
Using positron emission tomography, regional cerebral blood flow (CBF), oxygen extraction fraction (OEF) and oxygen consumption (CMRO2) were studied on 21 subjects with hypertensive intracerebral hematomas.

Results: 1) The study showed limited extension of an ischemic zone around a hematoma and less frequent appearance of luxury perfusion (2/21: 9.1 %) than that in cerebral infarct. 2) In the normodensity brains with smaller hematomas, almost homogenous and mild reduction of CBF with normal OEF were found. Those were thought to be due to remote effect of the lesions. 3) Diffuse reduction of CBF with increased OEF in the normodensity brain became more marked in the cases with a hematoma more than 4.5 cm in the maximal diameter.

Comment: With the result of the present PET study, surgical evacuation would be indicated for the hematoma more than 4.5 cm in diameter.


Elevation of oxygen extraction fraction (OEF) and accompanied vasodilation were observed in low perfused brain tissue. Those were thought to be due to remote effect of the lesions. Vascular reactivity (VRCO2) for hyper-/hypocapnia were defined by the absolute percent change of CBF per mmHg change of PaCO2. Total 19 hyper- and 18 hypocapnic measurements were performed together with OEF measurement. In each patient 30-40 ROI data were plotted with OEF on the abscissa and VRCO2 on the ordinate, and their correlations were evaluated. From the data which correlated in the above calculation, OEF at the cross-point (OEFc) of the regression line with VRCO2=0 was evaluated. OEF were ranged from 0.28 to 0.66. In hypercapnic studies 79 % (15 of 19) revealed negative correlations, and a mean OEFc of these was 0.54±0.09, which might correspond to the OEF at maximum vasodilation point. In hypcapnic studies only 28 % (5 of 18) showed positive correlations, which showed OEF at vasoparalysis point might be beyond the present observation range.


Twenty-eight patients with a chronic occlusion or a severe stenosis of the internal carotid artery or horizontal portion of the middle cerebral artery, and without a massive low density area on CT were studied using PET and the 15O-steady state method to measure cerebral circulation and oxygen metabolism.

In most patients, cerebral blood flow (CBF) and oxygen consumption rate (CMRO2) in the carotid distribution were diffusely decreased in both hemispheres, but those of the lowest perfusion tissue in the affected hemispheres were mostly not less than the levels of thresholds causing tissue necrosis. Only 3 of 28 patients revealed critically decreased CBF maintaining CMRO2 with increased oxygen extraction fraction (OEF). The coupled decrease of CBF and CMRO2 suggests that the structurally normal tissue perfused by diseased artery would have been damaged to some degree by chronically decreased CBF. In order to get the successful results of the EC/IC by pass surgery, we should choose the patients with maintaining CMRO2 by increased OEF. In this view, only 3 of 28 subjects (12 %) will be indicated for the surgery.