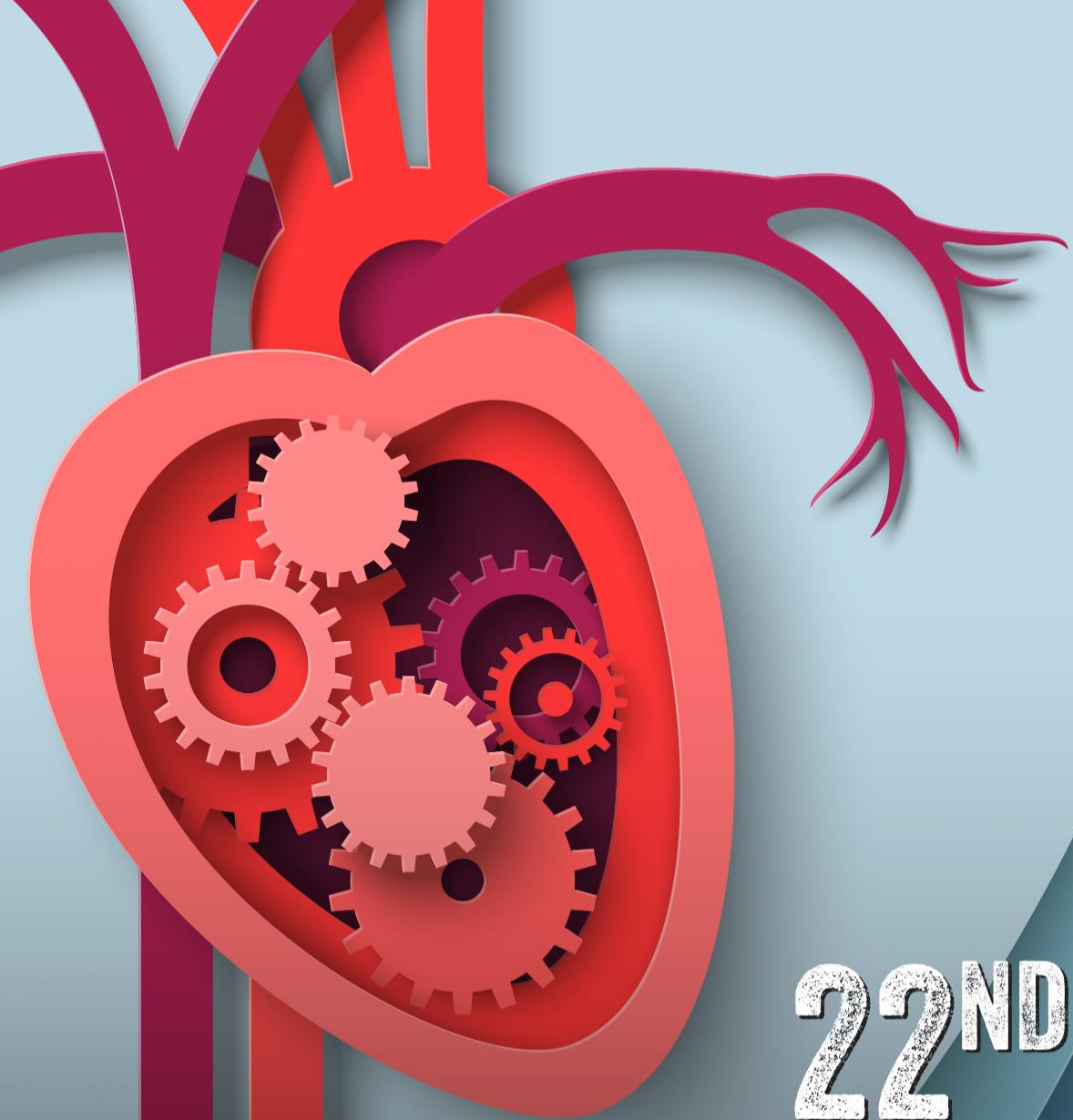




22ND ANNUAL MEETING & SCIENTIFIC SESSION



Kentucky
CHAPTER

Cardiac PET/CT

The Future of Nuclear Cardiac Imaging

Charles Eric Adams, RT (N), ARRT
Nuclear Medicine Supervisor
Baptist Health Lexington



Presentation Disclaimer

****I have nothing to disclose.****

Superiority of Cardiac PET/CT vs. SPECT

Cardiac PET/CT:

- Offers higher sensitivity (around 92.6% for coronary artery disease) and sharper 3D images because it can quantify *absolute* blood flow and is less prone to image distortion from soft tissue.
- PET also has better spatial resolution (PET 4-7 mm vs. SPECT 8-12mm) resulting in sharper images.
- PET also uses coincidence detection, resulting in higher count statistics.

Nuclear Stress (SPECT) imaging:

- Has a lower sensitivity (around 88.3% overall) and measures *relative* blood flow differences, which can sometimes be obscured by body tissue or smaller left ventricles.

Scan duration

Cardiac PET:

Much faster, taking about **20 to 30 minutes** for the actual imaging.

Nuclear Stress (SPECT):

Takes significantly longer, possibly completed in **2 hours**, **but can last up to 3-5 hours** at busy practices due to waiting periods between resting and stress image phase.

Further considerations

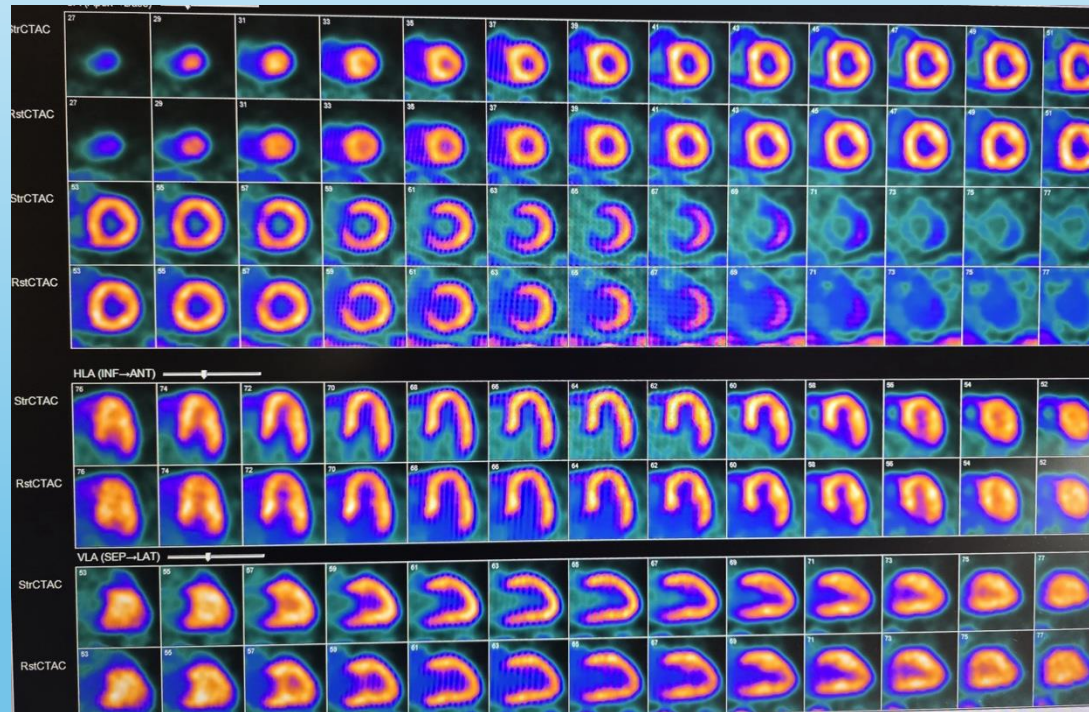
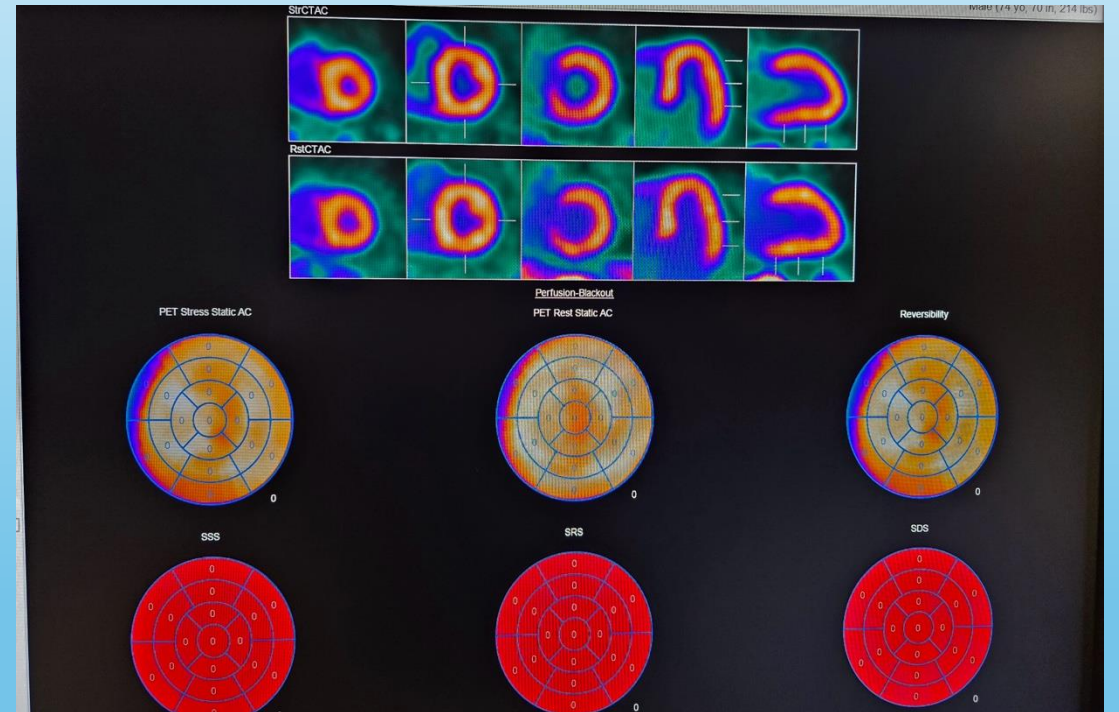
Cardiac PET:

- Statistically involves **lower radiation exposure (PET 2-4 mSv vs. SPECT 8-12 mSv)** compared to standard SPECT nuclear tests.
- Often combined with a CT scan (PET/CT) to map structural details and diagnose specialized conditions like cardiac sarcoidosis. CT Topogram may also reveal coronary artery calcifications.
- Allows for Resting and Stress LVEF calculations.

Case 1

- 74 y/o male presents with chest pain, BMI 31.
- History of CAD, CABG and Hyperlipidemia
- Baseline EKG: Normal Sinus Rhythm.
- 30 mCi Rubidium 82 administered at Rest.
- Followed **10 minutes** later by injection of Lexiscan (Regadenoson) and 30 mCi Rubidium 82 at Stress.
- Radiation dose received: approximately 2.4 mSv.

Images



Results

Myocardial perfusion imaging indicates a normal myocardial perfusion study with no evidence of ischemia. No regional perfusion defects

There is no prior study available for comparison

Resting EF = 45%, stress EF = 52%

Appropriate LVEF response Stress > Rest

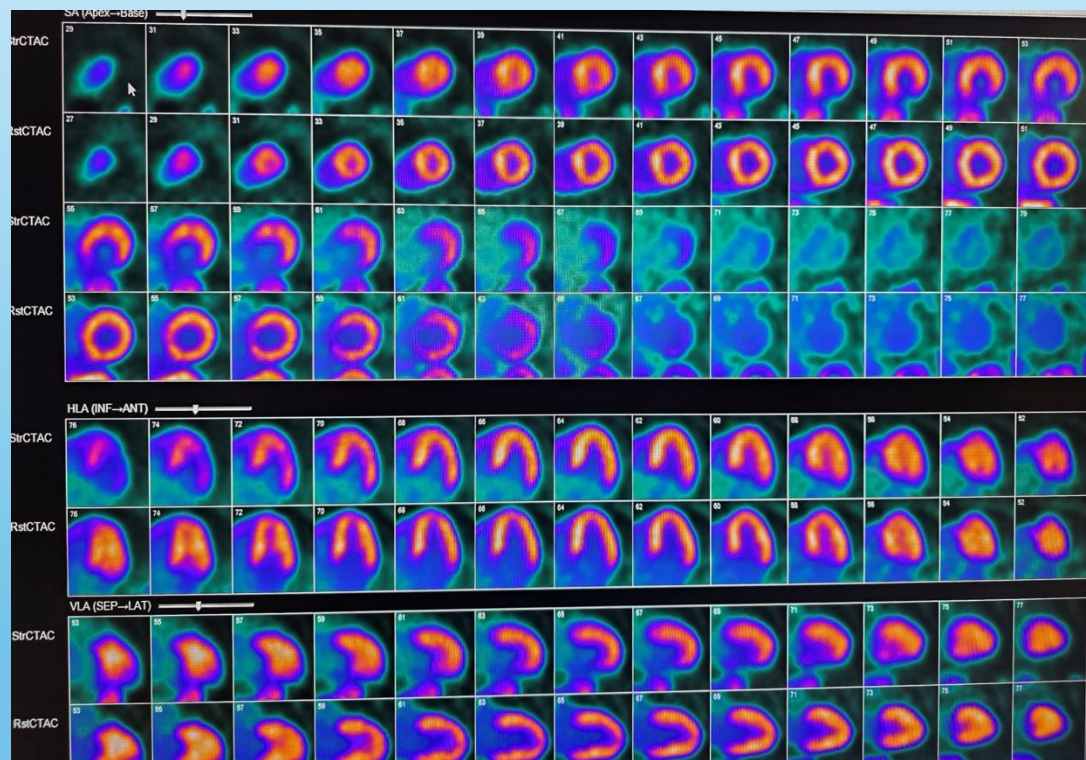
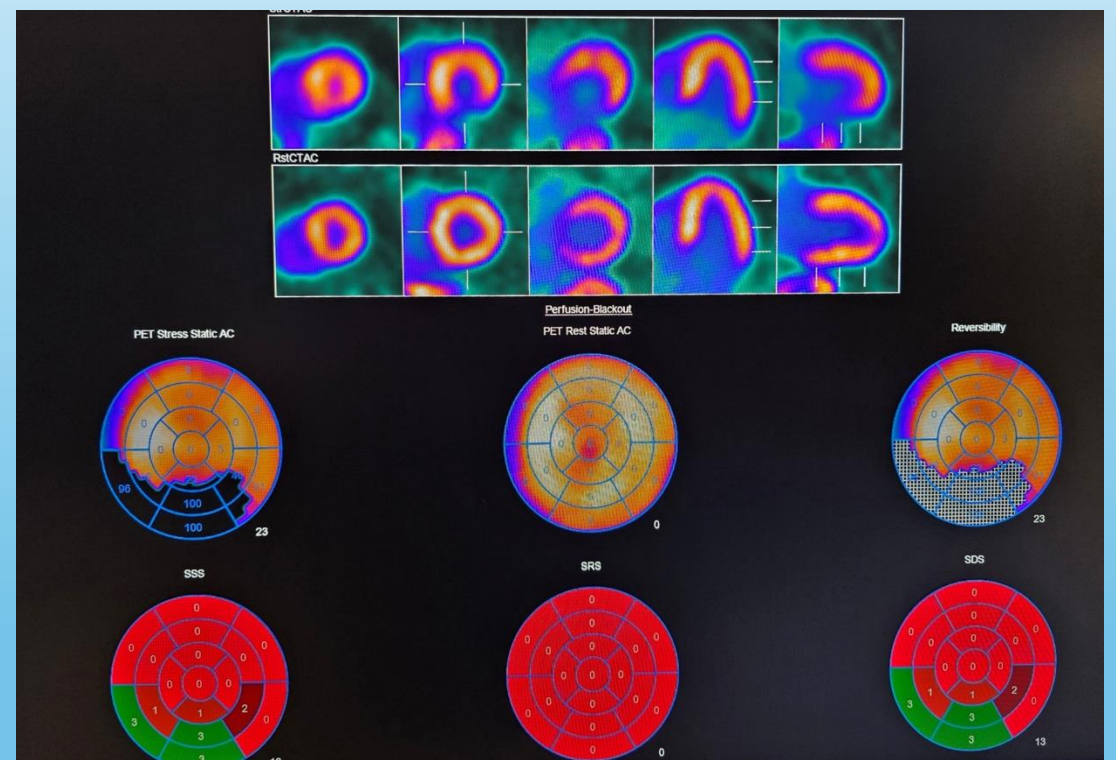
Impression: Normal Myocardial Perfusion.

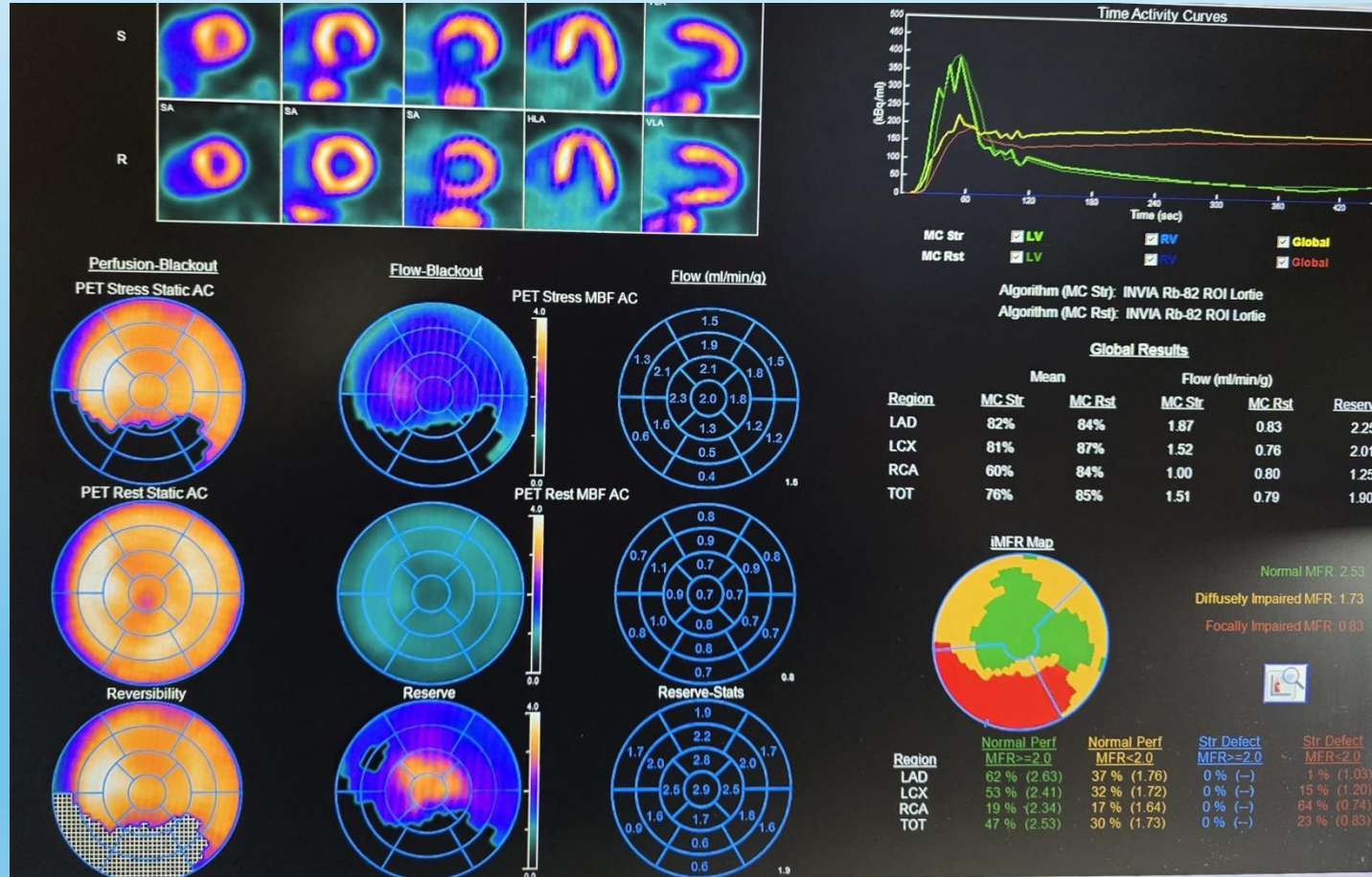
Normal Myocardial Blood Flow confirming normal myocardial perfusion

Case 2

- 79 y/o male with history of HTN, HLD, DM2 OSA, who presented with chest pain. BMI 31
- Baseline EKG: Normal Sinus Rhythm, with PAC and PVC noted.
- 29 mCi Rubidium 82 administered at Rest.
- Followed **11 minutes** later by injection of Lexiscan (Regadenoson) and 29 mCi Rubidium 82 at Stress.
- Radiation dose received approximately 2.4 mSv.

Images





Results

There is a large sized defect of severe severity present in the basal inferoseptal wall, basal inferior wall, mid inferoseptal wall, mid inferior wall, mid inferolateral wall and apical inferior wall.

Resting EF = 58%, Stress EF = 58%

Resting Myocardial Flow Normal

Stress Myocardial Blood Flow is severely reduced in the inferior wall correlating to a large reversible defect in the RCA territory.

Clinical follow-up

- Left heart catheterization confirmed >90% stenosis of mid-RCA lesion.
- Patient underwent successful PTCA and subsequent stenting of mid-RCA lesion.

Stress method

Cardiac PET:

- Typically uses a pharmacological stress agent (such as Lexiscan) to mimic exercise, making it ideal for patients who cannot walk or exercise on a treadmill.
- Rubidium 82 mandates pharmacological stress due to short half-life of 76 seconds.
- This may change with the recent release of F-18 Flurcado (flurpiridaz)

Nuclear Stress (SPECT) imaging:

- Can use either physical exercise (treadmill/bike) or a pharmacological stress agent.

Summary

Rubidium-82 Cardiac PET imaging is currently the most advanced Nuclear Perfusion Imaging technique available as it combines superior diagnostic accuracy, robust attenuation correction, quantitative blood flow, lower radiation exposure, **and** faster scan times.

These advantages lead to greater confidence in diagnosing coronary artery disease compared with traditional myocardial perfusion SPECT imaging.

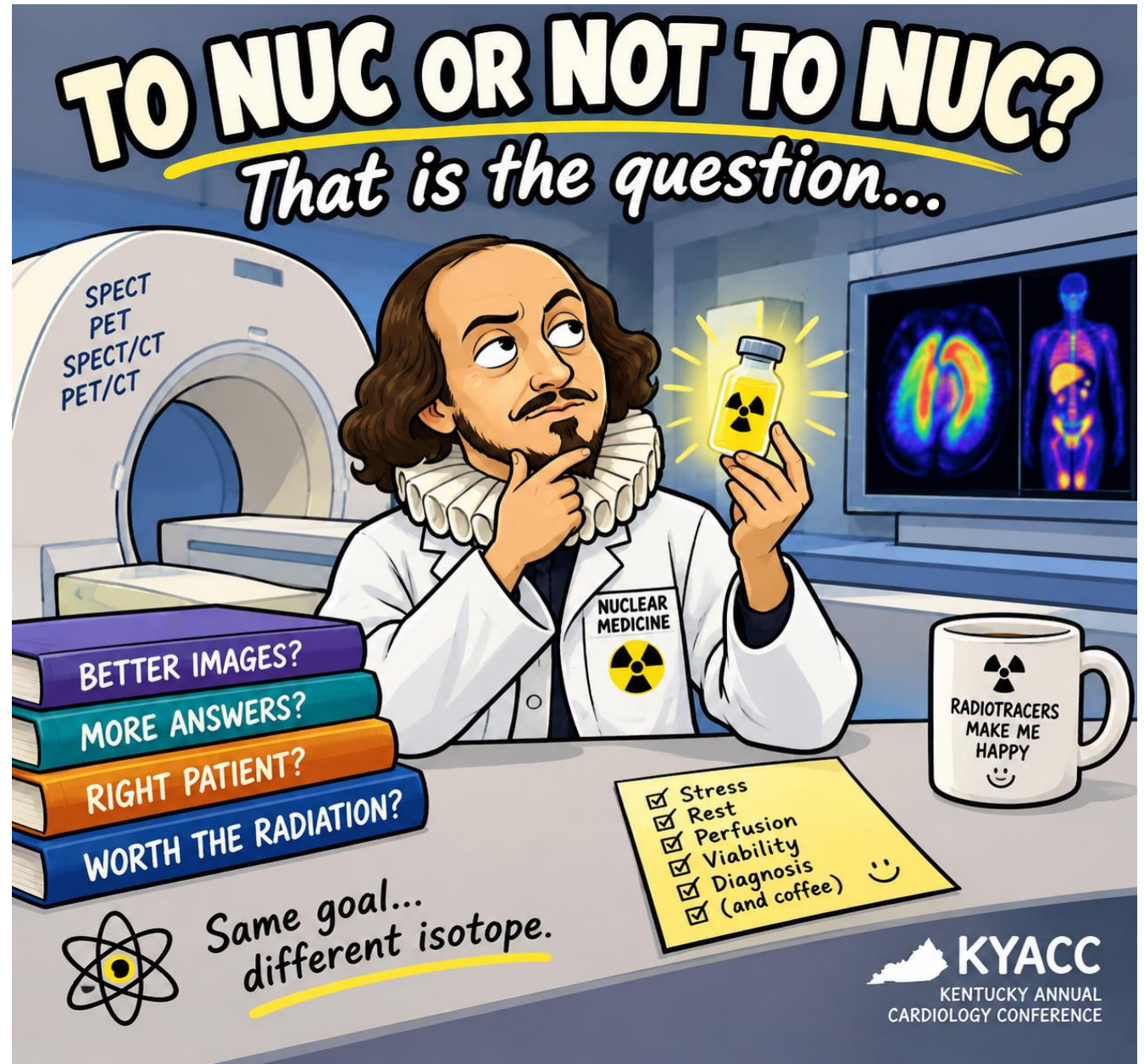
PET is the Future of cardiac imaging;
The Future is here;
Embrace the Future!



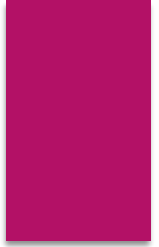
DISCLAIMER

- ▶ **The information presented in this speech is intended for educational and informational purposes only. It is not a substitute for professional medical advice, diagnosis, or treatment. Nuclear medicine procedures should only be performed and interpreted by qualified healthcare professionals in accordance with established safety protocols.**
- ▶ **Always consult a licensed physician or specialist for guidance regarding your specific health condition or any questions about nuclear medicine. The speaker and organizers disclaim any liability for actions taken based on the content of this presentation.**

CHOOSING
MYOCARDIAL
PERFUSION
SPECT: WHERE DOES
IT FIT IN WITH THE
OTHER STRESS
IMAGING OPTIONS



When stress imaging can answer the clinical question



Clinical purpose	Detect inducible ischemia and estimate risk when the result could change management.
Common settings	Stable symptoms with suspected coronary disease, or known disease with new or worsening symptoms.
Appropriateness	Angina, SOB, risk, and known disease DMII, HTN...
Reasons to clarify	Low-risk symptoms or asymptomatic screening do not automatically justify stress imaging.





	SPECT MPI	PET MPI	Stress echo
Main- signal	Relative tracer uptake and LV function	Perfusion plus quantitative flow when acquired	Stress-induced wall-motion change
Stress options	Exercise or medication	Usually medication*	Exercise or dobutamine
Radiation	Yes	Yes	No ionizing radiation
Quality concern	Attenuation and patient motion	Motion and PET/CT alignment	Acoustic windows and rapid image capture



Patient situation	Option to discuss	Reason
Can exercise, good echo windows	Exercise stress echo	Wall-motion assessment without ionizing radiation
Prior equivocal SPECT from attenuation	PET MPI, if available	Robust attenuation correction and added flow assessment
Poor echo windows, PET unavailable	SPECT MPI with artifact mitigation	Perfusion imaging may still answer the question
New chest pain at rest with instability	Urgent clinical assessment	Routine stress testing should not proceed

Myocardial Perfusion SPECT Stress

When It Fits:

Stress imaging is clinically appropriate.

PET is unavailable or impractical, and SPECT can provide a diagnostic study.

Patient is capable of walking on a treadmill, but may need to convert to a pharmacological stress

Insurance coverage

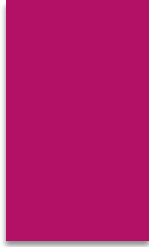
Camera weight limits can affect imaging options

Congenital Patient ex: Right Coronary Artery Anomaly

If pt is being considered for certain medications



Specific benefits of myocardial perfusion SPECT



Ischemia assessment

Stress–rest perfusion imaging localizes reversible defects and estimates the extent and severity of ischemia.

Function in one exam

ECG-gated images add left ventricular ejection fraction, volumes, and regional wall motion to perfusion findings.

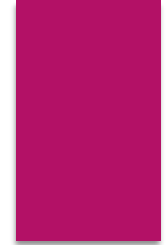
Risk stratification

Perfusion burden and ventricular function help estimate cardiac risk and inform the need for further evaluation.

Flexible stress options

Exercise adds functional capacity and symptom data.
Pharmacologic stress supports patients unable to exercise adequately.

Advances in cardiac SPECT imaging



SPECT/CT

SPECT maps emitted gamma photons. Conventional NaI crystals convert photons to light, which photomultipliers convert to electrical signals.

CT measures X-ray transmission to map tissue attenuation. CT-based correction reduces soft-tissue artifacts when SPECT and CT align correctly.

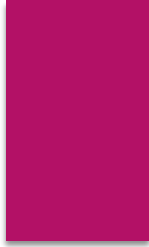
CZT SPECT

Cadmium zinc telluride directly converts gamma photons into electron-hole pairs. An electric field collects this charge, without a light-conversion step.

Better energy resolution and efficient cardiac camera designs support shorter scans or lower injected activity with validated protocols.

SPECT/CT describes hybrid imaging. CZT describes detector material.

D-SPECT supports lower-dose cardiac imaging



Dedicated cardiac camera

Spectrum Dynamics D-SPECT uses cadmium zinc telluride (CZT) detectors for myocardial perfusion imaging.

Higher sensitivity

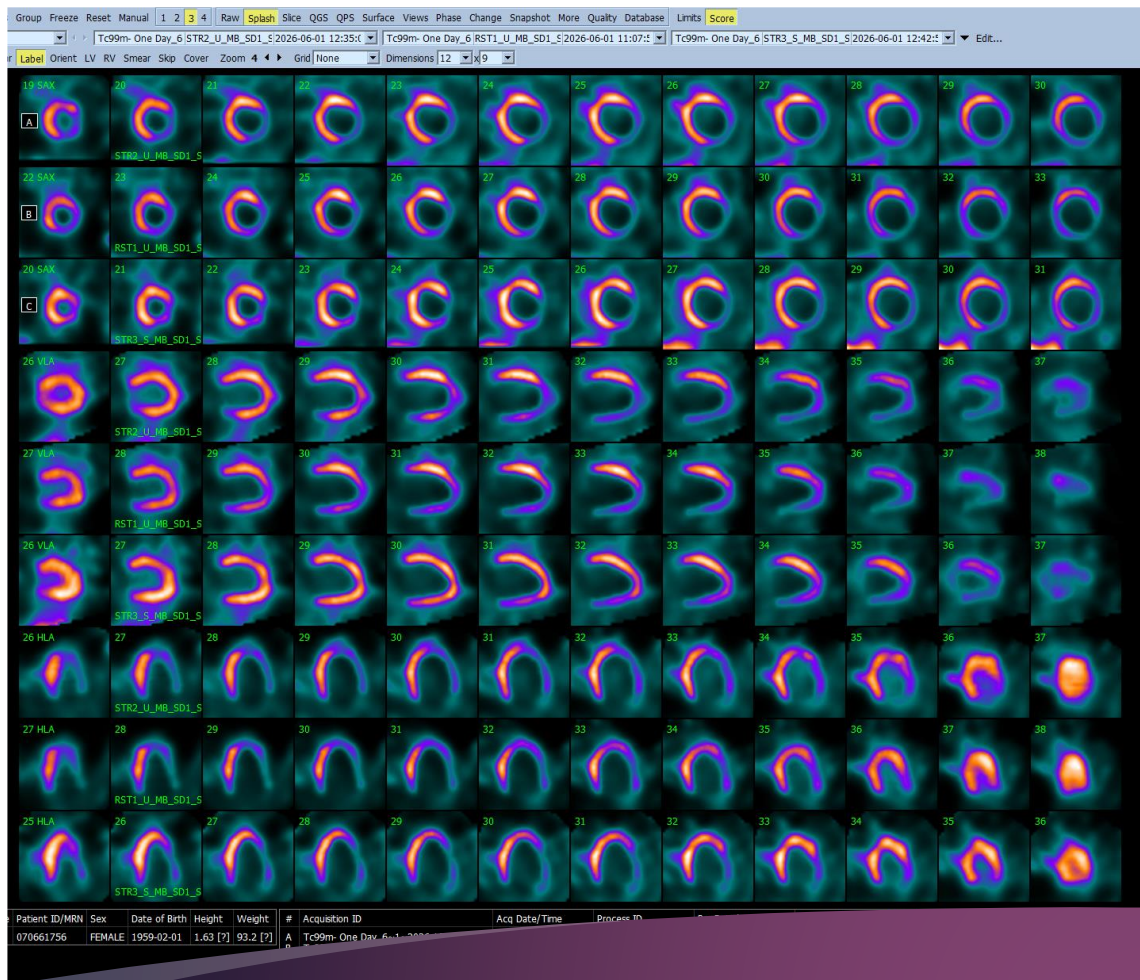
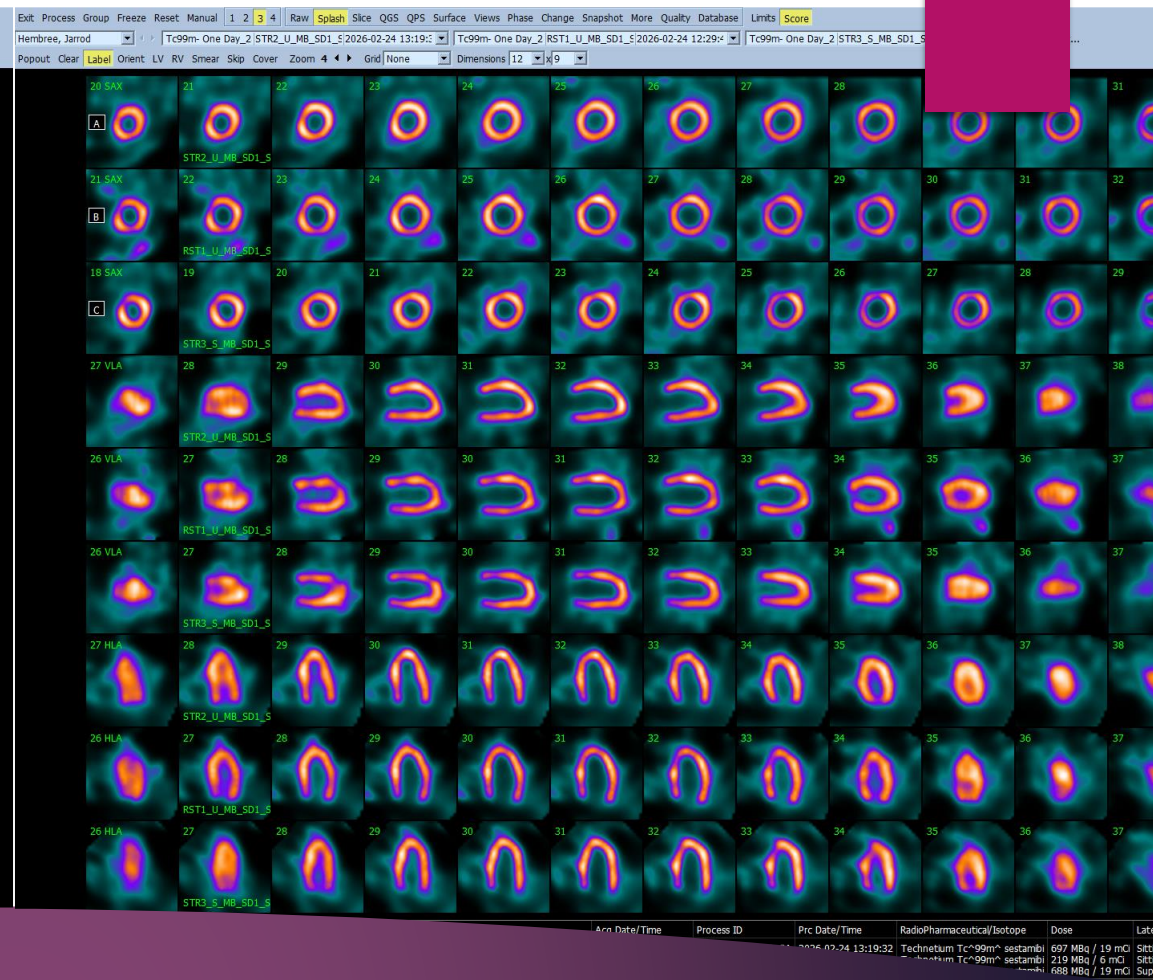
Efficient photon detection supports lower injected activity while preserving diagnostic image quality with suitable protocols.

