

PHILIPS CT USER GROUP MEETING 2019

Coronary Artery CT

Adele Trueman





NICE 2016 Guidelines

RCR provision of CCTA

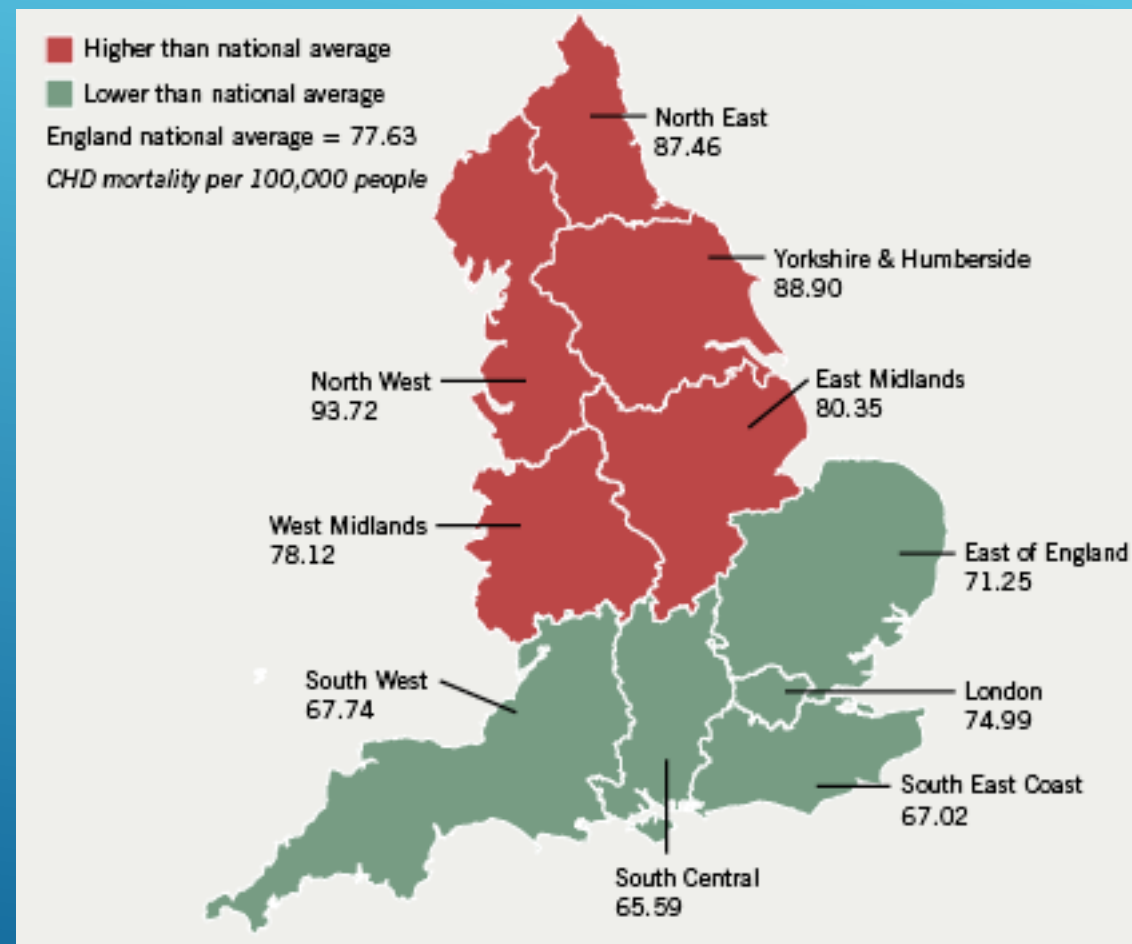
Incidence of coronary artery disease in NW

“Deaths due to heart disease in England are most common in the North West, primary care trust figures indicate.

The mortality rate in one PCT, Tameside and Glossop, is almost four times that of Kensington and Chelsea in London.

Three of the five worst death rates are found in the North West, while the South has the lowest rates of deaths through coronary heart disease”

BBC report 2011



- Patient Preparation
- On-table preparation
- Heart rate control
- Scan Acquisition
- Anatomy
- Image Quality
- The future





APPOINTMENT LETTER



HEART RATE/ BP
CHECKED



VERBAL
EXPLANATION

PATIENT PREPARATION



PURPOSE OF GOOD PREPARATION

Taking patients
from this.....



.....to this

► Hopefully, the careful explanation of the examination won't have the opposite effect!

PATIENT PREPARATION







Cannulation



```
graph TD; A[Cannulation] --> B[Loading of injector with contrast and saline]; B --> C[Practice breath holding techniques]; C --> D[ECG electrodes]; D --> E[HR control];
```

A vertical flowchart with five steps, each in a colored rounded rectangle. The steps are: 1. Cannulation (purple), 2. Loading of injector with contrast and saline (teal), 3. Practice breath holding techniques (green), 4. ECG electrodes (orange), and 5. HR control (pink). Each step is connected to the next by a downward-pointing arrow.

Loading of injector with
contrast and saline

Practice breath holding
techniques

ECG electrodes

HR control

ON TABLE
PREPARATION



Decorative white lines consisting of several parallel diagonal strokes on the right side of the slide.

- ▶ BD Nexiva Diffusics system
- ▶ 3 laser cut tear-drop shaped holes near catheter tip
- ▶ Blood is contained within the device
- ▶ Access is away from the insertion site
- ▶ Delivers higher flow rates with a power injector up to 325 psi
- ▶ Diffuser tip reduces catheter motion

