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A CLINICAL STUDY WITH POSITRON EMISSION TOMOGRAPHY PRELIMINARY RESULTS IN STROKE. N.Kamata, F.Shishido, K.Uemura, A.Inugami, T.Ogawa, T.Yamauchi, Y.Kawata, I.Kanno and M.Murakami. Research Institute of Brain & Blood Vessels-AKITA, Akita.

It is important to understand both cerebral metabolism and perfusion in stroke, particularly in the treatment of acute stage. Local cerebral blood flow (LCBF), oxygen utilization (LCMR₂), oxygen extraction rate (LOER) and cerebral blood volume (LCBV) were measured in patients with stroke at various stages. Our new positron tomograph; HEADTOME-III and a baby cyclotron system were used. The results of those measurements were compared with morphological findings of X-ray CT.

Generally, there are some discrepancies between the morphological findings of X-ray CT and physiological findings appeared on PCT. Discrepancy between LCBF and LCMR₂ was also noted on many cases with acute phase of the disease. It was tended that the decrease of LCBF on the very fresh lesion was more marked than that of LCMR₂, and in the next phase contradictory phenomenon, "luxury perfusion", was noted. In chronic phase, both LCBF and LCMR₂ of the stroke lesion are reduced equally.

The metabolic abnormalities involved a large area of brain than the abnormalities in tissue noted on X-ray CT in most cases. The results studied by ¹⁸F-FDG will be presented.

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Comparative Study of Brain Tumors by nuclear Medicine-Positron Emission CT, Brain Scan, and rCBF measurement-. T.Takahashi, S.Tamachi, F.Shishido, Y.Tateno, T.Yamasaki, H.Ikehira, H.Nakamura, K.Sueyoshi, A.Yamaura, N.Yui, F.Kinoshita and M.Koakutsu. 1)Chiba Cancer Center Hospital, 2)National Institute of Radiological Sciences, 3)Chiba University, Chiba.

Positron emission CT with N-13-ammonia, brain scan with Tc-99m-gluconate, rCBF measurement with Xe-133 by intracarotid injection calculated by height over area method and X-ray CT were performed on six patients with brain tumor. Six patients were glioblastoma (1case), astrocytoma grade I (1case), astrocytoma grade II (2cases), metastatic brain tumor (1case) and malignant ependymoma (1case). Glioblastoma multiforme showed prominent accumulation of Tc-99m-gluconate and N-13-ammonia in the tumoral tissues, and also showed high value of rCBF in the same area. Low grade astrocytomas showed either lowered accumulation or less prominent accumulation rather than that of glioblastoma multiforme in both of Tc-99m-gluconate and N-13-ammonia. But rCBF studies showed that rCBF of low grade astrocytomas were increased in spite of the lowered mean flow. Metastatic brain tumor was clearly accumulated in Tc-99m-gluconate but was not accumulated in N-13-ammonia and rCBF value was slightly lowered. Malignant ependymoma showed high accumulation both of Tc-99m-gluconate and N-13-ammonia.

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EVALUATION OF CEREBRAL CIRCULATION AND METABOLISM IN PATIENTS WITH BRAIN TUMOR BY POSITRON COMPUTED TOMOGRAPHY. S.Tamachi, F.Shishido, H.Ikehira, Y.Tateno, T.Yamasaki, T.Irie, O.Inoue, K.Tamate, K.Suzuki, A.Yamane, N.Fukuda, T.Takahashi, A.Yamaura, K.Yoshida, and K.Kodama. National Institute of Radiological Sciences. Chiba Cancer Center Hospital. Chiba University.

To evaluate the cerebral circulation and metabolism in patients of brain tumor, we used positron CT with N-13-Ammonia (13 cases), C-11-carbon monoxide (3 cases), F-18-fluorodeoxyglucose (4 cases), O-15-oxygen gas (8 cases), O-15-carbon dioxide (6 cases). Some patients were examined with several tracers. Brain tumors are glioblastoma multiforme (1 case), astrocytoma Grade 1 (1 case), grade 2 (4 cases), cerebellar astrocytoma (1 case), thalamic glioma suspect (1 case), malignant ependymoma (1 case), metastatic brain tumor (4 cases), meningioma (3 cases), miscellaneous (3 cases). In most benign astrocytomas and metastatic brain tumors, accumulation of the tracers (Ammonia, FDG, Oxygen gas, Carbon dioxide) were poor, whereas in meningioma, Ammonia and Carbon monoxide were accumulated significantly. In peri-tumoral edema, accumulation of tracers were poor, and it is difficult to demarcate benign tumor from brain edema with XCT and PET.

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POSITRON EMISSION TOMOGRAPHY OF APHASIA. T.Kato, T.Ujike, S.Kitamura, T.Soeda and A.Terashi. Nippon Medical School. M.Iio, Nakano National Hospital.

Patients with aphasia due to cerebrovascular disease were studied by positron emission tomography (PET) using C-11-carbon dioxide and C-11-glucose. Our subjects were three patients with motor aphasia, four with sensory aphasia and three with amnesic aphasia. During scanning patients closed their eyes and kept free from any stimulation. There were no discrepancies between images by C-11-glucose and C-11-carbon dioxide. Radioactive abnormalities of PET images occupied larger regions than shown by X-CT findings. Decreased activity of C-11 was presented in thalamus in seven patients. In two cases of motor aphasia, two cases of sensory aphasia and two cases of amnesic aphasia, each area where C-11 activity is low by PET were shown as abnormal density region by X-CT. It were in Broca area, Wernicke area and angular gyrus respectively. In one patient with sensory aphasia, X-CT showed the lesion in basal nucleus, but PET indicated the area of low activity of C-11 in basal nucleus and temporal lobe. In this case, the finding of PET agrees on the view what is called of the responsible area of aphasia. We conclude PET is useful means to make pathophysiology of aphasia clear.