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MUCOCILIARY CLEARANCE MECHANISM: TRACHEAL TRANSPORT VELOCITY AND PARTICLE SIZE. T.Hirano, T.Isawa, T.Teshima, A.Ebina and K.Konno. The Research Institute for Chest Diseases and Cancer, Tohoku University, Sendai.

The purpose of the present study was to elucidate whether tracheal transport velocity was affected by difference in size of tracer materials placed on the tracheal mucosa.

The following tracer materials labeled with Tc-99m were used; Tc-pertechnetate, human serum albumin (HSA), albumin millimicrosphere (Milli-MISA, 0.2 to 2 μ m in size), albumin microsphere (MISA, 23 to 45 μ m) and macroaggregated albumin (MAA, 10 to 60 μ m). The tracer material, 0.025 to 0.05 ml in volume, was placed at the carina of an anesthetized dog through a catheter under fiberoptic bronchoscopic guidance. Sequential imaging was made with a gamma camera. To estimate the mean migrating velocity (MMV), a linear regression was calculated from time required for migration and the migrating distance.

The mean MMV's were 13.7 ± 5.9 mm/min (mean \pm SD, n=10), 13.6 ± 3.3 (n=10), 14.0 ± 4.3 (n=12), 15.7 ± 6.0 (n=10) and 16.3 ± 5.6 (n=10), when Tc-pertechnetate, HSA, Milli-MISA, MISA and MAA were used as tracer materials, respectively. Among these 5 tracer materials there was no significant difference in MMV's.

In conclusion, tracheal transport velocity doesn't seem to be affected by difference in size of the tracer materials placed on the mucosal surface.

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RADIOAEROSOL INHALATION LUNG IMAGING AND MUCOCILIARY CLEARANCE MECHANISMS. T.Teshima, T.Isawa, T.Hirano, A.Ebina and K.Konno. The Research Institute for Chest Diseases and Cancer, Tohoku University, Sendai.

Radioserosol inhalation lung imaging not only reflects ventilatory status in the lungs but also mucociliary clearance mechanisms if measurement of radioactivity is made continuously over a certain period of time. The purpose of the present study was to analyze the time activity curves to estimate regional mucociliary clearance mechanisms.

Following inhalation of Tc-99m albumin aerosol, radioactivity was continuously measured over the thorax by a gamma camera for 30 to 120 min and the data was fed into a computer. The data was retrieved to compile radioaerosol inhalation lung cine-scinigraphy on one hand and to obtain time activity or clearance curves over the regions of interest selected over the aerosol inhalation lung images on the other. Analysis was made by a pattern recognition of time activity curves and calculation of half-time from the exponential curve fitting when applicable.

In normal subjects radioactivity deposited on the ciliated airways was cleared smoothly without stagnation on the airway mucosa but in patients with obstructive airways disease regional time activity curves were step-like, indicating clearance by cough or clearing throat maneuver. In the peripheral lung region a time activity curve showed a slowly declining or a near-flat one, indicating that clearance was not affected by cough or clearing throat maneuver. Tracheal velocity in normal subjects was calculated to be ca. 10 mm/min, but in patients with obstructive airways disease it was greatly retarded and even retrograde migration was seen.

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GENERATION OF MONODISPERSE AEROSOL. H.Maeda, T.Tamachi, Y.Todo, H.Itohi, Y.Ishii, K.Morita, K.Takahashi and K.Torizuka Dept. Radiology and Nucl. Med. Kyoto University Hosp. Sakyo-ku Kyoto, Inst. Nucl. Energy, Kyoto Univ. Uji, Kyoto.

Monodisperse aerosol is indispensable for the study of physiology of aerosol inhalation. We developed a Sinclair-Lamer type monodisperse aerosol generator. The particle is composed of di-octyl-sebacate (DOS) and uranin as a shell and a core respectively. Water solution of uranin was first vaporized by a conventional ultrasonic nebulizer. This was then guided into DOS boiler heated around 100 to 200 °C. Mixture of uranin particulates and DOS steam was reheated again over some 220 °C, and was passed into a condenser where the vapor of DOS accreted to the uranin nuclei. Distribution of the size of aerosol particles were measured with Andersen Aerosol Sampler and the fluorescence from uranin. The size of the particles was controlled from 0.3 to 3 μ m through the change of the temperature of the boiler and the reheater.

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FUNDAMENTAL EVALUATION OF FUNCTIONAL IMAGE IN SIMULTANEOUS STUDY WITH THE DOUBLE ISOTOPE. M.Yamada, M.Matsudaira, H.Tsujii, Y.Kurata, T.Maeda, M.Oguchi, K.Nakajima, H.Matsuda, H.Bunko, N.Tonami and K.Hisada. Div. of Radioisotope, Kanazawa Univ. Hospital and Dept. of Nuclear Medicine, Kanazawa Univ. Medical School. Kanazawa.

To make the functional lung images, Kr-81m ventilation study/Tc-99m-MAA perfusion study, we investigated the erroneous effect from the compton radiation. One of the pulse height analyzers was set the energy windows 190 KeV \pm 10% and another was 140 KeV \pm 12.5%.

The sum peaks from the 100 KeV were negligible in the window of 190 KeV, but the compton radiation from 190 KeV effected on the radioactivity of 140 KeV. So that we tried to correct this compton radiation using computer.