

CT Cardiac Angiography: A Significant Development in Cardiology

Dr Chris Ellis

Cardiologist

Greenlane CVS Services

Auckland City Hospital

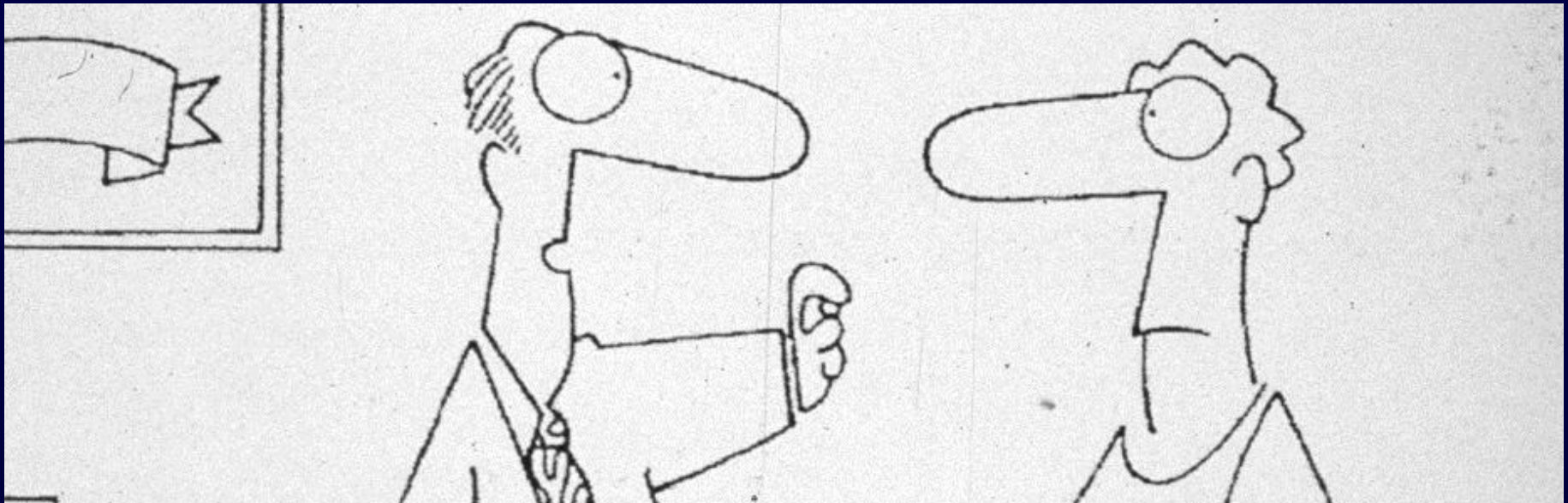
& Auckland Heart Group:

Mercy Hospital



NZMA GP CME Conference, Rotorua 9-12 June 2011

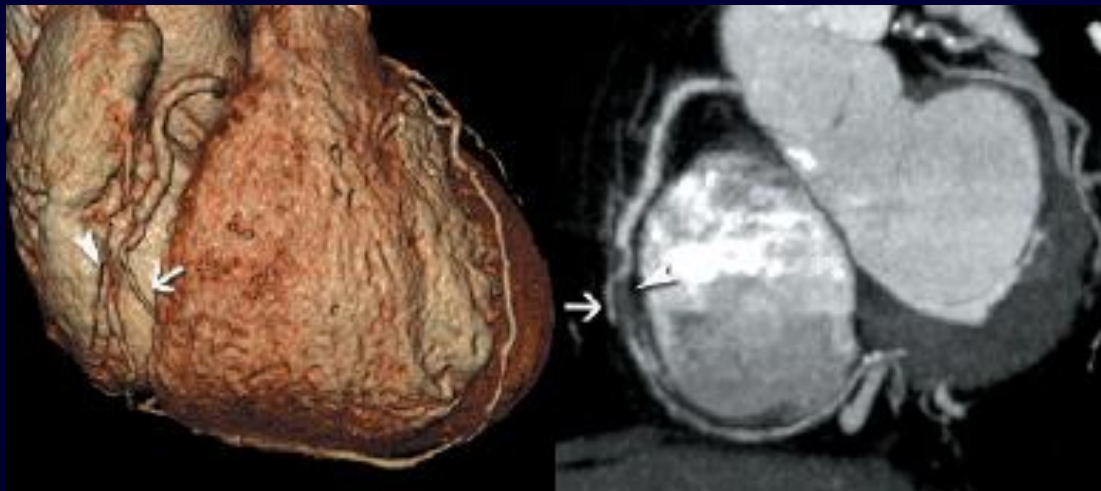
For a *Population*: A Healthy Lifestyle is Very Important



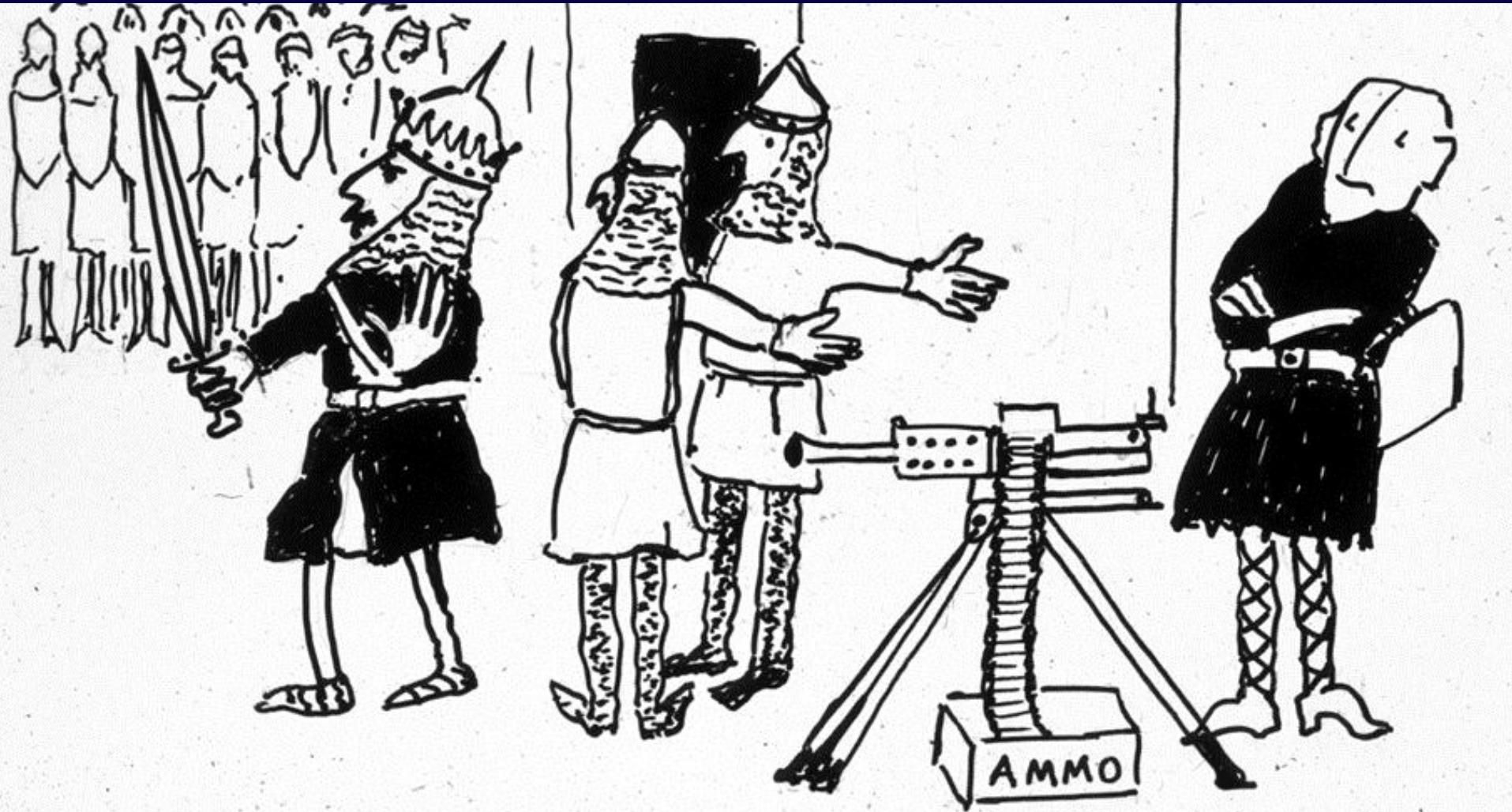
Aspirin & Statins: It's all about CVS Risk of the *Individual*.....the more the risk, the more the benefit. First determine the risk, using ALL of the clues which are available!

**“To prevent a heart attack, take one aspirin every day.
Take it out for a jog, then take it to the gym,
then take it for a bike ride....”**

CT Cardiac Angiography: What is it? How Can it Help Us?



Significant Developments are not Always Recognised by Everyone.....



'Tell him we haven't got time for any of his bright ideas- we've got a battle on our hands.'

CT Cardiac Angiography: Imaging Challenges

Coronary arteries:

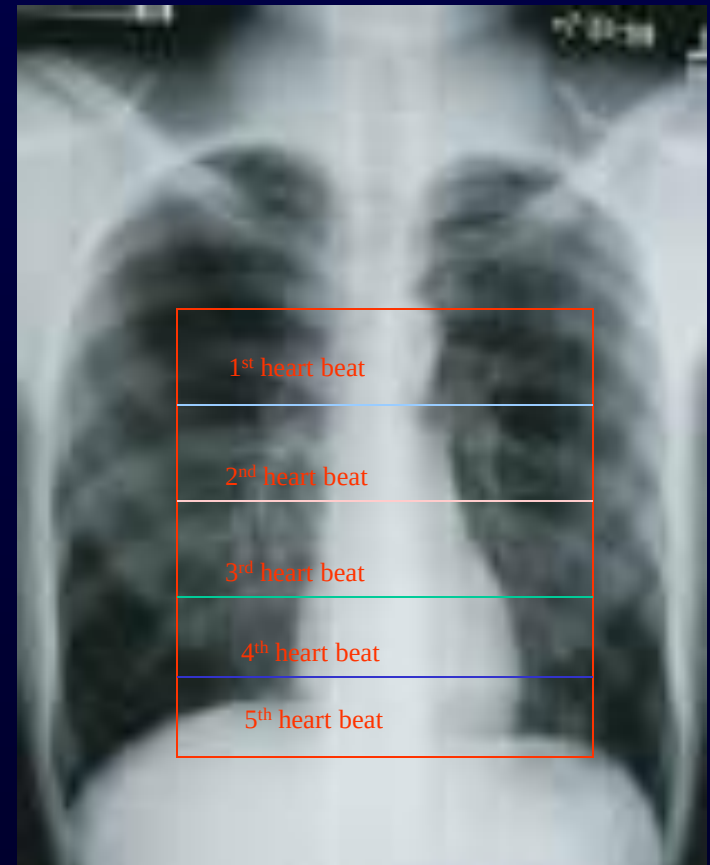
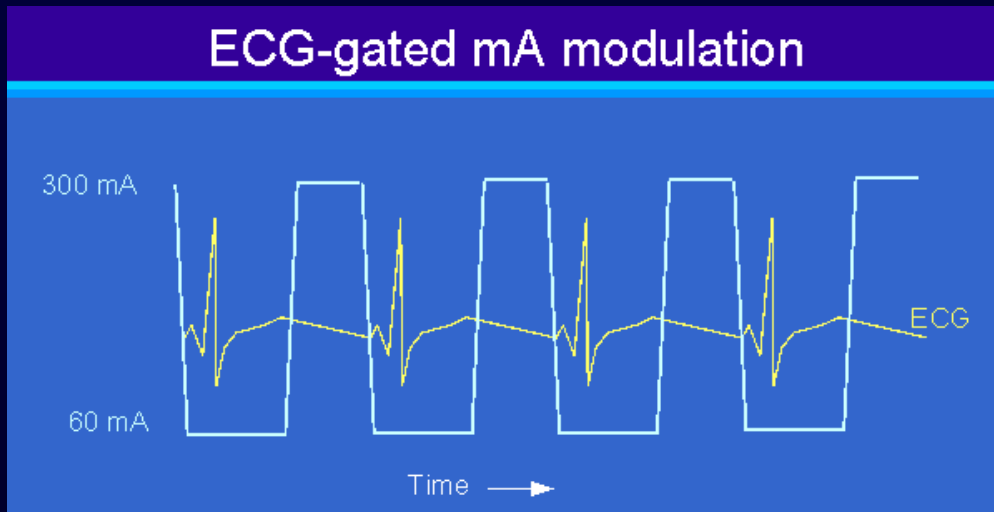
- small and tortuous (2-4mm).
- Subjected to complex respiratory and cardiac motion.
- RCA moves at up to 120 km/hour



120 km/h

Multi-Slice CT (64 slice)

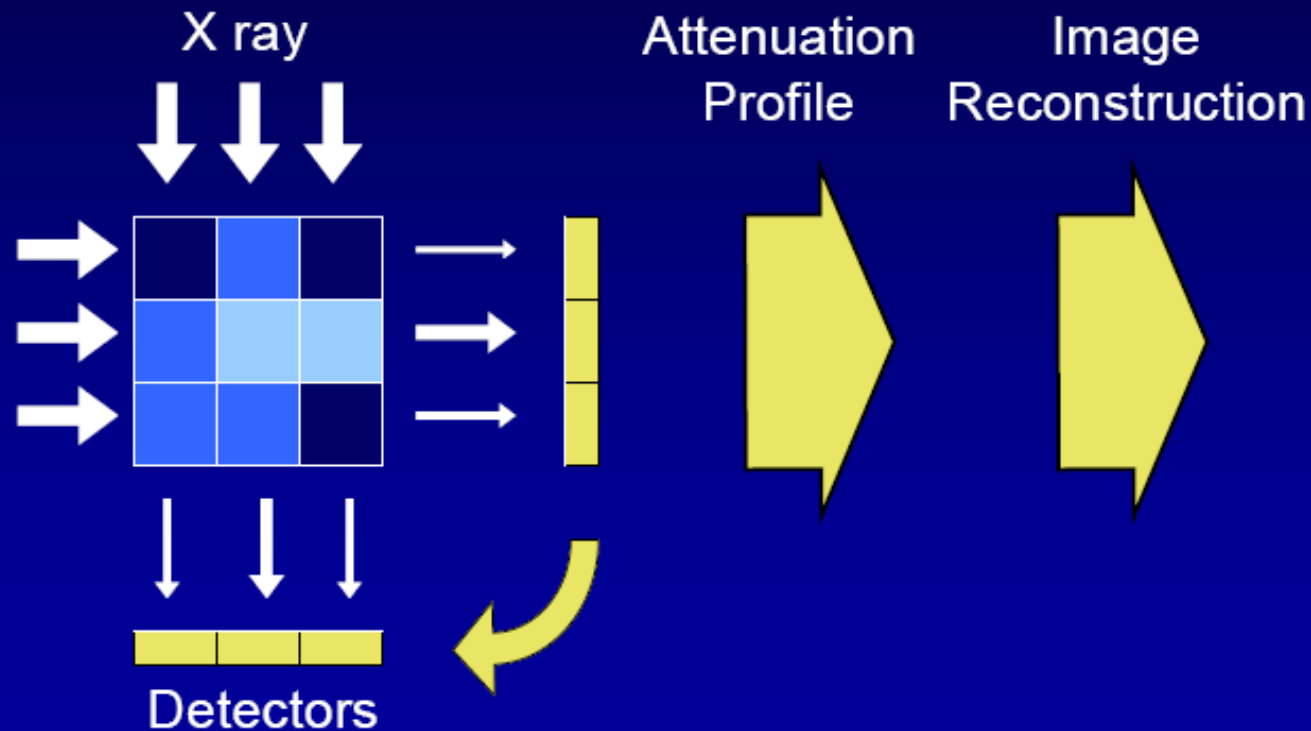
- The X-Ray is taken when the coronaries are most still: diastole
- ECG is 'gated'; requires slow and steady HR (50-70 bpm).
- Acquires a 3D data set of the whole heart, in 6-10 seconds



64-Slice CT Cardiac Angiography: CT Scanner



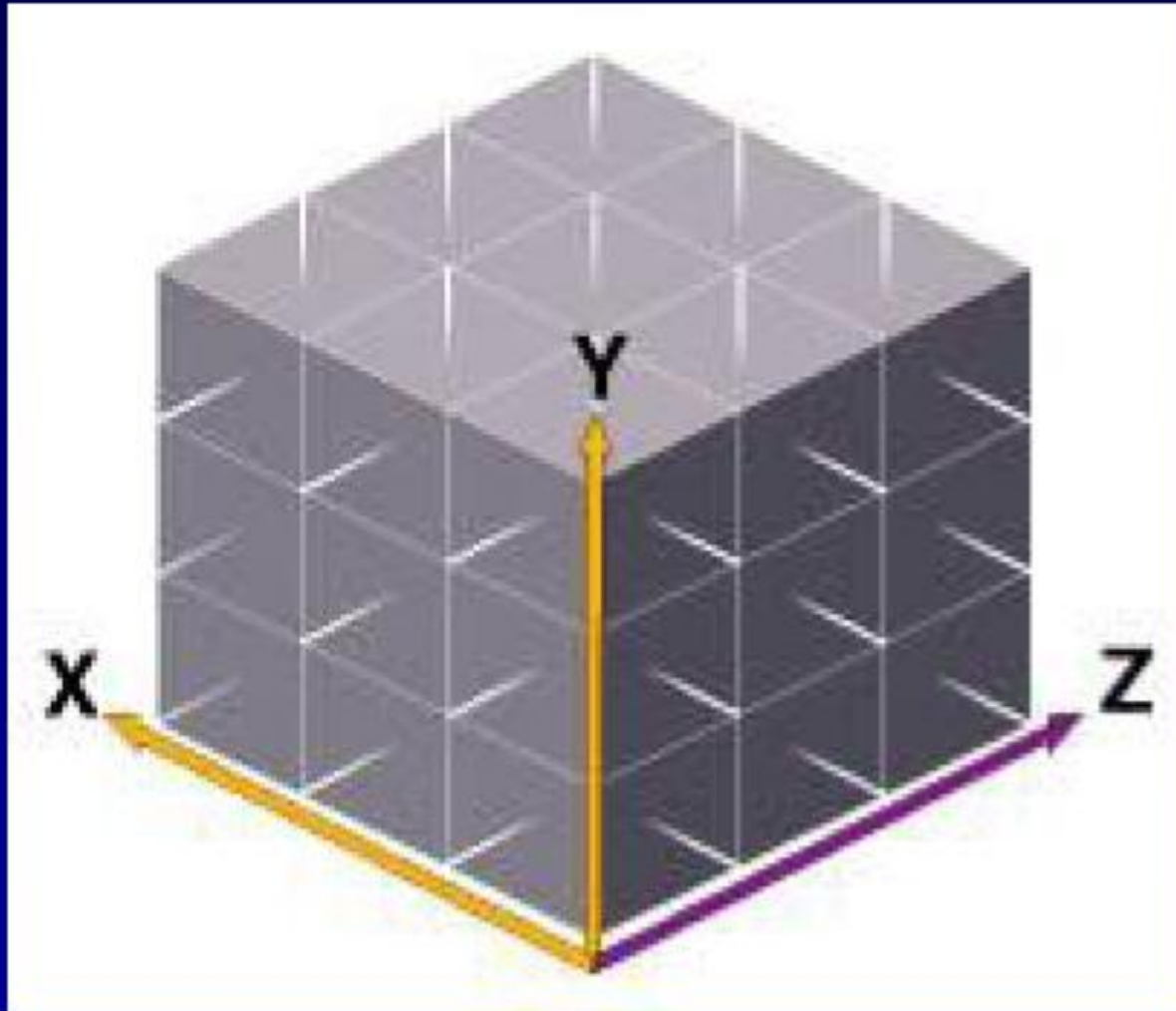
Data Acquisition



X-rays are collected by detectors which record and digitise into 'voxels' (3D 'pixels')

Voxel Size

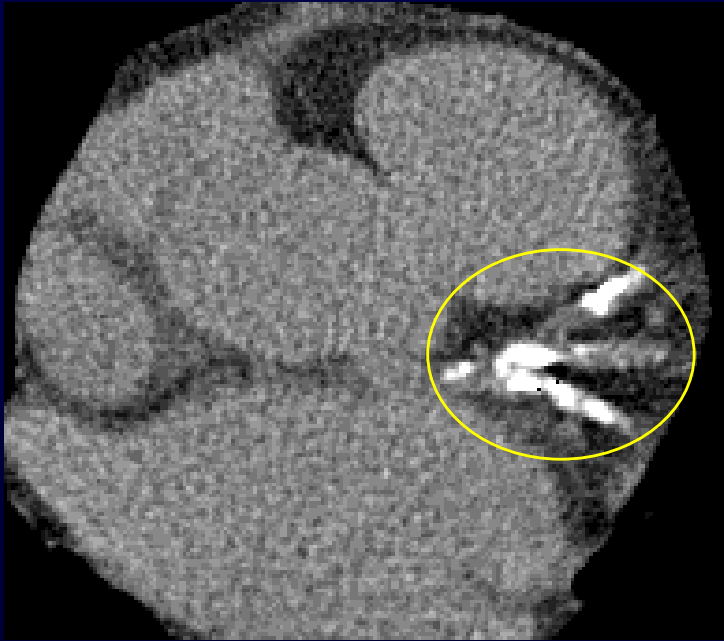
Spatial resolution 0.4mm x 0.4mm x 0.625mm



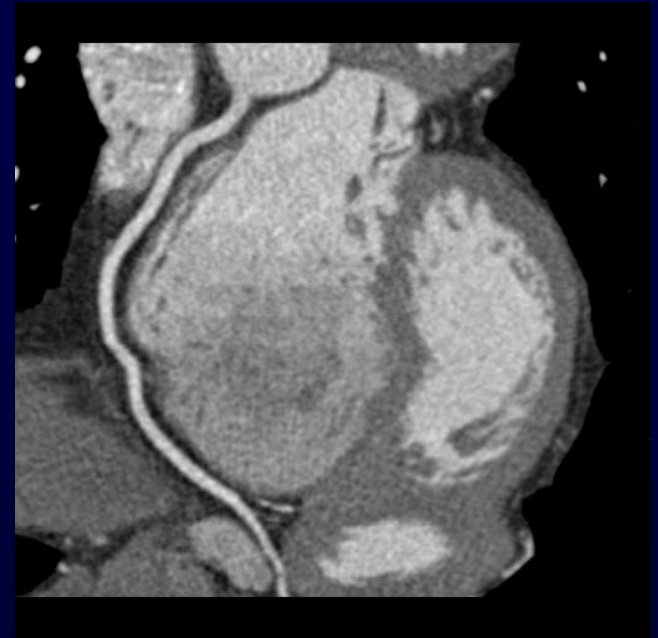
Voxel = “3-dimensional Pixel”

CTA Patients have 2 'scans'

1.



2.



- Calcium Score = 1mSv
 - Asymptomatic Patients
 - Improves CVS Risk Assessment
 - [Can have alone]
- CT Angiogram Scan = 7mSv
 - Equivocal symptoms or ECG signs
 - Anatomical Assessment

1. Coronary Calcium Score (Agatston Units)



Coronary Calcium Score:

Agatston Method Agatston et al JACC 1990;15:827-832.

