Multi-Crystal Type Transverse Section Scanning Device

E. TANAKA, T. IINUMA and N. NOHARA
National Institute of Radiological Sciences, Chiba
E. KASHIO, M. KATSURADA and Y. NANJYO
Toshiba Tamagawa Works, Kawasaki

Purpose: The purpose of Multi-Crystal Type Transverse Section Scanning Device is to obtain three dimensional RI position information having good accuracy and sensitivity by obtaining transverse RI distribution image by moving scintillation detectors round the object or RI distribution image on four sides of the object at the same time by performing lateral scanning.

Method: Four pieces of multi-crystal type NaI detectors are arranged around the object. Each detector is composed of fifteen pieces of scintillators placed in a straight line and eight pieces of PMT's, and the position of scintillator where an event occurs is taken out as one dimensional digital position signal. Rotation angle signal and the one dimensional position signal obtained by rotating these detectors round the object at constant speed are calculated with electronic circuit, and the image of RI distributed on the section perpendicular to rotation axis is displayed on CRT. Sixty digital position signals are obtained with the four detectors by shifting the detectors 1/4 of the width of scintillator. Collimator is provided with holes focussed on the section perpendicular to rotation axis so as to obtain thin transverse image.

The object is slidden inside the four detectors by moving the table at constant speed in the direction perpendicular to the plane on which the detectors are arranged. RI distribution images on four sides of the object are displayed at the same time on CRT processing electronically the scanning signal of this table and the scintillation position signals of the four detectors.

Conclusion: Three dimensional information of RI distribution is obtained with good accuracy and high sensitivity.

Experimental Study on Transverse Section Scintigraphy

R. KAYAMORI, M. HARA, K. SATO and T. KITABATAKE
Department of Radiology, Niigata University School of Medicine, Niigata

Some phantom experiments on a new method of taking transverse section scintigraphy was described, using a specially made CRT of rotating type and Anger type camera. A rotating table for a patient is prepared, which is set so as to be that the rotation center of rotating table should be placed within perpendicular line of the center of the detector facing sideways. A rotating tabe rotates synchronously with rotation of the CRT coil. The resolving power of transverse section image in a new CRT was moderatly better than that by former CRT.

Several fundamental experiments on transverse section scintigram were performed using a point source in different energies, and the resolving power was improved about 5 to 10%. Also the good uniformity was obtained. In a phantom study using an Alderson mock liver a 3 cm-sized cold area could be well demonstrated as clear defect on transverse section image. Clinical trials of the normal brain and liver also were demonstrated.

Clinical Experiences of Tomo Scinticamera for the Liver and Brain Diseases

K. Ishii, N. Yamada, K. Nakazawa, K. Yoda, N. Hara,
H. Kawagishi and S. Hashimoto
Department of Radiology, Kitasato University Hospital, Sagamihara.

We have experienced 53 tomo scintigraphies (Pho/Gamma HP type, Nuclear Chicago) of the liver and brain since 1972 in Kitasato University Hospital.

Method: 2 mCi of $^{99m}TcS_7$ was given intravenously for tomo scintigraphies of the liver. 30 minutes later the scaning was started, and 2–5 inches depths tomo scintigraphies was obtained by one inch interval.

Conditions were as follows: Table Mode on, Bed rotation 2 and tomo collimator was used. The brain tomo scintigraphy was obtained 1–4 inches depths by one inch interval after the administrations of 10 mCi of $^{99m}TcO_4$-intravenously.

Results: By this method it was almost impossible find small metastatic liver tumors which were difficult to detect by the present photo scintigraphic technique. However there were a few cases which were suggested the presence of small metastasis of the liver by the tomo scintigraphy.

The depth of the tumor was detected easily by this method, especially it was effective for the drainage of the liver abcess.

We found it was particularly useful to determine the location of the brain tumor when the radiation therapy was considered in postoperative period.

Compared to the parallel hole collimator, the tomo collimator was thin, and showed less resolution ability.

We think further improvement is necessary for clinical diagnosis of the liver and brain diseases.