Dose and scan time

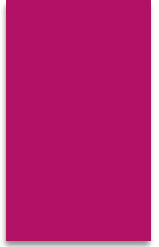
The laboratory balances injected activity with acquisition time and count quality. A shorter scan alone does not reduce radiation dose.

Patient positioning

Upright and supine imaging options support patient comfort and help the interpreting clinician assess attenuation artifacts.



Low-dose D-SPECT at UK HealthCare



Gill Institute protocol

One-day Tc-99m sestamibi rest–stress study on the Spectrum Dynamics D-SPECT CZT camera.

Patient-based activity

4–8 mCi at rest and 12–24 mCi at stress according to patient BMI.

Image-quality checks

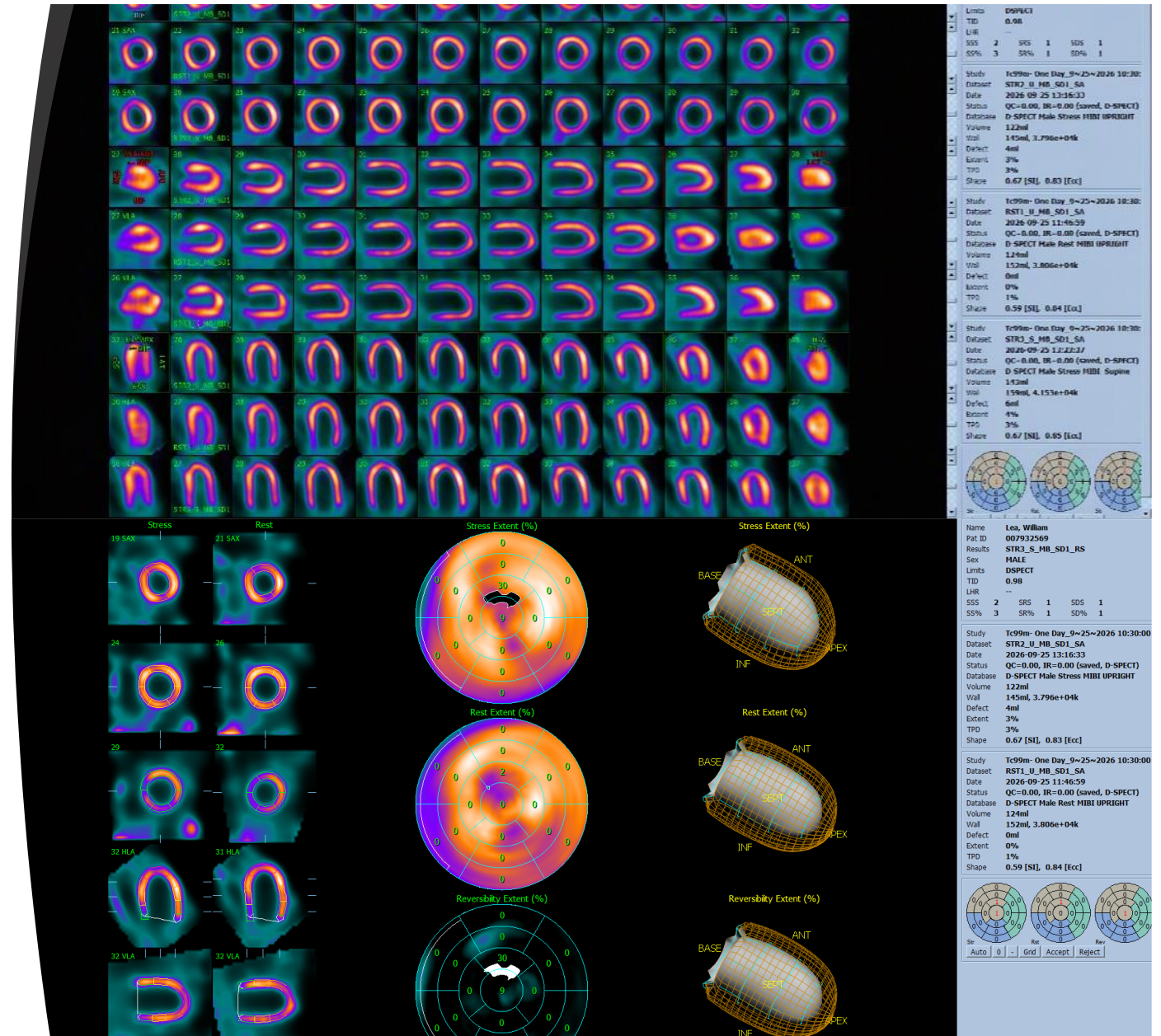
UK Gill Heart and Vascular workflow uses an upright rest image, an upright gated stress and an un-gated supine stress image.

Radiation stewardship

CZT sensitivity supports lower-activity protocols. ALARA guidelines

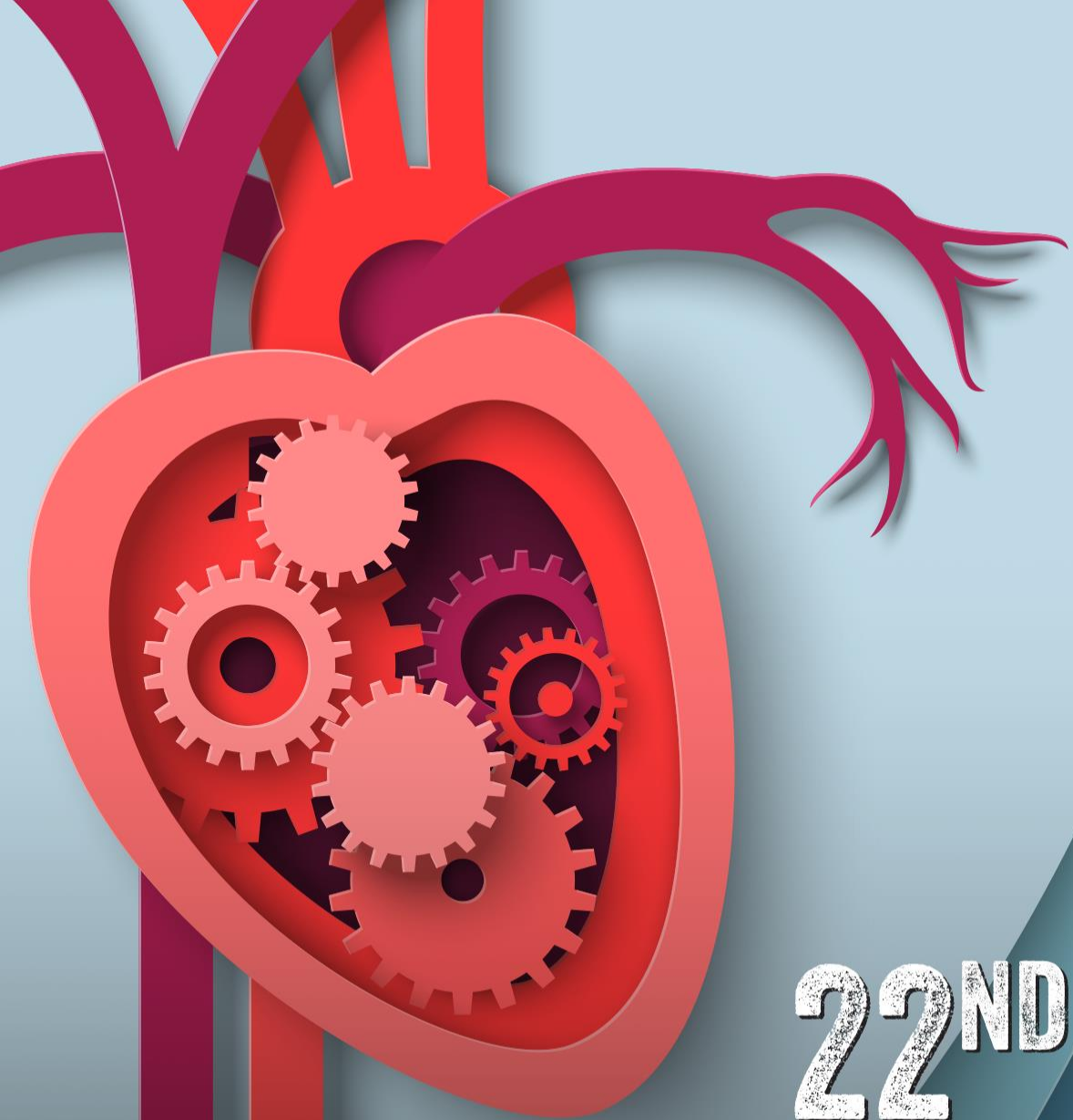
Spectrum Cardio DSPECT

- PT WEIGHT 495LB
- 9 MCI REST
- 28 MCI STRESS
- PHARMACOLOGICAL STRESS
- 1 HR WAIT POST INJECTION
- DRINK GIVEN POST REST INJ,
- DRINK AND SNACK GIVEN POST STRESS



Preparation and safety checks precede every study

- Before any stress** Confirm the indication, symptoms, ECG, vital signs, exercise ability, and the approved medication plan.
- For nuclear imaging** Confirm pregnancy or breastfeeding status, IV access, positioning tolerance, and equipment limits.
- Before a vasodilator** Verify caffeine restriction and interacting medicines. For regadenoson, avoid caffeine for at least 12 hours.
- Pause and escalate** Active ischemic symptoms, instability, wheezing, or relevant conduction disease need clinician review before testing.



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Stress Echo: Old But Gold



Stress Echocardiogram vs Nuclear Stress

Why choose stress echo?

No radiation

Efficient workflow

More information about cardiac mechanics

Two Tests, Different Signals

STRESS ECHO

Ultrasound

Wall motion and systolic thickening

Rest compared with stress

Exercise or dobutamine

Nuclear MPI (SPECT/PET)

Radiotracer + gamma camera/PET scanner

Relative myocardial perfusion

Stress ± rest imaging

Exercise or pharmacologic stress

MPI = myocardial perfusion imaging; SPECT= Single-Photon Emission Computerized Tomography; PET=Positron Emission Tomography



Advantage 1: No Ionizing Radiation

0 mSv
Stress echo

Nuclear stress requires radioactive tracer and camera room with lead lined walls

Dose varies by protocol and equipment

Stress-only / low-dose protocols reduce exposure

Tracer may remain in body for up to two days after stress test is performed

Especially relevant when repeat imaging is likely or avoiding radiation is a priority

Advantage 2: Efficient Workflow

01

Rapid review

Images available during the examination

02

Fewer steps

No tracer preparation or uptake wait (at least 30 minutes)

03

Lower cost

Typically lower; local costs vary

Camera costs ~400-500k (PET scanner ~1M or higher); Radioactive Isotope can be costly (Rubidium ~40k for a two month supply)

Advantage 3: Information Beyond Ischemia

BASELINE CONTEXT

Chamber size and ventricular function

Valve abnormalities

Wall thickness and pericardium (effusion)

TARGETED STRESS DOPPLER

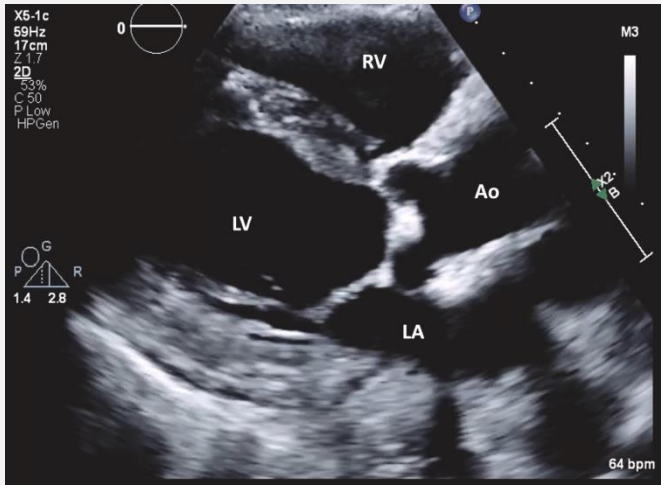
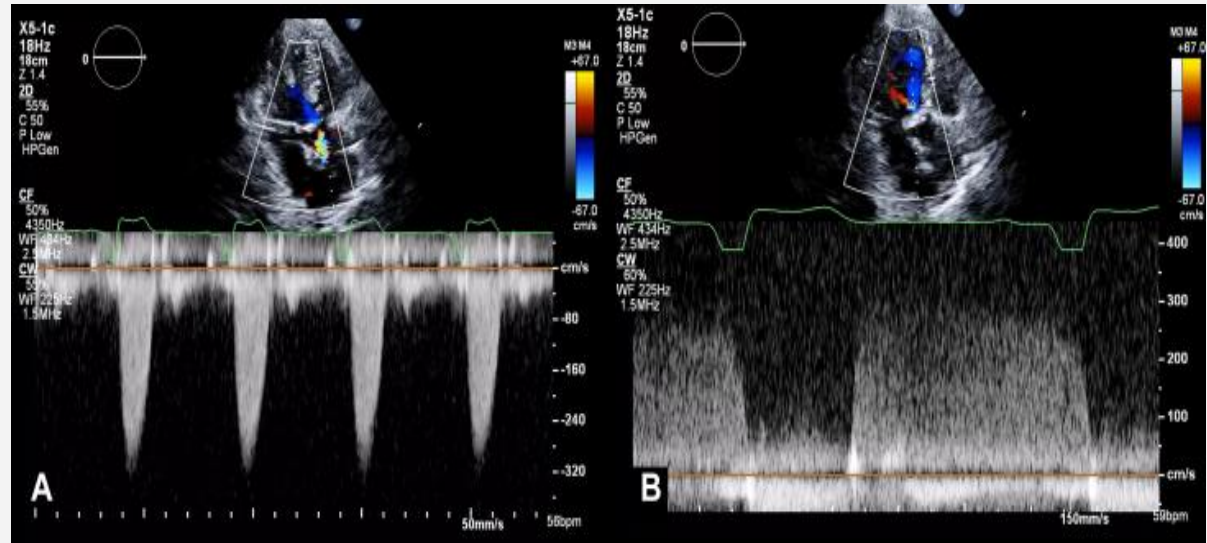
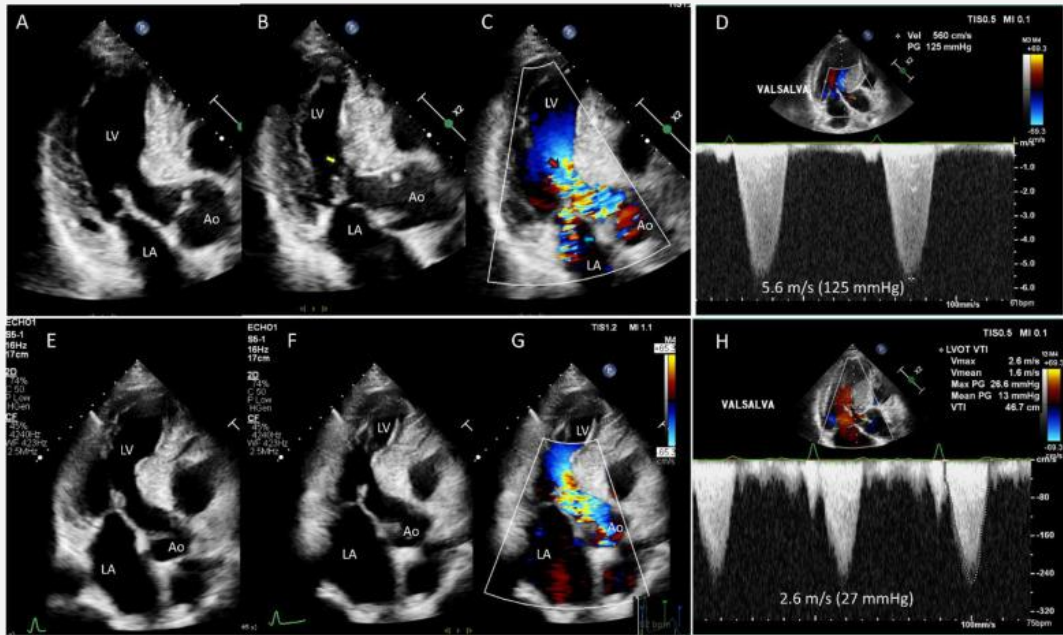
Valve gradients / regurgitation

Dynamic LV outflow obstruction

Filling and pulmonary pressures (diastolic dysfunction)

Additional hemodynamic questions require a dedicated protocol—not just standard wall-motion imaging





Advantage 4: Avoids Nuclear Stress Attenuation Artifacts

NUCLEAR STRESS CHALLENGE

Breast / diaphragmatic attenuation

May mimic a perfusion defect

Correction and prone imaging help

ECHO ADVANTAGE

No radiotracer attenuation artifact

Often higher specificity

Still depends on image quality

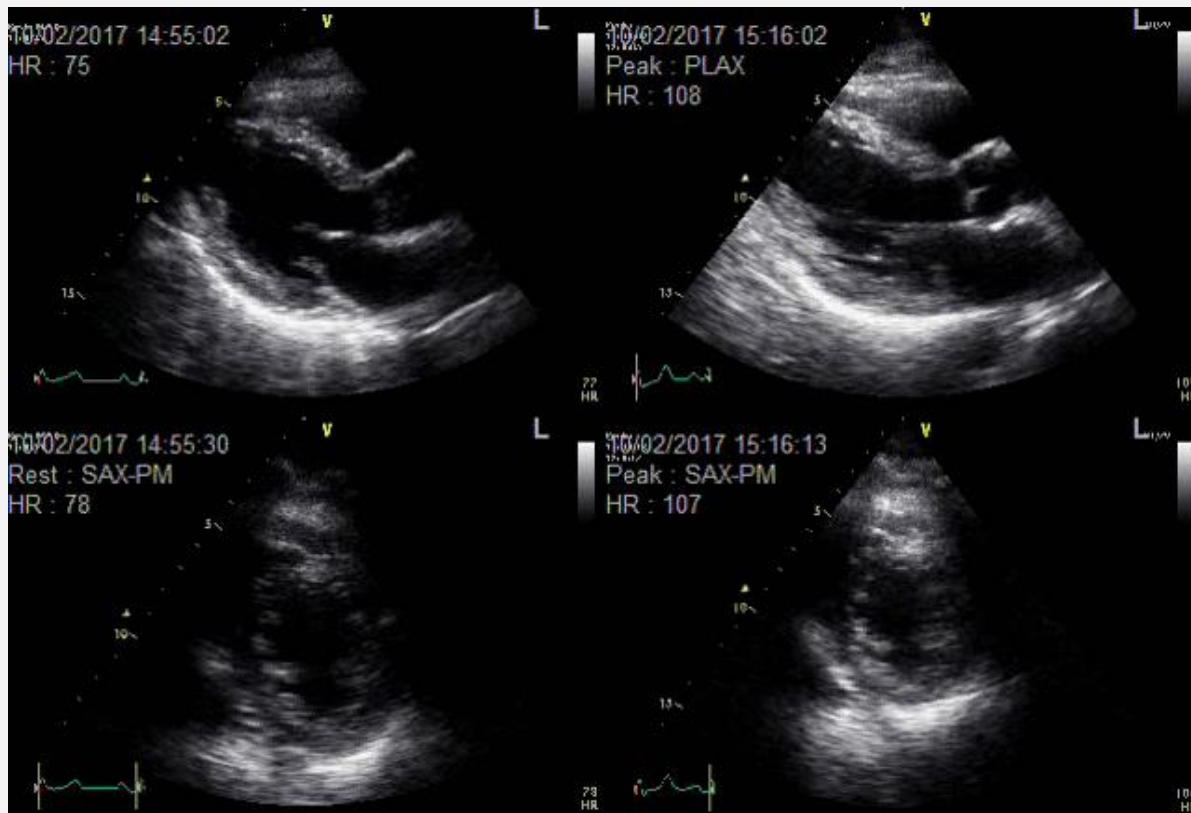
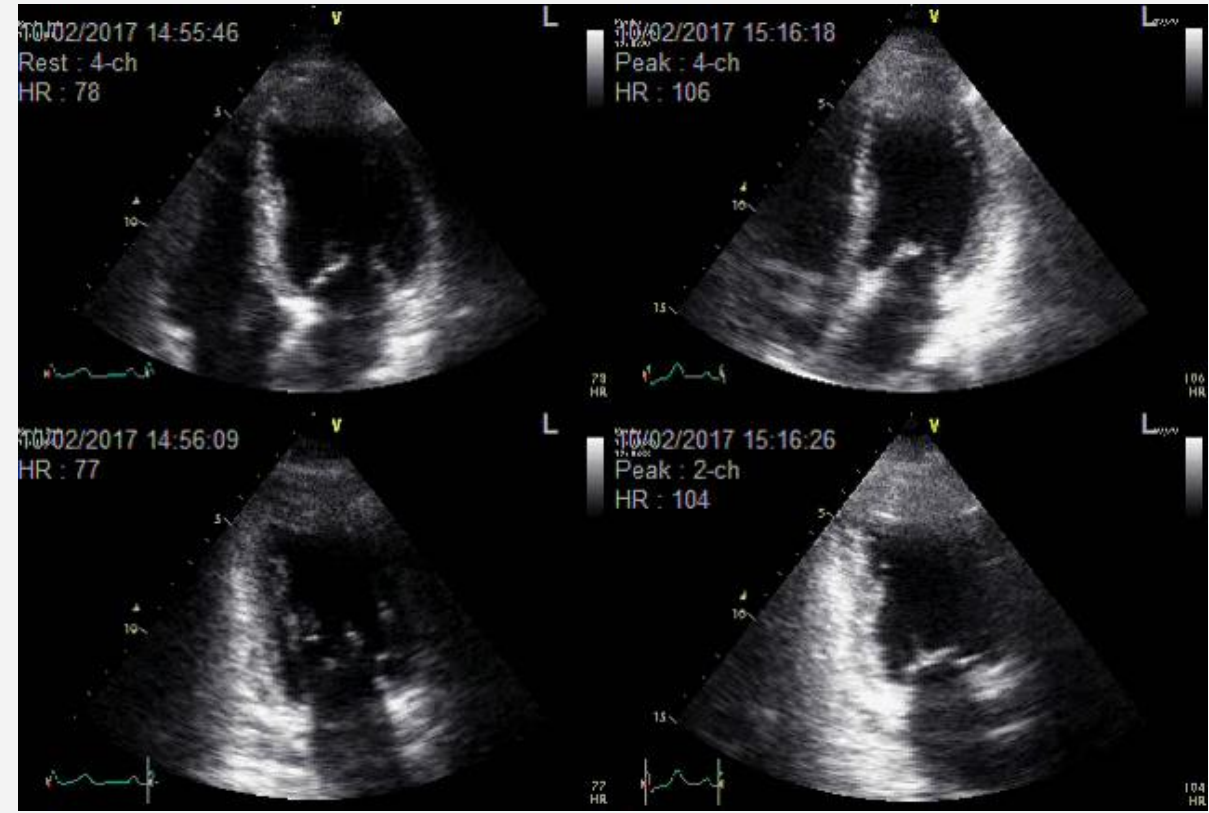
An advantage in specificity does not establish universal superiority in diagnostic accuracy

Good Images Make The Advantage Real

1. Acquire consistent rest and stress views
2. Capture peak / immediate post-exercise images promptly
3. Use ultrasound enhancement when indicated
4. Document stress adequacy (exercise capacity)
5. Imitates real life scenario causing symptoms



Stress Echocardiogram Baseline and Post-Exercise Images



Choose Stress Echo When Its Strengths Fit

No ionizing radiation

Efficient workflow and typically lower cost

Structural and targeted hemodynamic information

No SPECT-type soft-tissue attenuation artifact

Best fit: appropriate indication + adequate images + experienced team





BAPTIST HEALTH®

Dong Bo Yu, MD. PhD. FACC
System Medical Director of
Cardiovascular Imaging

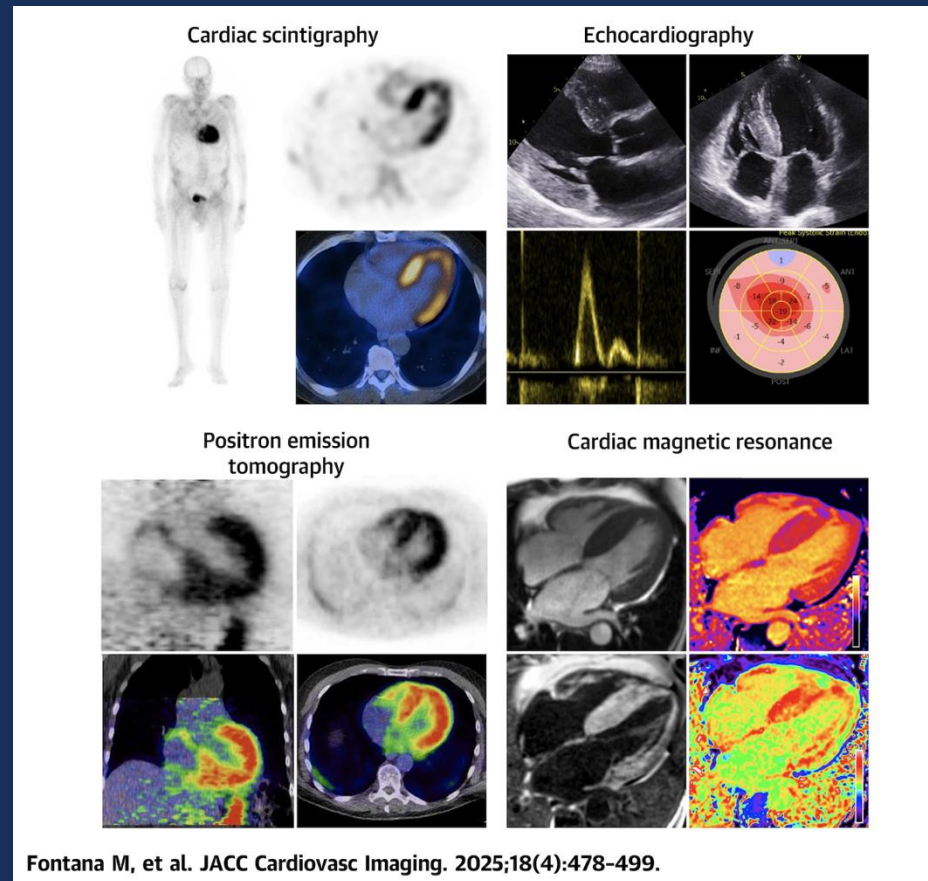
Robert Evers, RDCS, FASE
Manager/Technical director of
Echo Lab at Baptist Louisville

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All About Amyloid



1. Echo: Why it is fundamental
and How to do it right

2. PYP Scan – Why it is powerful,
and How to do it better



Disclosures

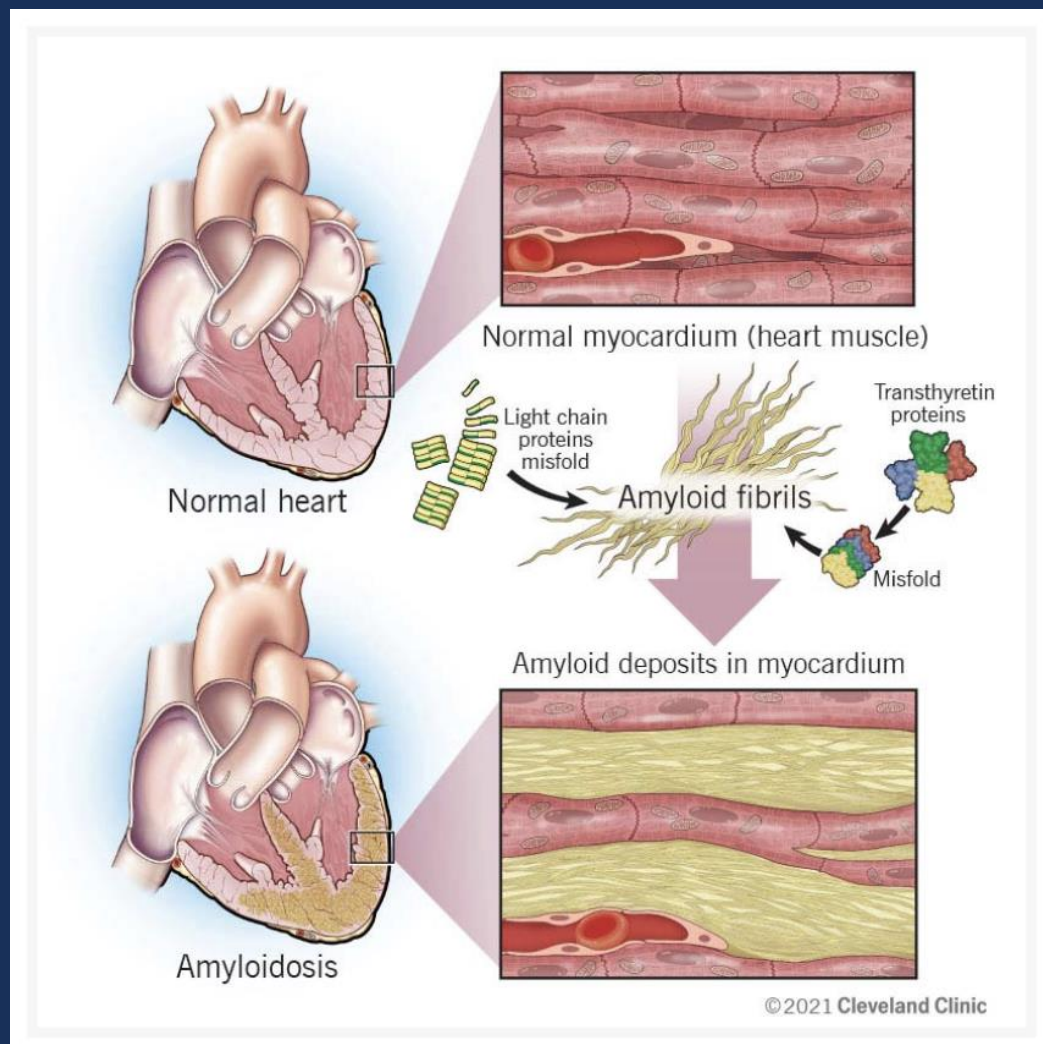
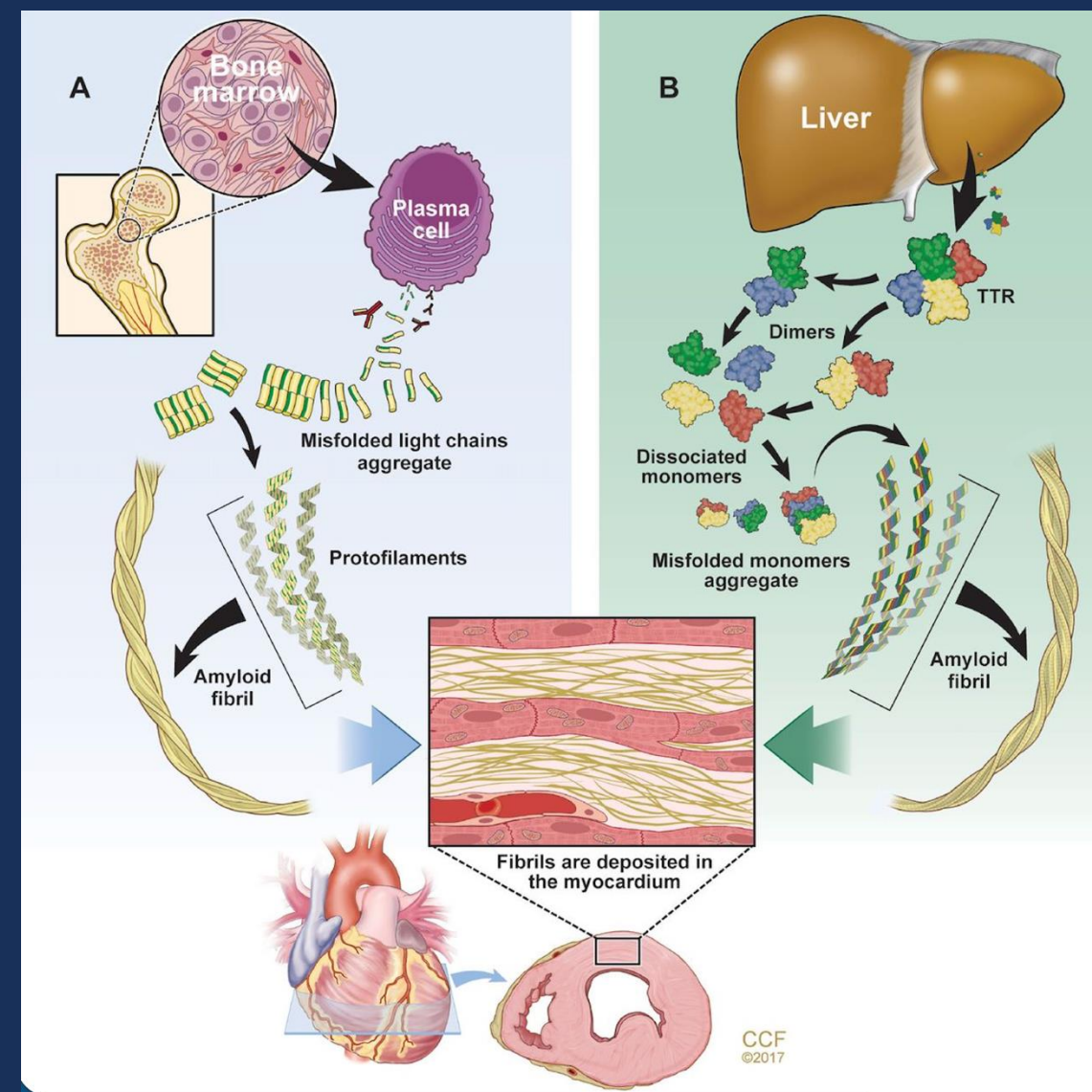
- Dr. Yu has served as external consultant for Medcase (past) and Caristo Diagnostics (present).
- Robert Evers serves as a speaker/consultant for Bristol Myers Squibb.



