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A STUDY ON THE CLINICAL APPLICATION OF COMPLEX IMAGING. A.Asahara,A.Yoshitake,Y.Ohasa,S.Yoshioka,S.Tachibana. Central Hospital of J.N.R., Tokyo.

In this study we attempted to produce a picture with superior diagnostic ability in clinical practice by complexing the different images such as nuclear medicine, x-ray, CT, ultrasonic image and reconstructing a new image as an approach to general image diagnosis. To compose the new image the various original picture were input into a computer through a video - camera to obtain a computer image and to monitor it on the film. In composing the picture the video signal was digitalized on a 512 x 512 matrix and we first ascertained that the reconstructed image obtained by the computer was completely satisfactory in regard to image interpretation in comparison with the original images and we then examined the composition of the various images. To match the size of the different images, on taking the original picture a marker was placed on the body surface and we used the method of matching the size by adjusting the distance to the subject at the time of the conversion of the video signals and in necessary cases we either enlarged or decreased the size of the computer image. After completion of this process, the typical complex image obtained was either an additive or reduced image of the various original images but the additive image obtained from x-ray photo and the nuclear medicine image proved to be effective in diagnosing tumor as well as the blood flow distribution and blood pool within organs. From the information provided by the various images it was particularly suitable for enabling a superior qualitative diagnosis of the disease focus and thus an image was obtained of high clinical significance.

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A UNIFIED DESIGN ALGORITHM OF DIGITAL FILTERS AND ITS APPLICATION TO NUCLEAR MEDICINE. K.Murase,S.Nagao,Y.Watanabe,H.Ito,M.Kawamura, A.Iio and K.Hamamoto. Ehime University School of Medicine, Ehime.

At the 23rd meeting, a unified design algorithm of digital filters was proposed.\* At this meeting, some applications were presented. Especially, a method for correcting the SPECT images degraded due to a Compton scatterer, a respiratory motion, etc. by using a digital filter was presented. Before considering a Compton-scatter correction method, the distribution functions of Compton-scattered photons were calculated under various conditions using the Monte Carlo technique. A frequency response of the scatter-correction filter was obtained by transforming the distribution functions calculated above into the frequency domain. The impulse responses of the filter were obtained by the method presented before\* and were convolved with the projection data, which caused a good result in the Compton-scatter correction of SPECT images. Finally, improvement of SPECT images degraded due to a respiratory motion by means of a band-pass filter was presented.

The technique presented here is very simple and does not increase the time required for data acquisition and processing, so it will be useful for routine clinical use.

\*)Murase K.,et al:Jpn.J.Nucl.Med.20:1059,1983

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PERFORMANCE CHARACTERISTICS OF WHOLE-BODY MULTISLICE SINGLE-PHOTON EMISSION COMPUTED TOMOGRAPH. T. Fujita, N. Tamaki, M. Senda, Y. Yonekura, S. Tanada, K. Murata, J. Konishi, K. Torizuka and Y. Hirose\*. Kyoto University School of Medicine, and \*Shimadzu Co., Kyoto.

Single-photon emission computed tomography has been widely applied in diagnostic nuclear medicine with rotating gamma camera. We have developed a new whole-body multislice single-photon emission computed tomograph in order to evaluate dynamic tracer kinetics. It has three detector rings, and 128 NaI detectors (14 x 26 x 30 mm) are arranged in each ring (packing ratio = 0.86), so that three tomographic images of 35 cm image field can be obtained at 30 mm intervals. The measured spatial resolution in the center of the field was 14.2 and 22.0 mm (FWHM) with high resolution (HR) collimator and high sensitivity (HS) collimator, respectively. The sensitivity measured with 20 cm diameter cylindrical phantom filled with Tc-99m solution was 5.7 and 17 kcps/( $\mu$ Ci/ml) with HR and HS collimator, respectively. The high sensitivity with fairly good spatial resolution permits serial dynamic tomographic measurement as well as ECG gated cardiac studies, and it is expected to play an important role in the assessment of tracer kinetics in normal and diseased states with various compounds.