| | | | | | |
|---|---|---|---|---|---|
| Pancreas with Se-75-SM | equall or camera | mobility, sensitivity | 203-CM | scanner | area |
| Spleen with Hg-203-MHP | scanner | isometric | Kidney with I-131-HA | camera | dynamics |
| Kidney with Hg- | | | Kidney with Tc-99m | camera | dynamics |

## The Comparative Study of the Scintillation Camera with Other Radiological Procedures The Study of Brain and Liver

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Radioisotopic imaging has been shown to be a sensitive and safe means of detecting and localizing intracranial and liver lesions. The present study deals with comparative evaluation of scintiphotography with conventional scanning and angiography of the brain and liver.

Brain: Because most focal intracranial lesions are vascular diseases or have abnormal vascular components, arteriographic visualization of the vascular nature of these lesions has aided greatly in diagnosis.

From this point of view, the intracranial angiography is the most useful radiological procedure, but unsuccessful cases may be encountered and mobidity can not be disregarded.

Conventional radioisotope scanning of intracranial lesions depends upon associated focal abnormalities of blood brain barrier, but sequential study of radioisotope distribution can not be obtained in the brain.

Scintillation camera have a potential of deriving information of localizing and making differential diagnosis of intracranial lesions from sequential scintiphotography by flow of $^{99m}$Tc pertechnetate and $^{131m}$In FeEDTA through these lesions. As an example, a sequential and 1 hour cranial scintiphotographic study in a patient with a left frontoparietal meningioma was shown. At 1 minute, an area of excessive filling of activity is noted in scintiphotography. A sequential study in a patient with A-V malformation is noted in the sequential scintiphotography and arteriography, but conventional scintiscanning could not demonstrate focal lesions.

A sequential study in another patient with intracerebral haemmorrhagic cyst was performed. At 1 to 20 minutes, vascular equilibration is noted throughout the sequential study. At 40 minute after injection of $^{99m}$Tc pertechnetate, an area of increased activity is well localized in right parietal region.

Representative studies from patients with a variety of intracranial lesions—primary neoplasm, cerebral cyst and A-V malformation—are shown to demonstrate vascular and other lesions and their relationship to studies of human liver scanning using radioisotopes, focal diseases are detected by their lower concentration of radioactivity than in the normal sourrounding liver tissue. As a result, defects in the liver are more difficult to visualize than focal diseases in other organs, such as brains, in which there is a higher concentration of activity in the lesion than in the normal tissue. Therefore, it is necessary to obtain most diagnostic scintigraphic images. The scintillation cameras are better units than the conventional scanners to obtain optimal images using the presetcounting system and standardized brightness of ossilloscopes to exposure. Scanning of the liver in the anterior-posterior and lateral view requires 1 to 1.5 hours using the connentional rectilinear scanner. Furthermore, there may be a possibility of decreasing dectectability of the small space occupying lesions in liver by breathing and movement of patient during scanning.

Scintiphotography can be performed with-

out breathing using the scintillation camera and $^{99m}Tc_2S_7$ (10 mCi) or $^{113m}$In-Gelatin.

In accordance with the experimental study of a liver phantom, mininum of detectable space occupying lesions was 2 cm in diameter using a 1,000 hole collimator. Application of pinhole collimator to liver scintiphotography was shown to have no sign of improvement.

## Diagnostic Evaluation of a Scintillation Camera in Comparison with Other Procedures; For the Pancreas and Pulmonary Diseases

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A scintillation camera can afford successive scintigrams of the internal organs with much shorter intervals than an ordinary scintiscanning equipment. When the distribution of radioisotopes rapidly changes as the time goes by, the successive scintigrams can bring a useful information not only regarding to the size and shape of the respective portion of the organ, but also suggesting its function.

$^{75}$Se-l-selenomethionine brings an image of the pancreas and its nearby organs on a scintigrams, which often make it difficult to draw distinctions between the pancreas and its nearby. Incidentally, an equal distribution of $^{75}$Se-I-selenomethionine is not shown over the pancreas. And, the light image on some part of it is increasing the density as the time goes by, or vice versa. Sintigrams including these incidental images may make a false diagnosis. The ordinary scintiscanning equipment produces a few scintigrams, while the scintillation camera does many successive ones. The successive scintigrams are useful to exclude the incidental false image, but a few one are impossible to do.

The erythrosine-B was a X-ray opaque medium, having been tried to contrast the liver and pancreas in a X-ray picture. $^{131}$I-labeled erythrosine-B was examined to patients for determining the availability of pancreas sintigraphy. But, the result showed that the pancrease could be not visualized by $^{131}$I-lebeled erythrosine-B.

The tomographic scintigraphy has been reported by Kuhl and Anger. A fundamental experiment concerning a tomographic scintigraphy using a scintillation camera clarified that the tomographic visualisation was possible by three principles corresponding to the X-ray tomography, planiography, circus tomography and transverse tomography. The tomographic visualization of pancreas using a scintillation camera may bring an additional information toward the diagnosis if a practical equipment of high resolution can be deviced.

The camera image can be converted to the two dimentional arrays of numerals indicating number of counts accumulated on that point. The two dimentional arrayes of numerals in place of counts or dots can supply a necessary information for the quantitative anlaysis of the function of the organ.

The regional pulmonary function can be examined by the aid of $^{133}$Xe and a scintillation camera. In normal pulmonary tissues, approximately 95% of $^{133}$Xe, administered by intravenous injection in isotonic saline, is discharged into the alveoli during its first pulmonary circulation. The regional impairment of pulmonary circulatory or respiratory tracts can be detected by successive scintigrams of very short intervals, 1 to 3 seconds. These techniques were employed in examining regional pulmonary function in infants with bronchial asthma.

The supine and prone measurements of $^{131}$I-lebeled macro-aggregated albumin deposited in the pulmonal tissues were performed by using a scintillation camera attached with a pin-hole collimator. The counts derived from two opposite measurement were calculated as to each side of lung. The phantom measurement showed that the average counts of the lung presented the deposite ratio of $^{131}$I-lebeled macro-aggregated albumin