TRANSEPTIAL TOMOGRAPHIC OBSERVATION OF REGIONAL CEREBRAL BLOOD FLOW (rCBF) IN THE PATIENTS WITH ISCHEMIC CVD BY Kr-81m AND HEAD-TOME. K. Uemura, S. Takahashi, Y. Kawata, I. Kanno, S. Mura and Y. Mura. Division of Radiology, Research Institute of Brain and Blood Vessels, Akita.

A new clinical application of the single photon emission tomography is the evaluation of regional cerebral blood circulation on the cross section images, which has been developed by Fazio et al and Uemura et al. We performed this examination in 27 patients and compared it's results with X-ray CT images and/or the functional maps of rCBF determined from Xe-133 clearance method. The transverse section images of the head were obtained using Tomogescanner (I & P Engineering Co., England). In the phantom studies it has been confirmed that the count rate linearity was good and the resolution and the thickness of the slice at each depth were nearly constant. The resolution of the reconstructed images at each depth was about 2.0mm in the FWHM. The conventional r-CBF studies by the intracarotid injection of Kr-81m showed more avid activities at the basal ganglia and the gray matter than those at the white matter and the watershed area in patients who showed normal distribution pattern of the r-CBF with Xe-133. Single photon emission CT studies were more useful in the estimation of the area of decreased r-CBF than the X-ray CT and the conventional Xe-133 studies.

A single photon collimator system for multislice hybrid emission computed tomography (HEAD-TOME-II) was investigated. The collimator consists of a few hundreds of 0.5 mm thick tungsten blades which are circularly arranged in a circle. The angle between the blades and the direction from the center line varies linearly with the angular position of the blade. The angle ranges from -30° to +30°. As the collimator rotates inside the detector ring, the direction of incident photons varies as if the collimator were swinging in front of each detector. Two types of the collimator, high resolution and high sensitivity, are prepared. As each collimator blade is fixed in a different angulation, a shape of a line spread function is dependent on the portion of the collimator assembly. The line spread functions of a several portions of the high resolution collimator were calculated, and 11.2 mm FWHM and 6.1 mm FWHM were obtained at the center of the FOV and at the periphery, for the angular position of the blade being 0°. The FWHMs tend to be less in accordance with the angle of the blade. The measurement of the line spread function by using Tc-99m was also done in air to compare with a calculated value. The measured line spread functions agreed well with calculated one.

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