Cardiac amyloidosis

- A form of restrictive cardiomyopathy from amyloid fibril deposition in the extracellular space of the heart
- Two main subtypes: AL (light chain) vs ATTR (transthyretin) amyloidosis
 - ATTR much more common and results from misfolded transthyretin protein made in the liver
 - Wild-type vs hereditary (variant) ATTR amyloidosis
 - AL results from plasma cell dyscrasia





<https://my.clevelandclinic.org/health/diseases/22598-cardiac-amyloidosis>



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CHAPTER

Donnelly and Hanna, *Cleveland Clinic Journal of Medicine*, 12/2017, 82 (12 suppl 3) 12-26

OCTOBER 17, 2026 • LOUISVILLE MARRIOTT EAST • LOUISVILLE, KY

Cardiac amyloidosis

- Historically considered a rare disease but true prevalence is likely much higher
 - > 5000 new diagnoses in US per year, estimated up to 120,000 cases
 - Much higher prevalence in older population and subpopulations with HFpEF (6-13%) and severe aortic stenosis (16%) based on small cohort studies



Diagnosing ATTR amyloidosis: Catch them before it's too late

- Historic:
 - Clinical suspicion
 - Low BP, intolerance of GDMT, associated neuropathy such as carpal tunnel & spinal stenosis, relatively low ECG voltage, high incidence of arrhythmia
 - Echo for initial screening
 - LVH, disproportional atrial enlargement, bright/speckled myocardial appearance, pericardial effusion, apical-sparing “cherry-on-top” strain pattern
 - Myocardial biopsy +/- mass spectrometry



Diagnosing ATTR amyloidosis: Catch them before it's too late

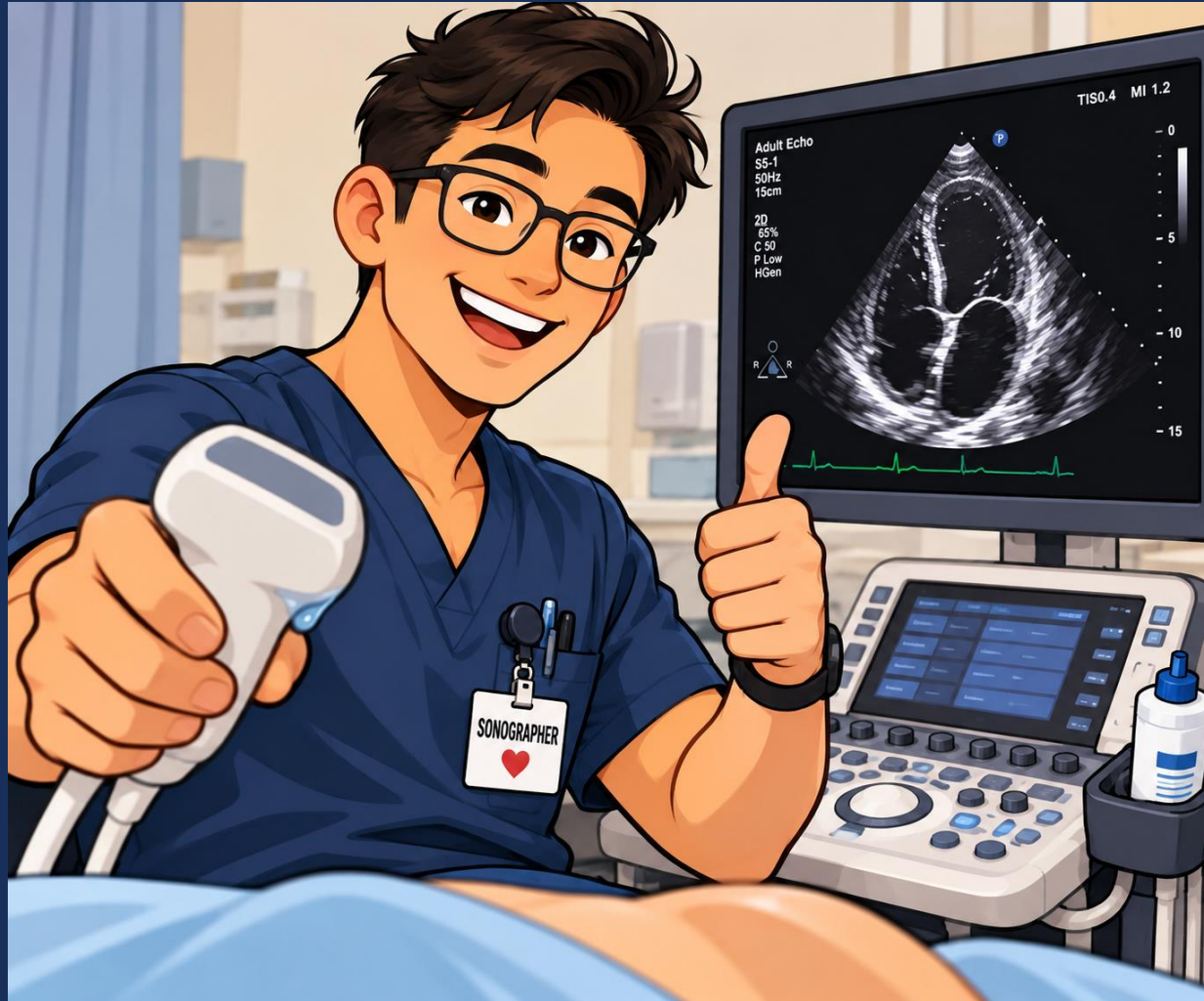
- Present
 - Cardiac MRI
 - Bone scintigraphy, aka cardiac amyloid radionuclide imaging (CARI), aka PYP scan



First-line test:

Echocardiogram





How to confirm once you have a suspicion?

PYP Scan

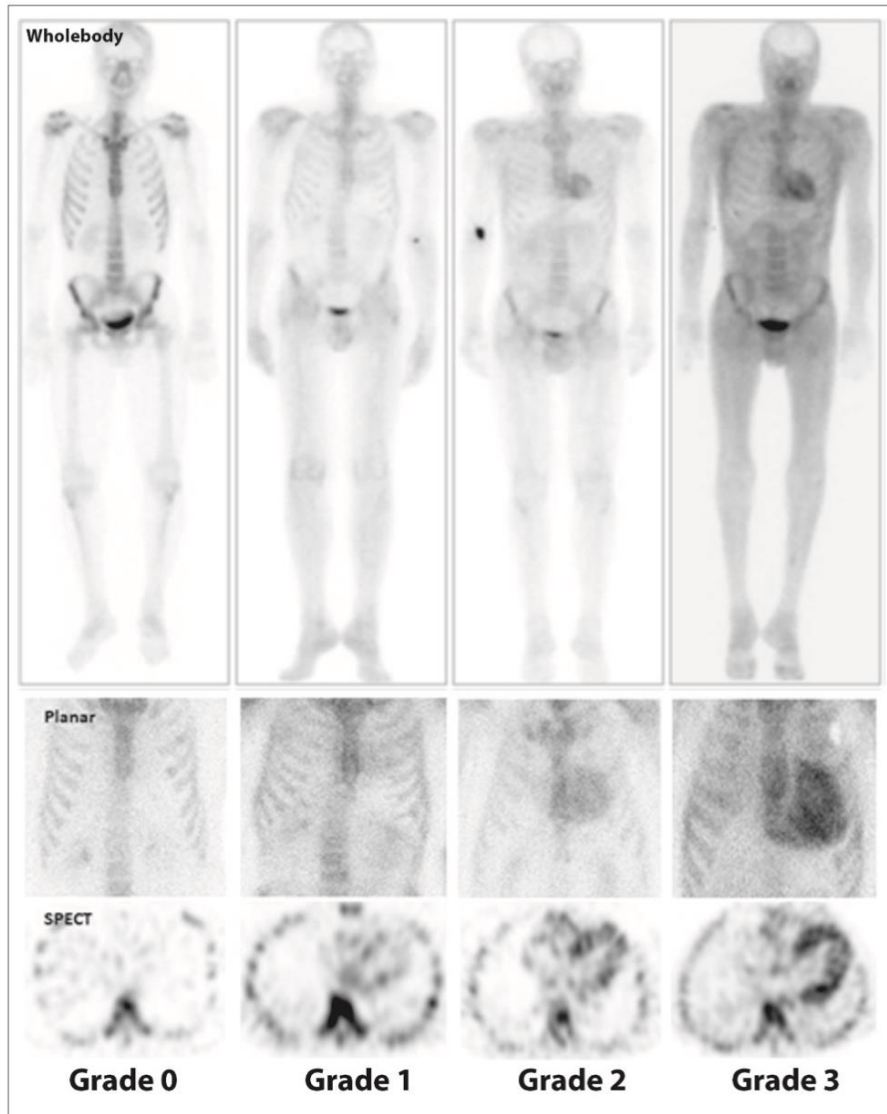


What is “PYP scan” ???

- Leverage Tc-99m PYP, a bone-avid tracer that localizes with high specificity to transthyretin amyloid deposits
 - Increasing use of ^{99m}Tc -HDMP (hydroxymethylene diphosphonate)
- Very sensitive and specific (>90-95%) for ATTR amyloidosis
- Can be easily performed on most SPECT camera used for myocardial perfusion scans
 - Easy workflow (scan 1.5 to 3 hours after tracer injection)
 - Low radiation exposure ~3 mSv
- Game changer to allow non-invasive diagnosis and thus early disease detection & therapy initiation



Figure 1. Grading of Myocardial ^{99m}Tc -DPD/HMDP Uptake



Visual grading scale for cardiac uptake on whole-body (top) and chest (middle) planar imaging, and chest SPECT (bottom) imaging (from left to right: grade 0, 1, 2, and 3).

Figure 1. Quantitation of Cardiac ^{99m}Tc -PYP Uptake Using Heart-to-Contralateral Lung (H/CL) Ratio

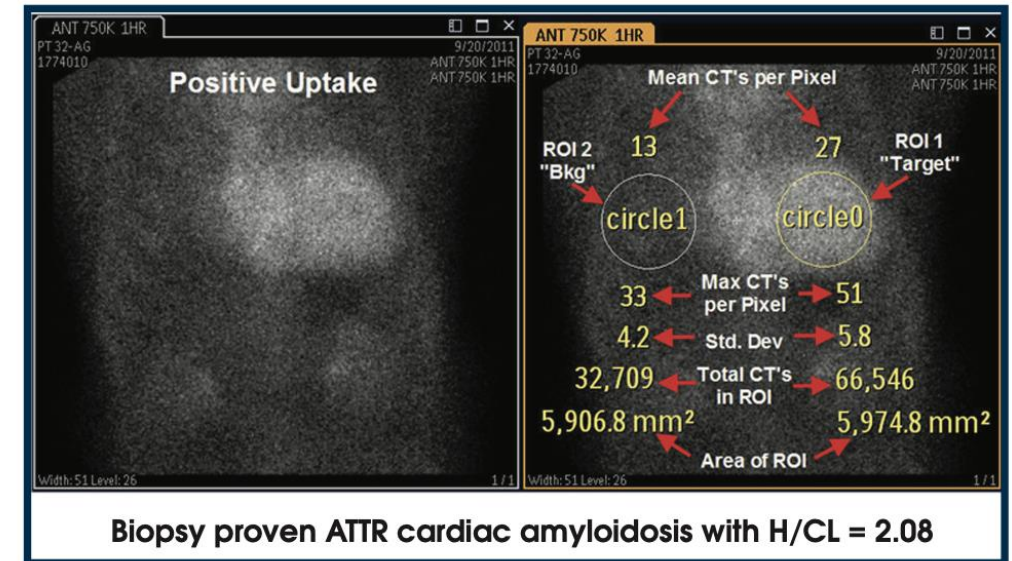
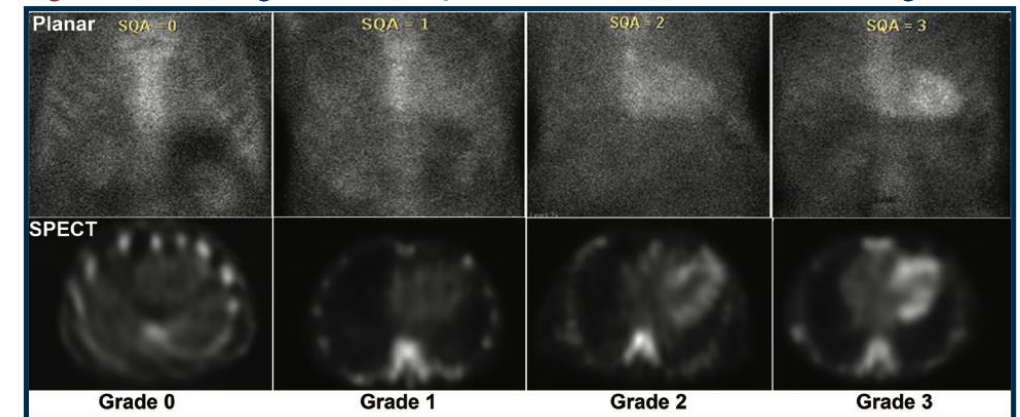
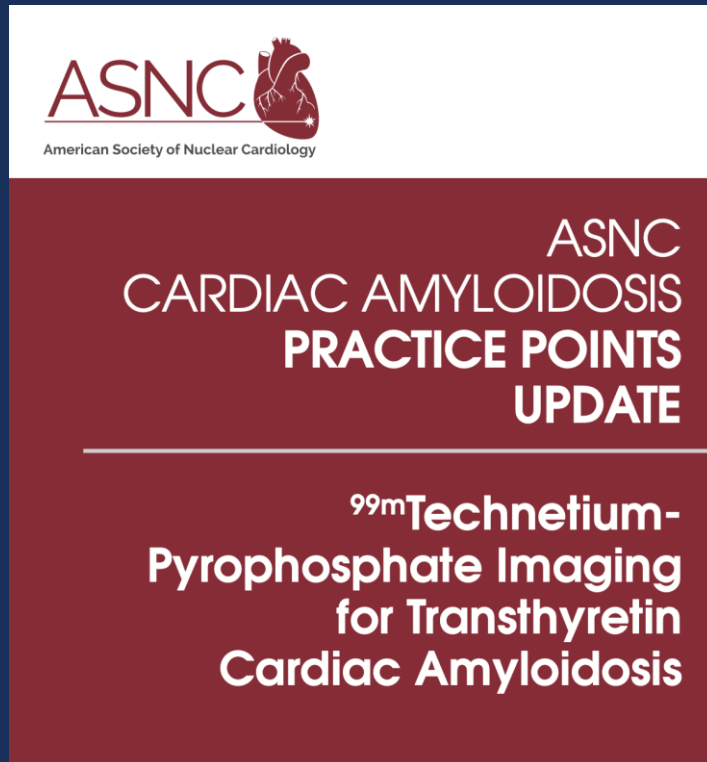
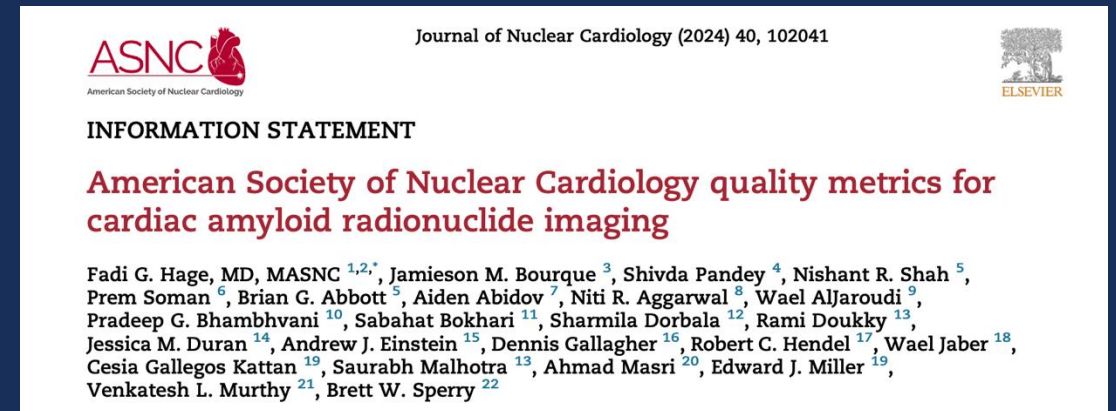


Figure 2. Grading ^{99m}Tc -PYP Uptake on Planar and SPECT Images



Standardization by American Society of Nuclear Cardiology (ASNC)



A Baptist Story

- Baptist Health is the largest healthcare provider in Kentucky/southern Indiana and provides service in 9 markets



What we do?

- Majority of Baptist markets routinely perform PYP scan, albeit at very uneven volumes.
- Most use SPECT-CT scanners by Siemens (e.g. Symbia Intevo)
- One exception: at Baptist Louisville, we use DSpect (CZT-based gamma camera without CT, upright patient position)
- Only SPECT images available → no planar imaging

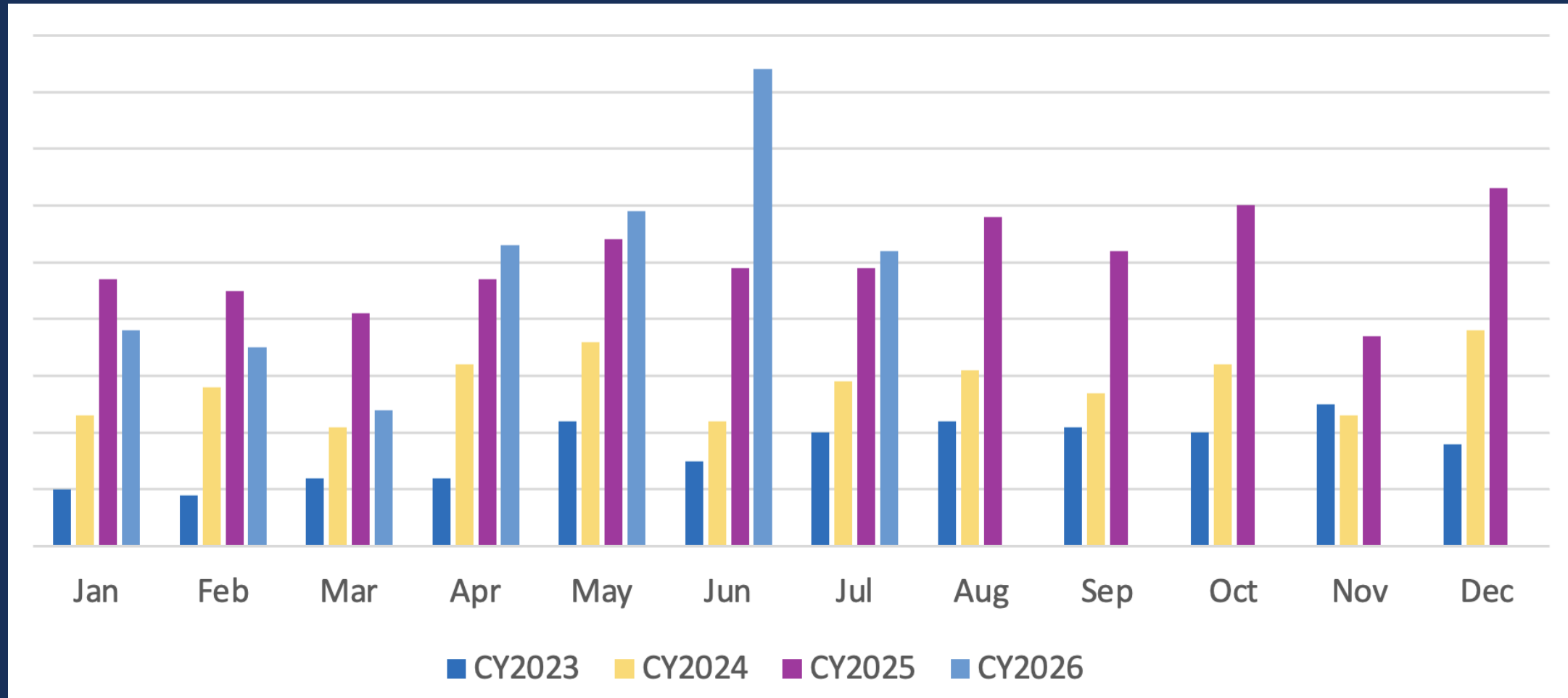


What we do?



- At Baptist Louisville, we use DSpect (CZT-based gamma camera without CT, upright patient position)

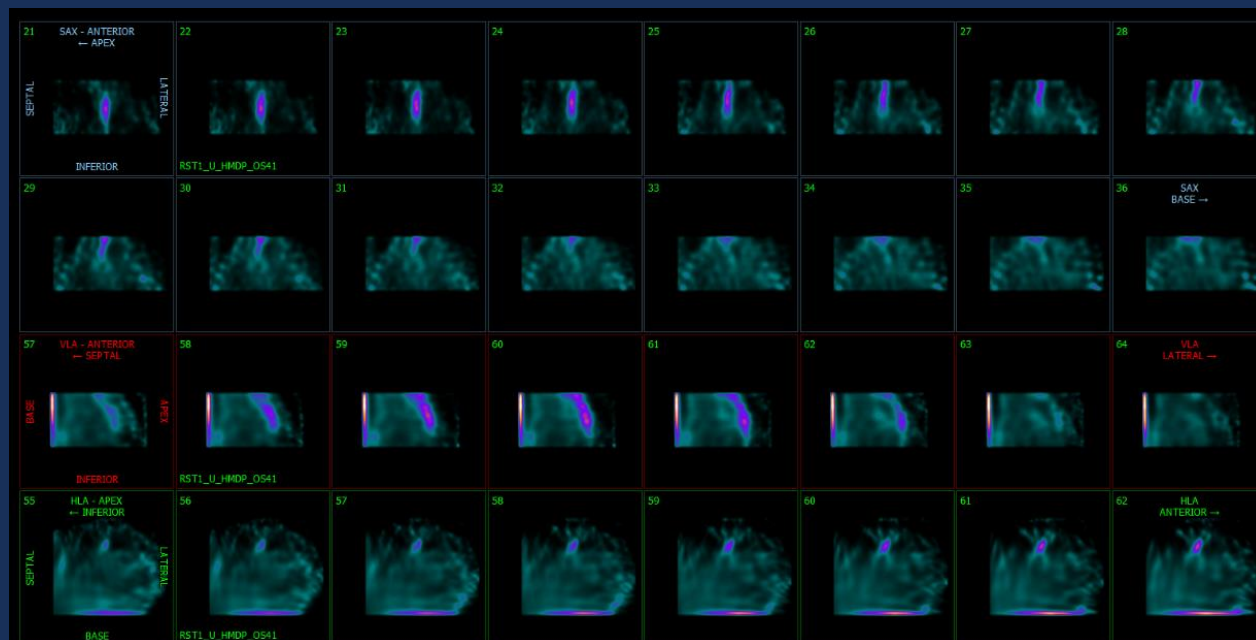
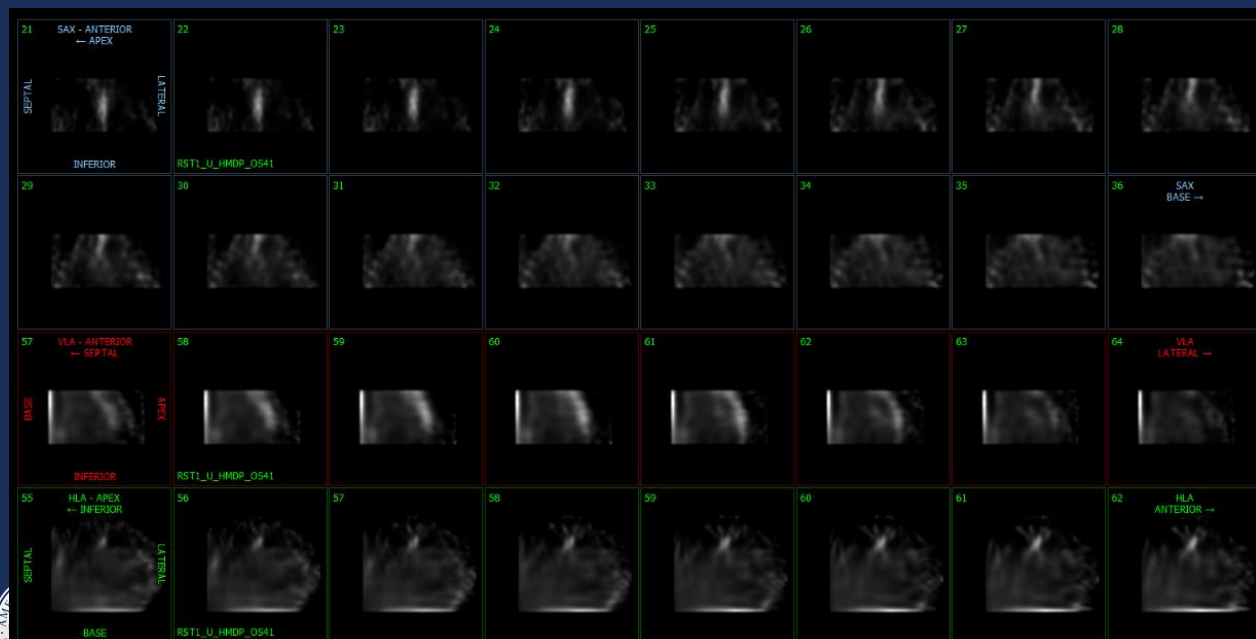
Total PYP scan volumes at Baptist Health



How we do it?

- Usually 15 mCi of tracer dose
- Historically we used technetium-99m pyrophosphate (PYP), but increasingly shifted to technetium-99m(hydroxymethylene diphosphonate (HMDP)
- Less blood pooling, slightly faster washout
- Image acquired at 1.5 hours (repeat at 3 hours if blood pool noted)
- Acquired gated images in case of ambiguity
- Post-process and display on Dspect software

