needed, but it is not easy. We made this study for the purpose of an exploitation of an easy labelling method to put RI-angiography in general practice. In this study, we investigated red blood cell labelling with inhaled $^{11}$CO gas for RI-angiography.

The Positron-camera coupling with on-line computer (TOSBAC 3400), was made up from a gamma camera (TOSHCBBA GCA-202) and a focal detector. Our co-workers made $^{11}$CO gas using the $^{14}$N $(p, \alpha)$ $^{11}$C reaction. The radiochemical purity of this RI-gas proved to be over 98\%. Fifteen mCi of $^{11}$CO was injected with one litre of air into a gas box connected to a respiratory circuit. Five volunteers of the co-workers inhaled the gas mixture by a single-breath method. The activity of $^{11}$CO in the lung was counted with the positron-camera and recorded into the computer. These records were fitted to an exponential equation of $Y = A \cdot e^{-rt}$. The mean value of $\lambda$ was 0.0314 (sec$^{-1}$). The uptake into blood flow at $t=20$ sec., calculated from an equation of $Y' = 100 \cdot (1-e^{-rt})$, was 45.7\%. The erythrocyte labelling ratio with $^{11}$CO after inhalation was calculated from radioactivities in the plasma and the whole blood. The labelling ratio of these five volunteers were all over 97.9\%.

After the inhalation studies, RI-angiography with the positron-camera were taken. These scintigrams showed a good resolution We could distinguish main sinus of the head and two arteries of the forearm.

We could found a rapid and easy labelling method for RI-angiography using $^{11}$CO gas inhalation and we could get RI-angiograms with a good resolution using a positron-camera. This combination method is safe and comfortable for patients because it is entirely noninvasive.

**Combined Detection for Pulmonary Embolism and Venous Thrombosis of Lower Extremity Using $^{99m}$Tc Labeled Capillary Blockage**


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In western country, venous thrombosis of lower extremity has been important cause of pulmonary embolism and its incidence is quite high. On the other hand, the incidence of pulmonary embolism itself is though to be quite low in our country. Using capillary blockage for radionuclide venography (RNV) as well as lung scintigraphy, we attempted to investigate the relation between venous thrombosis and pulmonary embolisim.

Fourty patients with a symptom of swelling of the lower extremity were investigated. About 10mCi of diluted volume of $^{99m}$Tc MAA or microsphere was introduced into dorsal vein, and standard RNV were taken concerning deep and superficial vein with or without application of tourniquet to the proximal site of ankle. Early dynamic images and late static images were taken, respectively, followed by the standard lung scintigraphy. Additional inhalation scintigraphy was done later, if it was necessary to differentiate pulmonary embolism with other diseases with a perfusion defect.

The criteria for the presence of venous thrombosis was as follow; 1) the presence of stenosis or defect with collateral circulation at the early dynamic images, and 2) the presence of hot spot formation at the late static images. A sole finding of the hot spot formation was evaluated to be false positive and twelve of seventeen cases with the hot spot at calf revealed to be false positive. According to this criteria, thirty five cases of all revealed positive findings, which located mostly in pelvic region (55\%) and in popliteocalf region (44\%). Twelve of all cases revealed the pulmonary embolism, half of these have not any symptom suggestive of this disease, nine of these were with positive RNV findings and remainder of two were with false positive finding at calf region.

In conclusion 25\% of cases with venous thrombosis resulted in pulmonary embolism, which was
the same incidence comparable with the reports in the western country. Hence, whenever indicative, combined RVN and lung scintigraphy for the detection of the thromboembol disease should be necessary also in Japan.

Clinical Use of Xe-133 Clearance Technique in Obliterative Arterial Disease of the Legs
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The clearance of Xe-133 from muscle following is local injection is a measure of blood flow at capillary level, and this technique has attained an everincreasing use in clinical studies. In this paper, some problems of clinical use of this technique for arterial obliterative disease of the leg were studied and the following findings were obtained.

1. The resting muscle blood flow was of little diagnostic or prognostic value. In order to demonstrate the presence of arterial lesions it was necessary to produce a period of hyperemia in the leg.
2. In Xe-133 non-ischemic work method, work load of the ankle should be kept constant. 3. There was a good correlation between clearance curves from the anterior tibial muscle and the degree of calf claudication in 54 limbs with arterial occlusion proximal to the popliteal bifurcation. 6. It was necessary to examine the clearance curves in the gastrocnemius and soleus muscles as well as in the anterior tibial muscle in some cases, especially in limbs with occlusion only in the tibial arteries.
7. With simple flexions of the ankle in the prone position, the reliable clearance curves from the gastrocnemius and soleus muscles could not be gained. When the subjects performed plantar and dorsal flexions 40 times per min lifting the weight of 3.5 kg, good clearance curves from those sural muscles were recorded. 8. In diagnosis of foot claudication, Xe-133 clearance technique applied in the flexor hallucis brevis muscles was applied.

Measurement of Skin Blood Flow Using Local Clearance Method of Xenon-133
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A study was made to determine the skin blood flow in the various region using the local clearance method of Xenon-133. The skin blood flow at the deltoid was measured in 82 patients.

The skin blood flow was estimated from the clearance rate of the first component and the following results were obtained.

1) The first component of the clearance curve was found to reflect the skin blood flow and the second component to reflect the blood flow of the subcutaneous tissue. These findings were supported by sequential images of $^{133}$Xe clearance.
2) A linear decreasing tendency was found to be statistically significant between the blood flow of the skin and subcutaneous tissue and age of the patient. A significant correlation was also found between the skin blood flow and blood flow of the subcutaneous tissue.
3) The rate of successful reconstruction with the deltopetroral flap was found to be low for patients with poor skin blood flow, with a clearance rate of less than 0.07.
4) The skin blood flow of the face was found to be higher in comparison with that of the deltoid.