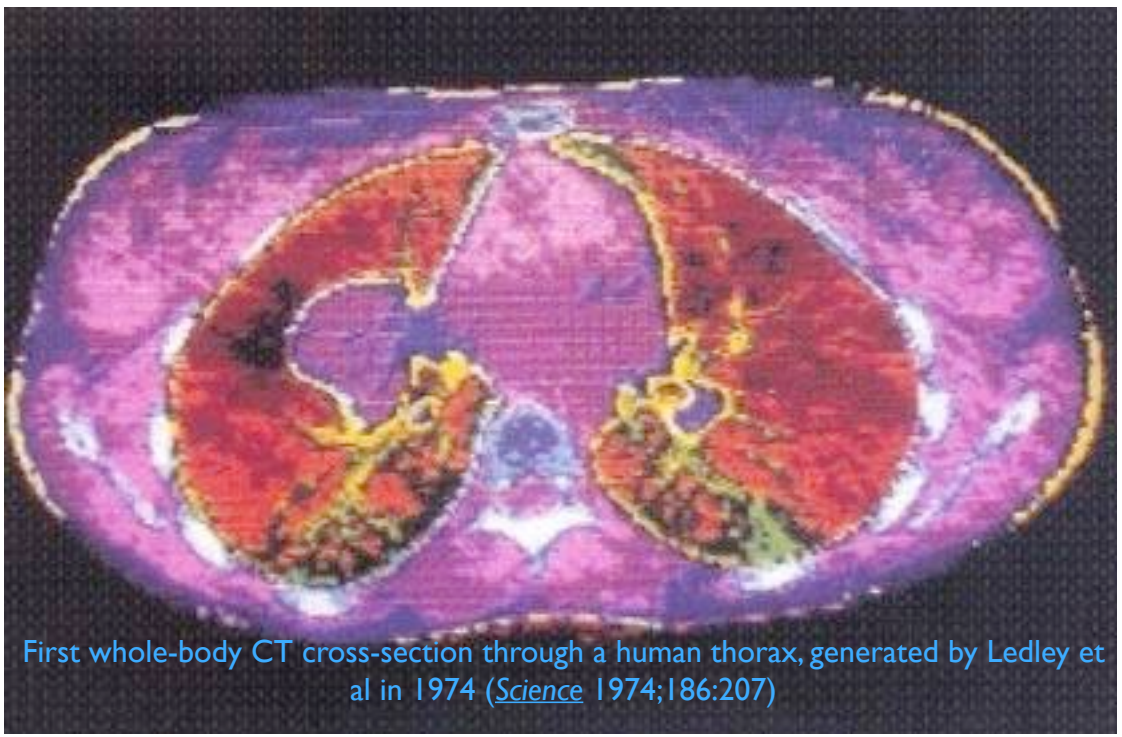
Multi-Slice CT in Clinical Cardiology

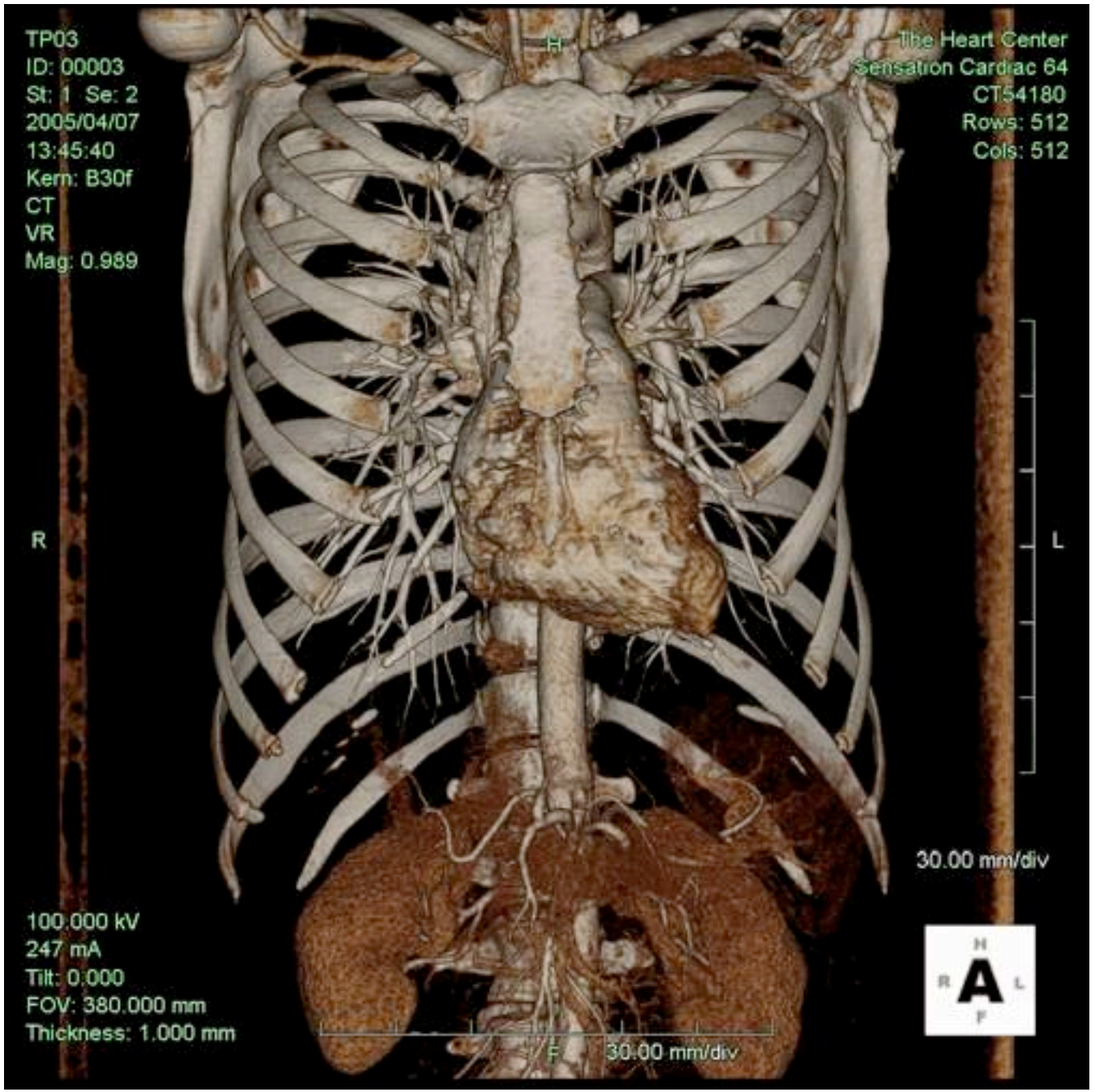


First whole-body CT cross-section through a human thorax, generated by Ledley et al in 1974 (*Science* 1974;186:207)

Saeed R Shaikh, MD, FACC, FSCA&I
Director, Cardiovascular Research
St. Francis Heart Center

