

tumor including meningioma (5), astrocytoma (1), glioblastoma (3), oligo dendroglioblastoma (1), acoustic neurinoma (3), secondary brain tumor (10), histological unknown (1), and other lesions which included A-V malformation with intracerebral hematoma (2), A-V malformation without intracerebral hematoma (2), subdural hematoma (1), brain abscess (1), giant cell tumor (1), secondary bone tumor (3).

The target-to-nontarget intensity ratio in cerebral infarction was greater with ^{99m}Tc -EHDP than with ^{99m}Tc -pertechnetate in 27 cases. In contrast to cerebral infarction, the target-to-nontarget intensity ratio was greater with ^{99m}Tc -pertechnetate than with ^{99m}Tc -EHDP in 14 cases.

In conclusion, these results indicate that this dual method is helpful in differentiating cerebral tumor from cerebral infarction.

Functional Image of Regional Cerebral Blood Flow (1) Method

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The functional imaging of the regional cerebral blood flow (rCBF) was developed using an Anger-type gamma camera and an on-line minicomputer system.

The data-processing system consists of an I/O unit, a CPU (16 KW), a MT, a typewriter and a CRT display. The programs were written in an assembly language and stored in the initial 4K words of the core memory and the remaining 12K words were allocated to the images and the wash-out curves.

In this study, 3–5 mCi of Xe-133 in saline solution was injected rapidly into the internal carotid artery and 130 serial digitalized images of one second frames were stored on the MT. Hyperventilation, CO₂ inhalation and/or vascular compression tests, if necessary, were performed afterwards and the serial images after the repeated Xe-133 injection were also stored on the MT.

The data were processed as follows; For the first place, the processing area was set in the accumulated image displayed on the CRT. Then the wash-out curves in every 8 mm*8 mm element in the area were extracted from the serial images on the MT. The blood flow rates in every element were calculated as rCBF-initial (ml/100 g/min) using the least square method after the logarithmic conversion of the curves. The statistical errors due to the random nature of the radioactive decay were then calculated and expressed in standard deviations of the finally calculated values.

The calculated parameters were rearranged in the corresponding matrices and displayed on the CRT in a gray map. Type printings of them in 2 digitdecimal numbers in a map format were also carried out. The changes of rCBFs before and after the tests were also displayed and printed out in both absolute differences and percent changes.

Functional Image of Regional Cerebral Blood Flow (2) Clinical Applications

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The clinical applications of rCBF functional image were performed in normal volunteers and 40 patients with intracranial disease.

The gamma camera was set at the skull. 5 mCi of Xe-133 in saline solution was injected into the internal carotid artery at rest and after each test