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AUTOMATIC DEVICE FOR PHOTOSYNTHESIS OF ^{11}C-LABELED GLUCOSE. K. Imamura, H. Yamaguchi, T. Nozaki and M. Iio Department of Radiology, St. Marianna University School of Medicine, Kawasaki; Research Institute of Physics and Chemistry, Wako; and National Nakano Chest Hospital, Nakano

We have obtained ^{11}C-labeled glucose (as a mixture with ^{11}C-fructose) using photosynthesis of leaves since 1979, and used the compound mainly for the examination of lung cancer.

The whole synthetic process was automated including concentration of $^{11}CO_2$ by molecular sieve. Chemical procedure is almost the same with that reported at the last annual meeting.

To automate the solvent extraction process, we designed a device separating solvents on the basis of the difference of electric conductivity of the two phases.

Water phase after solvent extraction showed high conductivity (1.3 m$\mho$) due to solution of ionic components from leaves, on the other hand that of ether phase is 36 $\mu\mho$. Automated solvent extraction system consists of glass cell with platinum electrodes. Electric valve at the outlet of the cell is controlled as to close when the electric conductivity is lower than preset value of potentiometer, and open otherwise. Main unit for the automated synthesis is 90 cm high, 50 cm width, and 40 cm depth. It is installed in a hot laboratory of baby cyclotron house, Nakano Chest Hospital, and works well. Cleaning process of the whole system will be added.

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ABSORPTION AND ORGAN DISTRIBUTION OF C-LABELLED HEXACOSANOIC ACID (^{11}C26:0). A. Matsui & N. Sakuragawa National Center for Nervous, Mental and Muscular Disorders. Tokyo, M. Iio National Nakano Chest Hospital. Tokyo, S. Iida & T. Yamada Japan Steel Work Industry Co. Ltd. Muroran, T. Karasawa & T. Nozaki Rikagaku Kenkyusho. Wako

It has been reported that adrenoleukodystrophy may have abnormal metabolism of long chain fatty acids. So we studied the metabolism of C26:0 in rats. In order to apply clinically short half-life nuclide, we used ^{11}C26:0, and ^{14}C26:0 to confirm the metabolism of C26:0 on the molecular basis. After injestion, this tracer was absorbed to give a peak of radioactivity in serum at 40 to 80 min. In studying the uptake by visceral organs, relative activity to blood showed variable values in conditions, but the value of liver was constantly above that of blood. The value of brain increasd gradually untill 40 min. Radioactivity in the lipid fraction of brain at 40 min. was highest in different organs and the next was that of liver, 17 and 14 times to the blood. Expired activities as CO2 during 30 or 40 min. were 16 to 35 % of ingested values. These results seem to reflect physiological metabolism of C26:0, so ^{11}C26:0 could be used clinically as a tracer for studying fatty acid metabolism in vivo.

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SYNTHESIS OF [F-18]RADIOPHARMACEUTICALS BY THE USE OF F_2[F-18]. T. Takahashi, T. Ido, K. Ishiwata, R. Iwata and M. Monma Cyclotron and Radioisotope Center, Tohoku University.

F-18 is an ideal positron-emitter and its relatively long half-life (110 min.) is favorable for the synthesis of [F-18]radiopharmaceuticals.

In the synthesis of [F-18]radiopharmaceuticals, the method of using F_2[F-18] is one of the useful methods. F_2[F-18] has the high reactivity. In particular, its additional reaction to various double bonds is simple and widely used. It is expected that this labelling method is used for the development of various [F-18]radiopharmaceuticals.

We produced F_2[F-18] from the deuteron bombardment of a neon-fluorine gas mixture and applied its additional reaction described above to the synthesis of 5-fluorouracil[F-18] (5-FU[F-18]), 5-fluorouridine[F-18] (5-FUR[F-18]), 5-fluoro-2'-deoxyuridine[F-18] (5-FdUR[F-18]), 2-deoxy-2-fluoro-D-glucose[F-18] (FDG[F-18]) and 2-deoxy-2-fluoro-D-mannose[F-18] (FDM[F-18]). We have succeeded in the synthesis of them in high radiochemical purity.

Moreover, by administrating 5-FU[F-18], 5-FUR[F-18], 5-FdUR[F-18], FDG[F-18] and FDM [F-18] to mice or rats, we have demonstrated that 5-FU[F-18], 5-FUR[F-18], 5-FdUR[F-18] are accumulated in intestine and FDG[F-18], FDM[F-18] are mainly accumulated in brain, heart and tumor.

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F-18-FLUORODEOXYGLUCOSE(F-18-FDG) IMAGING —ITS MEANING AND CLINICAL APPLICATION—. T.Takashima, A.Yamaura, S.Tamachi, F.Shishido, Y.Tateno, A.Yamane, T.Yamazaki, T.Irie, K.Fukushi, O.Inoue, T.Iinuma, Y.Suda, M. Endo, N.Fukuda, M.Uoji, K.Tamate, E.Tanaka and A.Kurisu Dep. of Neurosurgery, Chiba University and National Institute of Radiological Sciences. Chiba

Previously Shishido et al reported PCT imaging study using N-13-ammonia and C-11-carbon monoxide for volunteers and neurosurgical patients with POSITOLOGICA-I. As a new radiopharmaceutical agents, F-18-fluorodeoxyglucose(F-18-FDG),has been introduced in clinical use since 1980, the usefulness of F-18-FDG is well realized,particularly in diseased brains.

F-18-FDG is an analogous substance of glucose. Glucose within the brain tissue is metabolized to CO_2 and H_2O finally, but F-18-FDG is only metabolized to F-18-FDG-Phosphate and not furtherly.

According to these, F-18-FDG imaging conveys the information about the local cerebral glucose utilization rate(l-CMR-Glucose). In normal volunteers, the accumulation of F-18-FDG is high in grey matter,basal ganglia,brainstem and cerebellum. The distribution of F-18-FDG is very similar to N-13-ammonia,perfusion pattern. In some pathological cases, the difference of the distribution was noted, and F-18-FDG imaging shows more clearly demarcated focus than N-13-ammonia imaging.

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