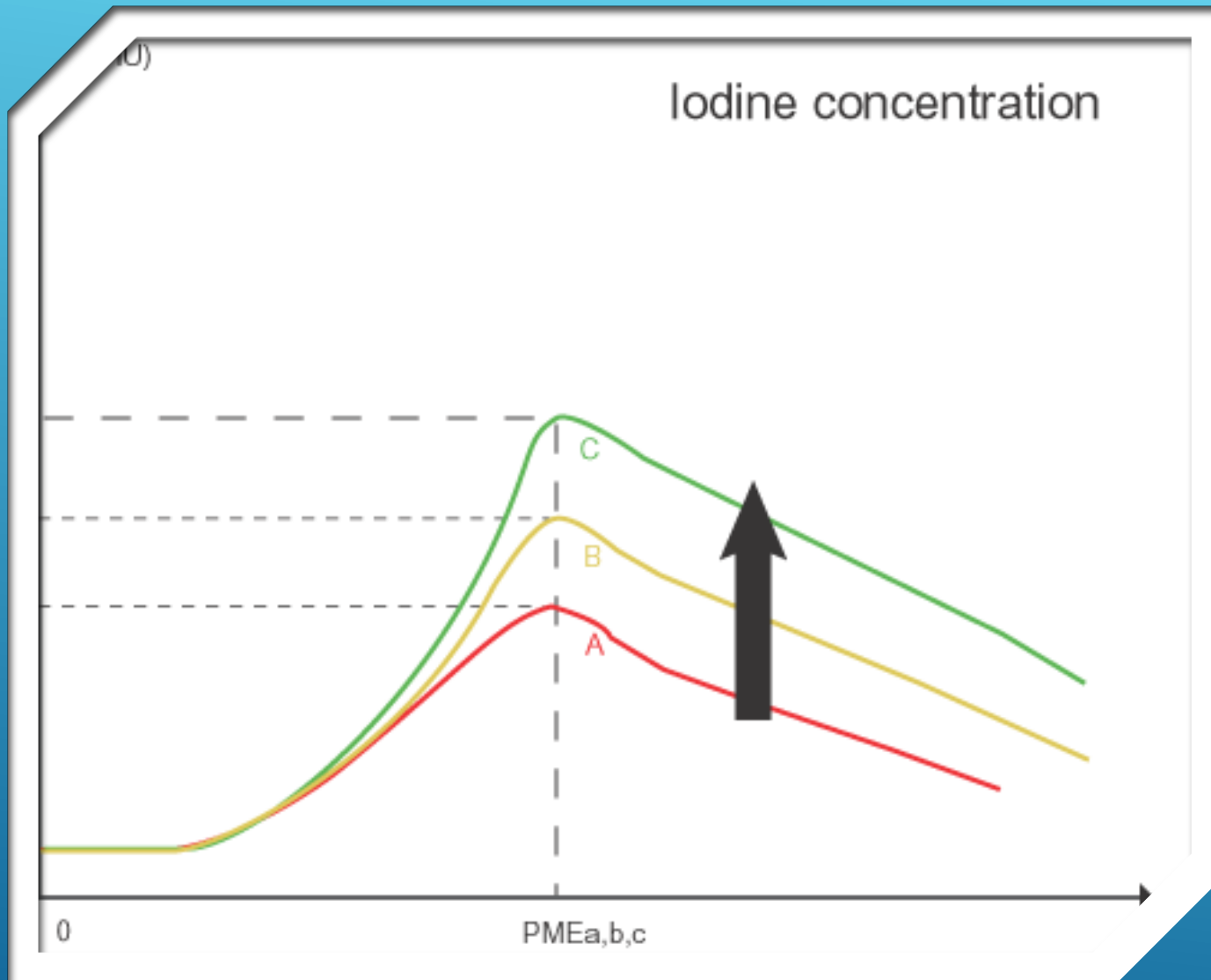


CANNULATION

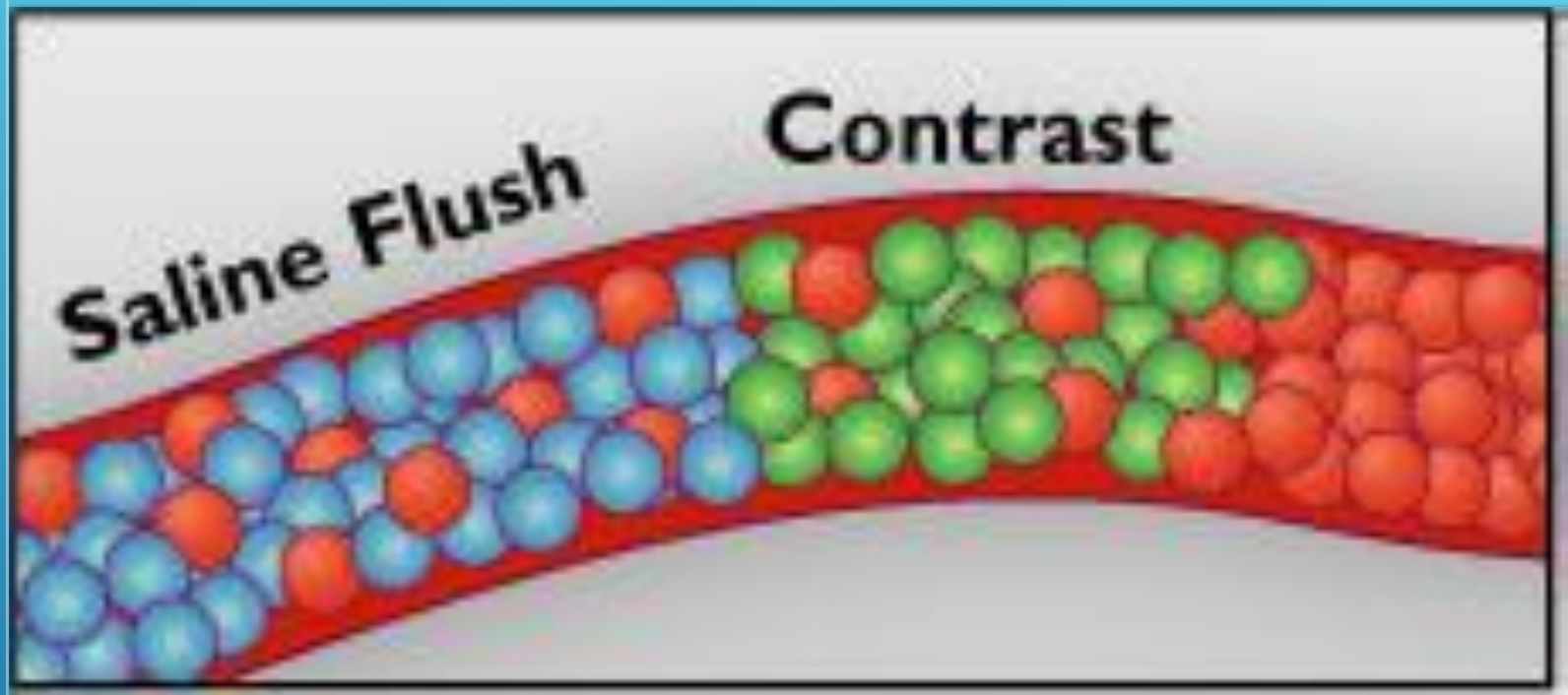


CONTRAST/SALINE LOADING

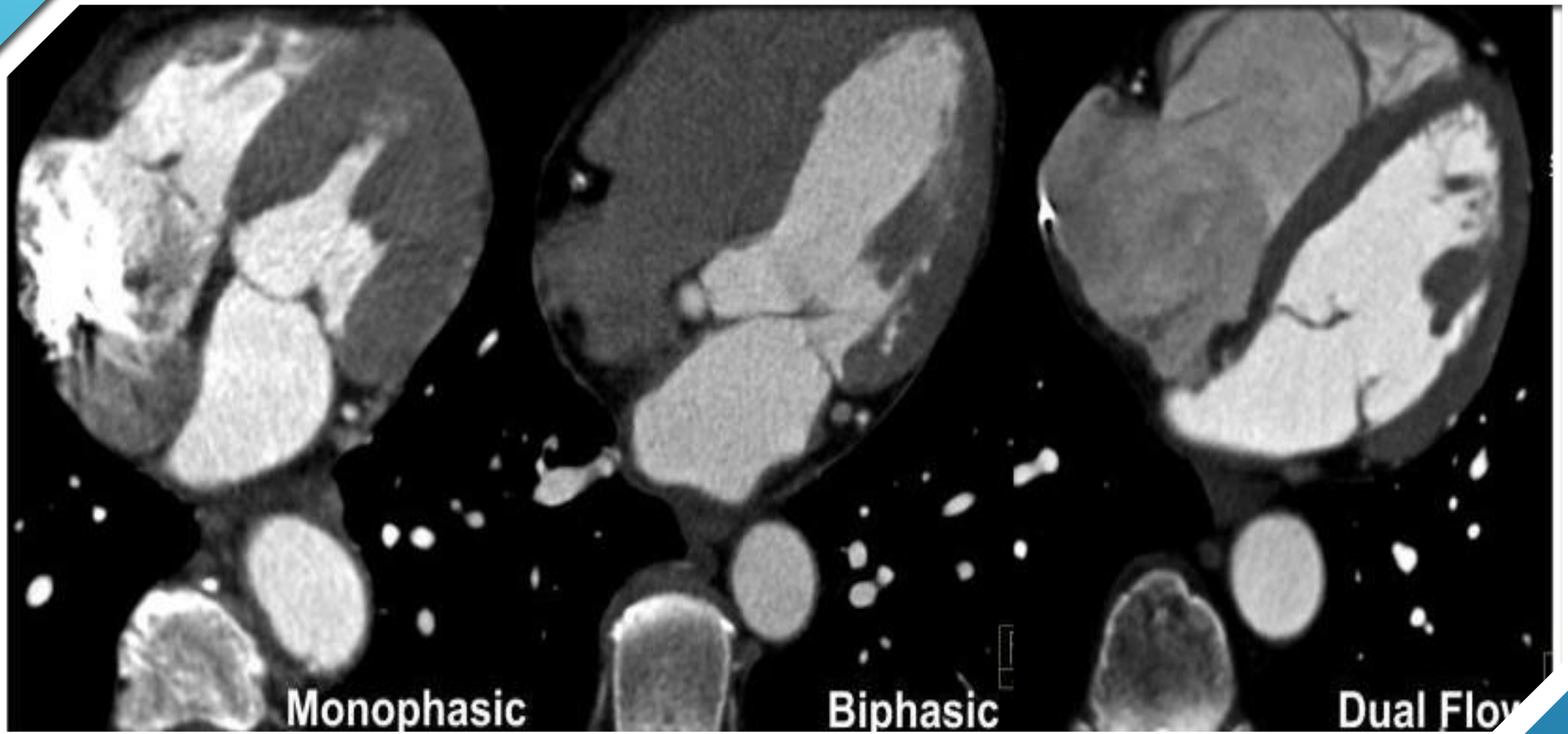
- ▶ Medrad Stellant Injector system
- ▶ P3T



Improved vessel enhancement
at higher concentrations of
iodine



Saline flush ensures a tight bolus of contrast



Cannulation



```
graph TD; A[Cannulation] --> B[Loading of injector with contrast and saline]; B --> C[Practice breath holding techniques]; C --> D[ECG electrodes]; D --> E[HR control];
```

A vertical flowchart with five steps, each in a colored rounded rectangle. The steps are: 1. Cannulation (purple), 2. Loading of injector with contrast and saline (teal), 3. Practice breath holding techniques (green), 4. ECG electrodes (orange), and 5. HR control (pink). Each step is connected to the next by a downward-pointing arrow.

