

the organ examined, and a distribution of the recorded data.

Our clinical materials studied in this report were 30 cases of nephrolithiasis (preoperatively and postoperatively), hydronephrosis, and pyelonephritis. The interest area renogram was obtained in each area of interest in the kidneys, which was selected as the upper pole, the lower pole, and the pelvic area, corresponding to the location of the calyces. On the interest area renogram, abnormal findings were represented as a delay of the peak and/or a pattern of excretory disturbance, in each selected area of interest, depending on the nature and the

severity of the illness. Abnormalities were also demonstrated in the blood flow in each area of interest, by the use of Tc^{99m} .

It was interestingly shown that a typical pattern of morphological destruction appeared when the surgical incision involved the renal parenchymal tissue, while the abnormal preoperative findings such as those seen in hydronephrosis completely recovered when the incision was not applied into the renal parenchyma.

Our interest of the study in the near future includes how to estimate preoperatively the range of recovery of the renal function in kidney diseases by these methods.

Measurements of $^{14}CO_2$ by Windowless p-n Semiconductor Radiation Detectors —Preliminary Studies of The Instrument for Inspection of the Existence of Bacteria in Blood Cultures and Urine Samples—

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For the measurement of precise dynamic biomedical and bacteriological process with aide of radioisotopes, such as ^{14}C and ^{35}S , stable windowless semiconductor detectors for low-energy beta-ray in vivo or in vitro counting were developed and the fundamental characteristics of the detectors were studied. The instrument for inspection of existence of bacteria in blood cultures and urine samples was also studied.

The windowless p-n semiconductor detectors developed have a sensitive area ranging from 4 mm² to 200 mm². The effective window (dead layer) of the detectors is less than 0.3 μ m.

The fundamental characteristics of counting rate vs discriminator level and counting rate vs temperature were studied for the detectors developed, especially the 20 mm² and 200 mm² area detectors, using thin solid source of ^{14}C .

The counting efficiency of the detector was

proportional to the sensitive area of the detector at the constant discriminator level. The counting rate was about 200 cpm/cm² for 3 μ Ci/cm² of ^{14}C solid source at the discriminator level 15 keV.

The experimental results show that 20 mm² area detector is feasible for the in vivo measurement of low-energy beta-ray, such as those emitted by ^{14}C and ^{35}S , and that a large area detector is feasible for in vitro application, according to its high counting efficiency for low-energy beta-ray at room temperature.

For in vitro application of windowless p-n semiconductor radiation detector, the test-instrument for inspection of bacteria in blood cultures or urine samples was constructed. The instrument consists of the windowless p-n semiconductor detector, gas container, culture vial, and associated electronic circuits to handle the data automatically.

The evaluation of this counting system was

carried out using blood cultures and urine samples. After the addition of the bacteria (*E-coli*) to 1 ml of sterile serum, 5 μ Ci of uniformly labeled ^{14}C -glucose was added, and the culture was incubated at 37°C. Radioactive carbon dioxide ($^{14}\text{CO}_2$) released from culture was measured automatically with chart-recorder and electronic counter.

The counting rate of $^{14}\text{CO}_2$ was increased after a 2 hour of incubation time while the culture was agitated continuously. However, the content of $^{14}\text{CO}_2$ released from the culture was less without continuous agitation.

The culture vial which is used for automatic sequentia sampling of many samples was also reported.

A Scintillation Probe for Efficient Counting of Low Energy Beta Rays in the Elution from Liquid or Gas Chromatographs

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A counting system is presented for the continuous scanning of soft beta ray emitters in the eluate from liquid or gas chromatographic columns. A relatively small portion of the column stream is diverted through the counting system while the main portion is passed through a light absorbance measurement and recording device to a fraction collector. The stream to be counted is mixed with liquid scintillator by cavitation and then nebulized into the counting chamber using a suitable gas to give a counting efficiency equivalent to that of vial counting. No change in efficiency was noted for easily soluble material in organic solvents when nebulization

and cavitation for more complete emulsification were omitted from the system. Radioactive counts and absorbance measurements can be plotted simultaneously on a chart recorder. The convenience and efficiency of the system was demonstrated by the recording of the counting and absorbance data for an aqueous elution of ^{14}C -cytidine and ^3H -uridine from a Dowex column. A few experiments are demonstrated for the explanation that advantages involved herein are of great use for continuous scanning of expiratory $^{14}\text{CO}_2$ and controlling of radioactive dust concentration in an automatic air pollution reproducer.