- 30-40 slices obtained at 3mm intervals down the heart to include the entire coronary tree (ECG 'gated')
- 'Effective' radiation dose of approx 1mSv/Scan (Mammography approx 1mSv)
- Units: 'Agatston score', dependent on volume & density calcium

GE MEDICAL SYSTEMS
LightSpeed VCT
Ex:
Se: 2
Im: 14
SN I132.50 Ax
DFOV 25.0cm
STND

A 183

TS1
M46Y
AW148002216.937.1305529664
Mar 08 2010
02:40:46 PM
SEGM 512 X 512

Mag = 1.00
FL:
ROT:



No calcium
in LAD

GE MEDICAL SYSTEMS
LightSpeed VCT
Ex:
Se: 2
Im: 1
SN 1100.00 Ax
DFOV 25.0cm
STND

A 133

TS1
M46Y
AW148002216.937.1305529664
Mar 08 2010
02:40:45 PM
SEGM512 X 512

Mag = 1.00
FL:
ROT:

R
1
0
8

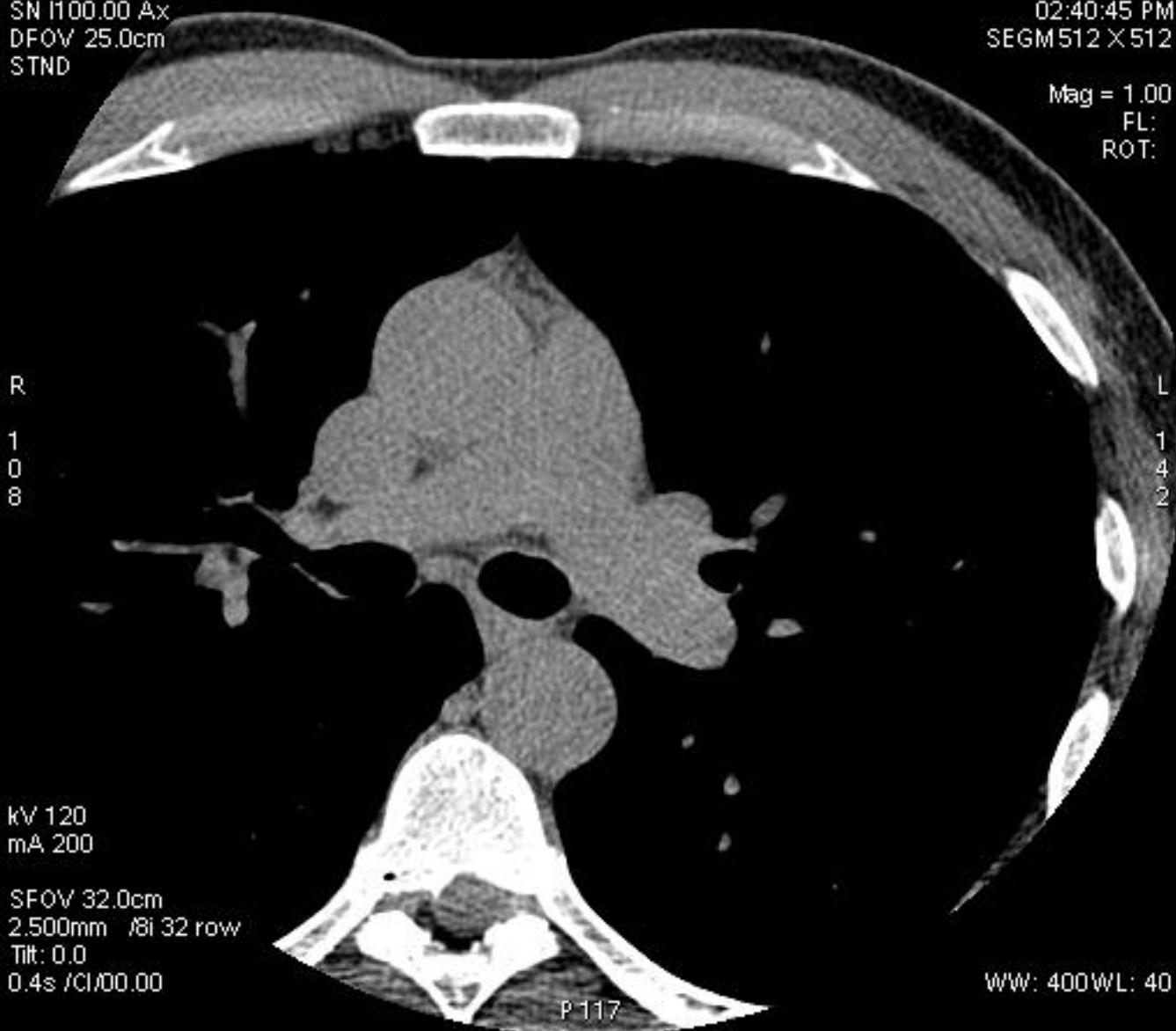
L
1
4
2

kV 120
mA 200

SFOV 32.0cm
2.500mm /8i 32 row
Tilt: 0.0
0.4s /CI/00.00

WW: 400WL: 40

P 117

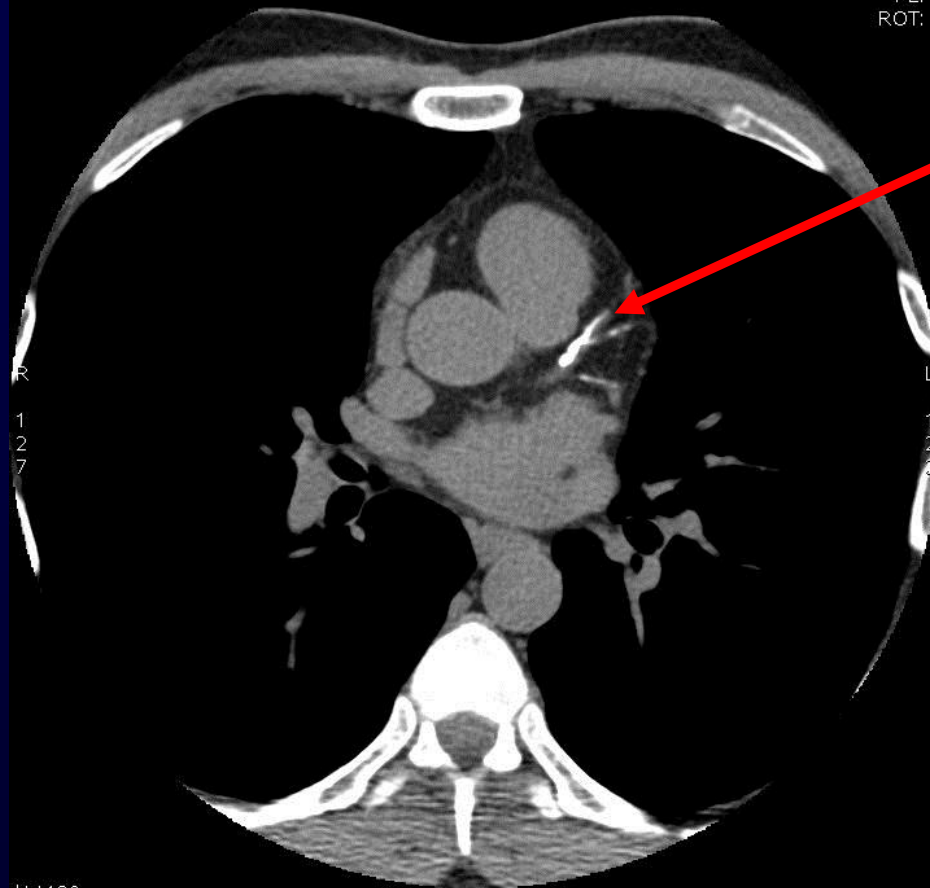


GE MEDICAL SYSTEMS
LightSpeed VCT
Ex:
Se: 2
Im: 13
SN I84.75 Ax
DFOV 25.0cm
STND

A 175

VS
M48Y
AW1700651958.994.1305536230
Mar 07 2011
02:56:34 PM
SEGM 512 X 512

Mag = 1.00
FL:
ROT:



Calcified
LAD

kV 120
mA 550

SFOV 32.0cm
2.500mm /8i 32 row
Tilt: 0.0
0.4s /CI/00.00

P 175

WW: 400WL: 40

GE MEDICAL SYSTEMS
LightSpeed VCT
Ex:
Se: 2
Im: 1
SN 169.50 Ax
DFOV 25.0cm
STND

A 141

BM Ca Score 1960 > 90th
M63Y
AW1281632371.615.1307242468
May 30 2011
02:51:45 PM
SEGM512 X 512

Mag = 1.00
FL:
ROT:

R
9
9

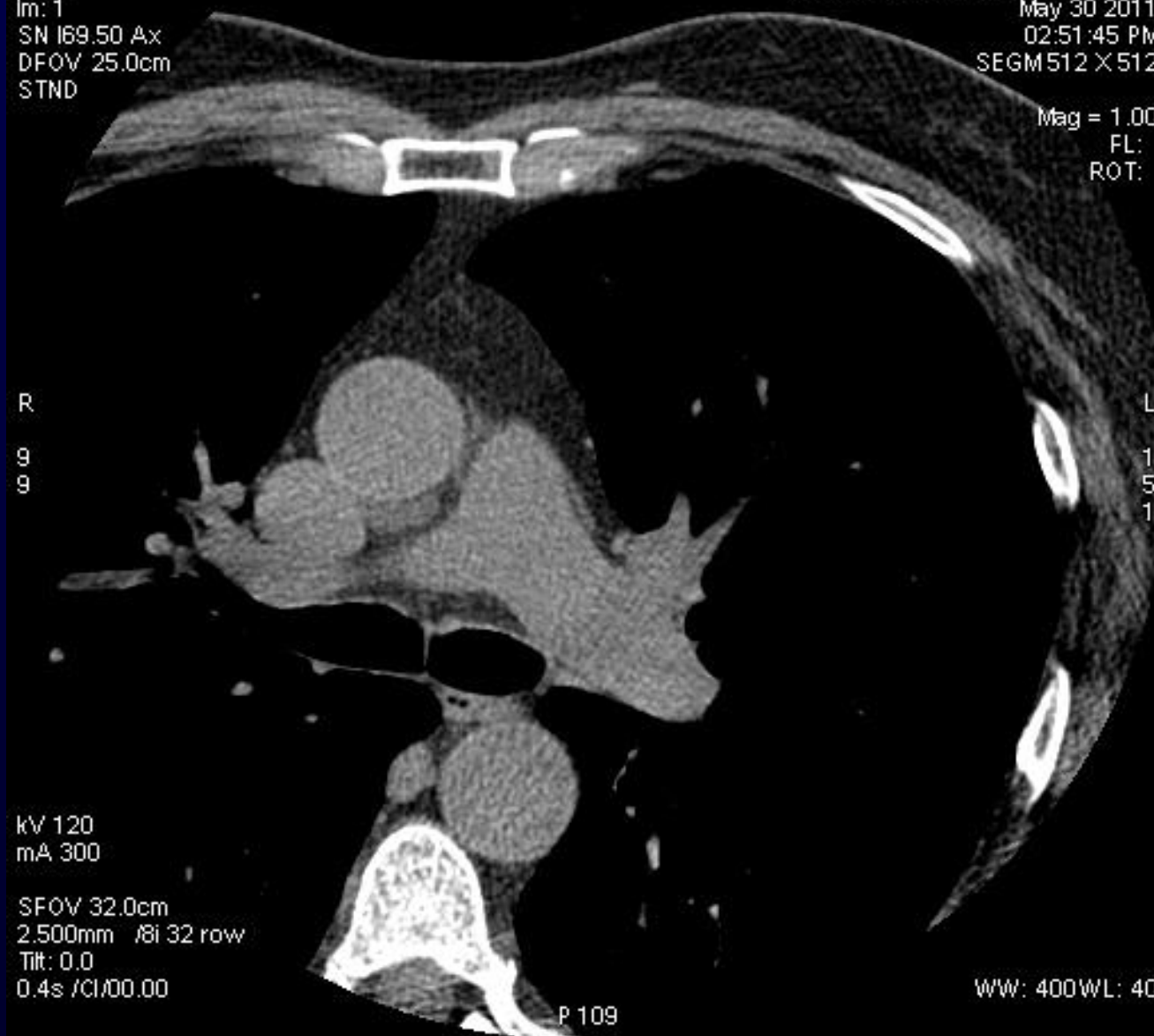
L
1
5
1

kV 120
mA 300

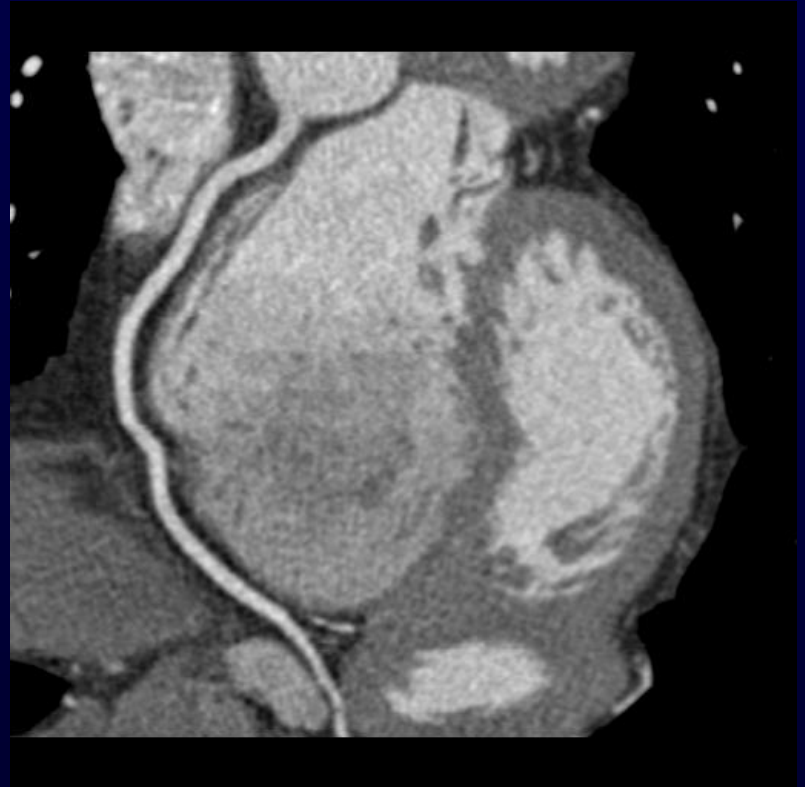
SFOV 32.0cm
2.500mm /8i 32 row
Tilt: 0.0
0.4s /CI/00.00

P 109

WW: 400WL: 40

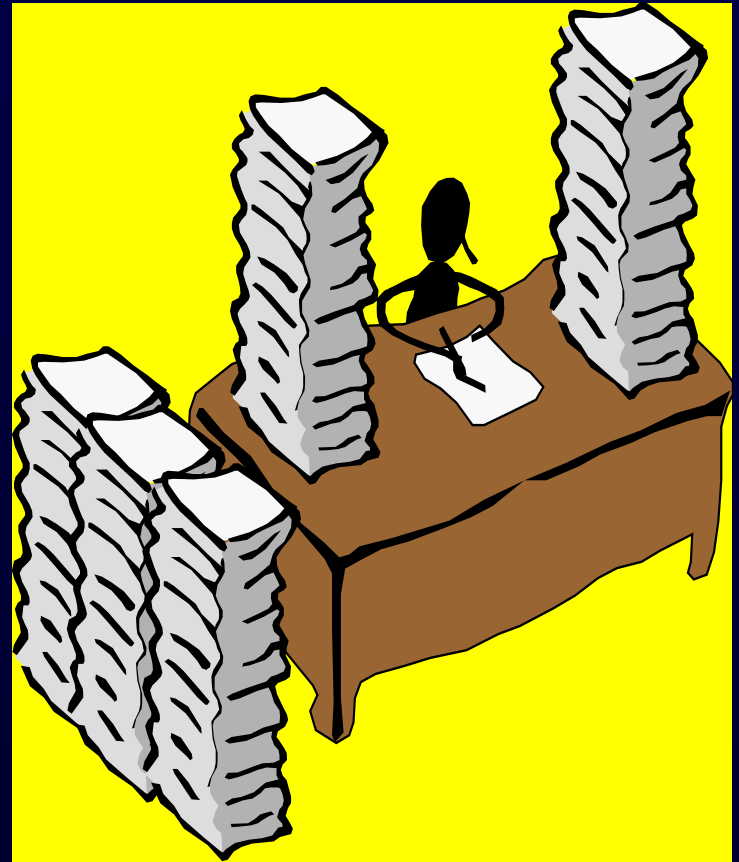


2. Main CT Cardiac Angiogram Scan with iv Contrast



CT Angiography Use

1. Assessment of coronary lumen and stenoses
2. Assessment of Cardiac structures
3. Additional tool for CVS risk assessment



Reformat 2

A 125

TS

Ex:

M 46 AW891998700.532.1304654424

Se: 133 +c

DoB:

I: 107.0

Ex: Mar 08 2010

DFOV 20.0cm

STND/C2 Ph:75%

R

L

7

1

6

2

4

0.4/

kv 100

mA 647

Rot 0.35s/CH 6.4mm/rot

0.6mm 0.16:1/0.6sp

Tilt: 0.0

02:44:49 PM

W = 1311 L = 198

P 75

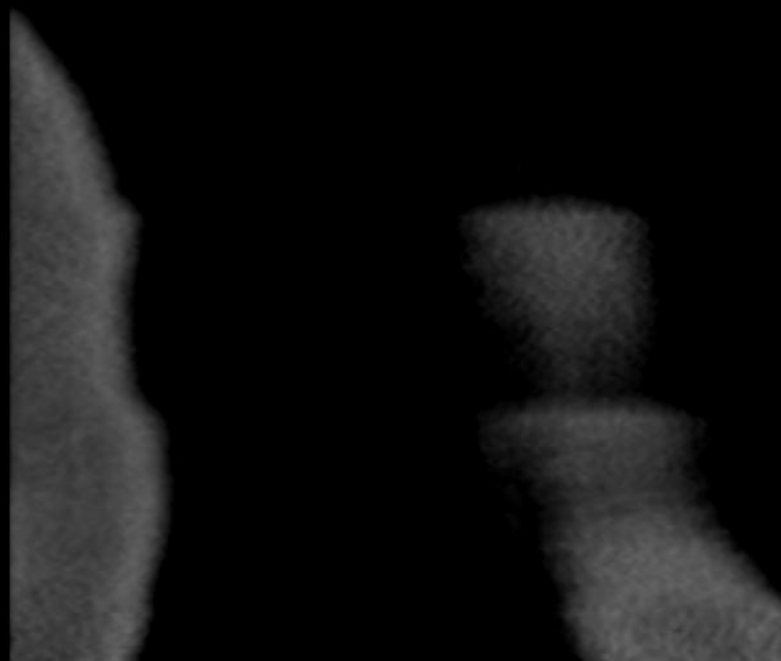
Reformat 2
Ex:
Se: 133 +c
A: 105.6 (coi)

I 94

TS
M 46 AW891998700.532.1304654424
DoB:
Ex: Mar 08 2010

DFOV 20.0cm
STND/C2 Ph:75%

R
A



L
P

0.4/
kv 100
mA 647
Rot 0.35s/CH 6.4mm/rot
0.6mm 0.16:1/0.6sp
Tilt: 0.0
02:44:49 PM
W = 1311 L = 198

I 294

3D
Ex:
Se: 133 +c
Volume Rendering - No cut

I 95

TS
M 46 AW891998700.532.1304654424
DoB:
Ex: Mar 08 2010

DFOV 15.0cm
STND/C2 Ph:75% (No Fill.)

0 L 0 LA 0 0 CRA

R
4
5

L
1
0
5

No VOI
kv 100
mA 647
Rot 0.35s/CH 6.4mm/rot
0.6mm 0.16:1 /0.6sp
Tilt: 0.0
02:44:49 PM
W = 4095 L = 2048

I 245

Surface 2
Ex:
Se: 133 +c
Volume Rendering No cut

177

TS
M 46 AW891998700.532.1304654424
DoB:
Ex: Mar 08 2010

DFOV 20.0cm
STND/C2 Ph:75% (No Filt.)

0 L 180 LAO 0 CRA

L
1
3
8

R
6
2

No VOI
kv 100
mA 647
Rot 0.35s/CH 6.4mm/rot
0.6mm 0.16:1 /0.6sp
Tilt: 0.0
02:44:49 PM
W = 4095 L = 2048

1277

3D
Ex:
Se: 133 +c
Volume Rendering No cut

SPR

TS1
M 46 AW148002216.937.1305529664
DoB:
Ex: Mar 08 2010

DFOV 20.0cm
STND/C2 Ph:75% (No Filt.)

0 L 30 LAO 30 CRA

R
A

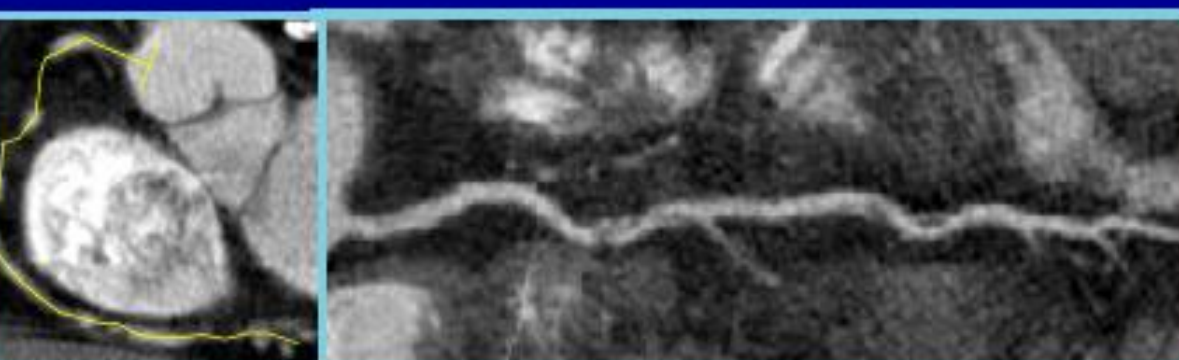
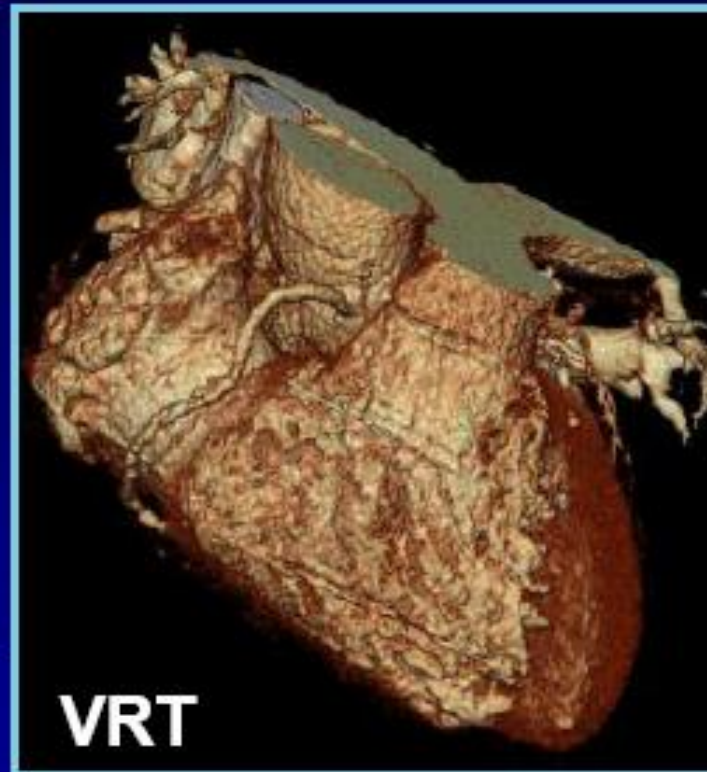
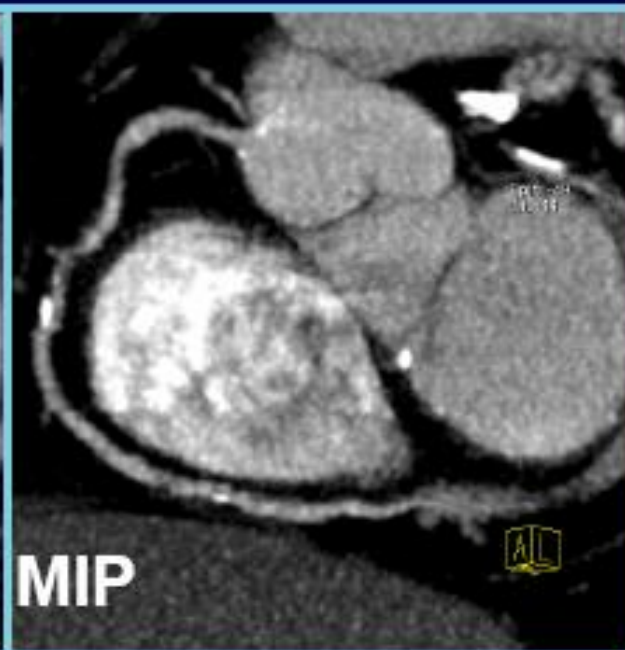
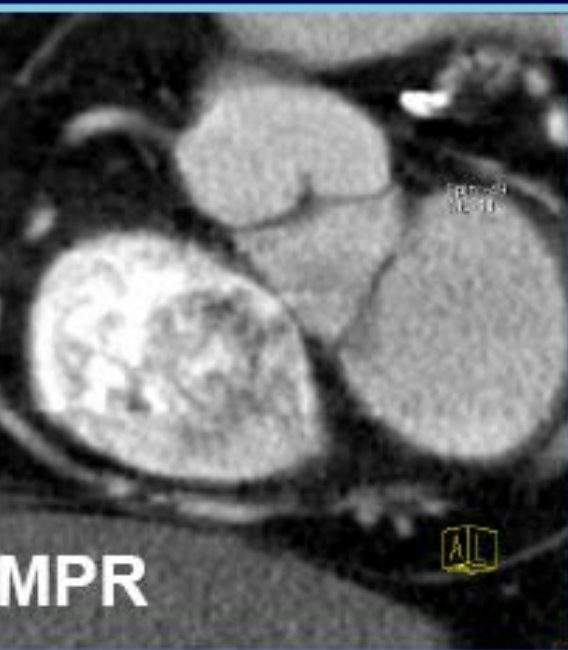
L
P

