Austin Radiological Association

Nuclear Medicine Procedure

HEAT-DAMAGED RBC STUDY
(Tc-99m-Red Blood Cells)

Overview

- The Heat-Damaged RBC study is highly sensitive and specific to assess for the presence and location of splenic tissue in a variety of clinical scenarios. This is due to the rapid splenic sequestration of damaged red blood cells.

Indications

- Identify accessory splenic tissue (also known as splenules or spleniculi) after surgical splenectomy.
- Identify accessory splenic tissue after splenic trauma.
- Assess whether a mass found on other imaging (such as CT) is a splenule.
- Assess congenital abnormality of splenic number or location.

Examination Time

- Approximately 3 hours:
  - Draw blood – 10 minutes
  - Tag Blood – 20 minutes
  - Cook vial – 20 minutes
  - Cool vial – 1 minute
  - Reinject – 5 minutes
  - Wait 60 minutes
  - Image – 60 minutes

Patient Preparation

- None.

Equipment & Energy Windows

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

Radiopharmaceutical, Dose, & Technique of Administration

- Radiopharmaceutical: Tc-99m-red blood cells, damaged by heating.
- Red blood cell labeling method
  > In vitro method using the Ultra-tag kit. Follow enclosed instructions.

  > Damage RBC's by "cooking" for 20 minutes at 49.5 degrees C in water bath, with periodic mild agitation.
  > Cool reaction vial in ice water for 1 minute.
  > Reinject patient's labeled RBC's
- Dose: 25 mCi (925 MBq). Order dose for injection time, not patient arrival time.
- Minimum pediatric dose is 2.2 mCi. Start with 4 mCi at time of blood draw to have 2.2-2.5 at time of injection. Pedi dose by NACG chart.
- Technique of administration: Standard intravenous injection via indwelling catheter

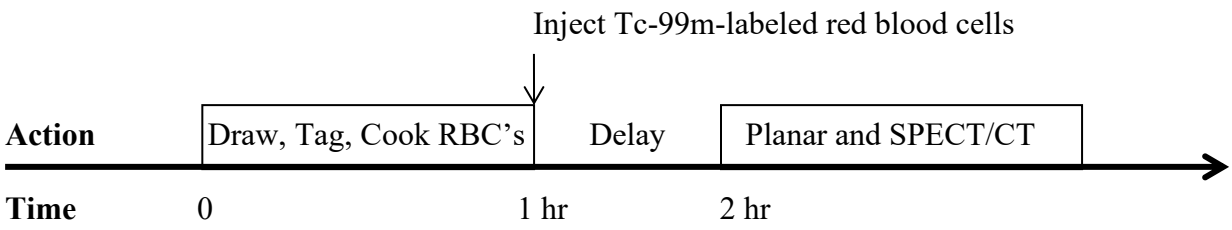
Patient Position & Imaging Field

- Patient position: Supine.
- Imaging field: Abdomen

Acquisition Protocol

- Start the acquisition one hour post injection.
- Acquire static images using Liver/Spleen workflow: Ant/Post, All Obliques, and Laterals.
- Acquire SPECT/CT using Parathyroid workflow. For infants/children, may change stops per head from 60 to 30 which decreases acquisition time to 15 minutes at 30 seconds per stop. Use Flash 3D resolution recovery software for processing.

Protocol Summary Diagram



Data Processing

- For SPECT/CT:
- a) reconstruct transverse, sagittal, and coronal images.
- b) filter selection depends on computer software package – preference is iterative (Flash 3D) processing with Gaussian filter.

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 (non-damaged RBC's)

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