were selected and an estimated multiple regression function was made. From the estimated multiple regression function FEV_{1.0}% was estimable with a coefficient of multiple correlation (R) of 0.892 and a coefficient of multiple determination (R²) of 0.797. To estimate ZVC, 4 variables were selected for the estimated multiple regression function that enabled the estimation of ZVC with R of 0.697 and R² of 0.486. In both FEV_{1.0}% and ZVC, statistically significant estimation was possible with p less than 0.01%.

In conclusion we believe that lung function not only of the whole lungs but also of a particular lung region can be estimated from the estimated multiple regression functions derived by the present method. Estimation of regional lung function would be especially useful to estimate the remaining postoperative lung function before surgery.

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MUCOCILIARY CLEARANCE STUDIED BY RADIOAEROSOL INHALATION LUNG CINE-SCINTIGRAPHY. T.Isawa, T. Teshima, T.Hirano, A.Ebina and K.Konno. Tohoku Univ. Sendai.

Radioaerosol inhalation lung cine-scintigraphy was performed on 19 patients with clinical diagnosis of fibrosis who showed characteristic interstitial densities on chest x-rays. 15 of them showed either FVC or DCO or both of less than 80% of the predicted values. These 15 patients could be called genuine fibrosis and described here in parenthesis. Thirteen (11) were male and 6 (4), female. Age ranged from 30 to 82. As etiology, gold therapy for RA, 4 (2), radiation 1 (0), silicotic 1 (1), leukemia (drug-induced fibrosis?) 1 (1), "konnyaku-powder" inhalation 1 (1), and idiopathic 11 (10).

Inhaled aerosol deposited rather inhomogeneously throughout the lungs but no excessive deposition was seen on the major airways. Mucus transport patterns in fibrosis were less markedly disturbed in degree and frequency than in COPD. Regurgitation was observed in 4/15, migration to the opposite bronchus, 0/15, stasis, 2/15 and spiral motion, 2/15, in fibrosis, while in COPD they were 10/21, 5/21, 14/21, and 4/21, respectively. Otherwise steady axial cephalad transport patterns were generally seen on the trachea. Although lung retention ratio remained in the 95% confidence interval (CI) of normals, airway deposition and airway retention ratios were slightly greater, and airway clearance efficiency and alveolar deposition ratio were slightly smaller than 95% CI of the normals.

In conclusion radioaerosol inhalation lung cine-scintigraphy has been useful in demonstrating that mucociliary clearance mechanisms in fibrosis are also deranged, but to a lesser degree than COPD in general. Quantification of the derangement was possible.

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AN IMPROVED METHOD FOR THE MULTIPLE COMPARTMENT ANALYSIS OF THE INSPIRED-GAS DISTRIBUTION BY XENON-133 WASHOUT TEST. H. Kageyama, Kagawa Rosai Hospital, Kagawa.

At the 22nd Annual Meeting of the Japanese Society of Nuclear Medicine, I reported my basic study on how to represent V-DOT obtained by the washout test. Generally, Bolus inspiration image is utilized for ventilation image in V/Q analysis. However, it is conceived that acquisition of accurate V-DOT encounters a great difficulty. Since Tl/2 as represented in a semilogarithmic paper is a primary function of regional ventilation volume and lung volume, it is considered that image resulting from division of a lung volume image by Tl/2 image is proportional with V-DOT. I examined whether the V-DOT thus obtained is usable or not in the V/Q analysis. While the examinee was breathing at rest, the Xe-133 gas was made to attain an equilibrium within the lung and washed out. After a lung volume image and Tl/2 image were obtained while the examinee was breathing at rest, Xe-133 was administered by intravenous infusion to the examinee breathing at rest, thus obtaining a perfusion image. These three kinds of image were calculated to obtain a V-DOT/Q-DOT image. Imaging was made in a matrix of 32 x 32 using the technique reported by us last year.