No VOI
kv 100
mA 647
Rot 0.35s/CH 6.4mm/rot
0.6mm 0.16:1/0.6sp
Tilt: 0.0
02:44:49 PM
W = 4095 L = 2048

IAL



Image Processing



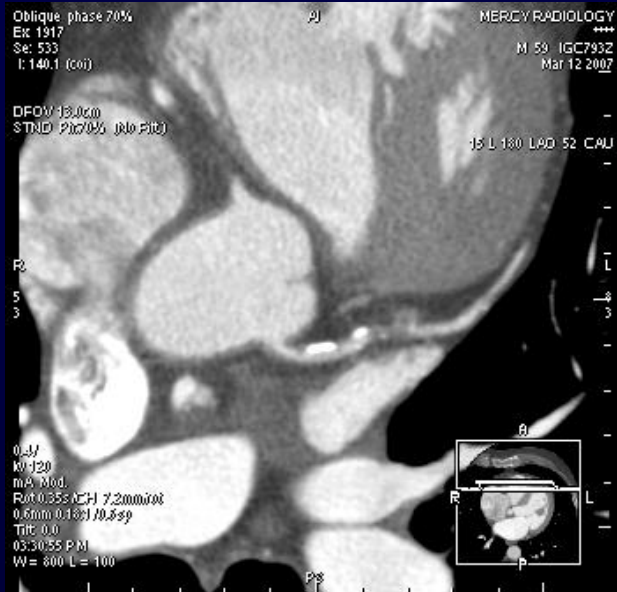
MPR: multiplanar reconstructions

MIP: maximum intensity projections

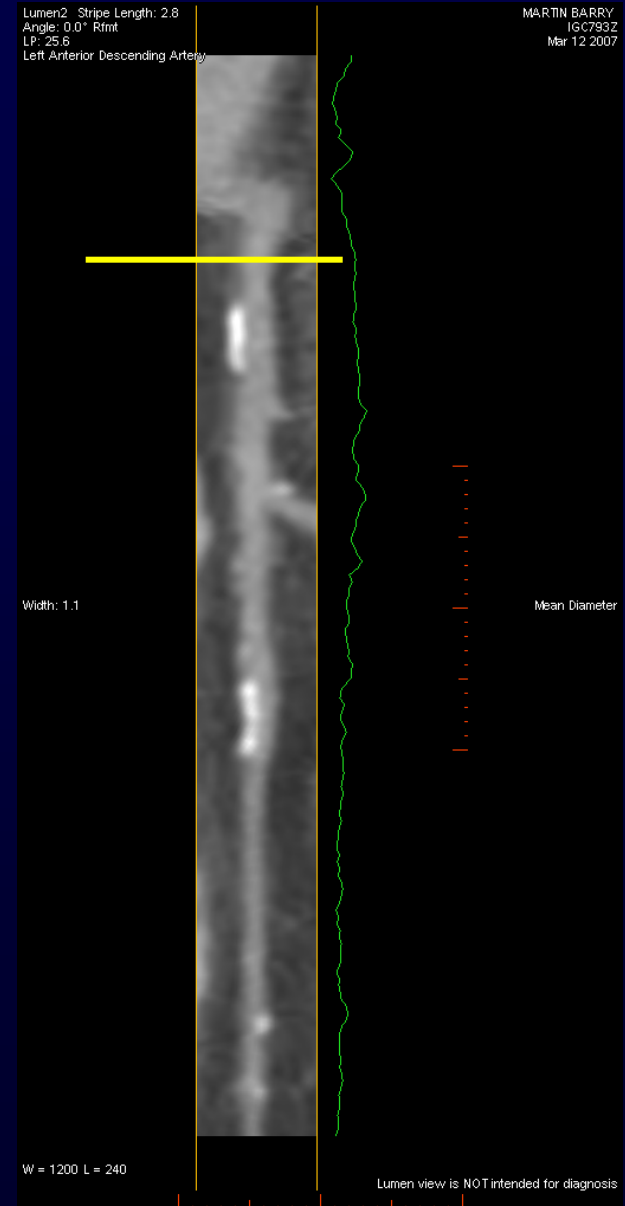
VRT: volume rendering techniques

Multiplanar Reconstruction (MPR): Luminal/Straight

Long Axis



Short Axis



Curved
Ex:
Se: 133 +c
Left Anterior Descending Artery Angle: 0.0

TS1
M 48 AWH148002218.987.1305529884
DOB:
Ex: Mar 08 2010

DFOV 18.5
STND/C2 Ph:75% (No Filt.)

A

P

kv 100
mA 647
Rot 0.35s/CH 6.4mm/rot
0.6mm 0.16:1/0.6sp 0.4/MP
Tilt: 0.0
02:44:49 PM
W = 1200 L = 240

I



Curved
Ex:
Se: 133 +c
Left Marginal Branch Angle: 359.0

TS1
M 48 AW148002218.987.1305529684
DoB:
Ex: Mar 08 2010

DFOV 12.1
STND/C2 Ph:75% (No Filt.)

kv 100
mA 847
Rot 0.35s/CH 3.4mm/rot
0.8mm 0.181/0.8sp 0.4/MP
Tilt: 0.0
02:44:49 PM
W = 1200 L = 240



CTA Case History 1



CTA Case History 1

- 40 year old man, 2 month history of chest heaviness, radiating to the throat and arms
- Walking up a hill, cutting grass
- Hospital admission, Negative troponin, referred for out-pt treadmill test
- Exercised to 12 minutes, minor ST changes, but pain provoked and very SOB
- Referred for CT Cardiac Angiography (CTA)

3D
Ex:
Se: 133
Volume Rendering No cut

P 53

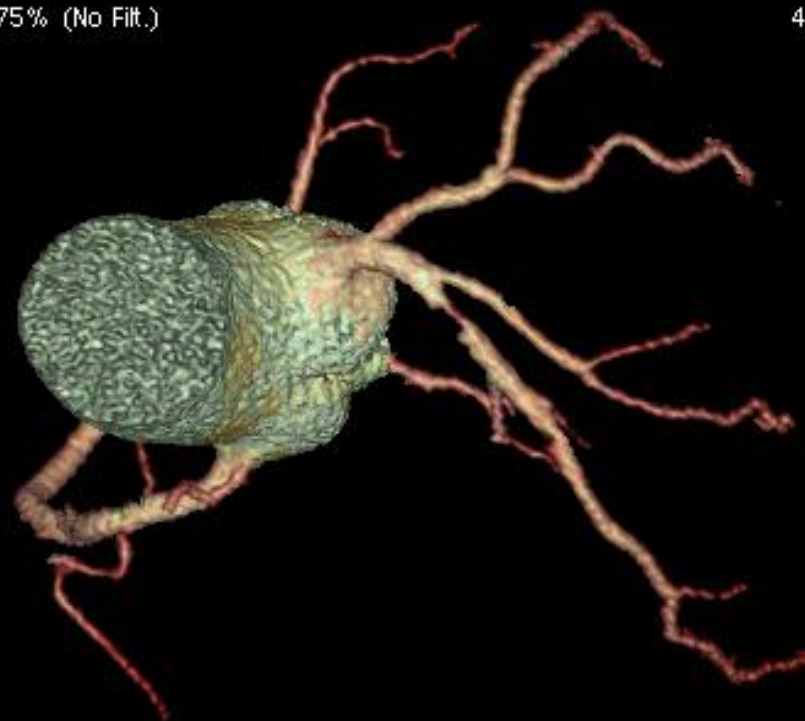
CL
M 40 AW1314886089.245.1306640202
DoB:
Ex: Apr 27 2011

DFOV 17.8cm
STND/C2 Ph:75% (No Filt.)

40 L 180 LAO 90 CRA

R
4
4

L
1
3
4



No VOI
kv 100
mA Mod.
Rot 0.35s/CH 8.0mm/rot
0.6mm 0.2:1 /0.6sp
Tilt: 0.0
01:59:41 PM
W = 4095 L = 2048

A 125

Oblique
Ex:
Se: 133
Left Anterior Descending Artery LP: 33.4

LAI

CL
M 40 AW1314886089.245.1306640202
DoB:
Ex: Apr 27 2011

DFOV 6.5cm
STND/C2 Ph:75% (No Filt.)

A
R
I

P
L
S

5.2/MP LSection / 0°
kv 100
mA Mod.
Rot 0.35s/CH 8.0mm/rot
0.8mm 0.2s/0.8ap
Tilt: 0.0
01:58:41 PM
W = 1200 L = 240

RPS

Lumen2 Stripe Length: 4.3
Angle: 0.0° Rfint
LP: 0.0
Left Anterior Descending Artery

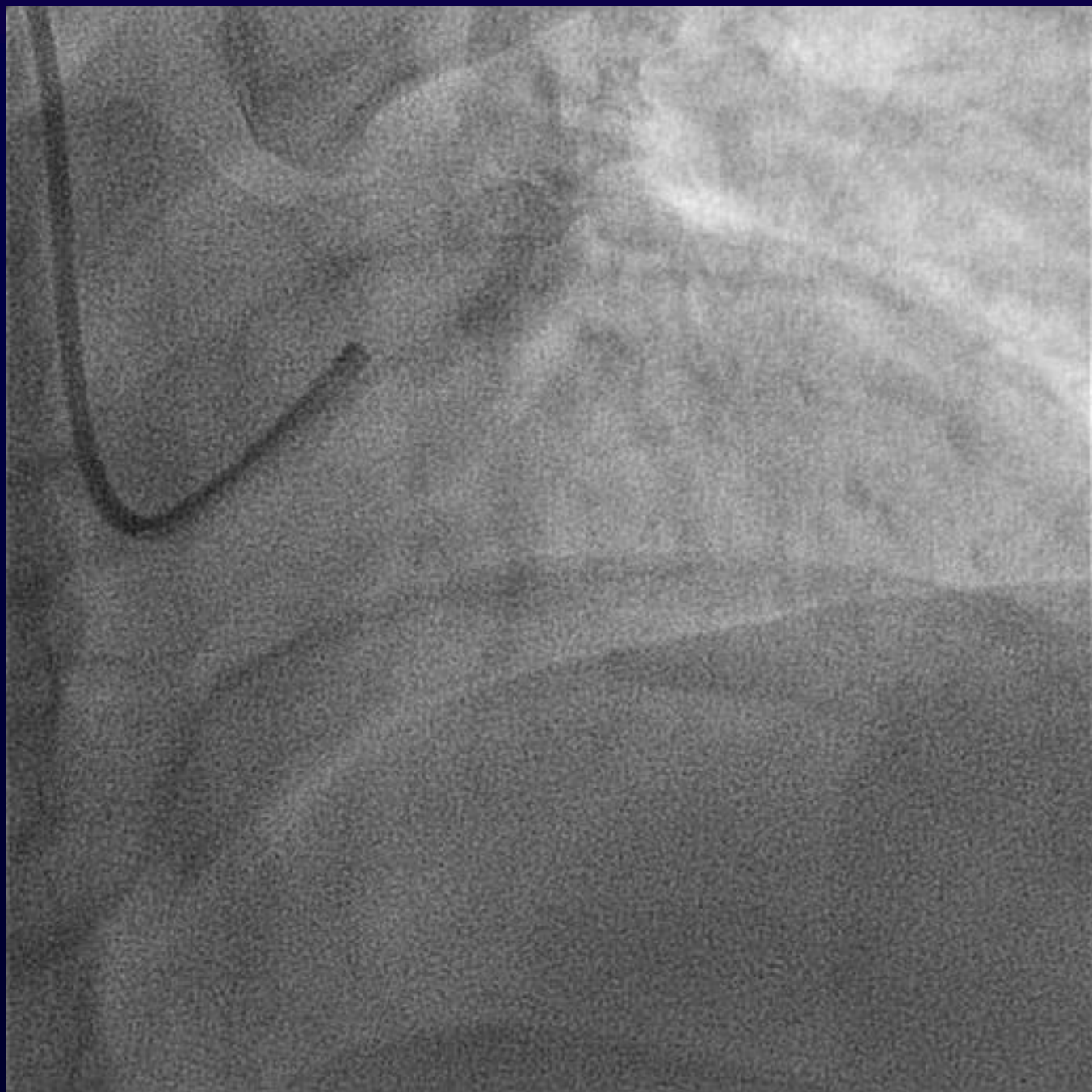
CL
AW1314886089.245.1306640202
Apr 27 2011

