Xe-133 inhalation study and lung CT were done within 3 weeks interval in 9 cases with pathologically proven diffuse panbronchiolitis. Xe-133 washout curve was analyzed with initial slope method. Time constant (λ) was calculated pixel by pixel, and histogram of λ was made. Unevenness of washout could be evaluated by SD and peak numbers. Median number of histogram correlated well with PaO2 (r=0.885).

Washout delay of Xe-133 was found in areas where peribronchiolar nodule was recognized on CT. We classified the lateral washout image into 3 types: peripheral, lobar, and mixed type. Major airway lesion was found in all 3 cases of lobar type, but not in any 3 cases of peripheral type. Various degree of major airway lesion was found in mixed type. However, chronic bronchitis with central bronchial wall thickening without peribronchiolar nodule on CT didn't show lobar type washout delay. In lobar type washout delay cases, it was considered that major bronchial lesion itself played insignificant role.

In conclusion, patient with COPD showed significantly less alveolar clearance of Tc-99m-labeled aerosol particles than in normal subjects. Alveolar deposition ratio of Tc-99m-albumin was 0.455 μm with a ZS of 1.40. The clearance curves of the small molecule Tc-99m compounds were biphasic. The lung clearance rate (T/2) of the rapid first compartment of Tc-99mDTPA was 7.0 minutes; that of Tc-99m DTPA 29.0 minutes; and that of Tc-99m disofenin 45.3 minutes. The rates of clearance correlated with their molecular size index (Xav) which was determined in methanolysis buffer by Sephadex gel chromatography. The lung clearance curve of Tc-99m albumin was logarithmic with a clearance rate (T/2) of 19.6 hours. Small molecule Tc-99m compounds in aerosol particles seemed to be cleared passively from the alveolar space into the capillary through junction pores in the alveolar epithelium. On the other hand, the large molecule, Tc-99m albumin, are thought to be cleared by pinocytosis or phagocytosis.