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COMPARATIVE STUDIES ON THE UPTAKE OF C-11 GLUCOSE AND F-18DG IN PATIENTS WITH LUNG CANCER. M.Matsuda, JSW Memorial Hospital, M.Furudate, DPT of Nuclear Medicine, Hokkaido University Medical School.

In the present experiments comparative studies on the uptake of glucose to lung cancer were performed using C-11 glucose and F-18DG. The detector used was LFOV camera equipped with high energy parallel hole collimeter. The results of the experiment were as follows.

1. F-18DG was rapidly taken up by liver and made a peak in early phase and declined with time, whereas uptake of F-18DG in heart muscle and tumor increased with time and make a plateau in the late phase. The pattern was basically the same as that of C-11 glucose.
2. The uptake of F-18DG by lung cancer tissue was much higher than that of C-11 glucose. This difference was estimated to be attributable to the difference in the metabolism.
3. The uptake of F-18DG by lung cancer tissue was more distinctive than Ga-67, whereas the uptake of C-11 glucose was lower than that of Ga-67 in all the cases of lung cancer.

These results indicated that F-18DG was a useful material than C-11 glucose for the detection and evaluation of glucose metabolism in lung cancer.

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PET DIAGNOSIS OF HEPATO-CELLULAR CARCINOMA WITH POSITRON-LABELED HEXOSES. H. Fukuda, K.Yamaguchi, T.Matsuzawa, Y.Abe, T.Fujiwara, M.Itoh, M.Tada, T.Takahashi, S.Watanuki and T.Ido. The CYRIC, Tohoku University, The Research Institute for TB and Cancer, Tohoku University, Sendai

Increased glycolysis is an important characteristics of cancer. ^{18}F FDG can be a probe for grading tumor malignancy, because ^{18}F FDG is phosphorylated by hexokinase and trapped in cancer cells. While 2-deoxy-2- ^{18}F -fluoro-D-galactose (^{18}F FDGal), an analog of D-galactose, phosphorylated by galactokinase and accumulated much in the normal liver. Decrease of galactose metabolism accompanied with increasing tumor growth rate was reported in experimental hepatomas. Then, ^{18}F FDGal can be a probe for tumor differentiation. PET scans were performed in patients with hepato-cellular carcinoma (HCC) using ^{18}F FDG and ^{18}F FDGal. ^{18}F FDG uptake in the tumor increased with time. However tumor uptake varied case to case and very low uptake was observed in a case. This means hexokinase activity will be variable among HCCs. On the other hand, ^{18}F FDGal accumulated much in HCC and the uptake varied from 70 to 40 of normal liver. However no accumulation was observed in metastatic tumors. From these results, it was suggested that PET scans with ^{18}F FDG and ^{18}F FDGal can provide and information about differentiation of HCC.

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STUDIES OF Ga-68 HYDROXIDE AS LIVER AND LUNG IMAGING AGENTS.

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Compounds as liver and lung imaging agents in use of Ga-68 which is generated by Ge-Ga milking system were studied. Stable gallium chloride was added to Ga-68 elution. Sodium hydroxide and sodium bicarbonate were adjusted pH 7.0-7.5. Then Ga-68 hydroxide was precipitated, the diameter of which particle was ranged from 0-80 μm .

The agents were injected to rabbits and rats. They were sacrificed 5, 15, 30, 60 or 120 minutes after the injection. The radioactivities of blood, muscle, kidney liver, lung and spleen were measured by a well-type scintillation counter. These agents were distributed mainly to lung, liver and spleen. 23 patients were examined by intravenous injection of the agents whose radioactivity was 1.0-1.5 mCi without any side effects. Cross sectional images of liver and lung were performed by Shimadzu positron camera (SET 120w). In all cases good images were obtained and tumors were expressed as the areas where radioactivities of Ga-68 were decreased.

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Quantitative blood volume measurement of liver disease, K.Yamaguchi, T.Matsuzawa, M.Itoh, Y.Abe, T.Fujiwara, T.Yamaguchi, M.Tada, T.Ido*; Res.Ins.TB and Cancer, *CYRIC

<method and materials> 3 normal volunteers, 4 liver cirrhosis patients, 3 cavernous hemangioma patients, and 3 hepatocellular carcinoma patients were studied. The machine to use this study was ECAT II (ORTEC). The transmission scan using Ga-67 ring source was performed before C-11 CO inhalation. C-11 CO inhalation was continued until the liver counts were over 3000 count/sec. The emission scan was started at the beginning of inhalation, and performed sequential scan every 5 min until 40 min. The blood volume calculation was performed using Phelps's method. About correction factor for peripheral tissue hematocrit, we used Newton's value. <result> It took about 10 min after inhalation to reach steady state except cavernous hemangioma. About cavernous hemangioma it took about 40 min. Calculated blood volume were as follows; normal liver was 47ml/100g tissue, cirrhotic liver was 21.5ml/100g tissue, cavernous hemangioma was 113.8ml/100g tissue, and hepatocellular carcinoma was 21.2ml/100g tissue.