



Austin Radiological Association
Nuclear Medicine Procedure
CARDIAC AMYLOIDOSIS
(Tc-99m-PYP)

Overview

- Tc-99m-PYP has the ability to specifically identify ATTR cardiac amyloidosis non-invasively and guide patient management.

Indications

- Suspicion of cardiac amyloidosis.

Examination Time

- Initially: 15 minutes for injection of the radiopharmaceutical.
- One hour later: 60 - 90 minutes for Planar and SPECT imaging, possible WB Sweep.

Patient Preparation

- None.

Equipment & Energy Windows

- Gamma camera: Large field of view, preferably a dual head camera.
- Collimator: Low energy, high resolution, parallel hole.
- Energy window: 20% window centered at 140 keV.

Radiopharmaceutical, Dose, & Technique of Administration

- Radiopharmaceutical: Tc-99m-PYP.
- Dose: 15 mCi
- Technique of administration: Standard intravenous injection.

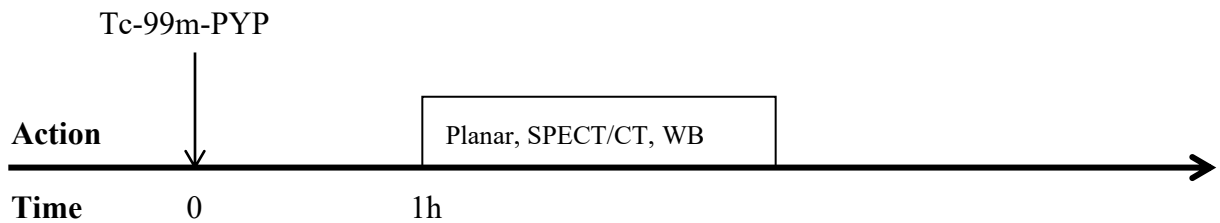
Patient Position & Imaging Field

- Patient position: supine.
- Imaging field: Planar and Chest SPECT/CT, possible WB sweep at radiologist discretion.

Acquisition Protocol

- Imaging may begin 1 hour post injection and possibly 3 hours post injection (renal failure).
- Acquire images of the chest in the LT LAT, LAO, ANT and WB sweep projections.
 1. Acquire each image for approximately 750 K.
- SPECT images of perfusion may be substituted for planar imaging if approved by radiologist. SPECT/CT images may be preferred.

Protocol Summary Diagram



Data Processing

- None.

Optional Maneuvers

- Quantitation: 3-hour delay for renal failure.
- Whole Body planar imaging may be helpful to identify uptake of tracer in the shoulder and hip girdles (a specific sign of systemic ATTR amyloidosis) and should be considered adjunctive and optional.

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.

Processing calculations and example:

ROI Processing – Planar Image

Circular ROI over the heart (ROI)

Circular ROI right side of the chest: Contralateral chest ROI (CL)

Avoid placing either ROI over the sternum, ribs, and liver!

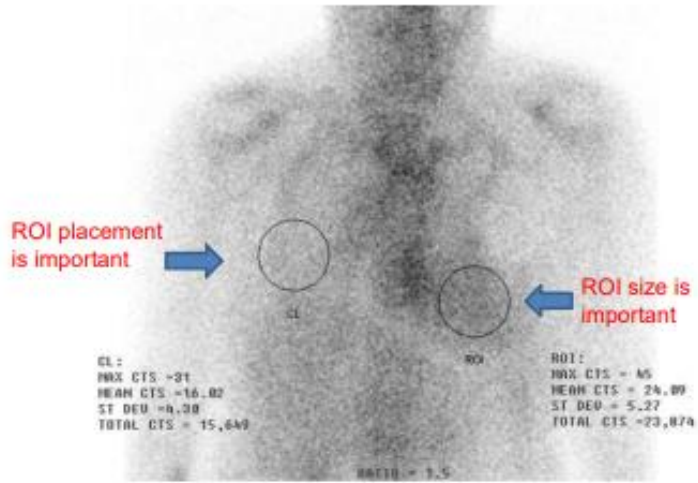
Record: Mean counts, Max counts, St Dev counts, Total counts
for ROI and CL

$$\text{RATIO} = \frac{\text{Mean counts of the ROI (cardiac)}}{\text{Mean counts of the CL (contralateral)}}$$

RATIO >1.5 suggestive of cardiac amyloidosis

American Society of Nuclear Cardiology (ASNC). ASNC practice points: 99mTechnetium-pyrophosphate imaging for transthyretin cardiac amyloidosis.
Available at: <https://www.asnc.org/Files/Practice%20Resources/Practice%20Points/ASNC%20Practice%20Point-99mTechnetiumPyrophosphateImaging2016.pdf>. © 2019 American Society of Nuclear Cardiology.