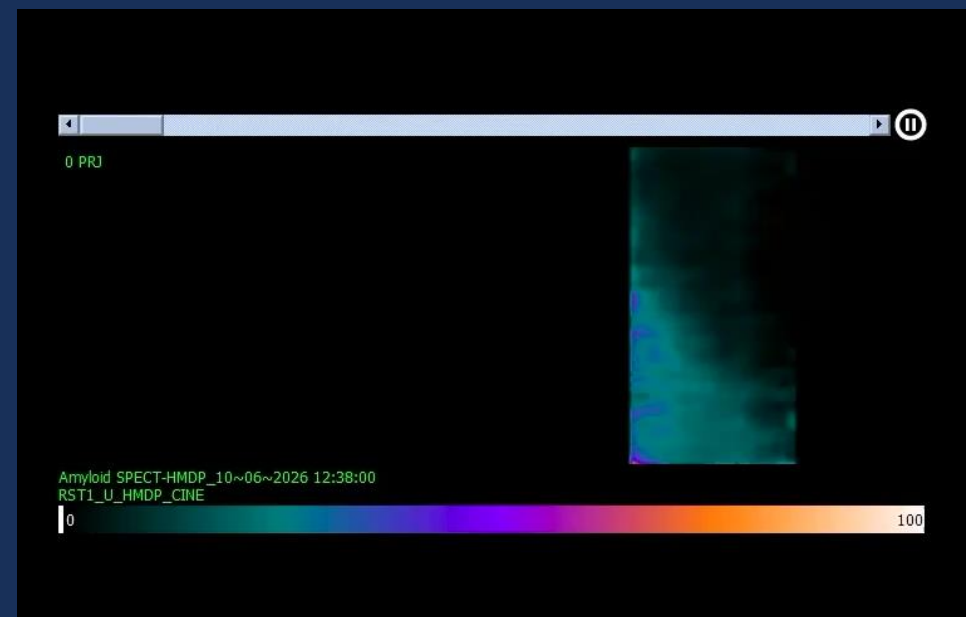


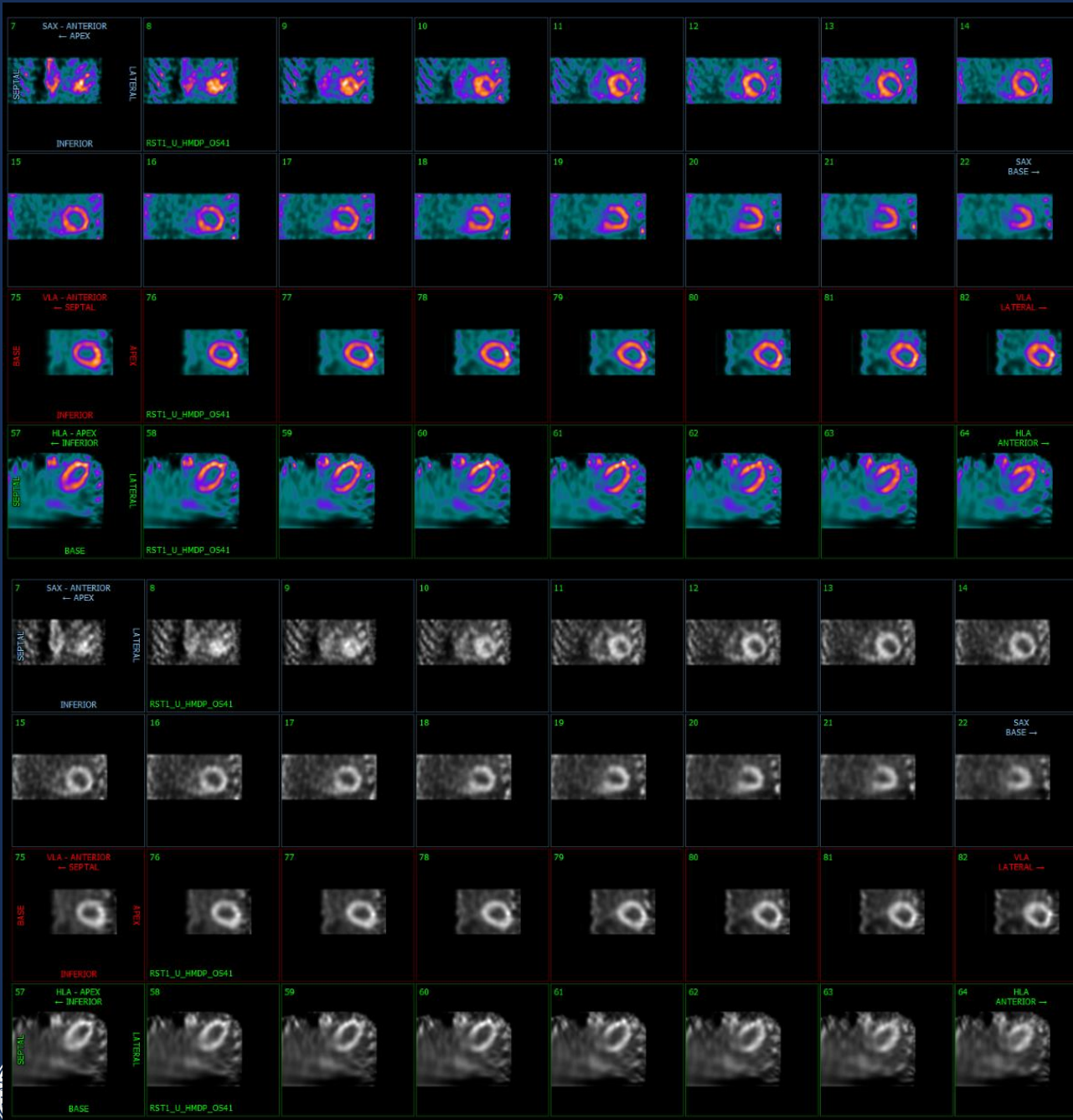


Case 0

79 y/o M

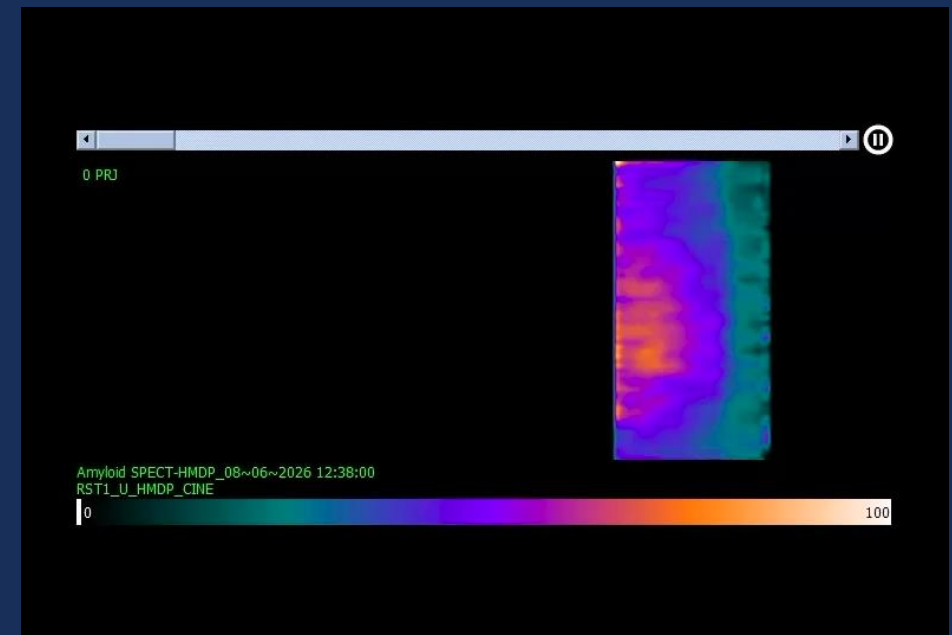
Hx HFpEF, MVR/TVR, ICD

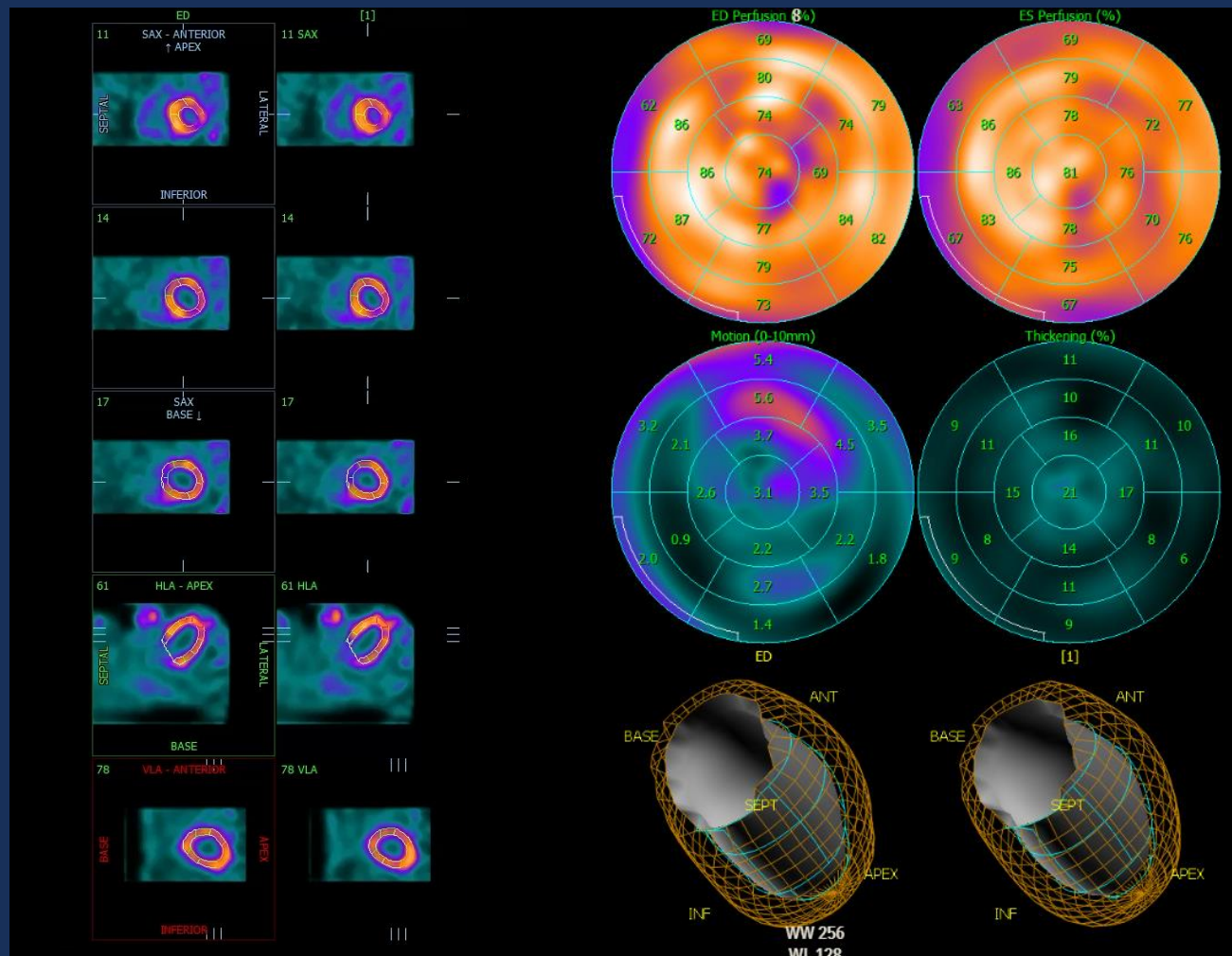




Case 1

83 y/o M with PAD, HFrEF,
LVH, PVCs





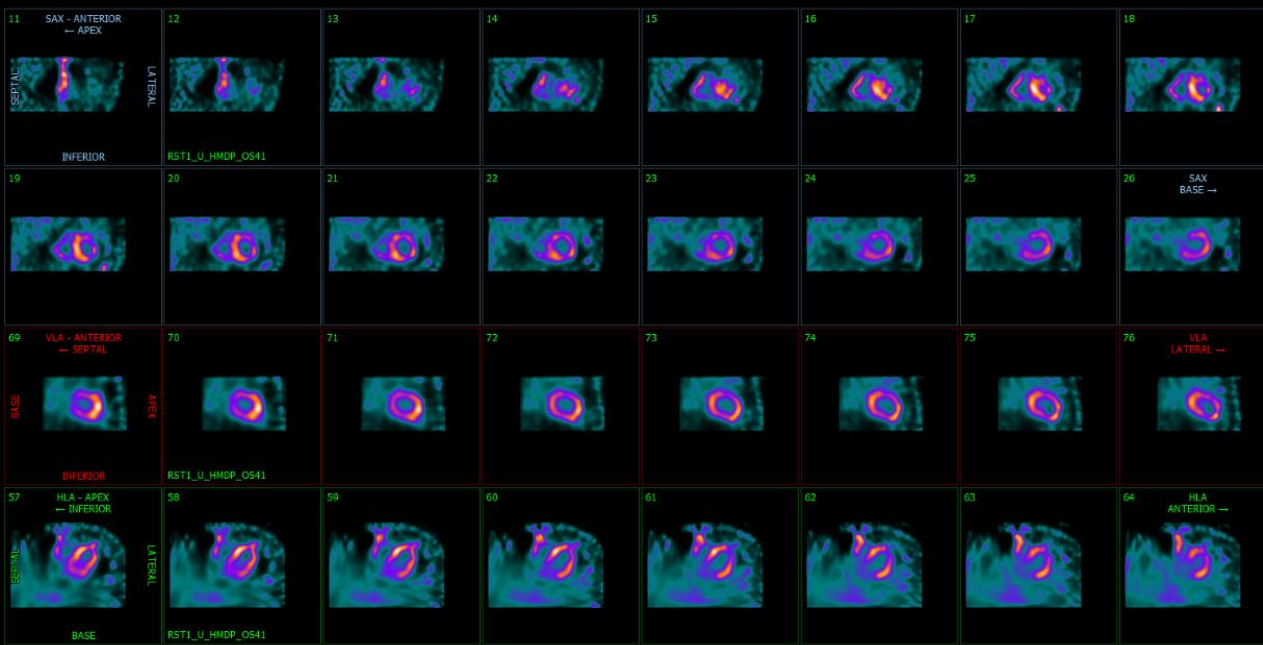
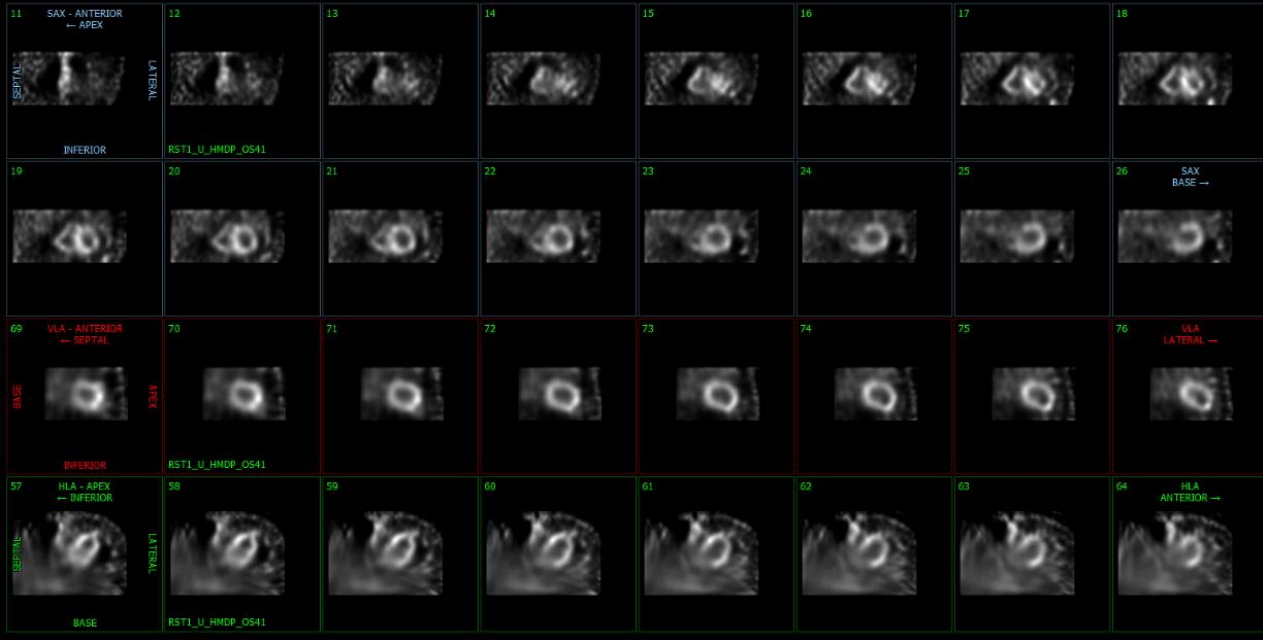
Sex	MALE		
Limits	DSPECT		
TID	--		
SMS	40	STS	37
SM%	47	ST%	73

Study	Amyloid SPECT-HMDP_08~06~2026 12:3		
Dataset	RST1_U_HMDP_OS41		
Date	2026-08-06 12:46:18		
Status	QC=5.55, IR=0.39 (saved)		
Volume	145ml [1]		
EDV	160ml [7]		
ESV	120ml [3]		
SV	41ml		
EF	25%		
Mot Ext	88%, 152cm ² [1]		
Thk Ext	63%, 109cm ² [1]		
Shape	0.62 [SI ED], 0.54 [SI ES], 0.79 [Ecc 1]		
Matrix	128x128 x 56(z) x 8(t)		
Mm/Vox	4.92 x 4.92 x 4.92		

LV Volume [ml] and Filling [ml/s]			

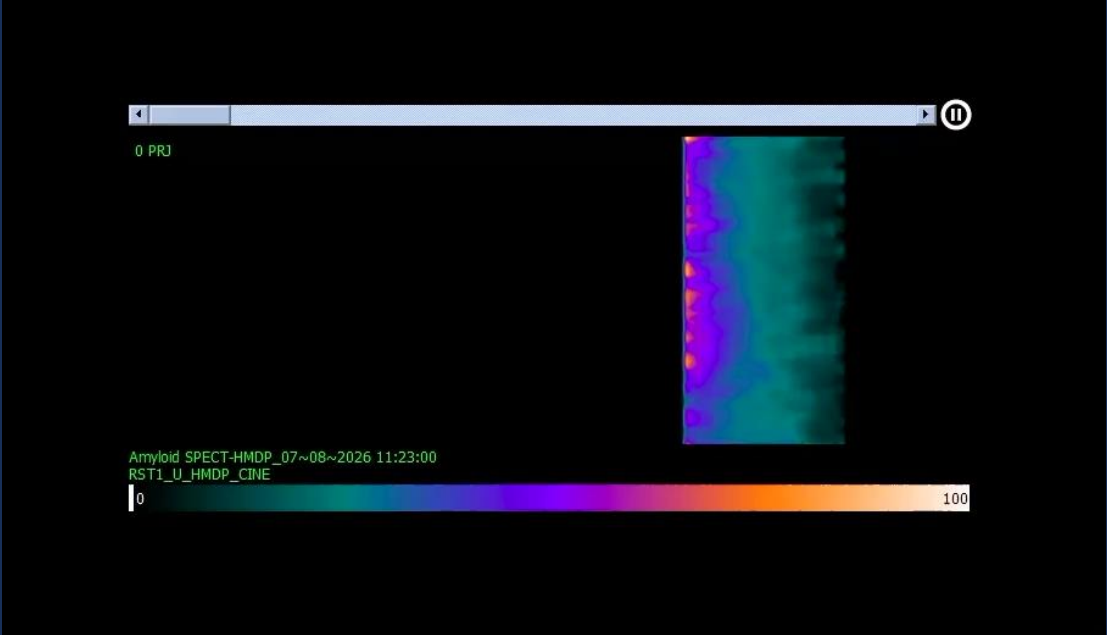
PER	-0.82 EDV/s [1.5]
PFR	1.04 EDV/s [5.3]
PFR2	-- EDV/s [--]
MFR/3	0.23 EDV/s
TTPF	324ms
BPM	52.1 (R-R=1152ms)

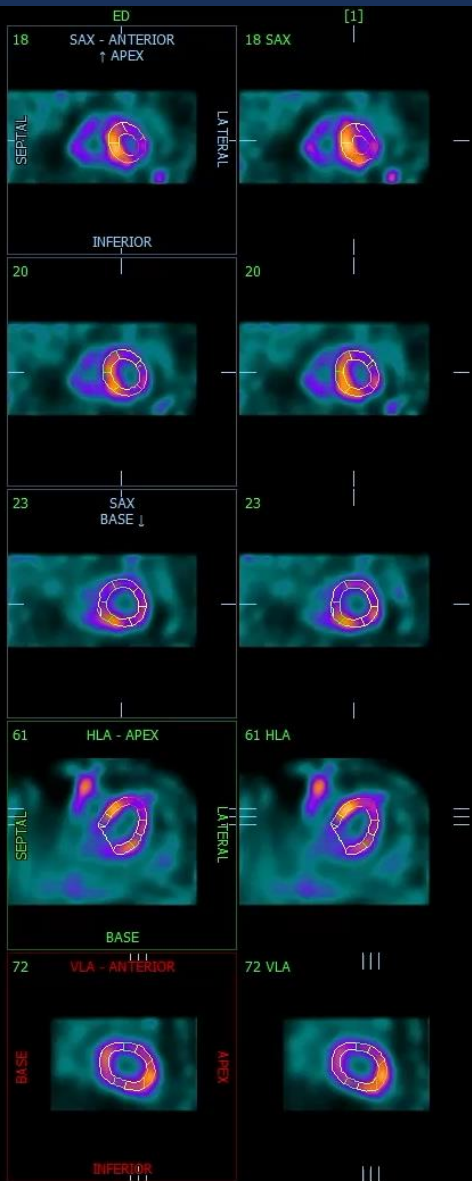
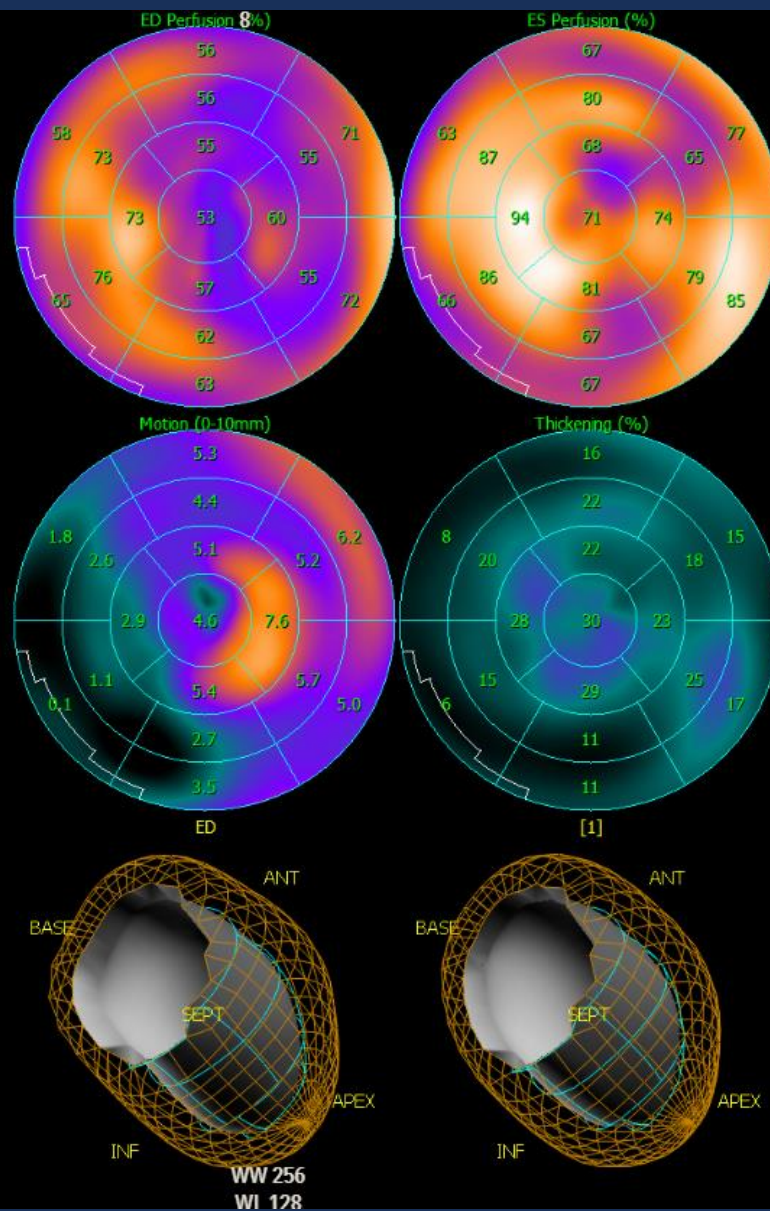




Case 2

72 y/o M with CAD s/p CABG, HFrEF, LVH



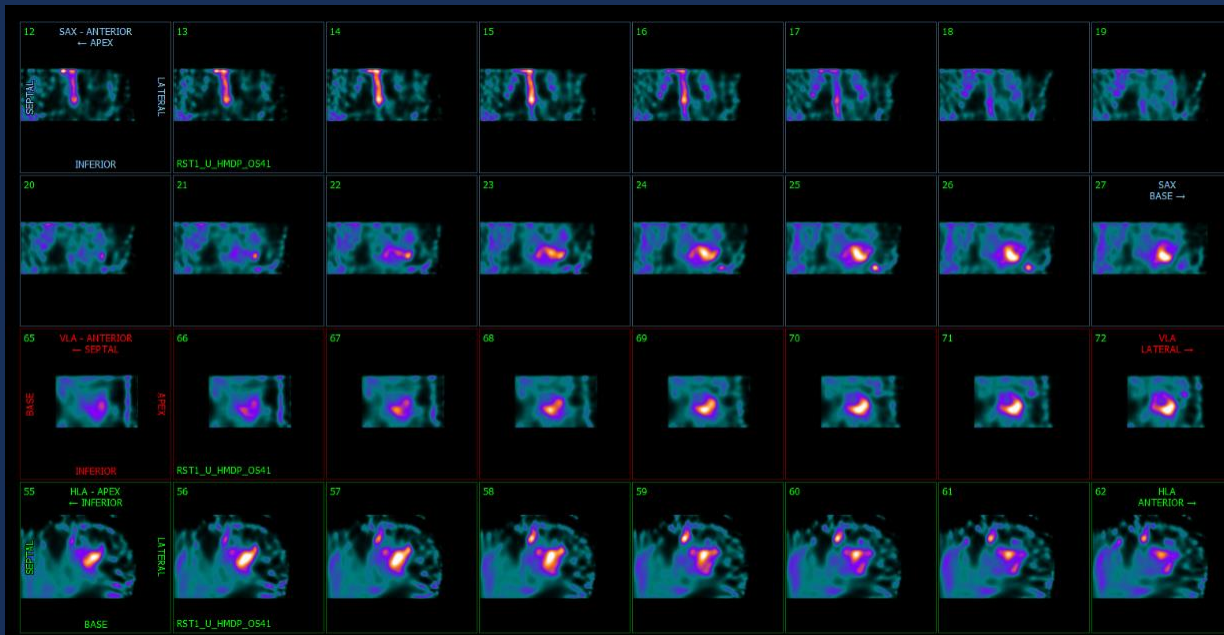
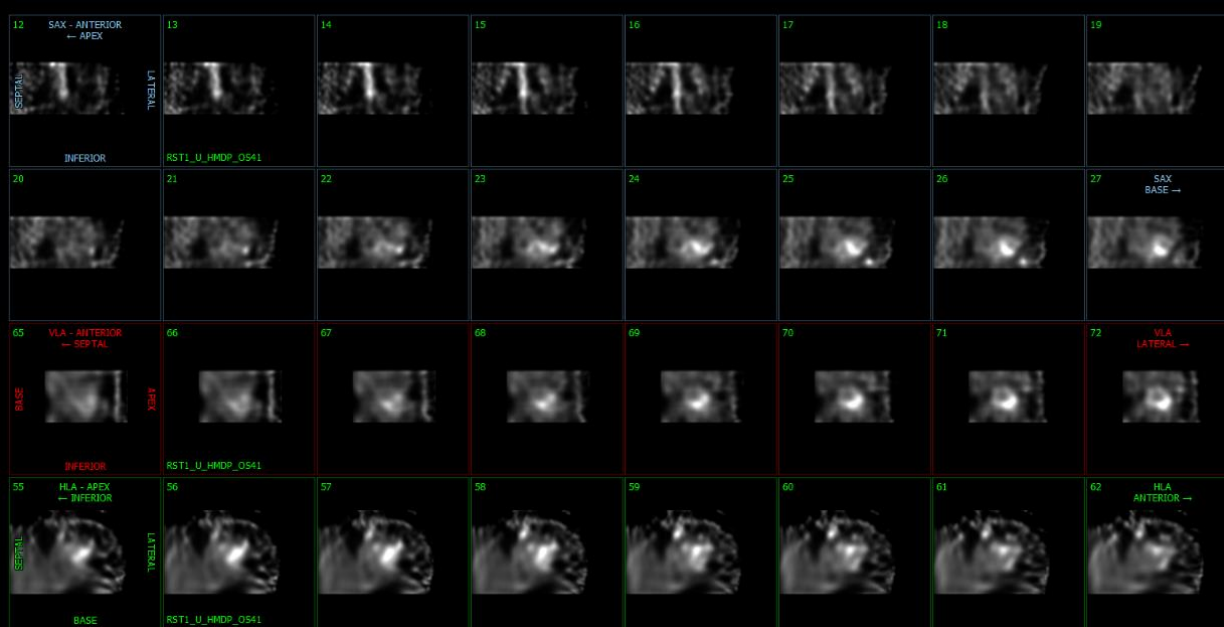


Sex	MALE		
Limits	DSPECT		
TID	--		
SMS	30	STS	23
SM%	35	ST%	45

Study	Amyloid SPECT-HMDP_07~08~2026 11:2		
Dataset	RST1_U_HMDP_OS41		
Date	2026-07-08 12:37:36		
Status	QC=0.00, IR=0.00 (saved)		
Volume	126ml [1]		
EDV	129ml [8]		
ESV	83ml [3]		
SV	46ml		
EF	36%		
Mot Ext	66%, 104cm ² [1]		
Thk Ext	37%, 58cm ² [1]		
Shape	0.68 [SI ED], 0.62 [SI ES], 0.75 [Ecc 1]		
Matrix	128x128 x 54(z) x 8(t)		
Mm/Vox	4.92 x 4.92 x 4.92		

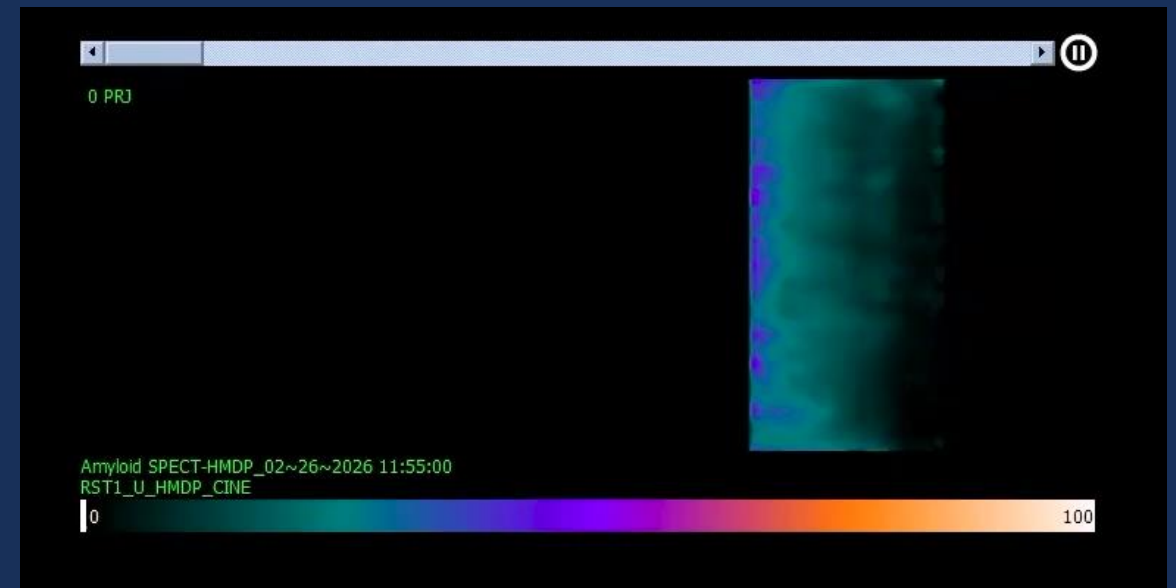
LV Volume [ml] and Filling [ml/s]			
PER	-2.04 EDV/s [1.8]		
PFR	1.25 EDV/s [4.6]		
PFR2	1.08 EDV/s [6.4]		
MFR/3	0.88 EDV/s		
TTPF	117ms		
BPM	74.3 (R-R=808ms)		

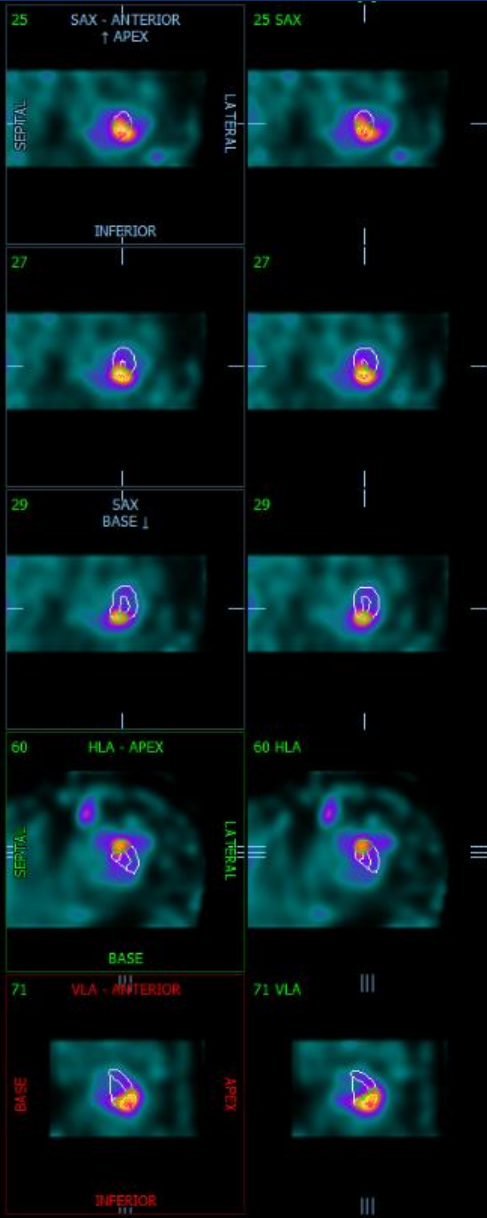
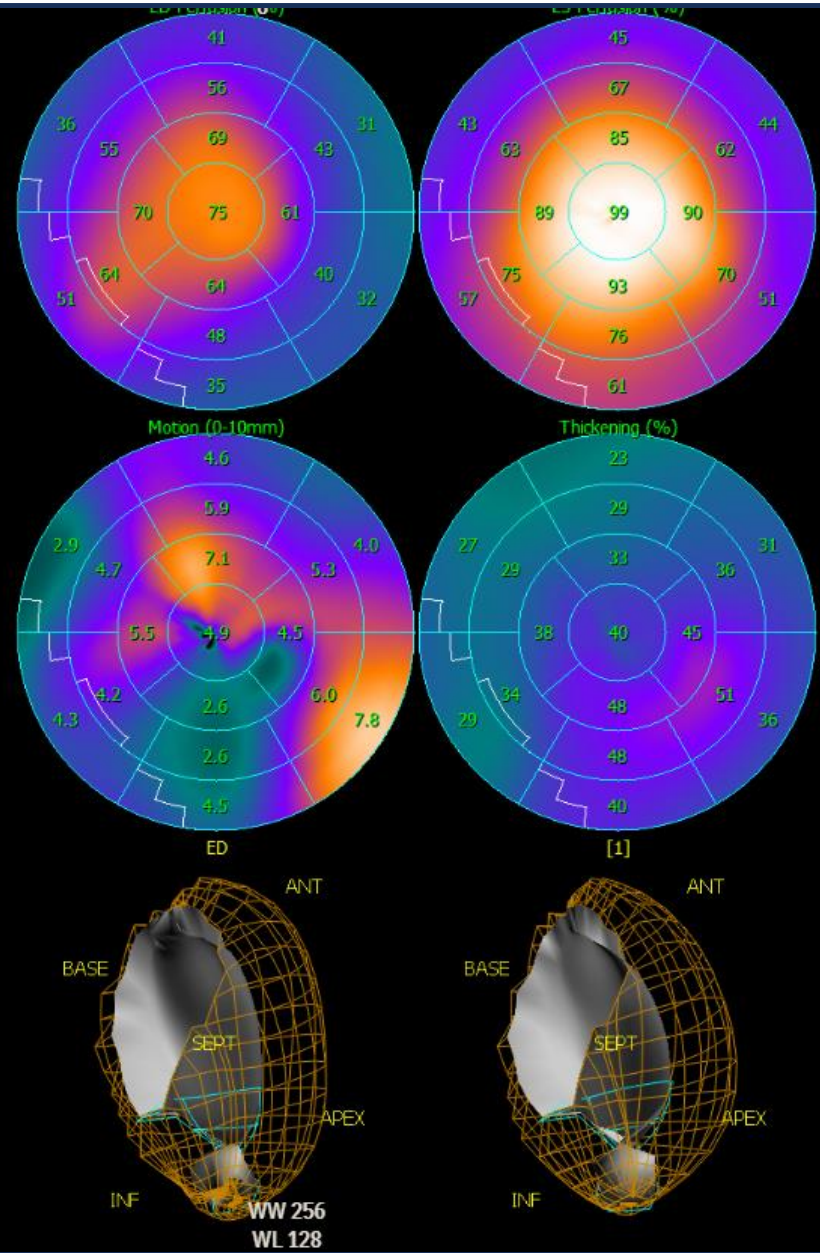




Case 3

92 y/o M with HFpEF,
LVH/abnormal strain, MDS





Sex	MALE	
Limits	DSPECT	
TID	---	
SMS	26	STS 19
SM%	31	ST% 37

Study Amyloid SPECT-HMDP_02~26~2026 11:51

Dataset RST1_U_HMDP_OS41

Date 2026-02-26 12:56:09

Warning Mask Failure: QC=11.87

Volume 9ml [1]

EDV 10ml [8]

ESV 3ml [4]

SV 8ml

EF 75%

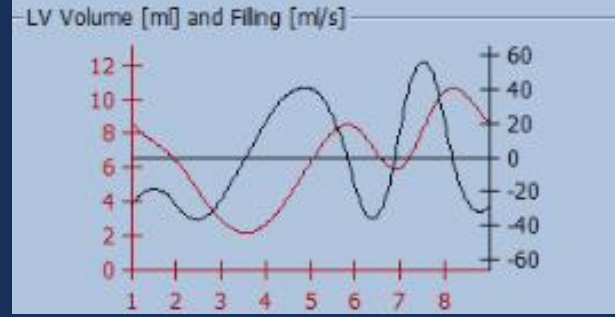
Mot Ext 72%, 29cm² [1]

Thk Ext 45%, 18cm² [1]

Shape 0.62 [SI ED], 0.45 [SI ES], 0.82 [Ecc 1]

