blood flow can be divided into two types; (1) diffuse perfusion which is found in the normal case and the normal pressure hydrocephalus, (2) type which shows increased or decreased area of the rCBF compared with the surrounding tissues in such cases as the brain tumor or CVD. In the case of CVD, occlusion of major cerebral artery can be visualized as wedgeshaped decreased area of rCBF even at the time when conventional brain scan misses the lesion. This fact suggests that functional images obtained using $^{133}$Xe clearance method are very useful to diagnose the CVD such as infarction.

**Functional Image Processing Applied Compartmental Analysis**

*Department of Radiology, Kyoto University Medical School*  
J. Handa  
*Department of Neurosurgery, Kyoto University Medical School*  
and K. Hamamoto  
*Department of Radiology, Ehime University Medical School*

The construction of the functional image representing the regional cerebral blood flow analyzed by the two terms of compartmental model using $^{133}$Xe and scintillation camera was attempted.

The radioxenon washout process can be expressed by multi-exponential equation as

$$y = \sum_{i} A_i \exp \left( -\alpha_i t \right).$$

Each elemental regional washout curve was analyzed according to the weighted least square non-linear regression method, providing initial value $A_i$, turnover rate $\alpha_i$, and most suitable number of compartment $i$. Ninety-five percent confidence limits for these parameters were calculated to examine the measurement accuracy.

Scinticamera images were obtained with bolus injection of 5 mCi of $^{133}$Xe, and thirty-two of sequential image data was recorded onto a magnetic tape at the intervals of 6 sec. for initial 24 sec. 9 sec. for subsequent 100 sec. 18 sec. for following 3 min. and 45 sec. for the last 5 min., respectively. These digitized image frames were smoothed to reduce the random fluctuation of images and were arranged in a form of $30 \times 20$ matrix. The functional images of $\alpha_i$ represent the blood flow rates of the gray and white matter, respectively; and those of $A_i$ represent the fractional distributions of those anatomical components. While the conventional analysis such as the $H/A$ and the initial slope methods can merely provides with the mean values of flow rate, the present method was proved to give additional informations concerning the anatomical informations.

However, by the application of this type of complicated processing, the statistical noise in each element with low counts might become more serious than the conventional processing.