level, stop digitalis and monitor the rhythm in the patient. Some cardiologists might put in a temporary pacemaker to be replaced by a permanent one if the heart block does not clear; or if there is associated myocardial infarction as shown by enzymes (serial enzymes) and technetium TC Pyrophosphate scan, as it is difficult to diagnose myocardial infarction in the presence of complete left bundle branch block with few exceptions.

If the serum digitalis level comes back (serum digoxin level) as therapeutic or patient does not improve in a few days or if the patient was not on digoxin at all, then one must think of the second possibility, i.e. sick sinus syndrome (SSS). This is a disease of the conduction system with symptoms associated with tachycardia and bradycardia. In this patient, there is atrial fibrillation, complete heart block, complete left bundle branch block, junctional escape rhythm, suggestive of diffuse conduction system disease in which case a temporary pacemaker followed by ventricular activated and ventricular inhibited rate programmable, permanent pacemaker should be implanted. In this patient, dyspnea and lightheadedness is due to low output and pulmonary congestion due to bradycardia and increased venous return due to the exertion of walking.

In conclusion and in summary, if in the presence of atrial fibrillation ventricular response becomes slow and regular, always think of digitotoxicity; and if the patient is not on dig, or if his level is therapeutic, think of sick sinus syndrome. These patients need a permanent pacemaker.

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**ABSTRACT**

Diseases of the pancreas are difficult to diagnose by standard clinical or radiographic techniques. Klintrup in his recent statistical, clinical and pathological survey report emphasized the lack of suitable diagnostic agents for pancreatic carcinoma which is the most difficult abdominal tumor to diagnose, and in only about 30% of autopsied cases the clinical diagnosis was correct. As the existing diagnostic procedures confirm the pathological condition too late for proper treatment, the prognosis of pancreatic carcinoma is poor.

In 1929, Crandall et al used acid dyes such as acid fuchsin, fast yellow fluorescein and methyl orange and basic dyes such as basic fuchsin, methylene blue, rhodamin B, safarino and safarin extra bluish to measure pancreatic function, as these dyes concentrated moderately selectively in the pancreas.

In this paper, radioisotope labeled agents such as $^{35}$S-methionine, $^{125}$I-Selenomethionine, $^{13}$C-methionine radiodiode labeled paraipodo-phenyl alanine, $^{99}$mTc-labeled methionine, $^{13}$Cs-cesium acetate, etc. used to image the pancreas will be presented.
observed the concentrations of alpha aminoclopropionate-14C-carboxylic acid in the pancreas of the mouse, but not in that of dogs and rabbits. Based on the reports that phenylalanine-14C and p-fluorophenylalanine-14C21 have pancreatic specificity, Counsell, et al24 synthesized ortho meta and paraoidophenylalanine-125I and made their tissue distribution analysis. All three iodophenylalanine-125I isomers showed a specificity for pancreatic tissue in mice but not in dogs.

Ulberg and Blomquint25 working independently on the selective localization to pancreas of radioiodinated phenylalanine analogs pointed out two advantages of the use of these amino acids over 75Se-selenomethionine: (a) higher degree of concentration in the pancreas and (b) short biological half-life due to more rapid renal excretion.

Tubis and Endow26 prepared 99mTc labeled cystine, methionine and a synthetic lepta-cosa-peptide amide hormone with secretin-like properties. They studied the distribution of these compounds in the organs of mice. At 5 minutes the 99mTc methionine radioactivity in the pancreas was less than that of liver at 5, 30 and 60 minutes. The 99mTc synthetic secretion of radioactivity in the pancreas remained about the same for 5-10 minutes, whereas there was a rise in the liver activity during this period.

While scanning the pancreas of a dog, they noticed a definite but somewhat diffuse uptake in the scintiscan of the pancreas.

