experiments and some clinical tests the particular possibilities of the linear scanning scintiphoto system are discussed. For example, it is possible to find out simultaneously the images of thyroid and bladder on one flame, for three hours elapsed patient, orally

\[ {^{131}}\text{I-NaI} \] administrated.

Especially, such a linear scanning scintiphoto system is useful for taking up whole body time lapse distribution of radioisotopes namely thyroid cancer metastases, bone narrow scanning and so on.

Some basic experiences of Digital Autofluoroscope "Model 5600"

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Resolution, sensitivity, and dynamic function of Digital Autofluoroscope were studied.

The resolution was measured with IAEA liver slice phantom, which was filled \( {^{131}}\text{I} \) solution. The resolution with multihole collimator (1\( \frac{1}{2} \)'') was estimated 1 cm \( \phi \) when distance between the phantom and the collimator was 0 cm, 2 cm \( \phi \), when distance was 10 cm, and 3.2 cm \( \phi \), when 20 cm.

When the picture was enlarged 2 times using pinhole collimator, 0.5 cm \( \phi \) void was recognized clearly.

The sensitivity seemed to be a little superior than Anger type camera, especially in high energy \( \gamma \) ray.

The most excellent feature of the Autofluoroscope was its function in fast dynamic study.

Fractional renogram using 200 \( \mu \text{Ci} \) \( {^{131}}\text{I} \) Hippuran, and serial \( \gamma \) ray cardiogram (2F/sec) using 10 mCi \( {^{113}}\text{mIn} \) EDTA were examined successfully.

Anatomic orientation of the radionuclide emission images by the gamma-ray source

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We have tried transmission scanning proposed by Kuhl. This method intends to improve the anatomic orientation of radionuclide emission scan. A gamm-source of \( {^{241}}\text{Am} \) (300 mCi) is made to move under the patient so as to follow the motion of the detector.

The photons from \( {^{241}}\text{Am} \) are collimated and directed through the patient to the detector. The emission and transmission radiation are separated by pulse-height-analysis and recorded separately.

Cross talk to the emission image is negligible when this source is employed for simultaneous counting with \( {^{99m}}\text{Te} \), \( {^{203}}\text{Hg} \), \( {^{131}}\text{I} \), \( {^{113}}\text{mIn} \), \( {^{87m}}\text{Sr} \) or \( {^{198}}\text{Au} \). The transmission image can be superimposed to the emission image with no geometric distortion.

This technique also can be applied to the gamma camera. As the transmission source, Anger used \( {^{99m}}\text{Te} \). Because of its short half-life, the source must be renewed daily. \( {^{241}}\text{Am} \) solution can be used covering the full field of view of the camera crystal.
The circular container (28 cm in diameter, 1 cm thick) is loaded with 10 mCi of $^{241}\text{Am}$. A second multichannel collimator is placed on top of the source for producing a beam of parallel gamma rays. The 60 keV gamma rays of $^{241}\text{Am}$ have rather selective absorption in bone.

The good quality transmission image of the chest is obtained. But the image quality of polaroid film is inferior to that of photorecording.

The patient receives less than 0.1 mR/h to the examined area.

The method has been applied to scintiscanning of the lungs, liver, brain and bones and to the scintiphotos of the chest, brain and pelvis.

Scintigraphic image processed by memory unit

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There are many methods for recording scintiscan data. We have used the 4096-channel memory unit for digital recording in which all information is accumulated in original forms. The system consists of the 4096-channel memory unit, ADC, display unit and tape punch.

The scanner is a commercial type with NaI(Tl) crystals 5 in. diameter.

The collimator is an 85-hole focusing hexagonal type. The scanner is equipped with the potentiometers which yields positional signals.

A scanner must deliver the following signals. An analog voltage proportional to the X travel, X limit signals (start and end of line), producing the Y increment. Output pulses from the detector after pulse height selector. The scanning format is $64 \times 64$. The scanning area is $128 \times 128$ mm (pitch size 2 mm) and $256 \times 256$ mm (pitch size 4 mm).

The digitized information is fed into the 4096 channel memory unit and then analyzed variously.

These systems have the following advantages.

1. The distribution of the tracer activity in the organ is stored in digital form. This means it can be processed easily with the digital computer.

2. With the oscilloscope display unit, “islands” of low or high concentration can be shown up during or after the examination without the data being destroyed.

So we can get “rescan” effect. A circular phantom with “cold” bulbs (6-mm-30 mm in diameter) is constructed to evaluate this method.

The phantom contains 100 ml of $^{131}\text{I}$-1 mCi. The following are the scanning displays compared.

1. multi-dot recording
2. photographic recording
3. digital image
4. computer processed image

The system used is HITAC 5020. Here 10 levels are represented by typed symbols.

Every display can detect “cold” bulb of 6 mm in diameter. But the computer processed image delineates the simulated tumor most completely.

Naturally the image quality of dot recording is not good.

This digital recording method has been applied to scintiscanning of the lungs, thyroid glands, liver and bone.