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Determination of the metabolic rate of ^{18}F-FDG in the normal rat brain microvessels vs. whole brain. K.Kawashima,R.Iwata,K.Ishiwata, T.Takahashi,K.Yanai,and T.Ido. Cyclotron and Radioisotope Center Tohoku University Sendai Japan.

^{18}F-FDG is a useful radiopharmaceutical to determine the cerebral metabolic rate of glucose using computerized emission tomography, and the theory by Sokoloff et al is generally used in this technique. Since this method can only represent the metabolisms in local areas of the brain, the metabolisms of each compartment(e.g. neurons, glial celles and brain microvessels) cannot be measured. Compartment analysis is more important to understand the brain metabolism than the analysis of whole brain so that each compartment should be refined.

In this present experiment, ^{18}F-FDG metabolic rate of rat brain microvessels vs. whole brain was obtained by the isolating brain microvessels according to the method of Brendel et al. FDG-6-P activities of both microvessels and whole brain were approximately 0.093 and 0.974(%Dose/g tissue) respectively at the time of 30 minutes after injection. Rackl et al show the volume of microvessels in the brain was calculated to be about 2.1%. So the distribution ratio of FDG-6-P in the rat brain microvessels vs. whole brain can be estimated to be 0.204 %.

This value suggests a fact that, under the normal conditions, FDG metabolism in rat brain microvessels must be a negligible facter in that of whole brain.

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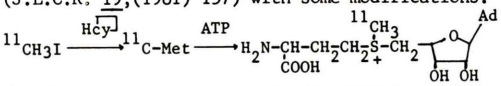
ENZYMATIC SYNTHESIS OF [C-11]S-ADENOSYL-L-METHIONINE AND ITS TISSUE DISTRIBUTION IN RATS. H.Sato, K. Ishiwata*, R.Iwata*, T.Ido*, Y.Abe** and K.Kogure. Dept. Neurology, Cyclotron & RI Center* and Res. Inst. TB & Cancer**, Tohoku University. Sendai.

[C-11]S-Adenosyl-L-methionine(SAM) is expected to be a new positron-emitting radiopharmaceutical as a tracer of the transmethylation.

[C-11]SAM was synthesized enzymatically from [C-11]L-methionine(Met) by the method of Gueguen et al (J.L.C.R. 19,(1981) 157) with some modifications.



[C-11]Met was synthesized with [C-11]CH_3I and L-homocysteine thiolactone. Rat liver extract was the fraction precipitating with 33-50% saturation of $(NH_4)_2SO_4$ and was used as an enzyme source without further purification. The mixture of [C-11]Met, 10mM ATP, liver extract, 100mM $MgCl_2$ in 100mM triethanolamine acetate(pH 8.2) was incubated at 37°C for 10 min. After incubation the mixture was acidified with $HClO_4$ and the denatured protein was removed by centrifugation. The supernatant was loaded on SP-Sephadex C-25 to remove the unreacted reagents. The [C-11]SAM was eluted with 1M HCl, evaporated to dryness and dissolved in saline. The [C-11]SAM was obtained in a radiochemical yield of about 42% and a radiochemical purity of more than 94% within 75 min.

The results of the tissue distribution study of the [C-11]SAM in tumor(AH109A)-beating rats were as follows; the clearance of radioactivity from the blood was slow, the concentration of radioactivity was the highest in the kidney and the lowest in the brain, and it appeared to increase in the tumor, the pancreas and the liver.

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REMOTE-CONTROLLED TARGET SYSTEM FOR ANHYDROUS H^{18}F PRODUCTION. S. Iida, T. Ogata, M.Akiyama, T. Sugawara, R. Iwata*, T. Ido* The Japan Steel Works, LTD. Muroran, *Cyclotron and Radioisotope Center, Tohoku University. Sendai

Among the positron emitting radionuclides, ^{18}F is a very useful nuclide in nuclear medicine. Molecular fluorine ($^{18}F_2$) is routinely used for the synthesis of 2-fluoro-2-deoxy-glucose (FDG). Another chemical form of fluorine, $^{18}F^-$, is also important in the labeling of biomedical materials. We have designed a compact target box eqipped with a heater and a thermocouple and constructed a remote-controlled target system. ^{18}F was produced by ^{20}Ne(d,α)^{18}F reaction with 7.5 Mev deuteron beam of mini-cyclotron. Anhydrous H^{18}F was recovered under hydrogen flow at around 500°C. Up to 48 % of ^{18}F was recovered compared with thick target yield. Target system was designed to prevent explosion and can be controlled by remote control panel or micro computer system.

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DEVELOPMENT OF $H_2{}^{15}O$ AUTOMATIC SYNTHESIS SYSTEM. K.Enoki,A.Tanaka and Y.Nishihara. Sumitomo Heavy Industries, Ltd. H.Saji and K.Torizuka. Kyoto University School of Medicine.

$H_2{}^{15}O$ has a potential for clinical application, such as for measurement of blood flow rate, but as a high rate of yield is required owing to the short half-life, its radio exposure poses a problem. It was confirmed that the newly-developed synthesis system could synthesize $H_2{}^{15}O$ at a high rate (600 mci at EOS; d-50 μA, 5 min.) as a result of synthesis tests using small medical cyclotron (CYPRIS). As $H_2{}^{15}O$ is trapped automatically into a Pb-shielded vial, radiation exposure is sizably diminished. Moreover, as it does not incorporate the conventional bubbling system for recovery of $H_2{}^{15}O$, it greatly eases the recycling production and system cleaning.