19

CRANIAL SPECT BY SAMPLING AT SAGITTAL 180°.
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The common single photon emission CT (SPECT) using a gamma camera is a procedure in which a detector is rotated at 360° centered on the body axis (transaxial 360°). Because it is difficult for the rotational diameter of the frontal surface of the detector to be decreased to less than the width of the shoulder, the distance between the head surface and the collimator is increased, resulting in a decrease in image resolving power. By contrast, the procedure in which the detector is rotated at 180° in a parietal direction on the median plane vertical to the direction of rotation (sagittal 180°) allows close sampling, with an expected improvement in resolving power. This procedure has other advantages: it induces a decrease in sampling time under the same sampling conditions, and allows an operator to neglect the differences in diffusion and attenuation of a preparation in cerebral tissues which occur in the right and left hemispheres due to sampling-time-related differences. From the results of rCBF (by I-123-IMP) and phantom experiments employing this procedure, it was considered to be a very useful clinical useful modality.

20

FUNDAMENTAL PERFORMANCE EVALUATION OF PT931-04 PET SCANNER. S.Watanuki, T.Matsuzawa, M. Ito, K.Ishii, H.Orihara and T.Ido. Tohoku University, CYRIC and The Res.Inst.for TB. & Cancer.

A new positron emission tomographic system PT931-04(CTI Inc.) was introduced to our Center where ECAT II(EG&G ORTEC) has already been working. PT931-04 is a wholebody system having 4 detector rings and 7 image planes. It uses small BGO detectors(5.6x13.5x30 mm) per ring. The fundamental performances were evaluated, and the results obtained are shown below.

A. Resolution in the FOV was measured with a 2 mm diameter steel needle.

1) Spatial (mm FWHM)

Sampling mode		Distance from FOV center 0 cm	10 cm	20 cm
Wobbled	Tang.	5.4	5.4	5.9
	Radi.	5.2	5.6	8.3
Stationally	Tang.	6.0	6.4	7.1
	Radi.	6.0	6.6	9.0

2) Axial (mm FWHM)

Plane	Septa	Distance from FOV center 0 cm	10 cm	20 cm
Direct	in	6.9	6.7	6.7
Cross	in	6.4	6.1	5.8
Direct	out	8.7	8.4	8.5
Cross	out	8.9	9.8	8.9

B. Efficiency was measured with a 20 cm diameter cylinder phamtom.

Plane	Septa	(counts/sec.per μCi/mL)
Direct	in	5.8 k
Cross	in	9.8 k
Direct	out	10.9 k
Cross	out	22.1 k

21

STATIONARY PET AND THE IMAGE RECONSTRUCTION BY A FAST MAXIMUM LIKELIHOOD ALGORITHM. E.Tanaka, N.Nohara, T.Tomitani, M.Yamamoto and H.Murayama. National Institute of Radiological Sciences, Chiba.

A stationary PET based on a new concept is reported, in which the conventional sampling requirement for "projection data" is disregarded and the sampling of the "object plane" is taken into account instead. A bank array of detectors is proposed, in which the detectors are grouped into odd number banks, the gap between the banks being equal to the detector spacing. For the image reconstruction, a fast maximum likelihood(FML) algorithm has been developed. The algorithm is basically an enhanced EM(expectation maximization) algorithm with improved frequency response. High frequency components of the ratio of measured to calculated projections are extracted and are taken into account to iterative correction of image density in such a way that the correction is performed with a uniform efficiency over the image plane and with a flat frequency response. As a result, the convergence speed is significantly improved compared to the standard EM algorithm, and satisfactory images are obtained by two or three iterations. Non-negativity of the reconstructed image is preserved. Simulation studies showed that the stationary bank array PET provides more uniform spatial resolution than the PET having a uniform detector array, and that the image quality is good enough for clinical applications.

22

THE PHANTOM EXPERIMENT FOR QUALITATIVE AND QUANTITATIVE EVALUATION OF BRAIN PERFUSION IMAGE. K.Morozumi,M.Hashimoto, H.Kurokawa, Y.Kawasaki,K.Ikei,H.Hashimoto,T.Tsukiyama and H.Nishimoto.Saitama Children's Medical Center,Saitama.

The spatial resolution and anatomical detection in Single Photon Emission Computed Tomography (SPECT) are examined in the phantom experiment before qualitative and quantitative evaluation of brain perfusion image by SPECT using N-isopropyl-p-[I-123] Iodoamphetamine.SPECT data were collected in 64 x 64 matrix.The reconstruction of the image was made according to the convolution method using Shepp and Logan filter.Spatial resolution was 1.8cm in full width at half maximum(FWHM).In the experiment with Hoffman brain phantom or with thalamic level-slice phantom for examining anatomical detection there was also a limit in imaging the caudate nucleus, putamen, and thalamus.Further phantom experiments for examining density resolution and position dependence and the studies on collection and processing methods of the data are necessary.