Loading of injector with
contrast and saline

Practice breath holding
techniques

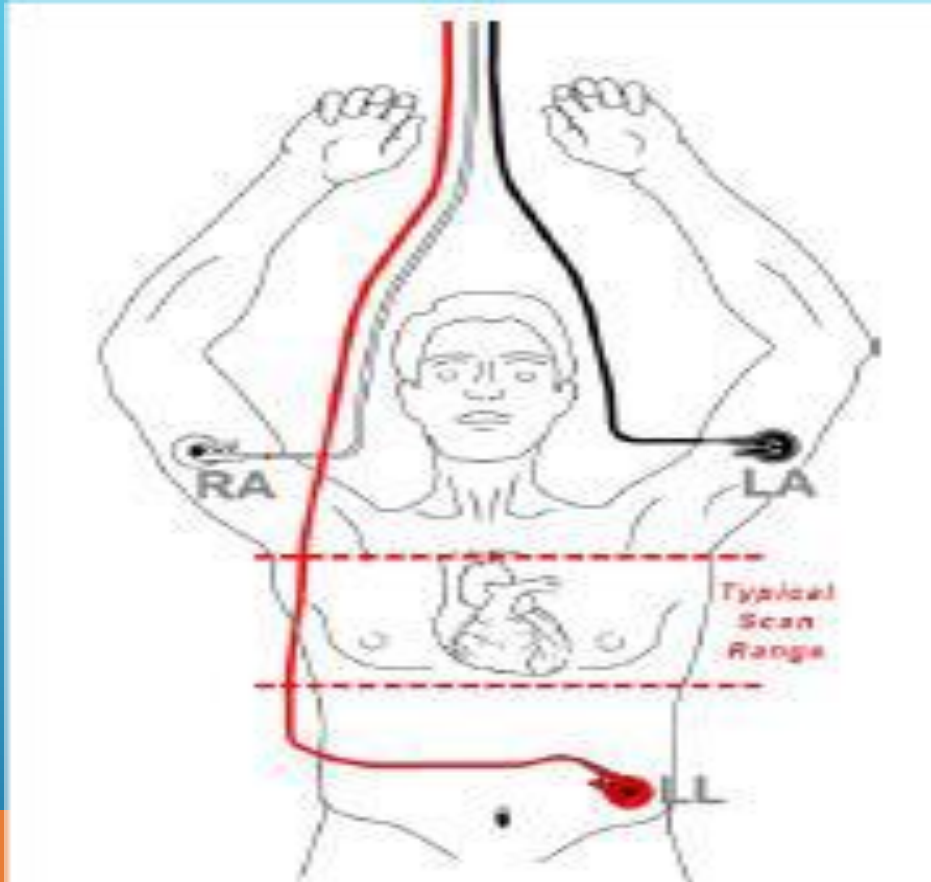
ECG electrodes

HR control

ON TABLE
PREPARATION



Decorative white lines consisting of several parallel diagonal strokes on the right side of the slide.



ELECTRODE PLACING



HEART RATE CONTROL




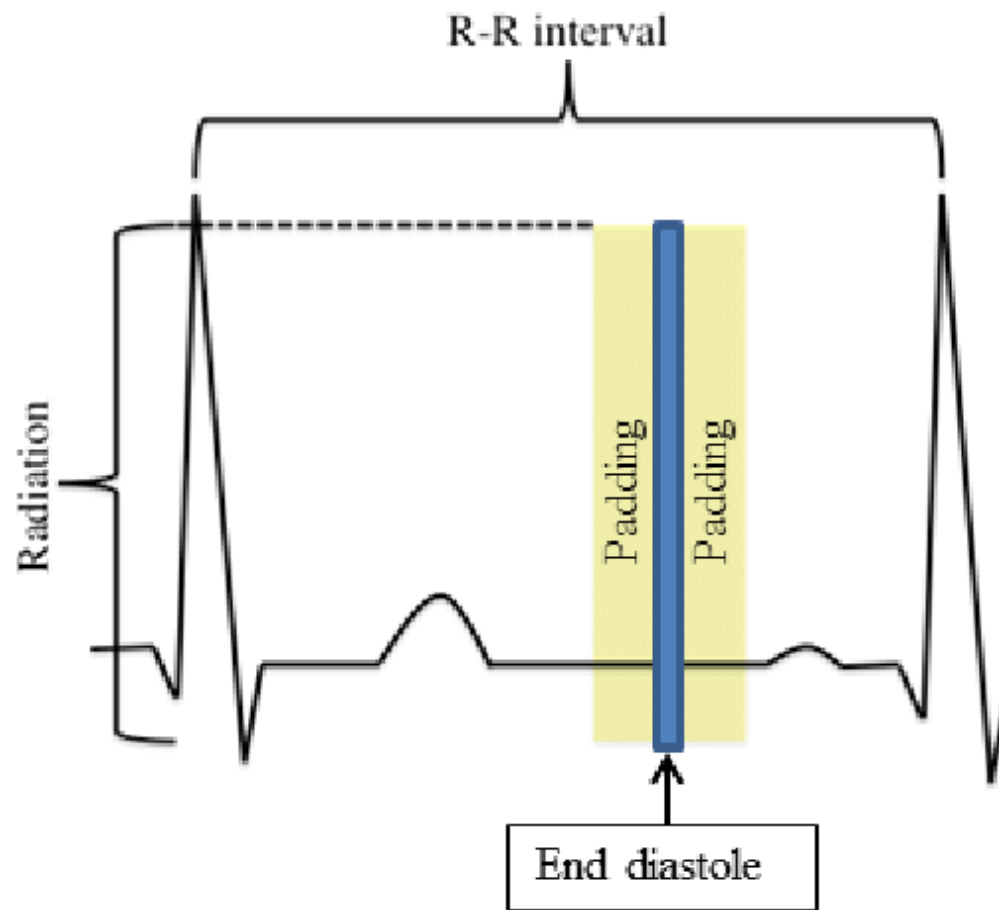
TO CALCIUM SCORE OR NOT TO CALCIUM SCORE.....

That is the question???



RISK FACTORS FOR CORONARY ARTERY DISEASE

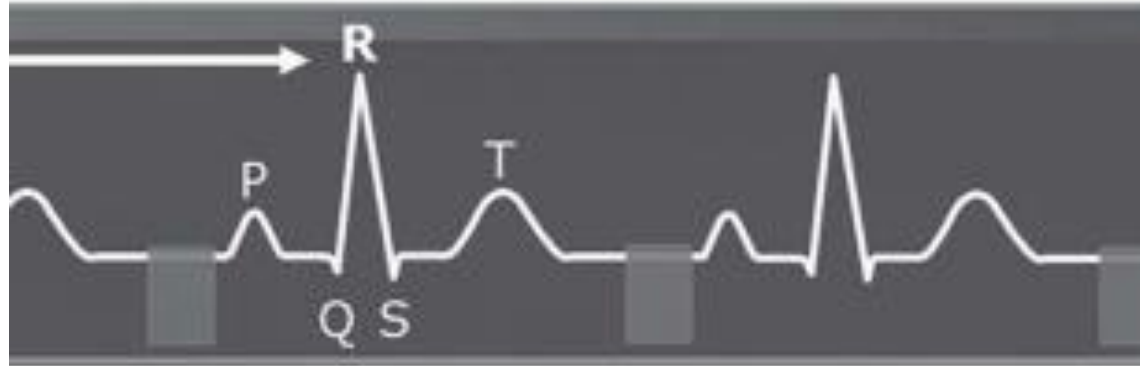
- ▶ High cholesterol
 - ▶ Family history of coronary artery disease
 - ▶ Obesity
 - ▶ Diabetes
 - ▶ Lack of exercise
 - ▶ Smoking
 - ▶ High blood pressure
- 
- A series of three parallel white diagonal lines in the bottom right corner of the slide, extending from the middle of the right edge towards the bottom left.