Whole Heart Volume is acquired in 10-12 segments

320 SLICE AQUILION ONE-TOSHIBA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2005/04/07
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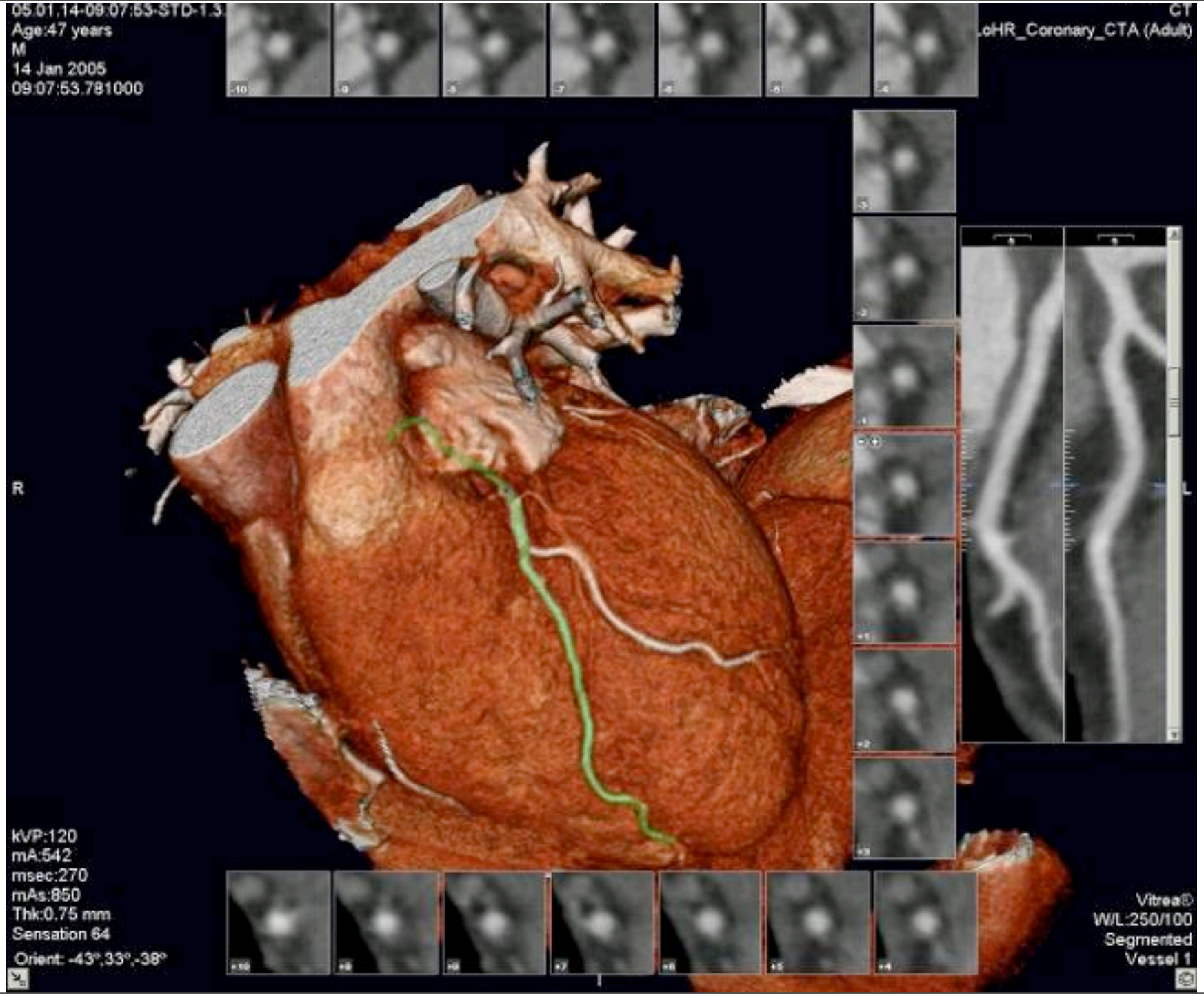
VR
Mag: 0.989
H
The Heart Center
Sensation Cardiac 64
CT54180
Rows: 512
Cols: 512
R
L
30.00 mm/div
100.000 kV
247 mA
Tilt: 0.000
FOV: 380.000 mm
Thickness: 1.000 mm
F
30.00 mm/div
H
R
A
L
F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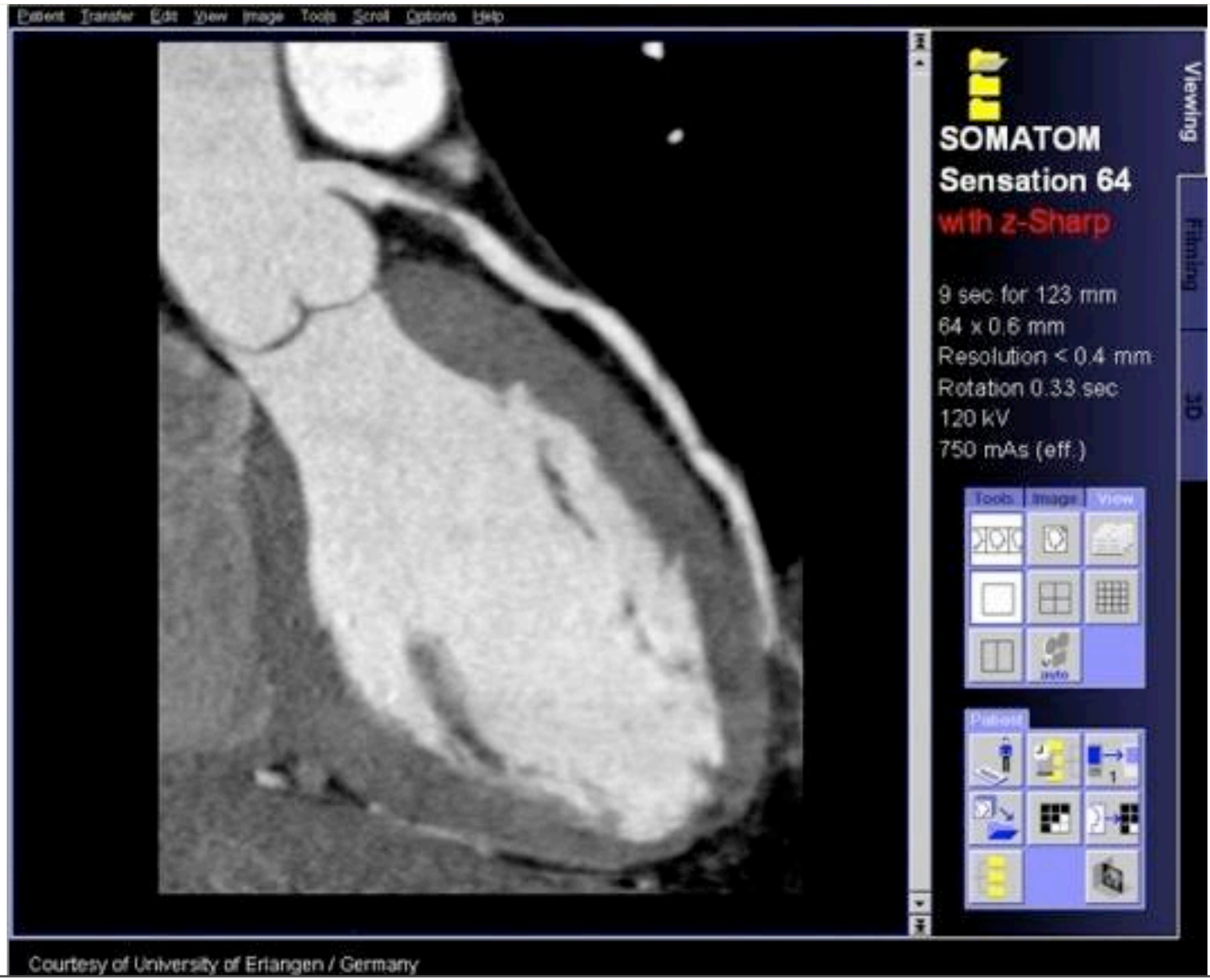
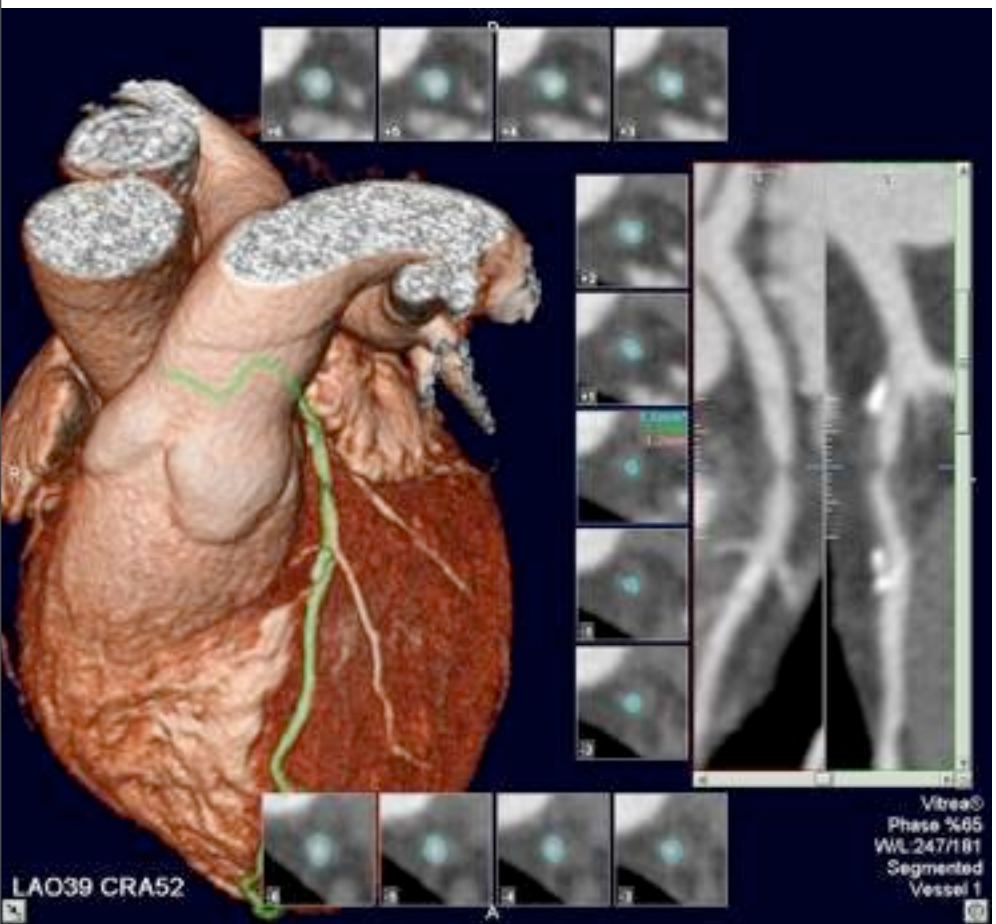
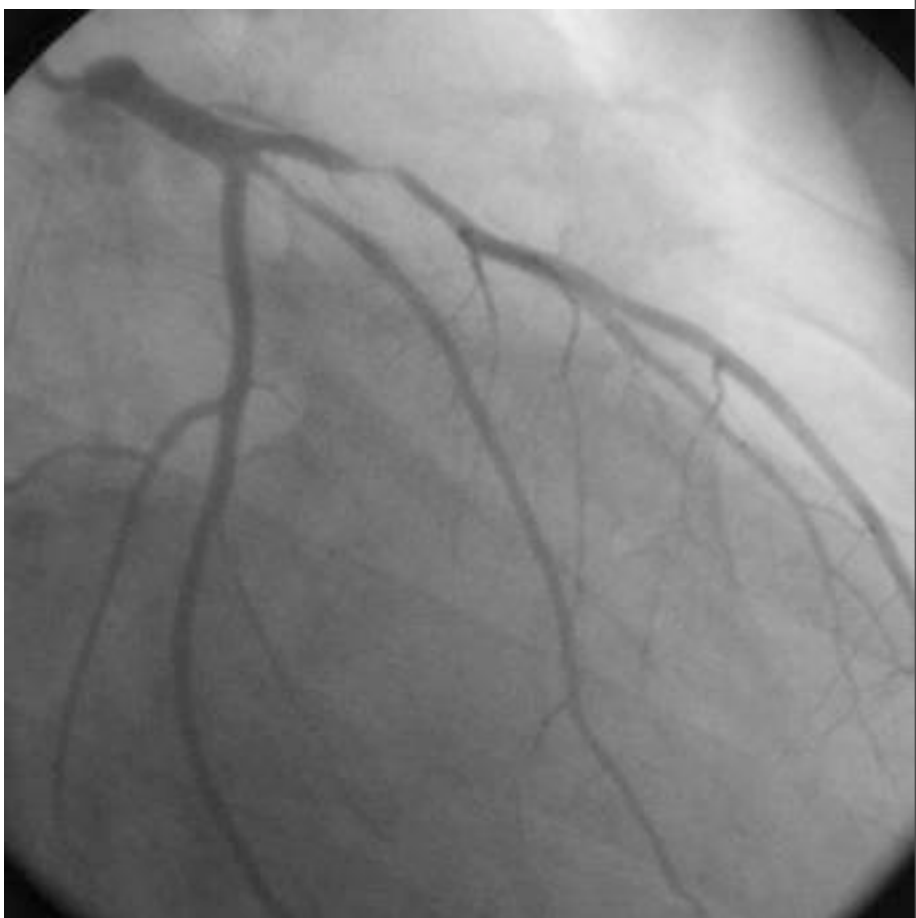
M
14 Jan 2005
09:07:53.781000
CT
HR_Coronary_CTA (Adult)
R
kVP:120
mA:542
msec:270
mAs:850
Thk:0.75 mm
Sensation 64
Orient: -43°,33°,-38°
Vitrea®
W/L:250/100
Segmented
Vessel 1

