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MORPHOLOGICAL AND KINETIC ANALYSES BY QUANTITATIVE RESEPTOR AUTORADIOGRAPHY. H.Mori, K.Shiba, S.Tsuji, H.Matsuda, K.Hisada and K.Kojima. Kanazawa University, Kanazawa.

The kinetics and pharmacological characteristics of H-3-spiperone, QNB, diprenorphine and muscimol binding sites were studied in slide mounted sections of rat brain, and optical binding conditions were determined. Using the receptor autoradiographic techniques with tritium-sensitive LKB sheet film, the distribution of dopamine(2), muscarinic acetylcholine, opiate and GABA receptors were determined in slices including several areas of rat brain. The autoradiograms were analyzed using a computer-assisted densitometer, and the quantitative receptor autoradiograms were obtained.

These studies suggest that the distribution and kinetics of several receptors can be analyzed in detail by the quantitative receptor autoradiography, and this method might be useful in the explanation of etiology in the field of neuro-psychiatric diseases and the fundamental studies of positron emission computed tomography.

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METABOLISM, SUBCELLULAR DISTRIBUTION AND BINDING SITES OF I-125-IMP IN THE RAT BRAIN. H.Mori, K.Shiba, S.Tsuji, H.Matsuda and K.Hisada. Kanazawa University, Kanazawa.

N-Isopropyl I-123 P-iodoamphetamine(IMP) is a radioactive tracer with high lipophilic properties that has proven useful for the assessment of regional cerebral blood flow using single-photon emission computed tomography. In this study the metabolism, subcellular distribution and binding sites of I-125-IMP in the rat brain were assessed in order to elucidate the mechanism for localization of IMP in the brain.

Our results suggested that the dealkylation is the major route of metabolism of IMP in the brain and IMP is relatively rapidly metabolized to P-iodoamphetamine. The subcellular fractionation study showed that the synaptic membrane fraction had higher specific activity (% dose/g protein) than other fractions. Specific I-125-IMP binding in crude synaptosomal fraction is saturable and stereospecific with K_d of 56 μ M, B_{max} of 15.7 nmol/mg. Therefore, the delayed distribution of IMP in the brain could be related to its binding to the high capacity, relatively nonspecific binding sites which have greater affinity in the synaptic membranes.

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CHARACTERISTICS OF SPECIFIC IN VIVO LABELLING OF NEUROLEPTIC BINDING SITES WITH 3-N-[C-11]METHYLSPIPERONE. K.Yanai*, K.Ishiwata, T.Ido, J.Hatazawa, S.Watanuki, T.Takahashi, K.Tada*, M.Ito, T.Matsuzawa. *Department of Pediatrics, Tohoku University. Cyclotron and Radioisotope Center, Tohoku University, Sendai.

In vivo binding of 3-N-[C-11]methylspiperone([C-11]NMSP) was saturable in the rat forebrain, but not in the cerebellum. Nonspecific binding was almost equivalent in all brain regions except for white matter. [C-11]NMSP binding was localized to receptor-rich fractions in low administered doses (less than 20 nmol/kg body weight). Striatum to cerebellum ratio was a function of time after injection and administered dose. This ratio remained constant for low doses of under 30 nmol/kg. The radioactivity curve for the cerebellum in the control positron emission tomographic study almost equaled that of the striatum in the dog pretreated with spiperone(2 mg). This indicated that the amount of binding in the cerebellum might be considered as due to non-specific binding and unbound pool. The data obtained from the pretreatment study was different from that obtained from the displacement study, which suggested that displaceable [C-11]NMSP in the specific binding sites of the striatum was not completely cleared from the brain tissue by a large amount of unlabeled spiperone.

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Quantitative Positron Autoradiography by Simplified Standardization Procedure - Measurement of CMRgl using 18FDG - M Kameyama, *K Kawashima, R Shirane, Y Tsurumi, J Suzuki, *K Ishiwata, *S Watanuki and *T Ido, Div Neurosurg, Inst Brain Diseases, *Div Radioisotope Res, Cyclotron RI Center, Tohoku Univ, Sendai

The recent development of multiple labeled autoradiographic technique has enabled us to measure various physiological informations simultaneously. However, it has been necessary to obtain autoradiographic standards for quantifying the data in each experimental process due to the very short half life of the radionuclides used. To simplify this time consuming and complex procedure, we have tried to perform the quantitative positron autoradiography by simply using commercially available 14C standards. As results, the linear relationship between the density and the radioactivity were found both in 18F and 14C, and thus between 18F and 14C. These results clearly demonstrate that the linear relationship between the density and the radioactivity in 18F and 14C allows us to make quantifiable positron autoradiography by simply using the permanent 14C standards if the experiment was done under the same scheduled condition. On the basis of this simple and reliable procedure, the measurement of rate constants, lumped constant and CMRgl in the rat brain using 18FDG are also reported.