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## DETECTION OF RADIATION INDUCED LUNG INJURY BY Tc-99m DTPA AEROSOL INHALATION SCINTIGRAPHY.

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Radiation induced lung injury was investigated in man based on the measurement of alveolar epithelial permeability. Eight patients with radiation pneumonitis and eleven who underwent chest radiation therapy were studied. Tc-99m diethylene triamine penta acetate (DTPA) solution was aerosolized and inhaled on normal breathing. Alveolar epithelial permeability was estimated from the rate constant of the chest counts (kep) representing the rate of Tc-99m DTPA flux across alveolar epithelium. The patients with radiation pneumonitis showed the increased kep value with  $29.9 \pm 12.3 \times 10^{-3} \text{ min}^{-1}$  (mean  $\pm$  SD), which was significantly greater than the value obtained from the healthy controls with  $9.3 \pm 1.7 \times 10^{-3} \text{ min}^{-1}$ . Three out of 11 patients studied prospectively developed radiation pneumonitis. Their mean kep value was elevated to  $22.7 \times 10^{-3} \text{ min}^{-1}$  during the latent periods of radiation pneumonitis. On the other hand, the kep values in the eight subjects who did not manifest pneumonitis remained within a normal range. In conclusion, the measurement of alveolar epithelial permeability enables us to detect radiation induced lung injury early in the course of radiation pneumonitis.

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## ASSESSMENT OF LUNG INJURY IN IDIOPATHIC INTERSTITIAL PNEUMONIA IN TERMS OF MICROVASCULAR PERMEABILITY MEASUREMENT.

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The aim of the present investigation is to assess the degree of lung injury in patients with idiopathic pneumonia with an emphasis on the prognosis. Patients with idiopathic interstitial pneumonia (n=15) followed for more than six months after the permeability measurement were classified into two groups; the deceased (n=6) and the alive (n=9). The pulmonary microvascular permeability was estimated from the rate constant, defined as "ken", of transvascular Tc-99m labeled human serum albumin (HSA) flux from plasma to interstitium in the lungs. Scintigraphic data were obtained for 60 minutes after 10mCi of Tc-99m HSA injection using a gamma camera. The deceased showed greater ken values of  $2.21 \pm 0.47 \times 10^{-3} \text{ min}^{-1}$  (mean  $\pm$  SD) than the alive of  $1.00 \pm 0.38 \times 10^{-3} \text{ min}^{-1}$  ( $p < 0.005$ ). On the other hand, there was no difference between two groups in other clinical parameters like erythrocyte sedimentation ratio, serum LDH, scintigraphic accumulation of Ga-68 in the lung fields or %vital capacity. The patients with greater ken value had progressive diseases and showed poor prognosis. It is concluded that the present method enables us to assess the degree of lung injury in interstitial pneumonia.

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## QUANTITATIVE ASSESSMENT OF GA-67 SCINTIGRAPHY IN INTERSTITIAL PULMONARY DISEASES.

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We developed a method of quantitation of Ga-67 uptake in lung parenchyma and hilus in patients with interstitial pulmonary diseases. 48h after an intravenous injection of  $111\text{-}185\text{MBq}$  ( $3\text{-}5\text{mCi}$ ) of Ga-67 citrate, a posterior image was obtained and simultaneously recorded on a computer. The regions of interest corresponding to the right upper lung field, the right lower lung field, the left upper lung field, the left lower lung field, the hilus and the right lobe of the liver were delineated. The average counts/pixel were determined. Ga-67 uptake values in each lung field were calculated as a percentage of the average counts in the right lobe of the liver. The average percentage of 4 lung fields was  $37.8 \pm 2.5$  in normal subjects (n=5),  $44.1 \pm 5.2$  in stage I sarcoidosis (n=9),  $54.7 \pm 11.3$  in stage II-III sarcoidosis (n=6),  $49.3 \pm 3.5$  in idiopathic pulmonary fibrosis (n=6) and  $67.3 \pm 24.6$  in pneumoconiosis (n=7). The hilar uptake values were calculated by the same method. This method provided a more sensitive, more objective evaluation than the traditional qualitative assessment. We believe that further studies of setting ROIs and the standard are required.

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HILAR ACCUMULATION OF  $^{67}\text{Ga}$ -CITRATE IN PATIENTS WITH PRIMARY LUNG CANCER.

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Metastases to hilar lymph-nodes occur rather frequently in lung cancer and are one of the most critical prognosis-factors in resected cases of lung cancer. Scintigraphy with  $^{67}\text{Ga}$ -citrate is a widely used examination to detect the metastases in hilar lymph-nodes. But in some cases, abnormal accumulation of  $^{67}\text{Ga}$ -citrate was observed on a scintigram despite of the absence of any metastasis. To clarify the significance of the accumulation of  $^{67}\text{Ga}$ -citrate in hilar lymph-nodes, we analyzed the 130 cases of primary lung cancer.

Who had been surgically treated in our hospital (1980-'84) and examined patho histologically. We report here the accordance rate between the hilar accumulation of  $^{67}\text{Ga}$ -citrate on a scintigram and the presence of metastasis in hilar lymph-nodes. (Rate of accurate diagnosis). The cases who had metastasis in hilar lymph-nodes were further analyzed in relation to the histological type of the cancer and the size of the lymph-nodes. The cases who showed abnormal accumulation of  $^{67}\text{Ga}$ -citrate with out metastasis were compared with those who did not show the accumulation of  $^{67}\text{Ga}$ -citrate in respect of their age, previous history of respiratory diseases other than lung cancer and patho histological findings of their lymph-nodes.