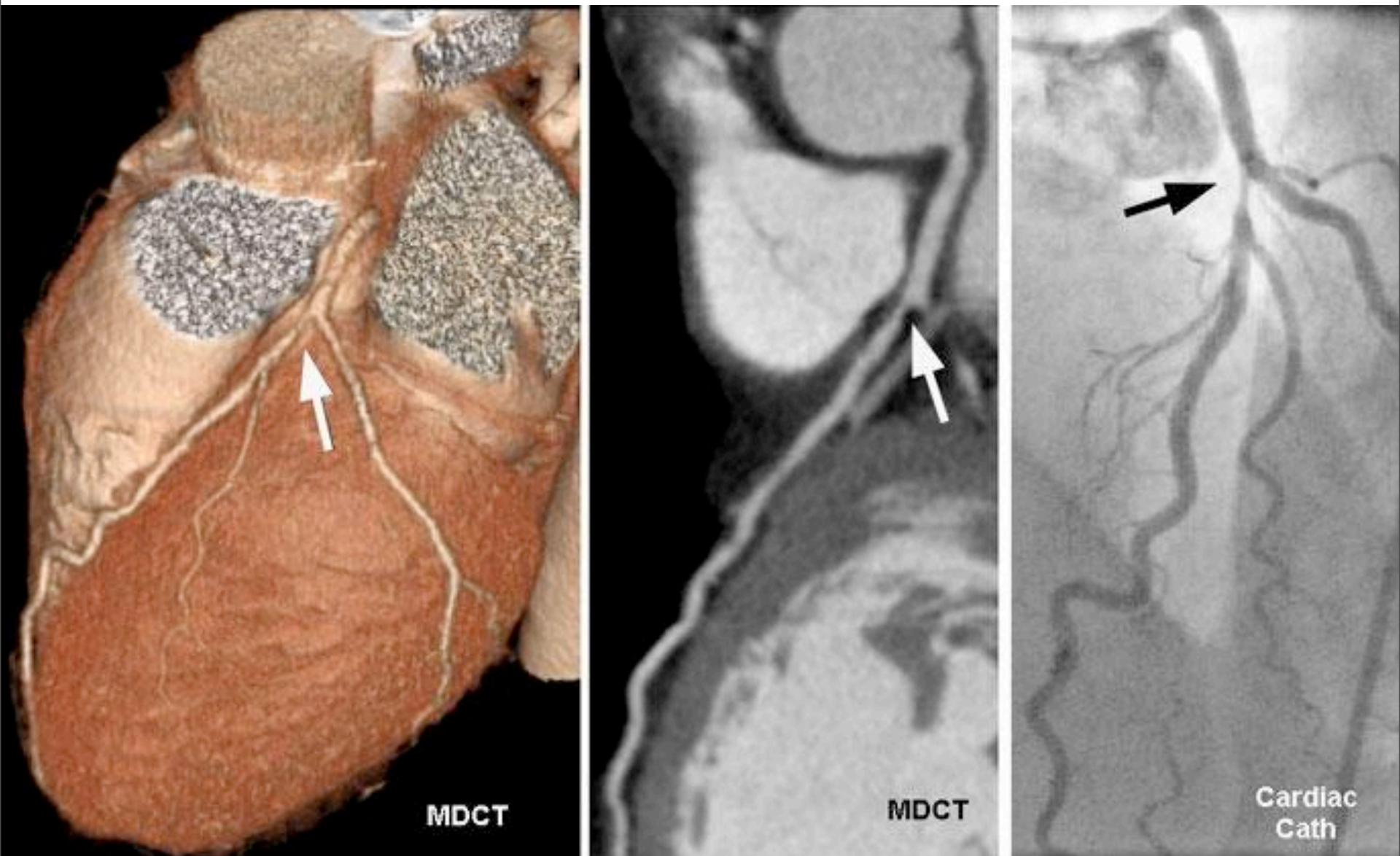
Maximum Intensity Projection

Soft Plaque in Proximal LAD

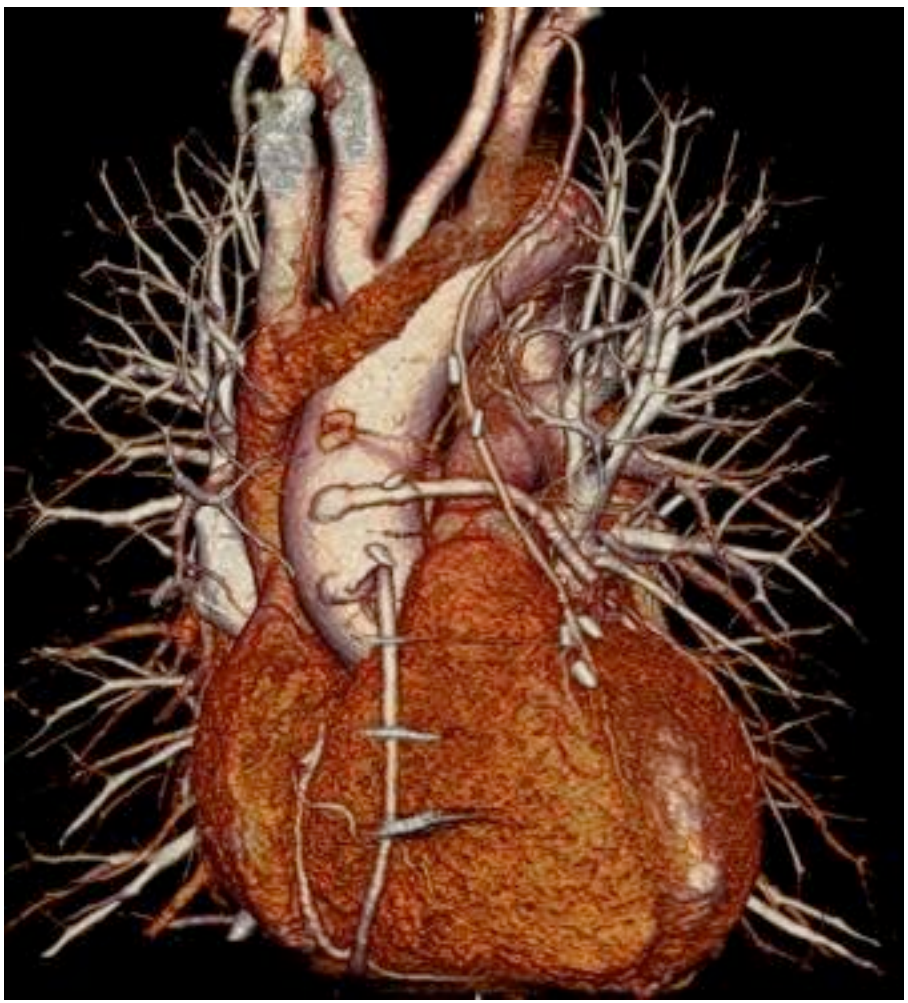


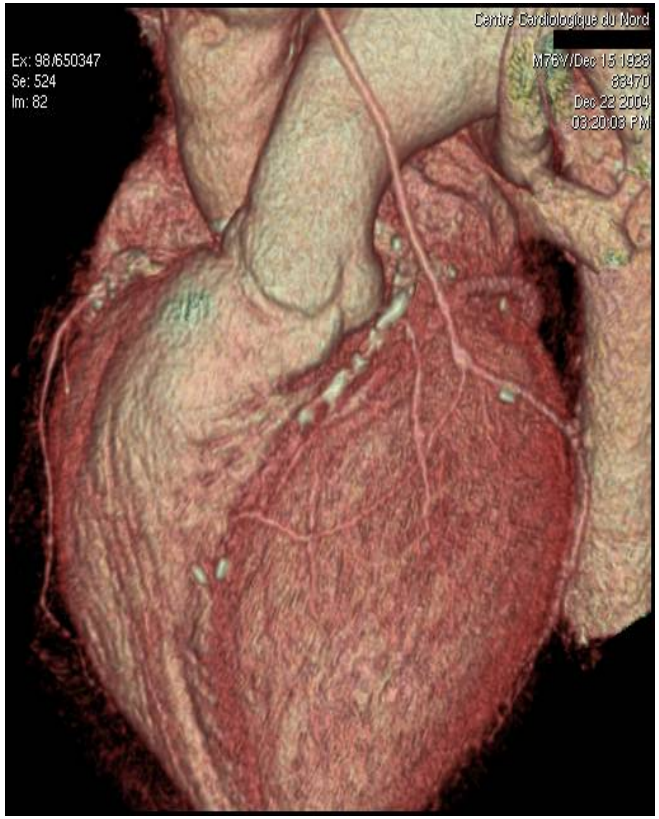

LAO39 CRA52
Vitrea®
Phase %65
WL:247/181
Segmented
Vessel 1




MDCT
MDCT
Cardiac
Cath

EVALUATION OF BYPASS GRAFTS




Centre Cardiologique du Nord
Ex: 98/650347
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Im: 82
M76Y/Dec 15 1923
88470
Dec 23 2004
03:20:08 PM

