\[ \text{Cov}(x, y) = n_{B} [p(x, y) * h(x, y)] \]
where \( n_{B} \) is the count density. The variance of the noise is equal to \( \text{Cov}(0, 0) \).

Assuming a constant aperture area, the signal to noise ratio in detecting a small lesion in a uniform large organ is proportional to the “figure of merit” given by:
\[ F = \left[ A/ \int \int p(x, y) h(x, y) \, dx \, dy \right]^{1/2} \]
where \( A \) is the area of the shadow of the aperture onto the object plane. An analysis shows that no coded aperture has a larger F-value than that of the optimum pinhole for a given spatial resolution, but a suitable coded aperture would provide an image having different noise characteristics which may yield a larger F-value over a certain range of resolution than a pinhole. Such a coded aperture may be expected to be suitable for observing an image with various resolution by modifying the processing function.

Spatial Frequency Filtering of Scintigram

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The spatial filtering in scintigraphic reproduction can be performed by several methods. The basic feature of the spatial filtering studied is the coherence of He-Ne Laser. We used a pinhole for a low-pass filter. The small filtering diaphragm is placed at the fraunhofer spectrum corresponding to the scintigram.

The quality of the filtering image, particularly the sharpness, will be decreased; however if we want to lower the noise level of a scintigram, it is necessary to suppress some of the high spatial frequency components. This circular diaphragm behaves like a low-pass filter, and the cut-off frequency transmitted by the system is given by \( \nu = \gamma/f \cdot \lambda \), where \( \gamma \) is the radius of the aperture, \( f \) is the focal length of the lens, and \( \lambda \) is the wave length of the radiation. The sample was used 35 mm size film printed the scintigram. The best image quality was recorded in a frequency band equal to 0-0.7 mm\(^{-1}\). One could see a improvement in the contrast of the image and a decrease of the noise level. The noise level had been considerably lowered by the spatial filtering; and as a result of this action the resolving power seemed to be increased.

The Development of Color Data Processing System with Dividing Subtraction Method

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The color data processing system developed by us, can change the density level of scintigram to twelve colors by taking a picture of passed or reflected figure. It has a function to erase unneces-
sary parts of the reproduced picture or to make clear boundaries of the density by using black or white color.

It has also a function to calculate area ratio of parts of the specific density by percentage. Furthermore, it has a function to divide a figure symmetrically by its axis and subtract the density of right side from left side, for the purpose of making ease to recognize of abnormal focus existing unsymmetrically. The method of dividing subtraction is that a figure passes through TV lense and is divided by half mirror to two pictures, which are made positive and reverse negative signal electrically, and thereafter both signals are added and displayed on TV moniter. As the results of the development of this system, we can get precise data of RI image.

Color Television System for the Purpose of Superimposing Image

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Images are very useful to obtain diagnostic informations in medical fields. Also by superimposing two or three images obtained from same patient, various informations, for example a degree of overlapping and anatomical land mark, which can not be found in only one image, can be often found. In this paper characteristics of our trial color television system for the purpose of superimposing X-ray images and/or radioisotope (RI) images are described.

(Outline of color television system) This color television system superimposing two images in each different color is consisted of two monochromatic vidicon cameras and 20 inches popular color television in which only two simple video amplifying circuits are added. Signals from vidicon cameras are amplified about 100 times and are directly applied on cathode terminals of color CRT in the television. This system is very simple and economical color display, and enhances a degree of overlapping and displacement between images.

(Application and discussion) As one of clinical applications, pancreas images were superimposed in color by this method. As a result, displacement in position of pancreas was enhanced. Also X-ray image and RI image were superimposed to find exactly the position of tumors. Futhermore this system was very useful for color display of multi-nuclides scintigraphies.