The dye, toluidine blue O. (TBO) was observed to have preferential concentration in the parathyroid and pancreas.27 It was suggested that radioisotopic labelling of this dye might permit the visualization of these organs by scanning procedures.28

Yeh, et al29 succeeded in labelling TBO with 99mTc. However, they found the new complex was in an aggregated form, and hence, it was localized mainly in the liver rather than in the parathyroid and pancreas. There have been unpublished reports of labelling TBO with 111In and the complex being used for kidney scanning.30

Sodee31 used 131Cs cesium acetate in isotonic saline for scanning the pancreas in guinea pigs and dogs. The results were not encouraging and the author himself expressed doubt regarding the application of his finding to humans. After reading the reports of the localization of alloxan in the pancreas, Bedik, et al32 made an extensive study of the accumulation of 14C-labeled alloxan in mice and dogs in order to develop it as a pancreatic scanning agent. However, they came to the conclusion that alloxan cannot be used as a pancreatic scanning agent.

Recent advances in pancreatic imaging by computerized tomography, or CT,33 and by ultrasonography34 have been promising, but development of new radiopharmaceuticals for the
diagnosis of pancreatic disease has been slow. \(^{75}\)Se-selenomethionine has altered biochemical behavior compared with that of natural amino acids.\(^{35}\) For this reason, natural amino acids labeled with \(^{11}\)C (T \(1/2 = 20.4\) min) and \(^{13}\)N (T \(1/2 = 10.0\) min) are better choices for in vivo studies, since they follow normal metabolic pathways. Also, since both radionuclides are positron emitters, rectilinear scanning and positron tomography\(^{36}\) can be used. \(^{11}\)C-tryptophan and \(^{11}\)C-valine were tried as a diagnostic modality for the detection and study of pancreatic diseases.\(^{37}\) Adequate and prompt homogeneous concentration of a positron-emitting agent in the pancreas (i.e., C-11 amino acids) tends to rule out pancreatic disease; on the other hand, nonvisualization or poor uptake would be compatible with pancreatitis and segmental defects. Partial or nonvisualization could indicate a neoplasic or cystic process. \(^{11}\)C-methionine and positron computed tomography was used to image the pancreas. Although no false positive or negative was observed, a differential diagnosis between cancer and pancreatitis was impossible.\(^{38}\)

L-3-iado-a-methyltyrosine, labeled with either \(^{111}\)I or \(^{123}\)I, was found to have a high pancreatic specificity in mice, with a pancreas-to-liver ration of 8.6 during the first hour after i.v. injection.\(^{39}\)

One study indicates that in pancreatic emergencies, CT is the method of choice and that in chronic pancreatitis, CT is not advisable.\(^{40}\)

Radionuclide pancreatic imaging may supplement anatomic imaging with ultrasonography and computerized tomography (CT).

REFERENCES


![Chemical structure of methionine labeled with radioactive sulfur-35](image1)

**35S-methionine**

Figure 1: Chemical structure of methionine labeled with radioactive sulfur-35.

![Chemical structure of 75Se-methionine labeled with Selenium-75](image2)

**75Se-selenomethionine**

Figure 2: Chemical structure of methionine labeled with Selenium-75.

![Chemical structure of Alpha aminocyclopentane-14C-carboxylic acid](image3)

**Alpha aminocyclopentane-14C-carboxylic acid**

Figure 3: Chemical structure of Alpha aminocyclopentane-14C-carboxylic acid.

![Chemical structure of 125I-paraiodophenylalanine](image4)

**125I-paraiodophenylalanine**

Figure 4: Chemical structure of 125I-paraiodophenylalanine.
$^{99}\text{Tc}^m$-labeled methionine

Figure 5: Chemical structure of methionine labeled with Technetium-99m.

$^{99}\text{Tc}^m$-labeled cystine

Figure 6: Chemical structure of cystine labeled with Technetium-99m.

$^{131}\text{Cs}$-cesium acetate

Figure 7: Chemical structure of cesium acetate labeled with Cesium-131.

$^{14}\text{C}$-labeled alloxan

Figure 8: Chemical structure of alloxan labeled with Carbon-14.

1982 A.D. I.M.A. HAJJ MISSION

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