t.)
0.5/MIP

Diagnostic "ACCURACY" of CTA

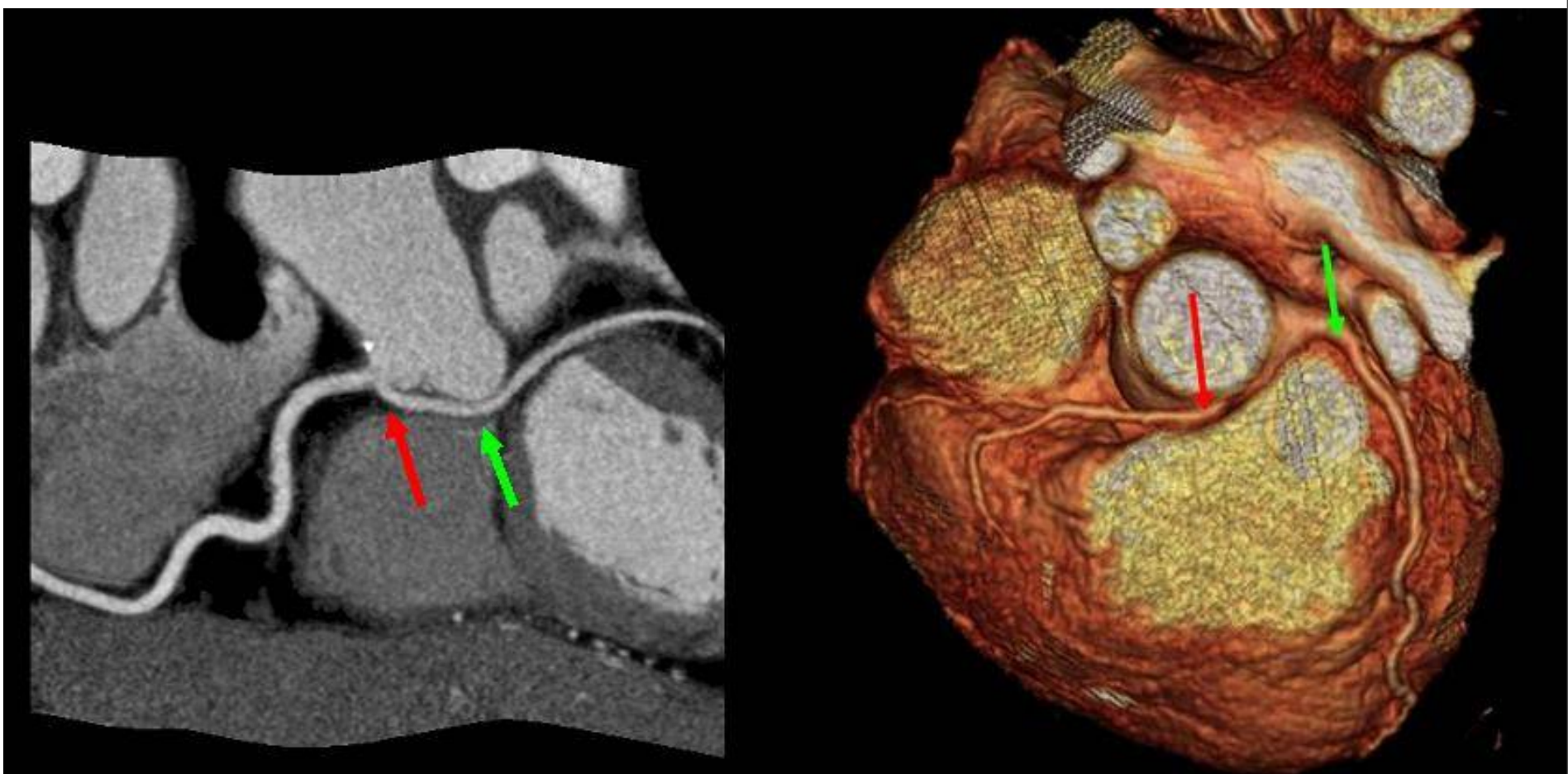
Analysis	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
Stenoses > 50%, per patient	93	82	62	97
Stenoses > 50%, per vessel	84	91	51	98
Stenoses > 70%, per patient	91	84	49	98
Stenoses > 70%, per vessel	85	92	33	99

PPV=positive predictive value
NPV=negative predictive value

Min J. Radiological Society of North America 2007; November 25-30, 2007; Chicago, IL.

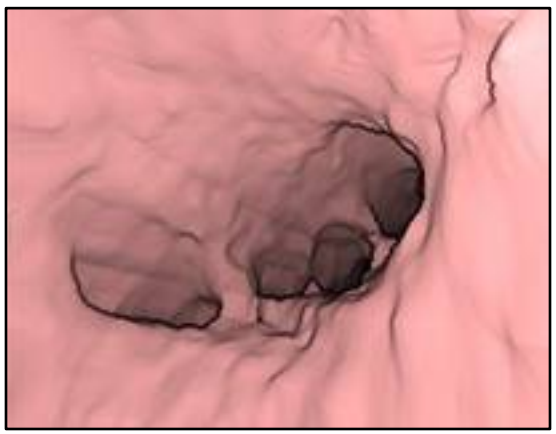
NON-CORONARY USES OF CARDIAC MSCT

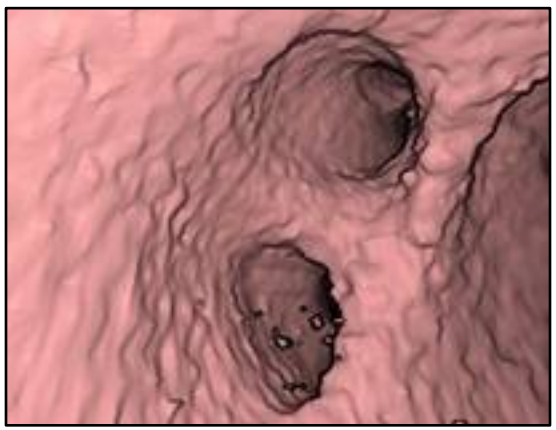
ANOMALOUS CORONARIES

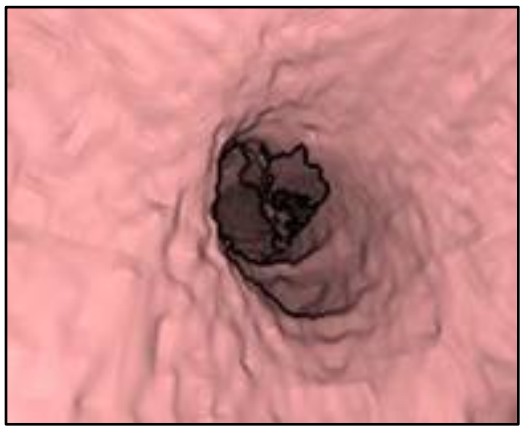


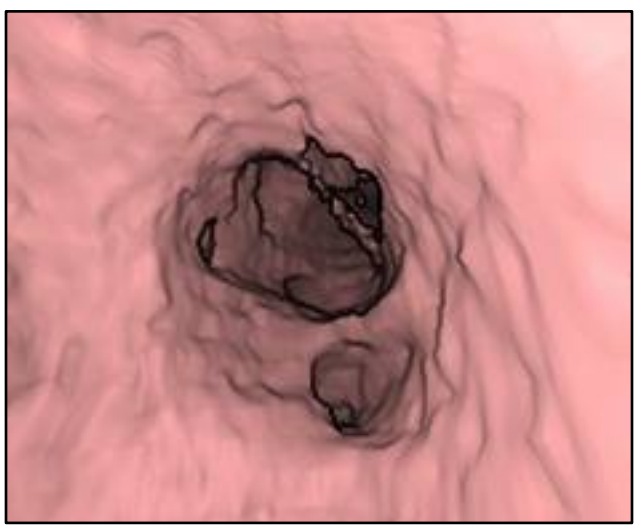
5 cm

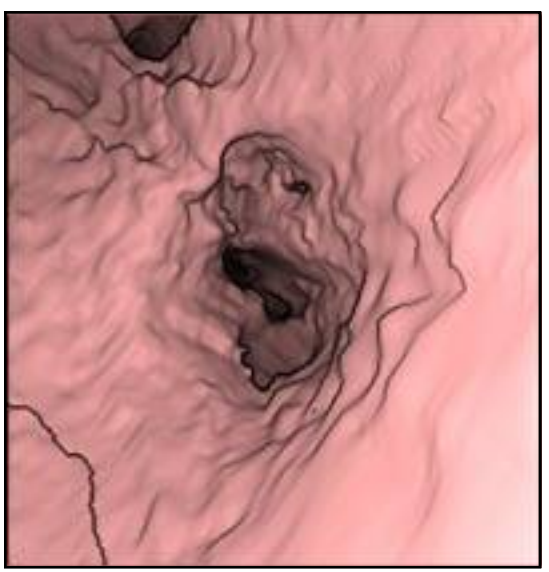
Pulmonary Vein Os Complexity
Atrial Fibrillation Ablation



