Measurement of Regional Cerebral Blood Flow by Clearance of ^{85}Kr — Observation of the Initial Part of Clearance Curve —

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The correct evaluation of the height of a clearance curve is required to calculate cerebral blood flow by the method of ^{85}Kr clearance. In this respect, we investigated the initial part of the clearance curve, recording it at a high speed and comparing it with a RISA dilution curve which could indicate the traveling isotope bolus in the vascular bed of the brain.

Following intracarotid injection of ^{85}Kr dissolved in 3 ml fo saline, the gamma activity was traced by a scintillation detector which was coupled to the ratemeter with a time constant of one second and was recorded at a high paper speed (18 cm per minuite)

A RISA dilution curve was made from the same area of ^{85}Kr clearance curve was obtained, following the intracarotid injection of RISA dissolved in 3 ml of saline.

Injection of these isotopes were performed at a constant rate (3 ml per 2 second) to make a uniform bolus.

In all of three patients who showed usual clearance curves, a brief initial plateau of maximal counting rate, lasting for a few seconds, was found by high speed recording.

This plateau might result from the traveling bolus of isotope in cerebral blood vessel. This could be supported by the finding that the duration of the plateau was approximately equal to the traversal time of the bolus which could be indicated by the dilution curve of RISA.

In all of 10 cases of arteriovenous malformation, a characteristic initial peak followed by slower falling phase was recorded from the lesion. In plotting the counting rate on semi-logarythmic paper against time, the initial part of the curve could be resolved into two components; one of them might reveal the slower phase, while the other the initial peak. The component representing the initial peak had a smaller T ½ than that of RISA dilution curve. The initial peak, therefore, might represent the traversing bolus through the arteriovenous shunt.

For this reason, this peak must be disregarded in measuring blood flow through brain tissue.

In some cases of angioblastic meningioma and glioma, a small initial peak similar to that in arteriovenous malformation was observed. The T ½ of the peak, however, was much larger than that of the RISA dilution curve; this might reflect the clearance of the compartment with high blood flow rate.

Topographical Peculiarity of the Distribution of ^{65}Zn in the Brain

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Topographical peculiarity of the distribution of ^{65}Zn in the brain was investigated in male mice and rats. The ^{65}Zn activity at 24 and 48 hours after subcutaneous injection of $^{65}Zn\ Cl_2$ had practically the same value in each part of the brain. At the late intervals (240 and 720 hours), however, the different parts of the brain were divided according to their ^{65}Zn activity (dose per gram) into three groups. The cerebrum and the cerebellum showed higher ^{65}Zn activity, while the activity in the diencephalon and the midbrain, pons and medulla oblongata was lower. The ^{65}Zn activity in the hippocampus and dentate

gyrus was highest; its relative ^{65}Zn activity, expressed as the ratio of ^{65}Zn in each part/whole brain, amounted to 180% at the 720 hour interval. On the other hand, autoradiographical study showed that intracerebrally injected ^{65}Zn was accumulated in the marginal part of the stratum radiatum of h_4, h_5 area which is contact with the stratum pyramidale of the hippocampus and the stratum multiforme of the dentate gyrus at 120 hours after injection. However, other parts did not show any distinct localization of ^{65}Zn. These observations indicate that ^{65}Zn has a characteristic affinity for the hippocampus and dentate gyrus, where zinc has been shown to be displayed histochemically.

The relative ^{65}Zn activity in the hippocampus and dentate gyrus, examined at 240 hours after subcutaneous injection of ^{65}Zn, was changed under some conditions. Caudal resection of the pancreas decreased the relative ^{65}Zn activity, while unilateral adrenalectomy produced its marked increase with a decrease in ^{65}Zn activity in whole brain. Splenectomy, partial resection of the liver and castration had little effect on it.

Absorption and Excretion of Water-Soluble ^{131}I-NMG Ioth in Positive Contrast Ventriculography

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Water-soluble media, 60% methylglucamine iothalamate (NMG Ioth) was used in our study on positive contrast ventriculography.

A total of 14 cases, 7 males and 7 females, between 3 months and 55 years old were clinically performed. About 5 ml. of NMG Ioth was diluted with same volume of ventricular fluid by ventricular puncture, injected into the ventricle within 30 to 60 seconds, and then lateral and straight axial radiographs were taken. Accurate visualization of the ventricular system (lateral, third and fourth ventricles, aqueduct of Sylvius and cysterna magna) was achieved immediately after the injection. This ventriculography had an advantage to reveal the precise placement of mass lesions in the ventricle, diencephalon or crebellopontile angle, and also disturbance of the cerebrospinal fluid circulation.

NMG Ioth containing 100 microcurie of radioactive iodine (^{131}I), was injected in order to see its absorption and excretion, and measured by a scintillation detector set on the temporal part. The remarkable decrease of ^{131}I was immediately after the injection and the gradual decrease in 20 minutes. It usually took 6 to 45 minutes to decrease in half volume of ^{131}I in the skull. At the same time a scintillation detector was set near the heart to measure ^{131}I absorpted into the blood. It resulted a mound in 2 minutes and gradual upward in 10 minutes in a curve of absorption.

The best visualization of ventriculography was produsedimmediately after the injection and disappeared within 2 hours in most cases without disturbance of the cerebrospinal fluid circulation. The maximum blood concentration and urinary excretion were shown in 5 hours after the injection. While in cases with occlusion in the cerebrospinal fluid system, absorption of ^{131}I was delayed.

Positive contrast ventriculography with water-soluble media, NMG Ioth was concluded not only to be accurate and brief method with little complications, but also the media was rapidly absorbed and excreted.