

Clinical Evaluation of ^{67}Ga -Citrate Scintigraphy in Pulmonary Diseases

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Clinical value of scintigraphy with ^{67}Ga -citrate was investigated on a group of patients with pulmonary diseases.

Fourteen cases with lung cancer, 5 cases with pulmonary tuberculosis, 2 cases with acute pulmonary inflammation and 5 cases with sarcoidosis have been examined by scintigraphy. A pho/Gamma III scintillation camera, 1600 channel analyzer connected to it and computer compatible magnetic tape were used. The scintigraphy was performed 3 or 4 days after the intravenous administration of 1.5 to 2.5 mCi of ^{67}Ga -citrate. Following the ^{67}Ga study, ^{131}I -Macroaggregated albumin (MAA) was administered intravenously and the scintiphoto was obtained in the same position in all cases.

Data stored in the magnetic tapes were processed by digital computer (FACOM 230-60). Tumor to non-tumor ratios of ^{67}Ga were obtained by using non-involved symmetrical parts of the tumor.

Positive scintiphotos of the tumor with ^{67}Ga -citrate were obtained in all cases with lung

cancer, in 4 of 5 cases with pulmonary tuberculosis, in all cases with acute pulmonary inflammations and sarcoidosis. Although there were some overlap, tumor to non-tumor ratio was highest in the undifferentiated cell carcinoma, nextly higher in the cases with squamous cell carcinoma, and lower in cases with adenocarcinoma. The ratio in cases with acute inflammation was very high and that in cases with pulmonary tuberculosis was the lowest. These results suggest that ^{67}Ga scintigraphy could be helpful to predict the type of tumor. However, there are many factors which influence the gallium uptake and our total numbers are too small to represent anything more than an interesting observation which may act as a clue to the mechanism of gallium uptake. Although computer scintigraphy made the interpretation of the lesions easy and was useful to get tumor to non-tumor ratio, simple scintiphotography was enough useful to detect the lesions, because of low background in the lung field.

Pulmonary Scintigram in Pneumoconiosis Utilizing ^{67}Ga -Citrate

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In cases of pneumoconiosis the lungs were scanned utilizing ^{67}Ga -citrate in an attempt to elucidate correlation between areas of ^{67}Ga -

citrate taken up by the lesion and various forms or stages of pneumoconiosis.

The lungs were scanned at intervals of 24

and 72 hours after intravenous injection of 1.5-2.0 mCi ^{67}Ga -citrate. The roentgenographic findings were evaluated according to the Internal Pneumoconiosis Roentgenography Classification. The study sample consisted of 15 cases of silicosis and 2 other forms of pneumoconiosis.

All cases of silicosis classified as a type p_2 - n_3 demonstrated radioisotope uptake almost in the whole lung fields. Approximately

the half of these cases showed markedly increased deposit of ^{67}Ga -citrate in the area of large conglomerate shadows appeared in the A and B lung fields. In almost all cases with bilateral hilar lymphadenopathy the uptake of ^{67}Ga -citrate was clearly demonstrated in the area of affected hilar lymphnodes.

The remaining 2 other forms of pneumoconiosis classified as a type p_1 did not reveal any ^{67}Ga -citrate uptake in the lung fields.

Evaluation of ^{67}Ga -Citrate Scintigraphy in Detecting the Tumors in Abdomen

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Clinical usefulness of ^{67}Ga -citrate scintigraphy was evaluated in 13 cases with primary liver cancer, 23 cases with metastatic liver cancer, 25 cases with other malignant tumors and 8 cases with inflammatory diseases in the abdomen.

Seventy two hours after the injection of 1 to 2 mCi of ^{67}Ga -citrate, tumor images were displayed on the polaroid camera integral with the scintillation camera, and the data were also stored in the memory of the 1600 channel analyzer using a 40×40 array.

For the patients with liver or pancreas tumor, 100 μCi of ^{198}Au -colloid or 200 μCi of ^{75}Se -selenomethionine was injected, keeping them in the same position, immediately after taking quallium scintiphotos.

The two operations of "smoothing" and "restoring" were performed in the digital computer. Subtraction scintigram was obtained by subtracting ^{198}Au -colloid or ^{75}Se -selenomethionine activity from ^{67}Ga activity in each matrix which were fed into the magnetic tape.

The excretion of ^{67}Ga into the bowel and its distribution within the normal liver tissue make it difficult to delineate tumors in the abdomen.

Analysis of the abdominal scintiphotos with ^{67}Ga -citrate in 78 patients of this series revealed positive scintiphoto in 92.3% of cases with primary liver cancer, in 39.1% of cases with metastatic liver cancer, in 44.4% of pancreas cancer and in 45.6% of cases with other tumors in abdomen.

With the subtraction scintigrams, positive findings were obtained in 100% of primary liver cancer and in 93.8% of metastatic liver cancer. These indicate computer processing is of great value. We obtained abnormal scintiphotos with ^{75}Se -selenomethionine such as lower uptake or filling defects in all cases with pancreas cancer we studied. On the other hand, subtraction scintigram showed abnormal area in 85.7%. This indicate ^{67}Ga -scintigraphy including computer processing is not useful in detecting pancreas tumor.