X-ray CT made it possible to diagnose the qualitative and anatomical changes in cerebrovascular disorders ataxically, but it cannot 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 ganglia. 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 hematoma.

The blood clearance of brain scan agent was examined in rat with subcutaneous Yoshida sarcoma. The order of the blood clearance was TC-DTPA > TC-glucenate > TC04 > TC-HSA up to 4 hours after intra venous injection. The tumor to blood ratio of TC-glucenate was almost same as TC-DTPA but evidently higher than that of TC04 or TC-HSA up to 4 hours after intravenous injection. In normal patients the blood clearance ratio of TC-glucenate showed almost same speed as TC-DTPA up to 2 hours after intravenous injection, but TC-glucenate showed slower clearance than TC-DTPA after that. In 22 patients TC-glucenate scan were repeated about three days after TC-DTPA scan. The lesion contrast on TC-glucenate 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-glucenate. The improvement of lesion contrast up to 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-glucenate is very hopeful brain scintigraphy agent.