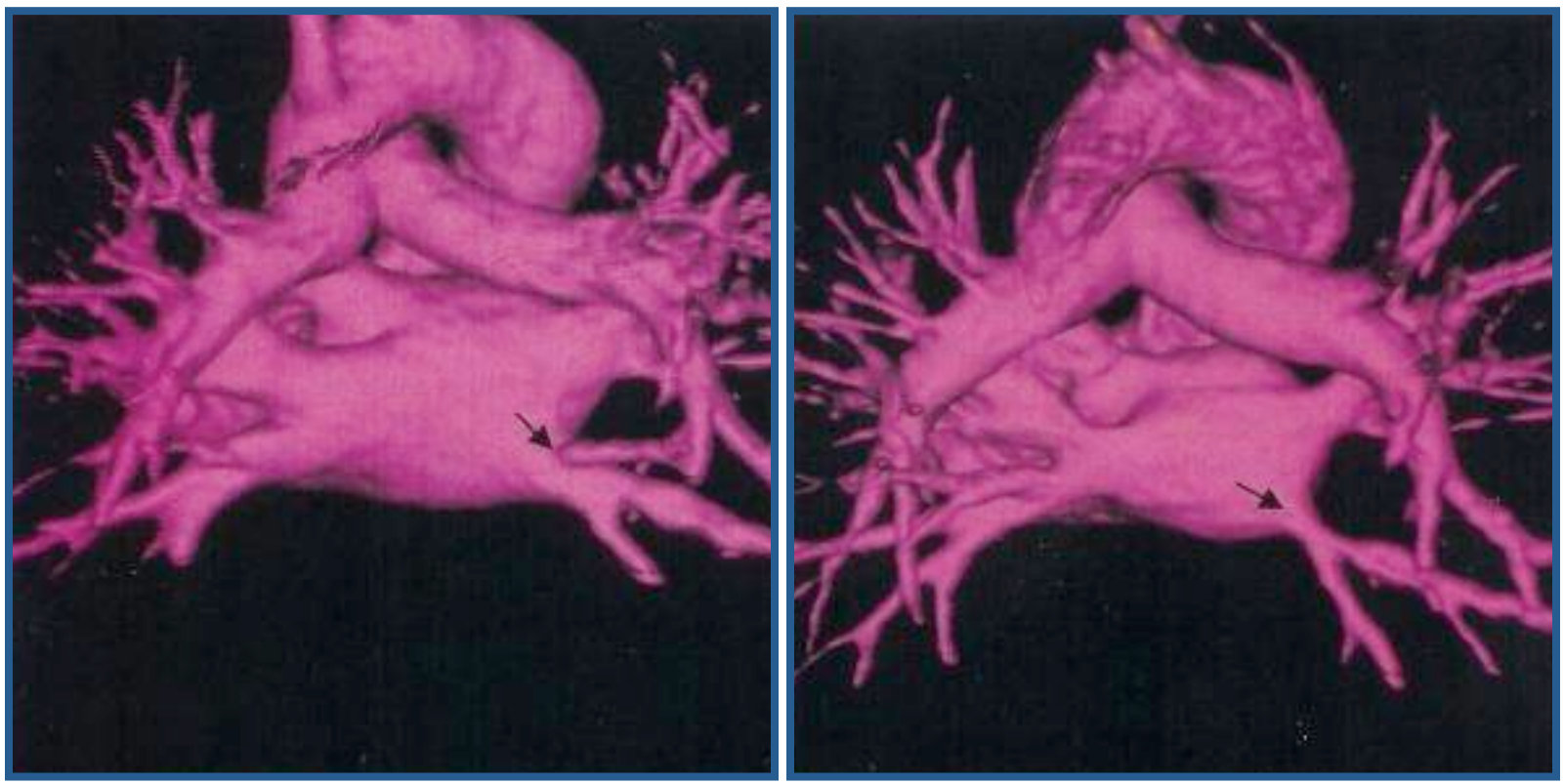




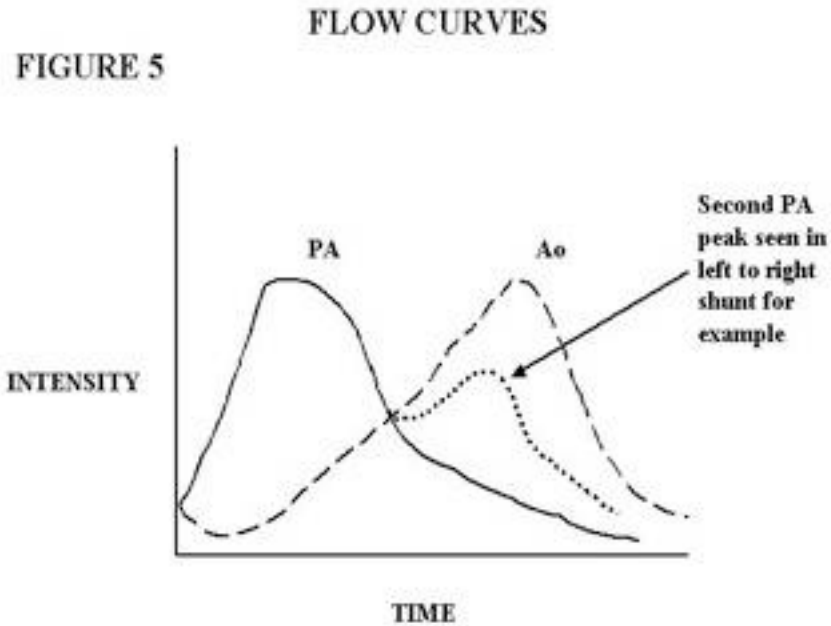




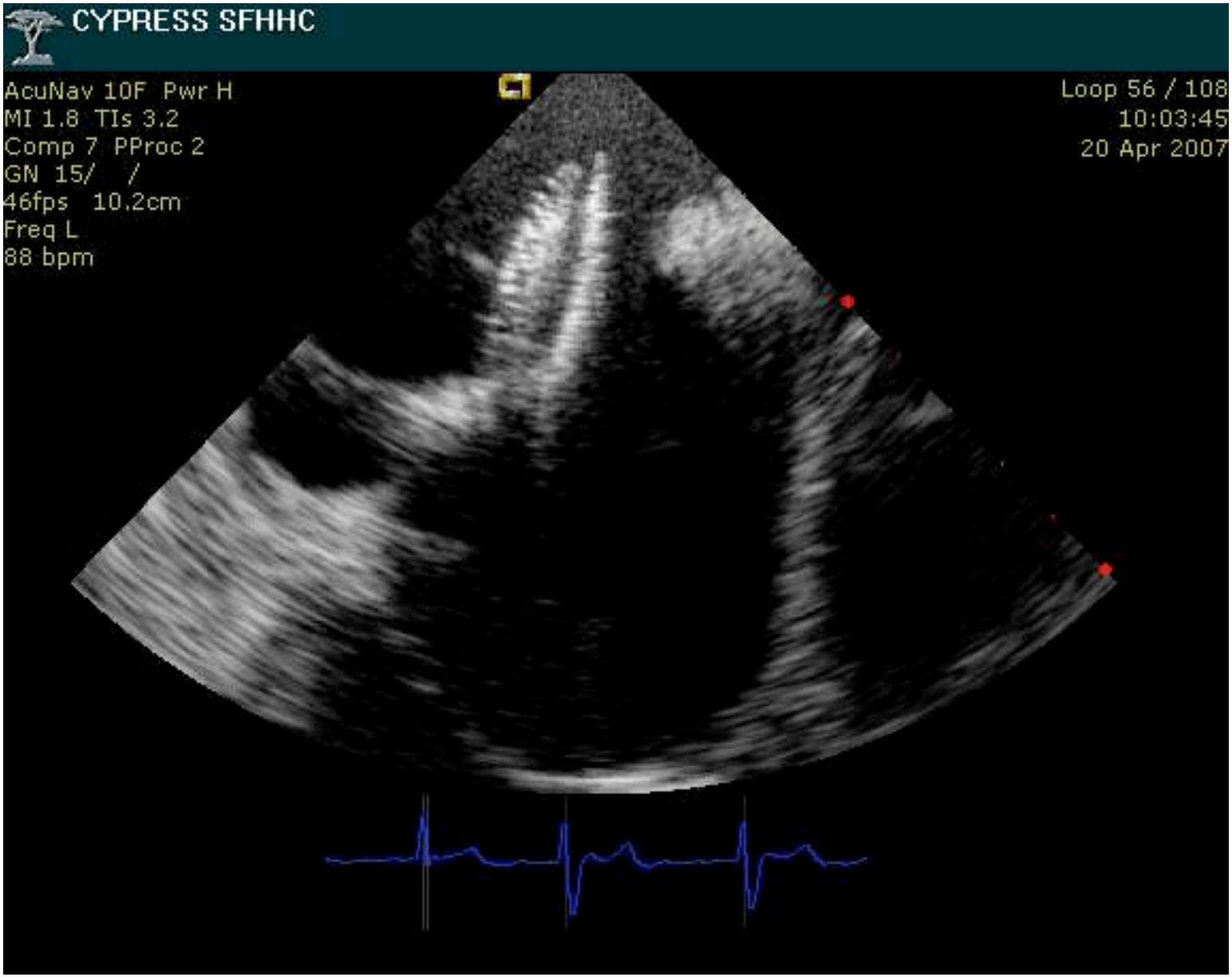
Pulmonary Vein Stenosis



Vasamreddy et al. ***Heart Rhythm*** (2004) 1, 78-81.



