
No methods have been clinically available for non-invasive and quantitative measurements of pulmonary extravascular water (PEVW). We have developed a method to measure PEVW in man from external gamma-ray counts and marker concentration in peripheral blood using either TC-99m or I-123 labeled markers. We use TC-99m or I-123 labeled human serum albumin as an intravascular marker, and TC-99m labeled DTPA or Na1-123 as an extracellular marker. We correct external gamma-ray counts for chest wall interference and tissue gamma-ray absorption in order to estimate PEVW.

In healthy subjects pulmonary plasma volume and interstitial volume in the TC-99m study (n=9) were 0.075±0.019 cm³/cm³ lung tissue and 0.065±0.016 cm³/cm³, while those in the I-123 study (n=10) were 0.070±0.010 cm³/cm³ and 0.073±0.012 cm³/cm³, respectively. The differences between the two methods were statistically not significant.

These results agreed with the reported data by direct PEVW measurements.


We evaluated clinical usefulness of ventilation and perfusion scintigraphies of the lung performed simultaneously on the patients of chronic obstructive pulmonary disease, lung cancer and diabetes mellitus. Kr-85m and Xe-133 gas were used for ventilation images and TC-99m-MAA for perfusion images. Kr-85m ventilation scanning and TC-99m-MAA perfusion scanning were performed in craniocaudal, anterior-posterior and both lateral views. Xe-133 ventilation scanning was carried out with single breath and rebreathing method followed by TC-99m-MAA perfusion scanning. In our study ventilation-perfusion mismatches were demonstrated in the patients with pulmonary arterial obstruction and bronchogenic carcinoma. Ventilation-perfusion defect in matched rate were visualized in the patients with chronic obstructive pulmonary disease, lung cancer, old lung tuberculosis and lung cyst. We also made the similar studies in patients of diabetes mellitus with hypoxemia who had not remarkable changes in chest X-ray and bronchography. Ventilation-perfusion defects in matched rate with delayed washout were noted in these patients. This method may prove useful for the study of localized pulmonary pathology concerned with DM.