



Austin Radiological Association

Nuclear Medicine Procedure

CARDIAC GATED BLOOD POOL STUDY - REST (Tc-99m-Red Blood Cells)

Overview

- The resting Cardiac Gated Blood Pool Study evaluates left regional ventricular wall motion and ejection fraction at rest. A radiotracer that is confined to the vascular space, such as Tc-99m-red blood cells, is used to acquire images of the heart at multiple intervals throughout the cardiac cycle with the assistance of the electrocardiograph (EKG) signal. These images are displayed dynamically to evaluate wall motion visually and are analyzed with regions of interest to quantitate ventricular ejection fraction.

Indications

- Evaluate ventricular regional wall motion.
- Quantitate ventricular ejection fraction.
- Monitor cardiotoxicity of doxorubicin.
- Differentiate pulmonary and cardiac causes of dyspnea.

Examination Time

- 15 minutes injection / 30 minutes wait / 15 minutes imaging (60 minutes total).

Patient Preparation

- Place 3 EKG leads on the patient:
 1. Ensure good electrical contact; this can be done by preparing the skin with methyl alcohol and/or extra-fine sandpaper.
 2. The white lead is placed in the region of the right axilla, the black lead in the region of the left axilla, and the red lead on the left side of the chest.

Equipment & Energy Windows

- Gamma camera: Large (40 cm) field of view camera with electronic magnification to a 25 cm field of view or small (25 cm) field of view camera.
- Collimator:
 - Low energy, high resolution, parallel hole.

- Energy window: 15 - 20% window centered at 140 keV.
- Computer with cardiac gated blood pool software.
- Cardiac gating device either built into the camera or stand-alone.

Radiopharmaceutical, Dose, & Technique of Administration

- Radiopharmaceutical: Tc-99m-labeled red blood cells.
- Dose: 25 mCi (925 MBq) Sodium Pertechnetate. Pedi dose by NACG chart.
- Red blood cell labeling method:
 - In vivo method.
 - Inject 2 - 3 ml of reconstituted PYP (per package insert) by direct puncture
 - Wait 30 minutes
 - Inject Pertechnetate
 - Wait 10 – 30 minute, and then perform imaging
 - In vitro method.
 - Use Ultratag kit – follow kit instructions

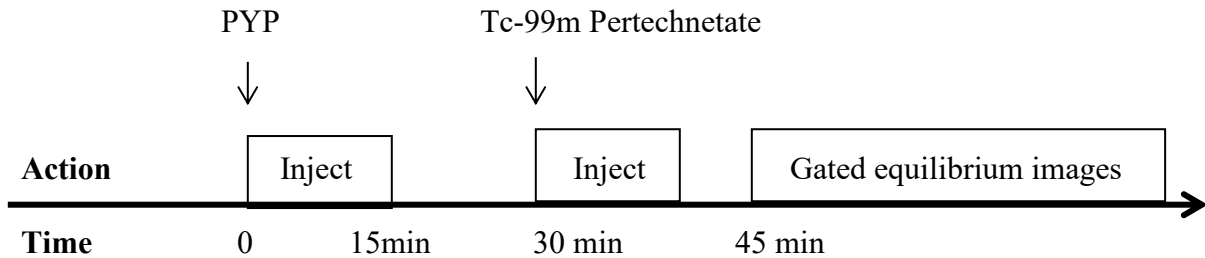
Patient Positioning & Imaging Field

- Patient position: Supine.
- Imaging field of view: Center on the heart in the lower left chest.

Acquisition Protocol

- For patients in normal sinus rhythm, set the cardiac cycle-length acceptance window at 30%.
- Set the computer program to divide each cardiac cycle into 24 frames.
- Position the camera in the LAO projection in order to maximize separation of the right and left ventricles. Note angle in tech notes for any follow-up scan.
- Acquire 10 minute gated (EKG synchronized) images in the LAO projection on the computer. The LAO acquisition is positioned to give maximum separation of the left and right ventricles as viewed in the persistence scope; the angle may be greater or less than 45°. Note chosen angle in the tech notes.
 1. Can use a 10-20° caudal tilt in the LAO projections to increase the separation of atria and ventricles.
 2. Forward gated time-activity curves are sufficiently accurate.

Protocol Summary Diagram



Data Processing

- Calculate the left ventricular ejection fraction using the LAO projection, and the software and protocol provided with your computer:
 1. Be sure that the regions of interest for background and the left ventricle are properly positioned throughout the cardiac cycle.

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 - Tc-99m

- Physical half-life = 6.01 hours.

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

Dosimetry - Tc-99m-Labeled Red Blood Cells (33)

Organ	rads/25 mCi	mGy/925 MBq
Heart	2.0	20.0
Liver	1.8	18.0
Spleen	1.5	15.0
Lungs	1.4	14.0
Kidneys	1.4	14.0
Blood	1.4	14.0
Red marrow	0.8	8.0
Whole body	0.4	4.0