IN HOUSE MEDICAL CYCLOTRON (CYPRIS)
INSTALLED IN KYOTO UNIVERSITY HOSPITAL.

An inhouse medical cyclotron CYPRIS (Sumitomo), 15 MeV for proton and 8 MeV for deuteron and the variable beam current of up to 50 µA, was installed in Kyoto University Hospital in 1982. The manipulation and the maintenance of the entire system is designed to be extremely simple. The operation of the cyclotron, gas synthesis circuits including the quality check systems and the transport of the gases to the positron camera are performed automatically from a key board and controlled by a micro-computer system.

Clinically sufficient amounts of 15O labelled O2 and CO2 could be supplied constantly. 10 min after the operation of the cyclotron, 20 min for 13N labelled N2 and 40 min for 13C-labelled CO and CO2. All these labelled gases proved to be sufficient quality for clinical use in the radiouclide, radiochemical and chemical purity.

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The positron CT project in Research Institute of Brain and Blood Vessels-Akita have been planned under the base of rCBF studies using the Xe-133 clearance, development of emission tomographs of the Headtome, family and SPECT studies using Headtome. The project will start in March of 1983 going with the opening of a new building for the Institute. The plan contains a baby cyclotron; BC-165, a new positron tomograph; Headtome. The laboratories for the positron CT study is included in the unit of nuclear medicine division.

The main themes of the project in the 1st year are as follows: 1) the quantitative PET studies of rCBF and metabolism using the steady state model with C15O2, H2O and 13CO2, and 18FDG; 2) a pathophysiological study of rCBF and energy metabolism in stroke patients (cerebral infarct, hypertensive intracerebral hemorrhage and subarachnoid hemorrhage due to a ruptured aneurysm); and 3) developing new methods for a short time tomographic-rCBF study using single breath of 15O2 or a intravenous bolus injection of H15O, and an inhalation of 15N2 or 18F-fluoromethane. A correlative study between rCBF examination using PET and SPECT will also be carried out.


F-18-labeled deoxy aldohexoses, F-18-deoxy glucose(F-18-FDG), F-18-deoxy mannose (F-18-FDM), F-18-deoxy galactose(F-18-FDGal) F-18-deoxy altraxose (F-18-FDA) and F-18-deoxy glucose were tested for tumor diagnostic agent for positron emission tomography. Tissue distribution study in hepatoma bearing rats, showed that tumor uptake of F-18-FDG and F-18-FDM were very rapid and high (2-3 dose/g) with very low uptake of liver and kidney.

Whereas the tumor uptake of F-18-FDGal was low (0.7 dose/g) and tumor uptake of L-F-18-FDG, F-18-FDA were low and followed by rapid wash out. From these results, it was concluded that F-18-FDG and F-18-FDM were the best agent for cancer detection among these radiochemicals.

POSITRON CT IN A PATIENT WITH SYSTEMIC LUPUS ERYTHEMATOSUS. M. Hiraawa*, T. Abe*, Masaaki Iio**. *Teikyo University School of Medicine. **Nakano National Chest Hospital. Tokyo.

Serial positron CT (PCT) were performed in a 11-year-old Japanese girl with systemic lupus erythematosus (SLE with Headtome II (Shimadzu). The studies were consisted from C-11 glucose ingestion and C-11 CO2 inhalation. The first study in the active stage of SLE disclosed the right front-temporal low attenuation area (LAA) both in glucose and CO2. Paroxysmal focus in electroencephalography (EEG) was incident to the LAA. The second study in the inactive stage showed disappeared LAA, and the focus in EEG, too. The third study in the relapsing stage revealed reappeared LAA at the same area. On EEG, the similar paroxysmal focus was noted as the first. It is well known in the patient with SLE there were often identified symptoms in central nervous system (CNS), and these CNS symptoms were thought to be from cerebral vasculitis. The diagnosis of cerebral vasculitis is rather difficult with usual clinical techniques. In our case, these changes in PET studies were well incident to the clinical features and EEG findings. Then we thought the findings in PET might be represented the states of cerebral vasculitis.

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