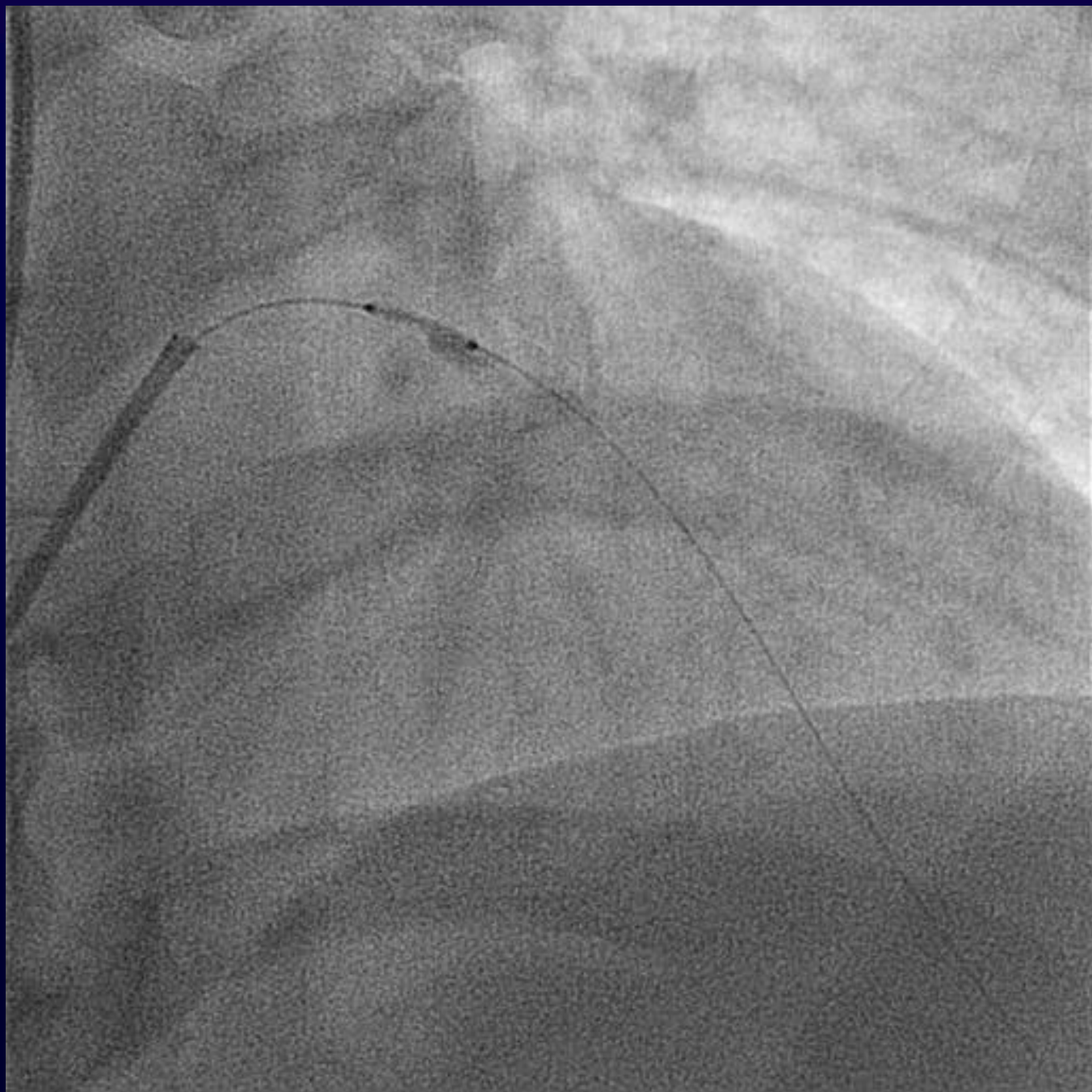
Width: 1.7

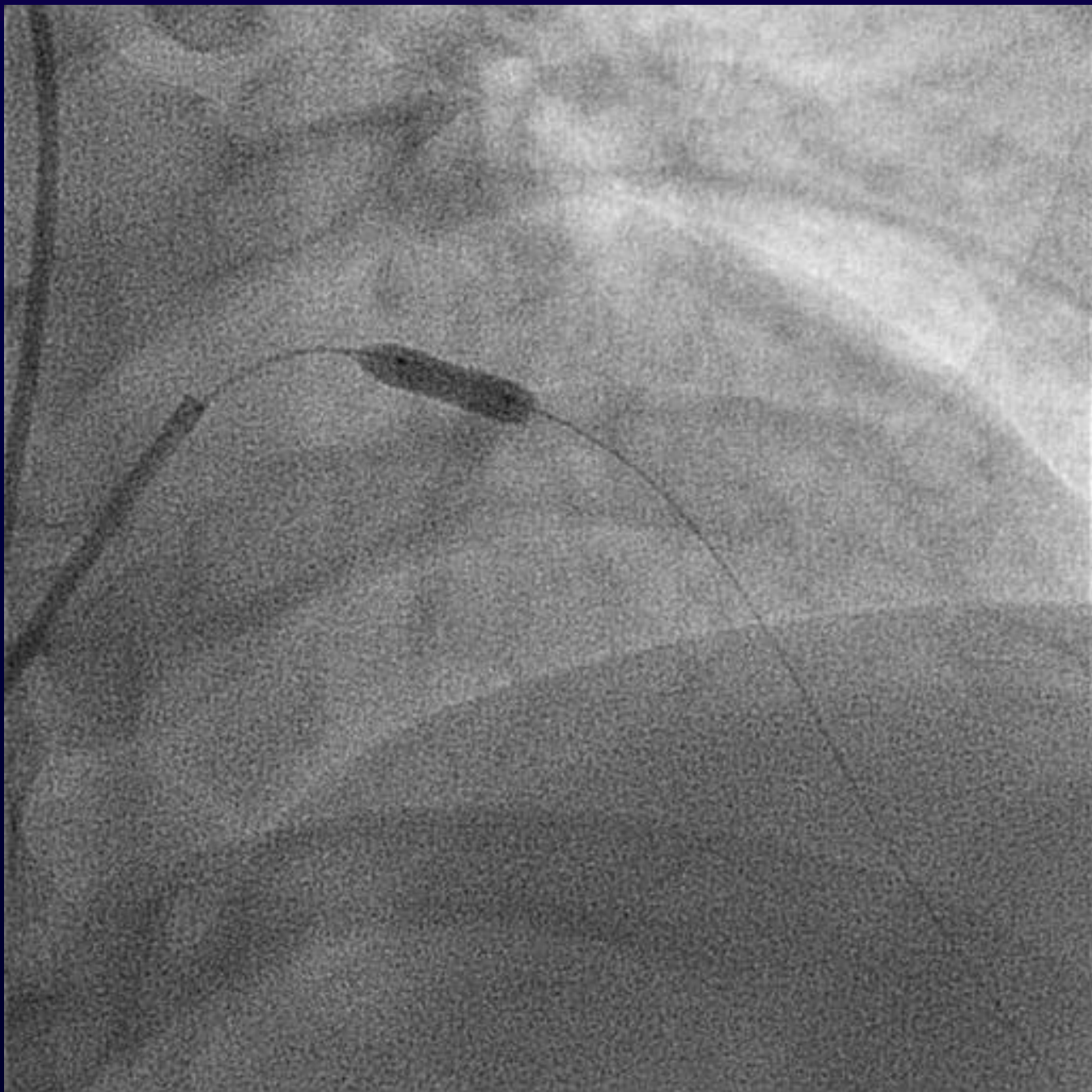
Mean Diameter

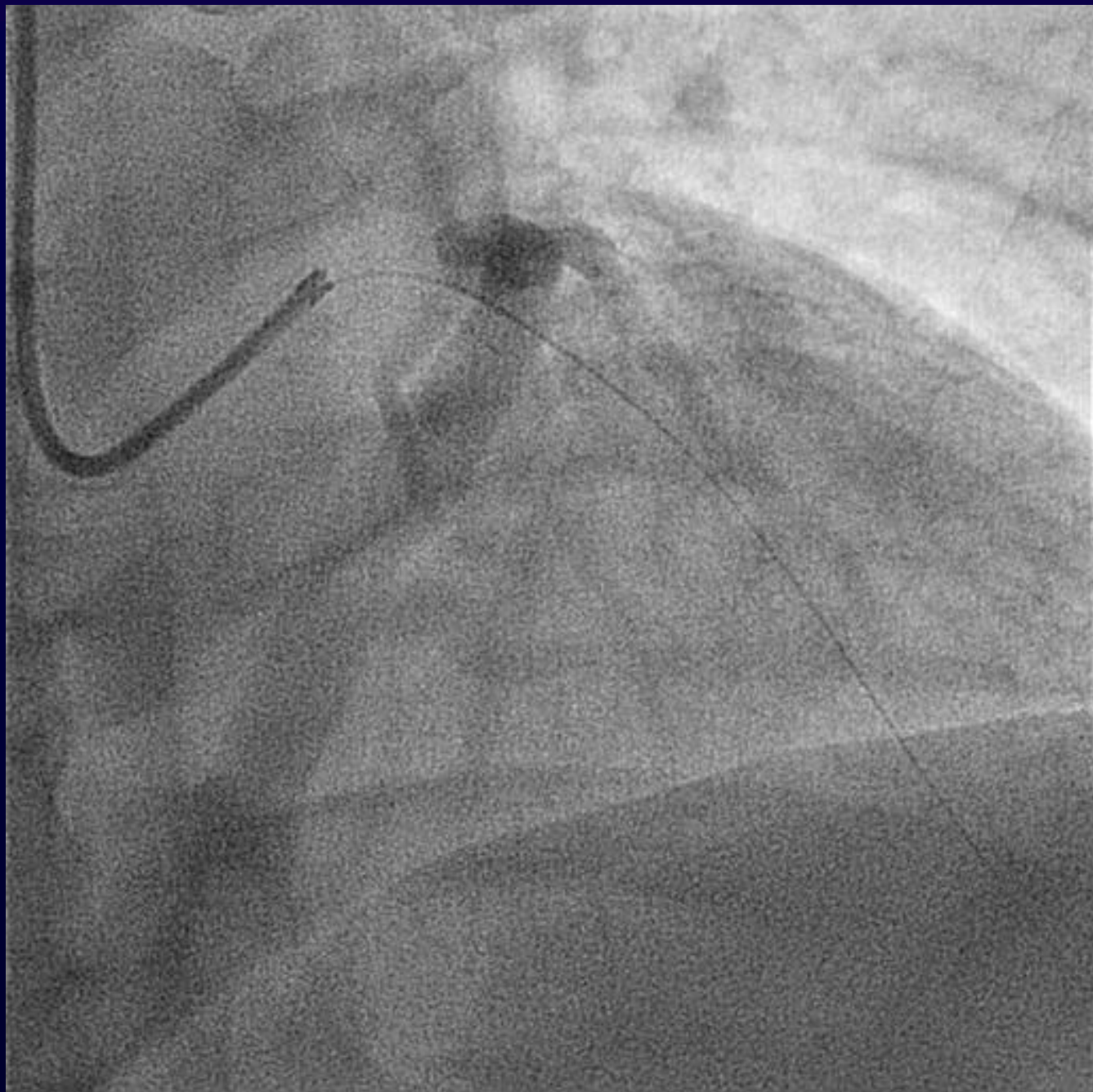
W = 1200 L = 240

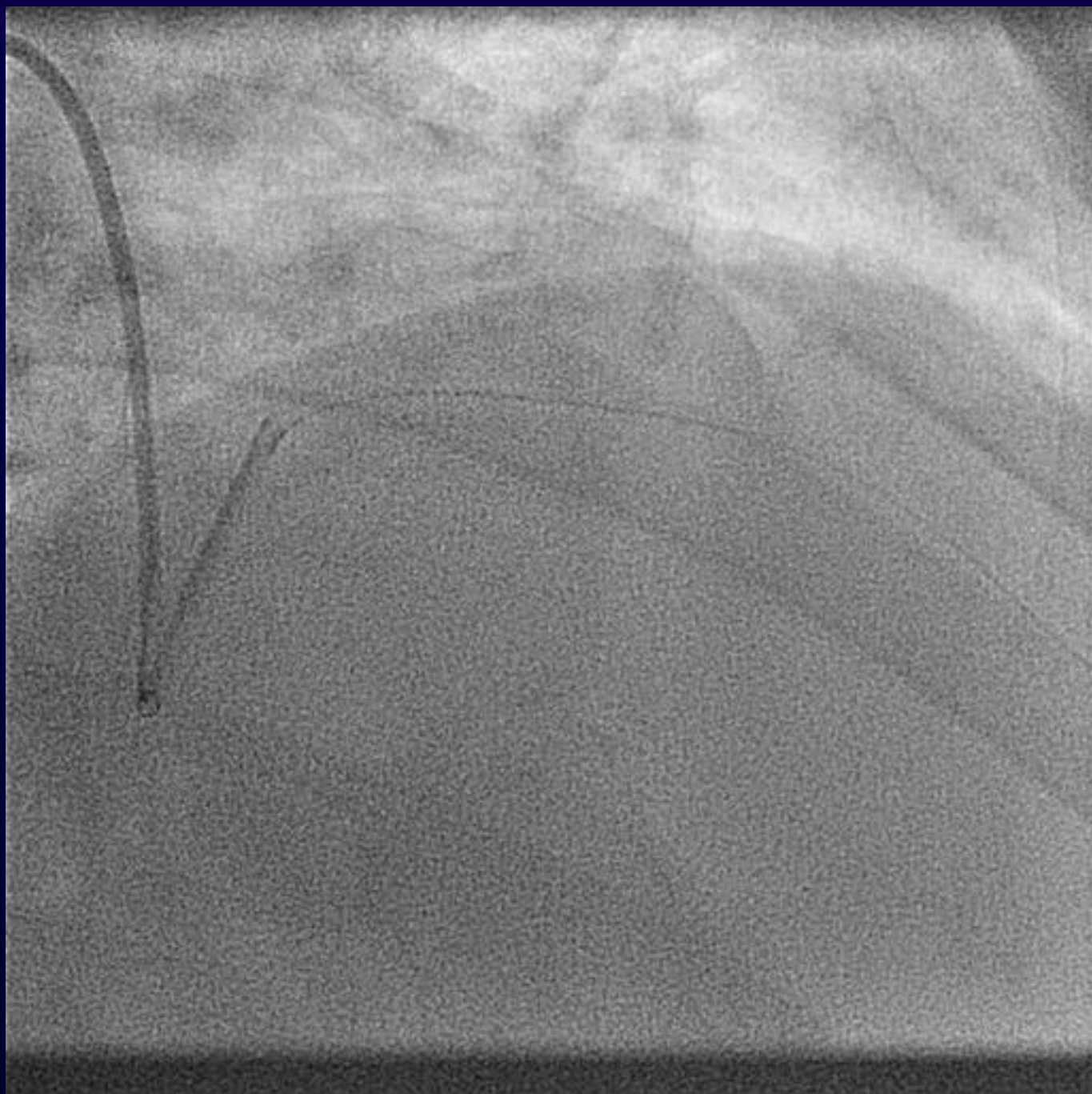
Lumen view is NOT intended for diagnosis





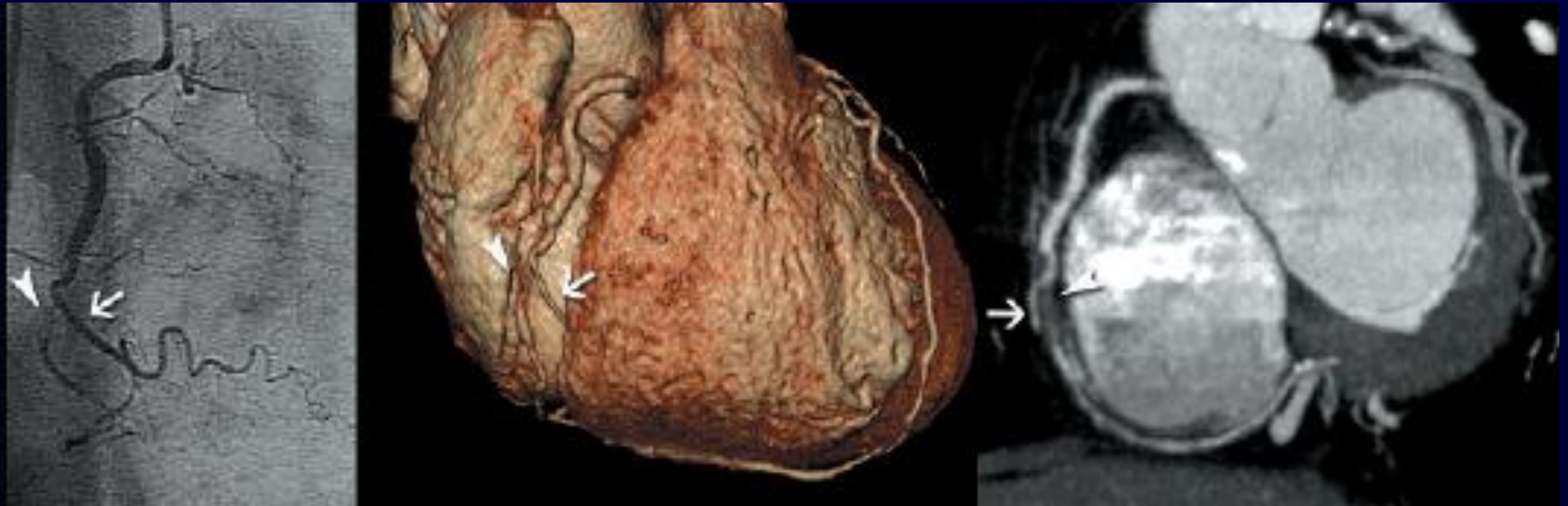




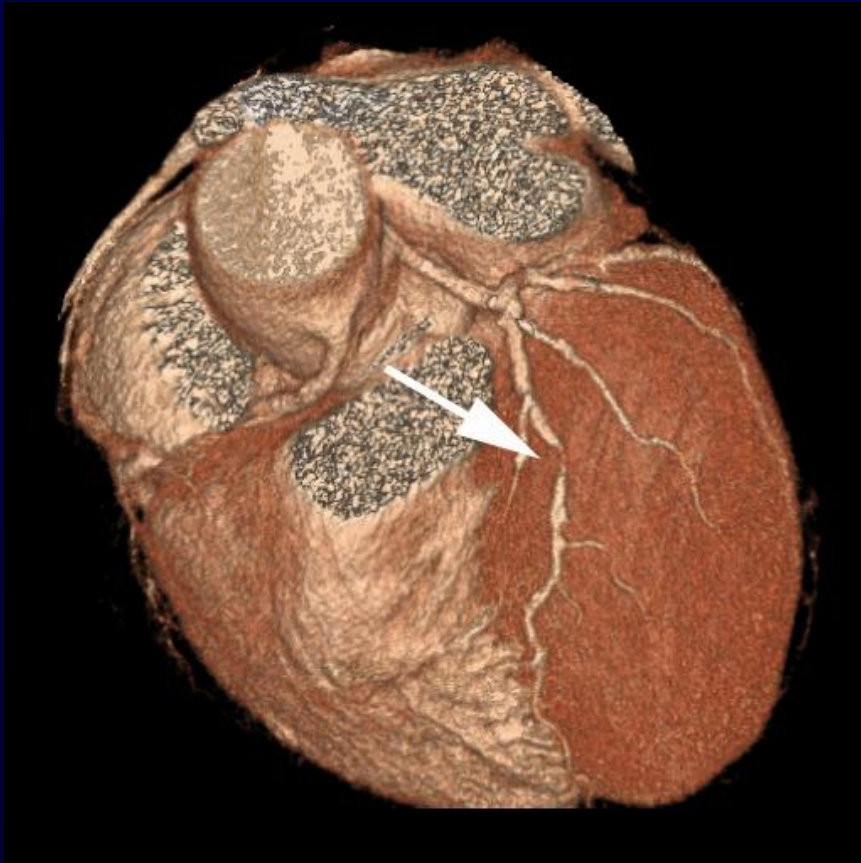


CT vs Conventional (Invasive) Angiography: Assessment of coronary lumen and stenoses

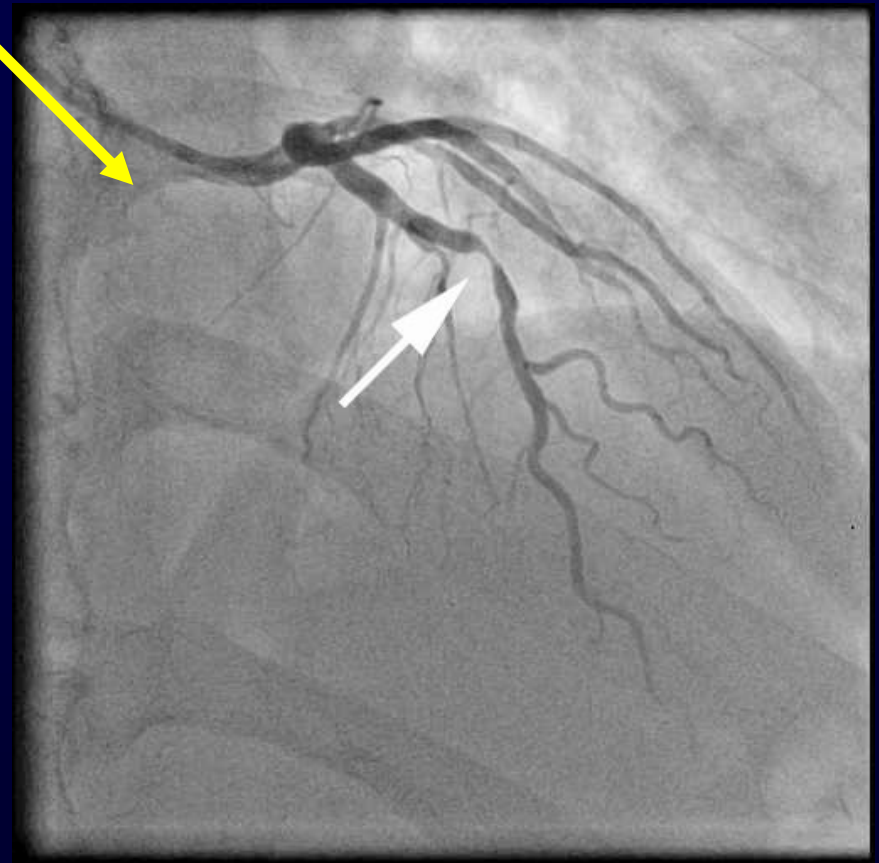
Which is better?



Invasive Angiography is the 'Gold Standard' for assessing the coronary lumen & stenoses



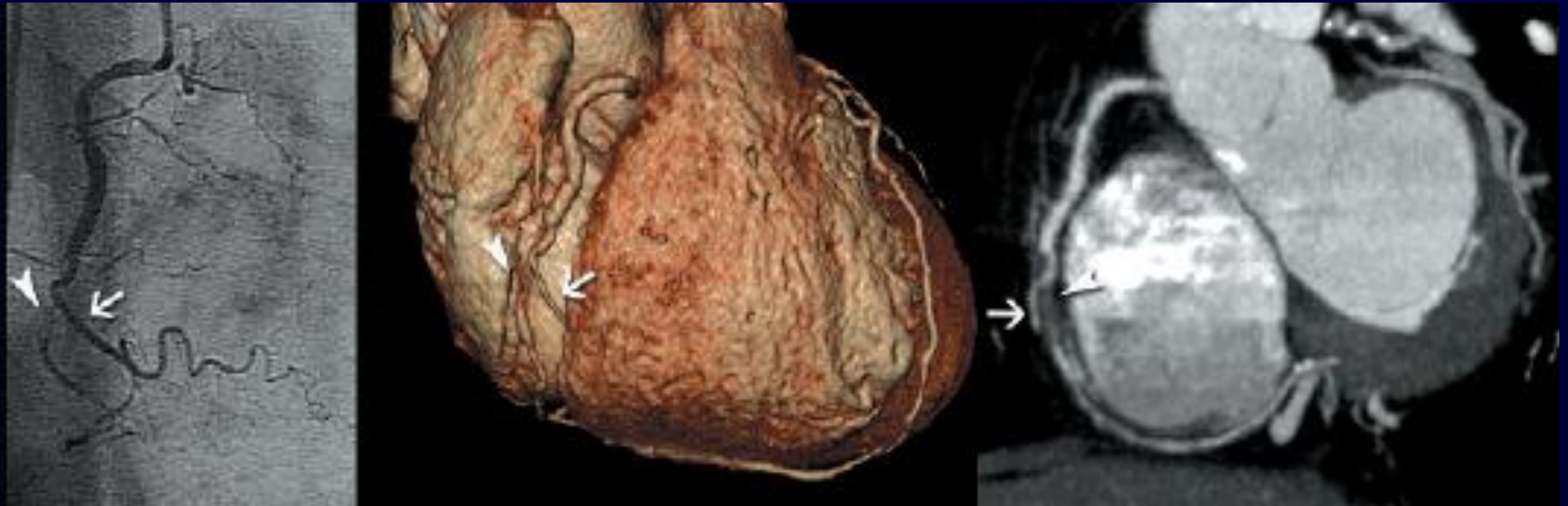
64-slice CT angiogram



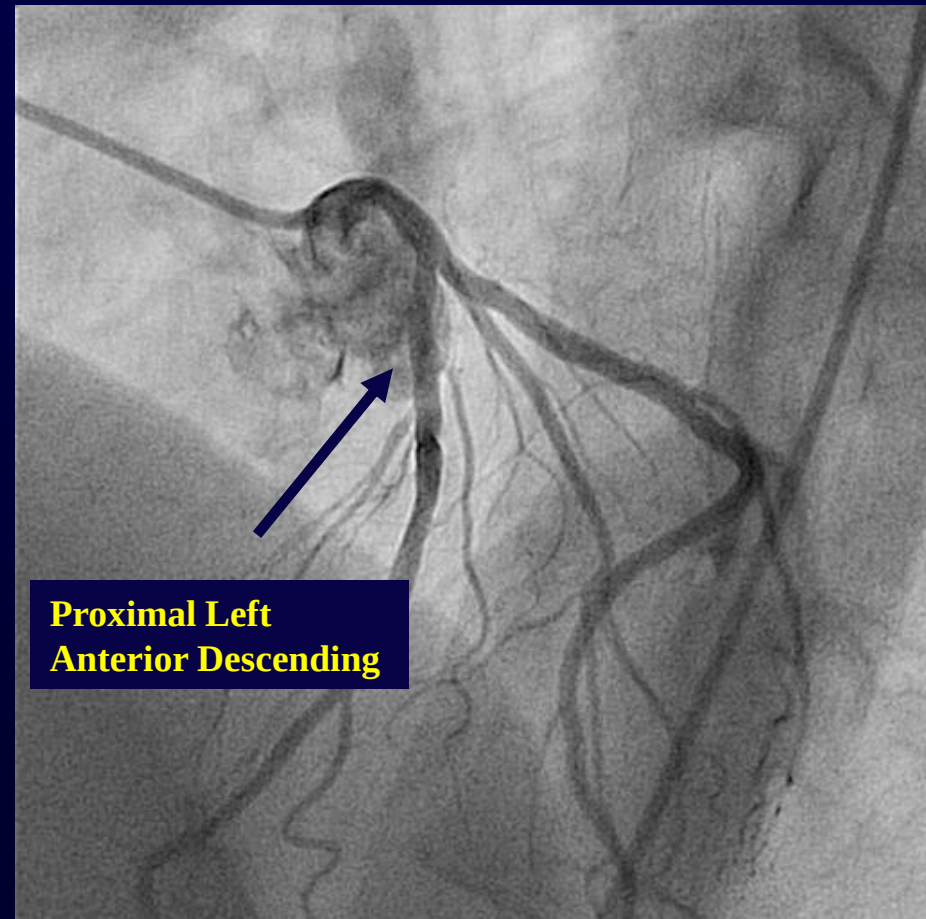
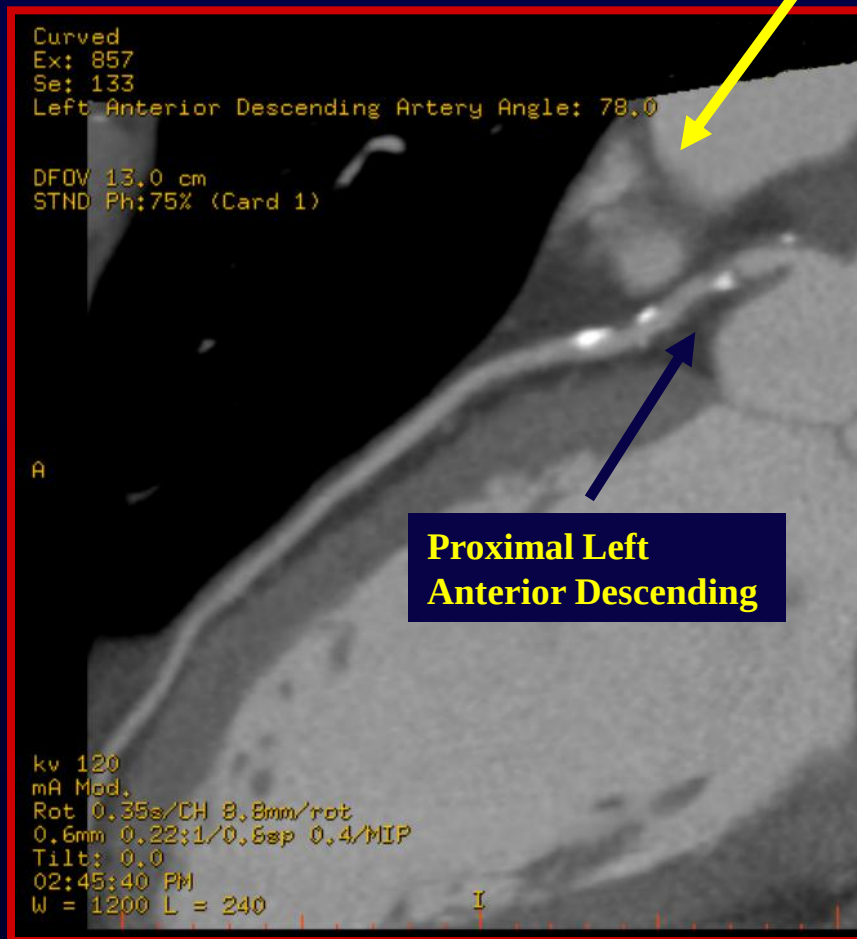
Invasive angiogram

CT vs Conventional (Invasive) Angiography: Assessment of coronary artery wall

Which is better?



CT Angiography is the 'Gold Standard' for assessing the coronary artery wall



ACCURACY Trial.

Budoff et al. JACC 2008;52:1724-32

- To evaluate diagnostic accuracy of 64-slice CTA vs Invasive coronary angiography (ICA)
 - 16 USA Centres: All 'Lightspeed' GE Scanners
- 230 pts referred for a conventional 'invasive coronary angiogram (ICA)
 - 59% male, mean age 57 ± 10 years
- Ability to detect $\geq 50\%$ and $\geq 70\%$ stenoses
- All pts and all segments assessed, no exclusions for poor images

ACCURACY Trial: Results

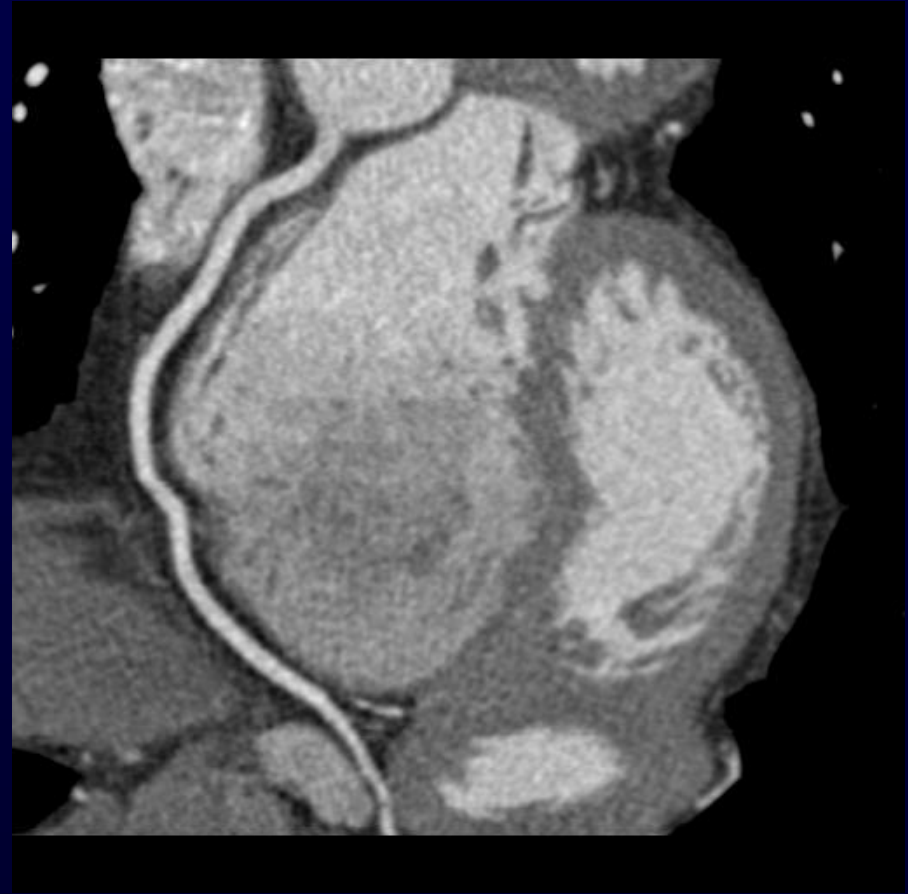
Table 2 Patient-Based Analysis

	Estimate, %	95% CI, %	Subjects In Group, n	Subjects Correct by CCTA, n
<u>≥50% stenosis</u>				
Sensitivity	95	85-99	55	52
Specificity	83	76-88	172	142
PPV	64	53-75	81	52
NPV	99	96-100	143	142
<u>≥70% stenosis</u>				
Sensitivity	94	79-99	31	29
Specificity	83	77-88	196	162
PPV	48	35-62	60	29
NPV	99	96-100	164	162

CCTA = coronary computed tomographic angiography; CI = confidence interval; NPV = negative predictive value; PPV = positive predictive value.

“The high NPV (99%) firmly establishes CTA as an effective non-invasive method to rule out obstructive coronary artery stenosis.”

