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COMPARISON WITH DOSE-RESPONSE CHARACTERISTICS USING PULMONARY IMPEDANCE, TRANSCUTANEOUS PO_2 , AND KRYPTON-81m VENTILATION IMAGE DURING METHACHOLINE INHALATION.

O.Kitada, F.Sato, M.Yoshida, M.Yorifuji, K.Yamada and M.Sugita. Hyogo College of Medicine.

M.Kawasaki, K.Ono, H.Tushima and J.Ono. Mihara General Hospital.

Inhalation dose-response curves for methacholine as the challenge agent using the pulmonary impedance (Zrs), transcutaneous PO_2 ($tcPo_2$) and ventilation scintigram with Krypton-81m were studied for 12 subjects with bronchial asthma. The concentrations of the methacholine at the moment when three indices (Zrs, $tcPo_2$, Kr-81m) changed, that is, the threshold levels for methacholine are compared. The correlation coefficient of threshold levels between Zrs, $tcPo_2$ and Kr-81m were excellent.

In some cases, the abrupt increase of impedance was observed at a certain concentration of methacholine solution but $tcPo_2$ and ventilation image by Kr-81m were not changed. The differences of regional threshold levels were apt to be inversely proportional to the slope of the pulmonary impedance curves.

From these data, it was shown that regional different responsiveness to methacholine of airway tracts seemed to influence of the dose-response curve of pulmonary impedance.

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EVALUATION OF PULMONARY BLOOD FLOW RATIO ON OXYGEN EFFECT BY Tc-99m-RBC PULMONARY SCAN. K.Hayashida, T.Nishimura, T.Uehara, and T.Kozuka. National Cardiovascular Center, Suita, Osaka.

The labeling of RBC with Tc-99m in vivo is best to see blood pool imaging because of high labeling rate and stability of Tc-99m with RBC. Pulmonary scan of Tc-99m-RBC can observe the change of pulmonary blood flow in posture and drug effect such as oxygen. In sitting position, pulmonary scan was done posteriorly for 15 minutes of 5 l/min of oxygen inhalation in 12 cases of mitral valvular disease (MVD) and 8 cases of atrial septal defect (ASD). Pulmonary blood flow ratio (=PBF ratio) was got from the ratio of mean upper third count to mean lower third count in right lung.

Mean upper third count decreased with oxygen inhalation to 0.862 of initial state in MVD and to 0.896 of initial state in ASD. PBF ratio decreased with oxygen inhalation from 1.027 to 0.904 in MVD and from 0.874 to 0.845 in ASD.

As a result, alternation of pulmonary blood flow was observed in mainly upper third lung field in MVD and in both upper and lower third lung field in ASD. This method can evaluate not only distribution but also alternation of pulmonary blood flow induced oxygen effect.

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STUDY OF PULMONARY HEMODYNAMICS BY FOURIER PHASE ANALYSIS USING RADIONUCLIDE ANGIO-CARDIOGRAPHY.

K.Nakazawa, K.Ishii, S.Horiike, N.Yamada, K.Yoda, J.Suzuki, T.Kikuichi and T.Matsubayashi. Department of Radiology, Kitasato University, School of Medicine, Sagamiara.

Fourier phase analysis has been now recognized to be useful to analyze the data of gated cardiac blood pool, of ^{133}Xe gated pulmonary ventilation. In this study, Fourier phase analysis was applied to estimate pulmonary hemodynamics using radionuclide angiocardiology.

We used a scinticamera (MAXI 400T, GE Co.) and a minicomputer (Simis 3, Informatek Co.). The detector was placed over the precordium of the supine patient on the bed. The data were collected to the computer for 40 sec. in list mode following the intravenous injection of ^{99m}Tc -pertechnetate (Tc). Twenty images of frame mode were reconstructed using list mode data from the time of Tc injection to the time when the bolus of Tc reached the aorta. These images were smoothed by spatial and temporal filter. The smoothed data were then processed by Fourier phase analysis program, which had been used to analyze the data of gated cardiac blood pool, to produce phase and amplitude images.

In normal patients, phase distribution was similar in left and right lungs. However, in a patient of PS, phase distribution in right lung was more delayed than that in left lung. In a patient of PDA, that in left lung was more delayed than that in right lung.

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THE UTILITY OF COMBINED VENTILATION/PERFUSION SCINTIGRAPHY IN DIAGNOSIS OF PULMONARY EMBOLISM. K.Suga, H.Kobayashi, H.Nakamura, K.Yamakawa, H.Nakamura, T.Yokoyama and T.Nakanishi. Department of Radiology, Yamaguchi University School of medicine, Yamaguchi.

Radionuclide lung scintigraphy is useful to detect pulmonary embolism as a routine screening procedure. It visualizes the regional pulmonary function non-invasively. While the sensitivity of the perfusion scintigraphy in detection of pulmonary emboli is higher, its specificity is lower. Additional ventilation scintigraphy increases the specificity. Six patients with pulmonary embolism, who were referred for combined ventilation/perfusion studies, are reported.