CARDIAC CT AND STRUCTURAL HEART DISEASE: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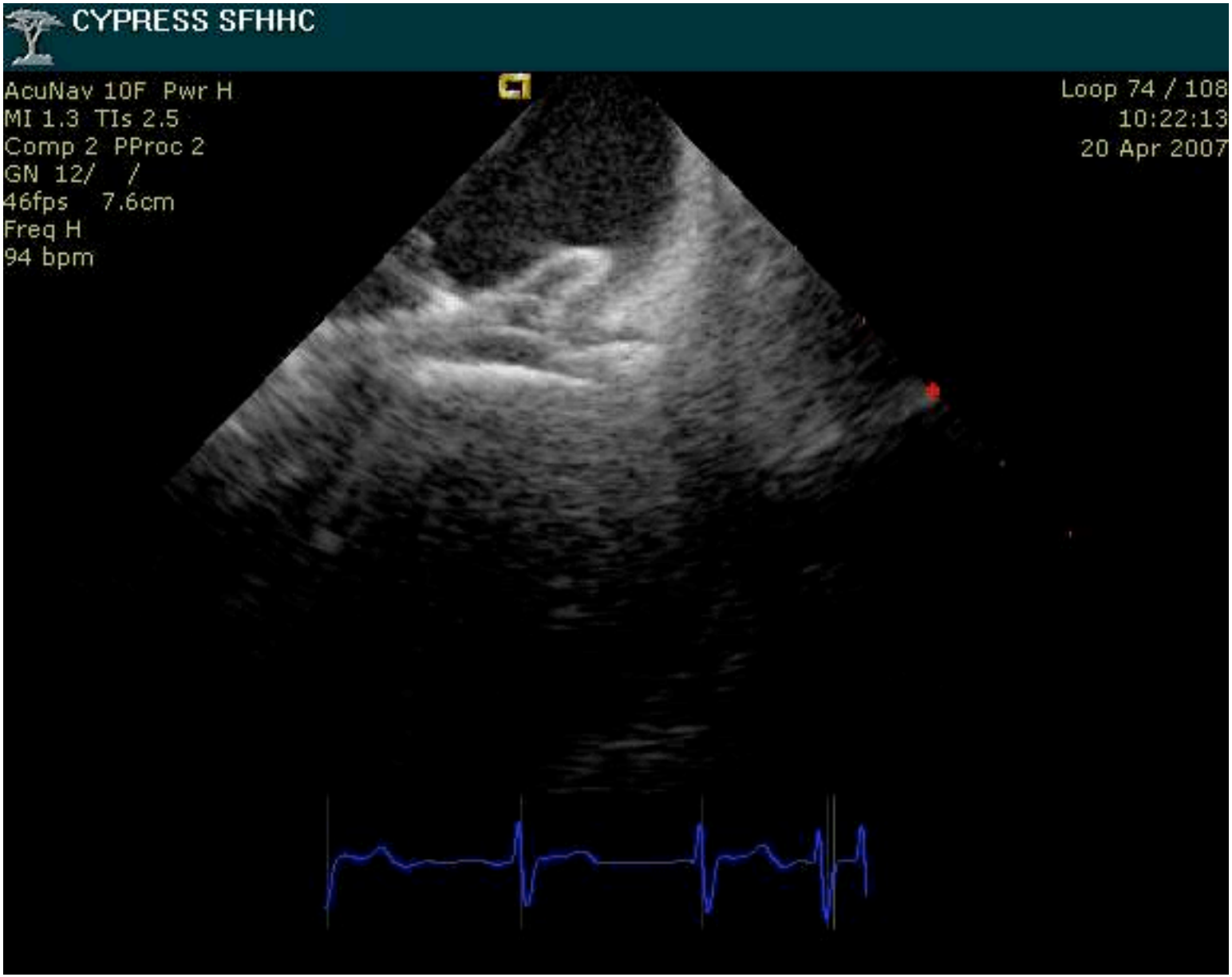
20 Apr 2007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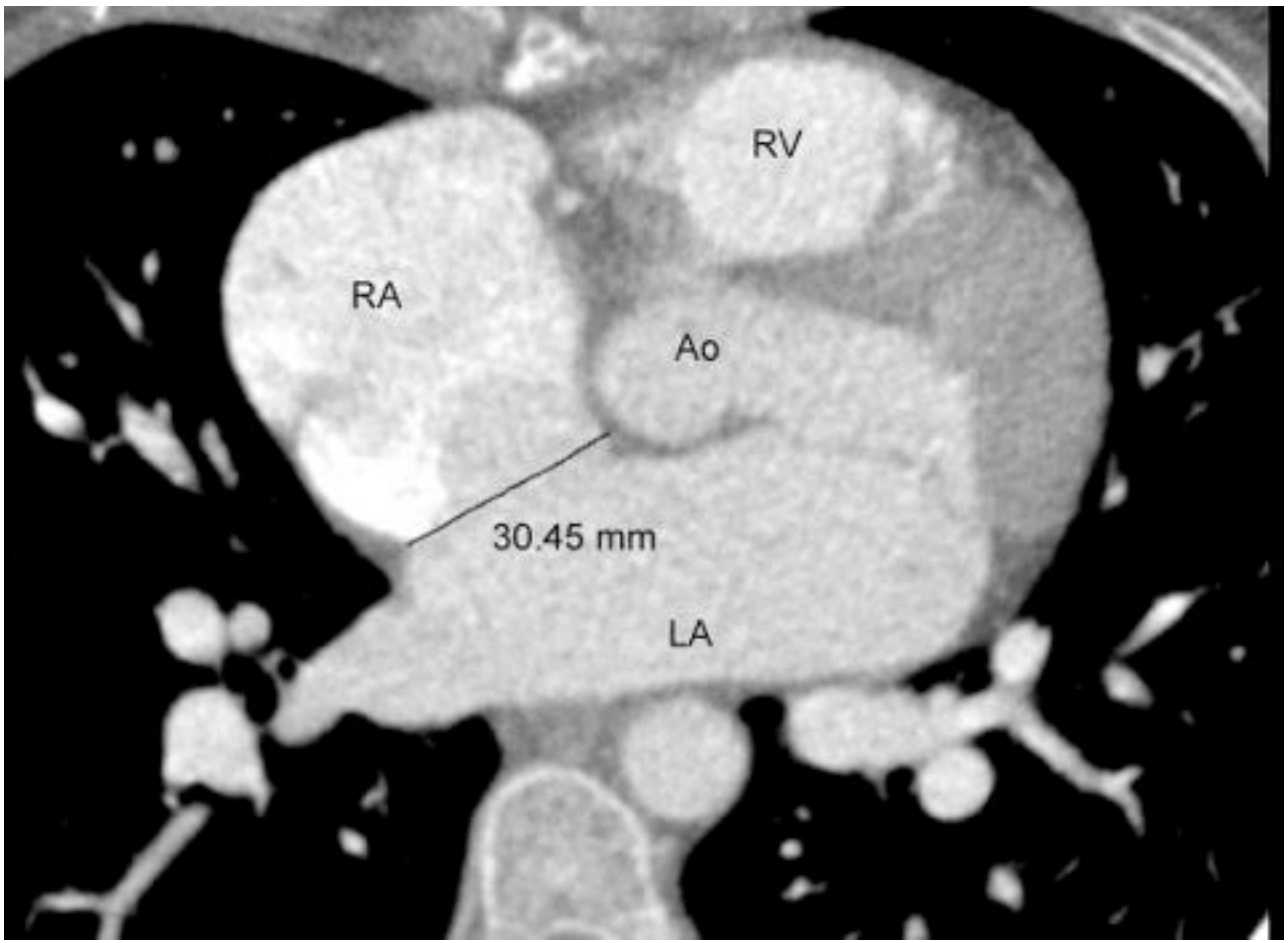
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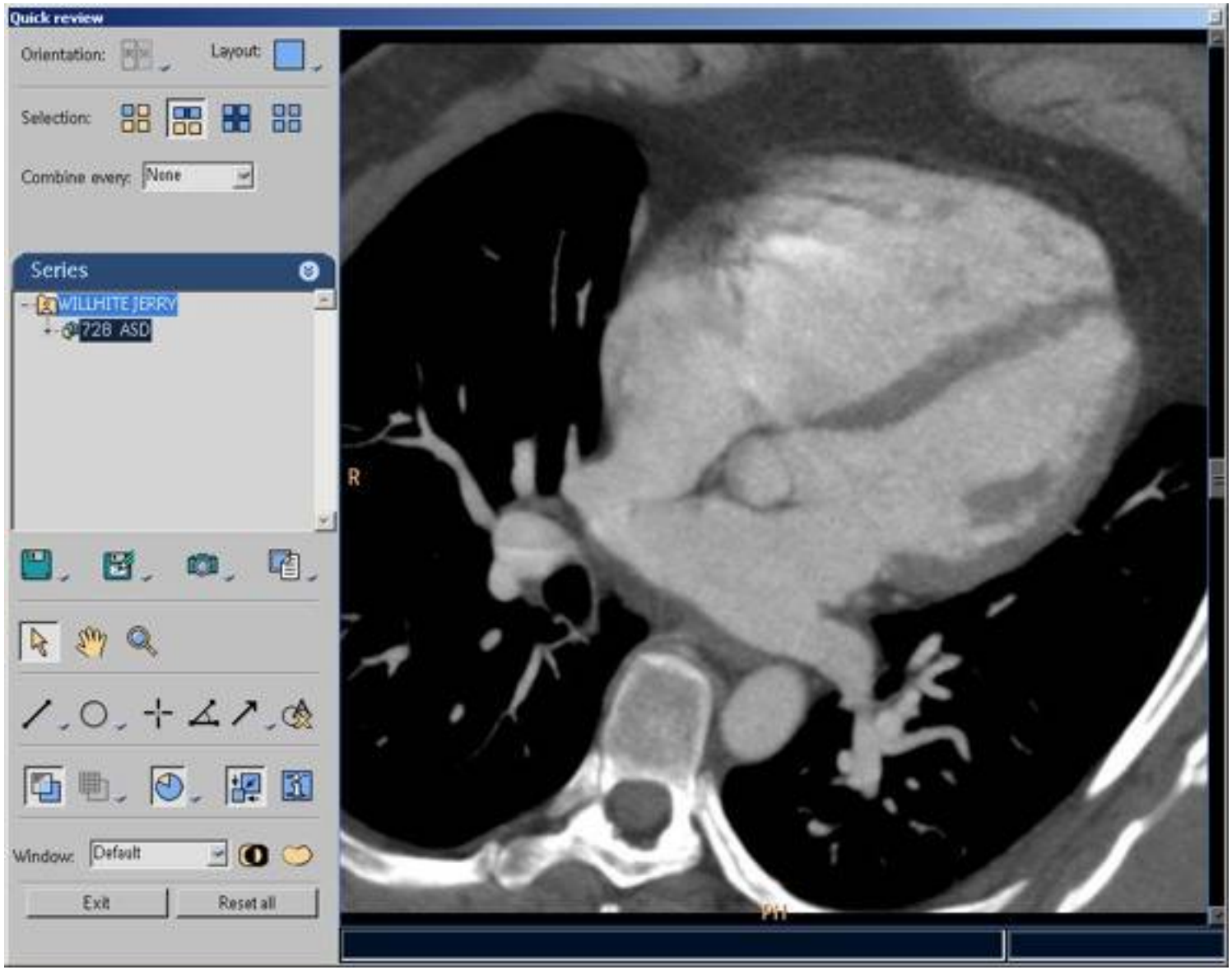
Ao
30.45 mm
LA

