

CSF Shunt Study

Special Instructions Consult with the attending radiologist before scheduling this procedure. The injection will need to be coordinated with Neurosurgery.

To be performed at UNMH only.

Radiopharmaceutical: Tc-99m pertechnetate (preferred) or In-111 DTPA

Tc-99m pertechnetate is not specifically approved for intrathecal administration, and accordingly meets the pharmacopoeial bacterial endotoxin standard for an intravenously administered drug. Because the CNS is more sensitive to endotoxins, the volume of Tc-99m pertechnetate injected should be $\leq 10\%$ of the volume of the fresh Mo-99/Tc-99m generator eluate; it will generally be much less than this amount, since it is prepared as a dilution of the generator eluate

Dose (Adult/Pediatric): Refer to Nuclear Medicine Dose Chart

Route of Administration: Injected into shunt reservoir (small volume) by a physician (typically a neurosurgeon or neurosurgery resident).

Patient Preparation: None.

Equipment Setup: Collimator: Low-energy high resolution
Computer set up:
Dynamic acquisition
64 x 64 matrix, 10 secs/frame, 60 frames for each acquisition

Static acquisition
256 x 256 matrix, 5 minutes

Patient Positioning: Initially supine; reposition to seated for 2nd acquisition as needed

Anterior images of the skull; additional images of chest and/or abdomen as directed by the radiologist to track the radiopharmaceutical activity.

Positioning the camera anterior to the patient's skull is best (usually it is the best position to separate the short limb going to ventricles from the long limb going to peritoneum in lateral approach shunts). It is important to position the camera in similar orientation and similar distance from patient head when doing re-imaging in sitting position and after walking, to compare counts after each intervention.

Procedure: The radiopharmaceutical syringe should be attached to the needle provided in the LP kit (which will be provided by the neurosurgeon) to aid with access and with obtaining the opening pressure.

The skin over the injection site should be shaved (if necessary) and cleansed with

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appropriate antiseptic solutions prior to injection.

A radiology attending physician should be in attendance when this study is performed so that the interpreting physicians will be familiar with the conditions under which the injection was performed and the images were obtained. The injection of the radiopharmaceutical should be made such that flow in the shunt system is disturbed as little as possible; specifically, CSF should not be withdrawn before injection, the syringe containing the radiopharmaceutical should not be flushed with CSF, and the neurosurgeon should avoid putting local pressure at the injection after removal of the needle.

If requested by the referring neurosurgeon, after the needle has been placed in the reservoir but before the radiopharmaceutical is injected, an opening pressure can be obtained by the neurosurgeon using the manometer provided in the LP kit.

Start the acquisition before the physician injects the radiopharmaceutical.

- The first 10-minute acquisition should be obtained in a supine position.
- If the shunt does not drain, a second identical acquisition may be requested in a sitting position.
- If shunt still does not drain, the patient may be asked to walk around, and take another dynamic set of images.
- After dynamic acquisitions are completed, acquire a static anterior image over shunt drainage spot (i.e. abdomen in case of VP shunt).

Consult with the radiologist about whether additional views or SPECT-CT are required.

Processing:

Draw ROI around shunt reservoir and generate a clearance curve for each imaging position.

Remember to record the patient's status during imaging (supine, sitting, after walking, etc.) and notate on the screen capture images and clearance curves.

Items Required For Complete Study:

- Raw data and lightboxes/savescreens of all digital images. All images should be labeled with time post-injection, patient positioning, and any interventions that occurred (e.g., the patient ambulated).
- Transfer of all digital images to PACS
- Complete the examination in RIS