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A COMPARISON OF ATTENUATION CORRECTION METHODS FOR SPECT. -CLINICAL APPLICATIONS FOR VARIOUS ORGANS-. M.Hosoba, H.Wani, H.Murata\*, H.Toyama\*\*, S.Yonamine\*\*, H.Yamada\*\* and E.Tanaka\*\*\*. Shimadzu Corp., Kyoto, Toranomon Hospital\*, Tokyo Metropolitan Geriatric Hospital\*\*, National Institute of Radiological Science\*\*\*, Tokyo.

The Weighted Backprojection(WBP) and Radial Post Correction method(RPC) developed by Tanaka(1983,1984) for SPECT have been compared with SORENSON's(PRE) and CHANG's(POST) by applying them to experimental phantoms and patients. New algorithm has been developed to detect body surface contour rapidly before reconstructing the images. It is mainly based on the threshold levels of the projection data which were determined empirically in each studies. The contrast ratio of the various cold spots were obtained from the cylindrical phantoms of 30 cm diameter and 20 cm diameter. More than 10 to 20 % better image contrast has been resulted in WBP, RPC and POST compared to PRE method, but POST caused serious distortion of the images in the 30 cm phantom. Computation time (factor) for these methods were 1 for PRE, 5 for POST, 3 for WBP and 1.5 for RPC. RPC was considered to be most suitable for clinical application because of high contrast characteristics and shorter computation time.

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CLINICAL EVALUATION OF SUPERIMPOSED IMAGE OF Ga-67-SPECT AND X-ray CT. S.Kawa, M.Nakazawa, T.Hasegawa, A.Kobayashi, Y.Tanaka, \*H.Nobezawa, \*M.Yoshida and \*S.Kobayashi. Kansai Medical University, Moriguchi and \*Hamamatsu Medical Center, Hamamatsu.

Ga-67-citrate scintigraphy shows pathological accumulation at neoplasm and inflammation but, on the other hand, it shows physiological one at bone marrow, pulmonary hilum and some gland tissue. SPECT makes it possible to separate them from each other, and it appears to be superior to planar image in detectability, however, it becomes indistinct in positional relationship. In order to make localization of Ga-67-SPECT clear, we superimposed SPECT image on X-ray CT image of the same size and same slice. Patients who had clinical diagnosis of lung cancer, malignant lymphoma, mediastinal tumor, esophageal cancer, sarcoidosis, and ovarian tumor were examined, chiefly their thoracic lesions, partly their cervical or abdominal lesions. No accumulation of Ga-67 existed in cystic lesion or atelectasis, low accumulation that seemed to reflect tumor necrosis, conversely, high accumulation masked by effusion in X-ray CT were presented well. Decreased size of mass and decreased accumulation of Ga-67 after therapy were displayed simultaneously. This method that contained morphological and functional informations were considered clinically useful.

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NEW METHOD FOR QUANTITATIVE RECONSTRUCTION IN SPECT INCLUDING SCATTER SUBTRACTION AND ATTENUATION CORRECTION.

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A new method for quantitative image reconstruction in single photon emission CT was developed. The algorithm consists of four steps: 1) The calibration of efficiency is carried out using a cylindrical uniform activity pool, and calibrates uniformity of efficiency of each detector and collimator angle. 2) Scatter level was subtracted in projection. 3) The projection was normalized with count density and distortion in reconstructed image was corrected. 4) The weighted back-projection was performed based on the principle by Tanaka's method, and compensates attenuation for uniform attenuation medium.

The algorithm tested by experimental data obtained by HEADTOME-II using various phantoms including cold region or hot region in a cylindrical pool. Thus, the new method gave remarkably improved results when compared with our previous reconstruction method.