RV
RA
Ao
LA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Selection:
Combine every:
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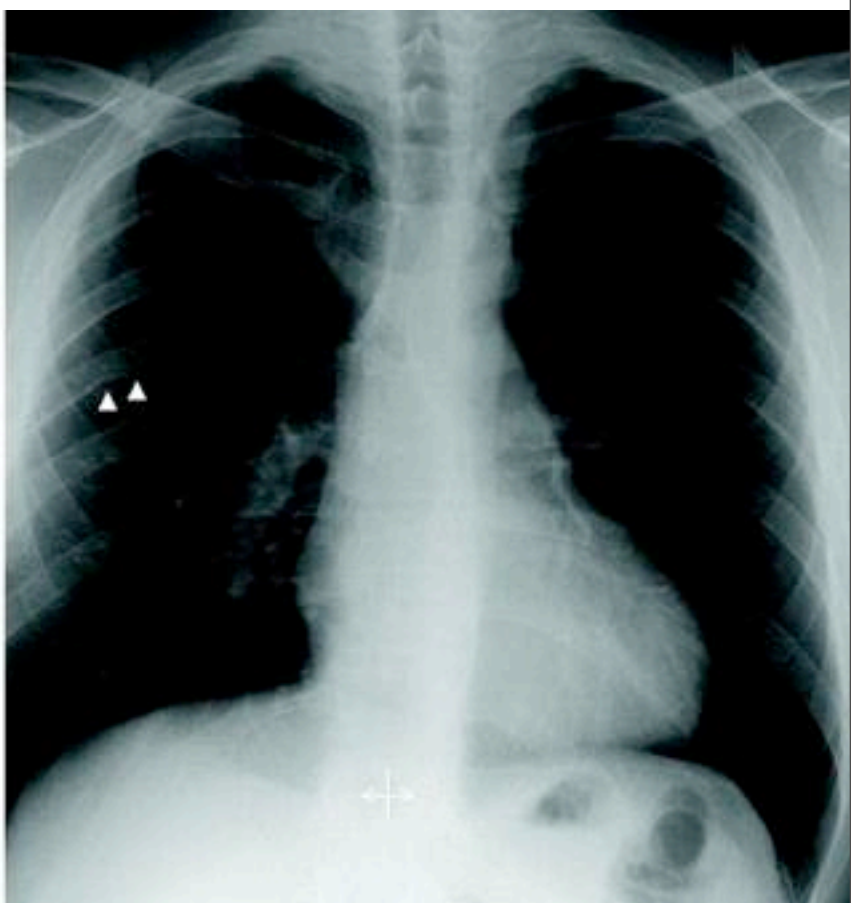
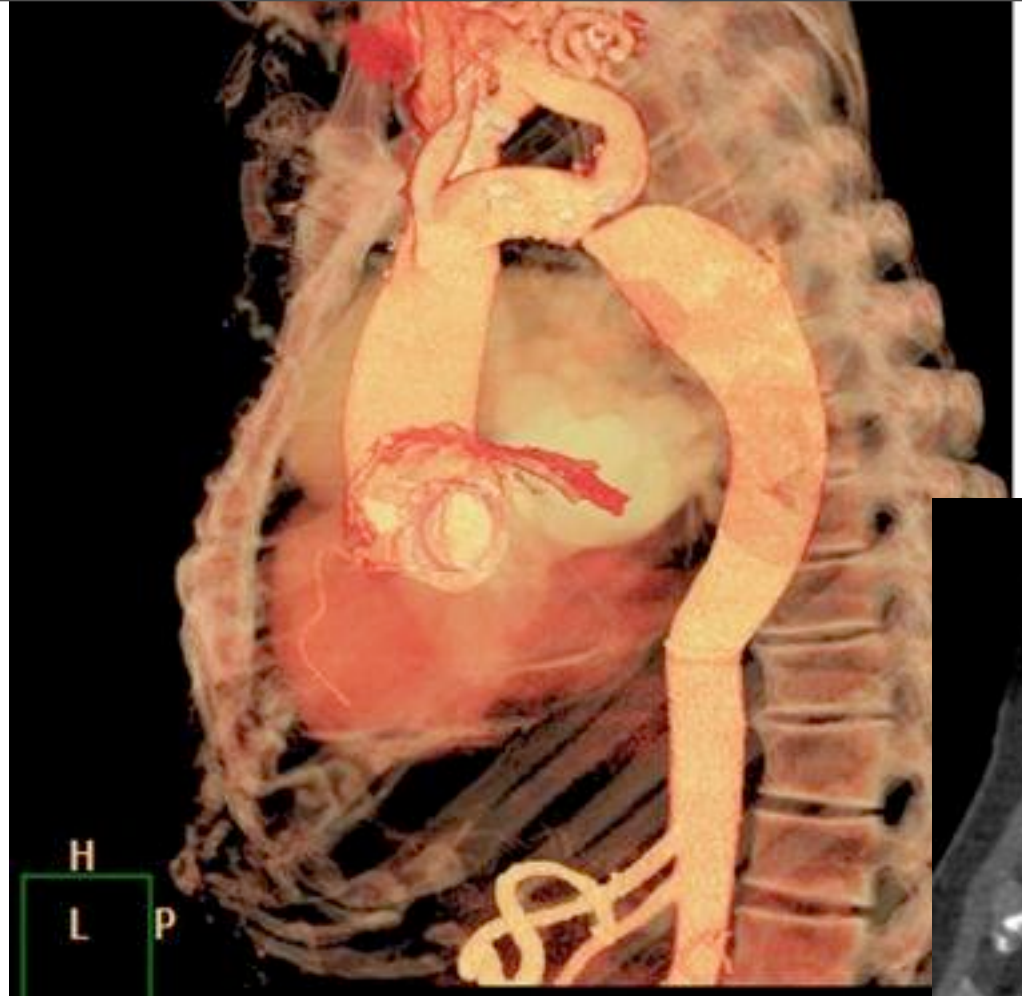
WILLHITE JERRY
728 ASD
Window:
Default
Exit
Reset all
R
PH

Sinus Venosus ASD

Aortic Coarctation

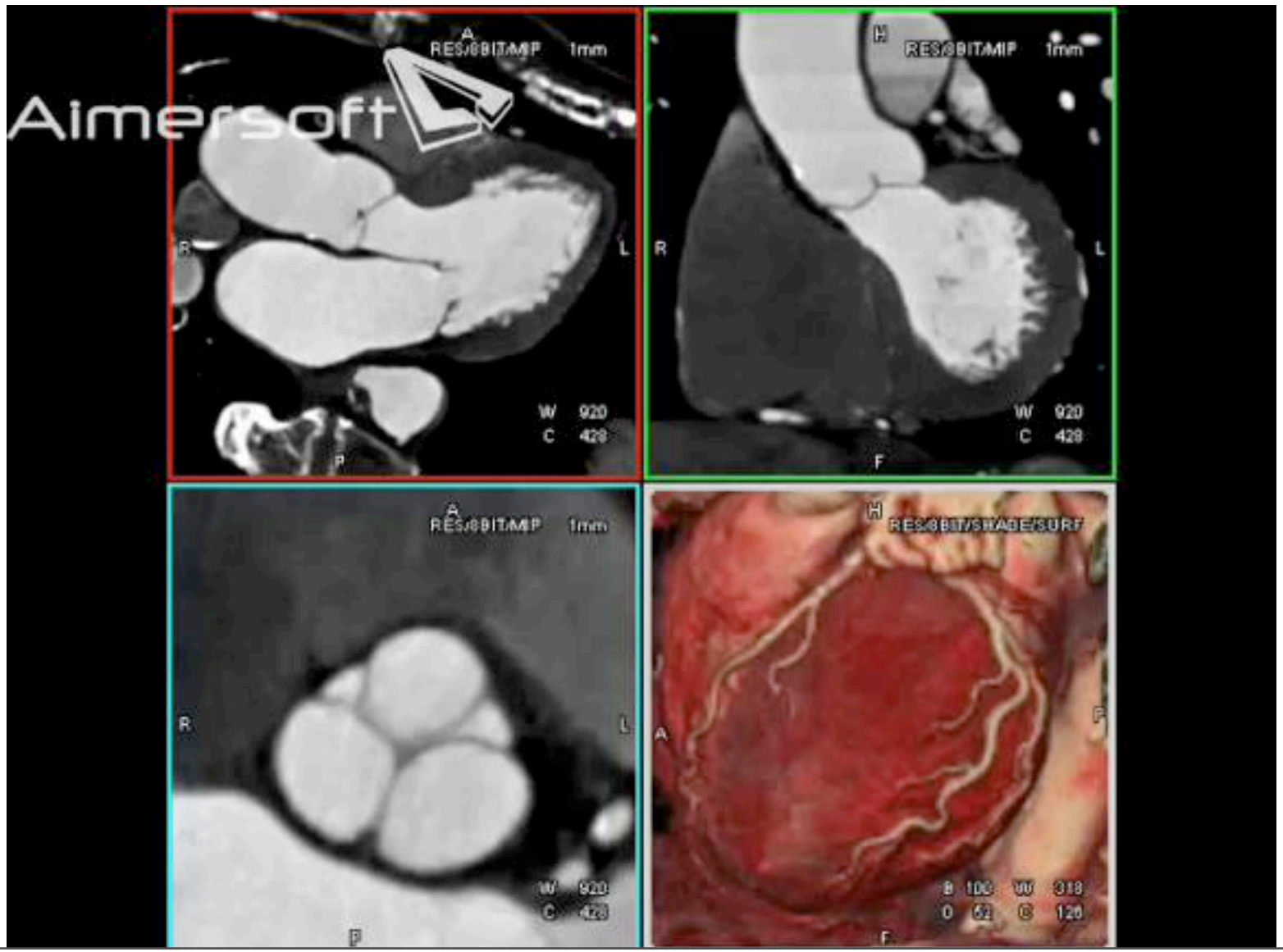


Fröhlich, G et al. ***Circulation***. 2005;112:e81.


