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ANALYSIS OF REGIONAL CEREBRAL BLOOD FLOW AND METABOLISM IN PATIENTS WITH CEREBRAL TUMOR USING POSITRON EMISSION TOMOGRAPHY. T.Ogawa, F.Shishido, A.Inugami, T.Yamaguchi, I.Kanno, M.Murakami, H.Sasaki, M.Kowada* and K.Uemura. Research Institute for Brain and Blood Vessels-AKITA, Akita University*.

Positron emission tomography enable to investigate not only regional cerebral blood flow but also regional cerebral metabolism in vivo. Using a high resolution positron emission tomograph (HEADTOME-III), we have been studying regional cerebral blood flow and metabolism in patients with a cerebral tumor, mainly glioma. In this study, 15 patients with cerebral glioma were studied with the ^{15}O steady state inhalation technique and the F-18-fluorodeoxyglucose (^{18}FDG) method. From this study, we were able to get the quantitative values of regional cerebral blood flow (rCBF), regional cerebral oxygen extraction fraction (rOEF), regional cerebral metabolic rate of ^{15}O (rCMRO₂), regional cerebral blood volume (rCBV) and regional cerebral metabolic rate of glucose (rCMRGl) about the tumor tissue and peritumoral tissue.

As the result, deference between oxygen and glucose metabolism was observed in tumor tissue. That is to say, in high grade glioma, low oxygen metabolism and high glucose metabolism were observed. This finding is in accordance with experimental tissue culture study.

I will present our results of the analysis.

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INVESTIGATION OF REGIONAL CEREBRAL BLOOD FLOW AND GLUCOSE METABOLISM IN BRAIN TUMOR BY PET. T.Tsukiyama¹, H.Kumakawa¹, H.Oohata¹, T.Tsubokawa¹, and M.Iio². Nihon university School of Medicine¹ and National Nakano Hospital².

It is important to know alteration of both regional cerebral blood flow and glucose metabolism in brain tumor for selection of adequate treatment. We performed PET in thirty patients with brain tumor (Glioma:18, Meningioma:9, Malignant lymphoma:2, Melanoma:1) using continuous inhalation $^{15}\text{O}_2$ and C^{15}O_2 for regional cerebral blood flow (r-CBF), oxygen extraction fraction (r-OEF) and oxygen consumption (r-CMRO₂) and oral administration of ^{11}C -glucose for regional distribution of glycolytic metabolites (r-GL). In benign glioma, r-CBF and r-GL decreased with coupling of them. But, in malignant glioma, they showed uncoupling phenomenon. The r-OEF in tumor area consistently exhibit a lower value than of the surrounding normal brain tissue. The positive correlation between glioma grade and glycolytic metabolites was found by ^{11}C -glucose PET study. In many of tumor area, low perfusion, hypoxic metabolism and high glucose metabolites were observed. We think they showed lactic acid produced by anaerobic metabolism.

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DIAGNOSIS OF BRAIN TUMORS USING A POSITRON CT.

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We reported mismatching between blood flow and metabolic rate of oxygen in human brain tumors measured with positron tomography. But the relationships among metabolism, i.e. glucose, oxygen or protein metabolism are not well evaluated yet. The purpose of this report is to clarify above parameters using C^{15}O_2 , $^{15}\text{O}_2$, ^{11}CO , ^{18}FDG , ^{11}C -methionine. The preliminary results suggested that accumulation pattern of each isotope are quite different from one another, and there may be some discrepancies among flow, glucose and protein metabolism.

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CEREBRAL BLOOD FLOW OF BRAIN TUMOR PATIENT. I.Sunada, N.Shirahata, K.Abe, T.Tsuruno, H.Yasuda, H.Ochi¹, K.Sone², A.Hakuba² and S.Nishimura². Neurosurgery of Yamamoto-Daisan Hospital, Nuclear medicine* and Neurosurgery** of Osaka City University. Osaka.

Cerebral blood flow was measured in 18 brain tumor cases using Xe-133 inhalation and single photon emission computed tomography with TOMOMATIC 64. The tumors are meningioma (9), glioblastoma multiforme (4), glioma (3), neurinoma (1) and metastatic tumor (1). 8 men and 10 women were included in the group and their ages were from 22 to 73 years (mean 46.1 years). The locations of tumors were frontal (3), temporal (1), parietal (1), frontoparietal (2), parietooccipital (2), temporooccipital (1), sphenoid ridge (3), petroclival (1), thalamus (1) and middle fossa (1). 5 patients were showing symptoms of increased intracranial pressure. Focal neurological deficits caused by the tumors were noted in 15 patients and the tumor stain was recognized on the cerebral angiogram in 9 patients. Cerebral blood flow studies showed abnormalities in 15 patients. Blood flow at tumor sites showed increase in 3, decrease in 11 and normal value in 4. Regarding the flow surrounding tumors, 4 showed low flow and low flow was noted in the portions remote from the tumor in 7 cases. The abnormalities of blood flow were improved following steroid administration or removal of tumors. There was no constant relation between nature and location of tumors and cerebral blood flow.