A Basic Study of Radiorespirometry
Analysis of Expired Air Pattern of Rats Bearing 3′-Me-DAB Experimental Liver Cancer

K. SATO*, N. KAMIMURA*, H. ISHIZUKA*, K. OTO*, S. FUJITA*, H. KANEDA*,
H. IWABUCHI**, Y. SHIKI** and A. KUBODERA**
Nihon University of the Third Internal Medicine
**Science University of Tokyo Faculty of Pharmaceutical Sciences*

Male Donryu rats were pretreated with 0.06% 3′-Me-DAB and then given ^{14}C-labled substrates in a biological system in order to study the differential pattern of $^{14}CO_2$ in respiratory system from the following three view points i.e., (1) peak time (2) peak hight, and (3) total amoutn of $^{14}CO_2$ collected in two hours. With α-fetoprotein (AFP) primary positive rats that are observed a few weeks after the administration of 3′-Me-DAB, the peak time of $^{14}CO_2$ generated from ^{14}C-glucose is temporarily delayed right after the appearance of AFP then the time to reach the peak is shortened.

With the rats the AFP primary reaction of which turned from positive to negative, peak time was delay. However, significant difference was not observed in the total amount of $^{14}CO_2$ between the treated and control rats.

Furthermore, in the period that AFP secondary reaction was positive, the same tendency as that of the primary reaction was observed and then peak hight was also increased.

With hepatoma cells glucose-metabolism is intensive, and with cancer-bearing rats, it is considered that the more rapid the proliferation of the cells is, the more glycolysis is enhanced.

It is suggested from the radiorespirometric pattern that anaerobic glycolysis would already be enhanced in the early stage of carcinogenic process, when the oval cells appear. This finding is considered to be interesting related to the production of AFP.

It seems that radiorespirometric analysis could be an useful method for diagnosis of nuclear medicine.

Evaluation of Liver Function Using Stable Isotope Labelled Benzoic Acid in the Patients with Various Liver Disease

K. NAKAMURA*, O. MIZUNO*, A. SUZUKI*, K. HONDA*, H. OSHITA*, T. OSHIKOJI*,
H. KATO**, Y. ISOGAI**, T. HIGASHI***, H. WAKAO*** and S. BABA****
Department of Internal Medicine, Keiyu General Hospital
**Department of Radiology, Keiyu General Hospital*
***Department of Radiology, Kanagawa Dental College*
****Tokyo College of Pharmacy*

We have attempted to improve the sensitivity of hippuric acid test using stable isotope labelled benzoic acid (D_5-benzoic acid) and gas chromatography/mass spectrometer system. At present, the hippuric acid test is not commonly used as liver function test despite its significance of indicating hepatic antidotal capacity, because it lacks in sharpness in detecting abnormality.

Approximately 100 mg of D_5-benzoic acid was administered orally, and urine was collected during the ensuing four hours. Hippuric acid was extracted from the urine and D_5-hippuric acid derived from D_5-benzoic acid and H_5-hippuric acid synthesized through normal metabolism were determined separately in high accuracy. Ratio of D_5-hippuric acid excreted into urine within four hours to the equivalent weight of D_5-benzoic acid administered was calculated in 45 cases. (9 normal

male, 8 cases with acute hepatitis, 8 with chronic hepatitis, 8 with liver cirrhosis, 4 with primary hepatoma, 3 with metastatic hepatoma, 2 with drug induced hepatitis and 3 with alcoholic liver disease).

In 9 normal cases, the ratios were above 95%, indicating that this method was more accurate and reliable than the traditional hippuric acid test using titlation or spectrophotometric method, in which normal value had been reported above 50%.

In 36 patients with various liver disease the ratios were scattered in wide range. These results were compared with those of liver function tests commonly used now in clinical medicine. It seems that the present method the authors have tried is almost as sensitive as those routine liver function tests, moreover it provides us with the different point of view in understanding the disturbance of liver function.

The Effect of Bucolome (Canalicular Choleretic) on the Biliary Excretion of ^{3}H Digitoxin in the Rat

S. KANAI, K. KITANI and Y. MORITA
First Laboratory of Clinical Physiology Tokyo Metropolitan Institute of Gerontology

The authors previously reported the marked increase in the biliary excretion of i.v. injected ^{3}H ouabain in the rat previously administered bucolome (Kanai & Kitani, Jap. J. Nucl. Med. 12: 517, 1975). Greenberger et al. (J. Lab. Clin. Med. 81: 241, 1973) suggested that the biliary excretion of digitoxin is also dependent on bile flow rate.

In the present study, we examined whether the biliary excretion of digitoxin can be also increased by bucolome induced choleresis in the rat.

Under nembutal anesthesia, the biliary excretion of i.v. injected ^{3}H digitoxin (0.18 mg, 0.27 mg/100 g) was compared between control and bucolome administered rats for 2 hrs. Bucolome induced 50–60 percent increase in the bile flow rate. The biliary excretion rates of digitoxin (% of the dose) for 1 and 2 hrs after injection were; control rats, 14.1 ± 1.7, 25.7 ± 3.4; BC rats, 13.4 ± 3.1, 23.9 ± 5.9, for rats given 0.18 mg/100 g, and control, 11.0 ± 0.9, 20.6 ± 1.7; BC, 11.1 ± 1.4, 19.9 ± 3.4 for rats given 0.27 mg/100 g digitoxin.

It was concluded that the choleresis induced by bucolome is ineffective in increasing the biliary excretion of digitoxin. The results indicate that the bile flow dependency of digitoxin excretion previously suggested by Greenberger et al. needs further reevaluation. Furthermore, the results suggested the difference in the regulatory mechanism of biliary excretion of ouabain and digitoxin.

Preparation of ^{99m}Tc and Aldehyde-Glutamic Acid Complexes

A. KONO*, N. OZEKI*, Y. MATSUSHIMA**, Y. KARUBE**, and T. MAEDA***
**Department of Radiology School of Medicine Kurume University Kurume*
***Fuculty of Pharmaceutical Sciences Kyushu University Fukuoka*
****Kyushu National Cancer Center Hospital Fukuoka*

In 1975, Baker et al found ^{99m}Tc labeled pyridoxal-glutamic acid (^{99m}Tc-PG) as a hepatobiliary radiopharmaceutical. It was also known that other aldehydes and glutamic acid complexes gave almost the same results.

At present, the chemical studies of these complexes were carried out for a simple labeling.

Methods

Aldehyde and 2 equimolar portions of glutamic acid was solved in the $^{99m}TcO_4^-$ saline solution, and adjusted to pH 7.5 with 0.1 N NaOH. The mixture was heated at 120° for 30 min. The UV absorption spectra of the mixture was measured. The thin layer chromatography was performed on