H
L
P

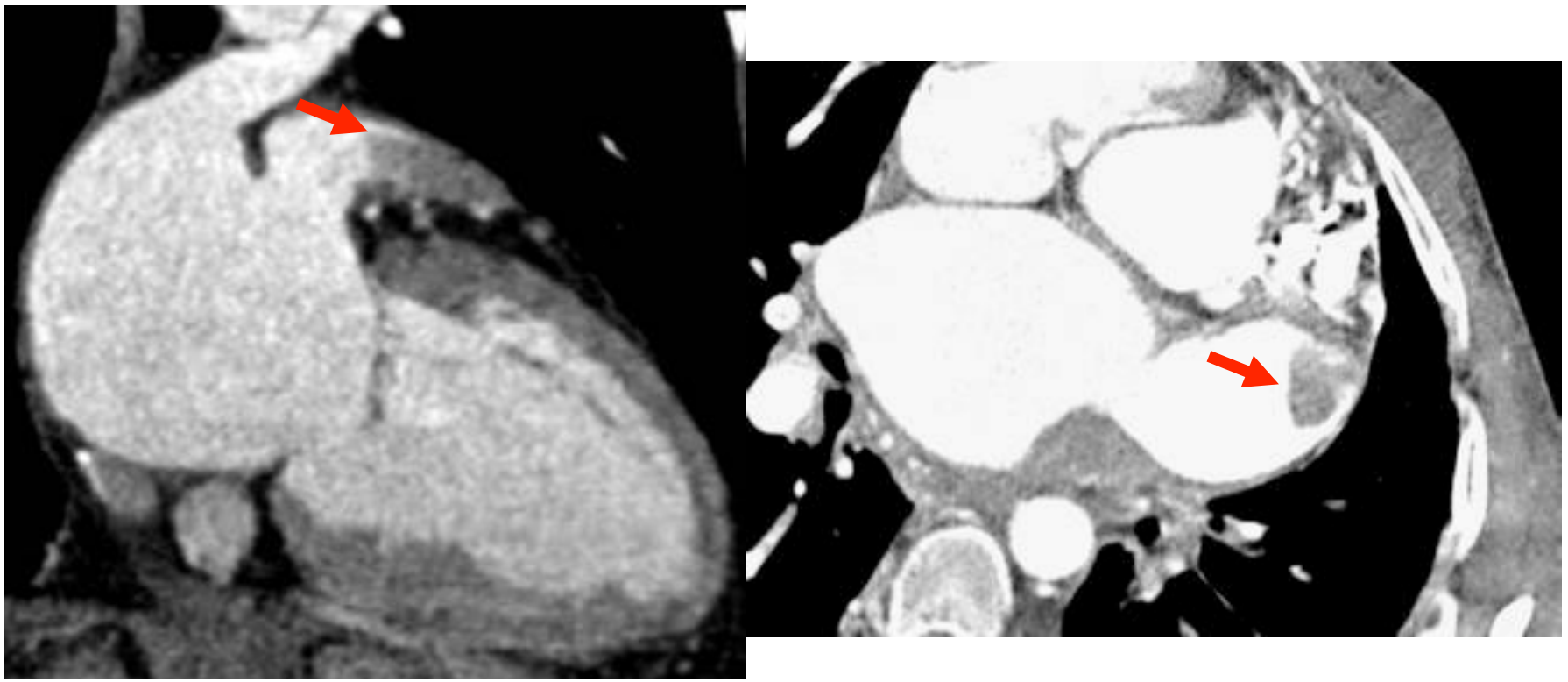
PROSTHETIC VALVE FUNCTION: St. Jude

Functional Analysis

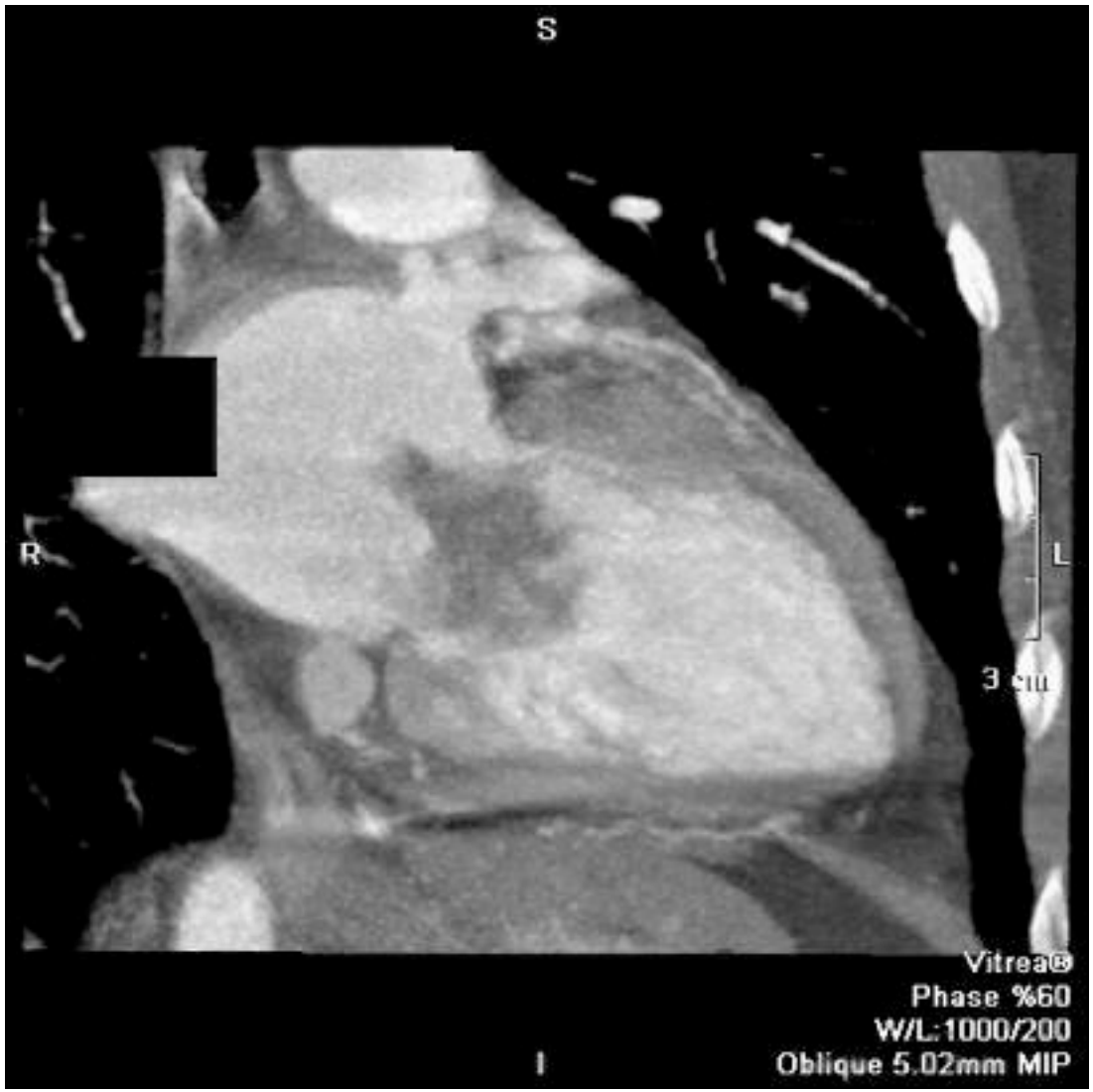


CARDIAC MASS

Left Atrial Appendage Thrombus

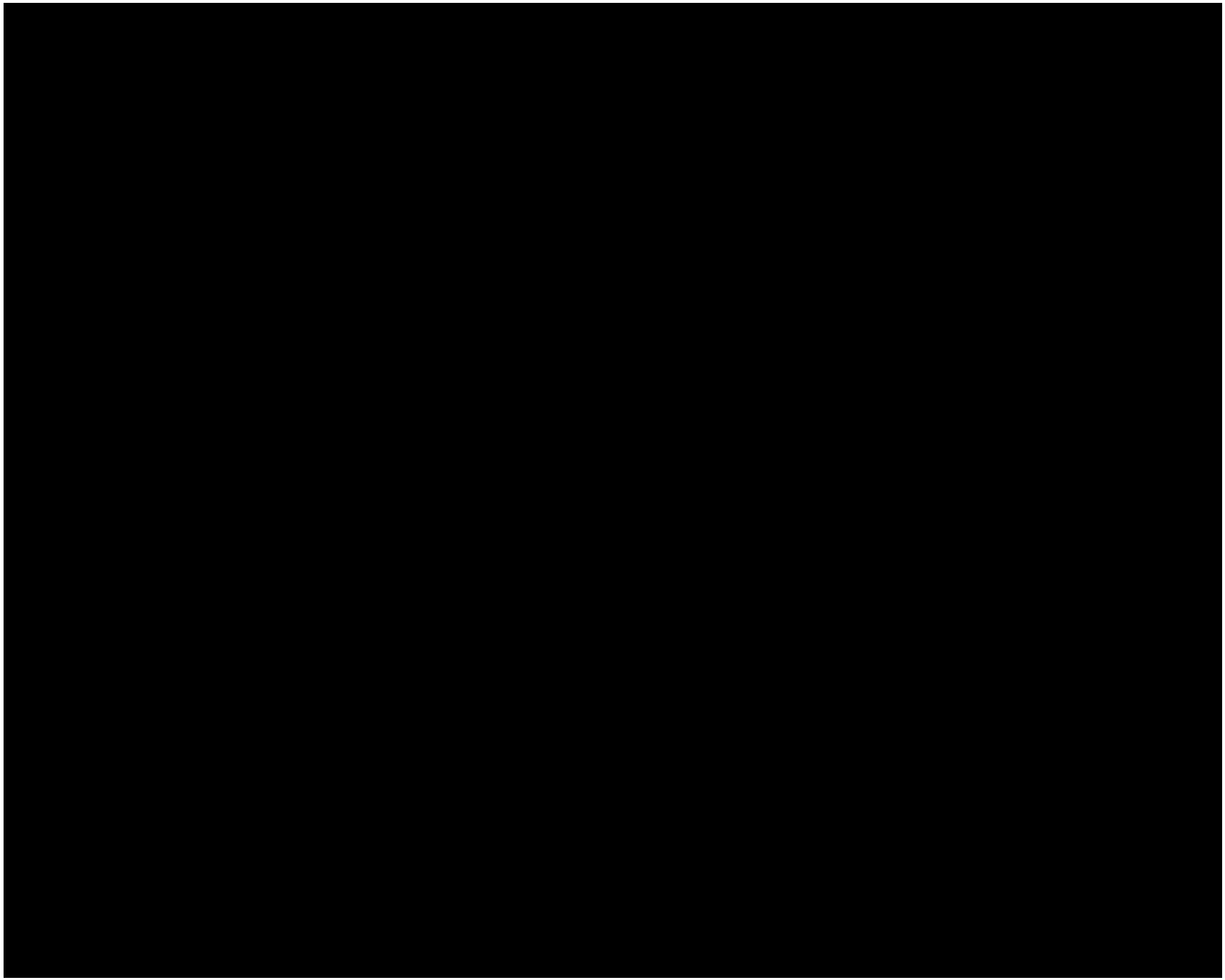


TUMOR PLOP



A
MPR Thin
LAO/RAO -128
CRAN/CAUD -64
R
L
P
F
W 667
C 236

PHILIPS
Patients
View
Analyze
Print
Report
Export
Live View
Review View
Side View
ID:
Birth Date
Sex:
1
2
3
3 Live
Interaction with the volume is possible, however the volume will snap back to its registered position when the mouse button is released
Place a tag
Select the segment you want to tag.
Place a tag in Live view.
Select the correct tag position on the target line using the tools in the toolbars in the side or review window.
Confirm the correct tag position in the side or review window.
Segment to tag
Left atrium and PV
Presets
Tag 1
Region of interest
Whole heart on/off
Interaction
CRAN 6°
RAO 38°
Review



CTA Limitations

- Rapid (>80 bpm) and irregular HR
- High calcium scores (>800-1000)
- Stents
- Contrast requirements (Cr > 2.0 mg/dl)
- Small vessels (<1.5 mm) and collaterals
- Obese and uncooperative patients
- RADIATION EXPOSURE

When to consider MSCT?

- Equivocal stress test or persistent symptoms despite negative stress test
- Prior to non-coronary cardiac surgery (valve or congenital repair)
- Patients with difficult access or on therapeutic warfarin
- Suspected coronary anomalies

Effective Dose of

- PA/Lateral CXR 0.04-0.06 mSv
- Head CT 1-2 mSv
- Chest CT 5-7 mSv
- Abd/Pelvis CT 8-11 mSv
- Diagnostic Cor Angiogram 3-5 mSv
- MSCT angiography 9.3-11.3 mSv

Average annual background radiation in U.S ~ 3.6 mSv

Morin et al. *Circulation* 2003;107:917-22.