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DETECTION OF BRAIN DAMAGES ON CEREBROVASCULAR DISEASE USING POSITRON CT.
P.Shishido, K.Uemura, I.Kanno and M.Murakami.
Research Institute for Brain and Blood Vessels, Akita, Japan.

Positron CT measurement was performed for 13 stroke patients with cerebral infarctions detected by X-ray CT in the territory of middle cerebral artery. The used radiopharmaceuticals were O-15 labeled CO2, O2, and CO gases, and used positron CT device was Head tome-III developed in our institute. The physiological parameters which we calculated were rCBF, rCMRO2, rOEF and rCBV. From these parameters we also calculated regional parameter of rCBV/rCBF which means rMTT. Patients with early stroke showed two types of uncoupling between blood flow and oxygen metabolism. Patients within 1-5 days after onset indicated high rOEF with low rCBF in the infarcted focus. About one or three weeks after onset rOEF was changed into low rOEF with almost normal rCBF. These changes of rCBF and rCMRO2 may be a natural course of ischemic acute stroke. About one month after onset infarcted focus showed low rOEF and low rCBF, and two or three months later the lesion gradually altered matched change of rCBF and rCMRO2. rMTT had a good correlation with rOEF. rMTT may be a useful parameter for single photon emission CT measurement, because SPECT can be measured rCBF by I-123-IMP and rCBV by Tc-99m-RBC.
The usefulness of positron CT measurement for diagnosis of cerebral infarction were explained by means of demonstrating several clinical cases.

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EVALUATION OF CEREBRAL DYSFUNCTION IN DEMENTIA USING POSITRON EMISSION TOMOGRAPHY.

Recent development of positron emission tomography (PET) technique has enabled us to study cerebral circulation and metabolism in man. This can greatly contribute better understanding of disturbed hemodynamics and energy metabolism in pathological state of cerebro-vascular diseases, brain tumor and degenerative disorders by measuring cerebral blood flow, blood volume oxygen and glucose utilization in absolute units.

In Tohoku University, clinical study on brain aging and dementias has begun using PET techniques since September in 1983. The following points were extensively examined in patients with multi-infarct dementia (MID) and Alzheimer's disease (AD).

1) the relationship between supply and demand of glucose and oxygen
2) the relationship between glucose and oxygen utilization

Five AD, four MID and normal controls were studied with PET and the O-15 steady state inhalation and the F-18 fluorodeoxyglucose combined methods. Values of glucose supply (CBF multiplied by arteri al glucose) and oxygen supply (CBF multiplied by arterial oxygen content), fractional extraction of glucose and oxygen (GEF and OEF) and cerebral glucose and oxygen utilization (CMRGlc and CMRO2) were obtained in the tomographic planes of brain (OM+3,5,7 cm).