TECHNIQUE

Prospective imaging

E GATING



VE GATING

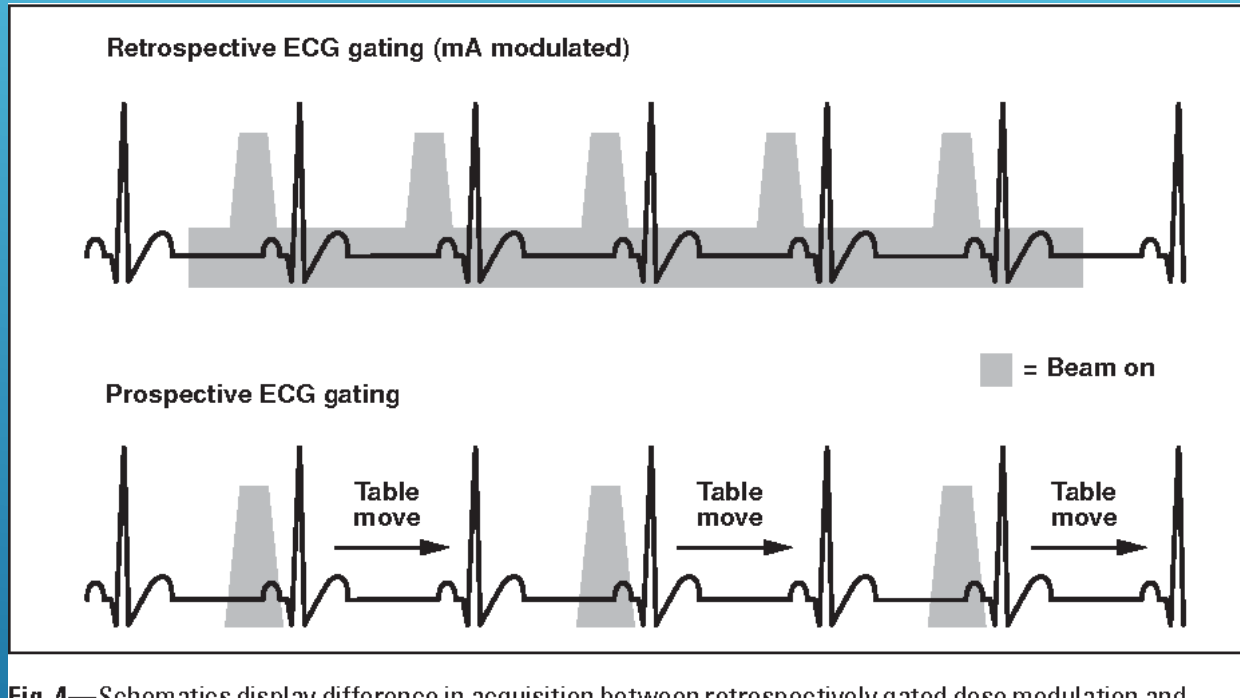


TECHNIQUE

Retrospective
acquisition

RETROSPECTIVE + MODULATION

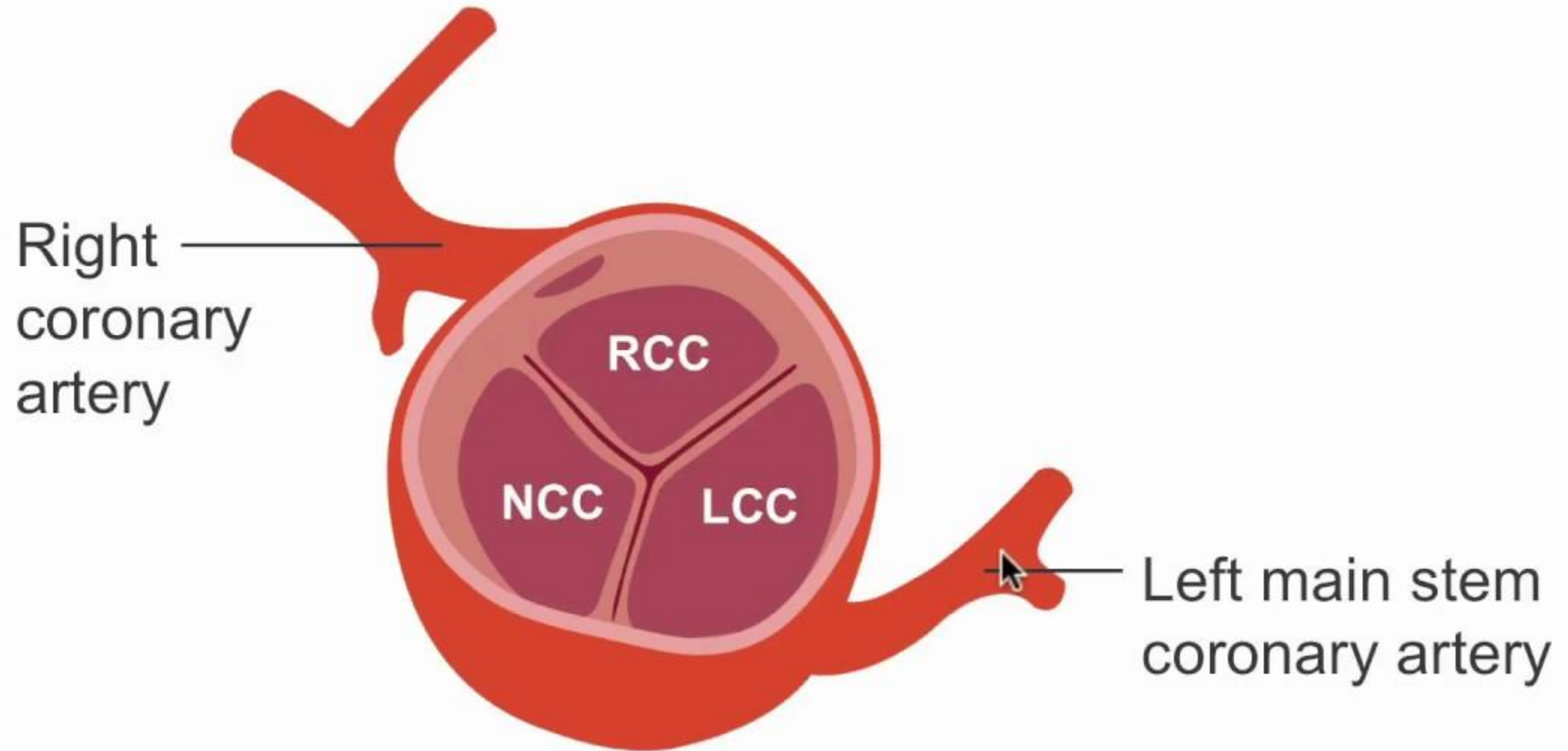
Cardiac dose right
modulation

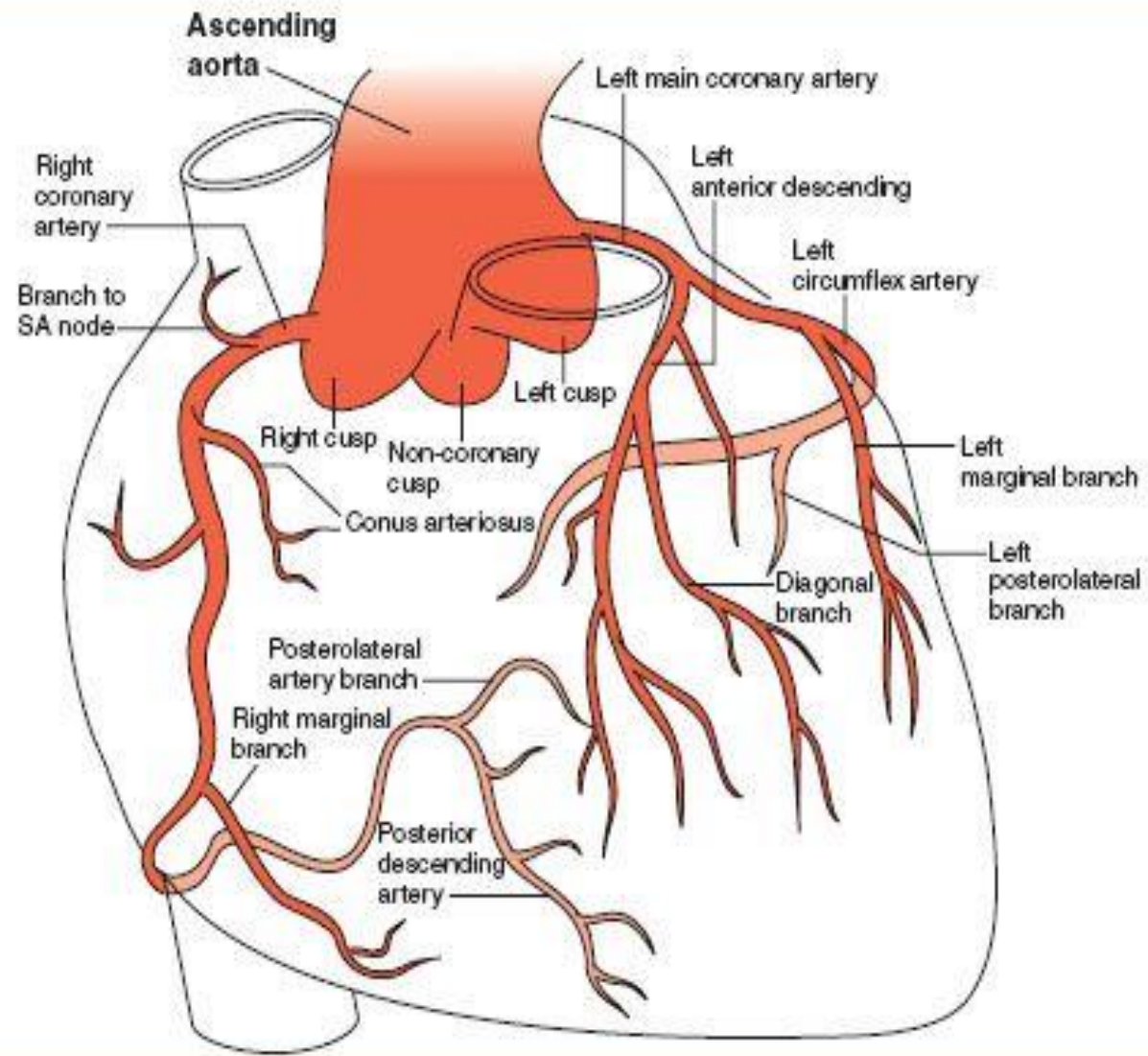


ANATOMY REVISION

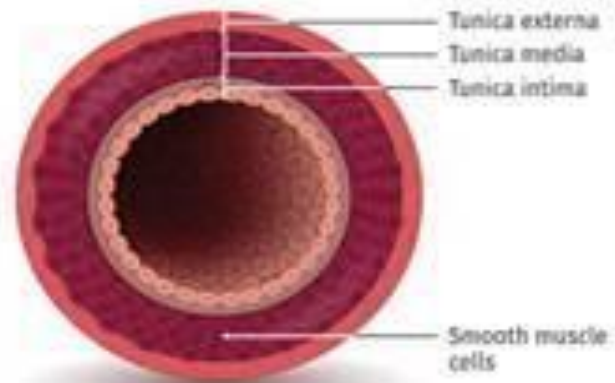


Coronary artery origins

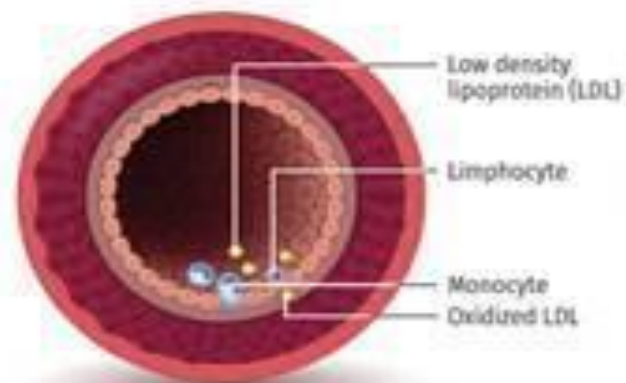




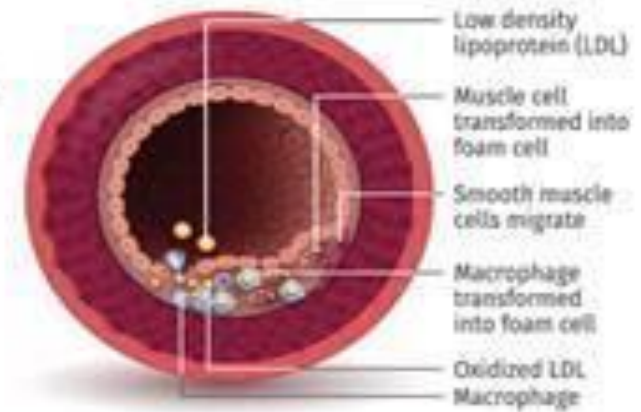
Normal artery



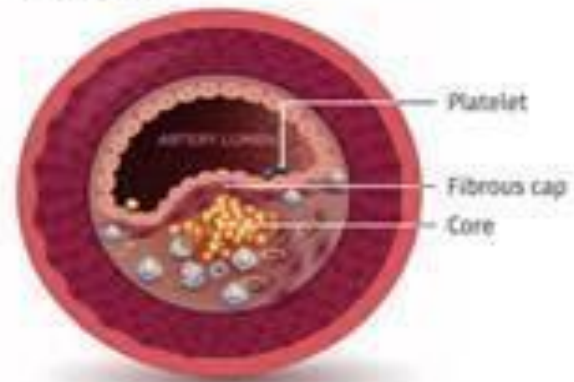
Endothelial dysfunction



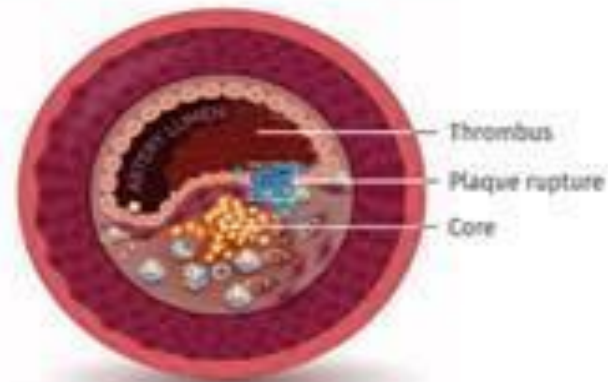
Fatty streak formation



Stable (fibrous) plaque formation



Unstable plaque formation



What we we looking for anyway??

AHHA

PHILIPS USER 2 M/53Y

