

ized ones in Nippon Kokan Hospital, with whom GOT, GPT, A1-P, and LDH had been measured. The malignant cancers diagnosed by operation, autopsy, or pathologic findings and the benignant disorders with high level of CEA in serum were excluded.

(Method)

GOT and GPT were determined by the U.V. method, A1-P by a modification of KIND-KING method, and CEA level in serum was measured by a radioimmunoassay in which free and bound CEA were separated by means of a second antibody.

(Results)

1. No correlation was found between the CEA level in serum and liver function.
2. There was a significant difference in the average value of CEA between the group with normal value of GOT and the one in abnormal GOT level ($t < 0.01$).
3. There was no difference in S.D. in each group.
4. The average value of CEA in the group showing the abnormal GOT level has been arranged in order of decreasing CEA level, the GOT, A1-P, GPT, and LDH group.

The ROC Analysis of Scintigram Observation Using IAEA Simulated Phantom

K. FUKUHISA, T. A. IINUMA, K. MACHIDA, T. YAMAZAKI, T. NAGAI

National Institute of Radiological Sciences, Chiba

Department of Radiology, Tokyo University, School of Medicine, Tokyo

Department of Radiology, Tokyo Women's Medical College, Tokyo

Department of Radiology, Gunma University, School of Medicine, Maebashi

Various image processing techniques are available for transforming scintigraphic image quality. However, it is not so easy to determine the best processing method in view of diagnosis of disease by physicians. In order to know the effect of image quality on the physician's interpretation, 24 images of computer simulated phantom which was established in the first coordinated programme on the "Intercomparison of Computer-assisted Scintigraphic Techniques" sponsored by IAEA, are processed by using the Gaussian filter with simple smoothing effect and the 'Optimum filter' with medium frequency enhancing effect, and are displayed as a contour map with same displaying factors by a curve plotter of computer system. The processed and displayed 48 images with mixed up are viewed by four physicians who are specialists in scintigraphic diagnosis, with the suggestions as follows:

- (1) The images are consisted of 48 pictures.
- (2) Each image is divided into four quadrants, each of which could contain either one lesion or none. Therefore, each image could contain from 0 to 4 lesions.

- (3) All lesions in the phantom are either cold or hot, but there are no mixed lesions of both in a picture.
- (4) The probability of presence of a lesion in a given quadrant are taken to be about 2/3, and
- (5) The lesions observed should be entered with following figure of rating from 1 to 4; 1: definitely positive, 2: probably positive, 3: possibly negative and 4: definitely negative.

The results of their answers are analyzed with the receiver operating characteristics (ROC) curve and other methods by computer. Among the results, the "Optimum filter" are given significantly better results compared with the Gaussian filter. The cold lesions are more detectable compared with hot lesions of the phantoms which are similar to a scintigram of human liver administrated ^{99m}Tc -colloid. Moreover, the results suggest that the physicians are very careful to observe the scintigram such as not increasing number of false positive when the probability of the true positive is limited up to 50% of all lesions.