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POSITRON EMISSION TOMOGRAPHY IN CEREBROVASCULAR DISORDERS USING CARBON-11 CARBON DIOXIDE. T.Ujiike, T.Kato, S.Kitamura, T.Soeda, A.Terashi, M.Iio The 2nd Department of Internal Medicine, Nippon Medical School, Tokyo. Department of Radiology, Nakano National Hospital. Tokyo.

X-ray CT made it possible to diagnose the qualitative and anatomical changes in cerebrovascular disorders automatically, but it can not show their biochemical and physiological changes. By measurement of regional cerebral blood flow using Xe-133, it is possible to study the focal circulatory changes in brain cortex, but impossible to measure the changes in the deep brain structures such as basal gangliae. We tried to study the cerebral circulation in cerebrovascular disorders three-dimensionally by Positron Emission Tomography using C-11 carbon dioxide. Patients with cerebral infarction and cerebral hemorrhage were studied. The tracer was C-11 carbon dioxide that was produced in Baby Cyclotron, and which was administered to patients by bolus inhalation.

In patients with cerebral infarction, C-11 radioactivity was low in the ischemic lesions that could be seen as low density areas by X-ray CT. In some cases, C-11 radioactivity was low in the lesions where X-ray CT did not show any abnormalities. In patients with cerebral hemorrhage, C-11 radioactivity was low in the regions of hemetoma.

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FINDINGS OF CT AND RI ANGIOGRAM OF ISCHEMIC CEREBROVASCULAR DISEASE IN ACUTE AND SUBACUTE STAGE. M.Takemoto, A.Doi, Y.Manabe and T. Furutsubo. Kagawa Pre.Central Hospital. Takamatsu.

Two hundred patients with ischemic cerebrovascular disease were investigated by CT and RI angiogram at the same time. These cases included 11 of TIA, 7 of RIND, 163 of completed cerebral infarction, 12 of multiple infarction, 2 of cerebellar infarction and 5 of brain stem infarction. 42 of these cases were studied in the acute stage (within 3 days after attack) and other 42 in the subacute stage (within 6 days). In the chronic stage (on and after 2 weeks), 116 patients were examined. In the acute stage, 21 (50%) out of 42 cases had lesions on CT, LDA in the cerebral cortex (6 cases), in the basal ganglia (13) and brain stem (1) and mass signs (1). But, RI angiography revealed abnormal pathological findings in 34 cases (81%), including of defects of RI band (7), low perfusion pattern (16), high perfusion (5) and a flip-flop phenomenon (6). In the subacute stage, there were 25 cases (59.5%) with the lesions on CT, LDA in cerebral cortex (14), in basal ganglia (7) and in brain stem (2) and HDA in cerebral cortex (1) and mass signs (1). RI angiography showed the abnormal findings in 25 (59.5%). These findings included defects of RI band (3), low perfusion pattern (17), high perfusion (2) and a flip-flop phenomenon (3). These results suspected that RI angiogram is valuable study for diagnosis of ischemic cerebrovascular disease in the acute and subacute stage.

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THE BRAIN SCINTIGRAPHY WITH Tc-99m GLUCONATE AND THE COMPARISON BETWEEN THE OTHER RADIOPHARMACEUTICALS IN RAT AND HUMAN STUDY. L.Xi Gui, T.Maeda, H.Matsuda, T.Takayama and K.Hisada. Kanazawa University, School of Medicine. Kanazawa.

The blood clearance of brain scan agent was examined in rat with subcutaneous Yoshida's sarcoma. The order of the blood clearance was Tc-DTPA > Tc-gluconate > TcO₄ > Tc-HSA upto 4-hours after intra venous injection. The tumor to blood ratio of Tc-gluconate was almost same as Tc-DTPA but evidently higher than that of TcO₄ or Tc-HSA upto 4-hours after intravenous injection.

In normal patients the blood clearance ratio of Tc-gluconate showed almost same speed as Tc-DTPA upto 2 hours after intravenous injection, but Tc-gluconate showed slower clearance than Tc-DTPA after that. In 22 patients Tc-gluconate scan were repeated about three days after Tc-DTPA scan. The lesion contrast on Tc-gluconate image were superior in 5 cases, equal in 10 cases and inferior in 7 cases to Tc-DTPA images but the same detectability. The lesion contrast of 11 out of 57 cases were prominent even though on 24-hour images of Tc-gluconate. The improvement of lesion contrast on 24-hour images were observed only in solid tumors especially in metastatic brain tumors and meningiomas but not in benign lesions such as cerebral vascular diseases, subdural hematomas, inflammations. The Tc-gluconate is very hopeful brain scintigraphy agent.

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QUANTITATIVE MEASUREMENT OF REGIONAL CEREBRAL BLOOD VOLUME AND HEMATOCRIT USING SPECT. K.Nakazawa, K.Ishii, N.Yamada, K.Murata, J.Suzuki, K.Yoda, T.Matsubayashi, F.Sakai and N.Kitai. School of Medicine, Kitasato University. Sagamihara.

The measurement of regional cerebral blood volume (rCBV) is considered to be as importance as the measurement of regional cerebral blood flow (rCBF) for assessing cerebral hemodynamics. We attempted the three dimensional measurement of rCBV and regional cerebral hematocrit (HcT) by SPECT following the intravenous injection of 99m-Tc in-vitro labeled red blood cell (RBC) and 99m-Tc in-vitro labeled human serum albumin (HSA).

We used a rotating gamma camera (maxi400T) manufactured by GE Co. and a minicomputer (simis 3) manufactured by Informatek Co..

A set of SPECT data was obtained with 32 projections about 360° following the injection of RBC and HSA respectively with one day's interval in the same patient. Tomographic reconstruction was performed by the filtered back-projection technique.

Regional cerebral HcT was obtained by calculating the ratio between the RBC image and the HSA image, and HcT values were used for the computation of rCBV.

In normals, rCBV values ranged from 2.0 to 7.0 ml/100g (averaged 4.5) depending on the region of the brain, higher values in the grey matter area and lower values in the white matter area. Regional cerebral HcT values ranged from 16% to 40% (averaged 33%) depending on the location.