502-1 75%, iDose (5)

-210.8 mm

ECG: 75%

C

iDose (5)

Ingenuity CT

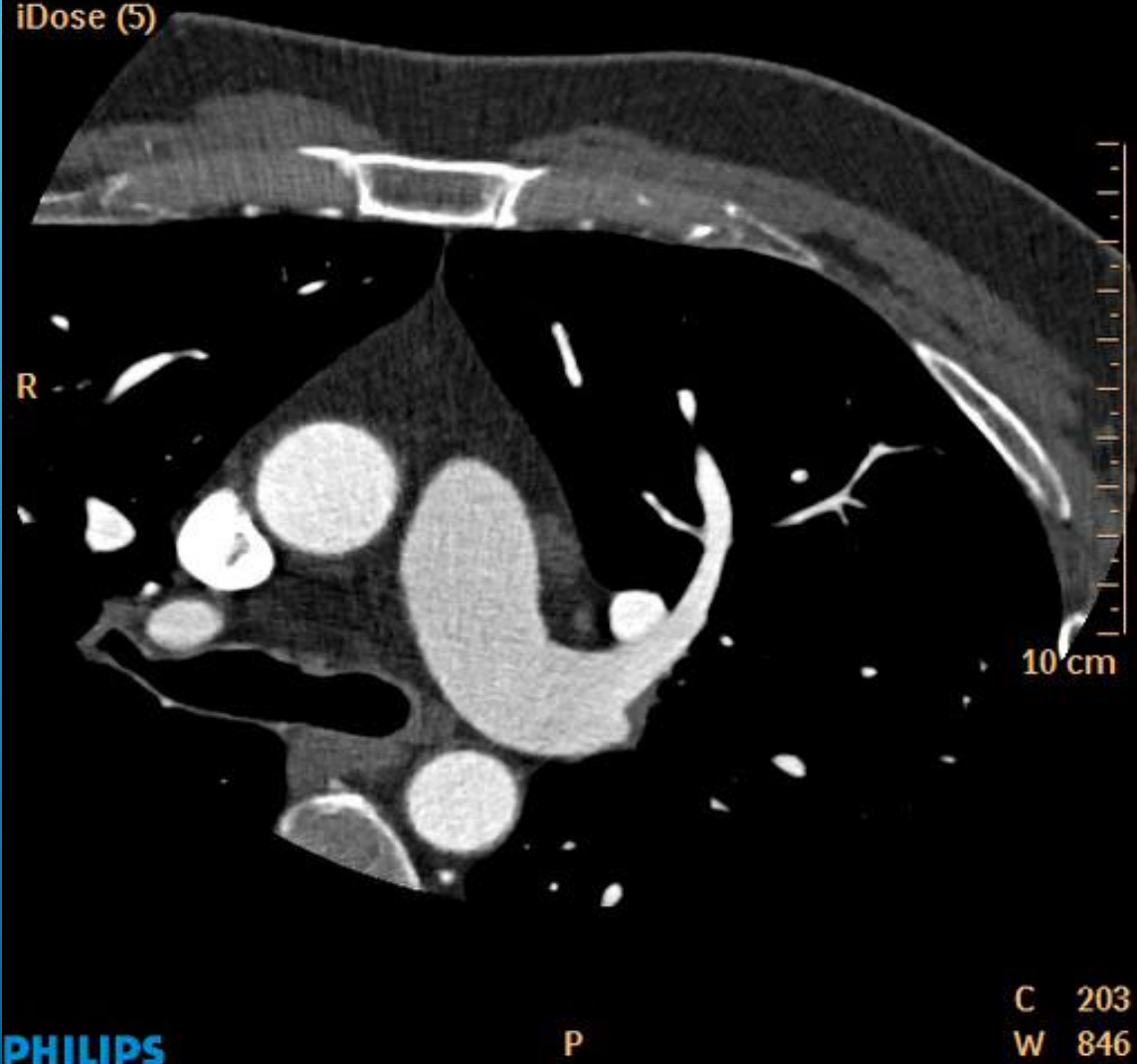
1 Sep, 2019 10:41:30.01

100 kV

FOV 214.0 mm

SW 0.90 mm

Z 1.00



PHILIPS

C 203

W 846

Phase 75%
AH H A
PHILIPS STUDY DAY3 1 M/53Y
23 Sep, 2019 / 10:41:30.01
75%, iDose (5)
Series 502
iDose (5)

AL



Vol. Rend.
Opacity 13
CARDIAC 1
Heart

AH H A
PHILIPS STUDY DAY3 1 M/53Y
23 Sep, 2019 / 10:41:30.01
75%, iDose (5)
Series 502
iDose (5)



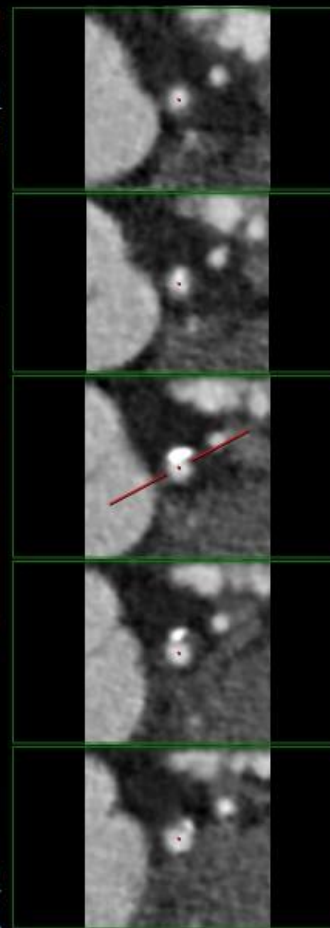
F

NUFFIELD HEALTH
Philips, Ingenuity CT
PHILIPS STUDY DAY3 1 M/53Y
23 Sep, 2019 / 10:41:30.01
75%, iDose (5)
Series 502
iDose (5)



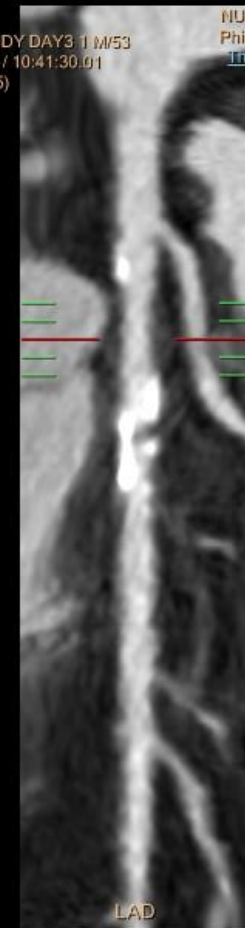
NUFFIELD HEALTH
Philips, Ingenuity CT
Zoom 1.00
Contrast

