such as $CO_2$ inhalation, hyperventilation, the elevation of blood pressure and the compression of contralateral common carotid artery.

In a case with normal brain, the hemispheric cerebral blood flow (HCBF) was 62 ml/100 g/min and the rCBF were high in the parietotemporal region. After $CO_2$ inhalation, the HCBF and rCBF markedly increased in the most region. In another case with normal brain, the HCBF was 63 ml/100 g/min and the rCBF were also high in the parietotemporal region. After the elevation of blood pressure (from 116/82 to 140/110) by the infusion of angiotensin, the HCBF and rCBF did not change significantly, showing the autoregulation of CBF. In a case with arteriovenous malformation, the rCBF in the lesion were low at rest and increased less than that in the normal region after $CO_2$ inhalation. In a case with parasaggital meningioma, the rCBF in the lesion were high at rest and inversely decreased in contrast to increasing in the normal region after $CO_2$ inhalation. In a case with the occlusion of left middle cerebral artery complicated by major stroke, the rCBF were remarkably low in the perfusion area of the artery. After $CO_2$ inhalation, the rCBF increased in the temporal region and decreased in the fronto-parietal region. In a case with left-sided cerebral thrombosis without angiographical findings, the rCBF decreased remarkably in the left parieto-temporal region after the compression of right common carotid artery.

The rCBF were demonstrated clearly by our functional image. Consequently, the rCBF functional image was useful for understanding the brain circulation and evaluating the treatments.

## Regional Brain Functional Image Using Computorized Multicrystal Scintillation Gamma Camera (System-70)

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Measurements of Regional Cerebral Blood Flow and preparation of Brain Functional Images were attempted with System-70 and H/A Method. The System-70 is unique in having a Multicrystal Detector, which is a matrix consisting of 21 rows and 14 columns of columnar crystal elements, each measuring $0.8 \times 0.8 \times 3.8$ cm. 5 mCi of 133-Xe is injected in Bolus into an internal carotid artery of a patient. Simultaneously counting is made over the diseased region for 11 minutes at the rate of 1 sec/frame. Calculation between frames and normalization of counts against pre-determined ones are possible by "Data Process". We modified collimeters to obtain better geometry and succeeded in improving images. $H_0$ and $H_{10}$ were derived from values of Acc. interval (set at 20 sec). This proved to be quite satisfactory for clinical use. The display of Functional Images in 16 shades of color and further, their normalization made comparison of pre- and post-operative conditions etc. easier and were proved to be clinically useful.

## The Computer Treatment of Brain Scintiphotogram

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We originated the new program of on-line minicomputer method for improving the diagnostic quarity of brain images by scintillation camera system and applied this program to phantoms and patients.

We reported it was the effectual method in

this case.

We used Shimazu Scintipack-200 that connected directly with Nuclear Chicago Pho/Gamma HP scintillation camera by on-line. And it was corresponded between crystal side of camera and memory with 64×64 matrix.

If data is cached during t seconds, for example count ratio from intracranial lesion representing by sign Ca and count ratio from normal adjacent brain doing by sign Cb, its difference D is showed D=t (Ca-Cb).

When the difference of Ca-Cb is small namely RI accumulation of lesion is not larger, the difference D is stressed by to have the data store time long. And it is to subtract Cb·t that is normal brain count, as base count. Namely it is to subtract Cb·t out of each matrix counts. Also to remove the influence of high accumulation in face, it is to make enhancement by separating the magnification into ten levels and displaying, in the maximum of 1.2 to 1.5 times for base count. By the above method, we could stress and clear up the lesion having little accumulation that is difficult to discriminate in original image of phantoms and clinical cases.

About some clinical cases, we showed the contrast of original image and display by computer enhancement.

## Multiplane Isotope Scan in Cerebral Lesion —In Compasison with Cerebral Arteriography—

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The multiplane isotope scanner (Pho/Con) is a newly developed equipment by which twelve images are obtained in 12 different layers simultaneously.

Three hundred cases with various brain lesions were studied by the radionuclide and/or the cerebral arteriography. In 65 cases both Pho/Con scanning and arteriography were performed and the results analyzed.

Both studies gave the same results, positive or negative, in 53 cases, coincidence rate 81.5%, while the results did not coincide with each in 12 cases.

A case of the cerebral infarct and another of tumor involving corpus callosum were demonstrated clearly on brain scintigram, but missed by angiography. on the other hand, ten cases with various lesions were detected only by angiography.

These cases included arteriovenous malformation, epidermoid at the cerebellopontine angle, intraventricular glioma, thalamic tumor, pontine glioma, and others.

The multiplane radionuclide scanning are felt to be especially indicated in deep-seated and posterior fossa lesions.