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DEVELOPMENT OF ^{11}C-PALMITIC ACID AUTOMATIC SYNTHESIS SYSTEM. M.Sakai, TNS. Y.Nishihara, A.Tanaka and K.Enoki. Sumitomo Heavy Industries, Ltd. H.Saji and K.Torizuka. Kyoto University School of Medicine.

The development of ^{11}C-palmitic acid as a radiopharmaceutical to be used as a myocardial scanner is highly anticipated. We studied a process for automatically synthesizing ^{11}C-palmitic acid with a radiochemically high yield and high purity and report our findings as follows.

^{11}C-palmitic acid is obtained by introducing $^{11}CO_2$ gas into Grignard reagent, $CH_3(CH_2)_{14}MgBr$, and by hydrolyzing the products obtained. This reaction, however, tends to produce byproducts such as ketone, hydrocarbon and many other compounds which affect purity and yield. In efforts to minimize the amount of these byproducts, we conducted diverse examinations and developed an automatic synthesis system capable of synthesizing high purity ^{11}C-palmitic acid. 35 - 40 mci (EOS yield) of ^{11}C-palmitic acid was obtained after a 20-minute irradiation by CYPRIS at P-20 μA.

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EXPERIMENTAL STUDY ON DIFFERENTIAL DIAGNOSIS OF TUMOR AND INFLAMMATION WITH ^{18}FDG BY POSITRON EMISSION TOMOGRAPHY. H.Fukuda, S.Yoshioka, T.Matsuzawa(The Res. Inst for TB & Cancer, Tohoku Univ.), S.Watanuki, T.Ido(Cyclotron and Radioisotope Center, Tohoku Univ.) and M.Kiyosawa(Tohoku Univ. School of Med.)

The validity of cancer diagnostic technic with ^{18}FDG by positron emission tomography was tested in an experimental rabbit tumor and aseptic inflammation. A male rabbit, which has VX2 tumor in the left thigh and croton oil induced inflammation in the right thigh, was injected with 3 mCi of ^{18}FDG. Just after injection, serial sanning for every 3 min was done by positron emission tomography. The tumor uptake of ^{18}FDG was high and increased with time during the 60-min study period. Whereas, ^{18}FDG uptake of inflammation was lower than that of tumor and relatively constant during the period. This was the important findings that distinguishes inflammation from cancer and it would be useful for clinical PET study of cancer diagnosis with ^{18}FDG.

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DEVELOPEMENT OF CANCER DIAGNOSTIC TECHNIC WITH ^{18}FDG AND ITS CLINICAL APPLICATION TO THE DETECTION OF CANCERS LOCATED IN ABDOMEN. H.Fukuda, K.Yamada, M.Ito, Y.Abe, S.Yoshioka, J.Hatazawa, K.Kubota, T.Matsuzawa(The Res. Inst for TB & Cancer, Tohoku Univ.), T.Ido(Cyclotron and Radioisotope Center, Tohoku Univ.)

By experimental study, ^{18}FDG was found to be a good radiopharmaceutical for cancer detection, because of high tumor accumulation, rapid blood clearance and low accumulation in liver and pancreas. This cancer diagnostic technic with ^{18}FDG was applied to primary and metastatic hepatomas and pancreatic cancers. The patients were injected with 4-6 mCi of ^{18}FDG and serial scanning for every 5 min was done by positron emission tomography. Tumor uptake of ^{18}FDG was high and increased with time, whereas ^{18}FDG uptake of normal liver decreased with time. Therefore, by 50-60 min after injection, positive and clear image of intrahepatic and pancreatic cancers were obtained. In a case who was irradiated to a part of tumor, there was a decrease of ^{18}FDG uptake in agreed with the irradiated area. This meant that ^{18}FDG uptake depends on tumor viability and so that this technic would be useful for the evaluation of cancer treatment.

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QUANTITATIVE MEASUREMENT OF REGIONAL CEREBRAL GLUCOSE UTILIZATION USING FLUORINE-18FLUORO-DEOXY-GLUCOSE AND POSITRON CT. J.Hatazawa, H.Fukuda, Y.Abe M.Ito, S.yoshioka, K.Kubota, T.Matsuzawa, Dep.Radiol.&Nucl.Med, The Res.Inst.for TB.&Cancer, T.Ido, The Cyclotron&R.I. Center, Tohoku University, Sendai.

Regional cerebral metabolic rate of glucose(rCMRGlu) was measured in post-apoplexic patient.(three months old left putaminal hemorrhage) The procedure was carried out according to deoxy-glucose method originally developed by Sokoloff and applied to PCT by Phelps. 5 mCi of F-18 FDG was injected and 12 fiveminutes scan was performed after injection at the level of OM + 50 mm in order to measure accumulation of F-18 FDG in brain tissue. Arterial blood sampling from radial artery was performed in order to calculate plasma activity of FDG. After 12 sequential scans, tissue distribution of FDG was measured at the level of OM + 20 mm and OM + 80 mm.

rCMRGlu was markedly decreased in overall affected hemispher and right cerebellum . The values in frontal, temporal, occipital and parietal cortex were 5.0, 3.1, 4.1 and 3.5 mg/100g/min in left hemispher, 6.3, 6.4, 6.8 and 7.0 mg/100g/min in right hemispher. These values by autoradiographic measurement were higher than the values obtained by kinetic measurement of rate constants determined in the least square fitting procedure between tissue and plasma FDG activity.