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A NEW METHOD TO EVALUATE REGIONAL PULMONARY BLOOD FLOW AND EXTRAVASCULAR SPACE USING N-13 AMMONIA AND POSITRON COMPUTED TOMOGRAPH.
M.Senda, Y.Yonekura, N.Tamaki, K.Murata, H.Ito, H.Saji, S.Kodama, S.Tanada, N.Hayashi, T.Fujita, K.Torizuka.
Kyoto University Medical School, Kyoto.

Following bolus intravenous injection of 10 mCi of N-13 labeled ammonia solution, a dynamic scan of the lungs was performed at the framing rate of 10 or 15 seconds. We assumed that the ammonia is first distributed in the lungs according to the regional blood flow (F) and extracted in the extravascular space (V) and then washed out by the blood flow. Applying a single compartment model, we calculated the turn over rate (F/V), blood flow (F) and extravascular space (V) from the regional time-activity curves.

In a supine normal volunteer, the dorsal part showed larger F and V than the ventral part due to the gravity. In a patient with congestive heart failure, F/V showed marked decrease due to decreased cardiac output and increased extravascular space. In a patient with emphysema, the diseased area showed decrease in F and V, demonstrating V-Q match and decreased interstitial space caused by destruction of the alveolar tissues. Thus our method provides useful informations about regional pulmonary blood flow and the size of extravascular space.

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STUDIES OF REGIONAL VENTILATION AND PERFUSION IN RADIATION PNEUMONITIS BY VENTILATORY STEADY STATE MEASUREMENT WITH XENON-133.
F.Nishi, M.Oshibuchi, S.Shirai, R.Dannoura, S.Kikuchi, S.Morita, M.Koganemaru, K.Yano, H.Ohtake, K.Noguchi*, Y.Fukudome*, T.Yamashita* and T.Iwasawa*. Department of Radiology, Kurume University School of Medicine, *Department of Central Radiology, Kurume University Hospital, Kurume.

Ventilation (\dot{V}), Perfusion (\dot{Q}) and Mean Transit Time (MTT) were evaluated by Xe-133 steady state method in 30 patients who developed radiation pneumonitis after radiation therapy for primary lung cancer. Measurements were taken before radiation therapy, immediately after radiation therapy, and after development radiation pneumonitis. Pattern of alteration of \dot{V} , \dot{Q} , MTT before and after radiation was examined and patients were classified into 2 groups. First group showed marked improvement in all parameters, i.e., 30 % improvement in \dot{V} , 20 % improvement in \dot{Q} , 12 seconds shortening MTT. Second group showed slight worsening of all parameters. When radiation pneumonitis was noted, \dot{V} , \dot{Q} and MTT returned to pre-radiation level in the first group. Whereas in the second group, \dot{V} and \dot{Q} were as same level as those immediately after radiation. In both groups MTT showed 30 seconds prolongation after radiation. Among these parameters \dot{V} showed most prominent change in the whole course of measurement.

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RADIOISOTOPE VENOGRAPHY AND SVC SYNDROME.
T.Hirano, T. Isawa, T. Teshima, A. Ebina and K.Konno. Tohoku University, Sendai.

The purpose of the study was to elucidate how radioisotope (R.I.) venography was useful to diagnosing SVC syndrome and evaluating responses to therapy. 86 patients were studied. The tracer (Tc-99m MAA) was injected into the bilateral antecubital veins with the patients in the supine position under a gamma camera. When necessary, a unilateral injection was also made. Normally, the tracer reached the SVC almost simultaneously from both sides taking ca. 5 sec. No collateral pathways were seen. In patients with lung cancer and/or mediastinal tumor clinically showing SVC syndrome, collateral pathways were through 1) the internal thoracic vein to the IVC, 2) the lateral thoracic veins to the intercostal ones and 3) the jugular veins to the opposite side of the neck. Seven patients without manifest SVC syndrome revealed collateral circulations and one of them developed the syndrome later. Time required for radioactivity to travel from the axillary veins through the lung tissue was twice longer in patients with SVC syndrome than normally expected. In 8 patients, R.I. venography was repeated after irradiation and chemotherapy. Two of them showed a marked improvement, and the remainder, none on R.I. venography.

In conclusion R.I. venography with Tc-99m MAA is useful to the diagnosis of SVC syndrome and the evaluation of responses to treatment.

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LOCAL LUNG PERFUSION AND VENTILATION WITH RADIOISOTOPES IN THE CERVICAL CORD-INJURED PATIENTS.
Y.Hiraizumi, E.Fujimaki. (Dept., Orth., School of Med., Showa Univ., Tokyo)
T.Hishida. (Dept., Radiol., School of Med., Showa Univ. Tokyo)
T.Maruyama. (Dept., Orth., Atami gen.Hosp., Fukushima)
Y.Maeda, M.Takeuchi. (Dept., Nucl., Atami gen.Hosp. Fukushima)

Cervical cord-injured patients generally show restrictive lung dysfunction due to paralysis of the intercostal muscles, and their vital capacity decrease below 50 per cent of normal ones.

They reveal paradoxical respiration that the intercostal spaces subside on inspiration.

We performed ventilation scintigraphy with Xe-133 and perfusion scintigraphy with Tc-99m-MAA to nine cervical cord-injured patients and three normal ones, and investigated local lung function.

1) Wash-in and wash-out curves were sluggish in the cervical cord-injured patients.

2) Compared with normal ones, ventilation of the upper lung were especially impaired.

3) Functional lung images were different from those of normal ones.