H
L P
LAO 134 Cranial 2
Angle -1, 2, -134 deg



AH H A
PHILIPS STUDY DAY3 1 M/53Y
23 Sep, 2019 / 10:41:30.01
75%, iDose (5)
Series 502
iDose (5)

WL 262
WW 910

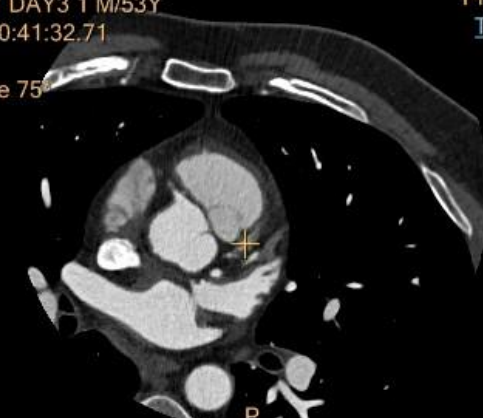


NUFFIELD HEALTH
Philips, Ingenuity CT
Thickness 0.42 mm
Zoom 1.00
Contrast

AH H A
PHILIPS STUDY DAY3 1 M/53Y
23 Sep, 2019 / 10:41:32.71
75%, iDose (5)
Series 502 - Slice 75
iDose (5)

R

MIP
WL 262
WW 910



NUFFIELD HEALTH
Philips, Ingenuity CT
Thickness 0.90 mm
Zoom 1.00
Contrast

RH H R

PHILIPS USER 1 M/33Y

602-1 75%, iDose (5)

-199.4 mm

ECG: 75%

C

iDose (5)

Ingenuity CT

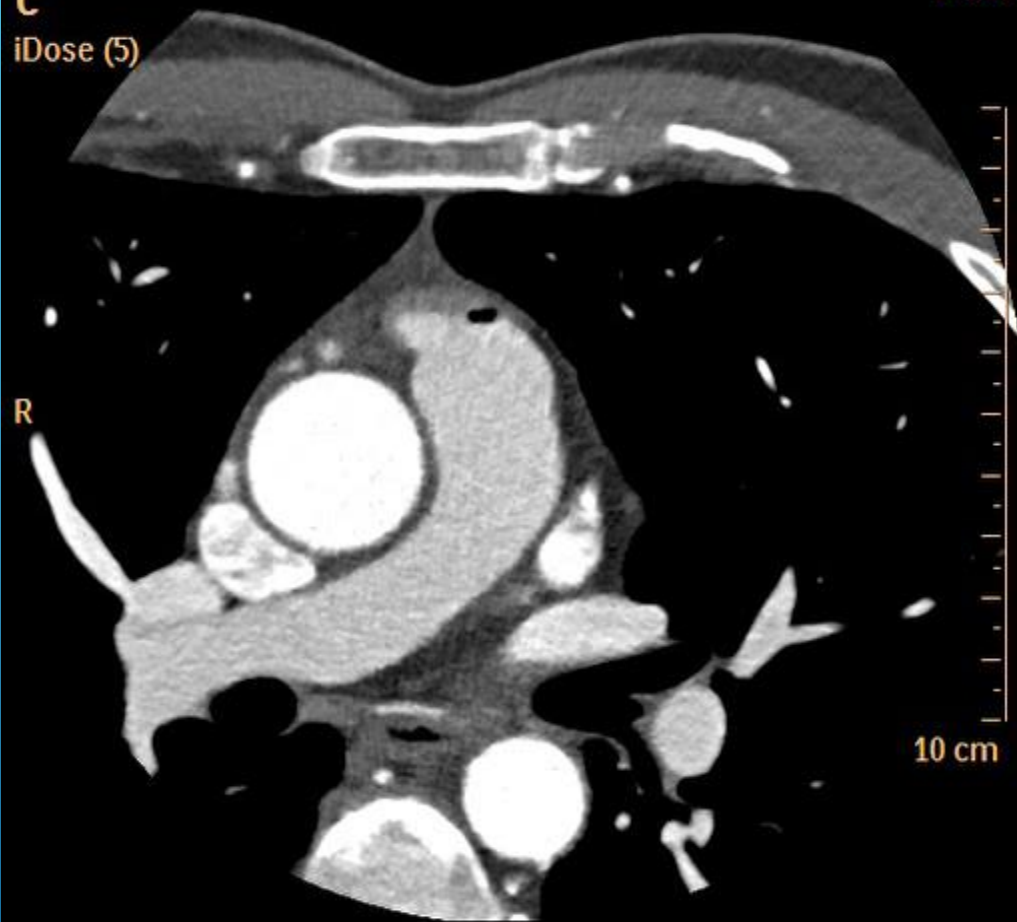
1 Sep, 2019 11:05:50.87

100 kV

FOV 167.0 mm

SW 0.90 mm

Z 1.00



10 cm

C 151

W 772

PHILIPS

P

Philips Study Day 1 M/33Y
17 Sep, 2019 / 11:05:48.88
75%, iDose (5)
Series 602
iDose (5)

 Calcified
 Non-calcified

Opacity 30
WL 247
WW 1003

NUFFIELD HEALTH
Phillips, Ingenuity CT
Zoom 1.00
Contrast

HR
Philips Study Day 1 M/33Y
17 Sep, 2019 / 11:05:48.88
75%, iDose (5)
Series 602
iDose (5)

NUFFIELD HEALTH
Philips, Ingenuity CT
Zoom 4.00
Contrast

H
R A L
F RCA

RCA

H R NUFFIELD HEALTH
Philips Study Day Thickness 0.00 mm
17 Sep. 2019 / 11: Contrast
75%, iDose (5)
iDose (5)

Lumen Area: 6.0

H R NUFFIELD HEALTH
Philips Study Day Thickness 0.00 mm
17 Sep. 2019 / 11: Contrast
75%, iDose (5)
iDose (5)

H R
Philips Study Day
17 Sep, 2019 / 11:
75%, iDose (5)
iDose (5)

Lumen Area: 4.5

NUFFIELD HEALTH
Thickness 0.33 mm
Contrast

H R
Philips Study Day 1 M/33Y
17 Sep, 2019 / 11:05:48.88
75%, iDose (5)
iDose (5)

RCA

Measurements - RCA (Gaussian)							
Finding Name	Volume±Error	Content	Non-calcified Cont...	Min. Lumen Ar...	Position (Min. Lum. A...	Max. Burden	Finding Length

H R

Philips Study Day 1 M/33Y
17 Sep, 2019 / 11:05:48.88
75%, iDose (5)
Series 602
iDose (5)

NUFFIELD HEALTH
Philips, Ingenuity CT
Zoom 1.00
Contrast

RF



5 cm

Vol. Rend.
Opacity 13
CARDIAC 1
Defects Assessment

ALF

R H
A
RAO 24 Cranial 36
Angle 53, 36, 24 deg

H R

Philips Study Day 1 M/33Y
17 Sep, 2019 / 11:05:53.82
75%, iDose (5)
Series 602
iDose (5)

NUFFIELD HEALTH
Philips, Ingenuity CT
100 kV
FOV 167.0 mm
Thickness 0.66 mm
Zoom 1.00
Contrast

R

5 cm

MIP
WL 358
WW 1104

PH



RAO 176 Caudal 60



B B B B
PHILIPS STUDY DAY4 1 M/55Y
30 Aug, 2019 / 11:48:09.25
75%, 75%, iDose (5)
Series 502
iDose (5)

