

Studies on Peripheral Circulatory Using Radioisotopes

H. TANEDA, M. INOSAKI, T. KAWAI, Y. OGAWA and, H. AKAGI

Department of Radiology, Osaka Medical School, Takatsuki

Gamma camera and a minicomputer system were used for the studies on the peripheral circulatory movement of xenon-133, which was injected in calf muscle of patients, to pursuit of the diffusion and its direction of flow.

Method:

After the injection of xenon-133 (200–800 μ Ci in 0.5 ml) in calf muscle, the images from gamma camera were recorded on disk-cartridge, displayed the distribution of radioactivity on CRT and also

R.O.I. curves were obtained in 2–10 second interval of 20 frames to 60 frames.

Result:

- (1) The direction of flow of injected xenon-133 in calf muscle was demonstrated clearly on the CRT-display, and the direction of movement was to the heart of the patient.
- (2) The R.O.I. curves showed the same results as displayed on the CRT.

Determinations of Regional Blood Flow in Gangrenous Lesions of Diabetics Using ^{133}Xe and a Scintillation Camera

K. KASAGI and M. INADA

Endocrine Section, Department of Internal Medicine, Tenri Hospital, Tenri

We previously reported on the measurement of the mean blood flow and the mean transit time through the capillary bed of the toes of diabetic patients with a scintillation counter, using ^{133}Xe or $^{99\text{m}}\text{Tc}$ labeled albumin. In the present study, determination of regional blood flow in the foot was made by the AOI method with a scintillation camera VTR on line system.

^{133}Xe saline solution was injected rapidly into the femoral artery of normal subjects and of patients with diabetes mellitus. A collimator equipped with a ratemeter and recorder was placed on the foot, and the changes of ^{133}Xe activities were recorded by the VTR for 30 minutes. Thereafter, the ^{133}Xe clearance curve in each area of interest

(AOI) was reproduced from the VTR. The curve was plotted semilogarithmically and was resolved by the peeling-off procedure into three components. The mean blood flow (MBF, ml./min./100 g.) was calculated as follows: $\text{MBF} = 100 \times \lambda \times \text{Km}$, where λ is the tissue blood partition coefficient and Km is the mean fractional disappearance rate of ^{133}Xe .

Values for the MBF of the toes of diabetic patients with mild neuropathy averaged 11.5 ± 8.5 ml./min./100 g. and were significantly lower than those of the control subjects (Mean \pm SD = 22.1 ± 5.4 ml./min./100 g. $P < 0.05$). Values for the MBF of the toes of one diabetic patient with severe neuropathy (63.7 ml./min./100 g.) and of three diabetic patients with gangrene or ulcer (30.8,