General Reference:
Theranostic Imaging of Yttrium-90

Common Indications:
Primary hepatocellular carcinoma, liver metastasis

Pre-scan Clinical History:
Determine history related to stated clinical history. Locate any pertinent imaging results which describe related findings.

Patient Preparation:
None

Relative Contraindications (if present, consult with nuclear medicine physician prior to scan):

- Previous external beam radiation therapy to the liver
- Ascites or clinical liver failure
- Markedly abnormal synthetic and excretory liver function tests (LTFs),
- Greater than 20% lung shunting of the hepatic artery blood flow determined by MAA mapping
- Pre-assessment angiogram that demonstrates abnormal vascular anatomy that would result in significant reflux of hepatic arterial blood to the stomach, pancreas or bowel
- Disseminated extra-hepatic malignant disease
- Treatment with capecitabine within the two previous months, or patients who will be treated with capecitabine at any time following treatment with SIR-Spheres
- Portal vein thrombosis.

Radiopharmaceuticals and Routes of Administration:
5 mCi Tc99m MAA for mapping via indwelling intrahepatic catheter.
Y-90 Sir-Spheres for therapy via indwelling intrahepatic catheter. (patient-specific amount to be calculated by the dosing interventional radiologist).

Notes: Check with the supplying radiopharmacy for delivery schedules; the agent may be available on certain days only

Procedure:

Mapping (prior to ordering and administration of the therapeutic dose.)
1. Place a 3cc syringe containing 5.0 mCi MAA shield over the dose, place the dose in a lead syringe transport box, and deliver the dose to IR.
2. The interventional radiologist will inject the MAA into the liver.
3. When the patient is stable, IR staff should bring the patient to nuclear medicine for imaging.
    a. Acquire the following static images: From the top of the shoulders down, and the top of the liver down. 300 seconds, 128x128 matrix, zoom 1.45, 15% window around 140 kEv.

b. Acquire SPECT/CT of the liver, 128x128 matrix, 30 seconds per stop for 64 (32 dual-head) stops.

4. Survey the IR suite for any possible contamination with a GM-meter. Obtain the lead syringe transport box or MAA pig and return it to nuclear medicine for disposal. Typically, t technologist who completes the scan is responsible for these steps.

Therapeutic Dose:

1. The Y-90 SIR-Spheres dose will typically arrive the day prior to the scheduled administration.
2. Contact the interventional radiology department for the prescribed amount of Y-90 SIR-Spheres to be drawn.
3. Obtain a SIR-Spheres written directive sheet. Draw the dose according to the instructions in the package insert.
    a. A medical physicist or their designate must be present at the time of the dose draw. The medical physicist will calculate the amount of Sir-Spheres to be drawn.
    b. If you are unsure how to properly draw a Y-90 SIR-Spheres dose, then DO NOT. Contact the department supervisor.
4. Place the V-Vial in the "Mayo Jar" center the jar on the Sirtex dose measuring chart. Measure all four sides with the Victoreen 451 or GM meter from the indicated position. Record all measurements in the appropriate spaces on the written directive.
5. The medical physicist or their designate will typically transport the dose, Mayo Jar, delivery box, and tubing to IR. They will remain in IR suite to observe the dose delivery, perform pre- and post-administration calculations, and survey the IR room/trash/linen for potential contamination.
6. The medical physicist or their designate will return the waste along with the delivery box to the nuclear medicine department. Place the Mayo Jar and the unused Sir-Spheres dose vial into decay storage.
7. Post-therapeutic imaging may be requested by the interventionalist.

Review:

Prepare images and documents for clinical review as per **Nuclear Imaging Acquisition and Presentation Guidelines**.