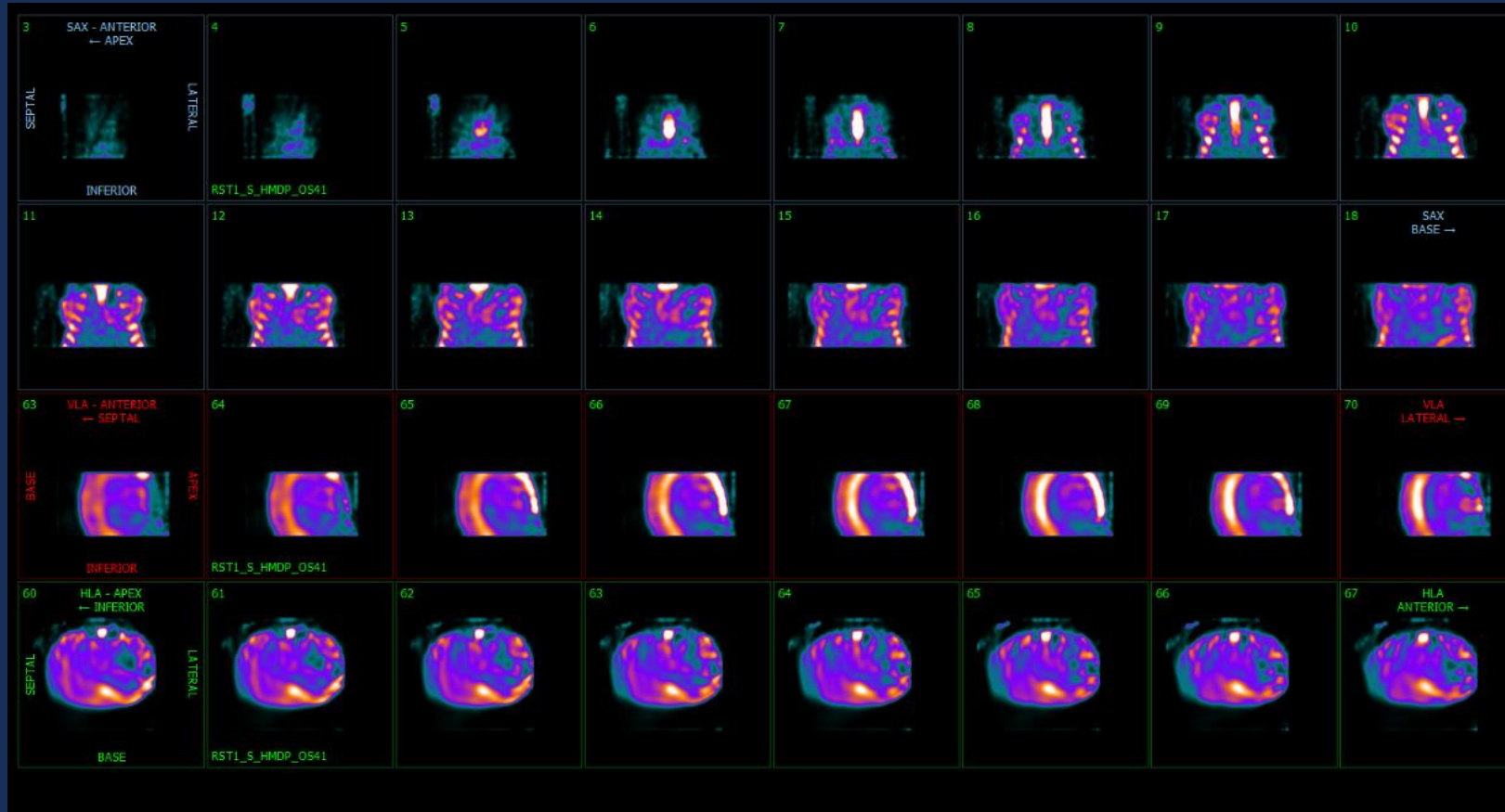
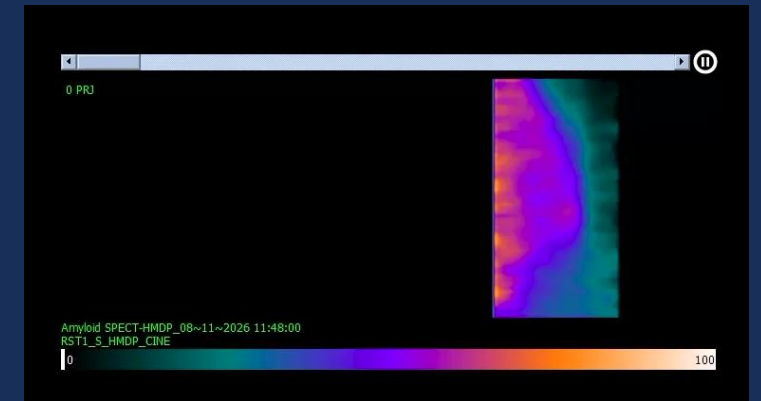
Matrix 128x128 x 55(z) x 8(t)

Mm/Vox 4.92 x 4.92 x 4.92

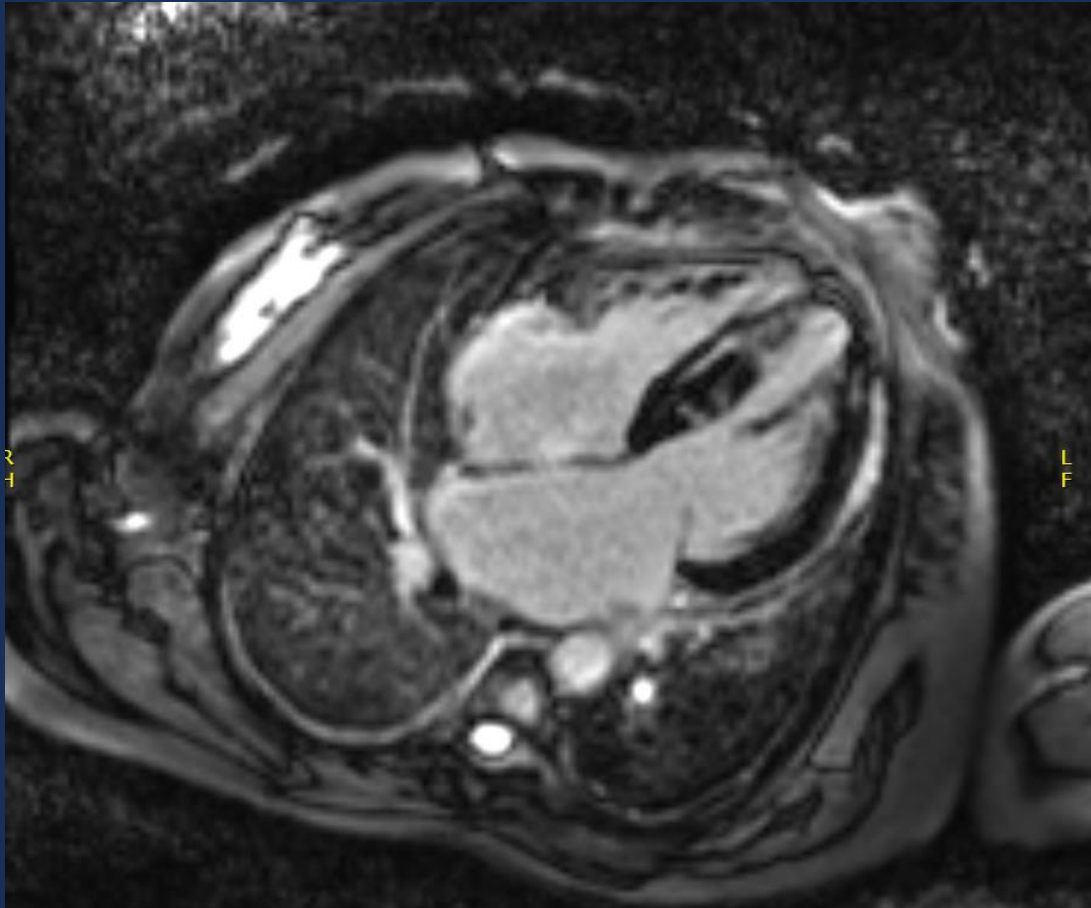
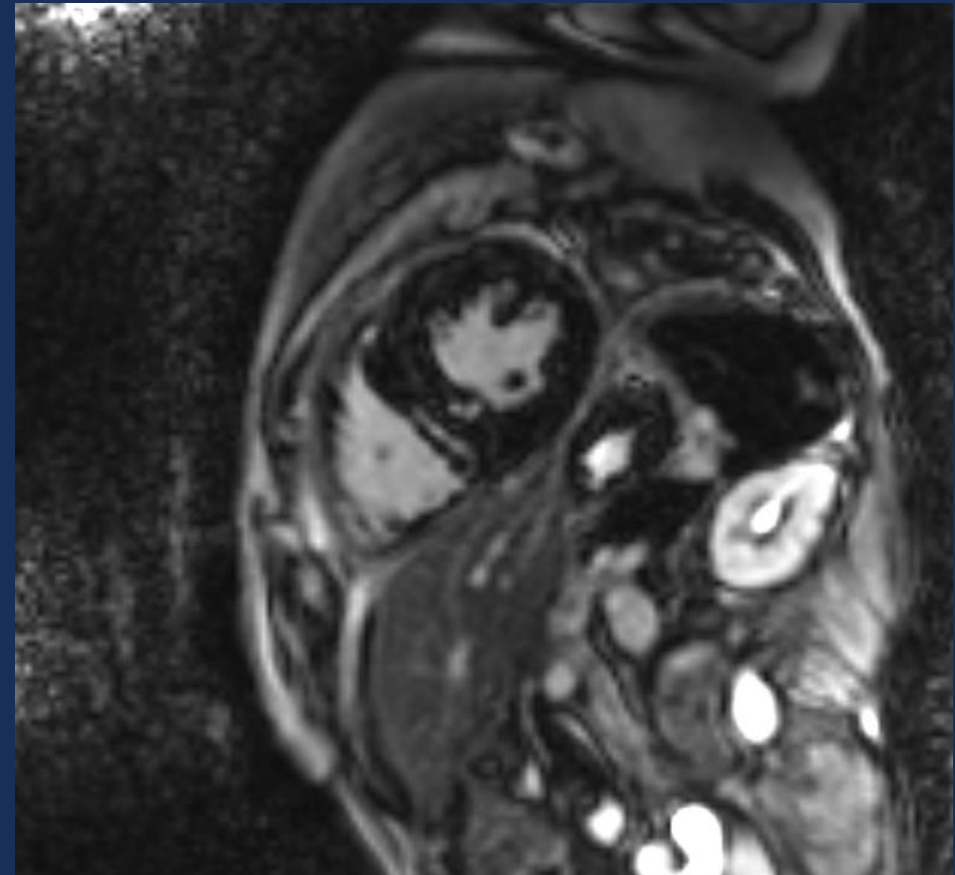


Kentucky
CHAPTER

Case 4



Case 4



What if you don't have CZT camera?



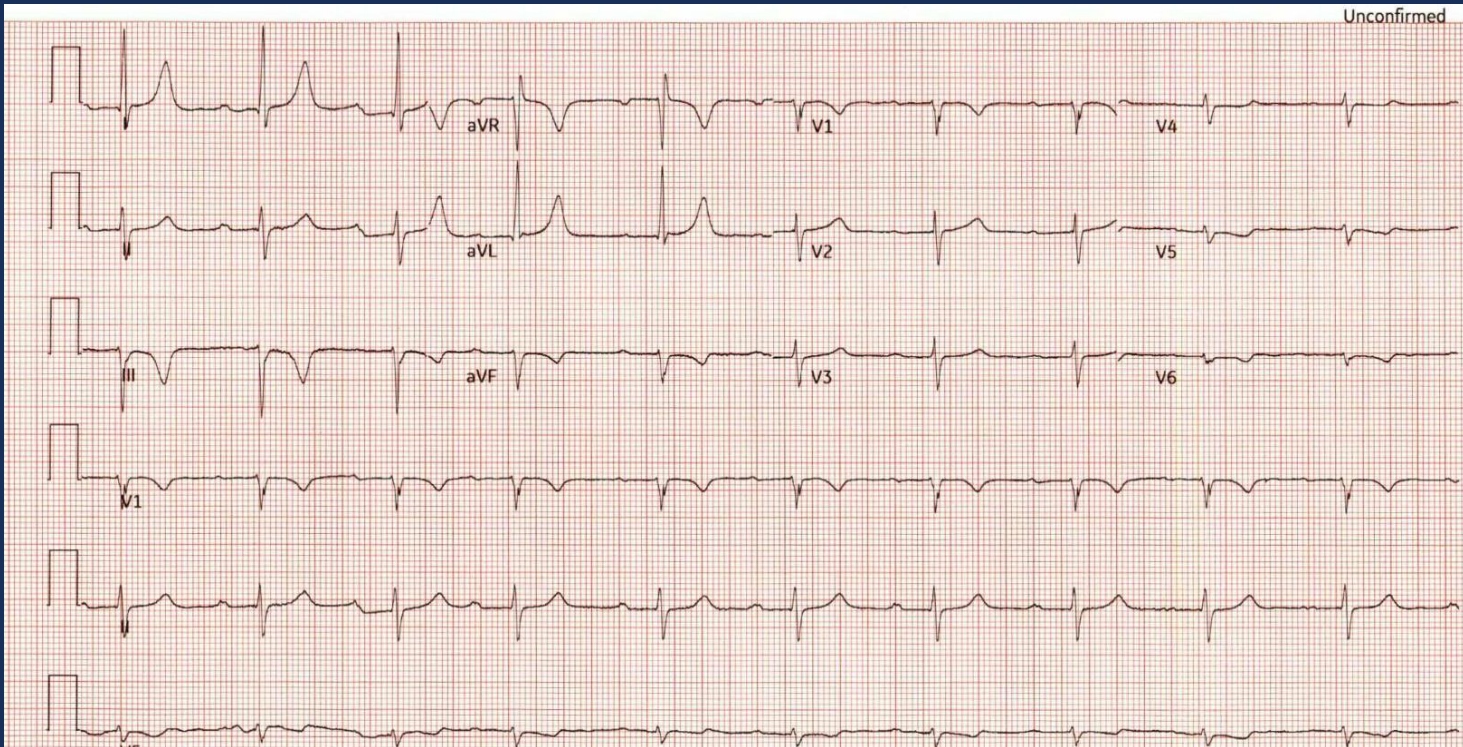
- Most sites use SPECT-CT camera
- Probably better (shhhh) especially with CT co-registration to confirm myocardial signal distribution

Case 5

87 y/o M with pulmonary fibrosis,
carpal tunnel referred for dyspnea

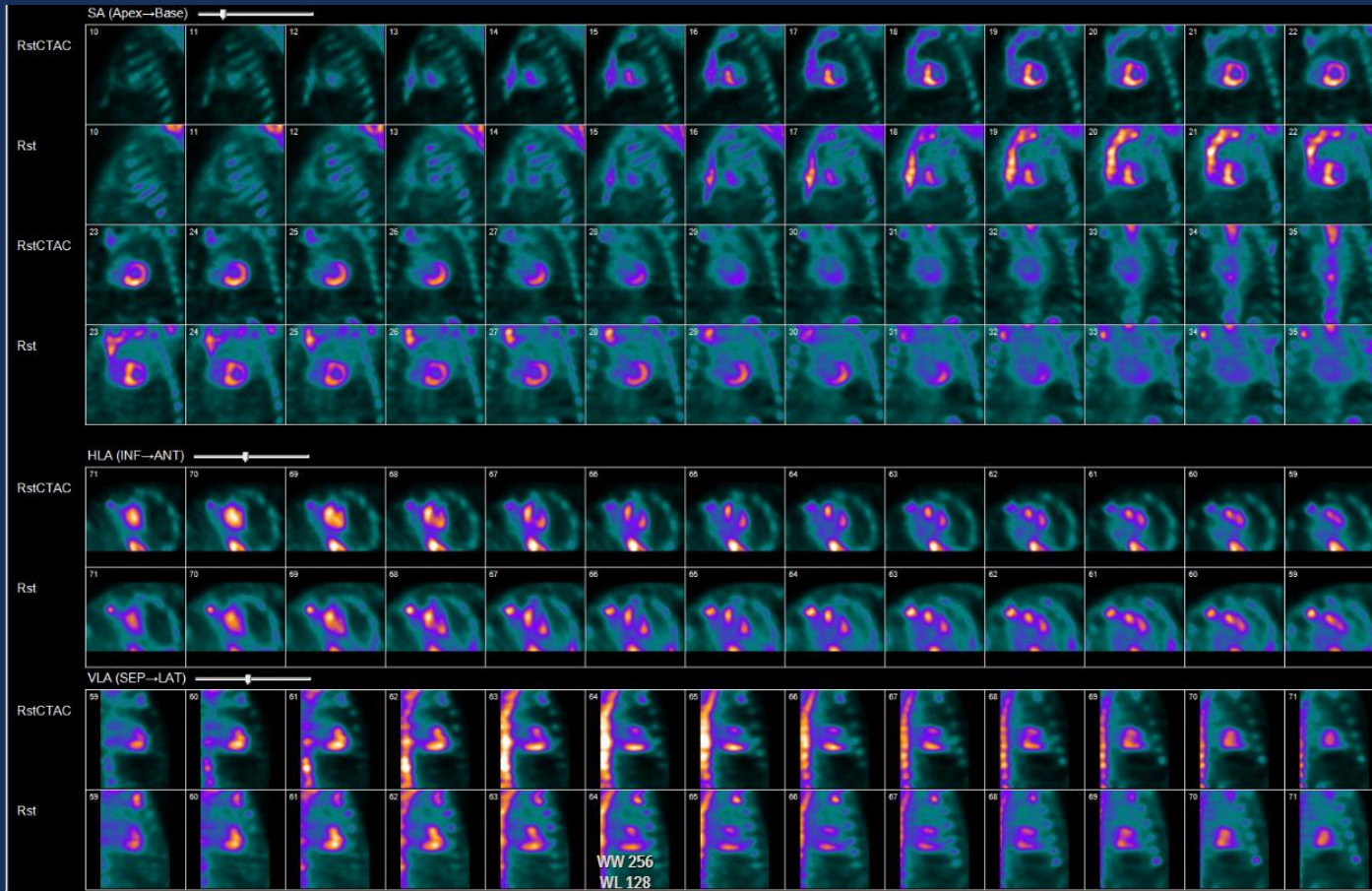
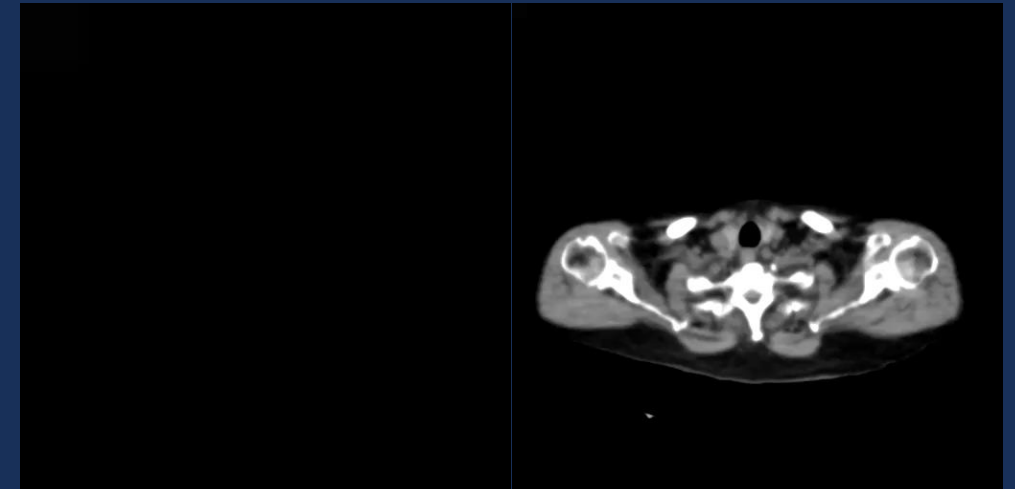
Echo showed normal EF, LVH

Cardiac MRI showed diffuse LGE



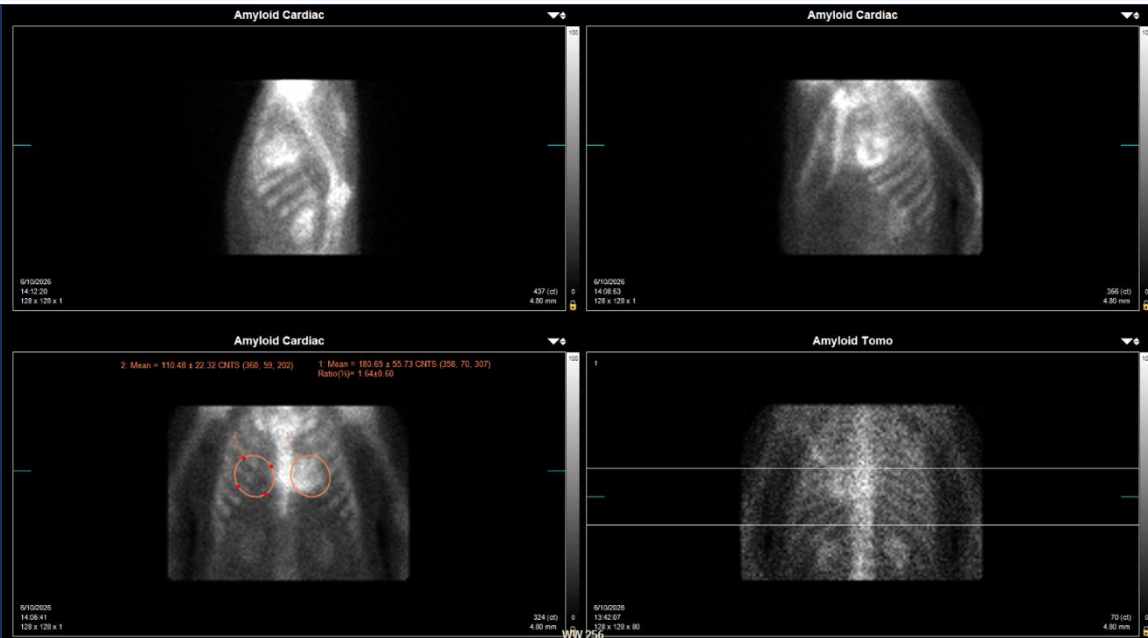
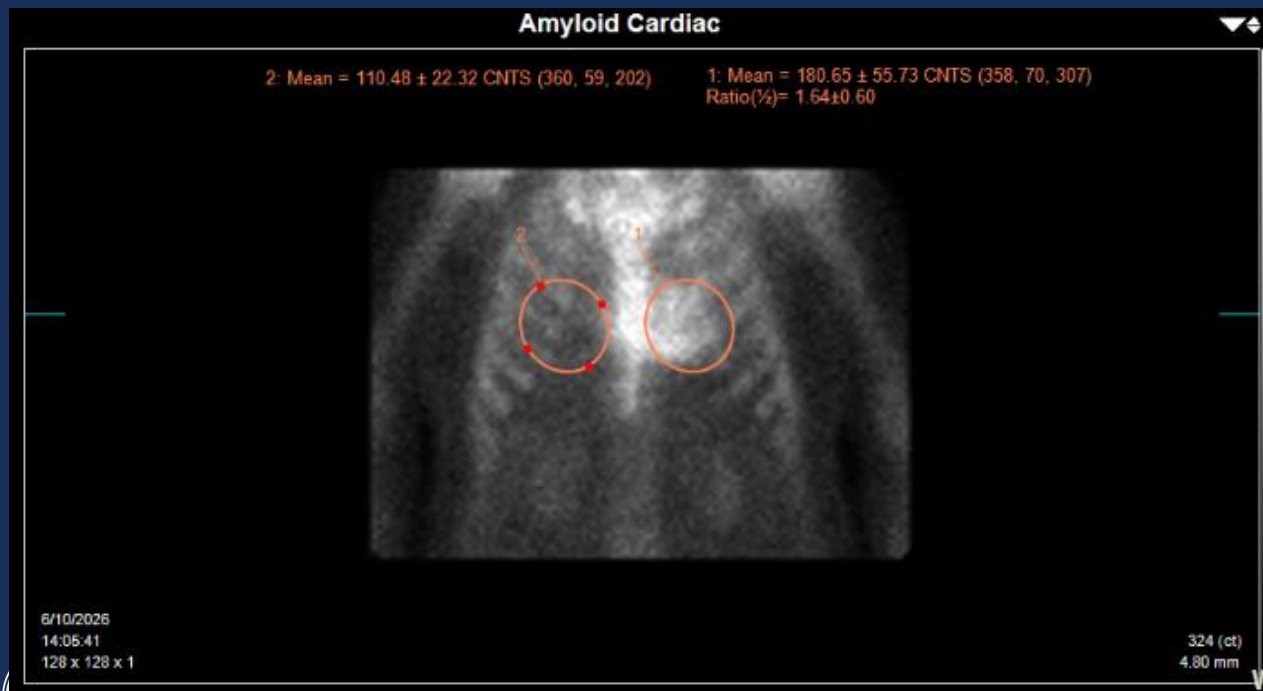
Case 5

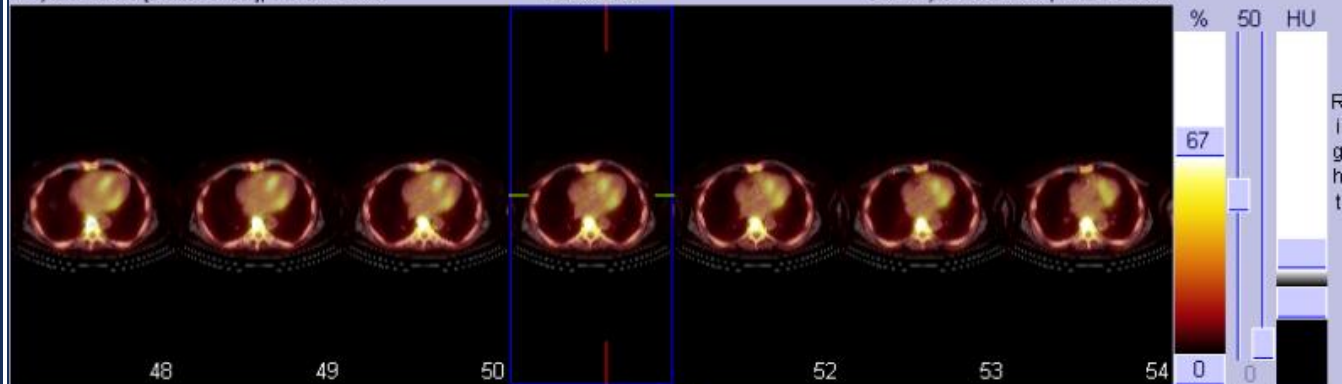
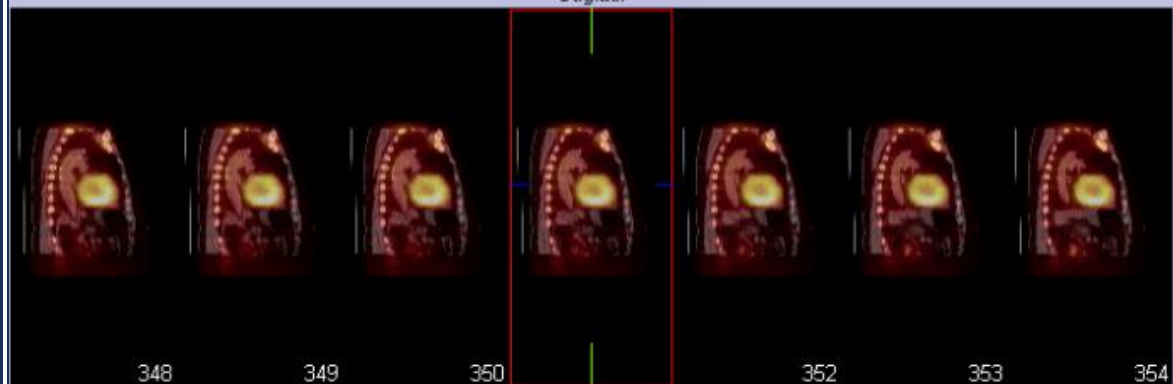
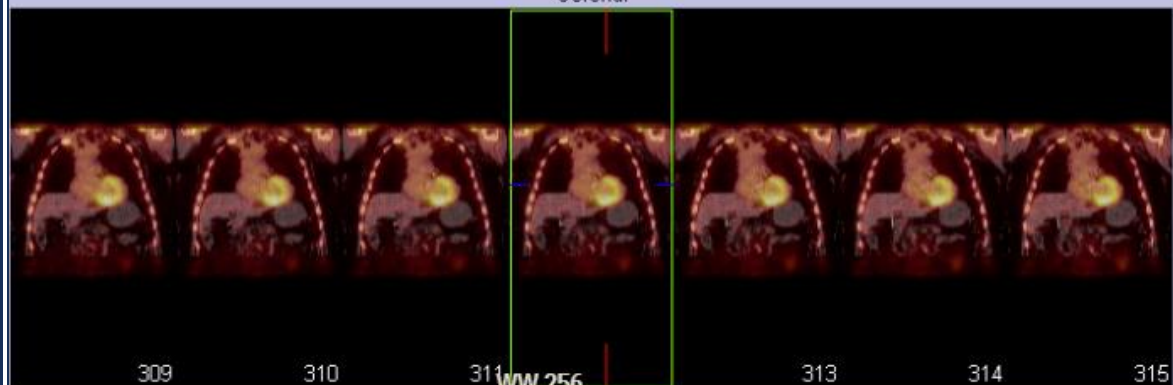
87 y/o M with pulmonary fibrosis,
carpal tunnel referred for dyspnea



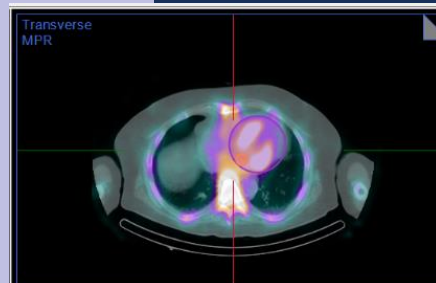
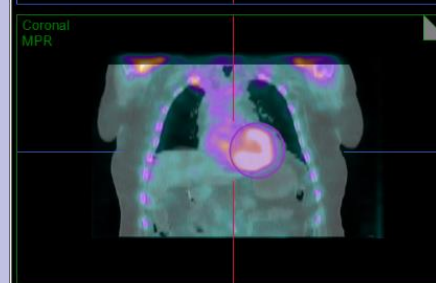
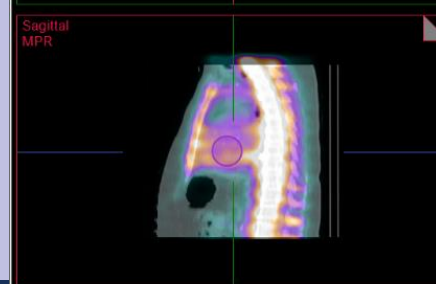
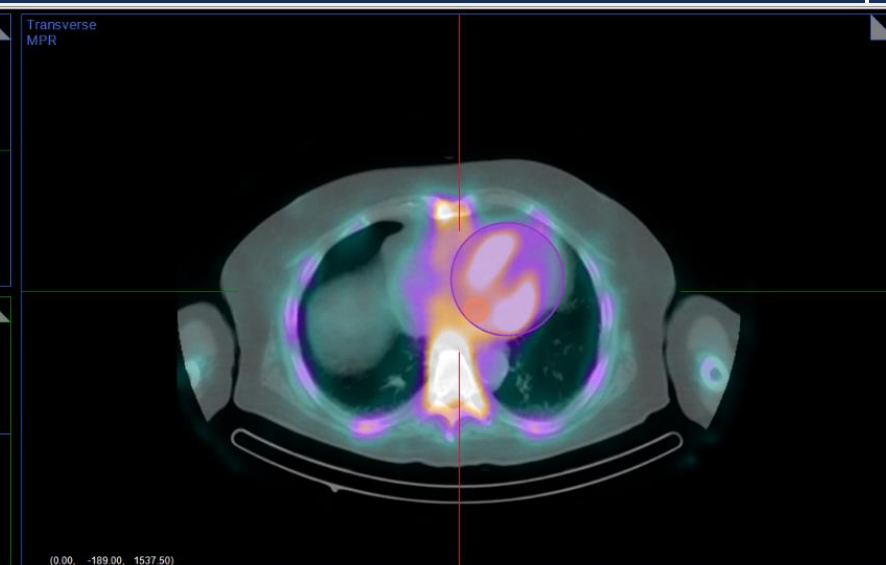
Case 5

H/CL ratio 1.6





Case 5



Volumetric ROI Results

Region	Units	Mean	StDv	Max	Volume
Blood pool	CNTS	3698.96	330.95	4110.00	2.98 ml
Heart	CNTS	3648.32	1709.14	8379.00	459.79 ml
Threshold		5548.44	CPV		CPA
			69.13 ml		121.18 ml