CTA: High Negative Predictive Value for Non-obstructive Coronary Disease



As long as the images obtained are of good quality

CT Cardiac Angiography: Patient Selection

Less clear CTA images are seen if:

- Overweight
- > 75 years [as usually significant calcium]
- Heart rate too fast [use Beta-blockers to slow]
- Marked asthma [cannot use beta-blocker]
- Atrial fibrillation/markedly irregular rhythm

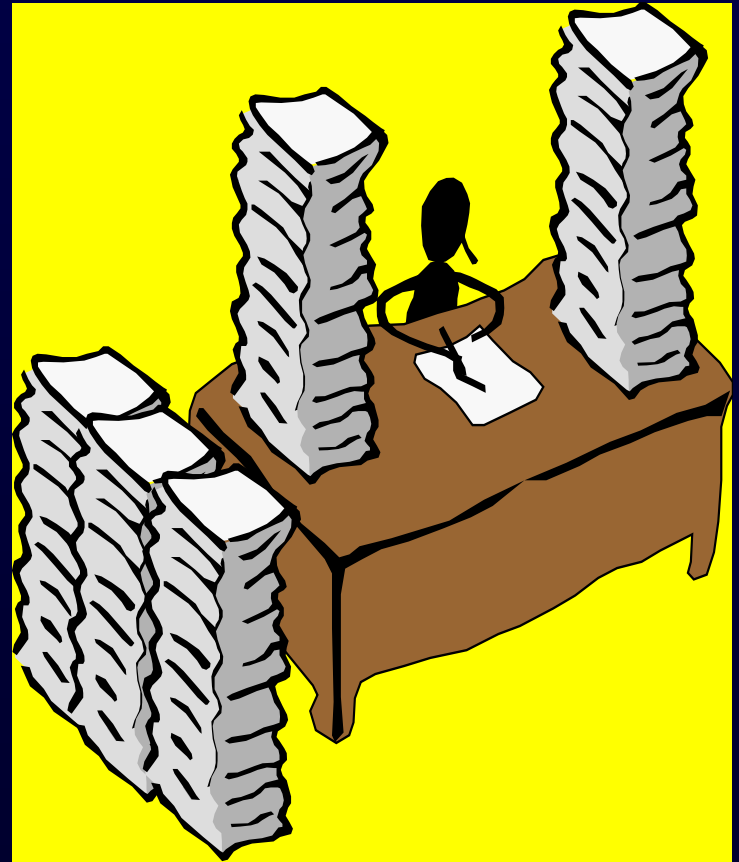
Hence patient selection is very important for good CT Cardiac angiography images

The Problem with HIGH Calcium scores



CT Angiography Use

1. Assessment of coronary lumen and stenoses
2. **Assessment of Cardiac structures**
3. Additional tool for CVS risk assessment



CTA Case History 2



"This shouldn't take too long!"

CTA Case History 2

- 75 year old man
- Chest pains of 20-30 mins at rest or with exercise
- Exercised to 6 minutes, minor ST changes, no pain provoked
- Referred for CT Cardiac Angiography (CTA)

3D
Ex:
Se: 133 +c
Volume Rendering No cut

SPR

IB 31 May 2011
M 75 AW1261973821.342.1306822898
DoB:
Ex: Sep 30 2009

DFOV 17.0cm
STND/C2 Ph:75% (No Fil.)

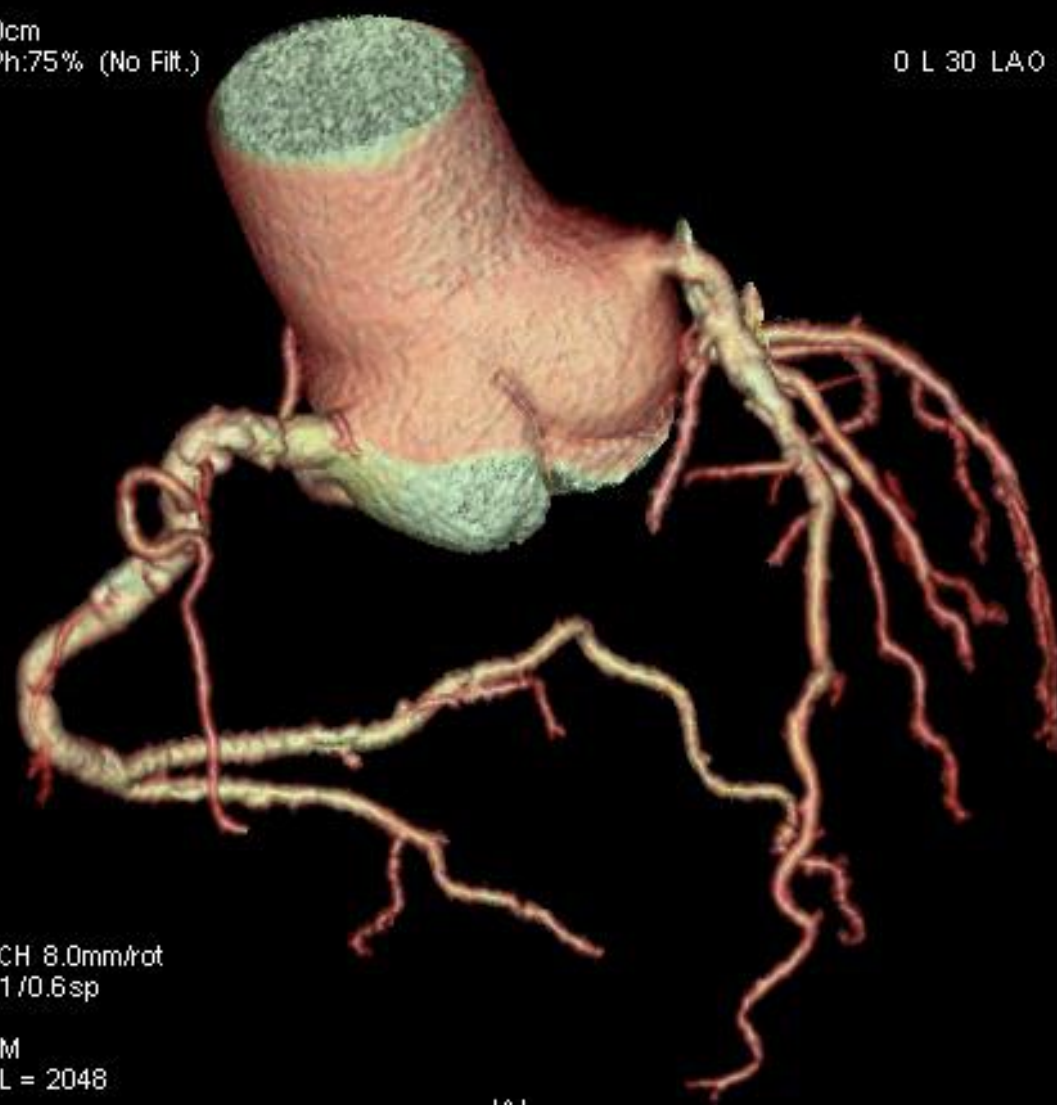
0 L 30 LAO 30 CRA

R
A

L
P

No VOI
kv 120
mA Mod.
Rot 0.35s/CH 8.0mm/rot
0.6mm 0.2:1 /0.6sp
Tilt: 0.0
02:52:38 PM
W = 4095 L = 2048

IAL



3D
Ex:
Se: 133 +c
Volume Rendering No cut

183

IB 31 May 2011
M 75 AW1261973821.342.1306822898
DoB:
Ex: Sep 30 2009

DFOV 17.0cm
STND/C2 Ph:75% (No Filt.)

0 L 90 LAO 0 CRA

A
1
0
3

P
6
7

No VOI
kv 120
mA Mod.
Rot 0.35s/CH 8.0mm/rot
0.6mm 0.2:1 /0.6sp
Tilt: 0.0
02:52:38 PM
W = 4095 L = 2048

1253



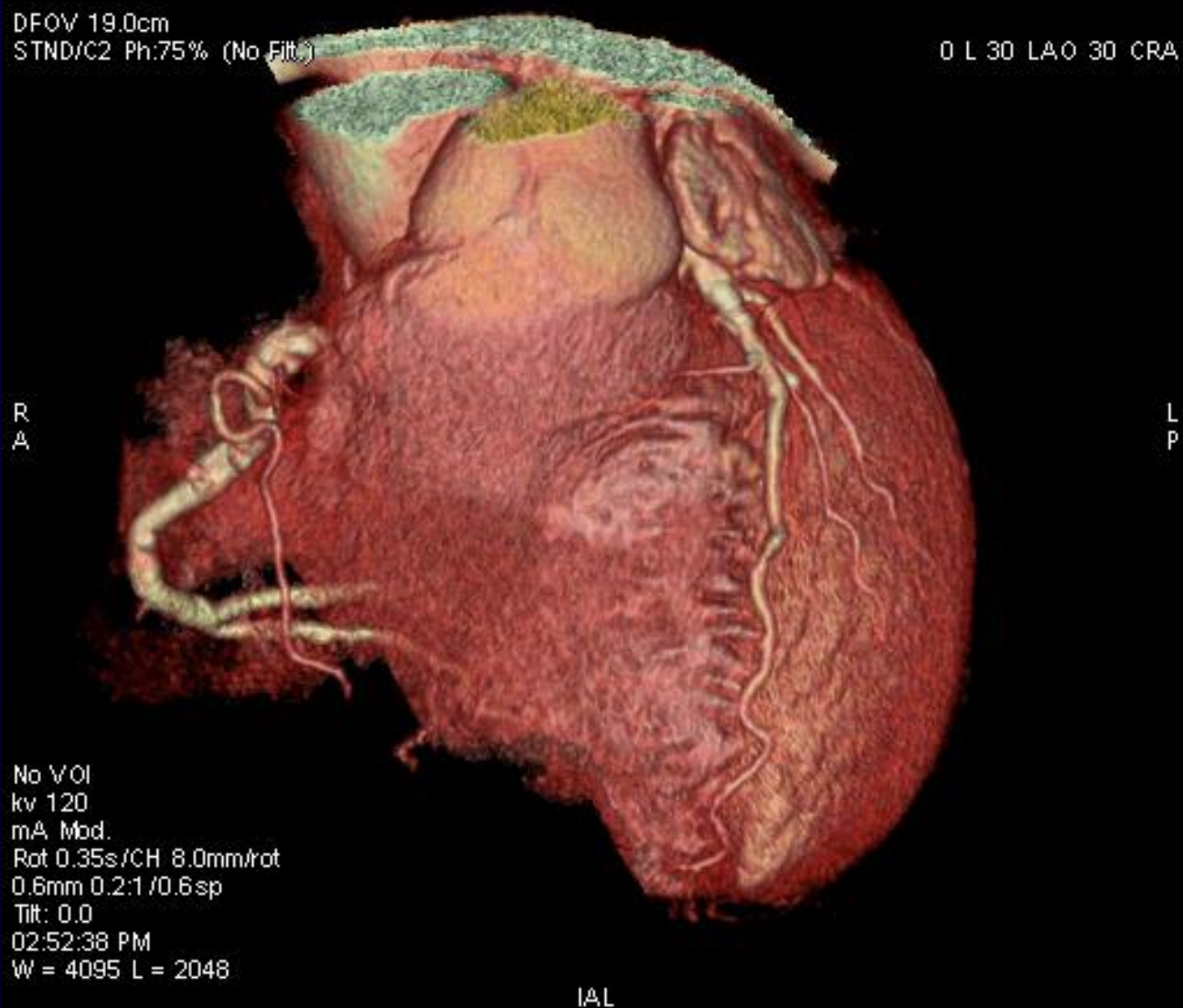
3D
Ex:
Se: 133 +c
Volume Rendering No cut

SPR

IB 31 May 2011
M 75 AW1261973821.342.1306822898
DoB:
Ex: Sep 30 2009

DFOV 19.0cm
STND/C2 Ph:75% (No Filt.)

0 L 30 LAO 30 CRA



No VOI
kv 120
mA Mod.
Rot 0.35s/CH 8.0mm/rot
0.6mm 0.2:1/0.6sp
Tilt: 0.0
02:52:38 PM
W = 4095 L = 2048

I A L

Curved

Ex:

Se: 133 +c

Left Anterior Descending Artery Angle: 0.0

IB 31 May 2011

M 75 AW1261973821.342.1306822898

DoB:

Ex: Sep 30 2009

DFOV 14.7

STND/C2 Ph:75% (No Filt.)

kv 120

mA Mod.

Rot 0.35s/CH 8.0mm/rot

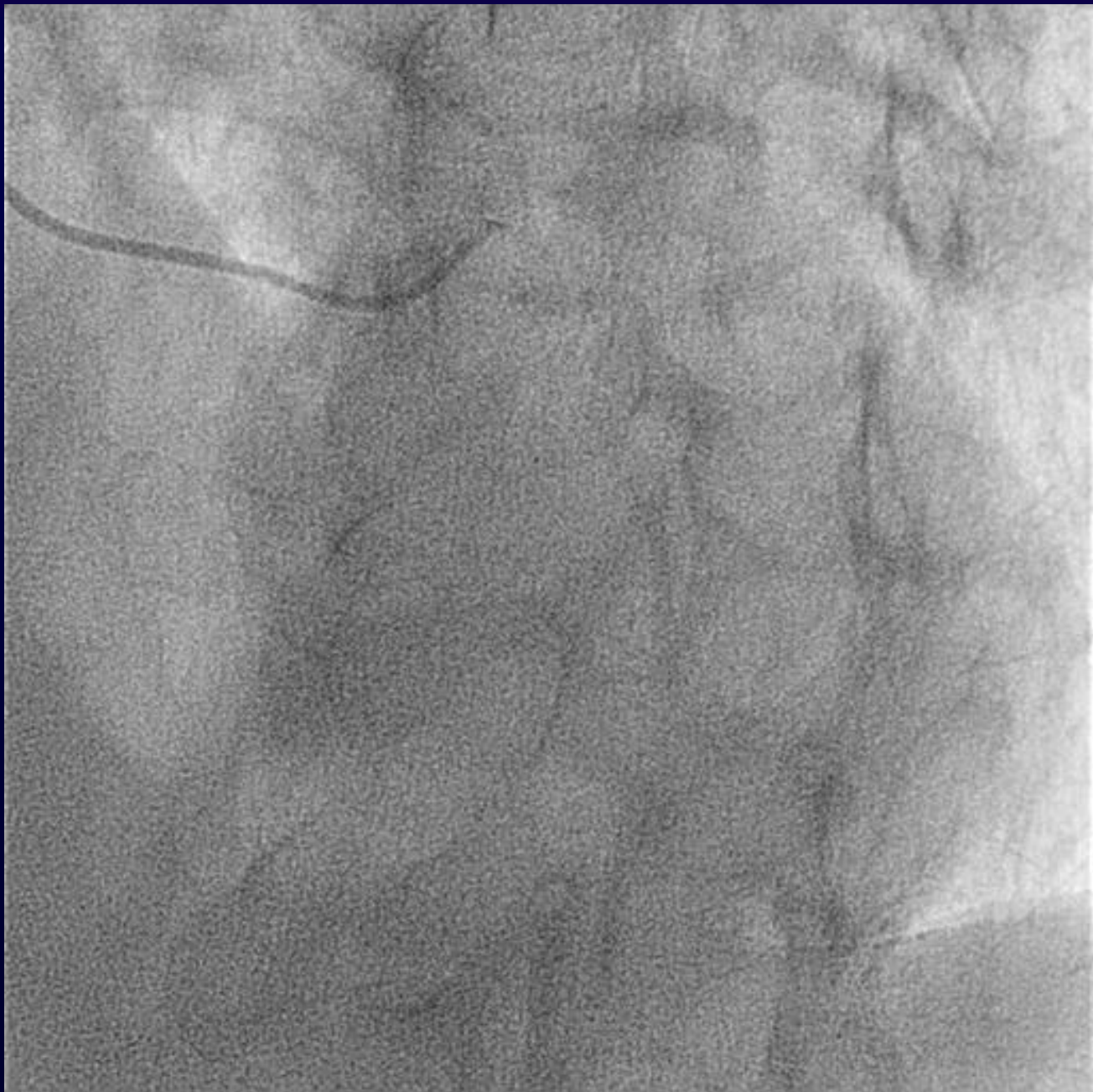
0.6mm 0.2:1/0.6sp 0.4/MP

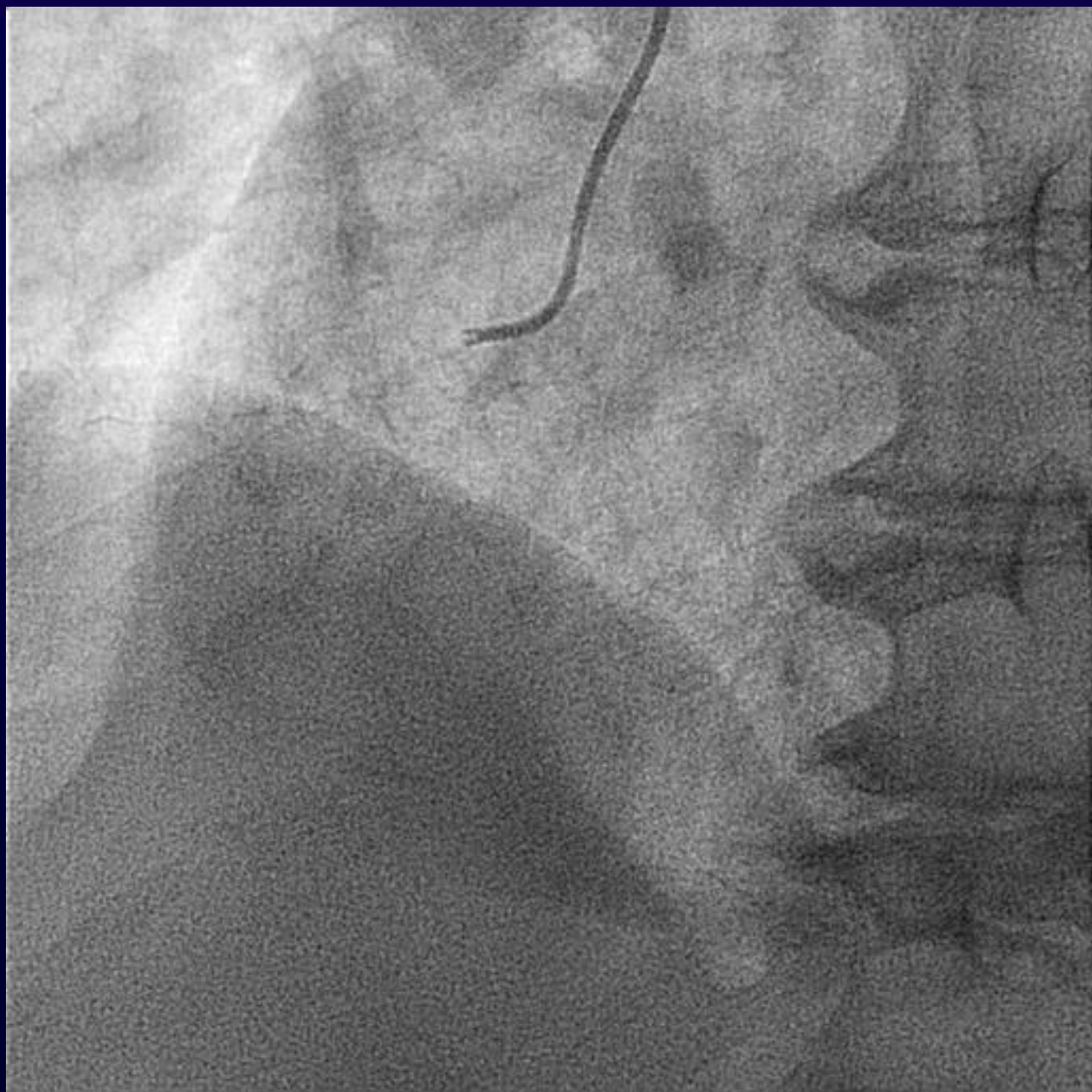
Tilt: 0.0

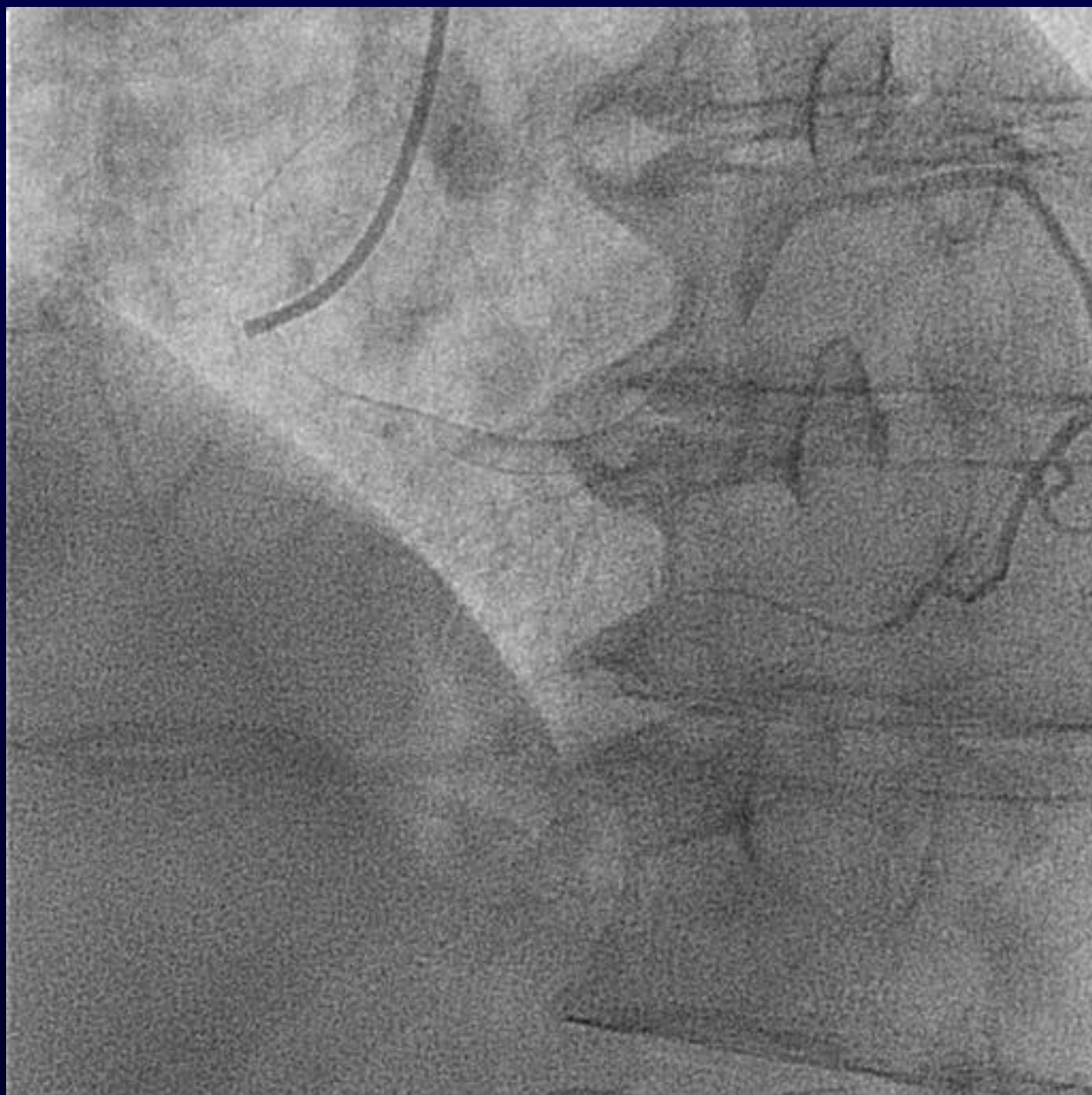
02:52:38 PM

W = 1200 L = 240









CTA Case History 2: Comment

- Aberrant Circumflex from RCA
- Non-Malignant course, behind aorta [not between 2 great arteries]
- Mild/moderate calcified coronary wall atheroma in LAD & RCA
- No flow limiting stenoses
- Medical management



Axial2
Ex:
Se: 133
I: 12.5
Im: 1

A 95

AM Ao Dil Mass
F 71 AW1481183568.892.1307328849
DoB:
Ex: Dec 10 2008

DFOV 20.0cm
STND/C3 Ph:75% (No Filt.)

