time when the subject changes his position from supine posture to sitting position. Next, we have found that it is not possible to calculate the liver accumulation coefficient with the available detector when the subject is standing or moving and that a new type of detector is required for this. Therefore, we have devised a scintillation detector whose mutual position relation to the subject is stable so that it can transmit reliable informations to the scaler or to the recorder even when the subject changes his posture and position.

In constructing a detector that is stable and portable as well as attachable to the body surface, it is necessary to give a consideration to its size, shape, weight and the corset attachment to make it attachable to the body. Needless to say that it is desirable to construct a detector as small and light as possible. For this reason, we have attempted to construct a detector with a higher efficiency for counting γ-energy and a better shielding effect of lead shield, when using ^{198}Au and ^{131}I. We find that the most suitable detector is the one with a collimator of $60\phi \times 100$ mm, and the body surface attachment apparatus of flat surface with a side window of rectangular shape, 22.5×45 mm in its center, and attached with a shielding accessory to adjust the window area to its half when necessary. In addition, it is constructed as to be able to close the side window so that it can be used as an end window type. The scintillator is NaI (Tl), $1/2 \times 2''$ in size, with 152 AVP (Philips) as photomultiplier, and the detector measures $62\phi \times 268.5$ mm and weighs about 3 kg. We have also modified the corset to be attached to the body; namely, it is made to be attachable to the upper half of the body with a bag holding the detector in a fixed position, and the bag is stabilized by a band hanging from the shoulder so as to prevent it from slipping down. As the result the mutual position relation of the detector and the liver is fairly stabilized. Therefore, this new type of detector proves to be a useful apparatus in clinic.

Some Performance of a Universal γ Countor and its Clinical Application

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The universal γ countor represents the practical solution for laboratories conducting investigations with γ emitting isotopes. It is a system skillfully designed to eliminate many of the troublesome and time-consuming problems usually encountered with large, small and variable-volume samples.

The system incorporates two vertically opposed scintillation detectors that deliver accurate results with sensitivity practically double that of single scintillator system. With these individually adjustable detectors, we can adjust the detecting geometally for each sample in order to maintain high uniform counting efficiency over a wide range of sample volumes. The detecter assembly is housed in a large-volume counting chamber shielded by about 1000 kilogram of steal-encased lead. The detector outputs can be either summed or monitored individually by a mixed preamplifier. Its outputs can be measured by the scaler that include degital plesition and pulse height analyzers designed primarily for γ-rays spectrometry. The counting chamber is equipped with two shielded doors. One can be used for a large-sample, other for human arm counting or other applications requiring straight-through insertion of the sample. These doors are easy to open and close, and have stepped construction to prevent radiation leakage.

The performance data of the instruments

for two 3 inch diameter NaI crystals are as followes:

Maximum sample demension: 15×15×15 cm^3.

Measuring γ-rays energy range: from 10 KeV to 3 Mev.

Back-ground rates: 80 cpm using a 24% ^{60}Co windor, 145 cpm using a 35% ^{131}I window, and approximately 1300 cpm in the integral mode.

counting efficiency for a space of 18 cm between two detector, using 0.5 L RI sample in 2 L beaker: 1.5% using 24% ^{60}Co window, 19% using 35% ^{131}I window.

Minimum detectable activity (4σ of B.G): 1.9 $\mu\mu$Ci/cc using 24% ^{60}Co window, 0.2 $\mu\mu$Ci/cc using 35% ^{131}I window.

The possible uses of this instruments in medicine are discussed.

As a conclusion, reproducible measurements are thus assured without need for time-consuming dilution or concentration of the samples to a standard volume, and therefore the universal γ countor is to be used to a γ counting problem in medicine.

On the Improvement of Scintigram Photorecorder

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1. General.

Although the scintiscanners being used in these days have been improved in the sensitivity, spacial resolution and the display system, it may be said that the comparatively long time required for scanning is one of the drawbacks remained for improvement. The speeding up of scanning may be a most easy way to shorten the time but there occur a few problems, that is, the higher sensitivity of detector system and the quick response of display system without scalloppings become major factors required for present case.

For the purpose of eliminating the scalloppings of scintigram even in high speed scanning, a contrast controlling device for photorecording is designed and the experimental results are reported.

2. Principle.

When the contrast enhancement of scintigram is made by using a rate meter circuit, scalloppings can not be avoided. Therefore, it is necessary to use the technique based entirely on other principle. In the improved device, such a system is used that the flash duration of light source is controled by the time intervals of successive two pulses which are reversely proportional to the average input counting rate. The principle of operation is as follows.

The time interval between the successive two pulses is converted to a voltage which is proportional to that time interval. The voltage so controls the speed of discharge of a capacitor having been charged to a fixed potential that the higher the voltage, becomes faster the speed of discharge. The time required for the potential to reach a determined value becomes the flash duration of light source. The voltage which controls the speed of discharge can also be varied by an external control so that the degrees of contrast enhancement may be determined manually. The rate-down ratios of ninety-nine steps from 1/1 to 1/99 are employed for more fine selection of recording factor than previous one.

3. Results.

The relations between the input count rate and the corresponding film density are measured. The comparisons are made for the degrees of scalloppings of scintigrams obtained by the former and the improved device. The scallopping of about 5 mm is measured in the scintigram obtained by the former device for scanning speed of 40 cm/min. and about 8 mm for 1.0 m/min. scanning speed. On the contrary, little scalloppings are measured in the scintigram obtained by the improved device for the both scanning speeds.