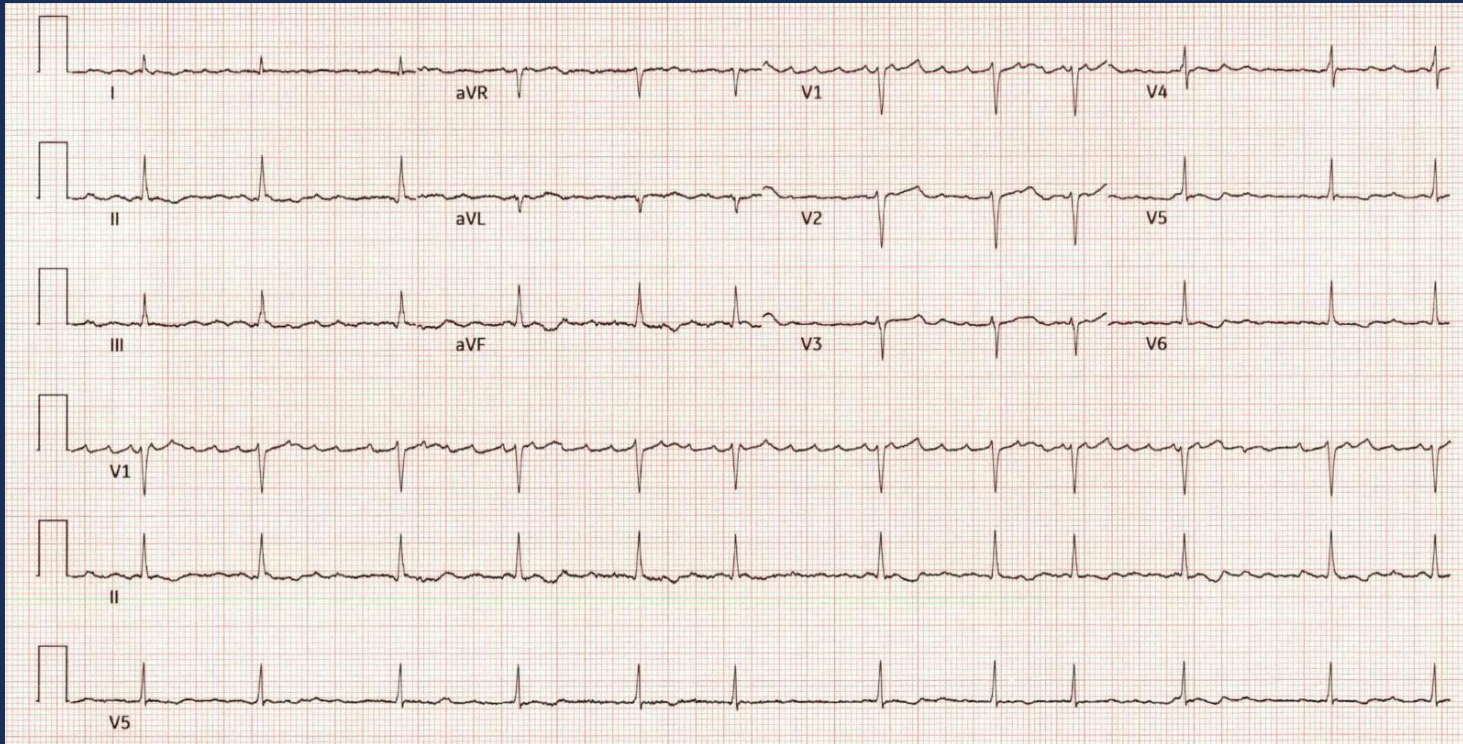
WW 256
WL 128

Case 6

76 y/o M with Afib, hx of PE,
spinal stenosis

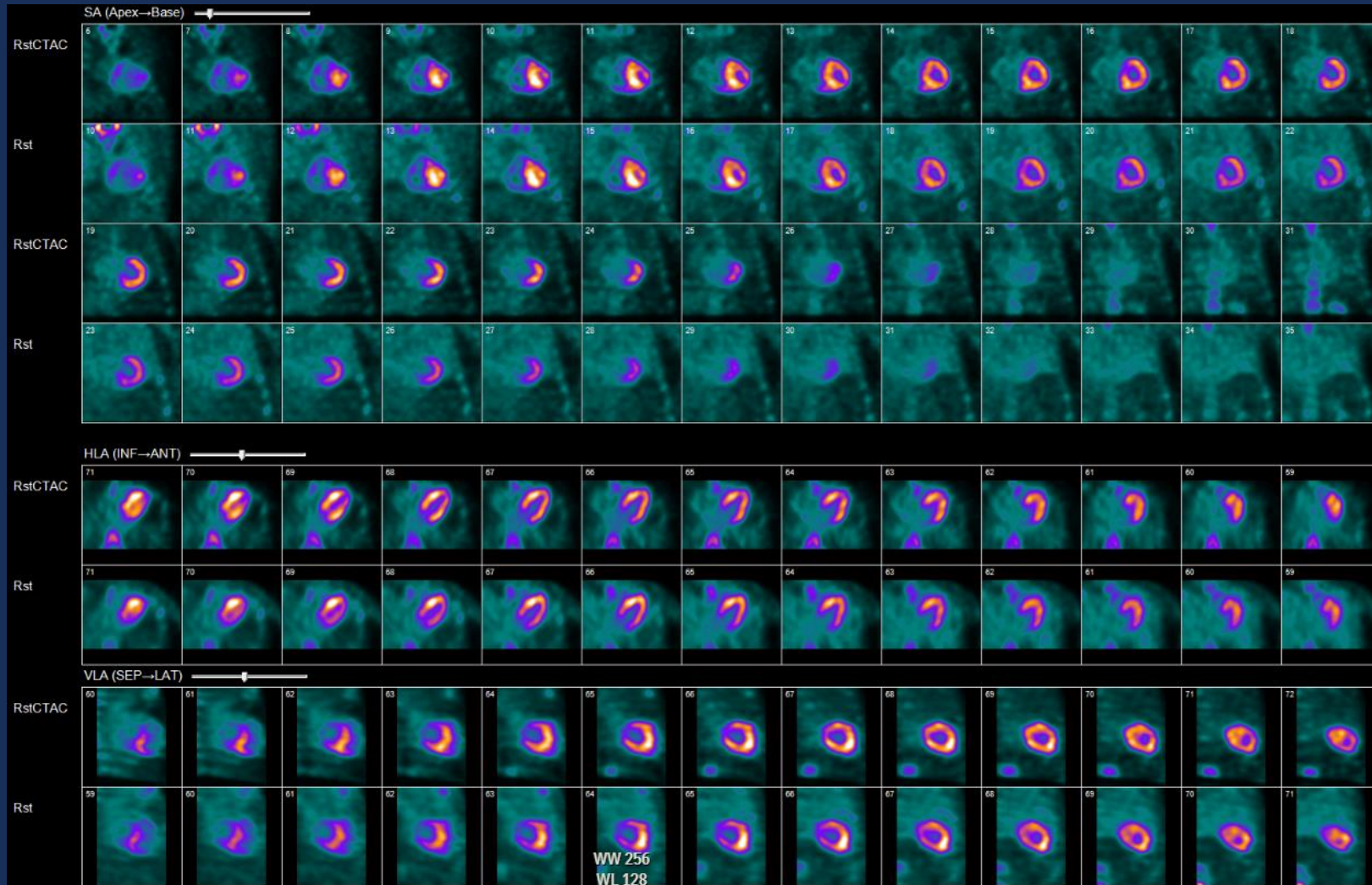
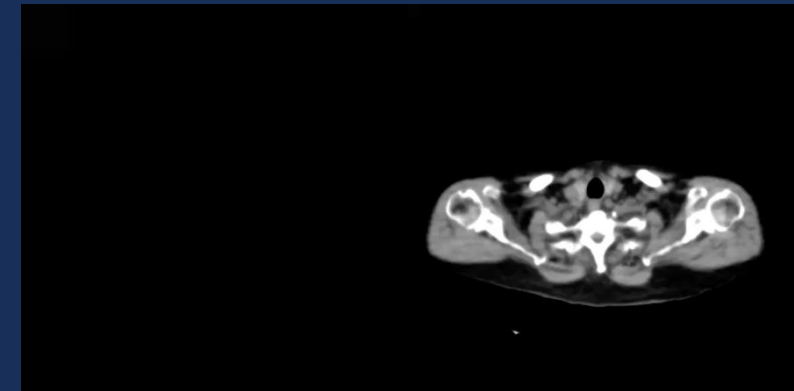
Echo showed LVEF 55-60%,
severe concentric LVH, GLS -13%

Cardiac MRI showed diffuse LGE



Case 6

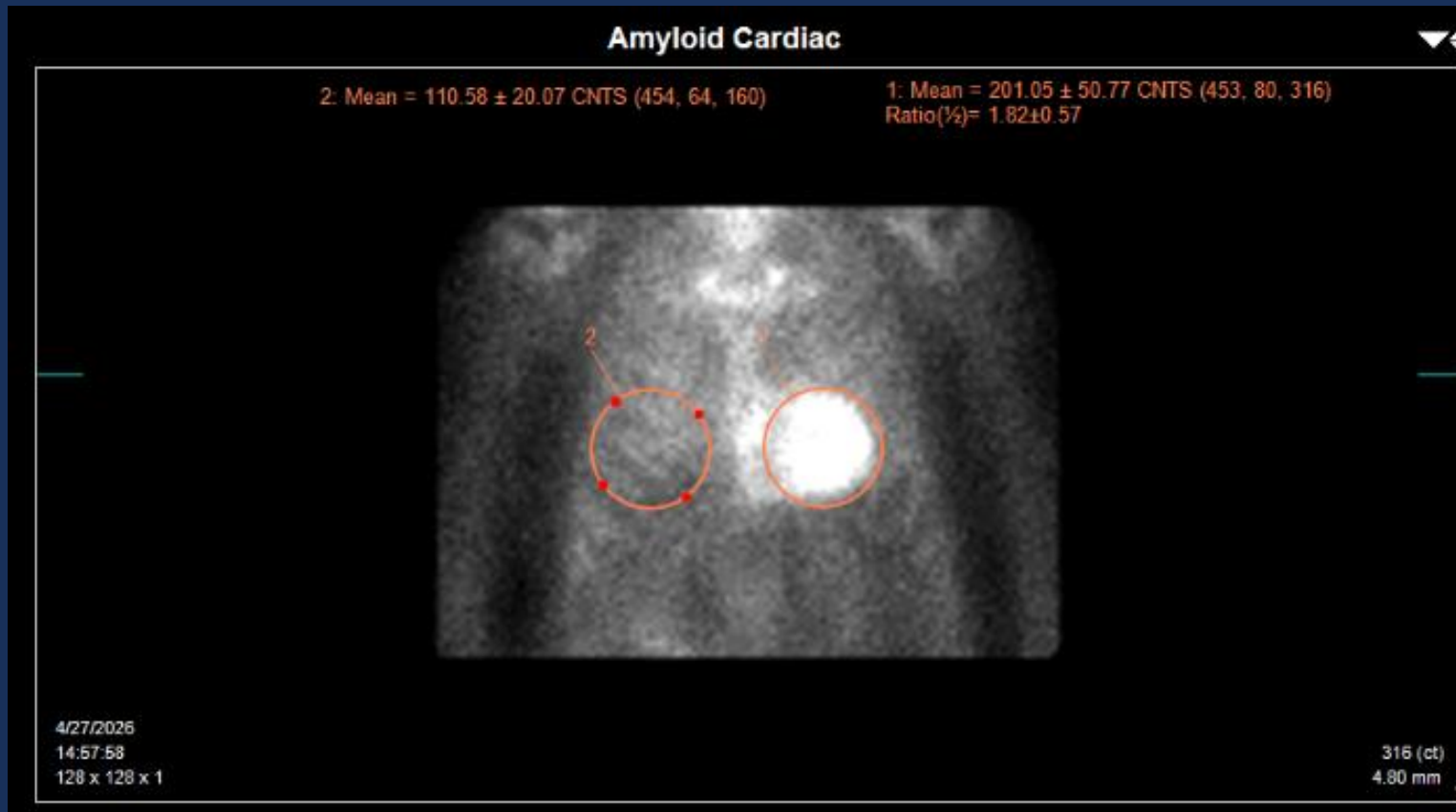
76 y/o M with Afib, hx
of PE, spinal stenosis



Case 6

76 y/o M with Afib, hx
of PE, spinal stenosis

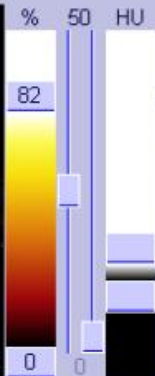
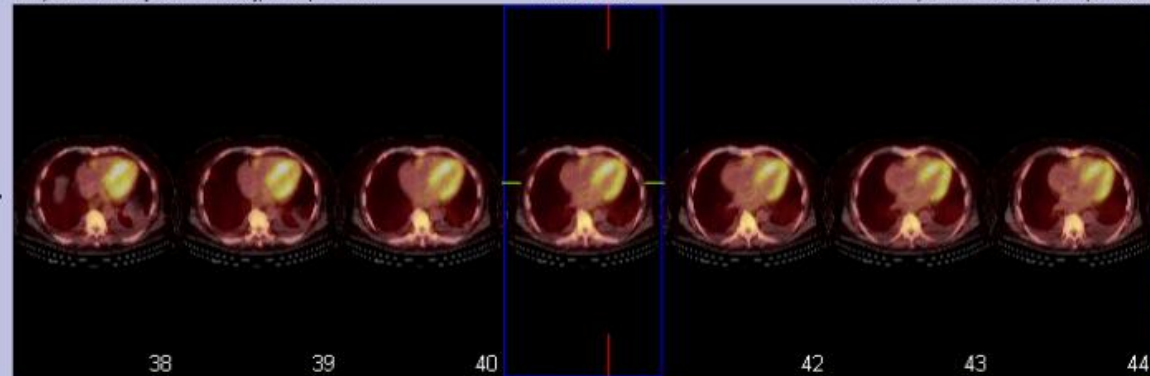
H/CL ratio 1.8



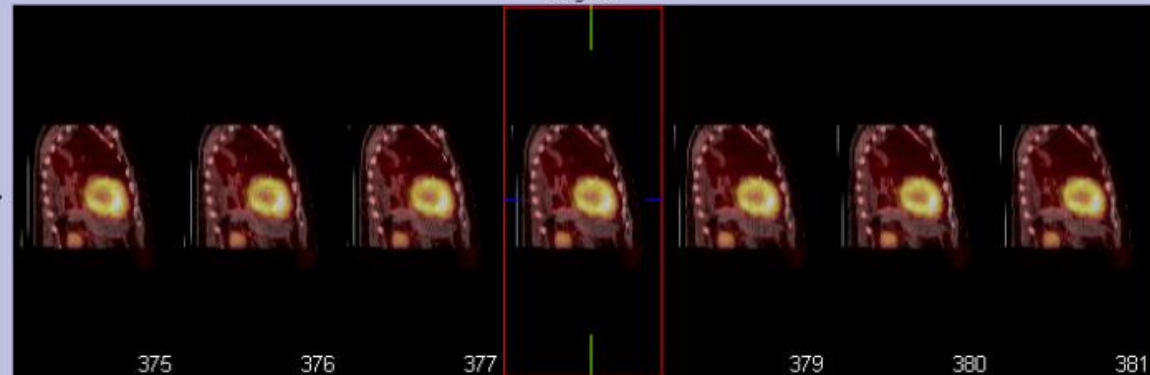
Amyloid Tomo [Recon - AC], 27-Apr-2026

Transverse

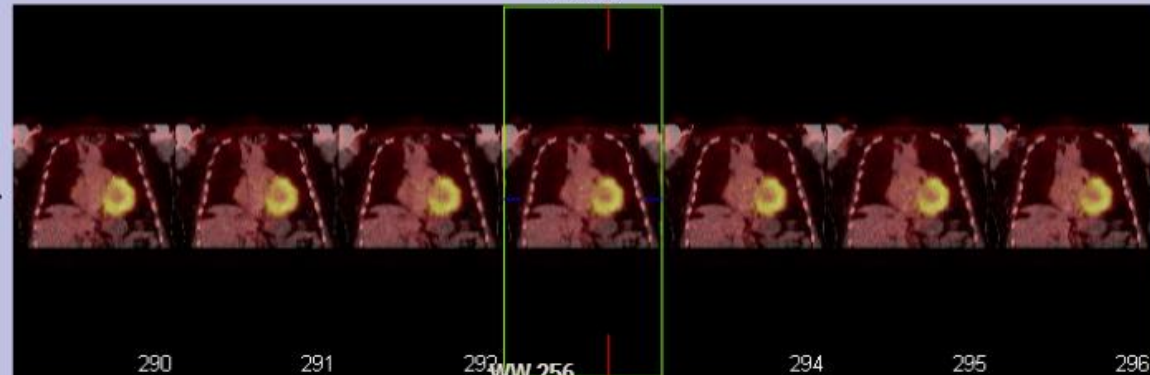
3D Amyloid3.0 B31 s, 27-Apr-2026



Sagittal



Coronal



Case 6

76 y/o M with Afib, hx of PE, spinal stenosis



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CHAPTER

What's on the horizon?

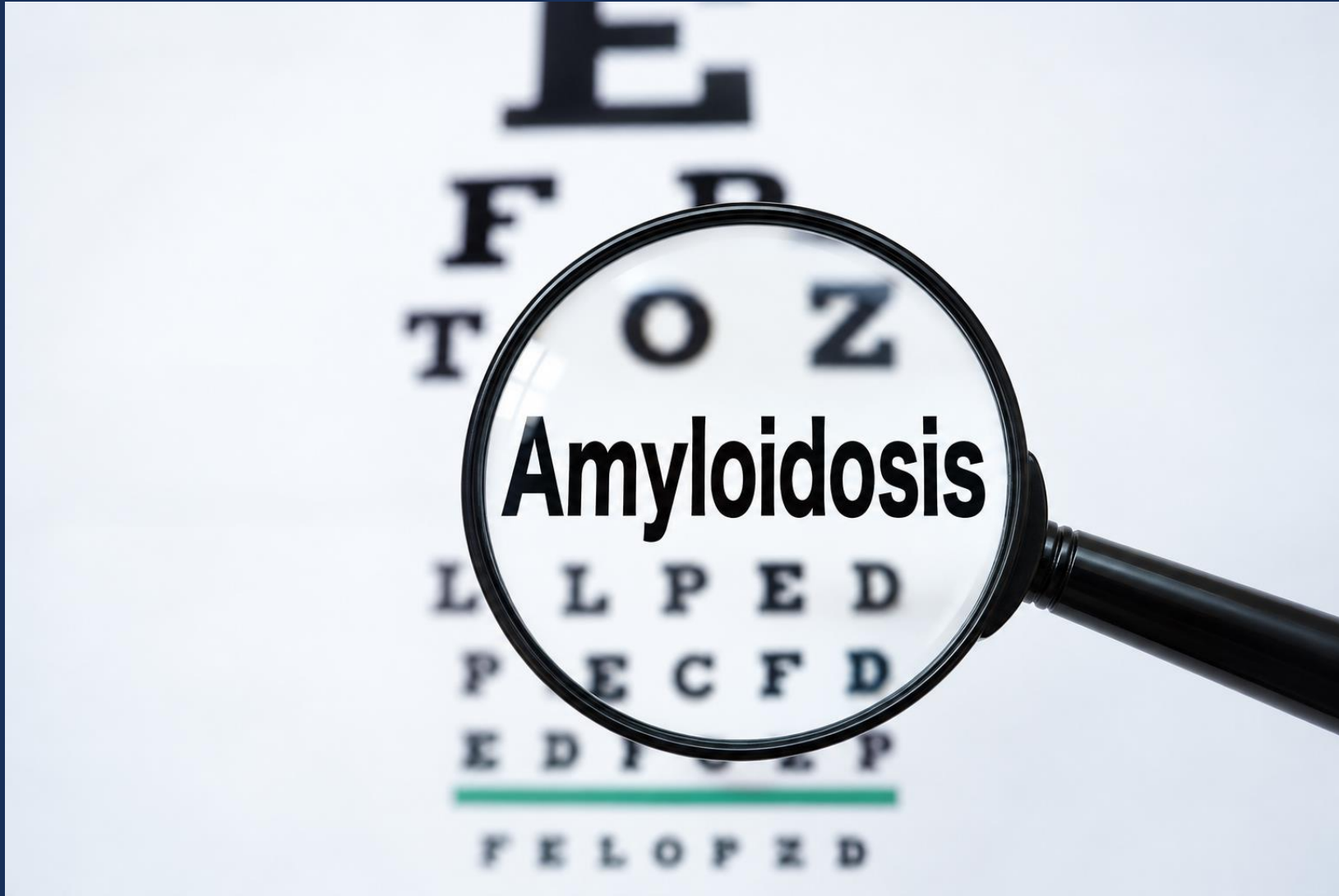
- Novel radiotracers in development with pan-amyloid sensitivity:
 - Use of synthetic peptide p5*14 for radio-labeling with I^{124} or Tc^{99m} to generate either PET tracer (I^{124} evuzamitide) or SPECT tracer
 - Aim to detect both AL and ATTR amyloidosis (and other more rare forms of amyloidosis)
- 94% sensitivity and 86% specificity per published data from phase 3 REVEAL study
- Detect early asymptomatic cases, assess amyloid burden, and explore serial bone scintigraphy to monitor response to therapy



How to win the battle against cardiac amyloidosis?

- Beyond technology, there needs to be a shift in philosophy
- Per ASNC:
 - Step 1: Think amyloid
 - Step 2: Talk amyloid
 - Step 3: Raise public awareness
- Seeing is believing → imagers have a big role in this fight.





Credit: ChatGPT :)



Kentucky
CHAPTER

OCTOBER 17, 2026 • LOUISVILLE MARRIOTT EAST • LOUISVILLE, KY

Questions?





Thank you!



- [Dong Bo Yu, MD. PhD, FACC](#)
- [Robert Evers, RDCS, FASE](#)
- [3900 Kresge Way Suite 60](#)
- [857-998-1762 \(cell\)](#)
- Dongbo.yu@bhsi.com
- Dongboyu21st@gmail.com



Cardiac Amyloid Echo Findings

KY ACC 2026

Robert Evers RDCS,FASE

+

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Disclosures

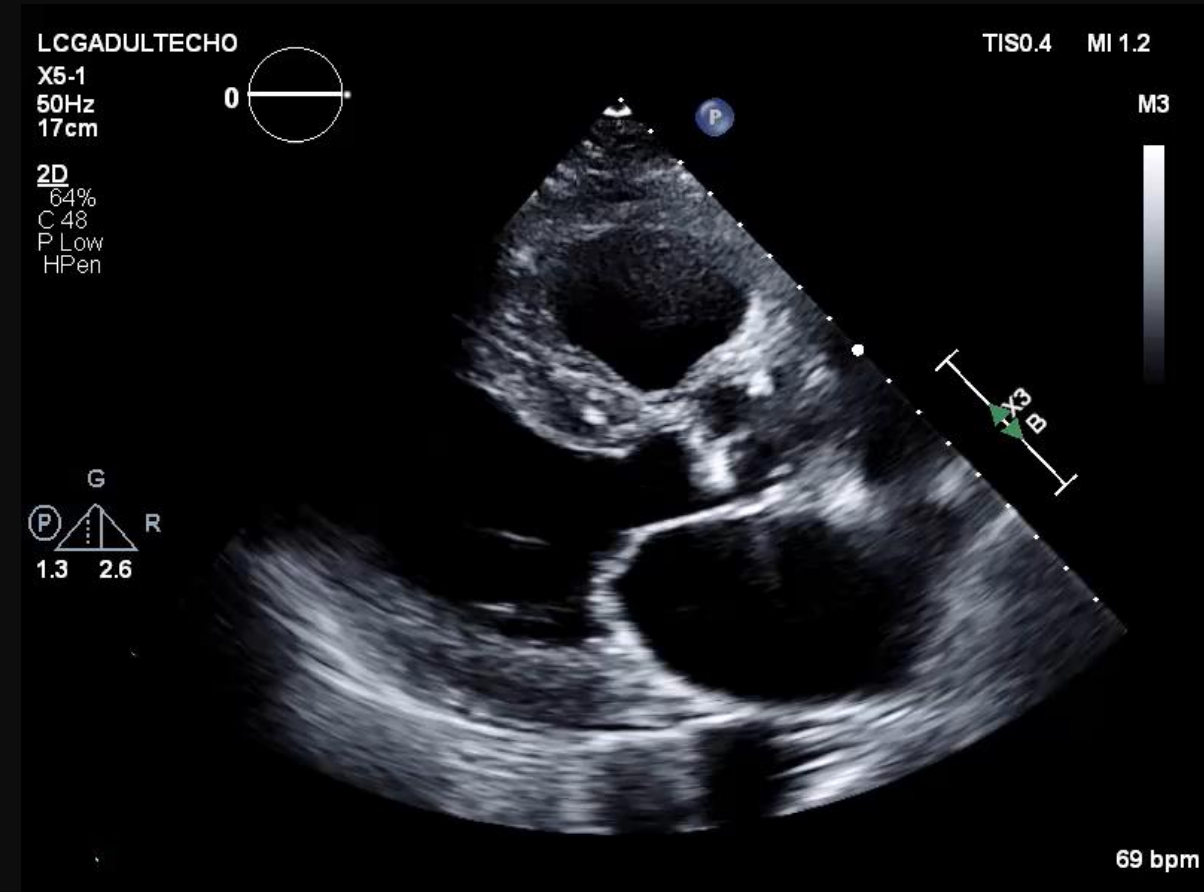
- I serve as a speaker/consultant for Bristol Myers Squibb. The content of this presentation is my own and is not related to, sponsored by, or endorsed by Bristol Myers Squibb

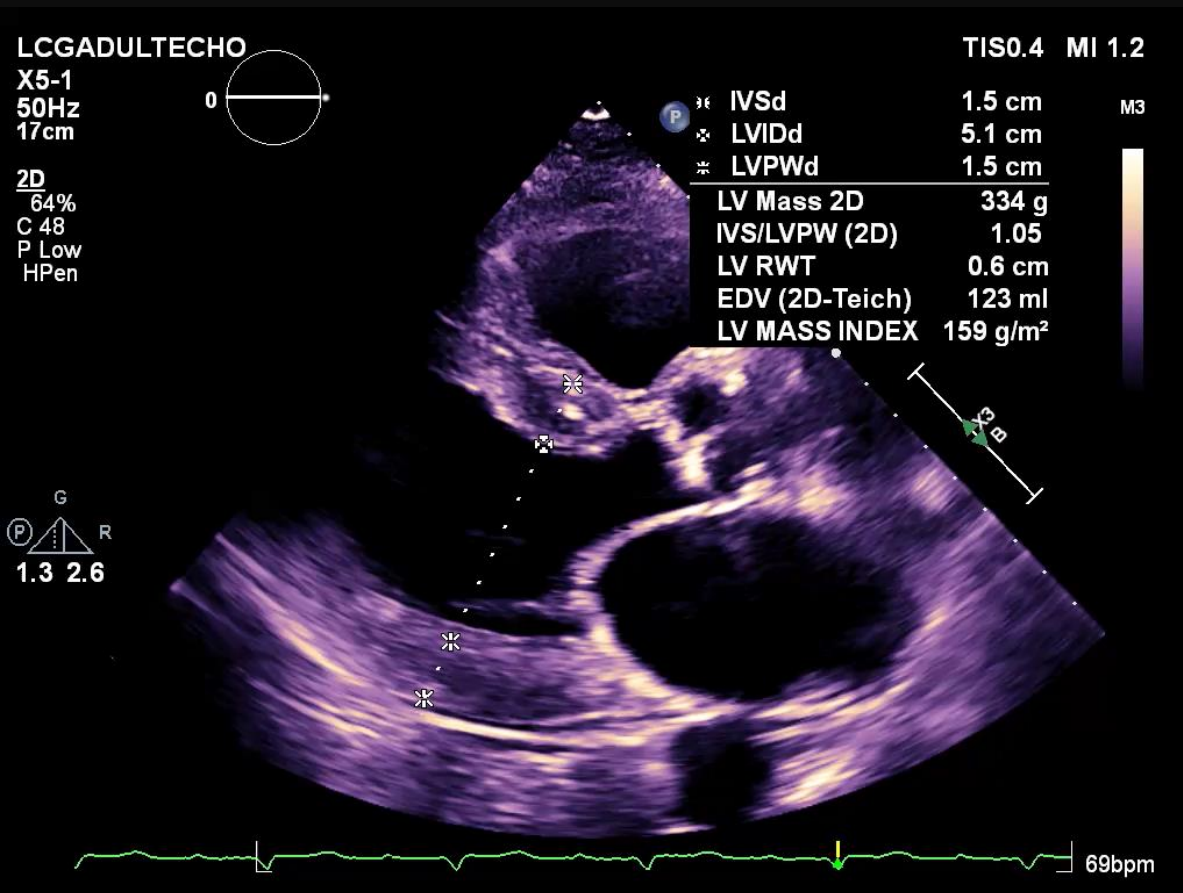
Case 1

- 83-year-old male with newly diagnosed HFrEF in August 2026 who presented to general cardiology with progressively worsening shortness of breath, fatigue, and lower extremity edema over several weeks to months. His cardiovascular risk factors include hypertension and a history of tobacco use as a former smoker.

Parasternal Long axis

- Increased Wall Thickness
- LV Speckled Appearance
- LAE
- Small Pericardial Effusion
- EF Reduced but may be normal in early disease
- Low ECG Voltage





2D LV measurment

- Confirming increased LV Wall Thickness



Parasternal Short Axis AV

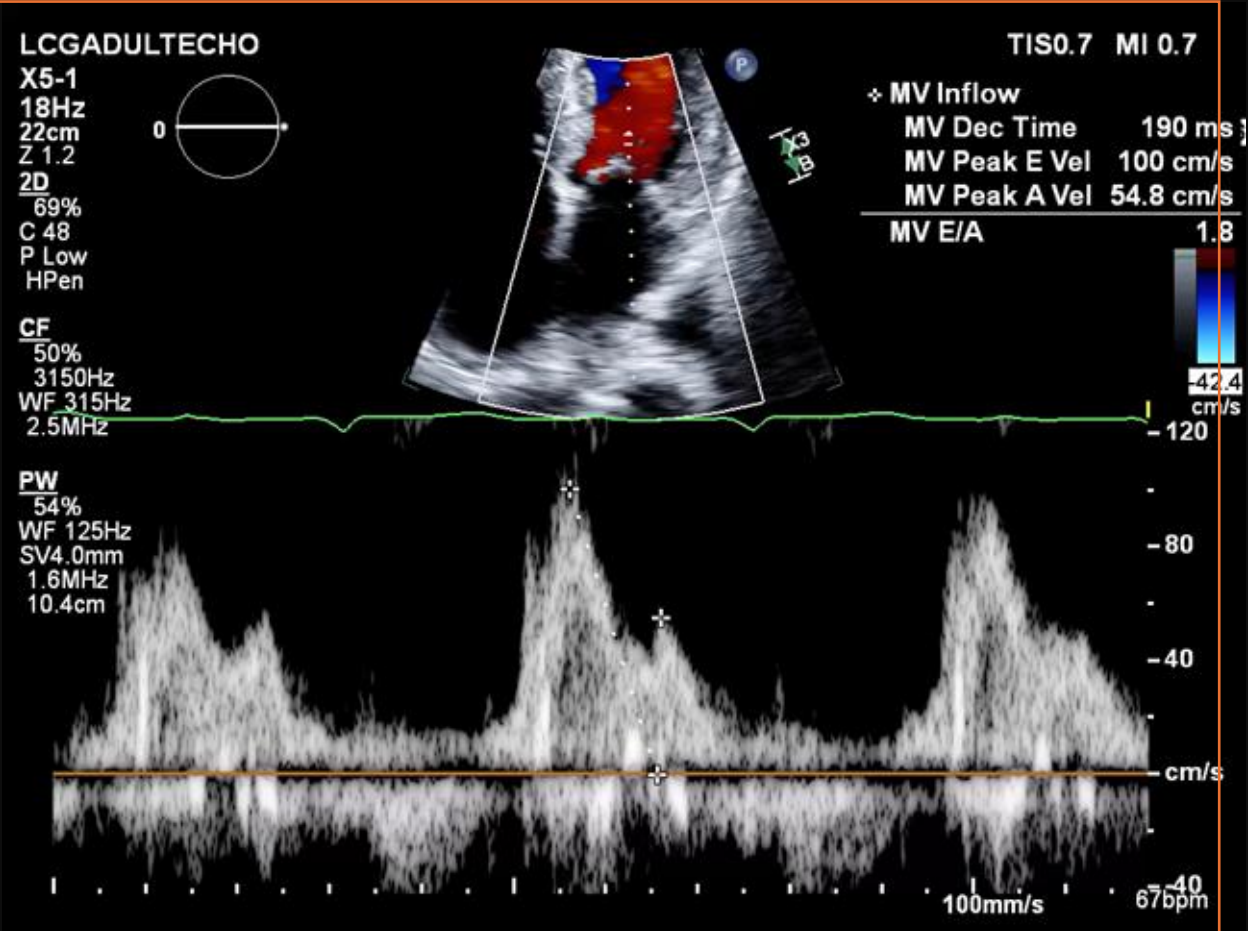
Confirming Calcified Aortic Valve Without Stenosis



Apical 4 Chamber

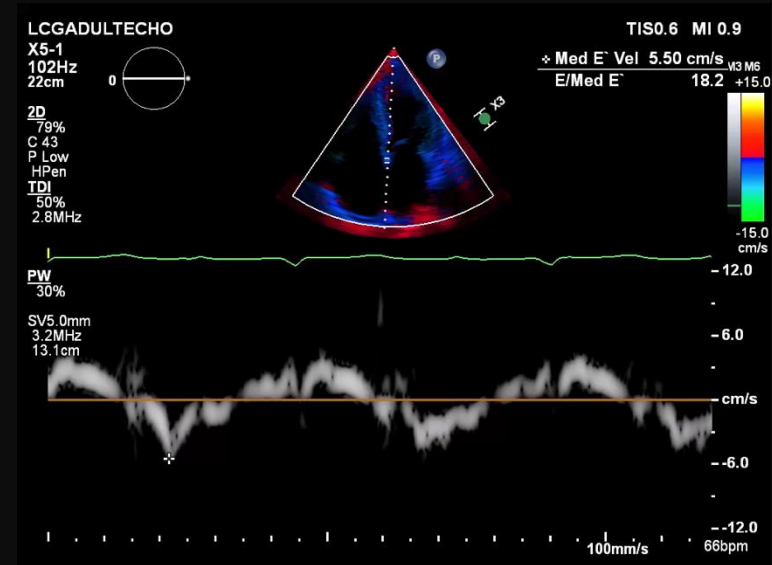
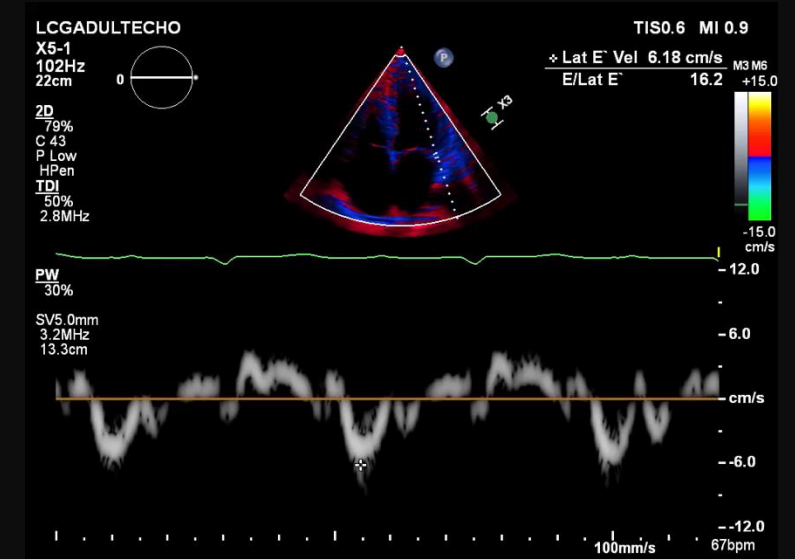
- Biatrial Enlargement
 - Increased Ventricular Wall Thickness
 - Granular Myocardial Appearance
-

