

88

UPTAKE OF F-18-FdUrd and F-18-FUra in the EXPERIMENTAL BRAIN TUMOR. Y.Tsurumi, M.Kameyama, R.Shirane, R.Katakura, J.Suzuki, *K.Ishiwata, *M.Murakami and *T.Ido. Division of Neurosurgery, Institute of Brain Diseases, *Cyclotron RI Center, Tohoku Univ. Sendai.

We have investigated the uptake of F-18-fluorodeoxyuridine (FdUrd) and F-18-fluorouracil in the experimental rat brain tumor (rat glioma C6) by autoradiography and the direct tissue counting technique. The clear brain tumor images were obtained in both cases, however, the brain tumor image looked clearer in the FdUrd cases rather than FUra cases. Also the tissue counting reveals that the uptake of FdUrd in the brain tumor was higher than that of FUra with statistically significant difference.

The autoradiographic technique using positron emitting radionuclide tracer has following characteristics: prompt result with fine resolution can be obtained, applicable to small animal experiment and the result can be applied directly to the analysis of positron CT data because it has the same theoretical background with positron CT and uses the same tracers.

Our result indicates that F-18-FdUrd would be more useful for the clinical application to the positron CT study of brain tumor patients.

89

A NEW METHOD FOR ANALYZING LOCAL CEREBRAL GLUCOSE METABOLISM USING POSITRON CT. M.Endo, T.Matsumoto, T.A.Iinuma, N.Fukuda, F.Shishido, Y.Tateno, T.Yamasaki, T.Takahashi and S.Tamachi. National Institute of Radiological Sciences and Chiba University School of Medicine. Chiba.

Recently Phelps et al. (UCLA) has developed a method for analyzing local cerebral metabolic rate of glucose (LCMRGlc) using positron CT. They calculated LCMRGlc from equilibrium distribution of 18-F-FDG and their method has become a standard technique. But it has two problems, one of which is necessity of $C_p(t)$, that is time-function of FDG concentration in artery. The other problem is using the normal values of rate constants, which results significant errors in low metabolic state like ischemia. We proposed a new method which analyzed LCMRGlc from time variation of FDG distribution after injection. With our method it is not necessary to use normal rate constants and $C_p(t)$. We analyzed a normal case with the UCLA method and the present method, and obtained a very good agreement of the both LCMRGlc's. They have a linear relationship with the coefficient of correlation = 0.99. With the UCLA method LCMRGlc is 5.31 for the average value of gray matter and 3.90 for white matter. With the present method LCMRGlc's are 5.36 and 3.72 for gray and white matter, respectively.

90

MEASUREMENT OF REGIONAL CEREBRAL BLOOD FLOW, OXYGEN AND GLUCOSE UTILIZATION RATE IN PATIENTS WITH CEREBRAL GLIOMA AND STROKE USING O-15 CO₂, O₂ and F-18 FLUORODEOXYGLUCOSE AND POSITRON EMISSION TOMOGRAPHY. J.Hatazawa, T.Matsuzawa. Tohoku Univ. School of Medicine Sendai. C.G.Rhodes, R.J.S.Wise and T. Jones MRC Cyclotron Unit Hammersmith Hospital London UK.

Recent development of positron emission tomography allows the accurate regional measurement of positron emitting isotopes like oxygen-15 CO₂ and O₂, fluorine-18 fluoro-deoxy-glucose (FDG) of which metabolism are well known biochemically.

Measurement of regional cerebral blood flow (rCBF), oxygen extraction (rERO₂) and the rate of oxygen utilization (rCMRO₂) were obtained using ECAT and the steady state oxygen-15 inhalation technique of CO₂ for rCBF and of O₂ for rERO₂ and rCMRO₂.

The rate of glucose utilization (rCMRGlu) was measured using ECAT, ¹⁸FDG and the equation originally developed by Sokoloff.

In patient with cerebral glioma, the mismatching between oxygen and glucose utilization, that is marked decrease of rERO₂ and rCMRO₂, and high values of rCMRGlu equal to gray matter, was observed.

In Patient with early cerebral stroke, rCBF in the lesion was markedly decreased with low rERO₂ which resulted in diminished rCMRO₂. The values of rCMRGlu in the same region was less decreased than that of rCMRO₂.

We conclude from these preliminary studies that anaerobic glucose metabolism exist in both cerebral glioma and early stroke.

91

POSITRON EMISSION CT OF MENINGIOMA WITH CENTRAL LOW DENSITY IN X-RAY CT. T.Tsukiyama, N.Doi, T.Tsubokawa, K.Sato, R.Kamata* and M.Iio**. Nihon University School of Medicine*. Nakano National Chest Hospital**. Tokyo.

Meningioma with central low density in X-ray CT is about 10% out of meningiomas and cystic meningioma is only about 1.2-2.0% of the meningioma in the literatures. The authors have experienced two meningiomas, central low density in X-ray CT. In the first case, central low density was seen 11C-CO₂ homogeneous high uptake area and 11C-GLUCOSE low uptake area in positron emission CT scan (PET). This area was found as lipid tissue on the operation. The pathological diagnosis was meningothelial meningioma. The second case PET scan showed that both 11C-CO₂ and 11C-GLUCOSE were low uptake in the central low density. In the operation, this area was found as xanthochromic cyst. The pathological diagnosis was the same one of the first case. These CT low density area can be related to ischemic central necrosis, lipid tissue and xanthochromic cyst. As a consequence, PET scan is very useful for different diagnosis of central low densities. We consider that the PET study has a value not only for measurement of the cerebral circulation and metabolism, but also for pathological diagnosis of brain tumor.