A New Pancreas Scanning Agent

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Radioiodinated phenylalanine with specific activity of about 1 mCi/mg was synthesized with isotopic exchange reaction in acidic solution. The radiochemical purity of the substance was examined with ascending paper chromatogram using n-butanol saturated with 1N acetic acid as a developer. The radioactivity of radioiodinated phenylalanine was on the colored spot developed with ninhydrin reaction. Rf values of the substance and free iodide in this paper chromatographic system were 0.6 and 0.3 respectively.

The radioiodinated phenylalanine solution liberated about 13% of free iodine after 16 days storage in refrigerator. However, the degree of the liberation was very much decreased with the addition of stabilizer in the solution.

Mice were given radioiodinated phenylalanine intravaneously and sacrificed at 2, 5, 10, 15, 30 and 60 min after injection and organs were routinely taken for radioactivity assay. The radioactivity was found in the highest concentration in the pancreas before 10 min after i.v. injection into mice. The maximum uptake of the injected activity into total pancreas was about 4% of the total dose, regardless of the total administration dose of 60 μg or 3 μg per mouse. This substance was demonstrated to concentrate in pancreas 30 min after i.v. administration with a pancreas: liver concentration ratio of about 5:1 and pancreas: blood concentration ratio of about 4:1. Kidney was only other organ than pancreas which showed more concentration than blood.

By the paper chromatographic examination of excreted urine from the injected mice, a peak having Rf value of 0.9 was found besides iodinated phenylalanine and iodide, and its relative ratio of radioactivity to other peaks was increased with time. This may be assumed as a metabolite of radioiodinated phenylalanine.

Radioiodinated phenylalanine (^{131}I) and selenomethionine (^{75}Se) were injected simultaneously into mice and organ uptakes of ^{131}I and ^{75}Se were measured and compared. The mean concentration of ^{131}I was more than 4 times that in liver during 30 min to 2 hours after the administration, and the mean concentration of ^{75}Se in pancreas of the same mice group was about 2 times that in the liver during the same period of time. It was, therefore, demonstrated that radioiodinated phenylalanine had more selective affinity to mice pancreas than selenomethionine.

An Autoradiographic Study on the Cell Differentiation of the Gastric Epithelium of the Mouse

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Cell proliferation and migration in the gastric epithelium of the mouse were studied with autoradiography after pulse labeling or cumulative labeling with ^{3}H-thymidine.

After embeding in paraffin, partly in epon, and sectioning in longitudinal plane, autoradiographs were stained with H-E or PAS. First series: Mice were injected with ^{3}H-Thymidine 1 μc/g intraperitoneally four times at intervals of six hours and animals were sacrificed at 20, 48, 72 hours, 6, 7, 10, 17 and 38 days. Second series: For cumulative labeling

the animals were injected with ^{3}H-Thymidine at intervals of six hours and sacrificed at 6, 20, 25, 49 hours, 3 and 10 days. One was sacrificed at two hours after injection of ^{3}H-Thymidine.

Histologically gastric epithelium is divided into three parts, namely surface epithelium, generative cell zone and glandular epithelium. In the first series, at 20 hours of cumulative labeling, labeling indices of generative cells, mucous neck cells, parietal cells and chief cells were 60%, 3%, 0.15% and 0.57%, respectively. Thereafter the number of labeled generative cells and mucous neck cells declined. After 10 days L.I. of generative cells was reduced to nearly zero and mucous neck cell to 0.15%. To the contrary, maximum 13% of the parietal cells were labeled at 10 days and L.I. was markedly reduced between 17 and 38 days. Simultaneously labeled parietal cells migrated down to the bottom from the top of the gland and were found in the middle portion of the gland at 17 days.

There appeared labeled parietal cells distributed among the surface epithelial cells at 6 days and disappeared at 17 days. This indicates shorter life span of these parietal cells than that of the gland. Highest L.I. 7.5% of the chief cells was observed at 10 days and thereafter the L.I. decreased. In the second series surface epithelial cells were totally labeled to the top of the villus at 49 hours. L.I. of the generative cells was 20% after flash labeling and 84% after cumulative labeling for 25 hours. Tg and ts of the generative cells were etsimated at 37 hours and 6.5 hours, respectively. Two hours after labeling the L.I. of mucous neck cells, parietal cells and chief cells were 0.15%, 0.33% and 0.27%, respectively.

After cumulative labeling for 10 days the labeling indices of mucous neck cell, parietal cell and chief cell reached 86%, 25% and 20%, respetively. Autoradiographs taken two hours after labeling showed that very small portion of glandular epithelial cells were labeled. Considering the migration of parietal cell, it is likely that a small portion of the glandular epithelial cells have DNA synthesizing capacity even after differentiation. Although there remain the unsolved problems about the imigration of the chief cells, the glandular epithelial cells seems to differentiate from generative cells similarly as surface epithelial cells. Then life span t_L of mucous neck cell, parietal cell and chief cell were roughly estimated at 11 days, 40 days and 50 days.

Studies on Regional Hepatic Blood Flow with ^{133}Xe

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The purpose of this study is to evaluate the regional hepatic blod flow using ^{133}Xe solution in the various liver diseases.

Experimental studies:

Adult mongrel dogs weighing 8~10 kg were anaesthetized with sodium pentobarbital, 25 mg per kg. Through a midline abdominal incision, a fine polyethylene catheter was inserted into the main portal vein via the V. mesenterica superior. First, 1 ml of ^{133}Xe (250 μCi) dissolved in saline was administered by rapid injection into the polyethylene catheter. Later, when the counts had fallen to background level, 0.1 ml of ^{133}Xe (250 μCi) dissolved in saline was injected into the parenchyma of the liver with a small gauge needle.

The washout curve was monitored over the liver by two 1.5 inch NaI scintillation detectors mounted in the narrow collimators connected to the multiscaler. (Fujitsu-Limited 400 channel multiscaler).

The counts obtained were plotted on semilogarithmic graph paper and manually analyzed by compartment analysis.

Hepatic blood flow (H.B.F.) expressed as ml. per 100 gr per min., is derived:

$$\text{H. B. F.} = \frac{K\lambda 100}{\rho}$$