PW Leaflet Tips



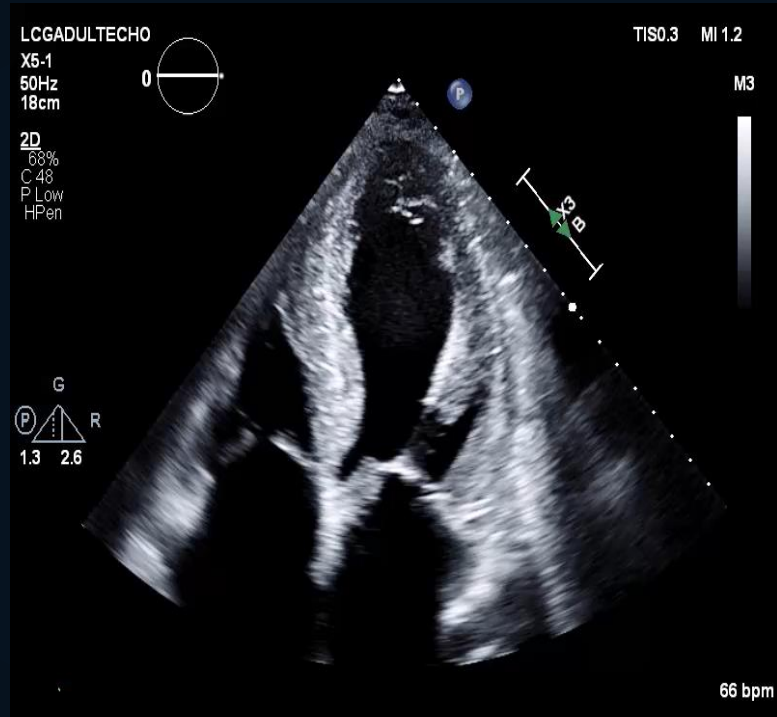
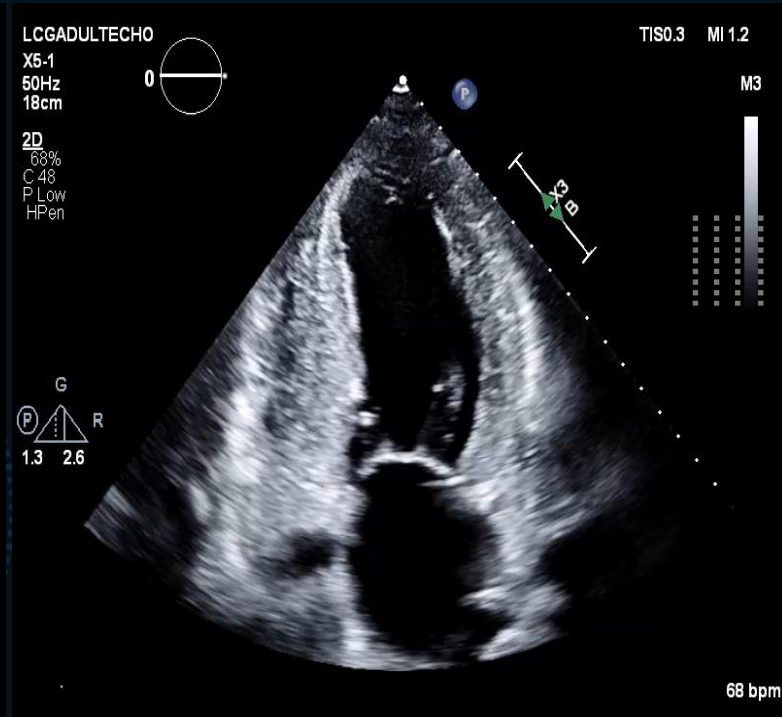
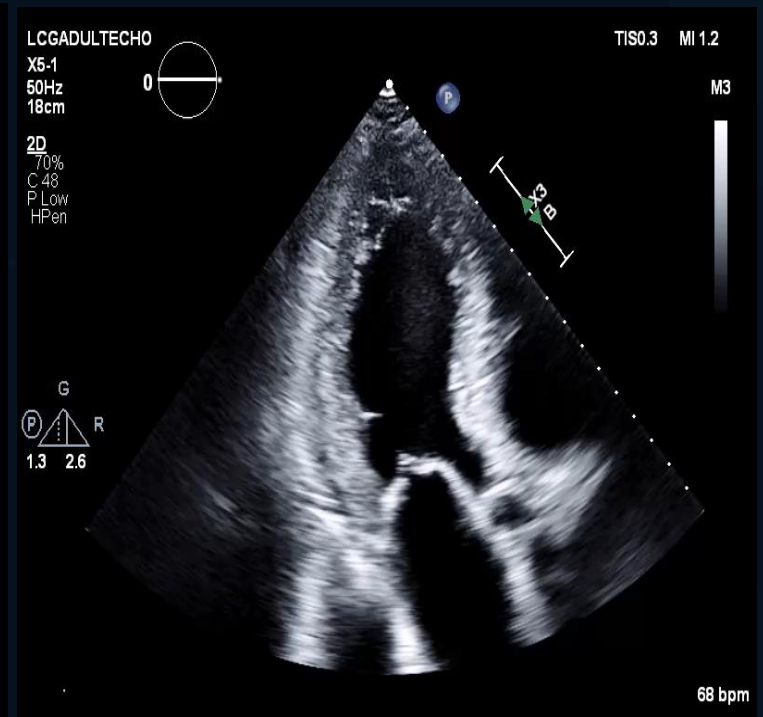
Tissue Doppler

- Reduced Medial and Lateral velocities with increased E/e' ratio
- Avg E/e' 17



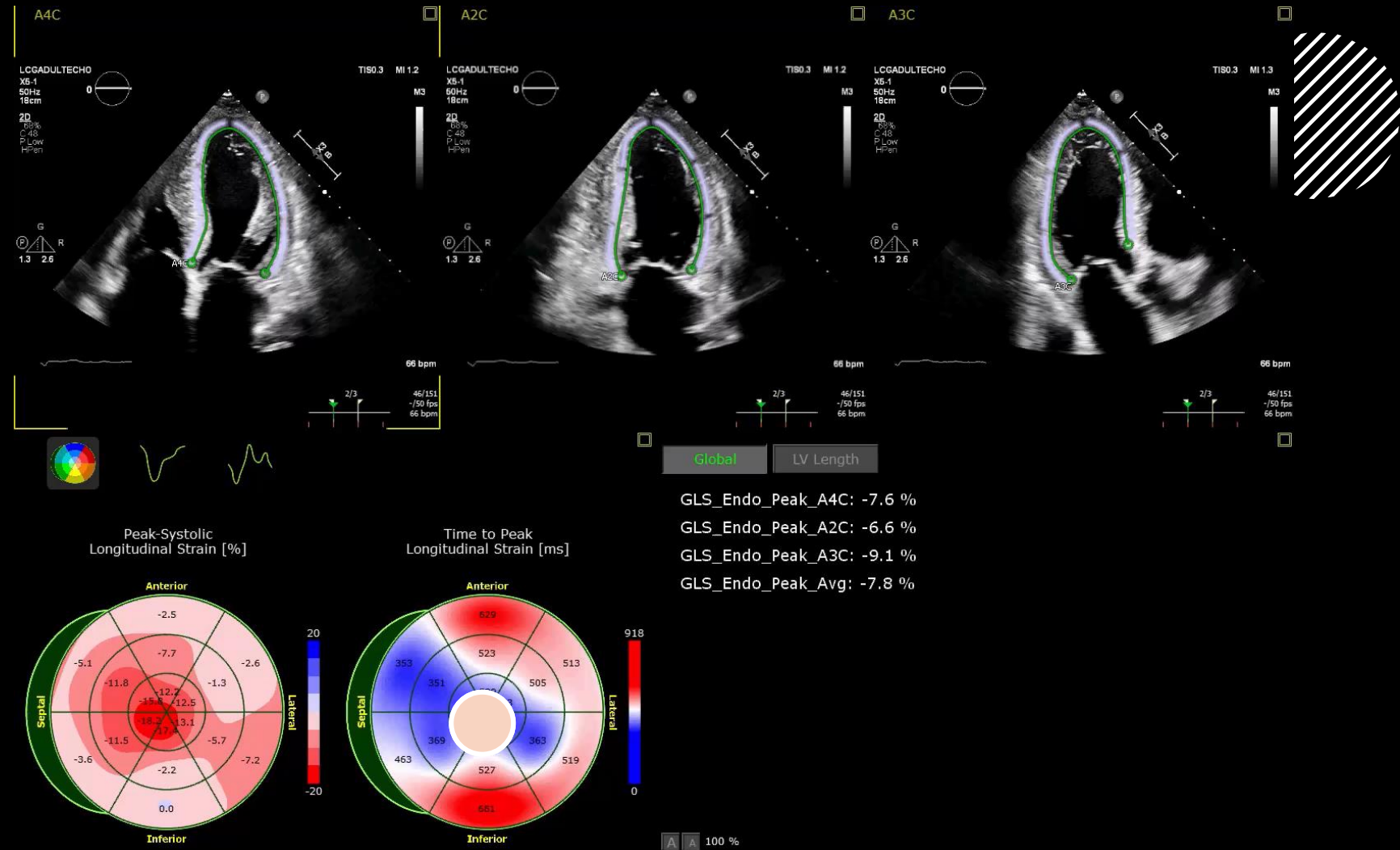
LV Focus Views for EF and GLS

- Taken in consecutive Images
- Adjust Depth



GLS

- Apical sparing
- Cherry on top



PYP Imaging Procedure

PYP Findings The image quality of the study was excellent. Semi-quantitative (visual grading by Perugini classification) of myocardial uptake by comparison to rib uptake was grade 3 (cardiac uptake greater than rib uptake with mild/absent rib uptake). . The study is suggestive of ATTR cardiac amyloidosis.

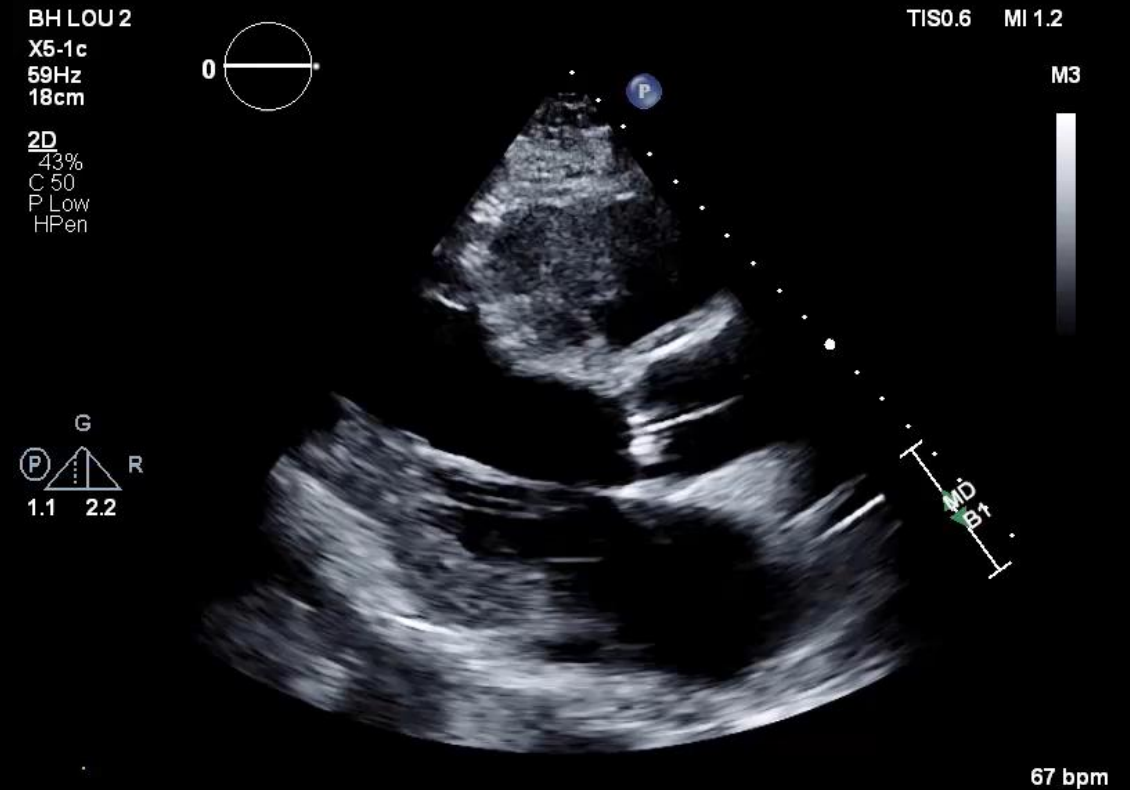
PYP

Case 2

- 72-year-old male with a past medical history significant for coronary artery disease, heart failure with reduced ejection fraction (HFrEF), diabetes mellitus, hypertension, and hyperlipidemia who presented to the hospital with progressively worsening shortness of breath, primarily with exertion. He also reports orthopnea.

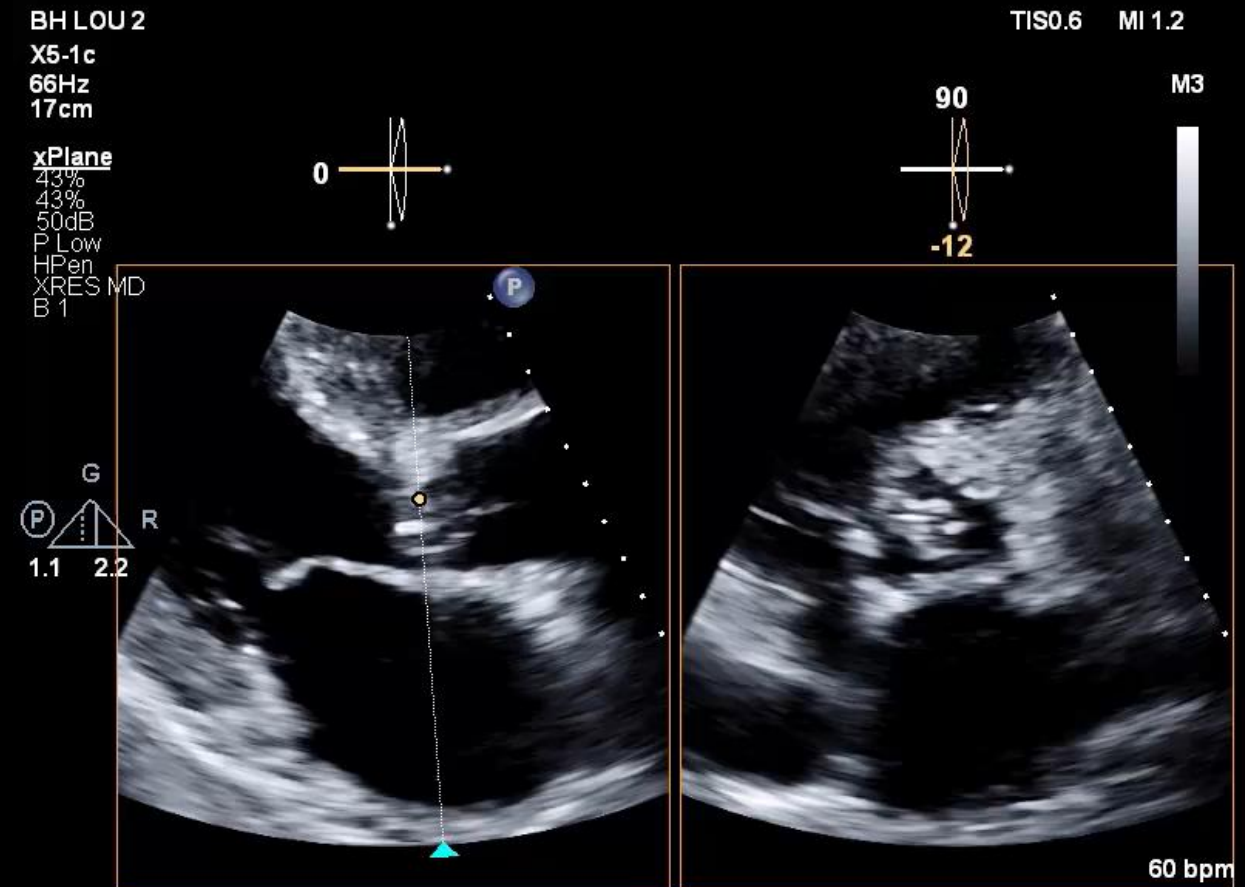
PLAX

- Reduced LV Systolic Function
- Increased LV thickness
- Left Atrial Enlargement
- Granular Myocardial Appearance
- EKG RBB



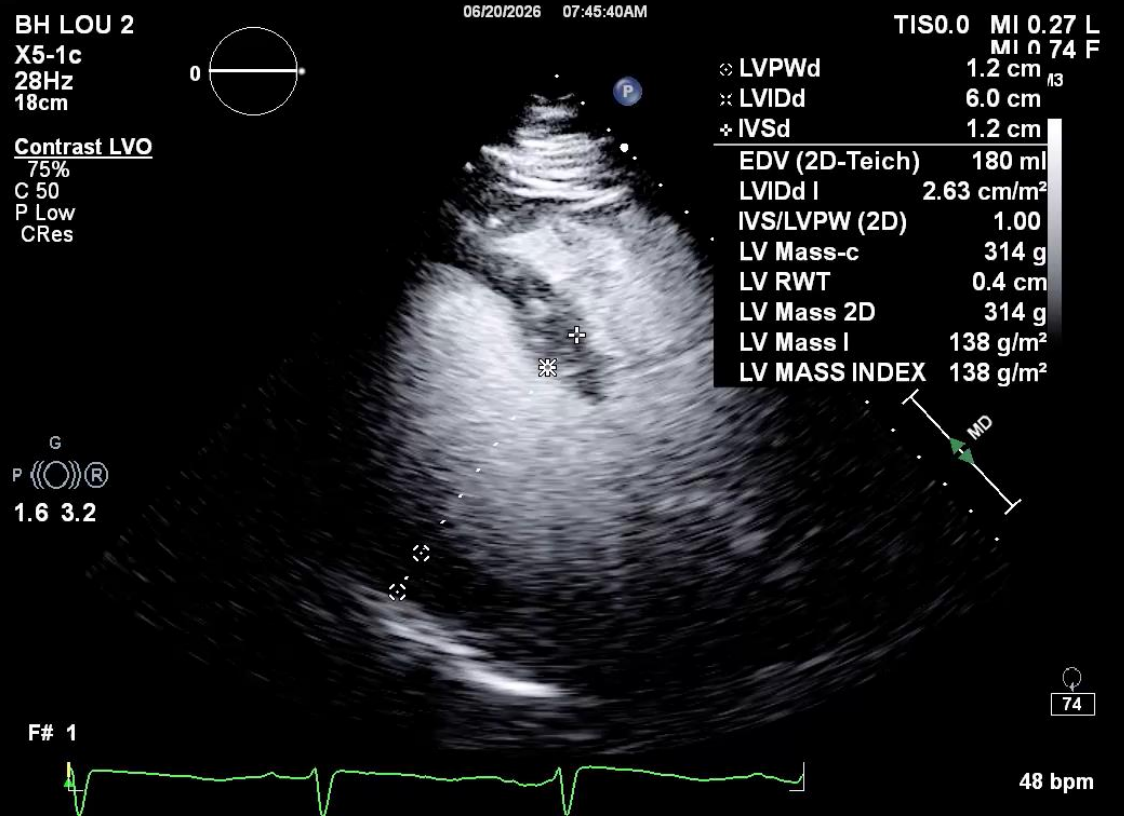
X-Plane Aortic Valve

- Confirming No Aortic Stenosis



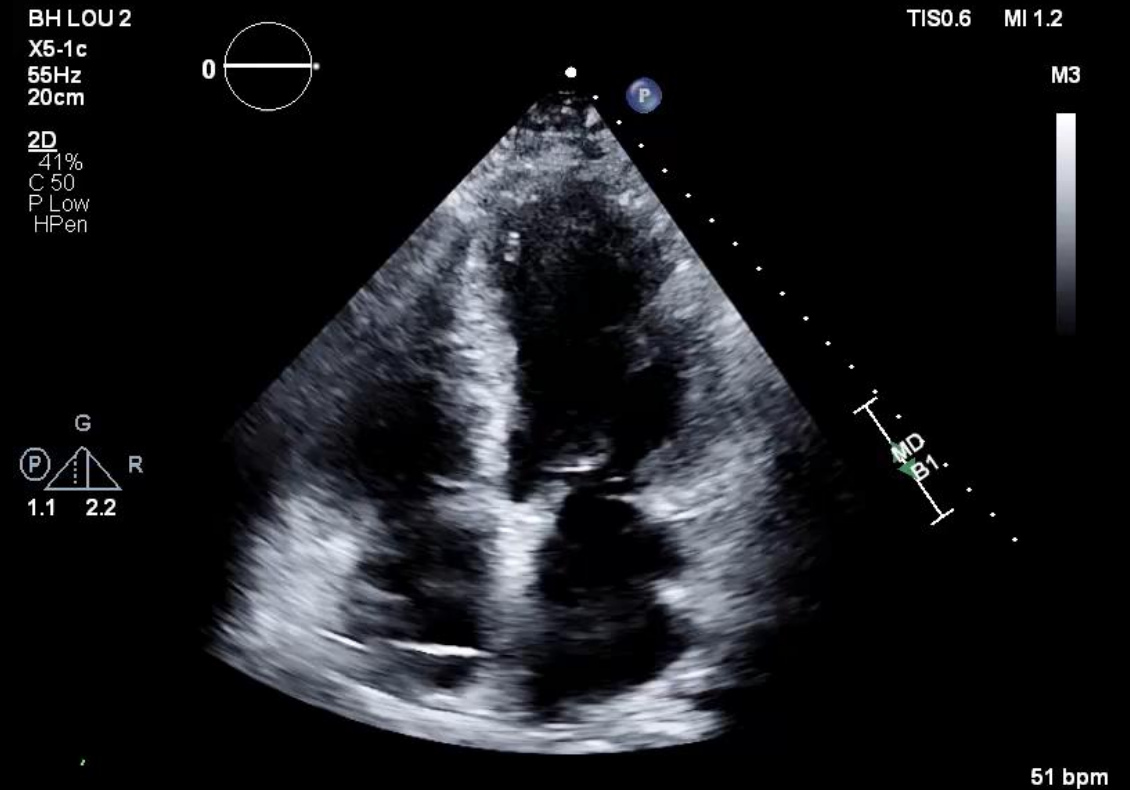
LV Measurements

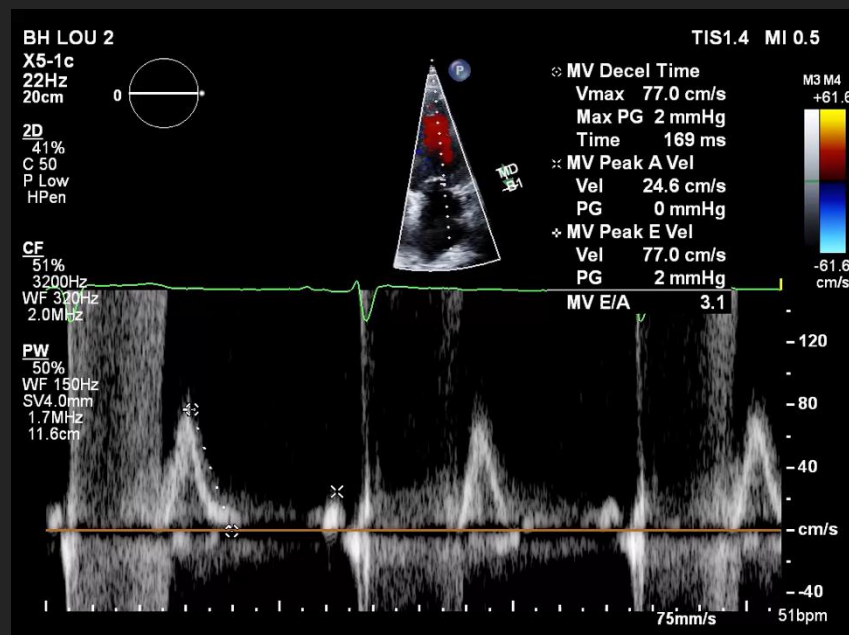
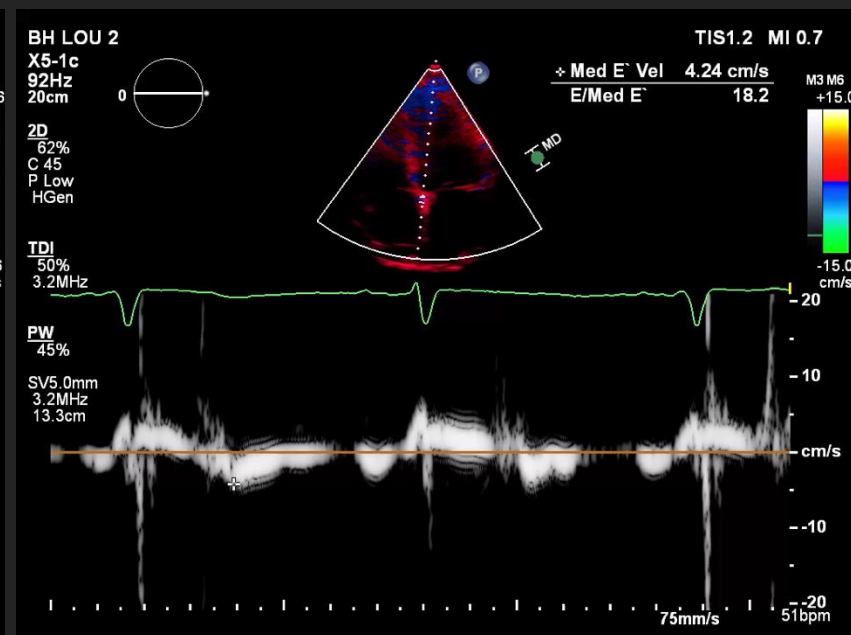
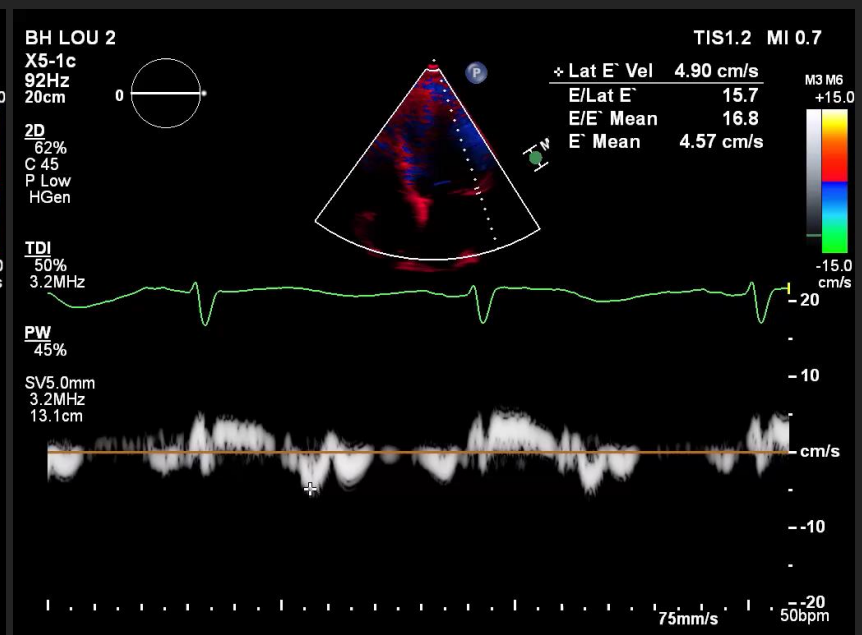
- Confirming Increased Wall Thickness



AP4

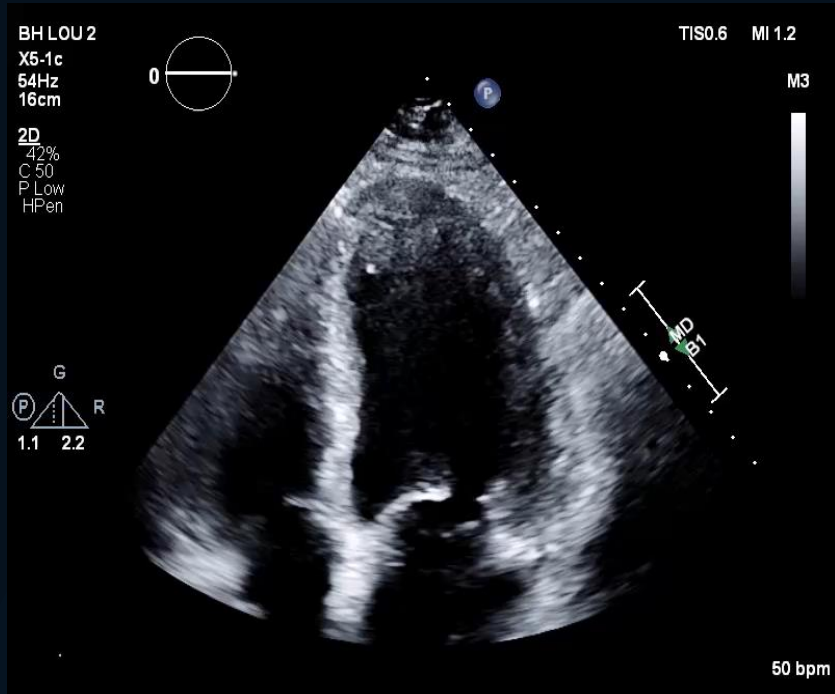
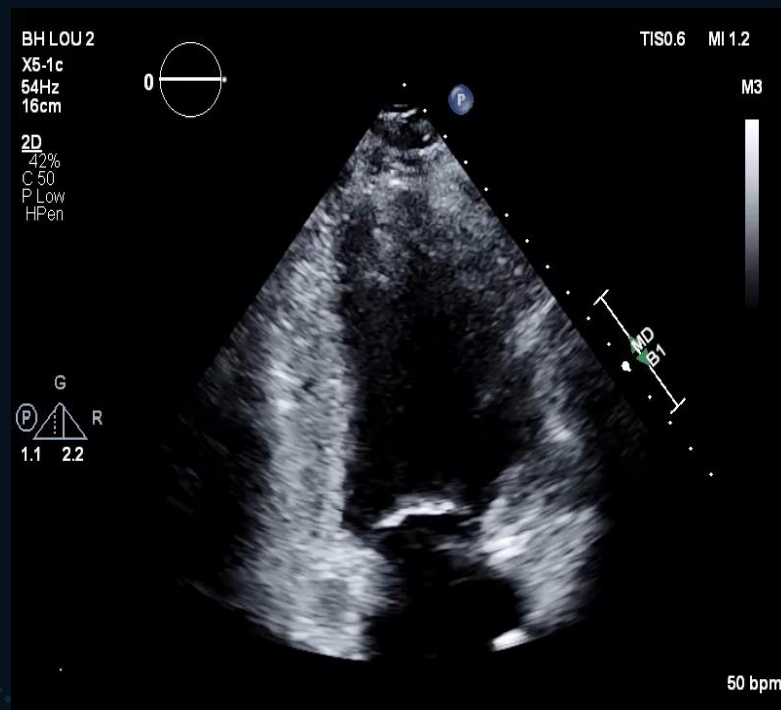
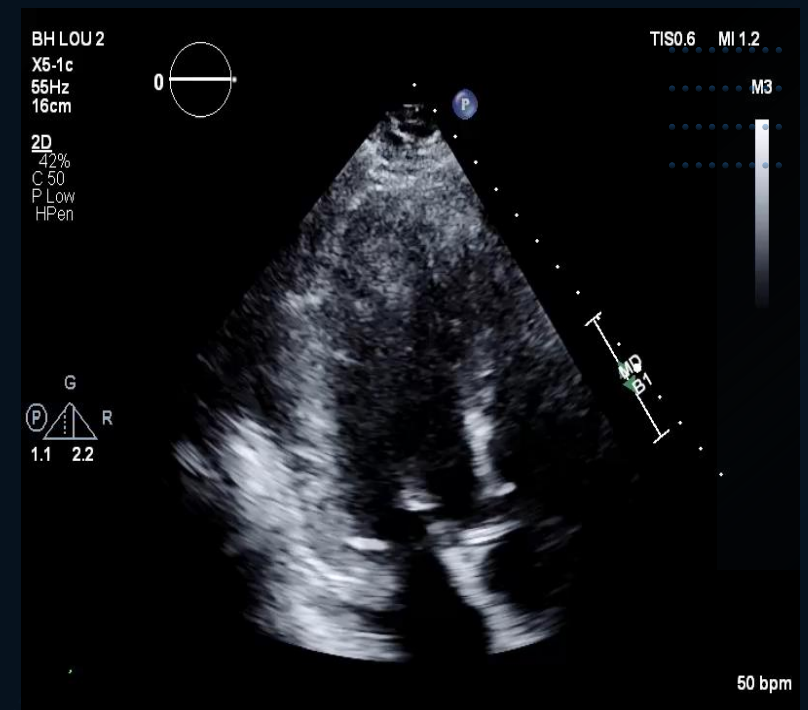
- Reduced Systolic Function
- Granular Myocardial Appearance
- Increased LV Wall Thickness
- Left Atrial Enlargement
- Electronic Lead Noted In Right Atrium





LV Filling

- E/e' Ratio 16.8

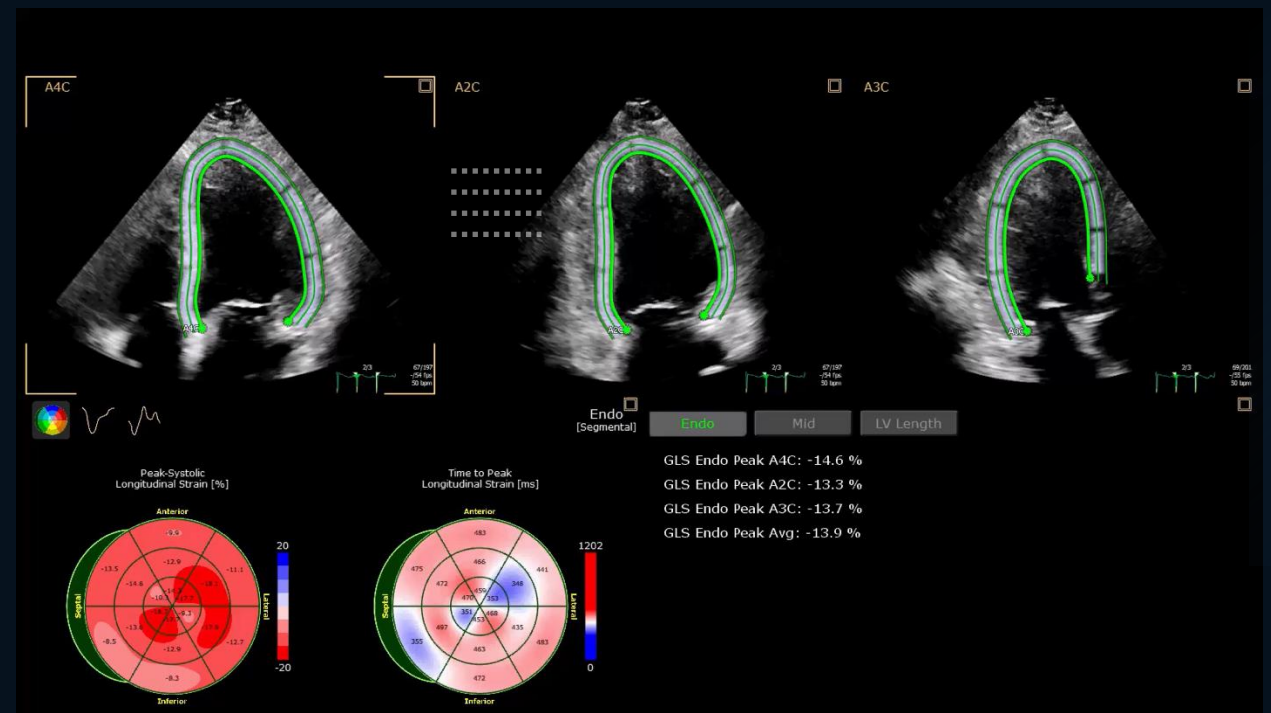
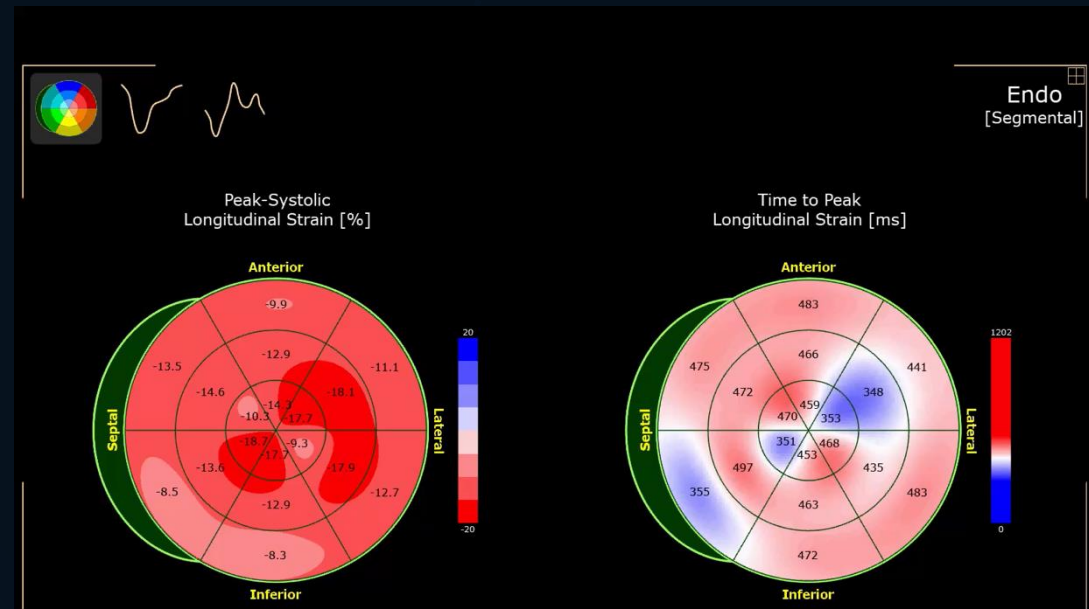


Apical LV Focused Views

- Do these Images in sequence.
- Avoid fore-shorting
- We want the image Depth and frame rate to be the same for all 3 images. This will also ensure hemodynamics are consistent

GLS

Apical Sparing (Cherry On Top)

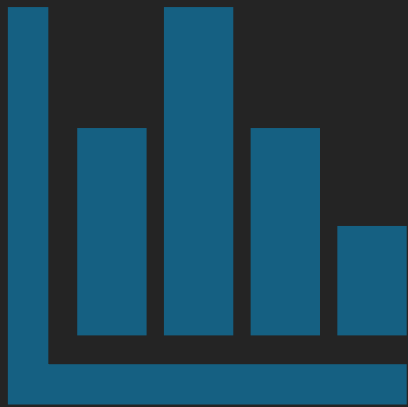


3D EF And Volumes



- 3D EF 37%

- 2D Bi-Plane EF 35%



PYP Results

- Semi-quantitative (visual grading by Perugini classification) of myocardial uptake by comparison to rib uptake was grade 3 (cardiac uptake greater than rib uptake with mild/absent rib uptake).
- The study is strongly suggestive of ATTR cardiac amyloidosis.