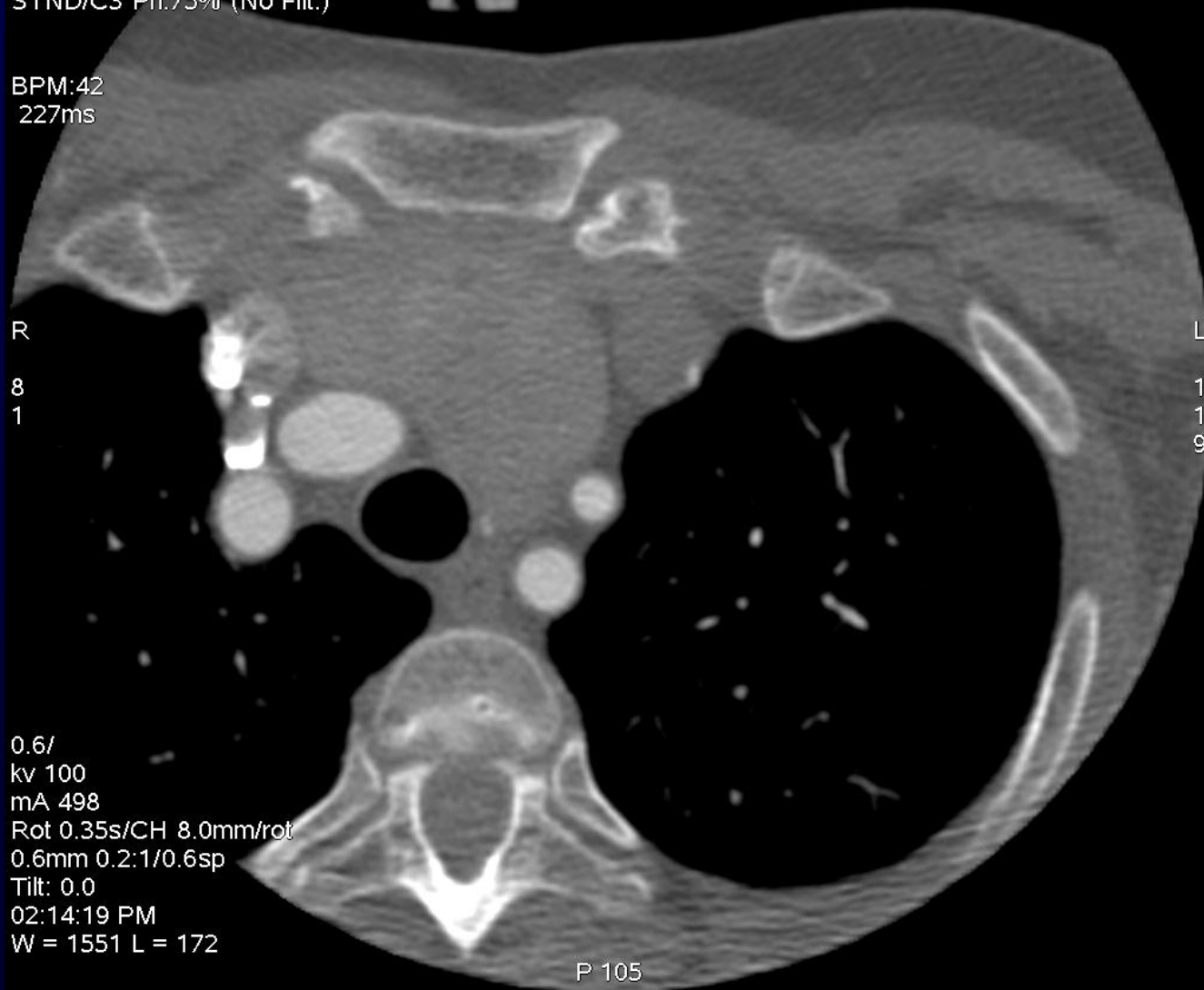
BPM:42
227ms

R
8
1

L
1
1
9

0.6/
kv 100
mA 498
Rot 0.35s/CH 8.0mm/rot
0.6mm 0.2:1/0.6sp
Tilt: 0.0
02:14:19 PM
W = 1551 L = 172

P 105



3D
Ex:
Se: 133
Volume Rendering No cut

DFOV 21.1cm
STND/C3 Ph:75% (No Filt.)

SPR

AM Ao Dil Mass
F 71 AW1481183568.892.1307328849
DoB:
Ex: Dec 10 2008

0 L 30 LAO 30 CRA

R
A

L
P

No VOI
kv 100
mA Mod.
Rot 0.35s/CH 8.0mm/rot
0.6mm 0.2:1 /0.6sp
Tilt: 0.0
02:14:19 PM
W = 4095 L = 2048

IAL



3D
Ex:
Se: 133 +c
Volume Rendering No cut

DFOV 26.0cm
STND/C2 Ph:75% (No Filt.)

SRP
MV AVR Coarct
? 55 AW1478812872.542.1307336015
DoB:
Ex: Jun 17 2009

0 L 60 LAO 30 CRA

A
R

P
L

No VOI
kv 120
mA Mod.
Rot 0.35s/CH 8.0mm/rot
0.6mm 0.2:1 /0.6sp
Tilt: 0.0
12:46:25 PM
W = 4095 L = 2048

ILA



3D
Ex:
Se: 133 +c
Volume Rendering No cut

S 16

MV AVR Coarct
? 55 AW1478812872.542.1307336015
DoB:
Ex: Jun 17 2009

DFOV 26.0cm
STND/C2 Ph:75% (No Filt.)

0 L 30 RAO 0 CRA

R
P

L
A

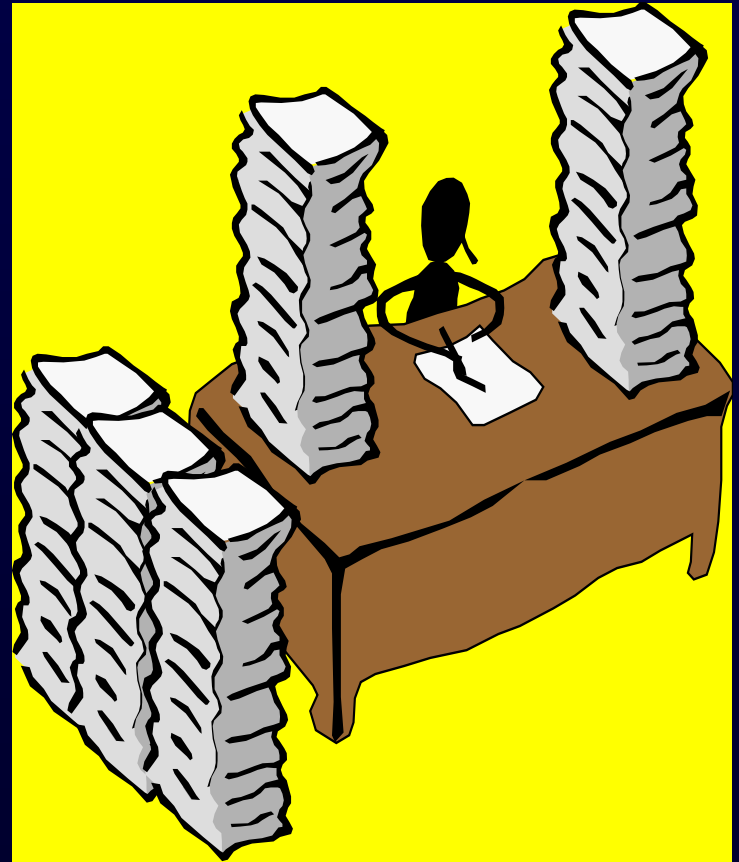
No VOI
kv 120
mA Mod.
Rot 0.35s/CH 8.0mm/rot
0.6mm 0.2:1/0.6sp
Tilt: 0.0
12:46:25 PM
W = 4095 L = 2048

I 244



CT Angiography Use

1. Assessment of coronary lumen and stenoses
2. Assessment of Cardiac structures
3. Additional tool for CVS risk assessment



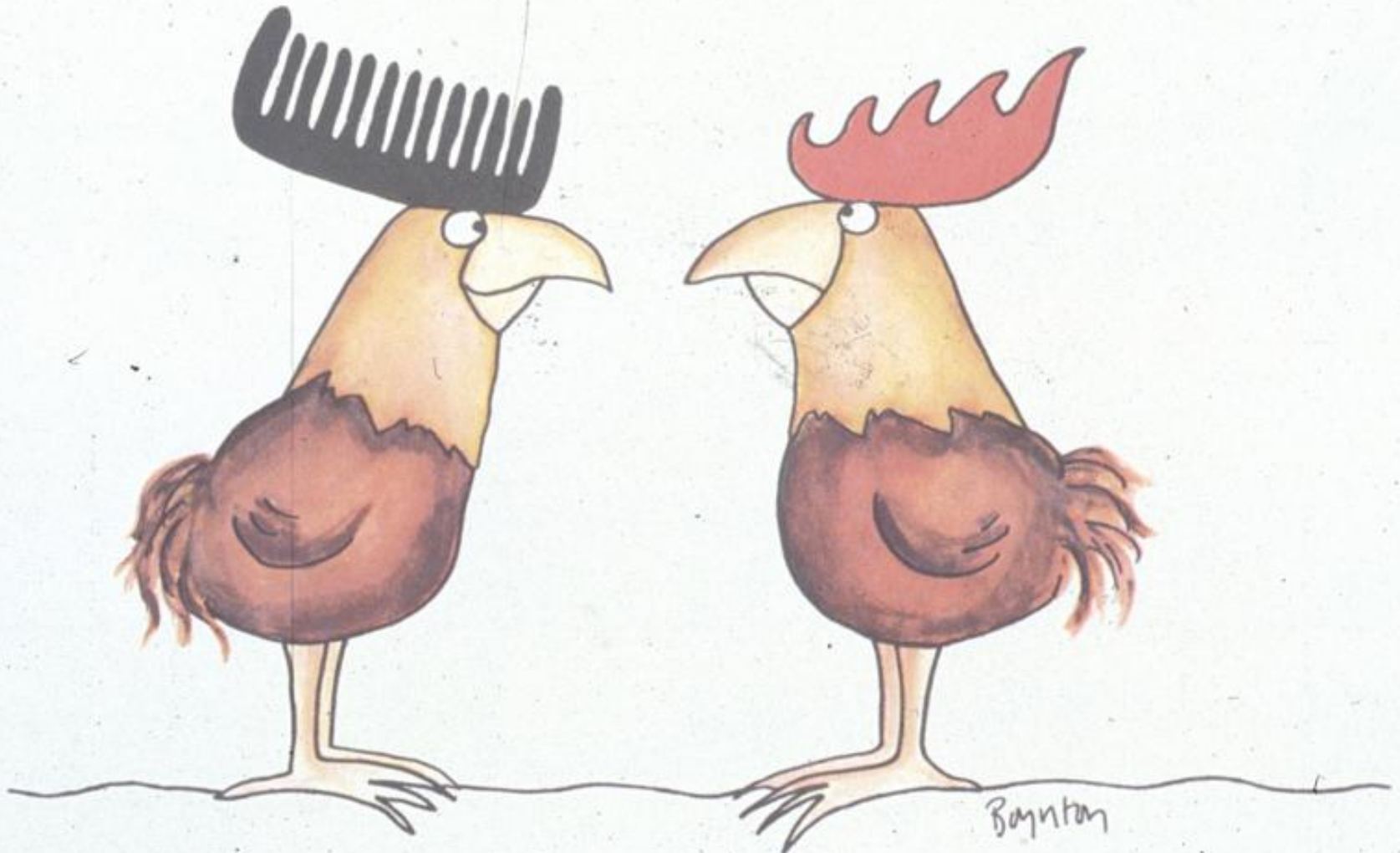
Chinese Proverb:

“It is better to light a
candle than to curse
the darkness”



CTA Ca Score Case History 2

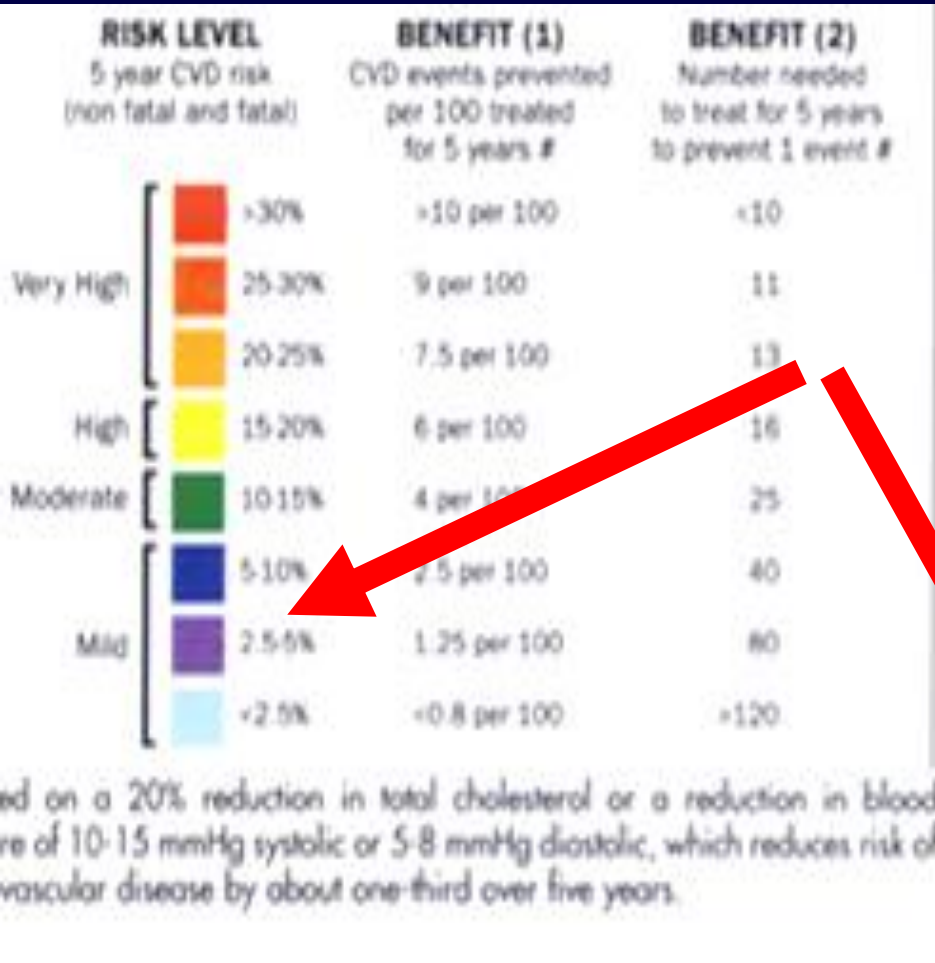
Dare to be different.



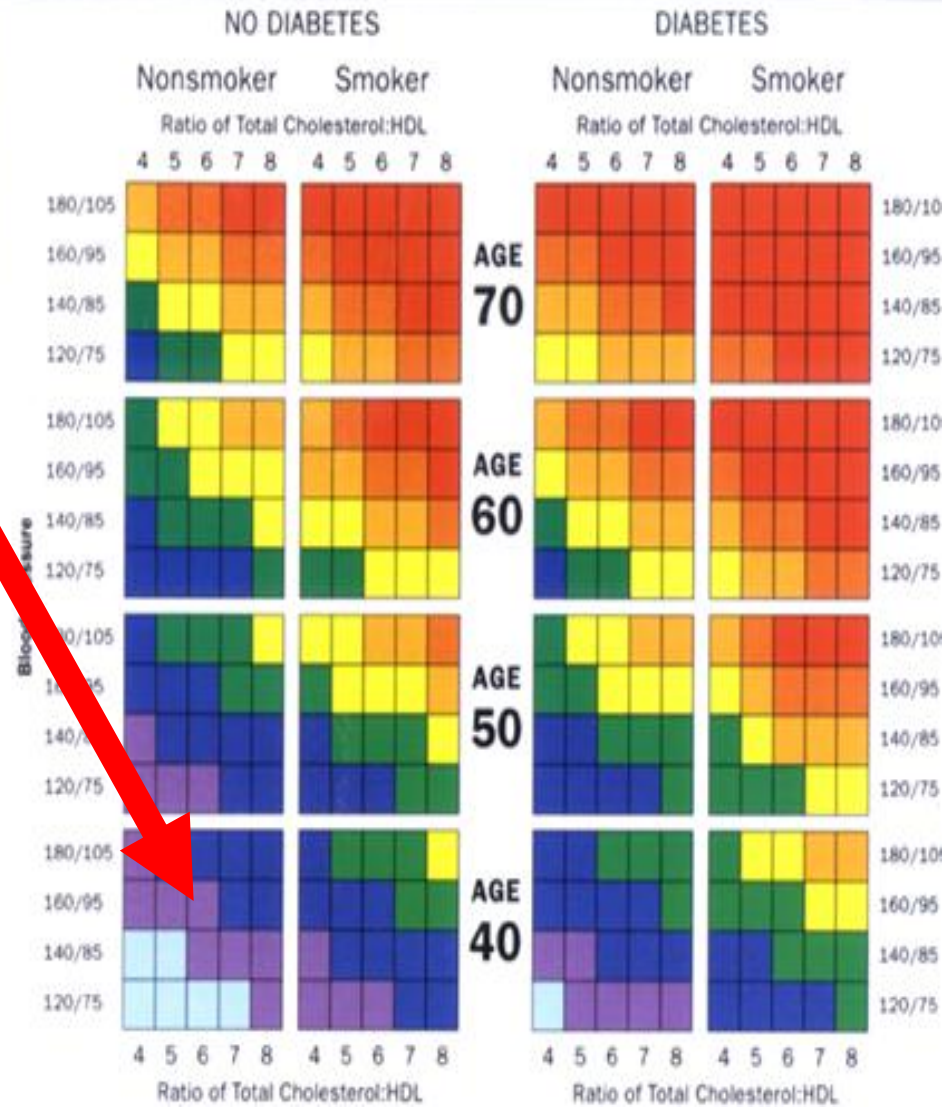
CTA Ca Score Case History 3

- 48 year old Indian Accountant
- Mother CABG at 63 years
- Mild BP from 40 years: Cilazapril
- Cholesterol 6.0mmol/l at 40 years: Lipex
- Reluctant and intermittent pill taker
- Returned at 48 years, no medicines for 3 years

Framingham 5-year CVS Risk 2.5 to 5%



Risk level men



GE MEDICAL SYSTEMS
LightSpeed VCT
Ex:
Se: 2
Im: 1
SN I54.75 Ax
DFOV 25.0cm
STND

A 125

VS
M48Y
AW1700651958.994.1305536230
Mar 07 2011
02:56:32 PM
SEGM512 X 512

Mag = 1.00
FL:
ROT:

