A. Instrumentation

Improvement of the Total MTF of Radioisotope Imaging Systems
—A use of a geometrical coincident collimator—

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Total MTF of radioisotope imaging systems with a collimator, a detector, a discrimination, a scaler and displays is mainly controlled by the directionality function of the collimator (Radioisotope (Japan) 16 (2), 1967, 73). It is distinct in radioisotope scanning systems. These years many low energy radioisotopes such as $^{67}$Ga, $^{99m}$Tc, $^{133}$Xe etc, and development of static radioisotope imaging systems have showed better radioisotope images. Collimators with more than 4000 holes or 10,000 holes are used and they have parallel holes and weightful and unconvinient for technicians to exchange. We planed to improve collimating and detecting systems. In this report, some qualities of new collimator have been shown.

What we said geometrical coincident collimator consists of the almost same two plates with rectangularly arrayed 2 cm diameter holes. The distance of two plates and their size are 3 cm, respectively. Thickness is 1 mm of lead. Each hole of two plates corresponds to each other completely. Radiographs by 140 kev gamma ray from $^{99m}$Tc showed less than 4 mm width of the half of the point response peak of a $^{99m}$Tc point source, 7 cm distance from the object plane of this collimator. Optical tracing showed the 10 percent amplitude of the second ordered hole transparency 5mm distant from the center. This transparency will be decreased by the corrected array of the holes. Moreover, Diameter and distance of holes may be more decreased.

This new collimator can show good radioisotope images. The present detection systems can not display without blurring the good images through the collimator. A kind of new detection systems can be thought to be more effective, such as the collimator containing scintillator in themself or the much small mosaic semiconductor collimator connecting to each amplifying, discriminating, scaling systems, etc. Already such new detecting systems to radiography were reported by authors. Then this application to radioisotope imaging systems will be reported next.