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FINDINGS FROM DYNAMIC PET STUDY WITH [F-18] FLUORODEOXYGLUCOSE IN NORMAL HUMAN SUBJECTS. H.Sasaki, I.Kanno, M.Murakami, F.Shishido, K.Uemura. Research Institute for Brain & Blood Vessels-AKITA, Akita.

Dynamic PET study with [F-18] fluoro-deoxyglucose (FDG) and [O-15] gases continuous inhalation study were carried on three normal human subjects. With the combined method, the metabolism of glucose and oxygen in the brain were investigated in detail. FDG dynamic study was carried for 58 min and the head activity curves were corrected for CBV and then the rate constants images ( $k_1$ ,  $k_2$ ,  $k_3$ ) were obtained and CMRglu was calculated with the regional rate constants. The CBV correction of the dynamic curves was essential for the rate constant calculation, but was not effective to the final CMRglu calculation. High correlation coefficient (mean 0.836) was found between  $k_1$  and CBF. Large difference of  $k_2$  was measured by twice studies of the same volunteer under the same condition. We considered that it was result of the difference of glucose concentration in blood (Cp). If glucose metabolism in the brain was kept constant against the Cp changes, rate constants must be varied. The discrepancy between CMRglu and CMRO<sub>2</sub> was found in the cerebellum. In the region, CMRglu was low according to low  $k_3$  despite high  $k_1$ , and CMRO<sub>2</sub> was high in proportion to regional CBF.

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ASSESSMENT OF BENZODIAZEPINE RECEPTOR DENSITIES IN THE HUMAN BRAIN WITH C-11 Ro15-1788 AND POSITRON EMISSION TOMOGRAPHY. H.Shinotoh, Y.Yamasaki, \*K.Suzuki, T.Itoh, K.Hashimoto, Y.Tateno, H.Ikehira. Division of Clinical Research, \*Section of Cyclotron, National Institute of Radiological Sciences, Chiba.

The kinetics of C-11 Ro15-1788 was studied in 13 normal volunteers with positron emission tomography.

Initially (0-5 min.) high uptake was observed throughout the gray matter of the brain, but at the later time of the study (10 min.-), C-11 was accumulated high in the cerebral cortex ( $9.3 \pm 2.3\%$  Dose/ml  $\times 10^{-3}$ ), intermediate in the subcortical gray matter and low in the brain stem and the white matter. This distribution of C-11 approximately parallels the known distribution of benzodiazepine receptor in the human brain.

The ratio of the radioactivity in the frontal cortex to that in the organic solvent extracted fraction of the blood was obtained. The ratio became stable after 20 minutes after injection in most subjects. So this ratio at 20 minutes after injection was regarded as an index of benzodiazepine densities in the human brain. Age related decline of cortex blood ratio was observed in the normal volunteers. The result suggest that benzodiazepine receptors might decrease with age, though one must take into account changes of cerebral blood flow, blood brain permeability, and non-specific binding with age.

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VISUALIZATION OF SPECIFIC BINDING SITES OF BENZODIAZEPINE WITH C-11 Ro15-1788 AND POSITRON EMISSION TOMOGRAPHY. H.Shinotoh, Y.Yamasaki, O.Inoue, \*K.Suzuki, T.Itoh, K.Hashimoto, Y.Tateno, H.Ikehira. Division of Clinical Research, \*Section of Cyclotron, National Institute of Radiological Sciences, Chiba.

In PET study of neuropharmacological receptor, we can only detect total radioactivity. It is the specific binding sites and the amount of the radioligand bound specifically that we want to know, so it is crucial how to differentiate the specific binding from the non-specific binding in human and it is desirable that the radioligand binds highly specific to the receptor in vivo.

Three volunteers took 0.3 mg/kg, 0.5 mg/kg, and 1.1 mg/kg of cold Ro15-1788, 30 minutes prior to an injection of C-11 Ro15-1788. In this saturation experiments, the radioactivity reached its peak within 2 minutes and decreased rapidly throughout the brain. The radioactivity (%Dose/ml) in the cerebral cortex was reduced to 48%, 22% and 31% of the control experiments respectively at 20 minutes after injection. However, the blood activity kinetics were not different significantly between two experiments. These results indicate that C-11 Ro15-1788 has a high specific binding and low non-specific binding in vivo in humans.

By subtracting the radioactivity in two experiments in the same subject, visualization of specific binding sites of benzodiazepine was performed.