

70

EFFECT OF EXTRACRANIAL FACTORS ON RI ANGIOGRAPHY OF BRAIN - STUDY WITH TWO SEQUENTIAL ADMINISTRATION OF Tc-99m PERTECHNETATE. O.Shimamura, T.Ishizu, M.Ochiai. Rakutoh hospital. H.Adachi, H.Ijichi. Kyoto prefectural Univ. of Med. Kyoto.

RI angiography of brain by Tc-99m intravenous injection method were employed to examine the change of the cerebral circulation of patients with occlusive cerebrovascular disease in chronic stage. Tc-99m pertechnetate, 15-20 mCi, were administered two time sequentially with 320 second interval. Four parameters (appearance to peak time: APT, mode of transit time: MTT, peak count: PC, upward slope: US) on region of interest in each hemisphere obtained from these examination were compared between the first study and the second study. In 10 control studies of patients without drug dosage, the reproducibility of these parameters was very good (co-efficiencies of correlation were $R=0.894$ in APT, $R=0.877$ in MTT, $R=0.950$ in PC and $R=0.980$ in US). Other 15 patients were divided into three groups, A, B and C. Angiotensin were dosed for patients of group A in the interval of two studies, Methoxamin hydrochloride for group B and Atropin sulfate for group C. Blood pressure elevated significantly in group A and group B and pulse rate increased in group C. The changes of each parameter in three drug-dosed groups were compared with those of control group. There was no significant change in four parameters except of US values in control site of the group A.

72

TOMOGRAPHIC CEREBRAL BLOOD FLOW IN NORMAL VOLUNTEERS BY Xe-133 INHALATION. N.Shirahata, S.Nishimura, L.Henriksen*, S.Vorstrup*, M.Lauritzen*, O.B.Paulson* and N.A.Lassen**. Osaka City University (Neurosurgery). Osaka, Rigshospitalet (Neurology), Bispebjerg Hospital (Clinical Physiology), Copenhagen.

Blood flow in the cerebral hemispheres and in the cerebellum was studied tomographically in 39 volunteers in resting state by single photon emission computed tomographic device (TOMOMATIC 64) and inhalation of Xe-133. Each study measures rCBF in 3 slices of 2 cm width and the changes of radio-activity in the brain was stored in 32×32 matrix. The arterial Xe-133 curve was made by a stationary collimated scintillation detector over the right upper lung. The algorithm for calculation of tomographic rCBF was based on a combination of "sequence of picture method" and "early picture method". Mean rCBF and its standard deviation in each pixel were obtained by calculating all rCBF values in the pixel in all of the volunteers. The tomographic rCBF map having a resolution element of $1.7 \times 1.7 \times 2.0$ cm, showed symmetrical value. The average cerebral and cerebellar blood flow was 56 ± 8 and 54 ± 6 ml/100g/min respectively. A significant relationship was observed between rCBF and P_{CO_2} ($P < 0.01$; $r = 0.7$) and between rCBF and age ($P < 0.05$; $r = -0.3$).

71

REGIONAL CEREBRAL BLOOD FLOW MEASUREMENT BY Xe-133 INHALATION AND ECT WITH GAMMA CAMERAS. K.Matsumura, H.Maeda, S.Toyota, T.Nakagawa, M.Taguchi, T.Kitano, N.Shinoda, M.Kakegawa and S.Matsui. Department and Clinical Lab. of Radiology, Mie University Hospital, Tsu, and Toshiba Co., Nasu.

A method for measurement of regional cerebral blood flow (RCBF) by Xe-133 inhalation and ECT with gamma cameras was investigated. An ECT system (Toshiba GCA-70AS) with dual opposed gamma cameras fitted with high sensitivity collimators was used. A sequence of ECT scan was performed with a rotation speed of $180^\circ/30$ sec. during and after a 1min. administration of Xe-133 (10mCi/l). Following the integration of 30sec. data into 4 one-minute data, the tomographic images were reconstructed using convolution algorithm and an attenuation correction was done using Chang's method. The air curve was monitored by a scintillation detector placed over the right lung. According to the method proposed by Kanno and Lassen, time constants "k" maps were constructed as functional images. In a normal case, a symmetrical distribution of "k" was shown and calculated average CBF was 54ml/100g/min. using λ of 0.85ml/g. In a case with right internal carotid artery occlusion, the evidence of decreased CBF in the right hemisphere could be detected. This method was considered to be useful for noninvasive measurement of RCBF by conventional instrumentation.

73

EVALUATION OF BRAIN SCINTIGRAPHY WITH Tc-99m LABELED HUMAN ALBUMIN MICROSPHERES, COMPARED WITH rCBF FUNCTIONAL IMAGE WITH Xe-133. M.Nakamura, H.Etani, R.Fukunaga, Y.Isaka, T.Asai, Y.Tsuda, S.Yoneda, S.Nakamura, H.Omori, Y.Kusumi, K.Kimura. Osaka University, Medical School. Osaka.

Brain scintigrams with Tc-99m labeled human albumin microspheres (HAM) were compared with rCBF functional images with Xe-133 in 37 cases with cerebrovascular disorder. About 3mCi of Xe-133 in saline was injected into the internal carotid artery through a catheter and the rCBF functional image was obtained by processing the data of Xe-133 dynamic images measured by a gamma camera with an on-line minicomputer system. Then, brain scintigrams were obtained from multiple views after injection of Tc-99m (15μ m in diameter, 80,000 particles, 5mCi) into the internal carotid artery. The HAM brain scintigrams were well compatible with the rCBF functional images in most cases. However, in some cases with diffuse reduction of CBF in Xe-133 rCBF functional images, the HAM brain scintigram showed no focal abnormality because this method is qualitative. Our results indicate that the HAM brain scintigraphy is the simple and useful qualitative method for the assessment of cerebral blood flow perfusion in cases with CVD.