Case Study 3

- 92-year-old retired physician with a history of hypertension and treated obstructive sleep apnea who presents with progressively worsening dyspnea. Despite his advanced age, he remains highly active, working with a personal trainer and exercising at a local gym three times per week. He reports a decline in his exercise tolerance with increasing shortness of breath compared to his baseline level of activity.

PLAX

- Increased LV Wall Thickness
- Left Atrial Enlargement
- Low Voltage EKG

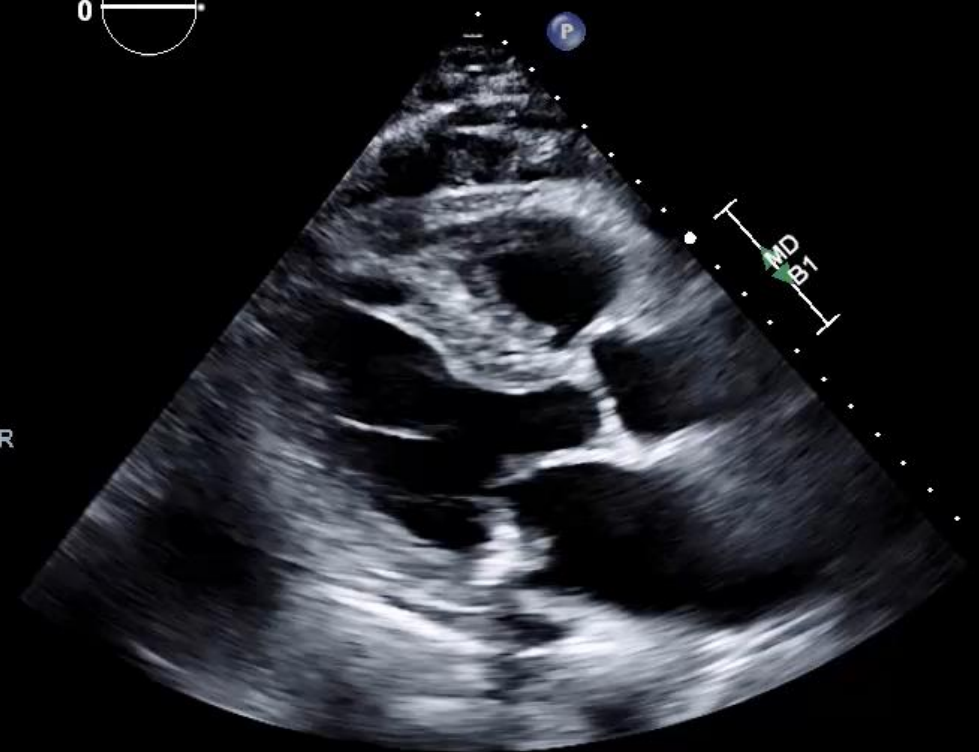
BH ECHO
X5-1c
57Hz
19cm

2D
52%
C 48
P Low
HPen



TIS0.6 MI 1.2

M3



62 bpm

BH ECHO

X5-1c
57Hz
19cm

2D

50%
C 48
P Low
HPen



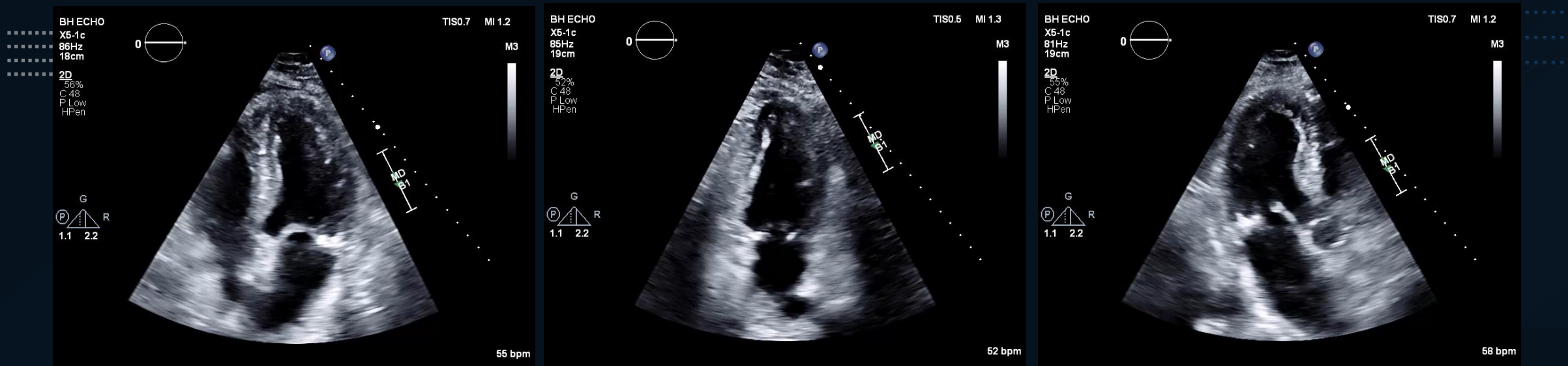
G
P R
1.1 2.2

TISO.6 MI 1.2

IVSd	1.3 cm
LVIDd	4.2 cm
LVPWd	1.1 cm
IVS/LVPW (2D)	1.20
LV Mass-c	183 g
LV Mass 2D	183 g
EDV (2D-Teich)	80.4 ml
LVIDd I	1.98 cm/m ²
LV RWT	0.5 cm
LV Mass I	85.5 g/m ²
LV MASS INDEX	85.5 g/m ²

2D Measurements

- Increased Wall Thickness

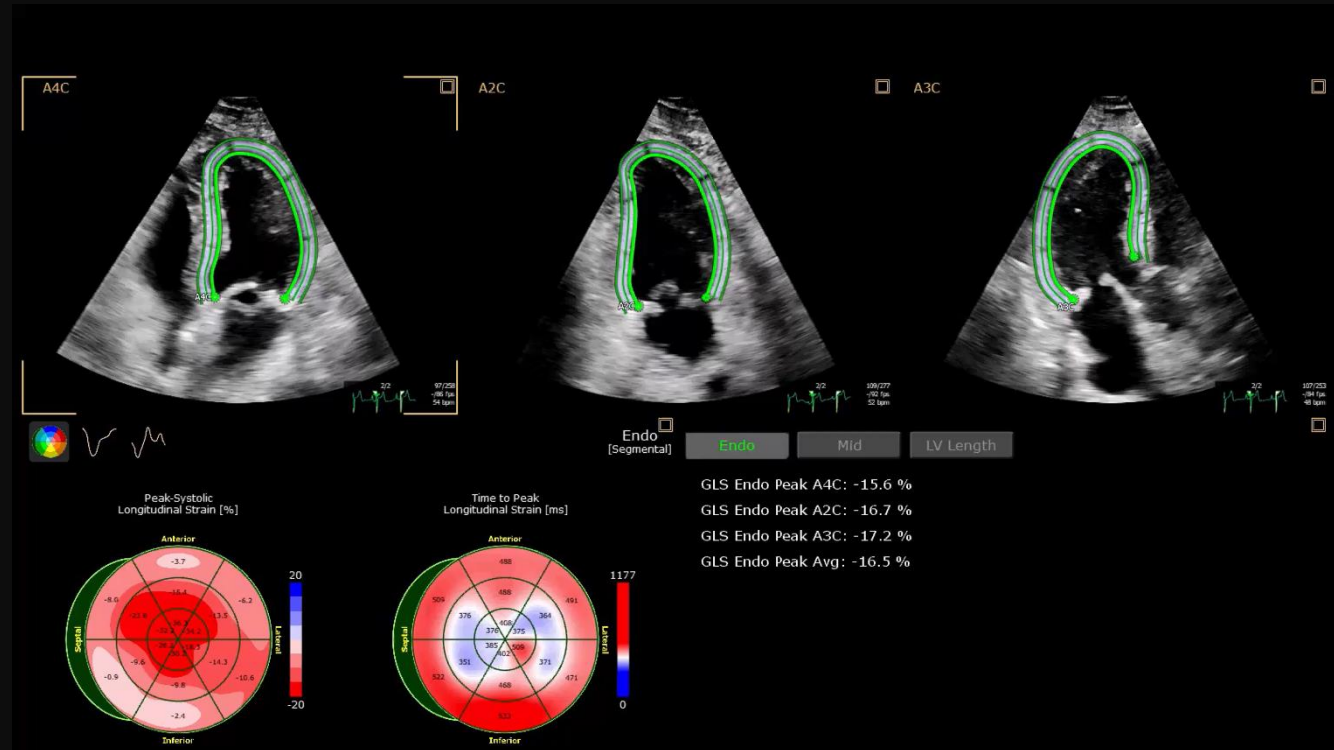


Apical Views

- Preserved EF

GLS

- Apical Sparing



PYP

PYP Imaging Procedure

PYP Findings The image quality of the study was good. Myocardial Tc-99m tracer uptake patterns are diffused. Semi-quantitative (visual grading by Perugini classification) of myocardial uptake by comparison to rib uptake was grade 3 (cardiac uptake greater than rib uptake with mild/absent rib uptake). . Quantitative analysis of heart/lung ratio was abnormal. The study is strongly suggestive of ATTR cardiac amyloidosis.

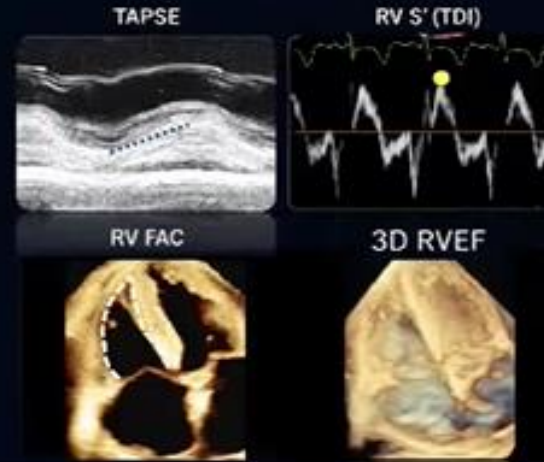
1. RV MORPHOLOGY

- Measure RV free-wall thickness in subcostal view at end-diastole
- Assess RV size and geometry
- Look for RV myocardial thickening
- Assess for pericardial effusion



2. RV SYSTOLIC FUNCTION

- ✓ TAPSE
- ✓ RV S'
- ✓ RV FAC
- ✓ Consider 3D RVEF when feasible



3. TRICUSPID VALVE

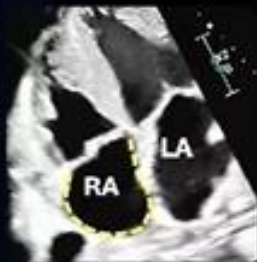
- Assess leaflet thickening
- Grade TR severity
- Obtain TR Vmax with CW Doppler
- Estimate RVSP/PASP



$$RVSP \approx 4 (TR Vmax)^2 + RAP$$

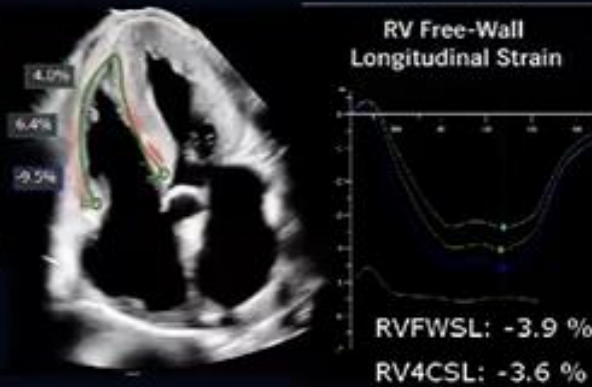
4. RIGHT ATRIUM & VENOUS CONGESTION

- RA size/volume
- IVC diameter and respiratory variation
- Hepatic vein flow



5. STRAIN – DON'T SKIP THE RV

- ✓ Acquire a dedicated RV-focused apical 4-chamber view
- ✓ Analyze RV free-wall strain
- ✓ Evaluate basal, mid and apical segments



SONOGRAPHER PEARL



Think beyond LV wall thickening.

Thick RV wall + reduced RV longitudinal function/strain + elevated right-sided pressures + systemic venous congestion = important supportive findings in cardiac amyloidosis.



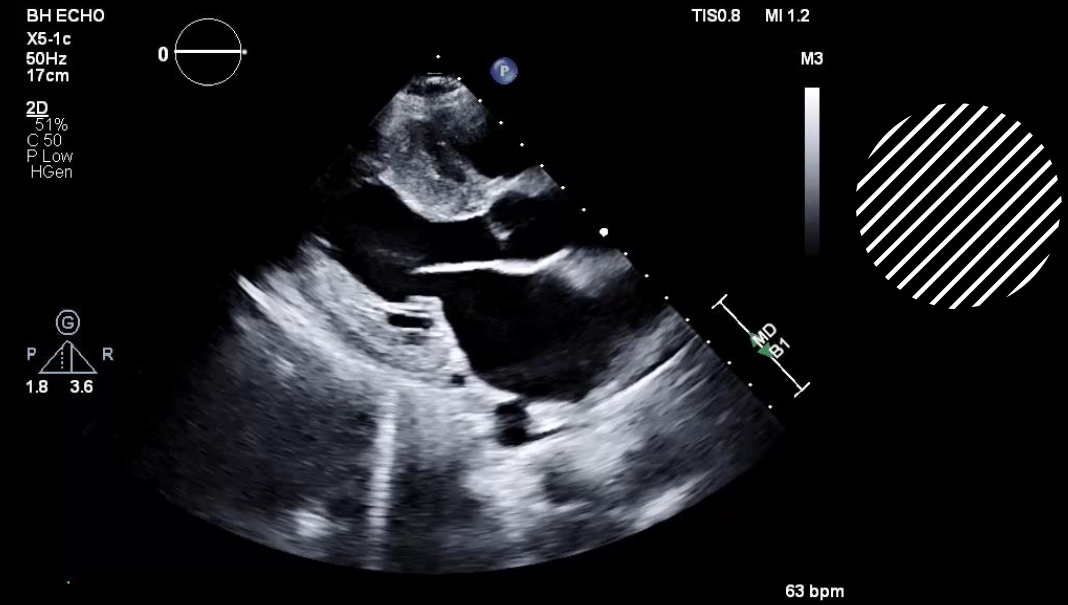
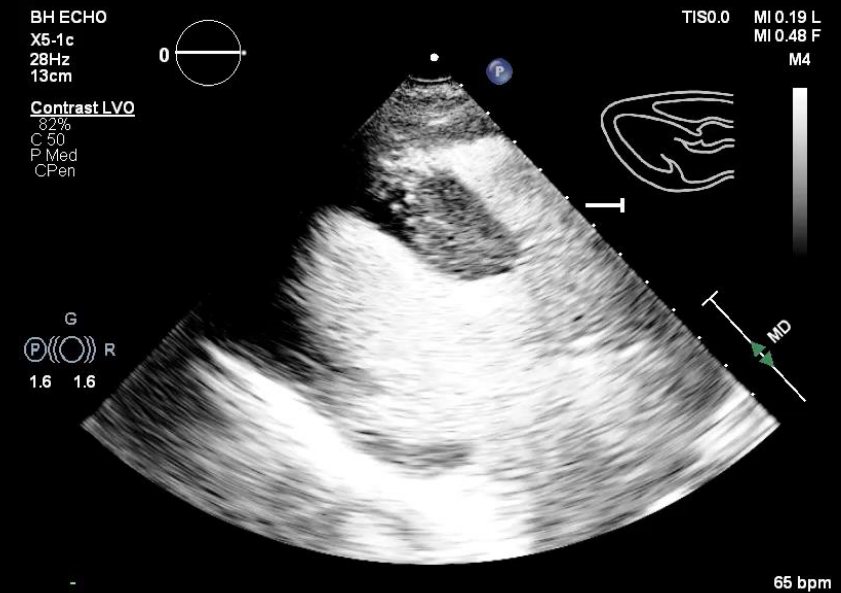
Right Ventricle
ASE

Case 4

- 42-year-old female with previously diagnosed infiltrative cardiomyopathy presenting with worsening exertional dyspnea, concerning for progression of cardiomyopathy and associated heart failure symptoms. Clinical correlation and further cardiac evaluation are recommended.

Don't Get Fooled

- Wall Thickening Not Concentric



2D Measurment

BH ECHO
X5-1c
37Hz
12cm

Contrast LVO

75%
C 48
P Low
CRes



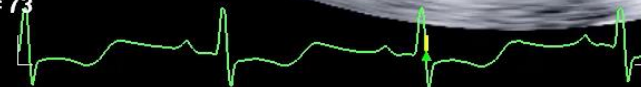
05/19/2026 05:11:22PM

TIS0.0 MI 0.28 L
MI 0.74 F
M4

◇ LVPWd	1.0 cm
× LVIDd	4.0 cm
÷ IVSd	1.6 cm
<hr/>	
EDV (2D-Teich)	70.0 ml
LVIDd I	2.96 cm/m ²
EF (2D-Teich)	74.1 %
LV Mass 2D	187 g
LV Mass-c	187 g
LV RWT	0.500
IVS/LVPW (2D)	1.60
LV MASS INDEX	139 g/m ²
LV Mass I	139 g/m ²

G
P (C) (R)
1.6 3.2

F# 73

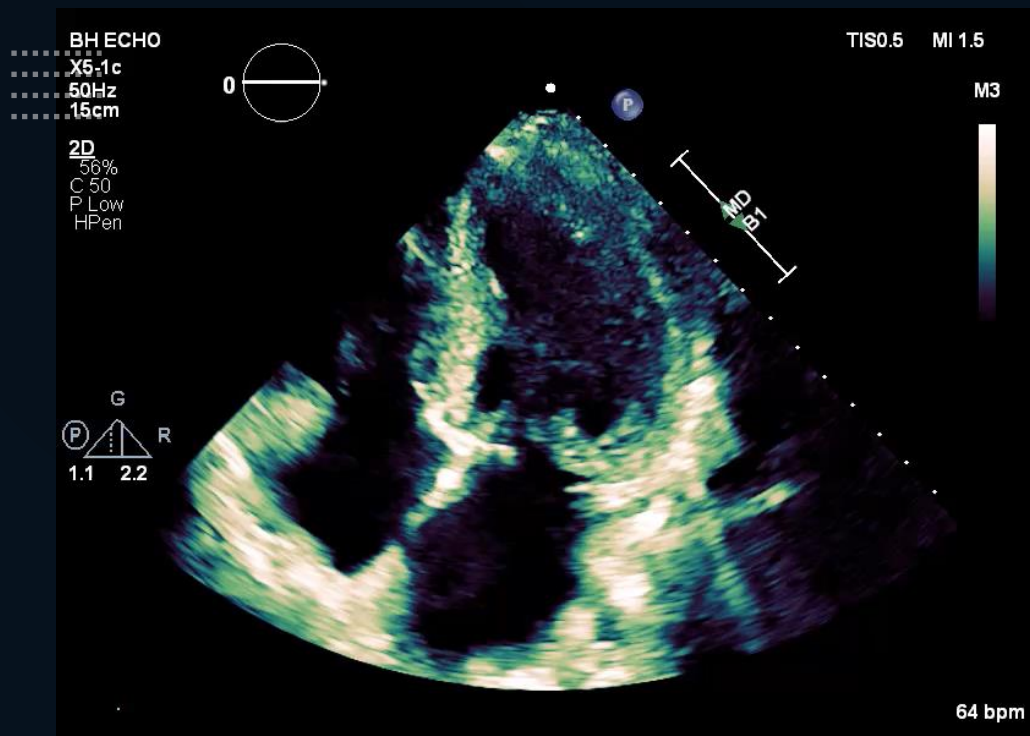
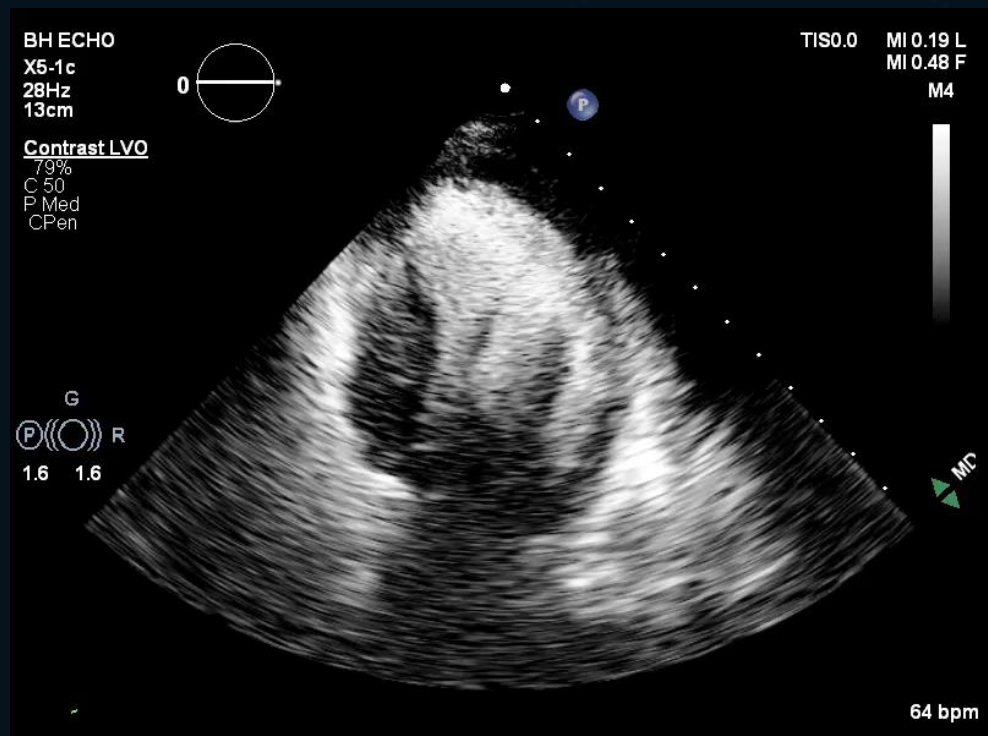


78

64 bpm

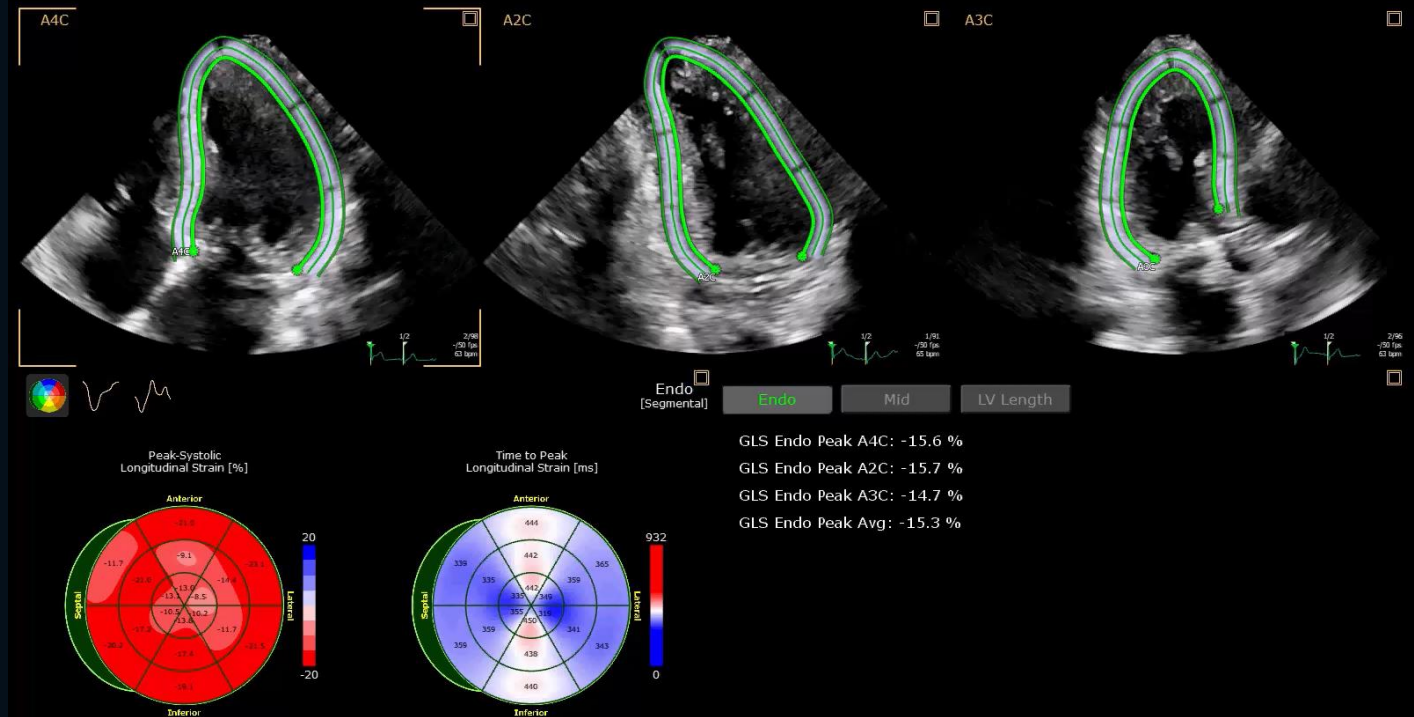
Apical 4 Chamber

- If Unsure use UEA



GLS

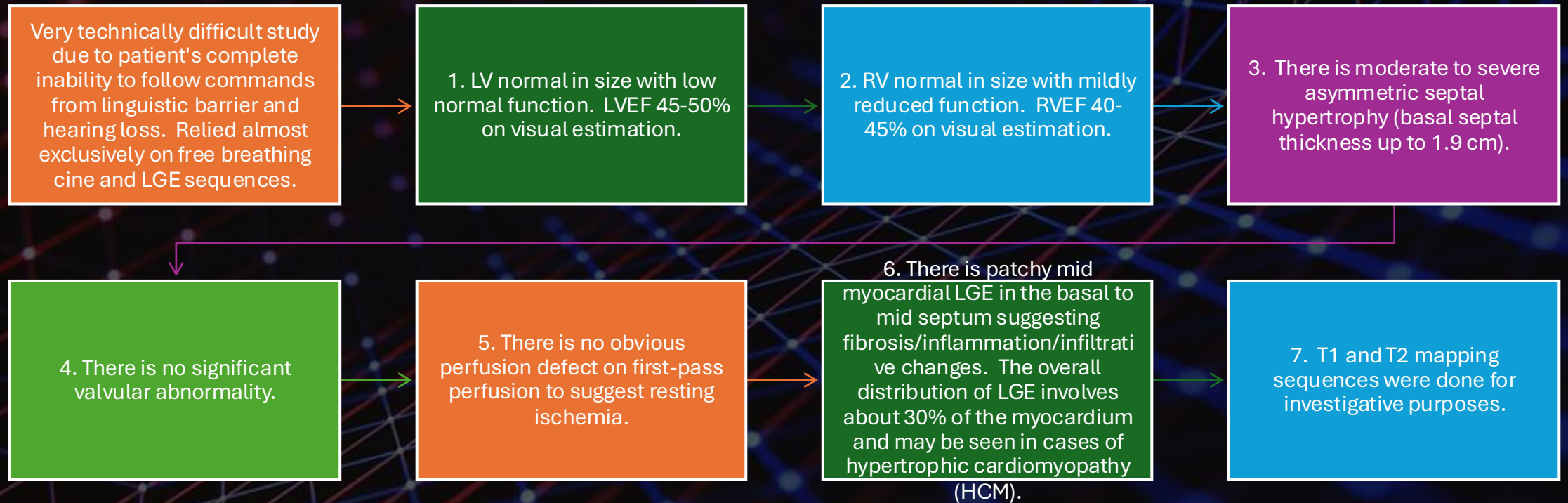
- No Apical Sparing Pattern



PYP

- The image quality of the study was poor. Myocardial Tc-99m tracer uptake patterns are focal. This study is equivocal of cardiac amyloidosis. Reason for equivocal: Cannot exclude focal uptake in a poor-quality study.

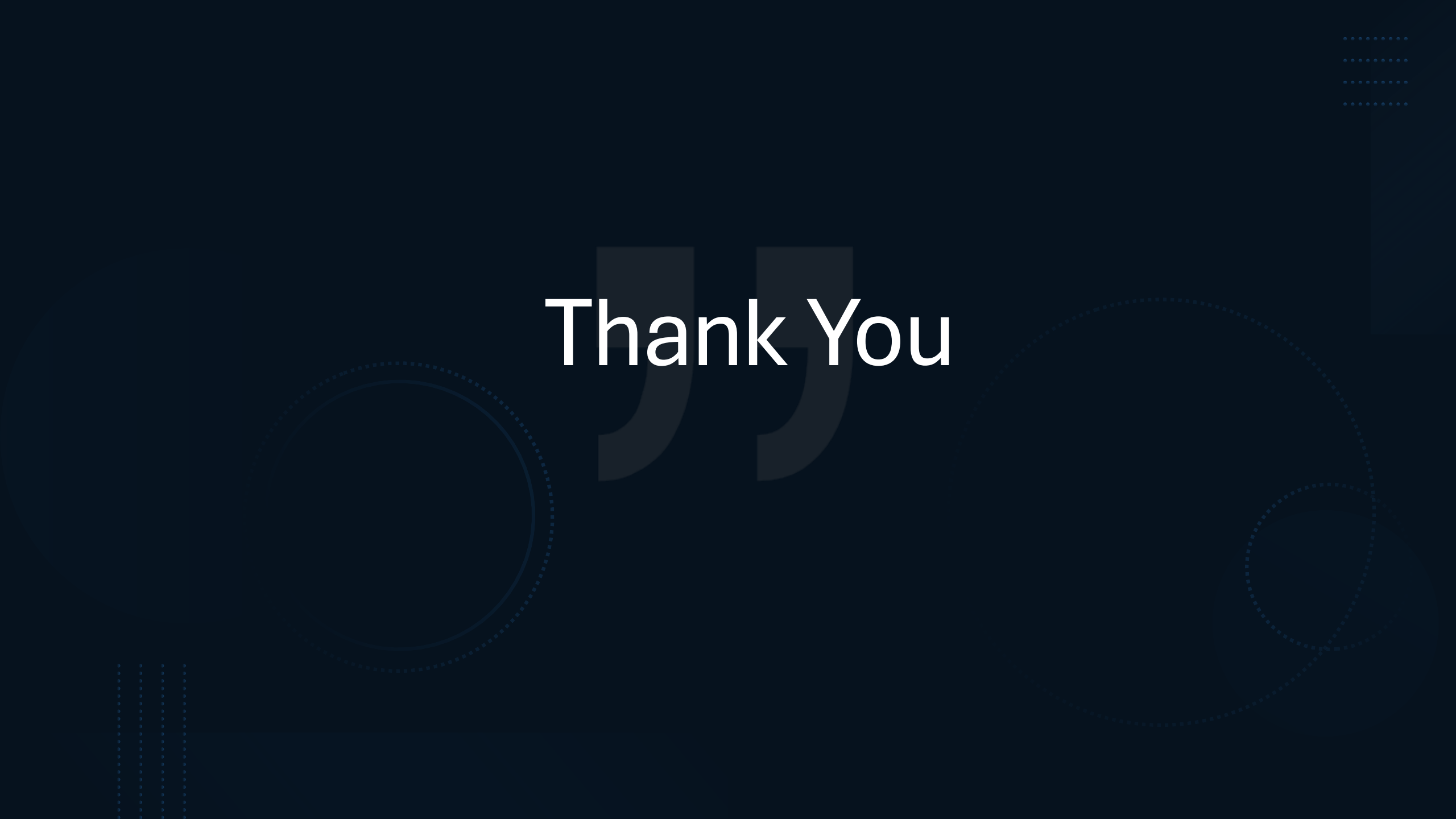
MRI Report



Echo Red Flags Suggesting Amyloidosis

When you see the following together, think amyloidosis:

- ✓ Increased LV wall thickness (>12 mm)
- ✓ Low-voltage ECG relative to wall thickness
- ✓ Biatrial enlargement
- ✓ Restrictive filling pattern
- ✓ Thickened valves and interatrial septum
- ✓ Small pericardial effusion
- ✓ Apical sparing on strain imaging

The background is a dark blue gradient. It features several faint, light blue geometric elements: a large circle on the left, a smaller circle on the right, and a large, faint 'J' shape in the center. In the top right corner, there are four horizontal dotted lines. In the bottom left corner, there are three vertical dotted lines.

Thank You