

brightness from apex to base of the lung representing the gravity dependent gradient. The brightness for the base was 3~4 times as much as the apex, \dot{V}/\dot{Q} -images showed inverse distribution. In cases with mitral stenosis, \dot{Q} -images showed just inversion of normal pattern, decreasing from the apex to the base, while \dot{V} -images showed diffuse distribution. In pulmonary thrombosis, the affected areas were shown as cold areas in \dot{Q} -images and hot areas in \dot{V}/\dot{Q} -images, indicating the effect of dead space. In chronic obstructive lung disease, each of total and differential lung volume

for TLC, FRC, FRC/TLC was increased. Both \dot{V} -images and \dot{Q} -images showed multifocal irregular distribution. MTT-images showed multifocal areas with delayed washout by which the extent and the degree of the obstruction were estimated.

This on-line computer-aided ^{133}Xe pulmonary function study facilitates the quantitative determination of total, differential and regional pulmonary functions and is considered very useful for diagnosis and follow up of various lung diseases.

Dynamic Analysis for Regional Pulmonary Function Using ^{133}Xe

T. MATSUMOTO*, N. FUKUDA*, T. A. IINUMA*, Y. TATENO*, K. FUKUHISA*,
K. KIMURA** and S. HASEGAWA**

*National Institute of Radiological Sciences, Chiba, **Tsukuba University, Ibaragi

Using ^{133}Xe , a Xenon lung function unit (Nuclear Associates, Inc.) and a large area scintillation camera (the effective field, 34 cm in diameter), combined with the computer system (TOSBAC 3400 Model 31), the regional pulmonary function was evaluated in 8 normal subjects, 13 patients with PSS (progressive systemic sclerosis), 7 patients with FLD (fibrosing lung disease) and 16 patients with COLD (chronic obstructive lung disease). As the regional pulmonary function together with the data of pulmonary function (%VC, FEV_{1.0}%, PaO₂, and so on), ventilation index (\dot{V}) and perfusion index (\dot{Q}) were obtained by single breath method, and clearance half time ($T_{1/2}$) and ratio of disappearance constant (λ_i/λ_t) were calculated from wash out curves for equilibrated ^{133}Xe

gas in the steady state. Statistical Analysis was performed for these data. Preliminary results obtained are as follows.

(1) Results of the principal component analysis by using the data of total pulmonary function suggested that the normal subjects, the patients with PSS, FLD and COLD were effectively distinguished each other.

(2) As the results of the analysis with the parameter of regional pulmonary function in each division of lung field, in the case of the \dot{V} , \dot{Q} , $T_{1/2}$, the normal and the abnormal groups might be separated with high probability. But the effects of the discrimination between the groups of the abnormal were inferior to those with the data of total pulmonary function measured by the spirometer.

Data Processing for Regional Ventilation Study Using ^{133}Xe

K. TABUSHI*, S. ITOH*, T. NAKAJIMA*, B. KADO*, Y. WATANABE*, K. UEHARA*,
M. SAKURA*, Y. SASAKI** and T. NAGAI***

*Department of Radiology, Saitama Cancer Center

**The Third Department of Internal Medicine, St. Marianna University
School of Medicine

***Department of Radiology, Gunma University School of Medicine

We made a computer program for the convenient processing of the data obtained in regional

ventilation study, which has been used for clinical diagnosis.