

dominal surgery under general anesthesia with a non-rebreathing system or at the time of portography by using trans-umbilical vein technique. The wash-out curves were obtained by the measurement of the radioactivity over the liver with two 1.5" NaI scintillation detectors mounted in the narrow collimators, which were connected to 400 channel analyzer and the digital printer.

The wash-out curves were evaluated in terms of three exponentials using the manual graphic method and the digital computer (Facom 230-25). The computed procedure has been carried out in FORTRAN IV with the program of Gradient's method. In order to estimate a curve fitting between the obtained data and the simulated data on the computer, we have introduced the Index of Performance (I.P.);

$$F(t) = \sum_{n=1}^n a_i \cdot e^{-k_i t} \dots\dots\dots(1)$$

$$I.P.(\text{minimum}) = \sum_{n=1}^n |D_i - F(t_i)| \dots\dots(2)$$

where a_i , k_i are constant, t is time (minute), and D is obtained data.

The computer program was set to minimize the Index of Performance, and this processing technique was called Gradient's method. A linear relationship was found to exist between the computed and the manual graphic values.

The advantages of computation analysis as compared with manual technique are as follows.

1) There is no necessity of replotting the data on semilog scale.

2) Computed automatic fitting is possible to make the objective determination on number of exponentials.

3) Speedy and relatively accurate estimation is clearly observed.

Muscle Blood Flow Measurements with ^{133}Xe and $^{99m}\text{TcO}_4$ in Patients with Muscular and Nervous Diseases

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The purpose of this paper is to present the results of measurements of blood flow in the anterior tibial muscle by using ^{133}Xe and ^{99m}Tc -pertechnetate in healthy subjects and in patients with muscular and nervous disorders, and to discuss their applications and limitations.

Six healthy subjects and 25 patients with progressive muscular dystrophy, amyotrophic lateral sclerosis, myelitis, polyneuritis and other neuromuscular disorders were studied.

Chronological radioactivities in the anterior tibial muscle following the intramuscular injection of 100 μCi (0.05–0.1 ml) of a saline solution of ^{133}Xe and a ^{99m}Tc pertechnetate solution were measured with a NaI crystal and plotted on the semilogarithmic paper.

After measuring the resting clearance-rate for 5 minutes, a cuff placed just above the knee was rapidly inflated to a pressure of about 270 mmHg. Following a 2-minute ischemia, the cuff was deflated, and during the subsequent stage of reactive hyperemia the clearance rate was measured for 10 to 20 minutes. Clearance curve following deflation consists of 2 components—rapid phase with a half-time ($T_{1/2}$) of around 10 seconds (phase 2) and slow phase with $T_{1/2}$ of 5 to 20 minutes (phase 3)—.

In healthy subjects, $T_{1/2}$ of phase 2 ranged from 5 to 13 seconds. In patients with marked muscle atrophy, it prolonged, although it was widely distributed and overlapped each other. $T_{1/2}$ of phase 3 was distributed more

widely than that of phase 2. $T_{1/2}$ of phase 2 by both ^{133}Xe and $^{99\text{m}}\text{TcO}_4$ reflected the clinical status, EMG findings and histological findings of muscle in patients with progressive muscular dystrophy. After hyperbolic treatment in cases with progressive muscular dystrophy, reduced $T_{1/2}$ of phase 2 and 3, which suggested the increase in muscle blood flow, was observed.

Both ^{133}Xe and $^{99\text{m}}\text{TcO}_4$ clearance were well correlated in a series of 26 simultaneous applications of the two isotopes by intramuscular injection.

It might be concluded that muscle clearance study with ^{133}Xe and $^{99\text{m}}\text{TcO}_4$ is useful for grasping the course of diseases and finding the effect of treatments.

Pericutaneous ^{198}Au Colloid Lymphography in Childhood

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In childhood, the lymphography is a important method for the planning of radiotherapy and diagnosis of abdominal malignant tumors, as malignant lymphoma, testicular tumor etc. Generally, the lymphography is very difficult to perform in the age under 2 years old, and the RI-lymphography becomes increasingly important.

We have done RI-lymphography on 26 children and 7 adult cases with malignant tumors. No marked change was observed in normal pelvic and abdominal lymph node pattern, in size, number and relative activity between child and adult. Profile scanning seems to offer more diagnostic value to study the timely transition of ^{198}Au colloid through lymphatic chain. In the majority of children's cases definite activity appeared in the liver

within 4 hours, whereas only minimum activity was observed in the liver after 24 hours. Timely transit of ^{198}Au colloid was found faster in the child than adult.

The shape of the liver in childhood changed remarkably with growth. Three dimensional measurement of the liver were done to compare with the standard liver weight with growth, and thus it has become possible to calculate the liver weight from the liver scan. Liver uptake study with age, and the dynamic study of lymphatic channel in children should await future study. The use of short-lived RI is recommended, as the transition of ^{198}Au colloid through abdominal lymph channel in childhood is completed within 4 hours, faster than that of the adult.