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COMPARATIVE STUDY OF TUBEROUS SCLEROSIS BY CT, EEG AND POSITRON EMISSION COMPUTED TOMOGRAPHY (PET): DISCUSSION ABOUT THE SIGNIFICANCE OF PET FINDINGS ON THE BASIS OF CHEMICAL STUDY BY USING EXPERIMENTAL ANIMALS. N.Sakuragawa, A.Matsui, Y.Kono, M.Arima, and M.Iio. National Center for Nervous, Mental and Muscular Diseases. National Nakano Chest Hospital. Tokyo.

CT, EEG and PET with ^{11}C -glucose and $^{-}\text{CO}_2$ were performed on a six year-old girl with tuberous sclerosis (TS) who had psychomotor retardation, epilepsy and skin lesions. CT showed periventricular calcification and moderate dilatation of left lateral ventricle. EEG revealed multifoci of spike and wave complexes on the left frontal and parietal areas. In contrast to that, PET with ^{11}C - CO_2 disclosed diffuse low uptake in the left hemisphere.

From the experimental study by using rat, ingested ^{11}C -glucose was metabolized mostly into organic acids in the Krebs cycle in the brain within 20 minutes. After ^{11}C - CO_2 gas inspiration for 3 minutes in the natural condition, ^{11}C -activity was counted in the rat brain mostly in the acid-labile fraction (95%).

Different findings of PET with ^{11}C - CO_2 and glucose may be reflected in the underlying brain pathology of the TS such as sclerotic brain lesions.

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EXPERIMENTAL STUDIES ON MYOCARDIAL GLUCOSE METABOLISM OF RATS. K.Yamada, S.Endo, H.Fukuda, S.Yoshioka, Y.Abe, K.Kubota, T.Sato, T.Matsuzawa. Dept.of Radiol.& Nucl. Med, The Res.Inst.for TB & Cancer, Tohoku Univ. Sendai. T.Ido, R.Iwata, T.Takahashi, M.Shinohara. Cyclotron & R.I.Center, Tohoku Univ. Sendai.

We have been studying the myocardial uptake of F-18 FDG under the fed and fasted states, and clarified that the myocardial uptake of F-18 FDG was suppressed in early stage of fasting. This result represents that the myocardium is entirely different from brain in the glucose metabolism. We investigated the correlation between F-18 FDG uptake and blood glucose. Because the dietary state of the rats was not controlled deliberately in this experiment, a wide range of blood glucose concentration was observed, from 70 to 199 mg%. Myocardial uptake of F-18 FDG was almost unchanged under about 120 mg% of blood glucose concentration, then increased steeply with increasing blood glucose. But the effects of insulin and glucose load did not agree with this correlation pattern. By glucose load, myocardial uptake of F-18 FDG increased slightly with increasing blood glucose. On the other hand, insulin increased myocardial uptake, even if blood glucose concentration was low. These results reflect the capability of the myocardium to utilize alternative substrates, such as free fatty acids and lactic acid, to meet its energy requirements.

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CHEMICAL ANALYSIS OF METABOLITES OF INSPIRED ^{11}C - CO_2 GAS OF THE BLOOD OF HUMAN AND RAT. N.Sakuragawa, A.Matsui, Y.Kono, M.Arima and M.Iio. National Center for Nervous, Mental and Muscular Diseases. National Nakano Chest Hospital. Tokyo.

Dynamic metabolism of inspired ^{11}C - CO_2 is necessary for understanding the PET findings with ^{11}C - CO_2 . We investigated the blood metabolites of inspired ^{11}C - CO_2 in human and rat. Blood clearance of normal volunteer after ^{11}C - CO_2 bolus inspiration showed 3 phases. Effective half life of 1st phase was within a minute, that of 2nd phase 5.5 min and that of 3rd phase was 17 min. Blood was treated with trichloroacetic acid (TCA). Acid-labile fraction (^{11}C - CO_2 , H_2CO_3 , HCO_3^-) was 86%, acid-soluble fraction (organic fraction) 10% and acid-insoluble fraction 4%.

Animal study by using Wistar rat, placed into a glass container, exposed to ^{11}C - CO_2 gas for 5 min, was performed basically with the same methods of human study. The composition of three fractions of blood treated with TCA was almost the same as that of human. Further analysis of acid-soluble fraction by using double column method, newly developed (Dowex AG-1 and Dowex 50W) showed major incorporation of ^{11}C -activity into the glucose (41.6%) and urea (44.1%). Radio-liquid chromatography of acid soluble fraction on Aminex HPX-87H column showed two peaks which was confirmed as glucose and urea by ^{14}C -glucose and urea standards on the same column.

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A NEW SCANNING AGENT FOR POSITRON TOMOGRAPHY OF THE LIVER. Y.Kuniyasu, K.Ishioaka, S.Higashi, M.Miura*, T.Tomitani*, Y.Tateno*, F.Shishido*, K.Uemura**, I.Kanno**, Y.Miura**, and S.Miura**. Teikyo University Hospital. *National Institute of Radiological Science. **Research Institute of Brain and Vessels.

We have developed a simple, highly efficient and rapid technique for labeling a microsphere with generator produced positron emitter Ga-68 for positron tomography of the liver. Ga-68 was eluted from the generator with a solution of disodium ethylenediaminetetraacetic acid and converted to the chloride form using a modification method by Carlton and Heyes. From the studies of the effect of pH on the binding of Ga-68 to microspheres, the optimum pH was 5.0 to 5.5. Ga-68 labeling ratio obtained at the optimum pH was over 95%. A 10mM of acetate buffer system was used to have a rapid technique for labeling. A total preparation time for Ga-68 labeled microspheres was shortened within half an hour. Tissue distribution and toxic studies with this scanning agent were examined using experimental animals (at 15, 30 and 60 min. after administration). Finally, the cross section images of the liver in rabbits and dogs with Ga-68 labeled microspheres were obtained using positron camera (HEADTOME and POSITROGICA). And they were compared with those images obtained using conventional gamma camera equipped with collimator for high energy (Hitachi Gamma-View). Thus, we have completely finished the preclinical studies of this new method for labeling microspheres with Ga-68.