2) Both ^{133}Xe gas and ^{81m}Kr gas were useful for estimation of inhalation, however, washout study was impractical for ^{81m}Kr gas because of extremely short half life of 13 seconds.

3) Diminished perfusion was much more clearly shown in ^{99m}Tc-MAA scintigraphy than ^{133}Xe solution scintigraphy.

4) In certain cases of hilar cancer, perfusion scintigraphy often revealed no noticeable improvement for pulmonary vascular obstruction in spite of marked radiographical regression of tumor shadow after radiation therapy.

5) Perfusion and ventilation scintigraphy often gave us new additional informations about the pathophysiological condition of main pulmonary arteries and main bronchi, those were hardly recoginzable on plain chest X-ray films, and was found to be a useful non-traumatic procedure for follow up study of lung cancer.

Aerosol Inhalation Lung Imaging: Aerosol Patircle Size, Inspiratory Flow Rate and Mode of Aerosol Deposition

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Radionuclide lung perfusion and aerosol inhalation imaging have the capability of detecting abnormalities in pulmonary diseases. However, the effects of aerosol particle size, the inspiratory flow rate during aerosol inhalation and airways abnormality on aerosol inhalation images have not been studied well yet. We have measured the size of aerosol particle by gravitational sedimentation and studied above aspects in vitro by using airway models as reported previously. The present study was undertaken in an attempt to correlate the human aerosol inhalation lung images with these results in normal subjects and patients with lung cancer.

We have found that when a reservoir was placed between an ultrasonic nubulizer (Mistogen EN-142) and a mouth piece, most of aerosol obtained at the mouth piece consisted of 1 to 3 μ in size with a larger-sized aerosol removed by the reservoir, while without the reservoir in place aerosol tended to be larger in size, say 3 to 10 μ in diameter. With increasing size and inspiratory flow rate during aerosol inhalation, inhalation images showed the so-called central pattern, indicating an excessive deposition of inhaled aerosol on the major airways and less aerosol in the lung parenchyma. Thus the major airways were roughly depicted as in crude bronchography. With the reservoir in place and by inhaling a smaller-sized aerosol with tidal ventilation, aerosol deposited in the lung parenchyma with little radioactivity in the major airways.

Therefore it seemed more reasonable to use a larger-sized aerosol or to inhale aerosol with increased flow rate in imaging pathology such as stenosis or partial obstruction in the major airways up to the secondary bronchi, while for lesions in the smaller airways, a smaller-sized aerosol was more useful. The selection of aerosol size and inhalation flow rate was particularly useful in patients with lung cancer in whom cancerous endobronchial lesions were depicted as "hot spots". Furthermore sequential delayed imaging was diagnostically useful for the evluation of mucociliary clearance mechanism at the "hot spots"; if "hot spots" did not disappear in 2 to 3 hours, denudation of the ciliated epithelium was highly suspected.