Q. Poster session

1701

PHO/GAMMA ZLC/37, ZLC/75 STANDARD CAMERAS.

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Anger-type scintillation cameras have their intrinsic nonuniformity mainly caused by the nonuniformity of energy (Z) signal and the distortion of positioning the incident gamma rays. The former generates the peak shift of energy spectrum from the fixed energy window, and the latter changes the count density in small area. These factors have prevented the improvement of intrinsic uniformity with good resolution.

*ZLC/37 and *ZLC/75 have the improved uniformity which is obtained by using correction coefficients. This correction operates in real time, can be applied for all energy range, and does not either increase nor decrease the number of incident counts. **The performance of cameras is much improved compared with *LFOV; intrinsic resolution is less than 4.9mm FWHM(ZLC/37), 3.8mmFWHM(ZLC/75), uniformity is less than ±6.0% (ZLC/37, ZLC/75), linearity is 0.45mm, count rate at 20% count loss is more than 60 kcps.

*Manufactured by Siemens Gammasonics Inc.
**These values are for Central Field of View based on NEMA STANDARDS Publication for Performance Measurements of Scintillation cameras.

1702

DEVELOPMENT OF MEDIUM OR HIGHER ENERGY COLLIMATORS FOR ROTATING GAMMA CAMERA ECT.

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The resolution of collimator parallel to ECT plane is a more important factor than the one perpendicular to ECT plane to get good ECT images by rotating gamma camera ECT. To realize above condition, we developed rectangular hole collimators for ECT. General collimators with square, circle or hexagonal holes have the problem that the spatial resolution becomes higher, the sensitivity decreases more. On the optimum condition of the collimator, the septa thickness is proportional to the hole size. The sensitivity is theoritically proportional to the area of the hole when having the same collimator hole length. One of our rectangular hole collimators have experimentally the resolution of 5.9mm for Y-direction, parallel to ECT plane and 8.2mm for X-direction, perpendicular to ECT plane at the distance of 10cm from the collimator surface to the γ-ray source and the sensitivity ratio of 1.28 as compared with the square hole collimator having the resolution of 5.9mm for both X and Y -direction on the same condition.
The above experimental values are in good agreement with the theory. Our rectangular hole collimator has both higher resolution and higher sensitivity.

1703

Bilateral collimator for ECT

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The bilateral collimators for rotating gamma camera ECT were developed to increase the sensitivity, to decrease the measuring time and to use the detector field wider. The sensitivity of the bilateral collimator is as twice as that of the usual parallel hole collimators because it can look at one organ from two different directions at the same time. In ECT with bilateral collimator it is difficult to keep the small organs in the field of view during 360° rotation. Some parameters of collimator are considered. Two types of bilateral collimators, high resolution(HR) and low energy all purpose (LEAP), were developed. Their slant angle is 18°, hole shape is hexagonal and thickness of septa is 0.14mm. Difference between two types is the length of hole, 23.6mm in LEAP and 29.5mm in HR. Useful field of view is 181.0mm diamiter (max) in ECT use.
The specifications of collimators were studied in Tc-99m line phantom by using Pho-Gamma LFOV-ECT with 20% window. Results are as follows. FWHM resolution in ECT with bilateral HR collimator is 17.3mm. Sensitivities of bilateral LEAP and bilateral HR are 1.84 and 1.18 times higher than that of parallel HR collimator.

1704

BASIC STUDY OF TOMOGRAPHIC IMAGING SYSTEM USING 7-PINHOLE COLLIMATOR.

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Hitachi 7-pinhole tomography system was basically studied for its physical properties, positioning for data acquisition and the circle program for producing circumferential profiles of myocardial perfusions.

1. Depth resolution as measured using line source:
   A tomographic image is reconstructed from data acquired with a 1 mmØ line source moved 1 cm at a time in a range of 11 to 20 cm from the 7 pinholes plane, to determine FWHM for each LSF. As result, FWHM was 15 mm for 11 cm and 45 mm for 20cm.
2. Propagation of defect as studied using IOWA phantom:
   A planar collimator was used to prepare a phantom for the background to be half of normal myocardial perfusion, and the propagation of defect was determined with defect/normal ratio from the 7-pinhole tomographic image thus obtained. The progapation of defect was 0.57 in the defect region and 0.70 in the adjoining normal region.
3. Positioning and circle program:
   It is essential for obtaining quality tomographic images to image the myocardium in circle in the center of the 7 fields of view. Seven marks were displayed on CRT screen to facilitate this positioning. For semi-quantitative diagnosis from the tomographic images of myocardial infarction cases, a lower limit was established from the average data of circumferential profiles of 5 normal cases.

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