R
1
2
7

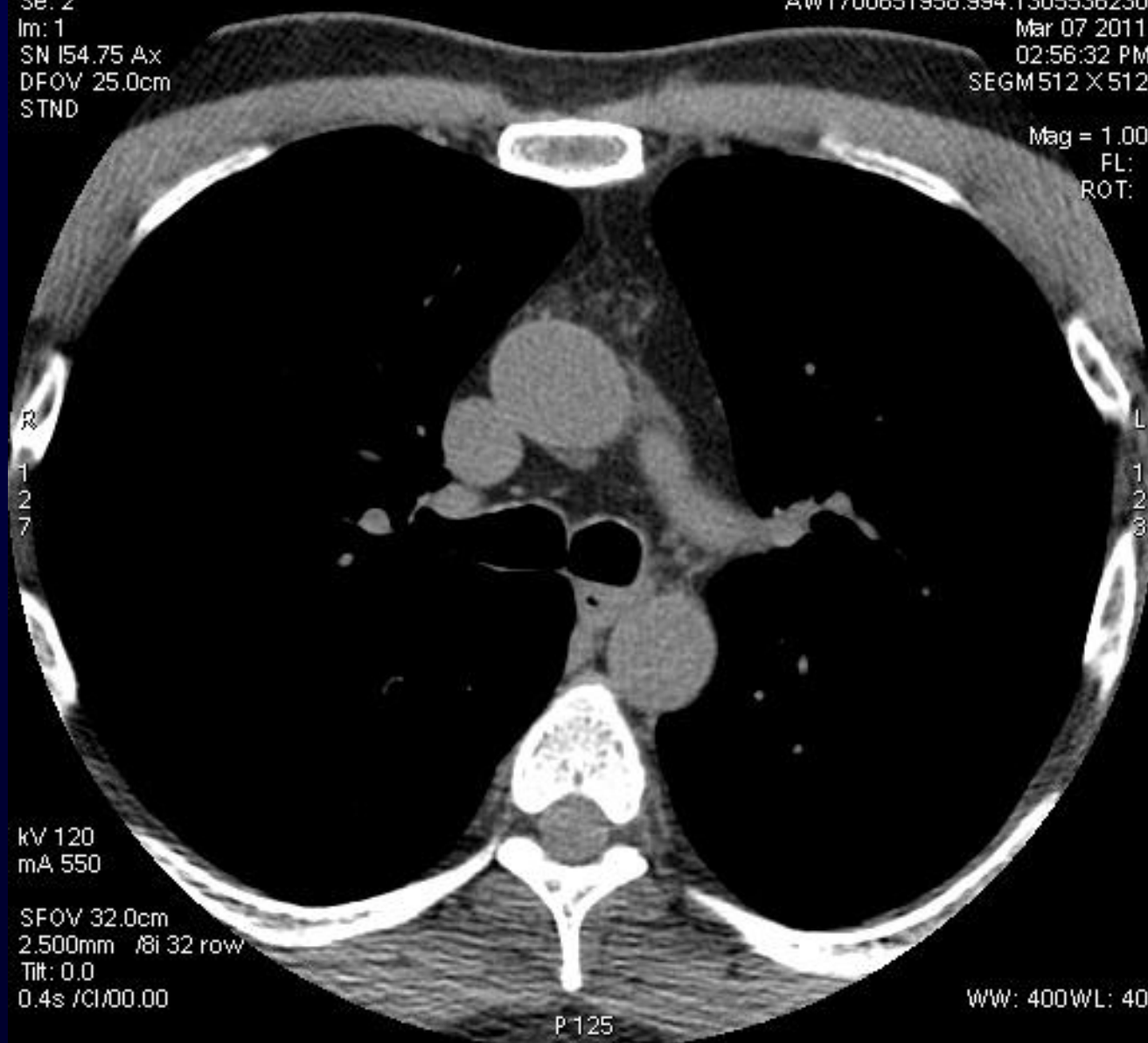
L
1
2
3

kV 120
mA 550

SFOV 32.0cm
2.500mm /8i 32 row/
Tilt: 0.0
0.4s /CI/00.00

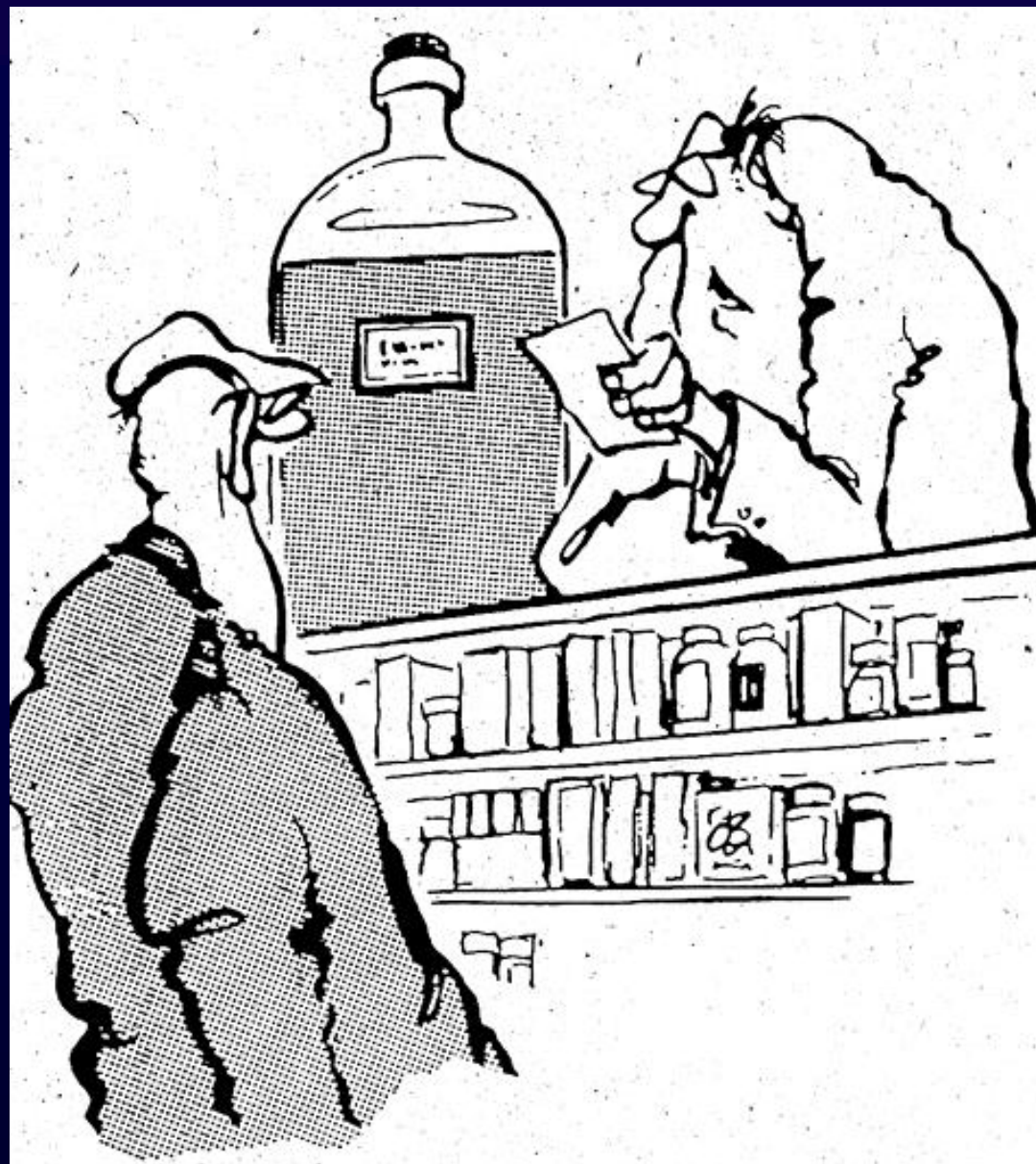
WW: 400WL: 40

P 125



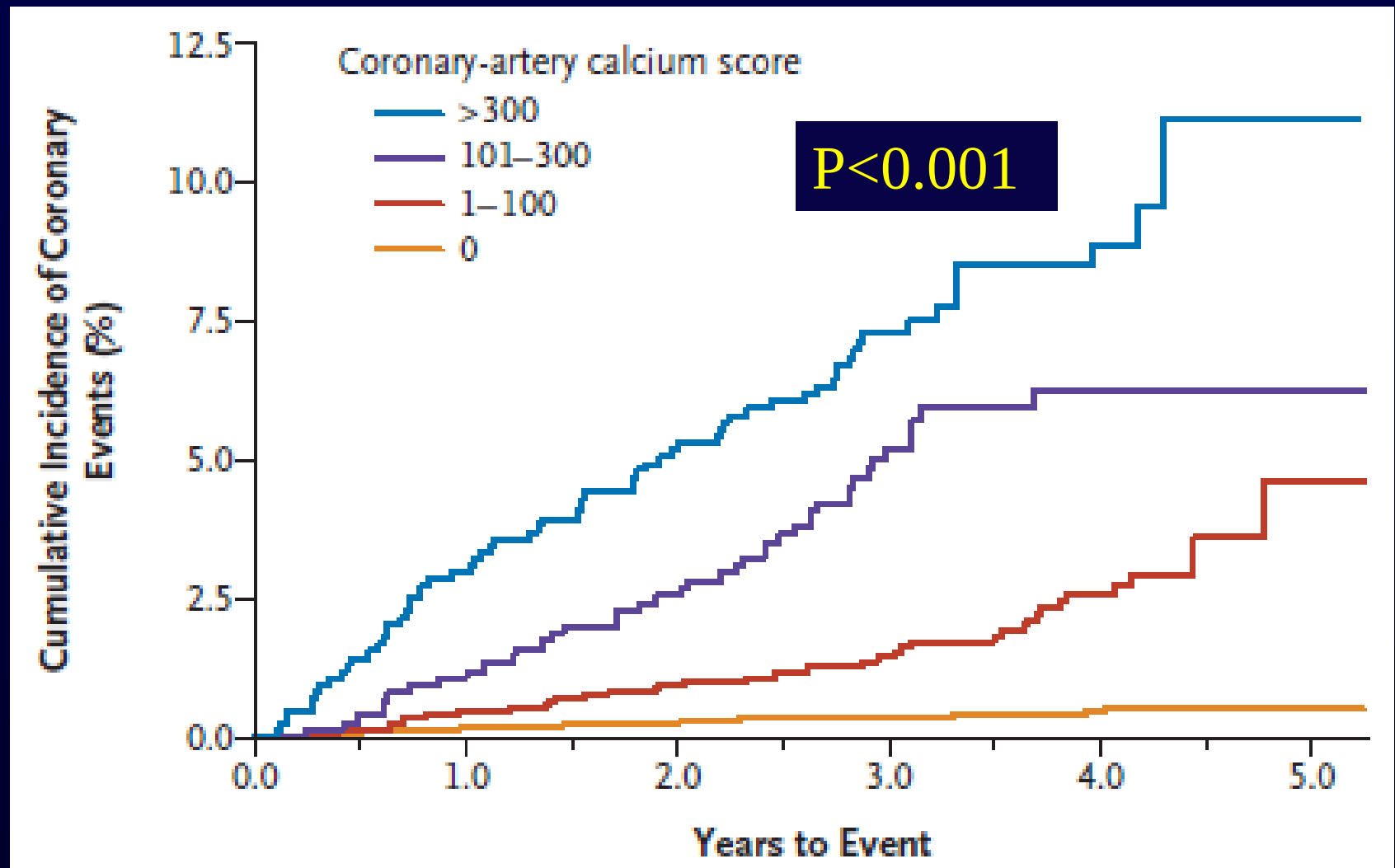
CTA Ca Score Case History 3: Comment

- 48 year old Indian Accountant
- Calcium score 1304 Agatston units: > 90th percentile for age/gender-matched 'Normal' population
- Now highly motivated, can see calcium in arteries
- Lipitor 80mg, ezetimibe 10mg, cilazapril,
- Lifestyle ++
- VERY useful Calcium score test



"That's what it says: 'one
tablespoonful, 300 times a day.'"

Calcium Score & Any Coronary Events: MESA Study NEJM 2008;358:1336-45



THE NEW ZEALAND MEDICAL JOURNAL

Journal of the New Zealand Medical Association



High calcium scores in patients with a low Framingham risk of cardiovascular (CVS) disease: implications for more accurate CVS risk assessment in New Zealand

Chris J Ellis, Malcolm E Legget, Colin Edwards, Niels Van Pelt, John A Ormiston,
Jonathan Christiansen, Helen Winch, Mark Osborne, Greg Gamble

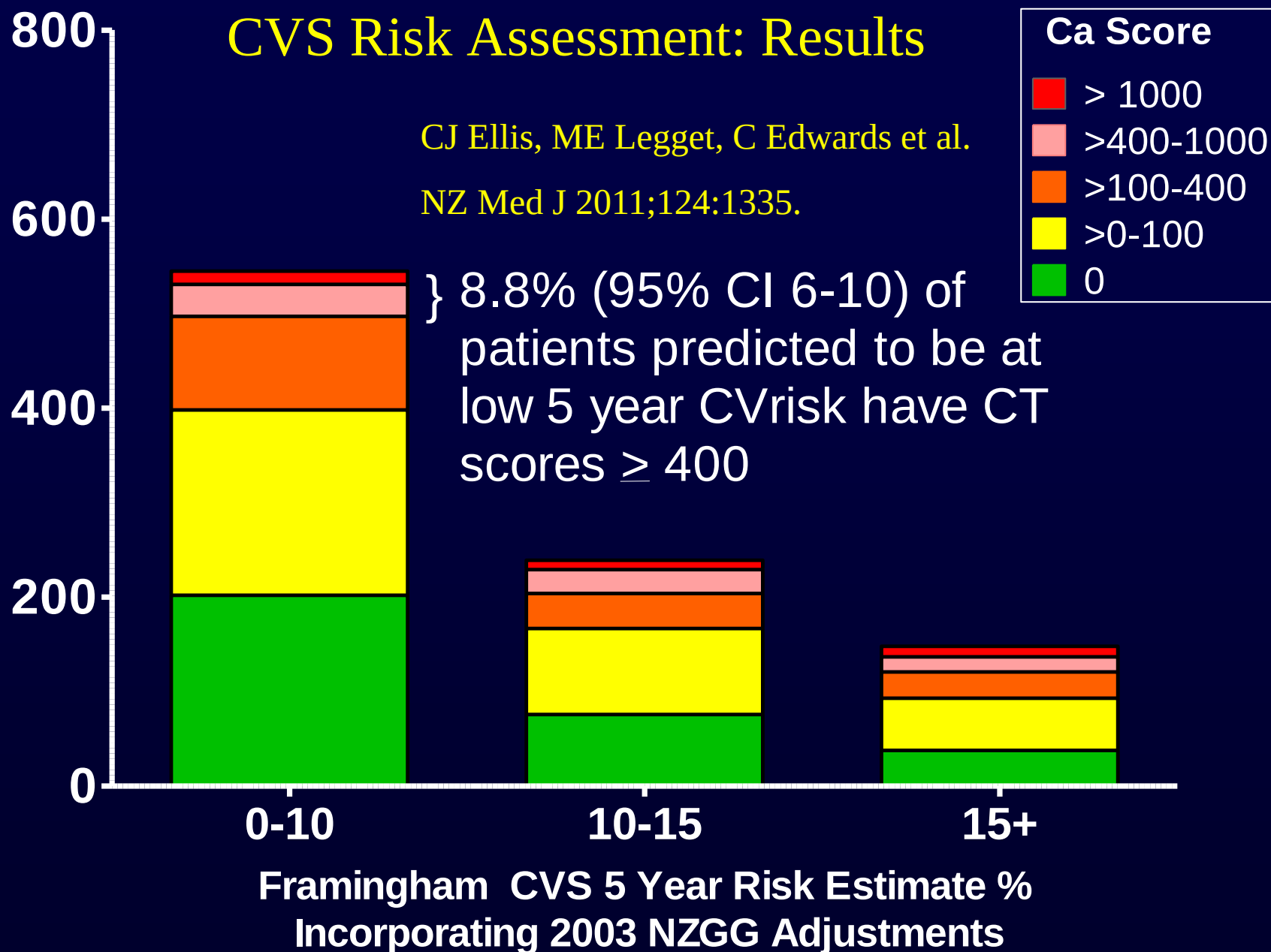
NZMJ 27 May 2011, Vol 124 No 1335; ISSN 1175 8716

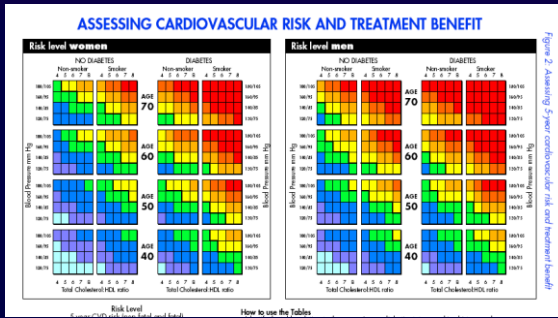
URL: <http://www.nzma.org.nz/journal/124-1335/4676/>

Calcium Score & More Accurate CVS Risk Assessment: Results

CJ Ellis, ME Legget, C Edwards et al.

NZ Med J 2011;124:1335.

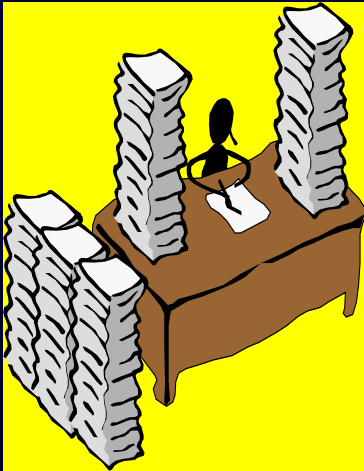
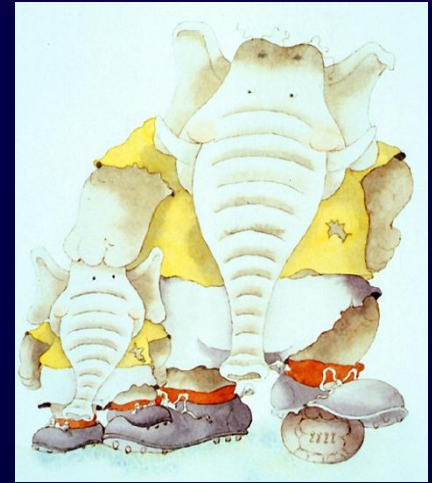




Framingham-Based:
5 or 10-Year Risk &
“Lifetime-Risk”

CVS Risk Assessment

Family History



“Modern Risk Factors”



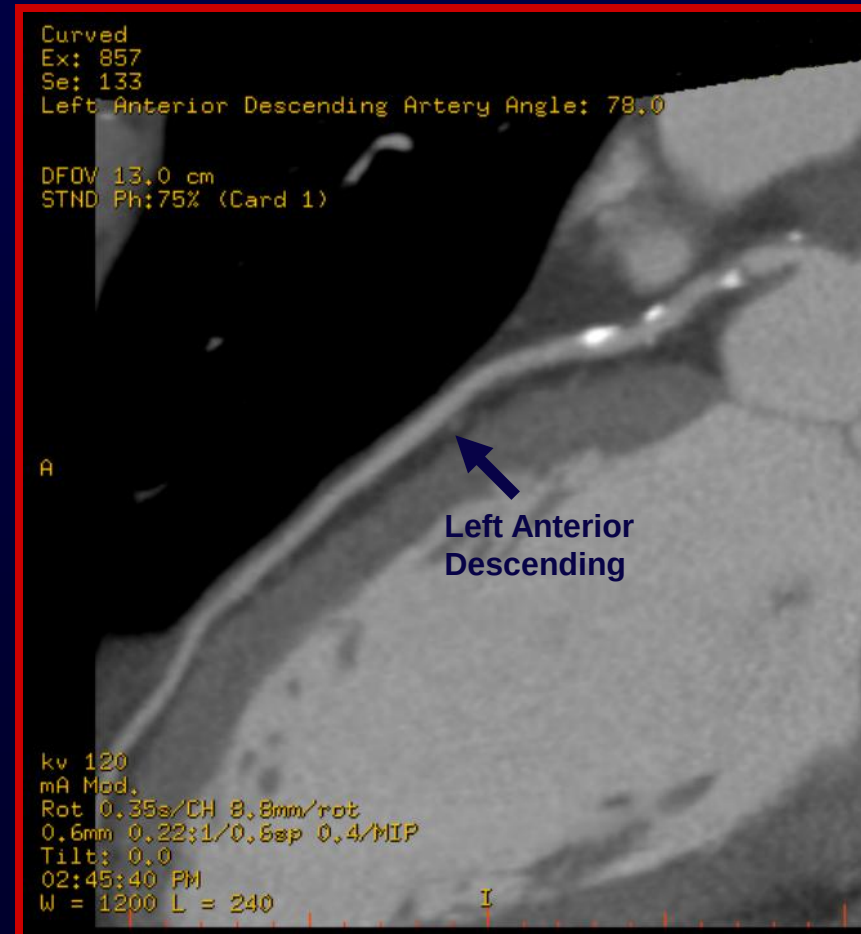
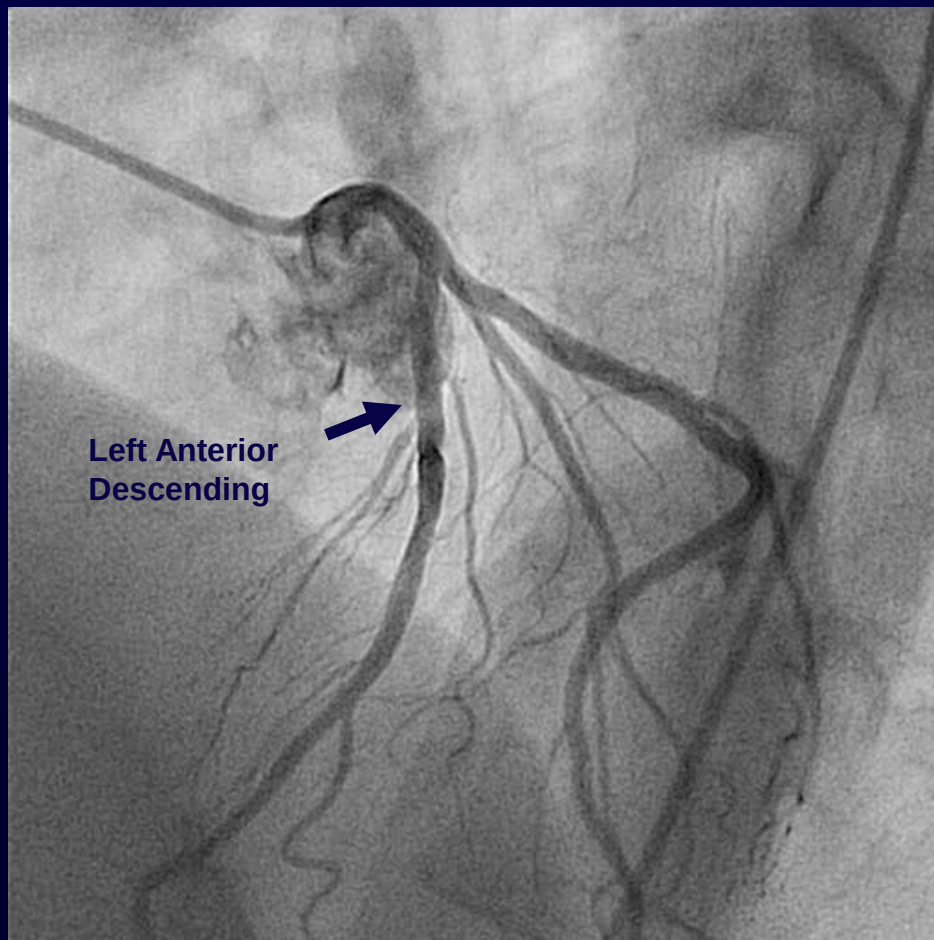
Calcium Scoring & CT
Angiography

64-slice CT Cardiac Angiography

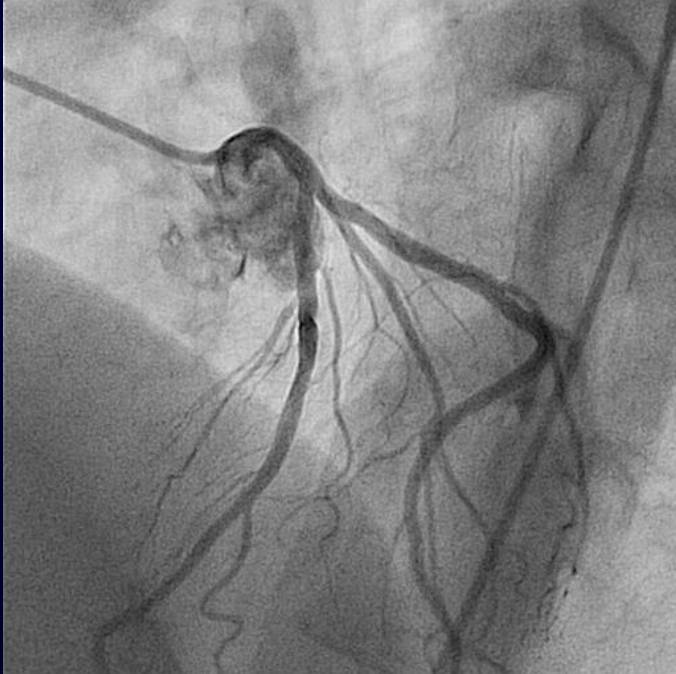
The opportunity to 'Personalise' CVS risk

Mild, calcified CAD seen on CT Angiography

Confirmed at Coronary Angiography



Personal Risk: No
longer abstract!
Very motivating:
Lifestyle &
Medication

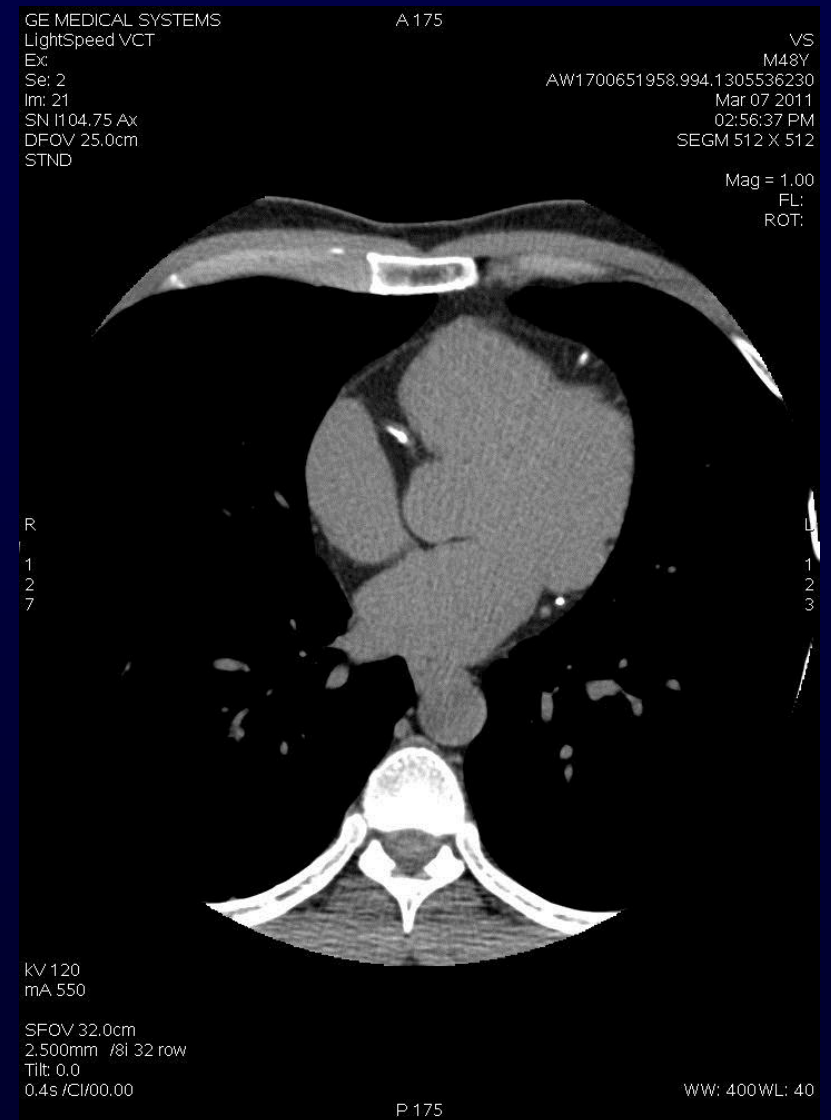
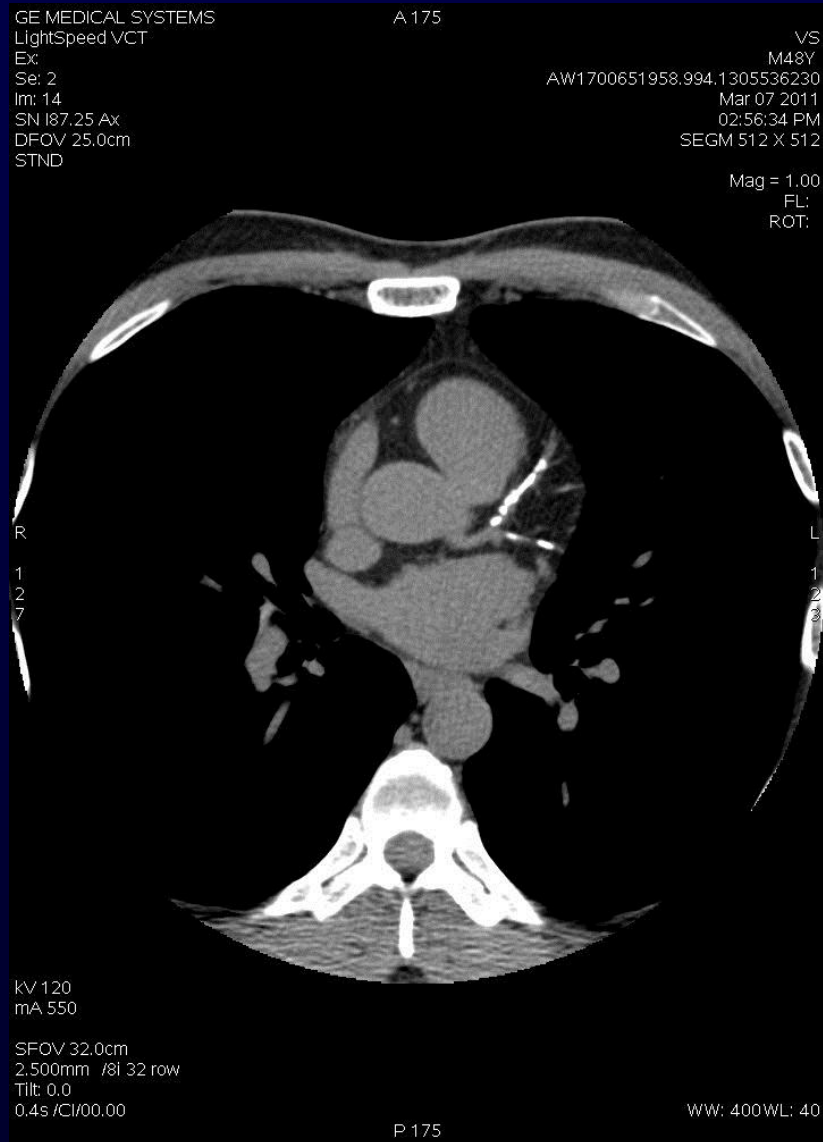