Reprocessed ROI



Whole Body Imaging

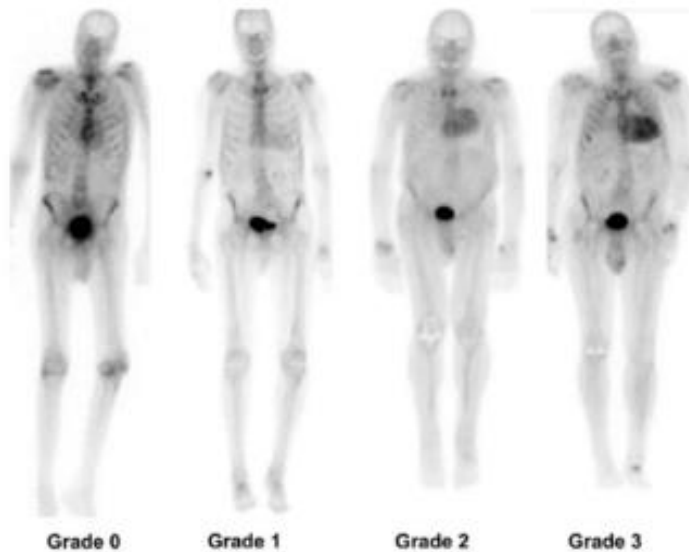
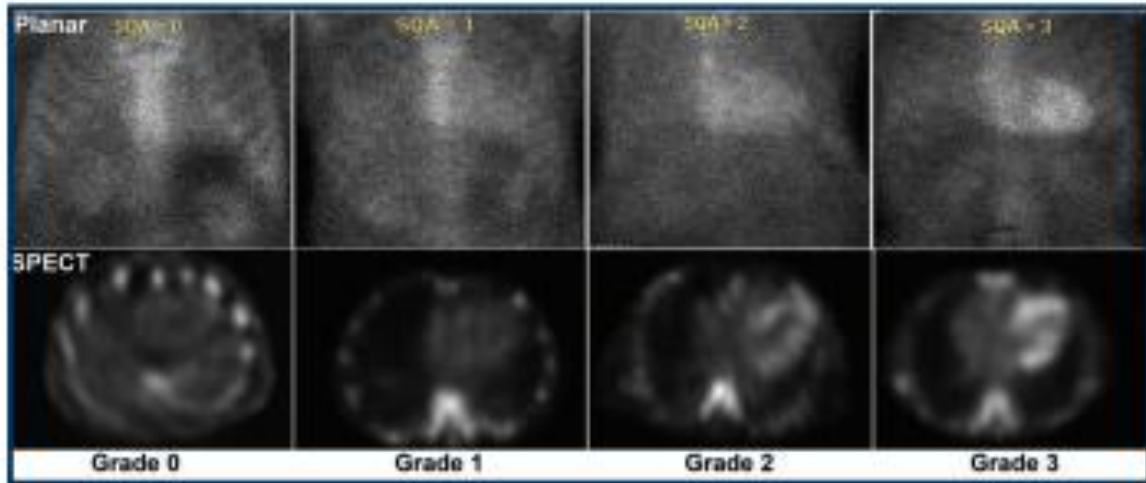


Figure 2. Grading ^{99m}Tc-PYP Uptake on Planar and SPECT Images



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-Per technetate as Sodium Per technetate

Organ	rads/5 mCi	mGy/185 MBq
Thyroid	0.65	6.5
Large intestine	0.60	6.0
Bladder wall	0.43	4.3
Stomach	0.26	2.6
Ovaries	0.15	1.5
Whole body	0.06	0.6
Testes	0.05	0.5
Red marrow	0.01	0.1