1310

MATRIX SIZE AND INDICES FOR CLEARANCE OF INHALED XENON GAS FOR GENERATING FUNCTIONAL IMAGES.

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To get a functional image of the lungs regarding regional clearance of inhaled Xe-133, single breath washin and washout studies on 35 patients were analyzed as follows; 3 different clearance time indices were calculated from washout curves in the lung as a whole and in a divided lung matrix; real half time (Tl/2R), half time estimated from exponential curve fitting, and the area under the clearance curve divided by the difference in count rate between 10 and 130 seconds (TA,H). In patients with good lung function, Tl/2R could be estimated without difficulty even in lung region if it was larger than or equal to the size of a single matrix when the lungs were divided into 16 x 16 matrixes, but in patients with COPD it could hardly be estimated. When the 3 indices were calculated in a single matrix out of 16 x 16 matrixes, there was a good correlation between Tl/2 and TA,H ($r=0.88$, $p \ll 0.001$), but the correlation between Tl/2R and Tl/2exp was less good ($r=0.66$).

Thus we could make a functional image of the lungs if the lungs were divided into 16 x 16 matrixes or larger in size. The index TA,H was the best of the 3 indices.

1311

SEPARATE VENTILATORY FUNCTION IN HEMIPLEGIC PATIENTS.

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The separate ventilatory function of hemiplegic patients caused by cerebrovascular disease was measured by Xe-133 inhalation study. The subject was kept on sitting position and faced his back to a scintilation camera linked to computer. The following parameters were compared between the healthy lung and the lung of affected side. (1)TLC (2)FRC (3)RV (4)ERV (5)Washout time (Tl/2) in tidal breathing and respiration during PEEP(positive end-expiratory pressure). There was no remarkable difference in TLC between the healthy and the affected side. The expiratory reserve volume(ERV) was reduced and RV increased in affected side. An increase of RV was prominent in the lower lung fields. The functional reserve volume(FRC) was slightly increased in the affected side of most of the cases, with prolonged washout time. During respiration with PEEP, the washout delayed in both lungs, more prominent in healthy side, consequently, difference of washout time between both lungs became small. These findings suggest that the hemiplegic patients had disturbance of ventilatory function of the affected side due to the weakness of the chest respiratory muscles.

1312

EVALUATION OF THE EFFECT OF RADIATION THERAPY OF LUNG CANCER WITH Xe-133 STUDY.

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About 13 cases of primary lung cancer that had radiation therapy, comparison study of pre- and post-irradiation findings using Xe-133 of both ventilation study and perfusion study was carried out.

The effect of radiation therapy was classified 3 groups in chest radiogram, that is, excellent group, effective group and no change group. In excellent group (6 cases), there was dissociation between perfusion and ventilation improvement in all cases except one case, which showed accordance in improvement of perfusion, ventilation and wash out time. In effective group (3 cases) and no change group (4 cases), improvement of ventilation and perfusion didn't be found in almost all cases. Xe-133 studies and chest X-ray findings were accorded. In a case of recurrence that was taken reirradiation, ventilation and perfusion didn't improve at all. We assumed that improvement of lung function could not be expected in the case that was necessary to take reirradiation.

1313

EVALUATION OF COMPLICATION AND PREDICTED PULMONARY FUNCTION AFTER LOBECTOMY IN PATIENTS WITH PRIMARY LUNG CANCER USING Xe-133 VENTILATION-PERFUSION STUDY.

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The expected reduction of pulmonary function in patients with lung cancer after lobectomy was calculated by combining the results of spirometry with quantitative mesurement of ventilation and perfusion scans according to Wernly's equation.

Xe-133 ventilation and perfusion scans were done in 45 patients with lung cancer who had resection of their tumor.

Coefficients of correlation between observed spirometry value ($FEV_{1.0}$, FVC) after lobectomy and predicted postlobectomy spirometry from ventilation ($\dot{V}$, V)-perfusion ($\dot{Q}$) are 0.75 ∿ 0.86.

This method is useful for predicting pulmonary function after lobectomy.

We also examined incidence of COPD using on Xe-133 wash out phase in 45 patients with lung cancer, 17 volunteers and 27 patients with silicosis.

COPD was recognized in 31.1% of lung cancer group (excluding a region of cancer), 27.8% of volunteers and 96% of silicosis group.

There is no significant difference between lung cancer group and control group in incidence of COPD.