74

Selective Catheterization and Superimposition Technique for the Topographic Assessment of Krypton-81m Single-Photon Emission Computed Tomography of the Brain. Toshiaki Higa, Shuji Tanada, Waro Taki, Hidenao Fukuyama, Yasushi Ishii, Toru Fujita, Yasuhiro Yonekawa, Teruo Odori, Takao Mukai, Hajime Handa, Masakuni Kameyama, Rikushi Morita, and Kanji Torizuka.
Kyoto University Hospital, Kyoto.

Selective catheterization and continuous infusion of krypton-81m (half-life of 13 sec) was performed for the tomographic assessment of the regional cerebral blood perfusion. Krypton-81m single-photon emission computed tomography and X-ray computed tomography were correlatively evaluated using a superimposition technique. The edge image of the lesion, the ventricles, and the cortical surfaces of the brain were detected by the X-ray computed tomography, and photographically superimposed on the krypton-81m single-photon emission computed tomogram. Topographic distribution of each major cerebral artery was precisely demonstrated in supratentorial and infratentorial compartments. The regional cerebral blood perfusion in the basal ganglia, the thalamus, and the watershed zones among the anterior, the middle, and the posterior cerebral arteries were evaluated with the method. The method potentiated detecting capability for abnormal perfusion areas aided by anatomical landmarks on the edge image of the brain. Twenty-one cases with various brain diseases were presented and clinical usefulness of the technique was discussed.

75

DRAWBACKS IN N-13-AMMONIA AS A CEREBRAL BLOOD FLOW TRACER. H.Kato,H.Ohtomo, M.Izumiyama,K.Kawashima,T.Kohnosu,K.Kogure, T.Ido*,R.Iwata*. Tohoku University School of Medicine and Cyclotron and Radioisotope Center*. Sendai.

WE estimated the properties of N-13-NH_3 as a cerebral blood flow (CBF) tracer by means of double-labeled autoradiography using N-13-NH_3 and C-14-iodoantipyrine (IAP) in the ischemic models of gerbils.

Under pentobarbital anesthesia, right carotid artery was occluded (and recirculated). 2 minutes before sacrifice, 50 mCi of N-13-NH_3 was administerd i.v. and 1 minute before, 10 microCi of C-14-IAP was injected i.v. for 1 minute. The brain was removed, frozen and cut into 30 micron sections.

NH_3 uptake by the brain is affected not only by capillary perfusion but also by metabolic trapping, tissue pH, vascular permeability and so forth.

As a result, N-13-NH_3 would serve as a CBF tracer under such a condition that perfusion is the primary factor for the NH_3 uptake by the brain. (e.g. physiological condition, severe ischemia, etc.)

On the contrary, under pathological condition such as postischemic reperfusion with metabolic disturbances and changes in tissue pH, vascular permeability, microcirculation, etc., the images of N-13-NH_3 dissociate from those of C-14-IAP, so that N-13-NH_3 might not serve as a useful CBF tracer.

76

POSITRON CT OF MOYAMOYA DISEASE USING N-13-AMMONIA. S.Tamachi,T.Takashima,A.Yamaura, F.Shishido,Y.Tateno,T.Yamazaki,T.Irie, O.Inoue,T.Nakayama,T.Suzuki,K.Tamate, F.Ikehira. Chiba University School of Medicine. National Institute of Radiological Sciences. Chiba. Yamanashi University School of Medicine. Yamanashi.

To evaluate the cerebral hemodynamics in Moyamoya disease, we examined five patients with positron CT using N-13-ammonia.Three were female under eighteen years old,and two were male and female adults. Two cases were examined after encephalo-myo-synangiosis.One case of children who had no neurological deficit, revealed no abnormal accumulation of N-13-ammonia. The other children had severe neurological deficits and had abnormally low accumulation of N-13-ammonia in cortical area,corresponding to neurological deficit. In an adult case, accumulation at the frontal cortex was slightly decreased but neurological sign was not significant. In these moyamoya disease the area of abnormal moyamoya vessels in angiography were almost normal in accumulation of N-13-ammonia by PET. Although,it is difficult to calculate absolute CBF value with N-13-ammonia, because of its uncertainty of uptake to brain under abnormal pH or other factors, positron CT was valuable to evaluate cerebral hemodynamics in moyamoya disease.

77

POSITRON CT IMAGING WITH POSITOLOGICA-II BY CONTINUOUS INHALATION OF O-15-OXYGEN AND O-15-CARBONDIOXIDE GAS. F.Shishido, Y.Tateno, T.Yamane, N.Fukuda, T.Yamasaki, T.Irie, O.Inoue, T.Nakayama, K.Suzuki, K.Tamate, M.Endo, T.Matsumoto, T.Iinuma, N.Nohara, A.Kurisu, S.Tamachi, T.Takashima, A.Yamaura and H.Ikehira.
National Institute of Radiological Sciences, Chiba, Chiba University School of Medicine, Chiba, and Yamanashi Medical University, Koufu.

We have utilized a multi-slice positron CT device for whole body and automatic radioactive gases production system of O-15-oxygen(02) and O-15-carbondioxide (CO2), since this spring. The purpose of this paper was to introduce these systems and to show preliminaly clinical results of brain tumor imaging.

Each of 02 and CO2 gas was given 10-20 mCi/min in dose, and was administered by continuous inhalation. Equilibrium images were obtained 10 min after the begining of continuous inhalation. For Positologica-II provides 5 simultaneous images with 18 mm interval, we performed 3 scans with 6 mm interval.

We studied cases of glioblastoma multiforme, and brain metastasis from lung cancer. The cerebral lesions of all cases were clearly shown as defect in PCT images. These findings indicated the lesions are low blood flow and low oxygen utilization.