Radiopharmaceutical: Tc99m-Mebrofenin (Choletec ®)
Dose: 4 mCi
T1/2: 6 hours
Energy: 140 keV
CPT: 78227 (HIDA with Sincalide); 78226 (HIDA without Sincalide)

Indications:
Indications for a hepatobiliary scan (HIDA) include, but are not limited to:

1. Evaluation of functional biliary pain syndromes (right upper quadrant pain, post-prandial abdominal pain, nausea, and vomiting).
2. Differentiation of acute versus chronic cholecystitis.
3. Evaluation of biliary obstruction.
4. Biliary dyskinesia.
5. Post cholecystectomy syndrome.
6. Bile leakage.
7. Biliary atresia.
8. Evaluation of hepatic transplant function.
9. Evaluation of choledochal cyst.
10. Calculation of gallbladder ejection fraction.

Radiopharmaceutical:

- 4 mCi 99mTc-Mebrofenin (Choletec)
- Pediatric patients to receive 0.06 mCi/kg of body weight.

Pharmacologic Intervention:

- 0.2 micrograms/Kg cholecystokinin (CCK, Kinevac, or sincalide) in 50 cc normal saline solution infused IV over 60 minutes, typically at 60 minutes post injection of tracer. CCK can be administered at 45 minutes if there is sufficient filling of the gallbladder. Delayed filling of the gallbladder may require later administration of CCK.
- Patients who are status post cholecystectomy can receive Kinevac (Sincalide) at 30 minutes, as long as common bile duct and a duodenum are visualized.
    - In the event of a Kinevac (Sincadline) shortage, 8oz Ensure PLUS is to be administered orally in place of at the appropriate time per protocol.
- Pediatric use of Kinevac (Sincalide) will be determined by radiologist.

Patient Instruction:

- NPO for at least 4 hours.
- No opioids for at least 4 hours.
- Scan time is approximately 1.5-2 hrs.
- Upon scheduling, if patient has any pertinent prior studies, please instruct either the patient or the physician's office to make those available for comparison.

Equipment:

1. Philips Skylight (VXUR collimator)
2. Philips Forte (VXUR collimator)
3. Philips Vertex Plus (LEUR collimator)

Procedure:

1. Set intravenous line for injection of radiotracer and interventional medication.
2. With patient lying down on scan bed, inject radiopharmaceutical.
3. Acquire immediate dynamic images from anterior projection for 60 seconds/frame for 105-120 frames (Depending on filling time of the gallbladder).
4. Give Kinevac (CCK) at 60 minutes post radiotracer injection if parenchyma, gallbladder and common bile duct appear. CCK can be administered at 45 minutes if the gallbladder is sufficiently filled. IF gallbladder visualizes late and is not sufficiently filled at 60 minutes, wait until 75 or 90 minutes to infuse CCK.
5. Continue scan for 60 minutes post CCK injection.

Note: If no GB and/or small bowel visualization at 2 hours, acquire a 5 minute anterior and right lateral statics. The patient will need to return for 4 hour static images in anterior and right lateral projections. Patients started after 2 p.m. will need to return the next morning for additional imaging.

S/P cholecystectomy - remote history

6. If patient has had cholecystectomy, CCK can be administered at 30 minutes as long as there is visualization of the parenchyma, bile ducts, and small intestine.

S/P RECENT Cholecystectomy (Bile leak)

7. If patient is status post recent cholecystectomy, administer radiopharmaceutical and acquire a 60 minute dynamic acquisition for 60 minutes. After the 60 minute dynamic, place the patient in the right lateral decubitus position for 15 minutes. Return the patient to supine and acquire a 5 minute anterior static.

Acquisition Parameters:

- VXUR collimator.
- Matrix 128 x 128.
- Scan 105-120 frames at 60 seconds/frame.
- Zoom: 1.46

Processing:

1. Left-click on REFRAME.
2. Choose patient study, ensuring accurate patient name and ID, and select PROCEED.
3. Choose the ANTERIOR image set.
4. Right-click at top of screen on SELECTION MENU, then right-click on 5. Right-click on SELECTION MENU again and right-click on 5 STANDARD.
5. Verify lack of patient motion by left-clicking on CINE button.
6. If images are suitable, then left click on the 16-view button.
7. Change color to GREY, and brighten until suitable for interpretation.
8. Pan images to fit the screen.
9. Turn off the image frames.

10. Left-click on PENCIL TOOL to annotate images.
11. Right-click on LOAD DEFAULTS, and choose HIDA_60MIN annotation set.
12. CANCEL annotation tool.
13. Left-click on CAMERA TOOL to snapshot image.
14. Cycle through first 16 images until last images are at top of 16 view screen.
15. Turn on image frames again, and then deselect the images you want to remain on the screen. Brighten highlighted images until they disappear, and turn off frames.
16. Left-click on PENCIL TOOL again.
17. Right-click on LOAD DEFAULTS and select HIDA_PG2.
18. CANCEL annotation tool.
19. Left-click on CAMERA TOOL to snapshot image.
20. Left-click on QUIT.
21. To calculate the EJECTION FRACTION, right-click on the blue screen on Pegasys background. Right-click on USER CUSTOM MENU. Right-click on TLI GBEF (MIN).
22. Choose ANTERIOR image set.
23. Enter start frame as 1, and enter end frame as 100.(or whatever frame the study ended)
24. Right click on appropriate data set (i.e. PARENCHYMA, GB, & CBD – With CCK)
25. If CCK was administered, enter time of administration (i.e. 60).
26. Draw ROI around liver parenchyma, gallbladder, and common bile duct.
27. Left-click on PROCEED.
28. Left-click on PENCIL TOOL to annotate graphs.
29. Right-click on LOAD DEFAULTS and right-click on HEPATO_GRAPH_60.
30. Adjust annotations and brighten composite image for interpretation.
31. CANCEL annotation tool.
32. Change color to GREY.
33. Left-click on CAMERA TOOL to snapshot image.
34. Left-click on QUIT and PROCEED WITHOUT SAVING.
35. Left-click on PAGE 2 in top right corner of menu, then left-click on CAMERA TOOL from same menu. This will create the “double snapshot.”
36. Choose all of the snapshots that were previously created.
37. Pan images to fit screen. Ensure that PATIENT NAME, MR NUMBER, and DATE OF STUDY are at the top of the image.
38. Left-click on CAMERA TOOL to snapshot image again.
39. Do this for all images.
40. When done, left-click on QUIT.
41. Now send double snapshots and ANTERIOR raw data set to PACS by right-clicking in the blue background. Right-click on PATIENT UTILITIES. Right-click on DICOM UTILITIES, and then DICOM EXPORT.
42. Choose proper patient and left-click on PROCEED. Then choose the double snapshots and ANTERIOR data set and left-click on PROCEED.
43. Left-click on START EXPORTING.
44. Scan all documents, type pertinent patient history and put online for radiologist interpretation.