NUFFIELD HEALTH
Philips, Ingenuity CT
[Zoom 1.00](#)
Contrast

AR

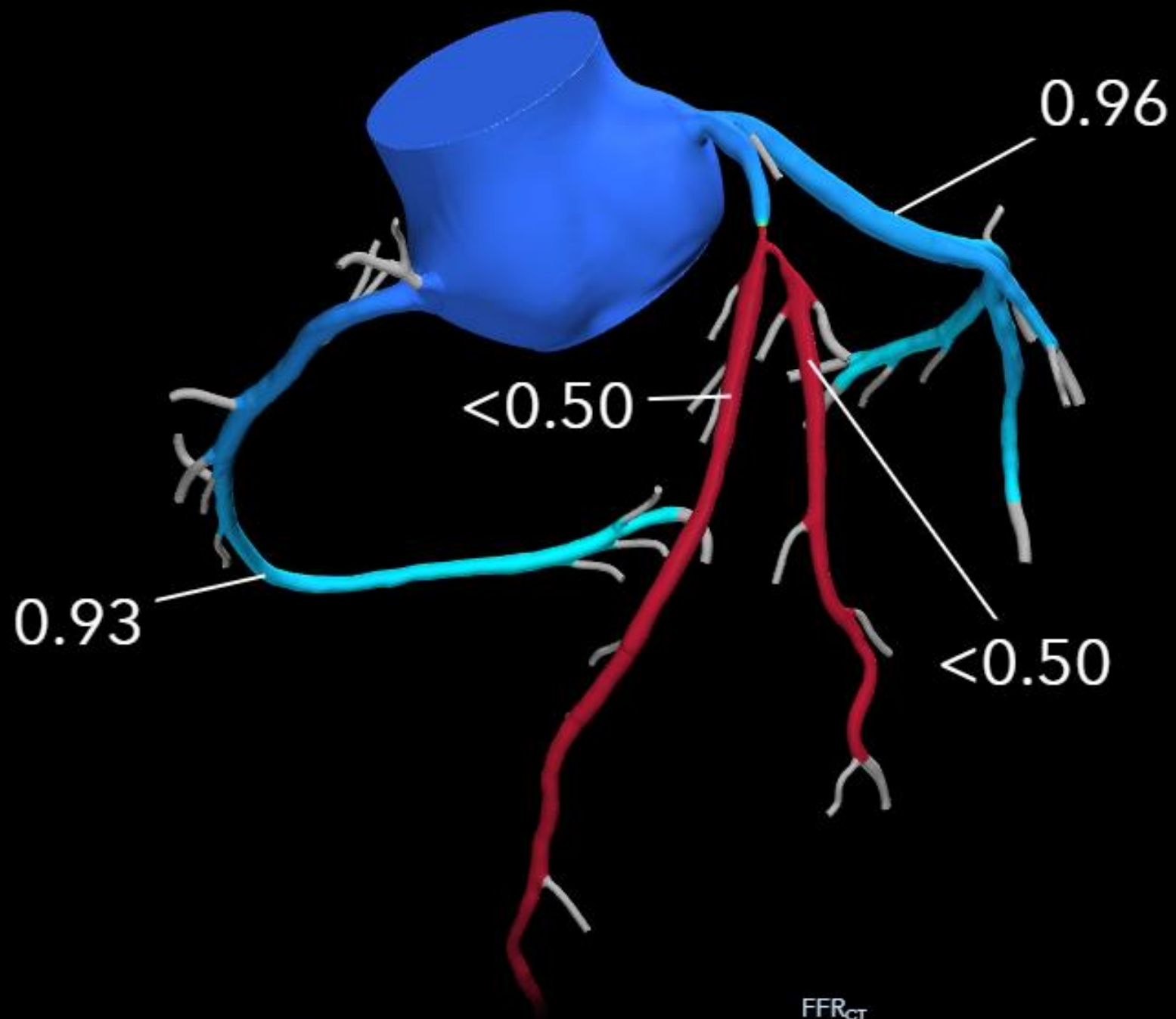


5 cm

[Vol. Rend.](#)
[Opacity 13](#)
[CARDIAC 1](#)

FL


LAO 47 Cranial 43
Angle 22, 40, -44 deg



LAO 56

Cran 46

modelled as

0.00

0.60

0.70

FFR_{CT}

0.80

0.90

1.00

SLLS

PHILIPS USER 1 M/65Y

502-1 75%, iDose (5)

-200.2 mm

ECG: 75%

C

iDose (5)

Ingenuity CT

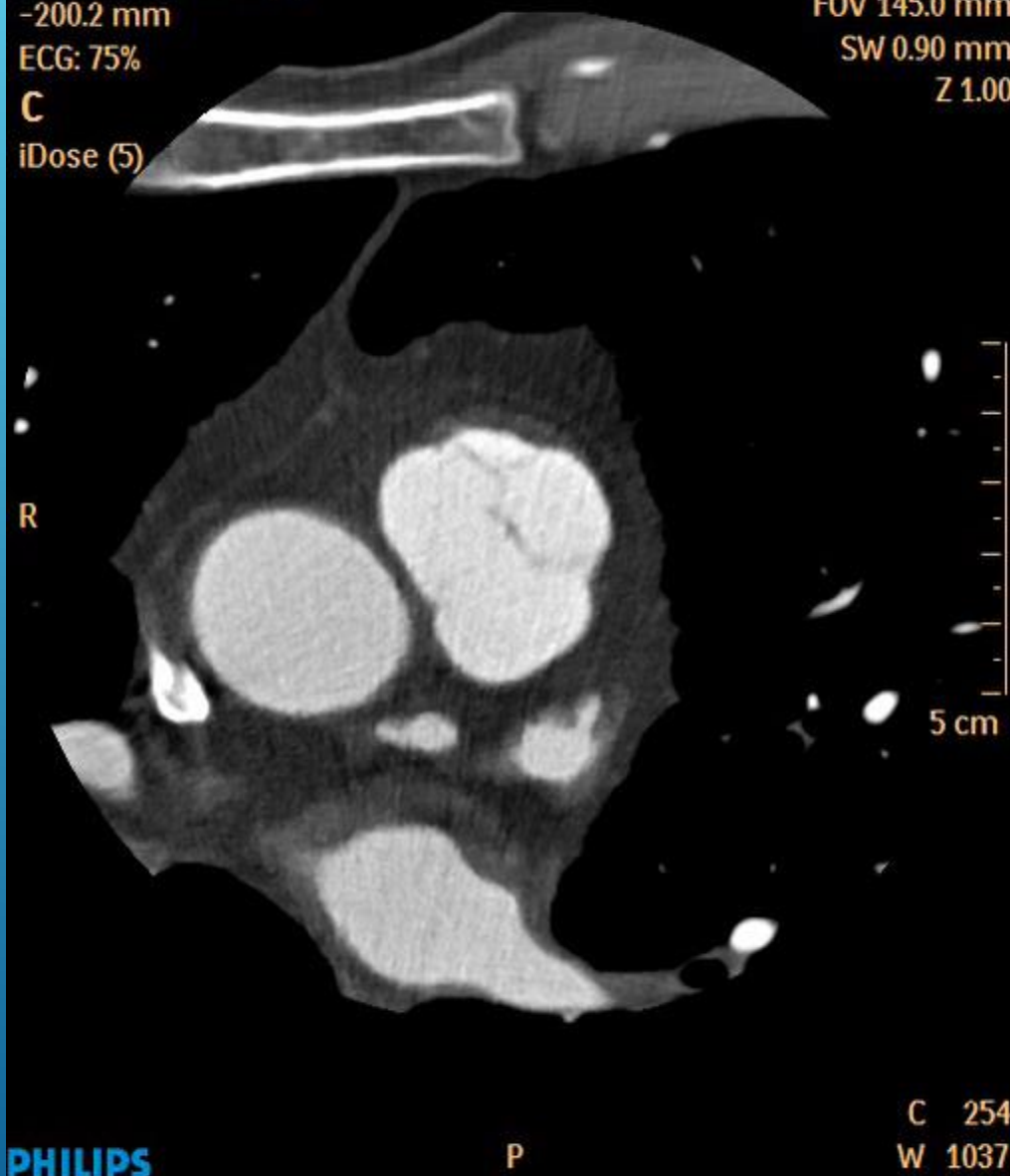
1 Sep, 2019 13:27:26.18

100 kV

FOV 145.0 mm

SW 0.90 mm

Z 1.00



PHILIPS

Phase 75%

L S

Philips study day3 1 M/64Y
10 Sep, 2019 / 13:27:24.10
75%, iDose (5)
Series 502
iDose (5)

R



Vol. Rend.
Opacity 13
CARDIAC 1
Heart

L S

Philips study day3 1 M/64Y
10 Sep, 2019 / 13:27:24.10
75%, iDose (5)
Series 502
iDose (5)

WL 136
WW 866



NUFFIELD HEALTH
Philips, Ingenuity CT
Thickness 1.00 mm
Zoom 2.03
Contrast

F

L S

Philips study day3 1 M/64Y
10 Sep, 2019 / 13:27:24.10
75%, iDose (5)
Series 502
iDose (5)

WL 136
WW 866

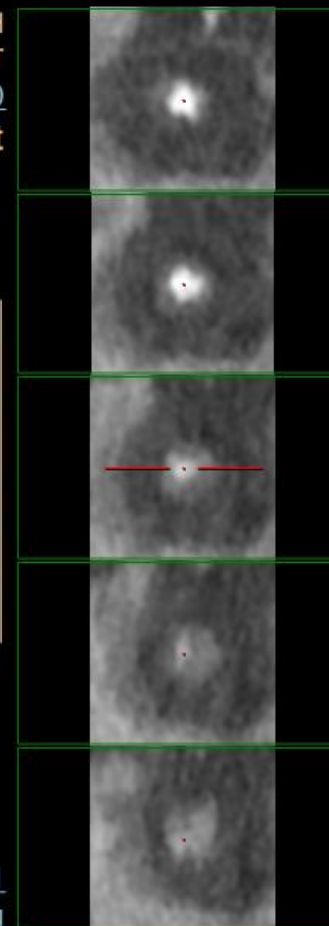


NUFFIELD HEALTH
Philips, Ingenuity CT
Zoom 1.00
Contrast

LAO 10 Cranial 1
Angle 1, -1, -10 deg

NUFFIELD HEALTH
Philips, Ingenuity CT
Thickness 1.00 mm
Zoom 2.23
Contrast

3 cm



L S
Philips study day3 1 M/64Y
10 Sep, 2019 / 13:27:24.10
75%, iDose (5)
Series 502
iDose (5)

WL 136
WW 866



NUFFIELD HEALTH
Philips, Ingenuity CT
Thickness 0.28 mm
Zoom 1.00
Contrast

3 cm

L S

Philips study day3 1 M/64Y
10 Sep, 2019 / 13:27:27.19
75%, iDose (5)
Series 502 - Slice 135*
iDose (5)

MIP
WL 136
WW 866

R



NUFFIELD HEALTH
Philips, Ingenuity CT
Thickness 0.90 mm
Zoom 1.00
Contrast

5 cm

P

Phase 75%

L S
Philips study day3 1 M/64Y
10 Sep, 2019 / 13:27:24.10
75%, iDose (5)
Series 502
iDose (5)

