This study was performed to evaluate the usefulness of N-isopropyl-1-123-Iodoamphetamine (IMP) for detection of regional cerebral blood flow abnormalities in cerebral infarcts. Single photon emission computed tomography (SPECT) with 3 mCi of IMP was done in 20 patients (27 images) with cerebral infarct and transverse, sagittal & coronal images of the brain were reconstructed. Then the reconstructed images (IMP image) were compared with CT images. The results of the present study were as follow. 1) Significantly decreased regional flow was detected in IMP image of an acute cerebral infarct, whereas abnormality was not detected on the CT image obtained on the same day. 2) Luxury perfusion at the infarction area was visualized in the IMP image of a patient with infarct 1 week after the stroke. 3) Crossed cerebellar diaschisis was observed in five images out of 27 images. 4) IMP images more than 50% showed larger lesions in comparison with those of CT. On the other hand, some of the smaller infarction lesions at the thalamus, caudate and putamen were not detected in IMP images. IMP image was sensitive to detect regional blood flow abnormality of the infarct and was useful for early diagnosis and follow up of the patients with cerebral infarction.

In order to investigate the cerebral hemodynamics, the measurement of regional cerebral blood flow and metabolism were undergone. Positron emission tomography (PET) using oxygen-15 were performed on 5 patients with aphasia due to cerebral infarction and 18 patients without aphasia. CBF, OEF and CMRO2 were measured by oxygen-15 labelled gaseous inhalation technique. The value of CBF on Broca area ranged between 6 and 29 (ml/100g/min) in motor aphasia and between 25 and 53 in cases without motor aphasia. The value of CMRO2 on Broca area ranged between 0.7 and 1.9 (ml/100g/min) in motor aphasia and between 2.1 and 4.5 in cases without motor aphasia. In our investigation, clinical threshold to cause motor aphasia was between 25 and 50 in CBF, and was about 2.0 in CMRO2. We conclude the measurement of CBF and CMRO2 were useful to decide diagnosis and treatment of patients.

Regional cerebral blood flow (rCBF), regional cerebral metabolic rate of oxygen (rCMRO2) and regional oxygen extraction fraction (rOEF) were measured on 7 normal volunteers using the 0-15 steady state method. Regional cerebral blood volume (rCBV) was also measured on each subject, and with the rCBV values, the correction was made for rCMRO2 and rOEF. In the present study, the regional values were analysed using the regions of interest (ROI) on the 4 functional images (rCBF, rCMRO2, rOEF and rCBV), which were displayed on the imaging-analysis system named "VAX-DEANZA" system. rCBF and rCMRO2 in the thalamus and in the basal ganglia, i.e. deep gray matter, were high, but those values in cortical area showed relatively low. rOEF was about 0.38 in any area. rCBV showed almost the same values reported previously.

Error factors in the measurement of these parameters using the 0-15 steady state method were also evaluated. The steadiness of subject's respiration is thought to be the most important factor that affects the accuracy of the measurement.