N. Lung

1301

A STUDY OF PULMONARY FUNCTION TESTS OF 11CO2, 11CO AND 13N2.

M. Furudate*, Y. Minami**, H. Itoh***, M. Matsuda***, A. Nishimura*** and I. Suzukawa***
*Department of Radiology and **1st Department of Internal, Hokkaido Univ., School of Medicine, Sapporo ***Japan Steel Works Memorial Hospital, Muroran

The present study was designed to estimate the regional pulmonary functions of 11CO2, 11CO and 13N2. In this study, we used positron labelled gas of 11CO2, 11CO, and 13N2 and as conventional study used 133Xe and 99mTc-MAA. The subjects comprised normal subjects, patients of chronic obstructive pulmonary disease (COPD), pulmanary fibrosis etc. Regional pulmonary function tests was performed using a gamma camera computer system (searle phogamma LFOV, scintipac 1200 system) with a high energy collimater for positron. The scintillation camera was positioned in the posterior projection of the chest in a sitting position. A single breath method was used (10-20sec.) and after a short period of breath holding (10-20sec.) the inspired gas was washed out for rebreathing room air. As a result, positron labelled gas is useful not only for its physiologic character, but also for its better depth response.

1302

THREE DIMENSIONAL DISPLAY OF VENTILATION PERFUSION RATIO

H.Maeda, H.Itoh, Y.Ishii, G.Todo, T.Mukai, T.Fujita and K.Torizuka
Kyoto University

The distribution of ventilation ($\dot{V}$) and perfusion ($\dot{Q}$) are important factors in assessing the pulmonary gas exchange. We adopted the radionuclide computed tomography (RCT) with continuous breathing of Kr-81m and with intravenous administration of Tc-99m macroaggregates of human serum albumin (MAA), to get tomographic displays of $\dot{V}$ and $\dot{Q}$, respectively. $\dot{V}/\dot{Q}$ was calculated pixel by pixel by a computer and the distributions of $\dot{V}/\dot{Q}$ were displayed in a logarythmic scale with the surrounding rib cages obtained from transmission RCT. The number of voxel vs $\log(\dot{V}/\dot{Q})$ had almost normal distribution with smaller variance in normal subjects than those with emphysema or bronchitis. In the former, coincidence between $\dot{V}$ and $\dot{Q}$ distributions was observed, whereas in the latter, dissociations were seen both spatial and, $\dot{V}$ vs $\log(\dot{V}/\dot{Q})$ and $\dot{Q}$ vs $\log(\dot{V}/\dot{Q})$ distribution curves.

1304

THE MEASUREMENT OF REGIONAL PULMONARY DENSITY, VENTILATION AND PERFUSION BY FOURIER ANALYSIS OF GATED STUDIES

H.Maeda, D.Hamanaka, H.Itoh, Y.Ishii, T.Mukai, G.Todo, T.Fujita and K.Torizuka
Kyoto University

Techniques of temporal Fourier analysis in cardiology provides useful informations of function of the heart. We applied this approach to the processing of spirometer gated lung studies on a pixel by pixel basis, by transmission of gamma rays from Tc-99m plane flood source, inhalation of Xe-133 and in vivo labeling of RBC with Tc-99m. The transformed data at the fundamental frequency (the respirtory rate) were used to get cinematic display of the wave of changes in density, ventilaion and perfusion as it spread over the lungs. Preliminary study show that temporal Fourier analysis permits visualization of the pattern of changes in these quantities, which may prove useful in the study of abnormal functions, including those of constrictive and obstructive lung diseases.

1305

CLINICAL STUDY OF SUBTRACTION IMAGE WITH Kr-81m INHALATION AND Tc-99mO4 TRANSMISSION METHOD.

K. Kimura, S. Hasegawa, Y. Kikuchi, M. Oshima and M. Akisada Institute of Clinical Medicine, University of Tsukuba, Ibaraki Pref.

The inhalation lung image of Kr-81m gas in ventilatory steady state is considered to show the well ventilated area. For the purpose of evaluation of defect and hot area of Kr-81m inhalation image, the subtraction image A (transmission image-inhalation image) and B (inhalation image-transmission image) were made by a large area scintilation camera (Searle, LFOV) combined with mini-computer system (Shimadzu, Scintipac 230) in 50 patients with lung diseases. Compared with the regional lung function measured with Xe-133, mean washout times calculated from the washout curves prolonged ($\bar{m}$=191. 1 sec.) and ventilation indices ($\dot{v}/v$) were reduced ($\bar{m}$=0.76) in the hot areas of image A. On the other hand mean wash out times were short and $\dot{v}/v$ were relatively high in the hot areas of image B. We evaluated that the hot area of the subtraction image A revealed the slow space and the hot area of the image B showed the fast space in ventilatory steady state.