CTA Report Given to Patient

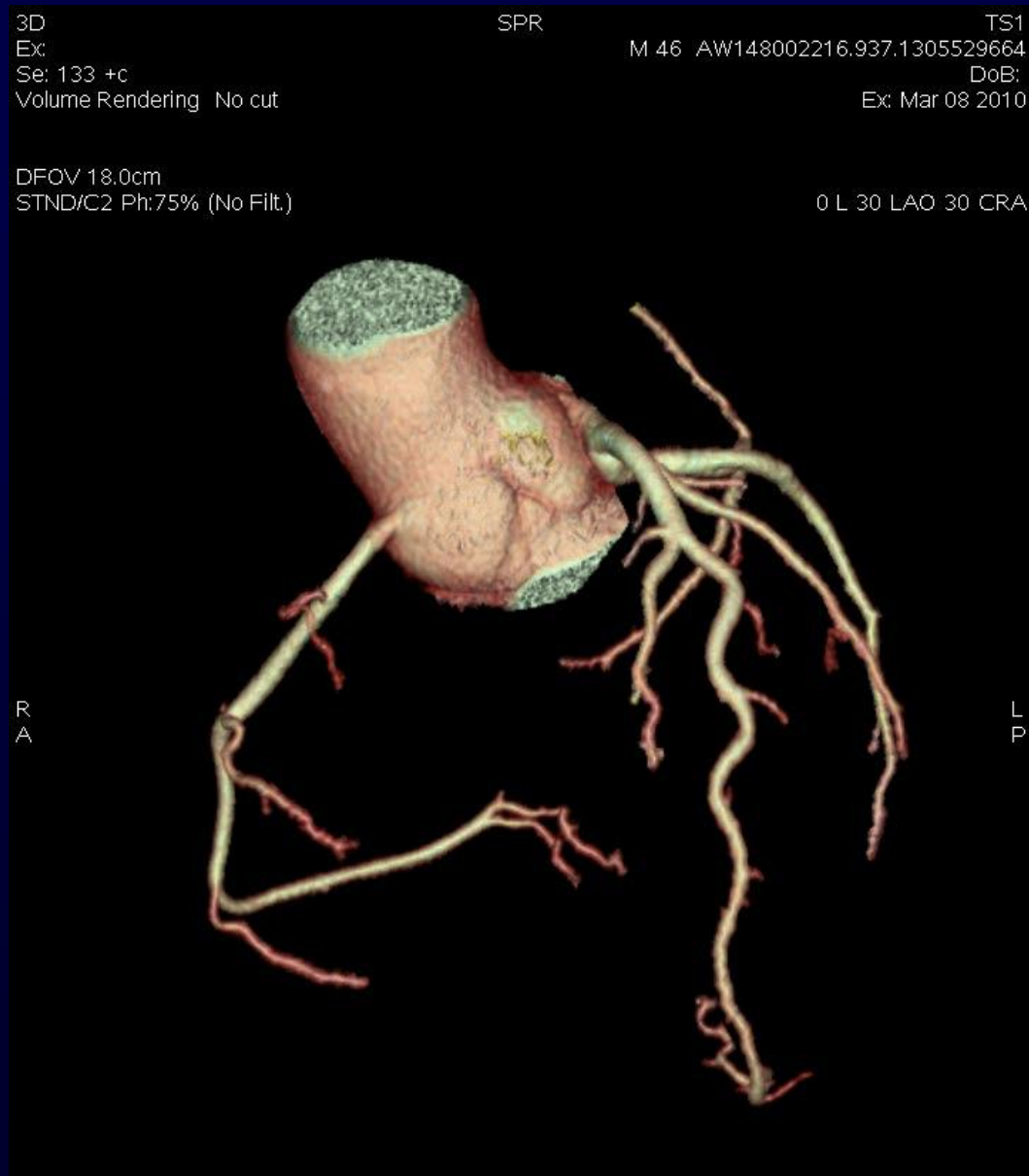
- Outstanding Impact on the patient
- Better understanding of medical issue
- Better understanding of their own situation
- VERY motivating for a patient with advanced atheroma
- “Give me the pills!”



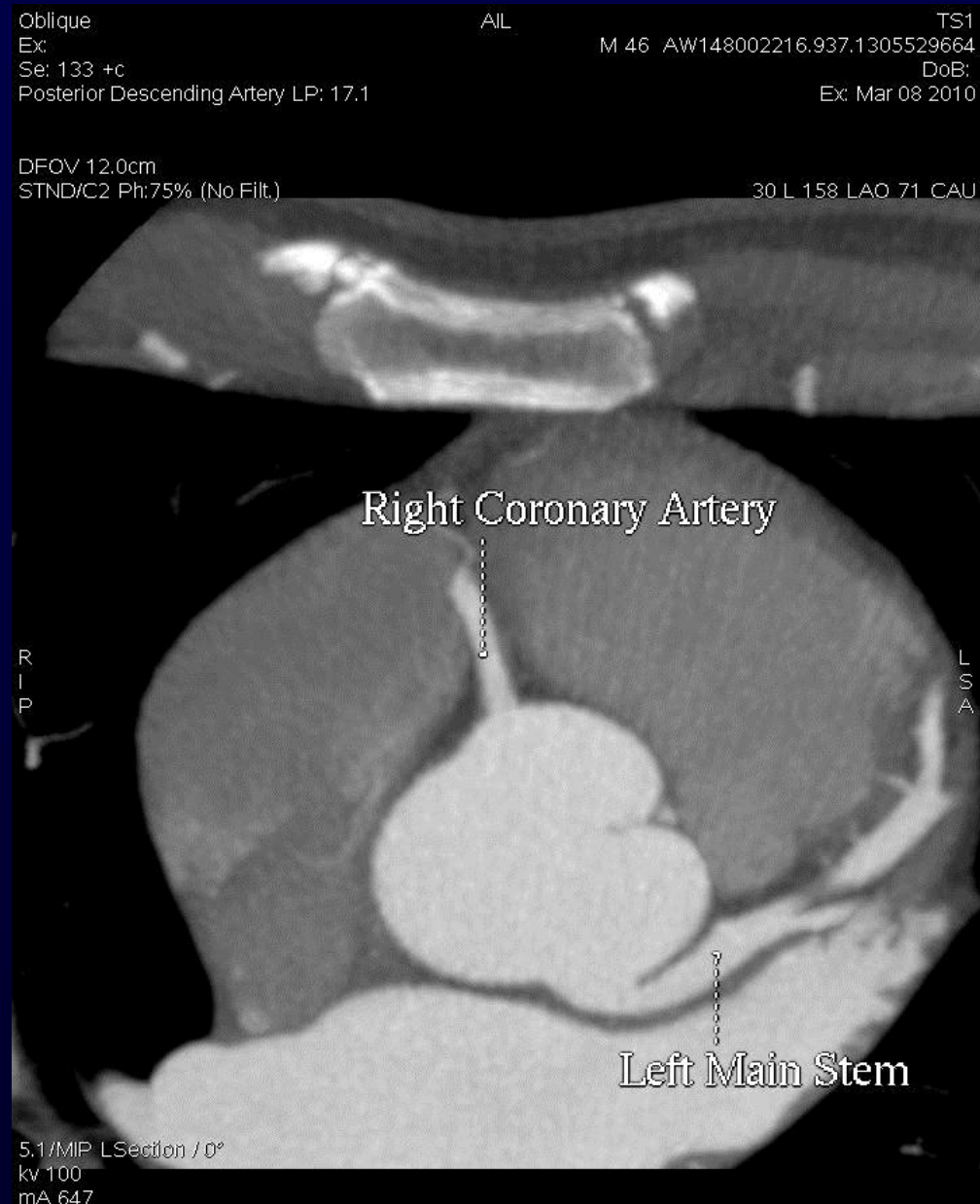
Asymptomatic: Calcium Score Images



Equivocal Symptoms/Signs CT Cardiac Angiogram Images



Equivocal Symptoms/Signs CT Cardiac Angiogram Images



Equivocal Symptoms/Signs CT Cardiac Angiogram Images



Equivocal Symptoms/Signs CT Cardiac Angiogram Images



Equivocal Symptoms/Signs CT Cardiac Angiogram Images



64-slice CT Cardiac Angiography

Significant issues

‘Effective Radiation Dose’ (mSv) for Selected Procedures

Circ 2009;119:1056-65

<u>Test</u>	<u>Effective Dose (mSv)</u>	<u>Reported Range (mSv)</u>
CX-Ray PA + Left Lateral	0.1	
Lumbar spine X-Ray	2.4	
CT Head	2.0	
CT Chest	7	4-18
CT Abdomen	10	4-25
Barium Enema	15	
Screening Mammography	1	0.5-1.5
CT Calcium Score	1	1-1.5
64-Slice CTCA, Current Modulation	7 @ AHG	7-11
Invasive Coronary angiogram	7	4-12
PCI	12	7-57
Stress Scintigraphy (Sestamibi)	9	
Yearly Background Dose (NZ)	3	1-10

Effective Radiation Dose: In Perspective

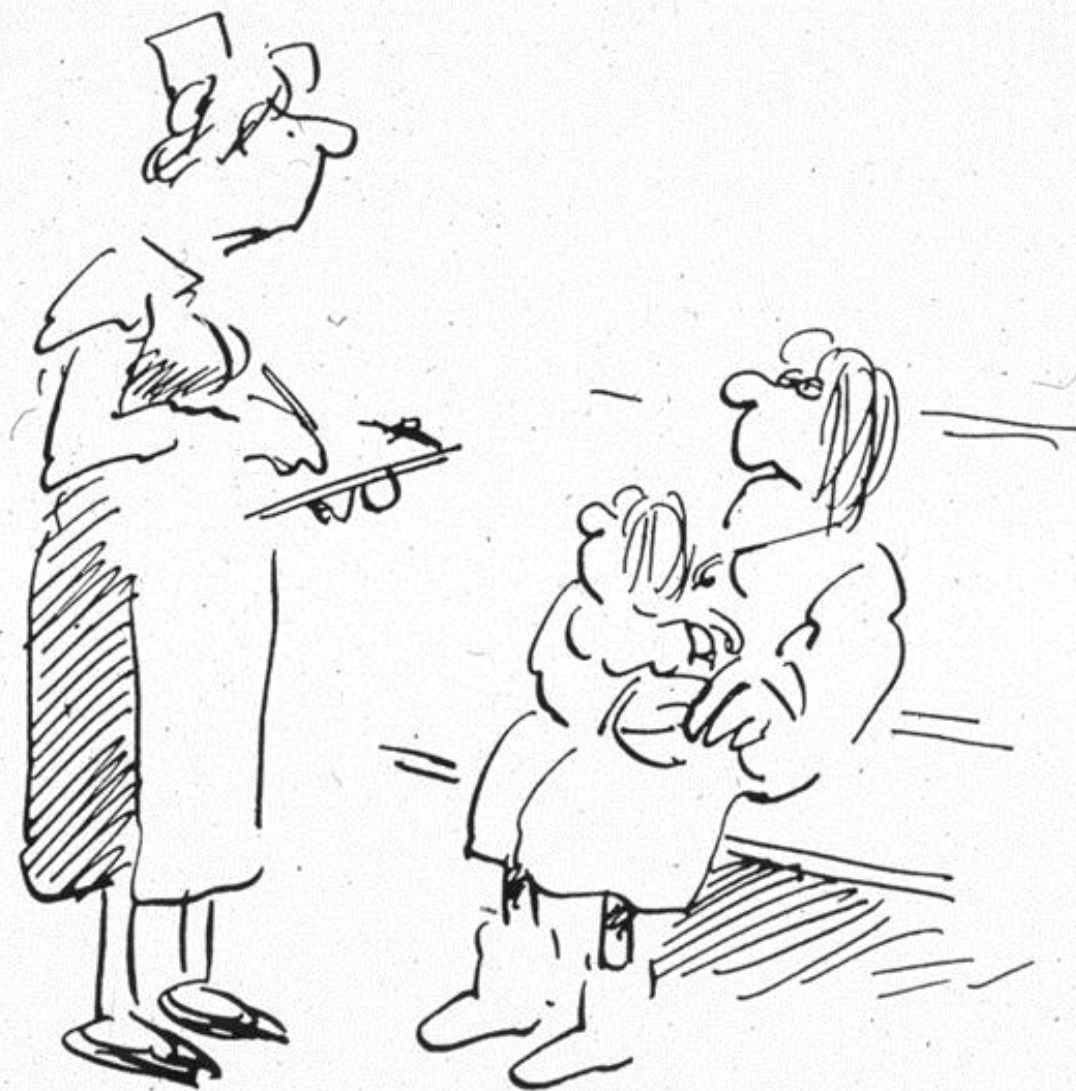
- Yearly Background Radiation: 3mSv (1-10)
- Yearly Background Radiation in Cornwall and Aberdeen: 10mSv [no increased cancer rate]
- Occupational Exposure: 20mSv/year (NZ NRL)
 - Over 5 years, max 50 mSv/year
- Airline Crew: 3-6 mSv/year
 - Dose doubles every 1500m altitude
 - Dose varies with sunshine & latitude
 - No consistent finding of increased cancer risk except skin (recreational exposure!)

Summary: CT Cardiac Angiography



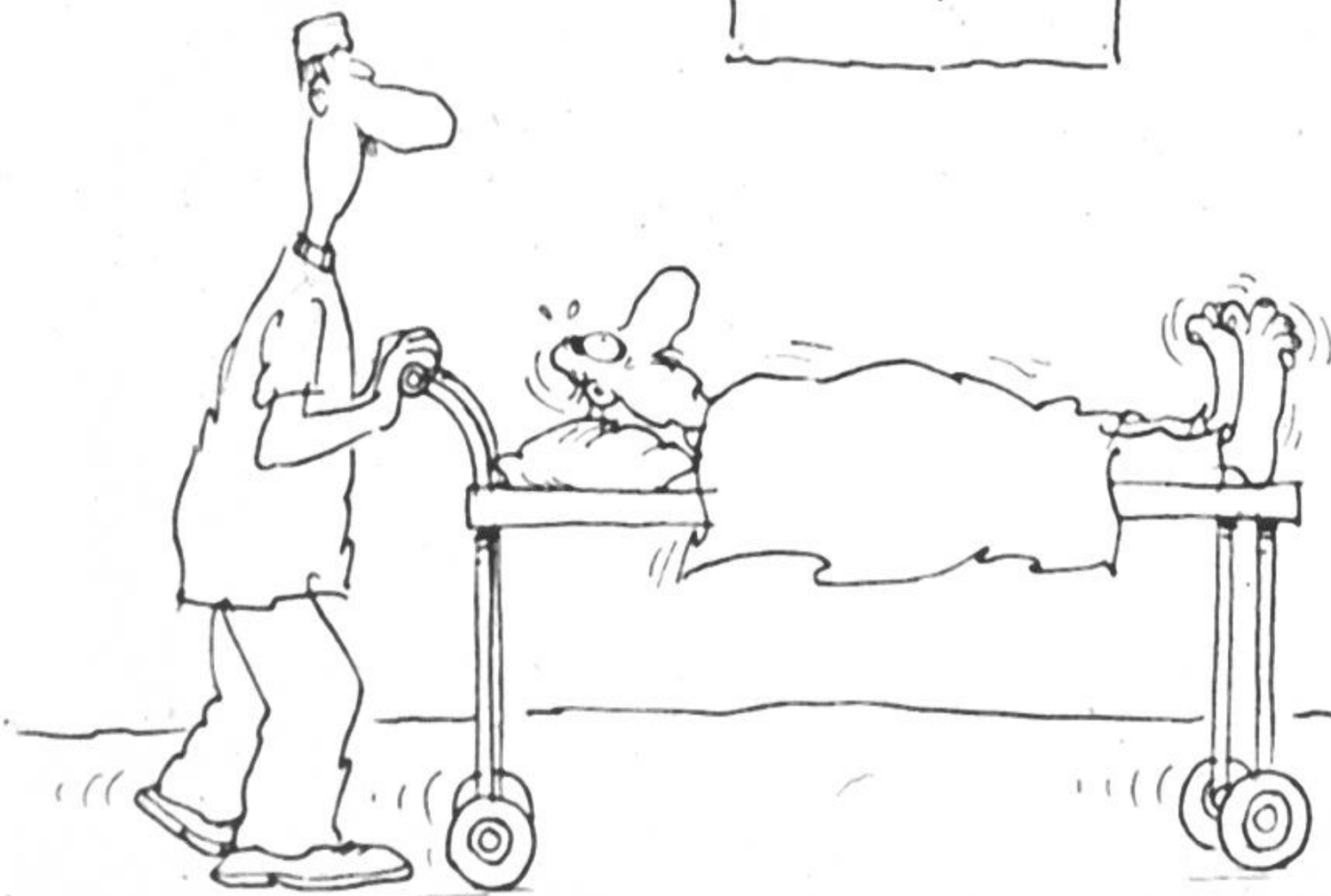
Potential Roles for CT Cardiac Angiography: Summary

- Impressive & accurate images of the heart
 - Potential to help in various clinical settings
 - Need to further lower X-Ray dose
- The negative predictive value for severe coronary stenosis has huge potential to exclude severe coronary disease
- The calcium score (1mSv) has been proven to significantly improve CVS risk assessment above the traditional Framingham risk
 - Clear ability to ‘personalise’ risk with Ca score and atheromatous images
- Will significantly increase within Public Hospitals for many different clinical problems; ?Community Ca Scoring
- ‘Watch the CT Cardiac Angiogram space’!



"Age? You mean now or when we first sat down?"

The End
➔



Eden

CT Cardiac Angiography Cardiologists at Auckland Heart Group & Mercy Radiology



Collaboration in Cardiac CT Angiography

Mercy Radiology

- CT Experience
- Infrastructure/machine!
- Non-Cardiac findings

Auckland Heart Group

- Cardiology expertise
- Coronary anatomy experience
- Patient management

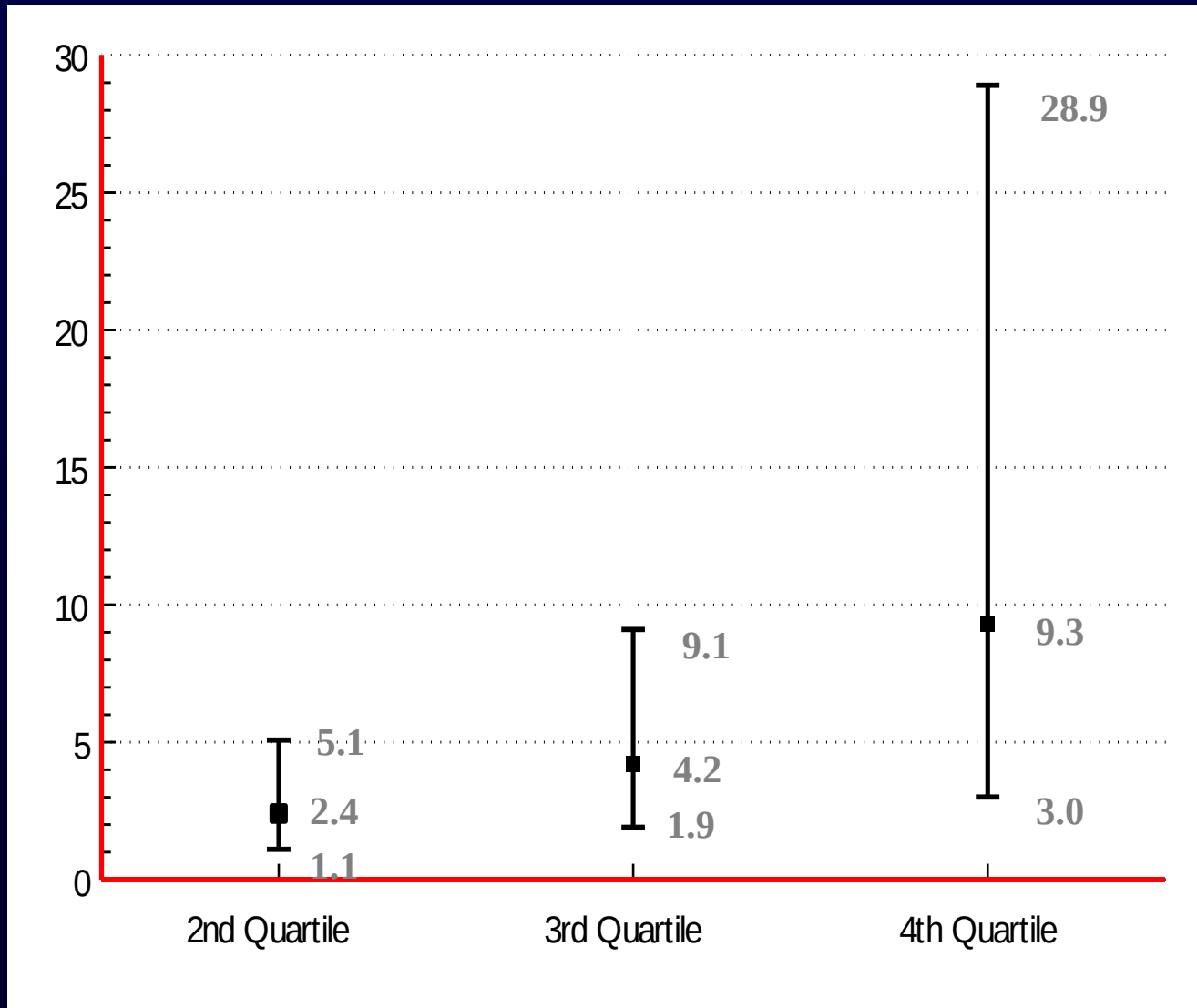
Mercy Hospital



Coronary Calcium Score and Compliance with Medical Therapy



Odds Ratio of maintaining statin therapy with various levels of baseline CAC (3.6 yr f/u) – Kalia et al. 2006



George Bernard Shaw

“The reasonable man
adapts himself to
the World. All
progress depends
on the unreasonable
man”

