466

FOUNDAMENTAL STUDY OF EMISSION COMPUTED TOMOGRAPHY BY VARIABLE DETECTOR ISOCENTER DISTANCE METHOD. T.Ichihara,M.Kakegawa, S.Matsui. (Toshiba Corp.) H.Maeda, K.Takeda,T.Nakagawa. (Mie Univ. school of Medicine).

In conventional gamma camera rotation type single photon ECT, projection data over a range of 360° is obtained by rotating a detector along a circular orbit having a predetermined radius. The resolution of the reconstructed image decreases as the rotation radius increases. This is presumably because the collimator resolution decreases depending on the distance. In measurements of the human body, this radius is normally determined by the body width direction, and the distance from body surface to detector involves a sufficient margin in the other directions.
To improve the resolution of the reconstructed image, a foundamental study was conducted concerning ECT by variable detector isocenter distance method. Projection images are obtained by using the Toshiba Universal Gamma Camera GCA-70S with the detector approaching the body surface at every sampling angle. Comparison of LSF obtained from the ECT image of a radiation source in air revealed a 20% improvement in the detector motion near the body surface (approximately elliptic orbit having a 50cm major axis and a 28m minor axis) over the circular movement (with a 50cm diameter).

467

A SIMULATION STUDY OF RESPIRATORY-MOTION EFFECT ON IMAGE QUALITIES OF SPECT. K.Murase,M.Ishine,M.Kawamura,S.Inatsuki,M.Yamaizumi,A.Iio and K.Hamamoto. Ehime University School of Medicine. Ehime.

The effect of respiratory motion on image qualities of SPECT was investigated by computer simulation and experimentally, paying attention to the detectability of lesions.

In computer simulation, a cylindrical phantom with a uniform background and a spherical cold or hot spot was assumed. In addition, to simulate respiratory motion, a cyclic linear motion parallel to the axis of rotation was assumed. The image contrast in the transaxial image was calculated and the dependence of lesion size, uptake ratio, filter function used in image reconstruction on image contrast was investigated, where image contrast was defined as the difference between the lesion count density and the background count density divided by the background count density.

In experiments, to simulate respiratory motion, a moving phantom (frequency=0~0.3 Hz, amplitude=0~8cm) was used. Comparison between simulation and experimental results was done and a good agreement was obtained.

Finally, to investigate the respiratory-motion effect on detectability of lesions, ROC analysis was used, and for its evaluation, an area under ROC curve was calculated.

468

Measurement of the Radioactive Quantity in a Human Body using a Universal Gamma Camera System. Y Akiyama, N Yui, F Kinoshita and M Koakutsu. Chiba Cancer Center Hospital. Chiba.

A radioactive quantity of each organ in a human body was obtained from whole body data and RCT data which were obtained by using a universal gamma camera system.

The radioactive quantity in the lesions where radioisotope was accumulated was computed from RCT data.

The radioactive quantity in the lesions where radioisotope was thin was computed from whole body data. and the formula

$$\sqrt{C_1 \cdot C_2}\ \mu L \exp(\mu L/2) / 2 \cdot \sinh(\mu L/2)$$

was applied to correct attenuation reduction, where, C_1 and C_2 are the counts obtained from opposed each detector, μ is attenuation coefficient, and L is body thickness.

The value corresponding to L has been able to obtain by using transmission data.

The formula mentioned above is quite correct under the condition where both the attenuation coefficient and the concentration of activity do not change through inside a body.

For the breast and some other parts of the body, this condition is not adequate, but difference between the value obtained using formula and the correct value was small.

469

THREE-DIMENSIONAL DEMONSTRATION OF IN VIVO ORGANS BY COMPUTER GRAPHICS USING SINGLE PHOTON EMISSION CT IMAGES. T.Kashiwagi,K.Takashi,T.Koizumi,T.Mukuta,K.Nagano,K.Takei, K.Kimura and H.Etani. Osaka Kosei-Nenkin Hospital, Osaka, Minamiosaka National Hospital, Kawachinagano, and Osaka University Hospital, Osaka.

Three-dimensional computer reconstruction system for in vivo organs has been developed in commonly used radionuclide data processing system and applied to single photon emission CT(ECT) images obtained from lung, liver, spleen and kidney. Three-demensional model was reconstructed from surface information from ECT images.

Surface contours of the organ were extracted from a set of parallel transverse or sagital slices in serial order by cut-off levels and stored in computer memory. The organ surface constructed from surface contours was divided into many triangular patches. The intensity of light to each patch was calculated from the selected direction of the incident light, eye position and the normal to the triangular patch. The intensity values were displayed on the color CRT. Organ volume was also estimated.

Using this system, the anatomical organ surface was realistically viewed from any way. Organ deformation and volume changes were clearly demonstrated in diseased conditions. Therefore it is considered that this system is clinically useful for evaluating the morphological changes in broad perspective.