suitable for the purpose. In the measurement of the source containing small amount of activity, it is inevitable to shorten the distance between source and surveymeter. In our experience the value of measurement was in fairly good inverse proportion to the square of the distance at sourcesurveymeter distance more than 30 cm. The sample thickness must be limited within 1 cm so that the influence of self-absorption or γ-ray is negligible. Scintillation counter having Pb-filter or/and 7-8 mm ϕ tapered cone and calibrated by ionization surveymeter was acceptable and convenient for the determination of the sample of 1-100 mCi.

Recently well-type ionization chamber became commercially available and convenient for daily use, but our isoresponse curve in the well proved that there might be some error due to sample volume and sample position in the well. Therefore attention must be paid to this fact in the use of well-type ionization chamber.

Clinical Value of ^{113m}In as Radioisotope Imaging Agents

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It is most desirable for radioisotope imaging to use a large dose of a short-lived nuclide which increases the photon output while reducing the absorbed radiation dose to the patient. From this point of view, ^{113m}In is an ideal nuclide which is eluted from the ^{113}Sn-^{113m}In generator and decays with a half-life of 1.7 hours by emitting 380 Kev gamma ray (no beta emission).

Because of the physical short half-life of ^{113m}In, the activity remaining in the whole-body will be less than 1 μCi at 24 hrs after administration of 10 mCi of ^{113m}In assuming no excretion therefore another radioisotope studies in the fallowing day will not be affected by the previous scanning. This is one of the advantages of ^{113m}In preparation over that of ^{99m}Tc.

We developed some preparations for various organ scanning, such as ^{113m}In sulfur colloid for liver and bone marrow scanning, ^{113}InFe ascorbic acid for blood pool and ventriculo-myelo scanning, ^{113m}InFe DTPA ascorbic acid for brain scanning and ^{113m}InFe $(AH)_3$ particles for lung scanning. Radioisotope angiocardiography was also performed by using the scintillation (Anger) camera with ^{113m}InFe ascorbic acid. Clinical values of the radiopharmacenticals mentioned above were discussed and the radioisotope images of high quality were presented.

The Contribution of Low Energy Gamma Emitter into the Scintigram

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Low energy gamma emitters with short physical half lives are useful as scanning agents. A large amount of radionuclide can be used to a patient without raising radiation dose to a possible hazard and the shielding effectiveness will increase. But, a good quality of scintigram showing less background can not be always taken in organ scanning, because low energy gamma ray makes a larger amount of the scatter radiation than that of the medium energy over 200 Kev. The purpose of this study is to know how low energy gamma ray contributes to the scintigram.

For measurements of the scatter radiation eight nuclides of energy range 30 to 412 KeV, and thyroid- and liver phantoms, each having a small chamber in the center, were prepared. Spectra including primary- and scatter radiations were obtained by filling uniformly the phantom with various isotopes, scatter spectra being obtained by filling the small chamber with water and the rest of the phantom with various isotopes. The fraction of scatter radiation in a photo peak was determined by the ratio between the area of the scatter regions and that of the photo peak, which lies inside the window set of $\pm 10\%$.

When low energy nuclides, ^{197}Hg, ^{99m}Tc, and ^{188}Re were used in a liver phantom, the scatter fraction in a photo peak was high (30—15%). With Se-75 and Hg-203 it was low (7 and With ^{75}Se ^{203}Hg it was low (7 and 5%). It was, however, a little higher (9 and 7%) with ^{131}I and ^{198}Au which is due to a little increase of the septal penetration of the primary gamma ray.

While the thyroid is a small organ compared to the liver, the fraction is little. For a low energy radionuclide the fraction of the scatter radiation comes 3 to 6 times as large as that of ^{75}Se and ^{203}Hg. As for the gamma ray of ^{198}Au, we found the shielding of collimator was a little insufficient, that is the shielding becomes more important for getting a good quality of scintigram. The counts of scatter radiation measured in a photopeak can not be entirely removed from those of the primary radiation, but it can decrease by means of moving the window set to upper level or reducing the window width.

This study suggests that the best energy of the gamma ray used in scanning is about 250 KeV from the view point of the shield effectiveness and the contribution of the scatter radiation.

Spark Chamber for the Use of Gamma Camera

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A spark chamber, which is known as an economic radiation detector because of simplicity in structure and in field size, has been investigated for use as a gamma camera. The main features of the spark chamber made in our laboratory for preliminary experiments are summerized as follows: (1) Two electroconductive glasses are arranged as parallel plate electrodes, of which conductive layers face each other. This arrangement gives the detection efficiency higher than that in any other type of spark chambers for a gamma camera. (2) Pure helium gas is employed at atmospheric pressure, because it has low starting potential or sparking and high electron multiplication factor. (3) The D. C. potential is applied to the electrodes through a quenching resister and semi-automatic on-off control is performed using a preset counter. (4) Although there is essentially and technically no limitation in the size, the field size of the spark chamber is chosen 21 cm in the diameter for the preliminary study of the spark chamber as a medical tool. (5) Spark images are recorded by a specially modefied Polaroid Land camera and ASA 3000 films at f:8 or 11. (6) In order to obtain excellent images, new multichannel collimators are employed. The design concept considering the thickness of the source is different from that of Anger's.

For the purpose of investigations on the characteristics of the above spark chamber, a Picker Nuclear phantom was used and gamma-ray emitting R. I., such as ^{99m}Tc, ^{131}I, ^{137}Cs and ^{198}Au, were prepared.

The experimental results are shown in the followings: (1) The detection efficiency is monotonously increasing with the energy of gamma-rays from R. I. under the same experi-