Studies on Cardiac Function with Scintillation Camera
(5th Report)
—Method of Separate Recording of the Right and Left Cardiac
RI Dilution Curves, and its Clinical Application—

H. Matsuo, Y. Nimura, A. Kitabatake, Y. Hamanaka and H. Abe
First Department of Medicine, Osaka University Medical School, Osaka

Y. Yamada, Y. Shimizu and H. Kawata
Department of Medicine, Osaka Rosai Hospital, Osaka

Separate recording of RI dilution curves of the right and left ventricle was developed employing a gamma-scintillation camera. The serial changes of radioactivity of $^{99m}$Tc within the cardiac chambers were recorded on films with time-lapse camera, by means of the technique of PROGRAMMING SCINTIPHOTOCARIOGRAPHY, which permits one to take scintiphotos of the heart at any phase in a cardiac period. The areas corresponded to the right and left ventricle were determined visually on the serial cardiac scintiphotos. Then, the degree of darkness of the ventricular regions on a film, which showed the concentration of radionuclide, was measured by means of a film densitometer frame by frame. These measurements allowed one to delineate time-concentration curves (RI dilution curves) of the both ventricles, separately. From these curves, cardiac output and pulmonary circulation time, as well as pulmonary blood volume could be calculated. In cases of interventricular septal defect with left to right shunt, the descending slope of the right ventricular curve fell slowly, showing the inflow of the radioactive substance to the right chamber through the defect. In a case of coronary arterio-venous fistula, another peak appeared on the descending slope of the right ventricular curve following the inflow of blood into right atrium through the fistula. On the other hand, cases of interventricular septal defect with right to left shunt revealed the characteristic change on the left ventricular curve, that is, early rise caused by direct inflow from right ventricle, followed another peak by inflow via pulmonary circulation.

Lung Scanning in Aortitis Syndrome and Others

K. Nakagawa and K. Hisada
Department of Radiology and Nuclear Medicine, Kanazawa University, Kanazawa

Lung scanning should be performed in many diseases, where pulmonary blood flow may be affected directly or indirectly, whether abnormal shadows are present in the chest roentgenograms or not. Our aim is to show how much lung scan can aid the radiologist in understanding of the function of the pulmonary circulation.

Lung scannings were performed utilizing radiiodinated macroaggregated albumin ($^{131}$I-MAA) in patients with aortitis syndrome, sarcoidosis, Wegener’s granulomatosis. Two hundred of $^{131}$I-MAA was intravenously. As “$^{133}$Xe-rebreathing technique” 3 mCi of

Presented by Medical*Online
was injected intravenously in the patient with Wegener's granulomatosis.

First, 4 cases with aortitis syndrome were demonstrated. In the chest roentgenograms, there were no abnormal findings, but the lung scan revealed uneven distribution of radioactivity with clear cut "cold" zones, which suggested the presence of the stenosis or obstruction of pulmonary artery branch. After several days, this was confirmed by pulmonary angiography.

Next, a case with Wegener's granulomatosis was presented. No abnormal shadow was seen in the chest film and the lung scan illustrated the uniform distribution of radioactivity. In this patient, "133Xe-rebreathing technique" was performed using the scintillation camera and 133Xe-solution. In the "Wash-out Phase", abnormal hot area was noticed indicating trapping 133Xe gas in respiratory trees.

Finally, in 3 patients with sarcoidosis comparison between lung scan images and the chest roentgenograms. No correlation was found between them.

The Pulmonary Scintigraphic Abnormalities Seen in Aortitis Syndrome
(Second Report)

M. Mohri, H. Morinari, M. Iio, S. Koike and I. Ito
Second Department of Internal Medicine, University of Tokyo, Tokyo

This is our second report (the first report being presented at the 9th Annual Meeting of Japanese Nuclear Medicine) on the scintigraphic abnormalities seen in aortitis syndrome.

Twenty seven patients were studied (2 males and 25 females). Aortography was done in all except for one on whom angiographic study was deferred because of possible pregnancy. Injection of 131I-MAA (0.2 mCi) was made in the supine position. For the interpretation, right to left counting ratios (R/L) in the upper (2nd intercostal space) and in the middle (3rd intercostal space) lung zones were used, the normal ranges being defined as 0.82 R/L 1.15 for the upper zone and 0.92 R/L 1.30 for the middle zone. These normal ranges were obtained from the study of 17 normal pulmonary scintigrams representing the 99.9% confidence limits of R/L ratios.

Results and Discussion: Out of 27 cases, normal scintigrams were seen in only six.

Upper zonal abnormalities were found most frequently, being observed in 18 out of 21 abnormal scans.

In the patients with aortitis syndrome, past history of tuberculosis is not uncommon. Out of 27 cases studied, the old tuberculous scars in the chest X-ray films were noticed in 9, of whom the scintigrams were abnormal in 7. The zones of abnormalities were often coincided with each other indicating the presence of common etiological process, namely tubeculous infection. For the other 14, whether tuberculosis or aortitis syndrome per se is responsible for the scintigraphic abnormalities is undetermined at this moment. Since it is not unreasonable to suspect that tuberculous pulmonary arteritis can trigger the auto-immune processes involving aortic arch and its major branches, further studies should be carried out to prove or disapprove the possible role of tuberculosis as a major cause of this syndrome.