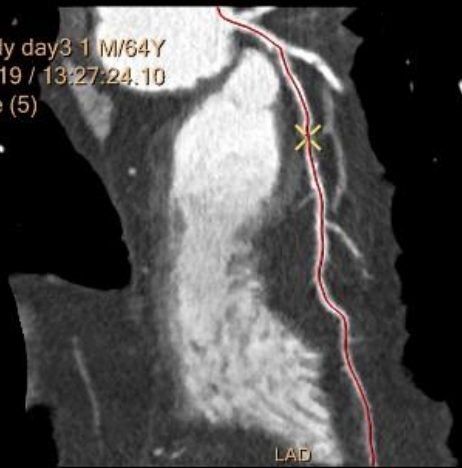
R



Vol. Rend.
Opacity 13
CARDIAC 1
Heart

L S
Philips study day3 1 M/64Y
10 Sep, 2019 / 13:27:24.10
75%, iDose (5)
Series 502
iDose (5)

WL 136
WW 866



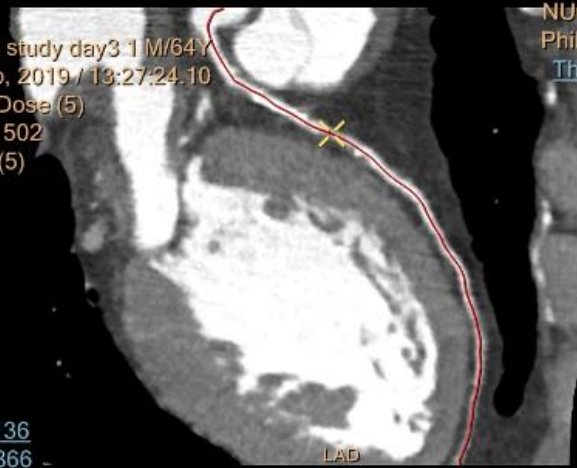
NUFFIELD HEALTH
Philips, Ingenuity CT
Thickness 1.00 mm
Zoom 1.66
Contrast

5 cm

F

L S
Philips study day3 1 M/64Y
10 Sep, 2019 / 13:27:24.10
75%, iDose (5)
Series 502
iDose (5)

WL 136
WW 866



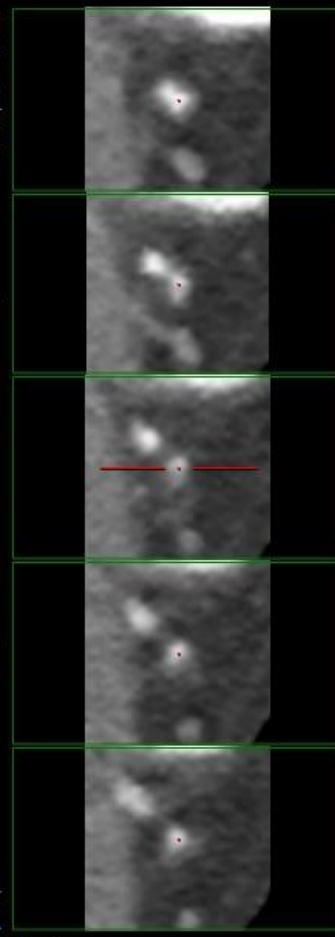
NUFFIELD HEALTH
Philips, Ingenuity CT
Zoom 1.00
Contrast

5 cm

LAO 10 Cranial 1
Angle 1, -1, -10 deg

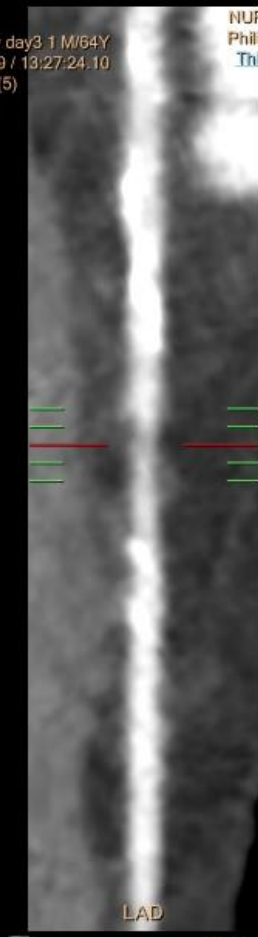
NUFFIELD HEALTH
Philips, Ingenuity CT
Thickness 1.00 mm
Zoom 1.90
Contrast

5 cm



L S
Philips study day3 1 M/64Y
10 Sep, 2019 / 13:27:24.10
75%, iDose (5)
Series 502
iDose (5)

WL 136
WW 866



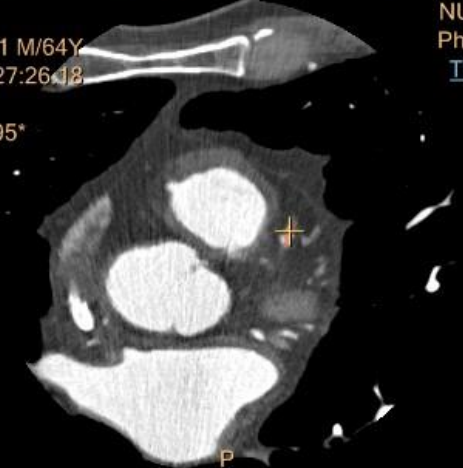
NUFFIELD HEALTH
Philips, Ingenuity CT
Thickness 0.28 mm
Zoom 1.00
Contrast

3 cm

L S
Philips study day3 1 M/64Y
10 Sep, 2019 / 13:27:26.18
75%, iDose (5)
Series 502 - Slice 95°
iDose (5)

R

MIP
WL 136
WW 866



NUFFIELD HEALTH
Philips, Ingenuity CT
Thickness 0.90 mm
Zoom 1.00
Contrast

5 cm

ASD

PHILIPS USER 1 M/37Y

502-1 75%, iDose (5)

-214.7 mm

ECG: 75%

C

iDose (5)

Ingenuity CT

1 Sep, 2019 16:37:47.66

100 kV

FOV 184.0 mm

SW 0.90 mm

Z 1.00




PHILIPS

P

C 182

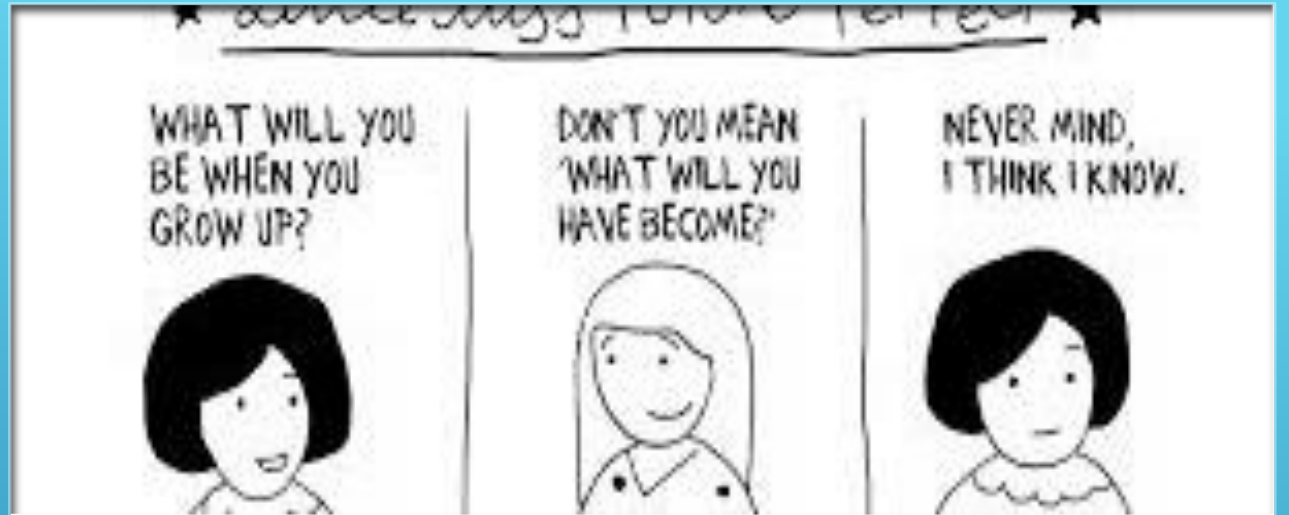
W 862

QUALITY ISSUES

- Preparation is key
 - High contrast concentration
 - Bespoke flow rate and contrast volume
 - Image noise
- 
- Several white lines of varying lengths and slopes are positioned in the bottom right corner of the slide, creating a modern, abstract graphic element.

WHAT DOES THE FUTURE LOOK LIKE?

Radiographer led service??



- ▶ Challenges in delivering computed tomography coronary angiography as the first-line test for stable chest pain :John G Dreisbach¹, Edward D Nicol², Carl A Roobottom³, Simon Padley⁴, Giles Roditi¹
- ▶ Old problems, new solutions: the HEART UK annual conference: August 2011 Br J Cardiol 2011;18:158–9
- ▶ Medrad
- ▶ Heart disease deaths highest in north-west England: By Dominic Hughes; Health correspondent, BBC News, 7 July 2011

REFERENCES

thank
you 