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POSITRON EMISSION COMPUTED TOMOGRAPHY IN SENILE DEMENTIA — QUANTITATIVE ANALYSIS OF CEREBRAL CIRCULATION AND OXYGEN METABOLISM USING THE O-15 STEADY STATE METHOD. T.Yamaguchi, F.Shishido, T.Ogawa, A.Inugami, K.Suzuki, M.Murakami, I.Kanno and K.Uemura. Research Institute for Brain and Blood Vessels—Akita, Akita.

Regional cerebral blood flow(rCBF), regional cerebral metabolic rate of oxygen (rCMRO<sub>2</sub>) and regional oxygen extraction fraction(rOEF) were measured on patients with senile dementia using the O-15 steady state method. Regional cerebral blood volume (rCBV) was also measured on each patient, and with the rCBV values, the correction was made for rCMRO<sub>2</sub> and rOEF, using the method described by Lammerstma.

In the present study, regional values were analysed using the circle or ellipsoid regions of interest(ROI) set at various regions on the 4 functional images(rCBF, rCMRO<sub>2</sub>, rOEF and rCBV), which were displayed on the imaging-analysis system named "VAX-DEANZA" system.

rCBF and rCMRO<sub>2</sub> were generally lower, compared with those values of the control group, but in the cerebellum and the basal ganglia, rCBF and rCMRO<sub>2</sub> were relatively preserved. rOEF was relatively higher than the control value, and rOEF in cortical areas, particularly in the frontal cortex, was higher than the cerebellum, the basal ganglia and the thalamus.

Relationship between the results and the type or severity of dementia was discussed.

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POSITRON EMISSION TOMOGRAPHIC STUDIES USING O-15 IN MULTI-INFARCT DEMENTIA. T.Ujike, T.Soeda, S.Kitamura, T.Kato, A.Terashi M.Iio\* 2nd Dept. of Internal Medicine, Nippon Medical School, Tokyo. \*Dept. of Radiology, Nakano National Hospital, Tokyo.

Three elder normal subjects and 10 patients with multi-infarct dementia(MID) were studied about cerebral blood flow and oxygen metabolism by Positron Emission Tomography using O-15. The diagnosis of MID was done according to the Hachinski's ischemic score and X-ray CT findings. All cases of MID were mild dementias. CBF, OEF and CMRO<sub>2</sub> were measured by the steady state technique. The values of CBF and CMRO<sub>2</sub> of elder normal subjects in each region were as follows; frontal cortex:60.8,4.15,temporal:68.8,4.89, occipital:55.0,3.86,parietal:50.8,3.49 and thalamus:63.0,3.66. Those of MID were as follows;frontal:30.0,2.26,temporal:36.7, 2.73,occipital:30.2,2.50,parietal:35.4,2.62, and thalamus:37.3,2.36. The rCBF and rCMRO<sub>2</sub> of MID in frontal,temporal,occipital cortex and thalamus were significantly low compared with those of normal subjects. The decrease of CBF and CMRO<sub>2</sub> in MID were remarkable in frontal and temporal cortex, especially in frontal cortex. The impairment of mental functions in MID should be caused by the decreased activities of frontal cortex. Two cases of MID were examined before and after treatment, and they showed the increase of CBF and CMRO<sub>2</sub> after treatment.

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FOCAL AND EXTRA-FOCAL CBF AND OXYGEN METABOLISM IN THE PATIENTS WITH CEREBRAL ISCHEMIA. K.Uemura, F.Shishido, A.Inugami, T.Ogawa, T.Yamaguchi, Y.Kawata, I.Kanno, M.Murakami, K.Tagawa, I.Sayama. Research Institute for Brain & Blood Vessels—AKITA.

Regional cerebral blood flow(rCBF), oxygen consumption (rCMRO<sub>2</sub>) and oxygen extraction fraction(rOEF) of the ten patients with cerebral ischemia were quantitatively evaluated using Headtome III and the O-15 steady-state method. Circular ROIs 2 cmφ were set at about 30 areas of the brain slices of each subjects.

The results were as follows: 1) The threshold level for brain tissue necrosis was estimated 15 ml/100μl/ml of rCBF and 1.5 ml/100 ml/min of rCMRO<sub>2</sub>. 2) In the acute phase, the luxury perfusion or misery perfusion was found in the infarcted lesion and the adjacent region. The later was prominent within 24 hours after onset. 3) Even in the chronic phase, some patients with an occlusion or a severe stenosis of a main arterial trunk showed mild increase of rOEF of those arterial distribution. 4) rCBF and rCMRO<sub>2</sub> of the brain tissue except the infarction and the adjacent area tended decreasing to various degree, and these were well coupled but, in most cases, rOEF of there were seemed to increase slightly.

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Study of rCBF in Malignant Brain Tumors with Intracarotid Injection Method Y.Ozawa, T.Takahashi, K.Sueyoshi, S.Mine, N.Yui, F.Kinoshita, M.Koatsuku, Chiba Cancer Center Hospital, Chiba

Using Xe-133 intracarotid injection method, two dimensional rCBF of the malignant brain tumors was measured. Additional studies other than rCBF were CTscan and cerebral angiography. Studies were undertaken using a gamma camera(Toshiba GCA-70A) and a data processor(Toshiba GMS-80A).rCBF was calculated by the height over area method. 38 examinations were performed on 28 patients including 14 metastatic tumors, 6 low-grade astrocytomas, 6 high-grade astrocytomas, one malignant lymphoma and one malignant ependymoma. The mean CBF was reduced in all groups, and markedly reduced in the metastatic tumor group and the high-grade astrocytoma group. The metastatic tumors showed relative ischemia in the lesion, while the rCBF in the lesion of the high-grade astrocytomas was elevated, that was closely related to the A-V shunt in cerebral angiography. The low-grade astrocytomas failed to show a constant tendency of the mean CBF and the rCBF in the lesion. As the malignant lymphoma and the malignant ependymoma were deeply seated, valuable information was not obtained. It was suggested that the broad and marked edema is one of the cause of the mean CBF reduction of the metastatic tumors and the high-grade astrocytomas.