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REGIONAL CEREBRAL BLOOD FLOW AND OXYGEN METABOLISM IN PATIENTS WITH INTRACEREBRAL HEMATOMAS. K.Uemura, S.Higano, F.Shishido, A.Inugami, N.Tomura, H.Fujita, I.Kanno and M.Murakami. Research Institute for Brain and Blood Vessels-Akita, Akita.

Using positron emission tomography, regional cerebral blood flow (CBF), oxygen extraction fraction (OEF) and oxygen consumption (CMRO<sub>2</sub>) were studied on 21 subjects with hypertensive intracerebral hematomas.

Results: 1) The study showed limited extension of an ischemic zone around a hematoma and less frequent appearance of luxury perfusion (2/21: 9.1 %) than that in cerebral infarct. 2) In the normodensity brains with smaller hematomas, almost homogenous and mild reduction of CBF with normal OEF were found. Those were thought to be due to remote effect of the lesions. 3) Diffuse reduction of CBF with increased OEF in the normodensity brain became to marked in the cases with a hematoma more than 4.5 cm in the maximal diameter.

Comment: With the result of the present PET study, surgical evacuation would be indicated for the hematoma more than 4.5 cm in diameter.

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VASODILATION IN LOW PERFUSED BRAIN TISSUE EVALUATED BY DIRECT CORRELATION BETWEEN OXYGEN EXTRACTION FRACTION AND PaCO<sub>2</sub> VASO-REACTIVITY MEASURED BY PET. I.Kanno, K.Uemura, M.Murakami, A.Inugami, F.Shishido and I.Sayama. Research Institute for Brain & Blood Vessels-AKITA, Akita.

Elevation of oxygen extraction fraction (OEF) and accompanied vasodilation were observed in low perfused brain tissue. The <sup>15</sup>O-gas inhalation steady state study and serial two or three H<sub>2</sub><sup>15</sup>O autoradiographic studies were successively carried out on 15 patients with cerebrovascular disease. Vascular reactivity (VRCO<sub>2</sub>) for hyper-/hypocapnia were defined by the absolute percent change of CBF per mmHg change of PaCO<sub>2</sub>. Total 19 hyper- and 18 hypocapnic measurements were performed together with OEF measurement. In each patient 30-40 ROI data were plotted with OEF on the abscissa and VRCO<sub>2</sub> on the ordinate, and their correlations were calculated. From the data which correlated in the above calculation, OEF at the cross-point (OEFc) of the regression line with VRCO<sub>2</sub>=0 was evaluated. OEF were ranged from 0.28 to 0.66. In hypercapnic studies 79 % (15 of 19) revealed negative correlations, and a mean OEFc of these was 0.54±0.09, which might correspond to the OEF at maximum vasodilation point. In hypocapnic studies only 28 % (5 of 18) showed positive correlations, which showed OEF at vasoparalysis point might be beyond the present observation range.

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CEREBRAL CIRCULATION AND OXYGEN METABOLISM OF THE CHRONICALLY OBSTRUCTIVE CAROTID DISEASE - SOME CONSIDERATION TO THE INDICATION FOR THE BYPASS SURGERY. S.Higano, K.Uemura, A.Inugami, F.Shishido, N.Tomura, H.Fujita. Research Institute for Brain and Blood Vessels-AKITA, Akita.

Twenty-eight patients with a chronic occlusion or a severe stenosis of the internal carotid artery or horizontal portion of the middle cerebral artery, and without a massive low density area on CT were studied using PET and the <sup>15</sup>O-steady-state method to measure cerebral circulation and oxygen metabolism.

In most patients, cerebral blood flow (CBF) and oxygen consumption rate (CMRO<sub>2</sub>) in the carotid distribution were diffusely decreased in both hemispheres, but those of the lowest perfusion tissue in the affected hemispheres were mostly not less than the levels of thresholds causing tissue necrosis. Only 3 of 28 patients revealed critically decreased CBF maintaining CMRO<sub>2</sub> with increased oxygen extraction fraction (OEF).

The coupled decrease of CBF and CMRO<sub>2</sub> suggests that the structurally normal tissue perfused by diseased artery would have been damaged to some degree by chronically decreased CBF. In order to get the successful results of the EC/IC by pass surgery, we should choose the patients with maintaining CMRO<sub>2</sub> by increased OEF. In this view, only 3 of 28 subjects (12 %) will be indicated for the surgery.

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METABOLIC APPROACH TO GLIOMA -- INVESTIGATION BY POSITRON EMISSION COMPUTED TOMOGRAPHY --. Y.Tsurumi, M.Kameyama, R.Shirane, J.Ito, K.Muraishi, R.Katakura, J.Suzuki, \*M.Ito, \*Y.Abe, \*\*S.Watanuki, \*\*T.Ido. Division of Neurosurgery, Institute of Brain Diseases, \*Department of Radiology and Nuclear Medicine, Institute for Tuberculosis and Cancer, \*\*Division of Radioisotope Research, Cyclotron Radioisotope Center, Tohoku University.

Many reports about glioma have been done using positron emission computed tomography, however, the investigations into glioma have not been attempted from the view points of multiple metabolic factors. Here, we report the results of oxygen metabolism by <sup>15</sup>O<sub>2</sub>, <sup>15</sup>C<sub>5</sub>-O<sub>2</sub>, glucose metabolism by <sup>18</sup>F-fluoro-deoxyglucose, amino acid metabolism by <sup>11</sup>C-methionine and nucleic acid metabolism by <sup>18</sup>F-fluorodeoxyuridine (FdU) in 21 cases of glioma. In all cases, CMRO<sub>2</sub> were low. In glucose metabolism, the grade of malignancy tended to be correlated with CMRgl, however, there were exceptions. Higher methionine uptake was revealed not only in high grade but also low grade cases. FdU uptake was indicated to be high in only high grade glioma cases. The investigations of metabolic movements in glioma may open a new field towards the characteristic diagnosis of glioma.