Modification of Subtraction Technique in Rectilinear Pancreatic Scanning

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When one attempted liver-pancreas scans, the liver offered considerable interference until Kaplan and Ben-Porath offered their subtraction technique in 1966 (*1*).

This technique offered relief from the problem but still allowed considerable interference to be visualized. A slight modification of their technique, offered by Picker with their dual-probe scanner, provides a scan with less liver interference as shown in Fig. 1.

Before scanning the patients were prepared by giving 50 ml^3 of 50% dextrose in combination with 2mCi of ^{99m}Tc-sulfur colloid. Standard AP, PA, and right lateral liver scans were performed. Upon completion of the liver scan, the patient was given 275 μCi of ^{75}Se-selenomethionine. An interval of 30–45 min followed before the pancreas scan was started using the modified subtraction technique.

Subtraction Technique

The technique used by Kaplan, offered with the Picker 500D Magnascanner, is as follows (*2*).

1. Turn high voltage supply lower probe off.
2. Set PHA input A on a, output on A.
   Set PHA input B on a + b, output on B.
3. Energy range 1 MeV
   PHA mode 100%
   PHA A ^{75}Se 240–310
   PHA B ^{99m}Tc 120–170
4. Find ^{75}Se liver hot spot with upper probe (upper ratemeter A).
5. Adjust ^{99m}Tc window on PHA B until counting rate on lower ratemeter equals ^{75}Se count rate on upper ratemeter.
6. A. Turn upper PHA output on A–B.
   B. Leave lower PHA output on B.
7. Find maximum counting rate over pancreas on the upper ratemeter A.
8. Set upper display (A) information density, contrast (60–70), calibrate upper probe.
9. Move probe back to liver hot spot.
10. Set lower display (B), contrast (70–90).

Modification

The modification used is simply delaying Part 6A until after Step 10. In doing this, the scanner is being "fooled" into seeing and computing more counts than are actually available. By calibrating the scanner on A it sees a larger number of counts than it would on A–B. Therefore the film density is calculated at 1.8 for that particular counting rate. By switching to A–B the counting rate drops,

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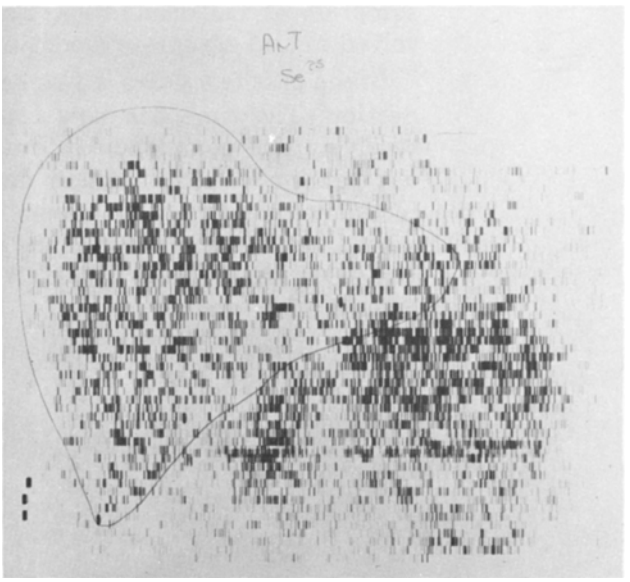

FIG. 1. Liver pancreas scan using current subtraction technique.

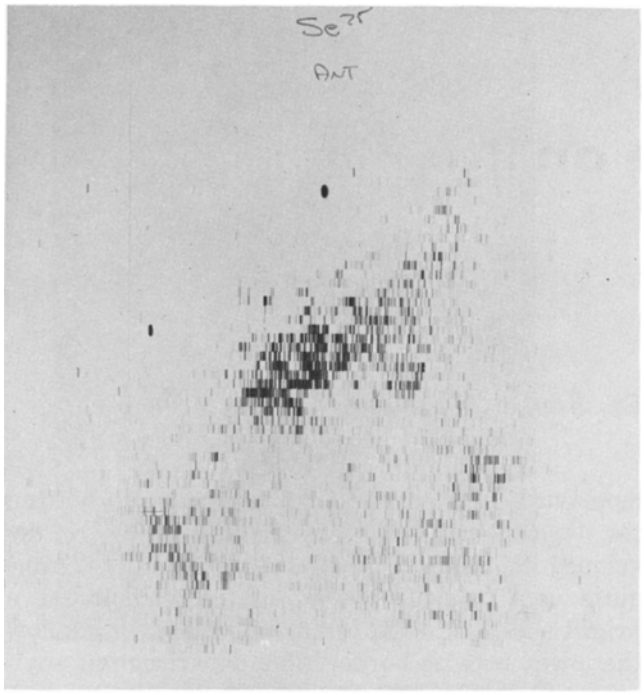

FIG. 2. Liver pancreas scan using subtraction technique modification.

but the scanner is calibrated for the large count rate with a film density of 1.8. To compensate, the photo display of the upper probe should be set at 1.3. This "fooling" of the scanner accounts for the decrease in ^{75}Se-selenomethionine liver interference in that the information density is enhanced on the scan by the manipulation (*3*).

Results

The results of this modification are apparent in the scans in Fig. 2. The two disadvantages to this modification are:

1. The pancreatic hot spot has to be located exactly. If this is not accomplished, the scan will look as if the modification had not been attempted.
2. The lower ID than initially selected in Step 8 will be achieved; thus, more statistical fluctuation will be observed in the scan.

Acknowledgment

I would like to thank Bob Culter of Picker for his help in understanding the electronic workings of the scanner and R. L. Thomas and B. R. Blackwell for their cooperation and encouragement.

References

1. Kaplan E, Ben-Porath M, Clayton GD, et al: Elimination of liver interference from the selenium methionine pancreas scan. *J Nucl Med* 7: 807–816, 1966

2. Kaplan E, Ben-Porath M: Dual channel scanning. *Med Clin North Am* 53: 189–203, 1969

3. Culter B: Personal communication, 1973