

## HEPATOBIILIARY STUDY

### Overview

- The Hepatobiliary exam demonstrates hepatic perfusion, hepatocyte clearance biliary excretion as the radiopharmaceutical moves from the hepatocytes to the small intestine.

### Indications

- Diagnosis of acute cholecystitis
- Evaluation of extrahepatic biliary tract obstruction
- Evaluation on the effects of surgical in the biliary tree
- Detection of bile leaks
- Diagnosis of biliary atresia and other congenital anomalies of the biliary tract

### Examination Time

- Routine study: 1 hour, unless delayed images is required

### Patient Preparation

- If evaluation of the gallbladder is desired, the patient should have fasted between 2 and 14 hours:
  1. If the patient has fasted for less than 2 hours:
    - a) delay the study until the patient has fasted for 2 hours.
  2. If the patient has fasted for more than 14 hours:
    - a) give the patient 0.02  $\mu$ gm/kg of Kinevac
    - b) inject intravenously over 3 minutes
    - c) start imaging 5 minutes post injection of the radiopharmaceutical

### Equipment & Energy Windows

- Gamma camera: Large field of view
- Collimator: Low energy, high resolution, parallel hole.
- Energy window: 20% window centered at 140 keV.

## **Radiopharmaceutical, Dose, & Technique of Administration**

- Radiopharmaceutical: Tc-99mIDA
- Dose: 6 mCi (222 MBq)
- Use a dose of up to 10 mCi if the patient has a high bilirubin level (15 - 20 mg/dl)
- Technique of administration: Standard intravenous injection

## **Patient Position & Imaging Field**

- Patient position: Supine
- Imaging field: Upper abdomen, off centered to the right to include the entire liver

## **Acquisition Protocol**

- Acquire ANT images every 5 minutes for up to 1 hour
- Acquire the first ANT image for 500 - 750 K counts
- If there is questionable uptake of the gal bladder take RAO and/or R-LAT image(s) to distinguish between bowel loop and gal bladder
- If the gal bladder has not been visualized by 60 minutes, morphine may be given only when activity is noted in the small intestine:
  1. Prepare and inject 0.04 mg/kg of body weight and dilute the morphine in 10 mL of saline and administer intravenously over 3minutes
  2. Acquire additional images every 5 minutes for 20 to 30 minutes

## **Data Processing**

- None.

## **Optional Maneuvers**

- Calculation of the gallbladder ejection fraction:
  1. At 60 minutes post injection of the IDA agent (or at maximum filling of the GB) acquire a 500 to 750 k image (PreCCK)
  2. Preset the rest of the post CCK images to the amount of time it take to image the PreCCK image
  3. Calculate the Kievac dose at 0.02  $\mu$ gm/kg of body weight.

4. Inject the Kinevac for exactly three minutes (an infusion pump is recommend)
5. Following the Kinevac injection take an image every 5 minutes for 20 - 30 minutes
4. After the acquisition draw regions of interest over the gal bladder and adjacent background medial to the gallbladder.
5. Background correct the gallbladder counts for PreCCK and all post CCK images
6. Calculate the gal bladder ejection fraction from:

$$\frac{\text{Pre CCK} - \text{CCK}_{5-20\text{min}}}{\text{PreCCK}} \times 100 = \% \text{ EF}$$

Where: PreCCK = background corrected gal bladder counts at baseline  
 CCK<sub>5-20min</sub> = background corrected gal bladder counts from 5 to 20 minutes post dose of Kinevac infusion

- Reversing the effects of morphine: If the patient has recently received morphine and if the images suggest common bile duct obstruction, naloxone may be given intravenously to reverse the effects of morphine and relax the sphincter of Oddi.
- Phenobarbital should be given to diagnose biliary atresia in neonates
- ANT images with the patient standing: May be used to help differentiate the gallbladder and bile leaks from the duodenum

**Principle Radiation Emission Data - Tc-99m**

- Physical half-life = 6.01 hours.

Radiation	Mean % per disintegration	Mean energy (keV)
Gamma-2	89.07	140.5

**Dosimetry - Tc-99m-Trimethylbromo-IDA**

Organ	rads/6 mCi	mGy/222 MBq
Large intestine	2.84	28.4
Small intestine	1.79	17.9
Gallbladder wall	0.82	8.2
Ovaries	0.61	6.1
Liver	0.28	2.8
Bladder wall	0.17	1.7

Whole body		0.12		1.2
Testes	0.03		0.3	
Red marrow		0.02		0.2