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:

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

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Where ρ=specific gravity of the liver tissue, 1.05

λ=the partition coefficient of ^{133}Xe between liver and blood, 0.74

$$\left(\frac{\text{tissue-concentration of } ^{133}Xe}{\text{blood-concentration of } ^{133}Xe}\right)$$

The disappearance rate (constant) is determined from the half-time ($t^1/_2$): $K=\frac{\log_e 2}{t^1/_2}$

Eighteen cases experiments were performed with the results that in every case the hepatic blood flow was higher by the portal route than by the intrahepatic injection route. Mean flow was 125 ml. per min. via the portal route and 59 ml. per 100 gr. per min. via the intrahepatic route.

Clinical studies:

Studies were carried out on 10 patients at the time of the upper abdominal surgery, e.g. gastrectomy, cholecystectomy. The patients were anesthetized with CI[581], nitrous oxide and oxygen under the controlled respiration using respirator. To measure liver blood flow, ^{131}Xe (300 μCi) dissolved in saline were injected serially into portal vein and into the substance of the liver. The similar results were obtained.

The significance of these studies are not completely understood yet. However, if there is functional mixing of the two routes, then the hepatic blood flow should be equal, regardless of the route of administration. It seems reasonable to assume that during portal route injection the liver tissues tagged with ^{133}Xe are immediately surrounding functioning capillaries and sinusoids. After intrahepatic injection on the other hand, the mean diffusion distance from functioning capillaries and sinusoids must be longer in this situation. Our findings suggest that the portal venous stream and arterial stream remain functionally separate as they perfuse the liver tissue.

Summary;

Hepatic blood flow was measured in man and dogs by determining the washout curve of ^{133}Xe from the liver. It was shown that hepatic blood flow was greater when the ^{133}Xe was given by the portal vein than when it was given by the intrahepatic injection. Thus, ^{133}Xe method can be considered as a powerful tool in the regional hepatic hemodynamics study.

An Analysis of Hepatic Circulation and Examination of Extrahepatic Shunt by Intrasplenic Injection of ^{198}Au Colloid

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As organs have numerous blood pathways and each pathway has its own transit time, a distribution of transit times should be considered in studying circulation system of organs. Surface counting curve obtained by sudden injection of radioisotopic substance include this distribution function of transit times. As we reported earlier the characteristic distribution function of transit times can be determined by application of Z transform to sudden injection process and use of digital computer. We applied this analytical method to the surface counting curve on the liver obtained by sudden injection of ^{198}Au colloid into the spleen and reported the results of analysis of hepatic circulation as follows.

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