



Austin Radiological Association
Nuclear Medicine Procedure
GALLIUM STUDY
(Ga-67 as Gallium Citrate)

Overview

- Once injected into the blood gallium binds to circulating transferrin and then, by mechanisms that are not completely understood, localizes in areas of inflammation (infectious or non-infectious) and in some tumors.

Indications

- Detection and localization of chronic infection and fever of unknown origin (FUO).
- Detection and localization of tumors.
- Evaluation of therapy for Hodgkin disease and lymphoma
- Evaluation of interstitial lung disease.
- Evaluation of patients with acquired immunodeficiency syndrome (AIDS).

Examination Time

- Initially: 15 minutes for injection of the radiopharmaceutical.
- Later:
 - > Infection: 1 hour for imaging at 24, 48, and 72 hrs.
 - > Tumor: 1 hour for imaging at 48, and 72 hours, with possibly 96 hrs. (Delayed images beyond the first set of images are often needed.)

Patient Preparation

- Mild laxative, e.g. Bisacodyl, prior to imaging.

Equipment & Energy Windows

- Camera: Rotating gamma camera. Dual head gamma camera is preferred.
- Collimator: Medium energy, parallel hole.

- Energy windows: Three pulse height analyzers: 20% windows centered at 93, 185, and 300 keV.
- Computer with SPECT software.

Radiopharmaceutical, Dose, & Technique of Administration

- Radiopharmaceutical: Ga-67 citrate. Pedi dose by NACG chart.
- Dose: 5 mCi (185 MBq) - infection
10 mCi (370 MBq) may be used in patients with known cancers.
- Technique of administration: Standard intravenous injection.

Patient Position & Imaging Field

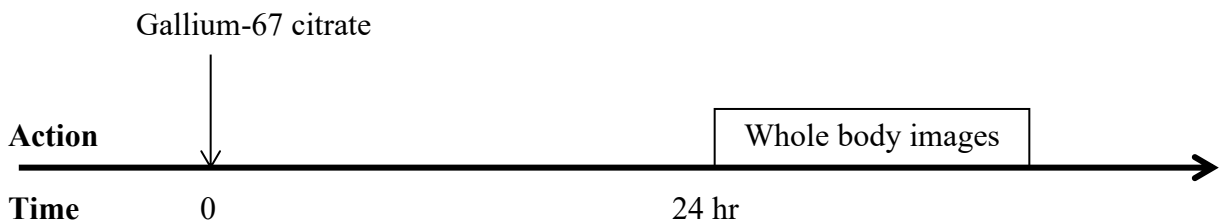
- Patient position: Supine.
- Imaging field: Depends on clinical indication; check with the nuclear medicine physician.

Acquisition Protocol

- Infection:
 1. Acquire initial images at 24 hours.
 2. Acquire delayed images as determined by the nuclear medicine physician at 48, 72 hours, and occasionally later. Parts of the body that are clearly normal at 24 hours do not need to be imaged at 48 hours.
 3. Acquire moving images at 8 cm/min or static images for 10 minutes each.
 4. ANT and POST images are acquired of the torso; occasionally other parts of the body are imaged and other projections are obtained - the nuclear medicine physician will specify the portion of the body to be imaged.
- Tumor:
 - 1.) Acquire initial images at 48 hours
 - 2.) Acquire delayed images as determined by the nuclear medicine physician at 48, 72 hours, and occasionally later.
 - 3.) Acquire moving images at 8 cm/min or static images for 10 minutes each.
 - 4.) ANT and POST images are acquired of the torso; occasionally other parts of the body are imaged and other projections are obtained - the nuclear medicine physician will specify the portion of the body to be imaged.

- SPECT imaging - use routinely for limited studies and areas of uncertainty
 1. Image acquisition parameters:
 - a) degrees of rotation: 360°.
 - b) number of images: 60.
 - c) time per image: 30 seconds.
- Delayed imaging, usually at 24 hour intervals, may be needed to differentiate normal colonic activity from lesions in the abdomen.

Protocol Summary Diagram



Data Processing

- SPECT image reconstruction:
 1. The exact procedure for processing SPECT images depends on the computer software being used. This varies with the manufacturer and, in general, the manufacturer's protocol should be followed.
 2. The reconstruction process in general terms is:
 - a) correct the 60 planar images for uniformity (camera non-uniformity) using a high count flood acquisition.
 - b) check the images for patient motion and apply a motion correction algorithm if indicated and if available.
 - c) specify the filters to be used in the reconstruction process.
 - d) reconstruct transverse, sagittal, and coronal image sets.

Optional Maneuvers

- Three dimensional display: The data may be processed as a maximum intensity projection (MIP) display.
- Lung uptake in the evaluation of interstitial pneumonitis: May be quantitated visually.
- SPECT/CT may be performed for improved localization.

Method for timely correction of Data Analysis and reporting errors and notification of referring parties

- Data Analysis and reporting errors are reported to the interpreting physician and appropriate clinic manager for timely correction and notification of the referring physician via report addendum or STAT call if error is significant.

Principle Radiation Emission Data - Ga-67

- Physical half-life = 3.26 days.

<u>Radiation</u>	<u>Mean % per disintegration</u>	<u>Mean energy (keV)</u>
Gamma-2	38.3	93.3
Gamma-3	20.9	184.6
Gamma-5	16.8	300.2
Gamma-6	4.7	393.5

Dosimetry - Ga-67 Citrate

<u>Organ</u>	<u>rads/6 mCi</u>	<u>mGy/222 MBq</u>
Large intestine	5.4	54.0
Bone marrow	3.48	34.8
Spleen	3.18	31.8
Liver	2.76	27.6
Skeleton	2.64	26.4
Kidney	2.46	24.6
Small intestine	2.16	21.6
Ovaries	1.68	16.8
Whole body	1.56	15.6
Testes	1.44	14.4